AIM modeling activity FY2010-FY2011

The 16th AIM International Workshop
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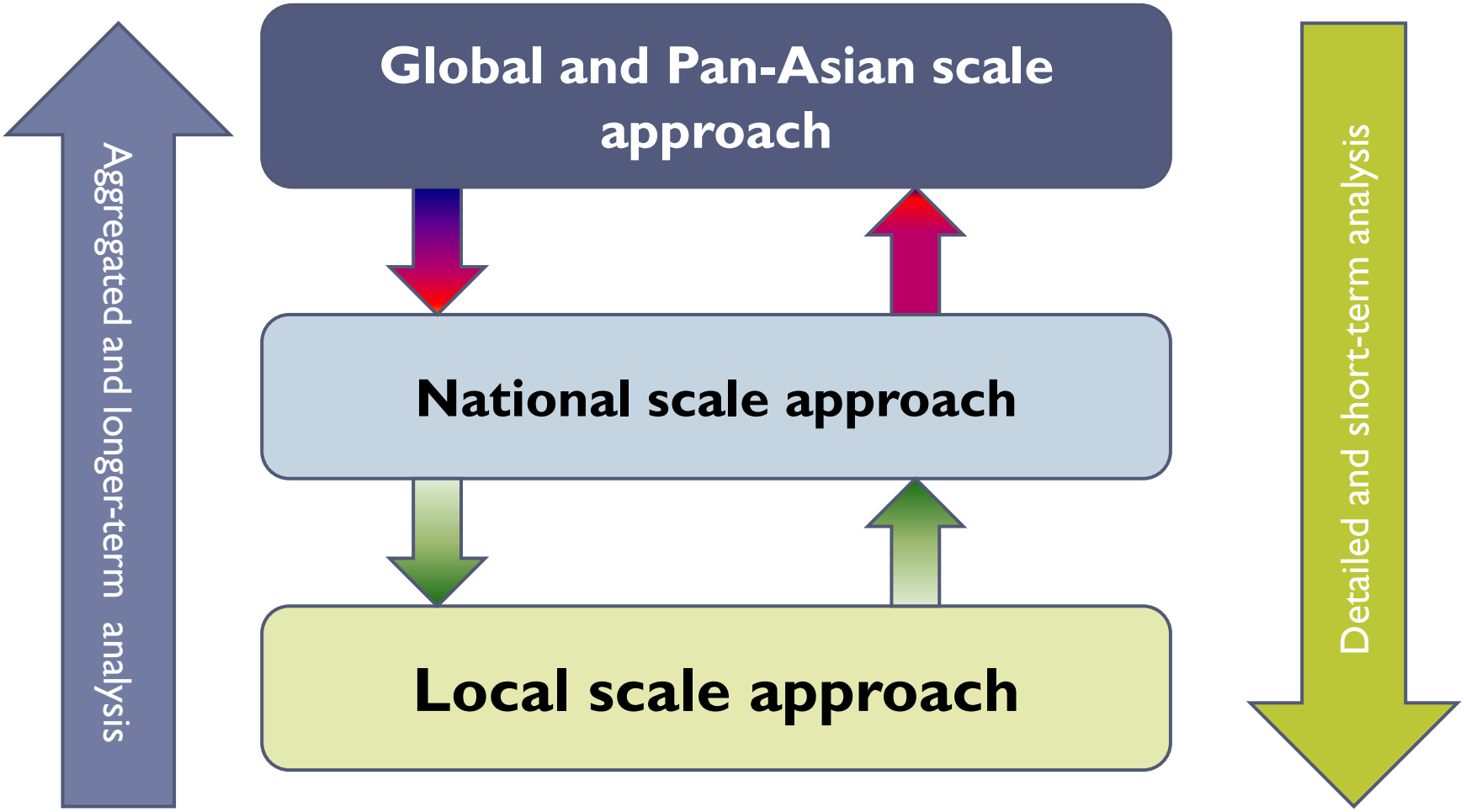
Clarification of models we are using and will use in FY2011

