WMCA Net Zero Neighbourhoods Blog September 2024

Transforming Energy at the Heart of Our Communities: The Role of Smart Energy Systems in Net Zero Neighbourhoods

The West Midlands is a place of contrasts. It's a thriving hub of innovation, home to a melting pot of communities, and at the same time, it faces some pretty tough challenges. From an energy perspective, it's one of the regions with the highest demand for power, while also dealing with aging infrastructure, pockets of fuel poverty, and geographical limitations that make large-scale renewable energy projects harder to implement.

As the pressure to meet the UK's 2050 Net Zero goal intensifies, we're facing the reality of having to decarbonize with one hand tied behind our back. Unlike other regions that have the space for big solar or wind farms, we've got to work smarter, not harder.

At the West Midlands Combined Authority (WMCA), we're tackling this head-on in the Net Zero Neighbourhoods (NZN) Programme. And our approach?

We're flipping the script on traditional energy solutions by using innovation to maximize existing resources and infrastructure. By focusing on the integration of smarter, more flexible energy solutions at the neighbourhood level, we are developing a system that works with the region's constraints, rather than against them.

The Net Zero Challenge: Turning Limitations into Opportunities

While we don't have the wide-open spaces for vast solar farms or large wind turbine fields, the West Midlands still has some big advantages. We're well-connected to the national transmission grid, we have an industrious spirit, and, most importantly, we've got a strong commitment to making a difference.

Our strategy for tackling decarbonization is twofold. First, we're taking a place-based approach—thinking about each area and its unique challenges and opportunities. Second, rather than relying on large-scale renewable energy projects, the region's strategy has shifted to making smarter use of existing infrastructure.

The West Midlands' Regional Energy Strategy (RES) emphasizes smart energy systems as a critical part of this approach —through smarter management, coordination, and integration of energy generation, storage, and consumption.

Although the task may seem daunting, For Net Zero Neighbourhoods it's an opportunity to make smarter, community-led changes that will transform how we generate, distribute, and consume energy in the long run.

West Midlands region WMCA Constituencies

WOLVERHAMPTON WALSALL SANDWELL DUDLEY BIRMINGHAM SOLIHULL COVENTRY

From Vision to Reality: Making Smart Energy Systems Work at a Neighbourhood Scale

The Net Zero Neighbourhoods Programme focuses on the goal of neighbourhood-scale decarbonisation. This involves a holistic suite of integrated interventions, including the decarbonisation of heat and transport, which relies on the electrification of heat and transport systems.

However, while this electrification is necessary, it brings its own set of challenges. As the population of the West Midlands continues to grow, so does the demand for energy. Areas with high population densities are already facing grid limitations (also known as Grid Constraint Zones), where the existing infrastructure—such as cables, transformers, and substations—are unable to meet the demand. This makes it essential to explore how we can manage local energy demand more effectively, especially as more communities transition to low-carbon technologies.

What Are Smart Energy Systems and How Do They Contribute to Decarbonization?

Essentially smart energy systems are about optimizing how energy is generated, distributed, and consumed using innovative technologies. These systems work smarter, not harder—ensuring energy is used as efficiently as possible while reducing waste and creating local resilience.

At a community scale, smart energy systems can look like:

- Smart meters and real-time energy controls that allow households to monitor and adjust energy usage, reducing waste and cutting costs.
- Solar PV and Battery Energy Storage Systems (BESS), which enable homes to generate and store their own renewable energy, making use of locally available clean energy.
- Demand-side response technologies that enable households to shift energy use away from peak times in exchange for financial rewards, helping to balance the grid.
- Smart EV charging solutions that manage the increased energy demand from electric vehicles without overloading local infrastructure.

These technologies are not only about reducing carbon emissions; they also create flexibility in how energy is consumed, ensuring we can meet rising demand without overwhelming our transmission grid.

Smart energy systems help address these challenges. By introducing flexible energy systems that reduce strain on the grid, we can minimize the risk of overload while still supporting the transition to Net Zero. These flexible systems can even contribute back to the grid by offering demand-side response services, or by creating opportunities for local energy trading and sharing among households.

One example of how this could work is the concept of community-owned energy schemes (Peer-to-Peer Trading). Imagine a neighbourhood where residents collectively own solar panels and benefit directly from the energy they produce. Through a smart energy platform, they can track their usage, trade excess energy, and even participate in flexibility markets—helping reduce their energy bills and increase the sustainability of their community.

Putting People at the Heart of the Transition: Community-Led Smart Energy Systems

While technology is crucial to the success of Smart Energy Systems, we recognize that they are nothing without people. Community co-design is at the heart of everything we do in the Net Zero Neighbourhoods Programme. Smart Energy Systems are not just about technology; they're about empowering people to take control of their future energy consumption.

For instance, in order for smart measures like demand-side response technologies to be effective, residents need to understand how to track their energy use and see the benefits of adjusting it during off-peak times. That's why we begin every project with community co-design—getting residents involved and on board, informed, and excited about the energy transition.

How Smart Energy Systems Will Be Integrated Across Our Projects

Each neighbourhood in the Net Zero Neighbourhoods Programme is taking a slightly different approach, based on its unique characteristics and energy needs. Here's a snapshot of how Smart Energy Systems might be embedded in some of our pilot projects:

- Brockmoor: With the installation of technologies like solar and batteries in the neighbourhood, the team are exploring the possibility of a peer-to-peer solution where citizens trade excess locally generated power through a central platform resulting in energy bill savings
- Castle Vale: Building on the significant community led work in this area, the team is investigating a Community-owned Generation solution that will directly benefit residents; resulting in a more energy resilient and self-reliant energy community

Looking Ahead: A More Resilient, Sustainable Future

Smart energy systems are about more than just reaching Net Zero—they're about creating a more resilient, equitable, and sustainable energy future for all of us.

While the journey to Net Zero is complex, we believe that by working with communities to integrate smart energy solutions, we're not just addressing the region's energy challenges; we're also helping to build stronger, more empowered neighbourhoods.

The Net Zero Neighbourhoods Programme is driven by the belief that the energy transition can—and should—be led by the people who will benefit from it most. With smart technology and community co-creation, we're not just aiming for a cleaner, greener future; we're working towards one that's fairer, too.

For more on West Midlands Net Zero Neighbourhoods, programme resources and materials visit our webpage

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