Standards and Labels: Transforming the Market for Energy Efficient Appliances

Clean Energy Solutions Center Webinar Series

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Agenda

- Organizational Overviews:
  - Clean Energy Ministerial
  - Clean Energy Solutions Center
  - SEAD Initiative
  - CLASP
- The CLASP Energy Efficiency Labels and Standards Guidebook:
  - Key principles and definitions for S&L Programs
  - Initial steps in developing an S&L Program
  - Case Study: Ghana
- Q&A Session

About the Clean Energy Ministerial

- The Clean Energy Ministerial (CEM) is a forum for 23 major-economy governments to accelerate the transition to clean energy technologies
- Energy ministers come together on a regular basis to review and drive progress within eleven technology-focused initiatives
- The next meeting (CEM3) will be in London in April 2012, followed by CEM4 in New Delhi and CEM5 in Seoul

Together, the national markets represented by the CEM account for:

- **90% of global clean energy investment**
- **Greater than 80% of global GHG emissions**

About the SEAD Initiative

- The SEAD initiative seeks to transform the global market for energy efficient equipment and appliances.
- SEAD engages governments and the private sector in voluntary activities and projects with a goal to:
  - **Raise the efficiency ceiling** by pulling super-efficient appliances and equipment into the market through cooperation on measures like incentives, procurement, awards and R&D investments
  - **Raise the efficiency floor** by bolstering national or regional policies like minimum efficiency standards and labels; and
  - **Strengthen the foundations** of efficiency programs by coordinating technical work to support these activities.
- SEAD members (as of January 2012): Australia, Brazil, Canada, European Commission, France, Germany, India, Japan, Korea, Mexico, Russia, South Africa, Sweden, United Arab Emirates, United Kingdom, and the United States

About CLASP

- CLASP is the leading voice for energy efficiency standards and labeling (S&L) for major appliances, equipment and lighting products worldwide.
  - Cooperative Agreement with the US Department of Energy as the Operating Agent for the SEAD Initiative.
  - Partners with the ClimateWorks Foundation as a Best Practice Network for the appliance sector.
- Core services include disseminating best practice information and training and providing technical assistance and expertise to national governments and other stakeholders.
- Headquarters is in Washington, DC. Regional offices in Beijing, Brussels, and New Delhi.

Global EES&L Programs

More than 75 countries have energy efficiency standards and labeling programs in place

Benefits of EES&L

Reducing the energy consumption of a product…

on aggregate, reduces overall energy use.

This reduces power demand…

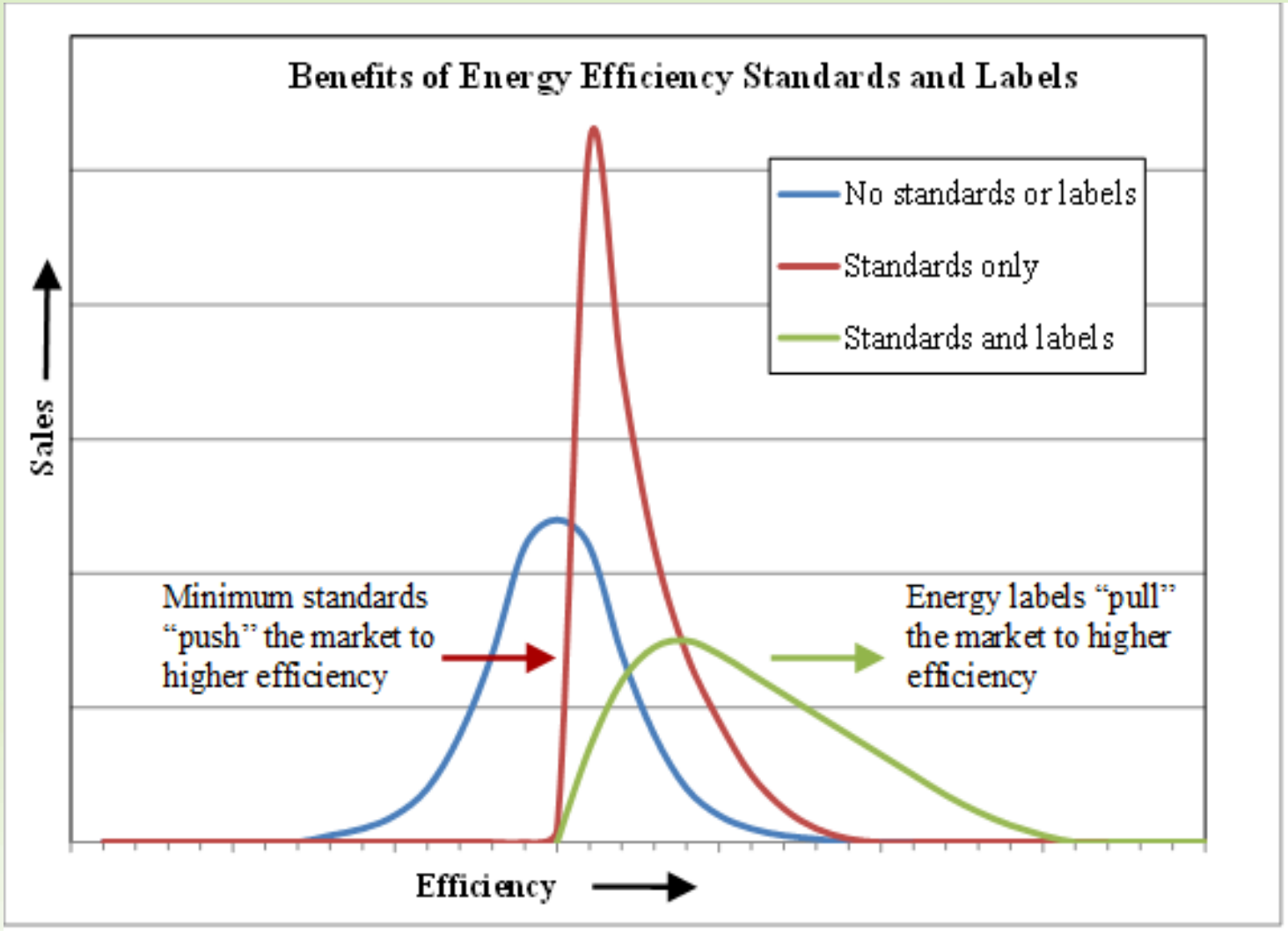
which reduces electricity and fuel consumption in existing power plants…

and reduces the need to build new power plants to produce more electricity.

Resulting benefits include:

