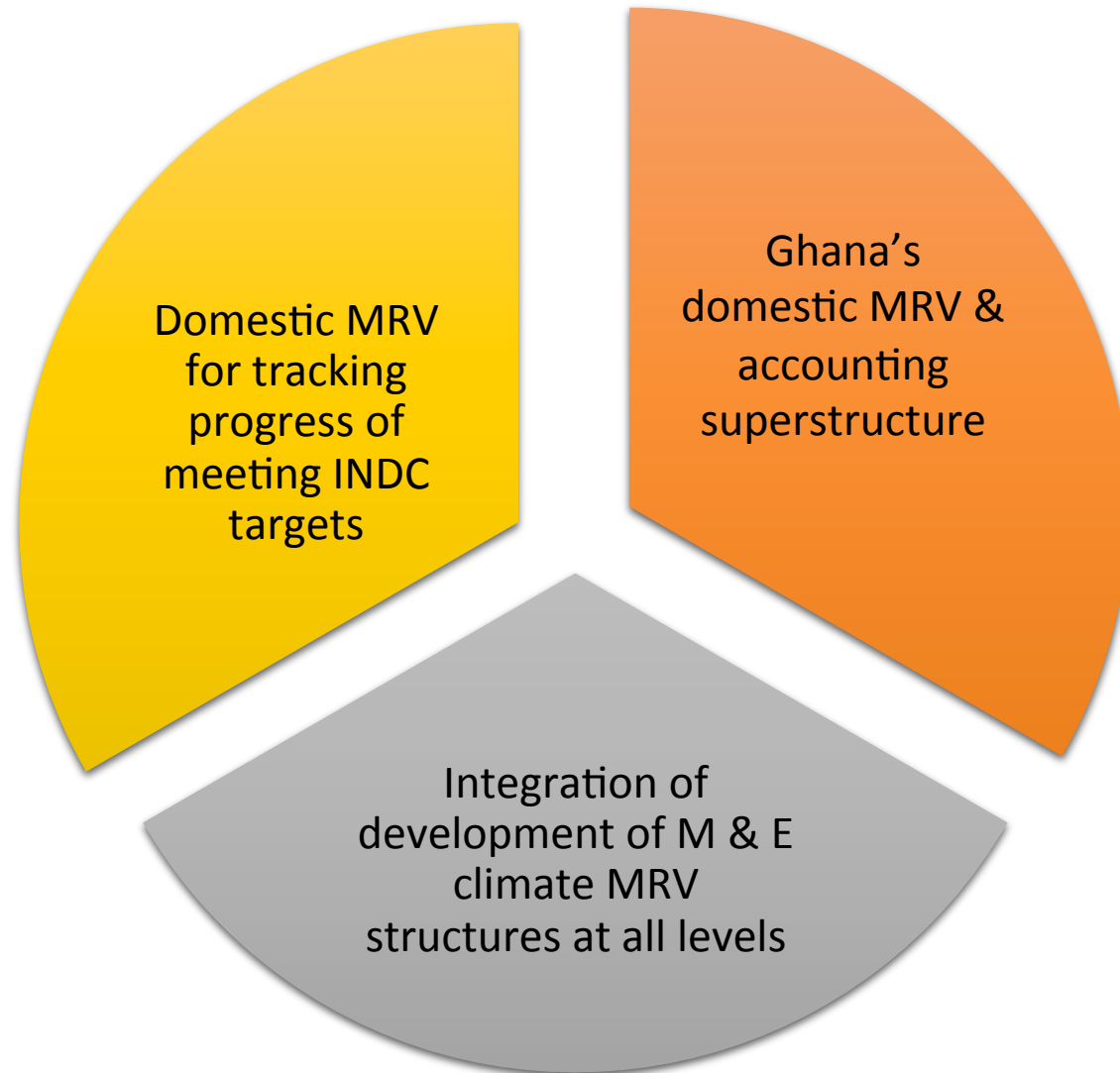




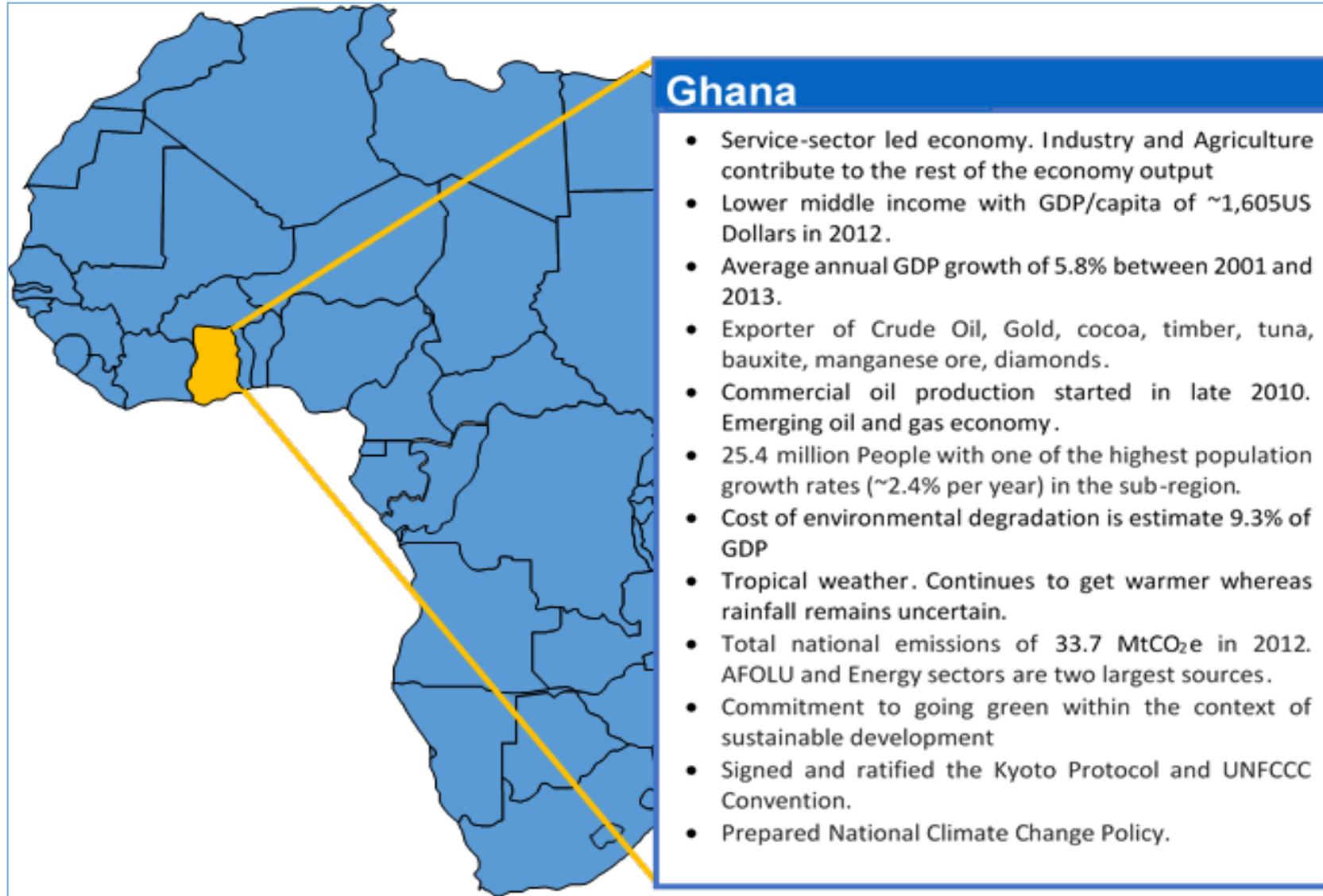
Experience in developing domestic MRV and accounting system for iNDC

