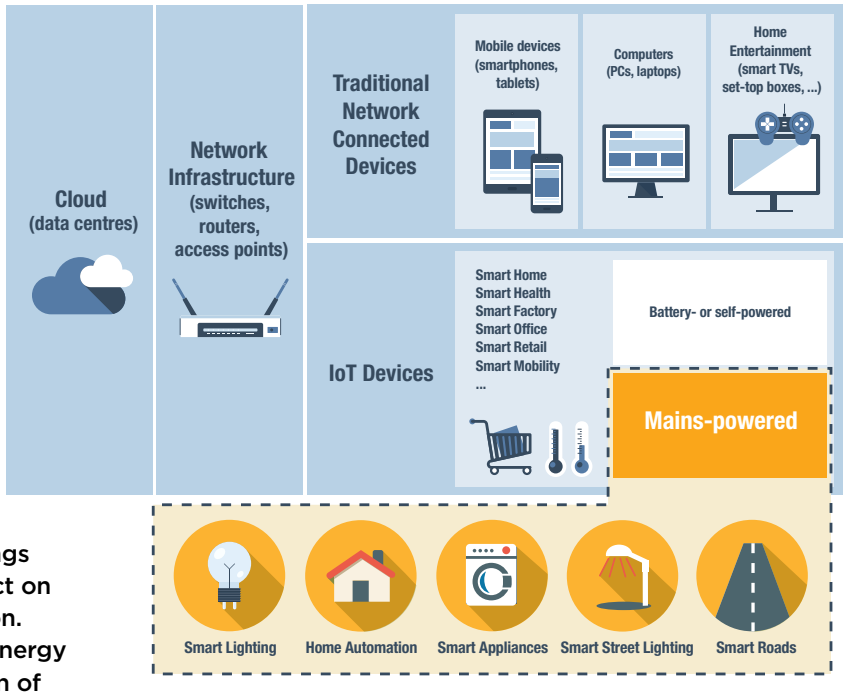
Energy Efficiency of the Internet of Things Technology and Energy Assessment

The 4E Electronic Devices and Networks Annex (EDNA) informs governments of the energy efficiency opportunities presented within the growing market for network-connected devices, as well as the policy implications.

This briefing summarises the key findings of the EDNA report: *Energy Efficiency of the Internet of things: Technology and Energy Assessment Report*, which provides an overview of the market for key Internet of Things (IoT) products and their impact on worldwide energy consumption. It describes the potential for energy savings, including the selection of appropriate communication technologies best suited to various applications.



The EDNA report focuses on mains-connected end-use devices deployed in Smart Lighting, Home Automation, Smart Appliances, Smart Street Lighting and Smart Roads applications, which represent a subset of all products that are typically included within the Internet of Things.

Observations for Policy Makers

- The number of devices connected to the internet is growing rapidly and has already surpassed the world's human population. The worldwide network-related standby energy consumption of the IoT devices considered in this report is also growing by 20% p.a., so that by 2025 it is estimated to consume 46 TWh p.a. This is equal to Portugal's annual electricity consumption in the year 2012.
- Of the IoT applications studied in the EDNA report, the most significant contributors to network-related standby energy consumption in 2025 are expected to be Home Automation (78%), Smart Appliances (15%) and Smart Lighting (7%).
- The selection of appropriate communication technology options, that demand the least power, would reduce the network standby energy consumption of IoT devices. Many low-power technologies are available, with widespread deployment in battery-powered IoT devices.
- The pre-configuration of power-saving options *within* communication technologies, would also achieve considerable energy savings.
- Depending on the application, the Internet of Things can also enable better energy management, leading to significant energy savings. However this was not part of the EDNA study and therefore is not reflected in this document.

More Information

For further information please email: **info@edna.iea-4e.org**
The full report is available from **http://edna.iea-4e.org/publications**

