Information Technology Industry Council
Leading Policy for the Innovation Economy

Position on Global Adoption of Energy Efficiency Programs for Personal Computers and Server Products

Version: August 2011

Executive Summary

As governments around the globe seek to reduce their energy demands and capture energy efficiency gains in their economies, many look to the information and communications technology (ICT) sector to offer solutions. While the ICT sector is working to increase the energy efficiency of its own products, the Climate Group's *Smart 2020* report found that the larger energy benefits will occur by enabling other sectors to be more energy efficient, an opportunity that could deliver carbon savings five times larger than the total emissions from the entire ICT sector in 2020. Smart manufacturing[1], smart logistics, smart buildings, smart grids and other smart solutions are all enabled by ICT products.

At the same time, country-specific ICT product energy initiatives and regulations have expanded rapidly over the past ten years. Diverging specifications have emerged in multiple markets and the resulting fragmentation of requirements around the globe places a large burden on the ICT sector's ability to develop and deploy ICT products to equip the smart solutions of tomorrow. In light of this trend, ITI has developed recommendations for regulators around the globe to consider as they are formulating energy efficiency programs for ICT products – especially for personal computers and servers. We hope that regulators will strive to align requirements globally and implement programs that will enable energy-efficient ICT products to be cost-effectively deployed to both save energy and promote economic growth.

1. Ensure programs facilitate product innovation.
Future economic growth and international competitiveness will depend significantly on the ICT sector's capacity to innovate. Governments should strive to develop design-neutral, performance-based standards and regulations that do not unnecessarily penalize innovation, performance, or the quality of ICT products and that focus on overall energy impact rather than on design parameters.

2. Ensure programs are based on sound data collection and analysis.
Governments should perform a full regulatory impact assessment before initiating energy reporting or use standards, voluntary programs, or regulation. The evaluation should consider potential impacts on a broad range of users in that market – for example, consumers, academia, professionals, businesses, including SMEs and industry R&D and operations.

3. Seek to adopt international standards and metrics.
With rapid globalization, ICT manufacturers need a common international standard for designing, building and testing their products, while leaving enough flexibility for country unique customization. The ENERGY STAR® framework and Ecma-383/IEC-62623 standard are key models for personal computers that have achieved global applicability and recognition.

4. Enact voluntary programs to achieve product energy efficiency gains.

[1] www.smart2020.org/publications/

In general, the global ICT industry supports voluntary programs to achieve product energy efficiency gains. Under voluntary programs, such as Energy Star, manufacturers that offer energy efficiency products are rewarded by the market, due to increased sales of their products to customers that desire the most energy efficient products. These programs have a strong record of success.

5. Avoid using voluntary program metrics as market access requirements.
Market access programs should aim to remove the least energy efficient products from the marketplace, whereas voluntary programs should aim to promote the best. Adoption of provisions from a voluntary program like Energy Star as market access limits is to be avoided, as it could constrain system makers from fulfilling customer needs when higher performance products that use more energy are required.

6. Harmonize with the international product category system.
To compare like product capability, product category definitions based on product attributes have been used for many years by Energy Star and Japan's Top Runner Programs, as well as EU ErP regulations. The categorization methodology allows for the comparison of like-capability products within a given product segment (e.g., notebooks, desktop computers, and see IEC 62623). The simple analogy is comparing motorcycles with other motorcycles for miles per gallon comparison, and not comparing motorcycles with cars or trucks for the same metric, since the capability of these vehicles is very different.

7. Ensure transparency and stakeholder participation in the regulatory process
An appropriate period of time should be included in the planning and development of energy regulations impacting ICT products. The life cycle of products should be taken into consideration for the regulatory time frame, since life cycles vary among products. Moreover, the development process should facilitate early and continuing participation from stakeholders.

8. Adopt minimally trade-restrictive conformity assessment requirements
ITI encourages conformity assessment based on one common set of international standards of performance and specification requirements; acceptance of test results conducted in a competent test facility, regardless of location; and acceptance of a supplier's declaration of conformity. This is an appropriate approach in the low-risk area of energy use, when combined with appropriate market surveillance.

