Market transformation through energy efficiency standards and labelling

Introduction

Worldwide, building energy use accounts for 34 per cent of energy consumption and about 25-30 per cent of energy-related carbon dioxide CO_2 emissions, as well as substantial amounts of sulphur dioxide (SO_2), nitrogen oxides (NOX), carbon monoxide (CO), particulate matter (PM) and other energy-related local pollutants.[14] Energy use in the building sector (principally household appliances, heating, cooling, lighting, and other energy-consuming household equipment) is a large and growing share of total energy use.

Due to economic growth and the increasing standard of living, growth in building energy use is particularly strong in developing countries. For example, in some Asian countries energy use in commercial sector buildings is growing by as much as 8.9 per cent annually. Without focused efforts to reduce the energy consumption by appliances and equipment, residential and commercial building electricity demand will continue to grow rapidly, taxing energy supply and delivery systems, restraining economic growth, and resulting in significant global and local environmental damage.

An energy efficiency standard is a regulation that prescribes minimum energy performance (that is, the maximum energy use) of an energy-using product (most commonly, household appliances, lighting products and other energy-consuming equipment). Energy efficiency labels are information labels attached to manufactured products indicating the product's energy efficiency rating or estimated annual energy use in order to provide consumers with the data necessary to make an informed purchase. Appliance energy efficiency labelling and standards can be a primary force in the creation of stronger markets for energy-efficient goods and services. By gradually eliminating low-cost, inefficient appliance models and by stimulating the development of more efficient technologies, labels and standards increase a country's overall energy efficiency.

Energy standards and labelling (S&L) programmes are often a highly cost-effective way to improve the building of energy efficiency. In the United States, each $1 of taxpayer money spent by the Government on existing standards will, over the life of those standards, result in $350 to $440 investment by consumers in energy efficiency and $610 to $760 net savings from fuel reductions. The United States experience with S&L programmes dramatically demonstrates the enormous energy savings that can be achieved with these policies. By the year 2020, standards will reduce annual residential energy consumption in the United States by a projected 8 to 9 per cent compared to the levels expected without any standards, saving a cumulative total of 25 to 30 quads of energy and 422 million metric tons of carbon by 2015 and 60 quads of energy and 964 metric tons of carbon by 2030.[15]

Based on programme results to date, successful implementation of appliance labelling and efficiency standards in the developing world can yield similar if not more significant results. Experts estimate that in some developing countries the adoption of comprehensive appliance labelling and efficiency standards could help shave electricity

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[14] *Energy-Efficiency Labels and Standards: A Guidebook for Appliances, Equipment, and Lighting*, 2nd edition, CLASP, February 2005.

[15] CLASP phase 2 project document.

consumption by as much as 10 to 20 per cent over the next 25 years, with concomitant reductions in greenhouse gas (GHG) emissions and consumer energy bills.

The project's goal was to promote the cost-effective adoption of energy efficiency standards and labels in the developing world, with particular focus on China, India and Brazil. In each of these countries, the project worked closely with government authorities and other stakeholders to develop and strengthen country-based and country-owned standards and labelling programmes. The focus of this work was to build national capacity and strengthen national and regional networks through technical assistance, training and provision of informational, technical and financial resources.

The project also conducted targeted country or regionally based activities in Ghana, South Africa, Mexico and Poland and in the South Asia region. Finally, the project developed a variety of informational and analytical tools and other materials, which were made available to interested parties via conferences, training workshops and the Internet, in particular the CLASP standards and labelling *Guidebook*, the CLASP website, the policy analysis calculator and model survey forms.

This case study describes and presents the results and findings of a United Nations project that sought to transform markets to higher levels of energy efficiency through implementation of a global programme on energy standards and labelling. The project technical counterpart is the Collaborative Labeling and Appliance Standards Program (CLASP), which is a World Summit on Sustainable Development (WSSD) partnership and non-profit corporation that seeks to serve as the primary international voice and resource for policymakers and practitioners of energy efficiency standards and labelling. The project is being implemented by the United Nations Department of Economic and Social Affairs (UNDESA).