Daniel T. Benefoh & Dr. Emmanuel Techie-Obeng
Ghana Environment Protection Agency

What I will talk about



Ghana's national circumstances



Ghana is vulnerable to the negative impacts of climate change

Agriculture

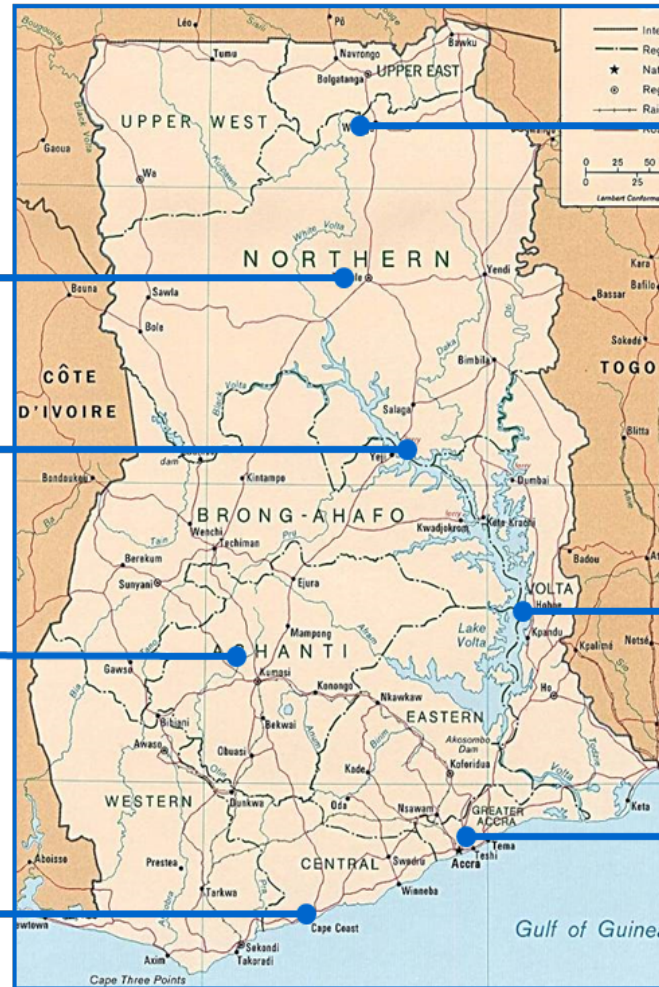
- Change in precipitation and temperature reduce yields

Water

- Variable precipitation increases water stress

Coastal areas

- Rising sea levels increase danger of flooding and coastal erosion



Health

- Changes increase risk of malnutrition, poor sanitation, diseases, and natural disasters

Energy

- Droughts endanger hydro power supply (60-70% of power)

Cities and infrastructure

- Floods and heat impact roads and buildings

Although low levels of GHG emissions but high potential to grow exponentially considering economic development trajectory

Sectors & Sub-sectors	Emissions MtCO ₂ e					% Change		
	1990	2000	2010	2011	2012	1990-2011	2000-2011	2011-2012
1. All Energy (combustion & fugitive)	3.5	5.5	11.3	11.6	13.5	233.0	110.3	15.9
(1.A1,A2&A5) Stationery energy combustion	2.0	2.7	6.5	6.2	7.0	206.5	127.8	13.3
(1.A5) Transport	1.5	2.8	4.8	5.4	6.5	268.3	92.5	19.4
(1.B) Fugitive emission	0.0	0.003	0.001	0.001	0.002	50.0	-81.2	156.5
2. Industrial Process & Product Use	0.8	0.8	0.2	0.4	0.47	-46.0	-43.2	6.5
3. AFOLU	8.6	7.7	14.7	14.0	15.2	240.6	94.0	1.6
3A Livestock	1.7	2.20	2.8	16.5	3.0	194.2	91.9	12.0
3B Land	-3.0	-4.00	1.9	14.08	1.8	63.6	82.5	7.7
3C. Aggregated and Non-CO ₂ emissions				2.8		62.9	27.4	8.9
	9.9	9.52	10.0		10.3			
4. Waste	1.3	2.3	4.2	1.3	4.52	-143.3	-132.7	40.3
Total emissions (excluding AFOLU)	5.6	8.6	15.8	10.0	18.5	0.6	4.8	3.2
Total net emissions (including AFOLU)	14.2	16.3	30.4	30.6	33.7	115.1	87.5	10.0

