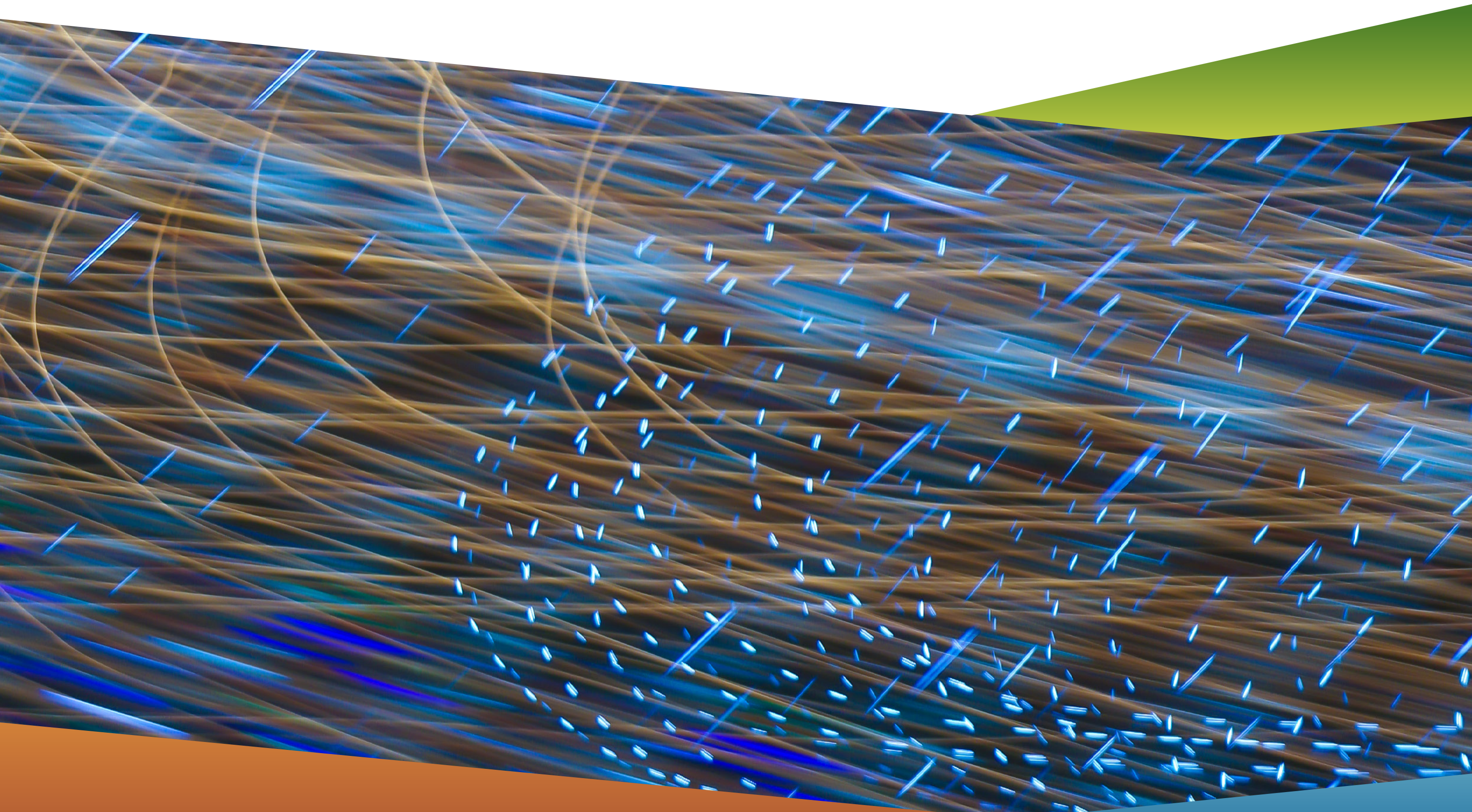
Australia 2014

G20 ENERGY EFFICIENCY ACTION PLAN: Networked Devices

WORKSHOP DISCUSSION DOCUMENT

PARIS | JANUARY 2015



4E Energy Efficient End-use Equipment International Energy Agency

iea International Energy Agency

SEAD Super-Efficient Equipment and Appliance Deployment

ipeec International Partnership for Energy Efficiency Cooperation

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1 PURPOSE OF THIS DISCUSSION DOCUMENT

The purpose of this discussion document is to provide background and stimulate discussion for the first workshop of the G20 Energy Efficiency Action Plan for Networked Devices, to be held in Paris on 19 January 2015 (government experts) and 20 January 2015 (government and industry experts).

