

## PROJECT BRIEF

### 1. IDENTIFIERS:

PROJECT NUMBER	PRC/00/A02
PROJECT NAME	China: Targeted Research Related to Climate Change
DURATION	3 years (Start Date: February 2001)
IMPLEMENTING AGENCY	United Nations Development Programme
EXECUTING AGENCY	State Development Planning Commission
REQUESTING COUNTRY	China
ELIGIBILITY	Ratified the UNFCCC on 05 January 1993
GEF FOCAL AREA	Climate Change
GEF PROGRAMMING FRAMEWORK	Enabling Activity / Targeted Research

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### 2. SUMMARY:

Targeted Research Related to Climate Change is a climate change targeted research project focusing on capacity building and estimation of emission factors critical to the improvement of future GHG inventories in China. It is to be funded by the GEF and the Government of China, implemented by the UNDP, and executed by the Chinese State Development Planning Commission. The principal aim of the project is to enable China to strengthen and develop capacity in research areas of relevance to compliance with the United Nations Framework Convention on Climate (UNFCCC) and to generate research results that may provide wider benefits in the development and application of emission factors for the improvement of national GHG inventories.

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### 3. COSTS AND FINANCING (MILLION US\$)

<b>GEF:</b>	Project:	1.500
	PDF B:	0.224
	<b>Sub-total</b>	<b>1.724</b>
<b>CO-FINANCING:</b>	National Government:	1.690
	<b>Total Project Cost:</b>	<b>3.414</b>

### 4. ASSOCIATED FINANCING (MILLION US\$):

Ministry of Science and Technology	0.012
National Nature Foundation	0.097
China Academy of Science	0.120

### 5. OPERATIONAL FOCAL POINT ENDORSEMENT:

Jinlin Yang, Operational Focal Point for China

### 6. IA CONTACT:

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## **1. BACKGROUND AND CONTEXT**

1. The Chinese government attaches great importance to climate change issues, and signed the United Nations Framework Convention on Climate Change (UNFCCC or Convention) in 1992. In the same year, the Convention was ratified by the Standing Committee of the Chinese National People's Congress; and China became one of the first countries to ratify the UNFCCC.
2. As one of the Non-Annex I Parties to the Convention, the Chinese Government endorses the principle of "common but differentiated responsibilities" put forward by the Convention as a basic prerequisite. China actively takes part in, and takes great effort to comply with, relevant obligations under the UNFCCC, including submission to the Convention of National Communications, which are to include national inventories of greenhouse gas (GHG) emissions as well as general descriptions of steps taken or envisaged to implement the Convention. This proposal requests funding for targeted research that will strengthen and develop capacity and produce results relevant to preparation of National Communications, implementation of the UNFCCC, and formulation of climate change policy within China.
3. China has a large territory represented by a complex geography and complex climate patterns. Its level of social and economic development is relatively low and unbalanced. In order to fulfil the requirements of the UNFCCC, the Chinese government has strengthened its research on the (1) science of the climate system and climate change, (2) impacts on social and economic development, and (3) response strategies. Due to the complexity of climate change issues, a lack of research tools and basic data, and extremely limited financial support, however, the results of research to date are far from complete; and further in-depth research in a wide range of areas is required. This work would not be accomplished in the short term in the absence of adequate financial support from GEF.
4. China has already made significant contributions to modifying the longer-term trends of climate change by such national measures as (1) population control, (2) pursuing energy conservation and changing their fuel mix, and (3) persistent large-scale afforestation. China is willing to contribute further to addressing climate change, but as a developing country with a population of over 1.2 billion and a per capita GDP of less than US\$ 800 (1998), China is faced with tremendous practical difficulties.
5. In recognition of the great importance of climate change to the future of the country, China has undertaken additional significant actions. Not the least amongst these has been the establishment of the National Coordinating Committee on Climate Change Policy, for which an office was established within the State Development Planning Commission.
6. China is committed to ongoing fulfillment of its obligations under the UNFCCC and wishes to report, through the vehicle of a series of National Communications, on steps taken or envisaged by China to implement the Convention. China also seeks to obtain research results to inform its climate change related policy formulation work. To realize these major objectives, China seeks financial and other assistance, consistent with Article 4.3 of the UNFCCC and with decisions of the Conference of the Parties to the Convention.

7. China views climate change, defined in Article 1 of the UNFCCC as “a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods”, as a major threat to its ability to achieve sustainable development through implementation of its priority policies, including poverty eradication, enhancement of food security and economic development.

#### ***A. Greenhouse Gas Emissions***

8. Given the current scale of the Chinese economy and its potential for growth, the situation of China in terms of GHG emissions is of vital interest to the international community. China is currently the world's second largest emitter of carbon dioxide (CO<sub>2</sub>, the most significant of all GHGs). The key sectors for GHG emissions and sinks in China are energy, industry (industrial processes), agriculture, forestry, and municipal solid waste. Despite the global significance of China's GHG emissions, the current status of its emissions is not well understood, indicating a need for further work on a sector by sector basis.

9. China's potential for economic growth, and thus for the growth in GHG emissions that generally accompanies economic growth, can be seen by reviewing some recent statistics on the Chinese economy. In 1998, China's GDP was 7.955 trillion Renminbi (RMB), with an annual growth rate over the previous year's GDP of 7.8% and a per capita GDP of US \$770 (based on calculations using the end-of-year foreign exchange rate). From 1993 to 1997, the annual economic growth rate in China averaged 11%, surpassing the world average and the average of developed countries by 7.3 and 8.8 percentage points, respectively, for the same period even though it continues to have a very low GDP per capita.

10. Of the key sectors for GHG emissions in China, the energy sector is the most significant in terms of total emissions. China currently ranks second worldwide in energy consumption. Coal is the major source of fuel in China and thus plays an extremely important role in the nation's social and economic development. This is particularly significant in terms of GHG emissions, because combustion of coal produces more CO<sub>2</sub> per unit energy than do other fossil fuels. Coal accounts for 75% of total primary energy consumption in China; and China's coal consumption accounts for about 30% of coal consumed worldwide, and only a very low percentage of China's energy consumption has “zero” GHG emissions (i.e., hydropower and nuclear). China has adopted extensive programs to slow growth in energy consumption and has made substantial progress over the last twenty years in controlling that growth, which has consequentially risen at only about half the rate of economic growth thereby reducing significantly the emission intensity (CO<sub>2</sub>/GDP) and the decarbonization index (CO<sub>2</sub>/toe) and there are good possibilities to continue this trend into the near future. Due to the continued use of out-dated technologies, however, utilization efficiency remains lower than that in the developed countries. Also, because China stands on the threshold of an era of continued economic growth, increases in energy consumption are inevitable, with coal, given the endowment of natural resources in China, being the cheapest and most available source of energy to fuel that growth. Thus, China's coal-dominated energy structure is not likely to change quickly in the short term; and GHG emissions resulting from energy consumption will continue to increase.

11. Oil and gas make up the second most important segment of China's energy sector. Together they account for about 20% of China's energy consumption. In 1997, oil and natural gas production reached 160.76 million tons and 160 billion cubic meters, respectively, with imports also playing an increasingly important role. Within two to three decades, the production and consumption of oil and gas is expected to increase significantly, in large part as a result of the rapid growth of the transportation sector. Thus, GHG emissions from this sub-sector may also become more important in the future, but the possible substitution of natural gas for coal provides a good possibility for controlling that growth.

12. Industrial processes are important in terms of GHG emissions, but further and in-depth research on emissions from such processes is required in China as well as around the world. China is a large producer of cement, lime, iron and steel, calcium carbide, and adipic acid, all of which have production processes that are undoubtedly important sources of GHG emissions. Given the large number of such manufacturing enterprises in China and the great disparity in technologies and processes, huge uncertainty exists in both the data on production levels and the emissions factors.

13. The agricultural sector is also a significant source of GHG emissions in China, with the most significant emissions from the sector being methane released during rice cultivation, methane and nitrous oxide released from the animal husbandry subsector, and nitrous oxide released from fertilized cropland. Rice production in China accounts for about 39% of world rice output. The contribution of rice paddy fields in China to global methane emissions has been a great concern to the international community. It is thus important to accurately quantify emissions factors and harvest areas for each category of rice field. The regional heterogeneity in geographic and climatic conditions of wetland rice fields and the large complexity in watering regime, fertilizer application, and other farm operations in rice cultivation, however, make it difficult to accurately quantify emissions factors and activity levels and thus present a challenge in developing a sufficiently accurate methane emissions inventory for the subsector.

14. China has the largest domestic livestock population in the world, with cattle and swine accounting for about 8% and 40% of the global population, respectively. Enteric fermentation and livestock waste together make up the second largest source for agricultural methane emissions in China. In the past decade, the nation's populations of cattle and swine have been increasing at rates of 0.4 and 15 million heads per year, respectively. China's livestock is widely distributed over several climatic zones, with large variability in feed characteristics, feed intake, and waste management. These parameters are important to methane emissions inventory development, but their values still remain greatly uncertain, so that strong efforts will be needed before a sufficiently accurate inventory of methane emissions from enteric fermentation and of methane and nitrous oxide emissions from livestock wastes can be made.

15. Cropland that is subject to amendment with nitrogen-based chemical fertilizers is one of the major sources of nitrous oxide emissions in China. During 1980-1995, the annual amount of nitrogen-based fertilizer consumption in China increased from 9.7 million tons to 25.2 million tons. With great complexity in terms of crop cultivation, management systems, and agricultural conditions and with a lack of experimental data, the study of nitrous oxide emissions from fertilized land in China is in its infancy; and much work remains to be done in order to reduce the hundred-fold uncertainty in current estimates.

16. Forests are important sinks for GHG emissions, as trees and other green plants take up carbon dioxide from the atmosphere for growth. China has undertaken extensive afforestation activities for the past several decades, with almost 30 million hectares of land having been afforested. Currently, China's forests are estimated to be net sinks of the order of 50-90 million tons of carbon annually.

17. Methane emissions from municipal solid wastes is thought to be an important contributor to GHG emissions in China. Over the past 20 years, the living standard in China has been rising and unprecedented developments in urbanization and growth of the urban population have been occurring. As a result, solid wastes are produced daily in large amounts, but waste management and treatment systems are still very poor. Such a situation usually leads to serious impacts on urban environmental sanitation and the health of city dwellers, as well as intensive emissions of methane via fermentation of organic wastes. Because of the poor level of management of urban wastes, little data relevant to estimating an urban wastes methane emissions inventory is yet available, thus making the task of developing an inventory for past years a difficult task.

### ***B. Related Research***

18. China has already implemented or is in the process of implementing a number of foreign assistance projects related to climate change. These projects include work on China's GHG emissions inventory as presented below.

### **Studies on Inventory of GHG Emissions**

19. Since 1992, four internationally supported studies on climate change that have addressed China's GHG emissions inventory have been conducted for research purposes. In each case, the projects were cooperative endeavors between the Chinese Government, relevant Chinese research institutes, and multilateral organizations or countries. The four studies, which estimated China's GHG emissions with varying degrees of effort, are listed below, with additional information on them given in Table 1 of Annex D:

- *Response Strategy on Global Climate Change in China*, supported by ADB and completed in 1993;
- *China: Issues and Options in GHG Emissions Control*, supported by the GEF and UNDP (executed by World Bank) and completed in 1994;
- *China Climate Change Country Study*, supported by the U.S. Department of Energy under its Country Studies Program and completed in 1998; and,
- *Asian Least-Cost GHG Abatement Strategy (ALGAS)*, funded by GEF/UNDP, executed by ADB, and completed in 1998.

20. The data and methodology used for the inventory work in these studies improved over time. The first two studies used the 1991 OECD methodology, which was later adopted by the Intergovernmental Panel on Climate Change (IPCC), for estimating emissions sources and sinks. The U.S.-supported China Climate Change Country Study was the first attempt to prepare a preliminary inventory using the 1995, and in some sectors the revised 1996, IPCC methodology. The last study, ALGAS, made small improvements over the China Climate Change Country Study.

21. Despite improvements, there are still many areas where past inventory work is deficient. Many of these gaps will be addressed in the parallel project CPR/00/G, which aims to enable China to prepare its Initial National Communication to the UNFCCC. In order that future National Communications will continue to make progress in terms of quality of the national inventory, however, it is extremely important that additional, long-term improvements in research capacity should be pursued. Areas of deficiency of particular interest, in this regard, include issues in the road transport, land use and forestry, and agricultural sectors as discussed below.

22. Road Transport: Classified as a part of the energy sector for inventory purposes, the anticipated strong growth of the road transport sub-sector suggests the pursuit of improved methodology in transport fuel use by type of vehicle and in the estimation of related emission factors.

23. Forestry: Past estimates of CO<sub>2</sub> emissions from the forestry sector are based on forestry resource survey data that does not contain the parameters and variables required for the estimation of CO<sub>2</sub> removal by land use change and forestry. Rather, the intake of CO<sub>2</sub> by the forestry sector is indirectly calculated in past studies from data on deforestation and afforestation areas; and this may have consequentially produced a great uncertainty in estimates. Soil is the largest carbon sink in the terrestrial ecosystem, playing a vital role for carbon absorption and prompting carbon transfer from the atmosphere to soils. Preliminary results show that the potential role of soils as a sink in China is possibly even larger than that of its forest sector, but previous inventory work in this area is lacking.

24. Agriculture: In the agricultural sector, additional work is needed in the sub-sectors of rice paddies, animal husbandry, and fertilized fields. For rice paddies, previous estimates of methane emissions relied on measurements of emissions factors made at only a few sites in China. Methane emissions, however, are sensitive to several factors, including the watering regime, organic and chemical fertilizer types and the manner of their application, and the type of rice cultivated. These key factors influencing the methane emissions factors of wetland rice fields must be considered in the estimation of total emissions from the sub-sector. The relevant data, however, is not available in agricultural yearbooks or related documents. In previous studies, the variations of these factors were not considered, with estimation of methane emissions made by setting these parameters as constants, under some unrealistic assumptions, in the modeling programs used. As a result, if the uncertainty of these regulating factors is considered, the estimate of methane emissions from wetland rice fields of China in 1990 may be as high as 13 Tg or as low as 5 Tg.

25. Previous estimates of methane emissions from enteric fermentation and livestock wastes also have high uncertainties. One reason for the uncertainty in methane emissions from enteric fermentation is that the uncertainty in the number of animals of various types is larger than is usually recognized. Another reason is that some important parameters associated with feeding characteristics (e.g. amount of feed consumed per animal) and the rate of conversion of feed to methane by these animals are greatly uncertain. Besides uncertainties in animal population and feed intake, those in data on the use of livestock waste management systems and in methane conversion coefficients related to such systems usually lead to large uncertainties in estimation of

methane emissions from livestock wastes. Considering these uncertainties, the estimate of methane emissions from enteric fermentation and livestock wastes in 1990 could be as low as 2.9 and 0.66 Tg or as high as 8.7 and 1.98 Tg, respectively. To improve the reliability of future inventory estimates, data on the age structure of the livestock population, data on feed intake, important parameters of livestock waste management systems, activity levels of livestock sub-categories and waste management systems, and emission factors have to be obtained via direct investigation.

26. Previous studies did not cover the estimation of nitrous oxide emissions from agriculture. Although a few field observations have been carried out in China, the existing data on emissions factors from croplands with fertilizer amendments is quite inadequate in representing the complexity of China's agricultural systems. At the same time, data on levels of activity in crop fertilization is still unavailable. Therefore, data on emissions factors and activity levels in this sub-sector would have to be obtained through investigation or field measurements in order to develop a more reliable inventory.

### **Associated Projects and Programs**

27. There are several ongoing or recently completed GEF projects that relate to the activities proposed in this project. Table 2 of Annex D shows UNDP energy-related projects in China, many of which are funded by GEF. While these may not be directly related to the targeted research and capacity building in this project, they are more generally related to the issues of climate change addressed in this project in that they lead to reduced GHG emissions. Effort will be made to identify the status of research and studies already undertaken in China to minimize duplication of previous efforts. In addition, the National Communications Support Programme is willing to assist China in identifying potential collaborating countries that have ongoing or recently completed studies.

28. A GEF project closely related to that described in this document (and initially developed as a part of the same process, using the same PDF B funds) is currently being developed. The project will serve to enable China to prepare its Initial National Communication, including a national inventory and general description of steps taken or envisaged to implement the Convention, and to build public awareness of climate change. This sister project has already been approved by the GEF Council and is due to be completed two years and four months after inception.

