# ENABLING THE TRANSITION **TO NET ZERO**

Smart Cities and Places

sse Energy Solutions | For a better world of energy

MAYFLOWER SMART CITIES AND PLACES COMPLEMENTS THE WIDER ENERGY AND TELECOMMUNICATION SERVICES OFFERED BY SSE AND SUPPORTS CLIENTS IN THEIR NET ZERO GOALS

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Smart Cities and Places: Enabling the transition to net zero places

# SMART LIGHTING NETWORK **INFRASTRUCTURE**

Net zero carbon living and gigabit speeds for all are now targets, not aspirational dreams. Increased connectivity and technology can make our day-to-day lives healthier, more efficient, sustainable and safe through the delivery of ‘smart services’ that drive down cost and improve efficiency.

With new technology innovations such as 5G, machine learning, cloud technology and edge processing, we now have the tools required to transform passive assets to smart assets and hence enable processes to create smart places, smart towns and smart cities.

SSE has over 40 years’ experience in energy asset development and management for both public and private sector clients. Our Distributed Energy business delivers a wide range of energy services and is at the forefront in ensuring these solutions address the needs of a data driven, sustainable world including: distributed generation, energy storage, smart grids, energy trading, smart buildings, smart street lighting and EV charging — all helping to build the infrastructure backbone of smart cities and places.

Mayflower Smart Cities and Places builds on our proven Central Management System (CMS) and utilises the existing smart lighting network infrastructure to deliver the latest technologies, and enable healthier, safer and more sustainable communities.

## Budget constraints

Significant budget reductions and an ageing population are leading to increased service level pressures and rising social care costs.

## Carbon reduction

In the UK, passing of the Net Zero Emissions by 2050 target into law is driving local authorities to review their entire operation in order to identify ways of radically driving carbon emissions down across their regions with a key focus on energy efficiency, heat and transport.

## Ultrafast broadband

To remain competitive, local authorities must encourage inward investment and ensure sustainable growth. This can be achieved through enabling the rollout of ultrafast broadband and 5G, whilst supporting innovation in machine-to-machine (M2M) communications and Internet of Things (IoT) services.

Addressing the above is made even more challenging given the traditional silo approach to procurement in many local authorities. What would help redress this is to replace this approach with integrated systems and processes that drive innovation, reduce emissions and create sustainable economic prosperity.

# SMART PROCESSES **AND SERVICES**

Our Mayflower Smart Lighting system provides a subsidised canopy increasing cost effective innovation in smart city solutions.

## Mayflower Smart Lighting System

Reduction in technology costs and the increasing prevalence of IoT connectivity has resulted in exponential growth in smart sensors and devices. Exploitation of these can allow local authorities to improve existing processes or re-engineer them entirely, subsequently enhancing service levels and driving down costs.

