Energy Efficiency Standards and Labels in North America: Opportunities for Harmonization[1]

Stephen Wiel, Lawrence Berkeley National Laboratory
Laura Van Wie McGrory, Lawrence Berkeley National Laboratory
Lloyd Harrington, Energy Efficient Strategies

ABSTRACT

To support the North American Energy Working Group's Expert Group on Energy Efficiency (NAEWG-EE), USDOE commissioned the Collaborative Labeling and Appliance Standards Program (CLASP) to prepare a resource document comparing current standards, labels, and test procedure regulations in Canada, México, and the United States. The resulting document reached the following conclusions: Out of 24 energy-using products for which at least one of the three countries has energy efficiency regulations, three products – refrigerators/freezers, split system central air conditioners, and room air conditioners – have similar or identical minimum energy performance standards (MEPS) in the three countries. These same three products, as well as three-phase motors, have similar or identical test procedures throughout the region. There are 10 products with different MEPS and test procedures, but which have the short-term potential to develop common test procedures, MEPS, and/or labels. Three other noteworthy areas where possible energy efficiency initiatives have potential for harmonization are standby losses, uniform endorsement labels, and a new standard or label on windows. This paper explains these conclusions and presents the underlying comparative data.

Introduction: Creation of NAEWG

In the spring of 2001, US President Bush, Mexican President Fox, and Canadian Prime Minister Chretien agreed to the creation of a North American Energy Initiative, which evolved into the North American Energy Working Group (NAEWG). NAEWG, led by the Secretaries of Energy from México and the United States and the Minister of Natural Resources Canada (NRCan), was created with the broad goals of fostering communication and cooperation among the governments and energy sectors of the three countries; enhancing North American energy trade, development, and interconnections; and promoting regional integration and increased energy security for the people of North America. Specifically, the Working Group is designed to explore policies, regulations, and technological innovations to encourage resource development, energy efficiency, renewable energy, clean power, and nuclear energy.

After its first meeting in June 2001 in Washington, D.C., the Working Group formed expert groups to gather information on the potential for joint cooperation in three focal areas: (1) development of a North American energy perspective on supply, demand, and infrastructure (the U.S. is the lead), (2) electricity restructuring and reliability (Canada is the

[1] This work was supported by the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technology, State, and Community Programs, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

lead), and (3) energy efficiency, with an emphasis on standards and related issues (Mexico is the lead). After the second NAEWG meeting (Ottawa, December 2001), a fourth expert group was formed to consider science and technology, with a focus on clean technology.

The Expert Group on Energy Efficiency (NAEWG-EE) convened in Mexico City on August 31, 2001. Participants included representatives from Mexico's National Commission for Energy Conservation (CONAE), Natural Resources Canada, and the U.S. Department of Energy (DOE). At the request of DOE and with the concurrence of the other two parties, representatives of the Collaborative Labeling and Appliance Standards Program (CLASP)[2] also participated in the meeting to provide technical assistance to the Expert Group.

Also at the request of the Expert Group in preparation for its August meeting, CLASP prepared a Resource Document comparing current standards, labels, and test procedure regulations in the three countries. Much of the background information for the Resource Document was provided by Energy Efficient Strategies, Australia, in its review of test procedures in APEC economies conducted for the APEC Secretariat (Harrington 1999). This paper provides an overview of the content of the resulting document, "*Minimum Energy Performance Standards, Labels, and Test Procedures in Canada, México, and the United States*".

The paper starts with a description of the scope of activities to harmonize certain aspects of the energy efficiency standards and labels programs of Canada, Mexico and the U.S. It follows with a description of the products covered by standards and labels in North America. There is then a comparison of standards and labels in North America, presented in four parts: 1) products with similar or identical MEPS, 2) products with different MEPS and test procedures but which have the short-term potential for harmonization of some element, 3) other noteworthy areas where possible energy efficiency initiatives have some potential for harmonization, and 4) comparison labels. The conclusions presented regarding the comparisons are then summarized. The paper concludes with a brief look at what harmonization activities might be forthcoming.

