Linking National GHG inventory and Low Carbon Society: Some thoughts

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Coverage

- Some issues in linking GHG inventory and LoCAR initiatives
- Southeast Asia GHG inventory example
- National Inventory Management System (NIMS) and LoCARNet Linkages
- Linking GHG Inventory and LoCARNet through NAMAs

Some issues in Linking GHG inventory and LoCAR initiatives

GHG Inventory Fundamentals

- Five pillars (transparency, accuracy, consistency, completeness, comparability)
- Three main components (Methodology, Activity data, Emission factor)
- Quality control: while the inventory is being prepared
- Quality assurance: third party checks on inventory estimates
- Uncertainty reduction
  - Activity data and emission factors
  - Sectoral and sub-regional variability
  - Riding the tier ladder

GHG Inventory and LoCAR

- Developing countries are submitting their national communications to UNFCCC – mostly third NC preparations being initiated now
- Biennial Update Report (BUR) to be also submitted – first in 2014
- GHG inventory updates and nationally appropriate mitigation actions (NAMAs) form main coverage of BUR
- Could LoCAR initiatives use the national GHG inventory and NAMA developments?
- What are the challenges?

Some Issues: GHG Inventory and LoCAR

- IPCC and UNFCCC inventory processes, designs and formats Vs regular LoCAR modeling outputs
- Which GHG inventory software to use? Its similarities with LoCAR modeling efforts?
- How to structure inventory related activity data and emission factor databases so as to link with LoCAR modeling databases?
- How to include detailed bottom-up activity data into national inventory numbers and LoCAR modeling efforts?
- How to create and then continuously improve national inventory management systems? Synergy with LoCARNet?
- How could IGES and other Asia Pacific partners help developing countries in their inventory and NAMA efforts including training of inventory compilers on a continuous basis?

Southeast Asia GHG Inventory Example

GHG Emissions in Southeast Asia

- In 2000, Southeast Asian nations contributed to about 12% of global greenhouse gas emissions
- 31% increase in total GHG emissions over 1990-2000, faster than global average
- Main contributing sectors
  - Over 75% emissions from LULUCF
  - Around 15% emissions from Energy (rising trend)
  - Around 8% emissions from Agriculture

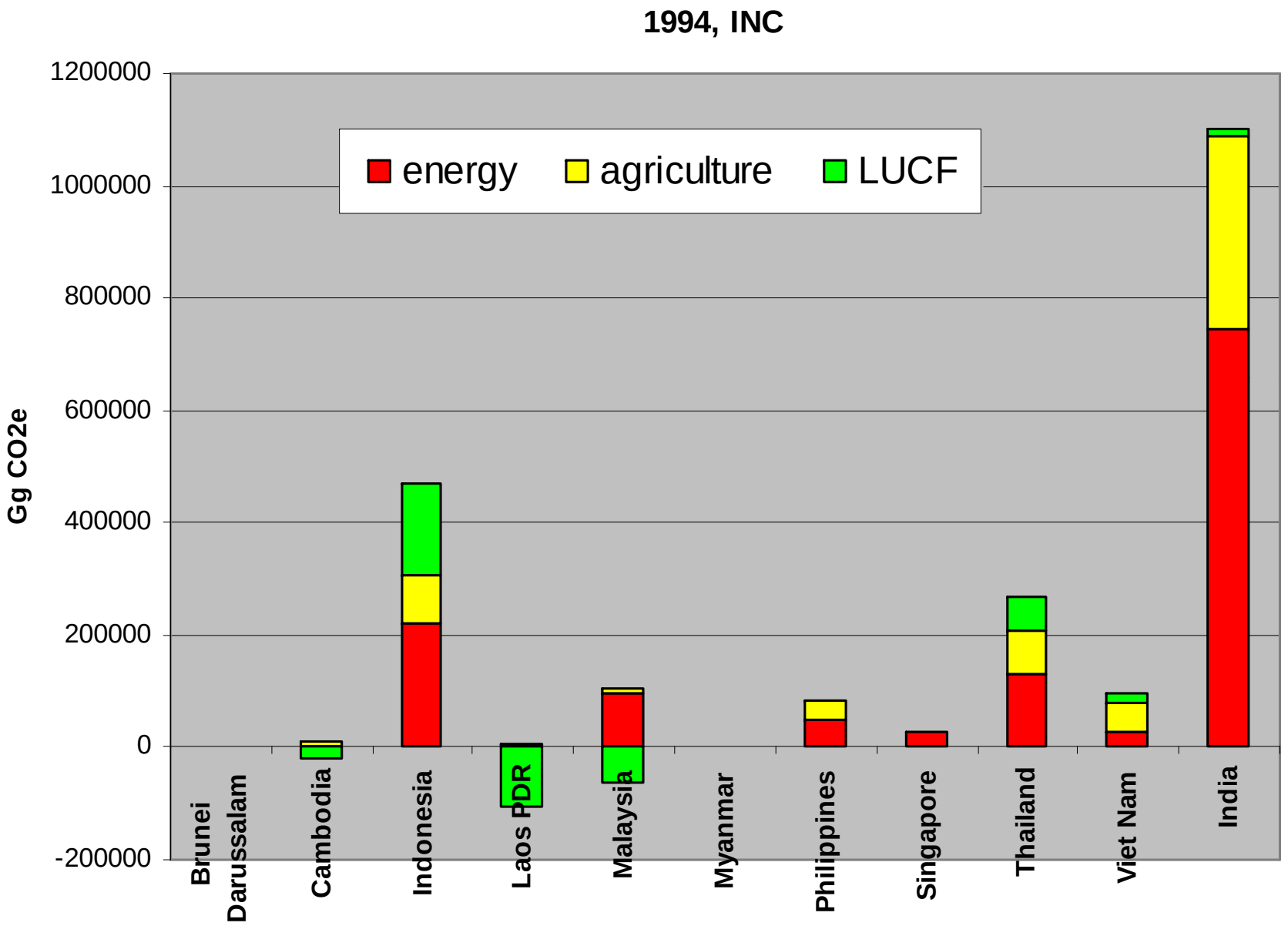
GHG Emissions in Southeast Asia (Mt CO_2)