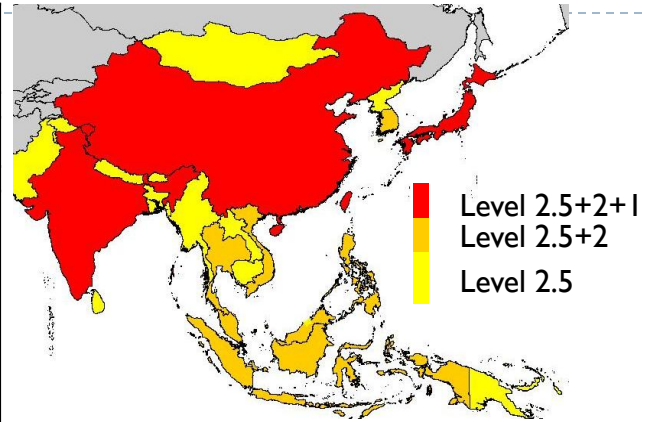
- ***AIM/CGE:*** **One/multi-regional CGE model. Integration platform with which element models are soft-linked according to analytical objects. Global and National scales.**
- ***AIM/enduse:*** **One or multi-regional, multi-sectoral bottom-up type energy end-use model. Integration platform of energy service's generation processes, energy technology development, and LCS policies. Global, national, and local scales.**
- ***Extended snapshot tool (ExSS):*** **A tool for integrating future economic, industrial, social and energy policies, using social accounting matrices, trade matrices, energy balance tables, energy technologies, regional energy resources information. Multi-regional accounting type tool.**
- ***Back-casting model /Tool (BCM/BCT):*** **A model for designing roadmaps towards low carbon societies. Dynamic optimization type model.**
- ***Element models:*** **Models of specific mechanisms of social-economic processes, energy service demand, such as Macro-economy, dynamic demography, building dynamics, traffic demand, material stocks and flow, and so.**

We are adopting three different scale but interactive approaches



Regionalization for Pan-Asian study

Country/Region	Level 2.5 (28 regions)	Level2 (15 regions)	Level 1 (4 regions)
Japan	JPN	JPN	JPN
China	CHN	CHN	CHN
Taiwan	TWN	TWN	
India	IND	IND	IND
Indonesia	IDN	IDN	ASIA
Malaysia	MYS	MYS	
Philippines	PHL	PHL	
Korea, Republic of	KOR	KOR	
Singapore	SGP	SGP	
Thailand	THA	THA	
Viet Nam	VNM	VNM	
Korea, DPR	PRK	XEA	
Mongolia	MNG		
Lao PDR	LAO	XSE	
Myanmar	MMR		
Brunei	BRN		
Cambodia	KHM		
Timor-Leste	TLS		
Bangladesh	BGD	XSA	
Bhutan	BTN		
Nepal	NPL		
Pakistan	PAK		
Maldives	MDV		
Sri Lanka	LKA		
Afghanistan	AFG		
Fiji	FJI	XOC	
Papua New Guinea	PNG		
Marshall Islands	MCR		
Micronesia			
Palau			
Kiribati	XOC		
Nauru			
Samoa			
Solomon Islands			
Tonga			
Tuvalu			
Vanuatu			



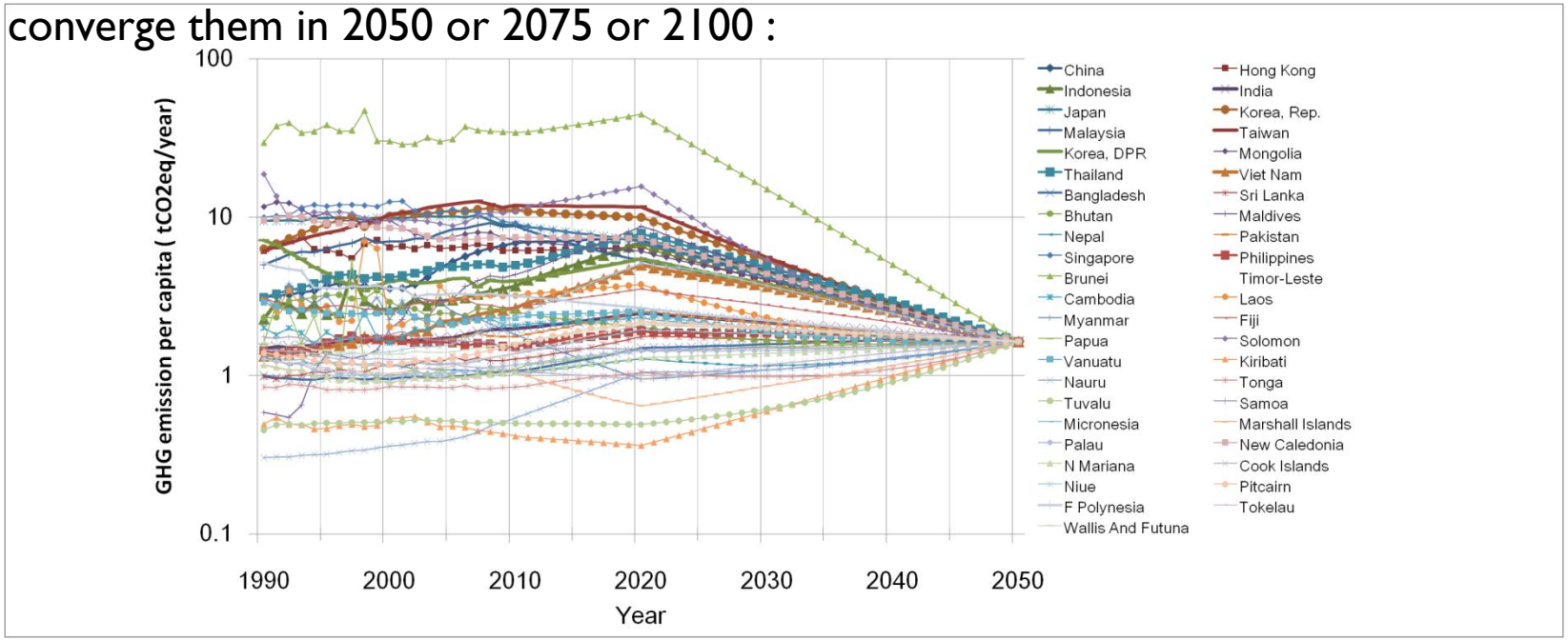
- East, South, Southeast Asia, Melanesia, Micronesia, and Polynesia, Based on major international statistics.
- Four regions in level 1, *i.e.* China, India, Japan and Rest of Asia
- Fifteen regions in level 2. Aggregation of small countries less than one million population and so on.
- 28 regions in level 2.5. Aggregation of small island states in Oceania region

