

Future AIM modeling

~Focused on

mid-term national integrated assessment models~

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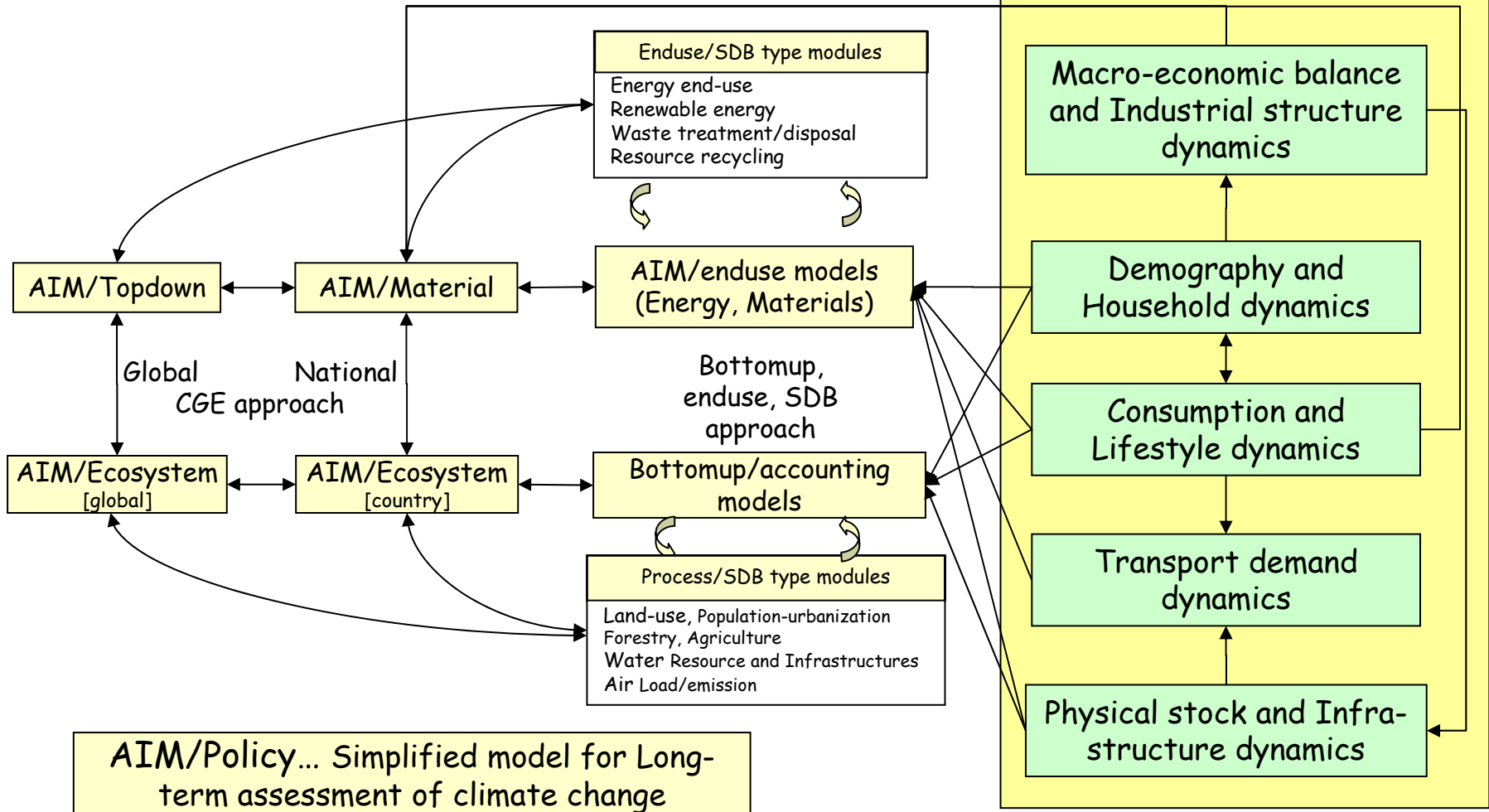
At Ohyama Memorial Hall
National Institute for Environmental Studies,
305-8506, Tsukuba, Japan

Focusing points

- Next AIM project (FY2005-2007)
- Next APEIS-IEA
- Low Carbon Society toward 2050 Project
- Climate Impact Top-down project

- Reinforcement of supporting ability to national integrated assessment considering global environmental problems
- Expansion of global warming problem to more comprehensive integration of socio-economic development and environmental problems, such as, WEHAB, lifestyle changes and so on

AIM model family



Development of mid-term national scale integrated assessment models

Develop a group of models which supports the following process

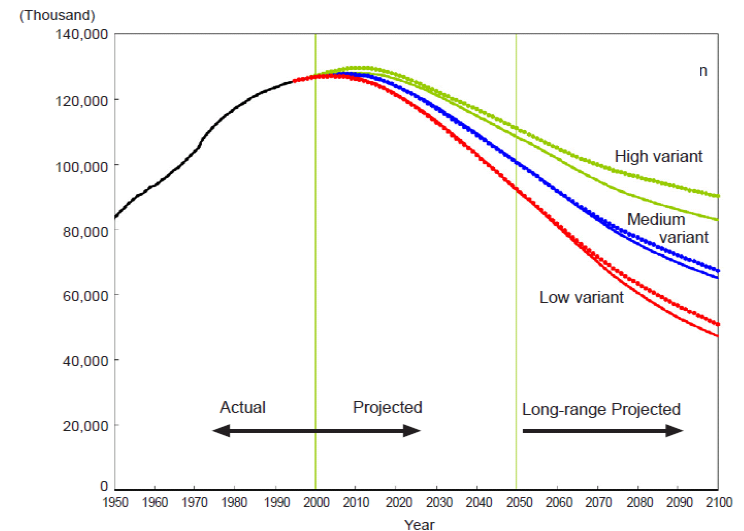
1. Creating concrete image of future world and policy targets such as;
 - Demographic transition: low fertility, aging society
 - Lifestyle change: Empowered women, affluent, flexible, insecurity, social capital loosing society
 - Industrial change: Weightless, hyper-IT and globalized world
 - Severe environmental and resource constraints society
 - National MDGs
2. Backcasting from the future world and identification of required policy intervention and investments