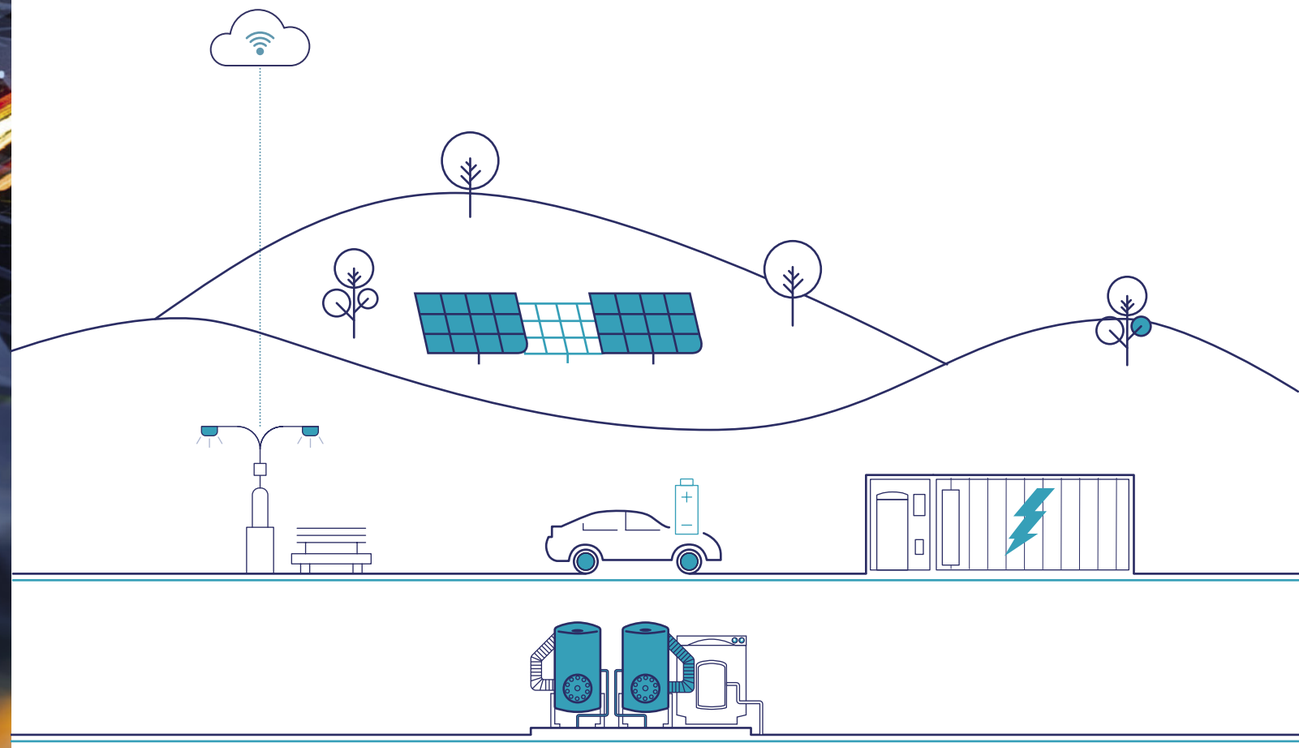
However, although smart applications that exploit remote sensors and devices are beginning to emerge, this market is relatively immature and most are developed as standalone solutions with their own connectivity. This results in the duplication of communication infrastructure and therefore increased costs for a local authority.

To address the above, SSE has enhanced its Mayflower smart lighting system to provide a subsidised communications canopy, which radically increases the potential for cost-effective innovation in smart city solutions.

## A smart energy system

To create a Net Zero Carbon city or place requires:

- Zero carbon power, zero carbon heat and zero carbon transport
- Significant capacity increase in the underlying power network and increased local power generation
- Low carbon heat adoption to be maximised with a combination of local heat pumps, local heat networks and district wide schemes
- Heat and power storage to minimise the impact of electrified heat on electricity demand at peak times
- A control scheme that manages key energy assets connected to the system in order to ensure security of supply whilst minimising investment needed in the underlying energy infrastructure
- The ability to generate revenues through trading generation, storage and/or demand flexibility in all available markets