The project's goal was to promote energy efficiency by providing technical assistance and/or informational tools to help developing countries develop and implement minimum energy performance standards and energy efficiency labels for appliances, lighting, motors and other energy-using products. CLASP was funded in two phases by the United Nations Foundation (UNF) and other donors.[16] Phase 1 was implemented from April 2000 to the end of 2001 with seed funding of $1.61 million from UNF and approximately $1.4 million from the Energy Foundation (EF), the International Copper Association (ICA), the Global Environment Facility (GEF), the United States Environmental Protection Agency (USEPA), the United States Agency for International Development (USAID) and the United States Department of Energy (USDOE). Phase 2 was implemented from the end of 2002 to the end of 2005, with funding of $1,250,000 from UNF (including a $750,000 pass-through from USAID), with parallel funding of $872,000 from USEPA, the Climate Technology Initiative and the Energy Foundation.

Each of these activity areas is discussed in detail in the following sections.

China country programme

The project's China programme is the largest and most comprehensive programme component. Activities included work on four energy efficiency standards, endorsement labels for three energy-efficient products, development of a new energy informational label, technical training, and a product prioritization study for future labelling work.

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[16] Project code ESA/GLO/99/095 for phase 1 funding and ESA/GLO/02/236 for phase 2.

The project collaborated with seven major in-country institutions, the key Chinese institutions responsible for standards and labelling policy. These included the National Development and Reform Commission (NDRC), which oversees all standards and labelling work; the National Commission for Standardization Management (formerly part of the State Bureau of Quality and Technical Supervision), which is responsible for approval and implementation of energy efficiency standards; the China National Institute of Standardization (CNIS), responsible for analysis, proposals and stakeholder involvement in the standard-setting process; the China Center for the Certification of Energy Conservation Products (CECP), responsible for the development of energy efficiency criteria for the nationally certified energy efficiency label; the China Institute of Metrology and the China Energy Conservation Association, responsible for oversight and management of China's certified national testing laboratories; and the Shanghai Electric Apparatus Research Institute (SEARI), the only internationally certified motor testing laboratory in China.

The programme's goal was to support and build on national activities that were planned or already in process in China, but for which international assistance was needed. For example, China was already developing new minimum efficiency standards, but with a budget of only US$ 1,200 per standard, and without engineering simulation, national impact analysis, financial analysis, and other key elements of standard development. The programme therefore focused on training Chinese staff to use these new analytical techniques for each standard under development.

The same approach was adopted with energy efficiency labelling. At the project's inception, China had a voluntary endorsement label in place, but no tools with which to evaluate potential energy savings of labelled products or the cost/benefit impact of the label criteria. The project therefore focused on providing those tools and training Chinese staff in their use.

New standards development for fluorescent lamps

Support for development of fluorescent lamp standards comprised training and support for stakeholder meetings. Six Chinese technical experts were trained in development of fluorescent lamp standards. This training included support for development of the technical support document for the standards, which includes the results of the techno-economic analysis and provides direct input to the development of the draft standards. Support was also provided to CNIS for the organization of three stakeholder meetings involving government, industry and academic experts to review the draft, revised and final standards for fluorescent lamps. These meetings preceded the final release and implementation of the standards. As a result of the training and stakeholder support, new mandatory fluorescent lamp standards were enacted at the end of 2002, yielding estimated carbon savings of 3 million tons in year 10 of operation and additional annual savings thereafter.

Development of new "reach" standard for motors

The Chinese Government approved a new policy approach to standards development that will result in significantly tighter minimum efficiency standards, combined with a longer lead-in time for manufacturers to prepare for changes in the standards and thus improve predictability and reduce compliance costs. In the past, energy efficiency standards in China were developed in small step increments for immediate implementation, resulting in manufacturers' inability to plan for longer-term changes.

Technical assistance was provided to CNIS in the establishment of new mandatory minimum efficiency standards for small and medium low-voltage air conditioner motors. This also included support for outreach for the involvement of motor manufacturers and other stakeholders in the review of proposed motor minimum efficiency standards (130 individual stakeholders, including manufacturers, users, research institutes,

universities and government agency staff contributed comments, more than 60 persons provided their feedback on the standards, and more than 30 persons participated in the review meetings).

