GHGs Emission and Mitigation Actions in Iran in 2020-2030 Horizon

Presented by:

Mohammad Sadegh Ahadi

Project Assistant for

Third National Communication to UNFCCC (UNDP/GEF)

National Climate Change Office

Department of Environment

Islamic Republic of Iran

The 15th Workshop on GHG Inventories in Asia (WGIA15)

11th – 13th July, 2017

Nay Pyi Taw, Myanmar

Presentation outlines

- Iran's Climate Change profile
- GHGs emission by sectors in 2010
- GHGs Emission and Mitigation Actions for 2020-2030
  - Objectives and Assumptions
  - Mitigation Actions and Results
- Barriers, Constraints and Recommendations

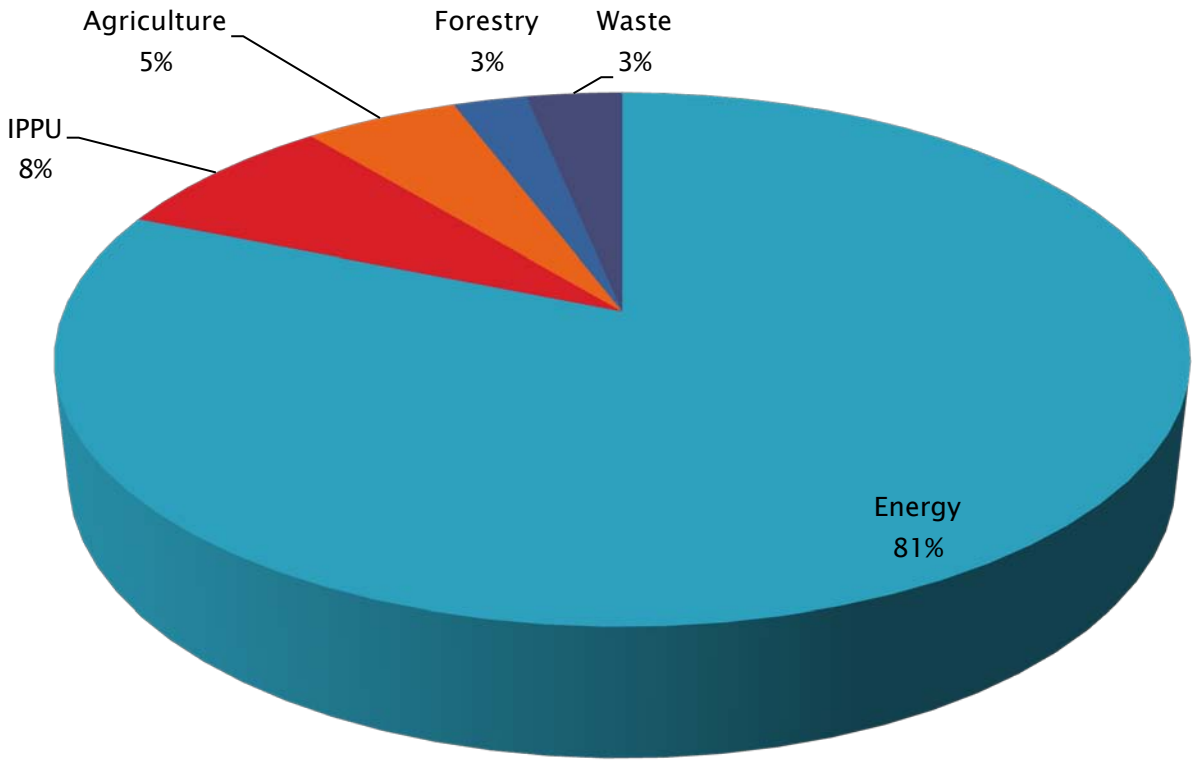
Iran's climate change profile in 2016

items	Value
UNFCCC and KP Ratified on :	1996 and 2005
INC, SNC and TNC Submitted on:	2003, 2011 and TNC will be submitted by July of 2016
National Inventory was prepared for :	INC, 1994 SNC, 2000 TNC, 2010 The GHGs emission from fuel combustion in yearly basis is published since 2000 by Ministry of Energy in Energy Year Book
INDC and Paris Agreement:	INDC submitted on 18 November 2015 and Paris Agreement was signed in April 2016 and under ratification by Parliament
National Rules of Procedure for Implementation of UNFCCC and KP was approved on:	2009 and revised on 2012 and 2015
Low Carbon Economy Strategies approved on :	January 2016
National Strategies and Action Plan on Climate Change:	Approved by NWGCC

Source: Iran's Climate Change Office

Contribution of different sectors on GHGs emission in 2010 (%-CO2 eq.)

