AIM modeling activity FY2012-FY2013

The 18th AIM International Workshop
December 15, 2012
NIES, Tsukuba, Japan

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Models in AIM model family operating FY2012

- **AIM/CGE(Global/National)**: One/multi-regional CGE model. Integration platform with which element models are soft-linked according to analytical objects. Global and National scales. Two versions are now in operational stage; MPSGE version and MCP version
- **AIM/Enduse(Global/National)**: 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. Now, covers all most all sectors on GHG emissions. Single/Multi-regional accounting type tool.

Models in AIM model family operating FY2012 (continued)

- **Back-casting model/Tool (BCM/BCT):** A model for designing roadmaps towards low carbon societies. Dynamic optimization type model.
- **AFOLU models:** Two types are now developed.
  AFOLU-A: A new model for AFOLU sector's activity, which describes the driving forces of AFOLU sectors with agriculture and forestry policies, food, feed, bio-energy, industrial activities, and land-use balances.
  AFOLU-B: AFOLU sector's GHG emission reduction model with bottom-up technology couplings.

- **Element models:** Models of specific mechanisms of social-economic processes and energy service demand, such as macro-economy, dynamic demography, building dynamics, traffic demand, material stocks and flow, agriculture forestry and land-use activity.

An Introduction of new members in AIM model family in FY2012 -2013

- **AFOLU-A model**

  Agriculture, Forestry and Other Land-use Activity model

- **LCP-Action Tools**

  Tools for designing and managing Low Carbon Policy and connecting models' output with policy actions

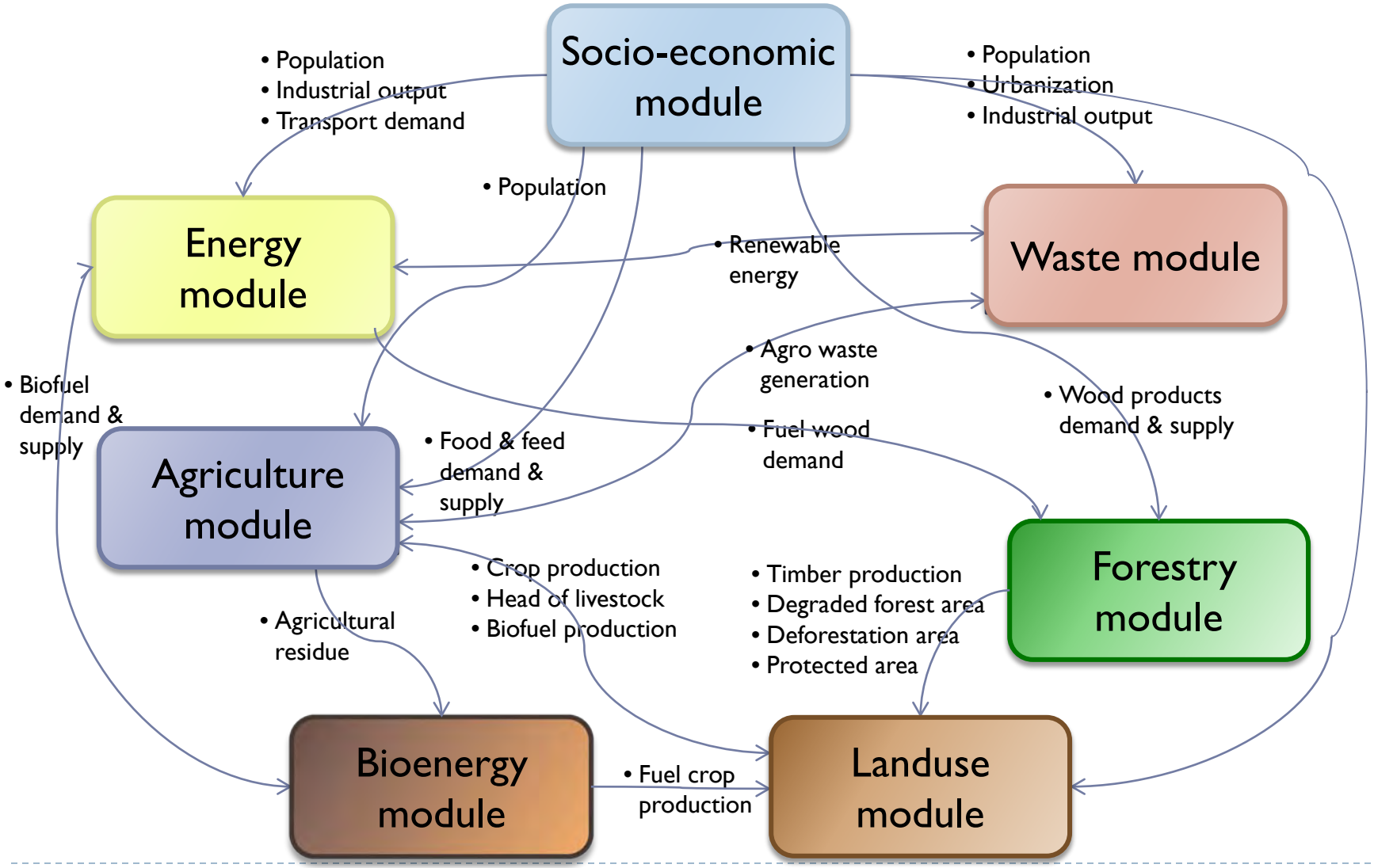
AFOLU-A model

Agriculture, Forestry and Other Land-use Activity model

- For projection of activity levels of AFOLU sectors and GHG emissions from these sectors
- Simple accounting type tool, based on land use accounting table, food balance table and biomass balance table
- Agriculture and forestry activities are consistent with socio-economic variables from other models, i.e. ExSS, CGE
- Considering production, consumption, import and export of forestry and agriculture products including bio-energy crops
- GAMS linear/non-linear program
- Developed by K.Gomi and Y.Matsuoka
- Now, applying to national and regional studies of Indonesia