The project conducted a manufacturers' survey and a consumer survey on the motor sector and motor efficiency levels. It also analysed international motor standards.

A stakeholder workshop was then held, which decided to propose for China the "Efficiency 1" level of motor efficiency as currently in use in the European Union, with a further move to the "Efficiency 2" level in 4 to 5 years as the "reach" part of the standard. A new mandatory motor standard for small and medium motors was approved and issued in 2002. The new "reach" motors standard was completed and then formally adopted in December 2004.

Other standards work

The project provided support for initial data collection and analysis by CNIS for a new central air conditioner standard. This included organization of a technical committee of government, industry and research institution stakeholders, development of a database of central air conditioning energy and market data; and preparation of a draft central air conditioner standard for review by stakeholders. The Government is implementing a new reach standard approach for room air conditioners, in parallel with and similar to the approach being taken for motors. Work also focused on training in technical and economic analysis for development of a washing-machine standard. Eight Chinese technical staff received training, and a draft new washing-machine standard was completed in 2002.

Endorsement efficiency labelling of office equipment

In 2002, the Government approved the research and analysis needed to develop a new mass procurement programme for energy-efficient products. A policy proposal for pilot implementation in government buildings (including central and local government, universities, schools and hospitals) was completed in December 2003. The programme includes labelling of the most standard office equipment, including computers, monitors, fax machines, printers, scanners, copiers and televisions. Prior to the project, none of these products had been certified for energy efficiency labelling. Work under this task included:

- Analysis of the market, usage and technical performance of each of these products in the China market;
- Development of an energy savings model for each product;
- Preparation of draft efficiency criteria for each product;
- Stakeholder meetings to discuss proposed efficiency levels;
- Certification of each office equipment product for inclusion in the government procurement programme.

All covered products were certified by December 2003. Projected savings from office equipment certification are expected to reach 420 kilotons carbon equivalent per year beginning in 2012. Building on and partially in response to the certification programme, the Ministry of Finance announced a new government policy for mandatory energy efficiency procurement of labelled products, which began in early January 2005.

Standby power losses have also been identified by the Government as a key concern, and this has led to development of plans for comprehensive standby power management. Results included: implementation of a first-ever survey of Chinese household standby energy use; participation by China in international standby power initiatives; and preparation of a plan for labelling standby power products, beginning with DVDs.

Development of China's energy information label

China decided to pursue the preparation of an energy information label as a further means of educating consumers about life-cycle energy costs for major appliances. The refrigerator was selected to be the first labelled product, and project support for this effort was extensive. First, an analysis was made of the product's current market and technical options. Then technical staff of CNIS were trained in the development of a criteria-setting model. A market research study was undertaken to test consumer reactions to various label designs and to determine the most effective message on labels. Subsequently, stakeholder meetings were organized and an implementation plan was finalized. Finally, the new information label was launched.

Energy efficiency information and endorsement labelling integration

China is one of relatively few countries that have both an endorsement label and an information label. The endorsement label is managed by CECP and is a voluntary one. The endorsement label was initially developed prior to commencement of the project, but the project supported the endorsement label's further development and the addition of new products to the labelling programme. The information label was developed through the project and is mandatory.

Because of the overlapping, yet in some cases differing, requirements of each of these label types, there are a number of technical and programmatic challenges to simultaneous adoption, promulgation and promotion of endorsement and information labels. This task therefore focused on clarifying potential technical and programmatic approaches to managing the two labels in an integrated fashion in order to achieve the greatest combined impact and to ensure consistency, uniformity and consumer appeal. An international survey of labelling issues (including labelling coordination) was completed during the first quarter of 2005 in order to support Chinese research and decision-making. The information label was subsequently launched in March 2005, and the integration report completed during the second half of 2005.

Other capacity-building

The CLASP *Guidebook* to energy standards and labelling and other international regulatory and policy-related materials regarding information labelling development and implementation were translated into Chinese. These publications and materials were widely distributed at the national, provincial and local levels.

Institutional capacities for appliance testing were also strengthened. Engineers from China's certified testing laboratories (China Institute of Metrology and China Energy Conservation Association) undertook international training on operation, management, procedures, quality assurance and testing conformity. A study was prepared that made recommendations for reforms at China's nationally certified testing laboratories, which resulted in improved testing accuracy.