Scope of NAEWG-EE Harmonization Activities

Energy efficiency is a crucial strategy in the energy policies of Canada, México, and the United States. Within the energy efficiency mandates of the three countries, test procedures, standards, labels, and associated compliance programs are important program initiatives to meet energy security, environmental, and various economic policy objectives. Some elements of these programs (e.g., technical specifications, test procedures) are common to the three countries. The NAEWG-EE Expert Group pointed out that, by collaborating, the three countries hope to reduce the costs of compliance with standards and mandatory labeling programs in the region and accelerate the replacement of older, less efficient products.

[2] CLASP, formed in 1999, is a collaboration among LBNL, the Alliance to Save Energy, and the International Institute for Energy Conservation (IIEC). CLASP's sole mission is to promote the appropriate use of energy efficiency standards and labels for appliances, equipment, and lighting in developing and transitional countries.

In general, energy efficiency standards are a set of procedures and regulations that prescribe the energy performance of manufactured products, sometimes prohibiting the sale of products less energy-efficient than the minimum standard.[3] There are three types of energy efficiency standards: 1) prescriptive standards, 2) minimum energy performance standards (MEPS), and 3) class-average standards. Prescriptive standards require a particular feature or device to be installed in all new products. Performance standards prescribe minimum efficiencies (sometimes in the form of maximum energy consumption for a particular product configuration and/or size) that manufacturers must achieve in each product, but not the technology or design specifications of that product. Class-average standards specify the average efficiency of a manufactured product, allowing each manufacturer to select the level of efficiency of each model in order to achieve an overall average efficiency for a product line (Wiel and McMahon 2001).

Energy efficiency labels are informative labels affixed to manufactured products indicating the products' energy performance (usually in the form of energy use, efficiency, and/or energy cost) to help consumers make more informed purchases. We distinguish among three kinds of labels: 1) endorsement labels, 2) comparative labels, and 3) information-only labels. Endorsement labels are essentially "seals of approval" according to some specified set of criteria (which may not relate specifically to energy). Endorsement labels do not usually show any product information or performance data. The endorsement labels used by each of the three countries to endorse energy efficient products are shown in Figure 1.

Figure 1. Endorsement Labels in Canada, México, and the United States

Comparative labels offer consumers information that allows them to compare performance among similar products, using either discrete categories of performance (or efficiency) or a continuous scale. Energy consumption and/or cost also may be shown on the

[3] The term "standard" is sometimes used to refer to a well-defined protocol (or laboratory test procedure) by which to obtain a sufficiently accurate estimate of the energy performance of a product in the way it is typically used, or at least a relative ranking of the energy performance compared to other models. In this paper, we use the term "standard" only for a target limit on energy performance formally established by a government.

label. The comparison labels used by each of the three countries are shown in Figure 2. Information-only labels simply provide basic data on a product's performance (with no reference to the relative performance of similar products) and are not used by any of the three countries examined in this paper (Wiel and McMahon, 2001).

The NAEWG-EE team initially has focused on five aspects of energy efficiency standards and labels programs and has documented the status of each in the three participating countries:

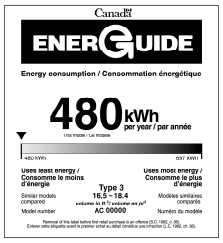
1. test procedures
2. mutual recognition of laboratory results
3. voluntary endorsement labels
4. mandatory comparative labels
5. minimum performance standards (MEPS)

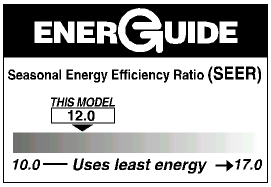
Figure 2. Comparison Labels in Canada, México, and the United States

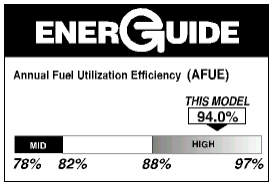
Canada

Mandatory EnerGuide Program: Labels display the annual energy (kWh/year) used by the appliance and how this compares with the lowest and highest energy consumption for similar products

Voluntary EnerGuide Program: Labels demonstrate how the appliance compares with the lowest & highest energy efficiency for similar products, generally used for HVAC.

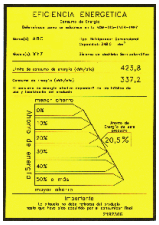






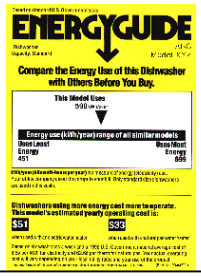
Mexico

Refrigerator and central AC: Percent of Energy Savings relative to the MEPS Level.
Rooom AC: Efficiency Rating relative to MEPS level, A to E (E best), and annual running costs.



