

# **Alignment of Efficiency Standards and Labeling Programs in South Asia**

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## **ABSTRACT**

In 2000, the United States Agency for International Development (USAID) initiated a program called the South Asia Regional Initiative for Energy and Development (SARI/Energy) to encourage regional development of energy programs, including standards and labeling for appliances. A team of technical experts from the United States, India and Sri Lanka were assembled to facilitate coordination of standards and labeling programs in participating countries through a series of reports and stakeholder meetings. These activities focused on the alignment of technical specifications for certification of efficiency for refrigerators, fluorescent lamp ballasts, compact fluorescent lamps and ceiling fans as candidates for alignment of technical specifications for certification of energy efficiency. In addition, activities encouraged cooperation towards development of effective policies, through identification of best practices and exchange of technical expertise between participating governments.

The SARI/Energy alignment project is significant not only in terms of energy efficiency policy outcomes in South Asia, but also because it is an instructive case study in the context of regional coordination of efficiency programs throughout the world. The SARI/Energy project is distinct from other efforts in that it is not underpinned by any concrete regional trade agreement. In addition, the project includes the creation of new programs which take advantage of lessons learned by neighbor countries. It serves as an example of how alignment can be framed to address a general set of policy goals and become a process of regional expansion of successful programs, rather than solely a process of bringing existing programs into agreement.

## **Introduction**

This paper represents a case study in the development of energy efficiency standards and labeling (EES&L) in developing countries. We hope that it provides concrete examples of issues that can arise in countries that share some common goals but which have a diversity of energy and market scenarios and varying levels of institutional capacity related to efficiency policy. More specifically, this case study addresses multi-country or regional level initiatives that focus on bringing existing policies into better correspondence and/or creating new programs through cooperation, including: resource sharing, best practice matching, and technical exchange. We hope that this work will contribute to the ongoing dialogue concerning development of such programs.

## **Alignment of Appliance Efficiency Regulations**

There are several possible meanings of alignment. First and most importantly, it can refer to the use of technically equivalent test procedures to define product efficiency. Alternatively, it can mean that level definitions, either of rating classes (for labels) or of

minimum requirements, be made equal. Finally, the design of efficiency labels can be duplicated.

Appliance manufacturers have a direct interest (and governments have an indirect interest) in the alignment of efficiency regulations, relating to the cost of compliance with the program. As mentioned above, standardized testing of appliances is the technical foundation of any program. Manufacturers usually bear most of the cost of testing. This cost may involve the construction and certification of laboratories, training of staff, destructive testing of product samples and paying the salaries of the technicians performing each test. If a country to which the manufacturer exports requires a different test procedure than the manufacturer's own government to determine the efficiency of the same products, the manufacturer will face, at minimum, double testing; in the extreme case, additional facilities may be required. If the programs in question are voluntary labeling programs, high costs may discourage manufacturers from participating. This means that consumers may lose the benefit of the efficiency information, and the manufacturer may be at a competitive disadvantage. If the programs are mandatory, the additional cost of testing may constitute a barrier to exports.

Even though the South Asia Regional Initiative for Energy and Cooperation and Development (SARI/Energy) uses the term "harmonization," for the purposes of this paper, we use the term "alignment," to avoid the coercive connotations which have been identified in association with harmonization (EEDAL 2003). We refer to "alignment" as a process realized by voluntary agreement, reserving the term "harmonization" only for cases in which agreement is mandated by a regional (or international) governing body with precedence over national policy.

### **Examples of Alignment Programs**

Recently, there have been several examples of initiatives to harmonize or align appliance efficiency regulations at a regional level. These efforts have focused on areas where there is a close trade relationship among parties, but the degree of institutionalization of this relationship, and the degree to which such agreements are binding, varies.

The European Union (EU) is the arena with the strictest requirements for equivalence of standards between individual countries, with regulations regarding appliance efficiency being no exception. In the EU, national efficiency standards and labeling requirements for appliances have been replaced entirely by European standards. More recently, in North America, an initiative was begun to promote the voluntary alignment of energy programs, in association with the North American Free Trade Agreement (NAFTA). The North American Energy Working Group was formed in 2001; one of its ongoing activities involves the alignment of appliance efficiency regulations. Initial studies by the Working Group indicated that 46 energy-consuming products are regulated for efficiency in at least one of the three NAFTA countries. Of these, three products are subject to similar or identical minimum efficiency performance standards (MEPS), and 10 products present a near-term potential to align (similar test procedures and MEPS) (Wiel 2002).

