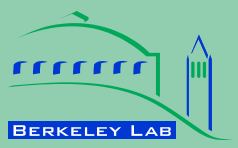

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International Comparison of Product Certification and Verification Methods for Appliances

Nan Zhou, John Romankiewicz, David Fridley, Nina Zheng
China Energy Group
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Executive Summary

Enforcement of appliance standards and consumer trust in appliance labeling are important foundations of growing a more energy efficient economy. Product certification and verification increase compliance rates which in turn increase both energy savings and consumer trust. This paper will serve two purposes: 1) to review international practices for product certification and verification as they relate to the enforcement of standards and labeling programs in the U.S., E.U., Australia, Japan, Canada, and China; and 2) to make recommendations for China to implement improved certification processes related to their mandatory standards and labeling program such as to increase compliance rates and energy savings potential.

Practices for product certification and verification vary across the world, with some programs focusing solely on either certification or verification (such as in Australia and Canada) and other programs focusing on both (such as ENERGY STAR in the U.S.). Accreditation practices for testing laboratories and certification bodies also vary, and some appliance standards and labeling programs are building databases to house all information on products and compliance.

Costs are imposed on manufacturers and program administrators when either product certification or verification processes are implemented. When designing or refining standards and labeling programs, program administrators make a comparison (estimation or calculation) of the costs of non-compliance to the costs of various third party certification and verification processes. The costs of third party processes fall on manufacturers (often passed on to consumers) and administrators (often paid for with taxpayer money), while the costs of non-compliance fall on consumers (in lost savings), society (increased costs associated with energy and climate change), and some manufacturers (those who do not comply and go unpunished have an advantage over those that do comply). A standards and labeling program decision on which monitoring methods to use (certification and/or verification) are based on a number of factors including legal framework, cost and budget, human resources, number of products, number of manufacturers, whether the program is voluntary or mandatory, and other factors.

For instance, when the U.S. Environmental Protection Agency (EPA) designed new certification and verification processes for its ENERGY STAR program, it tried to minimize costs for manufacturers and itself as the administrator. Recognizing that there would be new costs for any process involving a certification body and a third party testing laboratory, the EPA decided to allow witnessed manufacturer

testing laboratories as a lower cost option for manufacturers that already had testing laboratories in place. Although the tests still have to be witnessed by a certification body, the cost of this process is lower than sending products to third party laboratories for testing.

The EPA was able to ramp up their new certification and verification processes in a relatively short amount of time by focusing on existing legal frameworks and processes that were similar in function to the ones they were implementing. For example, there were already internationally recognized standards for accrediting and operating the certification bodies that are integral to EPA's product certification and verification processes, so EPA incorporated these directly into their new requirements. The EPA requires paperwork for all accreditation, certification, and verification performed relevant to products in the ENERGY STAR program; while this increases administrative burden, it provides them with a database of information that helps to guarantee the integrity of the ENERGY STAR label and the savings the label provides to consumers.

In China, the number of products covered by its mandatory standards program and labeling program has rapidly increased in recent years up to 44 products and 23 products, respectively. Now, China is seeking to improve the compliance rate for these products, but it wants to do so without reinventing its current organizational structure. China has bodies that oversee certification and accreditation processes under the authority of the General Administration of Quality, Supervision, Inspection and Quarantine. For instance, the Certification and Accreditation Commission of China oversees all certification and accreditation processes for product testing laboratories and certification bodies and specifically places the authority of accreditation with the China National Accreditation Service for Conformity Assessment. There are currently no standardized product certification and verification processes in place for China's mandatory standards and labeling program.[1] The common practice is have to have manufacturer's "self-declare" the energy efficiency performance of their products based on testing in their own laboratories or third party laboratories. Introducing third party product certification and verification for China's mandatory standards and labeling programs has the potential to significantly improve compliance levels without heavy administrative burden. Having reviewed international practices in product certification and verification, we offer the following summary recommendations for China to improve its practices in this space:

- **Organize certification bodies:** A call for certification bodies in energy efficiency standards should be organized, and the accreditation for these bodies can be managed by the China National Accreditation Service for Conformity Assessment or other accreditation bodies.
- **Mandate certification process:** New regulations should be announced to mandate that all new models in product categories covered by mandatory standards or labeling requirements need to have their performance and labeling information certified by these certification bodies prior to being sold.

[1] Laboratory accreditation exists for China's voluntary energy efficiency endorsement labeling program run by the China Quality Certification Center.

- **Allow witness testing:** Provisions can be made in the certification requirements to allow manufacturers to use in-house testing laboratories to produce performance and labeling information, so long as the tests are witnessed by an accredited certification body. This provision should allow for a lower cost of certification and compliance for the manufacturers, when the new certification requirements are introduced.
- **Adapt from international standards:** If gaps of knowledge exist in China's current accreditation and certification system to adequately meet the needs of the new requirements for energy efficient product certification, ISO and IEC standards used internationally can provide a good reference for various conformity assessment practices such as staff competence and impartiality.
- **Standardize verification testing:** If China would like to impose stricter standards beyond certification and achieve a higher level of integrity for its standards and labeling (albeit at increased cost), it can also introduce a standardized system for verification testing.

Figure 1 below shows how these bodies would interact. The China National Accreditation Service for Conformity Assessment or other AB's would be in charge of accrediting third party testing laboratories and certification bodies. Witnessed manufacturer testing laboratories and third party testing laboratories would submit information to accredited certification bodies, who would compare testing information with mandatory energy efficiency standards and manufacturer proclaimed label information. This information would then be submitted to the China National Institute of Standardization for final inspection. This structure serves simply as a recommendation based on international practices; further studies are needed to understand how China might fully implement such a structure.

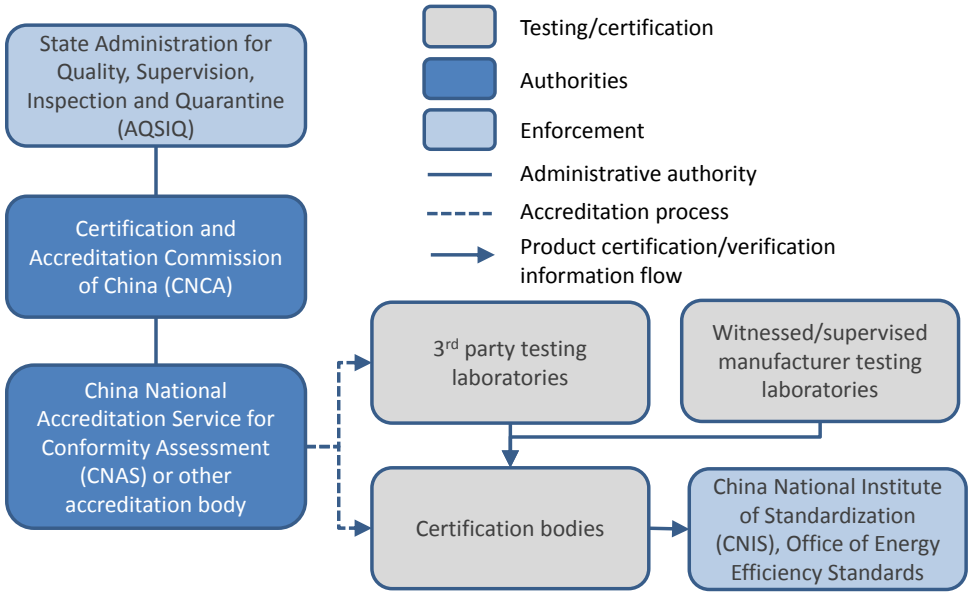

Figure 1: Recommended structure for an improved S&L enforcement regime with product certification and verification

执行摘要(Executive Summary)

家电标准的执行和消费者对家电标识的信任是推动能效经济的重要基础。产品认证和验证能增加产品的达标率，从而推动节能并增强消费者信任感。本报告有两个目的：1）回顾国际产品认证和验证的实践，包括美国、欧盟、澳大利亚、日本、加拿大和中国的标准和标识项目执行；2）为中国改进相关的强制标准和标识项目（例如提高达标率和节能潜力）的认证过程提供建议。

产品认证和验证实践在全球各地很不一样，一些项目仅侧重单一的认证或者验证（例如澳大利亚和加拿大），而另一些项目两方面都关注（例如美国的能源之星）。测试实验室和认证机构的认可方法也各不相同，一些家电标准和标识项目正在建立数据库，以容纳关于产品和达标的所有信息。

产品认证或验证的执行过程会导致制造商和项目管理者的成本增加。当设计或者改进标准和标识项目时，项目管理者要比较（估算或者计算的）不达标成本和各种第三方认证和验证过程的成本。第三方过程的成本落在制造商（往往又转嫁给消费者）和管理者（通常由纳税人支付）身上，而不达标的成本则由消费者（节能损失），社会（与能源和气候变化相关的成本增加）和部分制造商（那些不达标又未受到相应惩罚的制造商比那些达标的制造商有优势）共同买单。标准和标识项目对监测方法（认证和/或验证）的选择是由多种因素决定的，包括法律框架，成本和预算，人力资源，产品数量，制造商数量，标准和标志项目是自愿执行还是强制性执行等等。

例如，当美国环保署（EPA）为能源之星项目设计新的认证和验证过程时，它试图降低制造商和自身（作为管理者）的成本。意识到任何涉及认证机构和第三方测试实验室的的过程都会产生新的成本，环保署决定允许见证制造商测试实验室。这对已经有测试实验室的制造商而言，是一种成本较低的选择。尽管测试仍然必须由认证机构见证，这一过程产生的成本低于将产品送到第三方实验室测试所需的成本。

环保署能够在相对较短的时间里增加新的认证和验证过程，是因为它们将重点放在和正在执行的认证和验证过程功能相似的现有法律框架和过程上。例如，已经有国际公认的认可和经营认证机构的标准，这些标准和环保署产品的认证和验证过程密不可分，因此环保署直接将这些标准纳入到其新的要求里。环保署要求能源之星产品认可，认证和验证过程涉及的所有文书工作。这项要求在增加行政负担的同时，也给管理者提供了一个信息数据库，帮助他们保证能源之星标识的完整性和标识给消费者带来节约。

中国强制性标准项目涵盖的产品数量近年来快速增长至 44 种，标识项目涵盖的产品数量增长至 23 种。目前中国希望在不改变现有组织结构的前提下，设法提高产品的达标率。中国在质量监督检验检疫总局下设有专门的机构负责监督产品认证认可过程。例如，中国国家认证认可监督管理委员会负责监督产品测试实验室和认证机构的所有认证认可过程，而中国合格评定国家认可委员会则是权威的认可机构。

目前中国强制性标准和标识项目没有标准化的产品认证和验证过程[2]。常见的做法是制造商必须根据自己实验室或者是第三方实验室测试的产品能效表现信息提供一个“自我声明”。中国强制性标准和标识项目引进第三方产品认证和验证能够极大地提高产品的达标率，同时不会带来沉重的行政管理负担。通过回顾产品认证和验证的国际实践，我们为中国提供以下建议，以改进其在这一领域的实践：

1. **组织认证机构：**呼吁组织建立能效标准的认证机构，通过中国合格评定国家认可委员会或者其他认可机构对这些认证机构进行认可。
2. **强制认证过程：**公布新的法规要求，强制性标准或标识要求涵盖的所有产品类型的新型号在出售前必须有这些认证机构授予的产品表现和标识信息。
3. **允许目击测试：**制定认证要求规定，只要测试在被认可的认证机构目击下进行，允许制造商使用内部测试实验室获取产品表现和标识信息。当有了新的认证要求时，这一规定使得制造商降低认证成本。
4. **借鉴国际标准：**当中国现有的认可和认证系统难以满足能效产品认证的新的要求时，可以借鉴国际上通用的国际标准化组织（ISO）和国际电工委员会（IEC）的标准作为各种合格评定实践（例如工作人员能力和公正性）的参考依据。
5. **标准化验证测试：**如果中国想实施更为严格的认证标准，并实现更高的标准和标识水平（尽管会增加成本），可以引进验证测试的标准化体系。

图 1 显示了这些机构相互联系的过程。中国合格评定国家认可委员会或者其他认可机构负责对第三方测试实验室和认证机构进行认可。被见证或监督的制造商测试实验室和第三方测试实验室向被认可的认证机构提交产品测试信息。认证机构将产品测试信息和强制性能效标准以及制造商宣称的标识信息进行比较，然后将这些信息提交中国标准化研究院做最后的审查。该结构是根据国际实践提出的建议。中国如何完全实现这一结构，还需要做进一步的研究。

[2]中国质量认证中心运行的中国能源效率自愿认可标识项目有实验室认可。

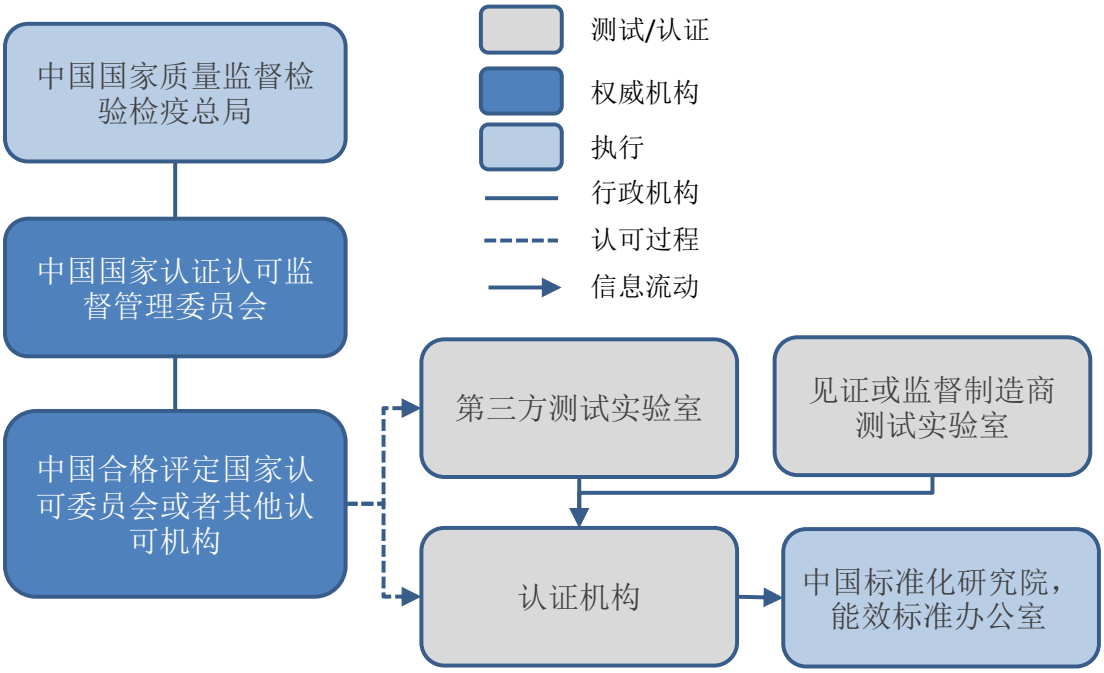

图 1 改进的产品标准和标识的认证验证执行结构

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Frequently used acronyms

AB – Accreditation body
ADCO – Ecodesign Administrative Cooperation group on market surveillance
AHAM – Association of Home Appliance Manufacturers
AHRI – Air-conditioning, Heating, and Refrigeration Institute
AQSIQ – General Administration of Quality Supervision, Inspection, and Quarantine
ATLETE – Appliance Testing for Energy Label Evaluation
CB – Certification body
CBSA – Canada Border Services Agency
CNAS – China National Accreditation Service for Conformity Assessment
CNCA – China Certification and Accreditation Administration
CNIS – China National Institute of Standardization
CQC – China Quality Certification Center
CSA – Canadian Standards Association
DEFRA – U.K. Department for Environment, Food and Rural Affairs
DOE – U.S. Department of Energy
EPA – U.S. Environmental Protection Agency
IEC – International Electrotechnical Commission
ISO – International Organization for Standardization
MEPS – Minimum energy performance standard
METI – Japan Ministry of Economy, Trade, and Industry
MSA – Market Surveillance Authority
NAEEEC – Australia National Appliance and Equipment Energy Efficiency Committee
NDRC – China National Development and Reform Commission
NIST – U.S. National Institute of Standards and Technology
NPC – China National People's Congress
NRCan – Natural Resources Canada
NVLAP – National Voluntary Laboratory Accreditation Program
S&L – Standards and labeling
SAC – Standardization Administration of China
SCC – Standards Council of Canada

Introduction: Motivations for enforcement of appliance S&L programs

Appliance standards and labeling (S&L) programs continue to play an enormous role in increasing an economy's energy efficiency and energy security while decreasing its carbon emissions footprint. Appliance S&L programs and the scope of products those programs cover are consistently growing year after year off the back of proven success of such programs as well as the steady stream of new energy-consuming products introduced into the markets.