## **2. RATIONALE AND OBJECTIVES**

### ***A. Objectives***

29. The objective of the proposed project is to build China's capacity and obtain results in targeted research that will enable China to prepare high quality National Communications to the UNFCCC in the future and to have the information required to formulate climate change related policy. In this regard, improved capacity and research results are to be developed through estimating GHG emissions in various sectors: Capacity built in this area will contribute to the improved quality of national inventories included in future National Communications to the UNFCCC and policy formulation in related areas.

## ***B. GEF Project/Programming Approach***

30. The project strategy follows the GEF Operational Criteria for Enabling Activities, in terms of:

- Sequencing and linking technical activities related to climate change with policy and with response planning;
- Carrying out planning and capacity building activities that are focussed specifically on enabling China to meet its reporting obligations under the UNFCCC;
- Using internationally established methodologies and procedures in carrying out the enabling activities; and,
- Achieving cost effectiveness through building on existing knowledge and expertise and by enhancing integration and avoiding duplication of relevant activities being undertaken within China and the region.

31. As mentioned, targeted research will focus on enabling China to prepare subsequent National Communications. The project will address key emerging issues for inventory work in China, such as the rapidly growing GHG emissions from the increasing use of motorized vehicles for transportation and from the increasing use of synthetic fertilizers for crop production. While the transport sector was not a major contributor to emissions in 1994 it is likely to be an important component of future National Communications, and hence warrants in-depth study. The synthetic fertilizer input to crop production in China has doubled in the past 15 years. However, the consequential effects of this rapid change on GHG emissions from crop production, which is to be an important component of National Communications, still remain greatly uncertain because no relevant study activity has yet addressed this issue. Thus, it, too, warrants focused targeted research.

## ***C. Alternative Course of Action as a Result of GEF Intervention***

32. GEF intervention will result in:

- strengthening and developing of capacity in China for the preparation of future National Communications; and,
- strengthening and developing capacity for the development of future national GHG inventories.

33. While China would possibly carry out some targeted research work on its own in the absence of GEF support, the scale would undoubtedly be much smaller than that of this project and thus be unable to address some of the key and longer-term issues. As a result, future National Communications would be of a lower level of quality; perhaps, for example, lacking improvement in increasingly important inventory areas, such as transportation and synthetic fertilizer application.



#### ***D. Integration of Project in National Programs and Plans / Additional Domestic Benefits***

34. The proposed targeted research will lead to domestic benefits in terms of a better understanding of GHG inventories for China. Capacity development related to determining GHG emissions from specific sectors will improve China's capacity to prepare national emissions inventories to be submitted as part of future National Communications under the requirements of the Convention. Further, targeted research will be integrated with policy making through the cross-ministerial National Coordinating Committee on Climate Change Policy.

### **3. PROJECT ACTIVITIES/COMPONENTS AND EXPECTED RESULTS**

35. Activities for the project are described below under three major activity areas:

- (i) strengthen and develop capacity to estimate GHG emissions from China's road transport sector;
- (ii) strengthen and develop capacity to improve estimates of GHG emissions and sinks from land use change and the forestry sector; and,
- (iii) strengthen and develop capacity to improve estimates of GHG emissions from the agricultural sector.

A detailed listing of the activities is given below<sup>1</sup>.

36. Capacity built up in estimating GHG emissions and/or sinks from the transport, agricultural, and forestry/land use sectors will enable China to produce more accurate national inventories for future National Communications to the UNFCCC. China is such a large country that an increased understanding of the nation's GHG emissions is critical to improving the global community's overall analysis of the impact of human activities on climate. The work for this component will be aimed at reducing the uncertainties in the information on which China's Initial National Communication will be based, thereby contributing to the enhanced quality, relevance, and usefulness of China's subsequent National Communications. Research results will also enhance relevant emissions work in other developing countries.

37. Prior to the preparation of the project document, a detailed survey will be conducted into previous research conducted in China, as briefly presented in the section Related Research (paragraphs 18 – 28). The purpose of this survey will be to clearly identify and summarize the results of the previous research, and therefore determine information gaps and avoid duplication of effort in the proposed project.

38. The research methodology will be further refined, prior to preparation of the project document, through continued input from international experts. The research design will aim to follow a deliberately distributed approach to ensure the research is in-depth while remaining applicable to the inventory calculations. Specific methodologies will be further described for developing and estimating emission factors, and methods for collecting data by sector. The research will aim partly to establish adequate monitoring and statistical information systems that will ensure compatibility with future evaluations of the effects of abatement measures.

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<sup>1</sup> These activities are described in greater detail in Annex E. Some of the activities listed are covered by baseline funding. In addition, many of the incremental activities are financed (in full or in part) by the Chinese Government. See Section 6 and Annex B for further details of the incremental cost analysis.

## **ACTIVITY 1: STRENGTHEN AND DEVELOP CAPACITY TO ESTIMATE GHG EMISSIONS FROM CHINA'S ROAD TRANSPORT SECTOR**

***Sub-Activity 1.1:*** Investigate characteristics of the main modes of road transport, vehicles used, and corresponding technological levels in China and other major developing countries. An analysis of the size and structure of the current and estimated future vehicle fleet in China will be made using two cities selected as case studies for detailed analysis. Railway transportation will be examined through the Initial National Communication project. It is proposed that the road transportation sector be examined under this targeted research project because it is more complicated to study than railway transportation in China. The issues related to road transportation sector cannot be fully addressed in the national communication project, therefore, it is proposed that this targeted research project further examine the road transportation sector.

Output: Data on mode of transport and information on vehicles used and corresponding technological levels in China and other major developing countries.

***Sub-Activity 1.2:*** Conduct survey in order to identify possible methods for estimating activity levels for the transportation sector in developing countries.

Output: Methods for estimating activity levels in the transportation sector.

***Sub-Activity 1.3:*** Carry out investigation and analysis in order to determine formulae for calculating emission factors and methods for in-situ measurements in developing countries.

Output: Options for estimation of emission factors and for methods used in carrying out in-situ measurement.

***Sub-Activity 1.4:*** Conduct case studies on emission factors of main technologies used for main types of road vehicles found in China.

Output: Results of case studies on main types of road vehicles.

***Sub-Activity 1.5:*** Organize and hold two international workshops to collect information on the characteristics of road transportation in other major developing countries, such as India, Brazil, and Egypt. Through these workshops, exchange experiences on methodology for estimating activity levels and for measuring emission factors. The experience of other countries regarding Natural Gas Vehicles (NGV) will be considered, taking into account future availability of this energy source in the China Energy Matrix.

Output: Summary of workshop proceedings and information on/a better understanding of the transportation sector in other developing countries.

***Sub-Activity 1.6:*** Train six persons abroad in developed countries on the methodology for developing transportation sector inventories.

Output: Chinese technicians trained, with better understanding of the methodology used in

developed countries to develop transportation sector inventories.

**ACTIVITY 2: STRENGTHEN AND DEVELOP CAPACITY TO IMPROVE ESTIMATES OF GHG EMISSIONS AND SINKS FROM LAND USE CHANGE AND THE FORESTRY SECTOR**

***Sub-Activity 2.1:*** Measure soil carbon content and estimate GHG fluxes associated with land-use change, forest harvesting, and detritus.

Output: A database compiling data and information, as described above, for land use change by forest and agricultural type or by species at an appropriate geographic level.

***Sub-Activity 2.2:*** Develop a stand-level model of carbon dynamics in soils, including roots and detritus, and use the model to project changes in carbon stocks for land converted from forest to other uses and for afforested lands.

Output: A carbon dynamics model with scenarios of carbon stock changes for alternative parameter values based on Sub-Activity 2.1.

***Sub-Activity 2.3:*** Collect and decode remote sensing maps of Eastern China, focusing on forest and other agriculture distribution, and use a geographic information system (GIS) to map the distribution of forests by type.

Output: A GIS system displaying the distribution of main forest types in the Eastern China and estimations of living stocks by region and forest type.

***Sub-Activity 2.4:*** Organize two regional workshops after project initiation to coordinate methods and criteria for land-use classification and to discuss image quality and details. Organize two additional regional workshops to discuss remote sensing techniques.

Output: Workshop summary for each workshop.

***Sub-Activity 2.5:*** Organize international study tours that will give Chinese participants exposure to international experience and training on techniques used in this field. Targeted institutions will be in the US and Brazil.

Output: Trained personnel in the field of soil carbon research.

**ACTIVITY 3: STRENGTHEN AND DEVELOP CAPACITY TO IMPROVE ESTIMATES OF GHG EMISSIONS FROM THE AGRICULTURAL SECTOR**

***Sub-Activity 3.1:*** Measure N<sub>2</sub>O flux from croplands using automatic and manual methods.

Output: Database compiling data and information, as indicated above, by region and/or crop type and at the appropriate geographic level.

***Sub-Activity 3.2:*** Develop and validate a process-based model for simulating and predicting N<sub>2</sub>O emissions from croplands with fertilizer amendment.

Output: A N<sub>2</sub>O dynamics model validated with scenarios of N<sub>2</sub>O fluxes for alternative parameter values based on *Sub-Activity 3.1*.

***Sub-Activity 3.3:*** Conduct international training for two persons on measurement and modeling of N<sub>2</sub>O emissions from croplands, with follow-up technical assistance.

Output: Chinese technicians trained in the use of models and measurement techniques.

***Sub-activity 3.4:*** Conduct continuous measurement of methane emissions from winter-flooded rice paddy fields.

Output: Database compiling data and information, as above, by region and/or crop type and at the appropriate geographic level.

***Sub-activity 3.5:*** Develop and validate a process-based model for simulating and predicting methane emissions from rice paddy fields.

Output: A process-oriented model that has been verified and validated with scenarios of methane fluxes for alternative parameter values based on *Sub-Activity 3.4*.

***Sub-activity 3.6:*** Conduct international training for two persons on automatic measurement and modeling of methane emission from rice paddy fields, with follow-up technical assistance.

Output: Chinese technicians trained in the use of models and methane measurement techniques.

***Sub-activity 3.7:*** Organize an international workshop on emissions of N<sub>2</sub>O and CH<sub>4</sub> from croplands.

Output: Summary of workshop proceedings.

***Sub-activity 3.8:*** Measure methane emissions from enteric fermentation and related parameters in the field and in the laboratory.

Output: Database compiling data and information, as above, by region and/or animal type and at the appropriate geographic level.

***Sub-activity 3.9:*** Conduct international training for two persons on measurement and modeling of methane emission from enteric fermentation, with follow-up technical assistance.

Output: Chinese technicians trained in the use of models and measurement techniques.

***Sub-activity 3.10:*** Measure methane emissions, nitrous oxide emissions, and related parameters from animal grazing and animal wastes in the field and in the lab.

Output: Database compiling data and information, as above, by region and/or animal type and at the appropriate geographical level.

***Sub-activity 3.11:*** Conduct studies of how to model methane and nitrous oxide emissions from livestock-related activities.

Output: A model for projecting emissions for methane and nitrous oxide from the livestock sector.

***Sub-activity 3.12:*** Conduct international training for two persons on measurement and modeling of methane and nitrous oxide emissions from livestock-related activities, with follow-up technical assistance.

Output: Two Chinese technicians trained in the use of equipment, measurement techniques, and modeling approaches.

***Sub-activity 3.13:*** Organize an international workshop on methane and nitrous oxide emission from livestock-related activities.

Output: Proceedings of the international workshop.

#### **4 RISKS AND SUSTAINABILITY**

39. Targeted Research Related to Climate Change will be strongly supported by national inputs of personnel, equipment, office facilities and other resources that will more than match those provided by the GEF. The research will result in substantial capacity building for China in areas of both global and domestic interest to the country. The Chinese Government has keen interest in supporting and maintaining this capacity as foreseen in its planned support in these areas during the 10th Five Year Plan for institutions that could potentially be responsible for conducting the relevant research. Hence, project activities will be partly supported by China's own resources that it intends to allocate during its next national plan, so that the risk of not attaining the project objectives of increased sustainability and improved results, thus contributing to the quality of future National Communications, is minimal.

40. Financial sustainability of the project will be facilitated by adding value to current national and provincial efforts related to the collection, analysis and use of environmental, economic, social and other information. Moreover, the involvement of a substantial national commitment and contribution to the targeted research will ensure that institutional and other arrangements can continue subsequent to GEF intervention.

41. Institutional sustainability is encouraged through a multi-sectoral approach. Besides the presence of government contributions reducing risk, the fact that China maintains some research capacity in each of the key areas of the proposed project also contributes to the risk of not completing various components being minimal.

## **5 STAKEHOLDER PARTICIPATION AND IMPLEMENTATION ARRANGEMENTS**

42. The main beneficiary of the project is international society, especially the Convention parties, Convention secretary, and the governments of all countries. The main stakeholders in this project are all the national and provincial agencies that have responsibility for the economic and other sectors that would be impacted adversely by climate change and that may be able to play a key role in climate change mitigation strategies.

43. China has established an inter-ministerial working group to coordinate national activities relating to climate change. This Committee, called the National Coordination Committee on Climate Change Policy, has 14 members and is charged with overseeing all activities related to climate change in China. Its members include the State Development and Planning Commission (SDPC), the State Economic and Trade Commission, the Ministry of Science and Technology, the China Meteorological Administration, the State Environmental Protection Administration, the Ministry of Foreign Affairs, the Ministry of Finance, the Ministry of Construction, the Ministry of Transportation, the Ministry of Water Resources, the Ministry of Agriculture, the State Forestry Administration, the Chinese Academy of Sciences, and the State Oceanic Administration. The SDPC chairs the Committee. Sitting inside the SDPC is the Office of the National Coordination Committee on Climate Change Policy, which acts as the secretariat to the Committee.

44. During the PDF phase for this project and the parallel project for preparing China's Initial National Communications, a Steering Committee was established. The Steering Committee will continue to work as the Steering Committee both for preparing Initial National Communication and for implementing the targeted research described in this project brief. The Project Steering Committee, chaired by SDPC, has 6 members, including the Ministry of Foreign Affairs, the China Meteorological Administration, the Ministry of Finance, State Environmental Protection Administration, Ministry of Science and Technology, and the State Economic and Trade Commission.

45. In consultations conducted by the National Climate Change Steering Committee, one of the main priorities for future climate change work for China was recognized as further institutional strengthening and other capacity building activities required to ensure the highest possible quality of information for China's Initial National Communication.

46. For the preparation of the Initial National Communication in the parallel project, a strengthened Project Steering Committee will be reconfirmed as a sub-committee of the National Coordinating Committee on Climate Change Policy and expanded to include technical and policy experts from the including agencies and community. This strengthened Committee will also serve as the Steering Committee for the targeted research project described in this brief.

47. The targeted research will draw on an appropriate mix of national and provincial and regional resources, expertise, information and institutional support, in order to undertake the diverse range of enabling activities. This approach will contribute to a strengthening of national and provincial institutions, thus building a solid foundation for future activities.

### **Executing Arrangements**

48. The project will be executed by China's State Development Planning Commission. The Commission has the mandate for coordinating and leading national activities related to climate change and chairs the National Coordinating Committee on Climate Change Policy. The State Development Planning Commission will ensure frequent consultation and close collaboration with relevant national and provincial agencies and with appropriate regional and international organizations and institutions. For certain components which involve the participation of international experts and agencies, the service of CICETE for recruitment and related financial management may be required.

### **Implementing Arrangements**

49. At the national level, the National Coordinating Committee on Climate Change Policy will have ultimate responsibility for implementation of the project, working through the Project Steering Committee and the State Development Planning Commission.

50. A Targeted Research Project Office, which will be responsible for the administration of the project, will be established by the State Development Planning Commission. The National Project Director (NPD) will be designated to lead this office. On behalf of SDPC, he/she will be responsible for effective management of the project, for overseeing the performance of the functions of staffing, planning and implementation of project activities, and for reporting to the related agencies officially on project status. Under the NPD, a Project Manager will be recruited by the State Development Planning Commission. The manager will be responsible for the day-to-day management of the project. He/she will plan and manage project activities. The manager will obtain guidance from and report to the NPD. Full-time staff will be recruited for the office. The State Development Planning Commission and other government agencies will also make available, on a part-time basis, various staff with expertise in areas related to climate change to assist on project activities.

51. International consultants will be recruited to help ensure the effective transfer of international guidelines, methodologies, and approaches, and to help ensure that the targeted research activities are implemented to international standards.