Sources	1990	1995	2000	% of total GHG	% increase (1990-2000)
Energy	432.6	635.5	971.8	11-18%	125%
Industrial process	25.4	46.4	50.8	1%	100%
Agriculture	336.7	369.3	407.0	7-8%	21%
LULUCF	3232.4	3823.2	3861.0	>75%	19%
Waste	64.4	70.5	76.6	1%	19%
Total	4091.5	4944.9	5367.2		31%

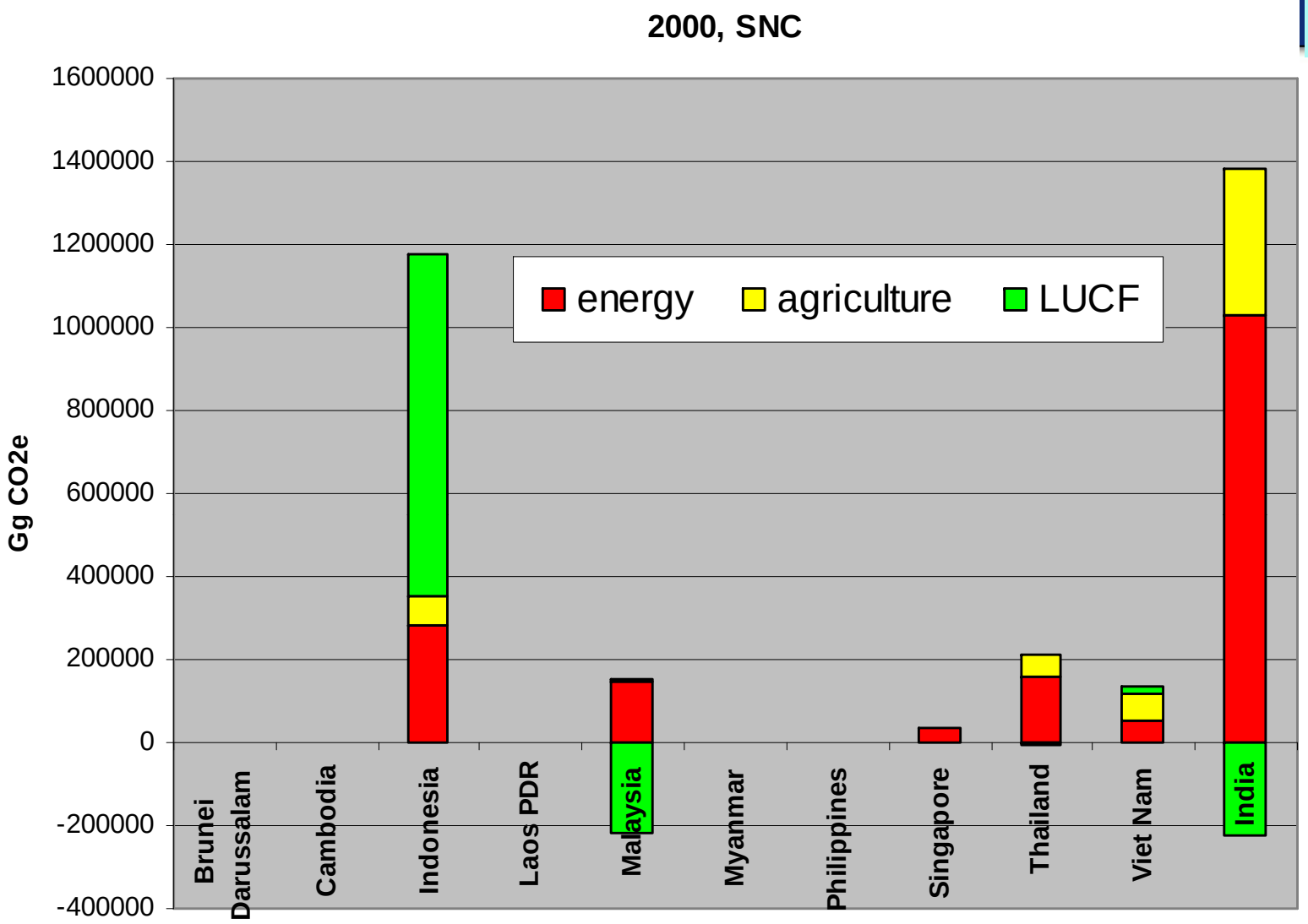
Inventory Years of National Communications

Country	INC	SNC
Brunei Darussalam		
Cambodia	1994	
Indonesia	1994	2000
Laos PDR	1990	
Malaysia	1994	2000
Myanmar		
Philippines	1994	
Singapore	1994	2000
Thailand	1994	2000
Viet Nam	1994	2000
India	1994	2000

Main Sectoral Emissions, 1994



Laos DPR - 1990



LUCF in almost all countries is becoming a larger relative sink during 1994-2000, except Indonesia.

