

# PARTNERSHIP FOR CLEAN INDOOR AIR (PCIA)



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This quarterly newsletter reports on the activities of the Partnership for Clean Indoor Air (PCIA) and its Partners to improve health, livelihood and quality of life by reducing exposure to indoor air pollution, primarily among women and children, from household energy use. More than 500 Partner organizations are working together to increase the use of affordable, reliable, clean, efficient and safe home cooking and heating practices. Visit [www.pciaonline.org](http://www.pciaonline.org) to join!

We are pleased to present this 28<sup>th</sup> issue of the PCIA Bulletin on the topic of biogas, a fuel that is now widely promoted and used to decrease fuel wood use and improve indoor air quality for families around the world. In this Bulletin you'll hear from programs with decades of experience promoting biogas stoves and fuel in Africa, Asia and Latin America at the household, community, national and regional levels. PCIA Partners reported manufacturing and/or selling over 100,000 biogas digesters in 2009 and 130,000 in 2010.

For those of you who are unfamiliar with this technology, here are some biogas basics: biogas is a methane-rich gas produced when biodegradable organic material including agricultural residue or dung (can include human feces) is broken down by bacteria in the absence of oxygen, known as anaerobic digestion. It burns cleanly and easily in LPG-type conventional low-pressure gas burners, and can even be used for lighting with special lamps.

Biogas is formed in biodigesters. After the biogas is produced, what remains can be used as fertilizer. Biodigesters come in many forms, from inexpensive plastic bag models to floating and fixed-dome models. Household-level digesters are available, and are a good fit for families that have several cows or pigs, as quantities of human excreta produced are not typically adequate. Some specialized household biodigesters exist that rely entirely on agricultural waste starches (e.g., waste grains, fruits, leaves and kitchen waste).

Biodigesters are most appropriate for communities with significant agriculture and animal husbandry. In locations

where sanitation services are lacking, biogas systems connected to latrines can provide an important additional service. In general, cooking with biogas has been more widely accepted in Asia than in Africa or Latin America, although as you'll soon read, PCIA Partners are implementing successful programs in all three regions.

Several common themes emerge throughout the following articles, including the importance of partnerships, education/training, innovative solutions to financing, and biogas's unique ability to sell itself through income savings and additional benefits to consumers (e.g. production of organic fertilizer). We encourage biogas-promoting Partners to seek out biogas networks in your region to see how you can get involved.

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## FEATURE ARTICLES - Innovative Strategies for Overcoming Barriers to Household Biogas

### Promotion of Household Biodigesters in Rural Southwest China

Olivier Lefebvre, Initiative Développement,  
[o.lefebvre@id-ong.org](mailto:o.lefebvre@id-ong.org)  
<http://www.pciaonline.org/id>

Initiative Développement (ID) has been working in China since 2002 and promoting biogas as an alternative decentralized energy source since 2005. Biodigester technology is well developed in China. Thanks to the efforts of the central government to drive the market, an estimated 40 million units were built by the end of 2010 and an additional 4 million more are built every year. National standards have also been developed to ensure quality, creating great incentive for business development as hundreds of companies are in the market of fittings, spare parts, and various innovative technologies such as glass-fibers, PVC digesters, and flexible bags.

In this context how can ID position itself as an NGO committed to poor remote households? The answer comes from the original way of financing our projects: carbon offsets. Indeed biogas technology reduces methane emission by improving animal manure management and reduces carbon dioxide through the displacement of fossil fuel or from non-renewable biomass. As the project has to be monitored over a minimum duration of 10 years, during which only verified emission reductions will be awarded, this way of finance is very much results-oriented giving us great incentive to set up a project oriented towards quality and the long term use of the infrastructure. This pushed us to develop extensive training sessions for households, with refresher



*Technician building tank: coating inside the biodigester with a special additive to ensure the gas tightness of the tank*

sessions on a periodic basis, to very closely monitor the quality of the construction and to put in place a maintenance system to diagnose and repair any failures that might happen during the 10 years following the construction.



*Training by ID staff on basic security of biodigester maintenance and operation*

The trainings are split into three small group sessions of 15 households each. Every session takes place on site with an emphasis on concrete demonstration rather than theoretical knowledge. The first session, scheduled before the construction, focuses on the construction itself to guarantee good quality building, explaining the construction process from the digging of the hole, to the use of good materials. The second session takes place after the construction of the biodigester and explains the standards for the outhouse construction, how to do the initial loading of the biodigester and how to install the fittings (water trap, pipes, filter, stove, rice cookers, lamp). The third session takes place after the biogas is produced and explains the safety measures, the daily operation, and general hygiene practices.

To ensure the quality of the construction, we work only with certified masons whose specialty is to build biodigesters. Each unit is independently checked and the masons have to insure their work with a 2 year warranty during which they repair the biodigesters for free.

For long term maintenance, we initially developed a

centralized system with an annual check from ID staff and then send a technician for repairs. We also had a hotline to repair problems as soon as they happen. However, since the number of biogas tanks built by ID kept on growing and to have a more sustainable and locally based process, we later decided to opt for a more decentralized system by setting up local service centers in each of the areas of the project. The centers, run by specialized technicians, are equipped with appropriate tools such as diagnostic tools and bio-slurry pumps. After an experimental run of this system with 300 units, ID is now extending it to the whole project (2500 units).

Meanwhile, ID was one of the first organizations in the world to register and issue Voluntary Emission Reductions (carbon credits) under the Gold Standard. All related project documents for ID's issued VER credits can be

found on [the Gold Standard Registry](#). Thanks to the success of these pilot projects and to the support of the French Development Agency and the French Global Environment Facility, a replication of these good practices on a much bigger scale was made possible. We are using the same financial mechanism to promote the improvement of management for projects implemented directly by the government. In Yunnan province, 24,000 biodigesters are being implemented following the same principles where the carbon revenue will be used to improve the training and the long term maintenance whereas, in Sichuan, around 800,000 biodigesters are being implemented. The carbon documentation is being written now whereas the first constructions will begin in September. ID is thrilled to see its pilot project replicated on such a scale and is ready to work on these new challenges!