Demography and Household Model

- Describe national/regional demographic transition considering marriage and household decision-making, family-planning services, social welfare programs
- 10 household classification (members composition × age structure × habitat)
- Cohort components with household transition matrix model ;
Required information: life table, birth rate, international/domestic migration, marriage cohabitation style change

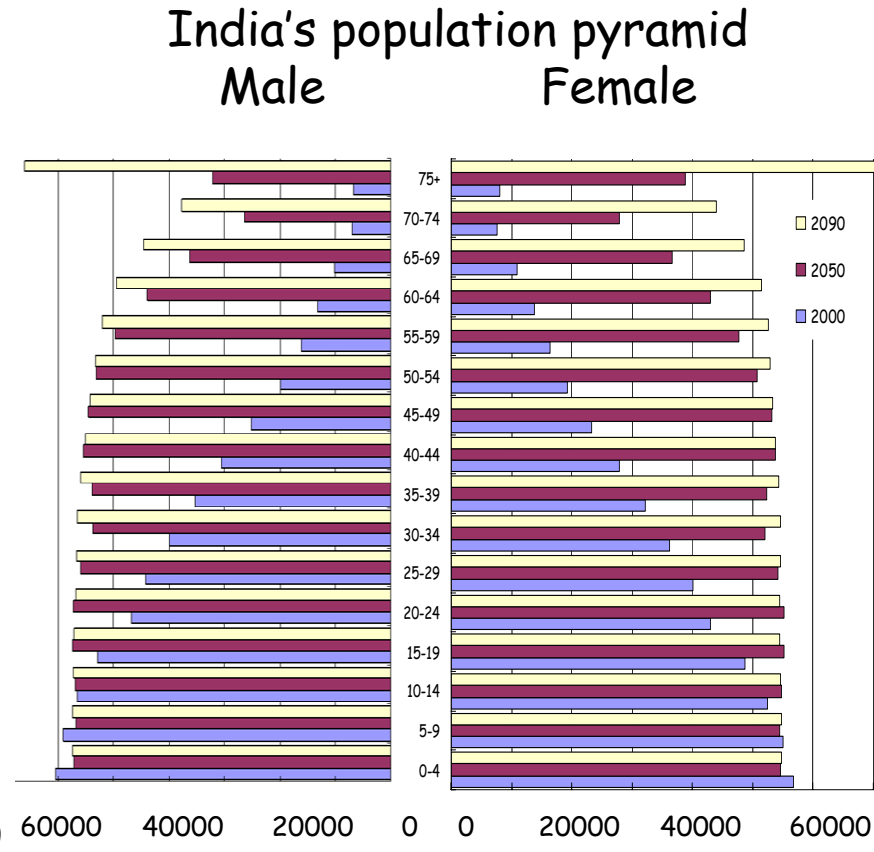
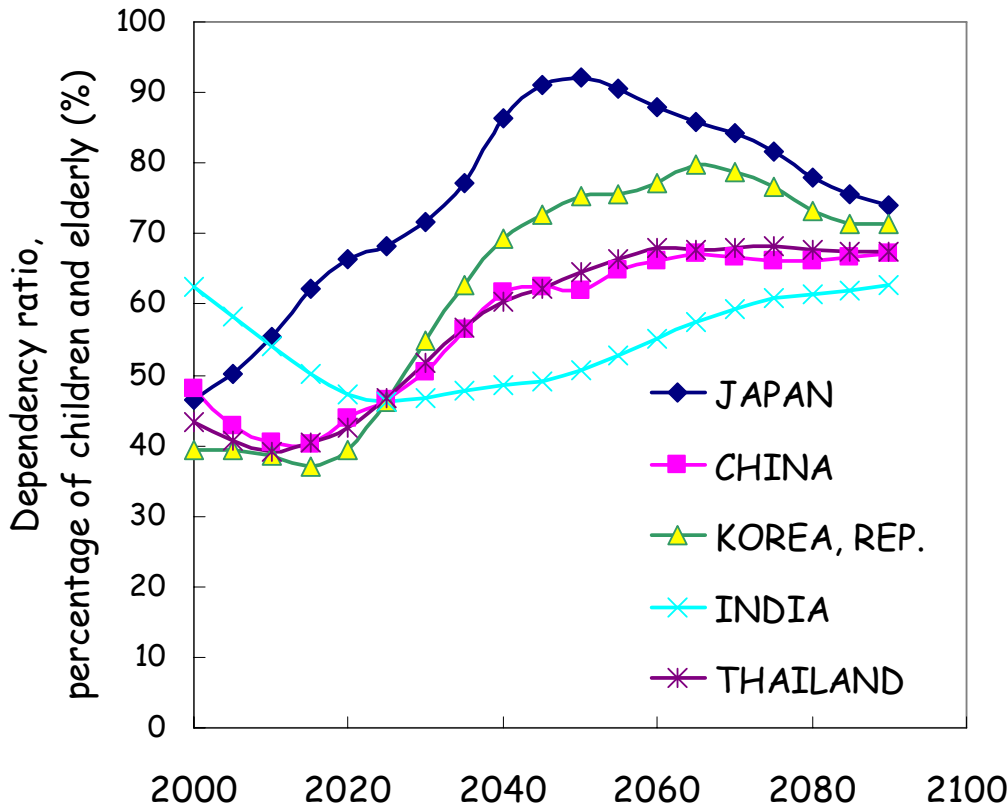
Household type

