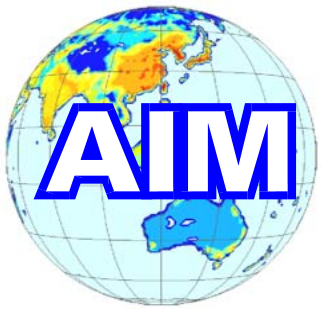


AIM/Trend Model

Junichi Fujino (NIES, Japan)

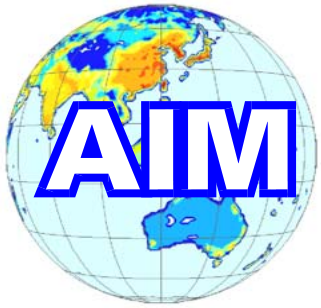
APEIS Capacity Building Workshop on

Integrated Environment Assessment in the Asia Pacific Region

October 24, 2002

Hotel Grand Inter-Continental, New Delhi

Objectives



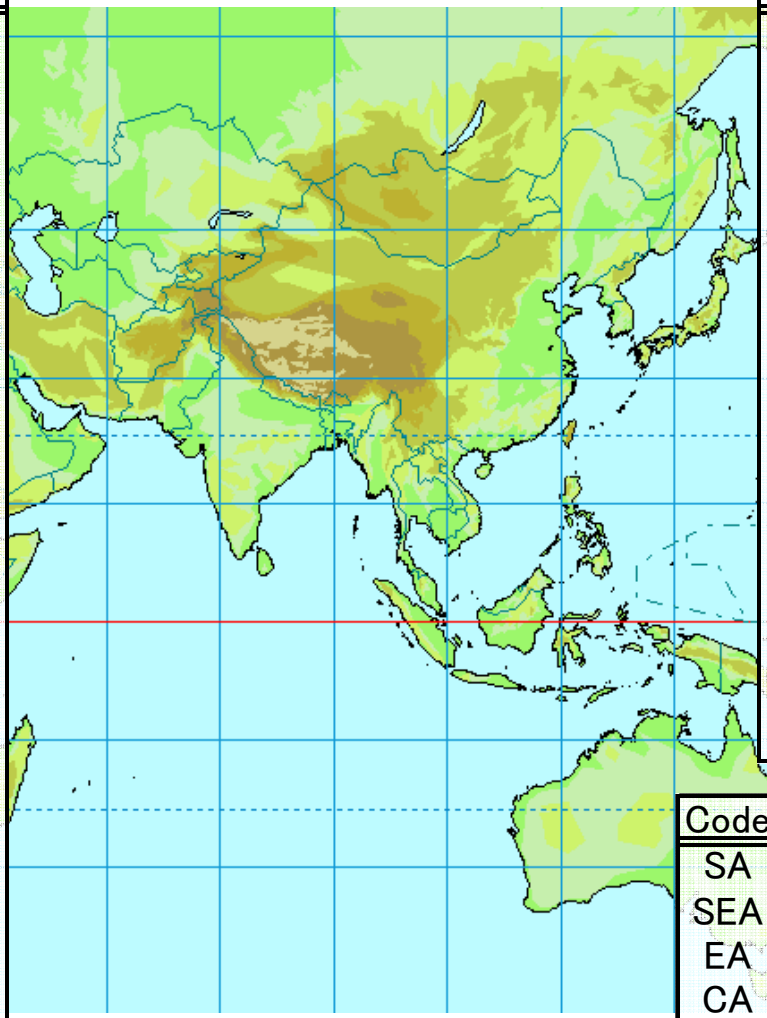
To prospect the situation of economy, energy and environment in Asia-Pacific region

- to cover as wide a range of countries in Asia-Pacific region (42 countries)
- the target year is 2032 (= Johannesburg summit + 30)
- to use simple method and develop several scenarios

Target Countries

Detailed data model (Model A)

Code	Country	Group
AUS	Australia	ANZ
BGD	Bangladesh	SA
CHN	China	EA
IDN	Indonesia	SEA
IND	India	SA
IRN	Iran	SA
JPN	Japan	EA
KAZ	Kazakhstan	CA
KGZ	Kyrgyz Republic	CA
KOR	Korea,Rep	EA
LKA	Sri Lanka	SA
MMR	Myanmar	SEA
MYS	Malaysia	SEA
NPL	Nepal	SA
NZL	New Zealand	ANZ
PAK	Pakistan	SA
PHL	Philippines	SEA
PRK	Korea,Dem	EA
SGP	Singapore	SEA
THA	Thailand	SEA
TJK	Tajikistan	CA
TKM	Turkmenistan	CA
TWN	Taiwan	EA
UZB	Uzbekistan	CA
VNM	Vietnam	SEA



Simple data model (Model B)

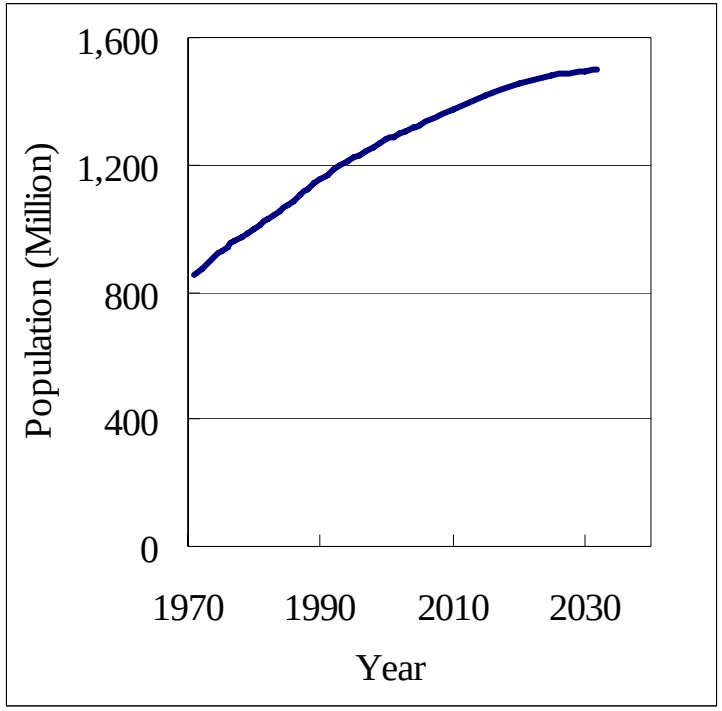
Code	Country	Group
AFG	Afghanistan	SA
BRN	Brunei	SEA
BTN	Bhutan	SA
FJI	Fiji	SP
KHM	Cambodia	SEA
KIR	Kiribati	SP
LAO	Lao	SEA
MDV	Maldives	SA
MNG	Mongolia	EA
NRU	Nauru	SP
PLW	Palau	SP
PNG	Papua New Guinea	SP
PYF	French Polynesia	SP
SLB	Solomon Islands	SP
TON	Tonga	SP
VUT	Vanuatu	SP
WSM	Samoa	SP