In recent years, the enforcement of S&L programs has become equally as important as the development and expansion of S&L programs for a number of reasons:

- Credibility and consumer confidence in voluntary and mandatory labels
- Large investment made by industry into energy efficient appliance innovation
- Improved compliance rates lead to improved S&L program outcomes (energy saved and emissions reduced)

As shown in Figure 2, strong enforcement (high compliance) of S&L programs cyclically leads to greater energy savings and a continuously improving program due to consumer confidence and increased purchasing of higher efficiency appliances. Weak enforcement (low compliance) leads to reduced energy savings and a weak program that consumers do not trust. Additionally, investments made by manufacturers into more energy efficient appliances can go to waste if enforcement is weak.

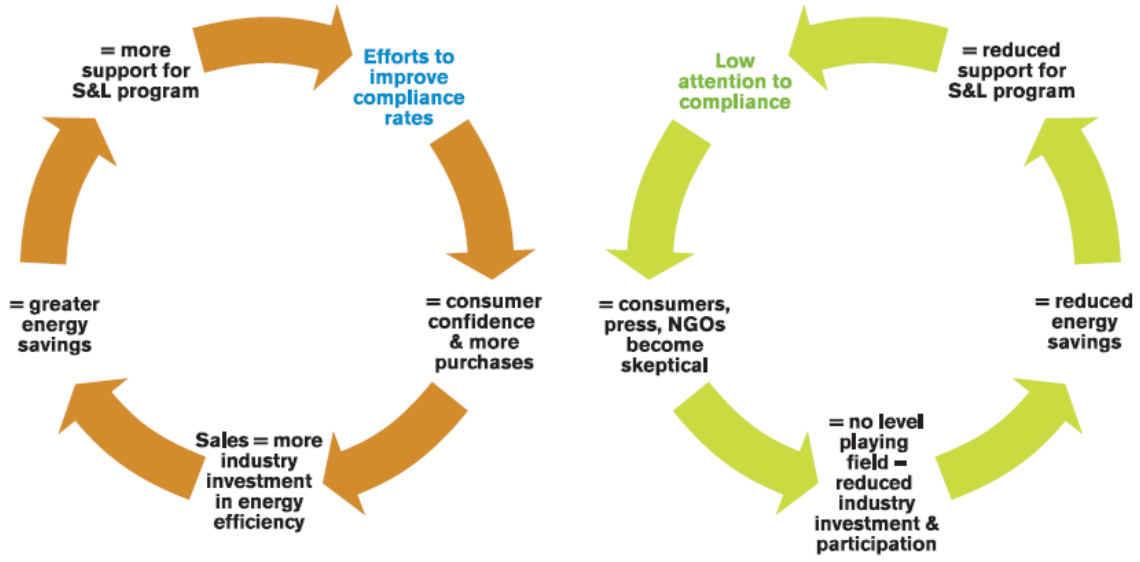

Figure 2: The compliance circle, Source: CLASP 2010

Many experts argue that the main route to better enforcement is the latent threat of punishment. It has been said that, "20 percent of the regulated population will automatically comply with any regulation, 5 percent will attempt to evade it, and the remaining 75 percent will comply as long as they think that the

5 percent will be caught and punished" (Zaelke 2005). In other words, an enforcement policy will be most effective if S&L program stakeholders perceive the risks associated with noncompliance to outweigh the benefits. So in order to enforce, you need some form of punishment (be it a penalty, a decertification, or some other form of negative incentive), and in order to punish, you need proof that the party has violated the rules. In appliance S&L programs, the most typical violations are if a product's energy performance or efficiency is not as good as indicated on the label or if there is a deficiency with the label itself (product has no label, improperly placed, etc.). A 2010 report by CLASP outlined a full list of possible violations:

- Failure to provide an energy label or other required energy-performance rating information;
- Failure to display an energy label or other required energy-performance rating information at the point of sale, including the use of a non-conformed label or logo;
- Misuse of the logo by industry participants who are not part of a voluntary program and do not have the authorization to use the label;
- Failure to register a product;
- Failure to provide proof of testing;
- Failure to submit a product for testing;
- Failure to cooperate with certification or verification testing bodies;
- Falsification of a product's energy performance, resulting in misleading labeling;
- Falsification of a product's energy label or a false statement of compliance with a minimum energy performance standard (MEPS);
- Failure to provide required energy-performance information in product catalogues, websites or other promotional media;
- Failure to cooperate with compliance authorities.

The following section will give a brief overview of different enforcement practices that try to capture the most common violations on the market (CLASP 2010).

Differentiation of appliance S&L program enforcement methods

Appliance S&L programs around the world have employed a variety of enforcement practices in checking compliance of manufacturers and retailers with appliance efficiency and labeling regulations. The most common practices are outlined in the blue boxes in Figure 3. Product verification, also known as market surveillance or off-the-shelf testing, is the most common monitoring practice worldwide. Here, products are pulled from the shelves of retail stores and tested in laboratories. Increasingly, many S&L programs are also testing and monitoring products before they hit the shelves through product certification or qualification programs.

Both product certification and verification need to take place in energy efficiency testing laboratories, and as the enforcement needs of S&L programs grow worldwide, the demands for testing laboratories are increasing rapidly. As such, S&L programs find themselves needing to test the laboratories that are testing the products, to be confident in any decisions regarding product certification or verification. Since those decisions are used to support any necessary enforcement, the procedures for verification

have to be sufficiently accurate. Often, testing is done at a laboratory that has been accredited and complies with international standards developed by voluntary technical standardization organizations such as the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC). The laboratories do not receive generic accreditations but rather specific accreditations for certain product test procedures (be it for lighting, TV's, refrigerators, etc.). Some S&L programs use round-robin testing, where one product is tested at different laboratories to compare results. The key is to have test procedures that are repeatable and accurate while not being too expensive. Whether that is achieved through testing at one accredited lab or round-robin testing at several labs is up to the S&L program administrator.

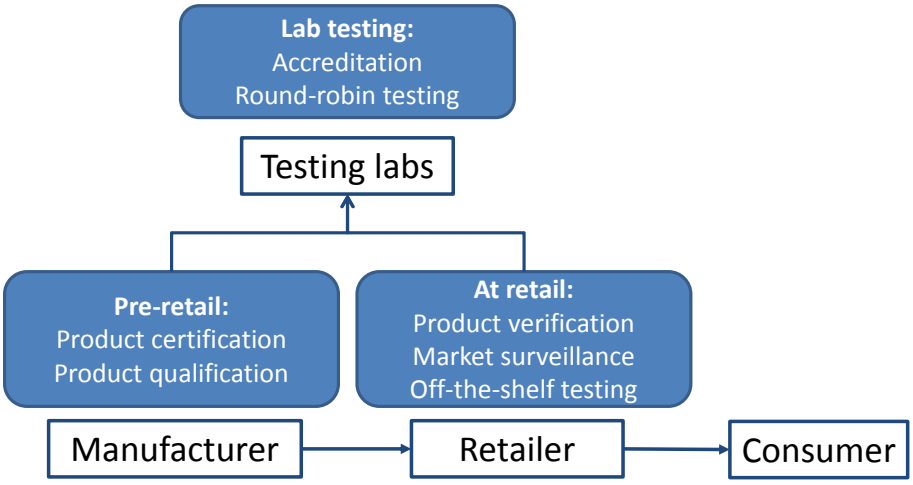

Figure 3: Flow of enforcement practices for appliance S&L programs

An S&L program's decision on which enforcement methods to use are based on a number of factors including legal framework, cost and budget, human resources, number of products, number of manufacturers, whether the program is voluntary or mandatory, and other factors. For instance, a decision on what kind of verification testing to require of manufacturers – whether in-house self-testing or independent testing – can have a big impact on the distribution of costs, as shown in Table 1. If an S&L program requires third-party verification, then this will put high initial compliance costs on industry, while lowered the program's costs associated with verification testing. The inverse is also true: allowing manufacturer in-house testing will increase the costs on the program while industry will enjoy lower compliance costs. When the ENERGY STAR program recently expanded its verification and certification requirements, use of third-party laboratories was introduced as the standard practice, but in-house testing was also allowed as long as the tests could be witnessed or supervised by an accredited third-party organization (EPA 2010a, EPA 2010b). Lastly, it should be noted that industry is quick to point out that the costs of any overtaxing verification regime will often be passed on to the consumer.

There are also cases were product verification is performed not by government or program bodies, but by non-governmental organizations (NGOs) or competitors. In regions with a particularly strong civil society, NGOs have often spoke up in defense of stronger S&L programs and supported such defenses with data they have collected themselves. It was also common practice in the U.S. for competitors to test each other's appliances in consolidated markets. For instance, refrigeration only has a small number

of major brands, so each manufacturer would often test each other's equipment and report any infractions to the U.S. Department of Energy (DOE) (Zhou et al. 2012).

Table 1: Distribution of costs based on type of testing, Source: CLASP 2010

Entry condition	Distribution of costs		
	Government/program	Industry participant	Consumers
In-house testing, calculation, or self-declaration allowed	High cost in market surveillance and verification testing	Low compliance costs	None
Independent tests required	Medium cost in market surveillance and verification testing	Medium initial compliance costs	May fund compliance costs in price of equipment
Third-party verification and/or certification required	Low cost in market surveillance and verification testing	High initial compliance costs	May fund compliance costs in price of equipment

The following sections will give a more detailed overview of enforcement practices used for S&L program enforcement throughout the world. Following the introduction of each program, a final section will compare the various monitoring methods.

International review of product certification and verification practices

United States: ENERGY STAR and Federal MEPS

ENERGY STAR was started in 1992 by the U.S. Environmental Protection Agency (EPA) as a voluntary program that sought to help save consumers and businesses money and reduce energy use (and related greenhouse gas emissions) through energy efficient products and practices. The program has grown tremendously and it was estimated that in 2010 alone, ENERGY STAR saved enough energy to avoid 170 MtCO2e of greenhouse gas emissions (equivalent to emissions from 33 million cars) while saving consumers $18 billion on their utility bills (EPA 2010d).

Table 2: Comparison of previous and current product qualification and verification processes for ENERGY STAR

Previous qualification process	New qualification and verification processes
EPA enters into partnership agreement with manufacturer	EPA enters into partnership agreement with manufacturer
Manufacturer partner submits test data to EPA; lab accreditation required for certain products	All products must be tested in an accredited laboratory and qualifying product information submitted to EPA via a certification body
EPA reviews test data and adds products to ENERGY STAR list	EPA reviews test data and adds products to ENERGY STAR list
EPA verifies energy performance through its compliance audit program	Verification: "Off the shelf" product testing will be instituted across all ENERGY STAR products

Source: EPA 2010a, EPA 2010b, EPA 2010c

Since so many consumers now rely on the accuracy of ENERGY STAR labels, it has come under increasing scrutiny, which was particularly publicized during 2010 when the U.S. Government Accountability Office (GAO) released a report, exposing loopholes in ENERGY STAR's product certification process. GAO submitted 15 products for certification that violated various ENERGY STAR criteria. Many received certification very quickly, however, including an alarm clock that was the size of a small generator powered by gasoline (GAO 2010).

This report caused the EPA and DOE to perform a thorough review of their product certification and verification processes and make appropriate revisions to ensure that all labels were accurate and that the EPA could punish those manufacturers who were not delivering the savings they claimed on the label. Table 2 shows a comparison of the previous and updated qualification and verification processes. The main differences are the introduction of "off the shelf" product testing for all ENERGY STAR products and the introduction of official accreditation and certification bodies.

Under the new processes, accreditation bodies (AB) provide official accreditation for laboratories and certification bodies (CB). Laboratories conduct testing for products seeking ENERGY STAR certification and verification. Manufacturers' laboratories may also be used but the test has to be witnessed by a CB. The CB certifies and compares the testing data with the relevant ENERGY STAR product specifications and then report the results to the EPA. The interaction of AB, CB, testing laboratories, and the EPA is summarized in Figure 4 (EPA 2010a, EPA 2010b, EPA 2010c).

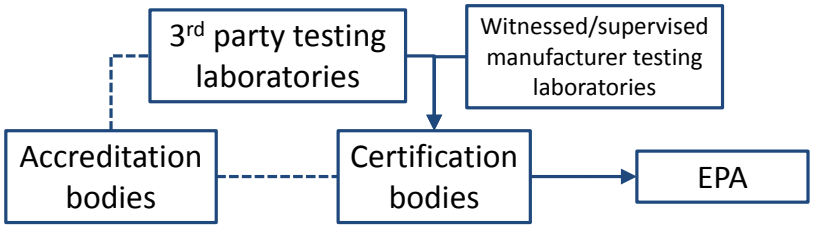

Figure 4: Flow process for ENERGY STAR certification and verification processes; Note: dotted lines indicate accreditation processes while solid lines indicate flow of information

There are a number of qualifications for all of the parties involved. Once AB's have submitted their application to EPA to operate as an AB (the application form can be found in the Appendix), they have to operate their accreditation program in accordance with ISO/IEC 17011: "General requirements for accrediting conformity assessment bodies." The requirements of ISO/IEC 17011 include maintaining a sufficient number of AB trained personnel. The AB's are also required by the EPA to maintain status as a signatory to the International Accreditation Forum (IAF) Mutual Recognition Agreement (MRA). They are required to accredit CB's and laboratories according to ENERGY STAR requirements and report results of any accreditations or renewals to EPA.

Testing laboratories must apply for accreditation from an AB in accordance with ISO/IEC 17025: "General requirements for the competence of testing and calibration laboratories." Under the requirements of ISO/IEC 17025, the laboratories must:

- Employ experienced personnel with proper training
- Have physical plant facilities and test equipment needed for proper testing
- Ensure equipment is calibrated and calibration records maintained
- Maintain records of all original observations and test data
- Maintain impartiality of product testing, for example employees must regularly pass ethics and compliance audits (EPA 2010b)

The laboratories must also agree to participate in relevant inter-laboratory comparison testing (also known as round robin testing) whenever the EPA or DOE deems it necessary. Once accredited, the laboratories must provide their accreditation certificate and scope of accreditation to the EPA and apply for official recognition (the application form can be found in the Appendix). Then, the laboratories are required to test products seeking certification and products selected for "off the shelf" verification as well as to cooperate with ongoing audits from the AB. All certification testing services are paid for by the manufacturer seeking certification, while DOE pays all verification costs for obtaining and testing products that have a federal MEPS and are covered by the ENERGY STAR program. For products that do not have MEPS but are under the ENERGY STAR program, the CB administers the verification program and the ENERGY STAR partner (manufacturer) must pay for the testing costs (EPA 2010c).
Finally, CB's must first submit an application to EPA for initial recognition before performing any certification duties for the ENERGY STAR program.[3] They must apply for accreditation from an AB, maintain accreditation according to ISO/IEC Guide 65: "General requirements for bodies operating product certification systems," and maintain status as a signatory to the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA). They will certify a product's performance by reviewing a laboratory report or witnessing testing if it is a manufacturer's testing laboratory. Once the information is certified, they report certified products with associated data to the EPA. CB's are also used to certify information related to verification testing. The CB's need to only apply once to be accredited, but they are assessed every year with on-site inspections and audits. Spot checks are warranted when there are significant changes in personnel or lab setup. In accrediting CB's, the AB must make sure they have technical experts capable of judging the CB's expertise in applying Guide 65 (EPA 2010c).

