

MEMORANDUM OF UNDERSTANDING
BETWEEN
COUNCIL FOR ADVANCEMENT OF PEOPLE'S ACTION AND
RURAL TECHNOLOGY, NEW DELHI
AND
INDIAN INSTITUTE OF SCIENCE, BANGALORE

This Memorandum of Understanding made at Bangalore on this Tenth day of December 2006 **between** Council for Advancement of People's Action And Rural Technology, New Delhi (hereinafter referred to as **CAPART**) **and** Indian Institute of Science, Bangalore (hereinafter referred to as **IISc**) witnesseth as follows:

Preamble

1. The Council for Advancement of People's Action and Rural Technology (CAPART) was established in 1986 with a mandate to encourage, promote and assist voluntary action and inject new technological inputs in the implementation of Rural Development Projects with particular emphasis on people living below the poverty line, SC/ST and other disadvantaged sections of the society for improving the quality of life of rural people.
2. CAPART's mandate as per its Memorandum of Association and Rules is to strengthen existing institutions of research and development and also to set up new institutions for conducting need based studies, survey, adaptive research and development, demonstration, dissemination and evolution of appropriate technologies among the end users in the rural areas.
3. The Indian Institute of Science (IISc) founded by J N Tata in 1909, the oldest of the premier R&D Institutions is an autonomous Institute of Higher Learning functioning the Ministry of Human resource Development(MHRD) of Government of India. **Centre for Sustainable Technologies (CST)**, earlier known as **ASTRA** (*Application of Science and Technology to Rural Areas*), of the Indian Institute of Science is dedicated to bridging the divide between Science and Technology and Society, particularly rural. CST is an inter-disciplinary centre aimed at developing technologies to improve the quality of life of rural people, particularly poor with special emphasis on the needs of women and children. ASTRA was initiated at Indian Institute of Science to develop alternative low-cost, energy efficient and environmentally sound technologies to promote socio-economic upliftment in rural areas, focusing on the needs of the neediest, through appropriate S&T. The role of S&T is as a catalyst to promote rural development and improve the quality of life. CST's faculty strength comprises 5 core faculty and 10 associate faculty from main stream Engineering and Science Departments actively involved

in R&D. CST is specialized in technology generation and demonstration, technical assistance, technology transfer, information, training, capacity building, and networking.

4. **Current R & D Activities of CST**

The main activities of CST are scientific research, technology development focused on rural areas, technology demonstration, technology support and transfer, training, information dissemination and networking. CST has a large number of innovations in the fields of wood burning devices (cook stoves and agro-products driers), alternate building technologies (for rural locations as well as disaster impacted regions), biogas (biomass fermenting and urban municipal waste treatment), biomass gasifiers of different capacities (for electrical and thermal applications), water treatment technologies (Fluoride and bacterial contamination), nursery practices for forest trees and medicinal plants, S&T packages for meeting rural energy needs in a sustainable way, etc. Salient examples are as follows:

i) Alternative building technologies:

CST has been working on various alternate building technologies; low cost, energy efficient, local resource-based and employment oriented. CST has developed over the years nearly 20 alternative technologies for roofs, walls, foundations and construction materials. More than 7000 houses have so far incorporated CST innovations. This was followed by recent on-going work on developing alternate building designs for Tsunami affected coastal areas.

ii) Sanitation for Coastal areas:

Providing sanitation for coastal areas is always a challenge due to lack of fresh water, close proximity to the sea, high water table, deep sandy soils, etc. CST has developed innovative toilet designs, both for individual households and household clusters suitable for coastal areas in Tsunami affected villages in Tamilnadu.

iii) Fluoride water treatment:

High levels of fluoride in drinking water (>1.5 ppm) leads to Fluorosis a crippling bones disease. CST has developed a new method to treat fluoride-contaminated water that relies on precipitation, sedimentation, and filtration technique employing non-toxic magnesium oxide. This method is cost-effective and simple for use in remote rural areas.