A married couple only
A married couple and their child(ren)
Father and his child(ren)
Mother and his child(ren)
One-person household



Japan's demographic transition

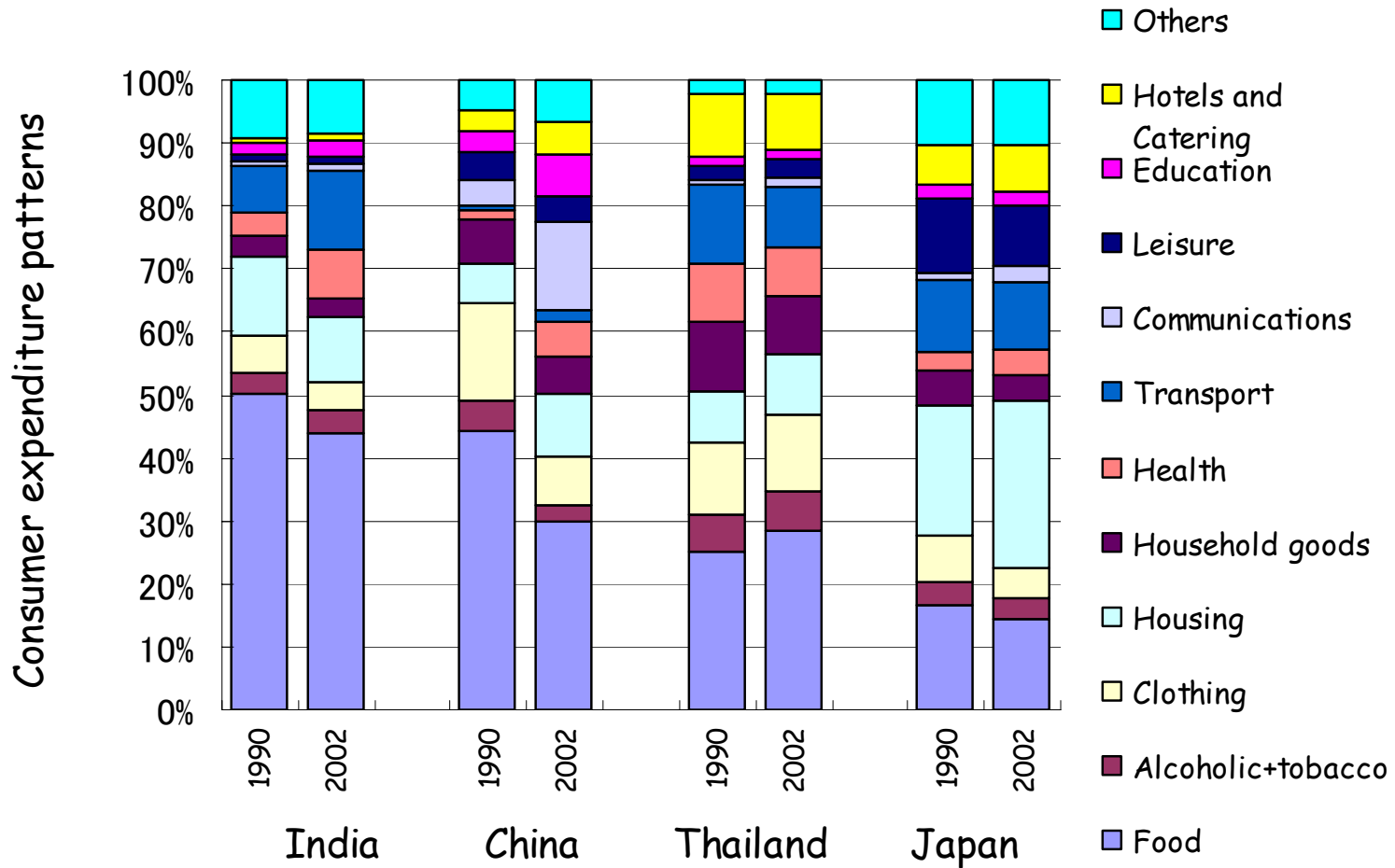
Change of demographic structure in Asian countries: Aging society



Household consumption and Lifestyle Model

- Describe long-term changes of household consumption, its content, quantities, and environmental load
- 1) Becker's "Household production approach" + 2) Household accounting matrix + 3) engineering type bottom-up approach for commodity production, goods consumption, and waste generation
- Household production approach: Households is assumed to (be a factory which) combines time and market goods to produce more basic commodities. One such commodity is sleeping, which is created from a bed, house, (pills?) and time.(Becker, 1965)
- Nested Logit type modeling for goods preference and commodities production, based on household surveys and time-use surveys

Recent household consumption patterns in Asian countries; how they change, and what is the environmental consequence ?