### **Coordination Arrangements between Proposed and other Relevant Projects**

52. Through the National Coordinating Committee on Climate Change Policy and the State Development Planning Commission, the targeted research will be closely coordinated with all other relevant climate change activities in the China.

53. As stated in Table 2 of Annex D, UNDP is implementing some 11 projects related to climate change and/or energy management in China. In addition, UNDP is also working on sustainable agriculture and forestry management. In order to maximize the impact of international support and develop possible synergies among this projects with the proposed project, major findings and technical outputs generated by the project could be shared with the proposed project experts and management staff. Experts from the proposed project could be invited to join the workshops organized by the other UNDP projects, or vice versa.

54. In addition, the targeted research project will be closely coordinated with the parallel project of preparing China's Initial National Communication. Results obtained in the parallel project will be used to better inform work conducted under this project. If results are obtained from this project in time, these can be used as input for the Initial National Communication.

## **6 INCREMENTAL COSTS AND PROJECT FINANCING**

55. This targeted research project is aimed at contributing to the enhanced quality, relevance, and usefulness of China's subsequent National Communications. China recognizes that some of this research would have been conducted regardless of the coming into force of the UNFCCC. Thus, funding of the full costs of the targeted research will be shared between China (baseline and 51% of incremental costs) and the GEF (49% of agreed incremental costs) as noted in the table below. Annex B provides details on the Incremental Cost calculation.



**Table 1: Incremental Costs of Targeted Research**

<b>BENEFITS /COSTS</b>	<b>BASELINE</b>	<b>ALTERNATIVE</b>	<b>INCREMENT (ALTERNATIVE-BASELINE)</b>
<b>Global Environmental Benefits</b>	<p>Land-use change and forestry (LUCF), agriculture, and transportation sector research is focused on improving the future inventory of China's GHG emissions. Its benefits are largely global.</p> <p>Land-use images of forested and other agricultural areas are available but remain unutilized, equipment to measure methane and N2O is available but remains or will remain under-utilized, and little or no detailed survey and measurement work is planned in the transportation sector.</p>	<p>Global benefits:</p> <p>(i) Significant data will be generated. This data to climate change will be of use to the convention and be of use to researchers/policy makers in all countries.</p> <p>(ii) Improved methodology. Existing CC methodologies apply principally to temperate countries in Europe and N. America and are of questionable application to other zones. The methodologies developed under this project will therefore be of use to all other countries, particularly developing countries, in their efforts to manage climate change and undertake obligations to the UNFCCC.</p>	<p>The additional data and analysis will significantly help China improve its national GHG emissions inventory in the LUCF, agriculture and transportation sectors. Emissions from agriculture are poorly understood and the uncertainty on N2O emissions is very large. Transportation sector emissions are growing faster than coal-related ones, and understanding this sector better will be crucial to future GHG inventories.</p>
<b>Domestic Benefits</b>	<p>See paragraph above for a description of the domestic benefits, which would be negligible for the LUCF, agriculture, and transportation sectors.</p> <p>The research will benefit China since it will provide China with better data, and information, in order to subsequently develop related policy measures.</p>		
<b>Costs</b>	\$100,000	\$3,190,000	\$3,090,000 of which: \$1,500,000 from GEF; \$1,590,000 from GOC

56. During the project formulation phase, UNDP, together with SDPC, with the help of the international and national experts, has prepared this draft brief, using GEF financial support. If the project proposal is approved by the GEF, a UNDP project document will be further developed. A more detailed description of project activities as well as budget allocation and work plan will be prepared. The SDPC and the project Steering Committee will be responsible for securing the government co-financing. A signed UNDP project document will be a legal document, confirming the commitment of full project financing. For GEF funds, payment for project activities will be arranged based on standard UNDP project management procedures.

Government co-financing will be arranged by the respective government or research agencies based on their internal rules and procedures. A full project budget with details is provided in section 8.

## **7 MONITORING, EVALUATION AND DISSEMINATION**

57. The project will be monitored and evaluated in accordance with UNDP rules and procedures and GEF guidelines for monitoring and evaluation. UNDP will undertake this activity in cooperation with China's SDPC. UNDP's extensive experience in monitoring large programs will be drawn upon to ensure that the project activities are carefully documented. Data will be collected on the key performance indicators; and results of monitoring and evaluation will be used, as needed, in order to implement changes to the project.

58. The project implementation team will undertake continuous, self monitoring of project activities. They will also carefully monitor external conditions related to the critical assumptions listed in the logical project framework (Annex A). At the outset, detailed and measurable performance indicators for each project sub-activity will be developed by the project team in consultation with UNDP and other stakeholders. The progress of the project will be assessed against these performance indicators every quarter (three months) in consultation with UNDP.

59. Based on the overall project objectives and the performance indicators, quarterly workplans will be prepared. The workplans will also indicate the extent to which the previous quarter's activities have contributed to the project's overall objectives.

60. In addition, the project will comply with any other Implementing Agency reporting requirements. These will include an annual review, mid-term review, and final evaluation of the project's performance. The purpose of these reviews will be to ensure that the project is conforming with all GEF, UNDP and State Development Planning Commission project requirements. All relevant stakeholders will be involved in project monitoring and evaluation. This includes relevant national agencies and institutions, the GEF, UNDP and the State Development Planning Commission.

## 8 BUDGET

### Budget Governing GEF Contributions Categorized by Activities (in units of 1000 USD)

Component/Activity	GEF Funding (US\$ '000)
Activity 1: Transportation	200
Activity 2: Land Use Change/Forestry	600
Activity 3: Agriculture	700
<b>Total GEF Costs</b>	<b>1,500</b>

### Budget Governing Government Contributions Categorized by Activities (in units of 1000 USD)

Component/Activity	GEF Funding (US\$ '000)
Activity 1: Transportation	210
Activity 2: Land Use Change/Forestry	770
Activity 3: Agriculture	710
<b>Total Government Contributions</b>	<b>1,690</b>

**Detailed Project Budget**

<b>Project financing per expenditure category -- Targeted Research</b> (in US\$1,000)						
<b>Category</b>	<b>GEF'000\$</b>	<b>% of Total</b>	<b>Project Totals</b>		<b>Total</b>	<b>% of Total</b>
			<b>Co-financing</b>	<b>% of Total</b>		
1 Personnel	365	24%	334	20%	699	22%
2 Equipment	300	20%	468	28%	768	24%
2a Eqpt. Supplies	0	0%	0	0%	0	0%
Data Purchase	213	14%	746	44%	938	29%
3 Subcontracts	20	1%	0	0%	20	1%
4 Workshops and	225	15%	10	1%	235	7%
Training	61	4%	0	0%	61	2%
5 Travel	171	11%	42	2%	133	4%
6 Executing agency	0	0%	0	0%	0	0%
support costs	0	0%	0	0%	0	0%
7 Monitoring and	0	0%	0	0%	0	0%
Evaluation	0	0%	0	0%	0	0%
8 Miscellaneous	85	6%	40	2%	125	4%
8a Office facilities	0	0%	50	3%	50	2%
8b Other	60	4%	0	0%	60	2%
9 PDF	0	0%	0	0%	0	0%
10 Project total	1500	100%	1690	100%	3190	100%
(PDF+Project Costs)					3414	

<b>Project financing per expenditure category -- Targeted Research</b> (in US\$1,000)									
<b>Category</b>	<b>1 Transportation</b>			<b>2 LUCF Inventory</b>			<b>3 Agriculture Inventory</b>		
	<b>GEF</b>	<b>Co-financing</b>	<b>Total</b>	<b>GEF</b>	<b>Co-financing</b>	<b>Total</b>	<b>GEF</b>	<b>Co-financi</b>	<b>Total</b>
1 Personnel	100.8	92	192.8	80	20	100	184	222	406
2 Equipment				60	20	80	240	448	688
2a Eqpt. Supplies						0			
Data Purchase	21.2	66.4	87.6	170	680	850	22		
3 Subcontracts	20		20			0			
4 Workshops and	21	10	31	140		140	64		64
Training	21		21			0	40		40
5 Travel	16	41.6	57.6	75		75	80		
6 Executing agency						0			
support costs						0			
7 Monitoring and						0			
Evaluation						0			
8 Miscellaneous				15		15	70	40	110
8a Office facilities					50	50			
8b Other				60		60			
9 PDF						0			
10 Project total	200	210	410	600	770	1370	700	710	1410
(PDF+Project Costs)									

## **List of Annexes**

Annex A: Project Planning Matrix  
Annex B: Incremental Cost Analysis  
Annex C: STAP Review and Response

## **List of Optional Annexes**

Annex D: Tables providing supplementary information

*This Annex provides a summary of information on previous inventory work in China, and a list and brief description of UNDP/China Energy-Related Projects.*

Annex E: Detailed sub-proposals from sub-sectors

*Annex E.1 - Proposal for Energy Inventory Targeted Research (Transportation)*

*Annex E.2 - Proposal for Forestry Inventory Targeted Research*

*Annex E.3 - Proposal for Agriculture Inventory Targeted Research*

## ANNEX A – PROJECT PLANNING MATRIX

Summary	Objectively Verifiable Indicators	Means of Verification	Critical Assumptions and Risks
<p><b>Objective:</b> GEF: Support sustainable measures that inform on, with the goal of minimizing, climate change.</p> <p>China: Meet commitments to the UNFCCC and build capacity related to climate change.</p> <p>UNDP: Help identify, finance, and implement programmes and policies that simultaneously stimulate sustainable development and limit GHGs.</p>	<p>Sustainable development in China and protection of global environment are promoted through the implementation of the project</p>	<p>Climate change issues are taken into account in national development planning</p>	<p>If left unchecked, the impacts of climate change on China could affect achievement of sustainable development</p>
<p><b>Outcomes:</b> China's technical capacity to prepare National Communications and its capacity to provide relevant input to policy makers are strengthened.</p>	<p>Enhanced capacity of China to provide needed input for policy formulation and response strategies and to prepare its future National Communications to the UNFCCC</p>	<p>Appraisal of project outputs through project monitoring and reporting requirements</p>	<p>GEF funding is necessary for China to achieve alternative / higher quality results in strengthening its capacity in relation to implementation of the UNFCCC and preparation of the National Communications.</p>
<p><b>Results:</b> Improved capacity in inventory preparation for National Communications.</p>	<p>Improved data, emission factors, and methodologies for inventory</p>	<p>Appraisal of project outputs through monitoring and reporting requirements</p>	<p>Baseline funding will be made available by the Chinese Government. Specific risks by component and activity are noted below.</p>

Summary	Objectively Verifiable Indicators	Means of Verification	Critical Assumptions and Risks
<p><b>Activity 1: Transportation Sector</b></p> <p>1.1 Investigate the specific characteristic of main modes of transportation, tools and technological level in China and other key developing countries.</p> <p>1.2 Conduct survey in order to identify the possible methods for estimating activity data for transportation sector in developing countries, then select</p> <p>1.3 Investigate and analyze in order to determine calculation formula for emission factor and in-situ measurement methodology in developing countries</p> <p>1.4 Conduct case study on emission factors of main technology of main transportation tools in China.</p> <p>1.5 two international workshops would be organized to collect information on transportation specialty in other developing countries such as India, Brazil, Egypt, and to exchange experience on methodology regarding to activity level estimation and emission factor measurement.</p> <p>1.6 train six persons abroad on inventory developing methodology of transportation sector in developed countries.</p>	<p>Overall, the work on inventories will result in improved data, emission factors, and methodologies for inventory work. Principal outputs of this activity will be:</p> <p>Transportation mode and specialty in China and other main options for estimation activity data in transportation sector of developing countries</p> <p>Options for estimation activity data in transportation sector</p> <p>Methods for estimation factor and in-situ measurement methodology</p> <p>Results of case study on main transportation tools</p> <p>Summary or proceedings of the workshops</p> <p>Trained technicians.</p>	<p>Appraisal of project outputs through monitoring and reporting requirements</p>	<p>Capacity built in inventory work will contribute to improved inventories of National Communications submitted in the future</p> <p>Historical data in developed countries was generally adopted by IPCC as default value without consideration that there is large disparity in transportation mode, tools, technological level, vehicle management and maintenance between developing countries and developed ones. Defect in methodology will limit China and other developing countries to improve the quality of inventory and to reduce emission from this sector. GEF funding is very necessary for China to complete and perfect relevant methodology, to clarify specialties and research methodology of activity level and emission factor in transportation sector in developing countries.</p>
<p><b>Activity 2: Land Use Change and Forestry</b></p> <p>2.1 Soil carbon measurement</p> <p>2.2 Soil carbon cycling model</p> <p>2.3 Remote sensing (RS) and GIS-based land use change</p>	<p>Measured data on soil carbon in forested lands and other land uses converted from and for forests in a research station</p> <p>Reduced uncertainties of parameters associated with soil carbon for initial and future national communication</p> <p>Increased reliability of land use change and forest dynamics for initial and future national communication and reduced uncertainties</p>	<p>Compiled soil carbon data related to forest conversion will be provided.</p> <p>Soil carbon cycling model and reports are submitted</p> <p>RS and GIS are successfully used in land use change classification. TM images of land use change and forest in two periods for eastern China (incl. Southwestern China) and related GIS image, database and reports are submitted.</p>	<p>The instrument for carbon flux should be available. Otherwise the flux will not be measured.</p> <p>If soil carbon is not measured properly, the model will not have parameters and data for development. And international experience and training are critical also.</p> <p>If left unchecked, it would be difficult to get reliable dynamic data of land use and forest in time, thus hard to improve precision of initial and future national communications.</p>

Summary	Objectively Verifiable Indicators	Means of Verification	Critical Assumptions and Risks
2.4 Workshops	Enhanced capacity of involved personnel in land use classification and RS and GIS techniques and capabilities in monitoring land use change and forest dynamics	Capabilities of land use classification and using RS and GIS in land use change and forests are enhanced.	If left unchecked, capabilities of involved persons could not be rapidly enhanced, thus the proceeding of the target research would be affected.
2.5 Study tours	Enhance capacity of involved personnel in soil carbon research.	Conductance of soil carbon research	If left unchecked, capabilities of involved persons could not be enhanced.
<b>Activity 3: Agriculture Sector</b> 3.1 Measure N <sub>2</sub> O flux from croplands using automatic and manual methods.  3.2 Develop and validate a process-based model for simulating and predicting N <sub>2</sub> O emissions from croplands.  3.3 International training on measurement of N <sub>2</sub> O emission and modeling.  3.4 Continuous measurement of methane emissions from winter-flooded rice paddy fields.  3.5 Develop and validate a process-based model tool for simulating and predicting methane emissions from rice paddy fields.  3.6 An abroad training on measurement of methane emission from rice paddy fields and modeling.  3.7 Organize an international workshop on N <sub>2</sub> O and CH <sub>4</sub> emissions from croplands.  3.8 Measurement of methane emissions from enteric fermentation.	Principal outputs of this sector will be: A database and emission factors from fields measurement.  A verified and validated N <sub>2</sub> O dynamics model.  Two trained Chinese technicians.  A database and emission factors from fields measurement.  A process-oriented tool model verified and validated with measured data under various conditions.  Two trained Chinese young scientists.  A proceeding.  A database and emission factors from fields measurement.	Appraisal of activity outputs through monitoring and reporting requirements Appraisal of the database and emission factors through reporting requirements.  Appraisal of the model through reporting requirements.  Monitoring the training activities through reporting requirements.  Appraisal of the database and emission factors through reporting requirements.  Appraisal of the model through reporting requirements.  Monitoring the training activities through reporting requirements.  Appraisal of the workshop through reviewing the proceedings.  Appraisal of the database and emission factors through reporting requirements.	If the issues left not studied, it is not possible to reduce the enormous uncertainty of GHG inventory of this sector. If left not studied through field measurement, knowledge on N <sub>2</sub> O emission from croplands of China will continue to be poor.  GEF funding is necessary for developing such a model based on developing country's situation.  GEF funding is necessary for technical assistance to China through training. If left not studied through field measurement, knowledge on CH <sub>4</sub> emission from winter-flooded rice fields, a special and important category, will continue to be poor. GEF funding is necessary for developing such a model based on developing country's situation.  GEF funding is necessary to promote technical assistance to China through training.  GEF funding is necessary to promote exchange and sharing knowledge on climate change between Chinese experts and other countries. If no measurement performed, the knowledge on CH <sub>4</sub> emission under China-



<b>Summary</b>	<b>Objectively Verifiable Indicators</b>	<b>Means of Verification</b>	<b>Critical Assumptions and Risks</b>
3.9 An abroad training on measurement of methane emission from enteric fermentation and modeling.	Two trained Chinese young scientists.	Monitoring the training activities through reporting requirements.	specific condition will continue to remain poor.
3.10 Measurement of methane and nitrous oxide emissions from animal grazing and animal wastes.	A database and emission factors from fields measurement.	Appraisal of the database and emission factors through reporting requirements.	GEF funding is necessary to promote technical assistance to China through training.
3.11 Modeling studies of methane and nitrous oxide emissions from animal-related agriculture.	A model for simulating and projecting CH <sub>4</sub> /N <sub>2</sub> O emissions this sector.	Appraisal of the model through reporting requirements.	If no measurement performed, the knowledge on CH <sub>4</sub> /N <sub>2</sub> O emission from this source under China-specific condition will continue to remain poor.
3.12 An abroad training on measurement and modeling of methane and nitrous oxide from animal-related agriculture.	Two trained Chinese young scientists.	Monitoring the training activities through reporting requirements.	GEF funding is necessary for developing such a model based on developing country's situation.
3.13 Organize an international workshop on methane and nitrous oxide emission from animal-related agriculture.	A proceedings.	Appraisal of the workshop through reviewing the proceedings.	GEF funding is necessary to promote technical assistance to China through training. GEF funding is necessary to promote exchange and sharing knowledge between Chinese experts and other countries.