USA

Energy Guide Program: Energy (kWh/year), operating cost and lowest & highest energy used for similar products (EER and or SEER for air conditioners).



Products Covered by Standards and Labels in North America

NAEWG-EE has identified 46 products for which at least one of the three countries has energy efficiency regulations. These are shown in Table 1.

Table 1. Existing MEPS and Labels in Canada, México, and the United States

Product	Canada	México	USA
Refrigerators	L_{mc}, L_{ve}, S_m	L_{mc},L_{ve},S_m	L_{mc},L_{ve},S_m
Freezers	L_{mc}, L_{ve}, S_m	S_m	L_{mc},L_{ve}**,S_m
Central AC	L_{vc}, L_{ve}, S_m	L_{mc},S_m	L_{mc},L_{ve},S_m
Heat Pumps	L_{vc}, L_{ve}, S_m	S_m	L_{mc},L_{ve},S_m
Room AC	L_{mc}, L_{ve}, S_m	L_{mc},L_{ve},S_m	L_{mc},L_{ve},S_m
Other AC/HP Categories	L_{vc}, L_{ve} S_m	L_{mc}	L_{mc}
Clothes Washers	L_{mc}, L_{ve} S_m	L_{mc},S_m	L_{mc},L_{ve},S_m
Clothes Dryers	L_{mc},S_m		L_{ve}**,S_m
Dishwashers	L_{mc},L_{ve},S_m		L_{mc},L_{ve},S_m
Fluorescent Ballasts	S_m	L_{mc}, S_v	L_{mc},S_m
Fluorescent Lamps	L_{ve},S_m	L_{mc},L_{ve},S_m	L_{mc},L_{ve},S_m
Incandescent Lamps and Luminaires	S_m (lamps only)		L_{ve},S_m
Ranges/Ovens	L_{mc}, S_m		L_{ve} **
Dehumidifiers	L_{ve} S_m		L_{ve}
Icemakers	S_m		
Televisions	L_{ve}	L_{ve}	L_{ve}
VCRs	L_{ve}		L_{ve}
DVDs	L_{ve}		L_{ve}
Set Top Boxes			L_{ve}
Radio Rcvr/Rcdr	L_{ve}		L_{ve}
Cordless Phones			L_{ve}
Answering Machines			L_{ve}
Ceiling and Ventilating Fans	L_{ve}		L_{ve}
Direct Heating Equipment			S_m
Computers	L_{ve}		L_{ve}
Monitors	L_{ve}		L_{ve}
Copiers	L_{ve}		L_{ve}
Printers	L_{ve}		L_{ve}
Fax Machines	L_{ve}		L_{ve}
Scanners	L_{ve}		L_{ve}
Multi-Function Devices*	L_{ve}		L_{ve}
Furnaces	L_{vc} L_{ve},S_m		L_{mc},L_{ve},S_m
Boilers	L_{ve} S_m	S_m	L_{mc},L_{ve},S_m
Central Gas Heaters	L_{vc}		L_{mc}
Space Heaters	L_{vc}		L_{mc}
Water Heaters	S_m	L_{mc},S_m	L_{mc},S_m
Motors	S_m	L_{ve},S_m	S_m
Transformers	L_{ve}, S_v (liquid)		L_{ve}

Centrifugal Residential Pumps		L_{mc},S_m	
Commercial Refrigerators		$L_{mc,}$ S_m	L_{ve}
Exit Signs	L_{ve}		L_{ve}
Water Coolers	L_{ve}		L_{ve}
Programmable Thermostats	L_{ve}		L_{ve}
Traffic Lights	L_{ve}		L_{ve}
Windows			L_{ve}
Roof Products			L_{ve}

L = Label, S= Standard, m = mandatory, v = voluntary, e = endorsement, c = comparative
*Multi-function Devices (MFDs) = Usually a combination of printer, fax, scanner, and/or copier
** In the US, Green Star voluntary endorsement labels apply to freezers, clothes dryers, and ranges/ovens, but Energy Star labels do not.