AFOLU-A model

Its Modules & variables

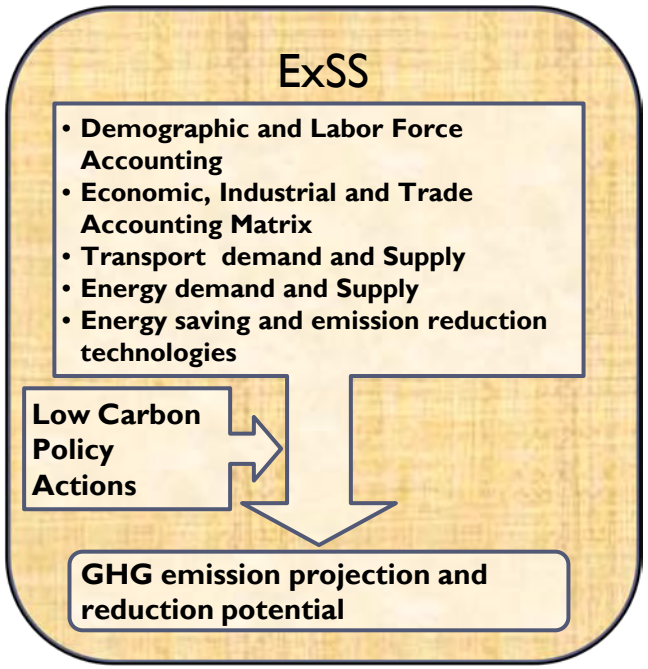


AFOLU-B model

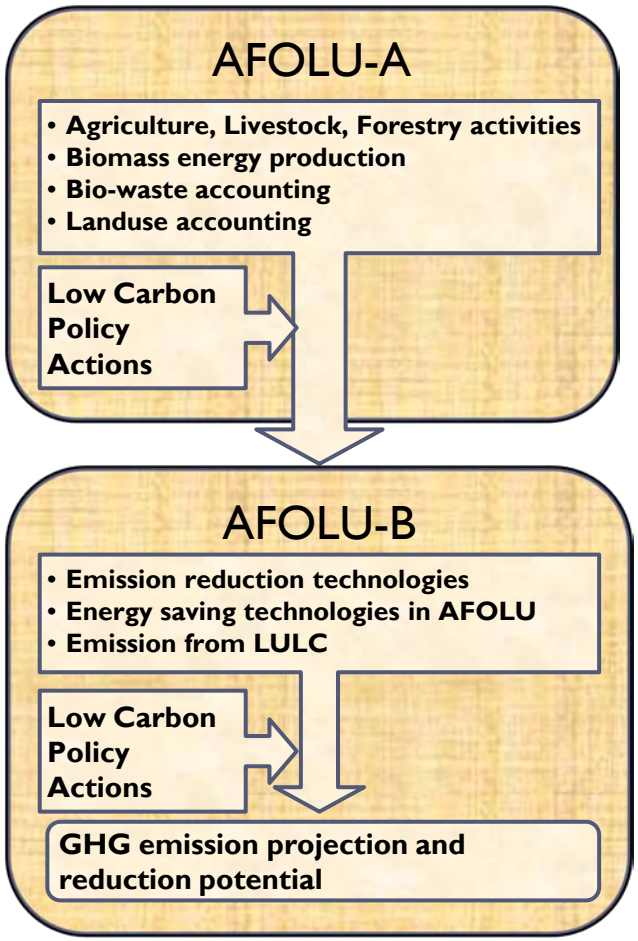
Agriculture, Forestry and Other Land-use sectors' Bottom-up type emission reduction model

- Technology based bottom-up type model, which consist of Agriculture/ Livestock module and FOLU module
- Calculates GHG emission mitigation potentials and combinations of mitigation technologies in AFOLU sectors, which minimize the net financial costs under arbitrary given conditions.
- Two types of optimization scheme, 1) Time sequential optimization, 2) Over the entire period optimization
- Requires information on 1) GHG emission reduction technologies, 2) Future scenarios of productions of agriculture, livestock and forestry and land-use change, 3) Scenarios of prices of commodities and energy, 4) Policy scenarios on GHG emission tax, energy tax rate, subsidies etc.
- Developed by T.Hasegawa and Y.Matsuoka
- Applied to national studies of Vietnam, Malaysia, Indonesia, and Bangladesh

Coupling of ExSS, AFOLU-A and AFOLU-B



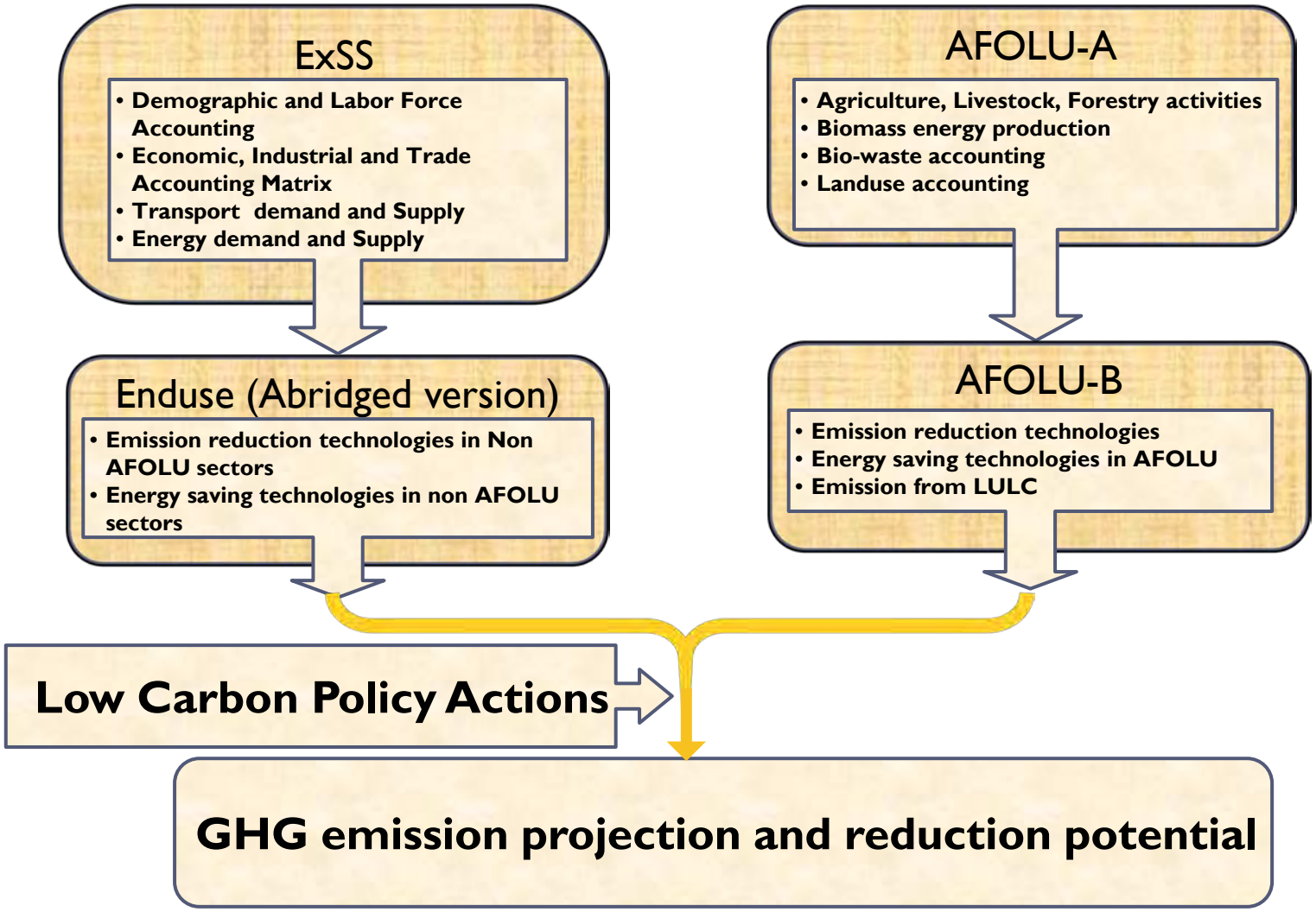
GHG emissions, Energy consumption and Solid Waste disposal in Residential, Commercial, Industrial, Transportation, and Power sectors