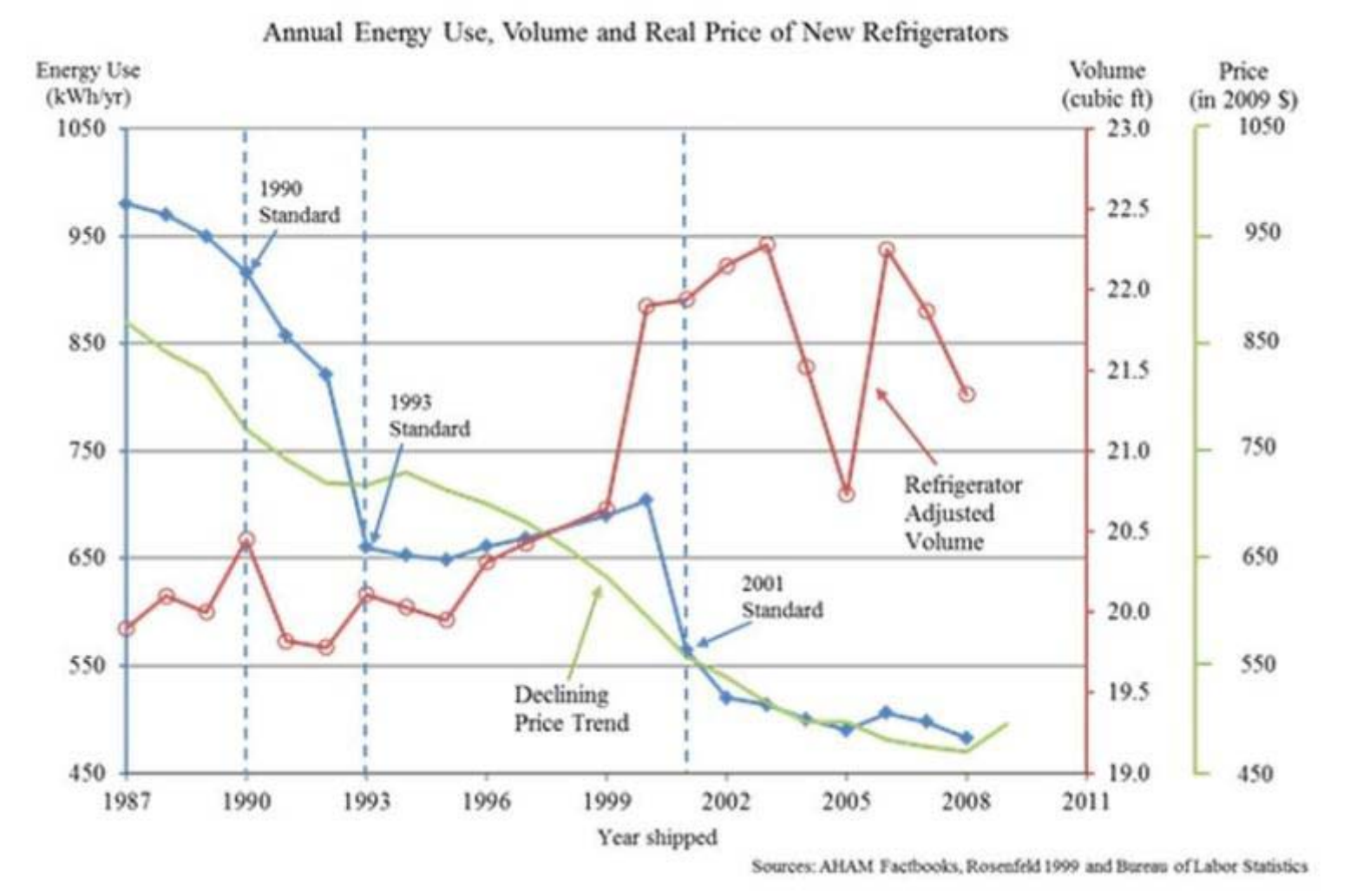
- Reduced capital investment in energy supply infrastructure;
- Enhanced national economic efficiency by reducing energy bills;
- Enhanced consumer welfare;
- Enhanced energy independence;
- Strengthened competitive markets;
- Reduced emissions to meet climate change goals;
- Averted urban/regional pollution.

Benefits of EES&L



Standards and labels work together to "push" and "pull" markets toward greater energy efficiency

Benefits of EES&L

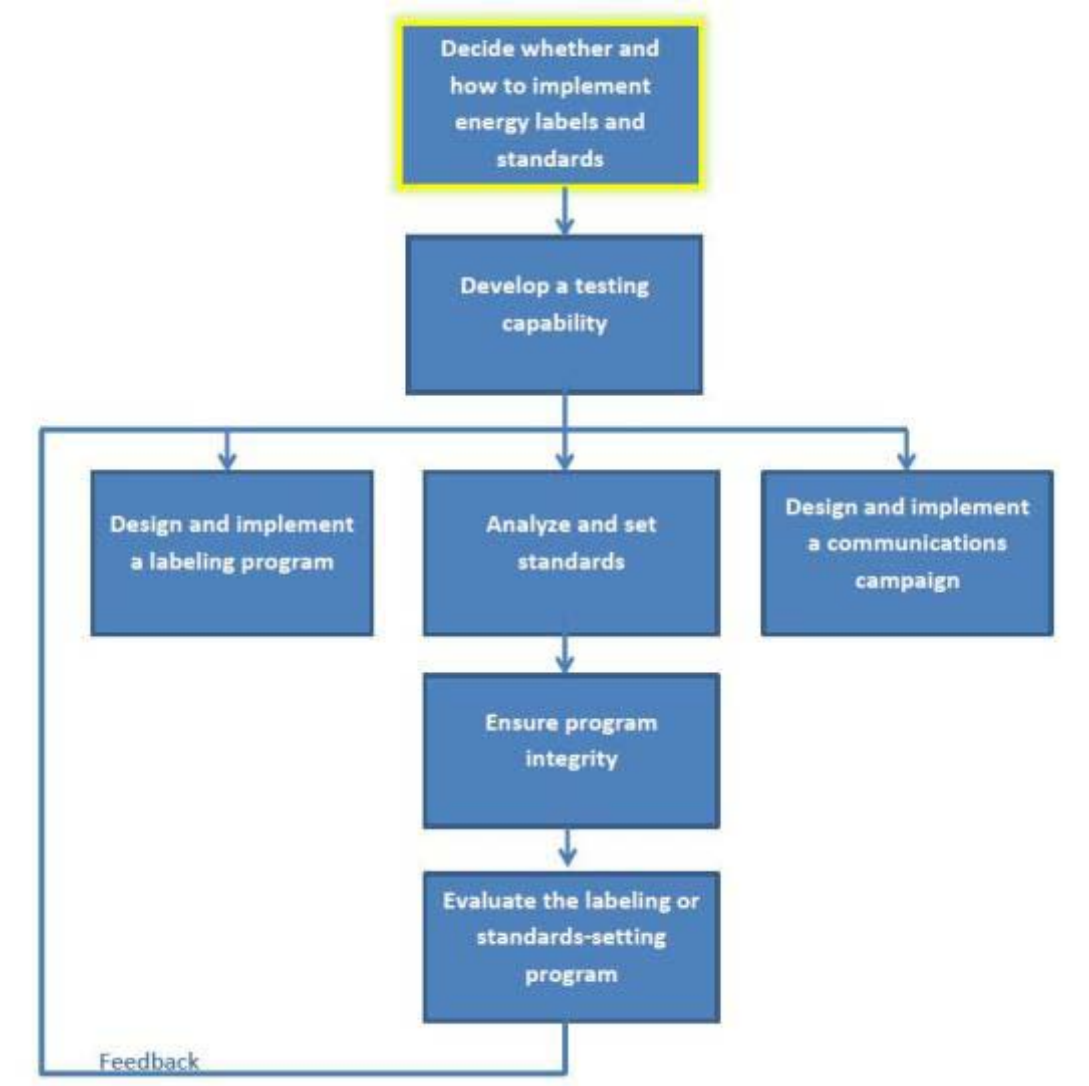


Minimum energy performance standards have accelerated the decline in product energy consumption and life cycle cost to consumers.