iv) Agro-products drier:

Agro-products drier developed at CST is being modified for drying different agro-products. These driers have been successfully disseminated

by many institutions in Western ghats region for drying Cardamom, fruits, vegetables, arecanut, fish, etc.

v) Plug flow and solid-state stratified bed digester biogas plants:

CST has recently developed Plug flow and solid-state stratified bed digester biogas designs to digest biomass residues such as weeds, forest leaf litter, unwanted crop residue and urban solid-waste. Apart from waste treatment, biogas is also generated for use as an alternative sustainable energy source.

vi) Economic uses of biogas and sludge:

Research and demonstration programmes have been conducted to exploit the potential options for economic gain from using biogas as well as digested biomass and digested liquid; using biogas as a fumigant for protection of food grains and use of digested material as vermi-compost medium, cultivation of mushroom etc.

vii) Biomass gasifiers:

Several designs of capacity 20 kW to 1000 kW have been designed to combust several types of biomass; tree wood, crop and fruit residue, plantation residue, etc. The recent development included developing gas-engines, which runs only on producer gas. Thermal gasifiers are also developed for process heat applications in many industries. These technologies are being disseminated in different parts of India for village electrification.

viii) Developing nursery practices for forest species:

Sustainable nursery practices, namely reproductive and vegetative techniques were developed for nearly 100 tree species, including species which are not normally included in afforestation programmes.

ix) Medicinal plants promotion programme:

Under a project from Medicinal Plants Board, CST has been promoting numerous medicinal plants, through demonstration, training and awareness programmes.

x) Training programmes on efficient wood burning and building technologies:

In the past 3 years several training programmes were conducted for popularizing and providing skills for construction, use and maintenance of efficient smokeless cook-stoves, agro-products driers, large institutional wood stoves and alternate building technologies.

5. Major Strengths of CST

- - **Technology generation:** The main strength of CST is the best scientific and technological capacity to address S&T problems of rural areas, natural resource management, small -scale industries and households with special emphasis on the requirements of women and children.
- - **Technology transfer:** CST has wide experience in transferring a large number of technologies, commercial (gasifiers and agro-products driers) as well as non-commercial (cook stoves and mud blocks) technologies to Govt agencies, NGOs, entrepreneurs and even individual users. Technology transfer has occurred through formal or informal training programmes and transfer of designs through formal agreements with different types of agencies.
- - **Village research centre:** CST has a village research and technology demonstration centre about 100 kms from Bangalore with basic infrastructure needed for technology demonstration, organizing training programmes and exhibitions, etc.
- - **Generation of information on technologies:** CST has initiated a process to assemble information on selected rural technologies for different stakeholders.

6. Areas of Technical Assistance and Collaboration

CST will provide technical assistance to CAPART and the organizations supported by CAPART in the following areas.

- a. a. **Water and sanitation:** Sustainable and quality water supply, water treatment technology packages addressing multiple contaminants
- b. b. **Household energy efficiency and alternate energy technologies:** Biomass gasifiers, bio-methanation, waste management and energy generation, Improved wood burning devices, cook-stoves, etc.
- c. c. **Sustainable building technologies:** Transfer of energy conservation, environment protection, local employment generation and cost reduction
- d. d. **Information system for Village Knowledge Centres and Panchayats:** Information systems for rural areas through content development and communication systems on rural science and technological issues, to transfer technologies as well as to help Village institutions (such as Panchayats, Water use groups, Self Help Groups) in decision making on natural resource management. Establishment of distant education and interactive communication facility between the institute and village panchayat.

