

**technology transfer
in viet nam**

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I. Introduction

1. Geography: Vietnam is located in Southeast Asia, sharing a land border with China, Laos and Cambodia. It has a land area of 330,990 km² consisting of thousands of islands and more than 1 million km² of surface water. The entire length of coastline is 3260 km.

Vietnam climate is under the influence of tropical monsoon. However the rainfall is not evenly distributed over the country and it is seasonal.

In 1993 Vietnam's population was estimated to be 71.02 million with a density of 214 persons per km². The population in April 1999 was 76.3 million.

2. Economy: In the two years 1996 and 1997 the GDP was 258,609 and 295,700 VND billion whereas the GDP per capita was 3,430 and 3,800 thousand VND in 1996 and 1997 respectively (US\$1 ~ 11,000 VND). Table 1 indicates the sectoral structure of Vietnam's economy in 1996 and 1997.

Table 1: Sectoral structure of Vietnam's economy in 1996 and 1997.

Sector	1996	1997
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Industry and construction	30.7	31.7
Agriculture, Forestry and Fishery	27.2	25.7
Service	42.1	42.6

Source: Development Strategy Institute, 1998

3. Status of Climate Change Activities in Vietnam:

Vietnam ratified the UNFCCC on 16 November 1994. The Hydrometeorological Service of Vietnam (HMS) has been assigned by the Government to take full responsibility for Climate Change issues and for implementing programs related to the objectives of the UNFCCC, and to be the focal agency of the Government to implement the Kyoto Protocol. A Viet Nam Climate Change Country Team (VNCCCT) was established in 1993 with a mandate to improve knowledge on climate change and its social, economic and environmental impacts. The VNCCCT consists of 20 members. It is chaired by the Director General of HMS, and it is represented by all relevant ministries and government agencies.

II. Technology needs and technology needs assessments

4. Economic development. The most important figures indicate that the economy of Vietnam will continue the sustainable trends in the future with GDP in the year 2030 at approximately 11 times that in the year 2000.

Table 2: Economic structure projected for the period 1994 - 2030

Sector	1994	2000	2010	2020	2030
Industry	30.0	33.5	37.3	38.1	38.8
y	27.5	19.5	11.0	6.3	4.0
Agriculture	42.4	47.1	51.7	55.6	57.2

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Source: Ministry of Planning and Investment, 1996

5. National inventory of GHG emissions and future emission.

The 1993 GHG emissions in Viet Nam were 111.7 million tonnes CO₂ equivalent, of which carbon dioxide contribute about 52% and methane 44%. Balance was contributed by nitrous oxide.

The Agriculture sector contributed to 47 million tonnes of CO₂ equivalent, while the Energy sector emitted 27.5 million tonnes of CO₂ equivalent, the Forestry sector emitted 30 million tonnes CO₂ equivalent.

Emission in the future will be increased mainly causing by the fossil fuel consumption. Emission from the energy sector in 2030 is projected to 396 million tonnes CO₂, it is more than 10 time higher than 1993. The GHG emissions from agriculture are projected from 47 M tonnes CO₂ equivalent in 1993 to 68 M tonnes CO₂ equivalent, in 2030. In the forestry sector, the amount of CO₂ is projected to decline from 29.9 million tonnes in 1993 to 4.2 million tonnes in the year 2000 and the net sequestration of 32.1 million tonnes in 2030. The Table 2 shows the GHG inventory projection to 2030.

Table 2: Projection GHG emission in Sectors (Tg) of CO₂ equivalent to 2030.

Sector	1993	2000	2010	2020	2030
Energy	27.5	44.48	103.40	187.82	396.35
Forestr y	29.88	4.20	-21.70	-28.40	-32.10
Agricul	46.60	52.50	57.20	64.70	68.29

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Total	111.69	101.18	138.90	224.12	432.54

6. Abatement Scenarios

6.1. Energy sector

Energy consumption scenarios:

Efficiency Improvement in Cooking
 Compact Fluorescent Lamp (CFL)
 High Efficiency Refrigerators
 Air Conditioning efficiency improvement
 More Efficient Industrial Motors.

