Climate Change: Energy, Gender & MRV Measures

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8th Climate Change and Development in Africa Conference,
"Stepping up climate action for a resilient Africa – a race we can and must win"
28-30 August 2019
Addis Ababa

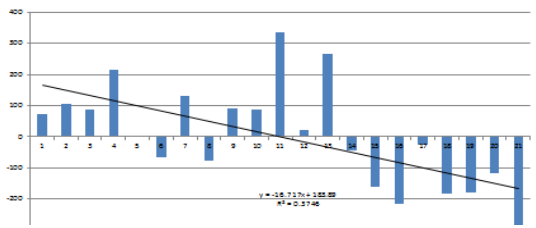
Contents

- Climate Change
- CRGE
- Renewable Energy
- Gender equality
- MRV
- Mitigation Practices
- Way forward

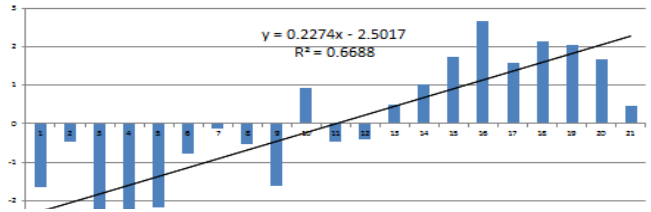
Why Climate Change Matter to Africa?

- Climate change is a reality
- Economy is sensitive to climate variability, particularly variations in rainfall.
- Communities are highly vulnerable with low adaptive capacity
- Significant share of GDP are spent on disaster response recovery, rather than growth.

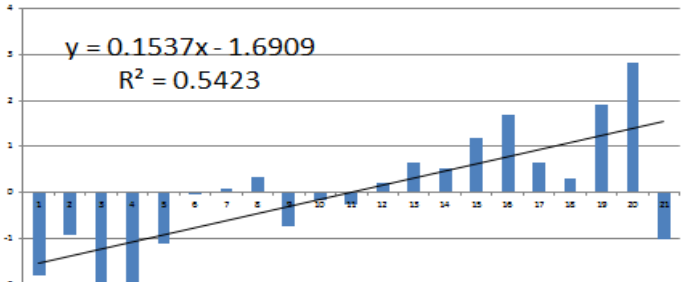
Long term RF trend analysis

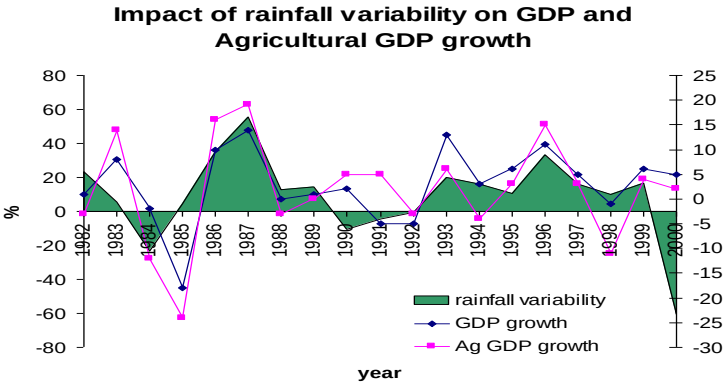


Long term Tmax (30.6)



Long term Tmin (17.34oC

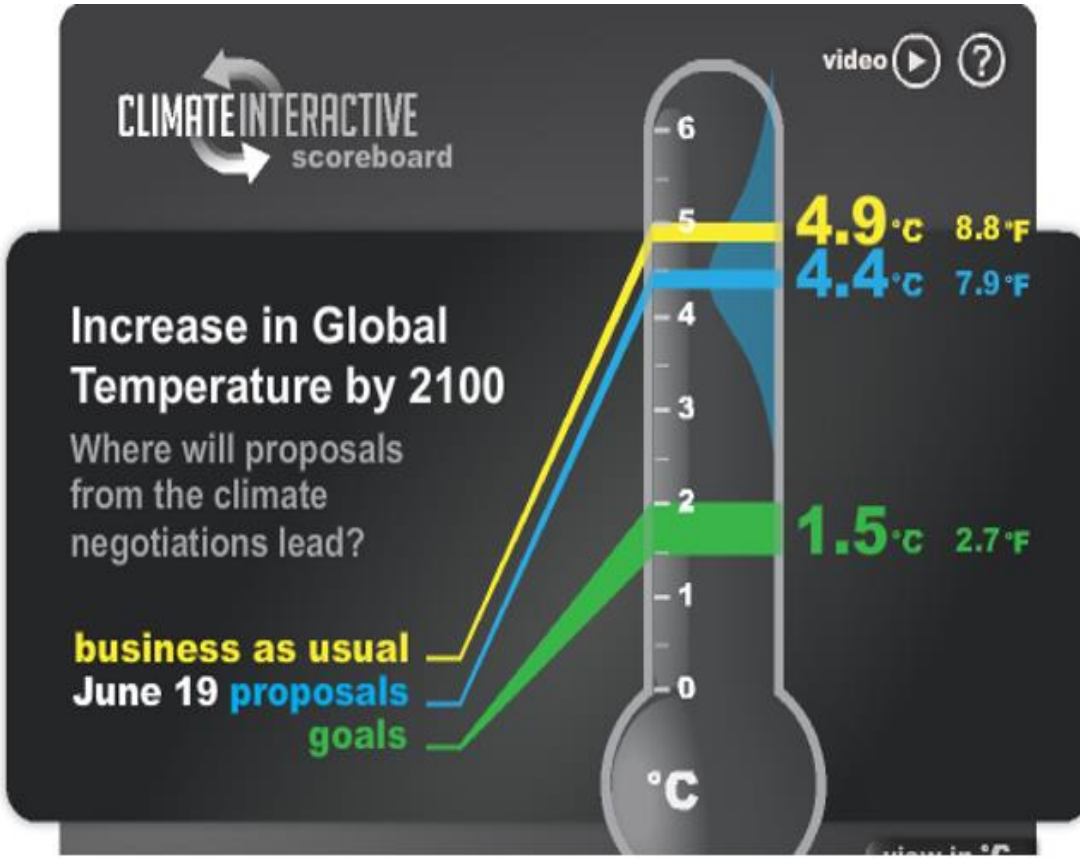




Combined national United Nations emissions cut pledges assuming all pledges are implemented in full

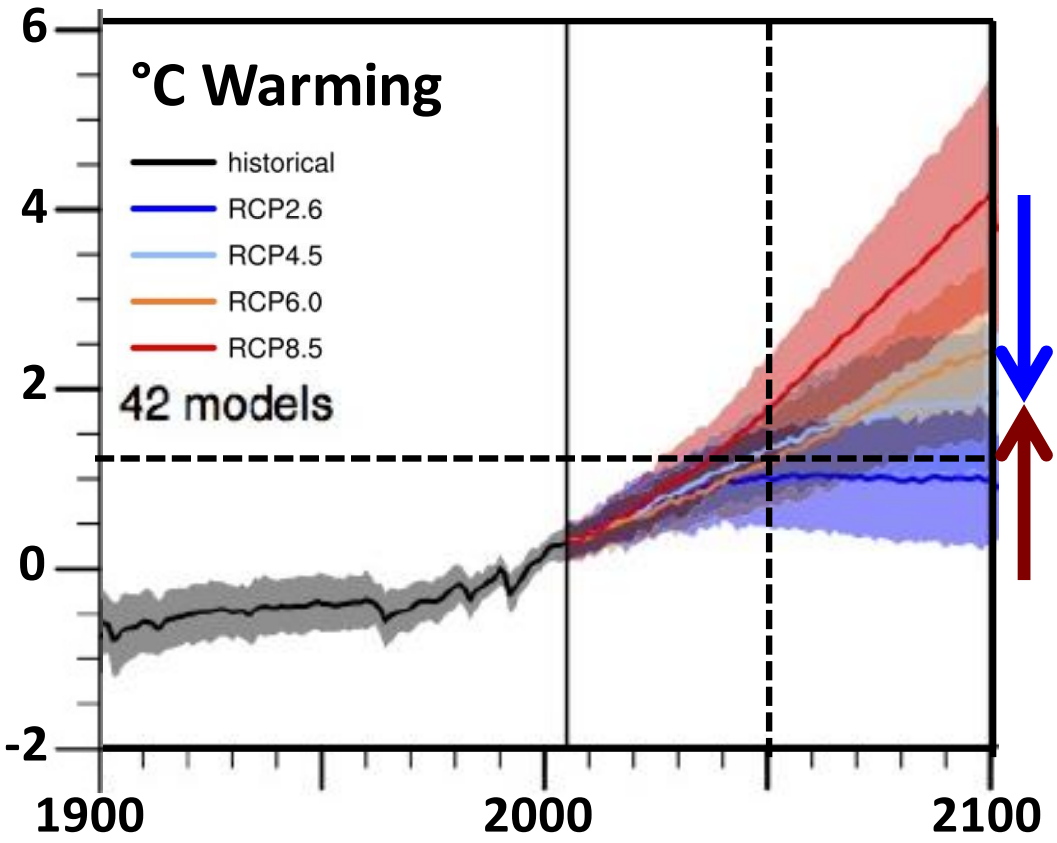
- Dramatic reductions in GHG emissions will be required to prevent dangerous climate change.
- Achieving a 2°C target will require a global response.