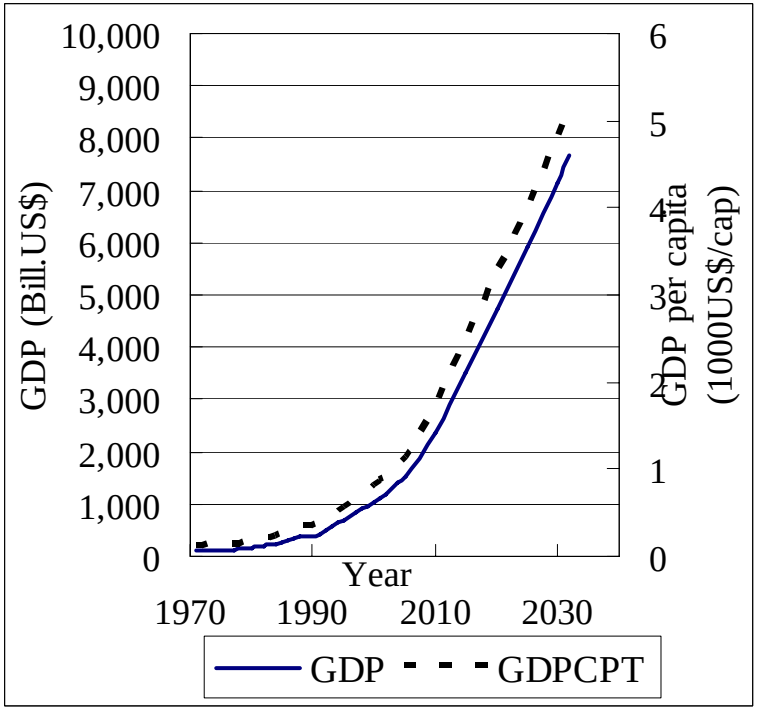
Code	Group
SA	South Asia
SEA	Southeast Asia
EA	Northwest Pacific and East Asia
CA	Cetral Asia
ANZ	Australia And New Zealand
SP	South Pacific

Target Period

2032: Rio summit (1992) + 40
Johannesburg summit (2002) + 30

To show “Historical data” + “Projection results”





Target Indices

(1) Population: population, rate of urbanization

(2) Economy: GDP (growth rate, per capita), GDP share (agriculture, industry, service, PFC (private final consumption), car holders

(3) Energy: primary energy supply by fuel, final energy demand by fuel and sector, energy plant, economic intensity, carbon intensity

(4) Environment: GHG (CO2, SOx, NOx, CH4, N2O, CO) emissions, wastes

(5) Water: withdrawal, consumption (agriculture, industry, domestic), population in water stress*

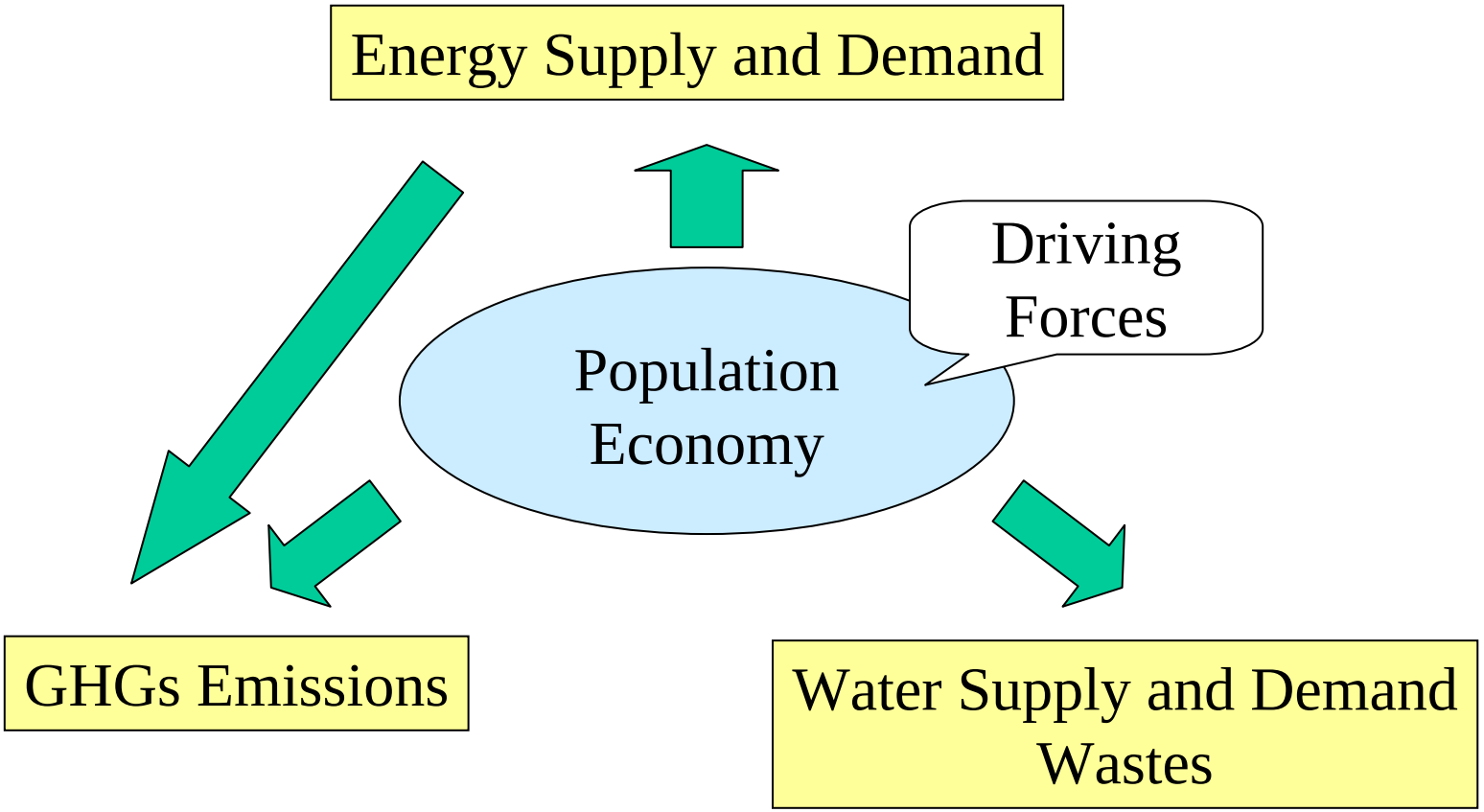
(6) Food and Agriculture*: average daily consumption, vegetable food consumption, animal food consumption, fraction of meat from feedlots, fish production, crop production, feed production, nitrogen fertilizer consumption