The EU and North America are not the only regions pursuing alignment of EES&L regulations: efforts have been made in this direction within APEC and ASEAN in the Asia-Pacific, and by MERCOSUR among the Southern Cone countries of South America. Finally, Australia and New Zealand have committed to co-promulgate all regulations to the extent that they constitute a single economy.

## **The SARI/Energy Appliance Efficiency Alignment Project**

We present the case of appliance efficiency standards and labeling program development in six countries in South Asia already part of a larger energy-related program initiated by the U.S. Agency for International Development (USAID) in the year 2000. The SARI/Energy program includes components for regional energy trade and exchange, regulatory and tariff policy reform, private sector involvement, and rural energy supply, in addition to energy efficiency. The component of this initiative relating specifically to appliance efficiency programs began in January 2002 with a training course for country representatives held in Bangkok. The objectives of this activity, and those that followed were the following:

- Assist the local standards institutions in understanding the benefits from energy-efficient standards and labeling.
- Communicate the role of and benefits from energy-efficiency standards in competitive markets.
- Develop a mechanism and network for regional standard-setting.
- Evaluate the benefits from regional testing facilities and recognize regional testing bodies for labeling to support energy-efficiency standards.
- Establish a monitoring process to determine impacts.

The authors participated as part of a team of international experts assembled in the spring of 2003 with the goal of presenting a series of meetings and workshops relating specifically to alignment of standards throughout the region. These activities occurred during the summer and fall of 2003, and were attended by representatives from Bangladesh, Bhutan, India, Nepal and Sri Lanka.<sup>1</sup>

### **Appliance Market and Trade**

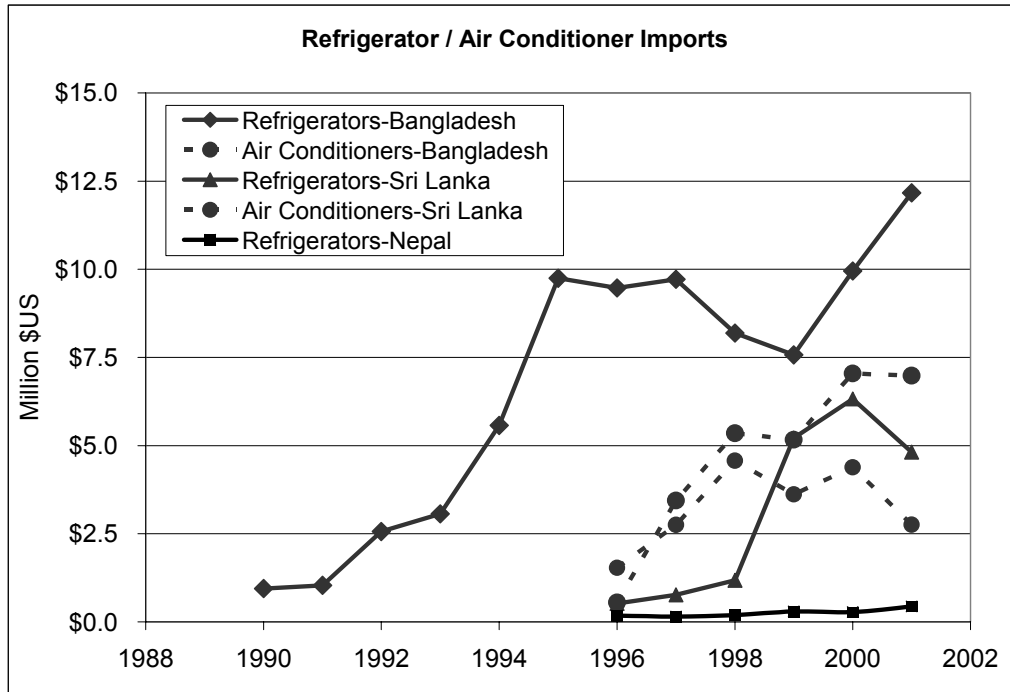
Of the appliance markets targeted by the SARI/Energy program, the Indian refrigerator market is by far the most developed. In addition, India possesses a well-developed organized domestic manufacturing sector, selling about three million refrigerators every year. Seven major manufacturers compete in this sector, sharing a significant part of the market with smaller-scale assembling businesses. Recently, large multinational manufacturers have entered the Indian market, but the market is still dominated by refrigerators manufactured within India. The annual growth rate of refrigerator sales in India was estimated to be as high as 16% (USAID/EPA) between 1995 and 2000. Future growth may be somewhat lower, however, as the market becomes saturated. The ownership rate of refrigerators in urban homes in Sri Lanka is about 70%, and sales growth rates are at the 10% level (LBNL 1999). According to industry estimates, about 250,000 refrigerators are currently installed in households in Bangladesh (Nexant/USAID 2003). Despite these small numbers, import data indicate that sales of appliances, particularly refrigerators and air conditioners, are growing rapidly there.