4.4°C by 2100



Global Climate Change

Future Global Temperature: Global temperature will rise by about 1° -1.5° C by 2050, 1° -4° C by 2100.



IPCC AR5 WG1; From Fig. 12.5

Mitigation:
Necessary to avoid *dangerous* climate change

A New Normal:
Some climate change is inevitable; Development / Adaptation should aim towards a new normal

FEDERAL DEMOCRATIC
REPUBLIC OF ETHIOPIA

Ethiopia's Climate-Resilient Green Economy

International Launch at COP-17
December 8, 18:30 – 20:00
(African Pavilion)

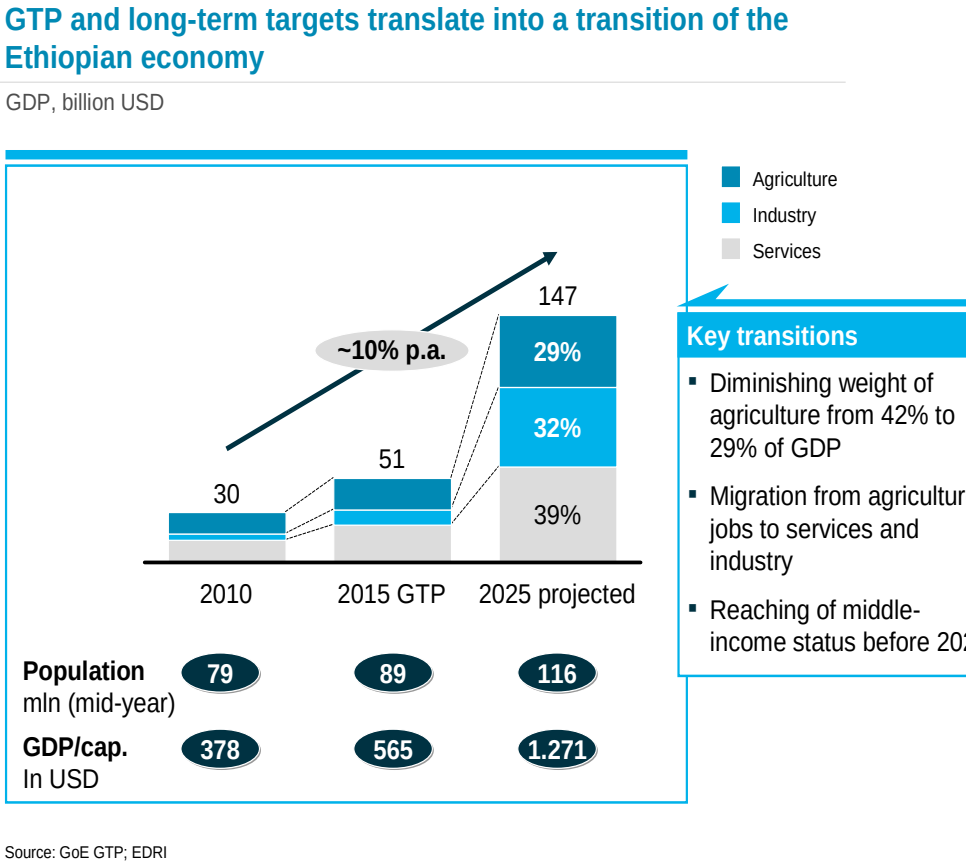
For Ethiopia to become a middle-income country by 2025 through economic growth that is resilient to climate change and results in no increase in emissions.

Water and energy are both key to the CRGE and Ethiopia's goals for economic growth and for poverty eradication.

Two-Way Relationship between Climate Change and Sustainable Development

- Climate change influences natural and human living conditions, and social/economic development

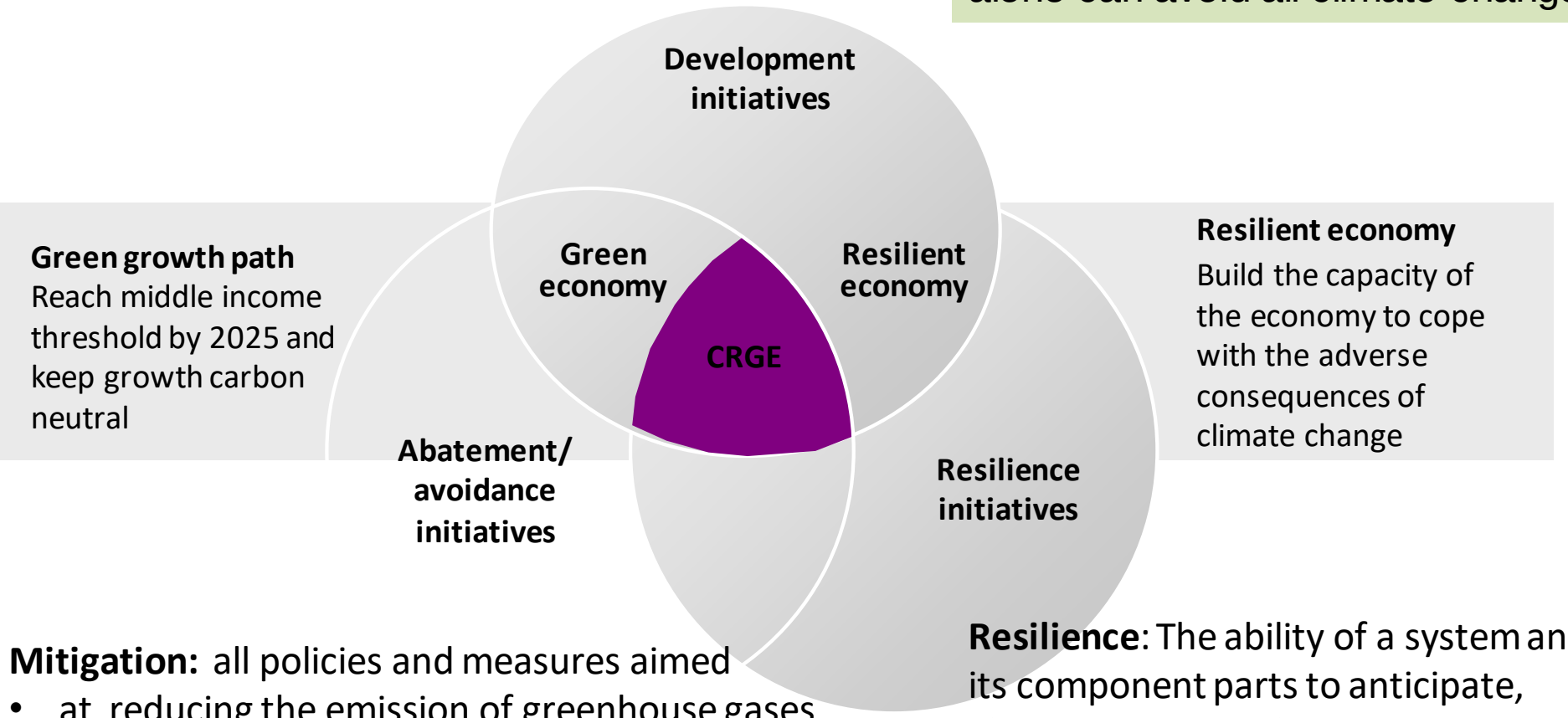
- Society's priorities on sustainable development influence GHG emissions, causing climate change and vulnerability