Seven Steps to EES&L

- This presentation will cover the first four steps in the development of an effective energy efficiency standards and labeling program:
  1. Decide Whether and How to Implement Energy Efficiency Standards and Labels
  2. Develop Testing Capability
  3. Analyze and Set Standards
  4. Design and Implement a Labeling Program
  5. Design and Implement a Communications Campaign
  6. Ensure Program Integrity
  7. Evaluate Program Performance and Refine
- Additional information is available in the CLASP Energy Efficiency Standards & Labels Guidebook, 2nd Edition, available for free download at: http://www.clasponline.org/ResourcesTools/Resources/StandardsLabelsGuidebook

clasp Step 1: Prepare to Implement EES&L



Identify Program Resources

- Legal and Authoritative Resources
  - Examine existing legislation to determine government authority to establish an S&L program
  - Two stages to develop legal authority: (1) Government develops framework legislation to authorize an agency to implement S&L; (2) Implementing agency defines and establishes standards.
- Financial Resources
  - Designate a regular and consistent budget source
    - The US government spent $104 million developing and implementing standards from 1978 to 1994; annual spending per household $0.02 to $0.12 per year
  - Countries that develop new programs can save costs by referencing existing work
  - Payback on increased investments in efficient technology is substantial

Identify Program Resources

- Human Resources
  - Qualified staff needed to manage implementation, though outsourcing may be possible.
  - Specialized staff are needed to conduct technical and market analysis, set standards and develop labels, develop and execute communication campaigns, and oversee monitoring, certification and compliance
- Physical/Facilities Resources
  - Establishing and accrediting test laboratories can be very resource-intensive and time-consuming
  - Other necessary facilities include central offices and field facilities for monitoring and enforcement
- Institutional Resources
  - All of the above should culminate in a managing institution with program responsibility

Case Study: Ghana

Whether and How to Implement Labels and Standards

- Ghana primarily relies heavily on intermittent hydroelectric power supplies.
- Ghana needs standards and labels to cost-effectively allow faster growth of energy services (~10%/year) with fewer blackouts due to supply constraints
- Efficiency is cheaper than new power plants
- Standards are implemented on imports by customs, and through rebate and incentive programs
- The first energy efficiency regulations in Ghana were promulgated in 2005 for air conditioners and compact fluorescent lights (CFLs) labels
- After lighting, refrigeration is the next biggest residential energy use

Case Study: Ghana

- Legal and Authoritative Resources:
  - Ghana Customs and Excise Policy Services: Enforcement
  - The Energy Commission – Policy analysis body for the Government of Ghana. Responsible for formulating regulations and setting policy and procedures with regards to the continuing practicalities of enforcement
  - Ministry of Energy
  - Parliamentary Committees
  - Ghana Standards Board: Codification of technical standards and test procedures
- Financial Resources
  - Ghana Energy Foundation – A partnership between the public and private sectors in Ghana formed in 1997 to promote energy efficiency and renewable energy use

Case Study: Ghana

- Human Resources
  - The Ghana Standards Board houses and staffs the S&L program
  - Council of Scientific and Industrial Research's Institute of Industrial Research: Coordinates and implements field research and data collection
  - The Ghana Energy Foundation also advocates for energy efficiency and consults and advises legislation and policy directives
- Physical Facilities & Product Certification
  - The Ghana Standards Board committed to build a test lab and train staff with the assistance of the Ghana Energy Foundation
  - Ghana has also considered allowing imports for products meeting certification requirements in other countries

Consider Regional Harmonization

- The major goal of harmonization is to reduce non-tariff trade barriers by:
  - Simplifying and harmonizing customs procedures among countries
  - Harmonizing test procedures, labels, and standards
  - Implementing mutual recognition agreements
- Harmonizing Test Methods is a Good First Step
  - Many countries reference standards from two international standards bodies: The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC)

Assess Data Needs & Policy Options

- Proper standards and labeling implementation requires market data - ideally:
  - Current levels and forecasted trends for efficiency of products in the market
  - Insight regarding new technology that has recently or will soon become available in the marketplace
  - Energy performance characteristics of both domestic and imported products, as well as products that are only available in overseas markets
  - Understanding of efficiency standards in other countries
- Decide on a programmatic approach
  - Standards vs. Labels
  - Mandatory vs. Voluntary Programs
  - Comparative vs. Endorsement Labels

Case Study: Ghana

- For lighting and air conditioning, the Ghana Energy Foundation and LBNL team developed a survey to determine the potential impact of energy efficiency standards in Ghana
- An impacts report was published in 1999 based on the data that had been gathered
- Computer models were used to determine the energy savings potential of efficiency standards
- Analysis showed that by 2020 the proposed standards would save about 250 GWh of energy per year, and free up nearly 250 MW of generating capacity
- The initial 1999 study lacked substantial field data for Ghana refrigerator (and other appliance) energy use, so Ghana conducted a 2003 household study and subsequent field use measurements

