

#SMARTer2030

ICT Solutions for 21st Century Challenges



GeSI
GLOBAL e-SUSTAINABILITY
INITIATIVE

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3.3 Building – Smarter homes, smarter offices

Smart Buildings– The Context

As urban populations grow rapidly, the demand for additional housing and commercial real estate is on the rise. However, the construction and operation of buildings remains highly resource and energy intensive, with buildings accounting for around 40% of global energy consumption¹.

The effects of increased urbanization need to be managed carefully from an environmental as well as a social and economic perspective, so that ICT-enabled smart building solutions can quickly gain ground as enablers of buildings that are energy and resource efficient.

Alongside constructing new ICT-enabled Smart Buildings to meet the demand of the growing urban population, another key challenge will be to optimize the efficiency of existing buildings. Many economies in both the developing and developed world still have a very long way to go to retrofit ageing housing stock and commercial property to improve energy efficiency.

What are Smart Buildings?

Smart Buildings can be described as a confluence between architecture, urban planning and ICT. The principle components of Smart Buildings are automation systems, sensors, integration into Smart Grids via smart meters, energy use analytics, forecasting and the better detection of faults through the use of monitoring technologies. For instance, data collected via smart meters and other smart home solutions can be communicated to users via their smart device, allowing users to monitor their energy use, control building functions such as lighting, cooling or heating, and detect faults or abnormalities early – all remotely. These solutions could be applied to large commercial and industrial complexes or smaller homes and condominiums, helping to drive the more efficient use of resources and energy.

¹ Accenture Study on Smart Building Solutions <http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Smart-Building-Solutions-Brochure.pdf>.

The Future of Smart Buildings

By 2030, we expect Smart Building solutions to provide domestic and commercial users with better “insight and control” and an enhanced living and working experience whilst saving resources, energy, time and money. We look at each of these benefits below.

Insight and Control

ICT-enabled solutions combined with user-friendly consumer interfaces like apps and dashboards will be able to enhance peoples’ awareness of their energy and resource consumption. These apps can be accessed remotely via smart devices and allow people to respond to changes or problems even if they are miles away. Besides using data analytics for predictive maintenance, real-time monitoring technology can also send notifications to the user’s smart device when an appliance or light is left on or when something is broken or needs replacing.

The available data can also be used by urban planners, utilities companies and architects to understand changing demand patterns and respond better, reducing costs to the consumer.

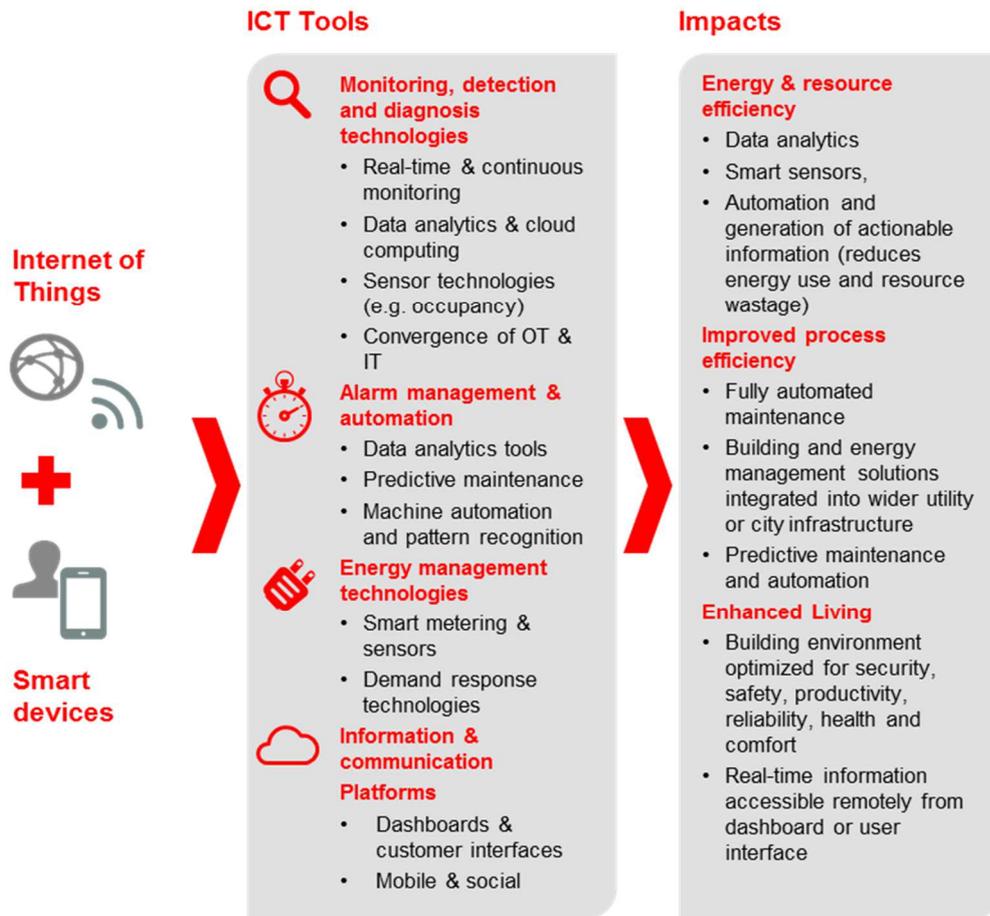
At the same time, Smart Building solutions open up significant cost cutting opportunities for companies. For example, Microsoft evaluated smart building applications from three vendors across 13 buildings within the company’s main 118-building campus. The technology firm’s experience so far demonstrates that a smart building solution can be established with an upfront investment of under 10% of annual energy expenditure, with an expected payback period of fewer than two years. By collecting and analyzing millions of data points every day, the company has been able to embark on multiple improvements that are reshaping the way its buildings are managed and is reducing its energy consumption by 15-30%.²