GHG emissions, Biowaste generation from AFOLU sectors

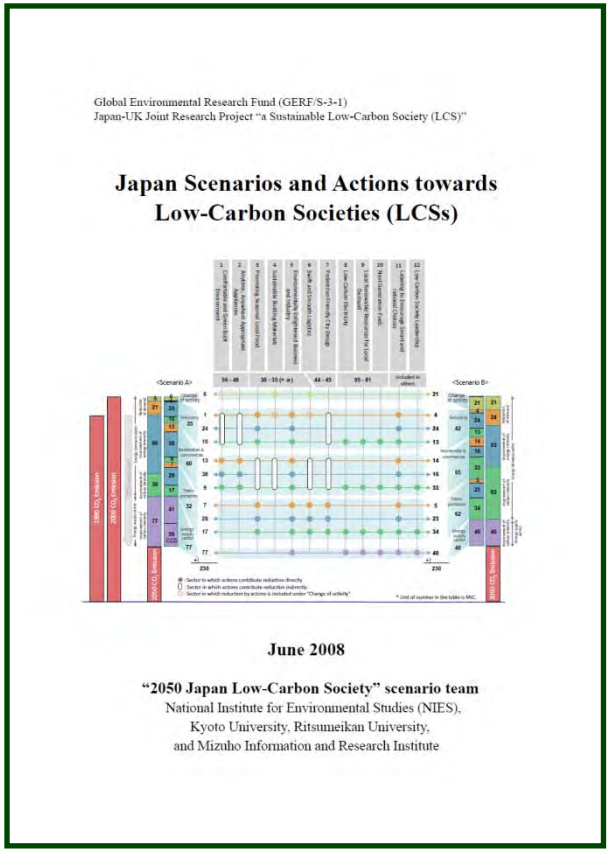
Coupling of ExSS, AFOLU-A and AFOLU-B

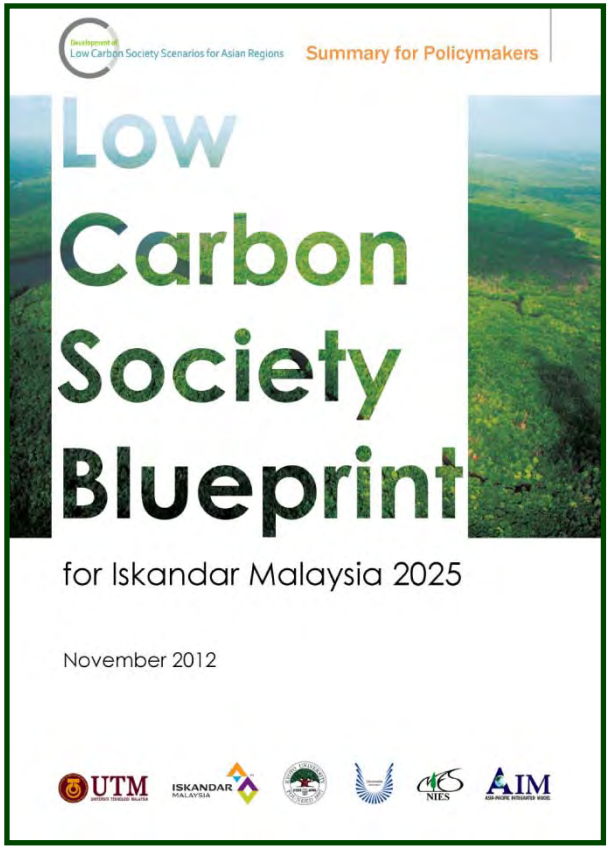
As an integrated design and assessment tool for Low Carbon Policies



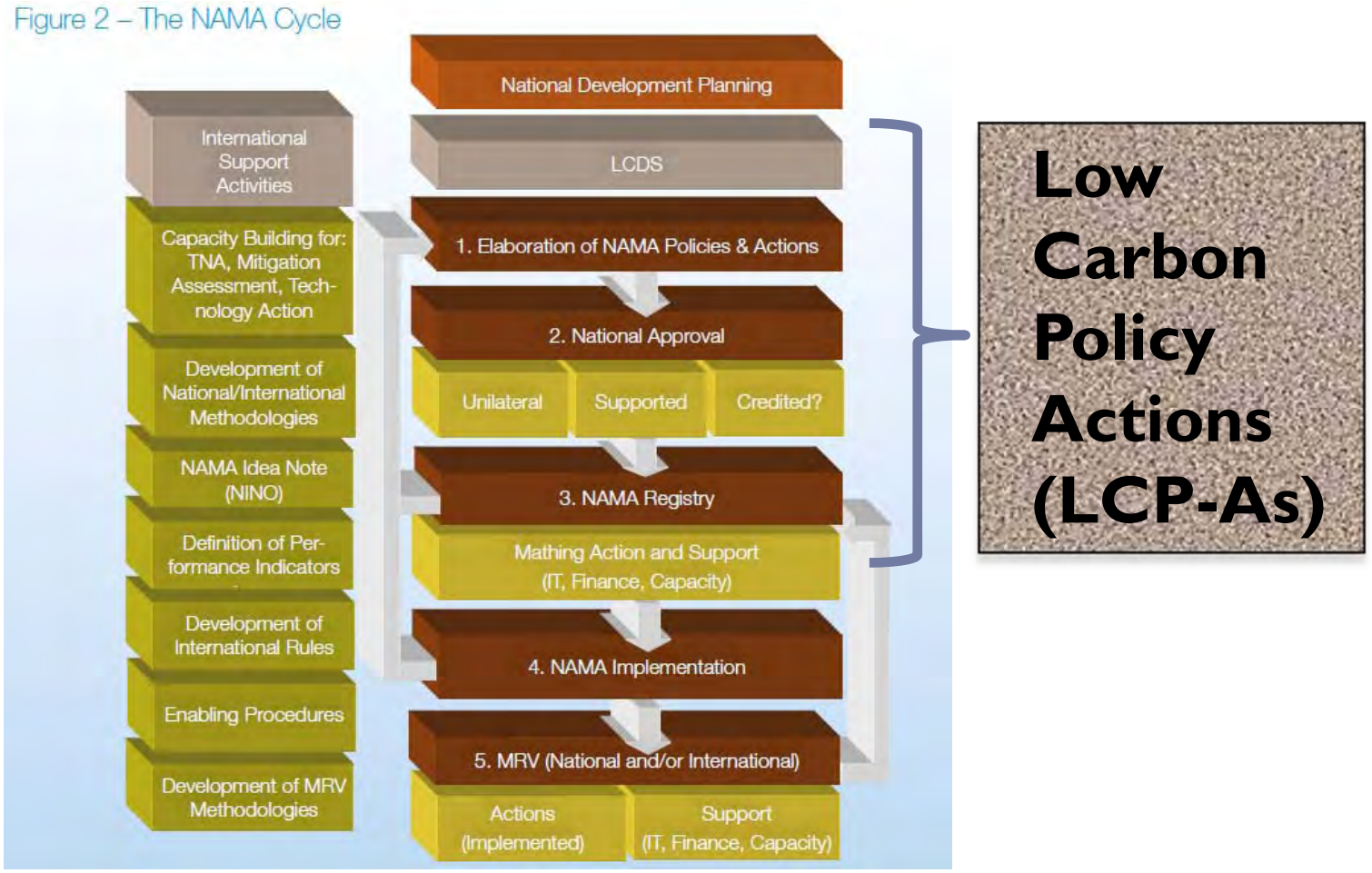
Up to now, we proposed many “Low Carbon Policy Actions (LCP-As)”