- e. e. **Agro-processing:** Standardizing codes/protocols for driers for different agro-products, commercial products development from agro-processing, quality control and packaging.
 - f. f. **Technical Support :** CST will act as the Chief Technical Adviser to CAPART for establishment and technical management of the Centre for Poverty Alleviation and Rural Technology (CPART).
- 7 A time bound detailed programme of activities and projects with specific targets and deliverable within the proposed area of cooperation between CAPART and Centre for Sustainable Technologies (IISc) will be approved by a Committee constituted under the Chairmanship of the DG, CAPART. The other members would be
- ❖ ❖ Chairman, Centre for Sustainable Technologies, (CST, IISc, Bangalore)
 - ❖ ❖ Representative of the Department of Rural Development (MoRD)
 - ❖ ❖ Representative of the Department of Drinking Water Supply(MoRD)
 - ❖ ❖ 4-6 NGOs/TRCs of CAPART
 - ❖ ❖ DDG, CAPART (Member Convenor)

The selection of NGOs/TRCs will be made by DG, CAPART in consultation with Director, CST. This Committee will meet once in a quarter.

8. **Village Technology Demonstration, Dissemination, Information Generation and Networking Activities**

CST will conduct the following activities and may also take up Research Projects based on the needs emerging from the grassroots as identified by the NGOs/departments/users' group. CST will also provide the following services to CAPART or the organizations supported by it.

Technology up-gradation, adaptation and standardization for different regions:

CST would like to adapt the currently available technologies developed at the institute to different regions as well as develop new designs in response to demand or requests on ***water, sanitation, housing, communication, rural energy***, etc. related to rural problems. CST would also develop standardization procedures for selected rural technologies and evaluate some of the existing technologies.

Multi-location field-testing of various CST technologies and demonstration of technologies in different locations:

Currently field-testing of technologies is done largely by the scientists and technologists of CST at the IISc field research station. We plan to field test the technologies developed, in multiple locations with differing socio-economic or climatic conditions. Currently field demonstration of many of the technologies is limited to one or two locations. With improved networking and collaboration, it is proposed to undertake technology demonstration and information dissemination in several locations in collaboration with Engineering colleges, NGOs and government agencies.

Networking with developmental agencies and NGOs:

CST would initiate and enhance networking with government agencies, NGOs, entrepreneurs and research institutions. This network would be involved in creating awareness, technology transfer, training technology managers, field-testing of alternative technologies, monitoring of technology performance and dissemination and/or marketing of technologies.

Technology information and resource centre and distant interactive-education facility:

CST will set up a technology information resource centre on alternative or improved technologies in selected areas such as; water, rural energy, buildings, sanitation, bio-energy technologies, including efficient wood burning devices. This centre would provide information to different stakeholders on the various designs, capacities, costs, features, suppliers, financing institutions, government policies, etc. The centre would also have an on-line query addressing and response portal for which a dedicated web-server and other communication facilities would be setup. This information portal would also encourage user-groups for sustained interaction.

Panchayat Knowledge and information on Natural resources and technologies:

Conservation of natural resources and sustainable use is fundamental for sustainable development, particularly for sustaining water resources, land productivity, biodiversity, etc at the village level. CST plans to develop natural resource monitoring and management packages suited to panchayats/villages.

Training and Capacity building:

CST would undertake periodic training and capacity building programmes to NGOs, Govt. Agencies and entrepreneurs on selected technologies such as alternate building technologies, rural energy, water and sanitation and natural resource management.

In witness whereof the parties hereto set their hands and signature on the day, month and year mentioned above.

FOR CAPART, New Delhi

FOR IISc, Bangalore

Jahshmi Rasad.

[Signature]

(DEPUTY DIRECTOR GENERAL)

(REGISTRAR)

Witness:

1.

2.

Witness:

1.

2.