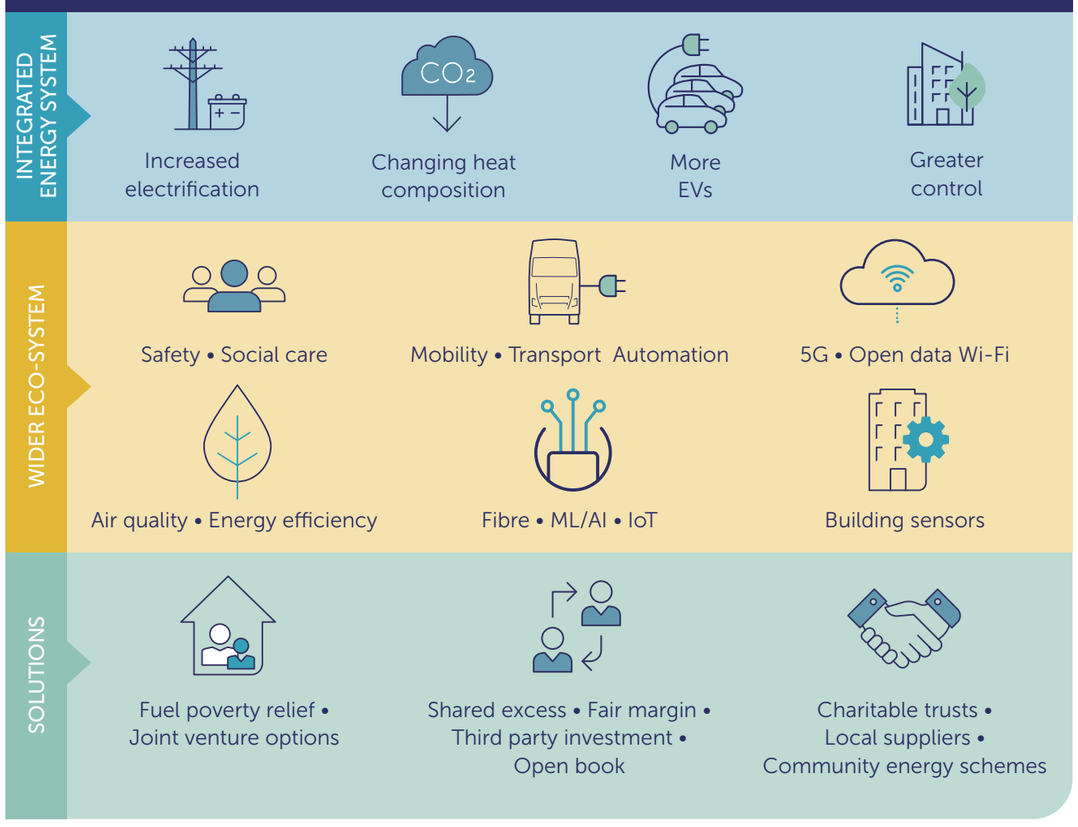
# SUPPORTING **SOLUTIONS**

SSE has a portfolio of propositions to meet the needs of emerging smart cities and places. We can fund, deliver and operate localised energy systems and the sub-systems within them to drive the transition to low carbon.

We can provide smart city infrastructure to enable solutions that drive down costs and deliver cleaner air, healthier lives and sustainable futures.

Our solutions bring together a wide breadth of technologies and services that can be uniquely tailored to the needs of the customer, whether this be for a single building, a bigger campus environment, a city or county authority.

## TARGET MODEL TO ADDRESS KEY CHALLENGES




### FLEXIBLE GENERATION AND STORAGE

- PV (solar)
- CHP
- Battery storage
- PPA (power purchase agreement)
- Corporate PPA
- Private wire to load (i.e. buildings)

### ENERGY DATA AND VISUALISATIONS

- Energy analytics and insight
- Machine learning and AI
- Automated monitoring and targeting platform
- Energy legislation
- Energy management

### BUILDING ENERGY MANAGEMENT

- BMS installation
- Support and maintenance
- ESOS audits
- Refits
- Remote and managed services

### ELECTRICAL INFRASTRUCTURE

- Private networks acquisition
- Upgrade, operation and maintenance
- Point-to-point private wire
- Smart grid control

### ENERGY AS A SERVICE

- Energy management to lower carbon
- Virtual power plant (trade your flexible energy)
- Energy asset acquisition
- Asset service management

### HEATING AND COOLING

- CHP
- Heat pumps
- District heat networks
- Waste heat exploitation
- Storage
- Optimisation
- as a Service options