Comparison of Standards and Labels in North America

NAEWG-EE has characterized the status of each of the aspects of energy efficiency standards and labels and has identified opportunities where the countries might benefit from harmonization. The results can be stated as the following four findings:

1) A comparison of the MEPS of each product shows that three – refrigerators/freezers, split system central air conditioners, and room air conditioners – have similar or identical minimum energy performance standards in the three countries (though the date of introduction of these standards varies by product). A look at the test procedures for each shows that these same three products, as well as three-phase motors, have similar or identical test procedures throughout the region. This finding is summarized below in Table 2. The comparisons of the MEPS are presented in Appendix 1. The comparisons of the test procedures are presented in Appendix 2**.**

Table 2 - Products with similar or identical MEPS and test procedures in Canada, México, and the United States

MEPS	**Test Procedures**
Refrigerators and freezers	Refrigerators and freezers
Split system central AC	Central AC and heat pumps
Room AC	Room AC
	3-phase motors

2) There are 10 products with different MEPS and test procedures, but which have the short-term potential to develop common test procedures, MEPS, and/or labels. Table 3 lists products for which one of the following applies.

- Canada, México, and the United States have MEPS and/or test procedures, but the details of these regulations differ between one or more of the countries; or
- Only two countries have MEPS and/or test procedures, but these are the same or similar.

Table 3. Products that could share common MEPS and label in the short term

MEPS	Test Procedures
Clothes washers	Clothes washers and dryers
Dishwashers	Dishwashers
Fluorescent lamp ballasts	Fluorescent lamp ballasts
Fluorescent lamps	Fluorescent lamps
Incandescent reflector lamps	Incandescent reflector lamps
Motors	
Small motors	
Single packaged CAC and HPs	
	Water heaters
	Transformers

3) Three other noteworthy areas were identified where possible energy efficiency initiatives have some potential for harmonization in the three countries.

a) Standby losses:

Relevant activities: On July 31, 2001, US President George Bush issued an executive order on energy efficient standby power devices. The order directs federal agencies, when purchasing commercially available products that use external standby power devices or that contain an internal standby power function, to buy products that use no more than one watt in their standby power consuming mode, or use the lowest wattage available. Agencies must adhere to these requirements when life-cycle cost-effective and practicable and where the relevant product's utility and performance are not compromised as a result. The Department of Energy, in consultation with the Department of Defense and the General Services Administration, is compiling a list of products to be subject to these requirements, which will be updated on an annual basis. Independent agencies are encouraged to comply with the provisions of this order. In addition, the Federal Energy Management Program (FEMP) has issued recommended maximum standby levels for televisions, VCRs, and a growing list of other products. A database of products with low standby power is available at http://oahu.lbl.gov/. FEMP also has created guidelines for measurement of standby power use (also available on the website), to support the Executive Order.

Standby losses also are a concern in Canada, which currently is investigating various strategies to address these concerns.

b) Uniform endorsement label:

The characteristics of the endorsement labels in the three countries are shown in Table 4. Relevant activities: Energy Star was introduced by the US Environmental Protection Agency (EPA) in 1992 as a voluntary labeling program designed to identify and promote energy-efficient products, in order to reduce carbon dioxide emissions. EPA partnered with the USDOE in 1996 to promote the Energy Star label, with each agency taking responsibility for particular product categories. Energy Star has expanded to cover new homes, most of the buildings sector, residential heating and cooling equipment, major appliances, office equipment, lighting, and consumer electronics. In May 2001, Canada signed an administrative agreement with the USEPA and USDOE to administer the Energy Star program in Canada. Products in the agreement that currently have an EnerGuide label will have the Energy Star logo on the same label (see Figure 1). Canada's program covers most of the products covered by the US Energy Star program; Canada will be increasing the

labeling of commercial and industrial type products either through the Energy Star or EnerGuide mechanism.

Pursuant to the goals of the NAEWG Energy Efficiency Working Group, Mexico is exploring the requirements and benefits of joining the Energy Star labeling program.