- As for the rest of the world, 20 regional disaggregation, we are using. So the world total is 35 regionalization.

Central Asia	XCS
Middle East	XME
Other Latin America	XLM
Canada	CAN
USA	USA
EU-15	XE15
EU-10	XE10
EU-2	XE2
Turkey	TUR
Other Europe	XENI
Other Western Europe in Annex I	XEWI
Other Eastern Europe in Annex I	XEEI
South Africa	ZAF
Other Africa	XAF
Russia	RUS
Mexico	MEX
Argentine	ARG
Brazil	BRA
Australia	AUS
New Zealand	NZL

Pan-Asian approach: How much are the required national reduction for global 50% reduction ?

If we contract per capita GHG emissions from 2020 and converge them in 2050 or 2075 or 2100 :



	Target and convergence year	Probability of exceeding 2 C		Reduction rate in 2050 compared with 2005 (%)							
		(AIM/IP)	(Meins-hausen)	China	India	Japan	Indonesia	Korea, Rep.	Thailand	Malaysia	Viet Nam
50% reduction of GHG emission compared with 1990	2050	0.30	(0.13-0.47)	66	-35	88	28	86	62	70	2
	2075	0.45	(0.27-0.67)	12	-101	73	-74	62	-10	37	-101
	2100	0.67	(0.42-0.87)	-32	-188	64	-166	39	-79	9	-187

Required national reduction for global 50% reduction (1)

	1990	2005	2020(1)	2030				2050			
				Conv @2050(2)		Conv @2075(3)		Conv @2050(2)		Conv @2075(3)	
	(GtCO2)	(GtCO2)	(GtCO2)	(GtCO2)	%	(GtCO2)	%	(GtCO2)	%	(GtCO2)	%
China	3.563	6.868	10.628	6.799	(1)	9.431	(-37)	2.325	(66)	6.059	(12)
India	1.279	1.956	3.399	3.200	(-64)	3.654	(-87)	2.648	(-35)	3.937	(-101)
Japan	1.168	1.293	0.876	0.484	(63)	0.650	(50)	0.156	(88)	0.347	(73)
Indonesia	0.403	0.656	1.759	1.220	(-86)	1.650	(-151)	0.473	(28)	1.144	(-74)
Korea, Rep.	0.271	0.514	0.493	0.263	(49)	0.379	(26)	0.072	(86)	0.197	(62)
Thailand	0.177	0.320	0.566	0.356	(-11)	0.510	(-60)	0.120	(62)	0.351	(-10)
Pakistan	0.169	0.283	0.574	0.566	(-100)	0.646	(-128)	0.550	(-94)	0.770	(-172)
Taiwan	0.125	0.275	0.276	0.133	(52)	0.184	(33)	0.035	(87)	0.079	(71)
Malaysia	0.090	0.214	0.171	0.130	(39)	0.167	(22)	0.065	(70)	0.135	(37)
Viet Nam	0.088	0.188	0.489	0.385	(-106)	0.490	(-161)	0.183	(2)	0.377	(-101)
Bangladesh	0.115	0.150	0.277	0.322	(-114)	0.366	(-143)	0.365	(-143)	0.499	(-232)
Philippines	0.090	0.137	0.210	0.232	(-69)	0.254	(-86)	0.240	(-75)	0.305	(-123)
Myanmar	0.128	0.122	0.053	0.064	(47)	0.066	(45)	0.104	(14)	0.090	(26)
Korea, DPR	0.144	0.096	0.135	0.095	(0)	0.122	(-27)	0.040	(58)	0.082	(14)
Singapore	0.030	0.048	0.036	0.023	(53)	0.030	(38)	0.009	(82)	0.018	(63)
Hong Kong	0.035	0.044	0.050	0.033	(25)	0.042	(5)	0.014	(68)	0.027	(40)
Cambodia	0.019	0.030	0.041	0.040	(-34)	0.045	(-52)	0.039	(-31)	0.047	(-57)
Nepal	0.025	0.030	0.045	0.047	(-58)	0.053	(-77)	0.080	(-171)	0.084	(-181)
Sri Lanka	0.017	0.026	0.038	0.037	(-46)	0.042	(-63)	0.036	(-39)	0.049	(-93)
Mongolia	0.026	0.019	0.018	0.013	(31)	0.017	(13)	0.006	(70)	0.012	(40)
Laos	0.013	0.018	0.029	0.021	(-18)	0.026	(-50)	0.018	(-1)	0.021	(-19)
Brunei	0.008	0.011	0.021	0.008	(29)	0.014	(-20)	0.001	(91)	0.005	(57)