### Lessons Learned from the IRRi Mexico Biogas Program

Alexander Eaton, International Renewable Resources Institute, [alex@irrimexico.org](mailto:alex@irrimexico.org)  
<http://www.pciaonline.org/IRRI>

"This biodigester has caused me nothing but problems," exclaimed Jesus Castillo in a recent demonstration of his Biobolsa biodigester producing biogas from the waste of his eight dairy cows, "with nearly unlimited hot water my daughters are showering three times per day and my neighbors want to come over and cook on our biogas stove!" His sarcasm was not lost on the crowd of neighbors and farmers from nearby communities who attended the demonstration; it was obvious that he is proud to have been one of the first people in his community to have a biodigester.

This type of event not only allows Jesus to try out some manure jokes as a way to break the ice with the group, but also forms the backbone of the Mexico Biogas Program. By providing a space where farmers can see and touch a functioning system, hear another producer share his/her experience, and have a local technician offer the installation of a system together with a micro-loan, we are overcoming the most substantial barriers of biodigester development all at the same time.

It starts with a reliable technology—Biobolsa is a highly durable geomembrane digester—but this is just the start. Sistema Biobolsa is more than merely a product: it is a



*Biogas market - Mexico*

program that includes education, capacity building and follow-up that promotes Biobolsa digesters and today is active in ten Mexican states, with projects in Nicaragua, Costa Rica, Haiti, and Honduras. Below are some of the lessons learned from IRRi's 7 years of biogas development in the region:

**Soft Touch:** The technology itself must be reliable, accessible, efficient and appropriate- essential characteristics of a successful program. However, a successful program must also be designed specifically for each population at the community and household level. It must seek to empower local actors and create long-term local capacity. It must be first and foremost an educational campaign, building and disseminating knowledge with built-in feedback mechanisms that can quickly incorporate local lessons into the curriculum.





Cooking with biogas - IRRI Mexican Biogas Program

**Let the People Choose:** Many people ask how we choose our end users: we don't. Our program is oriented to take advantage of the market, not because we are opposed to state funding, but because we have learned that if *the people choose* to have a Biobolsa, and commit to purchasing one, then the likelihood that it will be adopted and maintained is higher. The responsibility of the program is to demonstrate the benefits and eliminate the barriers that are inhibiting families from choosing to have a digester.

**Charge it:** Biogas technology is ideal for micro-financing programs because it begins producing economic benefits during the loan period, thus building capacity to pay off the loan and financing long-term economic sustainability within communities. The up-front cost of the system is a significant barrier, not the life cycle cost to benefit ratio. A 12-24 month loan term for Biobolsas will usually leave the user cash positive during the loan period (e.g. payments are lower than financial benefits). After the loan is paid off the economic benefits can then be converted into savings.

**Build an Army:** The participation of government agencies, local cooperatives, finance institutions, NGOs and private enterprise is key to our success. We seek out small businesses and extensionists that work with rural populations to train them how to promote and disseminate the technology. Most importantly, we ensure that purchasers become promoters.

**One size does not fit all:** The strength of small farmers is their ability to adapt to the local conditions, and so should a biodigester program adapt to local agricultural conditions. Understand how to maximize the benefits of the program relative to the problems and priorities of the local community and of each household.

**Sell the whole enchilada:** Biogas programs often start with renewable energy and clean air goals (as ours did), but those goals are not enough to guarantee full adoption of the system. Only through strong promotion of the other key benefits, notably organic fertilizer production, will the technology achieve high adoption rates. The digester cannot be sold as an energy production device alone when it really needs to be intimately integrated into the household waste management, crop production, animal management, and energy systems.

IRRI's program, built on these strategies, has been successful in promoting the adoption of 200 biogas digesters in Mexico in the past 2 years. This holistic approach ensures both program sustainability and the successful delivery of biogas's many benefits to the communities we serve.

**Benefits from Using Biogas:** Adapted from SNV website: [http://www.snvworld.org/en/ourwork/Pages/Potential\\_of\\_domestic\\_biogas.aspx](http://www.snvworld.org/en/ourwork/Pages/Potential_of_domestic_biogas.aspx)

<b>GENDER</b>	<ul style="list-style-type: none"> <li>* Saves time and reduces the workload especially for women related to:                             <ul style="list-style-type: none"> <li>- Collecting traditional cooking fuels</li> <li>- Cooking process</li> <li>- Cleaning cooking pots</li> </ul> </li> </ul>
<b>HEALTH</b>	<ul style="list-style-type: none"> <li>* Smoke- and soot less, reducing (especially for women):                             <ul style="list-style-type: none"> <li>- Respiratory health problems</li> <li>- Eye problems</li> </ul> </li> </ul>
<b>ENERGY</b>	<ul style="list-style-type: none"> <li>* Reduces fuel expenses for cooking and lighting</li> </ul>
<b>AGRICULTURE</b>	<ul style="list-style-type: none"> <li>* Reduces spending on chemical fertilisers</li> <li>* Improves crop yields</li> <li>* Supports animal husbandry</li> </ul>
<b>SANITATION</b>	<ul style="list-style-type: none"> <li>* Improves hygiene through toilet attachment</li> <li>* Reduces bad odours of manure</li> <li>* Decreases environmental pollution</li> </ul>
<b>ENVIRONMENT</b>	<ul style="list-style-type: none"> <li>* Improves soil fertility and plant nutrition</li> <li>* Reduces the rate of deforestation</li> <li>* Reduces green house gas emissions</li> </ul>

## Biogas for Institutions and Large-scale Users

### Institutional Cooking with Biogas – Meeting the Needs of a Ugandan Orphanage

Vianney Tumwesige, Centre for Research in Energy and Energy Conservation (CREEC)

<http://www.pciaonline.org/creec>

#### Background:

Nsambya Babies' Home in Kampala Uganda is run by the Child Welfare and Adoption Society and registered as a charitable, non-governmental organization. The Home cares for babies who have been neglected and orphaned due to family problems, civil wars, diseases and natural disasters.