Table 4. Characteristics of Endorsement Labels

AGREEMENTS WITH PARTNERS	
Energy Star (Canada)	Voluntary. Products approved in the US are licensed to display the label in Canada. Promotion and implementation of the bilingual program is the responsibility of NRCan.
Sello FIDE	Voluntary. Manufacturers pay for certification and sign an agreement stipulating length of validity of the Sello FIDE endorsement, how it can be displayed, etc.
Energy Star	Voluntary. Manufacturers pay the costs for printing and applying the Energy Star logos.
Green Seal	Voluntary. The products eligible for a label are selected in consultation with industry, environmentalists, consumer groups, and the public.
CRITERIA	
Energy Star (Canada)	See Energy Star. US EPA and US DOE are responsible for developing endorsement criteria, but all partners participate in the development of new specifications.
Sello FIDE	Products must have a high level of efficiency compared to the market in general.
Energy Star	For office and household electronic equipment, the label indicates that the model has certain power management capabilities and/or achieves a maximum allowable standby power consumption (e.g., for TVs, standby power ≤ 3W); in the case of computer equipment these capabilities have to be enabled when supplied. For other equipment, the label indicates that the product is among the most efficient of its type, either because it is in the top percentile of the range on the market, or because it exceeds the MEPS level by a specified margin (this margin differs for each product and depends on available technology, e.g., 20% for refrigerators and 15% for room AC). For photocopiers, the product must have certain paper handling as well as power management capabilities.
Green Seal	Eligible products are selected according to the significance of their potential environmental impact and in consultation with industry, environmentalists, consumer groups, and the public. Criteria are then established addressing the areas where the product has most negative impact.
COMPLIANCE	
Energy Star (Canada)	See Energy Star below – Manufacturers report their energy efficiency levels (as tested by a third party) to NRCan as part of the regulatory compliance which allows for additional verification for those Energy Star products that also have MEPS or a comparison label.

Sello FIDE	Manufacturers submit certified test results on their products. A certified laboratory tests the product to verify manufacturer claims.
Energy Star	Manufacturers are responsible for ensuring their own compliance to Energy Star criteria. USDOE and EPA can test products to check compliance if necessary; non-compliant products/manufacturers are removed from the program.
Green Seal	Manufacturers pay Green Seal to organize the testing and monitoring of their product. Once the label is awarded, the product is checked annually. Energy is one of the many criteria assessed for eligibility.

c. New standard or label on windows:

Relevant activities: The US and Canada have been working to standardize the process for determining and reporting energy efficiency properties of windows. Both countries have been involved in the writing of ISO15099, which documents the technical algorithms used by computer programs to simulate window thermal performance properties. This standard is now in FDIS form and is expected to be adopted in 2002.

The National Fenestration Rating Council (NFRC) in the US and the Canadian Standards Association (CSA-A440) in Canada have been working to standardize the logistical procedures for rating and labeling windows with thermal performance properties. This work has been ongoing for several years and is continuing. CSA also is working with the US American Architectural Manufacturers Association (AAMA) to standardize reporting of non-energy parameters (i.e., structural issues, water infiltration) for windows.

Recently, México's National Center for Research and Technology Development (CENIDET), associated with the National University of México, has been working with US and Canadian researchers on technical topics relating to determining window thermal performance parameters.

However, issues such as differences in climate and construction may mean that the endorsement criteria for window labels may be more difficult to harmonize, even if the underlying tests and methodologies are harmonized.

4) For various reasons, the harmonization of comparison labels among the three countries is judged to be of lower priority than the other opportunities described above.

Given differences in culture and language (among other things), such harmonization may not be appropriate and may not occur in the foreseeable future. For completeness of reporting, we show the characteristics of the three countries' comparison labels in Table 5.

Table 5. Characteristics of Comparative Labels in North America

Product	Canada (EnerGuide)	México	USA (Energy Guide)
Information Displayed on Label:	Mandatory labels: Energy (kWh/year) used by the appliance	Mandatory labels: Energy (kWh/year) used by the appliance	Energy (kWh/year) used by the appliance
	How energy use compares with the lowest and highest energy consumption for similar products		How energy use compares with the lowest and highest energy consumption for similar products
			Estimated annual energy cost based on energy consumption of the model
Refrigerators	Mandatory labels: Energy (kWh/year)	Percentage energy savings relative to the relevant MEPS level shown as an arrow with a % sign.	Energy (kWh/year)
AC ratings	Mandatory label: Air conditioner ratings based on EER Voluntary label: AC and HP ratings based on SEER	For CAC: same as refrigerators. For room AC: Label displays EER and allows calculation of running costs. It ranks the product relative to the MEPS level from A to E, with E best.	Ratings based on EER or SEER. Energy costs appear on label for room AC, and on fact sheets and in industry-produced product directories for the other climate-control appliances.
Furnace ratings	Voluntary label: Furnace ratings based on AFUE		
Clothes washer/ dryers	Labels show kWh used for 392 cycles per year for washers and 416 cycles per year for dryers.	Percentage energy savings relative to the relevant MEPS level shown as an arrow with a % sign.	Labels for clothes washers show kWh used for 416 cycles per year (clothes dryers do not carry a label).
Label placement	Mandatory label: On product. Voluntary label: In manufacturers' brochures and websites	On product	On product
Other program elements	EnerGuide brand also used to identify energy performance of cars, vans, light trucks, and homes.		
Future	Canada will be increasing the labeling of commercial and industrial type products perhaps through the EnerGuide mechanism.	The labeling system in México is under review.	Various alternative label designs have been examined in ongoing evaluation research of the EnergyGuide label.