(7) Land use*: crop land, irrigated cropland, potential cultivable land, mature forest, growing forest, pasture, protected, other land

(8) Human Health*: SPM (PM10, PM2.5)

(9) Biodiversity*: species, degree of threat to biological diversity, area of habitat remaining

Note: sign "*" means the element under consideration.

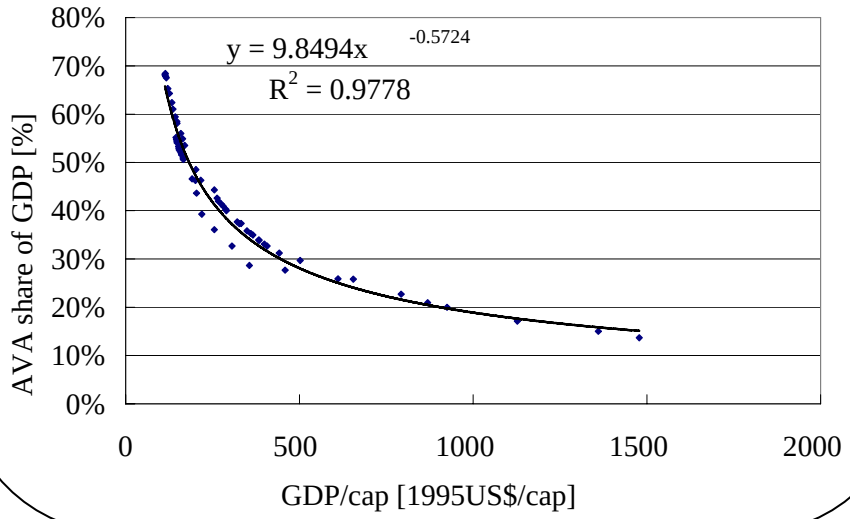


Model Structure

Model Procedures

Regression analysis

GDP share (AVA, IVA, SVA)
car holders
final energy demand
energy share

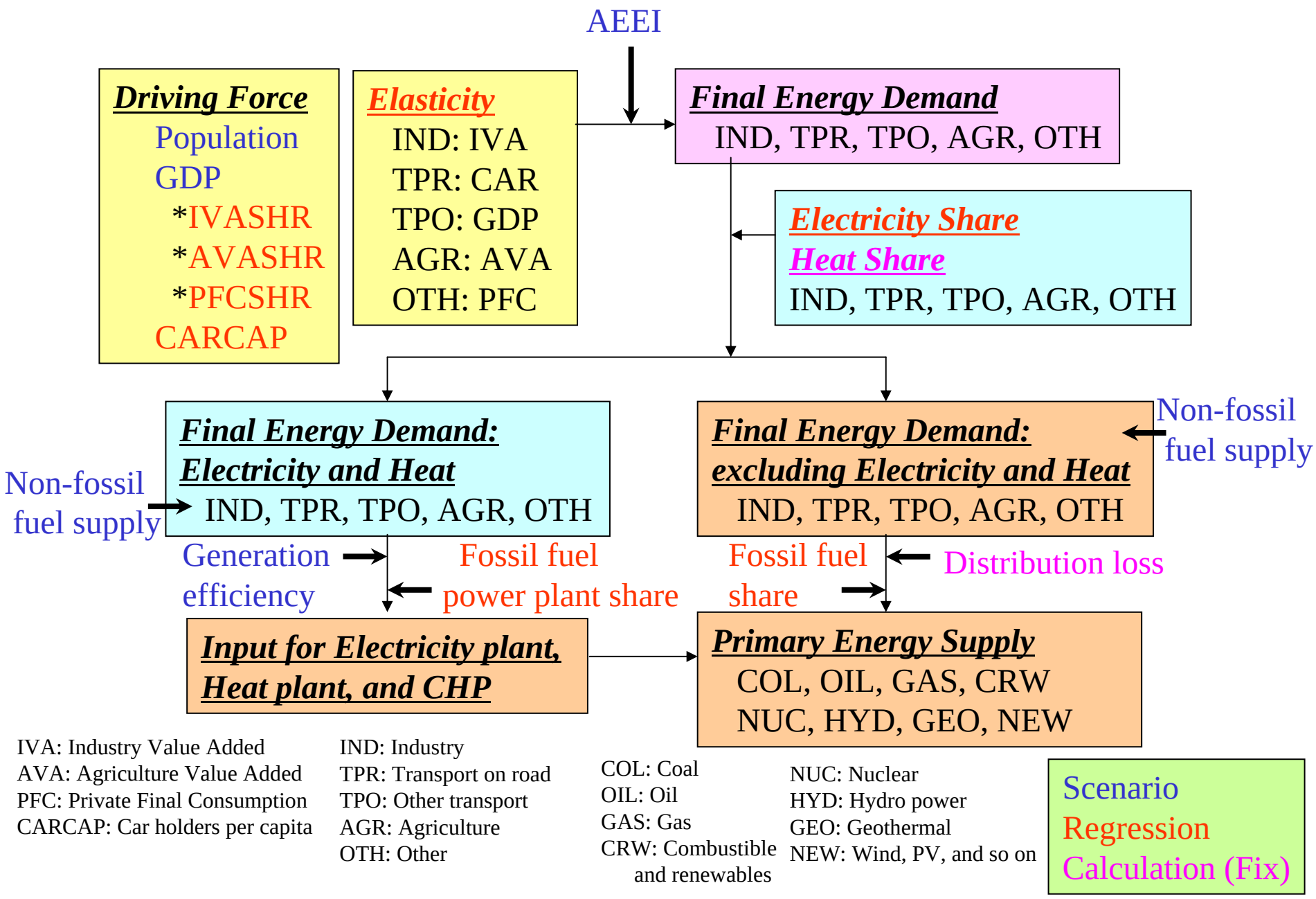


Prospect

Scenario Setting
GDP, population, AEEI,
non fossil fuel supply…

Regression results
GDP share,
final energy demand…

Calculation Flow of Energy Supply and Demand (Model A)



Programming and Interface

ATPL (AIM/Trend Program Language)

