

# STEM Assets in the West Midlands Innovation Landscape

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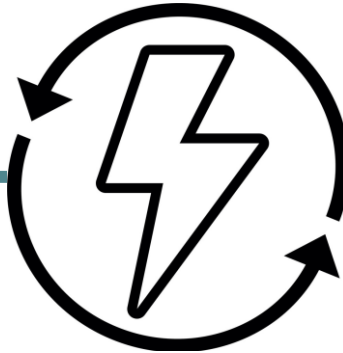
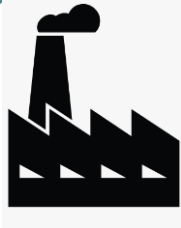
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# STEM assets in the West Midlands innovation landscape: Tyseley Energy Plant



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2022

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With special thanks to Martin Freer, Emily Prestwood, David Boardman and David Horsfall.

There is a persistent gap between university-based R&D and research users in the UK, including firms and public sector organisations. This means we are not fully leveraging our intellectual capital, assets and capabilities for economic growth and social development. As the country looks to increase R&D spending to a level of 2.4 percent of GDP (the OECD average) it is essential that there is better alignment between universities and these stakeholders in collaborative innovation efforts to improve our economy and our society. This policy briefing focusses specifically on a University of Birmingham asset (Tyseley Energy Plant) and explores the extent to which it is being leveraged to improve economic performance and social inequality in our region. The University has invested £3M in Tyseley Energy Park (TEP), a site which is owned by Webster and Horsfall. The vision for TEP is to develop new sustainable technologies, including ways of generating clean energy and a low waste economy. Infrastructure developed or planned on the site include a biomass plant, generating 10 MW of electricity, a low carbon refuelling hub linked to the City of Birmingham plans for a clean air zone (including hydrogen generation for the bus fleet) and an Innovation Hub (Birmingham Energy Innovation Centre).

## Introduction

This WMREDI project will work to identify the size, scale, employment, turnover, and growth of the Tyseley Energy Plant, in direct and indirect terms using proxy measures and multipliers. Additionally, it will compare the commercial and non-commercial impacts of the assets, identifying any social/environmental/economic trade-offs. Examples of non-commercial impacts are healthcare interventions, public sector and social innovations. This impact analysis will help identify different forms of regional economic growth that can be attributed to university-related investments. The purpose of this briefing is to outline the context behind the TEP case study and the next steps for our research.

## Overview

The mission of Tyseley Energy Park (TEP) is to deliver a green technologies hub for the City of Birmingham as part of a wider intention by Birmingham City Council and Energy Capital to create a large-scale Energy Innovation Zone in the city. TEP seeks to deliver new jobs and growth through the deployment of innovative energy supplies. These include renewable energy generation, energy storage, recycling of waste, materials and energy, innovative fuelling solution and bespoke research facilities designed to study the functionality of these processes closely.

TEP is an example of a University 'Fixed asset', which the University of Birmingham has co-invested in, alongside private firms, with matched funding support from regional economic development agencies. The approach by the University to leverage their investment has been different to the more traditional model of renting land on the park. Instead, the investment was used to fund a 'collaboration agreement' between the University and the park owners [Webster and Horsfall](#). The University influences the TEP via a steering group or 'TEP co-creation group' that was formed in 2018. The group's chair alternates between the University and Webster and Horsfall, meeting on a quarterly basis to share ideas and develop projects and systems thinking that can be applied at the city scale. Any activity carried out on the site is subject to the mutual consent of all parties from this group, taking into account any constraints of time, funding and other relevant resources (as per a signed Memorandum of Understanding).

A full list of co-creation partners can be found [here](#).

TEP offers an environment for both academics and industrial partners to build and demonstrate energy prototypes, accessing the viability of alternative pathways and transitioning to a green economy.

