

# Megatrends Sustainable Energy

The speed and scale of the changes affecting both business and society demand new thinking and new solutions. At Fujitsu, we are addressing these challenges in a responsible and sustainable way by exploiting new and emerging technology.



**Contents**

Energy concerns for business and society	2
Taking energy for granted	2
IT leading energy change	2
Getting our own house in order	3
IT enabling energy efficiency	3
Smartening up the grid	3
Conclusion: Energy for ever	4
About megatrends	4

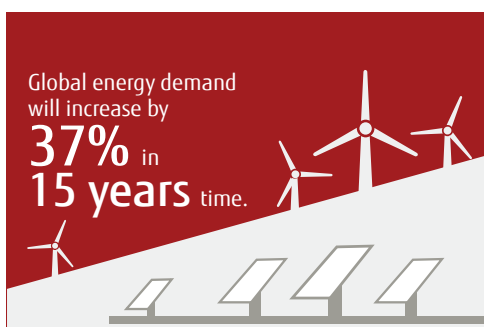
## Headlines

- The relationship between energy demand and supply is volatile, especially given our continued reliance on fossil fuels and out-dated infrastructure.
- We need to change our approach to energy – but the change may take several generations to accomplish.
- We can drastically reduce usage and cut waste throughout industry, commerce, government and the domestic setting.
- The tools are becoming available – we must ensure they have global application.

### Energy concerns for business and society

Global energy demand is set to grow by 37% by 2040<sup>1</sup>. People around the world naturally aspire to the standard of living and economic wealth currently enjoyed by the few. The most readily available sources of energy in the developing nations are fossil fuels, but burning these fuels also adds to CO2 emissions. Meanwhile established generation and distribution are inflexible and geared to the cheap fuels of yesterday.

How can technology help to reshape the energy landscape? Can we use IT to make fuels go farther? And what is the IT industry doing to limit its own impact on energy resources?



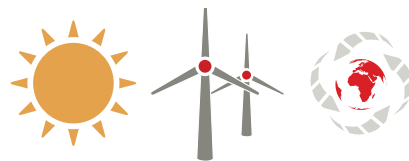
Current initiatives are bringing intelligence to the energy infrastructure and its management as well as empowering customers. With managed, sensitive innovation, we can ensure clean, affordable energy for all the world's citizens for generations to come.

In this paper, Principal Customer Solution Architect and Fujitsu Distinguished Engineer, Simon McKenna sets out his opinion on how technology can be best used to support a sustainable, efficient energy industry we can all live with.

**“Energy needs an injection of intelligence if we’re to keep the world’s lights on”**

### Taking energy for granted

We rely on energy for every aspect of our lives – but we’ve taken it for granted for too long. As demand increases, traditional supplies become ever scarcer, infrastructure decays and environmental concerns grow, we need a revolution in the creation, distribution and usage of energy. IT has an important part to play in conserving resources and improving management. But technology is also a prominent user of energy, so the IT industry must practise what it preaches.



**“Growing demand for energy is a global challenge”**

Ensuring ongoing energy security is a priority for national governments. However, energy is an increasingly internationalised business, with many countries relying on gas pipelines originating abroad, shipping of LPG and oil imports. The state of energy infrastructure varies around the world depending on past patterns of investment and market structures. Policy around investment in and encouragement of alternative and renewable energy also varies dramatically. This means that prescriptions for a brighter energy future must be sensitive to local contexts, existing structures and international relationships.

We are at the beginning of a multi-generational shift in attitudes and practice. Weaning the world off fossil fuels and developing a low-carbon society will require action on many fronts, and we can expect to encounter reversals as companies, consumers and government react to events. Effective use of IT can give us greater control over this evolutionary process – from providing improved demand signals through to self-organising delivery networks.

### IT leading energy change

At Fujitsu we believe IT must be a leader in energy change. Firstly, IT is major consumer of energy and the industry has a responsibility to reduce the consumption profile of its devices. With the growing shift towards use of IT as a service, we must also aim to reduce energy consumption per unit of work.

Secondly, IT is an enabler of energy efficiency in other sectors, especially in industrial production, buildings and transport. We need to make sure the net effect of IT usage here is positive – and trending upwards.

For example, the recently-published GeSI Smarter2030 report<sup>2</sup>, to which Fujitsu contributed as a Gold Sponsor, predicts that IT can enable a 20% reduction in global carbon emissions, holding emissions at 2015 levels.