For example,





“Low Carbon Policy Actions (LCP-As)” and related LCD framework, such as NAMA



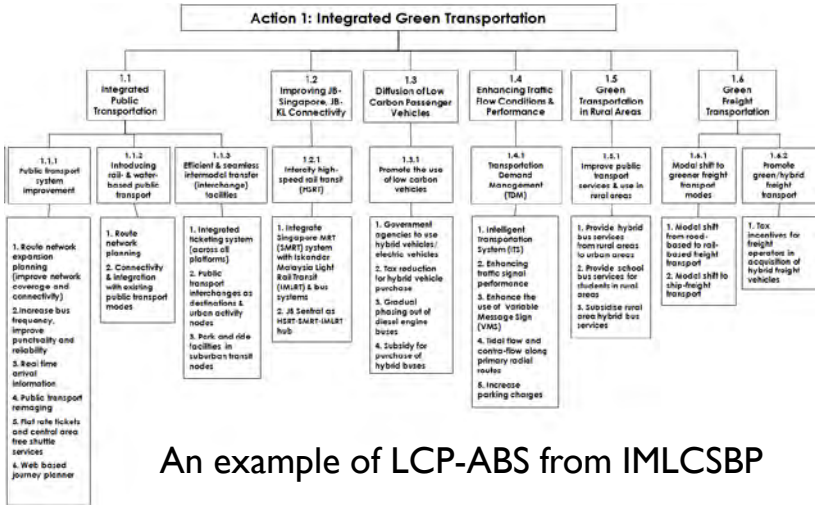
UNEP Riso Centre, 2011, A primer on framing NAMA in Developing Countries

Low Carbon Policy Actions (LCP-As)

- LCP-A is a deliverable-oriented grouping of elementally programs that organizes and totals the scope of the LCP.
- Overall structure of LCP-As is shown with its Work Breakdown Structure (LCP-Action Breakdown Structure). It is a graphical format of hierarchically displaying deliverable measures and projects, which are further broken down into more detailed deliverables.

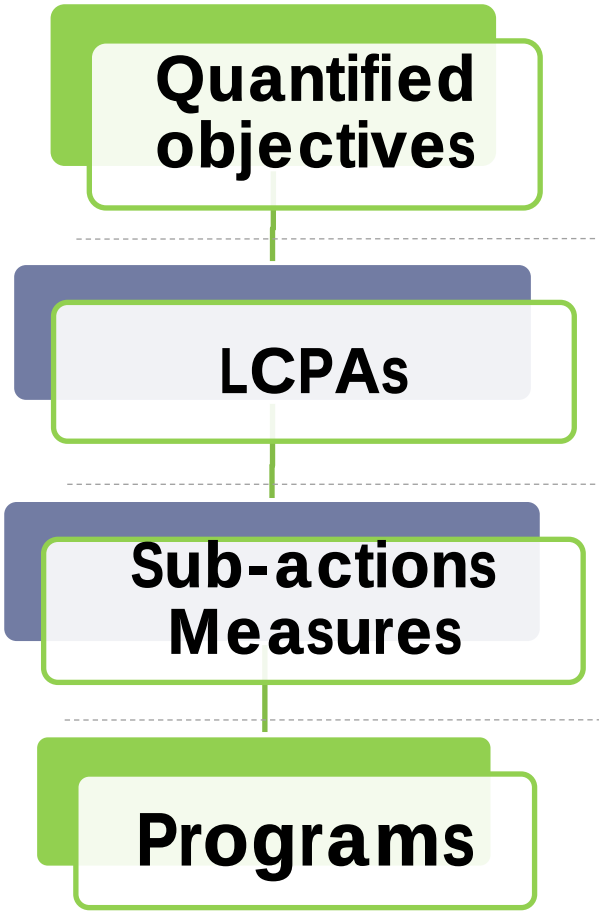
LCPA for Iskandar Malaysia, grouped into three Themes

	Action Names	Themes
1	Integrated Green Transportation	GREEN ECONOMY
2	Green Industry	
3	Low Carbon Urban Governance	
4	Green Building & Construction	
5	Green Energy System & Renewable Energy	
6	Low Carbon Lifestyle	GREEN COMMUNITY
7	Community Engagement & Consensus Building	
8	Walkable, Safe, Livable City Design	GREEN ENVIRONMENT
9	Smart Growth	
10	Green and Blue Infrastructure & Rural Resources	
11	Sustainable Waste Management	
12	Green and Clean Environment	



An example of LCP-ABS from IMLCSBP

Hierarchy of LCPAs system



0 LCP targets, such as 50% cut in carbon emission intensity, creation of 100,000 new job by 2030

1.0 Policy **Actions** needed to achieve the Quantified objectives of the LCP

1.1.1 Subactions/Measures are detailed breakdown and interpretation of actions into strategies with a clearer implementation dimension

1.1.1.1 Programs – Specific activities, deliverables, from which resource requirements, budget, implementation agencies and duration may be identified/estimated