Inventory Categories	IPCC Code	Mitigation Sectors	Historical Emissions (MtCO ₂ e)		Contribution to National Emissions (%) in 2010
			2000	2010	
Energy	1.A1	Electricity supply	0.48	3.08	10.1%
		Oil Refinery*	0.07	0.15	0.5%
	1.A3	Transportation	2.8	4.80	15.7%
	1.A4	Residential and Commercial	1.48	2.17	7.1%
	1.A2	Industry	0.71	1.11	3.6
Industrial Processes	2		0.78	0.24	0.8
AFOLU (Agriculture)	3A	Agriculture	2.20	2.82	9.2%
AFOLU (Land)	3B	Forest Management	-4.0	1.85	6.1%
AFOLU (Aggregated sources and non-CO ₂ emissions)	3C	Other sources	9.52	9.99	32.8%
Waste	4A, 4B 4C and 4D	Waste Management	2.3	4.24	13.9%
		Total	16.31	30.49	100%

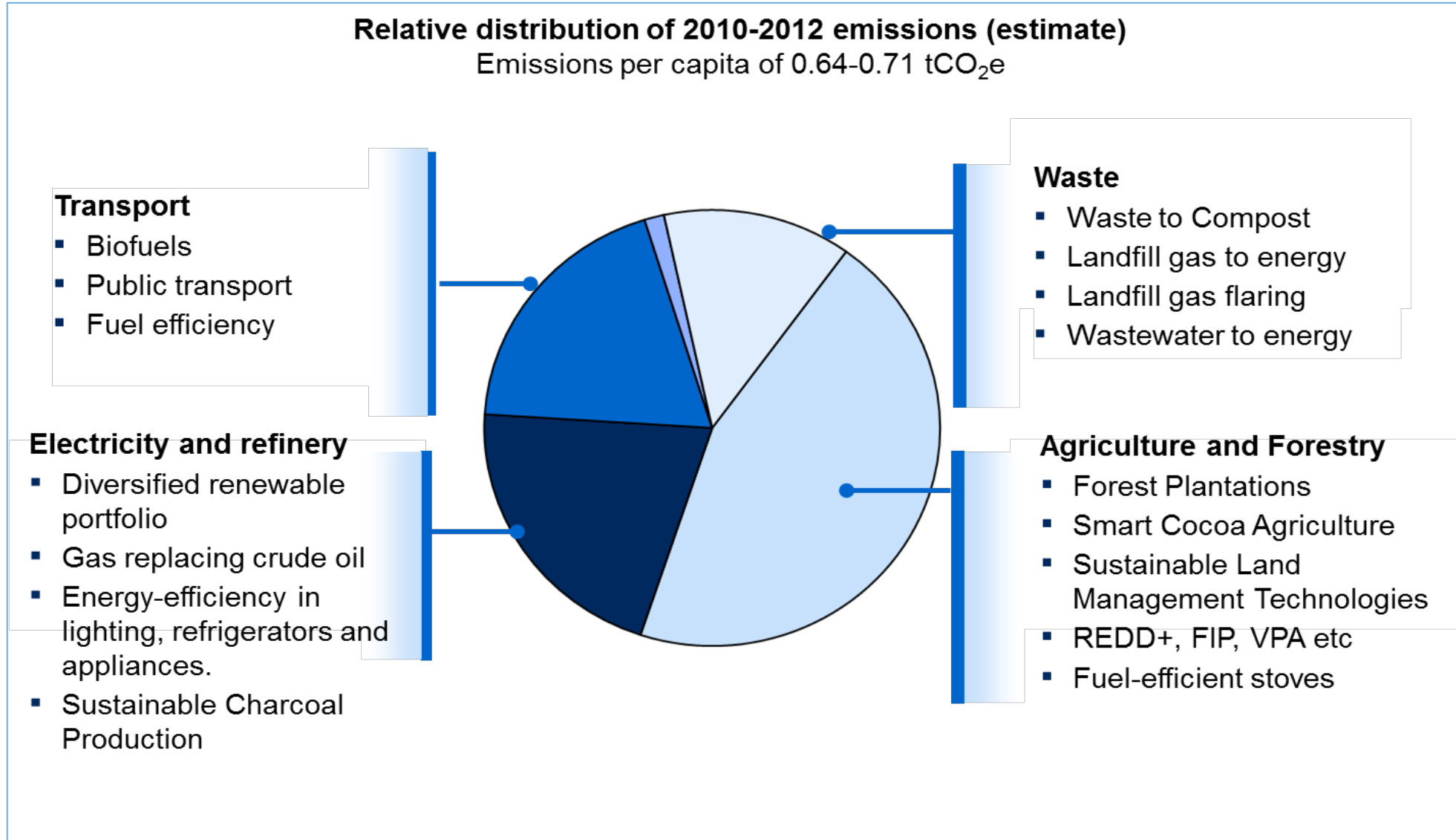
**Energy supply activities other than electricity generation (power supply) are often reported and analyzed in the sector activities such as oil refining under Energy Industries.*

Business as usual emissions scenario up 2020, 2030, 2040

Mitigation Sectors	Emissions (MtCO ₂ e)			
	Base Year 2010	Year 2020	Intermediate Year 2030	Projection End Year 2040
A. Energy sector				
A.1 Energy supply				
A.1.1. Electricity supply	3.08	8.24	20.48	45.18
A.2 Energy demand side management				
A.2.1. Residential and Commercial	2.17	2.20	2.28	13.7
A.2.2. Industry	0.71	2.32	6.17	15.9
A.2.3 Transport	4.80	11.35	22.2	43.14
B. Non-energy sector				
B.1 Forest Management**	1.85	3.07	4.29	5.5
B.2 Solid Waste Management*	1.5	1.57	1.64	1.72
Total	14.11	28.75	57.06	125.14

** Solid waste category only ** focused on CO₂ emissions from the Land category only. In 2010, the total emissions of 14.11 MtCO₂e cover only the mitigation categories*

Cross-section of opportunities for emission reductions



Examples of mitigation action and effects

Mitigation Actions



Description of Effects

Distribute 200,000 solar lantern to rural homes
Cost effective alternative to grid connection
1.29ktCO₂e/yr. emission reduction.
Avoided US\$ 34 million annual subsidy on kerosene
Cost: US\$ 2million. Domestic Contributions



Establish 3.54Mw national grid connected utility-scale solar systems.
Installation of 9,536 solar systems in deprived off-grid communities from 2009 to 2014 (~3.41MW).
5.21ktCO₂e/yr. emission reduction.
Cost: Unknown at time of publication



Replacing incandescent lighting with higher efficiency bulbs.
Cost effective alternative with longer lifespan.
121ktCO₂e/yr. emission reductions.
124MW of peak hour electricity saving. Translated to US\$ 3.6million.
Cost: 15 million. Domestic contributions



Mitigation Actions

Description



- Replacing natural gas from Nigeria with Light Crude oil for electricity generation.
- Lifetime of project expected to save between US\$94 million and US\$109 million from crude oil cost.
- 235.9ktCO₂e/yr. emission reduction.
- Cost - US\$500 million



- Natural Gas Recovery and Utilization from Jubilee Field that Otherwise be Flared or Vented.
- 120million sscf of gas per day for VRA thermal plants
- 148.84ktCO₂e/yr. emission reduction.
- Annual Fuel cost savings US\$ 500,000
- Cost – 1billion. GoG through China Loan.