Sectoral GHG Emissions and LoCAR Links

- LUCF, energy and agriculture are key sectors contributing around 95-98% emissions across countries
- Some very quick “key source analysis”
- Sub-sectors to focus for NAMAs and LoCAR initiatives?
  - LUCF: change in forest and other woody biomass
  - LUCF: Forest and grassland conversion
  - Energy: energy industries (power and refineries)
  - Energy: road transport
  - Energy: fugitive emissions from oil and gas
  - Agriculture: rice cultivation
  - Agriculture: livestock (enteric fermentation and manure management)

ASEAN Countries Emission Factors

Countries	NATCOM	Emission factors used
Combodia	INC	Revised 1996 IPCC default
Indonesia	INC	IPCC guidelines
Indonesia	SNC	An uncertainty analysis was conducted (Tier 1) following the Good Practice Guidance (GPG, 2000). The levels of uncertainty for activity data and emission factors were assessed based on expert judgment and consultation with the Centre for Data and Information in the related sectors

ASEAN Countries Emission Factors

Countries	NATCOM	Emission factors used
Laos PDR	INC	IPCC default emission factors
Malaysia	INC	Rice (Thailand EF), all others IPCC default.
Malaysia	SNC	The emission factor for rice fields is taken from Thailand, as the types of paddy grown and the growing methods used were quite similar to those of Malaysia.

ASEAN Countries Emission Factors

Countries	NATCOM	Emission factors used
Philippines	INC	Revised 1996 IPCC Guidelines provide activity data and emission factors for the various sectors of concern, local values were used in place of these data whenever possible.

IRRI Default Parameter Values and Methane Emission Factor for Rice Paddy Cultivation

Water Management Regime	Season length (days)	Methane EF (kg/ha/day)
Irrigated	114	2.3
Rainfed	113	0.4

ASEAN Countries Emission Factors

Countries	NATCOM	Emission factors used
Singapore	INC	IPCC default Emission factors used (Revised 1996 IPCC Guidelines)
Singapore	SNC	

Countries	NATCOM	Emission factors used
Thailand	INC	Inventory of the greenhouse gases followed the 1996 IPCC Revised Guidelines. Local emission factors are applied where available.
Thailand	SNC	

- E.g. methane emissions from paddy fields without fertilizer application vary from 7.49 Gg/sq m to 35.23 Gg/sq m.

ASEAN Countries Emission Factors

Countries	NATCOM	Emission factors used
Viet Nam	INC	1996 IPCC default emission factors (1996 Revised Guidelines)
Viet Nam	SNC	Same

Values of Seasonal Integrate Flow (SIF) of rice paddy with organic and inorganic fertilizers in North Viet Nam

Water management regime	Constantly flooded irrigation	Intermittently flooded irrigation	Rainfed
SIF (g/m^2)	37.5	18.8	30

Indian Efforts

- Tier-3: 7% emissions estimated by tier-3 methodology in INC (1994), 12% for 2000 and 2007
- Country specific EF: 26% source categories used CS EF in 1994, 35% for 2000 and 2007
- The emission factors used in INC and SNC are a mix of default emission factors available in the IPCC publications (1996, 2000, 2003, and 2006) and country-specific emission factors.
- EF measurements conducted for many sources and in almost all sectors

Some Suggestions

- National system establishment for continuous inventory preparation (BUR and NC)
  - Sharing best international and regional practices
  - Training workshops
  - Software (IPCC 2006)
- QA/QC across regions and countries
  - Creating a pool of experts
  - Training

Some Suggestions

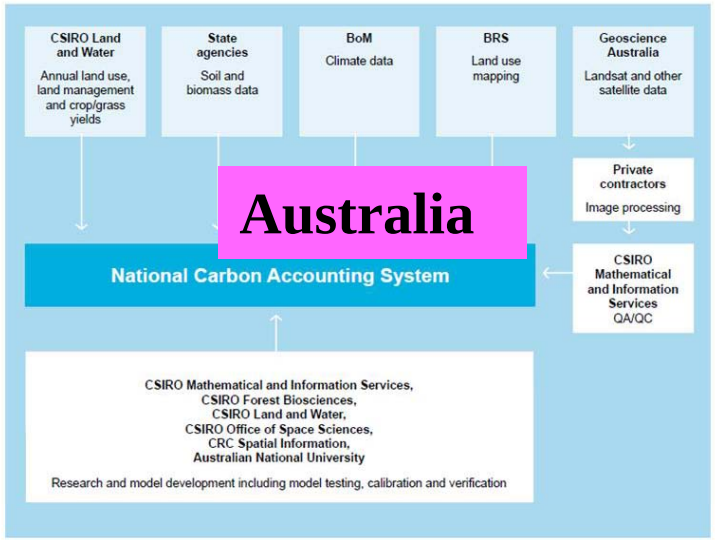
- Activity data uncertainty exists (could be as high as 50% for some source categories)
- Secondary data based reduction of uncertainty
- Focused AD and EF measurement programmes required to enhance consistency, accuracy, transparency and completeness of data
- Time series activity data collation and synthesis
- Consistent framework development (e.g. for data archiving and sharing) for Inventory and LoCAR efforts
- Creating common emission factor database
- Bringing (and training) national GHG inventory compilers into LoCAR and vice versa