LCP-Action Tools

Tools for designing and managing LCP-As

- LCP-A tools are for
  Connecting outputs of models with LCP-As quantitatively
  Monitoring and management of LCP-As progress

- They are composed of
  - LCP Policy/Action Reference Database
  - LCP-A Breakdown Structures (LCP-ABS, formerly called WBS)
  - LCP-A Specification Cards (LCP-ASPEC)
  - LCP-A Design Structure Matrix (LCP-ADSM)
  - Tool for attributing LCP Quantified targets to each Action program (Action program's RIPPLE effect) (LCP-ARIPPLE)
  - LCP-A Backcasting tool (LCP-ABCT)

LCP-Action Specification Cards (LCP-ASPEC)

Dictionary of a LCP-Action Breakdown Structure

- Describes the Scope statement, Workflow, Timeline of implementation, Required resource, Costing, Implementation organization, Stakeholders, SWOT*, Current status (where you are / how much is done /not done) of the Actions/Projects
- In order to discuss/analyze the Detailed design, Progress management, Sharing and communicating of the relevant information among research groups, implementation agencies and stockholders

Program 1.1.1 (1): Street tree planting for shades

Measure 1.1.1: Providing Comfortable Walkways

Sub-action 1.1: Designing Walkable City Centres & Neighbourhoods

Description

Objective

Time Line of Implementation

Sub-action		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1.1	Street tree planting for shades														

(Describe how this Sub-action will be implemented within this timeline)

Prerequisites of Implementation

Action		Program	Comments
1			
2			

Effects of this Action

Emission Reduction

GHG Emission Reduction
(Chart & Explaination)

Other Effects

Example:
Employment
Identification of Co-benefit

Existing Documentations

Document Name		Chapter	Page	Content
1	Comprehensive Development Plan			
2	Transportation Blue Print			

Stakeholders involved in Implementing

1	Iskandar Regional Development Authority	
2	The Local Authorities within the five (5) Flagship zones in	

SWOT Analysis

Strength	Weakness
Describe how this Program will be a benefit to IM	*What is the weakness of this program.– how will it be a negetive point for IM*
Opportunities	**Threats**
What kind of opportunity/ positive features of this Program	Negative points

An example from IMLCSBP case

* SWOT: Strengths, Weaknesses, Opportunities, and Threats

LCP-Action Design Structure Matrix (LCP-ADSM)

- LCP-ADSM shows relations and interactions among programs in LCP-ABS and crucial parameters/variables/output measure which influence quantified targets of LCPAs, with compact, easily scalable, and intuitively readable representation
- LCP-ADSM is a DSM*1, which has a structure of MDM*2 with four domains*3 , i.e. Player/Actor, Program/Action, Crucial parameter, and Quantified target

*1 DSM (Design Structure Matrix) is a network modeling tool to represent the elements comprising a system and their interactions

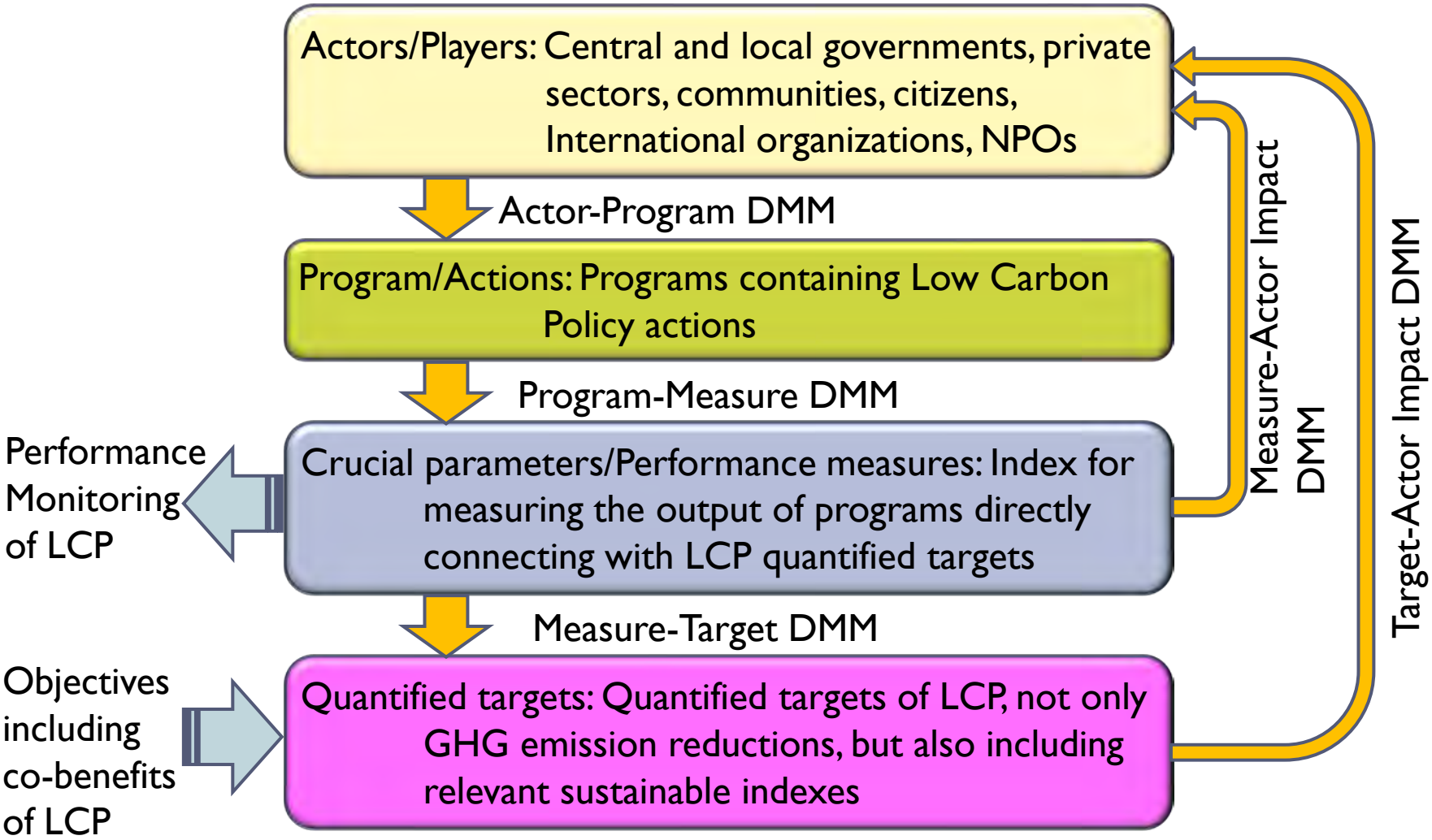
*2 MDM(Multidomain Matrix) is an extension of DSM modeling in which two or more DSM models in different domains are represented simultaneously. Each single-domain DSM is on the diagonal of the MDM, and the off-diagonal blocks are DMMs

*3 Domain is a realm of the elements comprising a DSM model of a system (e.g., product, process, organization, etc.).