### TEP's primary objectives are as follows:

- Develop solutions for power, heating, transport and waste processing that address key societal challenges as part of the transition to a zero-carbon energy future.
- Demonstrate how novel energy technologies and solutions can form innovative industrial ecologies through clustering and co-locating of assets and energy consumers.
- Create a green business/technologies hub to support SMEs to incubate, prove and deploy commercially viable technologies
- Deliver innovation-led regional growth and new jobs and training in integrated waste, energy and transport sectors, and new, green manufacturing and engineering industry.
- Share learning and knowledge, and proactively advocate change in the local community, city and region, and with cities across the UK.
- Work collaboratively as part of the Co-Creation Group to ensure opportunities are clean growth opportunities are fully integrated and support local and city-wide initiatives and objectives.

# Location – Tyseley Environmental Enterprise District



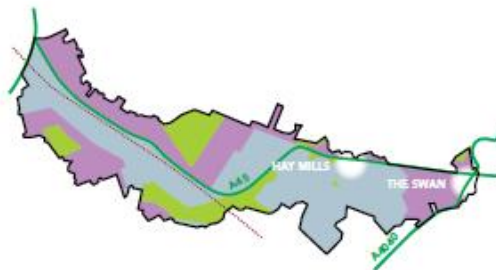
Area 2: Southern Industrial Area



In the southern part of East Birmingham, there is another significant industrial area alongside the A45, Birmingham-Solihull railway line and the Grand Union canal. Focused historically on the Tyseley Locomotive Works (now a heritage railway museum), the area is now home to the Tyseley Energy Park and many light manufacturing firms which benefit from the area's good road and rail transport links.

There are small pockets of houses within this area, especially to its eastern edge, and the densely populated area of Sparkbrook lies close by to the south.





Despite the road and rail connections into the city centre, public transport in this area does not offer good connections to many other parts of Birmingham.



PLAN 4 Southern Industrial Area

**Key**

-  East Birmingham Inclusive Growth Strategy area boundary
-  Motorway
-  Major road
-  Rail line

-  Industrial and commercial
-  Residential
-  Public open space
-  Local centres



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NOT TO SCALE

about east birmingham / east birmingham growth strategy

Image source: [East Birmingham Growth Strategy](#)

# Facilities

## Operational

### 10MW waste wood biomass power plant

A £47 million investment supplying the park's tenants with renewable electricity, having saved 72,000 tonnes of waste wood from going to landfill.

### Tyseley Refuelling Hub

The UK's first multi-fuel, open access low and zero carbon refuelling station, representing a £10 million investment. It sustainably fuels both public and commercial vehicles, including 20 hydrogen buses as part of an effort to reduce Birmingham's emissions and improve its air quality.



### Birmingham Energy Incubation Hub

Brings TEP's office / workshop space together with and the energy expertise and research facilities of the University of Birmingham's ATETA programme and the Climate Innovation Platform, supported by HSBC. Ten industrial units are available alongside testing facilities and mentoring for businesses in the form of two SME engagement programmes.

### The Birmingham Energy Innovation Centre

An £8.5 million centre facilitating a range of activities which contribute to innovation in waste, energy, and low carbon vehicle systems and technologies, with solutions anticipated to spillover beyond the city-region.

## Conceptual / proposed

### Energy Skills Academy University Technical College

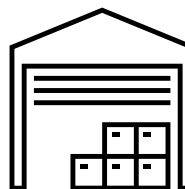
Intended to educate the next generation of researchers and engineers in the energy sector with state-of-the-art technologies.

### Community Energy Enablement Hub

Intended to develop bottom-up energy solutions to help local communities to deliver more efficient energy services.

### Energy from Waste Plant

A new plant intended to generate 25 MW of electricity.



