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GHG mitigation of Vietnam

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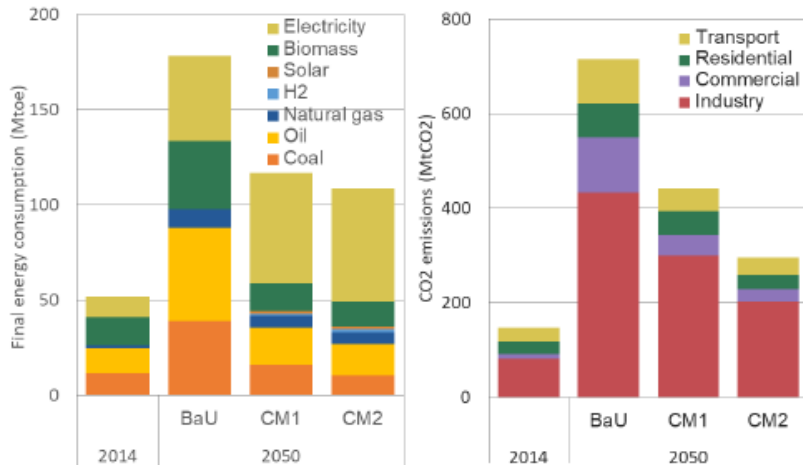
VNPI

- Mitigation policies:
 - Law on Environment
 - National strategy on CC
 - Roadmap to reduce GHG emission
 - Action plan to achieve Net-zero commitment
 - PDP VIII
- Implementation focus:
 - MRV systems by sectors, enterprises
 - Impacts of CC on socio-economic
 - Carbon credit market

Net zero emission scenario

- The AIM team has contributed to the preparation the long-term strategy. Results of the Asia-Pacific Integrated Model (AIM) was used for reference and consulted with line ministries, as the agreement at the 6th Vietnam – Japan Environmental Policy Dialogue between the Ministry of Natural Resources (MONRE) of Vietnam and the Ministry of the Environment of Japan (MoEJ) organized on August 24th and 25th 2020 virtually. The MONRE and MoEJ agreed that the development of the long-term strategy of Vietnam based on AIM (Asia-Pacific Integrated Model).
- The AIM model has provided an overview of long-term GHG peak of Vietnam, and suggested the potential countermeasures, as well as paths to achieve the mitigation targets.
- Three models have been used in this study; ExSS (Extended Snapshot) model to assess the emissions in 2050, AIM/Enduse to assess the technology options to achieve the future GHG mitigation, and AIM/CGE to assess the economic impacts to reduce the GHG emissions.
- AIM team: Dr. Toshihiko Masui, Dr. Hoa Nguyen, Dr. Go Hibino, Dr. Takaharu Ota, Dr. Tomoki Hirayama, Dr. Yuko Motoki, Mr. Yuki Ochi,

2050's deep GHG reduction with ExSS

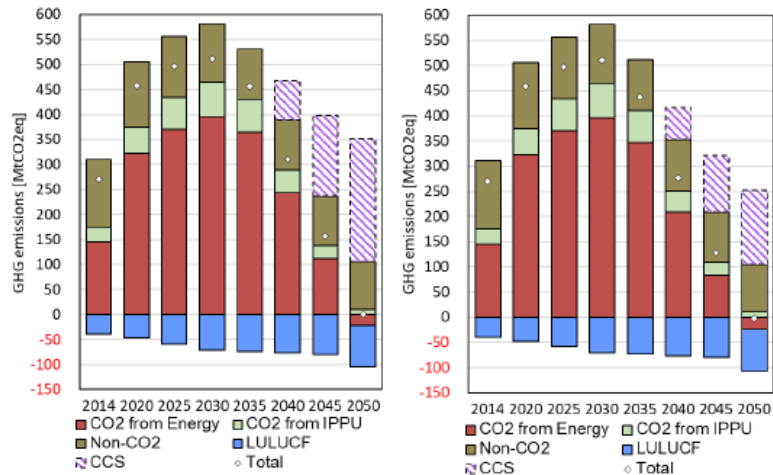


- BaU: No low carbon measures. Energy consumption increase 3.4 times compare to 2012
- CM 1: Vietnam's current national development plans. Energy consumption lower by 35% compared to BaU
- CM2: assumed a higher penetration of efficient technology and RE than CM1. 39% lower than BaU