9. Maintain flexible, consumer-friendly labeling requirements
Global manufacturers strive to inform consumers about product energy efficiency, power consumption, and power management through consumer-friendly channels, including marketing literature, web pages, and product manuals. Often, mandatory, country-specific labeling creates a patchwork of labels on products that are designed and manufactured for sale worldwide, confusing consumers and increasing costs and production-line inefficiencies for manufacturers.

Conclusion
Regulators face a daunting challenge in trying to meet environmental and energy objectives through energy efficiency programs within their economy. The global ICT industry also faces a daunting compliance challenge as regulators establish disparate regulatory programs that impact ICT products. Industry stakeholders are committed to working with interested governments and stakeholders to find ways to align requirements across the globe.

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Introduction[2]

The global information and communications technology (ICT) sector is growing and evolving rapidly and presents one of the strongest opportunities for enabling broader economic growth globally. Total worldwide ICT spending reached an estimated USD 3.5 trillion in 2008. The ICT industry is truly global in reach, with manufacturers, suppliers, and customers in every significant market around the globe. Thus, both developing and developed economies rely on an ICT infrastructure and industry presence for improving quality of life for their citizens, stimulating local economies, and meeting global market needs.[3]

As governments around the globe seek to reduce energy demand and capture energy efficiency gains in their economies, many look to the ICT sector. Some areas where significant productivity opportunities can occur include making other sectors more energy efficient, through greater use of ICT-enabled smart manufacturing[4], smart logistics, smart buildings, smart grids and other smart solutions. While the ICT sector is working to increase the energy efficiency of its own products and increase customer implementation of power management functions on personal computers (PCs) and servers, the Climate Group's *Smart 2020* report found that the largest energy benefits will occur by enabling greater efficiency in other sectors, an opportunity that could deliver carbon savings five times larger than the total emissions from the entire ICT sector in 2020. At the same time, country-specific ICT product energy initiatives are expanding rapidly, largely driven by climate change, energy security, and electric grid capacity concerns.

Relevant efforts to improve energy efficiency have grown significantly over the past two decades. In 1992, the U.S. Environmental Protection Agency (EPA) established its voluntary Energy Star program, for computers. In 1995, the German Blue Angel eco-labeling scheme included specifications for PCs and monitors, and now includes energy elements. In 1998, Japan initiated the Top Runner Program to improve energy efficiency of end-use products, including PCs. In 2010, ICT product energy regulations spanned the globe, covering North America, EU-27, Japan, Korea, China, India, Australia, New Zealand, with several new regulations in development in Latin America. Current product energy performance and labeling requirements, standards, or regulations take two basic forms:

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[2] SCOPE: While the recommendations below may be applied across all information and communications technology (ICT) products, these recommendations are focused on regulations for personal computers (PCs) and servers.

[4] www.smart2020.org/publications/

a) Voluntary and Leverage programs[5] (Examples: Blue Angel, TCO, EU Flower, Energy Star, Japan's Top Runner, Korea's Energy Boy, Chinese Taipai's Green Mark, and China's Energy Conservation Program)

b) Mandatory or market access programs (Examples: the European Union's Energy-related Product Directive Lot 6 regulation on standby power consumption, draft EU-ErP Lot 3 regulation on energy efficiency of PCs, monitors and internal power supplies for servers).

The global ICT industry would like to work as cooperative partners with governments and other stakeholders to ensure that new product energy programs DO improve the energy efficiency of ICT products both as standalone equipment and when integrated into networks and data centers, and DO NOT impede the growth of the ICT sector, place unnecessary barriers to trade, restrict innovation or product performance, or limit consumer choice. We respectfully make the following recommendations as governments adopt and expand energy efficiency programs for ICT products:

1. Ensure programs facilitate product innovation.

Future economic growth and international competitiveness depends on the global ICT industry's capacity to innovate. Governments should strive to develop standards and regulations that focus on energy impact, rather than specific design parameters, and do not unnecessarily penalize innovation, performance, or quality of ICT products. The very nature of the ICT sector is defined by its ability to innovate and produce the latest technologies, with the goal of improving the customer experience in communication, education, and entertainment. Recognizing that innovation is critical to the success of the ICT sector, governments should consider energy efficiency programs that provide allowances or exemptions for technologies that offer significant customer benefit, but may require a trade-off of higher energy consumption.