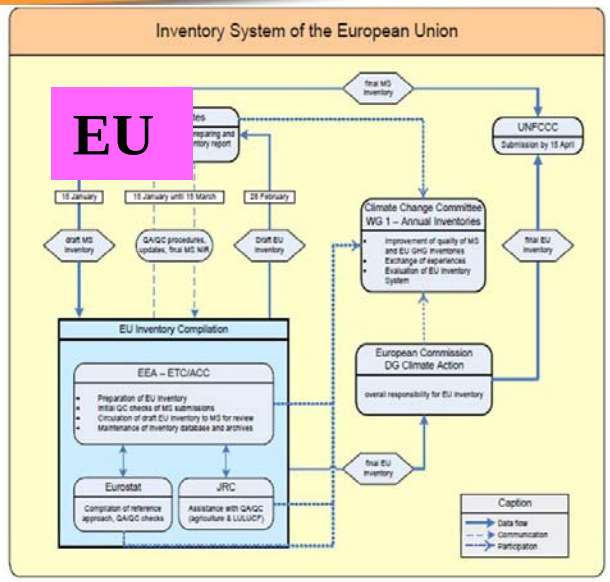
National Inventory Management System (NIMS) and LoCARNet Linkages

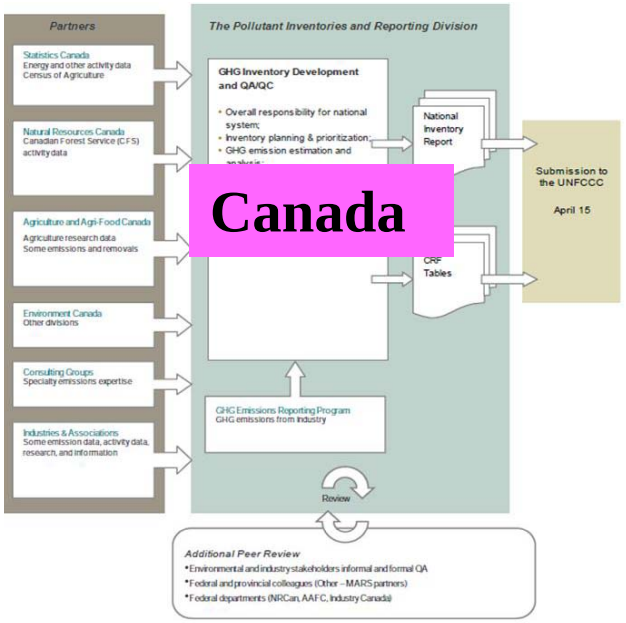
NIMS and LoCARNet

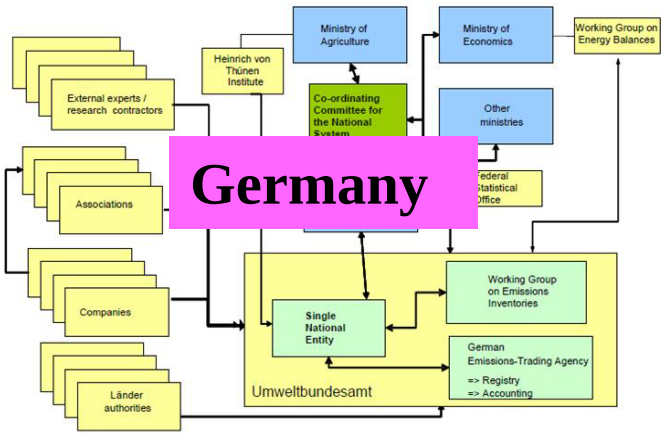
- NIMS is a dynamic system in place for continuous inventory preparation that -
  - Always meets all national reporting commitments to UNFCCC
  - Enhances inventory quality continuously (TACCC)
  - Develops and enhances institutional and human capacity for the same
- Linking NIMS and LoCARNet
  - Soft-linking preferred/ possible
  - Data validation protocols may require much deeper interactions
  - Inviting key national inventory compilers to LoCARNet discussions and workshops (?)
  - Continued institutional and expert level commitments
  - Methodology and software synchronization

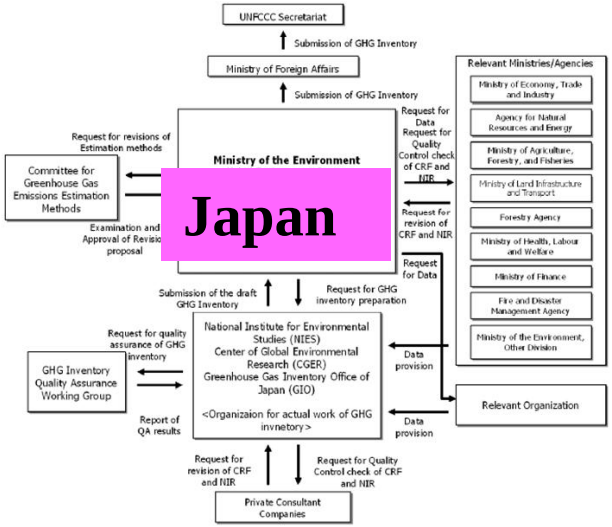
National Systems of Some Annex-1 Countries