Overall GHGs emissions on 2010 is about 857 Million tonnes-CO2 eq.



Source: Iran's Third National Communication to UNFCCC

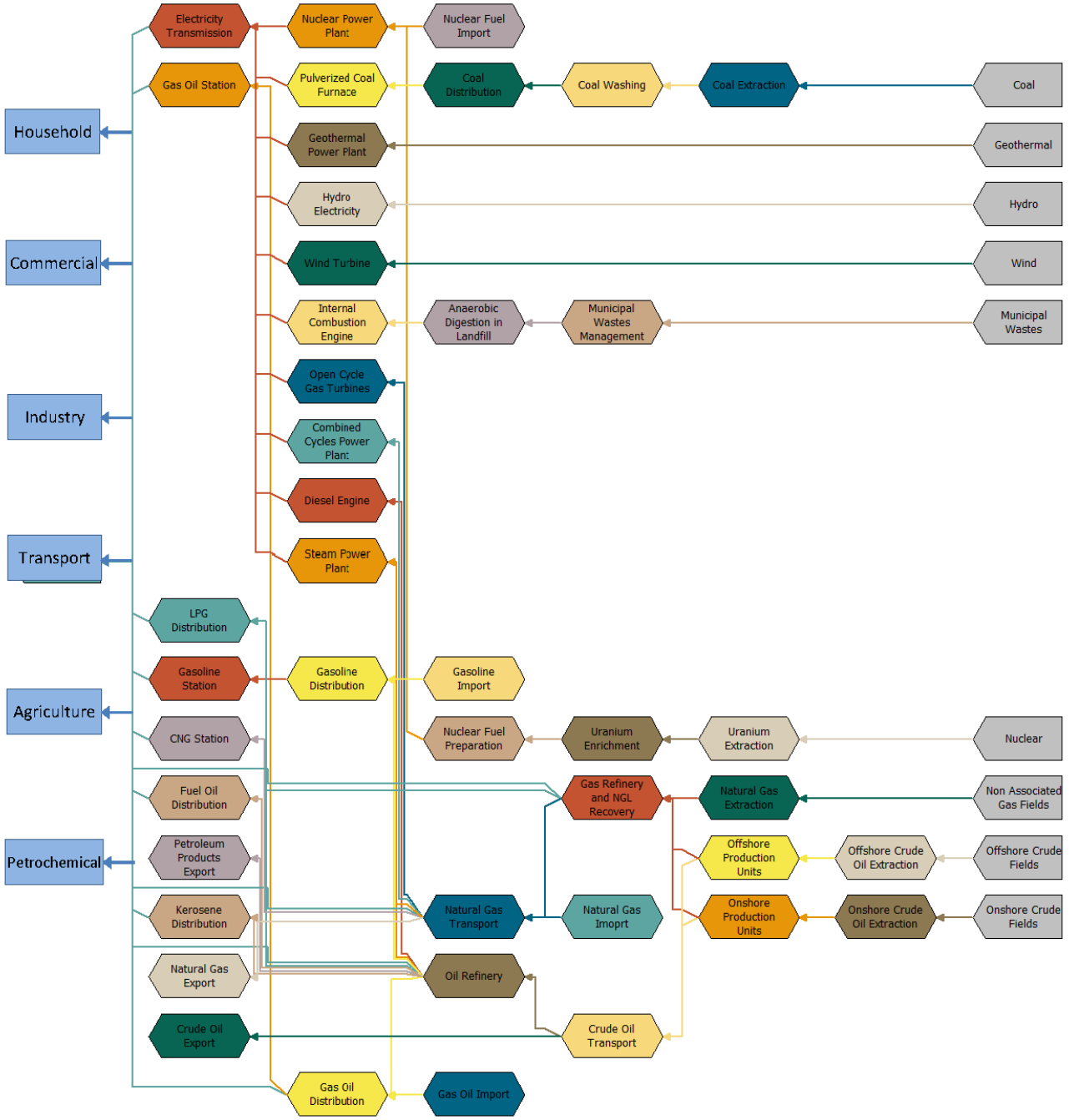
GHGs Emission and Mitigation Actions for 2020-2030: Objective and Assumptions

- to develop an integrated bottom-up energy model in order to assess how energy system evolves in the Business-As-Usual (BAU) scenario,
- to identify and analyze options of GHGs reduction in Iranian energy sector and subsequently, propose and develop alternative mitigation scenarios,
- to evaluate the potential of selected options to mitigate GHGs emissions, their viability and costs and to propose mechanisms and strategies that may allow implementation of the mitigation measures.