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<sup>1</sup> Although the Maldives are included in the SARI/Energy program, no representatives from that country attended activities relating to alignment in 2003.

Figure 1 shows estimated imports of refrigerators and air conditioners for Bangladesh, Sri Lanka, and Nepal.<sup>2</sup> Although the completeness of these data is unknown, they seem to indicate significant growth over the last decade for both appliances in all three countries.

**Figure 1. Refrigerator and Air Conditioner Imports**



Source: United Nations Comtrade Database – Dept. of Economic and Social Affairs, July 2003.

Although imports of appliances to the nations participating in the SARI/Energy project seem to be growing, the picture for inter-regional trade of these products is less clear. Table 1 shows the fraction of imports from various countries to Bangladesh, Nepal, and Sri Lanka by source. While India provides a significant share of refrigerators in these countries, there are more significant players—notably Thailand, Indonesia, and China. In the year 2000, export reporting indicates that about half a million \$US worth of refrigerators were shipped from India to Bangladesh, and the same amount of exports were shipped to Sri Lanka. This is likely an underestimate, since probably not all trade between these countries is captured. Nevertheless, indications are that India is not the dominant source of exports of refrigerators to these countries. Therefore, while alignment of procedures with India is important, standards already in place in other Asian trading partners should also be taken into consideration.

<sup>2</sup> Data shown are total exports to Bangladesh, Nepal and Sri Lanka from all trading partners.

**Table 1. Year 2000 Refrigerator Imports to SARI/Energy Countries**

Bangladesh		Nepal		Sri Lanka	
Exporter	% Imports	Exporter	% Imports	Exporter	% Imports
Thailand	61.8%	Indonesia	29.9%	Thailand	32.1%
China	17.4%	Thailand	26.2%	Indonesia	25.2%
Singapore	6.1%	India	18.3%	India	23.7%
India	5.7%	Korea	16.6%	Singapore	12.0%
Italy	4.4%	Other	9.1%	China	2.6%
New Zealand	2.9%			Other	4.4%
Other	1.7%				
<b>Total</b>	<b>100.0%</b>	<b>Total</b>	<b>100.0%</b>	<b>Total</b>	<b>100.0%</b>

Source: U.N. Comtrade Data– UNDESA July 2003. Exporter reported data.

India is not included because imports are a small fraction of its market.

Bhutan and Maldives are not included because there are insufficient data for these countries.

### Recent Alignment Activities

The alignment<sup>3</sup> component of the SARI/Energy EES&L project was part of a larger collection of activities, for which there was significant overlap in participation by institutions, if not by individuals. These included a general training course in EES&L, a training course covering test facilities and procedures, and national seminars in Bangladesh and Nepal. The alignment program began with a meeting of stakeholders in Colombo, Sri Lanka, in August 2002, specifically to address the issue of coordinating refrigerator test procedures under development in both India and Sri Lanka at that time. This meeting was followed by a second meeting on alignment in Chennai, India, which focused on refrigerators, but which also covered several other products. Finally, a workshop on alignment was held in October of 2003 in Bangalore, India. In total, about 60 different individuals participated in the three alignment activities. Participants came mostly from the government sector, in particular from the testing institutions—the Bangladesh Standards and Testing Institute (BSTI), the Nepal Bureau of Standards and Metrology (NBSM), and the Sri Lanka Standards Institute (SLSI)—and within established certification agencies, where present (i.e., India’s Bureau of Energy Efficiency (BEE) and the Demand-Side Management Branch of the Ceylon Electricity Board (CEB-DSM) in Sri Lanka). In addition, manufacturers, consumer groups, and chambers of commerce were represented.