(1) Calculated with countries' pledges, and model calculation

(2) By 2050, 50% reduction of global GHG emission compared with 1990, and per capita emissions are converged. ( ) is the required reduction % compared with 2005

(3) By 2075, 50% reduction of global GHG emission compared with 1990, and per capita emissions are converged. ( ) is the required reduction % compared with 2005

Required national reduction for global 50% reduction (2)

	1990	2005	2020(1)	2030				2050			
				Conv @2050(2)		Conv @2075(3)		Conv @2050(2)		Conv @2075(3)	
	(GtCO2)	(GtCO2)	(GtCO2)	(GtCO2)	%	(GtCO2)	%	(GtCO2)	%	(GtCO2)	%
Papua	6.5E-03	6.0E-03	1.2E-02	1.5E-02	(-155)	1.5E-02	(-150)	2.1E-02	(-251)	2.0E-02	(-227)
Solomon	5.9E-03	4.2E-03	1.0E-02	4.3E-03	(-2)	6.8E-03	(-63)	1.7E-03	(61)	3.1E-03	(27)
Fiji	2.3E-03	2.5E-03	3.1E-03	2.6E-03	(-5)	3.0E-03	(-24)	1.5E-03	(39)	2.5E-03	(-1)
New Caledonia	1.6E-03	1.7E-03	2.1E-03	1.4E-03	(19)	1.8E-03	(-2)	5.9E-04	(66)	1.1E-03	(34)
Bhutan	1.3E-03	1.6E-03	1.7E-03	1.5E-03	(6)	1.7E-03	(-7)	1.7E-03	(-4)	2.1E-03	(-33)
Maldives	1.3E-04	8.9E-04	3.2E-03	1.8E-03	(-106)	2.6E-03	(-188)	7.5E-04	(16)	1.7E-03	(-93)
Timor-Leste	4.5E-04	8.9E-04	4.1E-03	3.1E-03	(-249)	4.0E-03	(-349)	5.3E-03	(-496)	3.7E-03	(-318)
F Polynesia	1.0E-03	8.4E-04	8.1E-04	7.3E-04	(13)	7.9E-04	(6)	5.8E-04	(31)	7.2E-04	(14)
Vanuatu	4.3E-04	4.5E-04	7.8E-04	7.0E-04	(-55)	7.5E-04	(-66)	7.9E-04	(-74)	7.8E-04	(-72)
Samoa	2.8E-04	3.0E-04	2.7E-04	2.9E-04	(5)	3.0E-04	(2)	3.2E-04	(-4)	3.2E-04	(-7)
Micronesia	1.3E-04	1.3E-04	2.3E-04	2.3E-04	(-75)	2.4E-04	(-86)	2.1E-04	(-60)	2.5E-04	(-92)
Tonga	8.0E-05	8.5E-05	1.1E-04	1.1E-04	(-33)	1.2E-04	(-39)	2.0E-04	(-137)	1.4E-04	(-60)
N Mariana	5.1E-05	7.8E-05	1.3E-04	1.6E-04	(-111)	1.6E-04	(-104)	2.5E-04	(-219)	2.1E-04	(-165)
Marshall Islands	5.5E-05	5.5E-05	4.8E-05	7.1E-05	(-30)	6.3E-05	(-16)	1.5E-04	(-177)	1.0E-04	(-84)
Kiribati	3.5E-05	4.4E-05	4.2E-05	7.8E-05	(-76)	6.2E-05	(-41)	2.5E-04	(-463)	1.3E-04	(-187)
Cook Islands	2.5E-05	2.3E-05	2.0E-05	2.6E-05	(-14)	2.4E-05	(-8)	3.9E-05	(-75)	3.3E-05	(-47)
Wallis And Futuna	2.2E-05	2.1E-05	3.6E-05	3.4E-05	(-59)	3.7E-05	(-74)	2.8E-05	(-32)	3.6E-05	(-69)
Palau	1.9E-05	2.1E-05	3.2E-05	3.5E-05	(-69)	3.6E-05	(-71)	4.3E-05	(-107)	4.2E-05	(-98)
Tuvalu	4.0E-06	5.0E-06	5.1E-06	6.7E-06	(-33)	6.2E-06	(-23)	1.8E-05	(-259)	9.4E-06	(-87)
Nauru	2.8E-06	4.0E-06	1.1E-05	1.2E-05	(-201)	1.2E-05	(-208)	1.8E-05	(-344)	1.5E-05	(-265)
Niue	3.4E-06	2.6E-06	6.0E-06	4.0E-06	(-54)	5.1E-06	(-96)	1.8E-06	(30)	3.4E-06	(-33)
Tokelau	2.1E-06	1.4E-06	2.5E-06	2.4E-06	(-74)	2.6E-06	(-89)	2.0E-06	(-44)	2.6E-06	(-85)
Pitcairn	9.0E-08	6.4E-08	1.2E-07	1.1E-07	(-66)	1.2E-07	(-87)	8.4E-08	(-31)	1.1E-07	(-69)

