



Working paper No. 18 (2000)

**WORKSHOP OF THE CONSULTATIVE GROUP OF EXPERTS ON  
NATIONAL COMMUNICATIONS FROM NON-ANNEX I PARTIES  
FOR THE ASIAN REGION**

Bangkok, Thailand, 16-20 October 2000

**MEASURES CONTRIBUTING TO ADDRESSING CLIMATE CHANGE**

**Working paper**

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Explanatory notes

References to UNFCCC guidelines are to document FCCC/CP/1996/15/Add.1, decision 10/CP.2, annex: "Guidelines for the preparation of initial communications by Parties not included in Annex I to the Convention". The Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories are referred to in this document as the IPCC Guidelines.

The following chemical symbols and abbreviations are used:

CH <sub>4</sub>	methane
CO <sub>2</sub>	carbon dioxide
N <sub>2</sub> O	nitrous oxide

The following unit of weight is used:

Gg	gigagram (10 <sup>9</sup> grams)
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The following other abbreviations are used:

GDP	gross domestic product
GHG	greenhouse gas
GNP	gross national product
GWP	global warming potential
LUCF	land-use change and forestry

The following ISO country codes are used:

Cook Islands	COK	Malaysia	MYS
Micronesia (Federated States of)	FSM	Nauru	NRU
Indonesia	IDN	Philippines	PHL
Jordan	JOR	Singapore	SGP
Kiribati	KIR	Tuvalu	TUV
Republic of Korea	KOR	Vanuatu	VUT
Lebanon	LBN	Samoa	WSM



## I. EXECUTIVE SUMMARY

1. This working paper covers the information provided by fourteen Asian Parties that submitted their initial national communications by 1 June 2000: Cook Islands, Indonesia, Jordan, Kiribati, Lebanon, Malaysia, the Federated States of Micronesia, Nauru, the Philippines, the Republic of Korea, Singapore, Samoa, Tuvalu and Vanuatu. As this report covers information only from the above mentioned non-Annex I Asian Parties, general conclusions on common patterns may be not necessarily applicable for all Asian non-Annex I Parties.
2. Several **mitigation methodologies and tools** were used to determine the mitigation potential of the planned or implemented measures to limit emission of greenhouse gas from the energy, transport, agriculture, waste management and forestry sectors. In the energy sector, some Parties referred to the use of model(s), whereas others did not specify the methodology selected. Within the **energy sector**, the tools used for mitigation analysis included the use of models such as LEAP,<sup>1</sup> ENPEP,<sup>2</sup> and MARKAL<sup>3</sup>. In the **transport sector**, two Parties mentioned the use of the MARKAL model while others did not specify the methodology used. In the **waste management sector** and in the category of **enhancement of removal by sinks**, reporting Parties did not specify the methodology selected.
3. Several Parties reported on both **planned and implemented measures to limit GHG emissions** from one or more of the following sectors: energy, transport, forestry, agriculture and waste management. Some Parties provided estimates of the emission reduction associated with the implementation of identified measures while others reported on the technical potential for emission reduction in some of the sectors. Some reporting Parties included estimates of the cost of implementation of measures within different time-frames. A number of Parties also indicated limitations associated with the implementation of measures to limit emissions of GHGs and referred to the use of legislation, subsidies, tax incentives and development funds to encourage the adoption of emission reduction measures.
4. In the **energy sector**, the range of measures included those relating to energy efficiency or energy conservation, fuel switching and use of renewable energy for the industrial, residential and commercial sectors. Within the **transport sector**, Parties reported the promotion and/or use of cleaner fuels or fuels derived from biomass; introduction of hybrid electric vehicles; improvement of the modes of transport such as road, railway, underground and river transportation systems; improvement of vehicle maintenance or replacement of old vehicles; public awareness campaigns, education of drivers and promotion of carpooling; imposition of tariffs or taxation of cars and use or imposition of varied road tolls or traffic management. In the **agricultural sector**, Parties included options relating to the improvement of rice cropping systems, plant nutrient management, agricultural land utilization and management, and animal husbandry. Measures reported by Parties to limit emissions in the **waste management sector** included integrated waste management; waste minimization at production, distribution, consumption and disposal stages; waste recycling; and improvement of organic waste collection. Other measures included the use of sanitary landfills; capacity-building for the operation and maintenance of waste water treatment plants; rehabilitation of waste water treatment plants; flaring of CH<sub>4</sub> from landfills; waste utilization for energy production; and development of regulations to control urban industrial pollution. Other waste management measures included national action plans; national environmental management strategies; educational programmes;

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<sup>1</sup> LEAP: Long-range Energy Alternatives Planning system.