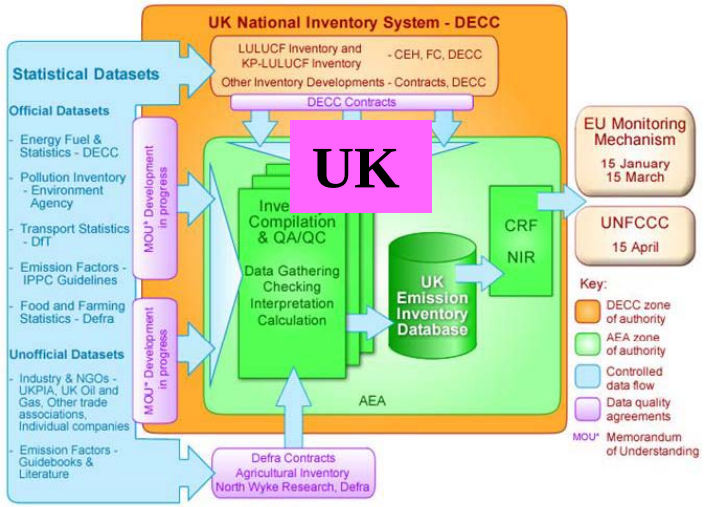












Learning from Other NIMS

Nodal ministry: Normally national Environment Ministry performs this function and has complete control

Legal sanctity of inventory preparatory process: In most of the countries around the world, this is achieved through an act of parliament/decree of nodal ministry.

Sectoral inventory responsibilities: Most of the countries follow a system wherein there is a Lead Institution for each sectoral inventory estimation, duly supported by sectoral expert institutions.

Main (activity) data suppliers: A mix of government departments, government controlled institutions, industry associations and private parties.

Who checks inventory quality?: in-country experts

Who manages Data archiving systems: NIMS nodal agency

Learning from Other NIMS

Software used for preparing inventory: Mostly UNFCCC CRF tables, as these are all Annex I countries who have to report annually as per UNFCCC reporting tables. Each country has developed its own inventory systems and software. German and UK systems are more user friendly, while Japan and USA systems are detailed and complex. IPCC 2006 software are available and good.

IPCC methodology followed: 1996 revised guidelines, GPG LULUCF -2003, 2000 GPG, 2006 GLs

Timelines for inventory cycle: Tight monthly monitoring with specific dates provided to each participating institution for each stage. These are for annual inventory reporting. BUR is biennial.

Linking GHG Inventory and LoCARNet through NAMAs

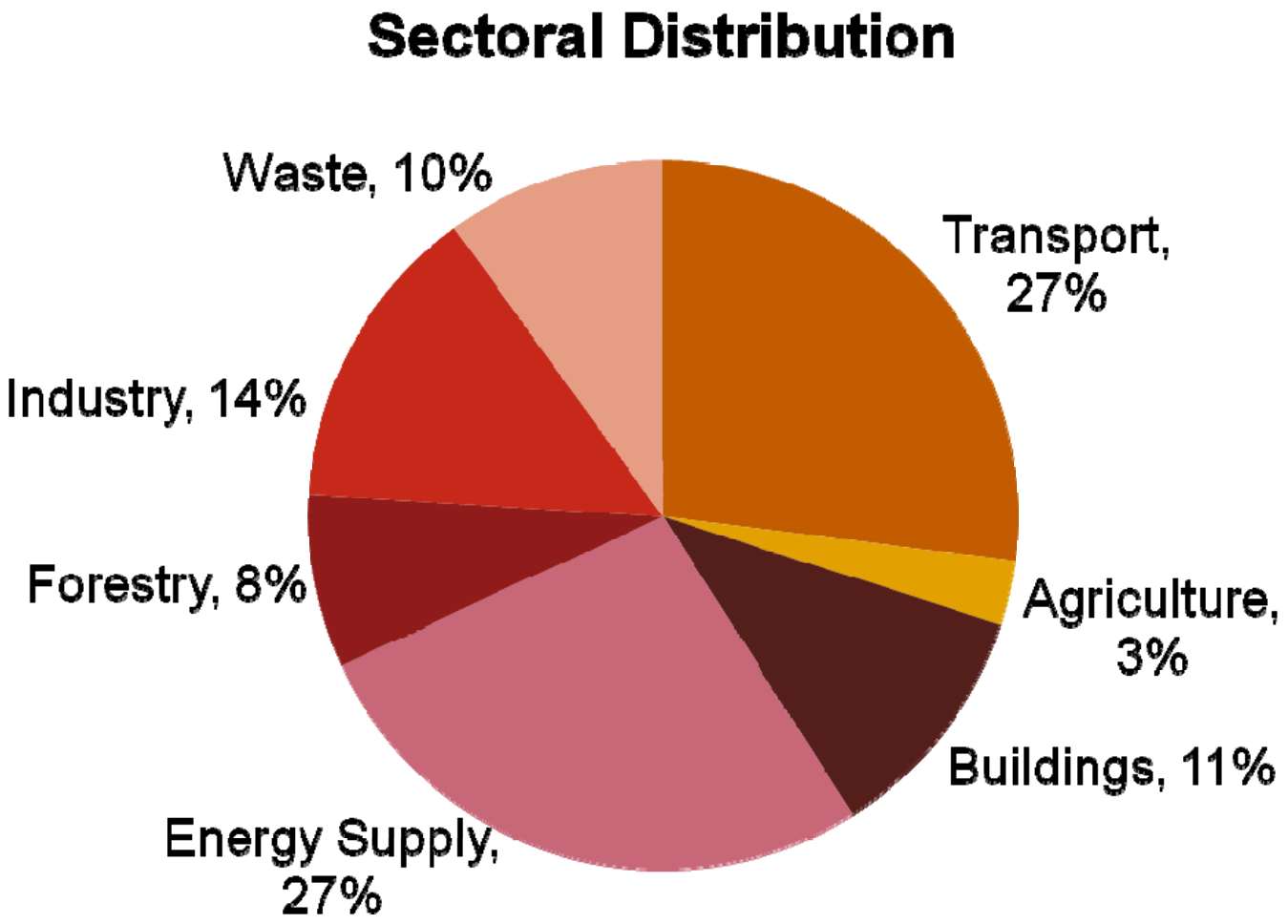
What are NAMAs?