Mitigation Actions



Description

- Restore the forest cover of 15,300ha of degraded forestlands every year.
- Average 29,000 direct Jobs yearly.
- Produce 370Mt food annually.
- 44.7ktCO₂e/yr. emission reduction.
- Cost: 52 million. GoG and Private sector



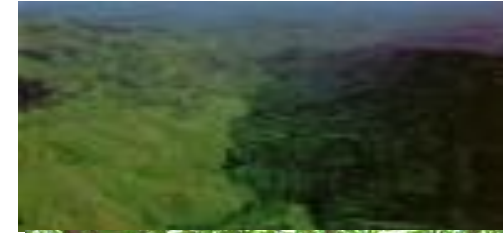
- REDD+ Result-based payment in Cocoa Landscape
- Double yield per ha, average production of 400 kg/ha, and would result in an additional annual income of \$650/ha.
- 1,200 ktCO₂e/yr. emission reduction.
- Cost: ~60 million. World Bank



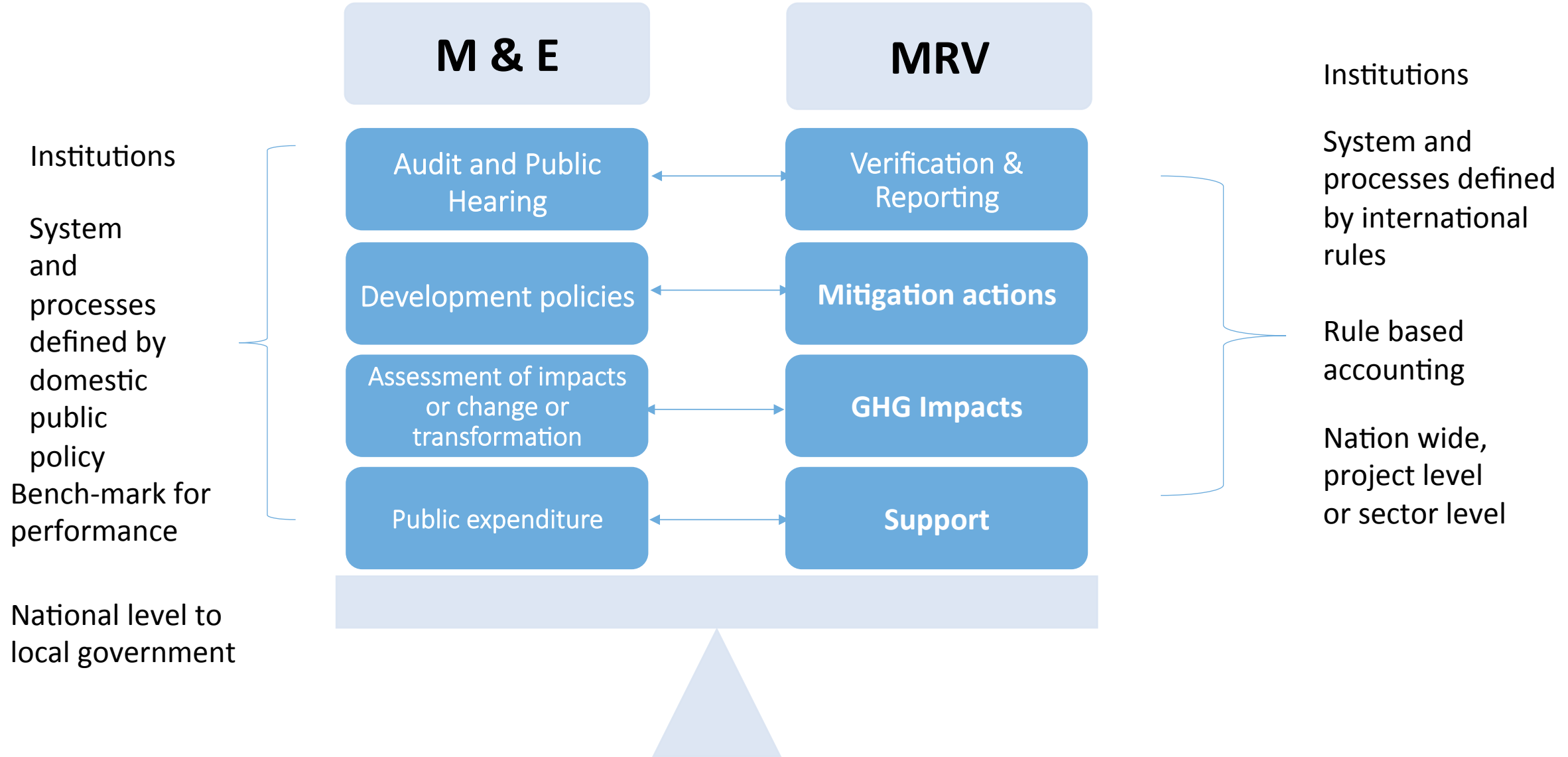
- Promote Climate-Smart Cocoa Landscapes in 110,000 ha cocoa landscape
- Conservation of biodiversity ecological networks and corridors
- 440ktCO₂e/yr. emission reduction
- Cost: 50million. World Bank, IFC, AFDB