<sup>2</sup> ENPEP: ENergy and Power Evaluation Programme.

<sup>3</sup> MARKAL: MARKet Allocation model.



and relevant legal instruments. Measures reported by Parties for the **enhancement of removal by sinks** included the preservation of existing forest cover; afforestation; reforestation; agroforestry; prevention and control of forest fires; control of diseases and pests; control of damage due to acid rain; promotion of low impact logging and improvement of timber utilization. Other identified measures in this category included soil and watershed conservation; rehabilitation of wetlands; forest research; forest management; ban on burning during land clearing; promotion of fast growing tree species; review of current forest and land management policies; forestry legislation; development funds; and public awareness and training programmes.

5. Pursuant to Article 12.4 of the Convention, several Parties reported on a number of **mitigation projects** which have been identified on a voluntary basis as needing funding. For the **energy sector** where the projects focused primarily on efficiency improvement and renewable energy, some Parties provided detailed figures for the quantity of energy and/or the amount of CO<sub>2</sub> emissions that would be reduced by the implementation of the projects and others described the associated estimated costs of projects or costs per tonne of CO<sub>2</sub> avoided by the implementation of the measures. In the **transport sector**, identified projects include those related to improved traffic management, switching to less emitting modes of transport, introduction of new technologies and effective maintenance of vehicles. A limited number of countries provided detailed information on either the amount of fuel or emissions saved or the associated costs. In the **agricultural sector**, one Party proposed projects related to land suitability evaluation studies, integrated watershed management plans and agricultural land conservation. Within the **waste management sector** the projects identified by reporting Parties related to the assessment of the best options for waste disposal and composting, waste recycling from the industrial sector, the recovery and commercial utilization of methane from landfills, flaring or energy production from landfills and promotion of biogas technology. In the category of **enhancement of removal by sinks** the mitigation projects identified related to the quantitative evaluation of the carbon sink potential of ecosystems.

6. In some sectors, due to the limited information provided by reporting Parties, it was difficult to discern the **exact level of implementation** of the reported measures. In the **energy and transport sector**, some Parties referred to the status of measures as being either ongoing or implemented. In the **agriculture sector**, Parties reported on the implementation of emission reduction measures through technical propagation projects, and through the implementation of medium-term agricultural development and national action plans. In the **waste management sector**, Parties provided information on the inclusion of waste management as a priority in the national action plans or their national environmental management strategy report. In the category relating to the **enhancement of removal by sinks** Parties mentioned that this sector was under consideration within the various forestry management plans and national environmental management strategies report.

7. Financial assistance and access to appropriate technologies were identified as being crucial to the development of integrated mitigation strategies and policies. Specific needs included the promotion of renewable energies and achievement of energy efficiency, expansion of sink capacities, research into sustainable agricultural practices, enhancement of national capacities for forest fire management, strengthening of national policies to manage solid and liquid wastes, and the promotion of the use of more energy-efficient vehicles. Parties also emphasized the need for improving their national capacities to prepare mitigation projects for funding.



## II. MEASURES CONTRIBUTING TO ADDRESSING CLIMATE CHANGE

### A. Energy

8. Fourteen Parties reported on some possible actions to limit greenhouse gas emissions from the energy sector, including energy conservation and efficiency, fuel switching and the use of renewable energy. The reported measures and specific projects, both planned and implemented, were diverse but generally covered the same main categories and included energy efficiency or conservation (COK, FSM, IDN, JOR, KIR, KOR, LBN, MYS, NRU, PHL, SGP, VUT), fuel switching (FSM, IDN, JOR, KOR, LBN, NRU, PHL, SGP) and renewable energy (COK, FSM, IDN, JOR, KIR, KOR, LBN, MYS, NRU, PHL, SGP, TUV, VUT) for the industrial as well as residential and commercial sectors.