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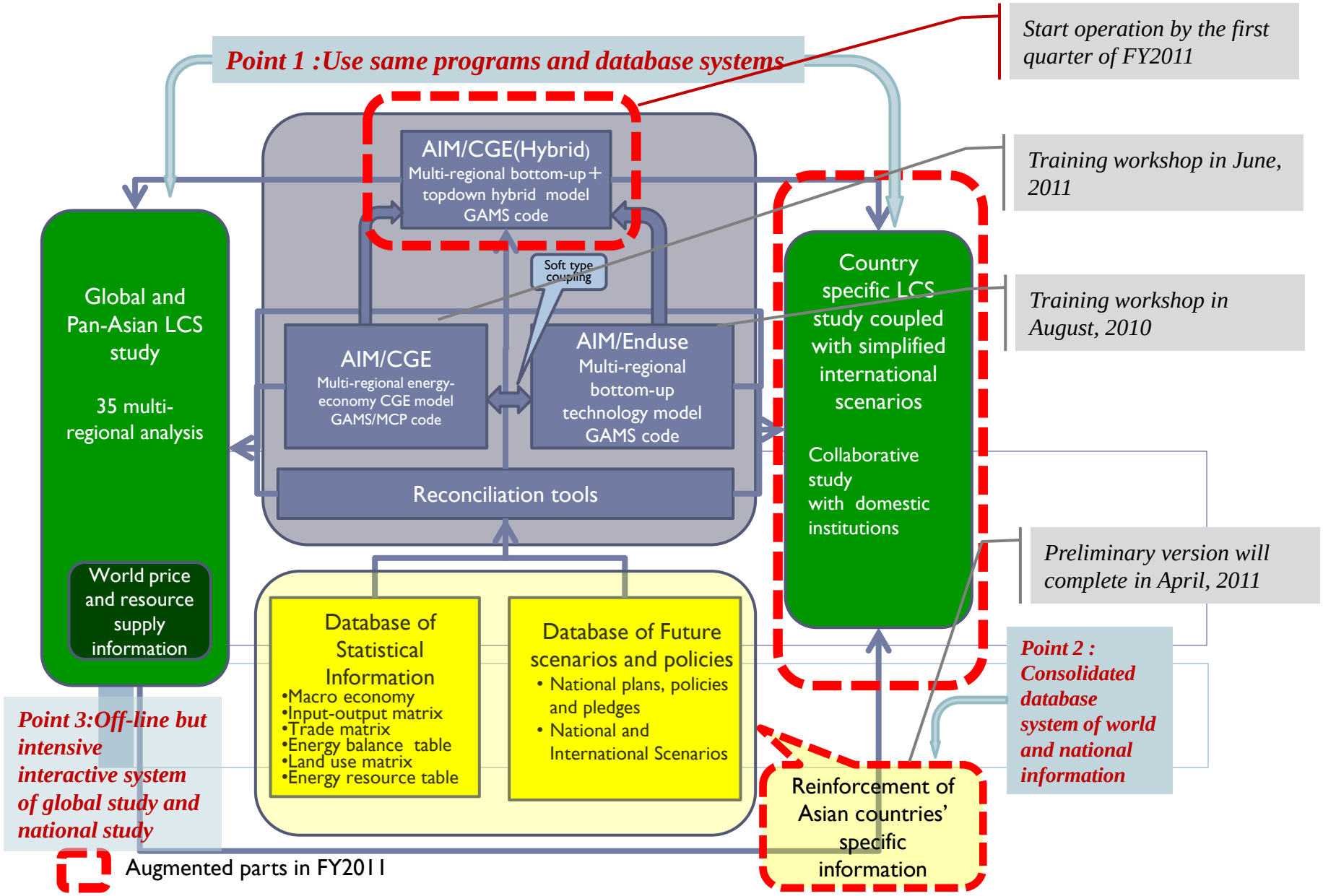
Approach for Pan-Asian LCS