**Existing programs.** The status of appliance efficiency programs in South Asia is mixed. Unlike the North American example, there are not a significant number of regulations in different countries that present possibility of alignment. On the other hand, there are several examples of successfully implemented programs, as well as programs that are close to implementation. Table 2 summarizes the status of programs at the time of the meetings and workshops in the summer and fall of 2003. At that time, several programs were under consideration, indicating the countries’ desire to go forward with the regulation of those products and the initiation of necessary steps to establish the technical infrastructure. Furthermore, several testing labs were available which were not yet being used for EES&L programs, but could possibly be modified to do so.

<sup>3</sup> This activity was called a “harmonization” program, but since there was no mandatory component, we refer to it as an “alignment” program.

**Table 2. Status of EES&L Programs in SARI/Energy Region**

	Bangladesh	India	Nepal	Sri Lanka
<b>Refrigerators</b>	Under Consideration	In Development	Under Consideration	In Development
<b>Fluorescent Lamp Ballasts</b>	Test Facilities	Test Facilities	In Development	Implemented
<b>Compact Fluorescent Lamps</b>	Under Consideration	Test Facilities	Under Consideration	Implemented
<b>Ceiling Fans</b>	Test Facilities	Test Facilities		In Development
<b>Air Conditioners</b>		In Development		

**Refrigerators.** Three of the countries in the SARI region—India, Sri Lanka, and Bangladesh—have separately decided to pursue energy-efficiency labeling programs for refrigerators. Nepal is still considering whether to build a program for refrigerators. The refrigerator program in India is the most advanced. The Indian BEE, working in cooperation with the Bureau of Indian Standards (BIS) and two committees with members representing manufacturers and consumer groups, expects to introduce refrigerator labels in 2004. This program currently includes only the frost-free products (about 15% of the market), but an expansion to direct-cool refrigerators is planned. There are already several manufacturer-owned and independent laboratories capable of testing refrigerators, and BEE has put forward an enforcement and certification framework. Furthermore, program managers in India have made considerable progress in developing label designs, and in collecting data to characterize the refrigerator market. Sri Lanka is also moving forward with a refrigerator program. There, a test procedure for refrigerators is in the draft stage and a refrigerator test facility is being built using funds from the World Bank. In Bangladesh, test procedures have been proposed for adoption.

Refrigerators are relatively expensive to test. Furthermore, they are a significant trade commodity in the region. Therefore, a main subject of the SARI/Energy alignment program concerned the development of equivalent refrigerator test procedures between the countries considering programs. The effort to align refrigerator test procedures began with agreement by India and Sri Lanka to develop parallel procedures if possible. As of October 2002, much progress had been made towards bringing the draft documents into agreement, but some unilateral changes to the drafts were subsequently made. Therefore, in preparation for a second meeting, the authors' main effort was spent in analyzing the drafts and clearly outlining outstanding discrepancies. There were two main conclusions of this work:

- There were a small number of differences between the two drafts, but these were technically significant.
- There was a great degree of overlap between each procedure and well-known procedures used in other countries.

The second point is important because, as noted above, countries in the region are supplied refrigerators by trade partners both within and outside of South Asia (see Table 1). In particular, during the process of the alignment activities, Bangladesh made the decision to build a program based on the procedure specified by the International Standards Organization (ISO)<sup>4</sup>.

<sup>4</sup> The Bangladeshi procedure is called BDS-ISO 7371:2003.

Two factors make ISO standards particularly attractive to Bangladesh. First, BSTI is a member of ISO and therefore has a strong investment in following ISO procedures and maintaining access to them. Second, Bangladesh indicated interest in developing an industry of assembling products for re-export, particularly to Europe, where standards are closely aligned with or identical to ISO standards. In addition to this, there is a strong argument in favor of ISO standards for the SARI Region, namely that refrigerator test procedures currently used in Thailand, China, and Indonesia are functionally identical to the ISO procedures. As Table 1 shows, these three importers account for over half of refrigerator imports to Bangladesh, Nepal, and Sri Lanka.

