

THE BOTTOM LINE

Initial lessons from the East Asia and Pacific (EAP) Clean Stove Initiative (CSI) confirm the need for country-specific roadmaps, strong national support, well-targeted subsidies, and integration of local conditions and international best practices into stoves standards and testing protocols. Pilot results suggest that results-based financing is a promising way to incentivize the clean stoves market. Linkage with other projects having clean stoves components could accelerate scaled-up implementation.

Toward Universal Access to Clean Cooking and Heating: Early Lessons from the East Asia and Pacific Clean Stove Initiative

Why is the issue important?

Accelerating the transition to clean cooking and heating solutions requires innovative approaches

Clean cooking and heating are pivotal to achieving goals in public health, gender equality, and climate-sensitive development. Exposure to household air pollution (HAP) linked to the smoke emitted by inefficient stoves is the fourth greatest risk factor for death in the world, accounting for 4.3 million premature deaths each year (Lim and others 2012). Adopting clean cooking and heating solutions can catalyze transformative health and economic benefits for some of the world's most vulnerable citizens. Moreover, it can reduce black carbon emissions, which contribute to ambient air pollution and climate change.

The United Nations Sustainable Energy for All (SE4All) initiative, co-led by the World Bank, has set the ambitious goal of achieving universal access to modern energy services by 2030. The Sustainable Development Goals (SDGs) of the post-2015 development agenda recognize clean cooking as a priority intervention (SDG 7). The most sustainable way to bring modern cooking and heating solutions to the hundreds of millions of families that are likely to depend on solid fuels beyond 2030 is to develop a thriving global industry in clean cookstoves and fuels that is constantly innovating to improve design and performance, while lowering stove and fuel costs (GACC 2011).

In East Asia and the Pacific (EAP), about 1 billion people—nearly half of all households in the region—depend on solid fuels for cooking, and more than 1.4 million people die prematurely from exposure to HAP linked to solid fuel use (Lim and others 2012). Achieving

universal access to clean cooking and heating in the EAP region by 2030 will require scaled-up development and marketing of advanced, clean-burning, high-efficiency stoves that burn coal and traditional biomass and that households will use consistently (World Bank 2011).

What has been the response?

The World Bank is implementing the EAP Clean Stove Initiative to scale up household access to clean cooking and heating stoves

Following on the recommendations of the Bank's (2011) energy flagship report, *One Goal, Two Paths: Achieving Universal Access to Modern Energy in East Asia and the Pacific*, the EAP Clean Stove Initiative (CSI), launched in 2012, focuses on achieving access to modern cooking and heating solutions in the EAP region, particularly scaled-up access to advanced cooking and heating stoves for poor, primarily rural households who will use solid fuels to meet most of their cooking and heating needs beyond 2030. The EAP CSI is a multi-country, multiphase program with funding support provided by Australian Aid (formerly AusAID) and the World Bank's Asia Sustainable and Alternative Energy Program (ASTAE) and Energy Sector Management Assistance Program (ESMAP).

The initiative adopts a phased approach focused on national implementation, knowledge-sharing across countries and regions, and innovation. It includes four country programs—China, Indonesia, Lao PDR, and Mongolia—and a cross-cutting regional program.

The implementation strategy is three-pronged: (i) establishing an enabling policy and regulatory environment for scaled-up access to



Yabei Zhang is a senior energy economist in the World Bank's Energy and Extractives Global Practice.



Norma Adams is a writer and consultant editor for the World Bank Group.

“The EAP CSI is at the forefront of applying results-based financing to the promotion of clean cooking and heating.”

advanced stoves, with strengthening of institutional capacity at the center of that effort; (ii) supporting supply-side market and business development; and (iii) stimulating user demand for clean and efficient stoves.

In each country, the initiative comprises four phases: (i) initial stocktaking and development of the implementation strategy; (ii) institutional strengthening, capacity building, and piloting of the strategy; (iii) scaled-up program implementation; and (iv) evaluation and dissemination of lessons learned (figure 1). This note summarizes the results and lessons learned from the first two program phases (2012–15) (World Bank 2016).