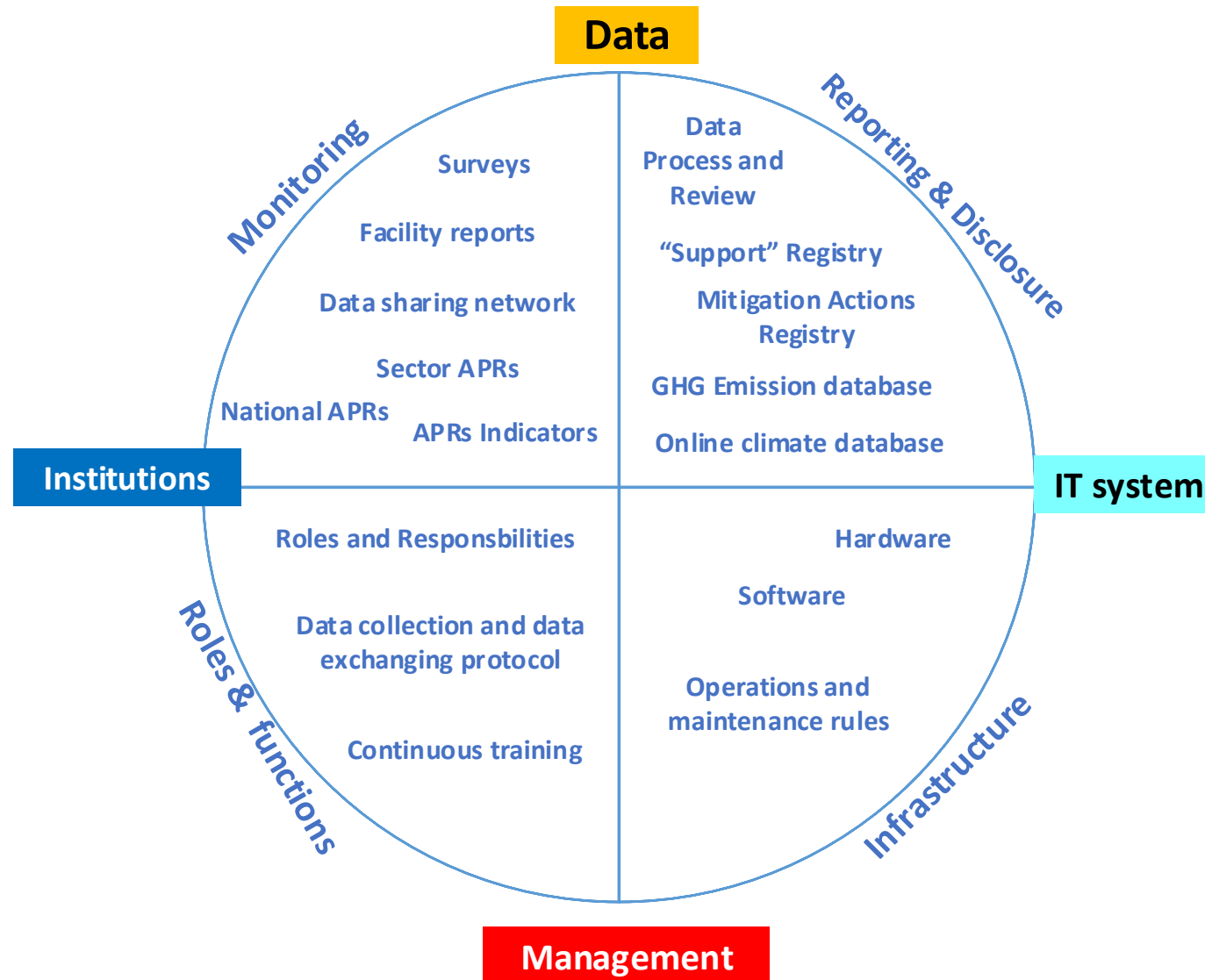
- Landscape approach to sustainable land and watershed management.
- Livelihood support
- 2.6 ktCO₂e/yr. emission reduction
- Cost: 8.75million. GEF/World Bank