- **Nationally:** Implementation at national level (host country)
- **Appropriate:** Relevant in the national circumstances (nations define their own NAMAs)
- **Mitigation:** of greenhouse gas emissions (co-benefits?)
- **Actions:** Implemented through various programmes

Types of NAMAs

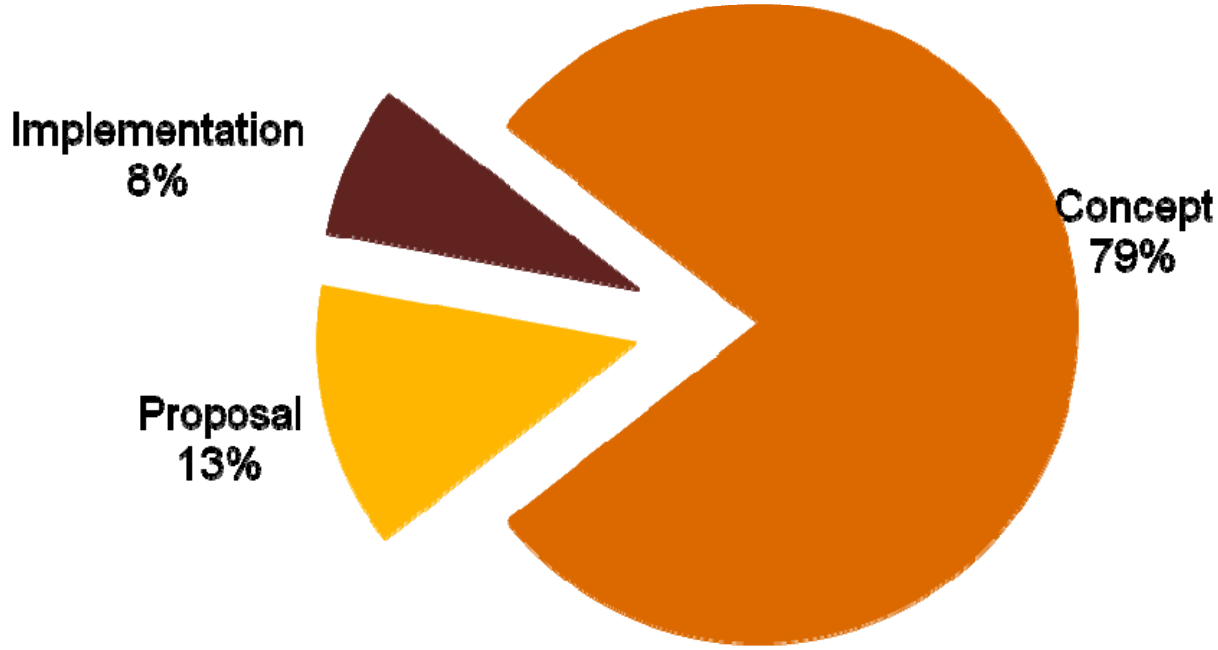
- Differentiation is in **Action** aspects
- **Unilateral NAMAs:** Supported and entirely financed by Host country
- **Supported NAMAs:** Supported internationally
- **Market Based NAMAs:** Generat carbon credits for the compliance market (similar to CDM)