The EAP CSI regional program provides a platform for promoting knowledge-sharing, learning, and collaboration on access to modern energy at the household level (figure 2). To implement its activities, the regional program plays four major roles. As a *convener*, it establishes a learning platform among the four country programs. As a *facilitator*, it engages other regional and global stakeholders beyond

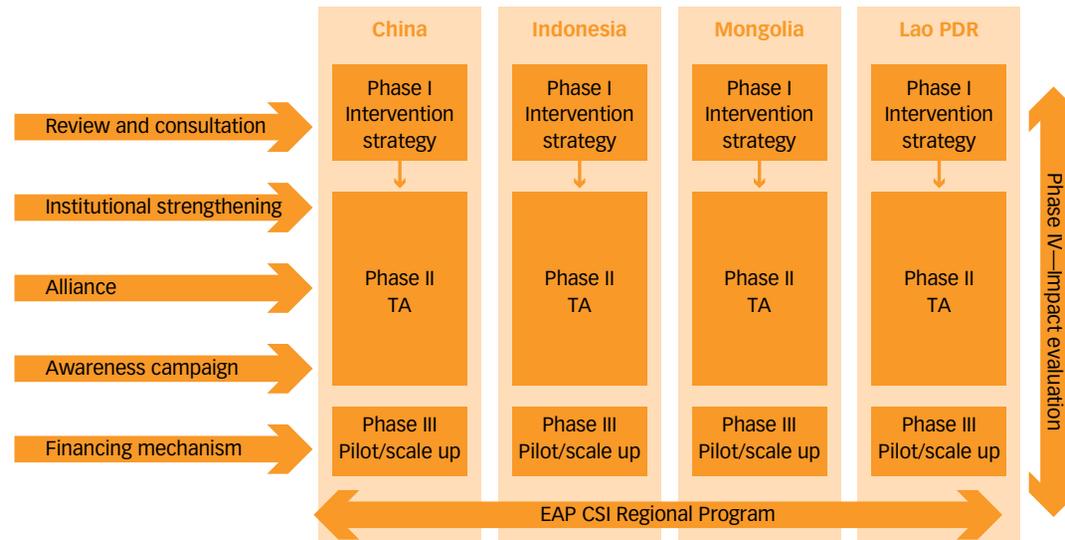
EAP to expand learning and knowledge-sharing. As an *experimenter*, it pilots new approaches and disseminates lessons learned. Finally, as a promoter of outreach to other sectors, it ensures that project impacts are leveraged.

What are the early program results?

The activities successfully completed under the first two program phases have prepared the CSI countries for scaled-up implementation

Promoting effectiveness through innovative results-based financing. The EAP CSI is at the forefront of applying results-based financing (RBF) to the promotion of clean cooking and heating. The RBF framework has three building blocks: (i) defined clean stoves, (ii) results-based incentives, and (iii) a monitoring and verification (M&V) system. These building blocks are supported by two pillars: (i) institutional strengthening and capacity building of key market

Figure 1. Overall program structure of the EAP CSI



“To develop a thriving global clean stoves market, the defined clean stoves must be based on internationally recognized standards, testing protocols, and certification systems whose metrics are scientifically valid.”

players and (ii) public awareness-raising campaigns to stimulate household demand (figure 3).

Implementing the RBF approach is aligned with each CSI country’s unique context and priorities. For example, in China and Mongolia, where government subsidies already exist, there has been a special focus on sustainability and adjusting subsidy levels. In Indonesia and Lao PDR, where private-sector capacity is low, technical assistance and capacity-building efforts have been directed toward the private sector.

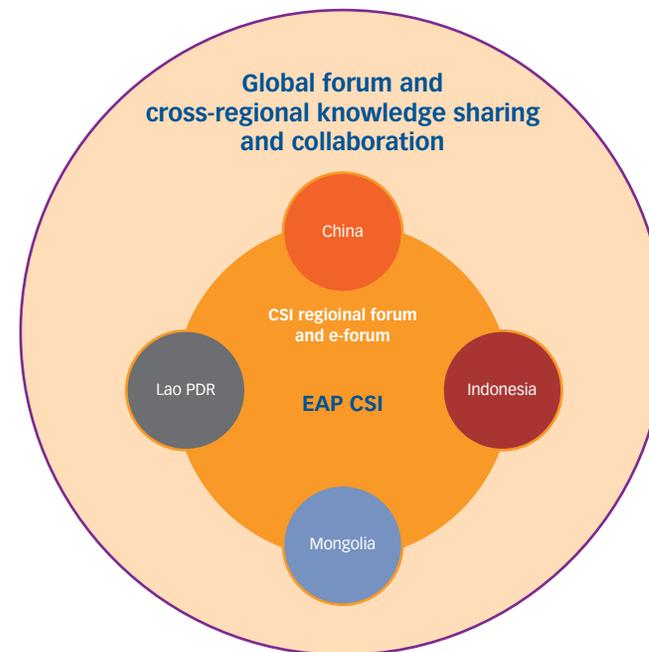
The **China** CSI has completed RBF pilots in two villages, where 480 stoves were sold. The pilots’ emphasis on results verification received positive feedback from key stakeholders. China has drafted an implementation plan using the RBF approach for disseminating 40 million clean stoves by 2020. Building on the CSI’s pilot experience, the Hebei Air Pollution Prevention P4R Project includes a clean stove component that applies the RBF approach.