### EV INFRASTRUCTURE

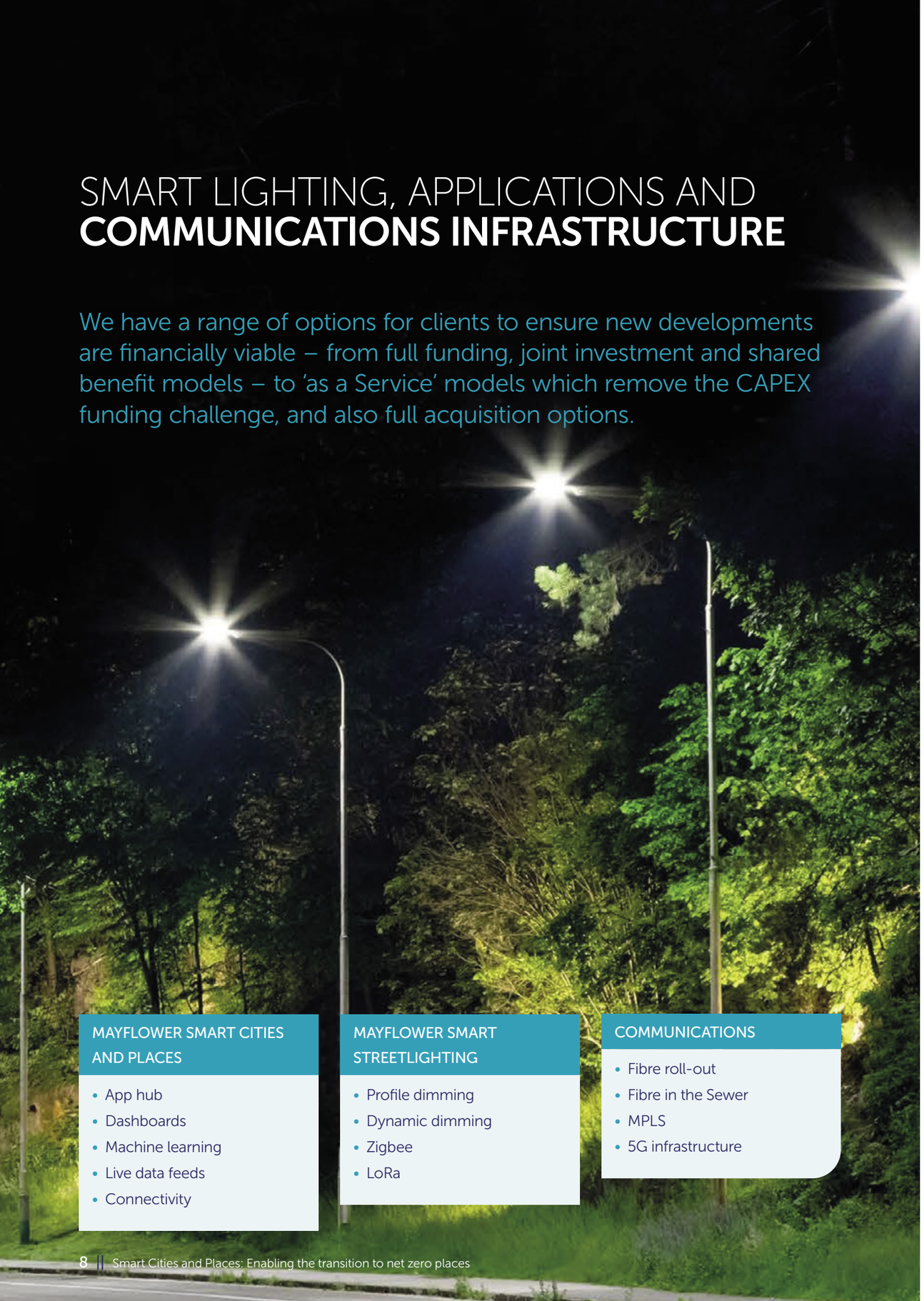
- Installation
- Operation, maintenance and management
- Fleet and taxi solutions
- Charge hubs
- Constraint management
- Charger agnostic (inc. rapid, smart)

### SMART ENERGY BUILDINGS

- Building-connected energy assets
- Local energy balancing
- Grid connection management
- Energy optimisation

# SMART LIGHTING, APPLICATIONS AND **COMMUNICATIONS INFRASTRUCTURE**

We have a range of options for clients to ensure new developments are financially viable – from full funding, joint investment and shared benefit models – to 'as a Service' models which remove the CAPEX funding challenge, and also full acquisition options.



**MAYFLOWER SMART CITIES AND PLACES**

- App hub
- Dashboards
- Machine learning
- Live data feeds
- Connectivity

**MAYFLOWER SMART STREETLIGHTING**

- Profile dimming
- Dynamic dimming
- Zigbee
- LoRa

**COMMUNICATIONS**

- Fibre roll-out
- Fibre in the Sewer
- MPLS
- 5G infrastructure



# ILLUSTRATIVE **SMART SOLUTIONS**

## Mayflower smart street lighting

SSE's Mayflower Smart Control is a leading Central Management System (CMS) provider, with almost half a million assets deployed across the UK, Ireland and Australia. Our robust and proven Mayflower CMS and its underlying communications infrastructure enables clients to remotely monitor, control and collect data from their illuminated street furniture – reducing the requirement for site visits and minimising energy expenditure.

Mayflower CMS primarily provides a Zigbee IoT mesh network across a local authority's area to connect, control and report data from streetlights. This has now been extended to incorporate a LoRa IoT communications layer to maximise sensor and device connectivity into the Mayflower Lighting Network.

## Electric vehicle charge hubs

The need for rapid deployment of electric vehicles across the UK is causing issues for the electricity grid and local infrastructure. We have created a solution that will mitigate this issue by combining EV charging infrastructure with low carbon generation and storage technology whilst improving financial viability at lower charge volumes by trading energy flexibility.