Previously, the Home used a combination of firewood and gas to cook all food for staff and children. That resulted in 40 tonnes of firewood and liquefied petroleum gas for cooking each year, costing USD \$1,800 and \$550 respectively and constituting a large proportion of the annual budget. Another issue the Home faced was that during the rainy season firewood was not dry, leading to increased health dangers for cooks, further inefficiencies in cooking and children getting their meals late. The Home's management was also concerned about the rapid rate of deforestation and its effects on water supply and soil erosion.

The Centre for Research in Energy and Energy Conservation (CREEC) is an organization for research, training and consultancy, located at the College of Engineering, Design, Art and within Makerere University. CREEC's mission is to enhance access to modern types of energy through research, training and consultancy in East-Africa. The centre focuses on four areas: bioenergy, solar PV, pico-hydro and energy management.



Mixing cow manure

Green Heat Uganda is a registered company that offers innovative and cost effective one-stop waste management solutions at the source of generation. Simple technologies and methodologies are used to generate energy from waste. Green Heat has gathered valuable experience from previous biogas installations facilitated over the past 4 years in Uganda.

#### Biogas assessment and installation

To determine if biogas would solve the Home's energy concerns, in September 2010 CREEC in partnership with Green Heat Uganda carried out a study on the potential of biogas at Nsambya Babies' Home. The following factors were looked at to determine the optimum installation: the amount and nature of organic waste, the energy demand, the cost of the system, the required space for installation and the human factor (i.e. operator and owner interest/willingness to be trained).



Finished digester - Nsambya Babies' Home, Uganda

As a result of the study, a 12 m<sup>3</sup> biogas digester was proposed to generate gas for at least 55 percent of the Home's cooking needs. The digester is fed with cow manure, cow urine and food leftovers. The quantities of available feedstock are sufficient for this digester. Biogas technology is an integrated waste management system that is a clean, renewable, naturally produced and under-utilized source of energy. The gas produced is composed of 50-70% flammable methane that can be used for cooking. A biogas system provides on-site energy production, storage and access.

The decision made by Nsambya Babies' Home to install the biogas unit was for both economic and long term environmental reasons. Although the initial investment of USD \$2,089 for the biogas installation was high, the Home



is able to save approximately USD \$870 every year by using biogas for cooking. The money saved from having the biogas unit will go directly towards improving services, accommodation facilities and to support more orphans.



*Cooking with a smile*

The environmental benefits of a biogas digester to Nsambya Babies' Home are in the provision of energy, the disposal of organic wastes and the improvement of air quality through reduced concentrations of indoor air pollutants. An added benefit is that the effluent of the biogas digester is a valuable organic fertilizer. Since January 2011, the fertilizer from the biogas system has been applied to crops at the Home, thus providing an additional source of income.

#### **Lessons learned:**

Experience from general biogas installations indicates that some systems fail due to the following reasons: poor operation and maintenance practices, poorly mixed feedstock, low quality appliances, poor construction and inadequate capacity building. Therefore, after every biogas installation capacity building should be carried out to train the owners and operators of the biogas unit. This enables biogas system owners and operators to sustainably manage and maintain the system with minimal support from the supplier.

### **Promoting Commercial Biogas Plants in Pakistan Dairy Farms**

Qamaruddin, Winrock International,  
[quddin@winrockpk.org](mailto:quddin@winrockpk.org)  
<http://www.pciaonline.org/wi>

Under its Global Methane Initiative, the United States Environmental Protection Agency has been supporting the "Capacity Building of Dairy Farms in Pakistan for Increased Investment in Commercial Biogas Sector" project. Under this project Winrock International works with dairy farms in Pakistan to build their capacity to channel investment into the development of commercial biogas plants and utilize methane as source of energy.

Pakistan's current power shortfall is approximately 20% of grid capacity and is growing at about 2,000 MW per year. Rural areas are the most adversely effected by this energy shortage. Winrock International is working with dairy farms to build their capacity to utilize cow dung for electrical and thermal energy by generating biogas. This energy resource can be used by the dairy farms themselves or sold to the national grid. There is great potential in Pakistan for conversion of cow dung into useful electrical energy, since there are more than 165,000 farms in the country with over 20 cattle/buffalos. Once the biogas generation and its conversion into electrical energy picks up pace, many of

these farm needs may be met from this self generation of electrical power at a very economical rate. The energy demands of a typical medium-to-large dairy farm include: electricity to run milking machines, operate chillers, pump water, and provide lighting and fans in barns, offices, and residences. In addition, a significant amount of thermal energy is required as a cooking fuel for labor intensive dairy farms. Such needs can be successfully fulfilled through the application of biogas. In addition to meeting energy needs, biogas digesters can also convert large volumes of dairy manure into a readily usable fertilizer for application on fields around the dairies.



*Dairy Farm - Pakistan Commercial Biogas Project*

This project will advance cost-effective, near-term methane recovery and use as a clean energy source in Pakistan. The project will contribute to a reduction of greenhouse gas (GHG) emissions by encouraging the application of modern handling and treatment of solid and liquid effluents that result from intensive cattle husbandry and dairy operations. The project targets small-to-medium sized dairy farms that produce large quantities of cattle manure. Winrock will develop a pipeline of commercial biogas projects to be implemented in Pakistan, and anticipates that investment in the sector will be encouraged through enhanced capacity and confidence of various stakeholders,

including: local dairy farms, local equity investors, financial institutions, and biogas plant installation companies.

In addition to supporting these farms for the installation of biogas plants, key stakeholders will be identified and linked with each other to share expertise and capitalize on opportunities for future collaboration to bring additional investment and expertise to the sector. Training and networking will be organized to build the capacity and confidence of dairy managers, local investors, financial institutions and technology suppliers.