The following sections of the document cover:

- Section 2 outlines the background to the G20 Action Plan.
- Section 3 outlines objectives for the first workshop.
- Section 4 provides more detail on the network standby issue.
- Section 5 summarises the recommendations from the IEA publication **'More Data, Less Energy'**. These are intended purely as a starting point for discussions at the first workshop. A series of questions is also raised in this section. It would be appreciated if attendees could give thought to these questions prior to attendance at the workshop.

2 THE G20 NETWORKED DEVICES PROJECT

The G20 ***Energy Efficiency Action Plan: Voluntary Collaboration on Energy Efficiency*** released in November 2014 noted that devices connected to a communications network can bring significant benefits to the global community, including enabling energy savings through ICT solutions. However, the Plan also highlighted the unintended and significant increase in energy consumption from maintaining a network connection.
This issue is explained in more detail in Section 4 and in this **short video.**

In order to address this, one of the six work streams under the G20 Action Plan is dedicated to Networked Devices:

Participating countries will work together to accelerate the development of new ways to improve the energy efficiency of networked devices. In 2015, this work will include consideration of options for goals for reducing the global standby mode energy consumption of networked devices.

This G20 work stream will be led by the UK Government's Department of Energy and Climate Change (DECC) with support from the International Energy Agency (IEA); and will cover all equipment connected to a communications network, including those that support the connectivity of a network, such as modems and routers.

The focus of the initiative is the minimisation of 'network standby', i.e. **the reduction of any energy wastage that directly results from the connectivity of networked devices.** As such, the initiative aims to support the *energy efficient* delivery of the many benefits flowing from the network connection of devices.

The project will provide a platform for international co-operation involving governments, experts and industry through the Energy Efficient End-Use Equipment Implementing Agreement (IEA-4E) and the Super-Efficient Equipment and Appliance Deployment (SEAD) initiative.

Key tasks under this collaboration will include:

- Expanding relevant research and information sharing.
- Accelerating the development of product standards and protocols.
- Developing policy frameworks.
- Considering goals for reducing the global standby mode energy consumption of networked devices.
- Reporting on the progress of these issues to the G20 Summit in Turkey in November 2015.

The International Partnership for Energy Efficiency Cooperation (IPEEC) is tasked with providing a progress report to the G20 in November 2015. Further background on previous work undertaken by these agencies and others is provided in Annex A.

Unconstrained, all trends point to dramatic increases in the use of network enabled devices and associated energy demand – most of which is ultimately wasted while devices wait to perform their primary functions. By stepping in now, governments could harness the momentum to realise significant opportunities for energy savings, even as device deployment grows.

Source: 'More Data, Less Energy'

3 OBJECTIVES FOR FIRST WORKSHOP

The first G20 Networked Devices workshop (19-20 January 2015) provides the opportunity for relevant government officials and industry partners to develop a platform for international co-operation on the Networked Devices project.

Given the need to provide the G20 with a progress report by November 2015, the first workshop aims to:

- **Identify pathways and actions towards smart and energy efficient products and systems.**
- **Identify potential joint government/industry actions and priorities for inclusion in the G20 report.**
- **Identify goals for the G20 Network Devices project.**

Consideration of response measures and the adoption of appropriate goals need to be viewed in the context of the short timeframe involved and the rapid evolution of technology, while also satisfying the concerns expressed by the G20.

As a result, the first workshop is intended to:

- Be **action oriented**, rather than a pure information exchange.
- Summarise what **industry is already doing** and outline what the joint government/industry group can do to **support** further industry efforts.
- Draw out **innovative responses from industry** that can be implemented quickly and demonstrate measurable results.
- Establish **priorities for action** and map a **clear path** to the G20 meeting in November 2015.

It is intended that the results of the workshop will be used by the UK Government to develop a clearer picture of the likely deliverables from the project, and to plan activities leading up to, and beyond, the G20 meeting in Turkey in November 2015.

A further workshop scheduled for 17–18 June 2015 in Paris will enable the reporting of progress and preparation of the G20 report.