- Built with VBA of Microsoft Excel
- Major commands are load, save, future parameter setting, future projection, format and regression.

Interface

- Clickable buttons are designed to perform simulations effectively. They are written in ATPL and users can write or change programs for their own purpose.

ATPL

Example program ImpSrsTest

Open worksheet

Import series data

	A	B	C	D	E
1		Program	ImpSrsTest		
2		OpenWS	!Import	DAT	<1
3		Series	!Import	YEAR	<1
4			!Table	DATA1	
5		ImpSrs	!Table	Data	
6			POP	POP_A	<1
7			GDP	GDP_A	
8		End			

Input data sheet 'DAT'

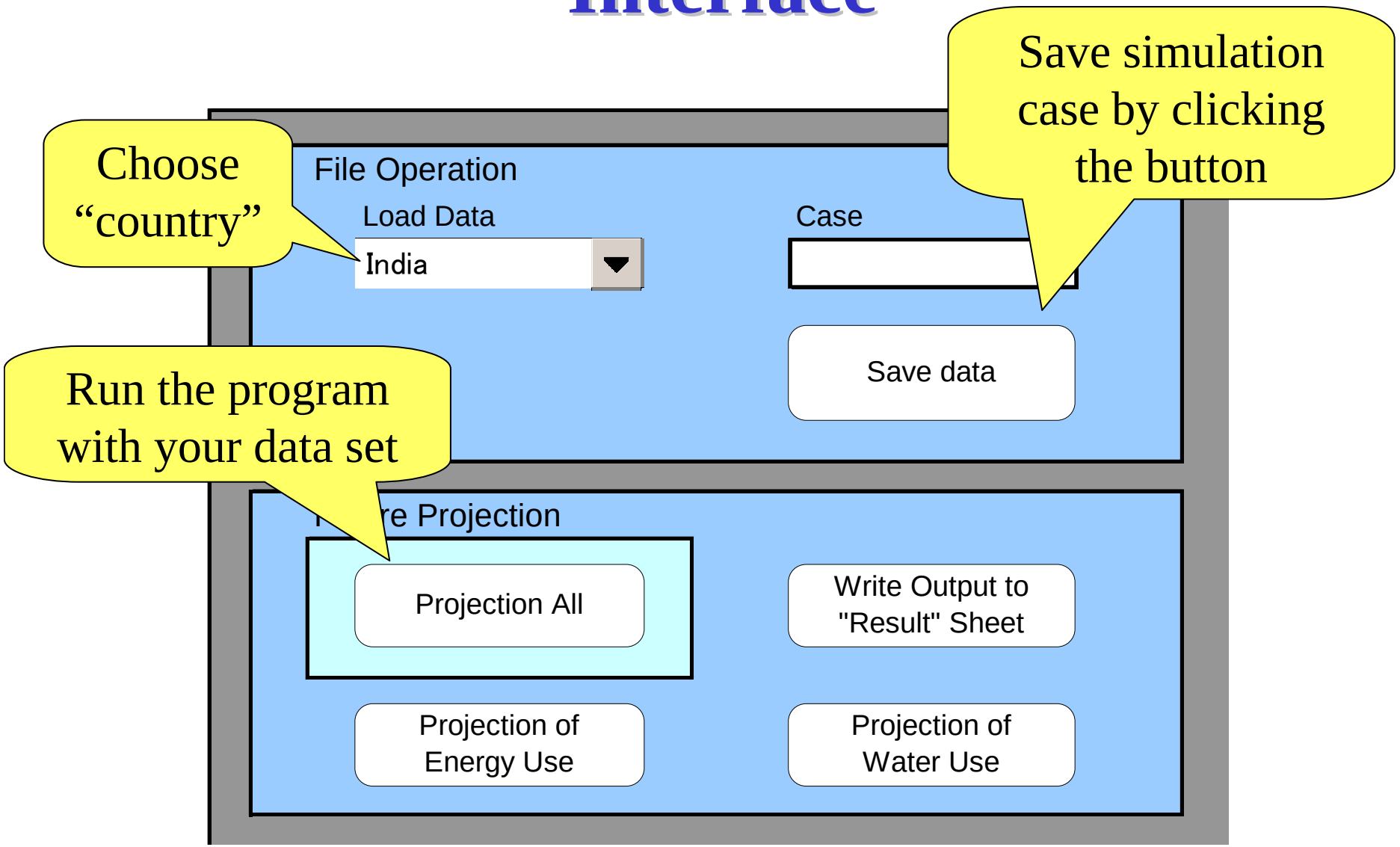
time series

time series data name

	A	B	C	D	E
1					
2	#TABLE	DATA1			
3	YEAR	1990	1995	2000	
4	POP_A	1,000	1,010	1,020	
5	GDP_A	1,000	1,050	1,120	
6					

Please see "AIMTrend-AddIn Manual.doc"