## National and Regional-level Approaches and Networks

### SNV Supported Domestic Biogas Programmes in Asia and Africa

Wim J. van Nes, SNV, [wvannes@snvworld.org](mailto:wvannes@snvworld.org)  
<http://www.pciaonline.org/snv>

SNV Netherlands Development Organisation is supporting the preparation and implementation of market-based domestic biogas programmes in different countries in Asia and Africa with a view to establish a commercially viable biogas sector. By the end of 2010, 360,480 fixed-dome biogas plants of sizes ranging from 2m<sup>3</sup> to 15m<sup>3</sup> have been installed in 16 countries. On average, these plants produce about 720,000 m<sup>3</sup> of biogas each day which supplements more than 3,600 tonnes of fuel wood. Benefits of biogas plants have positive impacts on basic livelihood indicators as well as rural economic development.

SNV initiated its support to the biogas sector in Nepal in 1989 resulting in the start of the Biogas Support Programme (BSP) aiming to develop over time a commercial biogas sector in the country. The success of BSP in Nepal encouraged SNV to support a national biogas programme in Vietnam in 2003 and subsequently similar programmes in other Asian countries, namely, Bangladesh, Cambodia, Lao PDR (2006), Pakistan and Indonesia (2009), and Bhutan (2011). In Africa, keeping in view the substantial potential for this technology at about 18.5 million households, SNV is active in the biogas sector in nine African countries. National programmes have been started in Rwanda (2007), Ethiopia, Tanzania (2008), Uganda, Kenya, Burkina Faso, Cameroon, Senegal and Benin (2009) out of which six countries are part of the Africa Biogas Partnership Programme funded by the

Netherlands government and managed by Hivos. Together, these programmes in Africa aim to support construction of well over 70,000 domestic biogas installations by the end of 2013. Compared to Asian countries, biogas development in Africa has been pretty modest so far because of various challenges, especially, the high investment costs, limited access to credit facilities, insufficient awareness raising activities and significantly lower purchasing power of potential households.



*Biogas plant construction in Senegal*

Through this experience, SNV has seen that most women appreciate the increase in comfort arising from the use of biogas. Cooking on biogas is healthier and more convenient because it does not produce toxic fumes that cause smoke-borne diseases such as respiratory ailment, headaches, coughing, dizziness and eye problems. The use of biogas reduces the hardship

involved in collection of firewood, and it encourages better management of dung and night-soil (i.e. human excreta). An increasing number of households are deciding to attach household latrines with biogas plants, which has helped to improve standards of hygiene and sewage management. Once the biogas plant is operational, households no longer need to spend time fetching firewood.



Rwanda biogas user

Large-scale domestic biogas programmes require a wide range of functions to be executed in a comprehensive and coordinated manner. To ensure effective implementation of all these functions, SNV adheres to the following five interrelated features:

- Facilitating participatory and context-specific preparation;
- Establishing a sustainable biogas sector as the ultimate long term objective;
- Interlinking impact and capacity development targets;

- Promoting and strengthening a market-oriented approach; and
- Attributing sector functions to multiple stakeholders.

Building viable domestic biogas programmes involves three important aspects: programmatic, technical, and financial sustainability. Aiming for programmatic sustainability, SNV follows an integrated approach to optimise institutional arrangements and to strengthen the capacities of all actors in the sector. Crucial in this approach is the role of the private sector from the beginning stages of the programme. SNV aims to involve a maximum of organisational and institutional capacities already available in the country and to strengthen these capacities through providing support to local capacity building organisations. Hence, SNV does not implement activities directly, limiting its permanent deployment of manpower. Technical sustainability is also pursued in biogas programmes by introducing a rigorous quality management component that helps to ensure that supply-side actors remain fully accountable to their customers. Quality management does not limit itself to direct “technical” aspects only, but includes promotional messaging, user satisfaction, and after-sales service. The financial sustainability of large-scale domestic biogas programmes is more complex to achieve, requiring national governments to contribute to the costs. Where and when possible, carbon revenues need to become a sustainable source of income for biogas sectors. So far, that has been materialised for the programmes in Nepal (CERs) and Cambodia (VERs). More information on these programs is found at [http://www.snvworld.org/en/ourwork/Pages/Renewable Energy.aspx](http://www.snvworld.org/en/ourwork/Pages/Renewable%20Energy.aspx)

## Biogas Resources:

### **SNV on-line library on domestic biogas:**

- [http://www.snvworld.org/en/ourwork/Pages/Renewable Energy.aspx](http://www.snvworld.org/en/ourwork/Pages/Renewable%20Energy.aspx)

### **SNV Domestic Biogas Newsletter:**

- Join SNV's Domestic Biogas Newsletter mailing list through their website at: [http://www.snvworld.org/en/ourwork/Pages/Renewable Energy.aspx](http://www.snvworld.org/en/ourwork/Pages/Renewable%20Energy.aspx) or directly through [following this link](#)
- Check out the most recent issue at: [http://www.snvworld.org/en/ourwork/Documents/SNV Domestic Biogas Newsletter issue 5 September 2011.pdf](http://www.snvworld.org/en/ourwork/Documents/SNV%20Domestic%20Biogas%20Newsletter%20issue%205%20September%202011.pdf)

### **Biogas information for Spanish speakers:**

- For more information on the Latin American & the Caribbean Biogas Network (RedBioLAC—see article pg. 9 of this Bulletin); please visit: <http://www.redbiolac.org>
- You can access Spanish-language information on biogas through their website, or directly through [following this link](#).