Summary of Conclusions

In the spring of 2001, US President Bush, Mexican President Fox, and Canadian Prime Minister Chretien initiated the creation the North American Energy Working Group (NAEWG). Within NAEWG a Working Group was formed to foster the harmonization of various aspects of the energy efficiency standard-setting and labeling programs of the three countries. A comparison of the MEPS of each of the 46 products for which at least one of the three countries has energy efficiency regulations, conducted for NAEWG by CLASP, shows that three – refrigerators/freezers, split system central air conditioners, and room air conditioners – have similar or identical minimum energy performance standards and these same three products, as well as three-phase motors, have similar or identical test procedures throughout the region (see Table 2 above). There are 10 products with different MEPS and test procedures, but which have the short-term potential to develop common test procedures, MEPS, and/or labels (see Table 3 above). Three other noteworthy areas were identified where possible energy efficiency initiatives have some potential for harmonization in the three countries: 1) treatment of standby losses, 2) an endorsement label, and 3) a new standard or label on windows.

Planned NAEWG Harmonization Activities

At the August 31st meeting, the NAEWG Energy Efficiency Expert Group drafted a workplan for Canada, México, and the United States to cooperate on energy efficiency programs. Five elements were identified as being within the scope of the Expert Group's objectives: test procedures, mutual recognition of laboratory results, voluntary endorsement labels, mandatory comparative labels, and mandatory energy performance standards. The workplan recommended that NAEWG concentrate initially on the first three of these elements—harmonization of test procedures and voluntary endorsement labels, and mutual recognition of laboratory results.

In addition, stakeholder participation was identified as a key issue in the continuation of the process. The Expert Group recommended to NAEWG that the process be opened to public consultation, and all three countries are implementing strategies for soliciting stakeholder input.

a) Test procedures:

The following four products were identified as candidates for possible early harmonization of test procedures: refrigerators and freezers, room air conditioners, central air conditioners and heat pumps, and integral horsepower electric motors. The Expert Group has completed initial comparisons of the test procedures for refrigerators and motors, and will work with stakeholders in the industry to verify the results of these analyses and carry out comparisons of the other two products.

b) Endorsement labels:

Mexico is exploring the requirements and benefits of adopting the Energy Star voluntary endorsement label.

c) Mutual recognition:

The Expert Group is working with the three governments to assess possibilities for mutual recognition of testing laboratories and their results.

Based on the results of consultations with stakeholders, the Expert Group plans to draft a long-term energy efficiency harmonization plan for North America.

To date, CLASP's findings have identified opportunities to beneficially harmonize several test procedures and program requirements, as well as endorsement labels, given the significant flow of energy-using products throughout North America. It remains to be seen, through the continuing activities of NAEWG-EE, what degree of harmonization of MEPS, if any, will be deemed desirable and feasible in the region.

References

Arasteh, Dariush (Lawrence Berkeley National Laboratory). 2002. Personal communication. February 12.

Delves, Katherine (Natural Resources Canada). 2002. Personal communication. February 19-21.

Harrington, Lloyd. 1999. *Review of energy efficiency test standards and regulations in APEC member economies*. APEC report #99-RE-01.5 ISBN 0-646-38672-7. Singapore: APEC Secretariat. Available from www.energyefficient.com.au under documents.

Harrington, Lloyd, and Melissa Damnics. 2001. *Energy Labelling and Standards Programs Throughout the World*. Version 1.02. Australia: The National Appliance and Equipment Energy Efficiency Committee. Available from www.energyefficient.com.au under documents.