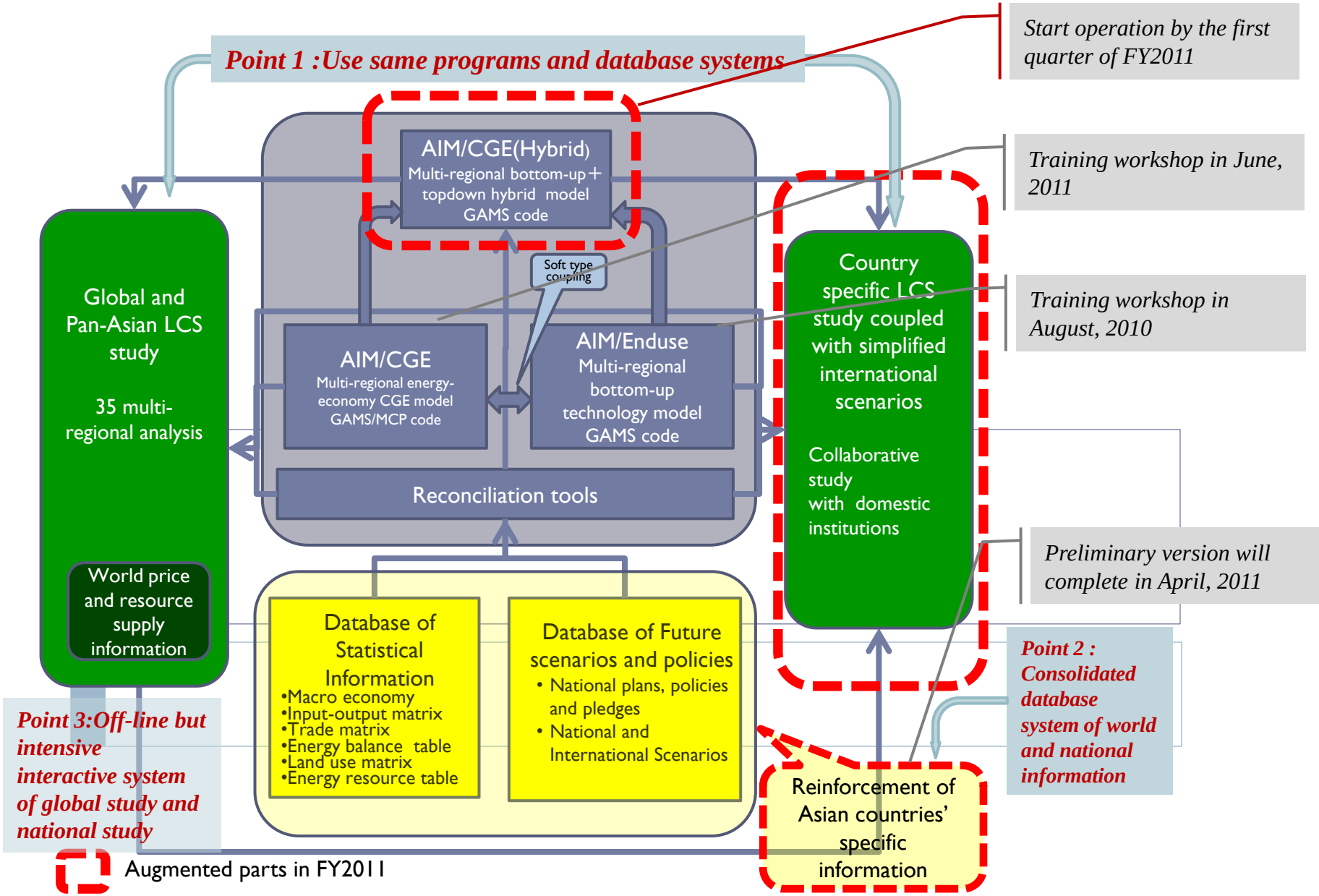


Pan-Asian LCS study now going on

Pan-Asian Study

	Progress in FY2010	Expected progress in FY2011	Collaborating Research Institutes
Pan-Asian Study	Two approaches now conducting simultaneously. 1. Global top-down approach by AIM/CGE and AIM/enduse, coupling with world GHG reduction buden-share scheme. 2. Country by country approach. Prepariation of each country's LCS policy, energy, and socio-economic database, and coupling them with AIM/CGE and ExSS 3. Developing Element Models, especially, material model, transport model and residential energy service model	1. Hard coupling of AIM/CGE, AIM/enduse and some elemet models to AIM/CGE(Hybrid) 2. Preparing world and Pan-Asian reference scenarios as a platform of deeper national LCS design 3. Integrating with national scenarios, and analyzing the gaps of international and local GHG reduction policies	S6 teams in Japanese institutions 