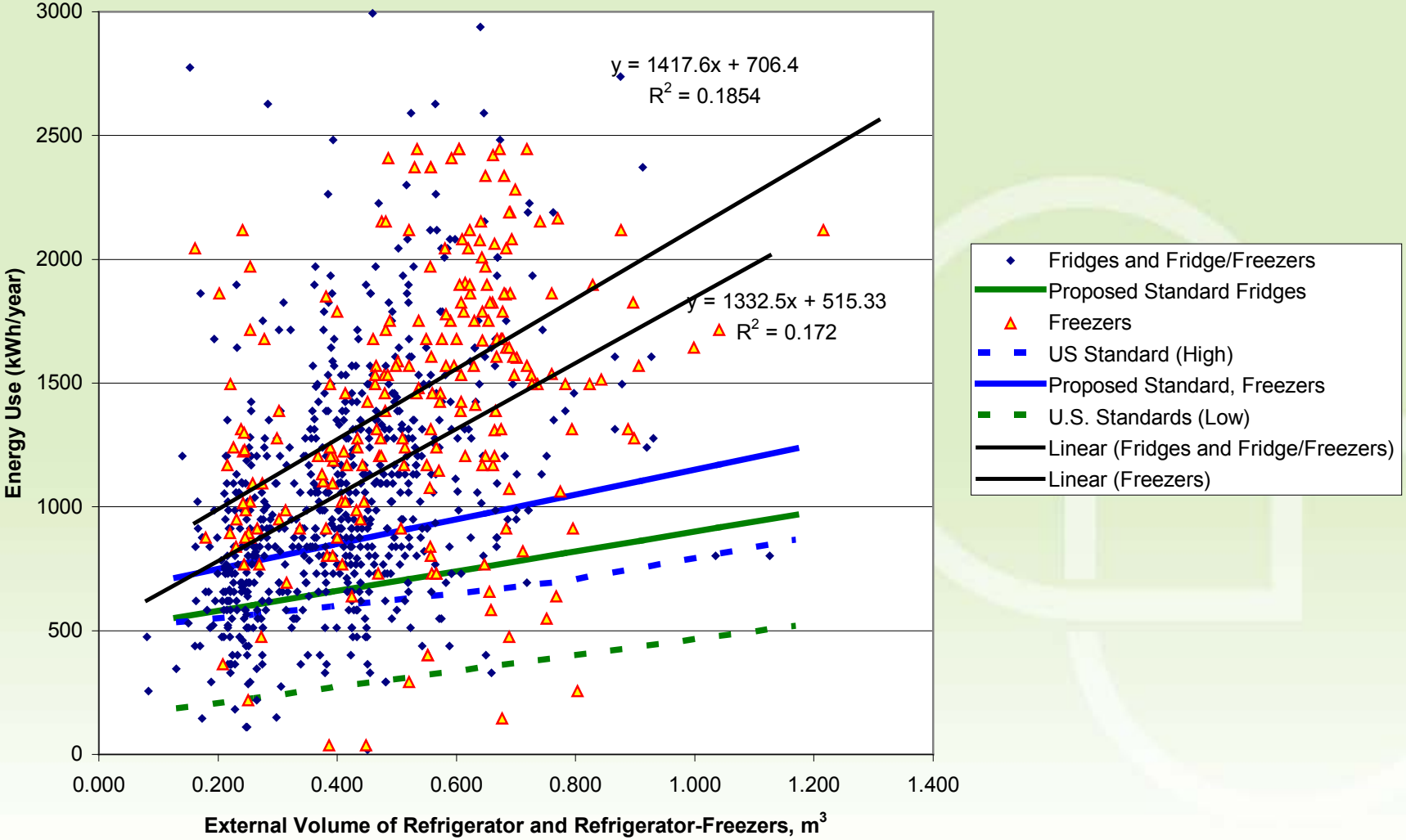
Case Study: Ghana

Appliance Saturations in Ghana from 2003 Survey

Appliance	# of Households that Answer Q's	Saturation as % HH w/ Appliance	Saturation as # of Appliances/cap
Lighting	2504	83.5 – 100.0	Fixtures- 1.31 – 1.56 Lamps- 1.71 – 2.05
Stove/Cooker	2735	91.2 – 100.0	0.302 – 0.330
Television	2808	93.6 – 100.0	0.227 – 0.243
VCR	2906	96.9 – 100.0	0.207 – 0.214
Stereo	2834	94.5 – 100.0	0.204 – 0.216
Pressing Iron	2836	79.8 – 84.4	0.186 – 0.196
Fan	2836	75.8 – 80.2	0.316 – 0.334
Refrigerator	2535	76.4 – 90.4	0.213 – 0.252
Tape Player	2836	70.7 – 74.8	0.172 – 0.182
Water Heating: y/n	2938	47.2 – 48.2	
Appliance Type	1451	48.4 – 49.4	0.104 – 0.106
Fuel Type	1341	44.7 – 45.6	0.130 – 0.141
Mobile Phone	2872	34.5 – 36.0	0.106 – 0.111
Vehicles*	599	20.0 – 21.0	0.0477 – 0.0501
CD Player	2836	18.0 – 19.1	0.0385 – 0.0408
Wood Fuel Iron	2836	12.3 – 13.0	0.0279 – 0.0295
DVD Player	2836	8.03 – 8.50	0.0166 – 0.0175
Computer	2836	6.67 – 7.05	0.0141 – 0.0149
Air Conditioning	2676	4.53 – 5.08	0.0187 – 0.0209
Blow Dryer	2836	3.10 – 3.28	0.0075 – 0.0079
Exhaust Fan	2836	2.17 – 2.29	0.0075 – 0.0079
Inkjet Printer	2836	1.83 – 1.94	0.0038 – 0.0040
Clothes Washer	2857	1.70 – 1.78	0.0035 – 0.0036
Satellite Receiver	2836	1.17 – 1.23	0.0026 – 0.0028
Laser Printer	2836	0.53 – 0.56	0.0011
Fax Machine	2836	0.43 – 0.49	0.0009
Dehumidifyer	2836	0.10 – 0.11	0.0002
Clothes Dryer	1746	0.47 – 0.80	0.0009 – 0.0016
HH Members	2868	4.93/HH	

Case Study: Ghana, Refrigerators

Field energy use was measured as much higher than developed-country standards



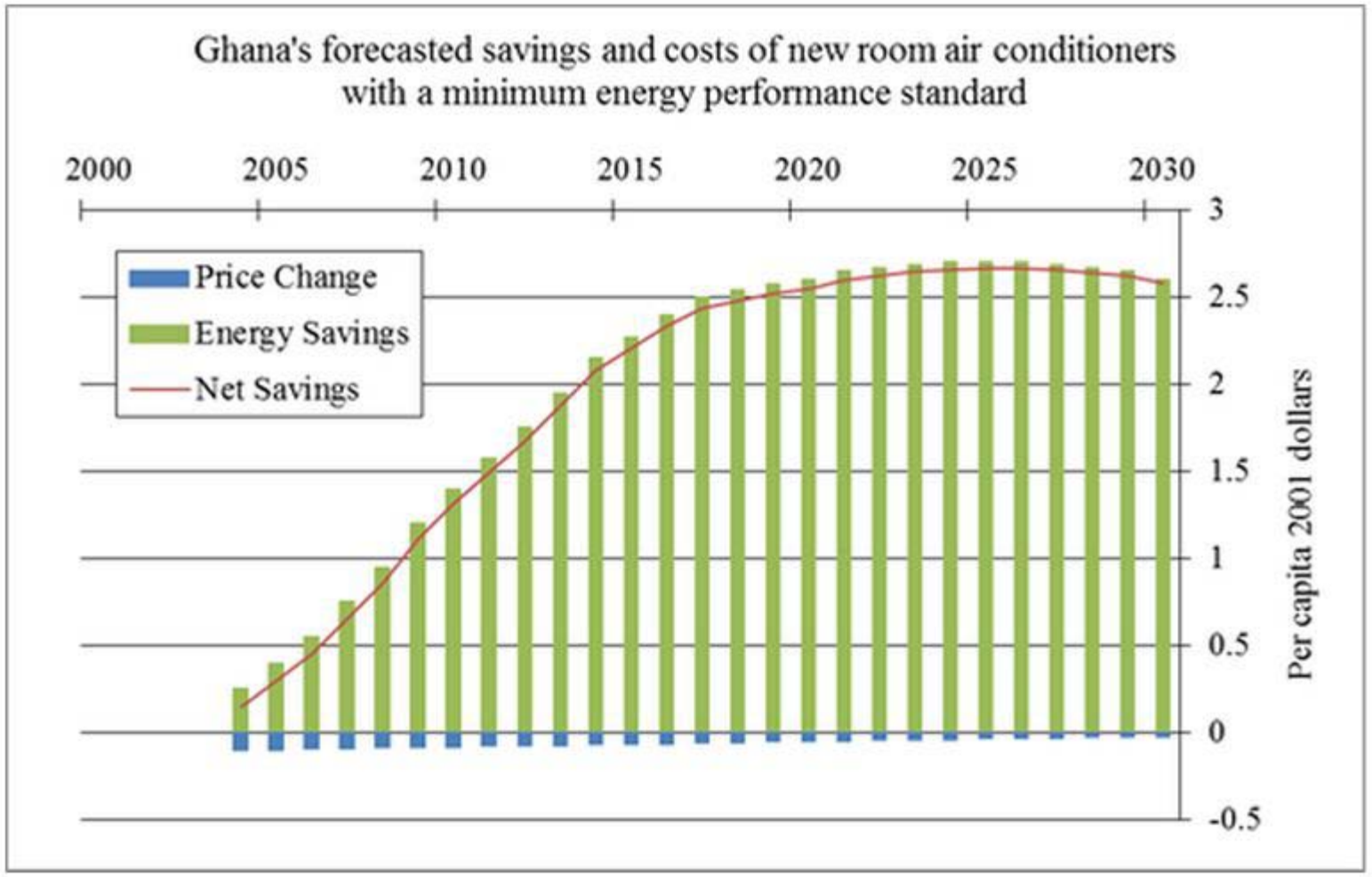
Select Products

- Consider the following criteria:
  - Impact on total energy demand
  - Level of ownership and turnover
  - Life cycle cost impacts
  - Potential for energy-efficiency improvement
  - Energy savings and greenhouse gas abatement potential
  - Number of manufacturers and market characteristics
  - Anticipated impact on manufacturers, consumers, etc.
  - Existence of test procedures
  - Existence of energy-efficiency standards and labeling schemes around the world