Energy supply scenarios:

Fuel Switching in Power Generation
 Wind power plants

6.2. Forestry sector.

A plan for reforestation and natural regeneration of 5 million additional hectares by 2010 was adopted by the Government. However, for the forestry sector the likely trends scenario is developed. Based on the current trend, it is assumed that the deforestation rate will continue to be on the average of 100,000 hectares per year. Likewise, the level of reforestation effort is not enough to offset the deforestation. The reforestation rate is about 70,000 hectares per year and the survival rate is assumed 100%. The following options are developed for abatement scenarios:

Enhanced natural regeneration: 1.85 million hectares of degraded forests will be promoted for natural regeneration in combination with reforestation at a rate of 50,000 per year.

Reforestation: 1.95 million hectares of degraded land will be converted into forest plantations at a reforestation rate of 130,000 ha per year.

Forest protection and conservation: 6.5 million hectares of natural forest will be protected. Logging and timber harvesting will not be allowed in the protected areas.

Scattered trees: 4 million scattered trees, equivalent of about 1.65 million hectares, will be planted up to 2030.

The above options will lead to a reduction of emissions 4539 Tg CO₂ equivalent compared to 2144 Tg in the baseline.

6.3. Agricultural sector.

Water management: By the year 2030, 5.5 M ha of rice paddy land will have intermittent drainage under controllable irrigation, resulting in a reduction of methane emissions from rice field of about 50 kg/ha/year. This will result in a total of mitigation of 5,5005 Gg CH₄.

Improving nutrition: Providing a higher quality of improved (processed) animal feed (4.2 Mt/year) will result in a reduction of 5 kg CH₄/head/year on a total of 4.4 M animals. This will result in the reduction of 385 Gg CH₄/year from animal husbandry.

III. Capacity building needs.

7. Identify and develop policy options for adequate monitoring systems and response strategies for climate change impacts assessment. However, these policy options will be based on the qualitative analysis of vulnerability and impact assessment, using the IPCC Technical Guidelines. Thus, a comprehensive vulnerability and impact assessment will be undertaken on terrestrial and

marine ecosystems (these include agriculture, coastal zone, water resources, human health, natural ecosystems, and other aspects such as socio-economics).

8. Update and when necessary, extend earlier works, for example, apart from the climate change impacts on the Red River Delta and the Mekong River Delta, those on other major river basins will also be assessed. The linkage between climate change and the frequency and intensity of typhoons, which are of great concern to the country, may be investigated.

9. A Vulnerability/Impacts Assessment and Adaptation Group, drawing from the existing expertise, will be formed to undertake this task. The capacity for this group will be strengthened and enhanced. In addition, institutional strengthening on this aspect will be needed.

10. Building capacity to integrate climate change concerns into planning: there is a need to build or strengthen the national capacity to integrate climate change concerns into capacity to integrate climate change concerns into medium and longterm planning. This may include education and training on climate change for national development planners, as well as for policy and decision-makers from all relevant ministries and government agencies.

11. Establishing a framework of technology collaboration for the transfer of climate-friendly technologies that could include co-ordination on national needs assessments; prioritisation exercises; training; institutional strengthening; financing. This should involve as many stakeholders as possible from both donor and developing countries including economic, energy and environment ministries; development agencies; local governments. In this framework, a body

established by UNFCCC Secretariat could serve as a focal point for such collaboration.

12. The Global Environment Facility (GEF) should focus on funding capacity development projects which aim to remove barriers to the adoption of cleaner technologies. One of the major barriers is the lack of technology assessment capabilities.

IV. Barriers to technology transfer.

13. Lack of experiences on technology transfer concerning climate change issues. Until now there is only one AIJ project with NEDO Japan implemented in Vietnam. There is not yet a framework for the transfer of climate-friendly technologies.

14. Lack of necessary policy frameworks, and the human, institutional and technical capabilities necessary to take full advantage of more energy-efficient production methods and to attract the investment.

15. The technology co-operation should be consistent with the development priorities of Vietnam as well as developing countries in general. It should build on local knowledge and expertise and capacity-building should be as important as the actual technology transfer.