9. Among the chosen measures in the field of energy efficiency or conservation were: energy cogeneration (KOR, SGP); increase of energy efficiency, promotion of energy saving through the introduction of efficient appliances; building standards, etc. (COK, FSM, IDN, JOR, KOR, LBN, NRU, PHL, SGP, VUT); increase of efficiency of thermal electricity generation (LBN, NRU, SGP); increase of efficiency of heating or hot water supply (KOR); establishment of energy intensity targets (KOR, SGP); ban on low efficiency appliances (VUT); reduction of electricity transmission and distribution losses (KIR, LBN, PHL); use of cleaner fuels such as low sulphur fuels, liquefied petroleum gas, etc. (IDN, KOR, LBN, NRU, PHL); and application of market prices, removal of subsidies, energy pricing policies, etc. (IDN, KOR, SGP).

10. Parties identified the following measures related to the use of renewable energies: hydropower, solar and wind energy promotion (COK, FSM, JOR, KIR, LBN, NRU, PHL, SGP, TUV, VUT); fiscal incentives for the use or development of renewable energy technologies (IDN, KOR); use of biofuels or development of related technology (KOR, MYS, PHL, VUT); use of geothermal energy (FSM). Apart from renewables, Parties reported on the use of non-fossil fuel sources such as nuclear energy (KOR), energy recovery from wastes (SGP) and use of photovoltaics to supplement household electricity supply in urban areas (MYS).

11. A small number of Parties (KOR, LBN) elaborated on the methodology used to estimate the mitigation potential of planned or already implemented measures in the energy sector. Malaysia presents a projection of greenhouse emissions considering two types of scenarios. Some Parties (IDN, JOR, KOR, LBN, PHL) mentioned the use of model(s), whereas others (COK, FSM, IDN, JOR, KIR, MYR, NRU, SGP, TUV, VUT, WSM) did not mention or specify the methodology selected.

12. The mitigation analysis tools used included LEAP<sup>4</sup> (KOR, LBN), ENPEP<sup>5</sup> (JOR), and MARKAL<sup>6</sup> (IDN, PHL). Some Parties (IDN, JOR, KOR, LBN, NRU, PHL) included estimates of the associated emission reductions for the reported measures. Among these Parties, some (IDN, JOR, KOR, LBN) provided the estimated reduction potential associated with the implementation of the measures relative to the national emissions, whereas others (KOR, NRU, PHL) provided estimates based on primary energy saved. The use of common methodologies and/or models would facilitate the comparison among Parties.

13. Some Parties (IDN, JOR, KOR, LBN, TUV) reported on the projected emission reductions associated with the implementation of the measures in the energy sector. This was

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<sup>4</sup> See footnote 1.

<sup>5</sup> See footnote 2.

<sup>6</sup> See footnote 3.



done with the use of various time horizons: 2008 (PHL), 2010 (KOR, TUV), 2020 (MYS), 2023 (JOR), 2025 (IDN), and 2040 (LBN).

14. Some Parties (IDN, JOR, LBN, PHL) provided detailed figures on projects aiming at mitigating greenhouse gas emissions, while others (IDN, JOR, PHL) even described the associated costs and/or mitigation potential of the measures. Almost all Parties reporting such mitigation potential expressed their results in tonnes of CO<sub>2</sub> per year. The mitigation measures were primarily related to the field of efficiency improvement and renewable energy.

## **B. Transport**

15. Most Parties reported on the analysis of possibilities of limiting greenhouse gas emissions from the transport sector (COK, FSM, IDN, JOR, KIR, KOR, LBN, MYS, NRU, PHL, SGP, VUT). The range of reported measures, both planned and implemented, was great; these included promotion and/or use of cleaner fuels or fuels derived from biomass (IDN, LBN); promotion of hybrid electric vehicles (LBN); improvement of the modes of transport, such as road, railway, underground, bicycle and river transportation systems (COK, FSM, IDN, LBN, NRU, PHL, SGP); improvement of vehicle maintenance or replacement of old vehicles (FSM, JOR, PHL, VUT); public awareness campaigns, education of drivers and promotion of carpooling (KOR, PHL); imposition of tariffs or taxation of cars, use or imposition of varied road tolls or traffic management (FSM, IDN, KIR, KOR, NRU, PHL, SGP).