The **Indonesia** CSI has set up an RBF fund of US\$190,000 managed by Bank Rakyat Indonesia and launched two sets of open calls for stove technologies and market aggregators. More than 20 companies submitted stove technology applications, and more than 10 market aggregators signed implementation agreements for the RBF incentives. At present, some 700 stoves are being verified for RBF incentives. The ongoing RETF project to pilot the RBF approach shows potential for replication and scale-up.¹ A national clean cook-stove program incorporating lessons from the RBF pilot experience is being designed.

An innovative RBF pilot focusing on health has been designed and developed under the **Lao PDR** CSI. Results of HAP assessments conducted in poor rural households confirm the cost-effectiveness of using modern clean cookstove technology to reduce the country’s burden of disease. To realize the health benefits, along with positive climate and community outcomes, the next step is to prepare an equally innovative RBF mechanism to mobilize private-sector and bilateral donor resources.

¹ The Indonesia CSI was a runner-up in the 2014 GPOBA InnOBAtions Awards competition in recognition for its innovative implementation of output-based aid and potential for replication and scale-up. <https://www.gpoba.org/InnOBAtion.Awards.2014>.

Figure 2. EAP CSI regional program structure

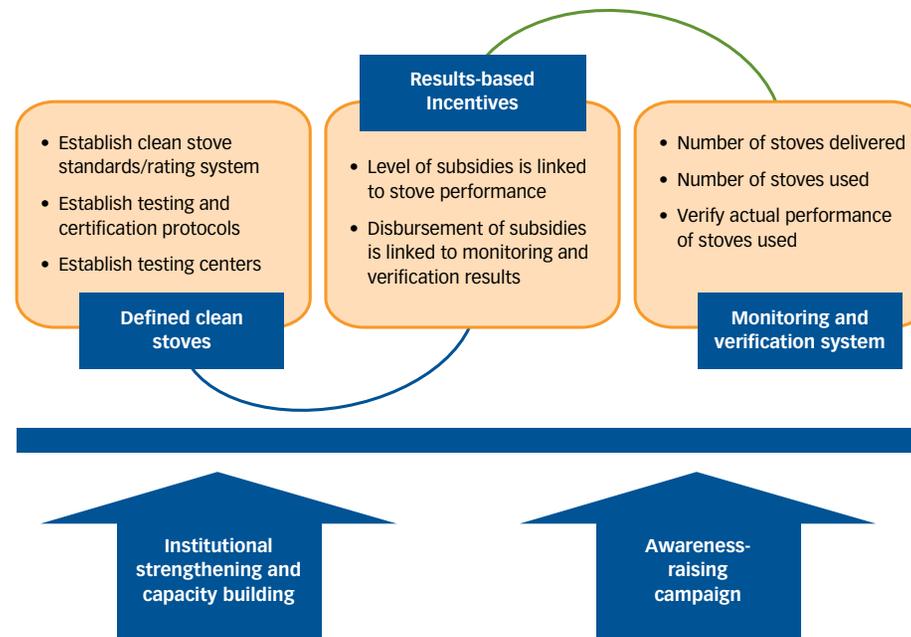


The **Mongolia** CSI supports the RBF approach under the ongoing stove-switching program of the Ulaanbaatar Clean Air Project, having already disseminated 36,533 low-emission heating stoves covering more than four-fifths of the potential household market. As a result, air pollution has dropped considerably in the town’s most polluted, high-density areas. A national program strategy has been developed, whose core elements—lowering subsidies, diversifying stove models, and advocacy for avoidance of outdated, polluting stoves—have been adopted and implemented.