Finally, an analytical study was prepared identifying the next tranche of products that should be targeted for endorsement labelling. This included organization of a training programme at the Lawrence Berkeley National Laboratory (LBNL) on analytical tools for use in the study. Fifteen products were identified for inclusion in future programmes; they included: compact fluorescent lamps (CFLs), adapters, gas water heaters, water cookers, motors, washing machines, transformers, personal computers, lampblack machines, computer monitors, fax machines, printers, scanners, VCD/DVD players and copiers.

India country programme

In 2002, the Indian Government passed a landmark Energy Conservation Act creating the Bureau of Energy Efficiency (BEE), a department of the Ministry of Power (MOP), and directing it to collaborate with the Bureau of Indian Standards (BIS) in energy efficiency standards and labelling development. CLASP international experts conducted several missions to India in order to meet with BEE and other officials and develop the project plan.

Concurrent with this planning process, the International Institute for Energy Conservation (IIEC) (one of the CLASP implementing partners) established and staffed offices in India and signed a memorandum of understanding (MOU) with BEE. The MOU established a public-private partnership between IIEC and BEE and called for IIEC to provide national and international experts to advise BEE in the implementation of energy conservation programmes in seven target areas: demand-side management, transmission and distribution, standards and labelling, special projects, building codes, ESCO finance, and water/energy efficiency. Standards and labelling is identified as one of the priority activities for implementation of the Energy Conservation (EC) Act and the MOU. IIEC's India office has therefore acted as the in-country partner for the CLASP project.

Baseline and market assessment for S&L target products

Based upon preliminary discussions with stakeholders, India identified refrigerators, air conditioners, water heaters and motors as the priority products for initial S&L development. Work under this task was conducted to verify the validity of that initial prioritization through analysis of data on the energy efficiency of existing products in the marketplace, comparative analysis of Indian product efficiency with international levels, and projections of GHG reduction potentials for the selected products.

During the work, it was discovered that efficiency data for air conditioners were not available because no testing labs were capable of performing the required testing in accordance with the selected International Standards Organization (ISO) testing procedure. As a result, the data analysis focused on refrigerators (a partial baseline analysis of air conditioners was completed). Collection of baseline refrigerator data from manufacturers was a significant achievement, since manufacturer associations in India do not generally share this information.

Assessment of testing capacity for priority products and expansion needs

CLASP subsequently worked with BEE to evaluate existing testing facilities, the number of new testing laboratories required, and options for upgrading current facilities. The most appropriate test procedures for the climate and use conditions in India were also evaluated and determined. Finally, training was conducted on procedures for certification and licensing.

A total of five refrigerator and air conditioner test facilities were evaluated. Draft test procedures for refrigerators and air conditioners were developed, along with an international comparison of local, ISO and Australian test procedures. A training workshop was conducted in May 2004 to provide an overview of international experience with refrigerator testing and hands-on experience with test procedures, methodology and reporting. Modified and improved test procedures were developed and submitted to the Ministry of Power for approval. All deliverables have been completed. Technical support to independent and manufacturers' test facilities is ongoing.

Development of at least one new minimum efficiency standard

Refrigerators were selected by the Government to be the first product to receive a revised standard. The project supported the work of committees in BEE and BIS charged with proposing, reviewing and setting a time frame

for finalizing minimum efficiency standards. It also provided technical assistance in the dialogue among consumers, manufacturers and other stakeholders to review the draft, revised and final standards and labelling criteria for target products. Support was then provided in the drafting and finalization of the standard prior to approval.

In October 2004, CLASP organized a training workshop for standard-setting analysis with the help of experts from LBNL and the Indian Institute of Technology (IIT). The refrigerator technical committee members from BEE, BIS, independent test labs, industry and consumer organizations attended the workshop. The purpose of organizing the training workshop was to build capacity within the refrigerator technical committee in conducting energy efficiency analysis for refrigerators using state-of-the-art software. As per standards and labelling programme implementation procedures, the technical committee will be engaged in future energy efficiency labelling and standard-setting activities. Providing hands-on training to the committee members was very beneficial for programme development and implementation.