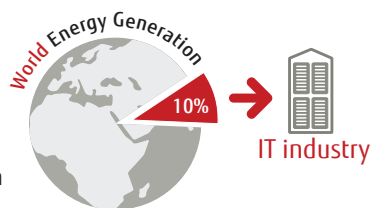
Thirdly, IT has the capability to stabilise the power grid through intelligent control. This will increase the overall efficiency of the power generating infrastructure, measurable in terms of CAPEX for a given level of required total supply. This aspect is also important in the process of changing from old large nuclear and coal-powered sources to renewables, since most renewable sources fluctuate. IT can enable the transition to clean energy in a managed, cost efficient way.

<sup>1</sup> International Energy Agency, World Energy Outlook 2014; <http://www.iea.org/textbase/npsu/sum/weo2014sum.pdf>

<sup>2</sup> Global e-Sustainability Initiative (GeSI) Smarter2030 'ICT Solutions for 21st Century Challenges' <http://smarter2030.gesi.org/>

## Getting our own house in order

IT equipment has been estimated to use as much as 10% of the world's electricity consumption, so we have a clear responsibility to improve efficiency. The industry has taken several important steps towards improving its own energy habits. Green Grid is a collaborative, non-profit industry association dedicated to improving IT and data centre resource efficiency.



We endorse and participate in the EU code of conduct for data centres. Since energy consumption accounts for around 12% of the cost of running a data centre, achieving sustainable reductions in usage is a key business driver. Our team is dedicated to improving data centre efficiency works both internally and for our customers.

Fujitsu has introduced energy-efficiency optimised servers and clients to our systems portfolio. All Fujitsu computing devices have energy saving capabilities and lead the market on the energy efficiency of individual components, but we often find that optimal energy efficient settings are not used. There is a need for greater education within organisations so that they can reduce their environmental impact and save money.

By being actively involved in several international LCA (Lifecycle Analysis) carbon footprint standards groups we are able to influence and promote initiatives to accurately measure IT's energy consumption and carbon emissions. LCA footprint is the sum of greenhouse gas emissions accumulated during the full lifecycle of a product or service, from design to disposal.

There is no doubt that the industry's reputation is enhanced by paying attention to energy usage. Facebook's server farm, just south of the Arctic Circle in Sweden, is a case in point. The facility takes advantage of the cool climate and abundant nearby hydroelectric power, showing that one of the world's busiest businesses can also make smart environmental decisions<sup>3</sup>.

**"Technology can give us clean, affordable energy for all the world's citizens for generations to come"**

## IT enabling energy efficiency

Waste is an integral part of traditional energy systems, which were designed to operate at scale rather than under fine control. Fuel is often burned unnecessarily. At the same time, energy by-products are released to the environment rather than being exploited. Obvious examples include power station cooling towers and industrial gas flares, but there are countless smaller energy inefficiencies which add up to significant waste. This pattern repeats at the consumer end of the supply line. As much as 90% of the energy that powers our datacentres ends up as heat<sup>4</sup>.

Awareness of waste is growing in every sector, alongside corrective initiatives. For example, the body heat of commuters at Stockholm's Central Station is now being used to heat a nearby office building. Fujitsu uses a similar strategy to funnel waste heat from our London North data centre to our office campus<sup>5</sup>.

Technology is needed to tackle waste further. With a smarter environment containing networked, embedded devices, we will be able to direct heat and light where they are needed. But while the application of these ideas on the ground will be intensely local, the IT industry must ensure its solutions are global and open. Fujitsu is committed to the relevant standardisation processes and we are particularly active in the drive to create global standards for IT energy efficiency assessment methods and metrics.

## Smartening up the grid

The electricity infrastructure is a potent symbol of industrial civilisation. Traditional power stations are massive constructions, designed to generate power around the clock for large populations. But this broad approach is no longer sustainable. Producers and consumers must collaborate to use resources more wisely and get greater value from existing plant and targeted new investments.

Collaboration is currently in its infancy. When supplies are constrained, electricity companies call or email their large commercial customers to ask them to reduce their usage. This process clearly does not scale to smaller customers, let alone domestic consumers. Fujitsu has launched standards-based Automated Demand Response (ADR) technology to enable quick and efficient coordination between generator and customer. Wide use of such client and server software will help to balance supply and demand while also spurring the creation of new businesses related to Demand Response.