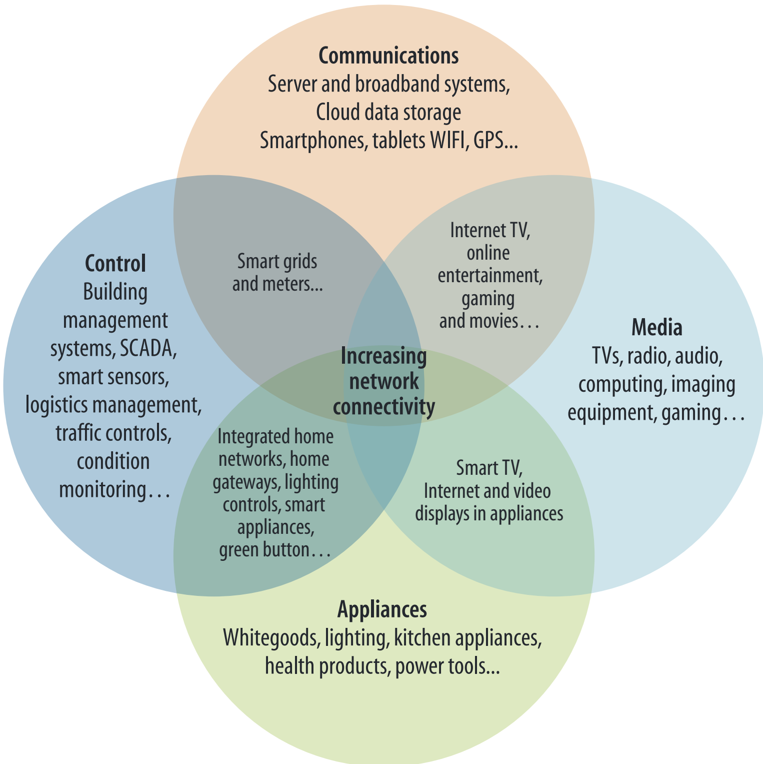
4 OUTLINE OF THE NETWORK STANDBY ISSUE

The material in this section has been drawn from the IEA publication **'More Data, Less Energy'**, which explores the topic in depth, identifies key stakeholders and charts a path forward.

4.1 NETWORK STANDBY

Network-connected technologies, such as broadband connectivity, wireless mobility, cloud computing, e-commerce, social media, sensors and the **"Internet of Things"** are rapidly transforming the world in which we live. Network connectivity already touches many aspects of daily life and advanced technologies are creating new services and benefits permeating all areas including communication, entertainment, security and health. Figure 1 attempts to summarise this emerging landscape.

Figure 1: The new age of information and communication technology [IEA, 2014]



Notes: GPS = global positioning system; SCADA = supervisory control and data acquisition system. Data will be online.
Source: IEA (2013b), Energy Efficiency Market Report 2013, OECD/IEA, Paris, www.iea.org/w/bookshop/add.aspx?id=460.

At the consumer level, individuals have ready access to much more diverse kinds of data and information. Many appliances and equipment that previously delivered relatively simple functions in isolation can now be controlled remotely and are able to interact with other devices.

While network enabled devices and systems have enormous potential to deliver diverse efficiencies across many sectors and services, the energy consumption of networked devices, when they are not in use but are in standby mode, is growing at a rapid rate. A large share of this is used when they are not being used but are just in standby maintaining network connectivity.

In some cases they may use as much or more energy in standby mode as they do when they are in use.

The challenge is:

- To enable them to power down to low power modes while maintaining a sufficient level of operation to either sustain a network connection or enable the device to power up and resume network connection when needed.
- To ensure that such devices remain in the lowest power mode possible, for the longest period of time possible, without compromising functions or services.

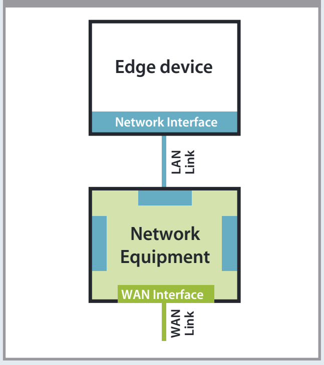
The interaction between devices and with networks is complex and involves the architecture of hardware and software in all components. To better understand the issues, some basic definitions of the key elements are included below.

WHAT IS A NETWORK? In the simplest sense, a digital or data network is a structure that allows transmission of information between two or more connected devices. Delving deeper, however, digital networks quickly become exceedingly complex and multi-layered. The main types of networks include

- Local area networks (LANs) - small networks that cover a single home or a building.
- Wide area networks (WANs) - large networks that cover a larger geographic area such as a whole city or district. The Internet is a wide area network.

Networks can interconnect with other networks and all can contain sub networks. Devices such as computers or TVs, for example, can be connected wirelessly via a "Wi-Fi" sub-network, which is then connected to a wider network (e.g. the Internet) via a Wi-Fi modem. Devices that are connected to networks are heterogeneous and play different roles.

Figure 2: Interface between networked devices and dedicated network equipment



HOW DO NETWORKS CONNECT? There are two primary mechanisms which allow networks to connect and exchange information:

- Wired networks use Ethernet cables or other cables, including the electrical or coaxial cabling already installed in existing buildings.
- Wireless networks use radio waves, with a common example being Wi-Fi.