Case Study: Ghana

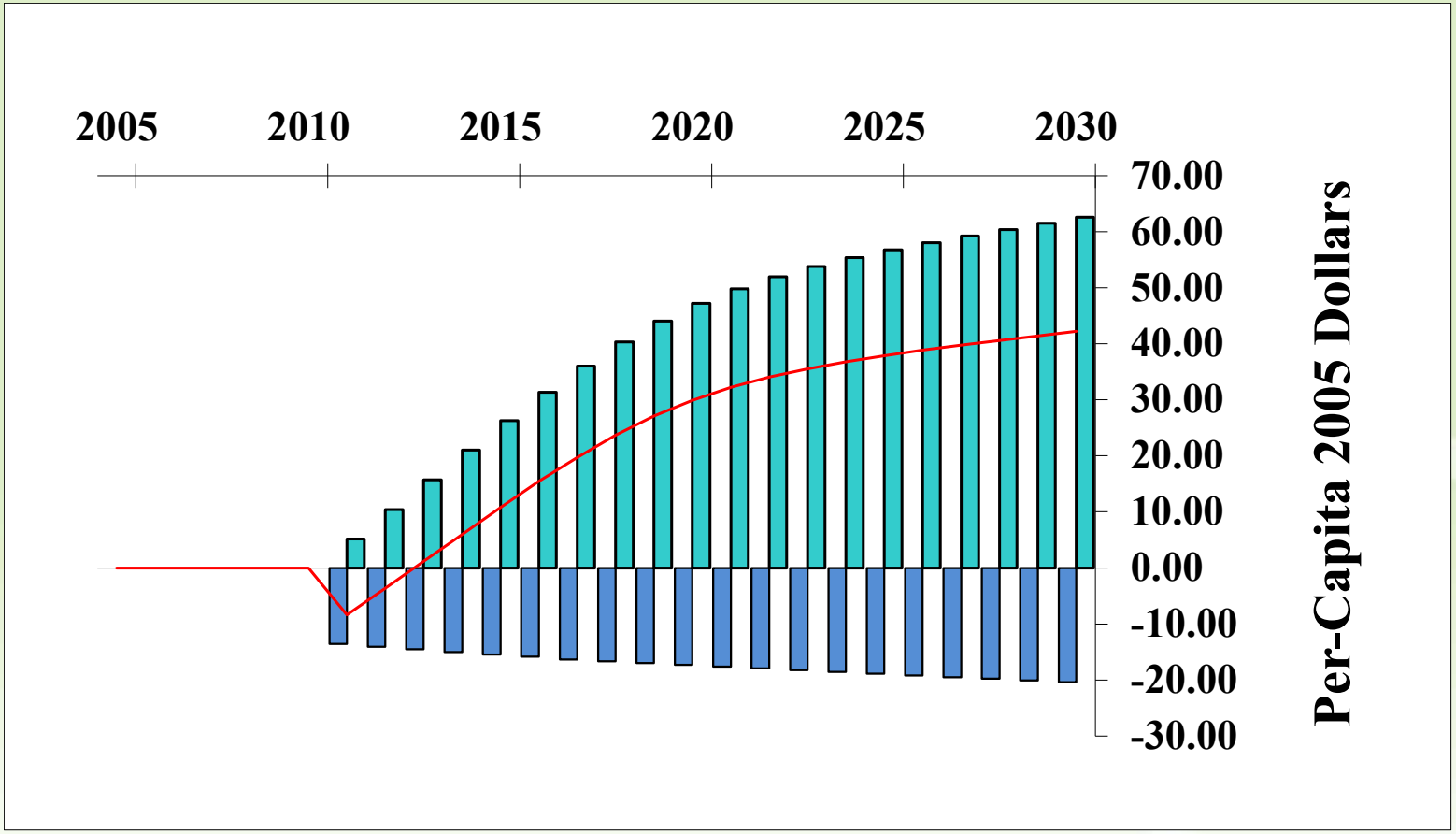
- Product prioritization was based on data analysis and market impacts
  - Air conditioners were selected for the first policy measures because of their role in the growth of peak electricity demand and because they are primarily owned by wealthier households who could afford the cost of efficiency
  - CFL regulation supported market transformation programs that include subsidized distribution by helping assure the quality of higher efficiency lighting products
  - Refrigerators standards were prioritized because they consume a disproportionately high amount of energy in Ghana.

Case Study: Ghana

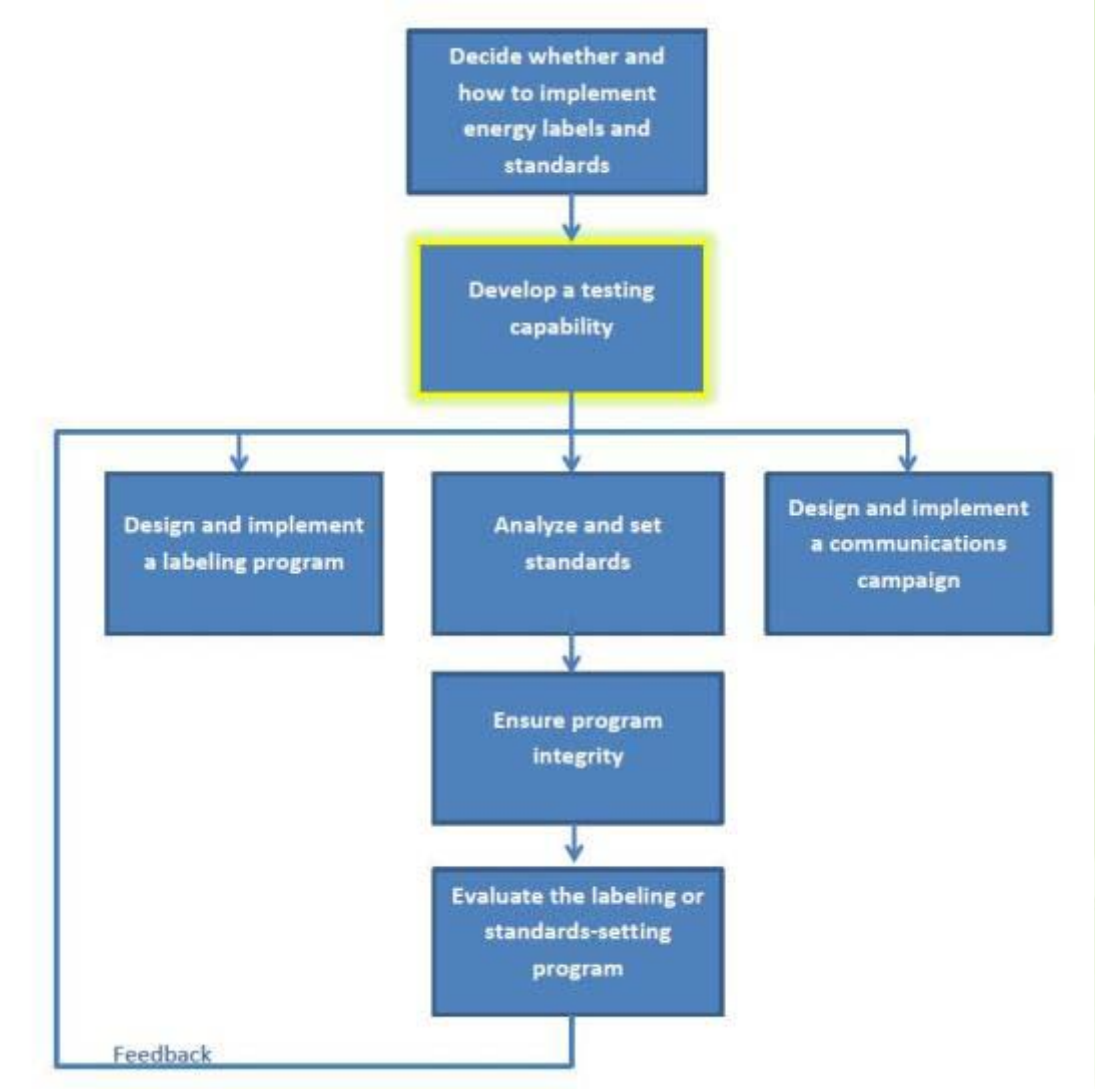


Case Study: Ghana

Refrigerator standards can potentially have a large per-capita impact



Step 2: Develop Testing Capability



Test Procedures

- Energy efficiency test procedures are the foundation of any S&L scheme.
- Test procedures should:
  - Reflect typical usage
  - Yield repeatable and accurate results
  - Be relatively inexpensive to perform
- Test procedures can be developed domestically or adopted from an international body.
- All testing should be conducted in accredited laboratories.