Factors and elements of household production

Factors/Elements of household production								
Basic commodity	Outputs (Products)	Activities	Shopping	Maintenance	Gardening	Cleaning	Management	Activities by paid domestic labour
Housing	Accommodation for members of hh Services produced by owner-occupied dwellings	House construction and renovation	Buying a dwelling, Renting a dwelling, Furniture, carpets and equipment for dwelling, Household textiles, etc.	Repairs to dwelling, Repairing equipment, furniture and household goods, Heating and water, Various arrangements	Tending ornamental plants	Cleaning dwelling, cellar, garage, Clearing yard	Paying bills, decision making, etc.	Cleaning, etc. Preparing meals baking, etc. (All above activities when provided by paid labour)
Eating	Meal, snacks, drinks for the members of hh	Food preparation, Meals/snacks, Baking, Preserving, Hunting, fishing, Picking berries, mushrooms, etc.	Appliances for cooking, cooling freezing and storing food, Groceries, etc.		Tending edible plants, Tending domestic animals	Dish washing	Planning meals and groceries, etc.	Laundry, ironing
Clothing	Clothes and their care for the member of hh	Producing textiles, Handicrafts	Clothing materials, Garments Shoes etc,	Care of clothes and shoes		Laundry, Ironing	Planning and decision making, etc.	Child care, babysitting
Health and care	The children, the sick, and the elderly care for	Physical care, Supervision, Reading or playing, Accompanying child Adult care	Toys, books, etc, Baby carriages, strollers, etc.	Caring for pets, Waking the dog and other pets			Coordinating children's activities, etc.	

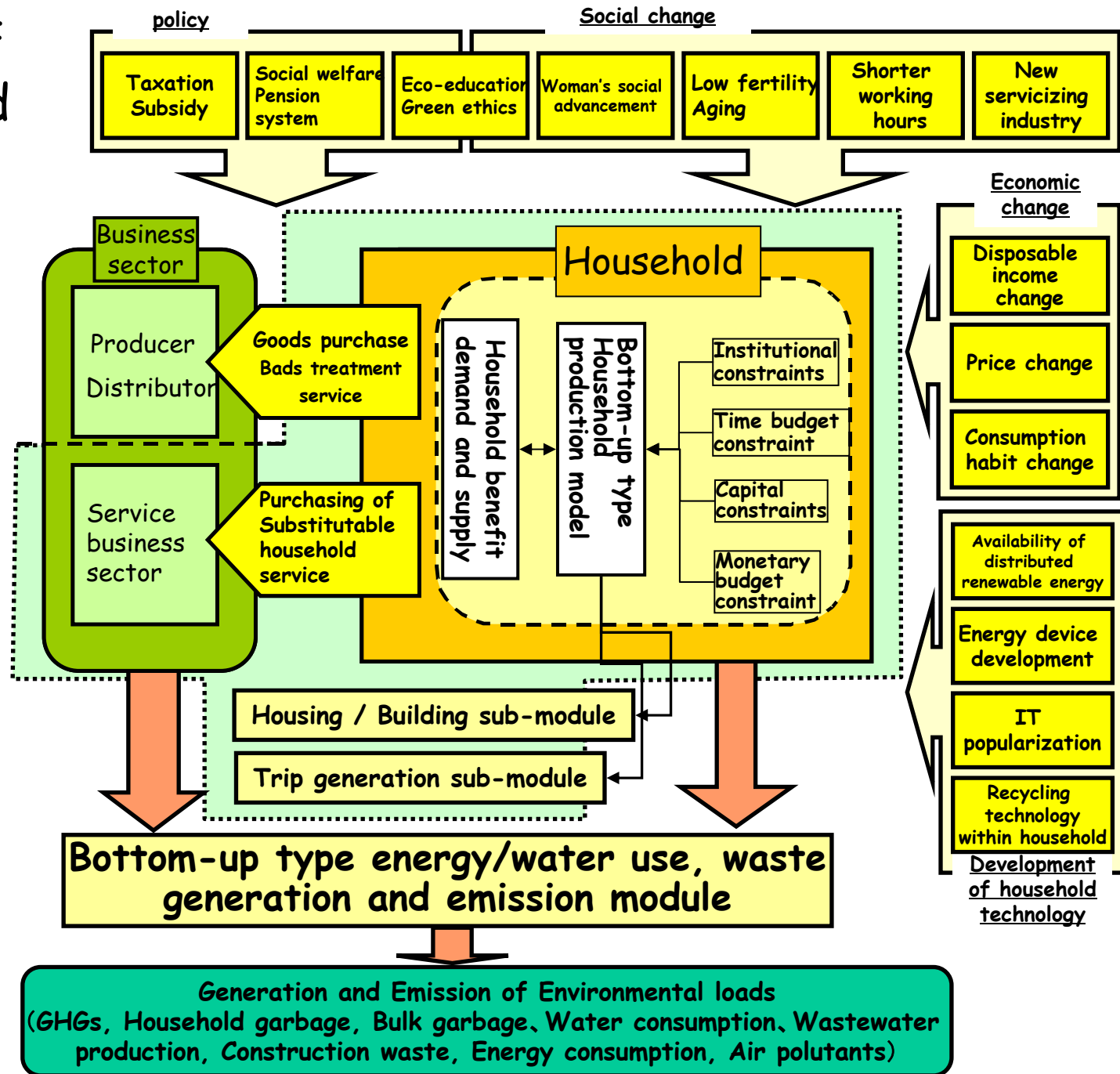
Household Accounting Matrix

Monetary and Material use and supply accounts of households

	Benefits produced				household capital	Total purchased	Energy used		Water used	Emission generated		
	benefits(1)	benefits(2)	benefits(3)	benefits(4)			Energy(1)	Energy(2)		CO2	SO2	Waste(1)
Supply (purchase)												
goods(1)	monetary and physical units					physical units						
goods(2)												
goods(3)												
Service purchased to substitute household production												
service(1)	monetary and physical units					BLANK						
service(2)												
service(3)												
Total purchases	monetary unit											
Paid domestic labour												
Time used	hours or minutes											