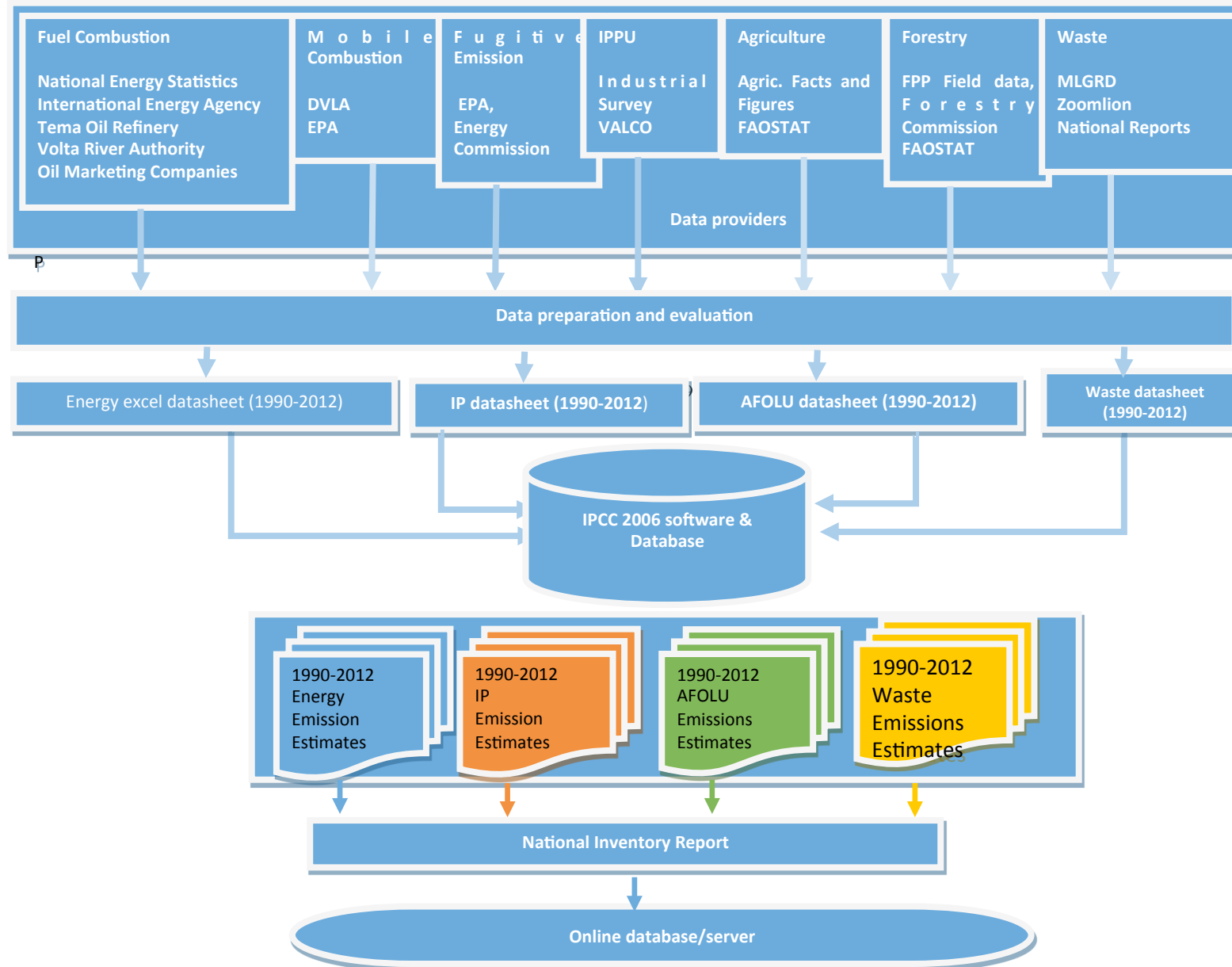
Approach to setting up our domestic MRV



Integration of development M & E structures and MRV system



Elements of “national arrangement” for accounting



Online data management platform



Climate Change Data Hub



[Search Options & Glossary](#)

[Partners & Collaborators](#)

[Submit information](#)

[Sponsors](#)

WELCOME

The Ghana's climate change database hub and project registry has been developed as part of the reforms introduced into the national system for climate reporting under the third national communication. The hub contains data and information collected from various actors in the implementation of the climate change activities in Ghana. The data was collected through internet and field surveys to identify, profile and map out institutions, projects and policies under implementation. The hubs provided seamless access to three dataset on climate change in Ghana. These are (a) greenhouse inventory data, (b) domestic registry of climate change initiatives and (c) dashboard of climate change policies and measures. The data and information contained in hub are already processed and updated to 2012 and will be regularly updated as new dataset come through the data exchange pipeline. The data in the hub is publicly available except the GHG database that some of the data will be restricted because of its confidential nature. The purpose of this hub is to be able to collect, collate, process, compile and disclose (a) data sources for estimating GHG emissions (b) tracking all climate change projects and programme and assess its impacts and above all (c) monitor the progress of implementation of climate change and related policies and measures in Ghana. It is the expectation of the Agency that, this hub will be useful to policy makers, researchers, students, business and the private sector and the general public to access regularly updated information and data on climate change in one-stop-shop dashboard, ensure frequent flow and exchange climate change information among the key actors, (c) help tracking the impacts of policies, measures, programmes and projects in addressing the impacts of climate change as well as addressing any future climate change.

EMISSION DATABASE



The GHG emissions database contains archive data (mainly activity data) used for the generation of the national estimates. The database is designed to help improve archiving all data used in the GHG inventory and also ensure that the general public have access to them in near real time. Apart from providing improved access to the emission data, it will also serve as an hub for data sharing among the data providers. The data models are designed in two formats.

Part of the database contains all the data files of activity data used in all the GHG inventory sectors from 1990 to 2012. The other part of the database contains primary data inputs from the disaggregated sub-categories to the sector level. The access to different parts of the database is restricted. The general public can have access to the open-source end of the database which contains publicly-available national data in file formats. Access to the primary data section is restricted.

DOMESTIC ELECTRONIC REGISTRY SYSTEM (DERS)



The DERS is a centralised data point for climate change and related initiatives in Ghana. The database contains information on all climate change initiatives in Ghana that have been implemented or under implementation and being planned. Additional information on the sources of support available to the initiative and monitoring of impacts of implementation are provided in the database. At this initial stage, the DERS is anchored on a simple spreadsheet designed to support; (a) tracking climate change initiative and support in Ghana, (b) assess the overall impacts and (c) disclose them to the general public bi-quarterly. As the data increase in capacity, the database will be regularly updated to accommodate it.

DASHBOARD OF GHANA'S CLIMATE CHANGE POLICIES & MEASURES DATABASE



The D-PaMs is the dashboard of policies and measures of all climate related policies and measures in the productive economic sectors in Ghana. The dashboard has a tracker which is meant to track the progress of implementation towards attainment of its goals. The impacts, achievement and envisaged actions toward achieving its strategic objectives are also contained in the database.

[Ministry of Science, Environment](#)

[National Development Planning Commission](#)

[Ministry of Finance](#)

[Ministry of Energy and Petroleum](#)

[Ministry of Lands & Natural Resources](#)

[Ghana Statistical Services](#)