16. In general, Parties did not elaborate on the methodology used to estimate the mitigation potential of the planned or implemented measures in the transport sector. Indonesia and Philippines used the model MARKAL<sup>7</sup> as tool for mitigation analysis. Others Parties did not specify the methodology used. Most greenhouse gas emission abatement measures were not quantified separately. The use of common methodologies and/or models would facilitate the comparison among Parties.

17. Information provided by Parties relating to transportation projects was not sufficient to give a clear picture of the status of implementation. In most instances, based on the limited information provided by Parties, it was difficult to discern the exact level of implementation of the reported measure. Some Parties mentioned ongoing or implemented measures (JOR, KOR, SGP). The Philippines has proposed the construction of bikeways as a component of a larger urban transport integration project.

18. Some Parties (IDN, KOR, LBN) gave information about the projections for this sector. The results were presented either as the quantity of CO<sub>2</sub> emissions associated with the energy consumption (IDN), or as a percentage of national emissions (LBN), or finally as a percentage of improvement of energy efficiency of all vehicles (KOR). This reporting was done using various time horizons: 2000 (KOR), 2008 (PHL), 2025 (IDN), and 2040 (LBN). The use of a common time horizon would greatly facilitate the comparison among Parties.

## **C. Agriculture**

19. Some Parties (IDN, KOR, PHL, TUV) reported on both planned and implemented measures to limit greenhouse gas emissions from the agricultural sector. The range of reported measures included agricultural and livestock-related operations. The options under rice cropping systems include the adoption of improved management practices in rice cultivation (IDN, KOR,

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<sup>7</sup> See footnote 3.



PHL), reduction of area under rice cultivation (PHL), promotion of low CH<sub>4</sub> emission rice cultivars (KOR, PHL), increase in area under directly seeded rice, and provision of education and information on mitigating CH<sub>4</sub> emissions from rice paddies (KOR).

20. Other options identified include those relating to plant nutrient management such as the appropriate and rational use of fertilizers (PHL, TUV), use of ammonium sulphate fertilizers instead of urea, use of a combination of phosphogypsum (hydrated calcium sulphate) and urea, use of composted rice straw instead of fresh rice straw (PHL) and enhanced use of organic fertilizers and biorganic technologies (TUV).

21. The Parties also identified options for limiting emissions from agriculture including those relating to agricultural land utilization and management such as the promotion of land-use planning (PHL) and the promotion of improved agricultural practices (IDN, PHL).

22. Reporting Parties further identified options for direct and indirect limitation of greenhouse gas emissions from agriculture using options relating to animal husbandry, such as optimization of livestock population (KOR), improvement of livestock production through diet alteration (KOR, PHL) or improvements in feed quality (KOR), use of nutrient supplement of a urea-molasses mineral block (PHL), confined animal management (KOR), manure management (KOR) and use of biodigesters (PHL).

23. The reporting Parties also identified emission limitation options relating to the utilization of low water use crops (PHL). Samoa referred to the conduct of an agricultural census. Indonesia mentioned the regionalization of agricultural research and development and food diversification. The Philippines also mentioned the need to upgrade food storage and distribution systems.

24. The Philippines estimated the methane reduction potential of identified measures in rice production. Nauru mentioned that the amount of emissions from animal manure management was relatively small.

25. The Philippines provided reduction estimates for the agricultural sector for the year 2020; Indonesia reported on the projected methane emission reductions for identified measures in livestock management and rice fields for 2020.

26. In response to Article 12.4 of the Convention and the requirement contained in the annex to decision 10/CP.2, Lebanon proposed three agricultural projects relating to land suitability evaluation studies, integrated watershed management and agricultural land conservation.

27. Regarding the status of implementation of the reported measures in the agricultural sector, The Philippines referred to the inclusion of some of the identified measures under its Medium Term Agricultural Development Plan (1993-1998) and its National Action Plan on Climate Change. In most instances, due to the limited information provided by the reporting Parties, it was extremely difficult to discern the level of implementation of the reported measures.