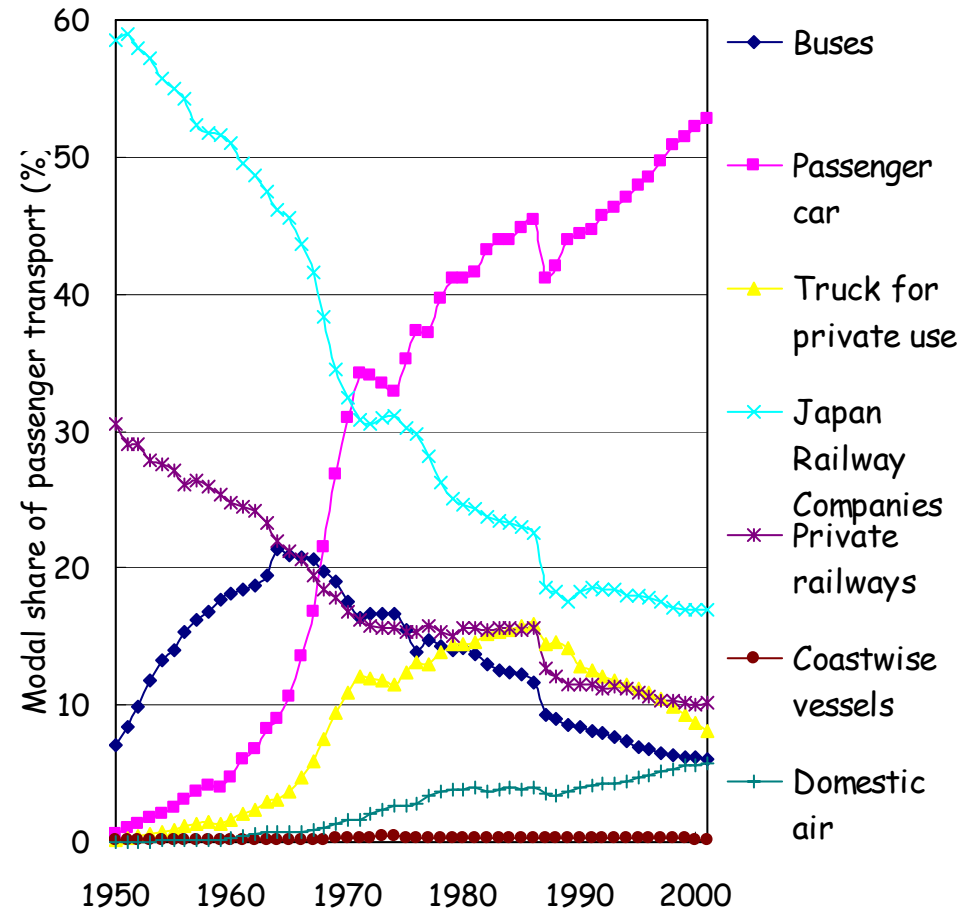
By household type (one-person, one couple only, one couple with children, others), rich/middle/poor, senior/junior household head, urban/rural

Framework of the Household consumption and Lifestyle Model



Transport demand model

- Objective: To assess travel and freight transport demand in drastically changing world, and provides driving forces to AIM/enduse model
- Methodology: 1) Activity-based approach for passenger transport, 2) Inter-industry approach for freight transport