For appliances, EPA has recognized 28 AB's, 21 CB's, and 410 testing laboratories (including witnessed manufacturers testing laboratories) to date, and it continues to review applications. EPA has created a chart of the interactions between EPA, partners, CB's, laboratories, and AB's, shown in Figure 5. EPA retains the right to revoke the right of any CB, AB, or testing laboratory to participate in the ENERGY STAR program if it feels it is in violation of any of the requirements set forth by EPA (EPA 2012).

[3] Applications for AB's, CB's, and labs can be found in the Appendix or at the following links:
http://www.energystar.gov/ia/partners/downloads/mou/Application_Accreditation_Body.pdf?2aea-a2eb
http://www.energystar.gov/ia/partners/downloads/mou/Application_Certification_Body.pdf?b3fe-063f
http://www.energystar.gov/ia/partners/downloads/mou/Application_Accredited_Laboratory.pdf?c193-3a3b

In addition to providing oversight and conducting site visits (as appropriate), the EPA has also committed to releasing all available information on product certification and verification to the public in the interests of transparency and confidence for both the consumer and the manufacturers. Once CB's have certified a product's testing results, they transmit the information to EPA via EPA's new XML-based data transfer system. EPA then uses this information to populate the ENERGY STAR product lists, which it posts on the web for public use. EPA also releases information to the public every year on failed and delisted products, as well as full summary of that year's testing. This information is not only important for consumers, but also for retailers and energy efficiency program sponsors who often offer rebates on ENERGY STAR products. Results from verification in 2010 and 2011 varied for lighting and appliance products. In lighting, 151 products were disqualified in 2010, increasing to 164 products in 2011, while in appliances, 29 products were disqualified in 2010, decreasing to only six products in 2011 (EPA 2011c).[4]

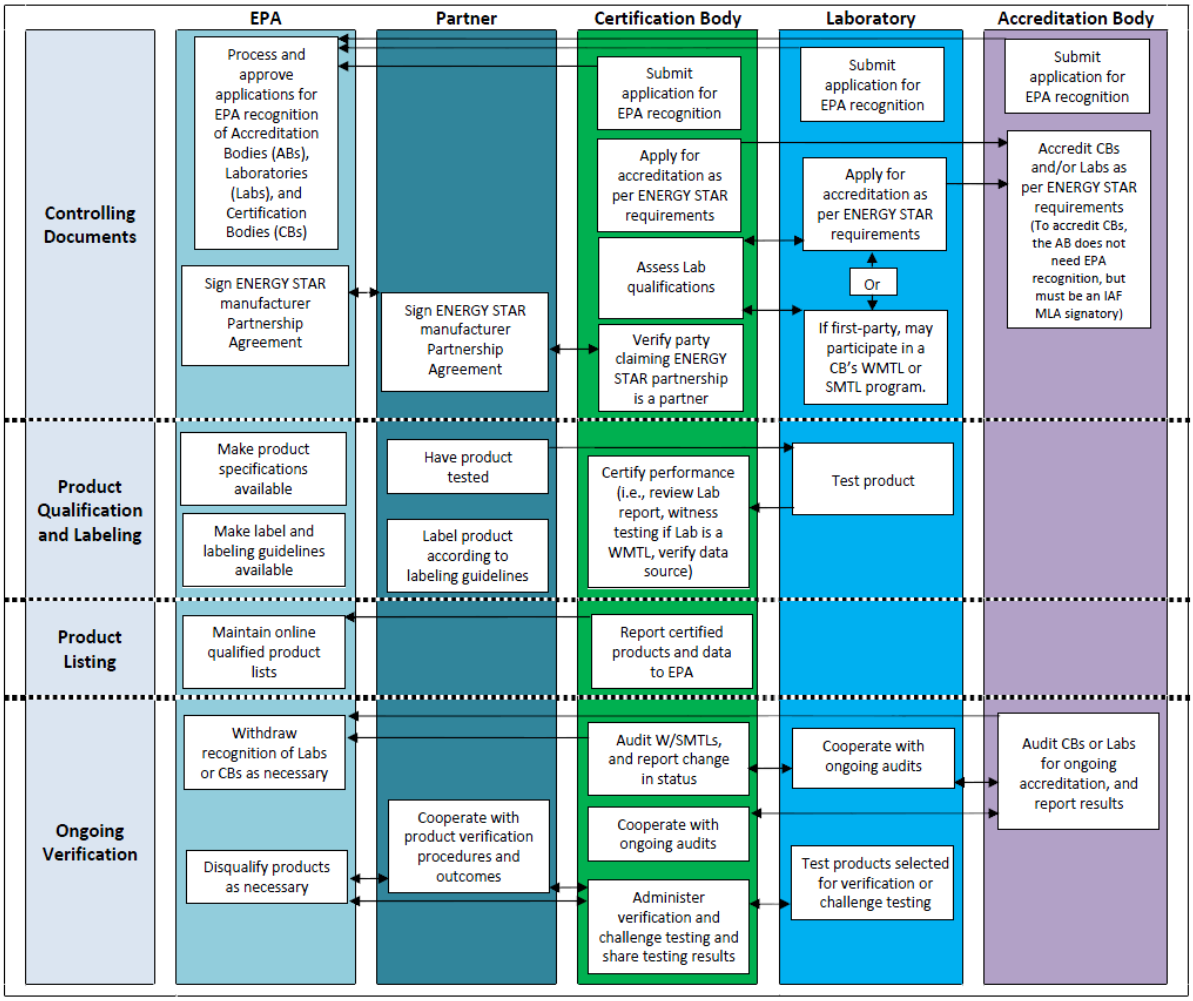

Figure 5: Overview of EPA's interaction with partners, CB's, AB's, and labs for product certification and verification processes,

Source: EPA 2012

[4] This number is through the fall of 2011; it is not final number for 2011.

The EPA uses a unique combination of techniques for verification, selecting some products at random and others based on failure or sales volume indicators. EPA requires every CB to test at least 10% of all ENERGY STAR qualified models the CB has certified or for which it has received qualified product data. Approximately half of that 10% should be randomly selected, while the remaining half should have one of the following indicators:

- Previous product failures
- Referrals from third parties regarding accuracy
- High sales volume, if that data is available to CB

Any of these indicators will help EPA to improve the compliance rate of the ENERGY STAR program. While previous product failures do not necessarily indicate a tendency for repeated failures, there will be cases of repeat violations. Also, guarantees on energy efficiency performance for particular popular products (with high sales volume) will highly improve the ENERGY STAR program and consumer experience. The random selection for half of the products guarantees that other violations will be caught, increasing the incentive for all manufacturers to make sure their products' actual energy efficiency matches the claimed energy efficiency. The EPA indicates that off the shelf or warehouse acquisition is preferred for products to be tested. If this is not possible for some reason, then products can be acquired directly from a manufacturer's production line (EPA 2010c).

If a product was certified based on a single test, which ENERGY STAR specifications require for products not subject to federal MEPS, then verification testing will involve a single test. If a product was qualified based on multiple test samples, (e.g. per DOE certification sampling plan associated with federal MEPS), then four units will be procured at once for verification testing (a full list of ENERGY STAR products that also have federal MEPS can be found in the Appendix. A spot check will be performed on the first unit. If the result of the spot check fails by 5% or more, the additional three units will be tested and statistical methods applied to the results for purposes of determining a failure (EPA 2011c).

Table 3: Division of duties between EPA and DOE on ENERGY STAR product specification, certification, and verification

	EPA	DOE
1) Revised and New Product Specifications	Set ENERGY STAR performance requirements for new and existing product categories consistent with program principles and through a systematic stakeholder process.	Lead the development of testing procedures and metrics, with assistance from EPA as necessary
2) Third-party Certification	Maintain requirements for recognizing AB's, CB's and testing laboratories involved in certification of product performance for purposes of ENERGY STAR qualification. Oversee implementation of third-party certification.	For select ENERGY STAR products, develop round robin testing for laboratories conducting DOE test procedures.
3) Verification and Enforcement	Oversee verification testing programs run by CB's. Manage transitional verification testing programs for lighting products. Make and respond to testing failure determinations.	Implement ongoing government testing program to verify energy performance of products in the market against reported energy performance data. Make final determinations regarding test procedure interpretations.

Source: EPA 2011b

The EPA and DOE signed a memorandum of understanding in September 2009, agreeing to better coordinate their agencies' respective capabilities to improve the ENERGY STAR program. The following table from a 2011 EPA-DOE work plan outlines the division of responsibilities, as applicable to the ENERGY STAR appliance program. Generally speaking, EPA plays a larger role in ENERGY STAR branding as well as product certification, while DOE plays a larger role in the verification testing program as well as development of important new testing procedures. Most recently, ENERGY STAR has started a pilot Most Efficient appliance program which EPA and DOE are working together on (EPA 2011b).

DOE remains the primary responsibility for the specification, certification, and verification of products that fall under federal MEPS. DOE runs a simplified certification timeline, whereby a manufacturer will submit one certification report a year for all products that it has in distribution for that year. The report is submitted online via DOE's Certification Compliance Management System. The report should include the following information: manufacturer name, brand name, basic model number and individual model numbers, sample size, total number of certification tests performed, and importer number from US Customs where applicable. Certification testing to ensure MEPS compliance may be conducted in-house or through an independent testing facility, except lighting and motors which must be tested in accredited labs from the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program (NVLAP). For products that need certification both for MEPS annual reporting requirements as well as ENERGY STAR requirements, the manufacturer will likely default to testing at an accredited testing laboratory recognized by the EPA (DOE 2011b).

Table 4: DOE ENERGY STAR pilot verification testing results; Note: Other indicates DOE conducted no further testing on these units because they were either no longer available in the market or were referred to EPA for potential enforcement action

Product type	Total Units Tested in Stage 1	Required Further Action (% of Product Type)			
		Total	Met ESTAR Specification in Stage 2	Referred to EPA	Other
Refrigerators and Refrigerator-Freezers	76	11 (14%)	3 (4%)	4 (5%)	4 (5%)
Freezers	18	5 (28%)	1 (6%)	4 (22%)	0 (0%)
Residential Clothes Washers	39	6 (15%)	3 (8%)	2 (5%)	1 (3%)
Residential Dishwashers	10	2 (20%)	1 (10%)	1 (10%)	0 (0%)
Tankless Water Heaters	11	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Storage Water Heaters	8	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Room Air Conditioners	77	20 (26%)	4 (5%)	13 (17%)	3 (4%)
Total	**239**	**44 (18%)**	**12 (5%)**	**24 (10%)**	**8 (3%)**

Source: DOE 2012

DOE ran a pilot verification testing program in 2010, which provided EPA and DOE with good experience to continue refining the design of third party verification testing programs. The appliances tested: residential refrigerators and refrigerator-freezers, residential freezers; residential clothes washers; residential dishwashers; residential gas tankless water heaters; residential gas storage water heaters, and room air conditioners. The primary objective was to verify product performance consistent with ENERGY STAR product specifications but those products are also subject to federal MEPS and Energy Guide requirements (regulated by the Federal Trade Commission), so the testing served also to verify compliance with those requirements. Overall, 239 models were tested (at third party laboratories) with 18% requiring further action, as indicated in Table 4. A summary report by DOE indicated that spot-check compliance programs in other countries often resulted in failure test rates of around 15%, and while the programs were not directly comparable, the results are roughly aligned (DOE 2012).
DOE's combined efforts in standards and enforcement had a budget of $35 million in 2011 and $58 million in 2012. There is a team of 13 people working full time on standards development. In March 2012, they reported having 34 new product rulemakings under development, including 12 standards and 22 test procedures. They have three people working full-time on enforcement. EPA reported having three full-time employees working overseeing their new third party programs with another three contractors providing additional support (Cymbalsky 2012).

United States: voluntary certification programs

In addition to the certification and verification techniques used for federal MEPS and ENERGY STAR products, a number of associations also run voluntary certification programs. For instance, the Association of Home Appliance Manufacturers (AHAM) issues an AHAM mark on various energy consuming products (dehumidifiers, refrigerators and freezers, room air cleaners, room air conditioners, clothes washers, dishwashers), which indicates to consumers and retailers that "a product may be selected at any time for verification testing, and that the product's energy consumption rating is

consistent with the energy consumption measured against standard test methods." AHAM has a specific third party laboratory under contract that collects certified values from manufacturers, and randomly selects equipment for verification testing. The database of "AHAM verified" products is available to the public online and an example is shown below in Figure 6. The database shows models by brand, indicating the model number, technical specifications, energy efficiency ratio, and whether the product is ENERGY STAR or not (AHAM 2012).

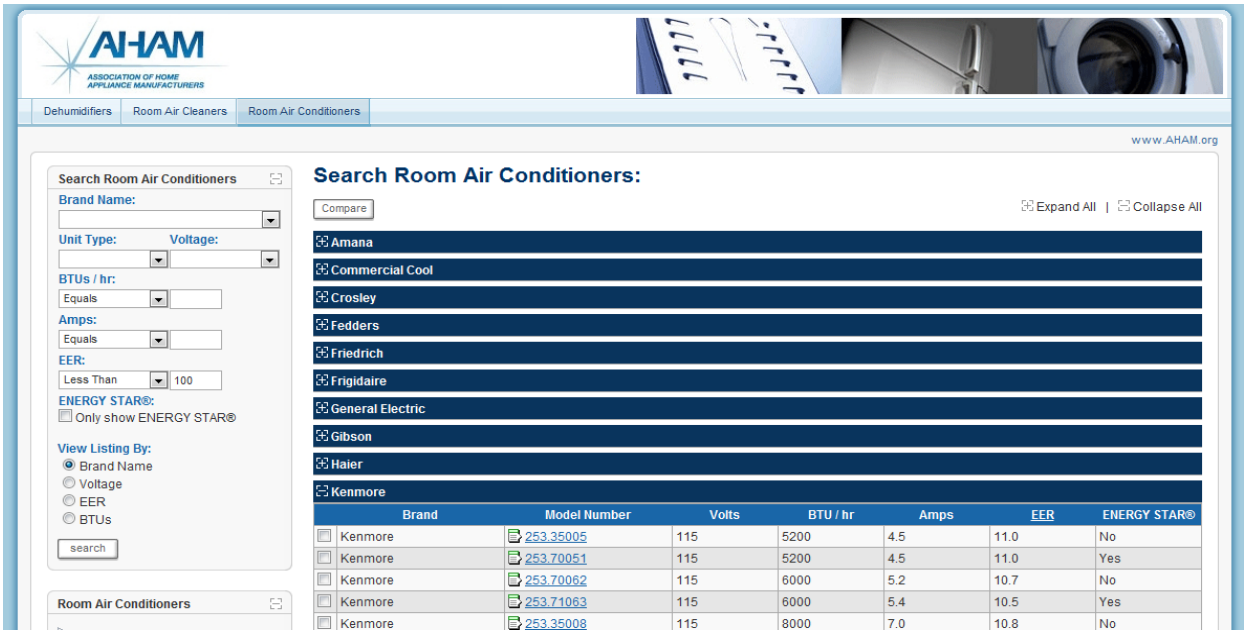

Figure 6: Example of AHAM database for verified appliances, Source: AHAM website

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) runs a voluntary certification program for heating, ventilation, and air-conditioning equipment. To be certified, products undergo testing by third party laboratories under contract to AHRI. The products are evaluated using the appropriate industry standard to certify that published performance ratings are accurate. While any manufacturer can follow AHRI Standard rating methodologies and claim that their products are "AHRI rated", the products have to participate in the certification program before they can become "AHRI Certified™" and use the label at left on their products. The first step is for the manufacturer to send an interest letter to AHRI with an application for certification and appropriate data (models, sales volume, etc.) so that AHRI can calculate the number of qualification tests that will be needed. Then, AHRI sends participation and license agreements back to the manufacturer as well as an invoice for participation and license fees. Once payment is made, qualification test samples are acquired within 30 days, and then the qualification tests are run at a designated third party laboratory. If the product passes the qualification tests, then it can be AHRI certified. If the product fails the qualification tests, AHRI will send a decision form to the manufacturer so they can decide between sending a second sample for testing or re-rating the failed model according to the test results. If the second sample fails, the product model will

automatically be re-rated. If the second sample falls below the federal minimum, the manufacturer will be required to perform a third qualification test. If the manufacturer elects to re-rate, then the re-rated data must be reflected in all the applicant's printed literature, specifications, and software (Tretsis et al 2012).