## Private networks

The drive to zero carbon will see the electrification of heat and transport which in turn will put significant pressure on underlying electrical networks. For private network owners, reinforcement costs can be significant. For public DNO networks, reinforcement needs will either result in increased connection costs or implementation delays. The net effect will be to deter and/or delay the rollout of low carbon technologies, hence impacting the local authority's decarbonisation agenda. To address this, SSE will acquire, reinforce and optimise existing private networks and build new private networks under towns and cities to work in harmony with the local DNO and maximise the deployment of low carbon assets.

## Heat generation, storage and cooling

SSE has been providing end-to-end heating and cooling network services to residential and commercial properties for many years. As we transition to lower carbon solutions, we are investing in system optimisation through storage, demand forecasting and as-a-service models.

We provide a range of generation and storage solutions that can be tailored to your business needs including long-term low carbon solutions, shorter term revenue generating schemes, those traded on the market or connected directly to load, funded or in partnership.

## Energy as a service

At the most basic level we create value from your core energy assets' flexibility, providing you with additional income. Alternatively, we can completely remove the complexity and risk of energy management by acquiring, investing in and operating your energy estate.

## Building energy management

Effective Building Energy Management Systems (BEMS) reduce building costs whilst improving staff comfort and working conditions. We work directly with end user clients and also consultants designing BEMS solutions.

## Data and visualisation

Both the prevalence and importance of data in this evolving technological world is increasing exponentially, enabling more insights and enhanced performance against business strategies. Our dedicated team of data scientists and data analysts extract insights, create machine learning models for carbon and energy reduction as well as predictive maintenance, wellbeing and productivity measures. Visualisation is through our UK-leading BEI platform or bespoke reports and dashboards.

# MAYFLOWER SMART **CITIES AND PLACES**

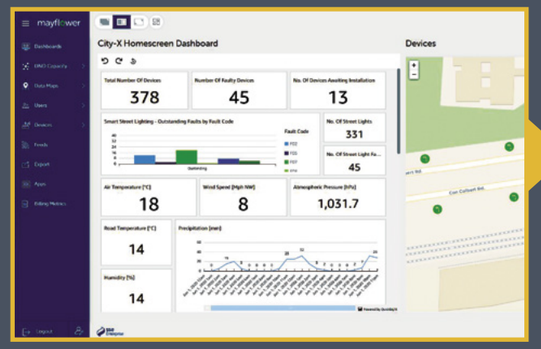
Mayflower Smart Cities and Places has been designed to complement the wider energy and telecommunications services offered by SSE in order to support our clients in the transition of their city, town or place into a smart, low carbon environment.

This is achieved by:

- Exploiting the Zigbee and LoRa connectivity inherent in the underlying Mayflower Smart Lighting Network to allow the low-cost connection of additional sensors and devices
- Introducing additional connectivity such as 3G, 4G and NB-IoT to widen the reach and hence capabilities of a smart offering
- Providing a Smart City App hub and third party data feeds to maximise innovation of smart city applications whilst encouraging growth in the local tech community and supporting the commercialisation of data
- Linking in SSE's Energy as a Service (EaaS) platform and Building Energy Management solutions to provide the ability to view and manage local energy demand
- Providing extensive functionality for users to define their own drill-down dashboards and maximise value in the information obtained from sensors and devices
- Providing a comprehensive city view, through a single user interface

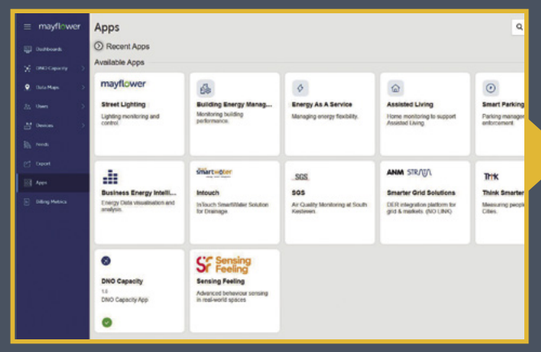



# KEY **FEATURES**



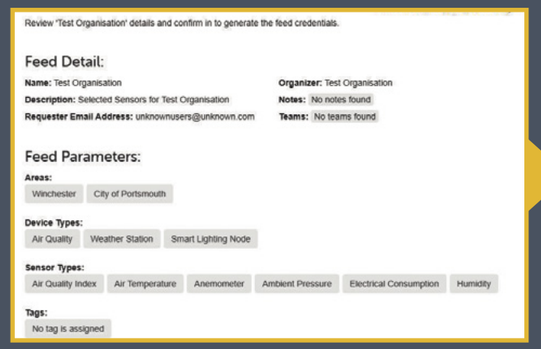

## FULLY CUSTOMISABLE DASHBOARDS

Real-time sensor and device data is streamed to the platform and made available to users to develop interactive and fully customisable drill-down dashboards. Sensor and device data can be combined with third-party data sets to generate far greater insight. Dashboards can be created, stored and shared with specific teams.