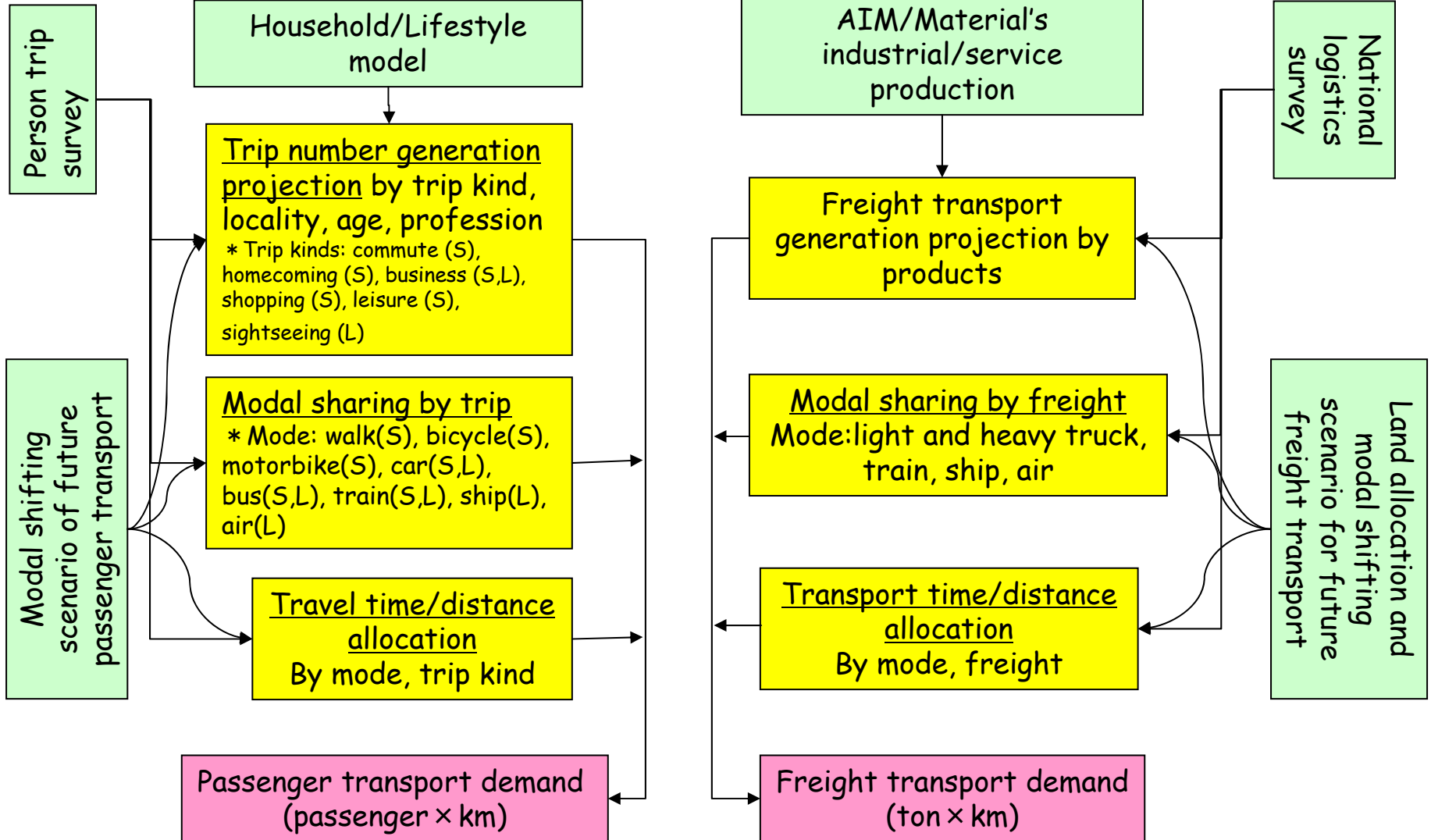


Modal shift in past 50 years in Japan

Framework of Transport demand model

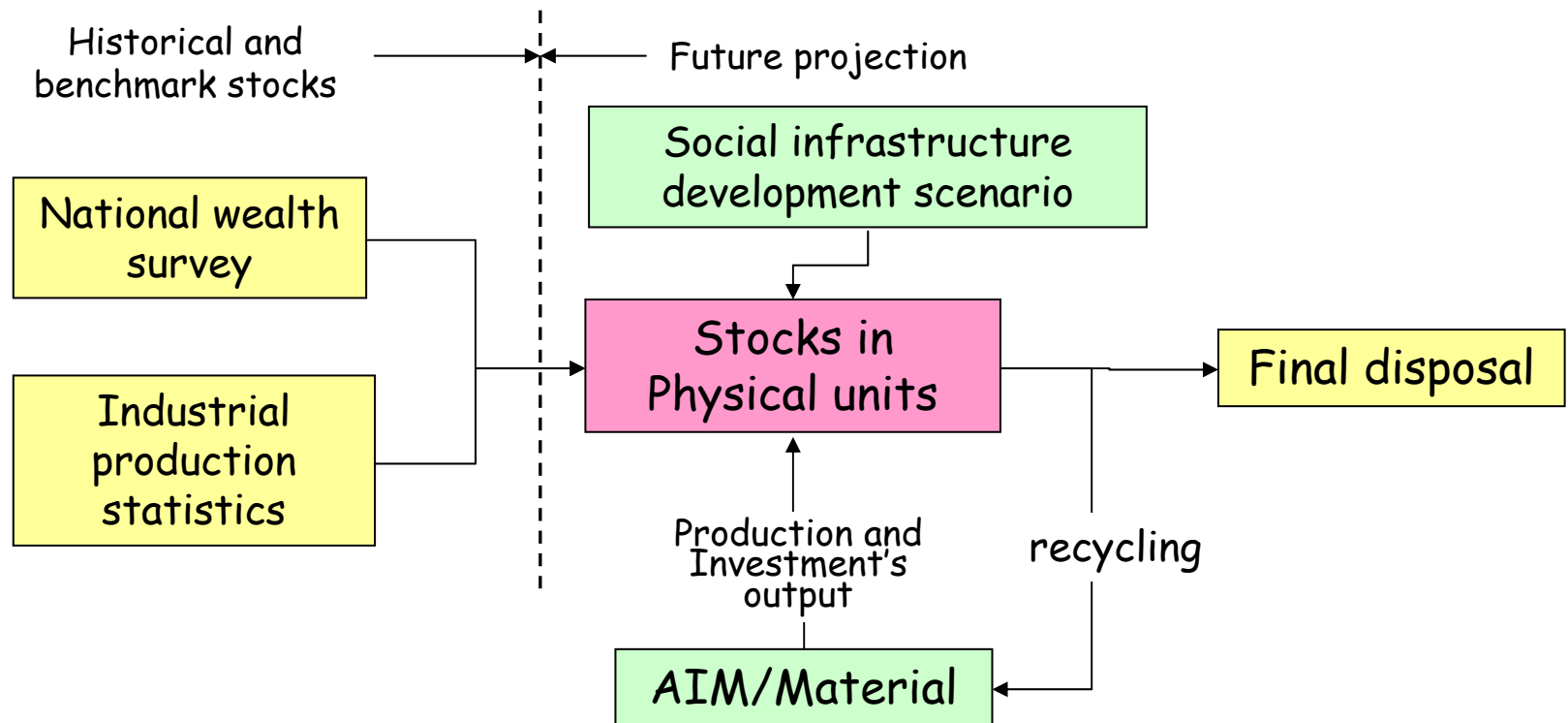
Passenger transport

Freight transport

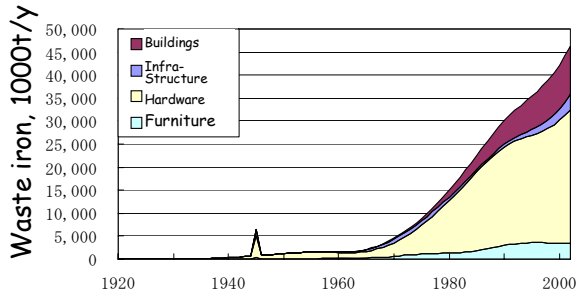
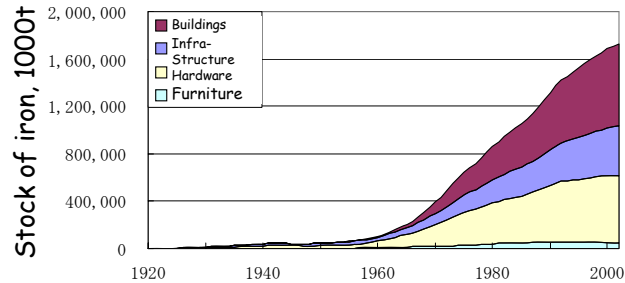
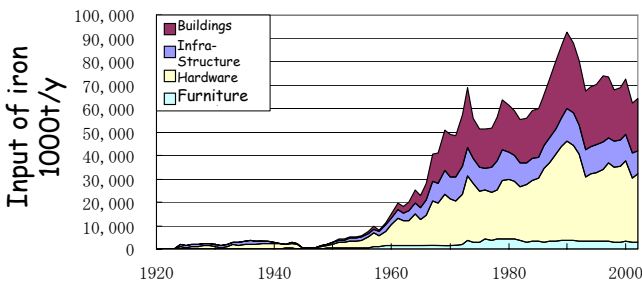
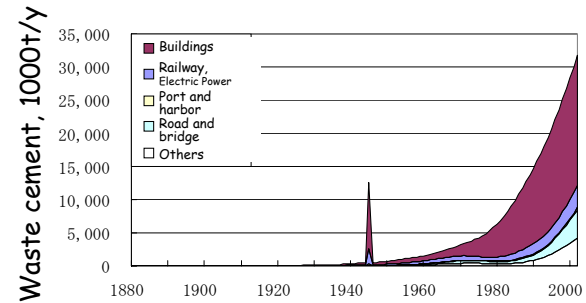
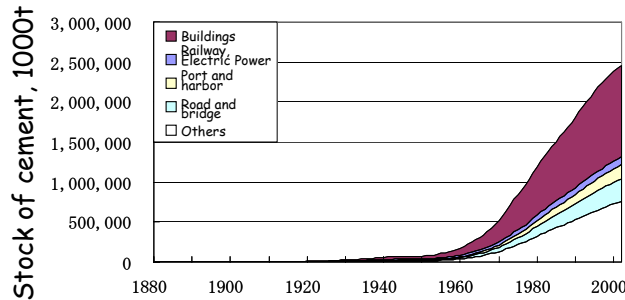
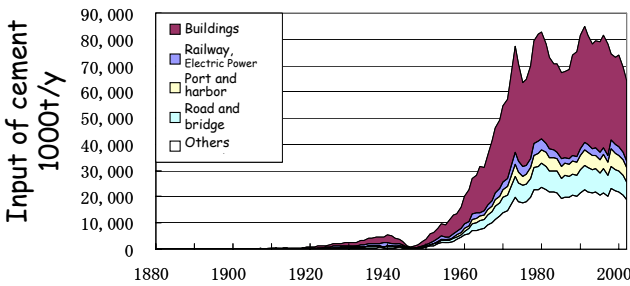
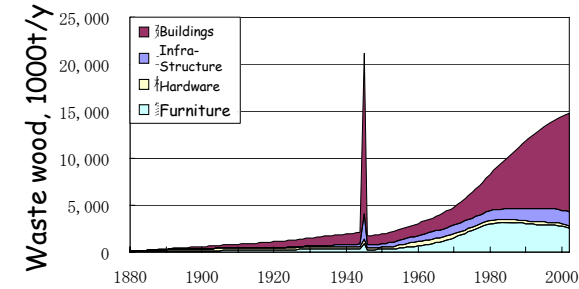
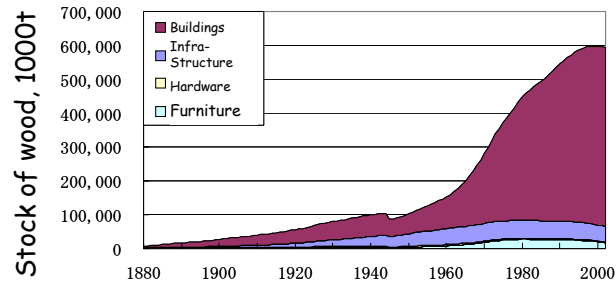
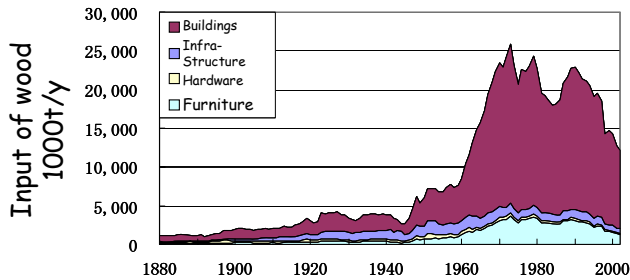


Stock and Infrastructure balance model

- Describe 1) National/regional material balance to assess metals and other material recycling, and 2) Supply mechanism of national social infrastructure
- Reinforce the long-term predication ability of AIM/material's material balancing and national development algorithm
- Methodology: Bench mark Year method (BY)+ Perpetual Inventory method (PI)
- Target materials and stocks: Iron, Copper, Aluminum, Wood, Buildings, Energy facilities, water and sanitary facilities...