The EPA and DOE often rely on AHAM, AHRI, and other manufacturer associations when developing new test procedures, as those associations have often already developed them. The federal government is required by law to consider all existing standards when developing new standards to avoid creating duplicate procedures and adding extra costs on industry. When EPA and DOE developed their new certification and verification procedures, certain parts were modeled after AHRI's existing certification program. Since EPA did not have to start from scratch, they were able to get their program up and running relatively quickly (Cymbalsky 2012, Monahan 2012).

Lastly, the National Institute of Standards and Technology (NIST) runs NVLAP, which provides third-party accreditation to testing and calibration laboratories. It operates an accreditation system that is compliant with ISO/IEC 17011, while accrediting laboratories against the ISO/IEC 17025 standard for general competence of testing and calibration laboratories. While NVLAP largely focuses on accrediting laboratories that are not necessarily energy efficiency focused (biometrics, environmental, emissions, mechanical, etc.), it did start a specific Energy Efficient Lighting Laboratory Accreditation Program in 1991 to accredit laboratories that test lamps and luminaires. This program is now recognized by ENERGY STAR as an official AB. Additionally, NVLAP does accreditation of laboratories that test the efficiency of electric motors (Alderman 2012).

Australia: MEPS and mandatory labeling

In Australia, MEPS and mandatory labeling are actually enacted through state law, with programs in Queensland, Victoria, New South Wales, and South Australia. The laws require all products to be registered with one of the state regulators prior to retail sales. The registration includes information on the product's model, supplier, and energy performance; the energy performance is stipulated by national standards for each product. Test data needs to be submitted along with the report, although these reports do not need to be done by accredited laboratories, as is the case with most programs in the U.S.

Data from the registration applications, with the exception of proprietary data, are placed in a user-searchable public register and updated daily. The registration database is intended for consumers to use and serves as a monitoring tool and compliance filter. Product registrations are active for four to five years, depending on the initial date of registration since registrations automatically expire on March 31st after three years of automatic renewal.

The Commonwealth Government has the power to fine or deregister products without appropriate energy labels or with measured energy efficiency that is lower than the claimed energy efficiency. Australia has used product verification since 1991 as the main avenue for finding products that have

measured efficiency lower than the level claimed by the manufacturer. It is part of their National Greenhouse Strategy and had a $1.5 million budget in 2009-2010. Rather than random selection of products off the shelf, Australia uses specific criteria to narrow down its range of choices, including:

- Exclusion of products that were recently tested without any problems
- Selection that favors testing of newer models and brands
- Models with high volume of sales or higher self-claimed energy efficiency
- Models from suppliers with non-compliance record
- Models with complaints received from third parties such as other manufacturers, consumers or consumer groups, and other regulators.

Australia's check-testing program consists of two stages of testing. In Stage 1 testing, a full or partial test is carried out following the given Australian Standard for one unit (acquired autonomously from a retailer or wholesale supplier) of the independently purchased unit at a laboratory accredited by Australia's National Association of Testing Authorities. Stage 1 testing costs are bore by the regulatory agency and National Appliance and Equipment Energy Efficiency Committee (NAEEEC). If the Government decides to de-register a product based on unsatisfactory test results (energy efficiency lower than what was claimed on the label), it first has to give the manufacturer a 15-day notice to respond to the claim. The manufacturer can contest deregistration during this time and agree to undergo Stage 2 testing for which it will bear the costs. At least two units (also acquired anonymously) must be tested successfully for the product registration to remain active (E3 2011).

E.U. and member states: Ecodesign MEPS and labeling

The E.U. requirements for appliance MEPS and labeling practices for all member states are outlined in the Framework Directive for Ecodesign (2009/125/EC: Ecodesign requirements for energy related products). The Framework Directive requires member states to put in place a Market Surveillance Authority (MSA), which will carry out check-testing, request relevant testing information from manufacturers, and request the withdrawal from the market of products that do not comply with MEPS or labeling requirements. The MSA's are to inform the European Commission (EC) of all result of market surveillance, and when appropriate, the EC will distribute that information to other member states. Member states are also required to ensure that consumers are given a way to submit their own observations and complaints on product compliance to the relevant MSA. To comply with MEPS requirements, manufacturers must make test results available to MSA's and keep them on file for at least three years from the date on which the appliance was last manufactured. For labeling requirements, labeling documentation and related test reports must be available for inspection for at least five years from the date on which the appliance was last manufactured (European Parliament and Council 2009).

As an example of a member state MSA's activities, the National Measurement Office (NMO) – under the supervision of the Department for Environment, Food, and Rural Affairs (DEFRA) – is responsible for enforcement of Ecodesign MEPS and labeling in the UK. It conducts periodic testing initiatives for

priority product groups, with aims to cover the majority of manufacturers, new brands, or a particular market sector. Appliance units are obtained anonymously from retailers, tested, and then the initial test results are shared with the manufacturer in question. If the measured energy efficiency performance is lower than the performance claimed on the appliance's label, then the manufacturer will be asked to repeat testing at an accredited testing laboratory for three additional samples for inclusion in the report. A recent review of testing reports found that manufacturer non-compliance rate for meeting the claimed energy level on the Energy Label is estimated to be 10% -15% while non-compliance rate for products without a correct label at the retail level is 20% (DEFRA 2010).

UK's implementation and compliance testing efforts are not necessarily representative of the E.U. and recent reviews of enforcement activities amongst the E.U.-15 member states have shown a range of enforcement efforts. In testing appliances for MEPS compliance, three out of nine original member states did not test appliances and only Denmark and the Netherlands performed many tests and reported the results centrally for enforcement action. Of all the E.U. member countries, only 17 countries have accredited test labs and of those, only seven countries have laboratories capable of conducting verification testing for more than one product. As a result, only between 800 and 1400 product energy efficiency performance tests are conducted annually in the E.U. There are some cases where retailers and consumer associations are conducting their own third-party testing to verify the energy performance of products being sold.

Currently, across the 30 member states of the European Economic Area, 80 full-time equivalent staff is estimated to work on Ecodesign MEPS and labeling compliance with a similar level of staff supporting store inspections of compliance with labeling directives. In terms of financial resources, it is estimated that total expenditure on S&L monitoring and enforcement is about €7 million per year across the entire E.U. region (Waide 2011).

There are currently two efforts going on in the E.U. to improve appliance S&L monitoring and enforcement. First, in 2009, the Ecodesign Administrative Cooperation group on market surveillance (ADCO) was established to bring together all MSA's and improve cooperation in the implementation and enforcement of appliance S&L programs across the E.U. Currently, the UK is chairing ADCO, where members discuss consistent approaches to enforcement and share testing plans and results in confidence.

The second effort is the E.U.'s Appliance Testing for Energy Label Evaluation (ATLETE) project, which recently concluded. By testing 80 randomly selected refrigerators, the ATLETE project conducted the first ever E.U.-wide market surveillance on an E.U. policy measure. One important finding from the project is that many member states simply do not prioritize the monitoring and enforcement of the Ecodesign framework. Even though monitoring and enforcements was delegated to each member state's MSA under the subsidiarity principle (one of the basic principles of E.U. law), it has led to a wide disparity in monitoring and enforcement methods, and in some cases, has led to a complete neglect of monitoring and enforcement. In July 2011, ATLETE released a report with guideline recommendations for verification of energy-related products in the E.U., including:

- Procedure for product compliance assessment
- Procedure for the random selection of product models, including the Template for Call for Tender for the market research institute for the purchasing of market data where needed
- Procedure for the selection of the testing laboratories, including a selection tool in the form of a Questionnaire and a specific Template for the Call for Tender for the laboratories
- Operational code (testing methodology) with an example for refrigerating appliances
- Correlation table indicating the modification to be introduced to apply the methodology to Energy

Related Products other than refrigerating appliances (ATLETE 2011)
Their recommendation for check-testing procedure is shown below in Figure 7. Many member states do not have check-testing procedures such as this in place yet.

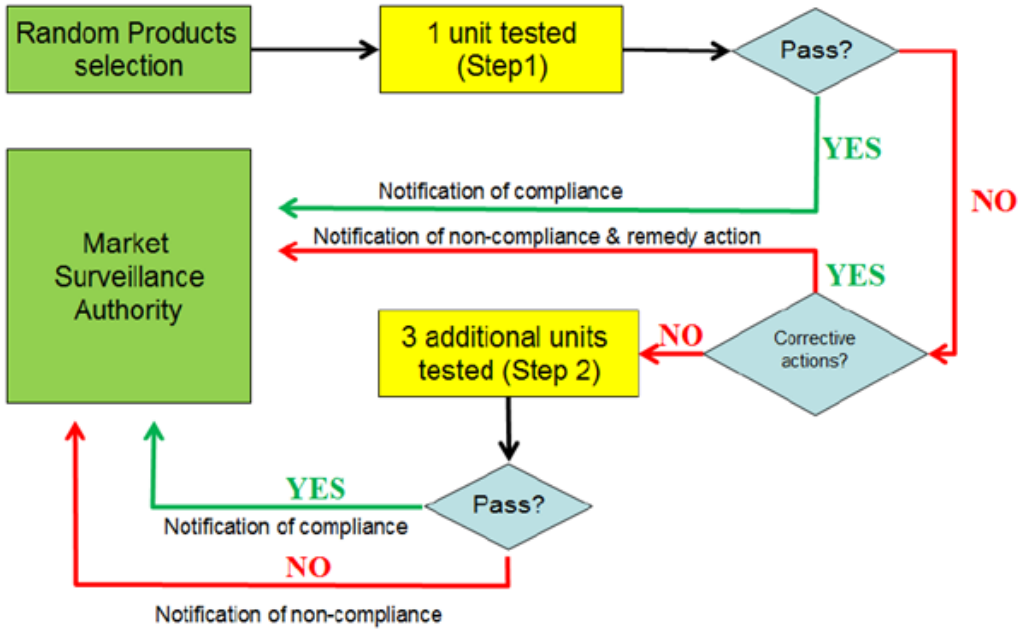

Figure 7: ATLETE recommended procedure for appliance verification (check-testing), Source: ATLETE 2011

Canada: MEPS and mandatory labeling

In Canada, the Natural Resources Canada (NRCan) Office of Energy Efficiency is responsible for enforcing the MEPS and comparative labeling program (EnerGuide) that Canada has in place. Product standards are developed by the Canadian Standards Association (CSA). The CSA uses a consensus process involving subcommittees (broken down by product), comprised of manufacturer, federal and provincial energy efficiency regulator, electric utility, and consumer participants.

NRCan uses third-party CB's to verify the performance of all regulated products against these CSA standards. All CB's must be accredited by the Standards Council of Canada (SCC). Their job is to issue energy efficiency verification marks (EEV) for all regulated products. They technically review

performance claims and testing data. Manufacturers have two testing options. They can either send their units to an accredited testing laboratory, such as the CSA itself or Underwriters Laboratories (UL), or they can test their prototype at their own in-house facilities. Before accepting manufacturers' data, however, engineers from the testing organization will visit the in-house testing facilities to confirm that the facilities and test methods comply with CSA standards.

NRCan maintains a database of compliant products carrying an EEV. NRCan requires that energy efficiency reports for new products on the market must be sent to NRCan by the dealer before the product is imported into Canada or shipped between provinces. The report describes the product, its energy efficiency performance, and the name of the organization or province that carried out the energy performance verification and authorized an EEV. Additionally, all products requiring an EnerGuide label must be labeled properly before their first retail sale.

Since Canada imports many of its appliances, the Canada Border Services Agency (CBSA) requires importers to comply with Canadian rules and supply needed product information to CBSA, which it then transmits to NRCan for review to ensure that the product is compliant. Additionally, since each province has their own CB, it is important that data is collected and products obtain an EEV before shipment to another province (NRCan 2012). Canada is also an international partner of the ENERGY STAR program, as many appliances are imported from the U.S. The EPA has officially registered the ENERGY STAR name and symbol in Canada with the Canadian Intellectual Property Office, while NRCan is responsible for monitoring the proper use of the ENERGY STAR name and symbol in Canada.

Japan: Top Runner program

Japan's enforcement of its Top Runner program differs from other countries since Top Runner is not a MEPS program, but rather based on a maximum standard value that can achieved on a sales-weighted basis. Compliance and verification testing cannot be used to evaluate compliance with the Top Runner target standard since achievement of the target is measured by a sales-weighted average, not a per unit, efficiency of product models sold by a manufacturer. Instead, verification of Top Runner target standard achievement is completed using questionnaires distributed by the Agency for Natural Resources and Energy to all manufacturers after the target fiscal year has ended. These questionnaires collect information on the total number of units shipped and the energy efficiency of the units. Product catalogues with product information along with retail store surveys are periodically and continuously collected to confirm labeling display implementation and to validate the manufacturers' completed questionnaires (Zhou et al 2012).

In the event that a manufacturer is not able to meet the Top Runner target standard after the target year, there are several options for addressing non-compliance. Japan's Ministry of Economy, Trade, and Industry (METI) can make recommendations to the manufacturer on improving their model's average

energy efficiency. If these recommendations are not followed, Japan has traditionally relied on a "name and shame" approach in which manufacturers are pressured to comply after METI's recommendations and the name of the manufacturer are made public. In some cases, manufacturers may be ordered to adopt METI's recommendations and in the most extreme cases, a penalty of less than one million yen may be imposed for non-compliance (Zhou et al 2012).

There are, however, some caveats to the enforcement of the Top Runner program. For example, only manufacturers whose efficiency improvements will have substantial impact on energy consumption and whose organizational capacity is economically and financially stable will be subject to recommendations for improvements. Smaller firms are therefore unlikely to be subjected to strict enforcement and verification of their progress in achieving the Top Runner targets. In addition, if an entire category of products fails to meet the Top Runner targets, then an evaluation of why the target was not met, other companies' achievement records and other factors will be undertaken before compliance can be enforced (Zhou et al 2012).

China: MEPS and mandatory labeling

In China, the General Administration of Quality, Supervision, Inspection and Quarantine (AQSIQ) is the body responsible for all "product quality" (including energy efficiency) and is thus formally charged with the responsibility for compliance with mandatory S&L requirements. In 1990, AQSIQ issued the Management Method for Energy Standardization to define the enforcement authority for energy standards. Articles 8 and 10 stipulated that AQSIQ offices at the national, regional, and provincial levels and their inspection institutions have authority to enforce mandatory energy efficiency standards. Specifically, the document mentions that AQSIQ should plan and undertake spot checks of products for energy efficiency (Zhou et al 2011).