Source: GoE GTP; EDRI

The Government of Ethiopia has launched its Climate-Resilient Green Economy initiative (CRGE) with 2 main objectives

"Continued GHG emissions
"Neither adaptation nor mitigation alone can avoid all climate change i



Green growth path
Reach middle income threshold by 2025 and keep growth carbon neutral

Resilient economy
Build the capacity of the economy to cope with the adverse consequences of climate change

Mitigation: all policies and measures aimed

- at reducing the emission of greenhouse gases such as CO2, or
- capturing GHG in forests, oceans or underground reservoirs

Resilience: The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner,

The strategy for a green economy is based on four pillars

Middle income country in 2025

Agriculture – Improving crop and livestock practices

- Reduce defores-tation by agricul-tural intensification and irrigation of degraded land
- Use lower-emitting techniques
- Improve animal value chain
- Shift animal mix
- Mechanize draft power

Forestry – Protecting and growing forests as carbon stocks

- Reduce demand for fuelwood via efficient stoves
- Increase seques-tration by affores-tation/reforestation and forest mana-gement

Power – Deploying renewable and clean power generation

- Build renewable power generation capacity and switch-off fossil fuel power generation
- Export renewable power to substitute for fossil fuel power generation abroad

Industry, transport and buildings – Using advanced technologies

- Improve industry energy efficiency
- Improve produc-tion processes
- Tighten fuel efficiency of cars
- Construct electric rail network
- Substitute fossil fuel by biofuels
- Improve waste management

Green economy strategy

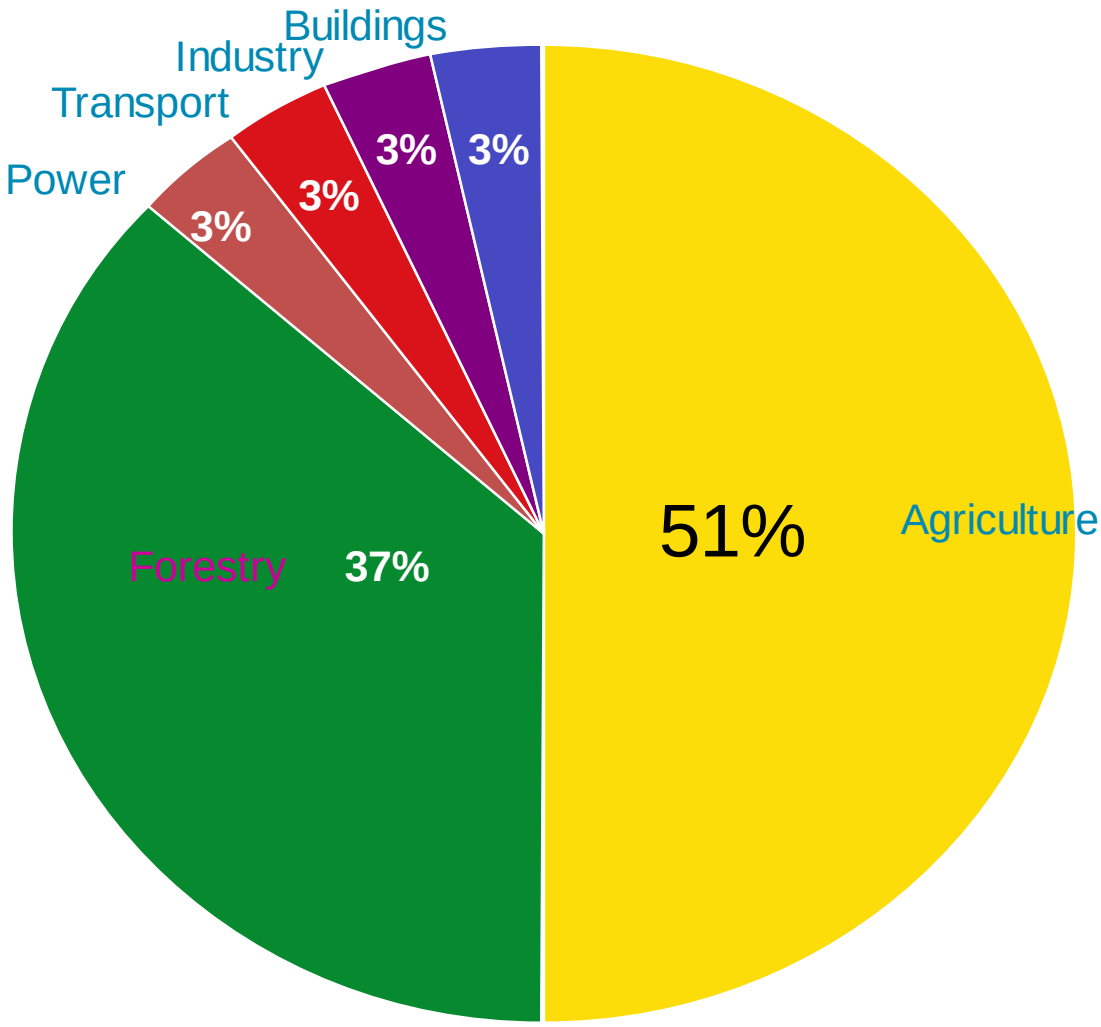
Source: CRGE

The CRGE Targeted Sectors & GHG Emissions

Targeted Sectors

- Agriculture (livestock and soil)
- Forestry
- Transport
- Electric Power
- Industry
- Buildings (including Wastes and Green Cities

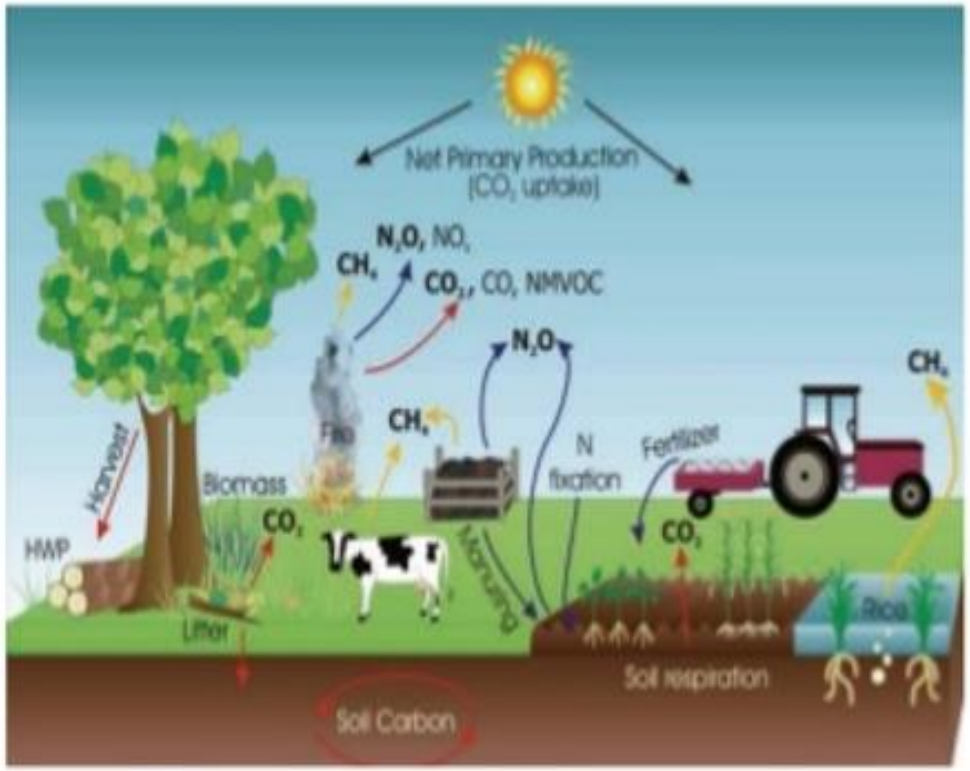
88% of GHG emissions come from agriculture and forestry