Stove standards, testing protocols, and certification systems. To develop a thriving global clean stoves market, the defined clean stoves must be based on internationally recognized

Figure 3. RBF Framework with Three Building Blocks and Two Supporting Pillars

“Stove designs must reflect the significant variety of cooking practices, climate conditions, and cultural preferences that characterize particular countries.”



Source: Zhang and Knight 2012.

standards, testing protocols, and certification systems whose metrics are scientifically valid. In addition, stove designs must reflect the significant variety of cooking practices, climate conditions, and cultural preferences that characterize particular countries. As part of the International Standards Organization (ISO) process, CSI country delegations have participated in attempts to design performance metrics, with positive results. Close collaboration with the social/gender team of the World Bank’s EAP Region resulted in an innovative stove-testing method in Indonesia that incorporates local cooking practices and social and cultural preferences based on anthropological studies and comprehensive household surveys. This new stove-testing method has made important contributions to ongoing ISO discussions.

Knowledge exchange, learning, and collaboration. The CSI regional program held two regional forums and various South-South knowledge-exchange events, established a virtual forum, and generated numerous knowledge products. The 2013 and 2014 regional CSI forums, scheduled concurrently with major global and regional events, offered valuable opportunities for knowledge-sharing and identifying collaborative activities among a broad range of stakeholders. South-South knowledge-exchange events have fostered collaboration and led to mutual benefits. For example, following the 2014 EAP CSI forum in Beijing, a Chinese delegation was invited to Mongolia to learn about that country’s stoves market. Later participation by China’s stove manufacturers in Mongolia’s stoves program resulted in a significant lowering of stove costs.

“Clean cooking and heating programs should involve stakeholders across many sectors and at all levels. But there is no substitute for high-level political, technical, and financial support from national leaders and agencies.”

The CSI e-forum, an extension of the EAP CSI forum, has become one of the most active online communities of the World Bank’s Collaboration for Development platform, with more than 100 participants and over 170 knowledge products shared and categorized. A recently launched Spanish-speaking section has enabled knowledge-sharing and learning with the Central American Clean Cooking Initiative. Under the knowledge-exchange series, numerous products have been generated—from formal reports and just-in-time knowledge notes to country-specific technical and outreach materials and a wide range of knowledge-sharing events. These have served to formulate CSI country intervention strategies, build stakeholder capacity, align additional implementation partners, and raise the profile of the clean cooking and heating issue on the policy agenda of participating CSI countries.

Collaborative efforts and partnerships. Given the cross-cutting nature of the clean cooking and heating agenda, the EAP CSI team has made special efforts to leverage experience and knowledge across countries and sectors, promote cross-country and cross-regional collaboration, and work with external partners. To leverage resources and ensure cross-country knowledge exchange, the CSI shared key consultants and team members across projects. To scale up impacts, the Lao PDR CSI program worked with the EAP health team to develop its health-impacts RBF feasibility study. The Indonesia CSI program worked with the social/gender team to study the social context, gender, and user needs in designing and promoting clean stoves.² The China CSI team collaborated with the EAP environment team to develop a case study on clean cookstoves in rural China to estimate all benefits of achieving universal access to clean cooking (Akbar and others 2014).

From the outset, the EAP CSI has collaborated with key external regional and international partners. Early on, the Indonesia CSI developed a roadmap for achieving universal access to clean cooking with the Indonesian government, thereby securing €250,000 in parallel financing from the French Development Agency (AFD) used to directly support program implementation through AFD’s implementing agency, GERES. The Indonesia CSI supported the establishment

² The series of analytical work, *From the Lab to the Field and Back: Social Context, Gender, and User Needs in the Design and Promotion of Clean Stoves in Indonesia*, is an important part of the EAP CSI’s efforts to improve gender equality in the region (<https://www.astae.net/publication/social-gender-support-to-indonesia-csi>).

and capacity building of the Indonesia Alliance for Clean Cookstoves and facilitated the Indonesia government joining the Global Alliance for Clean Cookstoves (GACC). The Lao PDR CSI worked closely with SNV on a stove acceptability study, and the China CSI worked closely with the China Alliance for Clean Stoves and the GACC.

Integrating solutions into World Bank lending operations.