Resource Efficiency

Smart building solutions will enable energy and resource savings both in existing buildings as well as newly constructed buildings. Automated building heating, cooling, ventilation and lighting control systems are already gaining ground, based on motion and light sensors, turning lighting off when there is enough daylight, or turning heating off when no one is around. It is also becoming possible for people to integrate their personal calendars into the system to enable it to adjust to their specific schedules automatically. In addition, smart technologies will also offer users full integration with the local smart grid, which permits on-site generation of renewable energy and the selling of energy back into the grid.

² Accenture (2011), Energy-Smart Buildings

Figure 1: Buildings - Future of Smart Buildings: Technology Vision for 2030



The benefits of Smart Buildings

We have quantified the global emissions abatement potential from Smart Buildings and, according to our analysis, the global emissions abatement potential from Smart Buildings comes in at approximately 2.0Gt, or 17% of the total potential of the eight sectors we have examined. The US and China are the countries with the highest abatement potential from Smart Building Solutions followed by Germany and the UK.

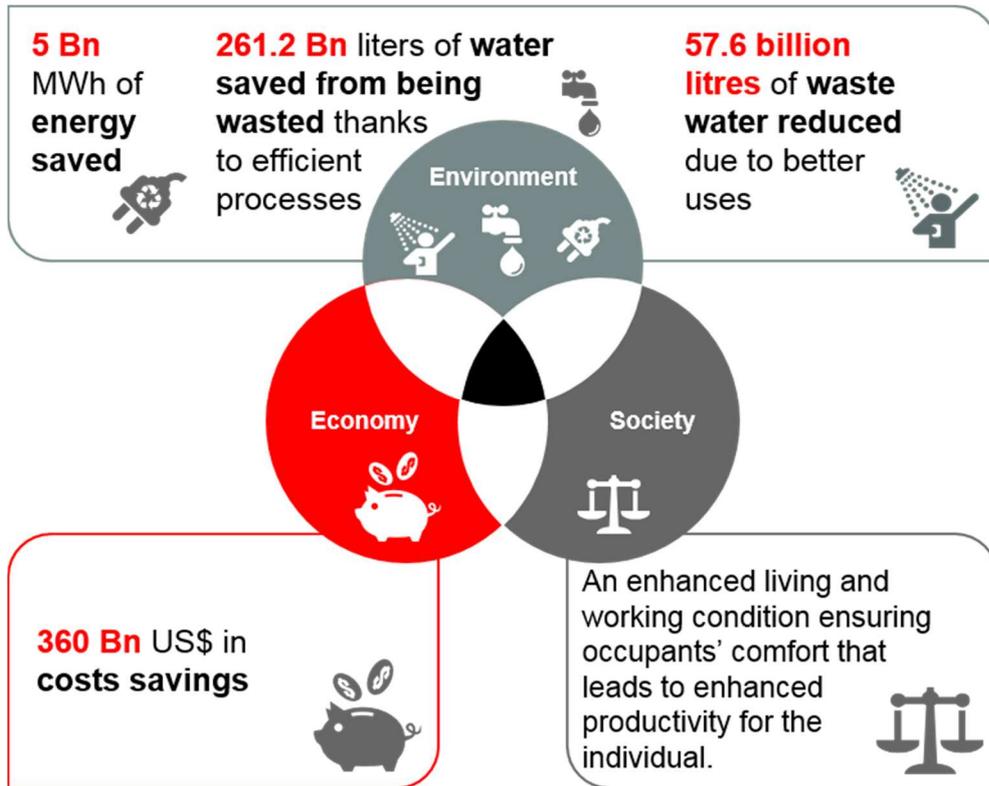
Besides the emissions abatement potential, there are other benefits from Smart Building solutions, including:

- 5 billion MWh of energy saved
- 300 billion liters of water saved
- \$360 billion of cost savings

Improved quality of life: Smart Buildings could vastly improve people's quality of life by tailoring their homes to their needs, saving them money and freeing up time spent on repairs.

The diagram below depicts the types of benefits that Smart Building Solutions can help accrue across environment, economy and society.

Figure 2: Buildings - Benefits of Smart Building



Smart Metering – Household solution to encourage more efficient energy use

Smart solutions for the measurement and control of energy flows help to use energy more efficiently. Consumers need to be able to see how much energy they are using and when, so that they are motivated to cut back their consumption. Smart Meters create the basis for this. Additionally, Smart Meters will be a key prerequisite for restructuring the energy market. By providing demand transparency they can support the integration of renewable energy into the grid. The German federal government is paving the way for large-scale installation, making smart metering a business area with strong development potential for Deutsche Telekom. Deutsche Telekom’s solution helps households to visualize real-time energy demand and thereby helps consumers to better understand their actual energy consumption. By using Smart Meters, households can reduce their electricity consumption by up to 8 percent. According to our calculations, installing Smart Meters in 7.8 million households in Germany by 2020 would reduce CO_{2e} emissions by up to 1.2 million metric tons annually.

Enetune-BEMS – Central energy management system

In Japan, sustainability and resource conservation are key topics of interest. In 2014, Date-City in Japan adopted Fujitsu’s Energy Management System to centrally manage and improve energy use of public facilities in the city. This cloud-based energy management system, called Enetune-BEMS, allows for central management, integration and visualization of multiple business sites and facilities. Through functions such as demand management and remote and automated control of energy consumption, the system allows for energy conservation measures across public facilities. The system allows the local government to effectively manage the energy use of 45 public facilities and schools in the city and enables the city to share information on power usage and energy saving measures between public officials and citizens. By centralizing information on public energy use, the Enetune-BEMS solution provides Date-City with an effective tool to implement energy saving measures, limit power consumption during peak periods and reduce CO_{2e} emissions through energy savings.



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About GeSI

The Global e-Sustainability Initiative (GeSI) is a strategic partnership of Information and Communication Technology (ICT) companies and organizations committed to creating and promoting technologies and practices to foster economic, environmental and social sustainability. Formed in 2001, GeSI's vision is a sustainable world through responsible, ICT-enabled transformation. GeSI fosters global and open cooperation, informs the public of its members' activities to improve their sustainability performance, and promotes innovative technologies for sustainable development. GeSI's membership includes over 30 of the world's leading ICT companies; the organization also collaborates with a range of international stakeholders committed to ICT sustainability objectives. These partnerships include the United Nations Environment Program (UNEP), the United Nations Framework Convention on Climate Change (UNFCCC), the International Telecommunications Union (ITU), and the World Business Council for Sustainable Development (WBCSD). Such collaborations help shape GeSI's global vision on evolution of the ICT sector, and how it can best meet the challenges of sustainable development. For more information, see www.gesi.org.

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