

1.1. Modified Framework, Objectives and Outcome

Initial framework of modelling analysis was modified in the face of data limitation. Basic idea is that the macro socio-economic sector, using generalized maximum entropy (GME) method, makes a future projection of basic variables which can be input to the sub-sector model as an exogenous variable, and then each sub-sector model makes projection of future energy consumption and CO₂ emission up to the year 2020. Projection of variables which macro socio-economic sector cannot cover, are estimated by supplementary estimation method such as computational general equilibrium (CGE) method, factor decomposition analysis etc (**Figure 4-1-2**).

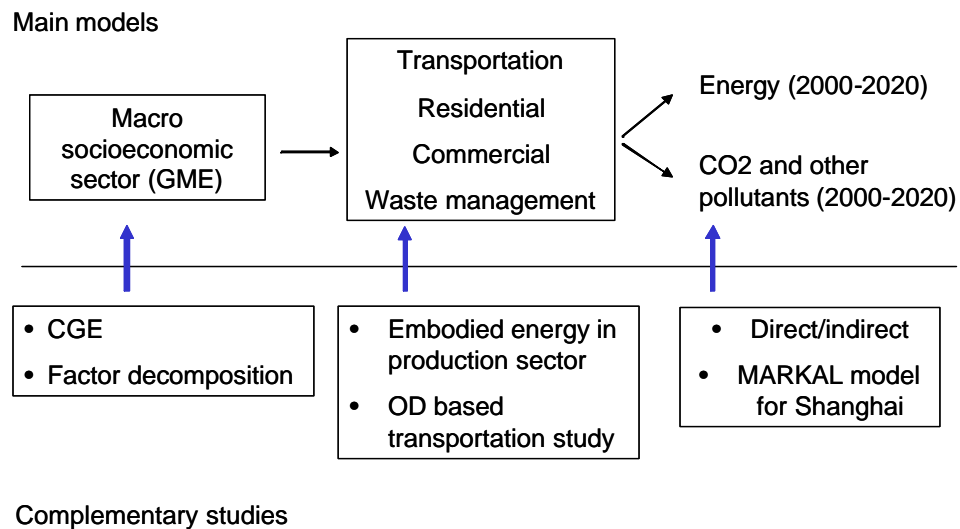


Figure 4-1-2: Modified Overall Study Framework

Such supplementary studies mainly deal with the following aspects.

- Interaction with outside regions (**Figure 4-1-3**)
 - Energy dependency and trans-boundary environmental impacts
 - Traffic inflow and outflow with surrounding regions
- Urban economic growth
 - CGE (Computational General Equilibrium) model

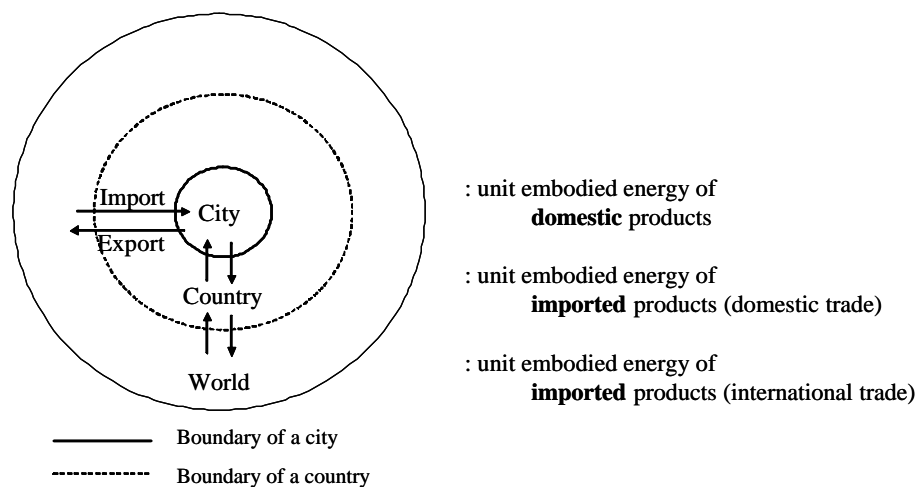


Figure 4-1-3: Boundary Setting of the City

Other aspects such as LCA assessment and water pollution are not covered by the main study, but such aspects are discussed through the presentation by invited speakers at workshops in Kitakyushu and Hawaii.

The degree of achievement of initial objectives are summarized in the **Table 4-1-5** below.

Table 4-1-5: Objectives and Achievements

Initial Objectives	Achievement
To collect GHG budget data of some mega-cities in Asia	Achieved. Completeness varies among the cities (see above tables)
To present future scenarios of GHG emissions and carbon cycle of the cities up until 2020.	Only CO ₂ has been calculated in Tokyo, Seoul, and Beijing
To generate inventory of various associated short-lived gases like CO, NO _x , SO _x and particulate matter. (Key sectors: macro economic & social framework, residential & commercial sector, urban transportation sector, municipal solid waste management sector, indirect energy consumption by industry).	Transportation sector covered CO, NO _x and PM. SMW sector covered energy recovery from waste incineration.
To account both for direct emissions and for embodied emissions	Indirect energy consumption was calculated but not yet emissions which can be done after integration of all the sub-sector models.

Table 4-1-6: Selected Cities and Sectors Covered in the Report

	Basic Information	Transportation sector	Residential sector	Commercial sector	Waste management
Tokyo	v	v	vv	v	vv
Seoul	v	v	v	vv	vv
Beijing	v	vv	vv	v	v
Shanghai	v	v	v	v	v

Note: v: Brief introduction, vv: Detail information