Overview of NAMAs submitted to UNFCCC



Source: Dr Inderjeet Singh, PwC India

Overview of NAMAs submitted to UNFCCC



Concept: Submissions where currently only concepts have been provided

Proposal – submissions where measures have been proposed and are seeking finance

Implementation – submissions where actual implementation has started

Source: Dr Inderjeet Singh, PwC India

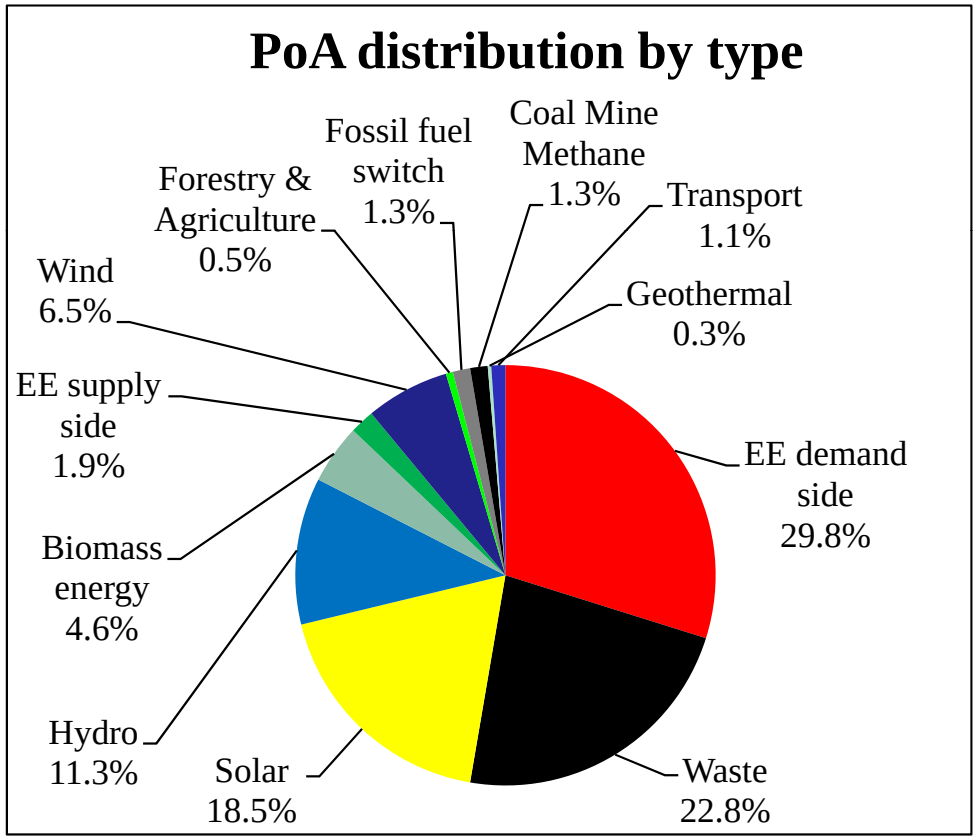
Overview of submitted NAMAs

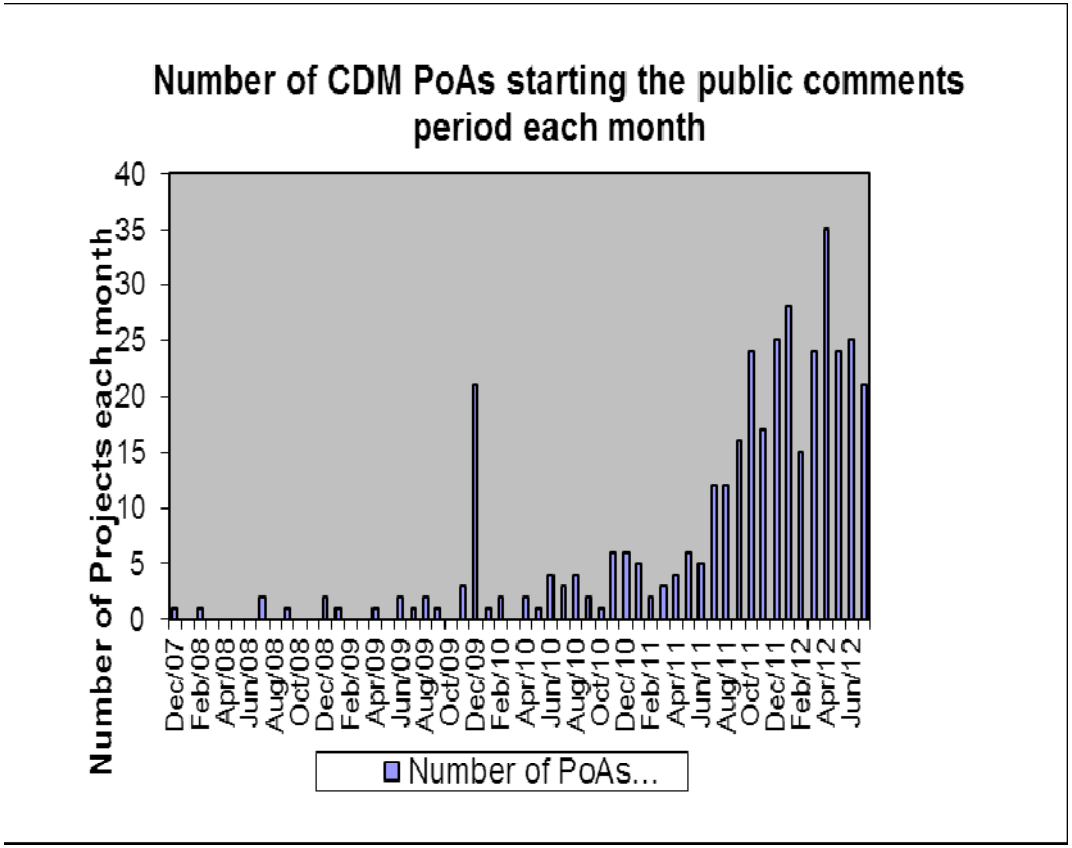
% Reductions in GHG emissions	% Reductions in GHG emissions per unit of GDP	% Increase in forest cover	Targeted % of total national energy from RE
Antigua & Barbuda 1990-2020	China 2005 - 2020	Central African Republic	Colombia
Brazil	India 2005 - 2020	Togo 2005 -2050	
Chile (2007-2020)			
Indonesia			
Israel			
Mexico			
Singapore			