Interface



Please see "AIMTrend-User's Manual.doc"

Scenario Study

UNEP/GEO3 scenario

Market First (MK): market driven developments converge on the values and expectations that prevail in industrialized countries

Policy First (PO): concerted action on environment and social issues occurs through incremental policy adjustments

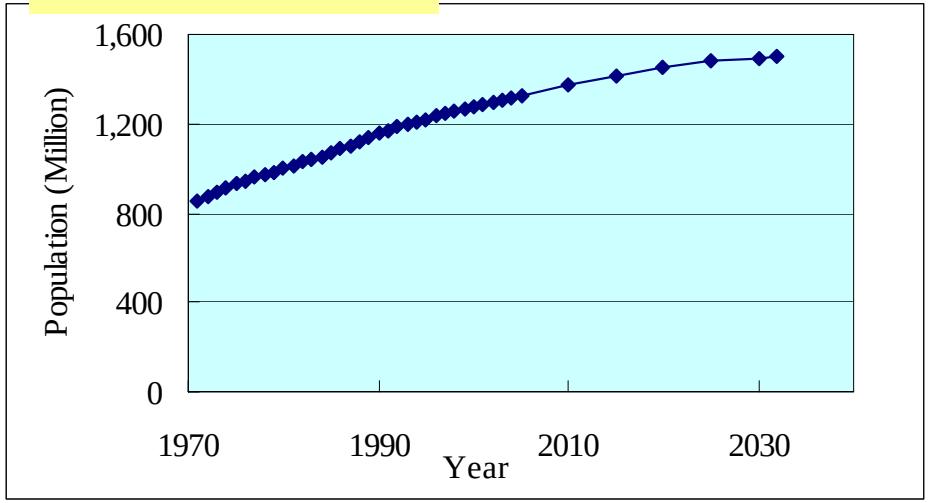
Security First (SC): inequality and conflict prevail, brought about by socio-economic and environmental stresses

Sustainability First (SU): a new development paradigm emerges in response to the challenge of sustainability, supported by new values and institutions

