

# Intelligent Efficiency: Smart Homes



The 4E Electronic Devices and Networks Annex (EDNA) provides technical analysis and policy guidance to 4E 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.

This briefing summarises the key findings of the EDNA report *Intelligent Efficiency - A Case Study of Barriers and Solutions - Smart Homes*. In this case study, *Smart Homes* utilise network connectivity to manage and automate services such as lighting, heating/cooling and washing in order to reduce energy consumption and running costs.

## What can Policy Makers do?

Energy efficiency policy makers need to better understand the energy implications of intelligent efficiency, the internet of things, *Smart Homes* and smart grids; together with the policy options available to ensure energy efficiency opportunities are taken up. There is a strong case for international cooperation to pool resources, develop global approaches and engage in high-level dialogue.

Policy makers can improve the *Smart Homes* value proposition through the following measures:

- Demonstrating costs and benefits by implementing field studies and trials.
- Developing methodologies to standardise the measurement of costs and benefits.
- Communicating costs and benefits to consumers.
- Informing consumers about product performance e.g. through better labelling.
- Developing guidelines for data privacy and security.
- Encouraging inter-operability between devices.
- Developing improved market conditions for smart grids, demand response and dynamic energy pricing.
- Developing supportive financial mechanisms.



## More Information

The EDNA report and further information is available from <https://edna.iea-4e.org/tasks/task3> and by contacting the EDNA operating agent at [info@edna.iea-4e.org](mailto:info@edna.iea-4e.org)

## Key Findings

### What is a Smart Home?

- A *Smart Home* uses technologies such as smart thermostats, smart window control, occupancy-based lighting, smart appliances, smart plugs and sensors, etc.
- It requires a home energy management system (HEMS) with a consumer interface and energy monitoring system. Cloud-based analytics are also common.
- A *Smart Home* may also make use of in-home generation, energy storage and an electric vehicle.
- A smart meter provides the link between a *Smart Home* and the energy grid, enabling the optimal matching of supply and demand to increase the overall efficiency of the energy system.

### To extract maximum benefits from Smart Homes, much needs to occur

Despite recent gains in building envelope and appliance efficiency, further opportunities remain to improve whole-building system efficiency through *Smart Homes*. However, there are significant barriers to their widespread adoption including:

- **High costs and unclear benefits:** smart devices cost more and suffer from a lack of consumer confidence about their benefits.
- **Privacy, trust and security:** consumers are concerned about misuse of data in the cloud, and hacking of data and devices.
- **Complexity and technology risk:** *Smart Homes* involve new and complex technologies which many consumers fear may not work as intended and are difficult to operate. Problems of interoperability between new and legacy devices are common and this tends to increase consumer concerns.

The report also examines the barriers to realising the “Smart Grid” benefits of *Smart Homes*, such as smart meter interoperability and the absence of suitable energy markets.



### Smart Grids are part of the picture

The ability of *Smart Homes* to avoid using energy from the grid at times of high energy cost provides a large proportion of the potential reduction in costs. However, in most parts of the world initiatives such as time-of-use pricing and participation of households in electricity markets are still at an early stage of development. In this context, policy makers could consider the development of standards and approaches which ensure that devices and homes are “demand response ready”. Several examples of such policy initiatives already exist.