*4 DMM (Domain Mapping Matrix) is a non-square matrix mapping the domain of one DSM to the domain of another DSM.

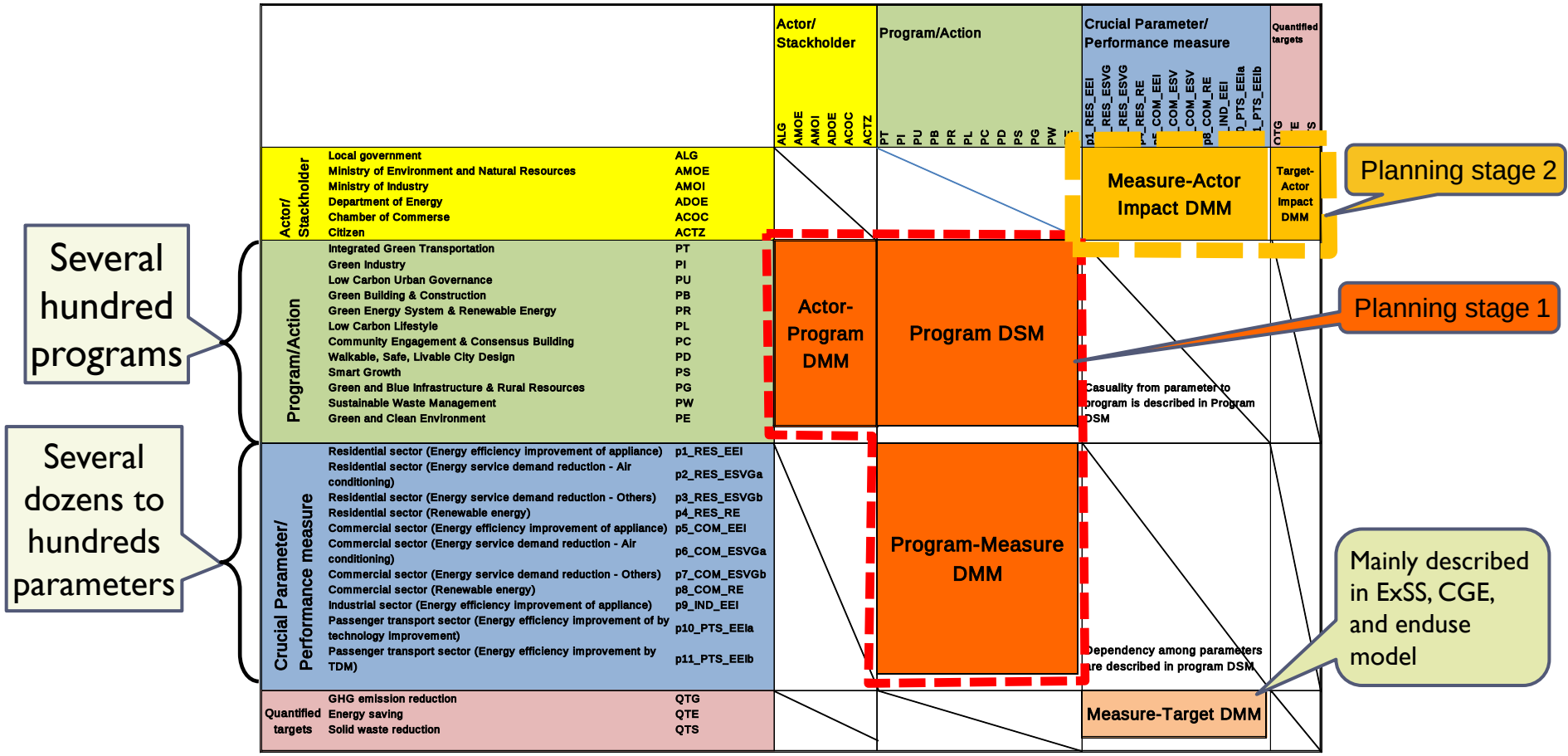
Terminology defined in Eppinger, D. and Browning, T., Design Structure Matrix Methods and Applications, MIT Press, 2012

Four domains in LCP-ADSM



An example of LCP-ADSM

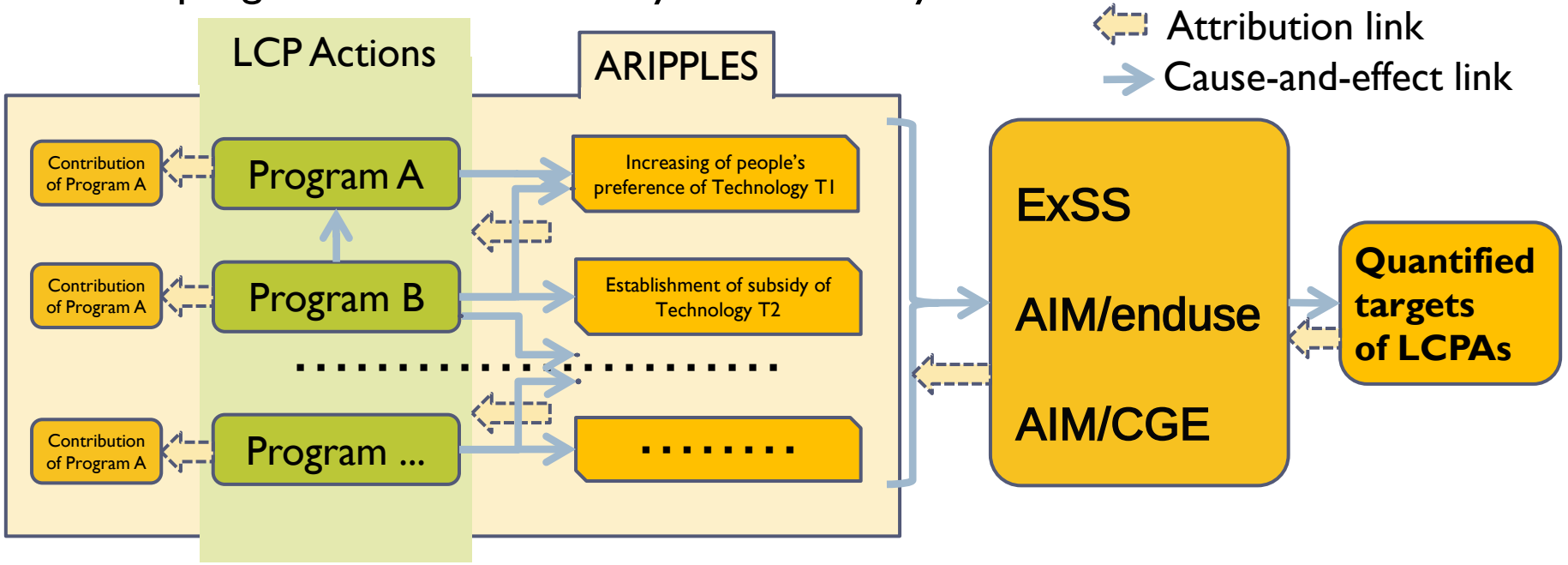
- Direction of information is from column to row
- Elements of matrix denote functional types of relation between column elements and row elements