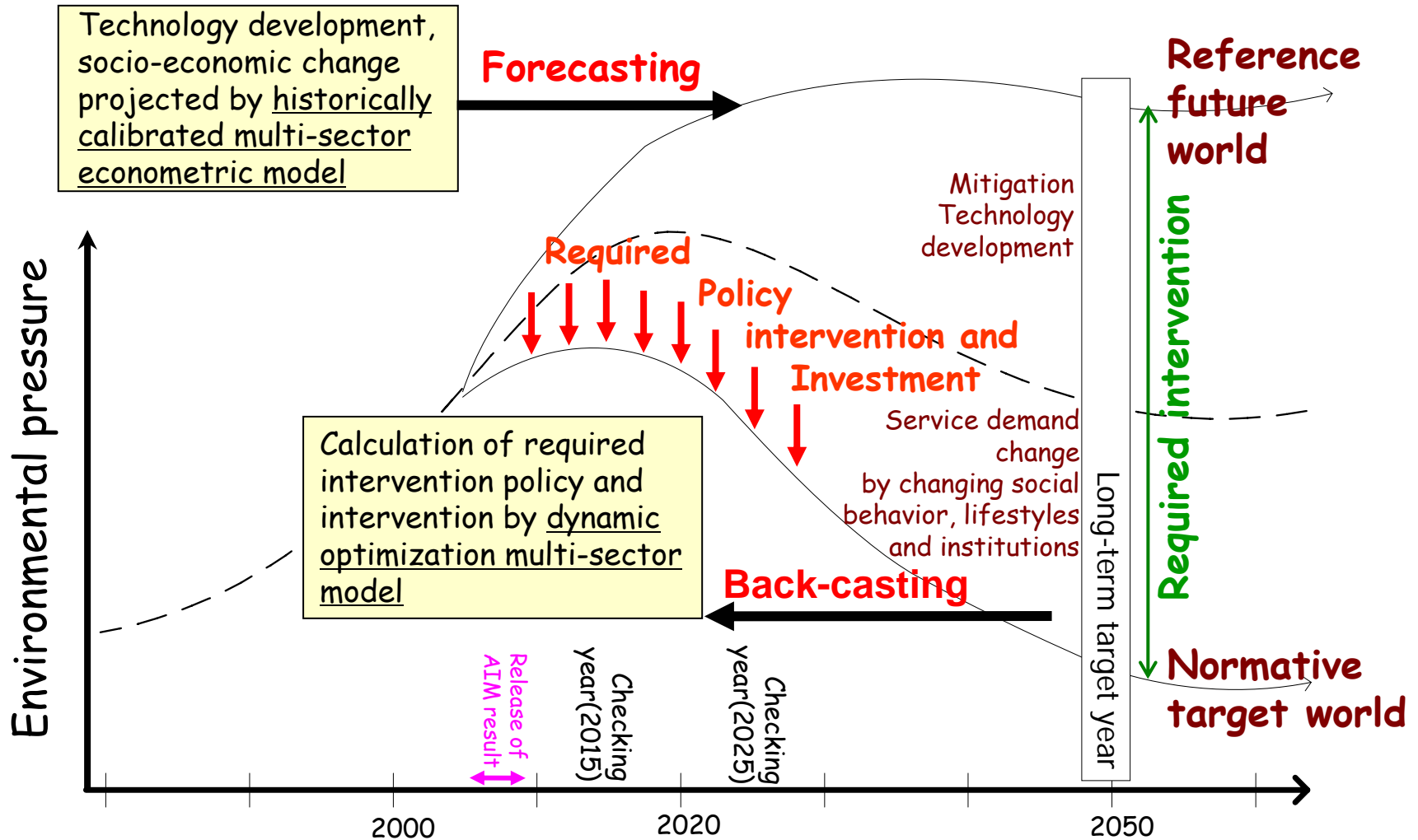
Material stock balances in Japan's society



Macro-economy and industry structure change model

- Objective: to assess
 - 1) Future economic structural change by technology developments and economic policy, and
 - 2) Identify required political intervention and public/private investment schedule with back-casting approach from future normative (target) world
- One country multi-sector (~20 sectors) econometric model coupled with
 - 1) Intervention/investment optimization module,
 - 2) Aggregated environmental load emission,and interfaces for
 - 1) Changes of input-output coefficients by technology development,
 - 2) Final consumption changes projected by the household life-style model

Back-casting from future target world by the macro-economy and industry structure dynamics model



Modeling activities in FY.2005

From the view point of Asian-Pacific environment in the 21st century;

1. Still we are interested in the following three spatial scales and three temporal scale
 - 1) Global/National/Sub-national,
 - 2) 2020 /2050/after 2100
2. However, we will put more attention on mid-term national scale integrated assessment models,
3. from the view points of creating 1) Low carbon socio-economy, 2) Resilient society to climate change, 3) Eco-efficient technological and institutional system.
4. We continue to maintain;
AIM/Enduse, AIM/Impact[Process], AIM/Material
5. Finish preparing operational versions of
SDB, AIM/CGE[global], AIM/Enduse[Global], AIM/Policy, AIM/Ecosystem[country]
6. Start to develop auxiliary models in order to intensify expressive power of future world and backcasting process of scenario approach
e.g. Macro-economic balance and Industrial structure dynamics
Demography and household dynamics
Consumption and Lifestyle dynamics
Transport demand dynamics
Physical stock and infra-structure dynamics