MIDLANDS ENGINE

OPPORTUNITIES TO LEAD THE WAY IN SMART ENERGY SOLUTIONS

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SAVING ENERGY, REDUCING CARBON EMISSIONS AND REALISING THE FULL POTENTIAL OF SMART ENERGY

As the energy crisis continues to make headline news and the drive to reach net zero by 2050 gathers pace, the pressure to find a new way forward becomes ever greater. In the UK, the energy crisis has shown we need to change policy structure to make it more robust so the price of energy doesn't continue to spiral out of control. We are already seeing significant change in our energy system to meet net zero.

This transition to new ways of managing the energy system is happening in parallel with the ongoing revolution in computing and artificial intelligence. Greater digitalisation in energy is an important part of this – but how does this relate to smart energy and realising its potential?

WHY DIGITALISATION? AND WHY SMART ENERGY?

Digitalisation is already disrupting and bringing benefits to diverse sectors. Within energy systems:

- Digitalisation empowers consumers through the value of data, to give evidence-based insights and the option to automate your energy in a way that suits your needs
- It is key to modernising our energy system with data-driven smart technologies that progress the energy transition needed
- Data-driven smart technologies help individuals and businesses better understand their use of energy, find ways to be more productive and do more with less. They also support the development of more resilient energy networks and reaching net zero
- These technologies are driven not only by digitalisation but also by artificial intelligence and machine learning – with a goal of using data to deliver a more resilient, dynamic and flexible system at a lower cost
- Consumers reap the reward of smart devices and smart systems to allow energy to be used when prices are lower
- There can be better management of energy usage to match variation in electricity generation from solar and wind
- Overall costs will be lower and carbon emissions will be lower.

SMART ENERGY IN THE MIDLANDS TODAY...

There are already several pioneering projects in the smart energy sector in the Midlands:

- The Smart Energy Network Demonstrator (SEND) project is the largest of its kind in Europe. The University of Keele is working in partnership with Siemens and Engie/EQUANS to create a smart energy network of energy generation, distribution and storage across different energy sources at the university campus
- The Trent Basin project in Nottingham is a housing development focused on local smart energy systems
- The Regional Energy Systems Operator project in Coventry has examined new ways of managing energy at a local level
- Plans for the University of Birmingham and Siemens to create a smart campus with 38,000 sensors linking to a smart energy system.

...AND TOMORROW

There is a real opportunity to upscale projects and initiatives to a position where smart energy systems monitor and optimise energy use in households, commerce, industry and with electric vehicles. In our region, these systems have the potential to:

- **Make energy savings of up to £70bn** from 2022 to 2050
- **Generate up to £1.5bn in gross value added (GVA)** and £0.6bn in exports
- Sustain **7,000 jobs** per year
- **Reduce CO_2 emissions by 106,000 kt** by 2050.

7,000 jobs
sustained per year

£70bn
of energy savings

THE SCALE OF SMART ENERGY OPPORTUNITIES

The Midlands accounts for approximately one-sixth of Great Britain's electrical and gas demand. The scale of the region's energy use alongside our ambition to reach net zero (as detailed in the Midlands Engine Ten Point Plan for Green Growth) gives us the potential to become a model smart energy region.

Smart energy systems are comprised of several elements and components. There is significant potential in these market segments and possible gains from investment by 2050.

Smart energy interventions include:

Smart meters

If 45,000 smart meters were installed in the region per month, then the smart meter roll-out could be completed by June 2024. By 2050, this could:

- **Save £0.25bn in energy costs** for domestic consumers
- **Reduce CO_2 emissions by up to 260 kt.**

Energy monitoring and optimisation in small and medium-sized enterprises (SMEs):

If at least 12,000 SMEs in the region fully monitor and optimise their energy usage:

- They could **save up to £0.8bn in energy costs**
- **Reduce CO_2 emissions by up to 100 kt** by 2050, depending upon their energy consumption.

Smart grids

The International Energy Agency defines a smart grid as:

"An electricity network that uses digital and other advanced technologies to monitor and manage the transport of electricity from all generation sources to meet the varying electricity demands of end users. Smart grids coordinate the needs and capabilities of all generators, grid operators, end users and electricity market stakeholders to operate all parts of the system as efficiently as possible, minimising costs and environmental impacts while maximising system reliability, resilience and stability."[1]

With a steady deployment of smart grids by 2050, the Midlands would see:

- **A reduction of approximately 80% of CO2 emissions** compared to 1990 levels
- **Up to £9bn in cost savings**
- This would **generate up to £1.5bn in GVA**
- And sustain **up to 1,400 jobs** throughout the 2020s and 2030s.

Vehicle-2-Grid

Vehicle-2-Grid enables energy to be pushed back to the power grid from the battery of an electric vehicle helping to balance variations in energy production and consumption.

With an estimated 156,000 electric vehicles in the region by 2030:

- Vehicle-2-Grid could **save up to £1.9bn to the energy system**
- Fleets could **save up to £2.4bn in energy costs**
- And **reduce CO_2 emissions by 10,000 kt** by 2050.

Microgrids

These small local electrical grids are able to function independently but can also be attached to the wider power grid.

With at least 70 regional microgrids by 2040, the region:

- Could **save up to 96,000 kt in CO_2 emissions** by 2050
- Sustain an average of **5,000 jobs** per year.

Taking advantage of the opportunities of smart energy requires positive action and investment. Midlands Engine partners are already planning how to overcome barriers and take steps to lead the way in this crucial and exciting sector.

The benefits in achieving our aims include reducing CO_2 emissions, cost savings for individuals and businesses and sustaining jobs in our region. Just as importantly, smart energy systems will also help us build energy security – and a future where we are less reliant on outside energy sources.

[1]Smart Grids – Analysis - IEA

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