❖**Total GHG emissions of ~150 Mt CO_2e in 2010**

Main source of GHG emission in Agri

Carbon dioxide ($CO_{2)}$	• microbial decomposition of soil organic matter (SOM) and dead organic matter (i.e. dead wood and litter) • deforestation • burning of organic matter
Methane (CH_4)	• enteric fermentation from livestock • methanogenesis under anaerobic conditions in soils (e.g. during rice cultivation) and manure storage • burning of organic matter
Nitrous oxide (N_2O)	• nitrification and denitrification due to application of synthetic fertilizers and organic amendments (e.g. manure) to soils • burning of organic matter (IPCC, 2006).



Source: IPCC, 2006.

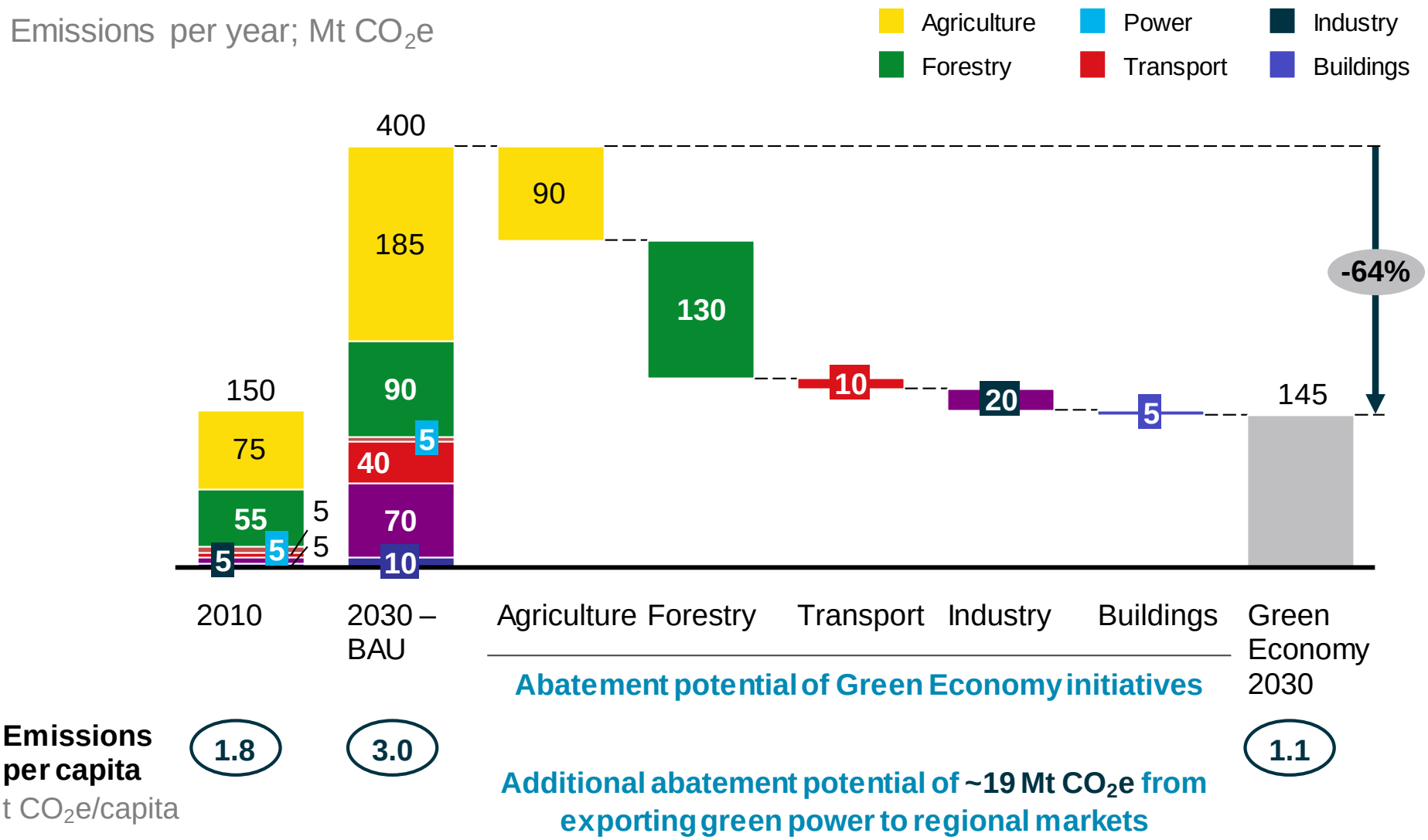
Along with CO_2, N_2O, CH_4 emissions, burning of organic matter generates emissions of GHG precursors, such as:

- oxides of nitrogen (NOx),
- non-methane volatile organic compounds (NMVOC) and
- carbon monoxide (CO).

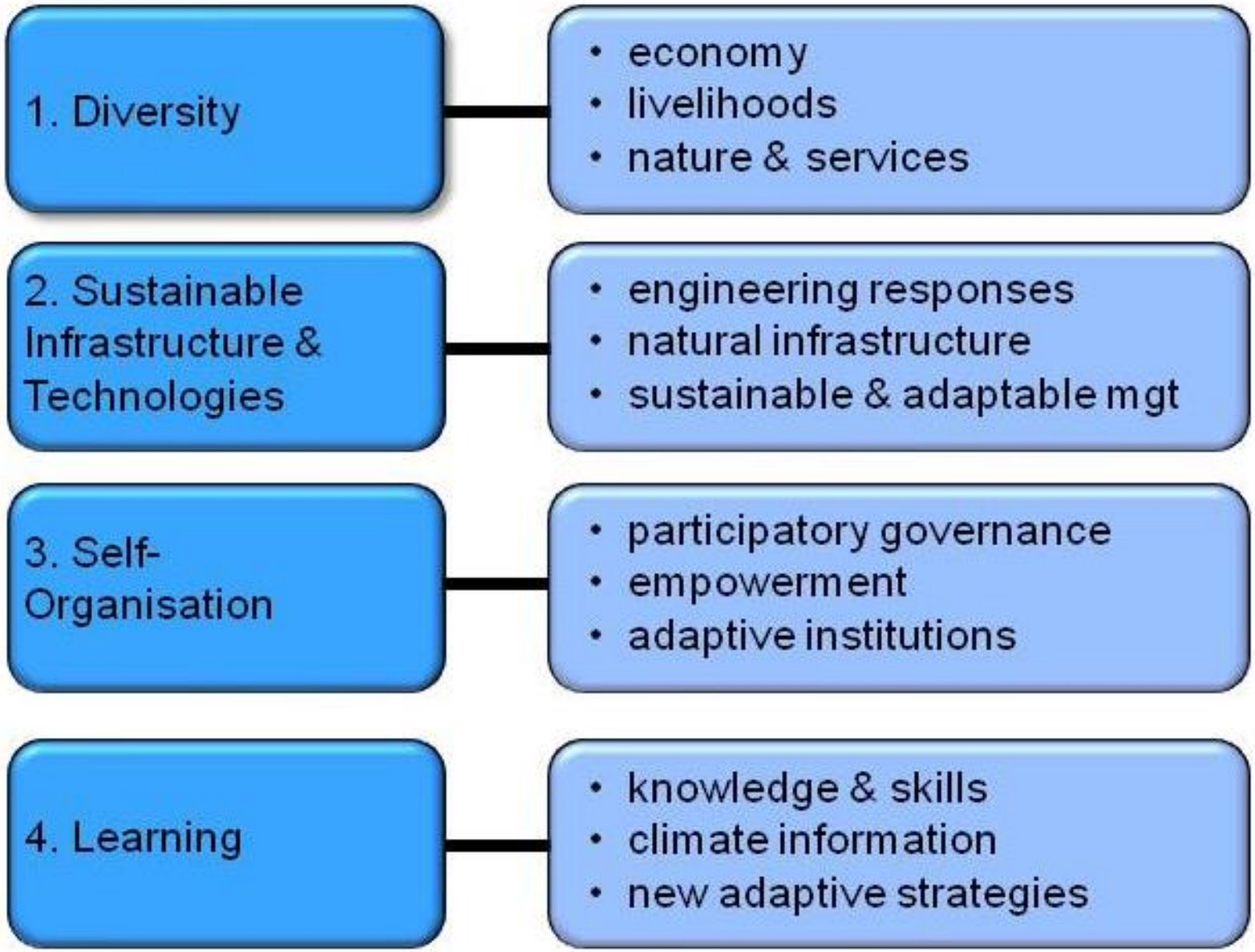
Volatilization losses of ammonia and NOx from manure management systems and soils leads to indirect GHG emissions.