#### **D. Waste management**

28. Most Parties (IDN, JOR, KOR, LBN, NRU, TUV, WSM) reported in a varying degree of detail on measures both planned and implemented to limit emissions in the waste management sector. The reported measures included integrated waste management (IDN, LBN), waste minimization at production, distribution, consumption and disposal stages (IDN, KOR, TUV),



waste recycling (KOR, TUV), use of sanitary landfills (LBN), waste water treatment (LBN, KOR), capacity-building for operation and maintenance of waste water treatment plants (JOR) and rehabilitation of waste water treatment plants (JOR), flaring of CH<sub>4</sub> from landfills (LBN), waste utilization for energy production (JOR), and development of regulations to control urban industrial pollution (JOR). Other measures included the use of national action plans (KOR, LBN), national environmental management strategies (WSM), education programmes (IDN), and legal instruments (KOR).

29. Lebanon provided information on the planned quantity of waste expected to reach landfills and the anticipated quantity of wastewater treatment in 2005 and 2040. Lebanon further mentioned that its waste management plan included the collection of CH<sub>4</sub> for flaring or use as an energy source. Nauru indicated that the amount of emissions from domestic solid waste disposal was relatively small.

30. On the status of implementation of the reported measures identified in the waste management sector, Samoa mentioned that it was included as a priority area in its National Environmental Management Strategy Report. The Republic of Korea indicated that implementation in this sector was proceeding under both the Waste Management Act and the Promotion of Saving and Reutilization of Resources Act. Lebanon stated that numerous projects were under way for the construction of waste water treatment plants (domestic and commercial) but indicated that industrial waste water treatment was not covered in the country's national industrial waste water action plan. Indonesia indicated the time-frame for waste sector initiatives as short and medium term.

31. While Parties laid emphasis on the identification of mitigation projects in the waste management sector (LBN), the information provided did not suffice for a clear picture to emerge on the status of implementation.

#### **E. Enhancement of removal by sinks**

32. Almost all the reporting Parties (FSM, IDN, JOR, KIR, KOR, LBN, NRU, PHL, TUV, VUT) included measures relating to the enhancement of removals by sinks. The range of reported measures both planned and implemented included the preservation of existing forest cover (IDN, JOR, KOR, LBN, PHL), afforestation (KOR, LBN, VUT), reforestation (FSM, IDN, KIR, KOR, LBN, NRU, TUV), plantation (IDN, NRU, PHL), agroforestry (FSM, TUV, VUT), prevention and control of forest fires (IDN, JOR, KOR, LBN), control of diseases and pests (KOR, LBN), control of damage due to acid rain (KOR), promotion of low impact logging (IDN) and improvement of timber utilization (KOR). Other identified measures included soil and watershed conservation (PHL), forest research (IDN, KIR, KOR, LBN), forest management (FSM, LBN, NRU, TUV), ban on burning during land clearing and promotion of fast growing tree species (TUV), review of current forest and land management policies (IDN, LBN), tax incentives (FSM, KOR), development funds (KOR) and public awareness and training programs (FSM).

33. In general, the reporting Parties provided limited information on the methodology used. Indonesia mentioned that the time-frame for actions was categorized as being short, medium and long term. Indonesia and the Philippines made projections of carbon uptake for the period up to the year 2020.

34. On the status of implementation of the measures reported under this category the Republic of Korea mentioned the consideration of the enhancement of removals by sinks within



the country's 10-year forest plans at regional and operational levels. The Philippines referred to its 1990 Master Plan for Forestry Development, the Federated States of Micronesia referred to the consideration of enhancement of removals by sinks within their National Environmental Management Strategy Report. The Republic of Korea referred to the use of subsidies to encourage afforestation, reforestation and the use of silvicultural practices. Vanuatu mentioned the limited scope for further application of such measures due to the current extent of forest. The Republic of Korea mentioned that it is presently using development funds to support reforestation and silvicultural practices as well as providing tax incentives and also referred to the ongoing research on the prediction of acid rain damage, rehabilitation techniques, and joint research projects within the region. Indonesia categorized the forestry sector policies as being short, medium and long term.

35. For this sector two Parties (FSM, MYS) referred to mitigation projects related to quantitative evaluation of the carbon sink potential of ecosystems.

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