Meier, Alan (Lawrence Berkeley National Laboratory). 2002. Personal communication. February 13-21.

Payne, Christopher (Lawrence Berkeley National Laboratory). 2002. Personal communication. March 6.

Pensado, Fernando Hernandez (Comision Nactional para el Ahorro de Energía). 2002. Personal communication. February 25.

Wiel, Stephen and James E. McMahon. 2001. *Energy-Efficiency Labels and Standards: A Guidebook for Appliances, Equipment, and Lighting*. Washington, DC: Collaborative Labeling and Appliance Standards Program (CLASP). Available from www.clasponline.org

Appendices

Appendix 1. Comparison of MEPS in Canada, México, and the United States

Refrigerators and freezers	All three countries have MEPS for refrigerators and freezers. All three countries had identical MEPS until July 2001, when Canada and the US adopted new (identical) MEPS
Central air conditioners and heat pumps	For single-packaged central AC and HPs, Canada's cooling SEER is the same as the US1993 MEPS; for split-systems, Canada's SEER is the same as the US 1992 MEPS. For both types, Canada's heating HSPF is identical with the US level for those levels covered (though the climate does not warrant coverage of all levels). In México, the MEPS for both

	split and packaged CACs is the same as the US and Canadian SEER for split system CACs, but heat pumps and CAC units with additional space heating capability are exempt. New MEPS for residential central AC are in progress in the US and Canada
Room air conditioners	Effective in 2002, Canada will implement increased MEPS, which will bring Canada in line with the Oct. 2000 US rule. México's rule was just revised and took effect in June 2001. The new levels are comparable to the 2000 US MEPS.
Other AC/HP categories	Only Canada and the US have MEPS in this category. For packaged terminal AC and HP, the two countries have different MEPS. Other classes of products in this category are defined differently and not comparable between the two countries.
Clothes washers and dryers	All three countries have MEPS for clothes washers. Only Canada and the U.S. have MEPS for clothes dryers. Canada is working to develop new MEPS for clothes washers to harmonize with recent USDOE modifications, scheduled to take effect in 2004 and 2007. México's MEPS for clothes washers is different.
Dishwashers	Only Canada and the US have dishwasher MEPS. They are identical.
Fluorescent lamp ballasts	Only Canada and the US have MEPS. In late 2001 or early 2002, Canada will increase its levels to match the US levels scheduled to take effect in 2005 and 2010.
Fluorescent lamps	The US and Canada have identical MEPS for general service fluorescent lamps; México has a voluntary standard, with different MEPS. México and the US have different standards for CFLs; Canada has no standard.
Incandescent lamps and luminaires	Canada is currently in the process of amending their MEPS for incandescent reflector lamps, which will make the US and Canadian scope and levels similar (except Canada plans to include ER lamps). México has a standard for lighting in commercial buildings and exterior lighting. The US has a standard for incandescent non-reflector lamps.
Electric ranges and ovens	Only Canada has MEPS. Depending on the results of the TP update, Canada may make changes to the levels. [n.b. United States regulations mandate that gas cooking products with an electrical supply cord shall not be equipped with a constant burning pilot light. Canada's regulations require that gas ranges may not have a continuously burning pilot light if the product has a cord set.]
Dehumidifiers	Only Canada has MEPS.
Icemakers	Only Canada has MEPS.
Direct Heating Equipment	Only the US has MEPS.
Furnaces and boilers	All three countries have different MEPS for residential furnaces and boilers. The US is undertaking a new rulemaking on this equipment.
Water heaters	All three countries have different levels, and Canada is working to harmonize with US levels. México's MEPS do not cover electric water heaters.

Motors	All three countries have MEPS. In Canada and the US, the MEPS relating to motors that conform to NEMA requirements are identical, but the Canadian program also covers metric motors. Mexico has recently completed a revision of its MEPS, making the levels equivalent to those in the US and Canada. Canada is investigating establishing minimum efficiency levels for small motors and harmonization with México's MEPS. The US is considering a small motors MEPS.
Transformers	México has MEPS for liquid-type distribution transformers and voluntary standards for dry-type transformers. Canada will soon publish MEPS for dry-type distribution transformers (effective 2003/2004). Canada also is working on a voluntary agreement for minimum levels for liquid filled transformers. The US currently is beginning a rulemaking for both dry and liquid-filled transformers (effective date TBD).
Pumps	México has MEPS for four types of pumps: vertical turbine external motor, centrifugal residential water, submersible clean water, electromechanical systems of vertical turbine pumps. The US and Canada have no MEPS for pumps.
Commercial Refrigerators	Only México has MEPS for commercial refrigeration units.