## RedBioLAC: A regional network to promote small-scale biodigesters in Latin America and the Caribbean

Contact: Ms. Anna Garwood, Green Empowerment,  
[anna@greenempowerment.org](mailto:anna@greenempowerment.org)  
<http://www.pciaonline.org/green-empowerment>

Written by: Erika Schoen & RedBioLAC Board of Directors  
 Alexander Eaton, [IRRI-Mexico Biogas Program](#)  
 Raul Botero Botero, [EARTH University](#)  
 Rafael Escobar, [Soluciones Prácticas](#)  
 Anna Garwood, [Green Empowerment](#)

RedBioLAC is the Biodigester Network (Red) of Latin America and the Caribbean (LAC) that promotes the benefits of small-scale biodigesters—including clean indoor air—through applied research and the development of best practices.

Latin America and the Caribbean have significant potential to tap biogas technology to utilize abundant organic waste from livestock to reduce the use of increasingly scarce firewood. There are a number of strong groups working with the small-scale biogas technology in the LAC region, however barriers include: 1) isolated biogas projects with limited information sharing; 2) limited LAC based research on the efficient use and associated benefits of biodigesters; 3) the lack of sustained, long-term institutional support; and 4) socio-economic challenges with the adoption of the technology in rural Latin America.



*RedBioLAC IRRI biogas installation*

In 2009, in an effort to overcome these barriers, Green Empowerment, Soluciones Prácticas, and the International Renewable Resources Institute (IRRI) organized the Biogas Design Exchange for Latin America in Cajamarca, Peru with the support of WISIONS, an initiative of the

Wuppertal Institute for Climate, Environment and Energy. RedBioLAC emerged from this first event, which brought together 33 people from 10 countries. The conference was followed by implementation of biodigesters in 5 countries. The first annual RedBioLAC conference was held at EARTH University in Costa Rica in 2010, with the support of WISIONS and the Inter-American Development Bank (IDB), resulting in the development of a Strategic Plan for RedBioLAC.

RedBioLAC's vision is to be the clearinghouse for research, development, promotion, implementation, and dissemination of biodigesters to advance integrated management of natural resources and the socioeconomic welfare of rural Latin American and Caribbean communities. RedBioLAC brings together institutions to share their own local experiences in order to strengthen the overall quality of small-scale biogas programs and research across the region. Local organizations with limited resources benefit from the international network of researchers, technical expertise, and funding agencies.

In May of 2011, the annual conference was held in Puebla, Mexico (also with IDB support) and featured site visits to several of IRRI Mexico Biogas Program installations at peri-urban dairy farms. This provided context for discussion on both system and program design, as 54 members from 14 countries shared their own experiences. Sessions featured presentations from local government partners, micro-finance organizations, and local farmers. The wide array of expertise in the RedBioLAC network allowed for interdisciplinary discussions including technical research, social considerations, financing and how to structure effective multi-stakeholder programs. Spanish-language proceedings from the event can be accessed through [the RedBioLAC website](#).

The U.S. Environmental Protection Agency's (EPA) Global Methane Initiative (GMI) has committed grant funds to strengthen RedBioLAC's mission, including support for the next three annual RedBioLAC conferences and other information-sharing activities. The 2012 conference will be held in Managua, Nicaragua and will include the work of two Dutch aid groups—the Humanistic Institute for Co-Operation with Developing Countries (HIVOS) and the Netherlands Development Organization (SNV)—as they develop a national biodigester program in Nicaragua. With the Nicaragua program as an exciting backdrop, the conference will feature the work of experts from an ever-expanding group of organizations that will bring

experience, research, opportunities, questions, and challenges from the entire LAC region.

RedBioLAC's current areas of technical research include: biodigester design, biogas production, use and appliance efficiency, biogas filtration, co-digestion of a variety of organic wastes, and fertilizer production and application rates. Social and economic research includes regional biogas market potential, marketing to small farmers, identifying key end user adoption factors, credit programs, and curriculum development.

The RedBioLAC Board of Directors consists of representatives from PCIA partner organizations EARTH University of Costa Rica, International Renewable Resources Institute in Mexico, Soluciones Prácticas (Practical Action) in Peru, and Green Empowerment (Portland, OR). Jaime Muñoz, Director of the Nicaragua-based NGO Asociación Fénix, recently joined the board to replace Jaime Marti of CIMNE/GTZ Bolivia, who will take over as the Research and Development Coordinator of RedBioLAC. All members must represent a non-profit NGO, university, or research center. Individuals are

invited to join the network as participants and may attend RedBioLAC conferences and participate in the listserv discussions. Member organizations make decisions about future activities, assist in international research, participate in virtual meetings, review technical documents, and are included in the RedBioLAC directory. Prospective members or participants can find more information or join RedBioLAC online at [www.redbiolac.org](http://www.redbiolac.org).



*RedBioLAC group photo—Mexico conference*

### Working Group on Domestic Biogas under the Energy for All Partnership in Asia

Wim J. van Nes, SNV, [wvannes@snvworld.org](mailto:wvannes@snvworld.org)  
<http://www.pciaonline.org/snv>

The Energy for All Partnership (E4ALL) initiated by the Asian Development Bank (ADB) was launched in June 2009 at the Asia Clean Energy Forum in Manila as a response to the challenge of regional energy poverty. The Partnership provides a platform for cooperation, knowledge and technical exchange, innovation, and project development, bringing together key stakeholders from business, financial institutions, governments, and non-government organizations. The Partnership is focused on action, with a goal to provide access to energy to 100 million people in Asia and the Pacific region by 2015.

As you've read throughout this Bulletin, Asia is the cradle of rural domestic biogas, with China having installed about 40 million units and India about 4.5 million units based on strong government support. Nepal, Vietnam, Bangladesh and Cambodia started market-based national programmes aiming to develop sustainable, commercially viable biogas sectors, followed by Lao PDR, Indonesia, Pakistan and Bhutan. By the end of 2010, more than 355,000 biogas plants were installed in these eight countries. Feasibility

studies and/or resource mobilisation are ongoing in other potential biogas countries including Sri Lanka, Myanmar and the Philippines. SNV Netherlands Development Organisation was invited by the Steering Committee of E4ALL to lead a Working Group on Domestic Biogas.