V. Possible actions and initiatives to remove barriers.

16. Under the Asia Least-cost Greenhouse Gas Abatement Strategy (ALGAS) Project, Vietnam as well as other 11 Asian countries have formulated cost effective strategies to reduce the growth of future net GHG emissions. The project was supported by GEF and executed by the Asian Development Bank (ADB). Under this project,

Vietnam has proposed some Technical Assistance Projects including:

- Improvement of energy efficiency in fuel combustion of industrial processes
- Waste heat recovery power generation from cement factory
- Energy efficiency measures in industrial boilers
- Reforestation for conservation and expansion of carbon sink
- Water management for reducing methane emissions from rice fields

The project portfolios represent potential technical assistance and investment that are needed for technology transfer. These projects will help Vietnam to contribute to the ultimate objective of the Convention and to develop sustainably. We look forward to the assistance from UNDP, World Bank or UNEP in the formulation of these projects and submit to GEF for approval. If they are implemented, the barriers mentioned-above can be removed gradually.

VI. Opportunities for investment and private sector participation

17. Energy sector: According to the National Energy Plan, certain institutional structures related to GHGs reduction would be developed and integrated; GHGs abatement by various measures should be conducted by restructuring the businesses of power generation, transmission, and distribution; Technical and management training should be instituted for experts and managers in order to strengthen their awareness of economic and environmental benefits of GHGs reduction; Prepare the action plan in coordination with the demand-side management (DSM) program; and promote the renewable energy program. Some opportunities for investment are;

- Enhancing the efficiency of coal and oil;
Substitution of coal by oil and oil by gas
- Construction of wind power plants
- Improvement of efficiency in cooking
- Substitution of old bulbs with compact fluorescent lamps
- Highly efficient air conditioning, refrigerators and electric motors

18. Forestry: In order to implement the forestry mitigation options successfully, there is a need to create close links between forestry and agriculture and between forest operations and forest industry. Participation of other economic sectors and local communities is also important in the success of plans and programs implemented in the sector, including forest protection, reforestation, and other related activities. Vietnam needs the support with more funding for operations such as forest protection, watershed management, biodiversity conservation, reforestation, the development of special use forests (nature reserves and national parks), and settlement of shifting cultivation. Following are opportunities for investment in forestry:

- Forest protection, enhanced natural regeneration
- Short/long rotation reforestation
- Planting scattered trees.

19. Agriculture: The ministry of Agriculture and Rural Development shall be responsible for activities relating to the projects' scheduling and budgetary and institutional needs. To reduce methane emissions from rice cultivation while maintaining or increasing yield in rice production, it is necessary to transfer the technology of water irrigation and drainage in rice fields. This will help to improve the water

management in the rice paddy of the Red River Delta and the Mekong Delta.

VII. Ongoing and planned technology transfer activities.

In order to implement fully the GHGs strategy and at the same time undertake commitments as a party to the Convention, and to optimize and use all financial assistance and technology transfer, Vietnam has developed a Country Program comprised of four main policies:

- (i) Reducing the growth of anthropogenic emissions by sources and enhancing sinks of all GHGs by using cleaner energies, reducing energy loss, saving energy, and planting and protecting forests;
- (ii) Adapting to climate change to foster agriculture's adaptability, to manage the use of water resources, to prevent floods, and to monitor the prevention of the natural calamities;
- (iii) Formulating policies on compiling and implementing laws to promulgate and to enforce relevant Government Decrees on responding to climate change; and
- (iv) Formulating policies on expanding international cooperation.

In the context of the National Program, the following sectoral technology transfer activities should be implemented:

20. Energy:

- Replace coal-fired and oil-fired thermal power generation by natural gas, with high efficiency gas combined cycle technology. The plan is expected to be completed in the period 1998-2005.

- Implement of new clean GHGs energy plan; first priority is to develop hydroelectric power capacity up to 17,000 MW.
- Develop and implement other renewable energy such as wind and solar power, by 2020 to reach capacity of 100 MW of wind power.
- Reduce grid power system loss by rehabilitation and upgrading, and replacing existing small conductors by higher conductors from 1999 to 2005. application of new technology and selection of standard medium voltage level at 20 kv.
- Implement demand-side management program by improving efficiency, reducing the intensity of energy consumption per unit of product, and electricity load management
- Grid power system rehabilitation plan has been started first by assistance from ADB (1996-1998), after that by French Government (1997-1998).
- Technical assistance for DSM has been prepared by World Bank and Electricity of Vietnam, Institute of Energy with establishment of DSM cell office responsible for Energy Policy.

