



project surya  
Fighting Climate Change Now

**C** CLIMATE  
CREDIT  
**P** PILOT  
PROJECT

C2P2

## Implementation Plan

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Core C2P2 Institutions



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## Synopsis

Project Surya ([www.projectsurya.org](http://www.projectsurya.org)) is initiating a major pilot project to explore if rewarding women directly with funds from carbon markets for using improved stoves and solar lighting will significantly enhance adoption. This ambitious initiative, called the Climate Credit Pilot Project, or C2P2, will be launched on April 15, 2013 in India. The core institutions of Project Surya are the University of California at San Diego, The Energy and Resources Institute (TERI) at New Delhi, and Nexleaf Analytics at Los Angeles, with over a dozen collaborating institutions around the world.

## What is new about C2P2?

- Rewarding women directly with funds produced by climate credits
- Expanding estimates of carbon offsets to include, in addition to CO<sub>2</sub> mitigation, the Short-Lived Climate Pollutants (black carbon, methane and ozone)

C2P2<sup>1</sup> will be initiated in three locations in the Indo-Gangetic Plains (Varanasi and Unnao districts in Uttar Pradesh state and Purnea district in Bihar state) and in one Himalayan region. The pilot phase will last for 24 months and will include 2,000 homes, and participation will be purely voluntary.

In order to launch C2P2 immediately, Project Surya has created the Surya Climate Mitigation Fund at the Scripps Institution of Oceanography at the University of California at San Diego and TERI, New Delhi. This fund will be used to reward customers who purchase and use improved biomass cookstoves. The amount of the monthly reward will be based on usage of the improved stoves and the value of the reductions in emissions of carbon dioxide (CO<sub>2</sub>) and short-lived climate pollutants (SLCPs), also called climate credits. Valuation of climate credits will be based on estimates by a voluntary carbon registry. Funds from the Surya Climate Mitigation Fund will be deposited in each participant's bank account through participating banks.

In order to build a sustainable model for transferring and monitoring funds that are part of C2P2, participants will be organized into self-help-groups (SHGs) of 5 to 20 households. The SHGs will obtain a loan (for those who need it) from a government approved bank participating in the pilot for each individual to purchase a cook stove. Loans will be repaid in part from funds received from the Surya Climate Mitigation Fund. The process will be guided by the Village Oversight Committee consisting of village leaders, leaders of self help groups and NGOs.

Rigorous monitoring and evaluation is core to C2P2. A Village Oversight Committee of participating village panchayat (governing body) chiefs and other community leaders will be

<sup>1</sup> See Ramanathan, Rehman and Ramanathan (2012) for the Concept Note on C2P2 ([www.projectsurya.org](http://www.projectsurya.org))



formed to motivate the participants to adopt the new cookstove, guide the administration of the project, and to ensure fidelity of reporting by participants. Only stoves that meet the host country (India) criteria for thermal efficiency (>35% for forced draft stoves), particulate (<=150 gm/MJ delivered), and carbon monoxide (<=5 gm/MJ delivered) emissions; and Surya's criteria for black carbon (BC) emissions, will be included in C2P2. CO<sub>2</sub> mitigation will be estimated using internationally accepted protocols. Mitigation of short-lived climate pollutants per stove will be estimated using individual data on hours of usage, energy efficiency, fuel use, BC and carbon monoxide reductions compared with traditional mud stoves and using local data for environmental parameters such as daylight hours, cloud fractions, and vertical profiles of BC, among others. Cell phone based data collection and thermal sensors placed in stoves will figure prominently in the evaluation.

A major focus will be to develop verifiable and internationally acceptable protocols for SLCPs mitigation and to register Surya-C2P2 in open voluntary carbon registries in the USA and European Union by the middle of Year 1. An internationally recognized and independent voluntary carbon registry and accreditor/auditor (SCS global services) will be brought in to ensure transparency and legitimacy of the entire process. In addition, an international group of renowned academics and social entrepreneurs will be brought in as part of an International Oversight Committee to guide the C2P2 team.