*Cooking with biogas in Vietnam*

The objective of this Working Group is the innovative dissemination of 1 million domestic biogas plants in about 15 Asian countries by 2016, providing access to sustainable energy to about 5 million people. In addition, the Working Group aims to make an important contribution to the development of sustainable, commercial biogas sectors in these countries. SNV in

close cooperation with the members of the Working Group will actively pursue the achievements of these objectives as a follow-up of its present biogas practice in the region through innovation, partnerships, networking, knowledge brokerage and resource mobilisation.

The Working Group is undertaking the following activities:

- Participatory studies on the feasibility of domestic biogas in ADB member countries that do not yet have a significant biogas programme (“new biogas countries”);
- Formulation of detailed implementation plans for feasible national programmes on domestic biogas in about 15 ADB member countries. These include approximately 10 countries with already ongoing programmes (“existing biogas countries” - including innovative programmes in China and India) and about five new countries;
- Establishment of a specific regional structured debt fund as well as a basket grant fund (contributions from multiple donors into one fund) for co-financing the implementation of national programmes on domestic biogas in the selected countries, covering the costs of programme support activities including investment incentives, technical assistance and fund management;

- Contracting and implementation of national programmes on domestic biogas in the selected countries;
- Networking and joint learning involving all relevant stakeholders in existing and new biogas countries, as well as experts around the world through internet, workshops, study tours and joint research, resulting in supra-national synergies to increase efficiency, effectiveness, innovation and accelerated growth of the sector.

More information about the E4ALL Working Group on Domestic Biogas is available at <http://www.energyforall.info/files/Domesticbiogas.pdf>



*Biogas plant construction in Bangladesh*

## RECENT PARTNER ACTIVITY

### Pakistan Domestic Biogas Programme Celebrated the Completion of 1,000 Biogas Plants

Prem Sagar Subedi, Winrock International,  
[psubedi@winrockpk.org](mailto:psubedi@winrockpk.org)  
<http://www.pciaonline.org/wi>  
<http://www.pciaonline.org/snv>

The Pakistan Domestic Biogas Program celebrated the completion of the 1,000<sup>th</sup> biogas plant in Pakistan in July 2011. Sohaib Sultan Khan, chairperson of the Rural Support Programmes Network (RSPN), together with the biogas plant owner, inaugurated the 1,000<sup>th</sup> plant in the Sargodha District of Pakistan. Representatives from Winrock International, government agencies, SNV and RSPN were present, along with Biogas construction companies and local community members. RSPN implements the program with financial support from the Embassy of the Kingdom of the Netherlands and technical support from SNV and Winrock International.

In 2007, Winrock and SNV conducted a feasibility study, which revealed the technical potential for 5 million domestic biogas plants in Pakistan. The Pakistan Domestic

Biogas Program was designed with a vision to create a commercially viable domestic biogas sector in Pakistan with an installation target of 300,000 biogas plants in 10 years. The program is being implemented through a modular approach which will be achieved through a market-oriented partnership between government, private sector organizations, civil society agent, and international development partners in Pakistan. The goal of the program is to improve the livelihoods and quality of life of rural farmers in Pakistan through exploiting the market and non-market benefits of domestic biogas. Through a market-led approach, both small and medium



*Inauguration of 1000th biogas plant, Pakistan*



scale farmers invest in biodigesters and thus provide their household with energy for cooking and lighting, while safeguarding the environment, improving agricultural productivity, and creating a healthy living environment.



*Biogas user couple sharing the benefits of biogas plants installed in their house, Pakistan Domestic Biogas Program*

Pakistan has around 65 million head of cattle providing ample raw material for biogas plants. The country experiences high temperatures in most potential sites and thus provides a favorable environment for good biogas plant performance. Additionally, abundant land and human resources are available for installing plants.

As biogas plants replace the use of unsustainably harvested fuel wood, this project qualifies for and is being developed as a Clean Development Mechanism (CDM) project, which is expected to provide a sustainable source of financing for materializing the vision. In terms of GHG emissions reductions, the initial estimate shows that a biogas plant will reduce emissions by around 2.29 tCO<sub>2</sub>e per year. Once 300,000 plants are installed, these plants will reduce emissions by over 687,000 tCO<sub>2</sub>e annually.

### Aprovecho Summer Stove Camp 2011

<http://www.pciaonline.org/aprovecho>

Stove Camp offers a unique opportunity for stove designers and implementers to use emissions monitoring systems and begin to optimize their stoves for emissions reduction and to draw on the experience of in-house and visiting experts. Some 41 participants attended this year and had the chance to become involved in projects led by Aprovecho staff. We also offered lectures and discussions in the morning and had lots of time to do prototype development and testing. This year's Stove Camp was patterned after a 'Three (8) Ring Circus'.

Participants were invited to help:

- Build and tune a large Rocket bread oven
- Use the Institutional Stove 'factory in a box' to make 60 liter pot stoves

- Experiment to make wood gas that is taken through a pipe and burned externally
- Build a large Telkes solar cooker
- Measure emissions from an efficient Jatropha seed burning stove
- Measure emissions from different recipes for making briquettes for fuel
- See how clean a TLUD could run on wood chunks, not pellets
- Measure charcoal stove emissions in the Test Kitchen



*Group Photo - Aprovecho Stove Camp Summer 2011*

Lots of stoves were built and some initial testing was completed. Stove Camp is often inspiring, for some folks one or two hopeful tests point them in fruitful directions, one team stayed up until 3am to get even temperatures and beautifully finish the bread oven! Some initial test results once again showed how institutional stoves can cook food with greatly reduced specific consumption (fuel used and emissions made per unit of food cooked) even while burning briquettes.

Participants experimented and traded experiences for five days, enough time to seriously contemplate how to improve our stoves. Making changes and testing the change is science that is grounded in experience. The iterative approach moves us from cyberspace back to real space -- it's where the people we want to help are living! Look for information on next summer's stove camp on the PCIA website.

