Energy Efficient End-use Equipment
International Energy Agency

ENERGY EFFICIENCY POLICY BRIEF

EDNA9

Upstream Consequences from Connected Devices

The 4E Electronic Devices and Networks Annex (EDNA) provides policy guidance to members and other governments aimed at improving the energy efficiency of *connected devices* and the *systems* in which they operate. EDNA is focussed on the increased energy consumption that results from devices becoming connected to the internet, and on the optimal operation of *systems of devices* to save energy.

Connecting devices to the internet has profound implications for energy use, in three areas:

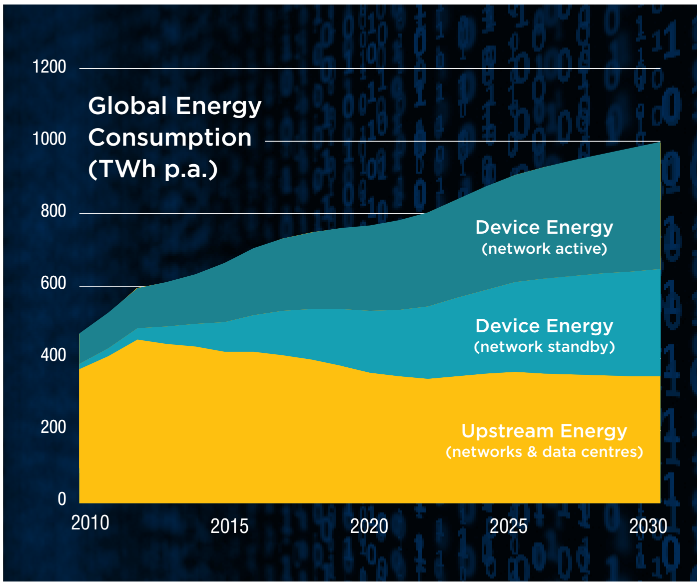
1. **DIGITALISATION:** connected devices can assist the digitalisation of the energy system by creating new ways to save energy and support renewables.
2. **WASTED ENERGY:** connected devices can waste considerable energy in (networked) standby mode.
3. **UPSTREAM CONSEQUENCES:** connected devices can result in increased data traffic, leading to increased energy use in the data network and data centres.

This policy brief covers the third topic – Upstream Consequences.

This policy brief is based on two EDNA reports: *Total Energy Model for Connected Devices* and *Intelligent Efficiency for Data Centres & Wide Area Networks.*

Observations for Policy Makers

- Internet traffic is predicted to increase exponentially for the foreseeable future, driven in part by many more devices becoming connected to the internet. This will result in increased energy use.
- The energy required to transmit, process and store each data bit is reducing, which counteracts the energy rise from increased internet traffic. The improved "energy intensity of the internet" is due to new and more efficient technologies being deployed, such as 5G, server virtualisation and heterogeneous computing. Accordingly, the total upstream energy caused by connected devices will stabilise or even decrease slightly.



- The data transmission network and data centres operate as complex, interconnected systems whose energy consumption is determined not simply by the energy needs of the equipment, but also by how these interoperate and are controlled.
- Various metrics have been developed to measure the energy efficiency of data networks and data centres, however these are often quite limited when used in real-world situations. Policy makers can help to address this by developing complementary test methods and metrics with better real-world applicability.

More Information

Further information is available from the EDNA reports ***Total Energy Model*** and ***Intelligent Efficiency for Data Centres & Wide Area Networks*** or by contacting the EDNA operating agent at **info@edna.iea-4e.org**

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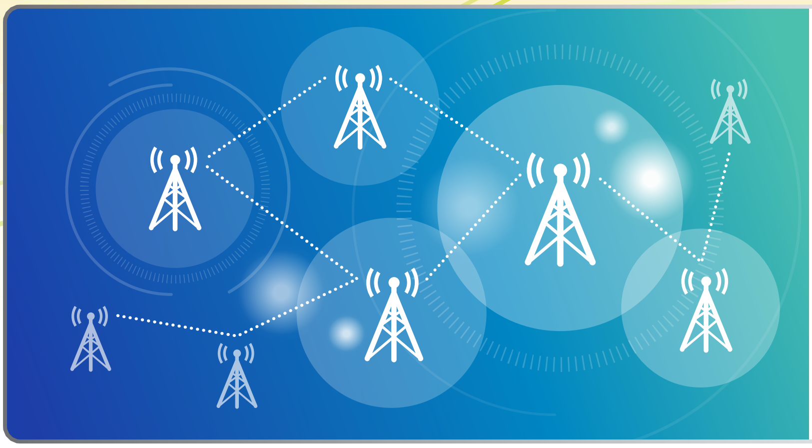
Key Findings

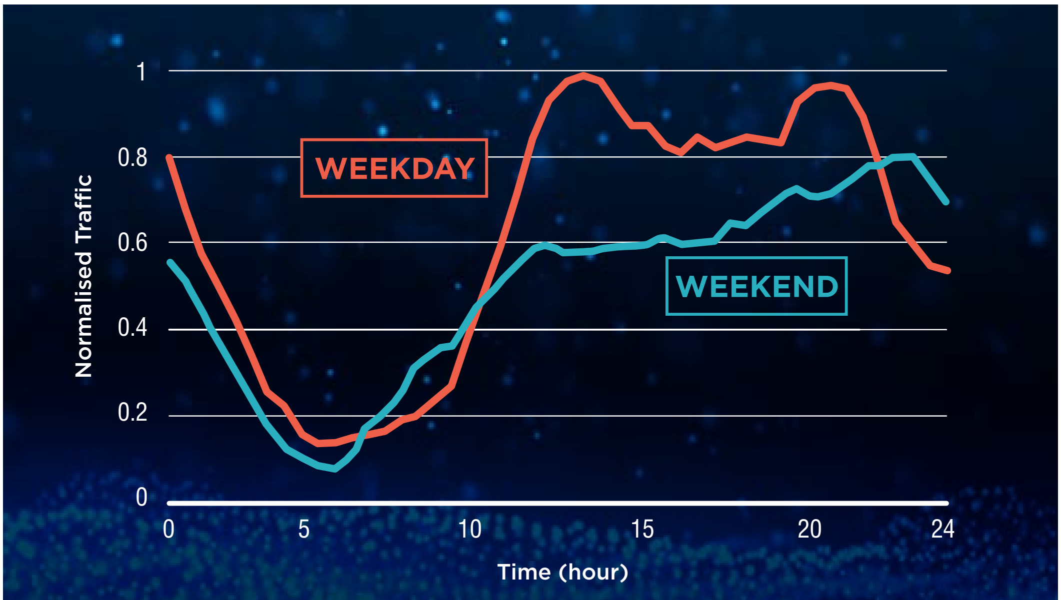


Replace Older Technologies

In data transmission networks and data centres, significant energy savings are available from accelerating the replacement of older technologies with next-generation equipment, particularly for developing economies where older technologies tend to linger.

Improve Equipment Utilisation Rates

Under-utilisation of equipment in networks and data centres is a significant area of energy wastage, as idle equipment can consume 30-70% of peak power. Dynamically moving workloads between under-utilised equipment would allow for operation at higher utilisation and efficiency levels, with idle equipment being switched off.



Data traffic: weekday vs weekend

Employ Intelligent Solutions

Adopting “intelligent efficiency” techniques within data transmission networks and data centres can significantly reduce energy consumption. Examples include real-time equipment monitoring and use of artificial intelligence to control cooling equipment.