Table 3 summarizes the main discrepancies in parameters between the ISO procedure, the procedure proposed by BEE in India, and the SLSI in Sri Lanka. There are three important issues. The first concerns the measurement of gross volume. Volume measurement is not critical to the measurement of energy consumption, but it is critical to the *rating* of efficiency, since the efficiency metric is usually taken to be energy consumption per unit volume. The discrepancy is whether or not the volume of air ducts, fans, and condensers is included or excluded for frost-free units. In the Indian draft standard, this volume was included, while in the ISO procedure and the SLS procedure, it is explicitly excluded. This volume reportedly could reach up to 10-15% of total refrigerator volume, so the discrepancy is significant. This discrepancy does not exist for direct-cool products.

**Table 3. Refrigerator Test Procedure Parameter Differences**

	ISO 7371/8187/8561	Draft BEE (India)	Draft SLS 1230:2003
Air Ducts Included in Gross Volume	NO	YES	NO
Freezers (°C)	* ≤ -6 ** ≤ -12 *** ≤ -18	Short Term -6 Long Term -15	Short Term -6 Long Term -15
Test Load	100%	No Load	No Load

The second issue is that not all of the temperature settings are identical from procedure to procedure. The ISO test procedure designates three freezer levels—marked with one, two, or three stars (snowflakes)—with a specified test temperature of -6, -12 and -18°C, respectively. Both the Indian and Sri Lankan test procedures specify only two types of freezer compartment, a short-term unit, which is located within the fresh food compartment, and a long-term freezer comprising a completely separate compartment. The test procedure for long-term compartments is specified at -15°C in both the Indian and Sri Lankan cases. This temperature does not correspond to any of the ISO freezer compartment levels.

Finally, there is an issue of freezer test loads. A test load comprises packages of a specialized material (to simulate food) with which the freezer compartment is filled at the time of testing. Of the test procedures analyzed, only the ISO procedure requires test loads.

The general recommendation of the study participants was to investigate the potential to align existing test procedures within the SARI/Energy region, and to consider a policy of aligning all test procedures with international norms, as revised procedures become available (ISO test procedures for refrigerators are expected by approximately 2006). Specific recommendations were:

- Consider reporting gross volume for the purpose of energy rating in accordance with the ISO test procedure, in the draft Indian standard (relevant for frost-free appliances only).
- Explain and document the rationale for the choice of freezer compartment set-point temperatures in the draft Indian standard.
- Consider adoption of test procedures in Bangladesh that do not require the loading of the freezer compartment.
- Secure commitment by all parties to reconsider alignment with ISO procedures, once a new revision of these test procedures becomes available.

**Lighting.** There are two important lighting products that make attractive targets for efficiency programs – fluorescent lamp ballasts and compact fluorescent lamps (CFLs). Lighting products are particularly important in South Asia, where lighting represents a high fraction of residential energy consumption, and where the evening lighting load drives peak demand. Fluorescent lamps are common throughout the region in both commercial and residential applications. Incandescent lamps are also very common, of course, and the replacement of these with CFLs can dramatically reduce household consumption.

The most advanced EES&L program in the region is the Sri Lankan voluntary labeling program for fluorescent lamp ballasts, which has been in effect for several years. The facilitating authority has been the Demand Side Management Branch of the CEB, in liaison with the SLSI, which acts as the certification authority, and the institute responsible for testing. To date, seven models of ballasts distributed by six different importers are labeled in Sri Lanka. The Sri Lankan ballast test procedure is more or less equivalent to the International Electrotechnical Commission (IEC) standard, IEC 921. The main issue in conforming exactly to the procedure is the requirement of reference lamps, which are lacking in the Sri Lanka procedure.

The Government of Nepal has chosen fluorescent lamp ballasts as its first target product for developing an efficiency labeling program. Toward this goal, the National Steering Committee on Ballasts, has been established with responsibility for setting energy-efficiency standards and creating labels for lighting appliances. The Government of Nepal's interest in fluorescent ballasts has led to technical exchanges with experts from Sri Lanka, as well as the completion of a market survey. Market survey data indicate that 400,000 ballasts are sold in Nepal each year, the majority of which are imported from India and China. For this reason, regulators in Nepal strongly prefer that lighting standards developed there be compatible with those in place in India and China.