### R&D Centre for Advanced Materials Recycling

Intended to develop advanced technologies to recover strategic elements and critical materials using advanced processes and robotic waste separation technologies

### Recycling plant for high-performance rare earth magnets











Intended to become the UK's first re-manufacturing line for high-performance sintered rare earth magnets for use in electric vehicles, aerospace, renewable energy technologies and low carbon technologies

### National Centre for the Decarbonisation of Heat

Source: [Tyseley Energy Park](#)

# Tyseley Energy Park Masterplan

## LEGEND

-  SITE BOUNDARY
-  EXISTING / IMPROVED INFRASTRUCTURE
-  POTENTIAL ACCESS POINTS
-  PHASE 1: BIOMASS POWER STATION
-  PHASE 2: GREEN FUEL FACILITY + OTHERS
-  PHASE 3: WASTE PROCESSING FROM EFW FACILITY
-  PHASE 4: CENTRE OF EXCELLENCE / LANDMARK
-  PHASE 5: WEBSTER AND HORSFALL NEW FOOTPRINT
-  EXISTING OPEN SPACE
-  EXISTING CANAL

## PLOT AREAS

-  PHASE 1: APPROX. 0.837 Ha (2.07 Acres)
-  PHASE 2: APPROX. 1.01 Ha (2.50 Acres)
-  PHASE 3: APPROX. 1.01 Ha (2.50 Acres)
-  PHASE 4: APPROX. 1.07 Ha (2.65 Acres)
-  PHASE 5: APPROX. 1.50 Ha (3.71 Acres)