WHAT ARE NETWORK-ENABLED DEVICES? Three main types of devices provide the functionality of networks:

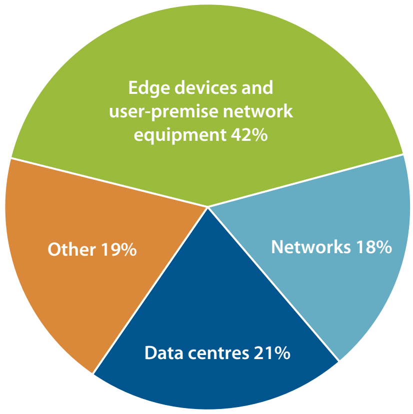
- Edge devices include end-user equipment and appliances that can be connected to a network and interact with the network or with other devices. Two main types of edge devices exist:
  - Electronic edge device comprises those for which the primary function is data storage or use; e.g. entertainment and communication type devices, such as smart TVs.
  - Other edge device comprises those for which the primary function is not data-related; i.e. all appliances and equipment other than electronic devices. These include kitchen and laundry appliances, cooking equipment, heating and cooling equipment, lighting, and all manner of commercial and industrial equipment.
- Network equipment provides connectivity to and among all devices attached to networks.
- Network infrastructure includes servers, data storage equipment and enterprise storage, load balancers, data centres and data security systems, which collectively manage and manipulate the data within the network as well as service application requests from edge devices. Because of demand for 24/7 service, most of these are networked devices that draw at least some power most of the time.

The uptake of networked devices is projected to expand exponentially, possibly reaching 50 billion by 2020, rising towards 100 billion by 2030 and 500 billion over the following decades[1].

Already, the annual standby power consumption of networked devices is estimated at over 600 TWh. This is greater than Canada's total annual electricity consumption for 2011.

By 2025, global standby power consumption is projected to nearly double.

Figure 3: The global energy footprint of information and communication technologies in 2013

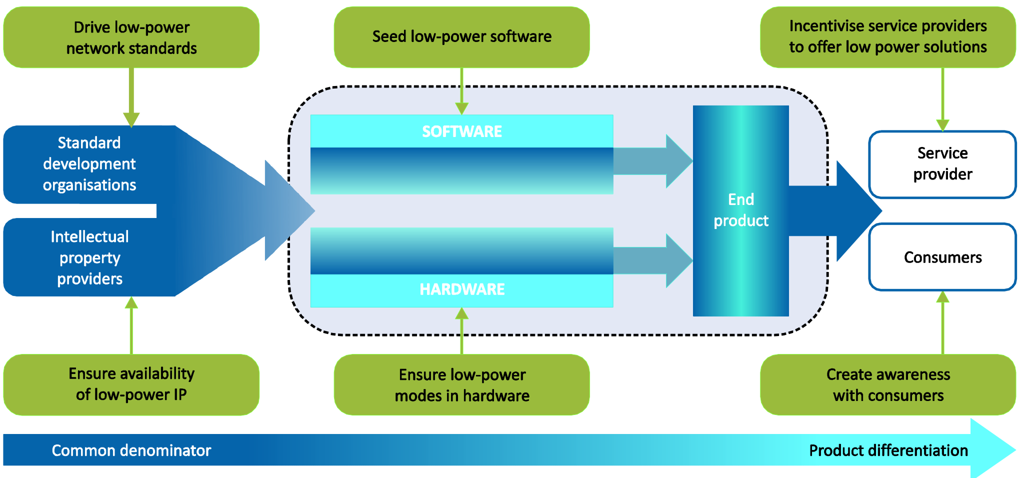


Note: Unless otherwise indicated, all tables and figures derive from IEA data and analysis.

4.2 STAKEHOLDERS IN NETWORKED DEVICES

As shown in the following figure and the text below, there are range of actors in the value chain of network-enabled devices that influence their design and operation. Ensuring that these are aligned to optimise energy efficiency requires considerable collaborative efforts within an environment that is highly competitive.

Figure 4: Energy efficiency along the ICT value chain



Source: Adapted from Siva, K. (2013), "Technical options and drivers for implementation", presentation at the Networked Standby Policy Framework Workshop, IEA 4E/SEAD and Natural Resources Canada, Toronto, 7 March, www.iea.org/media/workshops/2013/networkedstandby/22SIVAARM.pdf.

1 OECD (2012), OECD Internet Economy Outlook 2012, OECD Publishing, Paris, **www.oecd.org/sti/ieconomy/ieoutlook.htm** (accessed 28 February 2014).