An example is the innovation that is occurring around graphics content creation enabled by accelerated GPU computing, innovation that is enabling higher energy efficiency and faster performance for video content, and satisfying customer demands for new graphics capabilities, but also raise the energy usage of the device itself.

2. Ensure programs are based on sound data collection and analysis.

Governments should perform a full regulatory impact assessment before initiating voluntary or mandatory programs. The evaluation should consider potential impacts on a broad range of stakeholders and users in that local market – for example, consumers, academics, professionals, businesses including small- and medium-sized enterprises (SMEs) and industry research and development (R&D) and operations. During the development of regulations, industry can support policy makers by acting as a technical resource for data, product studies, impact assessments, and resulting analysis.

Use of the appropriate data is an essential element of the target-setting process in both voluntary and mandatory programs. Industry can often provide supplementary data for recent platform

[5] Programs that do not restrict sale of products by mandating requirements but drive the adoption of requirements in a market through government procurement, incentive programs, labeling requirement s or other drivers.

configurations intended for a specific market. Also, if data is collected over time periods of one year or more, manufacturers can work the required data collection into their product development and testing schedules. While this requires longer data collection periods, governments will benefit from a more complete picture of current market conditions and potential technology impacts. Finally, most manufacturers do not have excess testing capacity or readily available systems for testing on short notice, making responding to large and detailed data requests from regulators on a short time frame very challenging. Utilizing existing, available data to set the initial standards is also important.

The Energy Star database provides a full set of data to underpin the Energy Star program. However, use of this data may not be appropriate for other programs, due to differences in the Energy Star penetration rate or the breadth of the manufacturers' system portfolio. The ICT industry has recommended that Energy Star allow industry to submit system data that is truly representative of product in the entire marketplace – and not a smaller subset. This will provide a more accurate set of data for regulators that consult the Energy Star database for setting voluntary or mandatory programs.

3. Seek to align to <u>international standards and metrics.</u>

Standards
The rapid growth of the Internet, affordable technology, and consumers' demand for personal enrichment and productivity tools are driving the worldwide growth of high-performance ICT products. At the same time, these trends are driving tremendous gains in energy efficiency. Many regulators are increasingly focused on reducing green house gas (GHG) emissions through energy efficiency improvement and energy consumption reduction and seek to develop domestic energy regulations and standards to achieve this end. However, international standards provide a common global methodology that can be applied universally and allow each country to contribute toward the standard development, without having to expend resources to develop a new standard. Without such standards, manufacturers would be required to design, build and test products to meet each country requirements, leading to inefficiencies, increased assembly and manufacturing costs, and could lead to limited customer options and higher end-user prices.

Although ITI understand that governments may choose to establish energy efficiency initiatives and regulatory programs, it is critical that such programs not pick winners or losers based on the underlying technology or design of the product, rather than its performance. Any programs must achieve energy efficiency while allowing innovation and competition. Such standards and metrics work best when they are technology neutral, science-based, and incorporate international standards. Specifically, we would like to make the following recommendations as potential models for future global standards:

Specific to PC standards, industry recommends:
- The **<u>Energy Star Framework</u>**, Typical Energy Consumption (TEC) framework, based on annualized energy consumption (kWh/yr), and testing procedures aligned to international standards below, which supports both Energy Star V5.0/V5.2 specification and scales to the future V6.0 specification.
- The **<u>Ecma-383/IEC-62623 Standard</u>**, with global applicability. ECMA-383, whose charter was to set energy standards for testing, product categorization, Typical Energy Consumption (TEC) formulae and usage profiles, is continuing to be adopted worldwide. ErP Lot 3 draft

(EU-ErP regulation for PC), Australia/New Zealand MEPS, and China MEPS are accepting ECMA-383 innovations. (Note: The Ecma-383 standard became the basis for IEC-62623 international standard that is currently in Committee Draft for Vote (CDV) phase.)

Specific to server standards, industry recommends:

- **Energy Star Version 1 and 2**: The Energy Star computer server requirements provide workable testing methodologies for server systems with up to 4 processor sockets. The proposed **Server Efficiency Rating Tool (SERT) Metric**, being developed by Standard Performance Evaluation Corporation (SPEC®) in support of Energy Star, will expand testing to active energy use, providing a measure of performance per unit of energy consumed.