## **ANNEX B – INCREMENTAL COST ANALYSIS AND MATRIX**

### **Baseline**

There is a series of activities that China is undertaking/planning to undertake with regards to inventories of emissions. These activities are described in the IC matrix (below) and the total cost of these activities, funded by the Government of China, is US\$ 100,000.

### **Alternative**

For each component of the targeted research, the Alternative project to be implemented with GEF support consists of much more detailed databases, more analysis of recent and historical records, new and improved models for predicting emissions and impacts, more research into determining emission factors, international support to preparing models and databases, international training to ensure sustainable capacity is built. In each case the findings will be shared with the global community through papers, regional seminars, international seminars. Total cost of this alternative project is \$3,190,000.

The overall incremental cost is therefore: \$3,090,000. Of this, GEF is requested to finance \$1,500,000, and the GOC will finance \$1,590,000.

### **Domestic Benefits (of the Alternative, of the Baseline)**

For the targeted research, (a) support the preparation of subsequent National Communications for China and improve their quality; (b) the research will primarily benefit China since it will provide China with better data and information in order to develop policy measures to overcome any climate-related impacts.

### **Global Benefits (of the Alternative, of the Baseline)**

Benefits of the targeted research include the following: (a) significant data will be generated. This data related to climate change will be of use to the convention and be of use to researchers/policy makers in all countries; and (b) improved methodology. Existing CC methodologies apply principally to temperate countries in Europe and N. America and are of questionable application to other zones. The methodologies developed under this project will therefore be of use to all other countries, particularly developing countries, in their efforts to manage climate change and undertake obligations to the UNFCCC. (c) Global impact: Given China size (e.g., in terms of coastline, food production, population, emissions, etc.) helping China to manage CC has a sizeable impact on helping the world to manage CC. For example, ensuring the maintenance of China's food supply through climate change is of key importance to maintaining world food supplies and therefore to peace and development.

### **Overall Funding**

Government of China is to finance the baseline (\$100,000) and 51 % of the increment (\$1,590,000). Total GOC funding is therefore: \$1,690,000.

GEF is requested to contribute 49 % of the increment (\$1,500,000).

Total project cost is therefore: \$3,190,000 (with PDF, \$3,414,000).

**TARGETED RESEARCH: INCREMENTAL COST ANALYSIS**

<b>BENEFITS/ COSTS</b>	<b>BASELINE</b>	<b>ALTERNATIVE</b>	<b>INCREMENT (ALTERNATIVE-BASELINE)</b>
<b>Global Environmental Benefits</b>	<p>Land-use change and forestry (LUCF), agriculture and transportation sector research is focused on improving the future inventory of China's GHG emissions. Its benefits are largely global.</p> <p>Land-use images are available but remain unutilized, equipment to measure methane and N2O is available but remains or will remain under-utilized, and little or no detailed survey and measurement work is planned in the transportation sector.</p>	<p>Global benefits fall in 3 areas:</p> <p>(i) Significant data will be generated. This data related to climate change will be of use to the convention and be of use to researchers/policy makers in all countries.</p> <p>(ii) Improved methodology. Existing CC methodologies apply principally to temperate countries in Europe and N. America and are of questionable application to other zones. The methodologies developed under this project will therefore be of use to all other countries, particularly developing countries, in their efforts to manage climate change and undertake obligations to the UNFCCC</p> <p>(iii) Global impact: Given China size (e.g. in terms of coastline, food production, population, emissions, etc.) helping China to manage CC has a sizeable impact on helping the world to manage CC. For example, ensuring the maintenance of China's food supply through climate change is of key importance to maintaining world food supplies and therefore to peace and development.</p>	<p>The additional data and analysis will significantly help China improve its national GHG emissions inventory in the LUCF, agriculture and transportation sectors. Emissions from agriculture are poorly understood and the uncertainty on N2O emissions is very large. Transportation sector emissions are growing faster than coal-related ones, and understanding this sector better will be crucial to future GHG inventories.</p>
<b>Domestic Benefits</b>	<p>See paragraph above for a description of the domestic benefits, which would be negligible for the LUCF, agriculture, and transportation sectors.</p> <p>The research will benefit China since it will provide China with better data, and information, in order to subsequently develop related policy measures.</p>		

<b>BENEFITS/ COSTS</b>	<b>BASELINE</b>	<b>ALTERNATIVE</b>	<b>INCREMENT (ALTERNATIVE-BASELINE)</b>
<b>Activity 1: Transportati on Sector Inventory</b>	- Help China have a better understanding on its specific features of transportation modes and its energy consumption and environment emission from this sector, support planning making, energy conservation and environment policies making in the sector. US\$ 30,000	This research is focused on improving the future inventory of China's GHG emission. Its benefits are largely global. This study will conduct investigation on transportation sector with collaboration local researchers and do research on methodology suitable to developing countries regarding to activity level and emission factor in this sector and case studies and on-situ measurement would be undertaken on four types vehicle – coach, truck, motorcycle and agricultural vehicle. International training will also be provided. US\$ 410,000	GEF funding will support investigation, questionnaire and international training regarding to transportation sector, and will share the funding of equipment, consultation, information data process and international workshop.  Total increment is \$380,000, of which: \$200,000 from GEF; \$180,000 GOC co-funding.
<b>Activity 2 Land use change and Forestry Inventory</b>	China will improve its understanding on soil carbon content. US\$ 70,000	1. Measure soil carbon content, and estimate GHG fluxes associated with forest harvesting and detritus. 2. Develop a stand-level model of carbon dynamics and use the model to project changes in carbon stocks of various forests. 3. Collate and analyze remote sensed maps of Eastern Chinese land use, and develop a geographic information system (GIS). 4. Organize two regional workshops. 5. Review and revise existing policies and programmes  \$1,370,000	GEF will cover the cost of study tours, equipment, travel and loading, international advisory and data processing for soil carbon measurement  Total increment is \$1.3 million, of which: \$600,000 from GEF; \$700,000 from GOC co-funding.
<b>Activity 3 Agriculture Sector Inventory</b>	None	1. Field and laboratory measurement of N <sub>2</sub> O and CH <sub>4</sub> emissions from croplands and animal-related agriculture. 2. Developing tool models for simulating and projecting N <sub>2</sub> O and CH <sub>4</sub> emissions from croplands and animal-related agriculture. 3. Training (national and international) and academic workshops The total cost of these activities will be US\$ 1,410,000.	GEF will cover costs of utilizing the basic facilities, analysis equipment, laboratory and international inputs and training.  Total increment is \$1.41 million, of which: GEF \$700,000 GOC \$710,000.
<b>TOTAL</b>	<b>\$100,000</b>	<b>\$3,190,000</b>	<b>\$3,090,000, of which: GEF: \$1,500,000 GOC: \$1,590,000</b>

Note: Numbers may not add due to rounding.

## **ANNEX C – STAP REVIEW AND RESPONSE**

*[Please note that since the STAP review the Project Brief has been modified, therefore the page and paragraph references in Annex C may not correspond to the current document.]*

### **Technical Review of China Enabling Activity**

Daniel H. Bouille

#### **Project Brief**

Targets Researcher Related to Climate Change (TRRCC) is a proposal for a Project to be executed by State Development Planning Commission of China (SDRC), for a period of two years, beginning in 2000, with a total Project Cost of u\$ 11,55 Million including a national support of u\$ 5,742 Million and u\$ 5,808 Million from GEF including u\$ 0,224 Million as PDF allocation.

It is a Project “to enable china to built a strengthened capacity in research areas of relevance to complete with the UNFCC and to generate results that may be used in formulating climate change related policies.

The proposal is divided in 8 chapters and include 7 Annexes (2 to be included)

- 1) Background and Context.
- 2) Rational and Objectives
- 3) Project Activities/Components and expected Results.
- 4) Risks and Sustainability
- 5) Stakeholder Participation and Implementation Arrangements
- 6) Incremental Costs and Project Financing
- 7) Monitoring, Evaluations and Dissemination
- 8) Budget.

In general terms and having in mind the size and importance of the country involved, is a very good proposal with a reasonable budget and very important research results that surely would be of interest not only for the country but mainly at a regional and international level.

As far as it would be developed in parallel with the Initial National Communication (Project CPR/OP/G), supported also by the GEF, their research results would contribute to a better quality of the Communication.

As it is expressed in the proposal it would be very important to stress the possibilities of cooperation with other projects within the country and with other countries in the region, as well as the sharing of results of the Project with other developing countries.

The background and Context chapter is a good synthetic diagnosis of the China problems related with Climate Change, the present situation and the potential risks for the future.

It is considered a good approach of the Project to put the priority on the vulnerability and adaptation problems related to climate change.

In what follows we make some particular suggestions/remarks in order to separate the proposal and/or to be included in a next phase of the Enabling activities in China.

### **Summary**

Third line:

... to enable China to strengthened and built capacity...(It is important from the beginning the show the existence in the country of a good scientific and technical capability).

### **Background and Context**

Paragraph 4

... (2) pursuing energy conservation and changing their fuel mix, and...

a) Vulnerability to Climate Change.

Paragraph 16

The reference to areas that “lies below 5 m elevation” seems a rather high value, specially considering what is said later on about the impact in “coastal zones to an estimated size in sea level by 45-76 centimeters by 2100”. The doubt is if vulnerability of the population that lies below 5 m elevation is related to groundwater threatens coastal ecosystems and water supply. In such a case the 5 meters reference could be acceptable.

Paragraph 17

The Public Health issue is a very important one and it would be necessary to expand and strengthened this part of the Project.

b) Greenhouse Gas Emissions

Paragraph 19

... for the same period. Even though it continues to have a very low GDP/cap.

Paragraph 20

...coal consumed worldwide, only a very low percentage of China Energy Consumption are “zero” GHG emission (Hydropower and Nuclear).

#### Paragraph 20

...half the rate of economic growth, reducing significantly the emission intensity (CO<sub>2</sub>/GDP) and the decarbonization index (CO<sub>2</sub>/toe) and there are good possibilities to continue this trend into the future. Due to ...

Paragraph 20 at the end:

... is not likely to change quickly in the short term; ...

#### Paragraph 21

...more important in the future, but the possible substitution of Natural Gas for Coal gives a good possibility of controlling that growth.

In relation with the Energy Sector it would be convenient to include in the Project Proposal some Activity to develop studies about the alternative future scenarios using Rational Use of Energy (RUE) measures and fuel substitution policies and not only the analysis of Road Transportation (even been the most important consumption sector into the future).

#### Paragraph 26

Even if it is recognized that “other green plants take up carbon dioxide from the atmosphere” there are not any Activity related with the calculation methodologies and data to estimate the CO<sub>2</sub> uptake from all other agricultural biomass production beside forests. This Activity could be very important to have a more accurated idea of the net emissions of the country.

#### c) Related Research

#### Paragraph 31

It is very important to stress the relevance of the “long-term improvements in research capacity”

#### Paragraph 32

In relation with the areas in the Energy Sector we think that not only Road Transportation, but also Railway transportation (with high coal use); Industrial Energy Consumption and Energy and Electricity production, would be important to be studied in detail, if possible through this Project or in future activities.

The possibilities for future changes in electricity production (increasing share of hydropower, other renewables and nuclear energy as well as the use of natural gas against coal) can compensate the increase of emissions related to the Road Transportation.

#### Paragraph 45

It should be stressed the need for coordination and cooperation with all these other projects within China and with similar UNDP/GEF Projects in the region.

These studies and the one related with Vulnerability and Adaptation shows the good Scientific base of the country and some experience in these subjects. The experience assure a positive result of the Initial National Communication and the proposed targeted research provided the availability of funds through the project.

As well as in all developing countries, surely there are a very important “gray” literature and studies developed in Universities and other research centers in China. It would be important, as part of the initial activities of the targeted research program, to make a survey as deep as possible of this type of material, in order not to duplicate previous efforts.

## **2. Rationale and Objectives**

Paragraph 47

... to the UNFCCC and policy formulation in related areas

Paragraph 49, last part

(Why the research results are “not likely to be used for formulation of government policy in the near future”? It seems a not very wise idea??)

Paragraph 50

Add the “strengthening” of Capacity in points (2), (3) and (4). It is must be clear if they are going to use the terminology "building capacity" or "developing capacity" (see activity 1 in item 3). I suggest to use along the document "strengthening and developing capacity".

## **3. Project Activities/Component and Expected Results**

Paragraph 55

As said before, consider the possibility of including also the analysis of the Railway Transport (very important in China) and Electricity production activities.

Paragraph 55

In order to make a complete calculation of the emissions of the Road Transportation Activity it would be also necessary to make a detailed analysis of the size and structure of the stock of vehicles of all kinds at present and its future evolution.

Paragraph 55 . Sub-Activity 1.5



It could be relevant to consider the experience related with the NGV (Natural Gas Vehicles) in other developing countries, like Argentina, taking into account future availability of this energy source in the China Energy Matrix.

#### Paragraph 55. Training Activity

It seems necessary to increase the importance of the training activities taking into account the size and importance of the country and to open the possibility to develop this training in other developing countries with the UNDP/GEF support and not only in developed ones.

Looking at the very important activities to be developed under this component and even considering that they refer to the particular China situation, we think that it would be very important to see how to share the results with other developing countries; specially at the regional level. (This point relates with the question of the “Replicability” of the project and the linkages to other programs at regional level).

#### **4. Risks and Sustainability**

No comments

#### **5. Stakeholder Participation and Implementation Arrangements**

Paragraph 71 and Paragraph 72

These are very important points.

#### **6. Incremental Costs and Project Financing**

No comments

#### **7. Monitory, Evaluation and Dissemination**

No comments

#### **8. Budget**

No comments

#### **Annexes**

. G.1 Point 1 (Page 59)

The “Following features...” refers in general to developing countries or to China

. Table 1. (Clarify units Thousand?)

. Page 60 Point 3. Research Content, 2<sup>nd</sup>. Paragraph

. Page 61 Activity 1. Tasks

Why Vietnam? And not Brazil? ... such as Brazil, Egypt, India

. Page 61 Tasks. Point 4

... to identify transportation Activity levels

. Page 63. Table 2.

Training represents only 5% of the total?? It should be more important.

### **Main Conclusions**

As a synthesis, we can say that the project proposal will have very important benefits at the global level in China, in relation with the Climate Change Issue and their consequences in the short and long term.

The project will be a necessary and very important support and complement to the Initial National Communication (Project CPR/00/G).

In order to increase these benefits at the regional level it would be important to consider how to share the results of the project with other developing countries.

We think that the risks for the development of the project are low taking into account the good scientific and technical system in China, the technical support and the availability of funds from the GEF, as well as the National Government direct involvement in the project.

The global environmental benefits of the project are quite clear taking into account the place of China at international level both as a producer and consumer of energy and the importance of their agriculture and cattle raising activities at world level.

As a consequence the project also fits quite importantly in the context of the goals related with climate change issues.

The structure and organization proposed for the project detailed in point 5, give enough support to the future sustainability of the proposed activities, provided that economic resources are available for this type of basic and applied research, related with an issue of interest both for the international system and for the country.