Approach for National LCS



National studies now going on

National Studies

	Progress in FY2010	Expected progress in FY2011	Collaborating Research Institutes
China	Preparation of provincial energy, industrial, and economic database, and their reconciliation Especially internal trades of goods, energy are one of the focus.	Coupling with ERI's national study and enforcing the spatial details of China LCS scenarios (?) Coupling with regional air environmental management	China Energy Research Institute Tsinghua University
India		India national study using coupled CGE and enduse model	IIM Ahmedabad
Thailand	Preliminary analysis of Thailand energy related LCS with ExSS was finished	Thailand national study using coupled CGE and enduse model	Thammasat University
Indonesia	Preliminary analysis of Indonesia energy related LCS with ExSS was finished	Indonesia national study using coupled ExSS and enduse model	Institut Teknologi Bandung
Vietnam	Preliminary analysis of Vietnam energy related LCS with ExSSwas finished	Vietnam national LCS study covering all sectors	
Bangladesh	Preparation of related information	Preliminary analysis of Bangladesh LCS with ExSS, covering all sectors	
Penisula Malaysia	Preliminary analysis of Peninsula Malaysia energy related LCS with ExSS was finished	Peninsula Malaysia national LCS study covering all sectors	Universiti Teknologi Malaysia

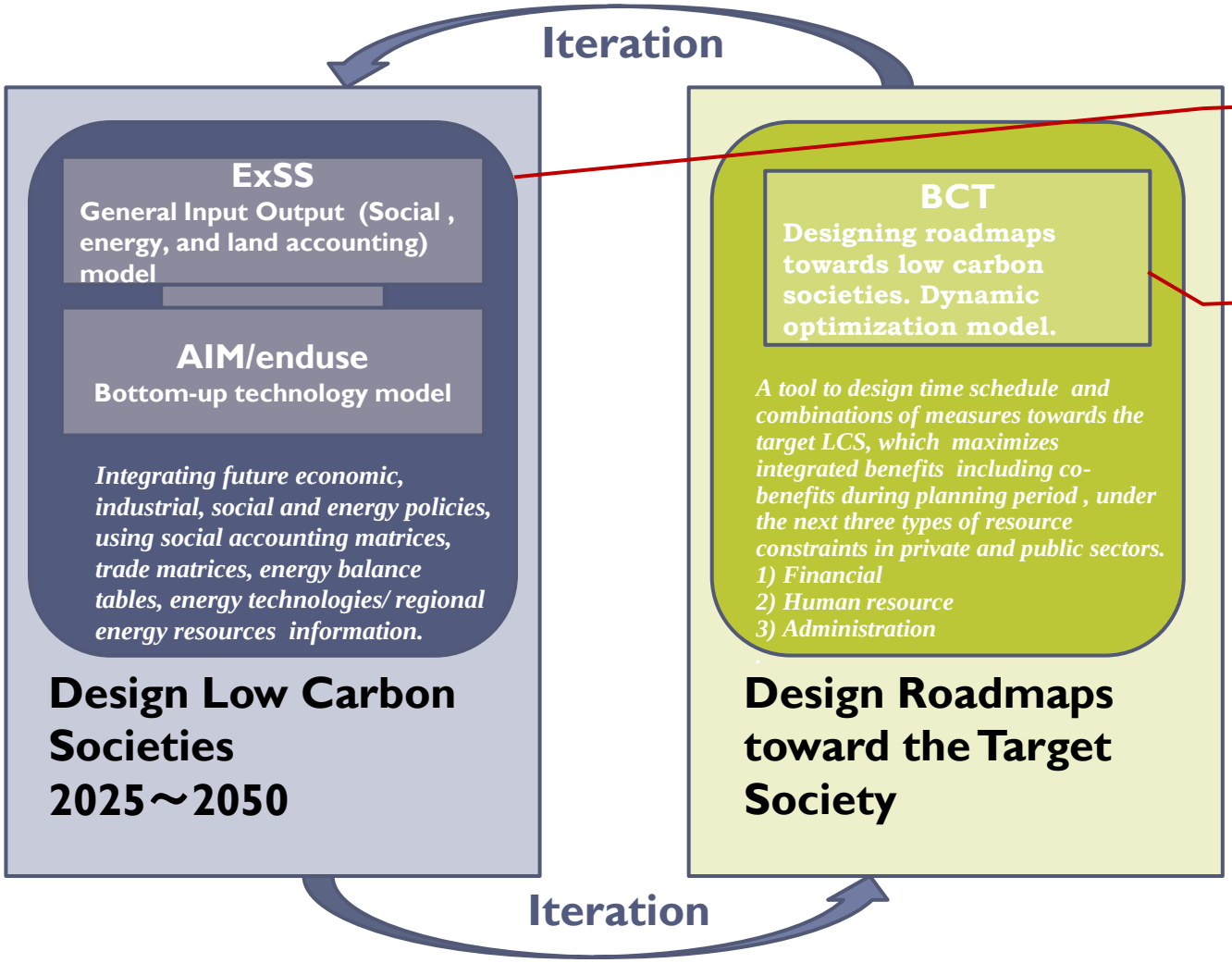
National studies now going on

National Studies

	Progress in FY2010	Expected progress in FY2011	Collaborating Research Institutes
China	Preparation of provincial energy, industrial, and economic database, and their reconciliation Especially internal trades of goods, energy are one of the focus.	Coupling with ERI's national study and enforcing the spatial details of China LCS scenarios (?) Coupling with regional air environmental management	China Energy Research Institute Tsinghua University
India		India national study using coupled CGE and enduse model	IIM Ahmedabad
Thailand	Preliminary analysis of Thailand energy related LCS with ExSS was finished	Thailand national study using coupled CGE and enduse model	Thammasat University
Indonesia	Preliminary analysis of Indonesia energy related LCS with ExSS was finished	Indonesia national study using coupled ExSS and enduse model	Institut Teknologi Bandung