GHGs Emission and Mitigation Actions for 2020-2030: Objective and Assumptions

- Long-range Energy Alternative Planning Systems (LEAP) was used for Mitigation Policies Assessment
- **BAU Scenario Assumptions**:
- In the Business-as-Usual (BAU) scenario (2011-2030) all of the exogenous variables of energy modeling vary based on 2005-2010 (2010 is base year) realities and it is assumed that no substantial changes will result from specific measures or introduction of energy conservation programs. The only remarkable change in BAU scenario compared to 2005-2010 facts concern economic growth.
- Base-year:2010, Time frame; 2010-2030
- GDP Growth: 8% (2017-2021), 6% (2022-2030)
- Number of Household: Increase from 19.5 Million in 2010 to 29.5 million in 2030
- Energy Intensity: No substantial changes in EI.

GHGs Emission and Mitigation Actions for 2020-2030: References Energy System



GHGs Emission and Mitigation Actions for 2020-2030: Mitigation Actions

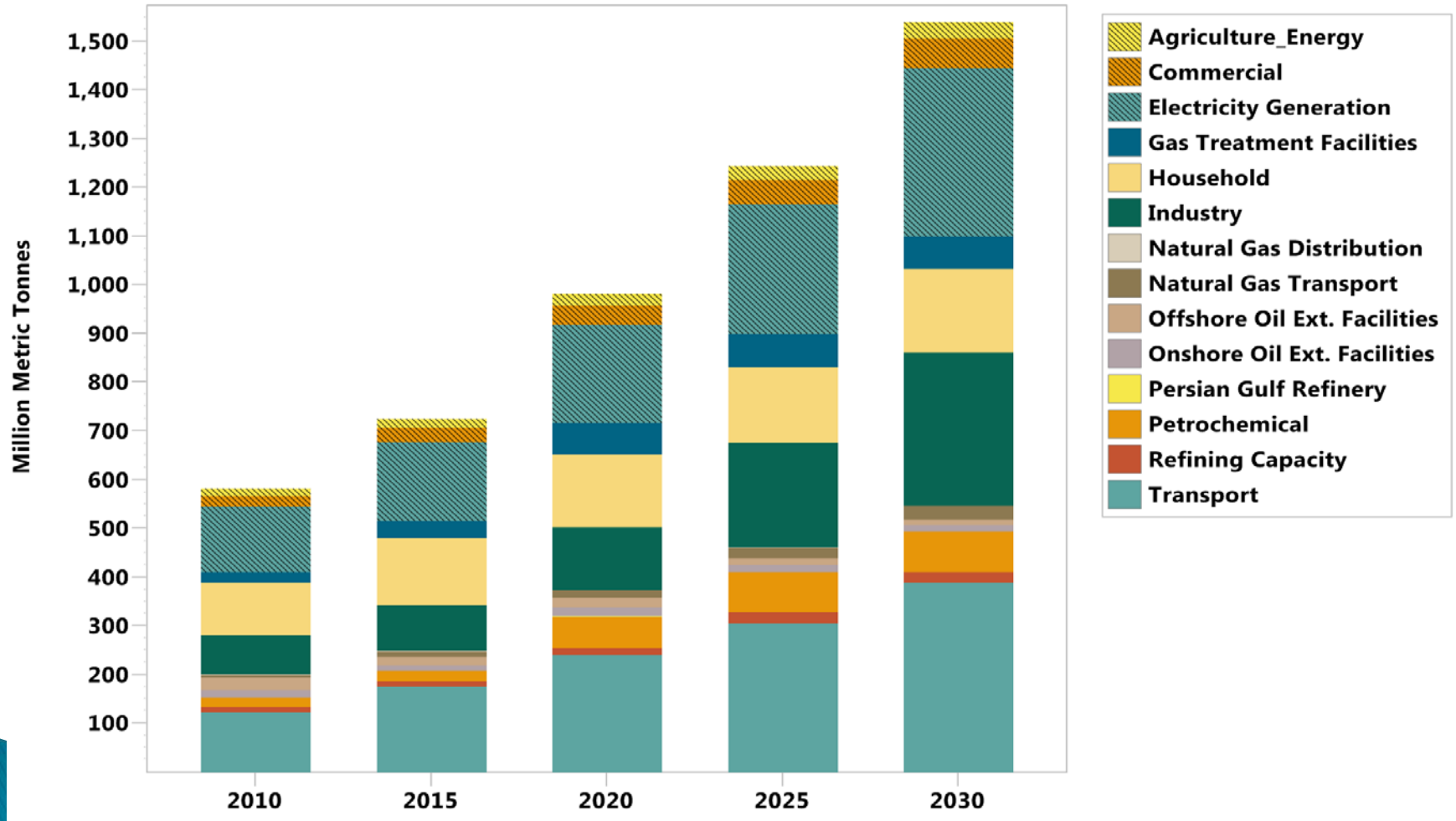
- **Household and commercial sector:**
- Improving energy efficiency of central heating systems for residential and commercial buildings: reduction of natural gas consumption by 9.85 to 13.16 million cubic meters per day by improving energy efficiency of central heating systems of 500,000 sets of residential and 100,000 sets of commercial buildings
- **Industrial sector:**
- Renewal of currently obsolete processing equipment and machinery in order to decrease energy consumption by 1% annually
- Switching to natural gas to decrease the level of liquid and heavy fuels consumption
- Introducing efficient energy conversion technologies (e.g. boilers and electro motors) in manufacturing and mining sector of Iran
- Promoting utilization of high temperature waste heats via Combined Heat and Power (CHP) and Waste Heat Recovery (WHR) technologies
- **Agricultural Sector:**
- Water pumps fuel switching of Agricultural wells: Reducing gas oil consumption by replacing existing diesel engines with electric submersible pumps in 217,000 agricultural wells