### Potential ISO Activity to Develop Global Voluntary Cookstove Standards

In response to requests expressed by many of you for global voluntary standards development, PCIA and the Global Alliance for Clean Cookstoves are working with the American National Standards Institute (ANSI) to move forward on this process, building on the Lima Consensus that was developed at the 2011 PCIA Forum. ANSI recently posted a notice on their website, seeking comments from their members and U.S.-based

stakeholders from the cookstove community. Although at this stage comments were specifically requested of US organizations, as this effort continues we look forward to making this an inclusive, transparent process with both the intent and requirement to involve as many stakeholders from our community as possible. Thank you to everyone who wrote emails of support for this effort! We were pleased with the opportunity to show ANSI the full engagement, interest and participation of our Partners on this important issue. We will continue to reach out and involve you all as this process develops.

### Rural Energy & Climate Initiative Workshop

<http://www.pciaonline.org/nexus-carbon-development>

How can we make pro-poor clean energy solutions affordable? This is the question the Rural Energy & Climate Initiative tried to answer during a three-day workshop bringing together project developers and financiers in Siem Reap, Cambodia, on 11-13 July 2011. The Rural Energy & Climate Initiative is a groundbreaking movement inspired by the lack of appropriate financial resources available for the mass dissemination of clean

and affordable rural energy solutions in developing countries. Led by Nexus-Carbon for Development, and supported by the blue moon fund and the Asian Development Bank, the Initiative builds on the work achieved by Nexus member organisations and partners in the field of energy, poverty and climate change.

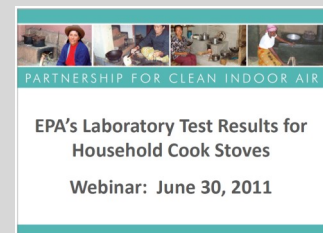
Project developers were given the opportunity to showcase their projects and to gather feedback from peers and funders. They left the meeting with an increased knowledge on best practices for rural energy projects, and with a greater understanding of how to package projects in order to attract donors. Thanks to financial support from the blue moon fund, three projects were selected and awarded seed funding to kick off their innovative initiative.

The meeting was a great opportunity for donors and financiers to meet project developers working on rural energy issues in the field, and a marketplace session was organized with the aim of matching funding sources to projects. The ADB and Nexus are already embarking on a new partnership to incubate rural energy projects under the Energy for All partnership.

## PCIA STOVE TESTING AND CARBON FINANCE WEBINARS

PCIA recently kicked off its Stove Testing webinar series with two informative and well-attended sessions on June 30 and August 11.

- ◆ The first webinar entitled [“EPA Lab Test Results for Household Cook Stoves”](#) had 72 participants from 19 countries. It provided lab test results for 22 cookstoves and 7 fuels conducted by the EPA using a variety of operating and testing conditions to test performance in terms of power usage, energy efficiency, fuel use and emissions. Jim Jetter, U.S. Environmental Protection Agency Senior Research Engineer and leading cook stove researcher, discussed the results in detail, the testing methods and equipment used, and provided recommendations on stove design and performance.
- ◆ Some 74 people from 22 countries participated in the second webinar in the series [“Impacts of Household Fuel Consumption for Biomass Stove Programs in India, Nepal and Peru.”](#) This webinar presented results from the EPA-funded Kitchen Performance Test (KPT) training, which provided technical assistance to PCIA Partners in those countries. Michael Johnson of Berkeley Air Monitoring Group discussed KPT basics, gave an overview of the training and field testing, presented results from each country, and provided ways to use the KPT results to enhance programmatic performance, and key recommendations for strengthening stove performance monitoring. In case you missed these, you can access the full recordings, PowerPoint presentations, and participant questions and answers on the PCIA website at [www.pciaonline.org/proceedings](http://www.pciaonline.org/proceedings).



PCIA has also begun a series of carbon finance webinars with The Gold Standard Foundation, the first of which was held Thursday, September 8<sup>th</sup> on “An Introduction to the Gold Standard.” **SAVE THE DATE** to participate in upcoming PCIA webinars on:

- September 27<sup>th</sup>—“Innovations in Version 3 of the Gold Standard Methodology”
- October 18<sup>th</sup>— “Case Studies: The Gold Standard in Practice”
- November 9<sup>th</sup>—“Perspectives: Allocating Carbon Revenue”

## EVENTS AND ANNOUNCEMENTS

**Biomass Energy Foundation Camp, Honduras, Sept 26-30, 2011, (in Spanish)**

The Biomass Energy Foundation is putting on a 5-day Spanish-language camp featuring hands-on experience plus theory and instruction on gasifiers of numerous types, but focusing on pyrolytic top-lit updraft (TLUD) technology for cookstoves. The camp will also focus on emissions measurement via PEMS. For more information on the camp, including costs and contact information, please see <http://www.pciaonline.org/events/BEFcamp>.

**International 100% Renewable Energy Conference and Exhibition, Istanbul, Turkey, October 6-8, 2011**

IRENEC, International 100% Renewable Energy Conferences and Exhibitions aims to promote a monumental transformation from fossil fuels to 100% renewable energy sources and to contribute to the 100 percent goal to be reached without nuclear energy or carbon-capture technology. Organized by EUROSOLAR Turkey, The Turkish Division of European Association for Renewable Energies, IRENEC 2011 will cover the most significant topics to lead a way to discussions and shifts in thinking in a world so overwhelmingly dependent on fossil fuels. For more information please visit [www.ireneec2011.com](http://www.ireneec2011.com)

**Nexus Carbon Finance Training, Singapore, October 17-19, 2011**

Nexus Carbon for Development is holding a three-day carbon finance training that will include insights from experts and practical exercises, tailored to participant needs. This training is for development and/or environmental NGOs, environmental project developers, businesses and other institutions seeking to interact with environmental markets. Participants will learn how to assess when carbon finance is a good option for their project, identify and understand the stages of the carbon project cycle, understand carbon project documentation and methodologies, and learn about commercialization of carbon credits. Nexus is offering a special 50% discount exclusively for PCIA Partners! For more information, please visit: <http://www.pciaonline.org/events/nexus-training>.