Chinese Air Conditioner Testing Facility

Case Study: Ghana

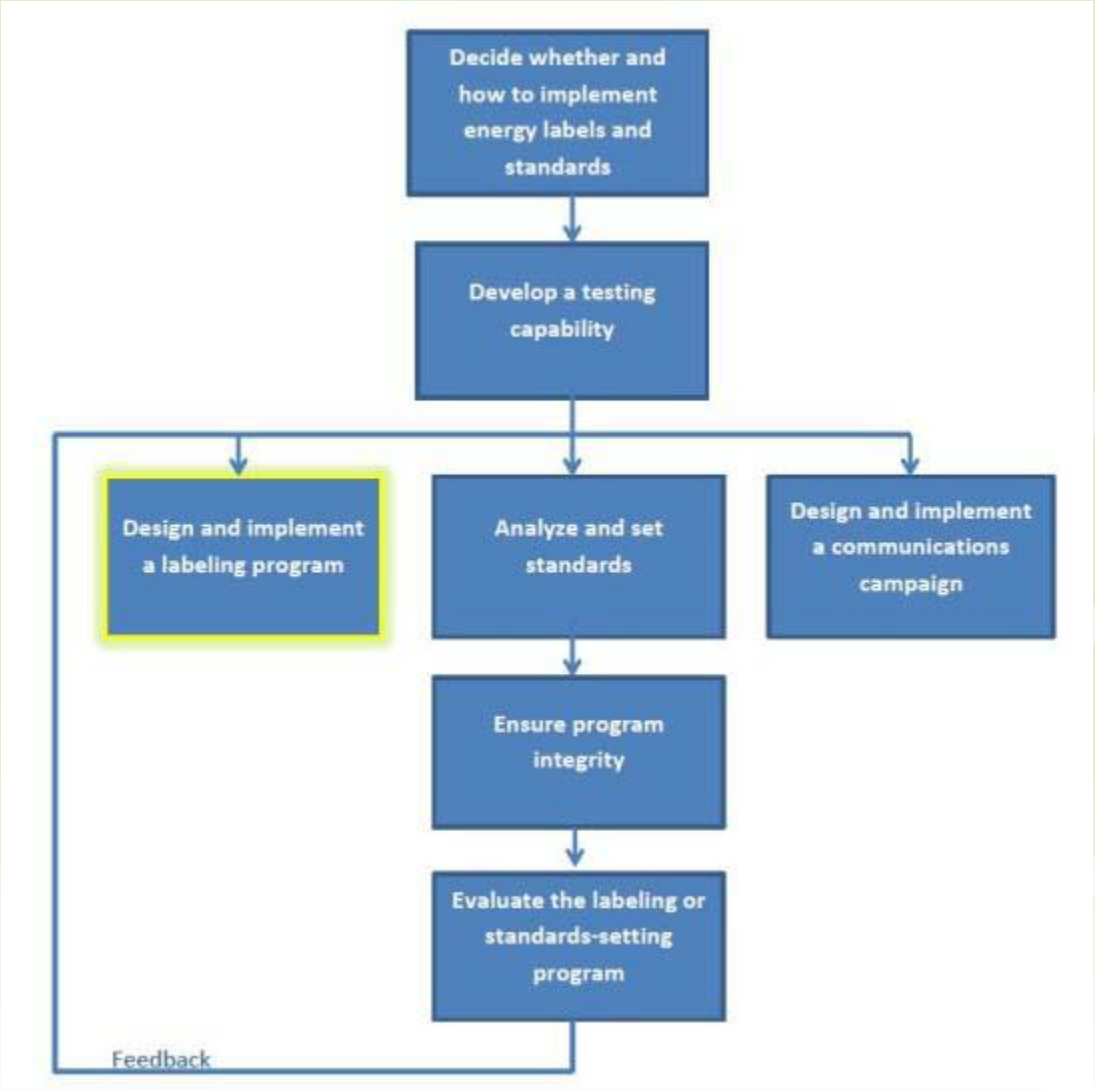
- A testing facility to test and certify the energy efficiency of Room Air Conditioners was built at the Ghana Standards Board offices in 2005
- Ghanaian Standards Board officials were trained on the use of the facility
- For refrigerators, Ghana adopted ISO test procedures, but specified that testing would be conducted under tropical or subtropical conditions

Case Study: Ghana, Refrigerators

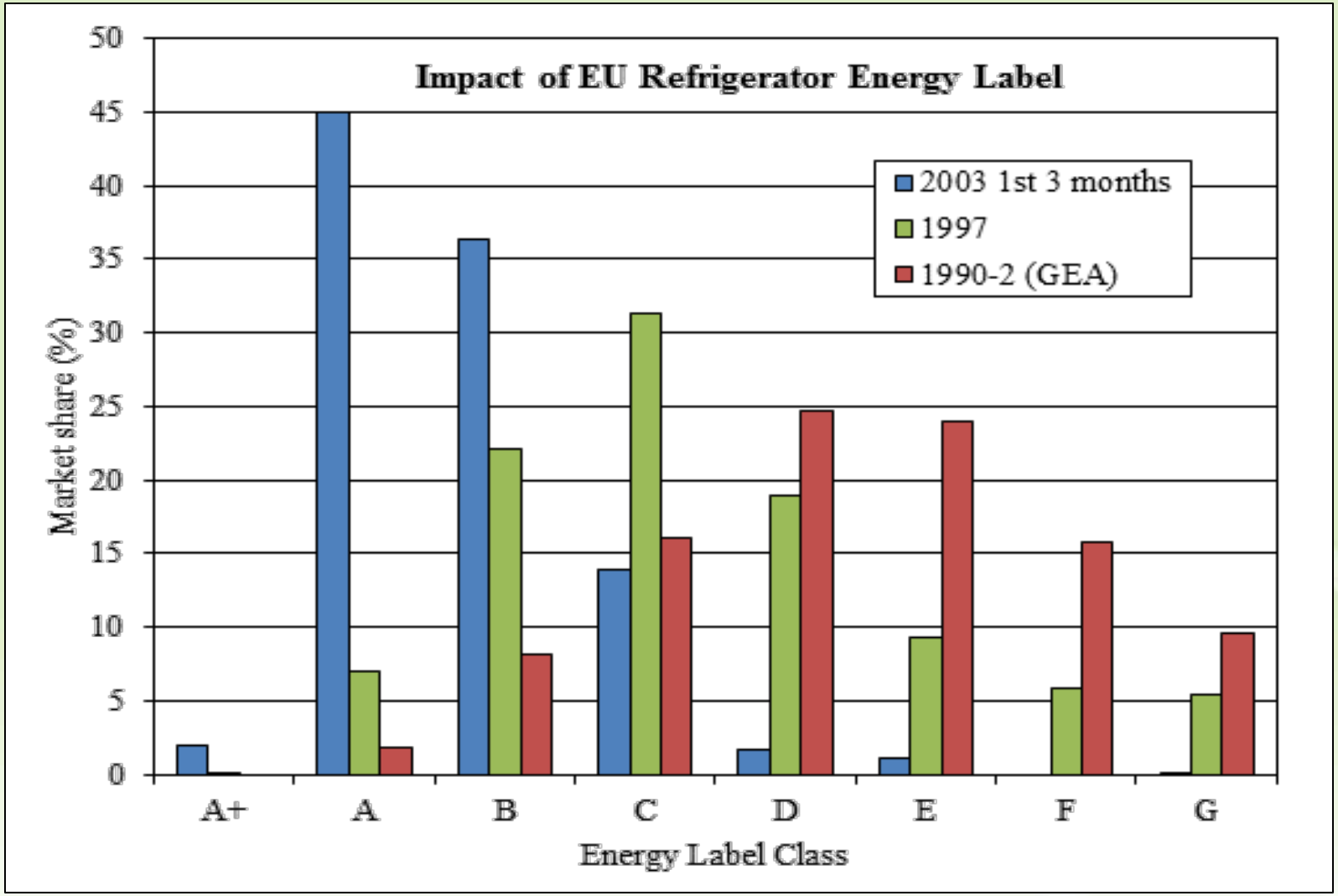
Ghana Standards Board recommended an adaptation European Standards in 2008:

- IEC 62552:2007 for the characterization and testing of household refrigerating appliances
- Product and standard level definitions as implemented in the European Union as defined by European Council Directives 92/2/EC and 2003/66/EC
- Only ST and T class refrigerating appliances should be allowed for import
- The Ghana one-star, two-star, three-start, four-star and five-star levels should be set equal to the European levels C, B, A, A+, and A++ respectively for the ST class refrigerating appliances, and to European levels D, C, B, A, and A+ for the T class refrigerating appliances respectively. More energy use is allowed for T class appliances because they are tested at a higher temperature (32 degrees C) compared to ST class appliances (which are tested at 25 degrees C).

Step 3: Implement

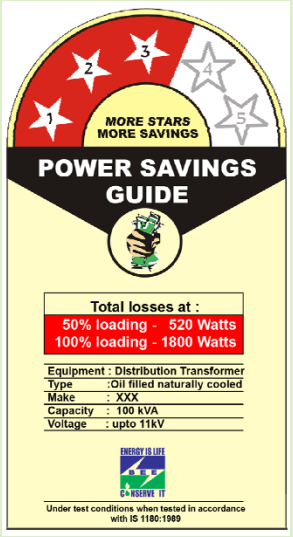


Labels Transform Markets

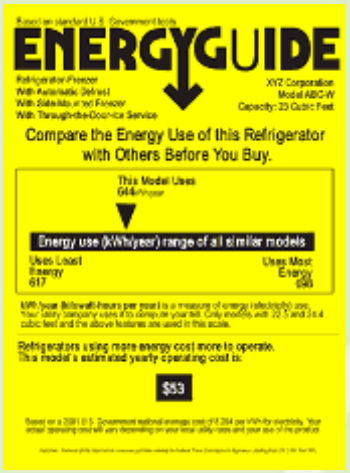


Energy Efficiency Labels

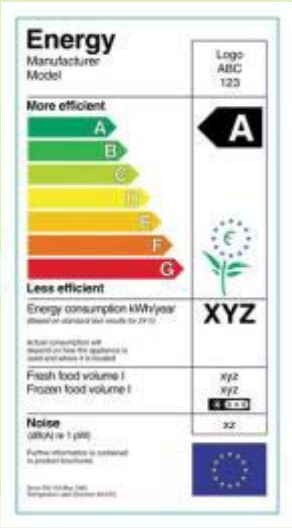
Categorical label (Dial)



Continuous Label



Categorical Label (Bars)



Endorsement Labels

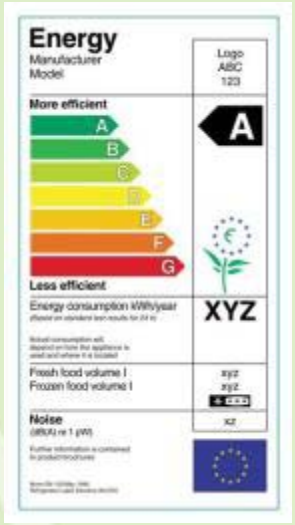
United States

India

Korea

Designing Labeling Programs

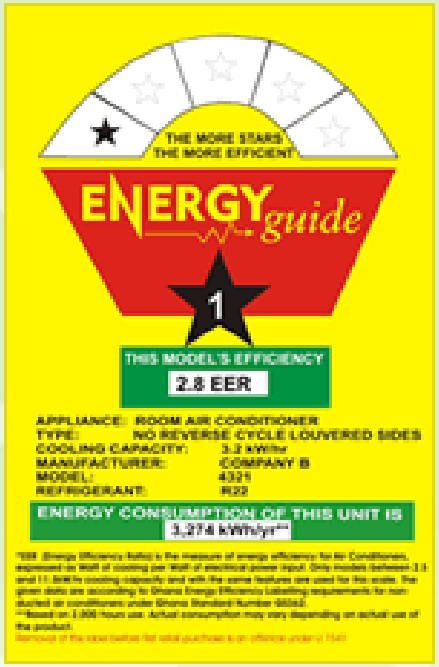
- Comparative Labels
  - Category scale allows consumers to compare the energy efficiency of products
  - Encourage competition among manufacturers
  - Comparative labels may be mandatory or voluntary.



- Endorsement Labels
  - Simple label allow consumers to identify the most energy efficient products
  - Endorsement labeling programs are inherently voluntary since they do not seek to eliminate the least efficient products from the market.

Case Study: Ghana

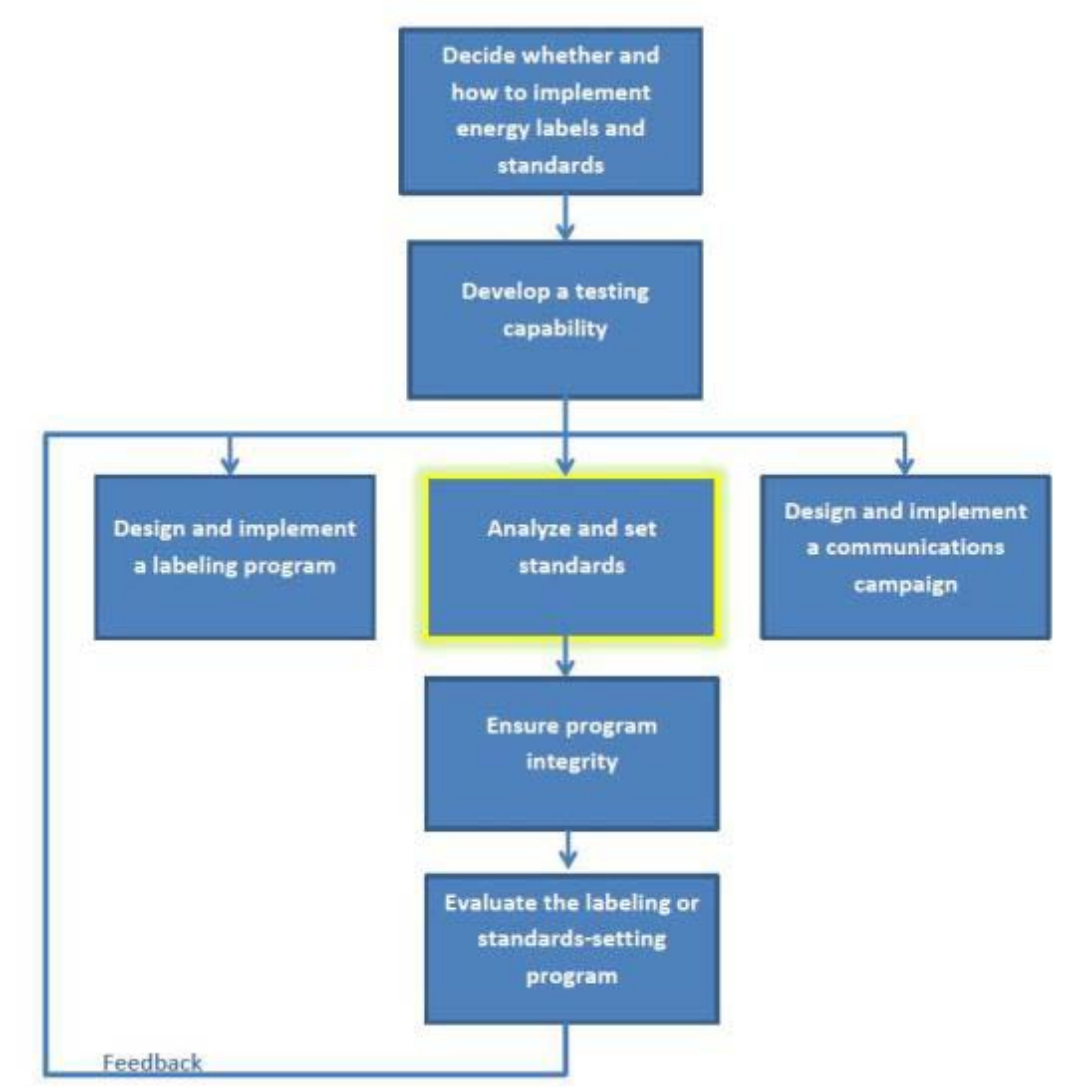
- A comparative star-rating labeling program was implemented in 2005 for room ACs and CFLs, and a program for refrigerators and freezers is under consideration.
- Label design was informed by market research
  - Ten focus groups in four cities to test consumer comprehension and qualitative impressions of four sample labels
  - Consumers expressed uncertainty as to whether more stars signified greater energy efficiency or consumption
  - More effective labels led to greater consumer understanding of product energy use, higher sales of efficient products, and market transformation