The three-day training agenda covered the most pertinent issues related to refrigerator energy efficiency in India (see *http://www.iea.org/Textbase/work/workshopdetail.asp?id=196*).

In July 2005, MOP advanced a new draft refrigerator standard, representing a significant success for the project. Previously, MOP had proposed a single set of 5-star rating categories for frost-free refrigerators only. In the revised draft, four increasingly stringent sets of draft 5-star label thresholds have been proposed for both frost-free and direct cool refrigerators, and a draft minimum energy performance standards (MEPS) level corresponding to the 1-star minimum threshold applies. The draft standard has been distributed to manufacturers for comment. If adopted, the new standard would lead to improvement of almost 50 per cent for a typical no-frost 250-litre refrigerator (722 kWh/year in 2005 to 370 kWh/year in 2012). In addition, a new draft standard has been completed for air conditioners, exceeding the workplan requirement of one revised standard.

Preparation of energy information labelling for one product

Refrigerators were selected by BEE as the initial target for energy-efficient labelling. Technical support from the project assisted in (*a*) analysing the current market and technical options, (*b*) training BEE in the development of a criteria-setting model, and (*c*) establishing new efficiency criteria for labelling the selected product. Support was given to stakeholder meetings for the promotion of labels (consumer groups, manufacturers, BIS, BEE), as well as for consensus-building around their roles in implementation. BEE was also assisted in designing a process to test the proposed labels in various regions in India, with help from a consumer marketing organization in India. After preparation of a media campaign, the new energy information label was launched.

Brazil country programme

Project assistance to Brazil focused on project scoping and strategic planning for a multi-year programme of technical assistance. Brazil is the project's priority country in South America, for two reasons. First, Brazil is the largest economy on the continent. Second, Brazil is currently facing a severe energy crisis. To avoid blackouts, the Government has issued emergency measures aimed at reducing electricity consumption by 20 per cent. Businesses and consumers that do not comply with this target face stiff financial penalties. In response to the crisis and the need to reduce energy consumption in both the long and short terms, a strong political consensus exists for energy efficiency standards and labelling, as evidenced by enaction of a new mandatory programme into law in October 2000 (prior to that time, Brazil had only a voluntary standards and labelling programme).

In January 2002, the Brazilian Government passed a decree elucidating how the new standards and labelling programme would be implemented. A technical committee will be responsible for coming up with the procedures that will govern how standards will be set for each category of end-use equipment. The committee responsible for each category of end-use equipment will be led by the Ministry of Mines and Energy (MME) and composed of representatives from other relevant ministries, the National Electric Regulatory Commission (ANEEL), a representative from an energy efficiency research university and a citizen representative with energy expertise.

Under the previous voluntary regime, standards and labels in Brazil were the result of political compromises between industry and government. International experience has shown that this approach results in less than optimum standard levels and/or labelling categories in comparison to a mandatory system. The project's goal was therefore to work with the Brazilian Government and industry to ensure that the procedure for setting standards and labels relies on sound technical and economic analysis. In addition, the CLASP project set a goal of providing technical assistance support for preparation of at least one mandatory standard or label in Brazil.

Institutional capacity and data needs assessment

An assessment was conducted through interviews with PROCEL, CEPEL and other laboratories, INMETRO and key industry groups (Eletros, ABINEE and ABNT). The assessment evaluated existing staff and institutional capacity to develop, implement and maintain S&L programmes based on sound technical and economic analysis. The project also reviewed the technical expertise that exists to evaluate and process the data as they are gathered. Finally, CLASP determined whether the number of lab and public policy staff is adequate for maintaining a solid mandatory standards and labelling regime. Results included:

- Report on existing institutional roles for standard-setting in Brazil and recommendations on possible changes that may facilitate the development of more effective minimum efficiency standards;
- Report on existing data-collection requirements that support the standards and labelling regime, and recommendations on what additional data may be needed, how they should be collected, by whom they should be collected and how they should be monitored.[17]

At the request of the Ministry of Mines and Energy and the Ministry of Science and Technology (MCT), a number of additional tasks were also undertaken, including: (*a*) an appliance market analysis and data collection for a specific appliance; (*b*) an inventory and comparison of international experience of standard-setting methodologies; (*c*) an evaluation of implementation and effectiveness of new mandatory standards for tri-phase motors (small commercial motors up to 250 hp); and (*d*) preparation of a two-year workplan in line with MME and MCT priorities.