Implications:

- The growth of electricity consumption is particularly large. Decarbonization in power generation is extremely important;
- CO2 emissions remain around 300 MtCO2 in 2050. Therefore further introduction of RE, carbon capture, usage and storage (CCUS) and hydrogen fuel will be necessary

Emission pathways toward Net Zero with AIM/Enduse



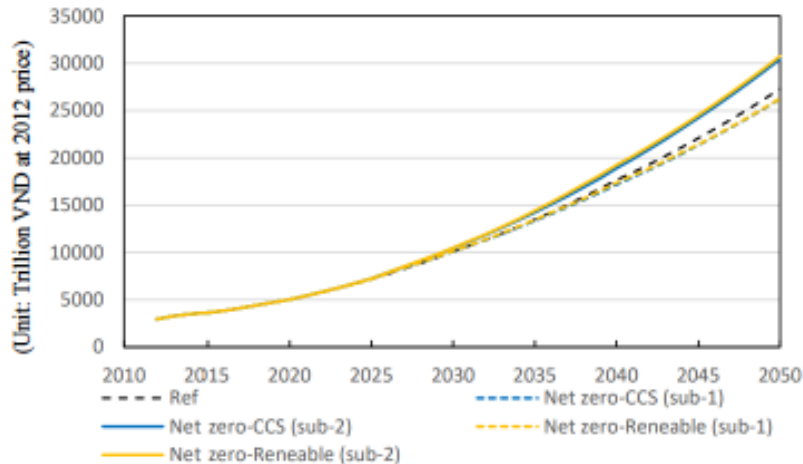
CM scenario 1: Net Zero-CCS: CCS is at higher rate;
 CM scenario 2: Net Zero-Renewable: Renewable is at higher rated

In both scenarios, GHG emissions peak at 511 MtCO₂ in 2030 and achieve GHG neutrality by 2050 (Updated NDC target of 524.2 MtCO₂ in 2030)

Implications:

- To achieve carbon neutrality without an unreasonable transition, it will be necessary to set the peak year before 2035 with more than 150 MtCO₂ of CCS and 80% renewables;
- Power generation in coal power plants will peak in 2025 and decline to zero by 2050;
- New gas power plants should be equipped with CCS or be prepared to install CCS. CCS should be started after 2030 at the latest;
- More than half of new biomass power plants should be equipped with CCS or be prepared to install CCS by 2050;
- All new sales of passenger cars should be EV after 2030 and freight cars should be BEV or FCV after 2040

Economic Impact of Decarbonization countermeasures with AIM/CGE



NZ-CCS and NZ-REN scenarios as the same in AIM/Enduse analysis;

For each scenario, prepare a scenario in which the investment without international support (sub1) and with international support (sub2)

Implication:

Investment to achieve net zero will have the impact of reducing GDP by about 4% by 2050. It is possible to reduce this impact, however, by utilizing international cooperation

National Strategy on CC

- **Issued by Decision No. 896/QD-TTg dated 26th July 2022 by PM**
- **By 2030:** total national GHG emissions are reduced by 43.5% compared to BAU.
- In which:
 - **The energy sector** decreased by 32.6%, the emissions did not exceed 457 million tons of CO₂ equivalent (CO₂eq);
 - **The agricultural sector** decreased by 43.0%, the emissions did not exceed 64 million tons of CO₂eq;
 - **The forestry sector, land use** will reduce emissions by 70% and increase carbon sequestration by 20%, with total emissions and removals reaching at least -95 million tons of CO₂eq;
 - **Waste sector** decreased by 60.7%, emissions did not exceed 18 million tons of CO₂eq;
 - **The industrial processes sector** decreased by 38.3%, the emissions did not exceed 86 million tons of CO₂eq. Establishments with annual greenhouse gas emissions of 2,000 tons CO₂eq or more must reduce greenhouse gas emissions.