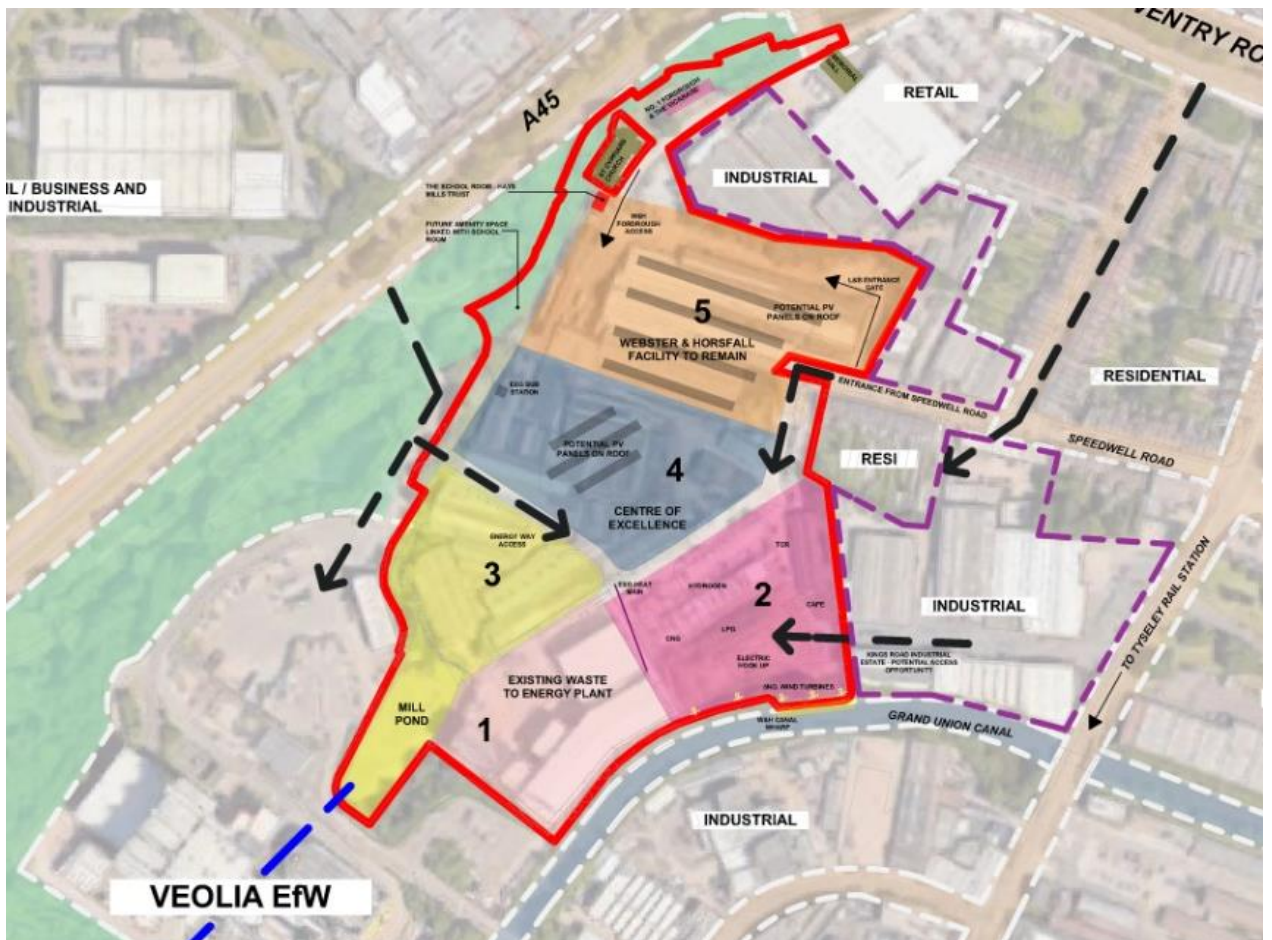


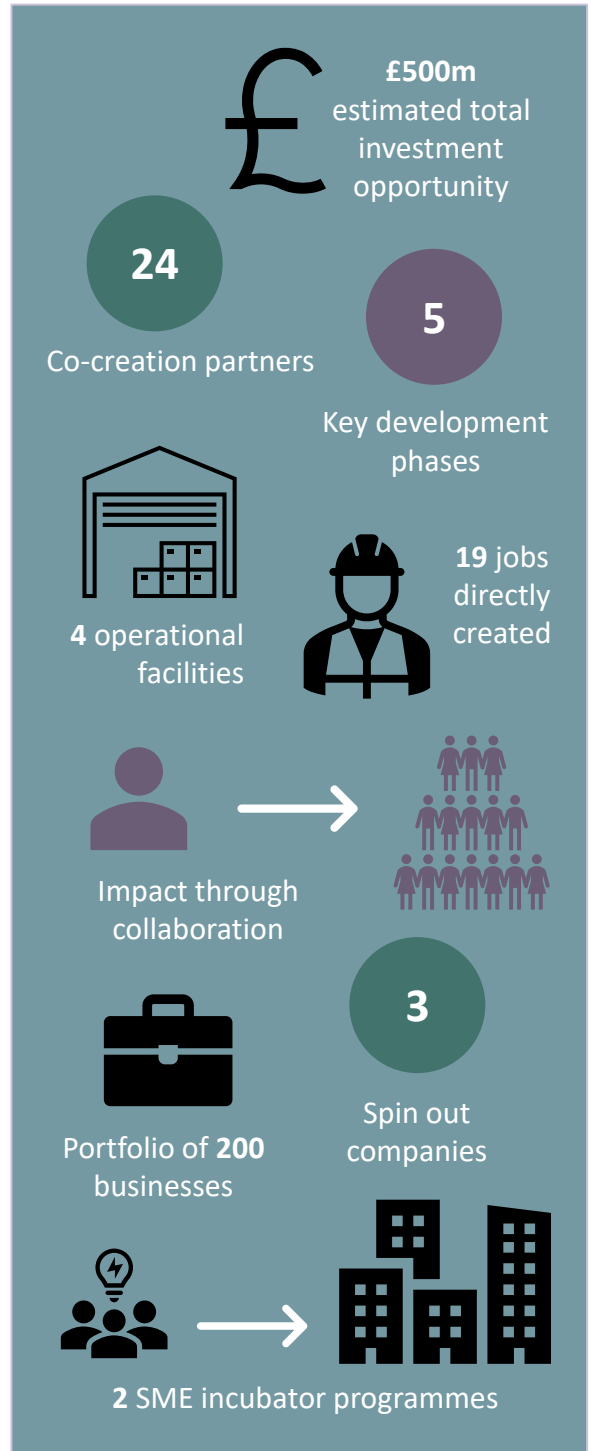
Image source: [Webster and Horsfall Group](https://www.websterandhorsfall.com)