Metrics for IT Systems

Understanding how proposed energy efficiency metrics represent the workloads run by actual product users is critical. For example, shipping computer systems that meet Energy Star version 5 limits are typically lightly configured in terms of CPU capability and number of cores/threads, type of chipset and chipset bandwidth, lower power supply unit (PSU) rating, simpler storage arrays, and lower-end discrete graphics. While these lightly configured systems may meet some end-user requirements, most high-end system users have more demanding requirements that can only be fulfilled by more richly configured systems. Under a voluntary scheme, richly configured systems can still be placed on the market. However, use of Energy Star Version 5 specifications in a mandatory program would severely restrict certain platforms and functionality from entering the market.

In general, metrics need better definition, identity, and agreement among stakeholders. For workstations, most regulatory activity appears headed to TEC framework, as defined in Energy Star, though few programs (EU-ErP regulation on standby power consumption, ErP Lot 3) still require modal power limits, in addition to TEC. Introducing multiple methodologies in different geographies complicates product design cycles, hurts design and innovation, and impacts customer choices. Further, multiple standards or requirements for the product increase costs without concomitant energy savings.

For servers, system energy efficiency is a combination of the amount of workload delivered per unit of energy applied; the ability to run multiple workloads to increase the amount of time it is doing work (utilization); and the ability to reduce power use when no work is being done. Each of these attributes drives energy efficiency in the data center, and work needs to broaden the criteria to cover these three attributes. Current work by SPEC on the SERT metric is an example of an effort to develop new metrics to better assess the power use efficiency of an operating server. Similar opportunities exist for a global effort to establish active power/performance metrics.

Note that the SERT tool, though critical, may not be able to encompass all the necessary aspects to drive energy efficiency in the data center. For example, the relevant duty cycle(s) across the three general attributes is highly workload-dependent as well as dependent on the overall data center architecture (e.g. tiered server hierarchies, use of virtualization, etc.). To achieve efficiency in the data center, tools and server efficiency standards need to be flexible enough to encourage innovation, while combined with data center best practices. Data center best practices for energy efficiency are being developed through The Green Grid, Data Center Code of Conduct, and other programs, with examples available at http://www.thegreengrid.org/library-and-tools.aspx.

Specific to PC client metrics, industry recommends:

- Base System TEC + additional capability allowances, also called "Adders," (both expressed in kWh/yr) for each product category (defined based on like product capabilities).

Specific to Server Metrics, industry recommends:

- Efficiency of internal power supplies according to 80 PLUS®, Bronze, Silver and Gold levels methodology Internal power supply (IPS) requirements, as detailed by the ErP lot 3 draft requirements.
- With the introduction of the revised Energy Star testing and verification program requirements, industry does not recommend the expansion of the Energy Star program for enterprise ICT products until the following items are analyzed and resolved:
  - The full implications of these requirements on complex products, particularly how to execute the verification process for "built-to-order" products.
  - Determine how to integrate Energy Star product registration with the requirements in other jurisdictions that promote Energy Star, such as the EU, Canada and Japan, to maintain seamless global Energy Star implementation.

4. Enact <u>voluntary programs</u> to achieve product energy efficiency gains.

In general, the global ICT industry prefers to avoid mandatory energy efficiency regulations and supports voluntary programs to achieve product energy efficiency gains. Under voluntary programs, such as Energy Star, manufacturers that offer energy efficient products are rewarded by sales of their products to governments, organizations, and customers that desire the most energy efficient products. When governments believe regulations must be put in place, the regulations should eliminate unsatisfactory performers – that is imposing minimum thresholds for market access – and include exemptions for specialized and high-performance products.

Voluntary programs have built a successful track record. Significant energy savings and GHG emissions reductions have been achieved, and normally without the unintended consequence of impaired customer choice, higher customer prices, or impediments to innovation and higher performance.

5. Avoid using voluntary program (best-in-class) metrics as <u>market access</u> requirements.

The voluntary Energy Star program aspires to reward the best-in-class products and is intended to allow qualification of only the most energy efficient products on the market – namely pass/fail criteria based on the 25 percentile of the data-set when the specifications are set. To date, the Energy Star program only focused on computers marketed and sold into the existing Energy Star preferred segments (government and corporate IT segments), NOT the entire PC marketplace. However, Energy Star pass/fail targets should not be adapted for mandatory programs globally since Energy Star specifications are not designed as market entry requirements.