GHGs Emission and Mitigation Actions for 2020-2030: Mitigation Actions

- **Transport Sector:**
- Rail transport development: capacity expansion of passenger rail systems from 17.4 billion passenger-kilometers per year to 34.2 billion passenger-kilometers per year in 2024 and freight rail capacity from 21.7 ton-kilometer per year to 75.8 ton-kilometer per year in 2024.
- Renewal of city bus fleets by retirement of 17,000 old diesel powered buses and of CNG-powered city buses
- Renewal of city taxi fleets by retirement of 140,000 old gasoline-fueled taxis and introduction of dedicated CNG-powered long range taxis
- Removing shortcomings of public transportation system by introducing 27,000 CNG-powered buses and 500,000 CNG-powered long range taxis
- Further development of subway network in 8 metropolitans: Ahwaz: 19 km, Tabriz: 17.2 km, Shiraz: 24.5 km, Esfahan: 20.2 km, Karaj: 27 km, Qom: 6.8 km, Kermanshah: 11 km and Mashhad: 19.6 km.
- Renewal of 400,000 old gasoline powered 125 cc motorcycles and supply of electric powered bikes with equivalent usage
- Renewal of country's freight fleets by retirement of 450,000 gasoline-fueled pickups and 500,000 diesel-fueled trucks and introduction of CNG-powered pickups and trucks
- Power generation sector:
- Installation of 6,000 MW wind and 18,700 MW hydro power plants in 2030. 2013 capacities were 98 MW and 10266 MW respectively.
- Raising share of efficient combined cycle power plants with thermal efficiency of around 45% in power generation mix from 27.3% in 2015 to 54.2% in 2025. This is done via either upgrading current open cycle gas turbine with steam cycle or installing new combined cycle power plants.
- **Oil and gas activity:**
- Recovery of 70% of total rich gas flared in offshore and onshore oil extraction facilities
- Flare gas reduction in gas treatment facilities
- Methane leakage reduction in transport and distribution of natural gas.

