

28th AIM International Workshop
13-14 September 2022

**The National Strategy on Climate Change for
2050 of Vietnam:
Introduction and AIM models contributions**

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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.

Main tasks

By 2030

- Develop and implement a plan to reduce greenhouse gas emissions of all sectors according to the roadmap to achieve net emissions of "zero" by 2050.
- Conduct a greenhouse gas inventory and reduce greenhouse gas emissions for the following sectors/ facilities that emit 3,000 tons of CO₂eq or more annually from 2022.
- Other emitters, especially those in the public sector, are encouraged to carry out greenhouse gas inventories and reduce greenhouse gas emissions.
- Develop a total greenhouse gas emission quota and organize the allocation of greenhouse gas emission quotas to greenhouse gas-emitting facilities that must carry out a greenhouse gas inventory from 2026;
- Implement measures to reduce greenhouse gas emissions in daily operations and in new investment and public procurement, including measures for economical use, energy efficiency, green buildings, sustainable cooling sustainable, use battery electric vehicles and low-energy devices. Encourage new investment projects and investment projects to transform, apply technologies, production processes, provide services with low greenhouse gas emissions;

Main tasks (cont.)

By 2050:

- Continue to develop and implement plans to reduce greenhouse gas emissions of all sectors according to the roadmap to achieve net emissions of "zero" by 2050;
- Carry out a greenhouse gas inventory and reduce greenhouse gas emissions for establishments that emit 2,000 tons of CO₂eq or more annually from 2030; 500 tons of CO₂eq or more from 2040; 200 tons of CO₂eq or more by 2050. All public sector establishments must conduct a greenhouse gas inventory and reduce their 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;

Agricultural Sector

- Management, technological innovation in cultivation and animal husbandry, change in land use methods, development of low-emission agricultural value chains and post-harvest processing and preservation;
- Sustainable organic agriculture development, crop structure transformation, integrated crop management, increased farming area irrigated economically, smart irrigation for wet rice cultivation and long-term crops; transforming agricultural farming models towards low emission; improve feed rations in livestock;
- Reusing crop by-products and treating livestock waste as organic fertilizer, generating biogas; applying composting and reducing chemical fertilizers; Replace urea with low emission fertilizers

Forestry and land use

- Improve the productivity and quality of plantations to increase carbon sequestration and reduce emissions through the application of technical advances, converting short-cycle plantations to long-cycle plantations; reduce logging of planted forests for woodchip production.
- Sustainable forest management and forest certification to reduce emissions from deforestation and forest degradation control, forest fires and biomass burning; increase GHG absorption through increasing forest quality, conserving biodiversity and improving ecosystem services. Developing and replicating agro-forestry models through additional planting of forestry trees and timber trees to increase carbon sequestration and combat land degradation, giving priority to sloping lands

Waste sector

- Implement measures to manage, minimize waste generation from production to consumption, expand the responsibility of manufacturers; increase reuse and recycling of waste.
- Develop models for integrated solid waste management. Apply advanced measures in solid waste treatment including: landfill with gas collection (LFG), semi-aerobic landfill; produce compost from organic waste; burning solid waste to generate electricity; Production of fuel pellets from solid waste.
- Apply advanced measures in waste and wastewater treatment to reduce methane emissions.

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. Implement solutions for blast furnace slag crushing, fly ash crushing, Puzzolana crushing and limestone crushing instead, reducing clinker ratio in cement 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.

AIM models contribution

- 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. Masui, Dr. Hoa, Dr. Hibino, Dr. Hirayama, Ochi san, Dr. Ota

Suggestions from models results

- To achieve carbon neutrality without unreasonable transition, it is necessary to set the peak year before 2035.
- To consider high proportion of RE in electricity generation. The global ratio of renewables in generation is 90% to achieve net zero by 2050. Vietnam has relatively abundant potential for PV and wind power and expected to overcome technological, economic and social barriers and achieve large amount of deployment for PV and wind power.
- Power generation in Coal Power Plant will be 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 latest.
- More than 50% of new Biomass Power Plants should be equipped with CCS or be prepared to install CCS by 2050.
- Hydrogen should be Equivalent to 25% of total final energy consumption in 2050 is required by 2050.
- CCS in the industry sector: It would be required in cement sector and iron and steel sector by 2050.
- Annual CCS quantity: In 2050 necessary scale of CCS will reach more amount than the total CO₂ emission from fuel combustion and industrial process in 2014. It is essential to find the suitable place for storage and operate the system within coming 30 years.
- All passenger cars should be EV after 2030, freight cars should be BEV or FCV after 2040.

Conclusion remarks

- It can be said that it will not be easy to achieve the pathway proposed by AIM's analysis, but other pathways will not be easy either. But from these results, at least the earlier hydrogen and CCS are introduced, the earlier the GHG emission peaks, and that leads to avoid the rapid emission reduction in a short term after the peak. In order to avoid stranded assets, CCS must be ready for being equipped with industrial and power plants well in advance.
- To achieve the net zero emission, it is estimated the amount of investment around 308 billion USD (investment cost after 2022 is discounted at the rate of 10%). The investment on renewables and batteries in power sectors and EV in transport sector account for the majority of the additional costs. The international support will accelerate the peak out, to help the country achieve both GDP growth and GHG emission reduction.
- it still needs a good and effective coordination amongst line ministries, with the direction from the top leader in implementing existing climate change policies. Regular review and update of ministries action plan are important to achieve the target of the Net Zero Emission by 2050 for Vietnam.

VNPI

- Vietnam National Productivity Institute - Ministry of Science and Technology:
- Website: vnpi.vn
- Function:
 - National Institute on Productivity policies
 - Productivity Enhancement based on Science, Technology and Innovation
 - Sustainable Production Consulting

Thank you very much for your attention!