Additionally, the Energy Conservation Law, which was amended by the National People's Congress in 2007, states that enterprises manufacturing, importing, or selling energy-using products which fail to meet MEPS will be ordered to stop production. It stipulates that the corresponding products and any illegal gains will be confiscated, and the persons involved will be fined 1-5 times of money equal to the illegal gains. If the situation is serious, the Industrial and Commercial Administrative Department will revoke that enterprise's business license. Also, for the products covered by mandatory label, any instances of lack of labeling, irregular labeling, failure to record product energy efficiency parameters in the China National Institute of Standardization (CNIS) database before labeling, or misleading labeling will all result in a penalty. No labeling results in a fine of RMB 10,000-30,000, no recording or irregular labeling results in a fine of RMB 10,000-30,000, misleading or false labeling results in a fine of RMB 50,000-100,000 (NPC 2007, Zhou et al 2011).

Figure 8 provides additional detail on the organizational structure for the development, implementation, and enforcement of S&L programs. While the National Development and Reform Commission (NDRC) manages the overall portfolio of energy efficiency policies under the Energy Conservation Law, AQSIQ performs its duties related to mandatory S&L with the assistance of the Standardization Administration

of China (SAC) and the Certification and Accreditation Commission of China (CNCA). SAC sets the S&L development agenda with technical input from the Office of Energy Efficiency Standards at CNIS. CNIS also maintains the China Energy Label Center, which all manufacturers are required to submit energy efficiency information for their products to before putting those products on the market. CNCA is in charge of accrediting testing laboratories and overseeing any certification schemes, most notably the voluntary energy efficiency endorsement labeling program run by the China Quality Certification Center (CQC). Both CQC and CNIS provide policy and technical assistance directly to the Division of Energy Efficiency at NDRC in order to inform policymakers of the latest energy efficiency trends as related to the implementation of mandatory and voluntary S&L programs.

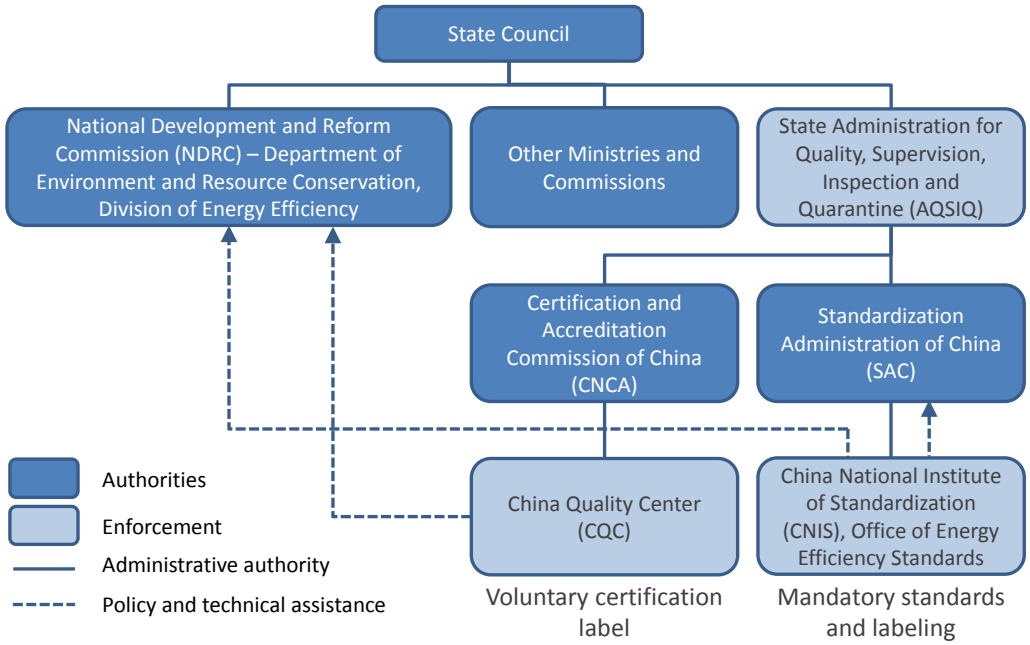

Figure 8: Organizational structure for development, implementation, and enforcement of S&L programs in China, Adapted from Saheb et al. 2010

Although there is strong legal backing for AQSIQ to strongly enforce mandatory MEPS and labeling, AQSIQ and related bodies have not been allocated sufficient money and human resources for widespread enforcement through product certification or verification. Traditionally a research body that simply informed policymaking, CNIS has become increasingly involved with enforcement efforts as the number of products covered by China's MEPS and mandatory labeling has grown to 44 products and 23 products, respectively. Generally speaking, "enterprise self-declaration" is the key feature of MEPS and mandatory labeling, with AQSIQ monitoring and enforcing proper labeling practices where their budget allows, while CNIS has begun to take responsibility for product verification via limited check testing trials. In recent years, several random market inspections and investigations of national and local supervision departments have raised questions about the validity of self-reported information as manufacturers and third-party laboratories were found to lack sufficient energy efficiency testing capacity (Zhou et al. 2010).

CNIS ran successful check-testing rounds in 2006, 2007, and 2009 in various provinces, first in Beijing, Guangdong, and Anhui in 2006 and 2007, and in Jiangsu, Shandong, Shanghai, and Sichuan in 2009. Appliances were acquired off the shelf and testing for compliance with MEPS all three years at various testing laboratories around the country. Additionally, in 2009, compliance with mandatory labeling requirements (under the China Energy Label) was also checked. Non-compliance rates decreased from 11 out of 54 models tested (20%) to 3 out of 73 models (4%) between 2006 and 2007 for the tests performed in Beijing, Guangdong, and Anhui. The non-compliance rates for the 2009 tests in Sichuan, however, were particularly high at around 59% (Saheb et al. 2010, Zhou et al. 2011).

These three check-testing rounds also highlighted inconsistent test results with significant variations in results when tested in different laboratories. A round-robin testing program was launched by CNIS in 2009 to identify the reasons for the differences. A leading domestic manufacturer was asked to produce three sets of split air conditioners, with an additional sample initially tested in Australia, and the samples were sent to six Chinese laboratories and a Japanese laboratory for efficiency testing following the MEPS. In the end, however, 43 tests were completed in four Chinese laboratories, and the results showed a decent level of quality control for the energy efficiency measurements of the air conditioning units in this round-robin test run (Zhou et al 2010).

A significant gap remains between the legal backing for S&L enforcement and the money and human resources devoted to S&L enforcement. Moving forward, China could continue to expand its check-testing verification methods for products and round-robin testing methods for laboratories, or China could explore product certification and laboratory accreditation methods used in other countries. The next section will summarize the array of options practiced in the U.S., E.U., Australia, Canada, and Japan.

Comparison of global product certification and verification practices

Practices for S&L program monitoring vary widely across the globe as shown in summary Table 5. Some programs focus solely on either certification or verification, while other programs focus on both certification and verification. Accreditation practices for testing laboratories and certifying bodies also vary, and some S&L programs are coming up with new databases to house all information on products and compliance.

Enforcement of appliance standards and consumer trust in appliance labeling are important foundations of growing a more energy efficient economy. Product certification and verification increase compliance which in turn increase both energy savings and consumer trust. When designing or refining S&L programs, different program administrators around the world are making a comparison (estimation or calculation) of the costs of non-compliance to the costs of various third party certification and verification processes. The costs of third party processes fall on manufacturers (often passed on to consumers) and administrators (often paid for with taxpayer money), while the costs of non-compliance fall on consumers (in lost savings), society (increased costs associated with energy and climate change), and some manufacturers (those who do not comply and go unpunished have an advantage over those that do comply) (CLASP 2010).

When the EPA designed its new certification and verification processes, it tried to minimize costs for manufacturers and itself as the administrator. Recognizing that there would be new costs for any process involving a certification body (costs for manufacturers can be up to a couple thousand dollars per product) and a third party testing laboratory, EPA decided to allow witnessed manufacturer testing laboratories as a lower cost option for manufacturers that already had testing laboratories in place (many do). For DOE's verification testing, the funds for acquiring products and performing certain analysis come from Congress appropriated budgets (via taxpayer dollars). So for ENERGY STAR's voluntary program, costs are passed onto the manufacturers directly with minimal administrator costs, but for DOE's MEPS program, costs for verification are paid for out of DOE's budget (Monahan 2012, Cymbalsky 2012).

Most other countries have programs that have fewer certification or verification requirements than those required by DOE and EPA. Canada has a product certification process using CB's and accredited (or witnessed) testing laboratories but does not have any verification process. In comparison, Australia has a straightforward product registration process with manufacturer self-declaration, but targeted verification processes that use accredited third party testing laboratories. The European Union has specified requirements for MEPS and Ecodesign labeling but is still in the process of building up best practices in verification for all of its Member States. Japan, due to the unique design of its Top Runner standard program, relies on manufacturers to self-report the energy efficiency of the products they sell, with the administrator using a "name and shame" approach to push non-compliant manufacturers to implement recommended improvements. Lastly, China – while having the legal backing in place for full enforcement of energy efficiency regulations – has been limited in its enforcement of appliance S&L. It does not practice regular product certification or verification methods, and only began pilot programs for check-testing of products in 2006 and round-robin testing of laboratories in 2009.

Table 5: Global overview of S&L program monitoring practices

Country	Program	Lead organization	Certification (pre-retail)	Verification (at retail)	Testing laboratory accreditation	Product information databases
US	Federal MEPS	DOE	Manufacturer will submit one certification report a year for all products that it has in distribution	DOE may conduct verification testing on any product at its discretion	Third party testing preferred but manufacturer testing laboratories witnessed by DOE allowed in certain cases	Certification reports submitted online via DOE's Certification Compliance Management System
US	ENERGY STAR	EPA, DOE	Product testing certified by CB and sent to EPA prior to bearing the ENERGY STAR label at retail stores	CB to test at least 10% of all ENERGY STAR qualified models the CB has certified or for which it has received qualified product data	Both testing laboratories and CB's must be accredited by official AB's; manufacturer testing laboratories witnessed by CB also allowed	ENERGY STAR product list available online, testing information transmitted from CB to EPA via XML
US	Voluntary Verification	AHAM	No	Equipment verified by AHAM may be randomly selected at any time for verification testing	Third-party testing laboratory used	Online, searchable database of all "AHAM certified" products
US	Voluntary Certification	AHRI	No	Although called "certification", the program tests products that are already on the market	Third-party testing laboratory used	Online, searchable database of all AHRI certified products
Australia	MEPS and labeling	State regulators	Products must be registered with state regulators prior to sales	Check-testing done every year according to pre-determined criteria	Testing laboratory must be accredited for check-testing but not for product registration	Online, searchable database of all registered products
Canada	MEPS and labeling	NRCan	Products must have EE verification mark prior to import or transport between provinces; CB's verify the performance of all regulated products	No	All CB's must be accredited by SCC; accredited labs or witnessed manufacturer testing labs may be used	Online database of compliant products with an EE verification mark and ENERGY STAR products
E.U.	Ecodesign MEPS and labeling	Member state bodies, Atlete, ADCO	Ecodesign documentation has requirements for MEPS and labeling	Member state market surveillance authorities are in charge of check-testing	Not all member states have accredited labs, and only seven member states have labs accredited for more than one product	Non-compliant products must be reported to E.U.; databases of compliant products vary between member states
China	MEPS and labeling	AQSIQ, CNIS	Enterprise "self-declaration"	Check-testing trials run in 2006, 2007, and 2009	Round-robin testing trial run in 2009	China Energy Label Center maintains database of products and testing laboratories
Japan	Top Runner	METI	No	Annual questionnaires to manufacturers on units shipped and EE of units; "name and shame" approach used for those in non-compliance	No	Product catalogues and retail store surveys collected to confirm labeling display and to validate manufacturers' questionnaires

Recommendations for China in third party product certification and verification

The number of products covered by China's mandatory S&L programs has surged in recent years (44 products and 23 products, respectively). Now, China is seeking to improve the compliance rate for these products, but it wants to do so without reinventing its current organizational structure and without high administrative costs. While all improvements to the enforcement of S&L programs will have associated costs on program administrators and manufacturers, the benefits of improved energy efficiency to consumers and society at large should outweigh the costs. Additionally, China has much of the organizational infrastructure already in place to execute a system of similar strength to the ENERGY STAR's recently expanded enforcement system, including accredited CB's and testing laboratories.

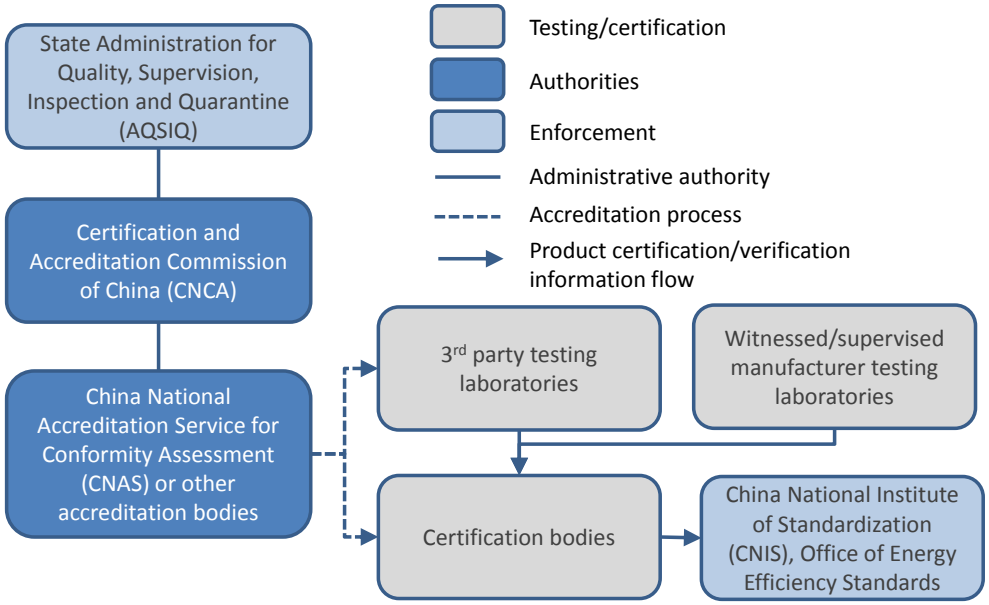

Figure 9: Recommended structure for an improved S&L enforcement regime with product certification and verification

Figure 9 shows the recommended structure for an improved S&L enforcement regime. China already has an AB in place, the China National Accreditation Service for Conformity Assessment (CNAS). CNAS is the accreditation arm of CNCA (who is in turn under the supervision of AQSIQ) and is in charge of accrediting testing laboratories in China for a multitude of purposes, including energy efficiency testing. Coincidentally, CNAS is also recognized under the ENERGY STAR program as are many testing laboratories in China (since many of the products are manufactured there. China has had a relevant certification and accreditation law in place since November 1, 2003 – Regulations of the People's Republic of China on Certification and Accreditation. The requirements for CB's are:

- having fixed premises and necessary facilities;
- having management system that meets the requirements for certification and accreditation;
- having a registered capital of not less than CNY 3,000,000;
- having not less than ten full-time certification personnel in relevant fields.

The law also stipulates that CB's should not have any relationships or conflicts of interest with program administrators. Currently, CB's are not used for China's energy efficiency S&L programs, since product performance is self-reported by the manufacturers. While the testing laboratories are accredited, there is no process to check the laboratory data against the product specification or information indicated on the label.

A process run by accredited CB's could significantly improve the compliance rates for China's S&L programs before products go to retail stores. CNAS or other AB's would coordinate the accreditation of CB's and testing laboratories. Similar to the EPA's role in ENERGY STAR, CNIS could act as a repository and overseer for the paperwork affirming all of these accreditations. All manufacturers would be required to submit the testing information related to energy efficiency to a recognized CB. Tests could be performed in accredited third party testing laboratories or manufacturer laboratories that are witnessed or supervised by an accredited CB. The CB would compare the testing information to a related MEPS or labeling claim and certify that the product performance is in compliance with the S&L requirements, then passing this certification on to CNIS. An additional verification process could be standardized for random or targeted check-testing of products that are pulled from the shelves of retail stores and warehouses.