Source: Dr Inderjeet Singh, PwC India

Programme of Activities CDM and NAMAs

- **PoA Projects (as on 01.06.2012)**
- **Projects in pipeline : 372**
- **Total Registered projects : 27**



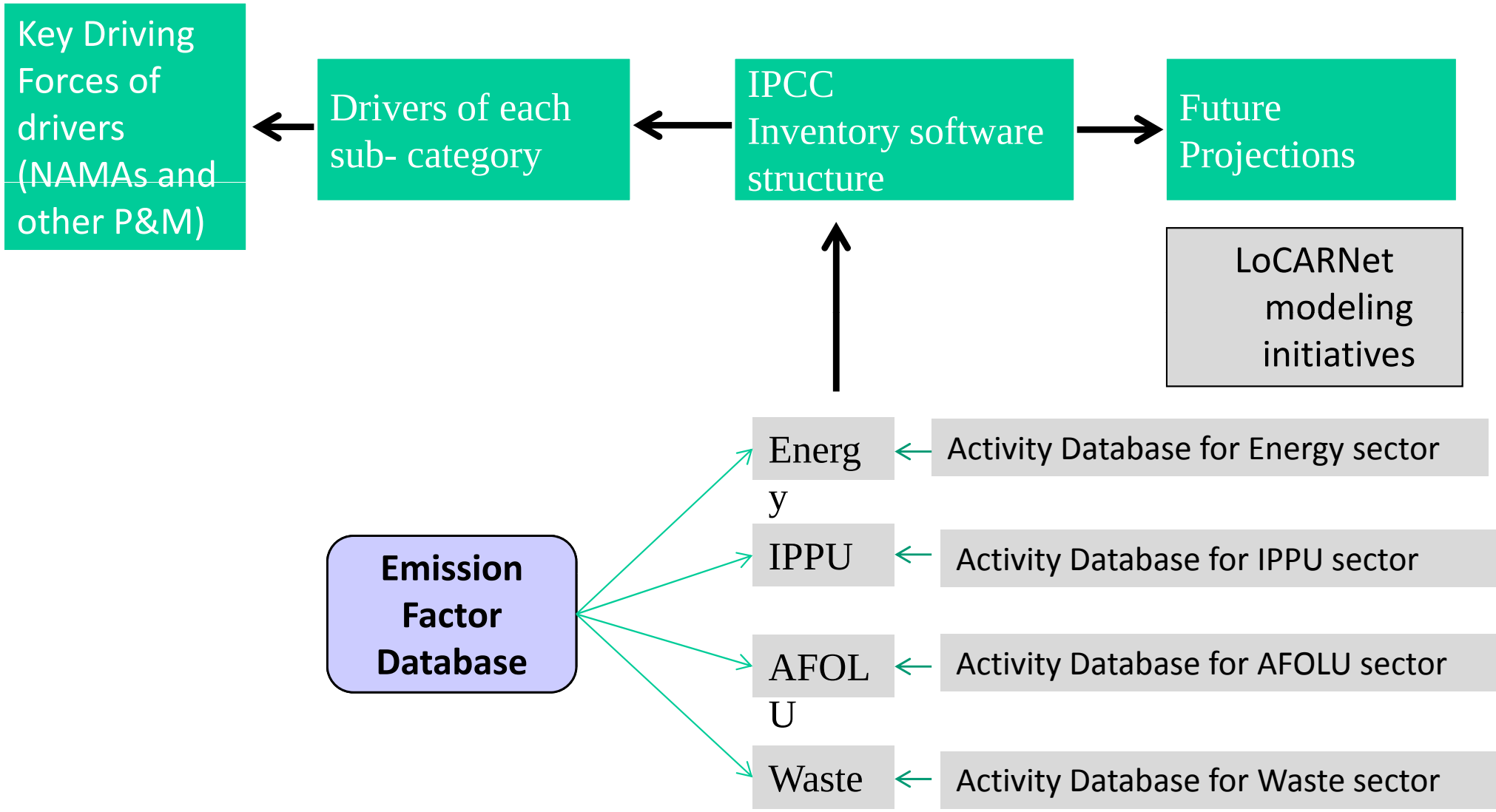


- **3685 ktCO2/yr registered for 1st period**
- **CERs not issued for any project yet**

Mitigation activities targeted by NAMAs

Agriculture	Buildings	Energy Supply	Forestry	Industry	Transport	Waste
• Use of efficient technology in agriculture • Land use change in peat lands to reduce decompositio n	• Solar water heaters • Efficient lighting • Use of efficient equipment	• Renewable energy projects • Increase in % share of renewable energy	• Sustainable forest manageme nt • Afforestati on • Use of efficient fuelwood stoves	• Energy efficient equipment • Reduction in energy intensity	• Truck to rail projects • Increase in share of public transport • Better transit/traffic management systems • Electric vehicles	• Industrial waste treatment • Waste management programmes • Waste to energy

Source: Dr Inderjeet Singh, PwC India


Key Driving Forces of drivers (NAMAs and other P&M)
Drivers of each sub- category
IPCC Inventory software structure
Future Projections
LoCARNet modeling initiatives
Emission Factor Database
Energy
Activity Database for Energy sector
IPPU
Activity Database for IPPU sector
AFOLU
Activity Database for AFOLU sector
Waste
Activity Database for Waste sector

Thanks

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