Harvested wood products (HWP) also contribute to CO_2 emissions and removals.

But Ethiopia can grow with no net increase in emissions



The logic of building resilience?



Adaptation Strategies in the Water & Energy sector

Middle income country in 2025

Water sector

- Building reservoirs
- Increase water-use efficiency: true-cost pricing
- Reuse wastewater and collect rainwater.
- Watershed Restoration:

Power Generation

- Diverse energy mix
- Improve energy efficiency

Energy Access

- Improve efficiency of biomass use
- Accelerate non-grid energy access

Irrigation

- Accelerate irrigation plans
- Support the resilience of rainfed agriculture
- Balance water demands

Access to WASH

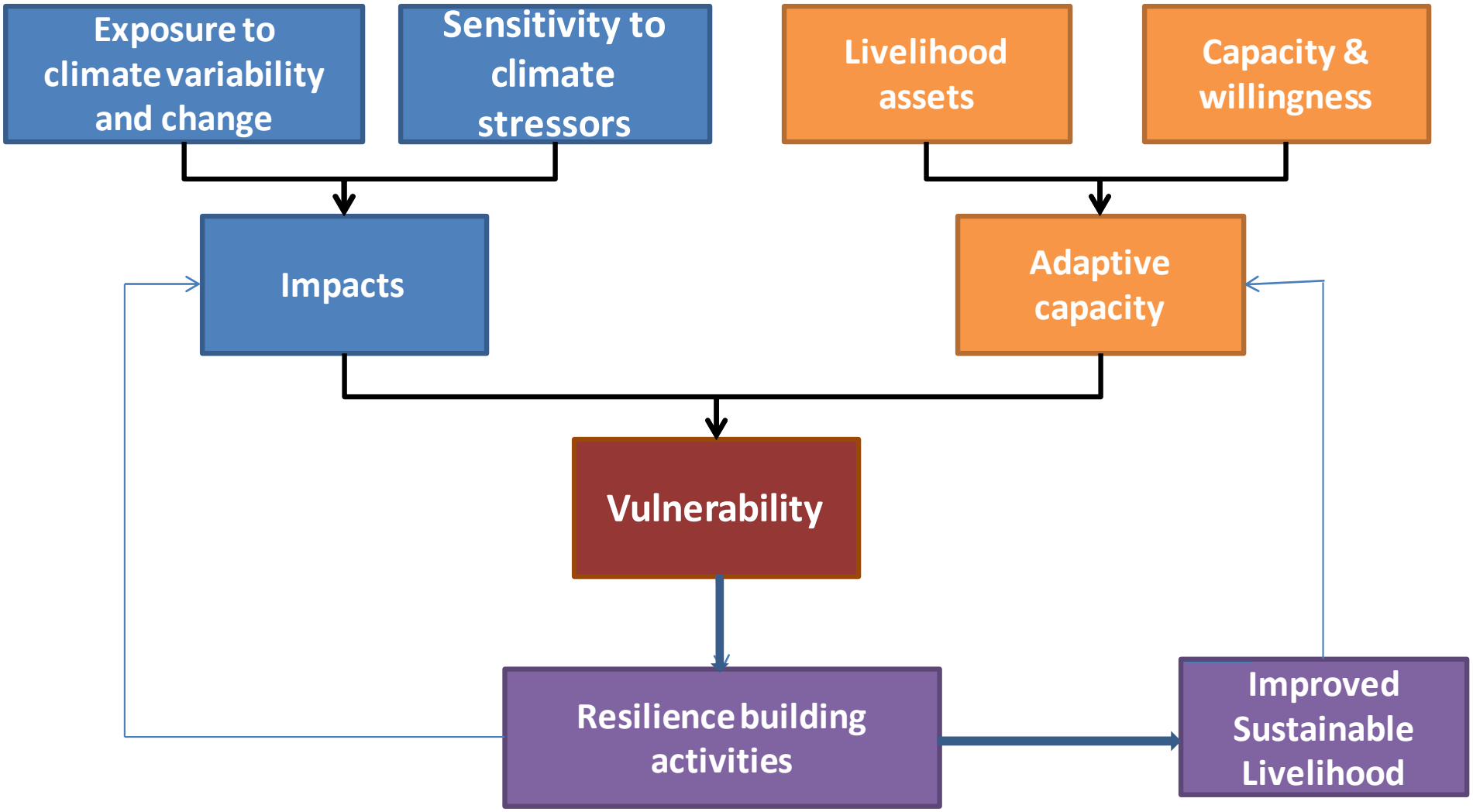
- Accelerate universal access to WASH
- Enhance the climate resilience of self-supply

(improving local water storage facilities or participatory water resource management

Climate Resilience strategy

Source: CRGE

Premise: Understanding climate impacts and vulnerabilities of local communities and ecosystems will enhance local adaptation options



The components of vulnerability

Exposure:

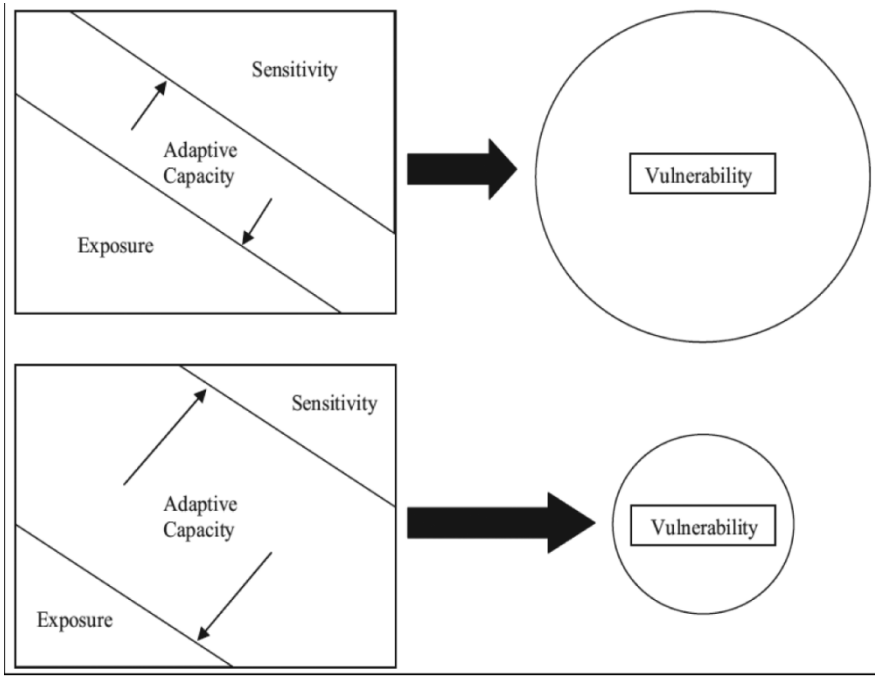
- relates to "the nature and degree to which a system is exposed to significant climatic variations" (IPCC, 2001).