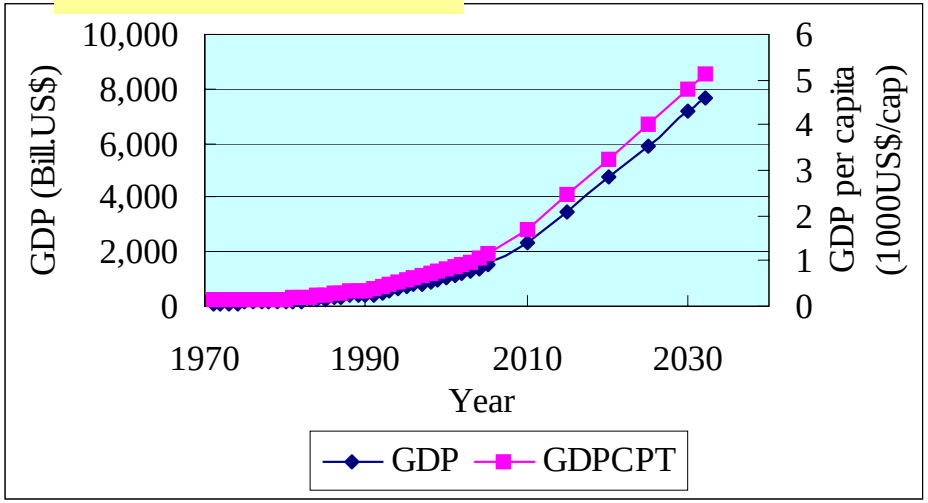
Driving forces

Sustainability First (SU) Scenario for China

Basic scenario

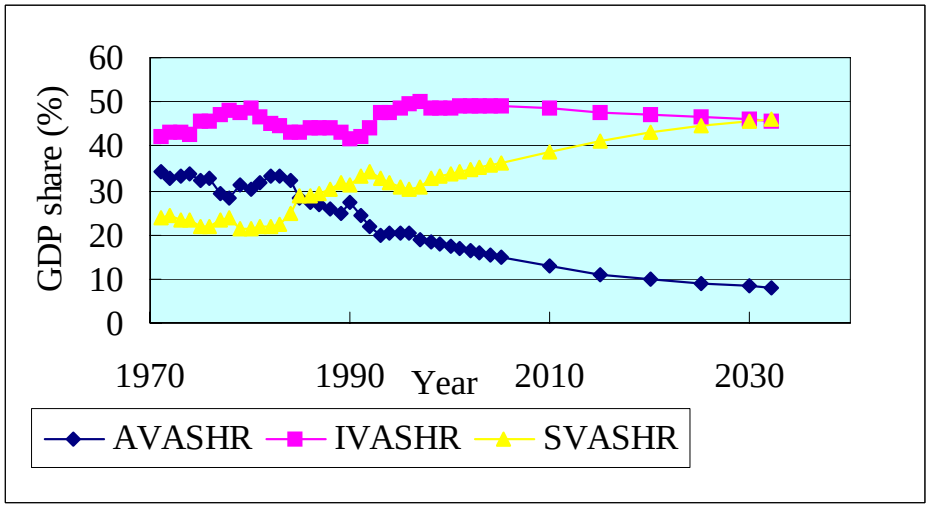


Basic scenario



Regression

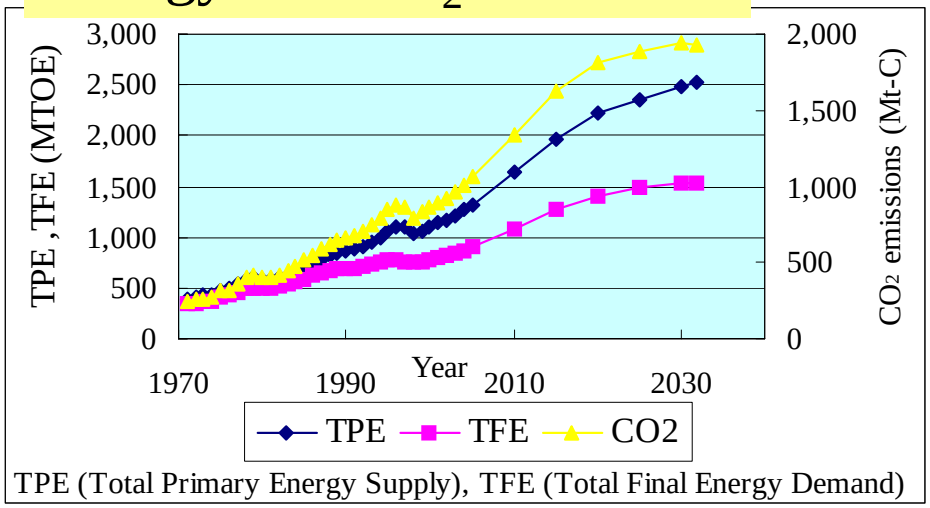
Regression



Energy structure

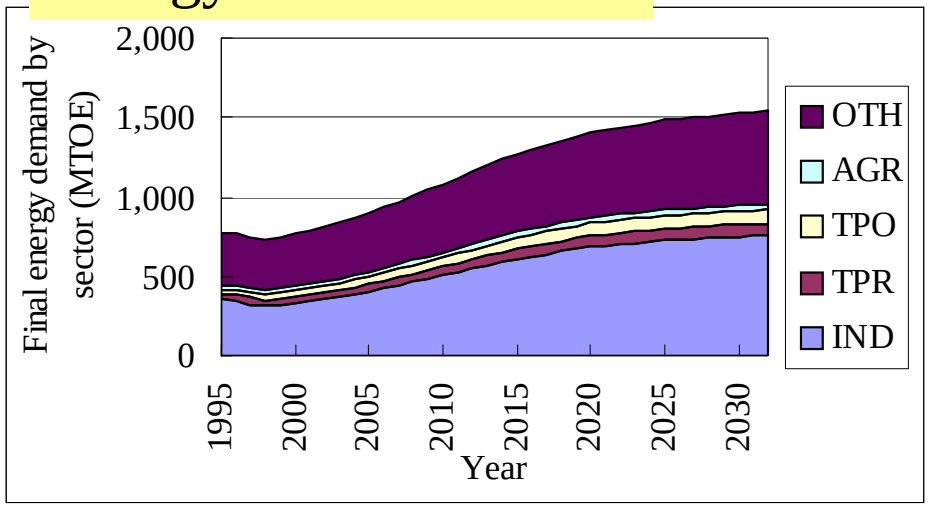
Sustainability First (SU) Scenario for China

Energy and CO_2 emissions

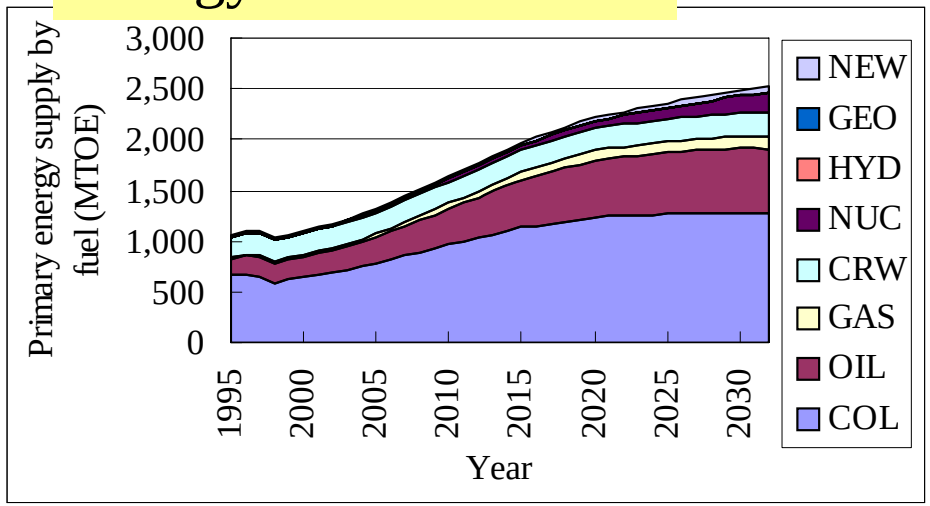


TPE (Total Primary Energy Supply), TFE (Total Final Energy Demand)