Appendix 2. Comparison of Test Procedures in Canada, México, and the United States

Refrigerators and freezers	All three countries use an equivalent test procedure.
Central air conditioners and heat pumps	Canada's TPs are based on ARI 210/240-89 and ASHRAE 37-1988. The US test procedure refers to ARI 310/380-93 and ARI 210/240-94. México's test method is ANSI/ASHRAE 37; the tolerances and efficiency levels are identical to that used in the US.
Room air conditioners	The test procedures are essentially the same in all three countries. An amendment to the Canadian TP was issued in 2001.
Other AC/HP Categories	For packaged terminal AC and HP, the US test procedure is ASHRAE 90.1, which specifies a number of ANSI and ARI standards as the test methods. Canada's TP is identical to ARI-310/380-93; Canada is working toward publication of a new Joint Standard with ARI 310/380.
Clothes washers and dryers	All three countries have test procedures for clothes washers. Only Canada and the U.S. have test procedures for clothes dryers. The current Canadian and U.S. TPs are essentially identical for both clothes washers and clothes dryers. México's test procedure for clothes washers is different. The US just published a new TP (J1) that will be effective in 2004, Canada is developing new editions of the TPs for both products (clothes washer similar to US).
Dishwashers	Only Canada and the US have test procedures, which are similar. The US will soon publish new test procedures, and will begin an additional TP for "smart" equipment.

Fluorescent lamp ballasts	All three countries have test procedures. Canada and the US have similar test procedures. The Canadian test procedure has been amended and is similar to US test procedure.
Fluorescent lamps	All three countries have test procedures for general service fluorescent lamps; those of the US and Canada are essentially identical. The three countries have different test procedures for CFLs.
Incandescent lamps and luminaires	The US and Canadian test procedures for incandescent reflector lamps are essentially the same. México has TPs for lighting in commercial buildings and exterior lighting. Canada has TPs for dusk to dawn luminaries and roadway luminaries. The US has a TP for incandescent non-reflector lamps.
Ranges and ovens	Canada and the US have test procedures for electric ranges; Canada is revising the TP to use the same usage factors as the US, also to include a volume specific formula for built-in ovens.
Dehumidifiers	Only Canada has a test procedure.
Icemakers	Only Canada has a test procedure.
Direct Heating Equipment	Only the US has a test procedure.
Furnaces and boilers	All three countries have different test procedures, although the TP for gas furnaces is identical in Canada and the U.S. The US will soon publish a revised test procedure for residential furnaces and boilers, which references ASHRAE 90.1. Canada has published a new version of the TP for oil-fired furnaces and boilers (updating to ANSI) but it has not been referenced in the regulations.
Water heaters	The three countries have different test procedures. Canada also has a TP, which is harmonized with the USA drawoff method, which is being considered for introduction into the Canadian regulations. A new test procedure is in progress in the US for commercial water heaters.
Motors	The three countries have similar test procedures, with some differences.
Transformers	Canada's test procedure for dry-type and liquid filled is essentially equivalent to NEMA TP2. The US has a test procedure underway that may be based on NEMA TP 2. NEMA has agreed to consider suggested revisions to TP 2. México has its own test procedures for transformers. Canada published a new TP for power transformers in 2001.
Pumps	The test procedure for small pumps in Canada will soon be published. Three of four test procedures for pumps in México are based on ISO-3555 standards. The US has no test procedure for pumps.
Refrigerated Display Cabinets/ Commercial Refrigerators	Only Canada has a test procedure for refrigerated display cabinets. Only México has a test procedure for commercial refrigeration units.

Uninterruptible Power Supplies	Only Canada has a test procedure.
Exit Signs	Only Canada has a test procedure.
Mechanical Ventilation Systems	Only Canada has a test procedure.
High intensity discharge lamp ballasts	Only Canada has a test procedure.
Building Envelopes	Only México has a test procedure.