# Inputs

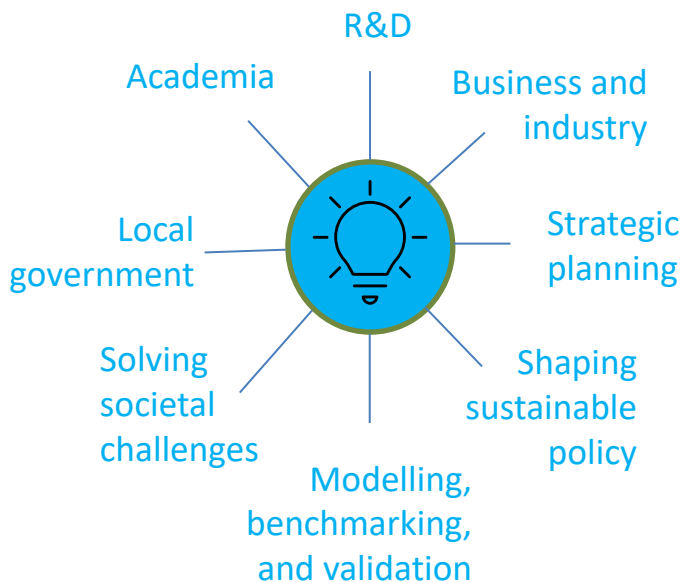
Aside from Webster and Horsfall's existing employees, Tyseley Energy Plant has directly created 19 jobs which run and maintain the biomass waste plant. The Innovation Centre is frequently accessed by academics, PhD and undergraduate students and businesses alike. Finally, over 30 businesses a year take advantage of the two SME programmes run through the Incubation Centre.

Two broad categories of activity happen at the park. Firstly, the University's Energy Institute works with businesses through the ATETA programme, which has so far helped a portfolio of over 200 SMEs. This programme revolves around problem solving, with businesses benefiting directly from any IP generated. The second type of collaboration developed shared IP whilst working with industry more broadly in addressing bigger challenges. The Innovation Centre combines the university's research programme with office space and industrial facilities, leading to the creation of spin out technologies. So far, three companies have been created: Vanguard (hydrogen trains), Hypromag (rare earth magnet recycling), and Kelvin Thermotech (energy technologies).

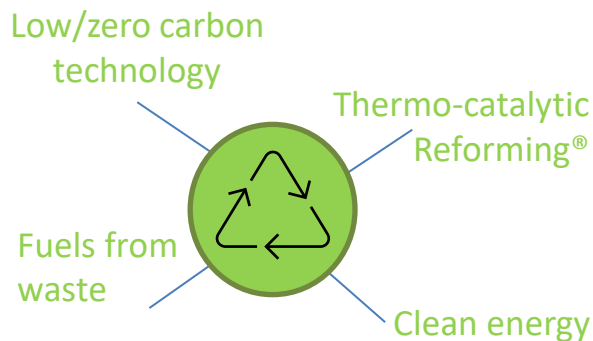
The park's funding is obtained through a combination of public and private funding, with the former so far totalling around £20 million, and the latter having generated around £70 million. As well as initial investment by Webster and Horsfall and the University of Birmingham, the Greater Birmingham and Solihull Local Enterprise Partnership has invested over £10 million, which funded the access road running through the park, as well as the refurbishment of the business incubator's facilities. In addition to this, BEIS supplies a great deal of the public funding given the industrial nature of TEP's activities, as does Innovate UK. Examples of projects benefiting from such funding include the £5 million Driving the Electric Vehicle Revolution programme and the £60 million Energy Research Accelerator. The park has also benefitted from: programme funding from the Faraday Institute (linked with the EPSRC) and the European Regional Development Fund; a £2 million donation from HSBC; and grants from the Local Growth Fund and the Royal Academy of Engineering.