The EAP CSI has supported the integration of clean cooking and heating into World Bank lending operations as a way to further scale up access. The China CSI has supported the Hebei Rural Renewable Energy Project, which includes a target of delivering clean cooking access to 96,100 households, and development of a clean stoves component under the Hebei Air Pollution Prevention P4R Project. The Indonesia CSI has implemented a Recipient-Executed Trust Fund (RETF) project, with the potential for eventual scale-up. The Lao PDR CSI has supported inclusion of a clean cooking component in the Health Governance and Nutrition Development Project, while the Mongolia CSI has supported a stove replacement program under the Ulaanbaatar Clean Air Project (UBCAP).

What has been learned?

Experience from the first two program phases provide key lessons for policy makers

Country-specific action plans and phased implementation are necessary and appropriate. Although there are common barriers to widespread adoption of clean stoves, the best solutions will vary from place to place owing to differences in social behavior, culture, resources, institutions, and market conditions. Thus, action plans that take country conditions into account are needed. Taking a phased approach—initial stocktaking and roadmap development, followed by capacity building and piloting—appears appropriate before scaling up implementation.

A national program with high-level support is key to scaling up. Clean cooking and heating programs should involve stakeholders across many sectors (public, private, and civil society) at all levels (local, provincial, national, and international). But there is no substitute for high-level political, technical, and financial support from national leaders and agencies. Such support is a key success factor and requires time and engagement to build and maintain.

“Only a robust, locally customizable testing protocol can provide stove developers the type of feedback needed to determine what types of local adaptation may be needed to make a stove relevant for a given geographic market.”

Well-targeted subsidies are needed to achieve universal access to clean cooking and heating solutions. Like universal access to electricity, which no country has achieved without some form of subsidy, universal access to clean cooking and heating will require subsidies to scale up access for the poor. Market forces and mechanisms are powerful tools for ensuring a sustainable supply of clean cooking stoves and should be harnessed in a way that helps the private sector to develop, market, and deliver modern cooking solutions. But left to market forces alone, access will be limited by affordability and other constraints that affect mainly poor households, particularly in less-developed and remote areas. Thus, government policies are needed (i) to establish and maintain adequate subsidy levels and (ii) to design and implement effective subsidy-allocation mechanisms to mobilize and sustain private-sector participation in scaling up access to clean stoves.

Results-based financing is a promising approach for integrating key elements of promoting clean stoves and using public resources to incentivize the market. The RBF framework developed under the EAP CSI provides a way to attract public funding for broad public benefits (such as better health and quality of life, improved gender equality, jobs creation, and climate change mitigation) and use market mechanisms for sustainability. In addition, there is potential for applying the RBF approach to other distributed energy solutions (solar home systems, solar lanterns, biogas).

Clean stove standards, testing protocols, and certification systems that take local conditions and international best practices into account are cornerstones for developing a clean stoves market. Without such systems, incentive mechanisms cannot be properly designed to attract the private sector to bring high-quality stoves into the market. Robust and locally relevant testing is especially important for developing a market where local conditions (expressed in factors such as wood moisture, cooking practices, and fuel preparation requirements) can vary significantly. Only a robust, locally customizable testing protocol can provide stove developers the type of feedback needed to determine what types of local adaptation may be needed to make a stove relevant for a given geographic market.

What lies ahead?

The four EAP CSI country programs will take different forms as they move forward

Scaled-up implementation will require dedicated time and effort, along with significant technical assistance.

Globally, there are few successful programs for scaling up the use of clean stoves. The process is complex, involving a wide range of stakeholders linked to diverse issues, including household behavior, institutional capacity, and private-sector development. Although the linkages to poverty alleviation are quite clear, the process of establishing and nurturing a sustainable clean stoves market will take dedicated time and effort.

As they move into the third phase of pilots and scaled-up implementation, the four country CSI projects are taking different forms, following their respective intervention strategies and roadmaps:

- In **China**, an implementation plan has been prepared in response to the government’s announced plan to disseminate 40 million clean stoves by 2020. In Hebei province, where a dissemination target of 6 million clean stoves by 2017 has been set, the China CSI is supporting the design and development of a clean stove component under the Hebei Air Pollution Prevention P4R Project.
- In **Mongolia**, the stove replacement program under the Ulaanbaatar Clean Air Project has already exceeded its goal of installing heating appliances (stoves and low-pressure boilers) in more than 80 percent of targeted households. Efforts are under way to scale up the clean stove program to the national level.
- In **Indonesia**, the ongoing RETF project to pilot the RBF approach has shown promise for replication and scaling up. A national clean cookstove program now under design will incorporate the experience and lessons learned from the pilot.
- In **Lao PDR**, the CSI team is progressing on the design and development of the innovative health impact RBF pilot, and aims to bring in private-sector financing.