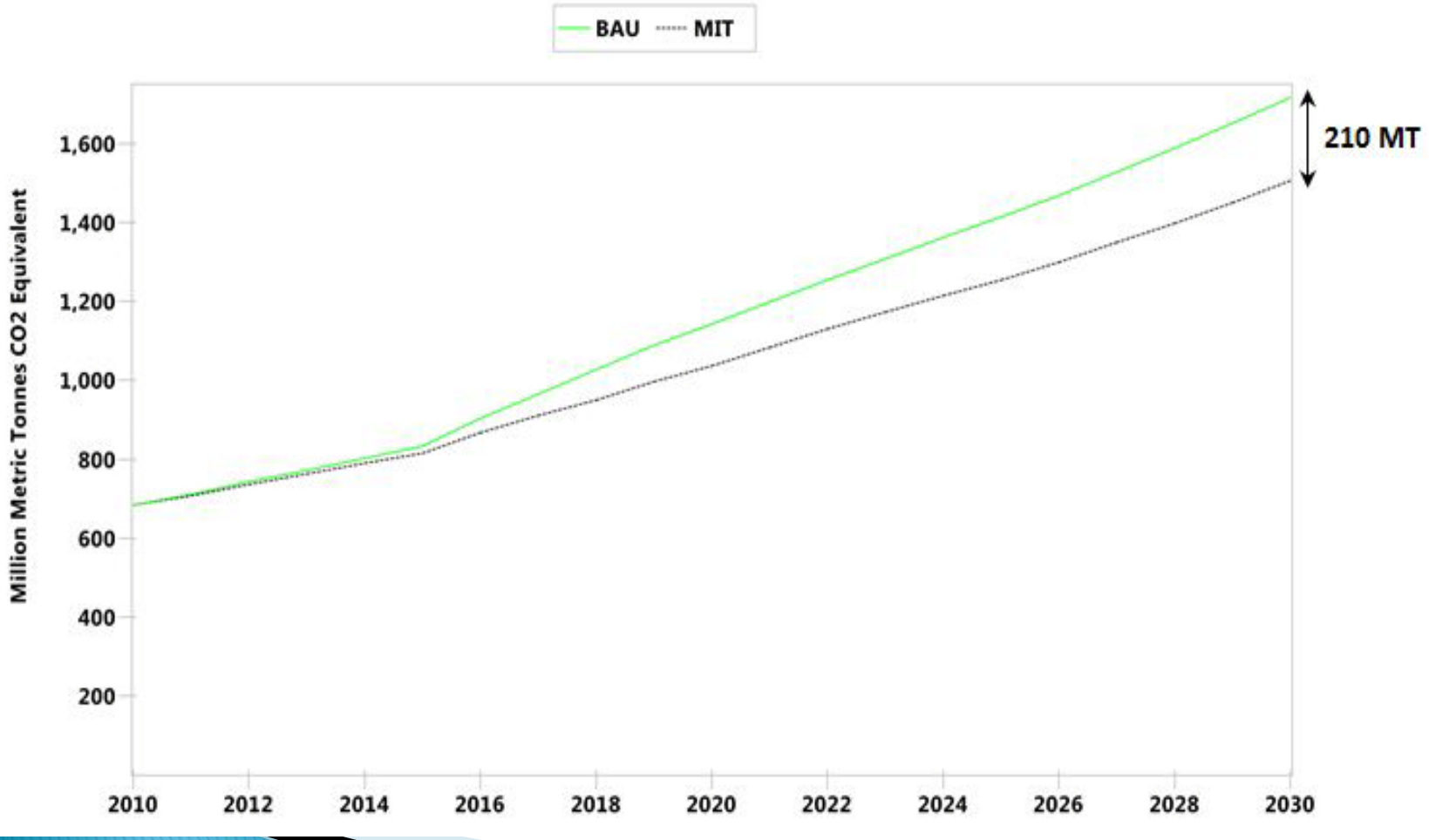
GHGs Emission and Mitigation Actions for 2020-2030: Results

CO_2 Emissions from Energy Sub-sectors in BAU Scenario.