Assessment of current levels of efficiency of end-use equipment in Brazil

Working with local partners, CLASP assessed pre-project levels of equipment energy efficiency to serve as a baseline for calculating the impact of the mandatory standards and labelling programme. Data gathered on end-use appliances included current and forecast efficiency levels, level of efficiency politically and technically possible, characteristics and numbers of domestically manufactured products, characteristics and numbers of

[17] Modifications were made to the original workplan at the request of the Ministry of Mines and Energy and the Ministry of Science and Technology.

imported products, annual sales volumes, sales prices, production volumes, distribution channels, retail and manufacturing sector characteristics, engineering data for technical and energy characteristics for individual product models available on the market, appliance usage data, consumer behaviour data, related data on energy prices, and other national energy statistics. Results included:

- Analysis of available data;
- Protocol for how to gather necessary information not available;
- Official assessment of current level of efficiency of end-use equipment in Brazil;
- Comparison of Brazil's efficiency levels for common products with other similar countries.

Technical capacity-building for at least one standard or label

This task incorporated the results of the preceding tasks to help Brazil develop the in-country technical expertise necessary to support preparation of at least one mandatory standard or label. That expertise includes the economic and statistical capability for data collection and analysis, as well as the technical capability for appliance testing. By training Brazil in both the full techno-economic analysis approach used by the United States and the life-cycle cost (LCC) approach used by some European countries, the goal was to allow Brazil to be fully equipped to decide which approach it wanted to use given the data it had available. The result was a completed draft report on development of minimum energy performance standards (MEPS) levels, comparison with international levels and test procedures, industry impacts and financial benefits to consumers.

Evaluation of effectiveness of new mandatory standards for tri-phase motors

A team of local and international experts conducted a preliminary impact assessment of the first MEPS for small commercial motors (up to 250 hp) passed in Brazil in December 2002. COPPE worked with the project to prepare a motor study with recommendations for the motor standard implementation. The study compared the MEPS with those used internationally. It also estimated the operating cost savings potential from the establishment of new MEPS as well as the costs and the cost/benefit ratio from the standpoint of the user and the Brazilian Interconnected Power System. In addition, the study assessed the potential for expansion of the range of motors covered by MEPS to 500 hp, as well as the technical advances towards high efficiency in induction motors, comparing these technologies and their impacts on motor design and fabrication. Finally, the study made specific recommendations regarding the appropriateness, additional preparatory work and timing of standards.

Ghana country programme

Work in Ghana was undertaken with the goal of developing at least three standards and one label. The project worked with the Ghana Standards Board (GSB), the Ministry of Energy, the Ghana Customs and Excise Police Service (CEPS), and several parliamentary select committees, including the Committees on Mines and Energy, Trade and Industry, and Finance. The Ghana Standards Board houses and staffs the S&L programme. CLASP also worked with the Ghana Energy Foundation, which provided co-funding for the Ghana programme.

As of the end of the programme, Ghana had one standard (for room air conditioners) in place and had completed market assessment and baseline work for at least two additional standards (refrigerators and motors). The estimated savings projected from the room air conditioner standard are energy savings of at least US$ 8 million, reduced emissions of 132,000 tons of CO_2 and power generation capacity savings of approxi-

mately 29 MW by 2010. Impacts from the commercial sector are expected to be even higher. Furthermore, the project's support in training Ghanaian staff in life-cycle cost and net impacts analysis led to a higher standard level for room air conditioners than local analysis (based on a statistical approach) had suggested.

CLASP built capacity in Ghana to allow the country's programme to succeed in implementing a comprehensive S&L programme. Without project intervention, market research with stakeholders (e.g., consumers) would not have been conducted. Because of the market research that did take place, Ghana has a much more effective labelling programme.