## **ANNEX C1 – RESPONSE TO STAP REVIEW**

*[Please note that since the STAP review the Project Brief has been modified, therefore the page and paragraph references in Annex C may not correspond to the current document.]*

The STAP roster reviewer indicated that the proposal is very good, with a reasonable budget, and very important research results that would be of interest to China and other countries around the world. In addition, the project will be a necessary and very important support and complement to the Initial National Communication.

However, as outlined below, the STAP roster reviewer made several suggestions as to how the project could be improved.

### **SUMMARY**

- *Third line:... to enable China to strengthened and built capacity...(It is important from the begining the show the existence in the country of a good scientific and technical capability).*

This comment is accepted, and the summary has been adjusted accordingly.

### **BACKGROUND AND CONTEXT**

- *Paragraph 4 ... (2) pursuing energy conservation and changing their fuel mix, and...*

This comment is accepted, and paragraph 4 has been adjusted accordingly.

- *Vulnerability to Climate Change. Paragraph 16. The reference to areas that “lies below 5 m elevation” seems a rather high value, specially considering what is said later on about the impact in “coastal zones to an estimated size in sea level by 45-76 centimeters by 2100”. The doubt is if vulnerability of the population that lies below 5 m elevation is related to groundwater threatens coastal ecosystems and water supply. In such a case the 5 meters reference could be acceptable.*

Based on the past study, the population that lies below 5 m in China is most fragile to storm surges which may become worse due to climate change, therefore, the areas that lie below 5 m was chosen for vulnerability assessment. Paragraph 52 has been modified to reflect the above.

- *Paragraph 17 The Public Health issue is a very important one and it would be necessary to expand and strengthened this part of the Project.*

Public health is a very important issue. However, since China does not have much experience in this field, and not much data is available, the project will to focus on a small aspect of this issue in order to reduce the risk. The study on public health issue may be expanded in the future project. Further, to maximize learning and access to appropriate data and studies, the National Communications Support Programme is willing to assist China in identifying potential collaborating countries that have conducted original research on public health. This has been reflected in sub-activity 5-3 on page 19.

- Greenhouse Gas Emissions Paragraph 19.. for the same period. Even though it continues to have a very low GDP/cap.***  
 This suggested revision has been accepted in paragraph 19.
- Paragraph 20 ...coal consumed worldwide, only a very low percentage of China Energy Consumption are “zero” GHG emission (Hydropower and Nuclear).***  
 This suggested revision has been accepted in paragraph 20.
- Paragraph 20 ...half the rate of economic growth, reducing significantly the emission intensity (CO<sub>2</sub>/GDP) and the decarbonization index (CO<sub>2</sub>/toe) and there are good possibilities to continue this trend into the future. Due to ...***  
 Paragraph 20 has been modified as suggested, however it reads “to continue this trend into the near future”.
- Paragraph 20 at the end: ... is not likely to change quickly in the short term; ...***  
 This suggested revision has been accepted in paragraph 20.
- Paragraph 21 ...more important in the future, but the possible substitution of Natural Gas for Coal gives a good possibility of controlling that growth.***  
 This suggested revision has been accepted in paragraph 21.
- Paragraph 21...In relation with the Energy Sector it would be convenient to include in the Project Proposal some Activity to develop studies about the alternative future scenarios using Rational Use of Energy (RUE) measures and fuel substitution policies and not only the analysis of Road Transportation (even been the most important consumption sector into the future).***  
 In component 1, the objective is to focus on the improvement of inventory, not the abatement policies. Therefore, to develop such studies may not fit into this purpose well. Rather, this type of study will be undertaken through another project.
- Paragraph 26 Even if it is recognized that “other green plants take up carbon dioxide from the atmosphere” there are not any Activity related with the calculation methodologies and data to estimate the CO<sub>2</sub> uptake from all other agricultural biomass production beside forests. This Activity could be very important to have a more accurated idea of the net emissions of the country.***  
 It is agreed that other green plants, in particular agricultural biomass, should be taken into account in addition to forests. The sub-activities of Activity 2, of component 1, have been expanded to include agriculture as well as forestry. Although no new activity is proposed, the existing activities will be expanded to address the importance of agricultural biomass production.
- Paragraph 31 It is very important to stress the relevance of the “long-term improvements in research capacity”***  
 Paragraph 31 has been modified to appropriately stress the relevance of the long-term improvements in research capacity.

- ***Paragraph 32 In relation with the areas in the Energy Sector we think that not only Road Transportation, but also Railway transportation (with high coal use); Industrial Energy Consumption and Energy and Electricity production, would be important to be studied in detail, if possible through this Project or in future activities. The possibilities for future changes in electricity production (increasing share of hydropower, other renewables and nuclear energy as well as the use of natural gas against coal) can compensate the increase of emissions related to the Road Transportation.***

Subactivity 1.1 of component 1, in paragraph 55, has clarified the examination of railway transportation in this project. . Railway transportation will be examined through the Initial National Communication project. The road transportation sector is proposed to be examined under this targeted research project because it is more complicated to study than railway transportation in China. The issues related to road transportation sector cannot be fully addressed in the national communication project, therefore, it is proposed that this targeted research project further examine the road transportation sector. Further, the Emission Inventory Project is addressing the Industrial Energy Consumption and Energy and Electricity production.

- ***Paragraph 45 It should be stressed the need for coordination and cooperation with all these other projects within China and with similar UNDP/GEF Projects in the region. These studies and the one related with Vulnerability and Adaptation shows the good Scientific base of the country and some experience in these subjects. The experience assure a positive result of the Initial National Communication and the proposed targeted research provided the availability of funds through the project. As well as in all developing countries, surely there are a very important “gray” literature and studies developed in Universities and other research centers in China. It would be important, as part of the initial activities of the targeted research program, to make a survey as deep as possible of this type of material, in order not to duplicate previous efforts.***

The following amendment has been added to paragraph 45: “Effort will be made to identify the status of research and studies already undertaken in China to minimize duplication of previous efforts. In addition, the National Communications Support Programme is willing to assist China in identifying potential collaborating countries that have ongoing or recently completed studies.”

## **RATIONALE AND OBJECTIVES**

- ***Paragraph 47 ... to the UNFCCC and policy formulation in related areas***

This suggestion has been accepted in paragraph 47.

- ***Paragraph 49, last part (Why the research results are “not likely to be used for formulation of government policy in the near future”? It seems a not very wise idea??)***

The relevant component of paragraph 49 has been reworded as follows: “Most of the vulnerability and adaptation research for this project is likely to provide results that are of importance for the longer term, however some results might be used for the formulation of government policy in the near future”.

- **Paragraph 50** Add the “strengthening” of Capacity in points (2), (3) and (4). It is must be clear if they are going to use the terminology "building capacity" or "developing capacity" (see activity 1 in item 3). I suggest to use along the document "strengthening and developing capacity".

The suggested phrase “strengthening and developing capacity” has been accepted in paragraph 50 and throughout the document.

## PROJECT ACTIVITIES/COMPONENT AND EXPECTED RESULTS

- **Paragraph 55** As said before, consider the possibility of including also the analysis of the *Railway Transport (very important in China) and Electricity production activities.*

Subactivity 1.1 of component 1, in paragraph 55, has clarified the examination of railway transportation in this project. . Railway transportation will be examined through the Initial National Communication project. The road transportation sector is proposed to be examined under this targeted research project because it is more complicated to study than railway transportation in China. The issues related to road transportation sector cannot be fully addressed in the national communication project, therefore, it is proposed that this targeted research project further examine the road transportation sector. Further, the Emission Inventory Project is addressing the Industrial Energy Consumption and Energy and Electricity production.

- **Paragraph 55** In order to make a complete calculation of the emissions of the Road Transportation Activity it would be also necessary to make a detailed analysis of the size and structure of the stock of vehicles of all kinds at present and its future evolution.

The following amendment has been made to sub-activity 1.1 of paragraph 55: “An analysis of the size and structure of the current and estimated future vehicle fleet in China will be made using two cities selected as case studies for detailed analysis.”

- **Paragraph 55 . Sub-Activity 1.5** It could be relevant to consider the experience related with the NGV (Natural Gas Vehicles) in other developing countries, like Argentina, taking into account future availability of this energy source in the China Energy Matrix.

Sub-activity 1.5 has been amended to include: “The experience of other countries regarding Natural Gas Vehicles (NGV) will be considered, taking into account future availability of this energy source in the China Energy Matrix.”

- **Paragraph 55. Training Activity** It seems necessary to increase the importance of the training activities taking into account the size and importance of the country and to open the possibility to develop this training in other developing countries with the UNDP/GEF support and not only in developed ones. Looking at the very important activities to be developed under this component and even considering that they refer to the particular China situation, we think that it would be very important to see how to share the results with other developing countries; specially at the regional level. (This point relates with the question of the “Replicability” of the project and the linkages to other programs at regional level).

The STAP reviewer’s comment on training has been accepted, and budget for training activities has been adjusted accordingly.

## ANNEXES

- ***G.1 Point 1 (Page 59) The “Following features...” refers in general to developing countries or to China***  
The text has been modified to read “Following features refer to developing countries in general, and in particular to China”.
- ***Table 1. (Clarify units Thousand?)***  
The units have been clarified.
- ***Page 60 Point 3. Research Content, 2nd. Paragraph***  
The paragraph includes the following revision: The project will study the main transportation mode, tools and dominant technology in selected developing countries, such as India and Egypt, for comparison with that of China.
- ***Page 61 Tasks. Point 4... to identify transportation Activity levels***  
The identified correction has been made.
- ***Page 63. Table 2...Training represents only 5% of the total?? It should be more important.***  
Training has been increased to 10 %, and has been reflected in the appropriate budget tables.

## ANNEX D – TABLES PROVIDING SUPPLEMENTARY INFORMATION

**Table 1. Summary information on previous inventory work**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Title of the general project or the name of report or publication</b>	Response Strategy on Global Climate Change in China	China: Issues and Options in Greenhouse Gas Control	China Climate Change Country Study	Asian Least Cost GHGs Abatement Strategy
<b>Title of the inventory</b>	Current Emissions of GHGs	Estimation of GHGs Emissions and Sinks in China, 1990	The Preliminary Compilation of GHG Emission Inventories	GHG Inventory by Sectors
<b>Sponsor</b>	ADB	GEF	US DOE	ADB
<b>Performer</b>	Energy Research Institute	Design and Research Institute of Environmental Engineering, Tsinghua University	Energy Research Institute	Energy Research Institute
<b>Year of inventory</b>	1990	1985-1990	1990	1990
<b>GHGs</b>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	CO <sub>2</sub> , CH <sub>4</sub>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O
<b>Year of completion</b>	1993	1994	1998	1998
<b>Estimation result</b>				
All energy				
Fuel comb.	609.2 Mt-C	667.64 Mt-C, 1.8-2.6 Mt- CH <sub>4</sub>	559.56 Mt-C, 2.97 Mt- CH <sub>4</sub>	559.6 Mt-C, 2.97 Mt- CH <sub>4</sub>
Fugitive fuel emission				
Oil and gas	0.4 Mt- CH <sub>4</sub>	0.179 Mt- CH <sub>4</sub>	0.092 Mt- CH <sub>4</sub>	0.092 Mt- CH <sub>4</sub>
Coal mining	5.3 Mt- CH <sub>4</sub>	18.45 Mt- CH <sub>4</sub>	8.689 Mt- CH <sub>4</sub>	8.78 Mt- CH <sub>4</sub>
Industrial processes	25.5 Mt-C	28.29 Mt-C	22 Mt-C	25.59 Mt-C
Agriculture	20.5 Mt- CH <sub>4</sub>	20.841 Mt- CH <sub>4</sub>	18.2 Mt- CH <sub>4</sub>	12.59-20.09 Mt- CH <sub>4</sub>
LUC and forestry	x	? 42.53 Mt-C	-86 Mt-C	-75.93 Mt-C
Waste	0.6 Mt- CH <sub>4</sub>	0.792 Mt- CH <sub>4</sub>	2.5 Mt- CH <sub>4</sub>	0.899 Mt- CH <sub>4</sub>



**Table 2 UNDP/China Energy-Related Projects**

As of October 1999, UNDP is implementing some 11 projects related to climate change and/or energy management in China. This is in addition to many closed and pipeline projects. These projects are supported by UNDP TRAC resources, GEF, bilateral and Chinese government cost-sharing. As per the following table, total ongoing grant assistance is over \$40million.

Where appropriate, UNDP China energy projects adopt a market transformation strategic approach to energy management and the reduction of GHG. In many cases this is through the development of market-based mechanisms, through the promotion and facilitation of private investment and PPP, and through the removal of market and policy barriers to sustainable energy in China. In addition, UNDP projects support the removal of technical barriers and the development of government technical capacity.

<b>Project Title (Project authority)</b>	<b>Project Duration (&amp; Status)</b>	<b>Budget UNDP+ Cost-sharing)</b>	<b>Brief Description</b>
Development of Coalbed Methane Resources in China (Ministry of Coal Industry)	1992-1998  (closed)	UNDP/GEF: \$10m	Assist China in developing plans to recover and use coalbed methane as a new energy source from its coal mines; to protect the global and local environment by reducing greenhouse gases; and to improve mining safety.
Landfill Methane Recovery and Utilization from Mixed Municipal Waste in China (SEPA)	1997-2001  (Ongoing)	UNDP/GEF: \$5,285,000	Demonstration project to extract methane and use it directly as fuel and for electricity generation, prepare national action plan and support establishment of institutional mechanisms for the sale of extracted methane for electricity to users of the grid.
Resources Concessions for Sustainable Development of Renewable Energy (Tsinghua university)	1997-1999  (ongoing)	UNDP SPPD: \$125,000	Policy study for establishment of a framework on using resources concessions, including necessary regulatory, financing and institutional components. Focus is on wind energy.
Capacity Building for Rapid Commercialization of Renewable Energy in China (SETC)	1999-2003  (Ongoing)	UNDP/GEF: \$8.8m Ausaid: \$3m Dutch : \$2.53m	Barrier-removal project to increase market penetration of the renewable energy technologies through capacity building activities and developing market-based institutions and /instruments.
Jilin Biomass Gasification (Jilin Provincial EPB)	1999-2002 (Project document just signed).	UNDP/UN Foundation: \$1.24m	Demonstration project launching a sustainable energy technology in rural village/township in Jilin Province based on the modernized use of biomass.
Capacity Building for the China Greenlights Programme (SETC)	1996 – 1999  (ongoing)	UNDP TRAC: \$995,000	Support implementation of China's National Green Lights Programme, through issuing national standards for efficient lighting and designing certification and labeling scheme, and developing consumer awareness on energy efficient lighting
Management and Energy Efficiency in the Electric Power Industry	1996 – 1999	UNDP TRAC: \$995,000 Govt. C/S: \$3.1m	Support the improvement of energy efficiency in China by introducing market-oriented utility and power plant management

<b>Project Title (Project authority)</b>	<b>Project Duration (&amp; Status)</b>	<b>Budget UNDP+ Cost-sharing)</b>	<b>Brief Description</b>
(State Power Corporation)	(ongoing)		techniques, such as benchmarking of different power plants against each other.
Energy Conservation in Township and Village Enterprises (Ministry of Agriculture)	1 <sup>st</sup> phase: 1997-1999 (formulation project 2 <sup>nd</sup> phase: 1999-2003 (to be started soon)	1st phase: UNDP/GEF: \$1m 2 <sup>nd</sup> phase: UNDP/GEF: \$8.9m	Support demonstration and commercialization of energy efficient and GHG reduction technologies in brick-making, cement, coking and metal casting sectors for TVEs.
Barrier Removal for Commercialization of Energy efficient Refrigerators (SEPA)	1999-2003  (Ongoing)	UNDP/GEF: \$9.6m	Promote the widespread commercialization of energy-efficient refrigerators by removing technical, market, commercial, information and other barriers to increased market penetration of the technologies and products.
Capacity Development for SO2 Emission and Acid Rain Control in Guiyang (China Research Academy of Environment Sciences/ Guiyang EPB)	1997-2000  (Ongoing)	UNDP TRAC: \$609,000 Govt. C/S: \$360,000	To reduce adverse social, environmental and economic consequences of air pollution and acid rain in the Guiyang Province through controlling sulfur dioxide emissions.
Initial Preparation for China's National Communication (SDPC)	1999-2000 (formulation project)	GEF/PDF: \$324,000	Help China to develop a proposal for the preparation of China's initial National Communication to the UNFCCC and to develop capacity for any future national communications
Power Grid Management Reform (State Power Corporation)	1999- 2001 (operationally started)	UNDP TRAC: \$716,000 Govt. C/S \$3,000,000	Support power grid reform in China by strengthening national and local capacity, addressing the wide range of technical, managerial, social and environmental issues involved.
Mainstreaming Renewable Energy in Energy Policy (SDPC)	Under formulation	UNDP/TRAC and cost-sharing to be determined	Establish a more appropriate planning methodology to formulate the overall energy development plan under China's 10 <sup>th</sup> Five Year Plan, and provide policy recommendations to the Government to promote renewable energy development and use of other clean technologies.