Ghana Climate Trends

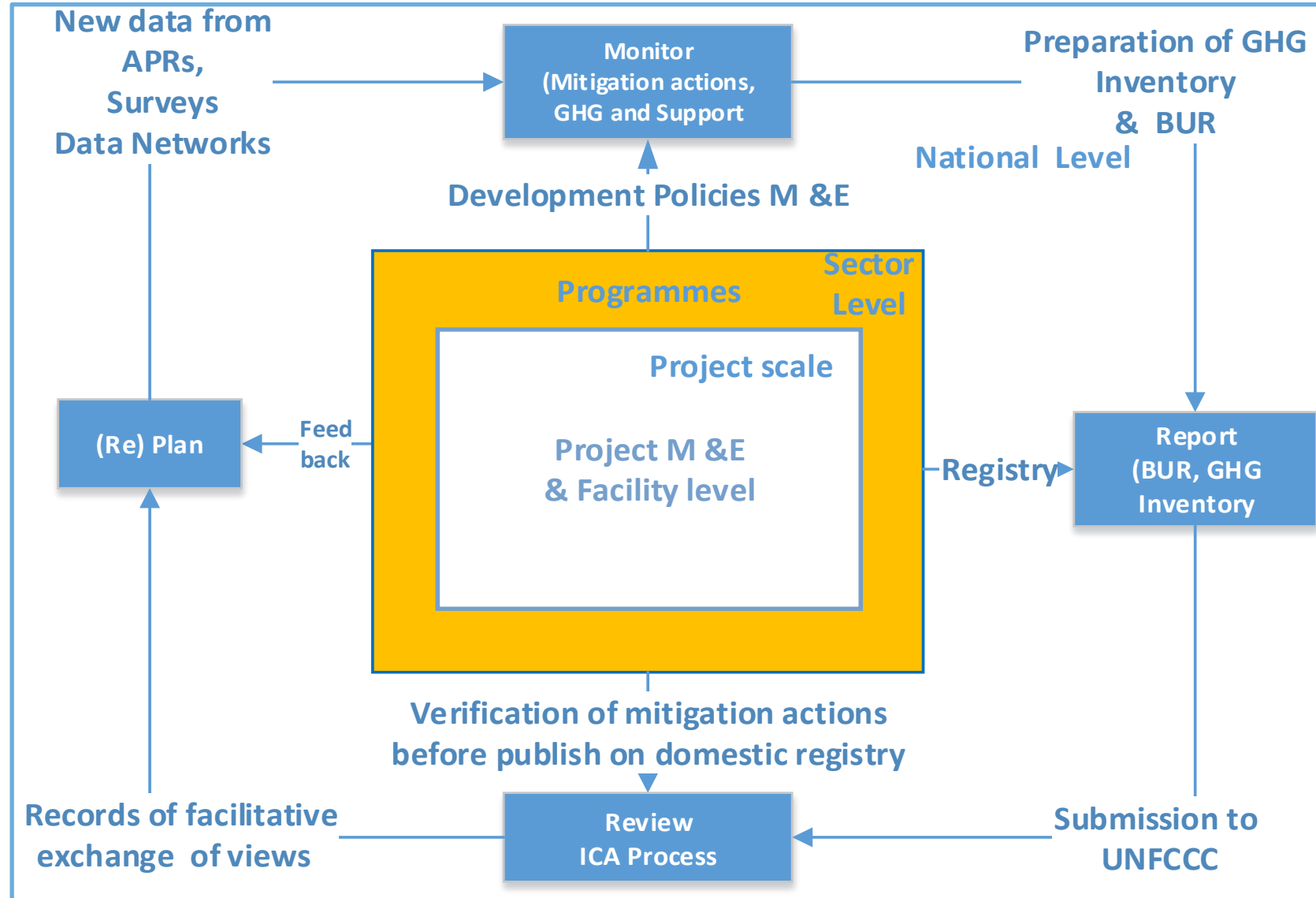
Emission Baselines

- National Emissions Stock (2012)
- National Emissions Stock (1990)
- Emission Per Capita
- CO₂/GDP @ Constant Price
- Projected Future Emission
- Key Emission Sources

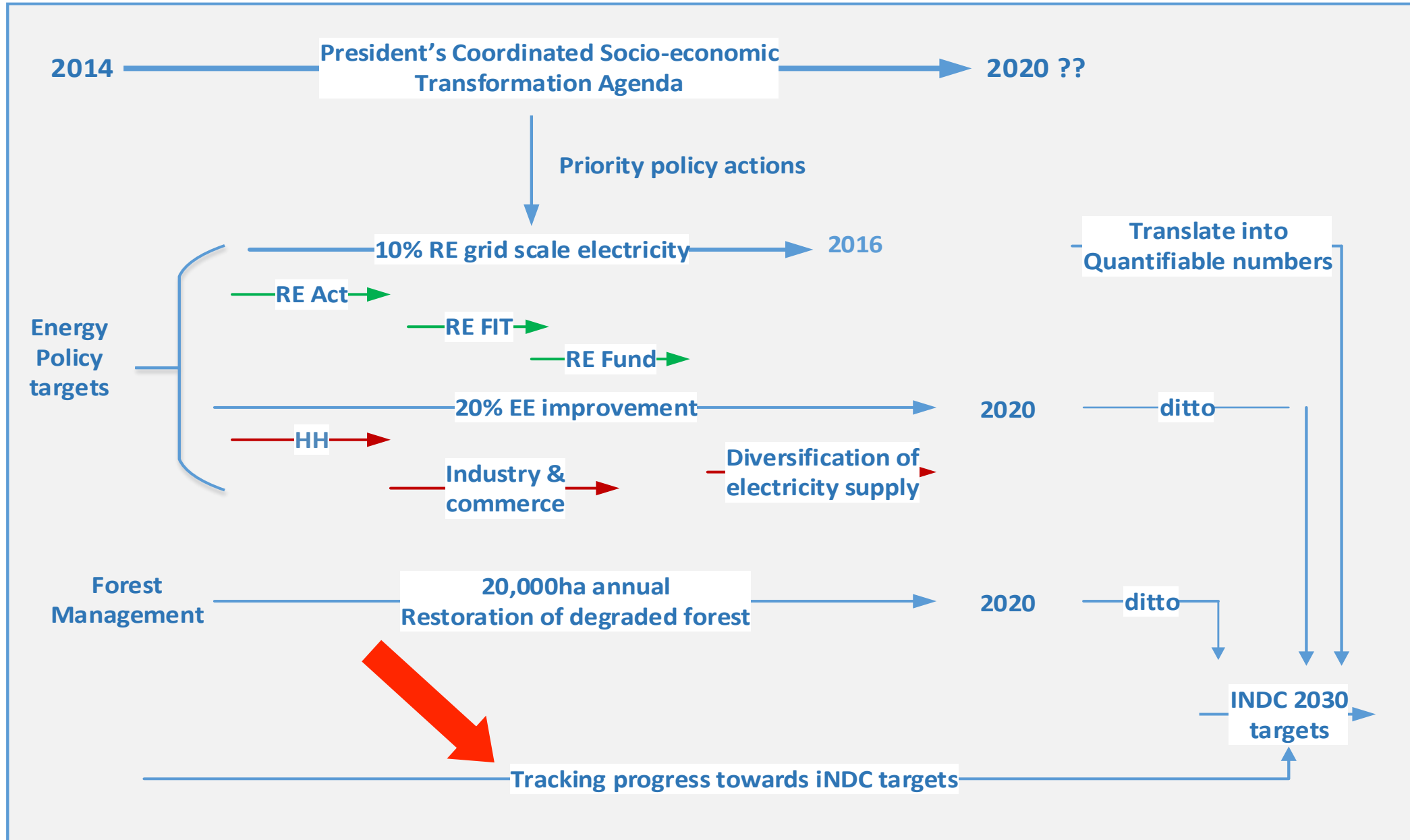
Mitigation Actions

- Renewable Energy Targets
- Feed in Tariff Rates
- Electronic Appliances Standards & Labeling Schemes
- Universal Access to Electricity by 2020
- 50% LPG Penetration Target
- Petroleum Products/ Utility Price Rationalization Policy
- Kerosene Lamp Replacement Program