Place: Bangalore

Date: 10th December 2006

Annexure-1

Budget Support for year 1 and 3 years (Rs. In lakhs)

<i>Details</i>	<i>Budget for year 1</i>		Budget for 3 years (Recurring & Non-recurring) Rs. in lakhs	<i>Justification</i>
	Non-recurring Expenditure Rs. in lakhs	Recurring Expenditure Rs. in lakhs		
Project Scientific Officers – 2 -Planning, coordination and monitoring		Rs.6.0	Rs.18.0	<ul style="list-style-type: none"> - IISc doesn't provide full time senior staff for technology transfer, capacity building activities - Fulltime scientist/technologists are needed for sustained planning, coordination & implementation of programmes - Post-Doc level staff needed to understand

				technologies, institutional requirements and capacity building needs of rural areas and NGOs,
Project Engineers – 2 <i>-Field testing, demonstration, capacity building, training etc</i>		Rs.3.6	Rs.10.8	<ul style="list-style-type: none"> - Project engineers are required to assist Scientific Officers in implementation of activities such as training & field-testing - Engineers are needed to understand the field situations and to adapt the technologies and provide field level training, advice and monitoring
Field / Laboratory Assistants – 2 <i>-Field and Lab assistance</i>		Rs.2.4	Rs.7.2	<ul style="list-style-type: none"> - Field or laboratory assistants are needed to actually install, commission and maintain technologies in the field. - To assist in field testing the technologies
Technology upgradation or adaptation, design development and standardization;	Rs.5.0	Rs.3.0	Rs.14.0	<ul style="list-style-type: none"> - Laboratory equipment, chemicals, glassware, etc. - Water, soil & waste testing instruments - Fabrication, testing
Technologies to be field tested & demonstrated in different locations		Rs.5.0	Rs.15.0	<ul style="list-style-type: none"> - Hardware for the initial systems (water treatment, bioenergy, waste treatment, sanitation, etc) for field testing and demonstration. - Installation, demonstration, operating and maintenance & Travel.
Development of database on selected technologies	Rs.3.0	Rs.1.0	Rs.6.0	<ul style="list-style-type: none"> - Workstations, publications of leaflets, publicity material, staff
Regional and national level		Rs.2.0	Rs. 6.0	<ul style="list-style-type: none"> - Workshop organization, training/study

networking for technology transfer				material, communication - - Travel
Administrative Cost (10%)	Rs.0.8	Rs.2.3	Rs.7.7	
Total	Rs.8.8	Rs.25.30	Rs.84.70	
Total Budget for 1 year		Rs.34.10		
Total Budget for 3 yeras		Rs.84.70		

- * The resource persons hired under the project would be co-terminus with the project and CAPART would not be bearing the cost towards them beyond the project period.

Existing Full Time Research and Development Staff

<i>No.</i>	<i>Name and Designation</i>	<i>Highest Qualification</i>	<i>Specialization</i>
1	Prof. N. H. Ravindranth <i>CHAIRMAN</i>	PhD (IITB)	Natural resource management, information for panchayats, forestry
2	Prof. B.N. Raghunandan	Ph.D (IISc)	Space technology application for rural development and natural resource management
3	Prof. M. Sudhakar Rao	Ph.D (Poona Uni)	Water quality and Chemistry
4	Prof. B.V.Venkatarama Reddy	Ph.D (IISc).	Low cost and efficient building technologies
5	Dr. Monto Mani	PhD (IITM)	Sustainable Habitats, integrated water & sanitation
6	Dr. H. N. Chanakya	PhD (UAS)	Biogas, waste treatment and management
7	Dr. S. Dasappa	PhD (IISc)	Biomass combustion and gasification
8	Dr. P. Balachandra	PhD (IISc)	Rural energy and energy efficiency
9	Dr. T.V.Ramachandra	Ph.D (IISc)	Rural spatial planning, information system, GIS application,
10	Mr. H. I. Somashekar	MSc Ag (UAS)	Training programmes, technology demonstration

Faculty from main stream Engineering and Science Departments/Centres of the Institute will also participate, whenever required, in technology generation and

design modification

Contribution of Indian Institute of Science

1. IISc Faculty (Professors and Scientists) time will be provided to the project activities as the IISc contribution. About 10 faculty members are expected to participate in the proposed project.
2. Infrastructure facility; IISc will provide office, computing, laboratory and library facilities, workshop facility etc., for the project at no cost to the proposed project.