Vietnam	Preliminary analysis of Vietnam energy related LCS with ExSSwas finished	Vietnam national LCS study covering all sectors	
Bangladesh	Preparation of related information	Preliminary analysis of Bangladesh LCS with ExSS, covering all sectors	
Penisula Malaysia	Preliminary analysis of Peninsula Malaysia energy related LCS with ExSS was finished	Peninsula Malaysia national LCS study covering all sectors	Universiti Teknologi Malaysia

Main topics of the 21st 's meeting

Asian Local LCS studies



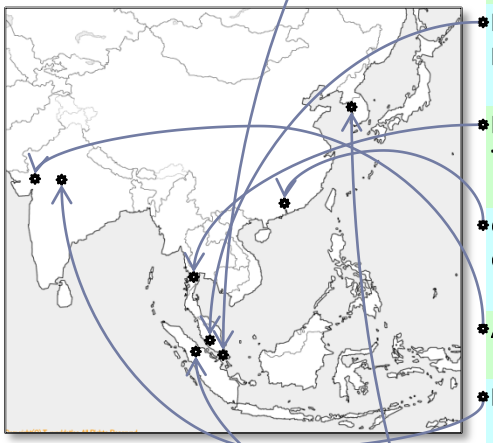
Training workshop in August, 2010

Training workshop in Winter, 2011

Basically, this an extension of Kyoto and Shiga study

Now applying to several regions in Asian countries

Local regional studies now going on



Local region studies

	Progress in FY2010	Expected progress in FY2011	Collaborating Research Institutes
Iskandar, Malaysia	Feasibility study finished and consolidating full-scale research task force composed of implementation agencies and research institutions	Proposing LCS policy options backuped with detailed designs of measures	Universiti Teknologi Malaysia Iskandar Regional Development Authority Federal Department of Town and Country Planning Malaysia Malaysian Green Technology Corporation
Putrajaya, Malaysis	Feasibility study and identification of policy option was finished	NEED DISCUSSION	Universiti Teknologi Malaysia Putrajaya Corporation
Ratchaburi, Thailand	Preliminary analysis of energy related part almost finished with ExSS, now adding AFOLU part	NEED DISCUSSION	King Mongkut's University of Technology
Guangzhou, China	Preliminary analysis of energy related part almost finished with ExSS	NEED DISCUSSION	Guangzhou Institute of Energy Conversion
Ahmedabad, India	Preliminary analysis of energy related part finished with ExSS	NEED DISCUSSION	IIM Ahmedabad
Bhopal, India	Preliminary analysis of energy related part almost finished with ExSS	NEED DISCUSSION	Maulana Azad National Institute of Technology, Bhopal School of Planning and Architecture, Bhopal
Liau, Indonesia	Discussion on FOLU part modeling	NEED DISCUSSION	Bogor Agricultural University
Kyonggi Province, Korea	Preliminary analysis of energy related part are conducting with ExSS	NEED DISCUSSION	Seoul National University

Main topics of the 21st's meeting

Collaboration with Asian colleagues