C2P2 is a collaborative project spearheaded by The Energy and Resources Institute (TERI) and TERI University at New Delhi, India; the University of California at San Diego at La Jolla, California; and NexLeaf Analytics of Los Angeles, California. C2P2 will be dovetailed with ongoing cook stove activities of the Government of India and the India program of the Department for International Development (DFID), UK Government at TERI. Initial funding for C2P2 has been provided by TERI, the Scripps Institution of Oceanography at the University of California at San Diego, United Nations Environment Program (UNEP), Qualcomm, US National Science Foundation EAGER Program, and the Alderson and Vetlesen foundations. C2P2 has cooperative agreements with Regional Rural Banks in India and Voluntary Carbon Market accreditation institutions in USA.



## Background

About 3 billion out of the world's 7 billion population have no access to modern cooking fuels. They depend mostly on direct burning of solid biomass for cooking and heating. The particles and gaseous pollutants in the smoke from these rudimentary stoves cause about 4 million deaths annually, destroy millions of tonnes of crops and also lead to global warming and large scale regional climate change. Improved stoves, which significantly reduce smoke indoors and outdoors, are currently too expensive. Improved solid fuel, biogas and solar stoves are available on the market, but typically range from USD 40 to USD 70. This is not affordable for the more than 2 billion people living under USD 2 a day, who rely on rudimentary cooking methods. Making matters worse, once distribution, maintenance and fuel supply are taken into account, the actual cost of the stoves increases further. A new approach is needed to solve this age-old problem.



Use of firewood in cook stoves releases carbon dioxide (CO<sub>2</sub>), the major global warming gas. The deforestation also leads to runoff of rain water and soil erosion. In addition, cook stoves and kerosene lamps also release SLCPs which have warming potential larger than that of CO<sub>2</sub>. Current climate credit markets such as carbon credits focus mainly on CO<sub>2</sub> mitigation. Why not have these markets account for mitigation of all of the warming pollutants? The potential for each improved cook stove to mitigate climate change can be much larger when taking SLCPs into account. Inclusion of SLCPs in addition to CO<sub>2</sub> in the evaluation of carbon credits can potentially subsidize the purchase and maintenance of the improved stoves and lamps and thus improve the lives of women and also save millions of lives each year. It is for such immense co-benefits that climate credits for cook stoves is referred to as Charismatic Climate Credits.

A growing body of scientific evidence (Ramanathan and Feng, 2008; Wallack and Ramanathan, 2009; Molina et al, 2009; Jacobson, 2010; Ramanathan and Xu, 2010; UNEP/WMO, 2011) supports a climate mitigation solution that includes SLCPs. There is global interest for such a solution, as indicated by initiatives like the Climate and Clean Air Coalition by the United Nations Environment Program and the Global Alliance for Clean Cookstoves by the United Nations Foundation. SLCPs cause 2 to 4 million deaths annually, crop damages worth tens of billions of dollars, the melting of glaciers in the Himalayas/Tibetan region, and disruption of monsoon rainfalls. Project Surya has been at the forefront of this work, having completed pilot projects in India and Kenya on the scientific and technological aspects of cook stoves, human exposure and



climate warming potentials of SLCPs (Rehman et al, 2010; Ramanathan et al, 2011; Praveen et al, 2012). Surya has identified (Kar et al, 2012) improved biomass stove models that significantly reduce emissions of CO<sub>2</sub> and SLCPs.

- C2P2 will use field data to develop climate credits based on avoided-CO<sub>2</sub> emissions and for reductions in SLCPs. Stove use, fuel consumption and emissions will be documented using wireless technologies and cell phones.
- C2P2 will distribute the funds from climate credits directly to women using wireless cell phone technologies or through local rural banks.