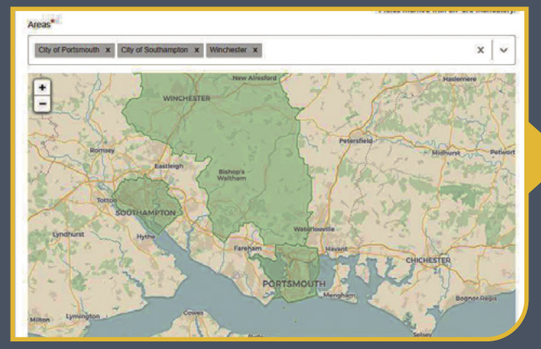

## APP HUB

Mayflower Smart Cities and Places incorporates a smart city App hub, which brings together both SSE and third-party applications through one simple user interface. Applications can be standalone or developed within the Mayflower environment using a developer toolkit. Clicking through into an application within the App hub gives users with appropriate permissions access to the full capabilities of the underlying solution.




## FEEDS

The Feeds feature allows sensor and device data captured in the platform to be streamed to third parties to encourage application development, catalyse growth in the local tech community and maximise innovation in smart city services. This could also open additional revenue streams for Mayflower clients through the commercialisation of data.




## DATA EXPORTING AND ANALYTICS

As well as direct analytics within the custom dashboards and business intelligence environment, sensor and device data can also be made available through an API to third-party apps within the App hub. Alternatively, users may choose to export platform data for use in additional applications and analytics packages.

# SMART CITIES
# IN ACTION

## The following case studies provide an overview of the breadth of our experience and demonstrate how our distributed energy business develops specialist client solutions.

We have worked with local authorities and private organisations to create innovative solutions across multiple diverse disciplines. Our specialist teams understand complex city issues and deliver improved services with minimal disruption to business as usual operations.

We are committed to helping improve the lives of citizens across the UK. By working in collaboration with clients, we develop tailored solutions that meet business needs and also improve quality of life for communities.

For more information on our solutions and services, please contact: SmartCities@sse.com

### REDUCING CARBON

With a vast array of buildings to manage, support and maintain, local authorities can achieve notable energy and financial savings through building energy optimisation. SSE Energy Solutions have experience in surveying and developing bespoke energy management solutions for buildings – encompassing technologies such as solar PV, HVAC, LED lighting and BEMS. Our engineers provide independent recommendations for clients to deliver projects under the government's RE:FIT scheme. By making high energy consuming assets more efficient, local authorities can reduce carbon emissions and energy consumption by over 25%.

### MONITORING POLLUTION

There is a growing urgency across local authorities and wider industry to reduce carbon emission levels. Local air quality monitoring devices can provide pollutant levels for both high-risk and densely populated areas. By connecting devices to Mayflower Smart Cities and Places, organisations can collate data for more detailed analysis, identify and classify areas of concern, provide base evidence around which to build an air quality improvement strategy and use controllable signs to drive behavioural change. Through continual monitoring, the effectiveness of strategies can be evaluated.



### ELECTRIC VEHICLE CHARGING

As electric vehicles become increasingly popular, local authorities are beginning to upgrade the infrastructure of towns, cities and places to facilitate EV charging. SSE Energy Solutions is a leader in the installation of EV chargers and connection points and has worked to optimise charge point deployment as part of a local research consortium. By collecting and analysing data from charge points, the consortium is able to effectively plan hub locations and minimise the impact to grid. Innovative projects such as Park & Charge support the UK Governments Net Zero by 2050 ambition, and lead to increased revenues for local authorities.

### FLOOD PREVENTION

By monitoring gullies and drains in densely-populated areas, local authorities can minimise consequential impacts and damages caused by flooding. Specialist flood and blockage monitoring devices are used to identify partial or full blockages, with data reported through the Mayflower Smart Lighting Network. This data can be analysed to identify geographical trends and provide a basis for further investigation as to how blockages can be prevented. Local authorities are able to maximise efficiency of their highways maintenance teams by planning cleansing routes in advance, whilst reducing carbon emissions by avoiding unnecessary site visits.