How we are putting the system to operation – the bigger picture



Linking domestic MRV and accounting system for iNDC



Monitor, report, verifyredo

What to monitor? GHG, support, co-benefits (SD indicators)

Does scale matter? sectors, city, facility level, project

“Policies and measures” (PaMs) – individual, aggregates, modifications, contributions of PaMs to attain iNDC targets

Case examples of NAMA Policy Packages

Energy Efficiency Strategy

P1 – EE Promotion Program

NAMA 1: Refrigeration Rebate scheme

NAMA 2: Appliance Labeling

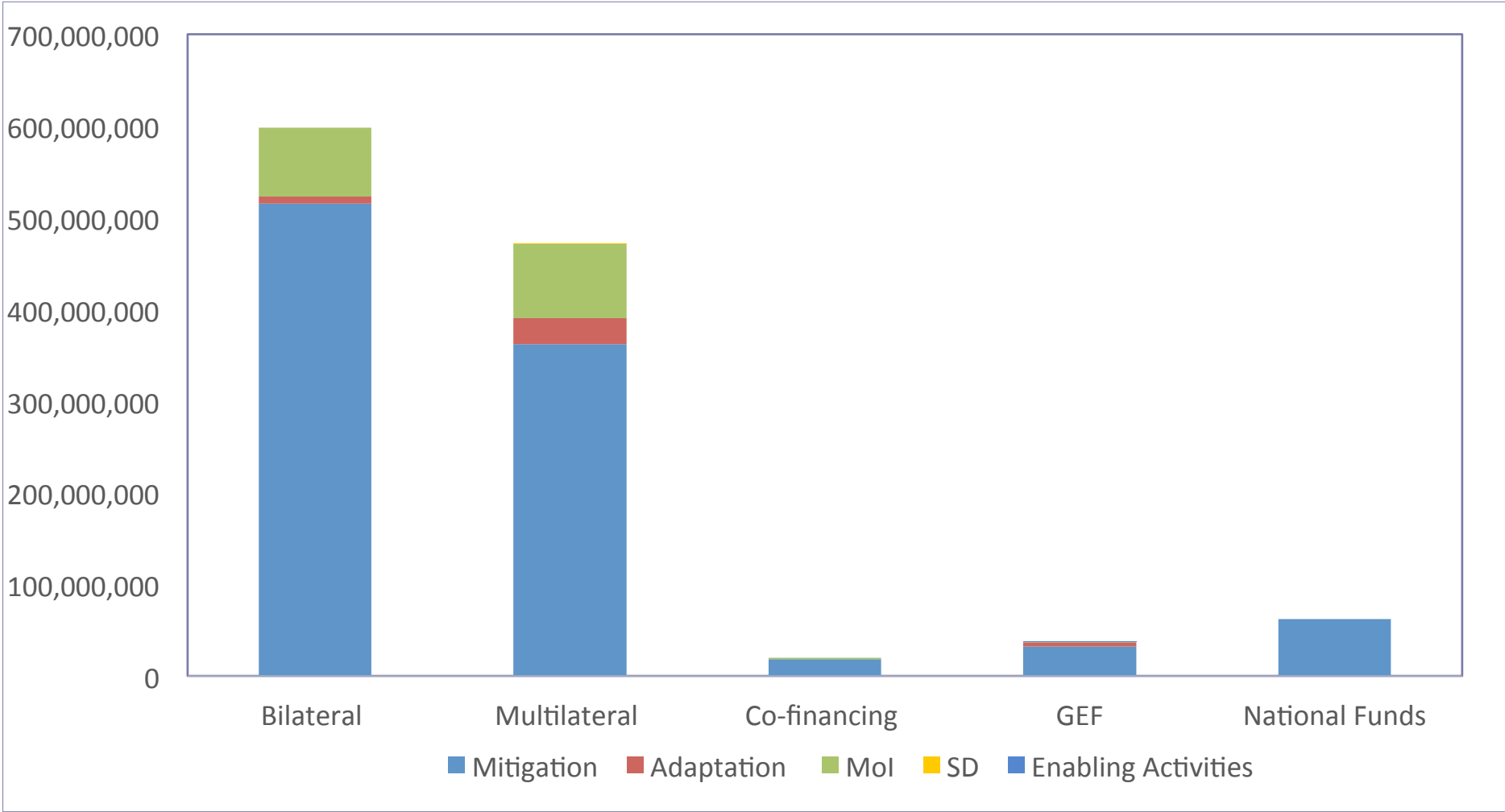
NAMA 3: Power factor correction program

NAMA 4: Industrial energy efficiency programme

What to measure or monitor

Energy savings, CO₂e, grid emission factor, demand side financial saving, Investment in EE (\$), etc

Preliminary results (2011-2014 in USD)



With loan from China Development bank, total financial inflow was US\$ 2,208,746,027 (equivalent of GhC 4,713,499,843) which was 3.7% share of GDP.

Monitor, report, verifyredo

Who to monitor and report ? Institutions, roles & coordination

Data – means/frequency of measurement, platform for data exchange (existing data suppliers – energy balance, forestry inventory etc)

Methodology – IPCC methodology, common accounting ,city-level protocols, project or facility level methods; selection of accounting activities and metrics

Monitor, report, verifyredo

What and when to report? – sectors, facilities, projects

Domestic report – Sector APRs, National APRs, Finance Tracking, facility level environment report to regulators – annual

International report – NIR (2 years), BUR (2 years) and TNC (4 years)

Monitor, report, **verify**redo

Domestic verification – verify before publication on “domestic registry”

Project verification – Third Party

International verification? (technical analysis) of NIR, BUR (ICA - TTE)

Some lessons we have learnt so far

- Climate change MRV in practice works better with development M & E.
- No need to reinvent the wheel.
 - What is needed is coordination, greater orientation, capacity and use of transparency tools.
 - Beginning from ground-zero could be expensive and become difficult to start
- Start little, pay attention to what is already working. Ramp up gradually.
- Importance to learn from existing Annex 1 reporting to UNFCCC

Thank you