**International Workshop on Domestic Biogas Programmes in Asia, Indonesia, November 22-24, 2011**

SNV and Hivos/Indonesia Domestic Biogas Programme, in cooperation with the ADB/E4ALL, are organising an International Workshop in Bandung, Indonesia, from 22-24 November 2011. The workshop will address issues such

as how to further commercialise the national programmes, how to increase local ownership, investments by farmers and financial contributions by national and local governments, which resources need to be mobilised up to 2016, how feasible the proposed regional structured debt fund is, what the opportunities to establish a regional basket fund are vis-à-vis bilateral funding, and how to maximise carbon financing. Click [here](#) for more information, or visit <http://www.pciaonline.org/asiabiogasworkshop>.

**LAST CHANCE to include your organization in PCIA's 2010 collective Results Reporting!!**

We'd like to extend a huge thank you to everyone who has already submitted their 2010 results reports (both in person at the PCIA Forum and online). We're grateful for your support of our efforts to capture the collective results of PCIA Partners – recognizing accomplishments and guiding future work of PCIA. We're planning a special edition of the PCIA Bulletin with the full 2010 results and we're reaching out to those who have not yet submitted results to please do so via the PCIA website at: <http://www.pciaonline.org/results/2010> no later than **Friday, September 30, 2011**.

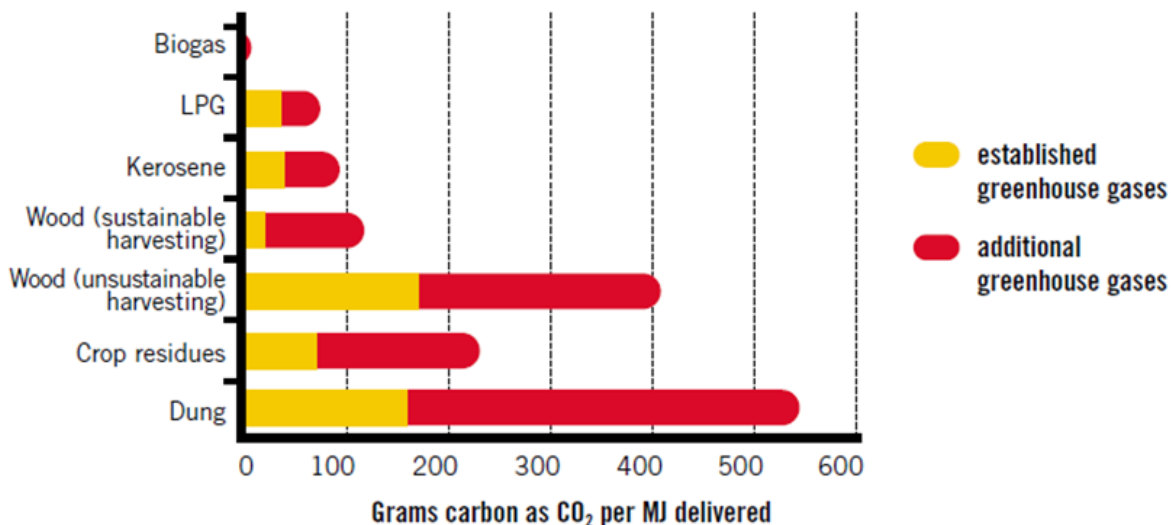
We want the work of all PCIA Partners to be included in this special edition Bulletin. Please note that the results you send us are only reported collectively, not individually (unless you give us permission separately to highlight your organization). Also, we encourage everyone to take the time to report (not just organizations who manufacture/sell stoves) as we value feedback from all types of organizations. If you have any questions about the reporting form, please contact [moderator@pciaonline.org](mailto:moderator@pciaonline.org).

**WHAT'S NEW ON THE PCIA WEBSITE?**

- New "Featured Partners" on the home page [www.pciaonline.org](http://www.pciaonline.org)
- Webinar Proceedings [www.pciaonline.org/proceedings](http://www.pciaonline.org/proceedings)
- Countries of Operation now showing on Partner Profiles - - please check to make sure your countries are up to date! [www.pciaonline.org/partners/search](http://www.pciaonline.org/partners/search)
- Stove Safety Guidelines and Testing available on the Testing page: [www.pciaonline.org/testing](http://www.pciaonline.org/testing)



### BIOGAS FACT BOX: Comparison of Biogas GHG Emissions to other Fuels



20-year greenhouse gas emissions in grams carbon as CO<sub>2</sub> emitted per megajoule (MJ)

- ◆ based on established greenhouse gases, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrogen dioxide (N<sub>2</sub>O);
- ◆ based on established and additional greenhouse gases, carbon monoxide (CO) and non-methane hydrocarbons (NMHC). Emissions from different fuel/stove combinations in India were systematically assessed using a standardized cooking test.

Adapted with permission from:

Smith KR, et al. Greenhouse implications of household stoves: an analysis for India. *Annual Review of Energy and the Environment*, 2000, 25:741-763

**Chart taken from:** “Fuel for life : household energy and health.” Written and coordinated by Eva Rehfuess. World Health Organization. 2006. Accessed September 15, 2011 from <http://www.who.int/indoorair/publications/fuelforlife.pdf>.



Biogas digesters in China (left) and Mexico (right)

The next PCIA Bulletin will focus on **charcoal & briquettes** highlighting innovative briquette-making technologies, high-efficiency charcoal-burning stoves and charcoal production, market development, behavior change/social and cultural practices, programs at scale, and regional networks. Do you have successful lessons to share with other PCIA Partners in these areas? If so, send an email to [moderator@pciaonline.org](mailto:moderator@pciaonline.org) by **Friday, September 30<sup>th</sup>** to reserve your spot in the November Bulletin.