## **ANNEX E.1**

### **Proposal for Energy Inventory Targeted Research (Transportation)**

#### **1. Background on Transport Sector Inventory**

Because activity data in transportation sector was seldom surveyed and measured in developing countries, historical data in developed countries was generally adopted by IPCC as default value and IPCC Guideline takes transportation sector in developed countries as reference too.

However, compared to the transportation status in developed countries, developing countries have their own specific situation in vehicle types, transportation mode, technology level and structure, vehicle maintenance and management. As a result, profound study is necessary to complement relevant methodology and emission factors used by IPCC.

Following features refer to developing countries in general, and in particular to China:

First, short of statistic data and completeness of statistic index system. A large number of vehicles are in operation in developing countries, ranging from the most advanced ones to those out-of-date, and energy consumption in transportation sector grows at rapid speed too. However, statistics work is very limited in this sector, for instance, in Chinese statistics system, the data is mainly about the vehicle controlled by transportation authorities, a large amount of other vehicles is ignored, especially for road transportation. As a result, it is very difficult to identify the activity data of China's transportation sector. In China's Energy Balance Table, energy consumption in transportation sector in 1990 was 29.02 Mtce, and 59.95Mtce in 1996, double increase compare to 1990. As said before, this is only the activity data about vehicle controlled by transportation authorities. Relevant experts estimated that energy consumption in this sector exceeded 100 Mt in 1996.

Second, low technological level of vehicles in developing countries and large difference in transportation mix and mode were found compared to those in developed countries. It is shown by previous study on 1990 emission inventory that CO<sub>2</sub> emission from transportation sector only accounted for 5.66% of the total energy activity emissions. The activity data were roughly estimated by adding oil consumption in various sectors to transportation sector, in which farming vehicles were ignored.

Most developing countries are in their initial stage of fast economic development and rapid growth in energy consumption in transportation is expected. Large difference between developing countries and developed ones is caused by a great number of farming vehicles, motorcycles and mini-cars in developing countries.

In previous studies on 1990-emission inventory, residential cars was disaggregated into car-petrol, light truck-petrol, light truck-diesel, heavy truck-petrol, heavy truck-diesel and motorcycle-petrol, bus was ignored. One of the problems on this category was that medium truck was not excluded from heavy truck, but medium truck accounted for quite a large proportion in the total. Another was there was no detailed categories for cars, but there are a great number of cars in China now, ranging from the most advanced to the out-of-date. Thirdly, farming vehicles were ignored, in fact unit energy consumption of this kind of vehicles is very high, though there are not so much on operation, its energy consumption and environment emission account for a

certain proportion of the total consumption and emission from road system.

**Table 1 Residential cars and farmland vehicle in China (in thousands)**

Year	Residential car	In which: Private car	tractor	In which: walking tractor	Motorcycle	In which: two-wheelers
1990	5513.6	816.2	4625.8	2648.1	4212.8	3105.8
1997	12190.9	3583.6	7328	2870.7	20222.2	17541.3

Table 1 shows the high growth rate of residential cars and farmland vehicle in China. This high developing speed still will be sustained for a long time because China is on its middle stage of high economy developing period. More and more families will buy their own private cars. All these factors will accelerate the energy consumption and environmental emission in transportation sector.

Other developing countries have their own distinguishing feature too. For example, domestic cars with low technology level dominate India transportation sectors and in Egypt, secondary cars with various level take a great proportion.

Third, low road rank and heavy traffic in urban area, both of which cause higher unit energy consumption and environmental emission in transportation sector than that in developed countries. In China, the mix of the roads with high rank is much lower than in developed countries, for instance, the mileage of highway is only one tenth of that in USA. Ordinary roads and substandard roads predominate the whole transportation system. In recent years, under the requirements for shorter travel time and more easiness, infrastructure of transportation began to be developed at the direction of high speed and high efficiency.

The improvement of road classification not only shortens the time spent on transportation and increases the transit ability, but also reduces energy consumption. In the near future, infrastructure of transportation in China would be improved further with the rapid growth of economy, so, high energy intensity caused by this factor would be eliminated gradually.

Because most big cities in China do not have subway system and vehicle volume grows much faster than the roadway does, these cities are troubled by serious traffic jam. From 1990 to 1997, urban roadway in China grew as an annual average of 6.6%, whereas residential cars 17.3% and taxi up to 73.95%. Compared to developed countries, unit energy consumption in transportation system in developing countries is more affected by urban traffic jam and the situation tends to be worse in future.

Fourthly, inefficient transportation management and poor vehicle maintenance. Many old cars and out-of-date cars should be phased out, but they are still in operation. Bad maintenance makes vehicle aged faster as they should be. And in some countries, overloading can be found everywhere. All these factors have negative influence on unit environmental emission from vehicle. Large difference exists in this area between developing countries and developed ones.

## 2. Objective

The inventory is intended to develop methodology suitable for developing countries' specific situation and conduct case study on emission factor simultaneously. Complement and perfect relevant issues in IPCC, providing helpful reference for inventory development in China and other developing countries.

## 3. Research content

Road transportation is the focus of this research, conducting methodology study and case study on emission factors according to the specific situation of developing countries. The research will study the detailed classification methodology for transportation vehicles on the basis of concrete and in-depth investigation and then will classify all kinds of vehicles according to transportation specialty and data availability. The study will investigate in detail the important and specific transportation mode and technologies in developing countries, taking specific influence factors as emphasis, and will put forward inventory developing methodology suitable for developing countries' specific situation. Representative cities and provinces for future technological development in China will be selected in the study for case study on emission factor, aiming at not only establishing a good basis for future national communications in China, but also providing helpful reference for other developing countries.

The project will study the main transportation mode, tools, and dominant technology in selected developed countries, such as India and Egypt, for comparison with that of China.

Main activities include the following:

### **Activity 1: Investigate the specific characteristic of main transportation mode and tools and technological level in China and other main developing countries;**

#### Tasks

1. Conduct international investigation in India and Egypt.
2. Information and data collection domestically

#### Costs:

1. International investigation: 2 person \* 2 countries \* \$2,700/person = \$10,800
  2. Personnel:
    - Senior researchers: 7person.M \* \$2000/person.M = \$14,000
    - Medium researchers: 7person.M \* \$1500/person.M = \$10,500
  3. Data purchasing: \$9,000
- Sub-total: 44,300

### **Activity 2: Conduct survey in order to identify the possible options for estimating activity level for transportation sector in developing countries, then select;**

#### Tasks

1. Conduct domestic investigation in two selected cities.
2. Distribute questionnaire on 4 kinds vehicle types
3. Information and data collecting and data processing

4. A domestic workshop on method by which to identify transportation activity levels.

Costs

1. Personnel:

Senior researchers:  $8\text{person.M} * \$2000/\text{person.M} = \$16,000$

Medium researchers:  $20\text{perspn.M} * \$1500/\text{person.M} = \$30,000$

Inferior researchers:  $5\text{perspon.M} * \$1000/\text{persson.M} = \$5,000$

2. travel:  $3\text{person} * 5\text{times} * 20\text{days} * \$120/\text{person.day} = \$36,000$

3. questionnaire:  $4 * 100\text{sheets} * \$100/\text{sheet} = \$40,000$

4. data purchase: \$15,600

5. a workshop:  $25\text{person} * 3\text{days} * \$200 = \$15,000$

Sub-total: \$157,600

**Activity 3: Investigate and analyze in order to determine calculation formula for emission factor and in-situ measurement methodology in developing countries;**

Tasks:

1. Collect information and data of China and other developing countries.

Costs:

1. Personnel:

Senior researchers:  $13\text{person.M} * \$2,000/\text{person.M} = \$26,000$

Medium researchers:  $34\text{person.M} * \$1500/\text{person.M} = \$51,000$

Inferior researchers:  $10\text{person.M} * \$1000/\text{person.M} = \$10,000$

2. Data purchase: \$15,000

Sub-total: \$102,000

**Activity 4: Conduct case study on emission factors of main technology of main transportation tools.**

Tasks

1. Conduct investigation in two selected cities.

2. Sampling and measuring on 4 kinds selected tools

3. Distribution of Questionnaire on different conditions related to emission factors

Costs

1. Personnel:

Senior researchers:  $4\text{person/M} * \$2000/\text{person.M} = \$8,000$

Medium researchers:  $15\text{person.M} * \$1500/\text{person.M} = \$22,500$

Inferior researchers:  $10\text{perspn.M} * \$1000/\text{person.M} = \$10,000$

2. Travel:  $2 * 3\text{persons} * 2\text{times} * 15\text{days} * \$120/\text{person.day} = \$10,800$

3. Sampling and measurement:  $4\text{ kinds} * 5\text{ samples/kind} * \$1000/\text{sample} = \$20,000$

4. questionnaire:  $4\text{kinds} * 20\text{sheets/kind} * \$100/\text{sheet} = \$8,000$

Sub-total: 79,300

## Activity 5: Organize and hold two international workshops

### Tasks

1. An international workshop on specific characteristic of main transportation mode and tools and technological level in China and other main developing countries
2. An international workshop on identifying of emission factor of various transportation tools.

### Costs

1. First international workshop:  $20\text{person} \times 2\text{days} \times \$200/\text{person.day} = \$8,000$
  2. International workshop:  $20\text{person} \times 2\text{days} \times \$200/\text{person.day} = \$8,000$
- Subtotal: \$16,000

## Activity 6: Train six persons abroad in developed countries on methodology for developing transport sector inventories

### Tasks

1. Train Chinese researchers on emission factor identifying in developed countries.

### Costs

1. training:  $6\text{person.time} \times \$3,500/\text{person.time} = \$21,000$
- Subtotal: \$21,000

**Table 2 Transportation inventory target research budget table (Unit: 1000\$)**

Budget Item	GEF total	Co-financing total
1. Personnel	100.8	92
2. Equipment	0	0
2a. Eqpt. supplies	0	0
2b. Data Purchase	21.2	66.4
3. Subcontracts	20	0
4. workshop and Training	21	10
5. Travel	16	41.6
6. Executing agency		
7. Monitoring and Evaluation		
8. Miscellaneous		
8a. Office facilities		
8b. Other		
9. PDF		
10. Project total	200	210

**Table 3 Timetable**

Targets	1 <sup>st</sup> to 2 <sup>nd</sup>	3 <sup>rd</sup> to 5 <sup>th</sup>	6 <sup>th</sup> – 12 <sup>th</sup>	13 <sup>th</sup> to 18 <sup>th</sup>	19 <sup>th</sup> to 21 <sup>st</sup>	22 <sup>nd</sup> to 24 <sup>th</sup>
Training	————					
Local and international investigation	————	————	————			
Case study			————	————		
Workshop	————			————		
Research work	————	————	————	————	————	
Final report compilation						————



## **ANNEX E.2**

### **Proposal for Forestry Inventory Targeted Research**

#### **1. Introduction**

This proposal is based on the review and assessment of climate change-related studies in China covering the land use change and forestry sector. The proposal mostly addresses the activities necessary to improve estimates of greenhouse gases (GHG) inventory in the country, consistent with China's obligations under the United Nations Framework Convention on Climate Change (UNFCCC), where signatories are committed to submit National Communications to the UNFCCC Secretariat.

We identify areas where further research is required for supporting future national communications. This is pursuant to Global Environmental Facility's (GEF) 'Targeted Research Program'.

#### **2. Inventory Targeted Research**

Even after submission of the Initial National Communication, some areas will remain wanting for further research in order to enhance the reliability of information needed for future national communications. Many of these areas will require careful collaboration between institutions within the sector and/or between sectors. The detailed information is in Table 1 as targeted research project planning matrix.

##### **Activity 1 - Soil carbon measurements**

Soil carbon is one area with large uncertainties among the parameters. To supplement the scarce information available in the literature, field measurements, including total carbon stock in soils, fluxes associated with various activities e.g. -land management and soil carbon accumulation especially from afforestation and reforestation, are necessary. Soil carbon contents and carbon fluxes associated with land-use change and forest harvesting mainly in temperate zone, will be measured.

A database compiling the above data and information at an appropriate geographic level for land-use change and forest type will be produced.

##### **Activity 2 - Soil carbon cycle modeling**

A comprehensive site or land level model will be developed to understand the carbon dynamics after land use change (especially after forest harvesting).

A ecosystem research station with better research background in temperate or sub-tropical area will be selected for the measurements of soil carbon storage and soil carbon dynamics. A model will be developed to include carbon absorption of root system, carbon release process in litter

and root decomposition, carbon leaching in soil and the effects of different land management practices on the above processes.

### **Activity 3 - Remote sensing (RS) and GIS-based land-use change mapping**

Remote sensing-based land use distribution map and GIS processing techniques are the basis of initial and future national communications. This activity will be implemented in cooperation with relevant remote sensing and GIS institutions, such as the Remote Sensing Center of the Chinese Academy of Sciences, and Forest Resources and Information Institute, Chinese Academy of Forestry and Institute of Agricultural Natural Resources and Regional Planning, Chinese Academy of Agricultural Sciences. Some preliminary studies on land use by means of remote sensing and GIS techniques are being carried out in China in recent years. From a long run, these data will be very useful for the future national communications. It should be noted that cost for acquiring the data is only the half of the actual price.

This activity will Collect and decode remote sensed maps of the territory of Eastern China focusing on agricultural and forestry land use distribution, and use a geographic information system (GIS) system to map the distribution of forests by type. And the living stocks of forests by region and forest type will be estimated.

### **Activity 4 - National workshops**

To hold two coordination workshops involving Chinese participants to determine methods, criteria for land use classification and relevant technical issues, and negotiate for the purchasing of remote sensing and GIS images and data related to land use and land use changes. And to hold two workshops in the second quarters of 2001 and 2002 to discuss techniques of remote sensing and GIS in land use assessment and its suitability so as to improve reliabilities of initial and future national communications.

### **Activity 5 - Study tours**

To organize international study tours to enhance the capability of the personnel involved in the soil carbon research.

**Table 1 Targeted Research Project Planning Matrix**

Summary	Objectively Verifiable Indicators	Means of Verification	Critical Assumptions and Risks
Land Use Change and Forestry			
Activity 1: Soil carbon measurement	Measured data on soil carbon in forested lands and other land uses converted from and for forests in a research station	Compiled soil carbon data related to land use and land use change conversion will be provided.	The instrument for carbon flux should be available. Otherwise the flux will not be measured.
Activity 2: Soil Carbon Cycling Model	Reduced uncertainties of parameters associated with soil carbon for initial and future national communication	Soil carbon cycling model and reports are submitted	If soil carbon is not measured properly, the model will not have parameters and data for development. And international experience and training are critical also.
Activity 3: Remote Sensing (RS) and GIS-based Land Use Change mapping	Increased reliability of land use change and forest dynamics for initial and future national communication and reduced uncertainties	RS and GIS are successfully used in land use change classification. TM images of land use change and forest in two periods for eastern China (including Southwestern China) and related GIS image, database and reports are submitted.	If left unchecked, it would be difficult to get reliable dynamic data of land use and forest in time, thus hard to improve precision of initial and future national communications
Activity 4: Workshops	Enhanced capacity of involved personnel in land use classification and RS and GIS techniques and capabilities in monitoring land use change and forest dynamics.	Capabilities of land use classification and using RS and GIS in land use change and forests are enhanced.	If left unchecked, capabilities of involved persons could not be rapidly enhanced, thus the proceeding of the target research would be affected.
Activity 5: Study tours	Enhance capacity of involved personnel in soil carbon research.	Conductance of soil carbon research	If left unchecked, capabilities of involved persons could not be enhanced.

### 3. Schedule and budget

The time schedule for Targeted Research activities is listed in Table 2. And the outputs for these activities are listed in Table 3. The budget is listed in Table 4.