<sup>3</sup> <http://www.bloomberg.com/bw/articles/2013-10-03/facebooks-new-data-center-in-sweden-puts-the-heat-on-hardware-makers>

<sup>4</sup> <http://www.nytimes.com/2012/09/23/technology/data-centers-waste-vast-amounts-of-energy-belying-industry-image.html>

<sup>5</sup> <http://www.bbc.co.uk/news/business-12137680>

Improving the relationship between supplier and user is one way of maximising efficiency and bringing a real market mechanism to the grid. Another complementary approach is to build more intelligence into the grid via smart devices and associated technology. Smart meters and service sensors help to make the grid smarter, but if such devices are implemented in a static manner, they can constrain the capabilities of the grid. Fujitsu's WisReed is a network technology which can automatically reconfigure a network in response to changing conditions, meaning that the smart grid can operate autonomously. WisReed is particularly useful for connecting smart meters in the last mile – the link between the customer site and the main supply.

A flexible, smart grid is ultimately only as valuable as its ability to morph to changing requirements. The growing population of smart devices demands advanced analytics to ensure networks deliver energy when and where it is needed. Soon it will be possible for the grid to manage demand actively – for example by delaying domestic washing machine programmes to low-demand periods. High-draw equipment such as air conditioners and freezers can also be controlled more intelligently.

The smart grid also enables new ways of sourcing and sharing energy. Micro-generation plants such as household solar installations and ground source heat pumps can be efficiently integrated, delivered and billed.

Fujitsu is one of the largest producers of air conditioning and we know well that intelligent control of cooling and heating plant can play a significant role in reducing building costs.

**“We need to build a smarter energy landscape that is efficient and environmentally responsible”**

### Conclusion: Energy for ever

Energy is at a crossroads. We need to temper a sense of urgency with cool, rational analyses of problems and solutions. This means steady, applied innovation. In the last few decades we have seen great improvements in both the creation and consumption of energy, from vehicles that run farther on less (and less polluting) fuel to lightbulbs that use fewer watts and last for years rather than months. We have also seen growing awareness of the potential for using IT to make more of our energy resources in industry, commerce and government.

The world's appetite for energy will continue to grow. If businesses, governments and citizens work together, we can ensure subsequent generations enjoy the prosperity we now take for granted. The future of energy is in an intelligent mix of supplies, distribution mechanisms and informed choices over usage. Technology is a key enabler. The devices and services now appearing in the market will become part of a smarter energy landscape that serves with efficiency and environmental responsibility.

### Three things you can do today – for an energy-efficient tomorrow

- Assess the total energy impact of the products and services that you consume and produce. Is energy wasted in your processes and if so what can you do to reduce or capture it?
- Create a strategy for energy security so that your business can continue to be successful, grow sustainably and keep its reputation.
- Explore how you can change the mix of energy types used by your organisation to meet environmental targets for renewables and CO2 reduction.

Fujitsu would be delighted to discuss the megatrend implications for your organisation. Please contact the author [Simon.McKenna@uk.fujitsu.com](mailto:Simon.McKenna@uk.fujitsu.com)

### About megatrends

This paper is one in a series of megatrends papers written by Fujitsu to help inform organisations of the current and future trends impacting business and society. Highlighting how human centric innovation is responding to these global challenges, they aim to enable you to consider how you can contribute to a more prosperous and sustainable world.

Other papers tackle the challenges and opportunities of population growth, urban migration, an ageing population, healthcare, and the Internet of Things.

### Contact

Simon McKenna  
Principal Customer Solution Architect  
Fujitsu Distinguished Engineer  
Phone: +44 (0) 7867 825538  
E-mail: [Simon.McKenna@uk.fujitsu.com](mailto:Simon.McKenna@uk.fujitsu.com)

ID 2701-C 07/2015

© 2015 FUJITSU SERVICES LIMITED Fujitsu, the Fujitsu logo are trademarks or registered trademarks of Fujitsu Limited in Japan and other countries. Other company, product and service names may be trademarks or registered trademarks of their respective owners. Technical data subject to modification and delivery subject to availability. Any liability that the data and illustrations are complete, actual or correct is excluded. Designations may be trademarks and/or copyrights of the respective manufacturer, the use of which by third parties for their own purposes may infringe the rights of such owner.