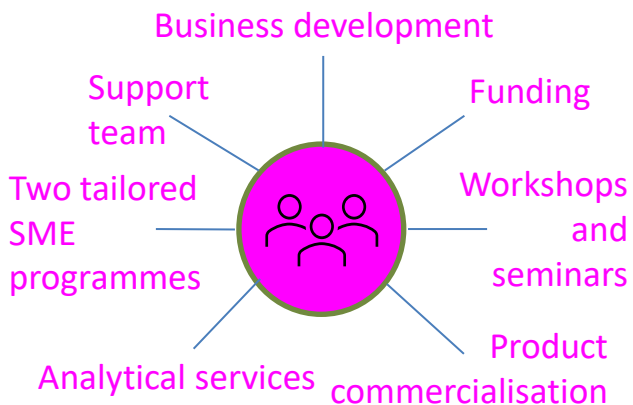
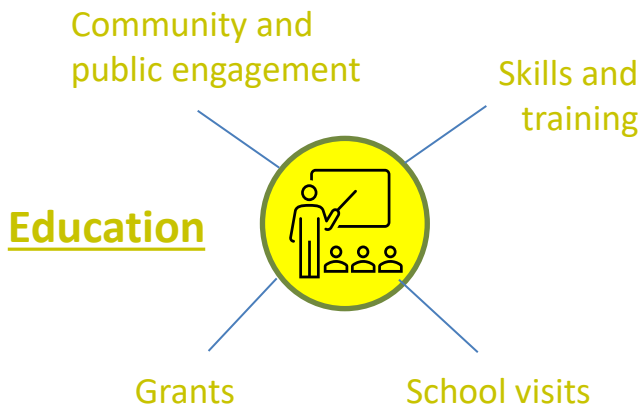
# Capabilities and activities



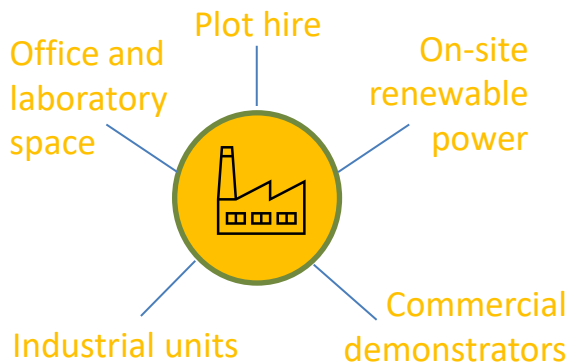
## Collaboration and innovation



## Generation and production



## Incubation and facilitation



## Demonstration and accommodation



## Next Step: Measuring impact

Impact addresses the ultimate significance and potentially transformative effects of an intervention. It seeks to identify social, environmental and economic effects of the intervention that are longer term. Beyond the immediate results, this criterion seeks to capture the indirect, secondary and potential consequences of the intervention.

# Pathways to impact

The primary value of TEP is its function as a melting pot, bringing different kinds of organizations together, from the City Council to the WMCA to businesses, to drive innovation in an organic and fluid manner. Consequently, multiple stakeholders benefit from the park: the University benefits from greater access to research funding given its collaborative work with industry; businesses benefit from incubation; local government benefits from the ability to work towards its net zero agenda; wider communities benefit from urban regeneration, access to spin out technologies, and innovative energy services; and individuals who benefit from IP or new jobs.

## Economic Impacts

Economic impact is the measurable impact on the economy in terms of output, jobs and contribution to GDP. TEP is delivering direct economic impact to the region by providing new/safeguarded jobs at and beyond the Tyseley site; within the private sector as a result of the activity unlocked by the investment and at the University from, research/business engagement activities.