**Table 2. Time table for the activities**

Year (quarter) Activities	2001				2002			
	1	2	3	4	1	2	3	4
Target research								
Satellite data purchase	■	■						
Satellite image decoding		■	■	■	■	■	■	
Measurement of soil carbon and model establishment	■	■	■	■	■	■	■	■
Workshops		■				■		
Reporting		■		■		■		■

**Table 3. Outputs of activities**

Target Research	
Satellite data purchase	2001(2): Survey and Buying
Satellite image decoding	2001(2): Northeast of China 2001(3): East part and the south of China 2001(4): Southwest of China 2002(1): Synthesis and analysis
Measurement of soil carbon	2001(1): Selection of the sites 2001(2): Instrument preparation and measurement starting 2001(3): Continuing measurement 2001(4): Model development 2002(1): Model development 2002(2): Continuing measurement 2002(3): Continuing measurement 2002(4): Data processing and reporting
Workshops	2001(2): Workshop report 2002(2): Workshop report
Reporting	2001(2): First draft report 2001(4): Second draft report 2002(2): Third draft report 2002(4): Final report

Note: 2001 (1) means by the end of the 1st season (three months).

The details for separating domestic payments and incremental costs for Targeted Research activities are listed in Table 4. The Targeted Research will include 3 components: Soil carbon, Land-use mapping, and Workshops. Please note that the total number of TM images for covering the whole China is 505. Because the west part of China is mostly desert and mountainous desert, only eastern part of China is studies in this project (the northeast, north, south, southwest of China). Therefore only 340 images will be used. The TM images will be purchased from domestic source to reduce the cost.

China will provide basic facilities, analysis instruments, trial field cost and labor for soil carbon measurement, totaling 90,000 \$US. And China will provide with TM images which cost 680,000 \$US. The total support from China side is 770,000 \$US (Table 5, and Annex 1.2.3). China is one

of big countries in the world covering wide range of climate and soil types, therefore the targeted research on soil carbon will have global significance. Not only can the measurements and modeling of soil carbon be used in China, but the established carbon cycling model can also be applicable for other countries. The research on remote sensing (RS) and GIS-based land-use change and forest dynamics will provide sound basis for the land-use change over time in the long run. And China is a mountainous country with diversified natural conditions, the practice in remote sensing decoding has its particular difficulties. The success in decoding remote sensing data will have universal significance.

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**Table 4. Budget in Targeted Research on Soil Carbon  
and Land Use Mapping (in 10<sup>3</sup> US\$)**

	Domestic payment	Increment al Cost	Total Cost	Description
<b>Soil Carbon Measurement</b>				
Basic Facilities	30			Incl. Renting, maintaining and purchasing of necessary office facilities and equipment etc.
Analysis Instruments	20			Incl. Renting, maintaining and purchasing of necessary equipment for soil and plant analysis
Trial Field	20			
Labor	20			
Study tours		45		
Equipment		40		Equipment for measurements of soil carbon flux and plant respiration, equipment for fine root research
Travel and Lodging		40		
International Advisory		30		
Data processing		40		
Reporting		20		
Unpredictable		5		
Sub-total	90	220	310	
<b>Land Use Mapping</b>				
TM images Purchase	680			The total number of TM images covering whole China is 505. In this project only eastern part of China's territory will be studied, i.e. 340 images covering the northeast, north, south and southwest of China. Unit price of 1 image is 2000 \$US. 340 images * 2000 \$US = 680 000 \$US.
TM Image Decoding		170		Cost for decoding each image is 500 \$US, and 340 * 500 = 170 000 \$US.
Equipment		20		GIS operation platform and software
International Advisory		40		
Study tours		30		
Working Meetings		40		
Workshop		30		
Reporting		40		
Unpredictable		10		
Sub-total	680	380	1060	
<b>Total</b>	<b>770</b>	<b>600</b>	<b>1370</b>	

**Table 5 UNDP Project Budget for Inventory Targeted Research in  
Land Use Change and Forestry (China's Component)**

Budget Line	Description	Total		(Year1)		(Year 2)	
		Month	US\$	Month	US\$	Month	US\$
0	PROJECT PERSONNEL						
1	International Experts						
11.01	Expert A						
11.02	Expert B						
1.49	Subtotal Experts						
1.50	International Consultants						
11.51	Consultant A						
11.52	Consultant B						
11.97	Consultants						
1.98	Subtotal Consultants						
1.99	Subtotal Experts & Consultants						
2	OPAS Experts						
12.01	Expert A						
2.99	Subtotal OPAS Experts						
3	Administrative Support						
13.01	Support Personnel A						
3.99	Subtotal Administrative Support						
4	United Nations Volunteers						
14.01	UN Volunteer A						
4.99	Subtotal UN Volunteers						
5	Duty Travel						
6	Mission Costs						
16.01	Mission A (e.g. midterm evaluation)						
7	National Professional Project Personnel						
17.01	National Expert A						
7.99	Subtotal NPPP						
9	Component Total						
0	SUBCONTRACTS						
21	Subcontract 1						
22	Subcontract 2						
9	Component Total						
0	TRAINING						
1	Fellowships						
31.01	Fellowship 1						
2	Study Tours/Group Training						
32.01	Training 1						
3	In-service Training						
9	Component total						
0	EQUIPMENT						
45	Equipment procurement operation and maintenance		50,000		50,000		0
9	Component Total		50,000		50,000		0
0	MISCELLANEOUS						
51	Miscellaneous		40,000		20,000		20,000
52	Reporting Costs						
9	Component Total		40,000		20,000		20,000

0	TECHNICAL SUPPORT SERVICES					
61	Formulation					
62	Appraisal					
63	Technical Support (Implementation)	680,000		340,000		340,000
64	Evaluation					
66	Mission Costs					
67	National Professionals					
68	Subcontract					
9	Component Total	680,000		340,000		340,000
0	MICRO-CAPITAL GRANTS					
71	Grants for Credit Activities					
72	Grants for other Capital Investments					
9	Component Total					
9	TOTAL UNDP CONTRIBUTION					
00	COST-SHARING					
101	Donor Contribution from Prog- Country (ies)	770,000		410,000		360,000
102	World/Regional Bank Loans/ Grants					
103	Third Party Contributions					
108	Adjustment Line					
09	Component Total	770,000		410,000		360,000
99	NET UNDP TOTAL CONTRIBUTION					

**Table 6 UNDP Project Budget for Inventory Targeted Research in Land Use Change and Forestry (UNDP/GEF Component)**

Budget Line	Description	Total		(Year1)		(Year 2)	
		Month	US\$	Month	US\$	Month	US\$
0	PROJECT PERSONNEL						
1	International Experts						
11.01	Expert A	0.25	15,000	0.25	15,000		
11.02	Expert B	0.25	15,000			0.25	15,000
1.49	Subtotal Experts	0.5	30,000	0.25	15,000	0.25	15,000
1.50	International Consultants						
11.51	Consultant A						
11.52	Consultant B						
11.97	Consultants						
1.98	Subtotal Consultants						
1.99	Subtotal Experts & Consultants	0.5	30,000	0.25	15,000	0.25	15,000
2	OPAS Experts						
12.01	Expert A						
2.99	Subtotal OPAS Experts						
3	Administrative Support						
13.01	Support Personnel A						
3.99	Subtotal Administrative Support						
4	United Nations Volunteers						
14.01	UN Volunteer A	0.6	20,000	0.3	10,000	0.3	10,000
4.99	Subtotal UN Volunteers						



5		Duty Travel		10,000		5,000		5,000
6		Mission Costs		10,000		5,000		5,000
	16.01	Mission A (e.g. midterm evaluation)						
7		National Professional Project Personnel						
	17.01	National Expert A						
7.99		Subtotal NPPP	20.0	70,000	10.0	40,000	10.0	30,000
9		Component Total	21.1	140,000	10.55	75,000	10.55	65,000
0		SUBCONTRACTS						
	21	Subcontract 1						
	22	Subcontract 2						
9		Component Total						
0		TRAINING						
1		Fellowships						
	31.01	Fellowship 1						
2		Study Tours/Group Training	3.0	75,000	1.2	30,000	1.8	45,000
	32.01	Training 1						
3		In-service Training						
9		Component total	3.0	75,000	1.2	30,000	1.8	45,000
0		EQUIPMENT						
	45	Equipment procurement operation and maintenance		60,000		60,000		
9		Component Total		60,000		60,000		
0		MISCELLANEOUS						
	51	Miscellaneous		40,000		20,000		20,000
	52	Reporting Costs		60,000		20,000		40,000
9		Component Total		100,000		40,000		60,000
0		TECHNICAL SUPPORT SERVICES						
	61	Formulation	0.2	5,000	0.2	5,000		
	62	Appraisal	0.2	5,000			0.2	5,000
	63	Technical Support (Implementation)	50.0	170,000	30.0	100,000	20.0	70,000
	64	Evaluation						
	66	Mission Costs		25,000		10,000		15,000
	67	National Professionals		20,000		10,000		10,000
	68	Subcontract						
9		Component Total	50.4	225,000	30.2	125,000	20.2	100,000
0		MICRO-CAPITAL GRANTS						
	71	Grants for Credit Activities						
	72	Grants for other Capital Investments						
9		Component Total						
9		TOTAL UNDP CONTRIBUTION		600,000		330,000		270,000
00		COST-SHARING						
	101	Donor Contribution from Project Country (ies)						
	102	World/Regional Bank Loans Grants						
	103	Third Party Contributions						
	108	Adjustment Line						
09		Component Total						
99		NET UNDP TOTAL CONTRIB.		600,000		330,000		270,000

## ANNEX E.3

### Proposal for Agriculture Inventory Targeted Research<sup>1</sup>

#### 1. Background

The agriculture system of China is most complex. A type of major agricultural GHG source usually distributes under cool, temperate, warm, wet, dry and semi-arid climatic zones. The simplified categorization criteria or default emission factors provided by *IPCC 1996 guidelines* are not completely suitable for China-specific circumstances. Some new categories of agriculture GHG sources should be defined based on China-specific agriculture system in addition to those of *IPCC 1996 guidelines*. Moreover, emission factors should be obtained from local field observation data to decrease the uncertainties associated with the inventory of these sources and the IPCC methodologies need to be modified.

**Table 1 Uncertainties of agricultural GHG emission of China in 1990**

Gas species	Methane			***Nitrous oxide (CH <sub>4</sub> equivalent) / (N <sub>2</sub> O)
Agricultural Sources	Wetland rice fields	Enteric fermentation	Animal wastes	Cropland soils
Emission Range <sup>†</sup> (Tg CH <sub>4</sub> /N <sub>2</sub> O yr <sup>-1</sup> )	5~13	2.9~8.7	0.66~1.98	* (0.44~20.4) / (0.11~0.91)
Proportion to global total	22%~31%	≈17.5%	≈7%	≈19%
Projection of 2030 (Tg CH <sub>4</sub> /N <sub>2</sub> O yr <sup>-1</sup> )	12.44~14.39	20.5	2.64	*(1.24~56.4) / (0.31~2.82)
**Contribution to 1990 total (9~49Tg CH <sub>4</sub> )	29%~56%	20%~32%	4%~7%	5%~46%
Uncertainty associated key factors	Rice field categorization and variables determining emission factors, such as water regime, organic and chemical fertilization and, rice cultivars	Livestock population, feed characteristics, feed digestibility, animal structure and methane conversion rate	Livestock population, manure management system, MCF and feed characteristics.	Field categorization, considered emission sources and variables closely related to emission factors, such as water regime, fertilization and crop systems

<sup>†</sup>Likely range of emission estimates depending on the adopted values of the factors not considered in the existing estimates.

\* Equivalent value of CH<sub>4</sub>, calculated with GWP (global warming potential) proposed by Shine et al. (1990)

\*\* Compared with CH<sub>4</sub> equivalent values.

\*\*\* Estimated only based on mineral fertilizer consumption.

Based on review and evaluation of previous agricultural inventory studies (ref. Annex 7.3.1 for details), the likely ranges of emission estimates of Chinese agricultural GHG, emission projection of 2030, contributions to global total of individual gas species and domestic total of agricultural GHG emission and, key factors associating with uncertainties were summarized in

<sup>1</sup> Developed by Mingxing Wang<sup>1</sup>, Xunhua Zheng<sup>1,3</sup>, Hongmin Dong<sup>2</sup>, Yu'e Li<sup>2</sup>, Jin Li<sup>1</sup>, Yao Huang<sup>1</sup>, Renjian Zhang<sup>1</sup> and Xuri<sup>1</sup>:

1. Institute of Atmospheric Physics, Chinese Academy of Sciences
2. Institute of Agricultural Meteorology, Chinese Academy of Agricultural Sciences
3. State Key Laboratory of Atmospheric Boundary Layer and Atmospheric Chemistry, Chinese Academy of Sciences

Table 1. The uncertainties of previous inventory estimates are mainly due to lacking of detailed data on these key factors or inappropriate methods adopted.

## **2. Project Objectives and Description**

Agricultural sources of GHG (CH<sub>4</sub> and N<sub>2</sub>O) in China mainly include rice paddy fields, enteric fermentation of ruminant livestock, domestic livestock wastes, cropland soils with fertilizer-N amendment, deposition of atmospheric N, leaching fertilizer-N and field burning of crop residues. The objective of the project is to perform targeted researches on understanding the processes or mechanisms of GHG emission from agriculture and developing model tools for inventory estimation.

To reach the objective, field measurements and model studies will be carried out simultaneously. Based on the experimental and modeling studies, model-based approaches for developing future inventories will be designed and built up by developing new models and modifying/improving existing models. Direct purpose of the targeted researches is to provide the most logical methodologies and approaches, which are capable of producing highly qualified inventory.

## **3. Approaches and procedures for targeted researches of the agricultural GHG sectors**

The targeted researches of agricultural GHG section cover experimental and modeling studies on N<sub>2</sub>O and CH<sub>4</sub> emission from major agricultural systems of China. In experimental studies, fluxes and related parameters of N<sub>2</sub>O emission from fertilized croplands, CH<sub>4</sub> emission from winter-flooded rice paddy fields and enteric fermentation and N<sub>2</sub>O/CH<sub>4</sub> emission from animal wastes and grazing will be investigated at fields and in laboratory. Meanwhile, modeling studies will be simultaneously carried out. For N<sub>2</sub>O emission from croplands, emission processes of 4 major crop ecosystems will be investigated while a new model for predicting N<sub>2</sub>O emission flux at both site and regions scales will be development. A continuous field measurement and related laboratory experiment will be performed to improving understanding of CH<sub>4</sub> production, oxidation and emission processes in rice paddy fields, which are special rice-based ecosystems seldom studied previously. Field and laboratory experiments will be performed to understanding CH<sub>4</sub> and N<sub>2</sub>O emission processes of China-specific animal agriculture. Meanwhile, tool models on CH<sub>4</sub> emission from rice paddy fields and CH<sub>4</sub>/N<sub>2</sub>O emission from animal agriculture will be built up by modifying the existing models and incorporating them as cores into newly designed tool model frames.

## **4. Activities of targeted researches on N<sub>2</sub>O/CH<sub>4</sub> emission from agriculture**

### **Targeted researches on N<sub>2</sub>O emission from croplands**

**Activity-1** Experimental studies on N<sub>2</sub>O emission from croplands, including continuous observation of N<sub>2</sub>O emission flux and related parameters in laboratory/field experiments on N<sub>2</sub>O emission processes.

**Activity-2** Development and validation of a process-based model for predicting N<sub>2</sub>O emission from croplands with fertilizer amendment.

**Activity-3** Abroad training --N<sub>2</sub>O (croplands): Technical training of 2 persons for observation and modeling of N<sub>2</sub>O emission from croplands.

### **Targeted researches on CH<sub>4</sub> emission from rice paddy fields**

**Activity-4** Continuous measurement of CH<sub>4</sub> emission from winter-flooded rice fields.

**Activity-5** Development a tool model for developing future inventory of methane from rice paddies.

**Activity-6** Abroad training--CH<sub>4</sub> (rice paddy fields): Technical training of 2 persons for observation and modeling of CH<sub>4</sub> emission from rice paddy fields.

**Activity-7** To hold an international workshop on N<sub>2</sub>O and CH<sub>4</sub> emission from croplands and related modeling studies.

### **Targeted researches on CH<sub>4</sub> emission from enteric fermentation**

**Activity-8** Measurement of parameters related to methane emission from enteric fermentation at fields and/or in laboratory

**Activity-9** Abroad training--CH<sub>4</sub> (enteric fermentation): Technical training of 2 persons for observation and modeling of CH<sub>4</sub> emission from enteric fermentation.