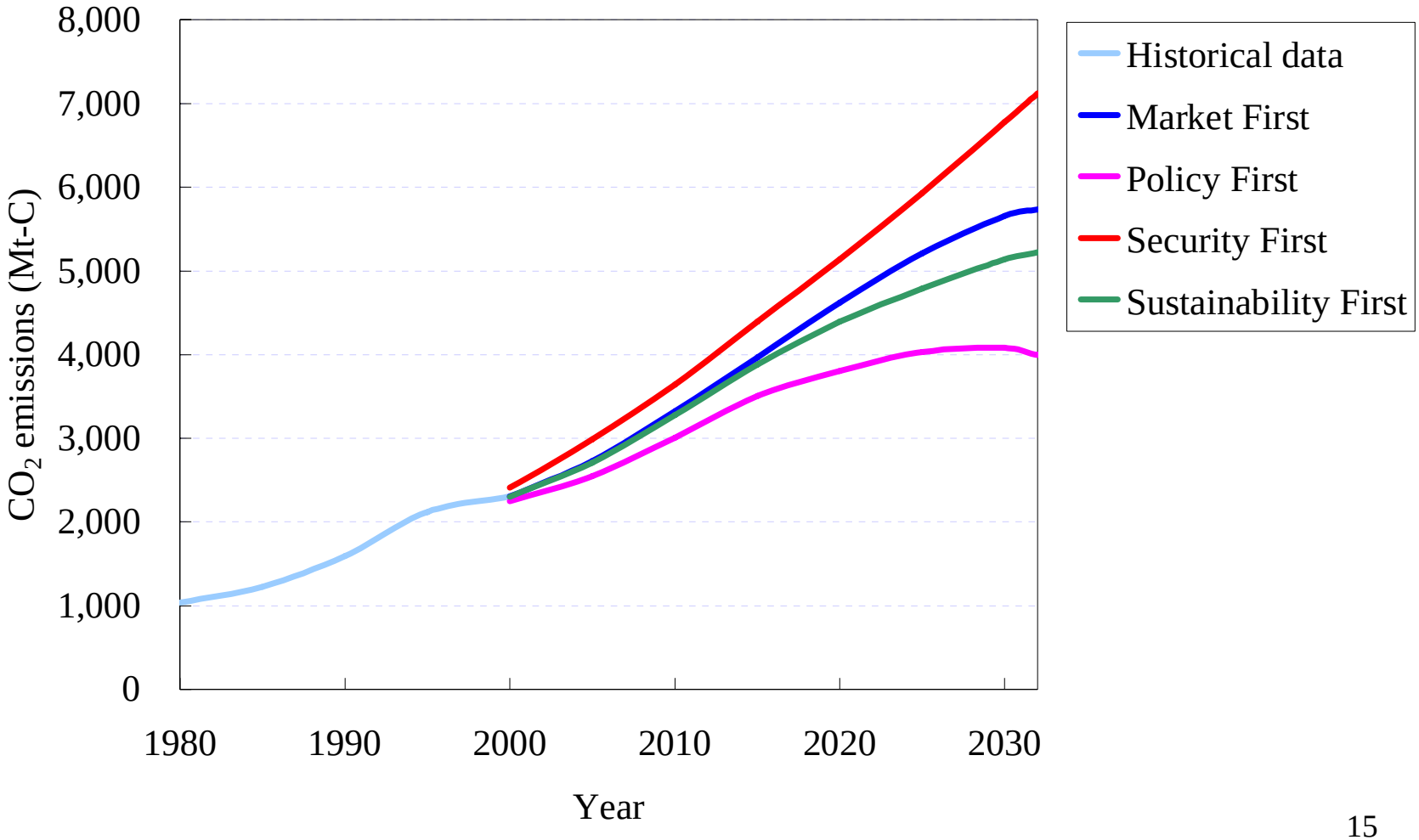
Energy structure of FE



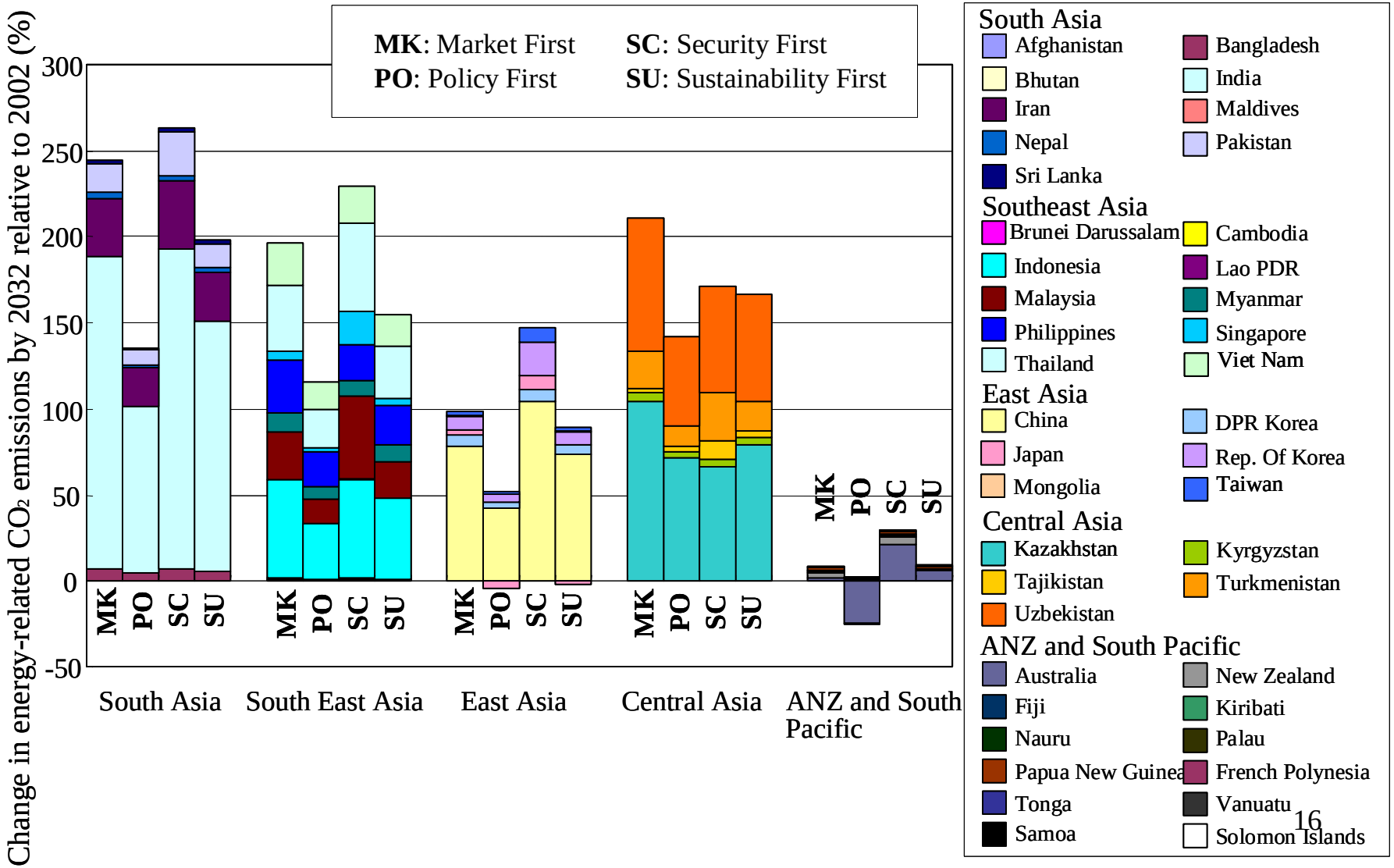
Energy structure of PE



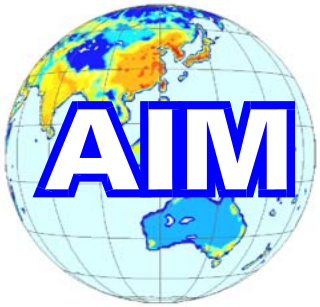
Energy related CO_2 emissions in Asia-Pacific region