Fluorescent ballasts do not present the complex technical issues that refrigerators do, so this product can much more easily be aligned, using the Sri Lankan program as an example; this has already been the strategy of Nepal. The alignment of procedures for this product would likely require only minor adjustment of test procedures, the identification of existing test facilities, and possibly the construction of a relatively low-cost laboratory.

The second phase of the efficiency labeling program in Sri Lanka concerns CFLs. The CFL program in Sri Lanka has a history going back several years, with a promotion project led by the CEB, beginning with a bulk purchase program in 1995-1996, followed by an interest-free deferred payment program for utility customers. The labeling phase of the CFL program was officially launched in March 2003. India is currently also moving forward with a CFL labeling program. Compact fluorescent lamps are also a good candidate for regional program development. International test procedures for CFLs exist, but they do not generally specify a metric for efficiency.



Program participants concluded with a recommendation to develop regionally aligned test procedures and an efficiency metric for fluorescent lamp ballasts, and to evaluate the possibility of alignment with international test procedures. Specifically, recommendations were to:

- Verify that current procedures used or proposed in all countries are in alignment with IEC test procedures, or evaluate requirements for bringing current procedures into alignment.
- Develop a regionally agreed-upon methodology for determining efficiency rating parameters.

**Ceiling fans.** Sri Lanka is currently developing a labeling program for ceiling fans as part of its overall labeling program, which includes lighting products and refrigerators. Ceiling fans are widely used in Sri Lanka in domestic, commercial, and industrial environments. There are a large number of brands and models in the local market supplied by about 20 major importers. A test facility for fans is to be constructed using local funding from the Energy Conservation Fund (ECF). The University of Moratuwa is assigned to develop a proper testing procedure, and to identify suitable performance indices and a rating methodology using stars. The goal for implementation of this program is the end of 2004.

There are several facilities for testing ceiling fans in India. Likewise, BSTI tests ceiling fans in Bangladesh. In general, test procedures for ceiling fans are designed to measure performance characteristics other than energy consumption, but it is believed that these procedures could be easily modified to measure efficiency. Recommendations identified by program participants regarding ceiling fans were:

- Verify procedures used in test facilities for ceiling fans in Bangladesh and India.
- Evaluate the feasibility and/or desirability of adoption of test procedures in alignment with IEC test procedures in Sri Lanka, and throughout the region. Develop a regionally agreed-upon methodology for determining efficiency rating parameters.
- Collect market data to assess typical types of fans used, major manufacturers and importers, and sales and penetration rates.

**Air conditioners.** Air conditioners are still relatively uncommon in South Asia, but as Figure 1 indicates, there is rapid growth in sales of this product within the region. Mechanical space cooling deserves attention for all energy policymakers, since the per-product electricity consumption of this end use is high, particularly in tropical climates. For this region, several Asian countries have prioritized labeling and standards for window-type air conditioning units. There are a variety of well-established test procedures, but generally construction and staffing of air conditioning test facilities is expensive. India has taken the lead in South Asia, mandating that an air conditioner program be established in the medium term, immediately after the refrigerator program is implemented. Establishment of manufacturer-owned test facilities is progressing toward this goal.

**Other recommendations for cooperative action.** During the course of the alignment activities of 2003, several other recommendations emerged. The first recommendation is to create a technical data exchange, by which those countries with the greatest experience in a certain area would provide the other countries with a report detailing the lessons learned as a result of those

experiences. Some examples of the topic areas and the related countries with the most experience are:

- Enforcement Issues – Sri Lanka Lighting Program and India Refrigerator Program
- Development of Labels - Sri Lanka Lighting Program and India Refrigerator Program
- Market Data Collection – India Refrigerator Program