Additionally, there are more indirect economic impacts, such as, supporting collaborative activities that possess the potential to drive innovation and the adoption of cheaper and more efficient waste/energy/mobility solutions. These more indirect impacts can specifically be associated with the 'University of Birmingham', due to their investment in a 'sustainable energy research and innovation centre' based at Tyseley Energy Park. The BEIC is the home of R&D, benchmarking and validation, business support, manufacturing systems integration and modelling expertise across the (public/private/academic) energy, waste and transportation systems sectors all in the one facility.

Our challenge is to begin to try and capture this impact in the form of proxy measures. For example, GVA increase for firms collaborating with the facility (in addition to jobs growth).

## Environmental Impacts

Tyseley is at the forefront of clean energy and sustainable technologies, all of which will have a measurable environmental impact, such as the reduction of CO2 emissions of associated transport, or the recycling and reusing of waste materials.

An example of a future environmental impact could include:

- Building a district heating line + private wire to new housing developments in Birmingham could supply ~50,000 people with all their electricity demand and 75% of their heating demand; CO2 emissions savings could be up to 90 kt per year. This would support clean air targets, as no local combustion in the residential areas would be required.

## Social Impacts

Social Value is the additional benefit, above and beyond economic value, that is generated in line with stated or accepted societal priorities to benefit specific groups. The potential value of TEP relate to the regeneration impact on the Tyseley and Haye Mills constituent in which the site sits on. The population of the area is 11,295, with a diverse ethnic make-up of 41% White, 41% Asian (23% Pakistani and 9% Bangladeshi), 9% Black and 6% multi-ethnic. There are higher than average numbers of children under 15 and 14% of the residents are unemployed, compared with an 11.1% average in Birmingham. The area also has very few community facilities and is ranked 200th most deprived out of 7511 nationally.

Any impact that TEP has to reduce deprivation in this area – such as improved health resulting from better air quality or access to innovative energy systems and services – matters because:

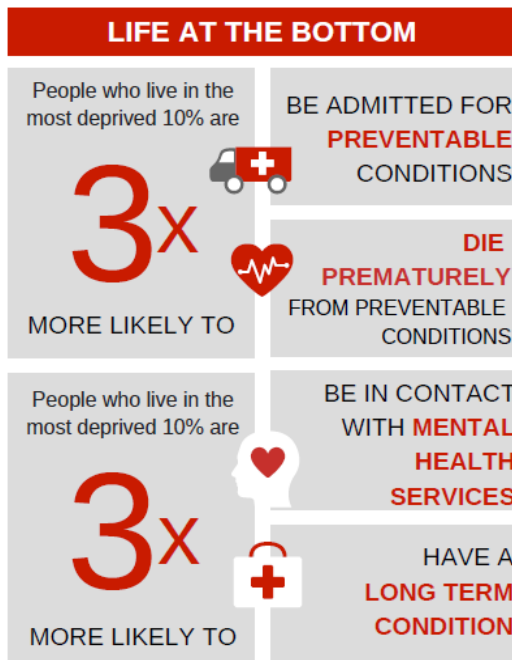


Image source: Birmingham City Council

## Next Steps:

Our objective is to compare the commercial and non-commercial impacts from TEP; modelling what the impact aggregate effects (macro-extension) would be if the assets did not exist, as well as estimating the regional impact of the adoption and diffusion of specific commercial and non-commercial innovations in the pipeline.

Our next step is to begin to measure the specific contribution of TEP as a University fixed asset and identify any factors that constrain its innovation/productivity growth. We are going to specifically focus on:

- ‘How’ and ‘in what way’ TEP generate impacts, including economic (commercial) and social/environmental (non-commercial) impacts.
- The factors that are constraining the innovation/productivity growth of TEP and the extent to which the constraints are they are region or university specific.

## Additional sources:

- [Birmingham Energy Institute](#)
- [Energy Research Accelerator](#)
- [Tyseley Energy Park](#)
- [West Midlands Combined Authority](#)