Case Study: Ghana, Refrigerators

- Market transformation is more complex because 80% of sales are used products, and ozone depleting substances (ODS) are an important issue
- Ghana partnered with UNDP-GEF to create a $6M market transformation experiment/program
- UNDP-GEF project has 8 components:
  - Strengthen EE institutions
  - Develop verification and enforcement capacity
  - Consumer and retailer awareness program
  - Establish test facilities
  - Establish ODS collection and disposal facilities
  - Develop EE program evaluation and monitoring capacity
  - Test business and organizational model designs for the accelerated exchange and rebates for efficient refrigerator replacements
  - Develop national scale business plan for scaled-up market transformation programs (i.e. carbon credits?)

Step 4: Analyze and Set Standards



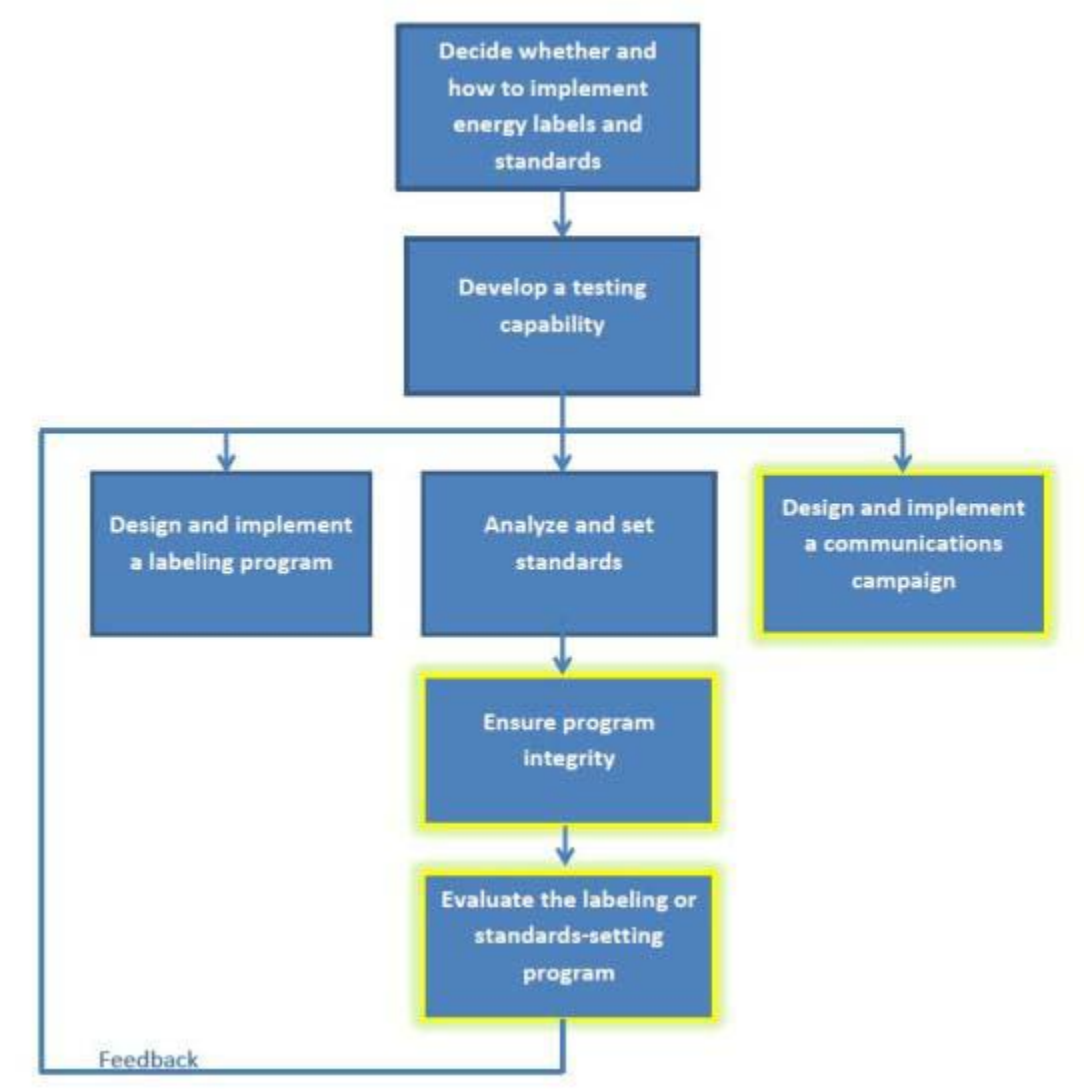
Energy Efficiency Standards

- Minimum Energy Performance Standards (MEPS) require that products achieve a minimum energy efficiency threshold (or maximum energy consumption); but do not require a specific technology or design
- Class Average Standards specify the average efficiency of a manufactured product, allowing each manufacturer to select the level of efficiency for each model so that the overall average is achieved.
- Prescriptive Standards require that a particular feature or device be installed in all new products.

Case Study: Ghana

- Account for regional needs:
  - Assess effects of standards on low-income groups
  - Ensure that efficient products are affordable
  - Make it attractive for businesses to supply the technology
- Example: Room air-conditioners
  - Payback on the initial incremental investment in efficiency by consumers is less than 9 months and consumers will save of average of US $64 million in annual energy bills. Little impact on low-income households because they do not have air conditioners
- Example: Refrigerator/freezers
  - There is a large market for second-hand appliances in Ghana, this standard regulates both new and used refrigerators/freezers
  - Harmonization with Europe, allows Europe-certified products to be allowed for import
  - Well-funded market transformation experiment will help determine how to address and design enforcement and incentive programs
- Example: CFLs
  - Standards helped 6-million-socket subsidized distribution of CFLs during a year of severe hydro-electric power shortages which was paid for through avoided power plant investments

Next Steps


Decide whether and how to implement energy labels and standards
Develop a testing capability
Design and implement a labeling program
Analyze and set standards
Design and implement a communications campaign
Ensure program integrity
Evaluate the labeling or standards-setting program
Feedback

Resources

Clean Energy Ministerial:

www.cleanenergyministerial.org

Clean Energy Solutions Center:

www.cleanenergysolutions.org

SEAD Initiative:

www.superefficient.org

CLASP:

www.clasponline.org