Having reviewed international practices in product certification and verification, we offer the following summary recommendations:

- **Organize certification bodies:** A call for certification bodies in energy efficiency standards should be organized. There should be relevant procedures in place such that these certification bodies can be accredited by CNAS or other accreditation bodies. Regular reassessment (annually) of this accreditation will be needed as well.
- **Mandate certification process:** New regulations should be announced to mandate that all new models in product categories covered by mandatory standards or labeling requirements need to have their performance and labeling information certified by these certification bodies prior to being sold. The performance and labeling information can come from a third party testing laboratory, accredited by CNAS or other accreditation bodies.
- **Allow witness testing:** Provisions can be made in the certification requirements to allow manufacturers to use in-house testing laboratories to produce performance and labeling information, so long as the tests are witnessed by an accredited certification body. This provision should allow for a lower cost of certification and compliance for the manufacturers, when the new certification requirements are introduced.
- **Adapt from international standards:** International standards are already in place for accreditation bodies (ISO/IEC 17025), certification bodies (Guide 65), and testing laboratories (ISO/IEC 17011). If gaps of knowledge exist in China's current accreditation and certification system to adequately meet the needs of the new requirements for energy efficient product certification, these standards can provide professional requirements for the various bodies. This will be of critical importance in conformity assessment areas such as ensuring the competence of technical staff as well as the

impartiality of the organizations themselves, such that the integrity of the entire system can be guaranteed.

- **Standardize verification testing:** If China would like to impose stricter standards beyond certification and achieve a higher level of integrity for its standards and labeling, it can also introduce a standardized system for verification testing (which will impose extra costs either on the manufacturer and program administrator). The ENERGY STAR program requires now that 10% of all products (the selection process is also standardized) that a certification body certifies in any given year must be subject to additional verification testing.
- **Establish an enforcement program overseer:** In the U.S., EPA acts as the program overseer for ENERGY STAR's third party certification program. While most of the functions of this program are performed by the accreditation bodies, certification bodies, testing laboratories, and manufacturers, the EPA requires paperwork relevant to the accreditation of any organization or certification of any product to be submitted to the EPA for final verification and filing. This introduces a small additional level of administrative burden but increases the overall integrity of the enforcement. CNIS or another relevant organization should act as the overseer of any expanded S&L enforcement program in China.

These recommendations and the proposed certification structure are based on international practices. Further studies are needed to understand how China might fully implement such a certification structure in order to improve the compliance rates and enforcement of its rapidly expanding S&L programs. This type of structure could be a positive development in China as it seeks to continue improving the overall energy efficiency of its economy under the ambitious targets set forth in the 12th Five Year Plan.

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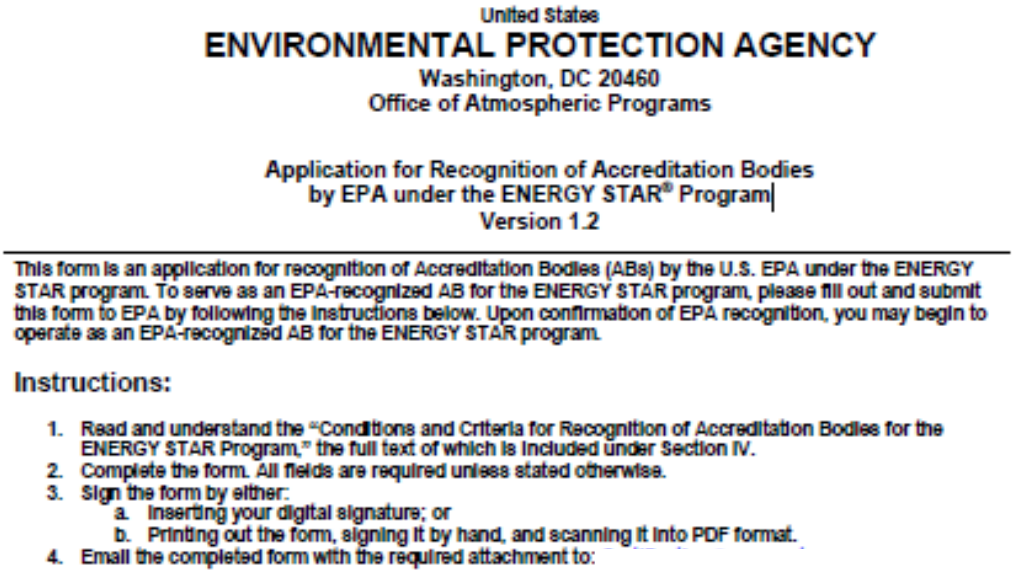
Appendix

Appendix A: ENERGY STAR products that are covered by federal MEPS as of April 2011

Lighting Products	**Residential**	Ceiling Fans
		Light Emitting Diodes
		Medium Base Compact Fluorescent Lamps
Heating Products	**Residential**	Furnaces
		Boilers
		Water Heaters
	Commercial	Storage Water Heaters
		Instantaneous Water Heaters
		Unfired Hot Water Storage Tanks
Space Cooling Products	**Residential**	Central Air Conditioners and Heat Pumps
	Commercial	Small Commercial Package Air-Conditioning and Heating Equipment
		Large Commercial Package Air-Conditioning and Heating Equipment
		Very Large Commercial Package Air-Conditioning and Heating Equipment
		Small Commercial Split-System Air-Conditioning and Heating Equipment
		Large Commercial Split-System Air-Conditioning and Heating Equipment
		Very Large Commercial Split-System Air-Conditioning and Heating Equipment
Commercial Refrigeration Products		Automatic Commercial Ice Makers
		Refrigerators, Freezers, and Refrigerator-Freezers
		Refrigerated Beverage Vending Machines
		Walk-in Coolers and Walk-in Freezers
Appliances	**Residential**	Dehumidifiers
		Dishwashers
		Kitchen Ranges and Ovens
		Microwave Ovens
		Refrigerators, Freezers, and Refrigerator-Freezers
		Clothes Washers
	Commercial	Clothes Washers
Computers and Electronics		Battery Chargers
		External Power Supplies, Class A
		External Power Supplies, non-Class A
		Television Sets

Appendix B: Application for recognition of accreditation bodies, certification bodies, and testing laboratories by EPA under the ENERGY STAR® program, including conditions and criteria for recognition

Accreditation bodies



United States
ENVIRONMENTAL PROTECTION AGENCY
Washington, DC 20460
Office of Atmospheric Programs

Application for Recognition of Accreditation Bodies
by EPA under the ENERGY STAR® Program
Version 1.2

This form is an application for recognition of Accreditation Bodies (ABs) by the U.S. EPA under the ENERGY STAR program. To serve as an EPA-recognized AB for the ENERGY STAR program, please fill out and submit this form to EPA by following the instructions below. Upon confirmation of EPA recognition, you may begin to operate as an EPA-recognized AB for the ENERGY STAR program.

Instructions:

1. Read and understand the "Conditions and Criteria for Recognition of Accreditation Bodies for the ENERGY STAR Program," the full text of which is included under Section IV.
2. Complete the form. All fields are required unless stated otherwise.
3. Sign the form by either:
   a. Inserting your digital signature; or
   b. Printing out the form, signing it by hand, and scanning it into PDF format.
4. Email the completed form with the required attachment to:

I. Accreditation Body Information

Organization Name:
Organization URL:
Address 1 (e.g., street address):
Address 2 (e.g., suite #):
City:
State:
Zip/Postal Code:
Country:

Primary contact first name:
Primary contact last (family) name:
Job title of primary contact:
Email:
Phone:

If mailing address of primary contact is different from the organization address, please provide it here:
Address 1 (e.g., street address):
Address 2 (e.g., suite #):
City:
State:
Zip/Postal Code:
Country:

The following secondary contact information section is ***optional****.*
Secondary contact first name:
Secondary contact last (family) name:
Job title of secondary contact:
Email:
Phone:

If mailing address of secondary contact is different from the organization address, please provide it here:
Address 1 (e.g., street address):
Address 2 (e.g., suite #):
City:
State:
Zip/Postal Code:
Country:

II. Required Documentation

☐ An electronic copy of the quality management system documentation required in Section 5 of ISO/IEC 17011 is included with this application (check box to confirm).

Comment (optional):

An up-to-date list of all EPA-recognized laboratories the AB has accredited or will accredit is available at the following URL:

Comment (optional):

(At a minimum, this online list must contain the laboratory name, address, and phone number; the laboratory point of contact; accreditation effective date; accreditation expiration date (as applicable); and scope of accreditation.)

III. **Declaration:**

☐ By checking this box, I declare that I have read and agree to the terms of "Conditions and Criteria for Recognition of Accreditation Bodies for the ENERGY STAR Program," and the information submitted via this form is, to the best of my knowledge, accurate and associated with the Accreditation Body named herein. I understand that the ENERGY STAR program will associate all information in this form with this Accreditation Body. I understand that if any of the submitted information is found to be inaccurate, the Accreditation Body will be removed from the list of EPA-recognized Accreditation Bodies. I understand that intentionally submitting false information to the U.S. government is a criminal violation of the False Statements Act, Title 18 U.S.C. section 1001.

I further declare that the Accreditation Body named herein will not use any ENERGY STAR mark for any purpose at any time.

You are required to provide your signature by either:

a. Inserting your digital signature in the box below, or,
b. Printing out the form, signing the signature box below by hand, and scanning the form into PDF format.

Responsible Corporate Official/Signatory:	
Printed Name:	
Job Title:	
Date:	

IV. Conditions and Criteria for Recognition of Accreditation Bodies for ENERGY STAR Laboratory Recognition

In order to serve as an Accreditation Body (AB) for the ENERGY STAR Laboratory Recognition Program, an AB shall agree in writing to the following requirements:

General Requirements:

1) Comply at all times with the conditions and criteria for recognition of accreditation bodies for the ENERGY STAR Laboratory Recognition Program.

2) Operate its accreditation program in accordance with ISO/IEC 17011, "Conformity assessment: General requirements for accreditation bodies accrediting conformity assessment bodies."

3) Maintain its status as a signatory to the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). Inform EPA, in writing, within 30 days of any change in signatory status in the ILAC MRA.

4) Within the AB's assessor training program, include training on the current requirements described in the ENERGY STAR Laboratory Recognition Requirements. Assessors must be trained prior to performing assessments and continue to be provided new and refresher courses. As per ISO/IEC 17011, training should be conducted as needed to ensure the AB maintains a sufficient number of competent personnel given the work performed.

Reporting to EPA:

1) Submit an electronic copy of the quality management system documentation required in Section 5 of ISO/IEC 17011.

2) Participate in meetings with EPA as necessary as part of continual improvement efforts in the enhanced testing program. During these meetings, the AB will be expected to brief EPA staff on the status of the program, common deficiencies, and issues related to accreditation of laboratories. EPA and the AB will jointly determine whether the meeting should take place by telephone or in-person.

3) Report to EPA within 30 days of any major changes that affect the AB's:
   a) Legal, commercial, organizational, or ownership status;
   b) Organization and management, e.g., key managerial staff;
   c) Policies or procedures, where appropriate;
   d) Location;
   e) Personnel, facilities, working environment or other resources, where significant;
   f) Other such matters that may affect the AB's capability, scope of recognized activities, or compliance with the ENERGY STAR requirements and relevant technical documents.

4) Forward any questions related to ENERGY STAR test procedures to EPA for resolution, and abide by the decisions of EPA relative to the resolution of those questions.

5) Upon request, provide EPA with electronic copies of laboratory accreditation information including:
   a) Accreditation effective date;
   b) Accreditation expiration date (if applicable);
   c) ENERGY STAR-relevant accredited test methods; and,
   d) A list of qualified personnel per ENERGY STAR-relevant accredited test methods.

6) Notify EPA immediately in writing, and update the AB's website to document any action that adversely affects the accreditation status of an EPA-recognized accredited laboratory.

7) Upon request, provide EPA with copies of laboratory assessment documentation related to ENERGY STAR testing, including corrective action plans, and documentation of resolution of deficiencies. Laboratories' consent to this is a condition of their recognition by EPA.

Conducting Laboratory Assessments:

1) Assess laboratory operations for compliance with ENERGY STAR Laboratory Recognition Requirements.
   a) Upon a satisfactory outcome, attest to the technical competence of laboratories to perform tests required for ENERGY STAR qualification as outlined in the ENERGY STAR Laboratory Recognition Requirements. This

should include ensuring that the list of specific test methods for which the laboratory has been accredited is included within the laboratory's scope of accreditation.

b) Notify EPA of any observed test method interpretations that require clarification.
c) Assess documentation demonstrating the impartiality and freedom of laboratory management and personnel from any undue internal or external commercial, financial or other pressures and influences that may adversely affect the quality of their work, as required by ISO/IEC 17025.

NOTE: It is EPA's expectation that ABs will systematically monitor the impartiality of laboratories on an ongoing basis. Document review, consistent with the requirements of ISO/IEC 17025, shall include but may not be limited to the following:

i) organization chart showing that the responsibilities, authorities, and inter-relationships of all personnel who manage, perform or verify laboratory results are free from influence that may adversely affect the quality of their work;
ii) dates of internal audits, audit findings, and any corrective actions taken;
iii) any customer complaints and corrective action taken;
iv) original testing records containing sufficient information for repeatability, including the names of staff who participated;
v) evidence that laboratory employees participate in and regularly pass ethics and compliance audits; and,
vi) evidence that mechanisms for reporting and responding to attempts to exert undue influence on test results are in place.

2) Conduct complete on-site assessments of each laboratory per the ILAC MRA and ISO/IEC 17011 requirements.

3) Verify that all assessment findings are resolved and corrective actions have been implemented before granting accreditation to a laboratory.

4) Allow EPA, at its discretion, to witness any assessments performed for compliance with the requirements of the verification testing program. EPA agrees to jointly determine with the AB when such witnessing will occur so as not to disrupt the AB's assessment schedule, and to operate solely as an observer and not participate in any way with the assessment activities of the AB and/or its assessors.

5) Publish and maintain on the AB's website an up-to-date directory identifying all EPA-recognized laboratories the AB has accredited. At a minimum, this directory must include the following information:
a) Laboratory name, address, and phone number;
b) Laboratory point of contact;
c) Accreditation effective date;
d) Accreditation expiration date (as applicable); and,
e) Scope of accreditation.

6) Maintain documentation relevant to the accreditation for at least five years.

7) Assume the responsibility of the laboratory accreditation decision itself; the AB cannot delegate fully or partially the accreditation decision to another organization.

End of text of "Conditions and Criteria for Recognition of Accreditation Bodies for ENERGY STAR Laboratory Recognition"

Certification bodies

United States

ENVIRONMENTAL PROTECTION AGENCY

Washington, DC 20460
Office of Atmospheric Programs

Application for Recognition of Certification Bodies by EPA under the ENERGY STAR® Program
Version 1.3

This form is an application for recognition of Certification Bodies (CBs) by the U.S. EPA under the ENERGY STAR program. To serve as an EPA-recognized CB for the ENERGY STAR program, please fill out and submit this form to EPA by following the instructions below. Upon confirmation of EPA recognition, you may begin to operate as an EPA-recognized CB for the ENERGY STAR program.