Actors that influence outcomes include:

- **Policy makers**, in developing policies and measures for different parts of the value chain to engage in energy efficiency and ensuring that the pre-conditions are in place to develop and implement energy efficient devices and systems, can provide incentives and establish market drivers.
- **Standard development organisations and intellectual property providers** create the foundations and technical standards to enable development of energy efficient software and hardware solutions.
- **Software and hardware developers** design solutions that can be used by manufacturers of devices.
- **Device manufacturers** bring together software and hardware solutions, thereby determining the energy performance and energy efficiency features of devices.
- **Network designers** establish the terms on which devices can connect to networks and how they need to operate to be part of a network; they also ensure that network communication supports energy efficiency in all connected devices.
- **Service providers** that provide Internet or other digital services to end users manage bulk purchases and deploy large quantities of devices; they can be instrumental in creating a market for more energy efficient devices.
- **Telecommunications industry** ensures the development and implementation of network design that supports energy efficiency.
- **Consumers** can, with proper guidance, make energy efficient purchasing decisions and adjust the settings of their devices to reduce energy consumption.

Realising the potential energy savings associated with efficient network standby requires a highly integrated international effort, involving a multitude of players in the development and application of both technical and non-technical solutions.

Source: 'More Data, Less Energy'

4.3 TOWARDS SOLUTIONS

The diversity of networked devices means that a range of technical solutions are required to improve energy efficiency. Broadly, these solutions fit into two categories:

- Implementing **energy management** by designing devices to automatically reduce the time they spend in high power modes and increase the time they spend in low power modes.
- Implementing **power scaling** by turning off un-needed functions and adjusting processing power to the actual tasks that need to be performed.

Mobile technologies have demonstrated that this is feasible, and they have been front-runners in the uptake of energy efficient solutions and technologies, driven by the need to conserve battery power. The adoption of similar solutions in mains-connected devices and networks has lagged behind.

Part of the solution to better energy management would be to improve interoperability. Currently, most of the thousands of network protocols that have been established require devices to remain awake and ready to respond to signals (messages from other devices) within a short time frame. This makes it difficult or, in some cases, impossible for the devices to power down to low power modes.

As noted above, responsibility for implementing solutions need to be shared throughout the value chain of network enabled devices – in software, network design, network architecture, communication protocol development, technical standardisation processes, service providers, and device and component manufacturing. In addition, users will need to be open to changes in how their devices function and perhaps modify their behaviours.

As many network devices are globally traded, all policy makers face similar issues: the need to track trends, assess energy implications and energy savings opportunities, and identify areas that warrant energy efficiency technology and policy attention.

Similarly, the technical issues facing industry are common across regions.

As a result there is a strong case for international collaboration and knowledge-sharing to cut the costs and time required to develop understanding and policies. It will also improve the potential for harmonised approaches that reduce costs for manufacturers though reduce barriers to trade and compliances costs.

Network enabled devices, such as smart phones, tablet and set top boxes, currently outnumber people on the planet by a ratio of 2:1. They underpin many aspects of daily life and are quickly transforming societies. As network connectivity spreads to more types of devices and appliances, new services are emerging and usage patterns are changing. Data traffic is expected to grow at an exponential rate.

Source: 'More Data, Less Energy'

5 RECOMMENDATIONS FROM 'MORE DATA, LESS ENERGY'

The IEA publication **'More Data, Less Energy'** makes five key recommendations for addressing network standby, in addition to many more detailed suggestions for action. These may provide a useful starting point for the discussions at the workshop, and lead to further questions such as those highlighted below.

Do the five areas (below) cover the main priorities for action?

Are these equally important or should our attention be more focused?

5.1 ASSESS, ANALYSE AND ALIGN EXISTING POLICY APPROACHES FOR GLOBALLY TRADED DEVICES

Policies have been implemented for some networked devices in the European Union, the United States and the Republic of Korea (see Annex C). Sharing the experiences with these may provide insights into the type of policy measures likely to be most effective.

Do stakeholders support internationally aligned policy approaches on network standby?

What goals should G20 leaders consider in 2015?

5.2 PURSUE CLOSE INTERACTION WITH INDUSTRY

In a rapidly evolving environment, it is critical to create close relationships that allow technology and policy development to be mutually supportive. Policy needs to be stable enough to build industry confidence, yet flexible enough to allow innovation within the policy frameworks. To the greatest extent possible, co-ordination or joint initiatives are desirable.

What is industry currently doing to address network standby?

Are there priorities for collaboration, for example: principles for inter-operability or technology standards?