### WINTER GRITTING

On average, local authorities grit 40% of their roads during the winter months. Localised road surface temperature sensors and weather stations allow local authorities to monitor the likelihood of ice formation on major highways. Data is transferred through the Mayflower Lighting Network to analytics software which can identify high risk geographical areas. From this data, local authorities are able to effectively plan the gritting routes and adopt a pro-active, optimised approach to adverse weather conditions that ensures everyone gets home safely.

# SMART DISTRIBUTED ENERGY **INFRASTRUCTURE SOLUTIONS**

## Designed to meet local energy needs and drive Net Zero.

**SSE Energy Solutions is part of SSE plc, a UK based FTSE 100 company with 75 years' experience operating in the fast-changing energy industry.**

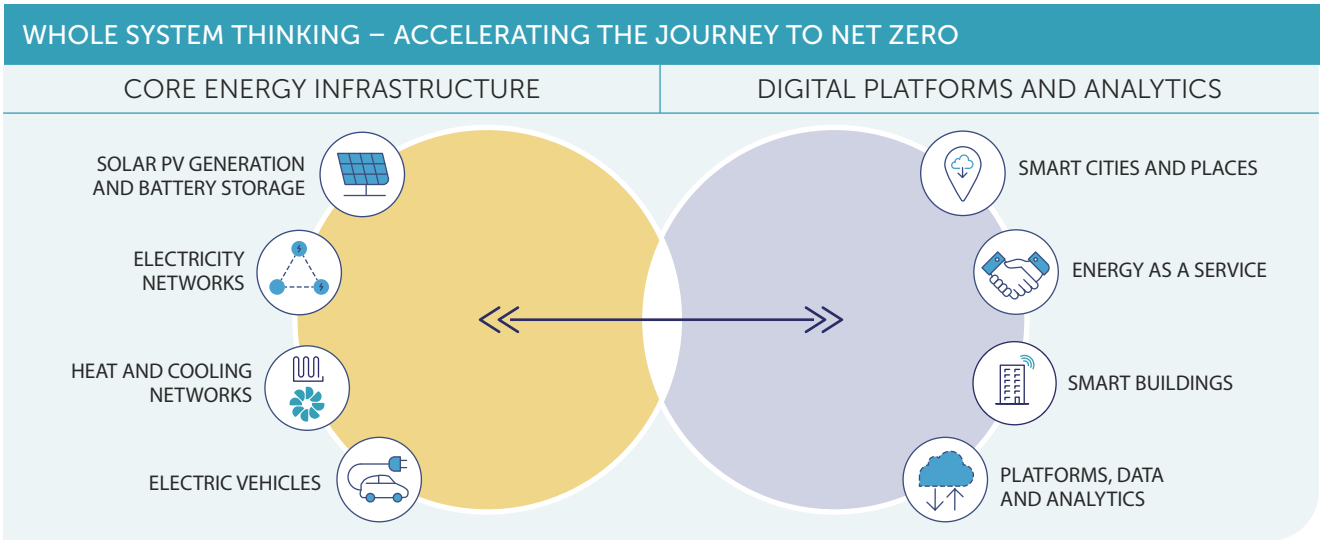
SSE Energy Solutions plays a major part in the emerging consumer-led energy system, and provides key services to enable users to benefit from new ways to optimise and manage their low carbon energy use.

Our Distributed Energy business teams adopt a whole system approach by investing in, building and connecting your localised, flexible energy assets to accelerate your path to net zero and create a more resilient energy system for the long-term.

Right now, your decision to pick SSE Energy Solutions, part of an established renewable energy company investing in all our futures, will be the right choice for you and for our environment.

Our energy solutions include:

- Electric vehicle infrastructure for public transportation and vehicle fleets
- Local electricity infrastructure including building, owning and adopting private HV networks
- Heating and cooling networks for residential, commercial and industrial consumers
- Local energy generation, including funded offsite/ onsite solar PV
- Energy storage solutions, including battery storage
- Optimising building energy consumption and use
- In-house digital twin engineering team for modelling optimised energy flows
- Data platform services to support smart buildings, places and cities
- SSE Enhance, our aggregation and trading platform for small energy assets
- A growing suite of green energy supply solutions, including corporate power purchase agreements.




**Get in touch with our team to find out how we can help you**

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