National Strategy on CC

- **By 2050:** total national GHG emissions reach the net emission level of “0”; emissions **peak in 2035**, then decline rapidly.
- In which:
 - **The energy sector** decreased by 91.6%, the emissions did not exceed 101 million tons of CO₂eq;
 - **The agricultural sector** decreased by 63.1%, the emissions did not exceed 56 million tons of CO₂eq;
 - **The forestry sector, land use** will reduce emissions by 90%, increase carbon sequestration by 30%, total emission and absorption will reach at least -185 million tons of CO₂eq;
 - **The waste sector** decreased by 90.7%, the emissions did not exceed 8 million tons of CO₂eq;
 - **The industrial processes sector** decreased by 84.8%, the emissions did not exceed 20 million tons of CO₂eq. Establishments with annual greenhouse gas emissions of 200 tons of CO₂eq or more must reduce greenhouse gas emissions.

Energy Sector

Energy Supply:

- Continue to develop small hydroelectric plants selectively, up to standards on environmental protection; expanding a number of medium and large hydropower plants to maximize the efficiency of hydroelectricity;
- Increasing the capacity of concentrated solar power plants, rooftop solar power, onshore wind power, offshore wind power, biomass power, development of hydrogen fuel technologies, ammonia, tidal energy technology, waves;
- By 2030, the proportion of renewable energy sources including hydroelectricity, wind power, solar power, biomass will account for at least 33% of total electricity generation. By 2050, renewable energy will account for at least 55% of total electricity generation;
- Developing energy storage technologies including battery storage, hydroelectricity, heat storage... and smart grid. Application of carbon capture and storage (CCS) technology for power plants using fossil fuels and industrial production facilities;

Industrial Processes

- Improving, developing and applying technology in the production of building materials; develop and use energy-saving and green building materials in the residential and commercial sectors. Replacing coal with natural gas in the production of ceramic tiles; use of alternative materials in glass production;
- Applying carbon capture technology in the fields of cement production, chemicals - fertilizers and steelmaking;
- Completing the system of regulations and standards on green buildings and green urban areas, ensuring that by 2050 the regulations and standards on green buildings and green urban areas are applied compulsorily to all public works, new construction.

Implementation

- Decree 06/TTg-2022 dated 07/01/2022
- Circular 01/TT-BTNMT dated 07/01/202
- Circular 17/TT-BTNMT dated 15/11/2022