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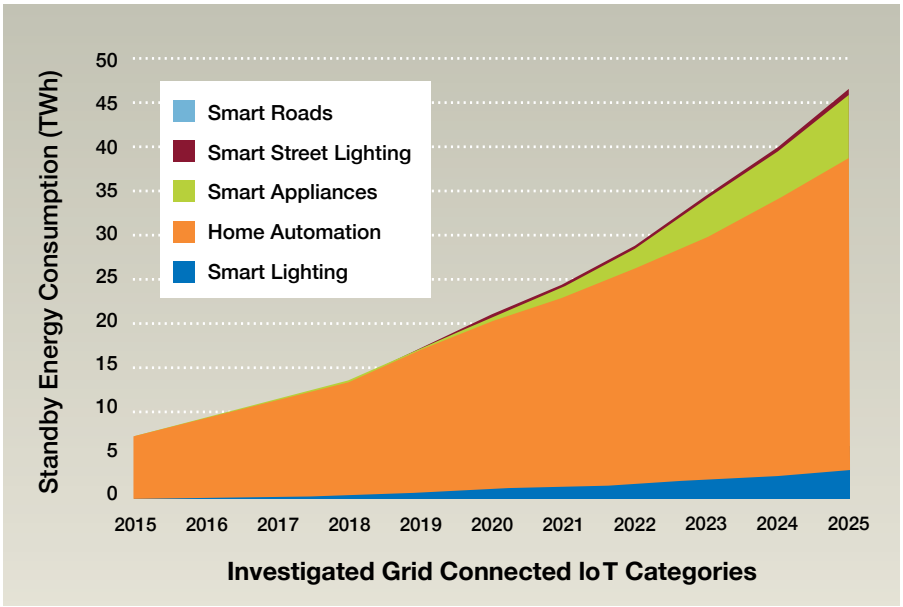
Key Findings

Significant Energy Implications

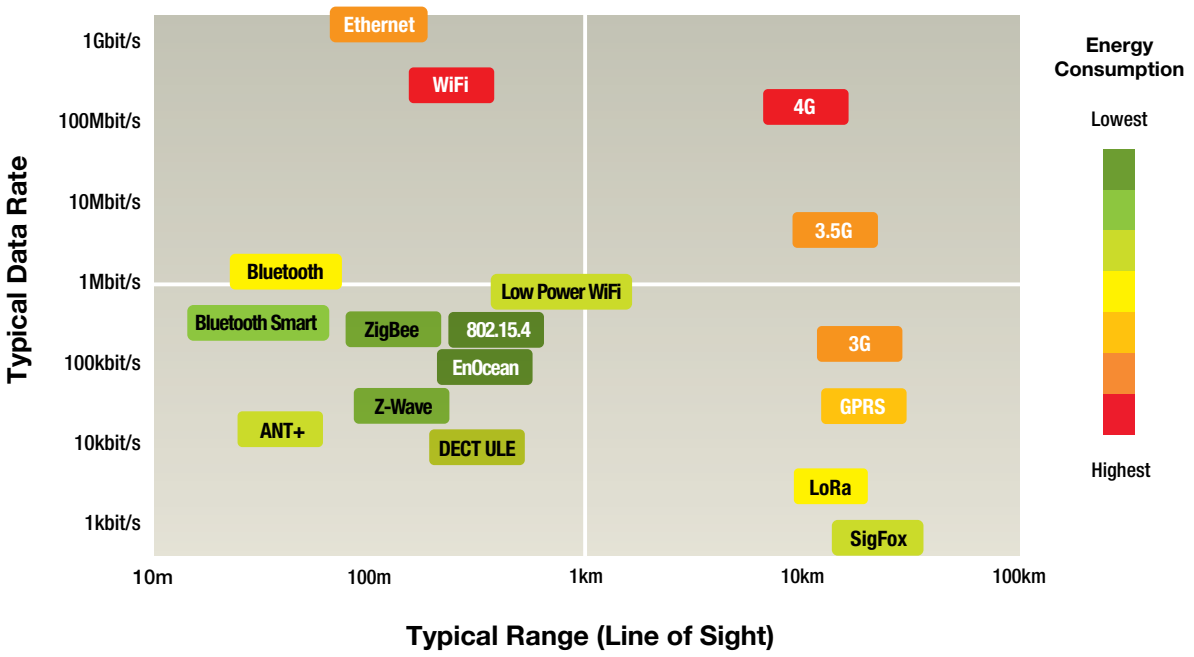
As mentioned above, the worldwide network related standby energy consumption of devices used for Smart Lighting, Home Automation, Smart Appliances, Smart Street Lighting and Smart Roads is predicted to reach 46 TWh in the year 2025. Home Automation and Smart Appliances make up 93% of this total.



Communication Technologies and Standby Energy Consumption

The highest standby power usage was measured in devices where the communication technology employed was considered not to be the most efficient choice for the particular application, or where low-power options for communication technologies had not been deployed. In selected devices the relatively low efficiency of AC/DC power supplies, at low loads, also caused unnecessarily high standby consumption.

The figure below illustrates the relative standby energy consumption of various wireless communication technologies (as well as Ethernet) and their typical data transfer rates and communication ranges. From this figure we can see that higher data rates and longer ranges tend to equate to higher standby energy consumption.



Several new communication technology options, with low standby power, have been developed or are emerging and are suited to a range of applications. The report describes these in more detail.