South Africa country programme

During the project lifetime, CLASP worked with South Africa to develop and launch an S&L programme for appliances and equipment, in the following areas.

Development of advocacy tools

CLASP worked with key institutions in South Africa including, in particular, the South African Standards Board, ESKOM, EDRC, and such government ministries as the Department of Environmental Affairs and Tourism. Outputs under this task included a preliminary S&L impact assessment and a preliminary S&L product prioritization. To support AED's efforts, CLASP attended workshops in February, July and November 2003, and provided such tools as CLASP's recruitment screener, moderator topic guide, label rating forms and comparison labels for use in the focus group survey. CLASP provided commentary on the focus group questionnaire, the labels selected for use by the focus group, the selection criteria for focus group members, and technical assistance on the questions raised prior to the focus group survey.

A workshop was organized in which focus group receptivity was cited, label design preferences noted and consumer behaviours discussed, as presented by CASE, the local consultants charged with conducting the survey. After this meeting, CLASP held meetings with other government agencies involved in the S&L process and subsequently reviewed technical data prior to final design of the label and formulation of the government implementation strategy. The project also produced the report "Public Understanding and Participation in South Africa", prepared using the data gained from the national telephone and omnibus surveys.

South Asia Regional Initiative

The South Asia Regional Initiative (SARI) was a cooperative activity carried out in conjunction with the Academy for Educational Development (AED). In December 2001, AED completed a training course for policymakers in the SARI/Energy region (Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka) on standards and labelling using the CLASP S&L *Guidebook* (discussed under "CLASP Toolkit", below) as the basis for the training course. Under phase 2 of the project, CLASP built on that earlier training workshop to provide training and stakeholder support of a more specific and problem-solving nature. The follow-on training's goals were to achieve: (*a*) regional consensus at the political level on potential for harmonization and (*b*) mobilization of individual country institutional resources within the SARI/Energy region towards similar S&L development. The programme was also coordinated with the activities under USAID's SARI/Energy technical assistance programme.

Based on country and regional needs determined through communication and relationships with S&L experts in the SARI region, two of the four new course concepts described below were developed into training courses and delivered in conjunction with AED via two workshops in the SARI region in 2003.

The first course, on effective S&L programme development, included analysis of legal, policy, regulatory and institutional frameworks required for harmonization of standards and labelling in the region. The results of the meeting were (*a*) draft framework legislation for each SARI/Energy country with recommendations on steps to finalization, and (*b*) a regional coordination plan for legislation implementation with recommendations on mechanisms and steps for official agreement.

The second course was on setting energy performance standards, including analysis of the costs and benefits of a standards and labelling programme for each of the SARI countries as well as regional trade-offs. This course made use of CLASP's policy analysis calculator, a modelling tool that aids in-country partners in producing detailed and accurate estimation of efficiency costs and benefits of appliance efficiency standards programmes. The results of the meeting were (*a*) a draft cost/benefit analysis for one standard for each SARI country with recommendations on steps to finalization, and (*b*) a regional coordination plan for standard-setting and assessment throughout the SARI region with recommendations on mechanisms and steps for official agreement.

A third course covered designing and managing energy efficiency test facilities and protocols, including analysis of test facilities and procedures for various kinds of appliances such as lighting, refrigerators, air conditioners and other electrical consumer durables to evaluate the potential of using existing facilities on a regional basis and avoiding duplication. Discussion on how enforcement is accomplished in other countries was addressed, particularly key variances in approach such as whether or not testing is performed at manufacturers', private third-party or government test facilities. The results of the meeting were: (*a*) a recommended test protocol for each SARI/Energy country; and (*b*) a regional plan for coordinated use and management of test facilities throughout the SARI region including recommendations for expansion of test capacity and mechanisms for official agreement.

Finally, a fourth course on designing and promoting labels, including establishment of uniform metrics, development of label concepts, and effective stakeholder engagement, promotion and marketing strategies, was developed. Results included: (*a*) research design plans for all countries without an existing label; (*b*) integrated marketing plans for all countries to implement labelling; and (*c*) a regional coordination plan for promotion of labelling throughout the SARI/Energy region.