Once the CSI country pilots and scaled-up program implementation are completed and the results are known (phase III), a comprehensive evaluation should be conducted to disseminate the lessons learned (phase IV).

MAKE FURTHER CONNECTIONS

Live Wire 2014/7. "Understanding the Differences Between Cookstoves," by Koffi Ekouevi, Kate Kennedy, and Ruchi Soni.

Live Wire 2014/8. "Tracking Access to Nonsolid Fuel for Cooking," by Sudeshna Ghosh Banerjee, Elisa Portale, Heather Adair-Rohani, and Sophie Bonjour.

Live Wire 2014/28 "Tracking Progress Toward Providing Sustainable Energy for All in East Asia and the Pacific," by Elisa Portale and Joeri de Wit.

Live Wire 2015/46. "Results-Based Financing to Promote Clean Stoves: Initial Lessons from Pilots in China and Indonesia," by Yabei Zhang and Norma Adams.

Live Wire 2015/63. "The Lao Cookstove Experience: Redefining Health through Cleaner Energy Solutions," by Rutu Dave and Rema N. Balasundaram.

References

- Akbar, S., G. Kleiman, S. Menon, and L. Segafredo. "Climate-Smart Development: Adding Up the Benefits of Actions That Help Build Prosperity, End Poverty and Combat Climate Change." Working Paper 88908, World Bank, Washington, DC, and ClimateWorks Foundation, San Francisco, CA.
- GACC (Global Alliance for Clean Cookstoves). 2011. *Igniting Change: A Strategy for Universal Adoption of Clean Cookstoves and Fuels*. Washington, DC.
- Lim, S. S., and many others. 2012. "A Comparative Risk Assessment of Burden of Disease and Injury Attributable to 67 Risk Factors and Risk Factor Clusters in 21 Regions, 1990–2010: A Systematic Analysis for the Global Burden of Disease Study 2010." *Lancet* 380 (9859): 2224–60.

World Bank. 2011. *One Goal, Two Paths: Achieving Universal Access to Modern Energy in East Asia and the Pacific*. Washington, DC: World Bank. <http://elibrary.worldbank.org/content/book/9780821388372>.

———. 2016. *East Asia and Pacific Clean Stove Initiative Summary Report*. Report No. AUS6083. Washington DC: World Bank.

Zhang, Y., and O. Knight. 2012. "Results-Based Financing Framework for Promoting Clean Stoves." EAP Clean Stove Initiative Knowledge Exchange Series. World Bank, Washington, DC.

This note was peer-reviewed by Wendy Hughes, Jan Kappen, and Helene Rex.

Get Connected to Live Wire

“Live Wire is designed for practitioners inside and outside the Bank. It is a resource to share with clients and counterparts.”

The *Live Wire* series of online knowledge notes is an initiative of the World Bank Group’s Energy and Extractives Global Practice, reflecting the emphasis on knowledge management and solutions-oriented knowledge that is emerging from the ongoing change process within the Bank Group.

Each *Live Wire* delivers, in 3–6 attractive, highly readable pages, knowledge that is immediately relevant to front-line practitioners.

Live Wires take a variety of forms:

- **Topic briefs** offer technical knowledge on key issues in energy and extractives
- **Case studies** highlight lessons from experiences in implementation
- **Global trends** provide analytical overviews of key energy and extractives data
- **Bank views** portray the Bank Group’s activities in the energy and extractives sectors
- **Private eyes** present a private sector perspective on topical issues in the field

Each *Live Wire* will be peer-reviewed by seasoned practitioners in the Bank. Once a year, the Energy and Extractives Global Practice takes stock of all notes that appeared, reviewing their quality and identifying priority areas to be covered in the following year’s pipeline.



Please visit our Live Wire web page for updates:
<http://www.worldbank.org/energy/livewire>



Live Wires are designed for easy reading on the screen and for downloading and self-printing in color or black and white.



For World Bank employees: Professional printing can also be undertaken on a customized basis for specific events or occasions by contacting GSDPM Customer Service Center at (202) 458-7479, or sending a written request to cgsdpm@worldbank.org.