Furthermore, some programs aspire to go beyond the current Energy Star specification-setting methodology that already rewards the top 25 percent most efficient products on the market. These so-called Top Tier programs and similar efforts being proposed in certain EU government procurement standards (Example: Energy Star TEC minus X percent) would set more stringent requirements than Energy Star, restricting fewer than 25 percent of configurations available for

purchase by customers. Such stringent schemes do not allow PC makers to offer a wide range of customization and performance for customer requirements. Such initiatives are unnecessary and significantly limit consumer choice.

If mandatory programs are inevitable, they should:

- Aim to remove the worst 10 – 25 percent energy efficient products from the marketplace (rather than promoting the best), while allowing the top 75 – 90 percent of the energy efficient products to pass. Targets should be based on data collected for shipping systems in the country;
- Rely on Energy Star testing methodologies;
- Be based on system-level requirements, not component level requirements; and
- Not limit consumer choice or significantly increase product cost.

6. Harmonize with a global product category system to ensure apples-to-apples product comparisons across regions.

To compare like product capability, product category definitions based on product attributes have been used by Energy Star and Top Runner, as well as EU ErP regulations, for many years. The categorization methodology allows for comparison of like-capability products within a given products segment (e.g., notebook, desktop computers). The simple analogy is comparing motorcycles with other motorcycles, for miles per gallon comparison, and not comparing motorcycles with cars or trucks, since the capability of these vehicles is very different.

Client Categories

Notebook and desktop PC categories are established taking into consideration market segment share of key shipping PC configurations, typically by form factor or Average Selling Price (ASP). Once the key differentiating market segments and configurations are established, the next step is to differentiate ingredients and criteria for separating into distinct categories (i.e., number of CPU cores, memory channels, memory size, etc). The criteria must be scalable across categories and should serve as a good proxy for capability and TEC separator. Industry recommends that future regulations harmonize with the Ecma-383/IEC-62623 category system. The product categories could vary by region based on the local PC market. A given country-specific program may only select a sub-set of established categories for voluntary or mandatory regulations. The Ecma-383 standard has a provision and criteria for adding new categories or changing existing categories based on unique geographic or market segment need. Industry recommends only using categories that are part of above the Ecma/IEC standard.

ULE Category

The Ultra Low Energy (ULE) category is defined for products with annualized TEC values of ≤ 20kWh. ULE products are those high-energy efficiency products with inherently low annualized AC energy consumption; primarily DC operation (i.e. not typically operated when connected to AC power charger, such as battery powered devices mobile phones, tablets/slates, etc); and employ highly energy efficient components and aggressive power management systems. Since AC chargers (external power supplies) are already required to meet certain energy efficiency requirements in many geographies, and battery charging system efficiency requirements are currently under active U.S. Department of Energy (DOE) consideration, there is no justification to regulate such devices based on TEC/Adder framework. ULE devices should be exempt from any voluntary or mandatory product energy regulations and should be explicitly stated to be out of scope of the given specification, along with other products deemed out of scope.

Server Categories
Product categories for servers should focus on high volume servers with 1 to 4 processor sockets and rack height of 5U or less. Other servers, such as high performance and mainframe computers, should not be covered by standards or regulations as they have limited market sales, are typically purpose made to their tasks, and are not amenable to metrics and test requirements developed for the high volume servers.

7. Ensure transparency and stakeholder participation in the regulatory process.

The planning and development of energy regulations for ICT products should include an appropriate period of time, based on the varying life cycle of different products, and should include time and opportunity for interactive input from stakeholders. Especially important is early notification of, and involvement of, key stakeholders. For example, the EU process for implementing the ErP Directive is a workable model for stakeholder involvement from the beginning.