Sensitivity:

- relates to the "degree to which a system is affected, either adversely or beneficially, by climate variability or change.

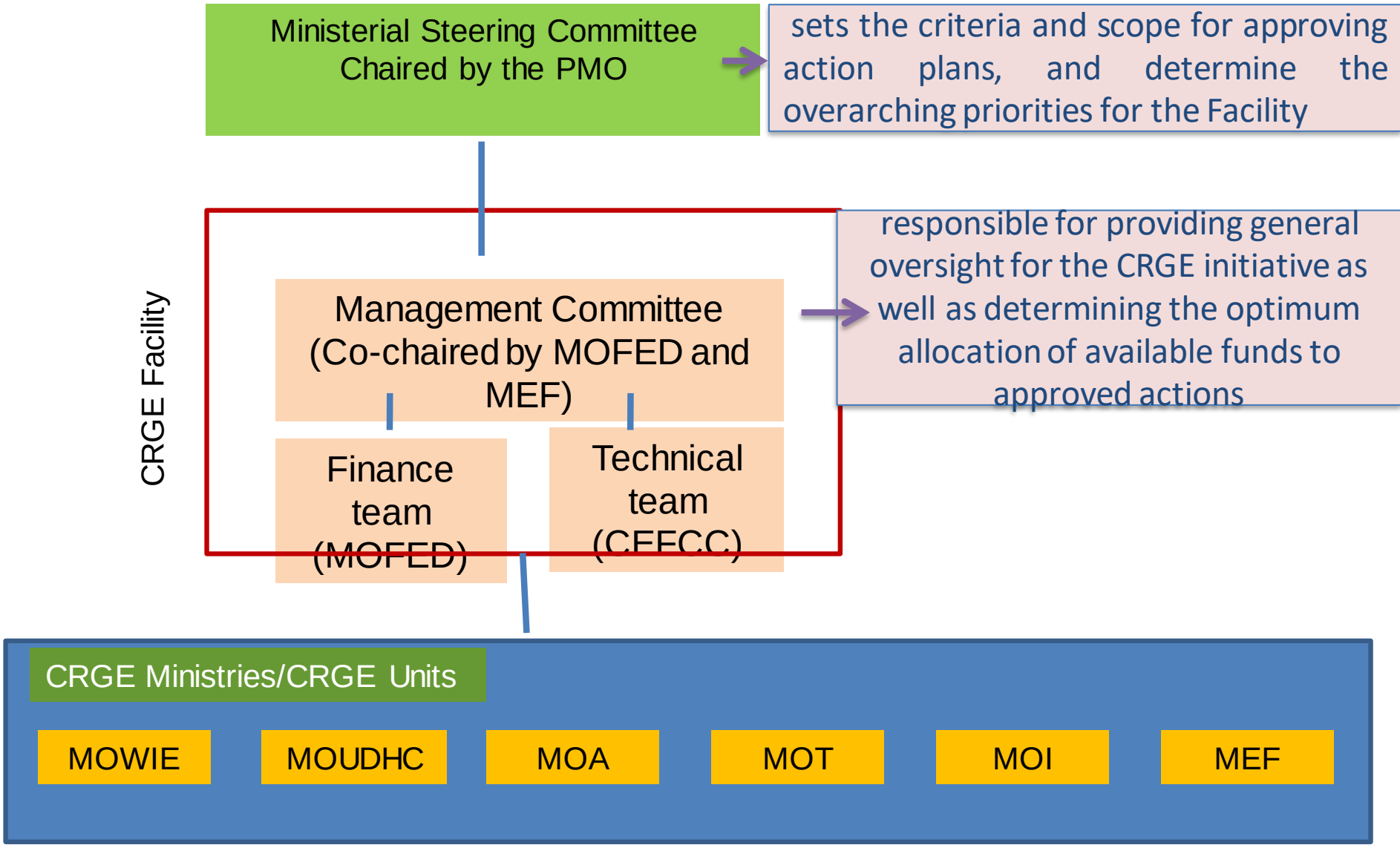
Adaptive capacity:

- whole of capabilities, resources and institutions of a region to implement effective adaptation measures.



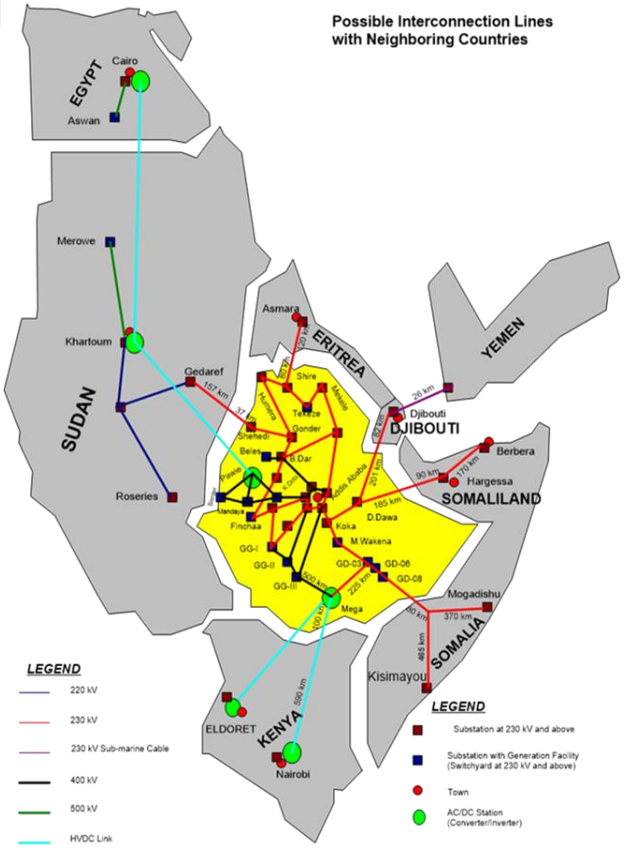
The basic role of adaptive capacity in influencing vulnerability
Source: Engle (2011).

The CRGE Institutional Arrangement



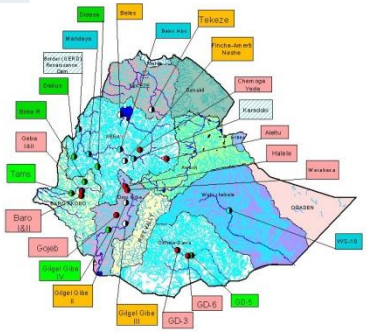
Energy

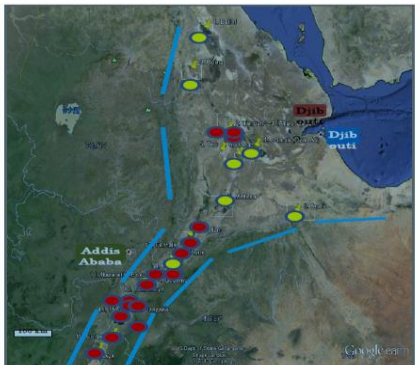
- Developed a National Electrification Program (NEP) - plan for achieving universal electricity access nationwide by 2025,
- Key operational action elements
  - New 14 million household customer connections (equivalently about 65% of the population in 2025)
  - access for the remaining 5.7 million rural and deep rural households without grid connectivity (equivalently about 35 percent of the population in 2025) - individual solar systems and isolated mini/micro-grids as feasible