## Scope and Objectives

The primary focus is to explore and demonstrate the efficacy of climate credit for incentivizing the stove uptake and usage. The specific objectives are as follows:

- Develop and field-test the mechanisms for linking climate credit with bank credit to users
- Evaluate the accelerated uptake based on climate credit incentives
- Evaluate proper usage and maintenance due to the carbon incentives
- Develop and field-test a functional protocol for monitoring the usage and calculating the avoided CO<sub>2</sub> emissions and reduction in SLCPs

## Study Approach

C2P2 will be started in up to 2,000 homes located in the Indo-Gangetic Plains and the Himalayan regions of India. Participation will be purely voluntary. The project will connect women's self-help groups with rural banks for getting loans and opening bank accounts. The climate credits will be converted to currency on a monthly basis and distributed to participants by transferring money directly to their bank accounts. The approach would involve evolving a mechanism for bank credit and taking care of a part/whole of the EMIs through the converted carbon credits. Thus the focus would be on evolving a value chain linking end users, rural banks and carbon incentives provisioning.

The full details of the pilot end-to-end trial that starts with purchase of the stove, deployment of sensor and cellphones for



measurements, and ends with transfer of funds to the user are provided in a supplement. Based on the results and experience gained from this pilot study, a framework for upscaling C2P2 to one million households will be developed.

## Methodology for Estimating and Validating Climate Credits

Surya Climate Credits will be gained by following two independent pathways—the first is the traditional approach of getting credits for mitigating CO<sub>2</sub> emissions by reducing consumption of firewood, and the second is for mitigating non-CO<sub>2</sub> SLCs (such as black carbon and methane). Estimates for the net climate credits that may be gained by a typical user of an improved cookstove in one year are summarized in the following table, with details (equations, estimates, and tabulated calculations) provided in accompanying supplemental material. To address the uncertainty associated with the warming potential of black carbon, we have used three literature scenarios—those described by Bond et al. (2007), Ramanathan and Carmichael (2008), and Jacobson (2010); and two different time horizons: first, GWP100 as used by the IPCC; and also 37 years, the projected time horizon for a +2K global average temperature change. The monetary value of a climate credit is based on a conservative value of USD 8, which is lower than the average value of USD 13 earned by cook stove projects in the voluntary markets in 2011.

## Preliminary Estimate of Anticipated Annual Climate Credits to Each Participant

Warming Agent for which Climate Credits are Accumulated	Time Horizon		
	GWP37	GWP100	
CO <sub>2</sub> from direct reductions in fuel use	\$16	\$16	
GHG (Methane) and Ozone precursors	\$2	\$2	
Black Carbon; Different forcing scenarios	Ramanathan and Carmichael (2008)	\$19	\$9
	Jacobson (2010)	\$19	\$11
	Bond et al. (2007)	\$12	\$6
<b>Total</b>	<b>\$30–\$37</b>	<b>\$24–\$29</b>	



## Validation and Accreditation

We will bring in independent professionals to evaluate the design, the protocols and the outcome. C2P2's data protocols and algorithms will be provided to the carbon registries for validation and accreditation. We are working with an accreditation institution and a carbon registry to enable this accreditation.



## Stove Use Tracking and Dissemination of Funds

The implementation of C2P2 revolves around the women who would be both the primary users and the direct beneficiaries of this project. The Surya Climate Credit Implementation Model (SC2IM), illustrated here as a schematic, demonstrates the execution plan and strategy to manage the Surya Climate Change Mitigation Fund (SC2MF), the Technology Dissemination System and the Climate Credit Tracking System.