8. Adopt minimally trade-restrictive conformity assessment requirements.

ITI encourages adoption of the following principles for conformity assessment, which offer a way to meet regulators' objectives in the least trade-restrictive manner in the low-risk area of energy use:

- Conformity assessment based on one common set of globally accepted standards of performance and specification requirements.
- Acceptance of test results conducted in any competent test facility (e.g., manufacturer's or third-party's test facility) that conforms to ISO/IEC 17025, regardless of the facility's geographic location.
- Acceptance of attestation of compliance on the basis of a supplier's declaration of conformity that complies with ISO/IEC 17050 Part 1 and 2. The supplier shall retain compliance documentation (i.e., description of product, test reports, etc.) providing the basis for the supplier's declaration and make it readily available to the regulator upon request. Market surveillance, coupled with enforcement via proportional penalties and notification to the public, is an important and necessary element of a conformity assessment program reliant on Supplier's Declaration of Conformity. This is also true for a conformity assessment program reliant on third-party certification.

9. Maintain flexible labeling requirements and allow manufacturers to communicate product energy information in a consumer-friendly manner.

Global manufacturers strive to inform consumers about product energy efficiency, power consumption, and power management through consumer-friendly channels, including marketing literature, web pages, and product manuals, whether electronic in the device or included in device packaging. While mandatory labels are usually intended to provide consumers with more information, the result is often a patchwork of country-specific labels on products that are designed and manufactured for sale worldwide, often confusing consumers and increasing costs for manufacturers. In addition, labels would have to be custom-developed for highly configurable products, and labeling requirements could also affect the mechanical design of a product, both of which add costs without commensurate benefit.

If policymakers move in the direction of labeling requirements for PCs and servers, we would urge the adoption of the voluntary Energy Star label, as opposed to mandatory country-specific or regional labels. The Energy Star program targets the top 25 percent most efficient products on the market and is recognized and trusted by customers worldwide. We also offer the following guidelines for labeling schemes:

- Labels should not be required to report power consumption data or other configuration-specific parameters. PCs and servers are designed to be highly configurable according to the customer's performance and configuration requirements, and power performance can vary among various PC and server model families. PC and server manufacturers cannot test every possible configuration in the model family, due to the significant costs and logistical impacts that would result.[6] Instead the manufacturers would select the "worst case" (highest energy consuming configuration) in the PC or server family within a given category, for testing. All configurations within the model represented by the as-tested configuration must not exceed the applicable category specifications. Due to the aforementioned constraints, placing typical energy consumption values on labels yields little meaningful information for the consumer and in many cases is misleading. The typical energy consumption of the tested products shall meet the stated value and reported in the manufacturer test report (but not on the product label) and typically provided to customers via Manufacturer's website and other marketing literature.
- Globally standardized test methods and label formats should be developed to avoid a patchwork of country-specific energy labels on products that are designed and manufactured for sale and distribution worldwide.
- The product scope for energy labels should be limited to "mainstream" products only, not mandated to lower volume, specialized product types, such as workstations or thin clients.
- Labels should rely on manufacturer data and self-declaration. Independent testing or registration would only add to product cost and delay time to market, with no significant value added for the consumer.

Conclusion

The global ICT industry faces a daunting compliance challenge, as regulators are under increasing pressure to show energy efficiency gains and initiate new standardization and regulatory efforts in this area. ITI is committed to working with interested governments and stakeholders to address this issue. ITI has offered some recommendations based upon member experiences that may be useful when developing and implementing energy efficiency programs for ICT products. Ideally, related standards should be developed and proof tested in use before becoming the basis for mandatory regulations. ITI would welcome working with government to establish a roadmap that could help guide the development of such programs, outlining essential standards that are needed for measuring power consumption of ICT equipment, followed by alignment with standards bodies, so that the appropriate standards can be developed and put in place prior to their use in regulations.

Many ICT engineers believe that client systems are pushing the limit in energy efficiency improvements, and additional energy savings will be minimal, as we reach the limits of the current technology. For enterprise data center equipment, requirements for hardware performance and energy use need to be established with an understanding of how those requirements translate into

[6] The number of discrete configurations within a single PC or Server model family can number in the hundreds due to the highly configurable design demanded by customers.

integration of the equipment into a data center, which requires both a hardware and system view in the development of requirements.

The global ICT industry is ready to work in partnership with other stakeholders to develop standards that capture any remaining energy efficiency gains from ICT products and seek out other ways to increase energy savings through the deployment of ICT products in the overall economy.