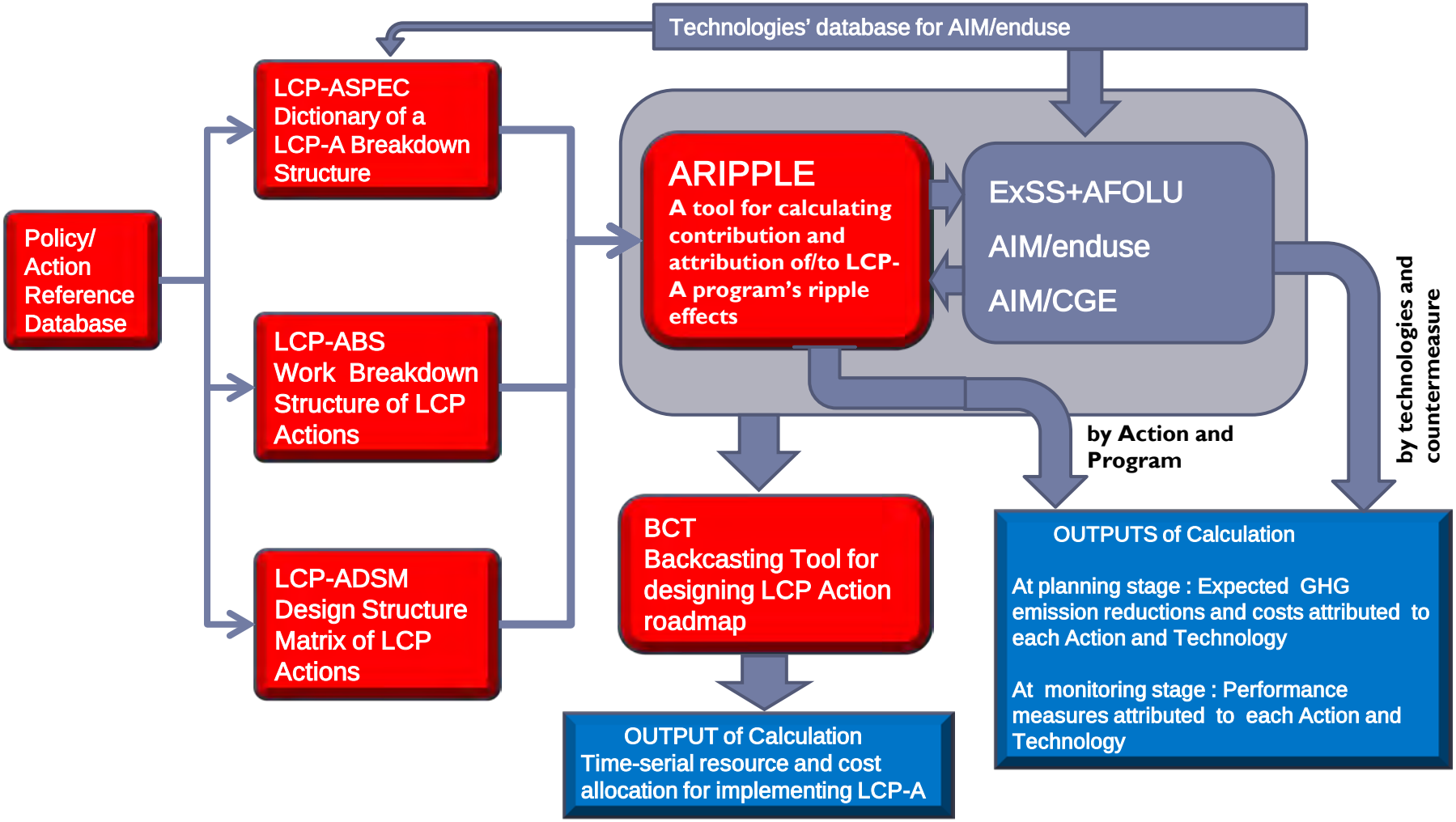
LCP-ARIPPLE

A tool for quantification of causality in planning stage 1 :
To calculate contribution of LCP Action program's ripple effects to quantified targets

- A tool for calculating contributions of LCP-A programs to the objectives of LCP-A, quantitatively, used coupling with ExSS/Enduse/CGE
- Implemented with GAMS/MIP and Excel
- Main input : LCP-ASPEC, LCP-ABS, LCP-ADSM
- Output : Attributed portions of Quantified targets/performance measures to each program and actor, directly and indirectly