Finally, meeting participants discussed the sharing of accreditation infrastructure and test facilities. India possesses a well-established accreditation organization, the National Accreditation Board for Testing and Calibration Laboratories (NABL). This organization is qualified to determine the proficiency of all types of laboratories, assuring adherence to international scientific standards, adequate facilities and staff, and acceptable levels of accuracy and variability. The NABL, like most national accrediting agencies, operates according to principles set by the ISO. As of September 2003, NABL was in the process of certifying refrigerator test labs in India for use within the BEE program there. Since none of the other countries have an accrediting agency qualified to evaluate appliance test labs, participants were asked to consider using NABL to evaluate labs in their own countries or, in the absence of these, to accept test results from NABL-approved laboratories in India. Since the construction and staffing of testing facilities represents a major program expense, participants were amenable to the prospect of sharing of accreditation and/or test facilities resources.

**Project results and next steps.** The final activity of the first phase of the SARI/Energy appliance efficiency alignment program was a training course held in Bangalore, India in late October, 2003. While this event covered many general issues related to establishing EES&L, it emphasized bringing together the results of previous discussions into a single set of conclusions and mapping the way forward with an outline of concrete action items for the next phase of the programs. During the course of the seminar, a draft roadmap was presented to participants for consideration, and main issues were discussed at length in an open, facilitated forum. The result was the creation of a consensus-driven document that was presented back to the participants, edited, amended, and approved in the last session of the course. These recommendations were summarized and published in a *Project Roadmap* (Nexant/USAID 2003).

## Conclusions

The output of the last session of the SARI/Energy alignment program of 2003 represents a concrete set of priorities and steps that we feel would be a significant step forward in the development of successful appliance efficiency programs. However, the success of these steps depends on several factors:

- The ability of participants to communicate to policymakers the importance of these types of programs, and of the benefits of regional cooperation in this area.
- The development of institutional and legal frameworks to transform these programs into enforceable regulations.
- The continued financial support of these activities by national governments and/or international funding agencies.

Finally, we note that the presence of a strong trade agreement seems to be a sufficient condition to promote alignment of appliance efficiency regulations, but whether or not it is a necessary condition is debatable. Experience with various attempts at regional alignment of appliance efficiency regulations has led to speculation that:

“[The] existence of a framework for mutual cooperation on a broader, higher-level mission like economic development is a prerequisite to establishing a thriving cooperative activity addressing S&L. S&L is simply not of high enough political or economic priority for it to stand on its own.” (Wiel 2003)

In the SARI/Energy region, there is no strong commitment to regional free trade, but an institutional framework for cooperation does exist. The South Asian Association for Regional Cooperation (SAARC) was formed in 1985 to promote liberalization of trade within its region, which consists of all of the countries of SARI/Energy, plus Pakistan. This led to a preferential trading agreement (South Asian Preferential Trading Agreement, or SAPTA) in 1993 and finally to the declaration of a free trade area (South Asian Free Trade Agreement, or SAFTA) in Islamabad on January 6, 2004. It is possible that these agreements will, in the future, provide the regional framework for alignment (or harmonization) of efficiency regulations, but the program described in this paper occurred in the absence of any real regional authority.

Therefore, the SARI/Energy EES&L alignment program represents somewhat of a counterexample to the EU and NAFTA cases, and even differs from other programs involving Asian countries that are conducted as a project of a trade association—e.g., the Asia Pacific Economic Cooperation (APEC) and the Association of South-East Asian Nations (ASEAN). We would argue that, although the cooperative activities are not supported by strong regional institutions, they nevertheless have the potential to bring significant benefits to countries in the region, and provide additional value compared to single-country programs. There are several reasons for this:

- The countries in the region face similar energy challenges, namely the inability to cover current demand and the potential for dramatic consumption growth in the residential sector.
- There have been successful initiatives started in the region on a single-country basis, but there is little overlap among country programs. This situation maximizes the benefit from technical cooperation and exchange between countries.
- A strong potential exists for direct sharing of resources needed for EES&L programs, possibly including regional test facilities or accreditation bodies.

We therefore would assert that a dual purpose exists in regional programs for cooperation in the area of EES&L programs. In addition to providing benefits to trade, they can facilitate the sharing of valuable technical information, experiences, and resources to the advantage of all parties. It is our hope that this program continues to build on the experience of past participants, and that a successful outcome in South Asia will serve as an important example for the development of other regional efficiency initiatives throughout the world.

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