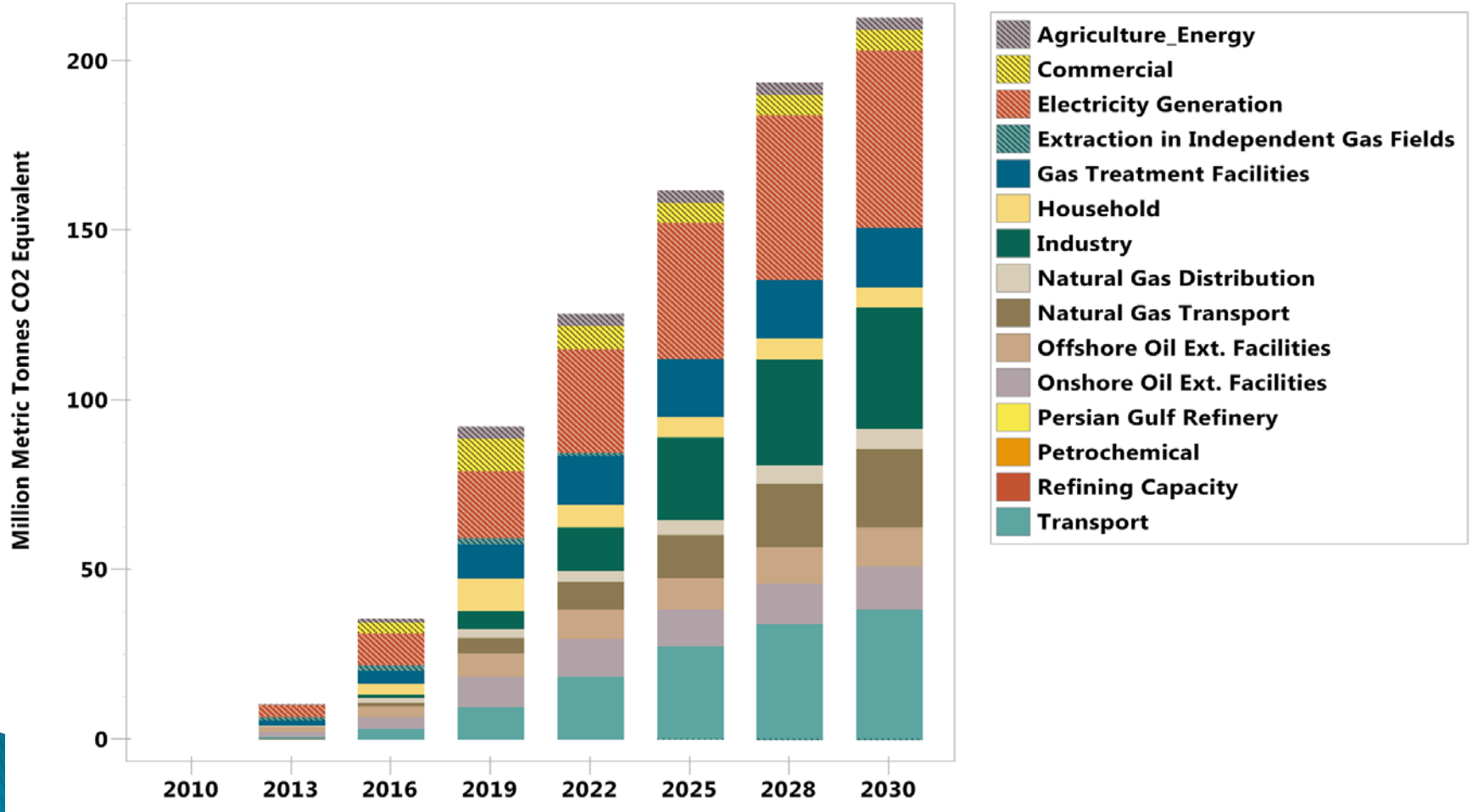
GHGs Emission and Mitigation Actions for 2020-2030: Results

Total Greenhouse Effect in MIT Scenario vs. BAU Scenario in Energy Sector



GHGs Emission and Mitigation Actions for 2020-2030: Results

Contribution of Energy Subsectors in Total Greenhouse Effect Reduction (BAU vs. MIT).



GHGs Emission and Mitigation Actions for 2020-2030: Results

Costs and Benefits of Mitigation Measure by Sector

Aggregated Measures	**Costs** **Billion US Dollar)**	**Reduction compared to BAU in 2030 (%)**
Household and Commercial	4.00	0.71
Transport	15.02	2.24
Industry	7.10	2.85
Agriculture	1.815	0.2
Electricity Generation	8.45	2.26
Gas Supply Chain	0.45	2.71
Oil Ext. Facilities	2.03	1.01
Total Capital Investment	**38.8**	
Foreign Trade	-18.35	
Opportunity Cost	-8.38	
Net Present Value	12.135	Total GHGs Savings during 2010-2030: 2,049.92 Million Tons CO_2e
Cost of Avoiding GHGs (U.S. Dollar/Tonne CO_2e)	5.92	

Gaps, constraints and Recommendations:

- Country demographic profile is youth oriented and needs for capital investment for job creation, dwelling and etc.
- Country economic profile is Carbon Incentives, and therefore the GHGs emission trend is increased rapidly.
- Energy Carriers are highly subsidies and therefore the EE programmes are not cost-effective, so there are not any incentives for their implementation.
- Country suffers from lack of financial resources, So for implementation of mitigation actions, it is required financial assistance under Climate Regimes
- Therefore, Market Mechanisms and also International Carbon Trade may have a crucial role in implementation of Mitigation Actions.

Thanks for your kind attention