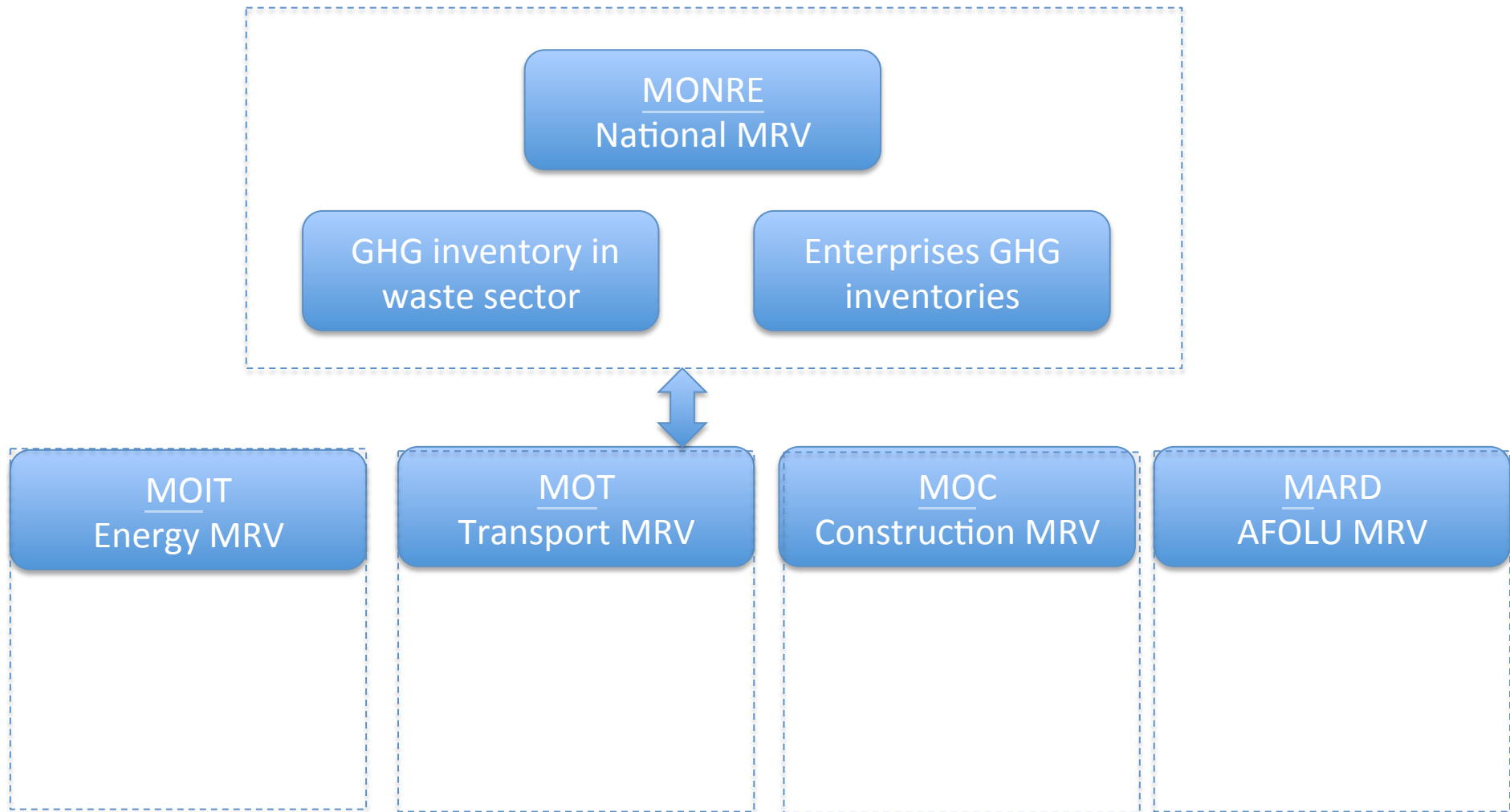
Decree No.06/2022/ND-CP on Mitigation of GHG emissions

- Elaborate some articles of the Law on Environmental Protection: GHG emission, ozone layer protection, and organization and development of a domestic carbon market;
- Section 1 concerns the mitigation of GHG emission, GHG inventory and national MRV system;
- Section 2 delineates the architecture and development of the domestic carbon market. It outlines a roadmap that from 2028 start the domestic carbon market, the certification of carbon credits, the exchange of GHG emissions quotas and carbon credits;

Circular No.01/2022/TT-BTNMT

- Circular No.01/2022/TT-BTNMT on Guidelines for Implementation of Law on Environmental Protection regarding Response to Climate Change
- Assessment of impacts, vulnerability, risks, loss and damage caused by climate change;
- Verification of GHG inventory results and GHG mitigation emissions mitigation

MRV systems responsibilities



Circular No. 17/2022/TT-BTNMT

Methods for MRV of reduction of GHG emissions and GHG inventory in waste management, dated 15/11/2023

- Process for development of **sector-level** GHG inventory
 - Method for sector-level GHG inventory development
 - Selection of sector-level GHG emission factors
 - Collection of data for sector-level GHG inventory
 - Calculation of sector-level GHG emission and absorption
 - Management of sector-level GHG inventory quality
 - Preparation of reports on sector-level GHG inventories
- Development of **facility-level** GHG inventory

Conclusion remarks

- AIM models have contributed significantly to the development of Vietnam Strategy on Climate change. It is appreciated to get the continuous support in review and evaluation through out the implementation of the strategy.
- It is essential of effective coordination amongst line ministries; Regular review and update of ministries mitigation scenarios with carefully evaluation of impacts are important to make achievable the Net Zero Emission by 2050 for Vietnam.

Thank you very much for your attention!