21. Forestry:

- To allocate forest land for local households, to create 5 million ha of new forest in combination with natural regeneration.
- To provide job opportunities for local people.
- To create the new resources based on the wastelands, to expand the protection forest area from 5.7 to 7 million ha.
- To strengthen wood processing industry and non-wood forest products sector.
- To plant 6 billion of scattered trees. To rehabilitate 1 million ha of degraded forest land including catchment and coastal areas.

- To supply 5 million m³ of logs, and around 30 million m³ of fuelwood to domestic consumers.

22. Agriculture:

- Improvement of water management from rice fields with the intermittent draining during growing season will reduce CH₄ emission.
- Improving nutrition through mechanical and chemical feed processing in lives-tock.

VIII. Key elements of successful transfer of technology activities.

23. To provide information on the best available technologies and processes that can reduce the growth of GHGs emissions in energy-intensive industries, in agriculture and enhance the sink through protection and increase the forest.

24. To build capacity and provide training for local experts and institutions to implement energy-efficient technology and advanced technologies in different sectors to reduce the GHGs emissions along with raising the living standard of the people.

25. The ALGAS project and some other projects has achieved the crucial initial steps that are necessary to implement the concrete GHG abatement projects and programs. In proposing the GHG abatement projects, Vietnam has substantially shown its commitment under the UNFCCC. However, as a developing country, Vietnam has higher and more pressing priorities that relate to national social, economic, and environmental matters. Without the additional support to maintain the large effort that has been provided to establish the necessary institutional framework and technical capacity, these critical components may weaken rapidly. Thus, the international community should continue to support activities of financial

and technology transfer that are consistent with the principles, especially Article 4.5 of the UNFCCC.

26. In technology transfer activities, attention should be given to local socioeconomic and technical conditions and the approach to participation of the local people to secure the sustainable development.

IX. Notable elements of a framework for meaningful and effective actions to enhance implementation of Article 4.5 of the Convention.

27. Technology transfer must be host-country driven process: Perhaps the most important element is that it is host-country directed. Countries structure their approach, select technology cooperation priorities, determinate the sustainable development characteristics of technology transfer projects, develop strategies to promote long-term sustainable development for application of new technologies, and define and implement actions to best meet national development priorities.

28. Governments can play a critical role: by removing legal and institutional barriers to technology deployment, such as lack of information, limited host country capacity, and well-organized coordination of national concerned agencies.

29. Successful technology transfer requires cooperation at many levels:

- Among host country government agencies, businesses, nongovernmental organizations (NGOs), and technical experts to define and implement technology transfer strategies and

actions (country teams lead by senior government officials can lead this operation).

- Between developing country and industrialized country technical experts to exchange technology information and experiences and to design technology cooperation actions.
- Between developing country and international businesses and investors to attract private sector investment
- Between developing country and international donors to secure necessary financial and technical assistance.

X. Conclusions.

30. The issues of technology transfer are very new and complicated for us. We hope that this Meeting will help us to understand more clearly about these processes, and it is necessary to continue to raise the awareness among the policies makers as well as people responsible for UNFCCC and the Kyoto protocol. This still requires the assistance in capacity building from international organisations and developed countries as well as regional and international cooperation.

The Government of Viet Nam is fully committed to the implementation of the UNFCCC. As an area prone to natural disasters, with its low-lying coastal zone, fragile ecosystems, including mountainous ecosystems, and economy highly dependent on income generated from the production, processing, export and consumption of fossil fuels and associated energy products, Viet Nam deserves special consideration under Article 4, paragraph 8 of the Convention, including necessary actions related to funding, insurance and the transfer of technology, to meet its specific needs and concerns arising from the adverse effects of climate change and/or the impacts of the implementation of response measures. To reduce the threat of global climate

change, concrete GHG emissions abatement projects need to be implemented.

Thank you for your attention.