Should industry and governments start by adopting the IEA's 'Guiding Principles for Energy Efficient Networks and Network-enabled Devices'? (see Annex B)

Which industry organisations are central to this project and should be involved?

5.3 ESTABLISH INTERNATIONAL TECHNOLOGY STANDARDS AT THE EARLIEST POSSIBLE DATE

International standards for definitions, metrics and test procedures are valuable to all stakeholders and across many levels. They also serve the public good by ensuring consumers are informed about the quality and energy efficiency of devices on the market. Governments and industry have a role to play in ensuring international standards developed are fit for policy making purposes.

What role should international standards play in supporting policies for connected devices?
Should we focus attention on certain key standards?
How can we accelerate the development of standards and maximise their usage?

5.4 ENCOURAGE DEVELOPMENT OF COMMUNICATION PROTOCOLS THAT SUPPORT ENERGY EFFICIENCY

Programmes and initiatives could be used to incentivise and reward the creation of communication protocols that enable energy savings. This could be achieved through certification schemes or labelling, for example, that recognise front runners, or by adjusting policy to reflect the top achievements in industry. Such incentives should, however, remain technology-neutral.

Could industry take the lead in developing proposals for these types of programs?
Are there effective schemes from other fields that we can emulate?

5.5 PRIORITISE DATA COLLECTION

Access to information on the network standby of devices and systems, and technological breakthroughs, will be important to track progress and highlight further opportunities. At a more detailed level, there is a need to better understand and benchmark the power used by different functions in devices; and the barriers to uptake of advanced technologies.

Analysis of this data will be used by governments to inform their policy response and also in the reporting back to the G20. Steps may include:

- Develop a data collection and data management plan.
- Reach consensus on data collection methodologies.
- Initiate data collection projects, ideally in parallel with establishing a system or repository to enable international data sharing and data management. Such a repository must be sufficiently resourced to ensure sustainability.

What information is required and by whom?
What data can industry provide, while protecting proprietary information?
Is there a need for a central repository of information?
Can information be collected systematically, without adding to reporting burdens?

ANNEX A PREVIOUS WORK

The Energy Efficient End-use Equipment (IEA-4E) Implementing Agreement and the Super-Efficient Equipment and Appliance Deployment (SEAD) initiative have been instrumental in raising the issue of energy implications of networked devices over many years.

The Energy Efficient End-use Equipment (IEA-4E) Implementing Agreement is part of the energy technology network established by the IEA to share information and transfer experience in order to support good policy development in the field of energy efficient appliances and equipment.

The SEAD initiative of the Clean Energy Ministerial (CEM) and the (IPEEC) brings together governments to work together to turn knowledge into action to save energy.

In 2012 and 2013, the IEA, the IEA-4E Standby Power Annex and SEAD organized workshops in Stockholm, Toronto and Paris to discuss the issue of network standby with key stakeholders including governments and industry. These formed part of the development process for ***'More Data, Less Energy'***, which was jointly published by the IEA and IEA-4E.

In 2014, the IEA-4E also published ***"Beyond Network Standby: A Policy Framework and Actions for Low Energy Networks"*** which elaborates a path forward for efficiency policy in the area of networks and complements '*More Data, Less Energy*'.

In 2014, IEA-4E launched the Electronic Devices and Networks Annex (**EDNA**), which will continue international collaborative work on efficient network devices and networks.

Many other agencies have also undertaken work in this area, for example:

- ACEEE Report – Energy Efficiency and Productivity Benefits of Smart Appliances and ICT – Enabled Networks: An Initial Assessment. Blog post with a link to the report -**http://www.aceee.org/blog/2014/11/internet-everything-could-be-huge-boo**
- ACEEE Intelligent Efficiency Conference November 2014 - **http://aceee.org/conferences/2014/ie/program**
- EPA and ITI work on systems efficiency - **http://www.energystar.gov/index.cfm?c=prod_development.prod_development_epa_workshop**

Annex B of ***'More Data, Less Energy'*** provides additional information on industry and government initiatives.