Instructions:

1. Read and understand the "Conditions and Criteria for Recognition of Certification Bodies for the ENERGY STAR Program," the full text of which is included under Section VI.
2. Complete the form. All fields are required unless stated otherwise.
3. Sign the form by either:
   a. Inserting your digital signature; or
   b. Printing out the form, signing it by hand, and scanning it into PDF format.
4. Email the completed form with the required attachment to:

I. **Certification Body Information**

Organization Name:
Organization URL:
Address 1 (e.g., street address):
Address 2 (e.g., suite #):
City:
State:
Zip/Postal Code:
Country:

Primary contact first name:
Primary contact last (family) name:
Job title of primary contact:
Email:
Phone:
If mailing address of primary contact is different from the organization address, please provide it here:
Address 1 (e.g., street address):
Address 2 (e.g., suite #):
City:
State:
Zip/Postal Code:
Country:

The following secondary contact information section is optional.
Secondary contact first name:
Secondary contact last (family) name:
Job title of secondary contact:
Email:
Phone:
If mailing address of secondary contact is different from the organization address, please provide it here:
Address 1 (e.g., street address):
Address 2 (e.g., suite #):
City:
State:
Zip/Postal Code:
Country:

II. **General Requirements**: Consistent with "Conditions and Criteria for Recognition of Certification Bodies for the ENERGY STAR Program," an EPA-recognized, accredited CB must maintain accreditation to ISO/IEC Guide 65, "General requirements for bodies operating product certification systems," by a signatory to the International Accreditation Forum (IAF) Multilateral Recognition Agreement (MLA) that covers accreditation of product certification bodies and operates in accordance with ISO/IEC 17011.

a. Name of Accreditation Body:

b. Accreditation effective date:

c. Accreditation expiration date (if applicable):

d. ☐ A digital copy of the CB's accreditation certificate and scope of accreditation is included with this application (check box to confirm).

e. Additional remarks (optional):

III. **Scope of Accreditation:** Below, please select each ENERGY STAR product category for which the CB named herein is accredited to operate its product certification system. Since EPA-recognition is per product category, EPA will recognize this CB *only* for products listed on its Scope of Accreditation. If in the future you wish to certify products not checked below, please resubmit this form with the additional products checked and your updated Scope of Accreditation. Products listed in italics are currently undergoing specification development; they are included here to provide interested CBs with notice of forthcoming ENERGY STAR product categories.

ENERGY STAR Product Categories

Appliances

- ☐ Clothes Washers
- ☐ Dishwashers
- ☐ Refrigerators and/or Freezers
- ☐ Water Coolers

HVAC

- ☐ Boilers
- ☐ Central Air Conditioners and Air-Source Heat Pumps
- ☐ Dehumidifiers
- ☐ Furnaces
- ☐ Geothermal Heat Pumps
- ☐ Light Commercial HVAC
- ☐ Residential Ceiling Fans
- ☐ Residential Ventilating Fans
- ☐ Residential Water Heaters
- ☐ Room Air Cleaners and Purifiers
- ☐ Room Air Conditioners

Climate Controls

Commercial Food Service

- ☐ Commercial Dishwashers
- ☐ Commercial Fryers
- ☐ Commercial Griddles
- ☐ Commercial Hot Food Holding Cabinets
- ☐ Commercial Ice Machines
- ☐ Commercial Ovens
- ☐ Commercial Refrigerators and Freezers
- ☐ Commercial Steam Cookers

Pre-Rinse Spray Valves

Home Electronics

- ☐ Audio/Video
- ☐ Set-top Boxes & Cable Boxes
- ☐ Telephony
- ☐ Televisions
- ☐ Battery Charging Systems (BCSs)

Information Technology

- ☐ Computers
- ☐ Displays
- ☐ Imaging Equipment
- ☐ Computer Servers

Enterprise Storage

Uninterruptible Power Supplies

Small Network Equipment

Lighting

- ☐ Decorative Light Strings
- ☐ Luminaires (including sub-components)
- ☐ Lamps

Home and Building Envelope

- ☐ Roof Products

Other

- ☐ New Refrigerated Beverage Vending Machines
- ☐ Rebuilt Refrigerated Beverage Vending Machines

Lab-grade Refrigerators/Freezers

IV. Required Documentation: Attach to this application a manual or procedural guide that describes your certification program, as well as any other documents necessary to demonstrate that your organization meets the "Conditions and Criteria for Recognition of Certification Bodies for the ENERGY STAR Program" (the complete text of which is in Section VI of this application). Complete the table below by citing in the "Applicant's Reference Document(s)" column the attached document that fulfills the ENERGY STAR requirement noted at left. To facilitate application review, please record the exact file name that is used in the attachment, and highlight the applicable text within the document or note in the table its exact location.

ENERGY STAR Requirements for Certification Bodies	Applicant's Reference Document(s) *(example: File123.pdf, relevant info in Section 6, page 9)*	Remarks	*Internal Use Only* Conforms (Yes/No)
2 a): Description of the CB's data review cycle time.			
2 b) ii: Description of procedure to verify partner claims as to which models are part of a family and which model may be a representative model from a family (*please indicate N/A if you certify no applicable product categories*).			
3 a) i: Description of the verification testing program.			
3 a) i (2): Description of the procedure for determining the number of models subject to verification testing.			
3 a) i (3): Description of the procedure for selecting products for verification testing.			
3 a) i (4): Description of the procurement procedure for products selected for verification testing.			

ENERGY STAR Requirements for Certification Bodies	Applicant's Reference Document(s) *(example: File123.pdf, relevant info in Section 6, page 9)*	Remarks	*Internal Use Only* Conforms (Yes/No)
3 b) i): Description of procedure for re-evaluating products in event of design changes.			
3 c): Description of challenge testing procedure.			
3 d): Description of procedure for resolving discrepancies that result from re-testing.			
Appendix A: Requirements for CBs Operating a Witnessed or Supervised Manufacturer's Testing Lab (WISMTL) Program *(please note "NA" if you do not operate such a program)*			
1 a): Description of initial and on-going auditing process of WMTLs/SMTLs to ensure compliance with ISO/IEC 17025.			
1 e): Description of proficiency testing procedure.			
2): Description of WMTL program.			
3): Description of SMTL program.			

ENERGY STAR Requirements for Certification Bodies	Applicant's Reference Document(s) *(example: File123.pdf, relevant info in Section 6, page 9)*	Remarks	*Internal Use Only* Conforms (Yes/No)
3 a) and 3 b): Description of process for establishing confidence in an SMTL.			

V. Declaration:

☐ By checking this box, I declare that I have read and agree to the terms of "Conditions and Criteria for Recognition of Certification Bodies for the ENERGY STAR Program," and the information submitted via this form is, to the best of my knowledge, accurate and associated with the Certification Body named herein. I understand that the ENERGY STAR program will associate all information in this form with this Certification Body. I understand that if any of the submitted information is found to be inaccurate, the Certification Body will be removed from the list of EPA-recognized Certification Bodies. I understand that intentionally submitting false information to the U.S. government is a criminal violation of the False Statements Act, Title 18 U.S.C. section 1001.

I further declare that the Certification Body named herein will not use any ENERGY STAR mark for any purpose at any time.

You are required to provide your signature by either:

a. Inserting your digital signature in the box below, or,
b. Printing out the form, signing the signature box below by hand, and scanning the form into PDF format.

Responsible Corporate Official/Signatory:

Printed Name:

Job Title:

Date:

VI. Conditions and Criteria for Recognition of Certification Bodies for the ENERGY STAR Program

In order to be recognized as a Certification Body (CB) for the ENERGY STAR Program, a CB shall agree in writing to the following requirements:

1) General Requirements and Responsibilities
   a) Maintain accreditation to ISO/IEC Guide 65, "General requirements for bodies operating product certification systems," by a signatory to the International Accreditation Forum (IAF) Multilateral Recognition Agreement (MLA) that covers accreditation of product certification bodies and operates in accordance with ISO/IEC 17011. Noteworthy elements of ISO/IEC Guide 65 include requirements that the CB shall:
      i) Operate in a non-discriminatory manner so as not to impede or inhibit access by applicants.
      ii) Make its services accessible to all applicants whose activities fall within its declared field of operation, independent of the size or membership status of the applicant.
      iii) Ensure that the relationship between it and each organization providing test data does not compromise the CB's independence.
      iv) Be responsible for decisions relating to its granting, maintaining, suspending, and withdrawing of certification, and make these decisions impartially.
      v) Decide whether or not to certify a product on the basis of the information gathered during the evaluation process.
      vi) Have a legally enforceable agreement for the provision of certification activities to its clients. Contract and agreements for certification shall take into account the responsibilities of the parties.
      vii) Provide, regularly update, and make available upon request by EPA a directory of the products it has certified, and their suppliers.
   b) Demonstrate to EPA's satisfaction adequate availability of personnel to the Agency and the ability to provide requested information in a timely manner.
   c) Apply the same conditions to the review of test reports from all EPA-recognized laboratories from which the CB has agreed to accept data, regardless of the ownership of the laboratory.
   d) Make available in written format to current or prospective clients all relevant aspects of the CB's certification program, and submit this information to EPA upon request. At a minimum, these shall include:
      i) A copy of the form or template which serves as the legally enforceable agreement for the provision of certification activities to the CB's client; and,
      ii) A description of the certification program.
   e) Make available in written format to EPA a description of the management of competencies of personnel involved in the certification process.
   f) Maintain test reports for certified products for at least the longer of 5 years or the duration of certification, and permit relevant EPA ENERGY STAR authorities to examine any information used in making certification decisions, including test data.
   g) Participate in meetings with EPA as EPA deems necessary to discuss changes to ENERGY STAR product specifications relevant to certified products. EPA and the CB will jointly determine whether the meeting should take place remotely (for example, by telephone) or in-person.
   h) Forward any questions related to ENERGY STAR test methods to EPA for resolution, and abide by the decisions of EPA relative to the resolution of those questions.
   i) Allow EPA, at its discretion, to audit product certification and verification activities.
   j) Notify EPA and any ENERGY STAR partner whose product(s) the CB has certified, of any suspension or withdrawal of the CB's accreditation.
   k) Not use its own mark to indicate that a product is ENERGY STAR qualified.

2) ENERGY STAR Qualification
   a) Provide EPA with a description of the CB's data review cycle time in order to allow the estimation of its potential impact on ENERGY STAR partners' product introduction cycles.
   b) Determination of qualification
      i) Determine qualification by assessing whether the product meets the performance parameters described in the relevant ENERGY STAR product specification. This assessment shall comprise a review of the test report of each model intended for ENERGY STAR qualification.
      ii) In the case of ENERGY STAR product specifications that permit the qualification of a group of models based on the test report of a representative model, the CB shall have a procedure to verify ENERGY STAR partner claims as to:

(1) Which models are part of a single family; and,
(2) Which model may be considered a representative model of that family.[1]

II) Confirm that all data in the test report originated from an EPA-recognized laboratory with an appropriate scope of accreditation. EPA-recognized laboratories include the following:
(1) All laboratories EPA has formally recognized as currently meeting the "Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program." The terms of this document include accreditation to ISO/IEC 17025 by an EPA-recognized Accreditation Body. EPA maintains an online list of these laboratories. Therefore, confirming data have originated with such a laboratory shall consist of confirming the presence of the laboratory on this list.
(2) All laboratories participating in the CB's witnessed or supervised manufacturers' testing laboratory (WMTL/SMTL) program per the requirements described in Appendix A. The terms of this include assessment to ISO/IEC 17025 by an EPA-recognized CB. Ensuring data have originated with such a laboratory shall consist of the CB confirming the presence of the laboratory on its internal list of WMTLs/SMTLs.

c) Report to EPA certified products and at a minimum the key data elements enumerated in the applicable ENERGY STAR product specification(s). EPA will use this specific information to create the ENERGY STAR Qualified Product Lists. EPA will ensure recognized CBs are provided with access to the necessary reporting tools, including secure electronic channels, and guidance on how to use them. Electronic channels may include secure FTP, an extranet system, and/or XML-based web services.

3) ENERGY STAR Verification
a) Verification Testing
I) Operate an ENERGY STAR partner-funded verification testing procedure that fulfills the verification testing requirements enumerated as follows:
(1) Ensure products meet all product performance parameters as described in the relevant ENERGY STAR product specification.
(2) Number of products:
(a) Annually test at least 10% of all ENERGY STAR qualified models the CB has certified or for which it has received qualified product data.
(b) In the case of ENERGY STAR specifications that address multiple product types, the CB will annually test at least 10% of each type.
(c) When determining the number of models subject to verification testing, the CB shall consider product families as defined in the relevant product specification, and in consultation with EPA.
(d) In the event of significant product failures, EPA may advise the CB to increase the number of models tested in subsequent years. The minimum number of products tested may differ by product category.
(3) Products shall be selected by the CB according to the following general guidelines:
(a) The CB shall select models for verification testing from the ENERGY STAR qualified models the CB has certified;
(b) Approximately 50% of models to be tested shall be randomly selected; although, the more recently a model has undergone verification or challenge testing, the less likely it should be selected in this random selection process; and,
(c) The remaining models shall comprise referrals from EPA as provided, and models selected in consideration of the following factors:
(I) Product classes from ENERGY STAR partners for which previous models failed verification testing;
(II) Referrals from third parties such as consumers, consumer groups or regulatory agencies regarding the accuracy of ratings; and,
(III) Models with high sales volumes if this data is available to the CB.
(4) Procurement of unit(s) for testing:
(a) The CB shall procure or obtain the unit(s) for testing, prioritizing the source of those units in the following order (from most to least favored)
(I) Off-the-shelf (i.e., from the open market);
(II) Warehouse (i.e., from a storage depot); or
(III) Off-the-line (i.e., from the manufacturing facility).

NOTE: Off-the-line testing is only appropriate where pulling products from the shelf or from a warehouse is not feasible. Examples include where the selected product is prohibitively expensive to

[1] The CB shall verify all such claims against EPA's definition of what constitutes a family and a representative model. These definitions are included in the relevant ENERGY STAR product specifications.

purchase and/or transport, is made-to-order, or is otherwise unavailable through normal retail channels.

NOTE: The CB shall be responsible for obtaining the unit for testing, and shall not allow the ENERGY STAR partner to choose the testing sample.

(b) Partners whose products are selected for verification testing are required to:
(I) In the case of off-the-shelf procurement, provide a list of at least three locations where a unit(s) of the product(s) to be tested may be obtained; or
(II) In the case of warehouse or off-the-line procurement, provide access to the CB to select a unit(s) of the product(s) for testing.

(5) Location of verification testing:
(a) Verification testing shall be performed at an EPA-recognized, third-party laboratory; or,
(b) If the unit is obtained off-the-line from the manufacturing facility, the verification testing may be performed at an EPA-recognized, first-party[2] laboratory provided that qualified CB personnel witness the test.

b) Re-evaluation in the Event of Significant Changes
I) Have procedures to re-evaluate product performance in the event of changes that could affect the ENERGY STAR qualification status of a product the CB has certified.[3] Consistent with this, the CB shall:
(1) Require the ENERGY STAR partner responsible for a product the CB has certified to inform the CB about any changes to that product that could result in it no longer meeting the requirements of the relevant ENERGY STAR product specification.
(2) Require, and evaluate the results of, retesting of the product's relevant performance.
II) Report to EPA any changes in product performance, including new test data.
(1) If the changes do not impact the ability of the product to qualify for ENERGY STAR, the CB shall report the relevant data to EPA on the same schedule as information on newly certified products.
(2) If the CB has determined the product no longer meets the product performance requirements of the relevant ENERGY STAR product specification, the CB shall notify the ENERGY STAR partner and EPA within two business days.

c) Challenge Testing
I) Have in place a challenge testing procedure, and contractual provisions for challenge testing.
II) A challenge may be initiated only when the CB has conveyed details of the challenge to the challengee, or confirmed the challenger has independently done so,[4] and the CB received the following:
(1) Identification of the challenged model number; and,
(2) Identification of the challenged parameters and the basis for the challenge. This basis may be but is not limited to marketing material that claims better performance than the data the CB has on record, or the results from a product test the challenger performs on its own, and for which it pays without reimbursement by the CB no matter the results of the CB's subsequent challenge test.
III) Upon the failure of a product to meet the performance requirements of the relevant ENERGY STAR product specification, the CB shall notify the ENERGY STAR partner and EPA within two business days.

d) Resolving Discrepancies: Have in place a procedure to resolve discrepancies between data resulting from product re-testing (for any purpose, for example, verification or challenge testing), and the data previously certified by the CB. In the case of a discrepancy, the CB shall report to EPA the test results, both initial and final in case additional re-testing is performed, that are relevant to ENERGY STAR qualification.[5] The CB shall also notify EPA of the resolution of product re-testing, for example, decertification or recertification.