### **Targeted researches on CH<sub>4</sub>/N<sub>2</sub>O emission from animal wastes and animal grazing**

**Activity-10** Measurements of parameters related to methane and nitrous oxide emissions from animal manure in fields and/or in laboratory.

**Activity-11** Abroad training: Technical training of 2 persons for observation and modeling of CH<sub>4</sub>/N<sub>2</sub>O emission from animal waste management systems and animal grazing.

### **Modeling studies on CH<sub>4</sub>/N<sub>2</sub>O emission from animal related agriculture**

**Activity-12** Development a tool model for developing future inventory of methane from enteric fermentation and methane/nitrous oxide emission from animal wastes.

**Activity-13** To hold an international workshop on CH<sub>4</sub>/N<sub>2</sub>O emission from animal agriculture and modeling approaches for inventory development.

## **5. Time schedules for targeted research activities of agricultural section**

(See Table 2)

## **6. Baseline for proposed targeted researches of the agricultural section**

The Tenth Plan for fundamental scientific research is about to be launched in 2000 by the Chinese government. The State Science and Technology Commission (SSTC), the State Development Planning Commission (SDPC), the National Natural Scientific Foundation Commission of China (NSFC), the Agricultural Ministry of China and the Chinese Academy of Sciences are to jointly implement a fundamental research project on studying the issues of sustainable development of agriculture. Under this project launched in the Tenth Plan, about 6.0 million RMB, with an equivalent of about 0.71 million USD (See Table 6), is to be invested in 2000 to equip four laboratories and seven field stations located at the sites which are able to represent the major agricultural systems of China. The involved laboratories are the State Key Laboratory of Carbon and Nitrogen Cycles, the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, the CAS Laboratory of Ecological Processes of

Trace Gas Related to Terrestrial Ecosystems and the Institute of Livestock Research Institute, Chinese Academy of Agricultural Sciences. Shenyang Agricultural Ecosystem Station, Xilinguole Grassland Ecosystem Station, Luancheng Agricultural Ecosystem Station, Yintan Agricultural Ecosystem Station, Changsu Agricultural Ecosystem Station, Taoyuan Agricultural Ecosystem Station and Yanting Agricultural Ecosystem Station, all of which are field stations of Chinese Ecosystems Research Network (CERN), will be involved. The Tenth Plan project is to purely aim at studying issues on sustainable development of agriculture in China, instead of addressing issues on greenhouse gas emissions associated with global climate change. By performing the Tenth Plan project, however, primary facilities, such as expensive equipment for gas analysis, laboratories, fields and office supplies, which are essentially required to implement the proposed targeted research activities, will soon be set up. If GEF will add an investment of 0.70 millions USD (See Table 6), the equipment and facilities will soon be adapted to meet the requirement of the proposed targeted research of the agricultural sector and serve the targeted research activities.

The proposed targeted research activities, which are not involved in the Tenth Plan project, will provide observed data on emission factors that will better reflect the situation of developing countries and, develop model approaches for simulating and predicting N<sub>2</sub>O/CH<sub>4</sub> emission from regional agriculture. Other countries under similar situations may use the emission factors and model approaches, the outcomes of the proposed targeted research, in preparing their GHG inventories. Meanwhile, the outcomes of the proposed targeted research may update the knowledge on the processes associated with N<sub>2</sub>O/CH<sub>4</sub> emission from agriculture under China-specific situations, provide more reliable methods and parameters for its inventory estimation, and consequentially benefit the global environment by clarifying China's GHG emission contribution. However, China may obtain little direct benefit from the project outcomes. In other words, almost all the outcomes of proposed targeted research will direct and indirectly benefit the global environment. Therefore, obviously, the proposed targeted research activities, which will be easily implemented by utilizing the domestically built facilities through adding an appropriate amount of investment and may produce enormous global environmental benefits as described above, should be financed by GEF through investing at least 0.7 millions USD (See Table 6).

## **7. Budget for incremental cost of the proposed targeted research activities**

(See Table 3).

## **8. Budget table in UNDP format for activities of targeted research**

(See Table 4)

## **9. Project outcomes**

N<sub>2</sub>O and CH<sub>4</sub> emission from the major crop cultivation systems and animal related processes will be investigated via field/laboratory experiment. Based on the experimental researches, a process-oriented model to simulate and predict N<sub>2</sub>O emission from cropland with fertilizer amendment will be developed. Meanwhile, two tool models for developing inventory of CH<sub>4</sub>

emission from rice paddy fields and CH<sub>4</sub>/N<sub>2</sub>O emission from animal-related agriculture will be built up.

**Table 2 Time schedules for targeted research activities of agricultural sectors**

Activities	Months 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Activity-1	_____																							
Activity-2	_____																							
Activity-3	—																							
Activity-4	_____																							
Activity-5	_____																							
Activity-6	—																							
Activity-7	_____																							
Activity-8	_____																							
Activity-9	—																							
Activity-10	_____																							
Activity-11	—																							
Activity-12	_____																							
Activity-13	—																							

**Table 3 Budget for incremental cost of the proposed targeted research activities**

Activities	Details	Baseline	Incremental cost (\$US)
Activity-1	Experimental studies on N <sub>2</sub> O emission from croplands, including continuous observation of N <sub>2</sub> O emission flux with automatic and manual methodologies, and related laboratory/field experiments on N <sub>2</sub> O emission processes	181,000	161,000
Activity-2	Development and validation of a process-based model for predicting N <sub>2</sub> O emission from croplands with fertilizer amendment	76,000	49,000
Activity-3	Abroad training--N <sub>2</sub> O (croplands)		10,000
Activity-4	Continuous measurement of CH <sub>4</sub> emission from winter-flooded rice fields	87,000	69,000
Activity-5	Development a tool model for developing future inventory of methane from rice paddies	45,000	43,000
Activity-6	Abroad training--CH <sub>4</sub> (rice paddy fields)		10,000
Activity-7	To hold an international workshop on N <sub>2</sub> O and CH <sub>4</sub> emission from croplands and related modeling studies		36,000
Activity-8	Measurement of parameters related to methane emission from enteric fermentation	141,000	126,000
Activity-9	Abroad training--CH <sub>4</sub> (enteric fermentation)		10,000
Activity-10	Measurements of parameters related to methane and nitrous oxide emissions from animal manure	115,000	97,000
Activity-11	Abroad training		10,000
Activity-12	Development a tool model for developing future inventory of methane from enteric fermentation and methane/nitrous oxide emission from animal wastes	65,000	43,000
Activity-13	To hold an international workshop on CH <sub>4</sub> /N <sub>2</sub> O emission from animal agriculture and modeling approaches for inventory development		36,000
<b>Total</b>	<b>Total of all activities</b>	<b>710,000</b>	<b>700,000</b>

**Table 4 Budget table in UNDP format for activities of targeted research (UNDP/GEF Contributions)**

Budget Line	Description	Total		(Year1)		(Year 2)	
		w/m	US\$	w/m	US\$	w/m	US\$
10	PROJECT PERSONNEL						
11	International Experts						
11.01	Expert A						
11.02	Expert B						
11.49	Subtotal Experts	14w	48,000			14w	48,000
11.50	International Consultants						
11.51	Consultant A						
11.52	Consultant B						
11.97	Consultants						
11.98	Subtotal Consultants						
11.99	Subtotal Experts & Consultants						
12	OPAS Experts						
12.01	Expert A						
12.99	Subtotal OPAS Experts						
13	Administrative Support						
13.01	Support Personnel A						
13.99	Subtotal Administrative Support						
14	United Nations Volunteers						
14.01	UN Volunteer A						
14.99	Subtotal UN Volunteers						
15	Duty Travel						
16	Mission Costs						
16.01	Mission A (e.g. midterm evaluation)						
17	National Professional Project Personnel						
17.01	National Expert A						
17.99	Subtotal NPPP						
19	Component Total						
20	SUBCONTRACTS						
21	Subcontract 1						
22	Subcontract 2						
29	Component Total		372,000		230,000		142,000
30	TRAINING						
31	Fellowships						
31.01	Fellowship 1						
32	Study Tours/Group Training						
32-01	Training 1						
33	In-service Training						
39	Component total		40,000		20,000		20,000

(Continued next page)



0	EQUIPMENT					
45	Equipment procurement, operation and maintenance					
9	Component Total		240,000	240,000		
0	MISCELLANEOUS					
51	Miscellaneous					
52	Reporting Costs					
9	Component Total					
0	TECHNICAL SUPPORT SERVICES					
61	Formulation					
62	Appraisal					
63	Technical Support (Implementation)					
64	Evaluation					
66	Mission Costs					
67	National Professionals					
68	Subcontract					
0	MICRO-CAPITAL GRANTS					
71	Grants for Credit Activities					
72	Grants for other Capital Investments					
9	Component Total					
9	TOTAL UNDP CONTRIBUTION					
00	COST-SHARING					
101	Donor Contribution from Prog. Country (ies)					
102	World/Regional Bank Loans/Grants					
103	Third Party Contributions					
108	Adjustment Line					
09	Component Total					
99	NET UNDP TOTAL CONTRIBUTION		700,000	490,000		210,000

# Cover Note

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Project Title: China - Targeted Research Related to Climate Change

Date: 29 August 2000/ 21 September 2000 (Revised)

	Work Program Inclusion	Reference/Note:
<b>1. Country Ownership</b>		
I. Country Eligibility	II.	Cover Sheet Page 1 (UNFCCC ratified on January 5, 1993)
Country Drivenness	Clear description of project's fit within: III. National reports/communications to Conventions IV. National or sector development plans V. Recommendations of appropriate regional intergovernmental meetings or agreements.	VI. <ul style="list-style-type: none"> <li>pg. 2 (<i>para. 1-7</i>); pg. 3-5 (<i>para. 8-17</i>); pg. 5-7 (<i>para. 18-28</i>)</li> </ul>
VII. Endorsement	<ul style="list-style-type: none"> <li>Endorsement by national operational focal point.</li> </ul>	VIII. OFP's letter of endorsement on file.
<b>2. Program &amp; Policy Conformity</b>		
C. Program Designation & Conformity	Describe how project objectives are consistent with Operational Program objectives or operational criteria.	
X. Project Design	Describe: I. sector issues, root causes, threats, barriers, etc, affecting global environment. I. Project logical framework, including a consistent strategy, goals, objectives, outputs, inputs/activities, measurable performance indicators, risks and assumptions. V. Detailed description of goals, objectives, outputs, and related assumptions, risks and performance indicators. V. Brief description of proposed project activities, including an explanation how the activities would result in project outputs	<ul style="list-style-type: none"> <li>Vulnerability pg. 3-5 (<i>para. 8-17</i>); Greenhouse gas emissions (<i>para. 17-26</i>)</li> <li>Annex A pg. 21-24 (<i>para 53-54</i>)</li> <li>pg. 7 (<i>para. 29</i>); Annex A pg. 21-24; Annex B pg. 25-28</li> </ul>
XI.		

	Work Program Inclusion	Reference/Note:
	<ul style="list-style-type: none"> <li>• Global environmental benefits of project.</li> <li>I. Incremental Cost Estimation based on the project logical framework.</li> <li>XVII. Describe project outputs (and related activities and costs) that result in <i>global</i> environmental benefits</li> <li>VIII. Describe project outputs (and related activities and costs) that result in joint <i>global and national</i> environmental benefits.</li> <li>XIX. Describe project outputs (and related activities and costs) that result in <i>national</i> environmental benefits.</li> <li>XX. Describe the process used to jointly estimate incremental cost with in-country project partner.</li> <li>XXI. Present the incremental cost estimate. If presented as a range, then a brief explanation of challenges and constraints and how these would be addressed by the time of CEO endorsement.</li> <li>XXII.</li> </ul>	<ul style="list-style-type: none"> <li>• pg. 9 (<i>para. 35-38</i>)</li> <li>• Table 1, pg. 17; Annex B pg. 26-28</li> <li>• pg. 17-18 (<i>para. 55-56</i>); Annex B pg. 26-28</li> <li>• Table 1, pg. 17; Annex B pg. 26-28</li> <li>• Table 1, pg. 17; Annex B pg. 26-28</li> <li>• Table 1, pg. 17; Annex B pg. 26-28</li> <li>• pg. 16-17 (<i>para. 53-54</i>); Annex B pg. 25-27</li> </ul>
I. Sustainability (including financial sustainability)	XXIV. Describe proposed approach to address factors influencing sustainability, within and/or outside the project to deal with these factors.	<ul style="list-style-type: none"> <li>• pg. 13-14 (<i>para. 39-41</i>)</li> </ul>
XXV. Replicability	Describe the proposed approach to replication, (for e.g., dissemination of lessons, training workshops, information exchange, national and regional forum, etc) (could be within project description).	<ul style="list-style-type: none"> <li>• Workshops and other forums for information exchange: <ul style="list-style-type: none"> <li>• pg. 10 (sub-activity 1.5); pg. 11 (sub-activity 2.4); pg. 13 (sub-activity 3.7 and 3.13)</li> </ul> </li> </ul>
XXVI. Stakeholder Involvement	<ul style="list-style-type: none"> <li>I. Describe how stakeholders have been involved in project development.</li> <li>I. Describe the approach for stakeholder involvement in further project development and implementation.</li> </ul>	<ul style="list-style-type: none"> <li>• pg. 14 (<i>para. 42-43</i>)</li> <li>• pg. 14 (<i>para. 44-4; 48-54</i>)</li> </ul>

	Work Program Inclusion	Reference/Note:
XXIX. Monitoring & Evaluation  XXX.	<ul style="list-style-type: none"> <li>Describe how the project design has incorporated lessons from similar projects in the past.</li> <li>Describe approach for project M&amp;E system, based on the project logical framework, including the following elements:               <ul style="list-style-type: none"> <li>Specification of indicators for objectives and outputs, including intermediate benchmarks, and means of measurement.</li> <li>Outline organizational arrangement for implementing M&amp;E.</li> </ul> </li> <li>Indicative total cost of M&amp;E (maybe reflected in total project cost).</li> </ul>	<ul style="list-style-type: none"> <li>Related research pg. 5-7 (<i>para. 19-28</i>); Annex D</li> <li>pg. 18 (<i>para. 57-60</i>)</li> <li>Annex A pg. 21-24</li> <li>pg. 18 (<i>para. 57-60</i>)</li> <li>Detailed project budget pg. 19-20</li> </ul>
<b>3. Financing</b>		
XXXI. Financing Plan	<ul style="list-style-type: none"> <li>Estimate total project cost</li> <li>Estimate contribution by financing partners.</li> <li>Propose type of financing instrument</li> </ul>	<ul style="list-style-type: none"> <li>pg. 19-20</li> </ul>
XXXII. Implementing Agency Fees	Propose IA fee	Fees are assumed to be the standard fees for Full Projects according to the new guidelines. This is not stated explicitly in the document.
XXXIII. Cost-effectiveness  XXXIV.  XXXV.	Estimate cost effectiveness, if feasible.  <ul style="list-style-type: none"> <li>Describe alternate project approaches considered and discarded.</li> </ul>	
<b>4. Institutional Coordination &amp; Support</b>		

	Work Program Inclusion	Reference/Note:
<b>IA Coordination and Support</b> Core commitments & Linkages XXXVI. XXXVII.	A. Describe how the proposed project is located within the IA's: Country/regional/global/sector programs. • GEF activities with potential influence on the proposed project (design and implementation).	• pg. 7 (para. 27-28); Annex D • pg. 7 (para. 27-28); Annex D
I. Consultation, Coordination and Collaboration between IAs, and IAs and EAs, if appropriate.	• Describe how the proposed project relates to activities of other IAs (and 4 RDBs) in the country/region. • Describe planned/agreed coordination, collaboration between IAs in project implementation.	• pg. 7 (para. 27-28); Annex D • pg. 15-16 (para. 48, 52-54)
<b>5. Response to Reviews</b>		
XXXIX. Council	Respond to Council Comments at pipeline entry.	No comments
Convention Secretariat	Respond to comments from Convention Secretariats.	No comments
GEF Secretariat	Respond to comments from GEFSEC on draft project brief.	No comments
Other IAs and 4 RDBs	Respond to comments from other IAs, 4RDBs on draft project brief.	No comments
STAP	Respond to comments by STAP at work program inclusion.	No comments
Review by expert from STAP Roster	Respond to review by expert from STAP roster.	Annex C-1 addresses the STAP reviewer's comments.