FURTHER INFORMATION ON THE ABOVE ORGANISATIONS IS AVAILABLE FROM:

- **International Energy Agency (IEA)**
- **International Partnership for Energy Efficiency Cooperation (IPEEC)**
- **Department of Energy and Climate Change (DECC)**
- **Energy Efficient End-use Equipment (IEA-4E)**
- **Super-efficient Equipment and Appliance Deployment (SEAD) initiative**
- **American Council for an Energy-efficient Economy (ACEEE)**

ANNEX B TEN IEA GUIDING PRINCIPLES FOR ENERGY EFFICIENT NETWORKS AND NETWORK-ENABLED DEVICES

In 2007, the IEA developed a set of principles to promote efficient energy management in networks and network-enabled devices. The principles underscore that no single power management solution ensures energy efficiency and that efficiency must be addressed in an integrated manner over the entire network-enabled value chain. The principles are as follows:

- All digital network technologies should include and actively support power management and should follow standard (international) energy management principles and designs.
- Connection to a network should not impede a device from implementing its own power management activities.
- Devices should not impede power management activities in other devices connected to the network.
- Networks should be designed such that legacy or incompatible devices do not prevent other equipment on the network from effective power management activities.
- Network connections should have the ability to modulate their own energy use in response to the amount of the service (level of function) required by the system.
- Electronic devices should enter low power modes automatically after a reasonable period when not being used (power management).
- Total energy consumption should be minimised in network-enabled electronic devices, with a priority placed on the establishment of industry-wide protocols for power management.
- Governments should consider limits on energy consumption in low power modes for network-enabled devices and require technically feasible energy-saving options where these are warranted.
- Energy efficiency specifications should not require a particular hardware or software technology.
- Requirements for network-enabled devices need to be generic and performance based.

ANNEX C EXAMPLES OF POLICY RESPONSES FOR NETWORKED DEVICES

MANDATORY MEPS (MINIMUM ENERGY PERFORMANCE STANDARDS) – EU ECODESIGN NETWORKED STANDBY REGULATION (801/2013 AMENDING 1275/2008)[2]

The EU EcoDesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment entered into force in September 2013. The Regulation also introduces special requirements for televisions and coffee machines.

A horizontal regulation was adopted since networked connectivity is a feature of a large range of products, including products that will appear in the future. Products that are able to be reactivated over a network would typically be IT- and Consumer electronics equipment, such as:

- Personal computers
- Displays
- Networked storage
- Imaging equipment
- Networked equipment

Examples of products excluded from the power consumption limits in the regulation are workstations, desktop thin clients, small-scale servers and computer servers.

The network standby limits are indicated in the table below:

Table 1: EcoDesign networked standby regulations

Networked product	Tier 1 (1 Jan 2015)	Tier 2 (1 Jan 2017)	Tier 3 (1 Jan 2019)
HiNA network products	12 W	8 W	8 W
Network products with HiNA function(s) other networked products	6W	3W	2W

Source: OJ L 225, 23.8.2013, p1-12.

Note: HiNA = High Network Availability

2 http://www.eceee.org/ecodesign/products/Lot26_networked_standby_losses

VOLUNTARY ENDORSEMENT LABEL – KOREAN E-STANDBY PROGRAM

Korea's e-Standby Program uses a device-by-device approach to set network standby limits for 11 electronic devices, based on a combination of power limits. The table below shows the network standby power limits that devices must meet in order to carry the e-Standby label.

Table 2: Korean networked standby power limits in e-Standby Program

Target devices	Power limits for network standby modes	Network functionality	Availability of network standby mode(s)
Computers	Total energy consumption including sleep mode, transition time and off mode	Available	Available (Wake-on-LAN mode)
Printers, fax machines, copiers, multi-function devices	Total energy consumption including sleep mode, transition time and off mode	Available	Available
Scanners	≤ 15 min (transition time) ≤ 5-10 W (standby mode) ≤ 0.5 W (off mode)	Available	Available
Building door phones, cord/cordless phones	≤ Various (standby mode)	Available	Available (backlight off control)
Set-top boxes	≤ 1 W (optional, passive standby) ≤ 10-20 W (active standby)	Available	None
Modems	≤ 0.75 W (off mode) ≤ Various (standby mode)	Available	None
Home gateways	≤ 10 min (transition time) ≤ 10-20 W (sleep mode)	Available	None

Source: Adapted from Jung, S. (2013), "Korea's energy efficiency Program in terms of networked standby", presentation at the Networked Standby Policy Framework Workshop, IEA 4E/SEAD and Natural Resources Canada, Toronto, 7 March, www.iea.org/media/workshops/2013/networkedstandby/5SanggukJUNGKoreasEnergyEfficiencyPrograms_TTA_130305.pdf.

VOLUNTARY ENDORSEMENT LABEL – US ENERGY STAR PROGRAM

The US Energy Star program includes network standby requirements for various items of equipment, including:

- Small network equipment (modems, routers, switches, etc.)[3]
- Set-top boxes[4]
- Home audio and DVD[5]
- Televisions (referring to new specification V7.0 in development[6]).

The Energy Star limits are typically expressed as a TEC (total energy consumption) metric which includes a calculation term for network standby mode (e.g. set-top boxes), or as a maximum power limit for the network standby mode (e.g. Televisions upcoming V7.0 which includes 3W limit for Standby-Active mode).