The two courses selected were on designing and managing energy efficiency test facilities and on protocols and effective S&L programme development and were held in October 2003 (one week each) in Sri Lanka and Bangalore, India, respectively. The Sri Lanka workshop was attended by 24 officials from Bangladesh, Bhutan, India, Nepal, Sri Lanka and the Maldives. In addition to the two key technical trainers assigned by CLASP, three guest speakers from the region were invited to provide regional and local perspectives to the participants. The Bangalore course was attended by 22 officials from Bangladesh, Bhutan, India, Nepal and Sri Lanka, and included a total of five guest speakers from SARI member countries, AED and CLASP.

CLASP Toolkit

In addition to the country and regional activities outlined in the section above, CLASP has developed a series of analytical tools for dissemination to country programme participants, as well as for broad distribution to other developing (or even developed) country energy efficiency officials and other interested parties. This has allowed CLASP to greatly increase the project's impact.

Standards and labelling Guidebook

The CLASP *Energy-Efficiency Labels and Standards: A Guidebook for Appliances, Equipment, and Lighting* was first released in February 2001, and an updated second version was issued in early 2005. The *Guidebook* is a 321-page document chock-full of information and analysis. It is distributed free of charge to project participants and partners, at workshops that CLASP is involved in, and is available for download from *www.clasponline.com.* The English version of the *Guidebook* has been distributed to over 1,000 people in 60 countries. The *Guidebook* has also been translated into Spanish, Korean and Chinese, and distributed in those languages to more than 300 representatives from 21 countries.

Policy analysis calculator

The purpose of the CLASP policy analysis modelling tool is to assist developing countries in estimating the costs and benefits of appliance efficiency standards programmes. The tool is an Excel-based spreadsheet program designed to aid in-country partners in producing detailed and accurate estimation of efficiency costs and benefits. In addition, the tool is meant to make these calculations easier and less costly (in particular relative to the high cost of international consultants) for developing country officials and other stakeholders to prepare preliminary high-quality, detailed analyses. Ghana, for example, selected a candidate room air conditioner standard based on a statistical approach (which requires a minimum of technical analysis) without using the calculator and had initially picked an EER for air conditioners of 2.5. By working with LBNL to apply and utilize the policy calculator, the Ghanaian/LBNL team was able to perform a more detailed analysis within only three days that showed that Ghana receives at least an additional $50 million in net economic benefit by improving the standard to an EER of 2.75.

CLASP was then able to test the calculator in other countries, perfect spreadsheet and web-based tools, develop technical manuals and evaluation documents, and develop a plan for further dissemination of the calculator. The goal was to achieve use of the calculator by at least three country partners, which has been significantly exceeded. Moreover, preliminary regional analyses were performed for Asia and South America. The policy calculator is available at *http://www.clasponline.org/policy.php3*, along with full user instructions.

Model survey forms

In most developing countries where there is a shortage of data, there is often a need to conduct surveys to collect new data in order to ensure proper analysis in the standard-setting process. This is an impediment to policymakers deciding to undertake S&L programmes, since it increases the cost of developing an S&L programme. In order to reduce this cost and simplify the survey process, the project developed a standardized survey form that addresses basic saturation and end-use questions. CLASP developed two model survey forms, one for residential and one for commercial use, each with sections for the following technologies: indoor and outdoor lighting, heating, air conditioning, refrigeration and hot water heating. These forms and instructions for their use are available on the CLASP website, *http://www.clasponline.org/survey.php3*. An initial draft of the forms was field-tested in Ghana with data gathered from about 3,000 residential surveys conducted throughout the country. The resulting data were used to further improve the forms.

CLASP website

CLASP launched its website (*www.CLASPonline.org*) in July 2000. The website contains information on S&L programmes worldwide, current research on issues in planning and implementing S&L programmes, presen-

tations, training materials, papers, downloadable sample labels and the full gamut of other tools that CLASP makes available free of charge to all interested parties (more than 150 documents are available on the website, and new documents are added regularly). The website also includes a webmaster e-mail address to which technical enquiries can be addressed and answered by CLASP S&L experts. Since its launch, the website's average monthly activity includes over 82,000 hits and 1.6 gigabytes of downloads from more than 100 countries.