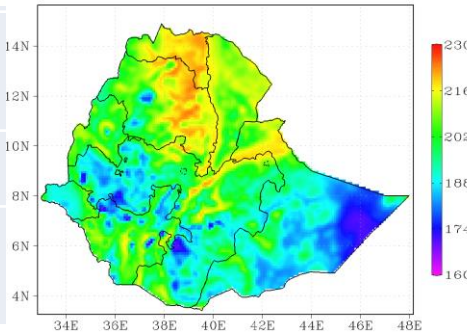


Energy Resources

Hydropower	8 wet river basins, 45,000 MW of hydropower potential
Geothermal	24 prospect sites identified with total potential o over 10,000 MW
Solar	Average daily irradiation of ~ 5.75 kWh /sq. m.da or 2100kWh /sq. m.year (rich resource)
Wind	> 1,000 GW with average wind speed of 7 meter/second and greater at 50 m above ground level
Wood	~ 1,120 million tones (annually sustainably exploitable)
Agricultural waste	~ 15 to 20 million tones (annually sustainably exploitable)
Natural gas (proven reserve)	8 TCF (226 billion m^3)
Coal (proven reserve)	> 300 million tonnes
Oil shale (proven reserve)	253 million tonnes

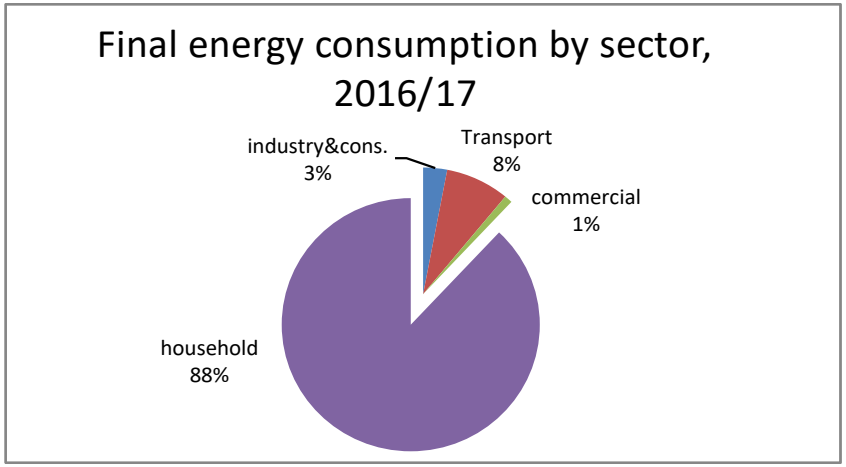


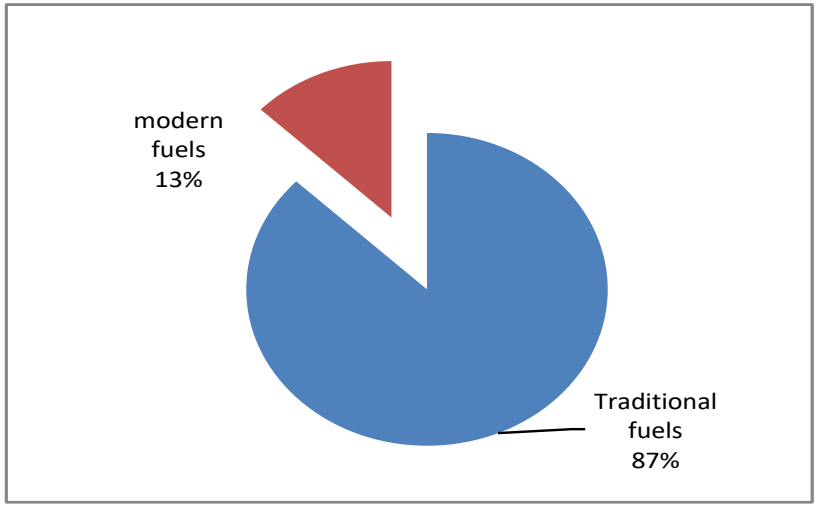


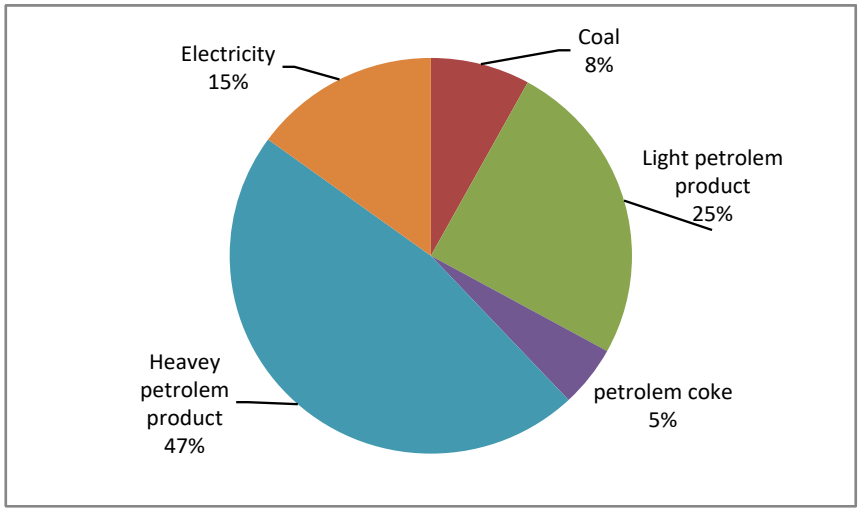


Affordable and non-polluting energy services is a prerequisite for achieving economic empowerment and poverty reduction

Energy consumption by source, 2016/1027

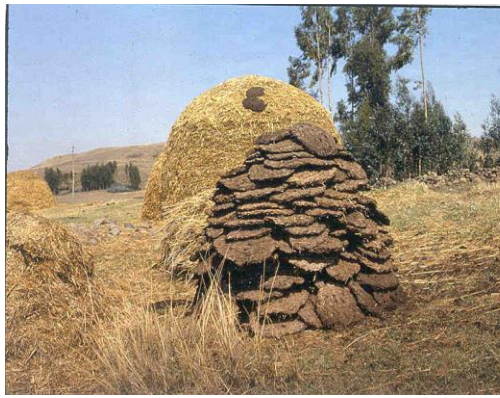






Gender equality and energy:

- **Gender equality (**social relations) is a fundamental human right,
- women are **disproportionally vulnerable** to the effects of climate change
  - Women are also crucial to the successfu implementation of mitigation and adaptation mechanisms,
- Men and women have different access to energy resources, resulting in gender-differentiated impacts at the individual, household, and community levels.
  - these inequalities limit the economic opportunities for women.



Gender inequality

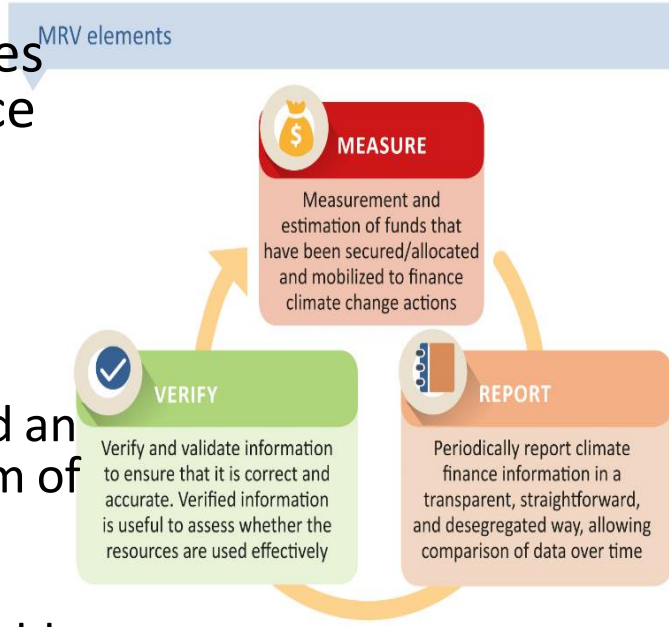
- spend long and exhausting hours performing basic subsistence tasks, including
  - time-consuming and physically draining tasks of collecting biomass fuels, which constrains them from
    - accessing decent wage employment,
    - educational opportunities and livelihood enhancing options, and
    - limits their options for social and political interaction outside the household
    - illnesses from indoor pollution

Gender mainstreaming in the Energy and Climate Change

- A gender blind project that does not consider the different roles, needs, opportunities and expectations of women and men will not be sustainable.
  - Is explicit attention given to the energy service needs of women as well as the requirements of men?
  - Is there an understanding of the impact energy investment has on people and the environment?
  - Will both men and women benefit from these investments?