3 http://www.energystar.gov/products/certified-products/detail/7588/partners

4 http://www.energystar.gov/products/certified-products/detail/set-top-boxes-cable-boxes

5 http://www.energystar.gov/index.cfm?c=audio_dvd.pr_crit_audio_dvd

6 http://www.energystar.gov/products/certified-products/detail/7625/partners

MANDATORY ENERGY RATING LABEL - KOREAN E-STANDBY PROGRAM

In the mandatory Korean rating label program, appliances that do not meet the standby power limits in the table below (sourced from More Data, Less Energy) cannot be rated above level 2 on the scale of 1 to 5 (1 being the most efficient).

Table 3: Network standby power limits in Korea's energy efficiency standards and labelling program

Target devices	Power limits for network standby modes	Network functionality	Availability of network standby mode(s)
Air conditioners	≤ 1 W (passive standby) ≤ 3 W (active standby)	Available (some)	Available (Ethernet communication)
Gas boilers	≤ 3 W (sleep mode)	Available (majority)	Available (serial communication)
Gas water heaters	≤ 3 W (sleep mode)	Available (majority)	Available (serial communication)
Washing machines	≤ 2 W (active standby)	Not available	-
Drum washing machines	≤ 2 W (active standby)	Available (some)	Available (Ethernet communication)
Dish washers	≤ 3 W (active standby)	Not available	-
Televisions	≤ 0.5 W (passive standby) ≤ 2 W (active standby)	Available	None

Note: W = watt.
Source: Adapted from Jung, S. (2013), "Korea's energy efficiency program in terms of networked standby", presentation at the Networked Standby Policy Framework Workshop, IEA 4E/SEAD and Natural Resources Canada, Toronto, 7 March, www.iea.org/media/workshops/2013/networkedstandby/5Sangguk JUNGKoreasEnergyEfficiencyPrograms_TTA_130305.pdf.

VOLUNTARY INDUSTRY AGREEMENT - UNITED STATES VOLUNTARY AGREEMENT ON SET-TOP BOXES[6]

The US Department of Energy (US DOE) recently drafted provisions to include set-top boxes and network equipment as devices covered in its Energy Efficiency Program for Consumer Devices, spurring industry to launch a voluntary agreement in 2013.

The US Set-top Box Energy Conservation Agreement is a voluntary agreement between the US government, oversight bodies and device providers and manufacturers. It requires 90% of all new set-top boxes purchased and deployed after 2013 to meet Energy Star 3.0 efficiency levels, among other agreement targets. The agreement is flexible and expected to consider new devices in the future. Participants will report measures taken and aggregated results will be presented on an annual basis.

Participants will meet regularly to review and update energy efficiency measures, and to host on-going discussions with the US DOE, the US EPA and other interested government agencies and stakeholders on new technologies and equipment. To create accountability and support transparency, the agreement's terms include detailed processes for verification of set-top box performance in the field, annual public reporting on energy efficiency improvements, and posting device energy consumption information by each company for its customers.

7 Text adapted from More Data, Less Energy

As part of the agreement, "light sleep" is being implemented in an increasing number of new and existing set-top boxes - it involves powering down hard disks, in-band tuners and video outputs, and automated power down. Enabling light sleep provides energy savings in the region of 20%. "Deep sleep" functionality in the next generation of cable set-top boxes will be field tested and deployed if successful. The agreement is expected to improve set-top box efficiency by 10% to 45% by 2017.

VOLUNTARY INDUSTRY AGREEMENT – EUROPEAN UNION VOLUNTARY AGREEMENT ON SET-TOP BOXES

The European Union is addressing the efficiency of network-enabled devices and other complex device categories through voluntary agreements and codes of conduct that cover the following device categories:

- Complex set-top boxes
- Imaging equipment
- Medical imaging equipment
- External power supplies
- Broadband equipment

The voluntary agreement for complex set-top boxes[7] (CSTBs) requires signatories (primarily) to ensure that 90% of their products comply with the following energy consumption targets:

Table 4: EU voluntary agreement for complex set-top boxes

Base Functionality	Tier 1 Annual Energy Allowance (kWh/year)	Tier 2 Annual Energy Allowance (kWh/year)
Cable	45	40
Satellite	45	40
IP	40	35
Terrestrial	40	35
Thin-Client/Remote	40	35

The Agreement also contains allowances for additional functionalities (refer Annex D of the Agreement).

8 **http://ec.europa.eu/energy/efficiency/ecodesign/doc/20121217_voluntary_industry_agreement_cstb.pdf**