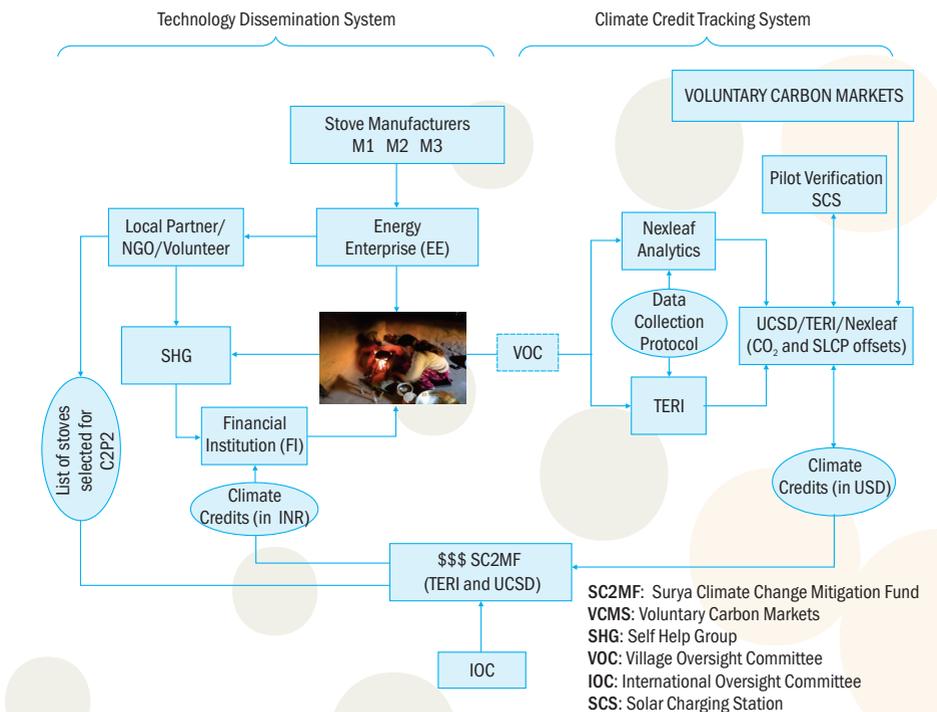


Figure 1: Schematic diagram of Surya Climate Credit Implementation Model



The step-by-step implementation plan, including descriptions of cash flow, information flow, and financial tracking, is provided in the supplemental material. In addition to the participating organizations, Village Oversight Committees (VOCs) at the regional scale and an International Oversight Committee (IOC) will be set up to ensure compliance and transparency.

## Energy Enterprise and Last Mile Delivery

As there are no distribution channels of forced draft cook stove manufacturers at the proposed C2P2 site, TERI has taken the lead in the creation of local energy enterprises (EEs) that will serve as “last mile” sales and service outlets for the cook stoves deployed under C2P2. TERI builds