[2] For the purpose of the ENERGY STAR program, EPA defines a first-party laboratory as a laboratory that is owned and/or operated by the manufacturer or private labeler of the product being tested.
[3] A laboratory's change in accreditation or WMTL/SMTL status would be considered relevant to the qualification status of products the laboratory tested only during the effective period of the factor(s) that led to the change in the laboratory's status.
[4] The CB shall not oblige the challenger to convey details of the challenge to the challengee.
[5] When the CB reports this data to EPA, it shall follow the rounding and qualification rules enumerated in the applicable ENERGY STAR specification.

Appendix A: Requirements for the operation of a Witnessed Manufacturers' Testing Laboratory (WMTL) or Supervised Manufacturers' Testing Laboratory (SMTL) program

A CB, per ISO/IEC Guide 65, may operate a testing program to accept test data from a manufacturer's first-party laboratory that participates in a WMTL or a SMTL program only if the CB adheres to the requirements enumerated below. Note, the CB shall not enroll as a WMTL any laboratory EPA has formally recognized as currently meeting the "Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program," since this recognition obviates the need to establish confidence in the laboratory via the level of witnessing inherent to a WMTL program. Instead, the CB shall enroll such a laboratory as an SMTL, and the procedure the CB follows to do so shall entail fewer steps than in the case of non-accredited laboratories.

To operate a testing program to accept test data from a manufacturer's first-party laboratory that participates in a WMTL or a SMTL program, the CB shall:

1) General Requirements:
   a) Ensure through an on-site initial assessment and periodic auditing that the WMTL or SMTL is able to demonstrate its facilities are in compliance with all relevant requirements of ISO/IEC 17025 and the applicable test method(s), and that the laboratory personnel conducting the testing have the necessary competence and expertise. Consistent with this, the CB shall have and follow written procedures for evaluating laboratory facilities; environmental controls; personnel and training; testing and calibration equipment types and accuracy; calibration procedures; written test procedures, set-up, measurement technique(s) and documentation systems; quality assurance programs; and other elements as required in the relevant ENERGY STAR product specification;
   b) Document and maintain reports of its assessments and periodic auditing of the WMTLs/SMTLs in the programs it operates;
   c) Have and follow procedures to monitor the impartiality of WMTLs/SMTLs on an ongoing basis. Document review, consistent with the requirements of ISO/IEC 17025, shall include but may not be limited to the following:
      i) Organization chart showing that the responsibilities, authorities, and inter-relationships of all personnel who manage, perform or verify laboratory results are free from influence that may adversely affect the quality of their work;
      ii) Dates of internal audits, audit findings, and any corrective actions taken;
      iii) Any customer complaints and corrective action taken;
      iv) Original testing records containing sufficient information for repeatability, including the names of staff who participated;
      v) Evidence that laboratory employees participate in and regularly pass ethics and compliance audits; and,
      vi) Evidence that mechanisms for reporting and responding to attempts to exert undue influence on test results are in place.
   d) Maintain records that demonstrate the test data originating with the WMTL/SMTL are unbiased.
   e) Operate proficiency testing when EPA/DOE deems it necessary to ensure consistent results between the WMTL/SMTL and an EPA-recognized third-party laboratory.
   f) Provide EPA with a list of each WMTL/SMTL testing products pursuant to ENERGY STAR qualification, and updates to this list on an ongoing basis as the CB enrolls laboratories in its WMTL/SMTL program. This list shall included the following information on each WMTL/SMTL:
      i) The date of the WMTL/SMTL agreement between the WMTL/SMTL and the CB;
      ii) The manufacturer's name and the address of its headquarters; and,
      iii) The ENERGY STAR product categories covered by the agreement.
   g) Assume full responsibility for the validity of the test results.
2) Requirements specific to the operation of a WMTL program:
   a) Supervise and check all critical aspects of the tests;
   b) Witness the final data acquisition;
   c) Ensure that the CB personnel who witness the test(s) have the necessary competence and expertise to carry out tests to the relevant ENERGY STAR product specification; and,
   d) Ensure that all tests are carried out by personnel of the WMTL in accordance with the applicable requirements.
3) Requirements specific to the operation of an SMTL program:
   a) Witness testing and all other elements that contribute to the establishment of confidence in the SMTL's quality processes;
   b) As the CB gains experience with and confidence in the SMTL, supervision may gradually shift away from witnessing tests;
   c) At least once per year, audit the SMTL's procedures on-site against the requirements of ISO/IEC 17025 and the applicable test method(s). During visits, the CB shall:

I) Supervise product testing; and,
II) Review relevant test reports in progress; and,

d) Maintain records of:
I) The dates and elements of performed supervision, including what tests were observed; and,
II) Observations made and advice provided to the SMTL during visits.

End of text of "Conditions and Criteria for Recognition of Certification Bodies for the ENERGY STAR Program"

Testing laboratories

United States
ENVIRONMENTAL PROTECTION AGENCY
Washington, DC 20460
Office of Atmospheric Programs

Application for Recognition of Accredited Laboratories by EPA under the ENERGY STAR® Program Version 1.6

This form is an application for recognition of laboratories by the U.S. EPA ENERGY STAR program. To serve as an EPA-recognized, accredited laboratory for the ENERGY STAR program, please fill out and submit this form to EPA by following the instructions below. Upon confirmation of EPA recognition, you may begin to operate as an EPA-recognized, accredited laboratory for the ENERGY STAR program.

First party laboratories that are granted EPA recognition are not required to participate in a supervised manufacturer test lab (SMTL) program as defined in Appendix A of the "Conditions and Criteria for Recognition of Certification Bodies." Certification bodies are encouraged to take EPA recognition into account when assessing a laboratory's competence.

Instructions:

1. Read and understand the "Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program," the full text of which is included under Section VI.
2. Complete the form. All fields are required unless stated otherwise.
3. Sign the form by either:
    a. Inserting your digital signature; or
    b. Printing out the form, signing it by hand, and scanning it into PDF format.
4. Email the completed form with the required attachments to:

I. **Laboratory Information**

Laboratory Name:
Laboratory URL:
Address 1 (e.g., street address):
Address 2 (e.g., suite #):
City:
State:
Zip/Postal Code:
Country:

Primary contact first name:
Primary contact last name:
Job title of primary contact:
Email:
Phone:
If mailing address of primary contact is different from the organization address, please provide it here:
Address 1 (e.g., street address):
Address 2 (e.g., suite #):
City:
State:
Zip/Postal Code:
Country:

The following secondary contact information section is optional.
Secondary contact first name:
Secondary contact last (family) name:
Job title of secondary contact:
Email:
Phone:
If mailing address of secondary contact is different from the organization address, please provide it here:
Address 1 (e.g., street address):
Address 2 (e.g., suite #):
City:
State:
Zip/Postal Code:
Country:

II. **Is the laboratory 1st party (i.e., manufacturer-owned)?** ☐ Yes / ☐ No

If yes, please provide the name of the ENERGY STAR partner/manufacturer and describe the nature of the relationship:

Partner/manufacturer name:

Nature of relationship between the 1st party laboratory and partner/manufacturer:

III. **General Requirements**: Consistent with "Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program," an EPA-recognized, accredited laboratory must maintain accreditation to ISO/IEC 17025, "General requirements for the competence of testing and calibration laboratories," by an EPA-recognized Accreditation Body.

a. Name of EPA-recognized Accreditation Body:

b. Laboratory accreditation effective date:

c. Laboratory accreditation expiration date (if applicable):

d. ☐ A digital copy of the laboratory's accreditation certificate and scope of accreditation is included with this application (check box to confirm).

Comment (optional):

IV. **Scope of Accreditation:** Below, please select each ENERGY STAR product category for which your lab is accredited to test products pursuant to ENERGY STAR qualification. Since EPA-recognition is per product category, EPA will recognize your Laboratory **only for products the test methods of which are listed on your Scope of Accreditation.** If in the future you wish to test products not checked below, please resubmit this form with the additional products checked, and your updated Scope of Accreditation. (Note: EPA will recognize laboratories for testing Windows, Doors, and Skylights through the National Fenestration Rating Council (www.nfrc.org)).

ENERGY STAR Product Categories

Appliances

- ☐ Clothes Washers
- ☐ Dishwashers
- ☐ Refrigerators and/or Freezers
- ☐ Water Coolers

Commercial Food Service

- ☐ Commercial Dishwashers
- ☐ Commercial Fryers
- ☐ Commercial Griddles
- ☐ Commercial Hot Food Holding Cabinets
- ☐ Commercial Ice Machines
- ☐ Commercial Ovens
- ☐ Commercial Refrigerators and Freezers
- ☐ Commercial Steam Cookers

Pre-Rinse Spray Valves

HVAC

- ☐ Boilers
- ☐ Central Air Conditioners and Air-Source Heat Pumps
- ☐ Dehumidifiers
- ☐ Furnaces
- ☐ Geothermal Heat Pumps
- ☐ Light Commercial HVAC
- ☐ Residential Ceiling Fans
- ☐ Residential Ventilating Fans
- ☐ Residential Water Heaters
- ☐ Room Air Cleaners and Purifiers
- ☐ Room Air Conditioners

Climate Controls

Home and Building Envelope

- ☐ Roof Products

Information Technology

- ☐ Computers
- ☐ Displays
- ☐ Imaging Equipment
- ☐ Computer Servers

Enterprise Storage

Uninterruptible Power Supplies

Small Network Equipment

Home Electronics

- ☐ Audio/Video
- ☐ Set-top Boxes & Cable Boxes
- ☐ Telephony
- ☐ Televisions
- ☐ Battery Charging Systems (BCSs)

Lighting

- ☐ Compact Fluorescent Lamps
- ☐ Integral LED Lamps (Omnidirectional/Directional)
- ☐ Integral LED Lamps (Decorative only)
- ☐ Luminaires: Fluorescent
- ☐ Luminaires: High Intensity Discharge
- ☐ Luminaires: Solid State
- ☐ Luminaires: Halogen
- ☐ LED package, module or array (IES LM-80-2008)
- ☐ Decorative Light Strings

Other

- ☐ New Refrigerated Beverage Vending Machines
- ☐ Rebuilt Refrigerated Beverage Vending Machines

Lab-grade Refrigerators/Freezers

V. **Declaration:**

☐ By checking this box, I declare that I have read and agree to the terms of "Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program," and the information submitted via this form is, to the best of my knowledge, accurate and associated with the laboratory named herein. I understand that the ENERGY STAR program will associate all information in this form with this laboratory. I understand that if any of the submitted information is found to be inaccurate, the laboratory will be removed from the list of EPA-recognized Laboratories. I understand that intentionally submitting false information to the U.S. government is a criminal violation of the False Statements Act, Title 18 U.S.C. section 1001.

I further declare that the laboratory named herein will not use any ENERGY STAR mark for any purpose at any time.

You are required to provide your signature by either:

a. Inserting your digital signature in the box below, or,
b. Printing out the form, signing the signature box below by hand, and scanning the form into PDF format.

Chief Executive/Signatory:	
Printed Name:	
Job Title:	
Date:	

VI. Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program

In order to serve as an EPA-recognized accredited[1] laboratory for the ENERGY STAR program, a laboratory shall agree in writing to comply at all times with the following requirements:

General Requirements:

1) Maintain accreditation to ISO/IEC 17025, "General requirements for the competence of testing and calibration laboratories," by an EPA-recognized Accreditation Body (AB). Noteworthy elements of ISO/IEC 17025 include requirements that laboratories shall:

   a) Have a policy that sets out quality objectives, commitments and operational procedures;

   b) Employ experienced personnel who have the education and training needed to conduct the tests;

   c) Have the physical plant facilities and test equipment needed for proper testing;

   d) Ensure that measuring equipment is accurate and calibrated and that calibration records are maintained;

   e) Maintain a record of all original observations, test data and calculations; and,

   f) Maintain arrangements to ensure the freedom of laboratory management and personnel from any undue internal or external commercial, financial or other pressures and influences that may adversely affect the quality of their work.

      NOTE: It is EPA's expectation that laboratories will consistently maintain the impartiality of product testing. Demonstration of impartiality, consistent with the requirements of ISO/IEC 17025, shall include but may not be limited to the following:
      - *i) organization chart showing that the responsibilities, authorities, and inter-relationships of all personnel who manage, perform or verify laboratory results are free from influence that may adversely affect the quality of their work;*
      - *ii) dates of internal audits, audit findings, and any corrective actions taken;*
      - *iii) any customer complaints and corrective action taken;*
      - *iv) original testing records containing sufficient information for repeatability, including the names of staff who participated;*
      - *v) evidence that laboratory employees participate in and regularly pass ethics and compliance audits; and,*
      - *vi) evidence that mechanisms for reporting and responding to attempts to exert undue influence on test results are in place.*

2) Develop and maintain separate laboratory test procedures for each accredited ENERGY STAR test method that detail how testing will be conducted utilizing the laboratory's test facilities, fixtures, equipment and personnel.

3) Notify EPA/DOE immediately of any attempt to hide or exert undue influence over test results.

4) Have recorded in its Scope of Accreditation its specific competence to carry out the test methods as outlined in the ENERGY STAR program for which the laboratory intends to test products.2

   NOTE: To decrease the burden to laboratories and accreditation bodies, EPA will not require laboratories to update their Scopes of Accreditation when an ENERGY STAR specification is revised. However, EPA will require that the laboratory ensures its methods remain consistent with the test methods described in the program requirements of the currently effective version of the specification. Further, major changes in test method, for example, when a specification revision calls for a different test method altogether from the preceding specification version, will necessitate a Scope of Accreditation update to reflect the newly required test method.

5) Allow EPA or an EPA-appointed representative, at its discretion, to witness any testing performed for qualification or verification of qualification to the requirements of the ENERGY STAR program. EPA or its appointed representative agrees to operate solely as an observer and not participate in any way with the testing activities of the laboratory.

Inter-laboratory Comparison Testing:

1) Agree to participate in relevant and available inter-laboratory comparison testing (ILC) when EPA/DOE deems it necessary.

2) Carry out ILC in accordance with normal testing/calibration and reporting procedures, unless otherwise specified in the instructions from the proficiency test provider.

3) Submit to EPA/DOE upon request:
   a) The results of ILC;
   b) The analysis of those results; and,
   c) Detailed corrective action responses for any outlying or unacceptable results.

Reporting:

1) Submit to EPA a digital copy of the accreditation certificate and scope of accreditation. This shall include at a minimum:
   a) Accreditation effective date;
   b) Accreditation expiration date (if applicable); and,
   c) ENERGY STAR-relevant accredited test methods.

2) Authorize the laboratory's AB to share with EPA copies of assessment documentation related to ENERGY STAR testing, including corrective action plans and deficiency resolutions.

3) Report to both EPA and the laboratory's AB within 30 days of any major changes that affect the laboratory's:
   a) Legal, commercial, organizational, or ownership status;
   b) Organization and management, e.g., key managerial staff;
   c) Policies or procedures, where appropriate;
   d) Location;
   e) Personnel, facilities, working environment or other resources, where significant; and,
   f) Other such matters that may affect the laboratory's capability, scope of recognized activities, or compliance with the ENERGY STAR requirements and relevant technical documents.

4) Forward any questions related to ENERGY STAR test methods to EPA for resolution, and abide by the decisions of EPA relative to the resolution of those questions.

End of text of "Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program"