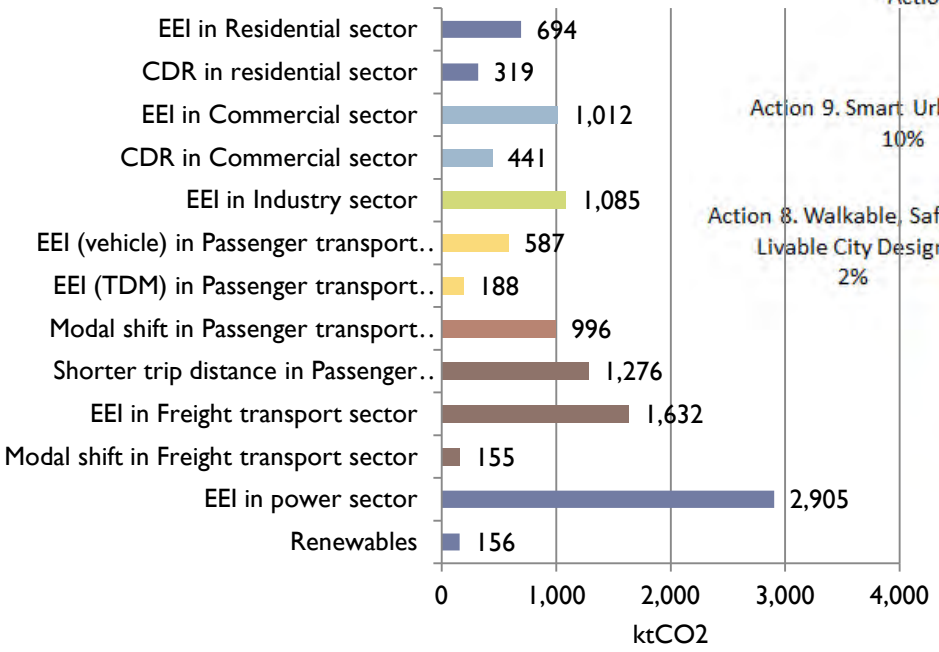


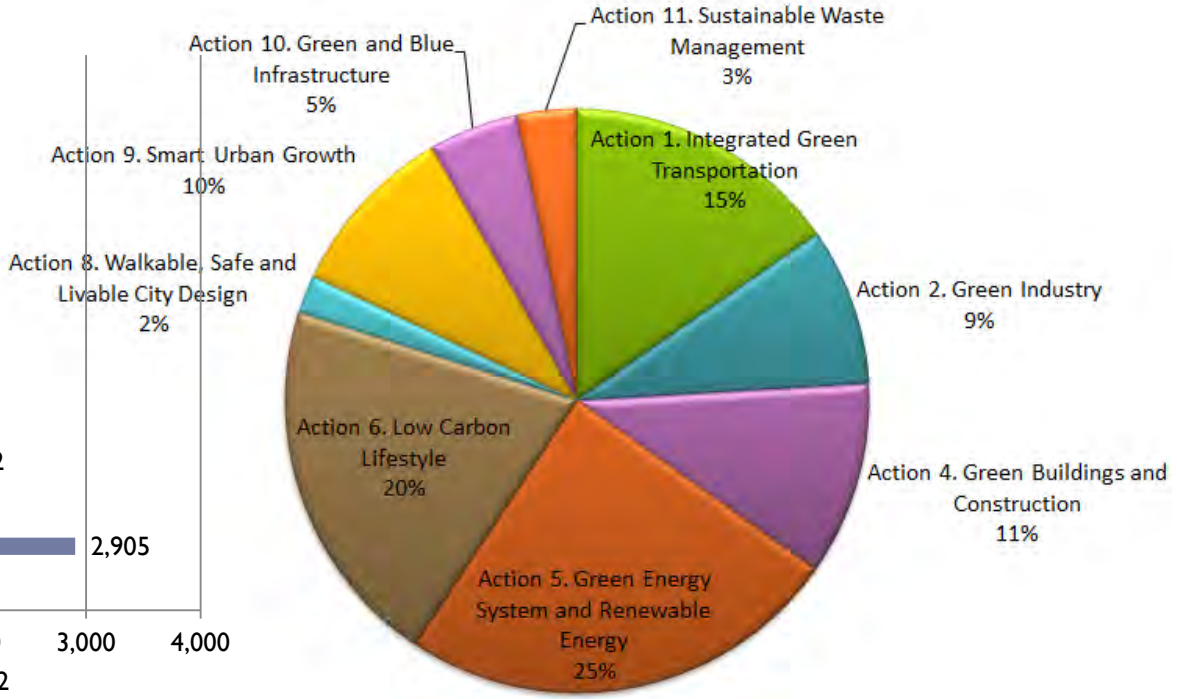
Collaboration framework of Tools for concrete design of LCP-Actions



An example of attribution of GHG emission reduction to LCP-Actions, from IMLCSBP

Green Economy: 59%
Green Community: 21%
Green Environment: 20%





Contribution of Emission reduction by sector/counter-measure

Contributions of Emission reduction by action

As for the preparing LCP-AWS in Asian countries, **Mr. Hibino, MHIR** are requesting each country's AIM mitigation teams to submit LCP-database and AWS, by Feb. 15, 2013

	CHN National	IND National	THA National	THA region	IDN National	MYS National	Bophal
LCP-database	◎	◎	◎	◎	◎	◎	◎
AWS/Buildings	◎	◎	◎	◎	◎	◎	◎
AWS/ Transportation	◎	◎	◎	◎	◎	◎	◎
AWS/Industrial	◎	◎	◎	◎	◎	◎	◎
AWS/Energy	◎	◎	◎	◎	◎	◎	◎
AWS/Agriculture	△	△	△	△	◎	◎	△
AWS/Forestry	△	△	△	△	◎	◎	△

◎ : Mandatory, △ : Voluntary

Model applications conducted in FY2012

	ExSS	CGE	AFOLU-B
National studies			
China		NIES (MPSGE), paper KU (MCP), paper	
India		IIM (MPSGE) KU (MCP), paper	
Thailand	TU (ExSS), brochure, paper	TU(MPSGE) KU (MCP),FY2012	
Indonesia	ITB+KU(ExSS) brochure	KU (MCP), FY2012	NIES+KU
Vietnam	KU (ExSS), brochure, paper	KU (MCP), paper	NIES+KU, brochure, paper
Bangladesh	KU (ExSS), brochure,paper		NIES+KU
Malaysia	UTM+KU (ExSS including Solid waste, Industry sectors), preparing brochure	KU (MCP), FY2012	NIES+KU
Regional studies			
Iskandar, Malaysia	UTM+KU (ExSS), brochure,paper, blueprint		
Putrajaya, Malaysia	UTM+KU(ExSS), brochure,paper		
Guangzhou, China	GIEC+KU(ExSS), preparing brochure		
Kyonggi Province, Korea	SNU+KU(ExSS), preparing brochure		

Model applications scheduled in FY2012-13

Country/Region	ExSS, AFOLU-A, AFOLU-B, LCP-A tools	CGE	AIM/enduse
National studies			
China		MPSGE extended to multi-provincial regions (NIES), MCP version coupled with enduse technology model (KU)	
India		MCP version coupled with enduse technology model (KU)	
Thailand	ExSS coupled with AFOLU-A (KU,TU)	MCP version coupled with enduse technology model (KU)	AIM/enduse (MIHR,TU)
Indonesia	ExSS coupled with AFOLU-A and B, multi-provincial regions (KU, IPB, ITB)	MCP version coupled with enduse technology model (KU)	AIM/enduse (MIHR, ITB)
Vietnam	AFOLU-A coupled with AFOLU-B (KU, ISPONRE)	MCP version coupled with enduse technology model (KU)	
Bangladesh	ExSS coupled with AFOLU-A and B (KU)		
Malaysia	ExSS coupled with AFOLU-A and B (KU,UTM)	MCP version coupled with enduse technology model (KU)	
Cambodia	ExSS coupled with AFOLU-A and B (KU)		
Taiwan, Philippines, Korea		MCP version coupled with enduse technology model (KU)	
Nepal			
Regional studies			
Iskandar, Malaysia	ExSS coupled with LCP-A tools (KU, UTM)		
(not determined), Thailand		(KMUT)	

Brochures published/updated in 2012

Communication and feedbacks of LCS study to real world