Energy related CO_2 emissions in sub-regions of Asia-Pacific region



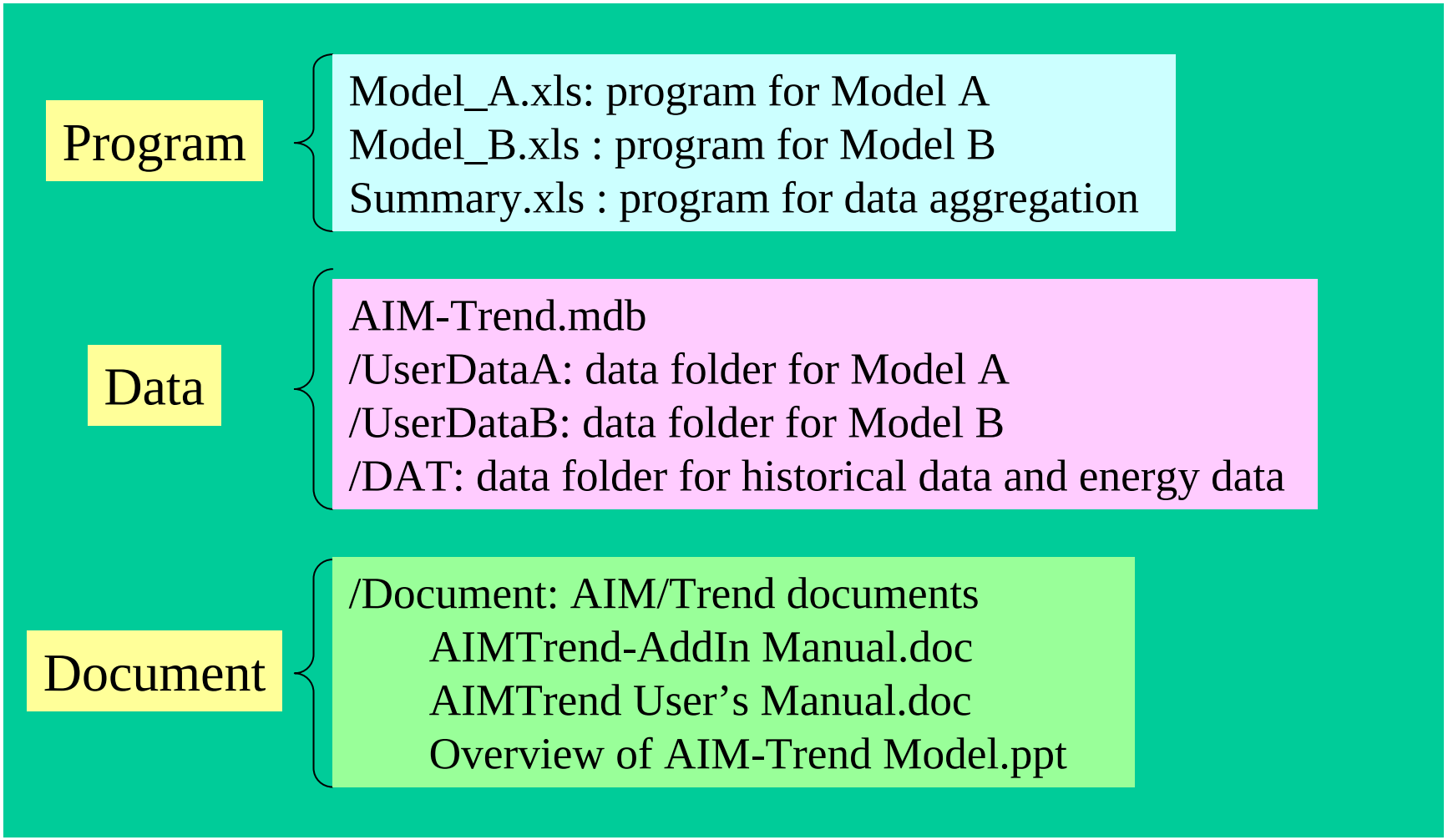
Next steps



- Revised AIM/Trend model (version 2)
- Scenarios should be checked by experts in each region
- Develop renewables, nuclear, gas supply scenario
- Add waste sector, food/biomass sector…
- Other role of AIM/Trend model:
  database, display of scenario results

  AIM/Trend scenarios can be used as input data for other AIM models (AIM/CGE, AIM/Country...)

Contents of CD-ROM



How to install AIM/Trend model

- Copy all files and folders from CD-ROM into your computer.

  ex. c:¥AIM-Trend
- Install “AIM Trend.xla”
  - Execute Microsoft Excel
  - Select [Tools]-[Add-Ins] menu option.
  - Click “Browse” button and select “AIM Trend.xla” file.

    ex. C:¥AIM-Trend¥Addins¥AIM Trend.xla
- If “AIM Trend” menu bar appears, you succeed to install AIM/Trend model !

AIM/Trend model Exercise

1) Open “Model_A.xls” file in your AIM/Trend folder. (please enable macro)
2) Choose your country from “load data” on “GUI” sheet.
3) Move to “GPro” sheet and “Result” sheet. Check the results of your country.
4) Choose other country from “load data” on “GUI” sheet and check the results.
5) Move to “Pam” sheet. You can check the assumptions for the projection.
6) Change population data, GDP growth rate data, or AEEI (Autonomous Energy Efficiency Improvement) data as you like.
7) Return to “GUI” sheet, and click “Pam Set All” button. “Projection of Driving Force”, “Projection of Final Energy Demand”, and “Projection of Energy Share ” will be done.
8) Click “Projection All”. You can see new results with your new input data on “GUI” sheet and “Result” sheet.