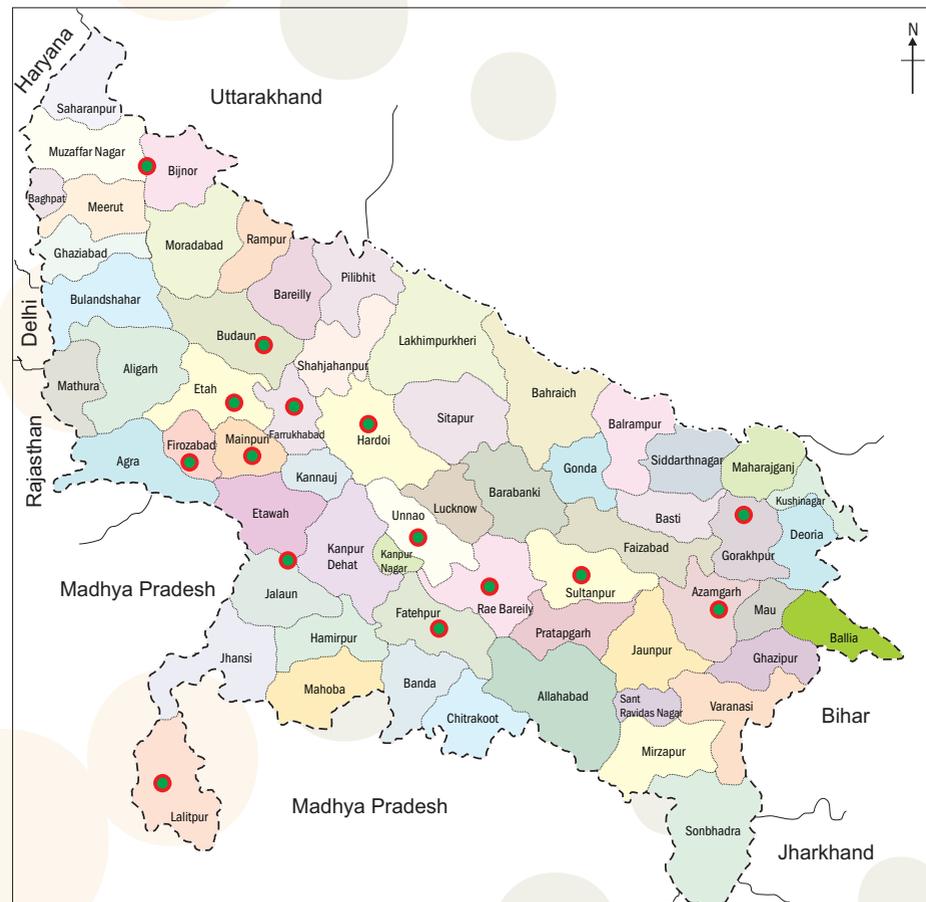


Figure 2: TERI supported Energy Enterprise presence—Uttar Pradesh



capacity and facilitates linkage with manufacturers to local entrepreneurial youth who invested in shop space, interiors and inventory for these physical retail sales and service outlets for clean energy technologies, including cook stoves, under the TERI-DFID clean energy partnership. An EE is selected based on its past business experience in local markets, credit worthiness, conduct in society and recommendations from eminent/responsible citizens in that area.

The EE serves two critical purposes that often hinder scale-up of stove usage—post-dissemination maintenance and service, and availability of user finance. It is often not viable for manufacturers to incur travel/salary expenses to maintain their service network in rural areas (unless assured of minimum customer density), and prospective customers are not willing to purchase stoves till they are assured of prompt after-sales service. Further, non-usage of a product due to service issues can lead to non-payment of loan instalments, thereby discouraging stove financing. This energy enterprise model is expected to be financially sustainable in the long run as entrepreneurs operate on margins (instead of salary/project support) and earn revenue from sales and service of multiple clean energy products. Presence of a local service network also encourages stove finance as banks are assured of service during the credit period.

The EE’s role in C2P2 would be to ensure the sales and after sales service of the disseminated cook stoves. The EE shall install the cook stove in households already approved by FIs or individual buyers (the NGO partner will coordinate the process) and provide initial training to the end users. The EEs will also coordinate with the manufacturer and other elements in the supply chain and manage the supply and demand in their service area. Establishment and inauguration of C2P2 linked energy enterprises in well-attended public functions also generate local interest/queries related to clean energy technologies and are often covered by local/national media.

TERI aims to facilitate the establishment of 500 such energy enterprises (51 currently operational across six states) by 2015; selected and established under the TERI-DFID programme for clean energy access in rural areas that will sell clean cooking technologies and provide prompt and reliable post-sales service at fair price. Manufacturers of all quality clean energy products can tap into this network of TERI supported retail outlets to introduce/sell/ provide post-sales service for their products.



## Facilitating Access to Credit in C2P2 Areas

TERI has tied up with two government owned regional rural banks to facilitate end user finance to customers for purchase of improved cook stoves. Facilities like interest buy down, assistance with documentation, and awareness generation campaigns in the banking community are being offered so that customers are able to purchase expensive improved cook stoves through financing.

## Glimpses...



Figure 3:  
Community  
participation during  
demonstration in  
Uttar Pradesh

## Acknowledgements

TERI gratefully acknowledges the support provided by the Kashi Gomti Samyut Gramin Bank for taking forward the C2P2 agenda and facilitating loans to a large number of rural households in eastern Uttar Pradesh in India. We are also thankful to the Vetlesen and Alderson foundation for the initial support provided for setting up of the C2P2 fund.

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