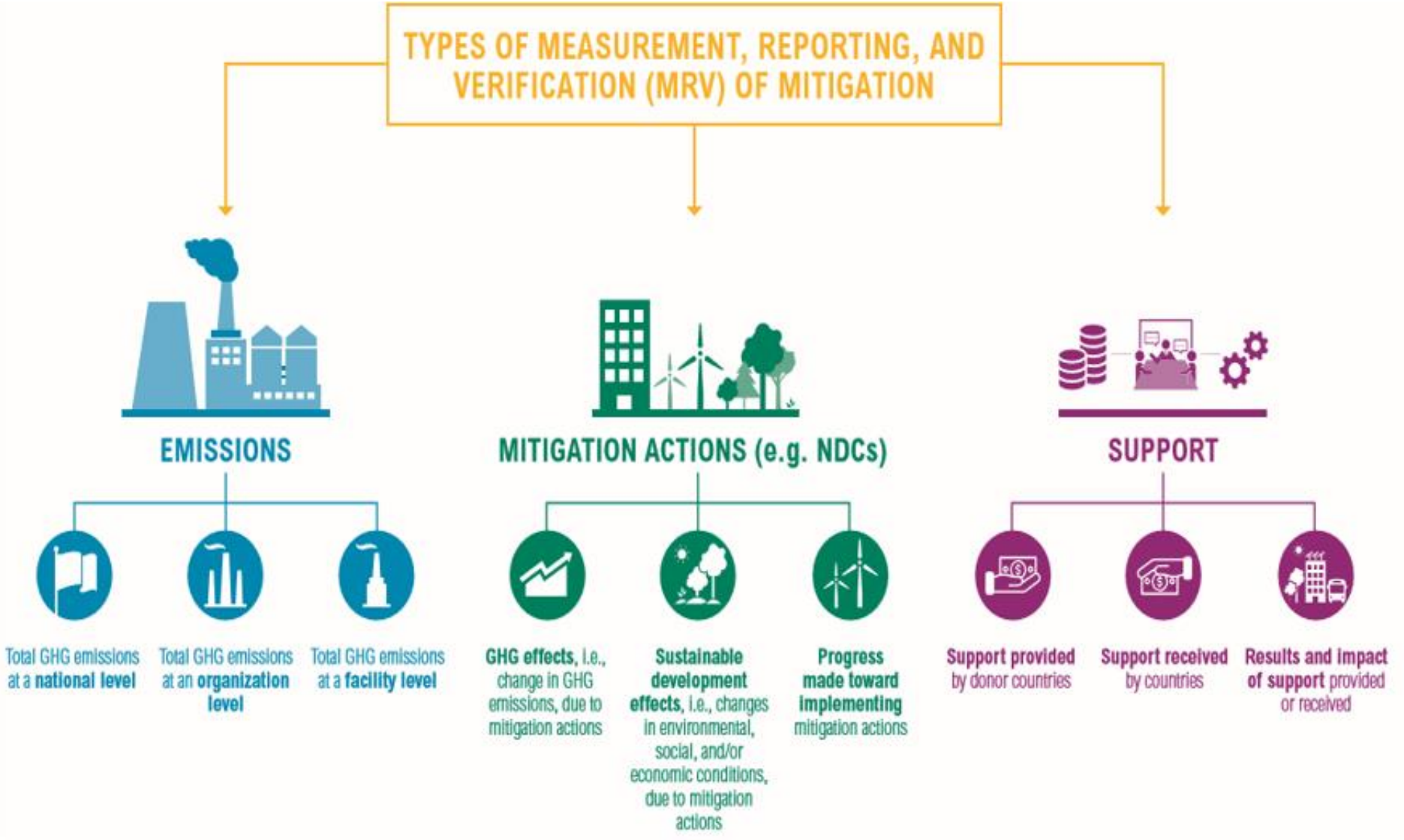
MRV Measures

- Effective measurement, reporting and verification (MRV) of emissions and emissions reductions is critical to help countries understand GHG sources and trends, design mitigation strategies, enhance credibility and take other policy actions,
- How much are we mitigating?
- Three types of mitigation-related MRV
  - **MRV of GHG emissions**, conducted at national, organizational, and/or facility level to understand an entity's emissions profile and report it in the form of an emissions inventory.
  - **MRV of mitigation actions** (e.g., policies and projects) to assess their GHG effects and sustainable development (non-GHG) effects as well as to monitor their implementation. This type of MRV focuses on estimating the change in GHG emissions or other non-GHG variables.
  - **MRV of support** (e.g., climate finance, technology transfer, and capacity building) to track provision and receipt of climate support, monitor results achieved, and assess impact.



Source: adapted from the UNFCCC

Types of Mitigation-related MRV

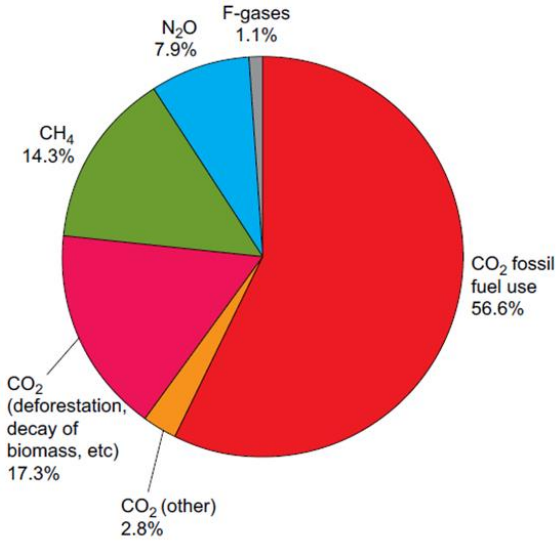


Greenhouse Gases: Sources and Sinks

Greenhouse Gas	Principal Sources (and Sinks)	GWP*
Carbon Dioxide (CO_2)	Fossil fuel use, land use change (oceans, terrestrial biosphere)	1
Methane (CH_4)	Fossil fuel mining/distribution, livestock, rice agriculture, landfills	21
Nitrous Oxide (N_2O)	Agriculture and associated land use change	310
"F-gases" Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF_6)	Industrial processes	140 - 23,900

*GWP = Global Warming Potential from Second Assessment Report, as used for reporting purposes under the UNFCCC

Global anthropogenic GHG emissions (2004)



Sources: IPCC (2007) AR4 WGI & WGIII

Key Mitigation Practices

- **Energy Supply**
  - Renewable heat and power (hydro, solar, wind, geothermal)
  - Improved supply and distribution efficiency
- **Transport**
  - Biofuels
  - Modal shifts from road transport (rail, public transport,..)
- **Buildings**
  - Efficient lighting and day lighting
  - More efficient electrical appliances
  - Improved cooking stoves
- **Industry**
  - More efficient end-use electrical equipment;
  - Heat and power recovery;
  - Material recycling and substitution

Looking Ahead: Policies and Practices

- Research, development and demonstration
- Appropriate energy infrastructure investments
- Regulations and standards
- Taxes and charges
- Change in lifestyles and consumption patterns
- Effective carbon price signal.

THANK YOU