

Applied Sustainability Projects

Applied Sustainability Projects give **you** the chance to make a difference by helping organisations within the sustainability sector. There are hundreds of organisations working to make the Manchester area a greener, happier and healthier place to live and as a University we have a huge role to play. Students at the University of Manchester have expertise in a range of relevant subjects and around 7.5 million hours of coursework time that could be used to help make the world around us more sustainable.

The Applied Sustainability Projects are set by a range of organisations, from NGOs and the University to large businesses and SMEs, to help them address the key challenges that they face. The project ideas are free to use however you want. They could form the focus for an essay, or an entire dissertation. It is up to you. The projects are not intended to provide a step-by-step template, but rather give you the freedom to focus on specific aspects that interest you.

All we ask is that you fill in your details [here](#) to let us know who you are and what topic you are doing. This also means that we can make sure that your finished work gets back to the organisation so that they can make use of it. If you have any questions or feedback about the process, please drop us a line at es@manchester.ac.uk.

The rest of this document presents the Applied Sustainability Projects that are available. They are listed under the organisation that has set them, and a brief introduction to the organisation precedes the project descriptions.

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The University of Manchester

The University of Manchester currently has the opportunity to offer a series of applied sustainability projects covering a wide-range of themes such as energy, biodiversity and travel. Projects are based on a local level, studying the effects on the university or across the City of Manchester and many make use of existing data-sets. Currently the datasets available include utilities, transport, air quality and weather.

1. *Energy Use and Consumption at The University of Manchester*

The University of Manchester annually consumes 246 million kWh in electricity and 143 million kWh in gas. The cost of this consumption is £8.9 million and £3.7 million respectively, costing a total of £12.6 million annually. The environmental impact of this energy use is also significant with a total of 67,000 tons of CO₂ being released due to the production of energy that we consume. By 2020 The University of Manchester must see a 39% decrease in its CO₂ emissions, set from a 2007/08 baseline. The University electricity system operates at 6.6kV and distributes power from a substation owned by Electricity North West to substations situated across the campus. In these substations the electricity is converted to mains voltage and is metered to allow us to understand the energy use on a building by building basis. Electricity is not usually used for heating purposes but supplies loads that include lighting, ventilation systems, pumps, cooling and the essential services required by users to power office and laboratory based equipment. The University also operates a number of heat networks that use gas to heat hot water / to generate steam. This hot water or steam is then circulated across the campus through the heat networks. Within individual buildings, these heat networks supply the users with hot water and central heating. Both heat and electricity data is gathered through a series of metering systems based across campus. With the £1 billion Campus Masterplan there is a series of potential projects based on how to make builds more sustainable.

- **Future Grid Emissions:** We would like to understand what the likely grid emission intensity (i.e. kg of CO₂ produced per kWh of electricity) will be in the future. The project should consider the current energy schemes being developed across the UK and the relevant social, political and economic factors.
- **Influencing Energy Use:** The role of users in determining how much energy is consumed on the Estate is vital. How do we best encourage users to carefully manage the way they consume energy and incentivise behaviour, particularly that relating to the purchase and use of high energy intensity capital equipment.
- **Weather Dependence:** It is clear that our energy use fluctuates as a function of weather conditions but the level of variation varies across the building stock. We would like to understand whether we can adjust our energy use in a manner that gives us a robust understanding of the underlying demand irrespective of weather conditions.
- **Energy Management Through Automatic Data Interrogation:** With access to sensors and settings from building management systems on the Estate is it possible to automatically determine systems which are using energy in a sub-optimal manner through the interrogation of present and historic data.
- **Future Technologies:** What changes in technology could reduce the amount of energy used by the University Estate and/or which technologies are likely to see the type and amount of energy we use increase over time?
- **Post-Construction Assessments:** We have a range of technologies that have been installed as part of a number of capital schemes. One example is the installation of earth pipes that are used

within the Whitworth Art Gallery for cooling / heating purposes. A number of projects could be offered in this area.

- **Controlled Energy Environments:** Previously a PhD project saw the implementation of temperature boxes, allowing respondents to feedback the overall Temperature of their areas. This scheme could be replicated and updated, although catered towards a higher level student (MSc – PhD).
- **Energy Intensive Areas:** Certain building types, such as laboratories, require a high amount of energy-intensive equipment. We would like to understand particular zones of overly high consumption. An analysis of these spaces would be supported through utilities data and visual analysis.
- **Minimal Building Requirements:** As with most other Russel Group Universities there are a number of older, inefficient buildings on campus. We want it to be determined whether the energy used within these buildings can be wholly attributed to what the building needs to use, or are people the cause?
- **Future Technologies v2:** Within budgetary constraints what future technologies would UoM be able to implement? Additionally, what areas on campus are highlighted as severely inefficient and thereby rely on the implementation of future technology?

DATA: <https://www.manchester-i.com/>

University of Manchester Environmental Sustainability Strategy:

<http://www.sustainability.manchester.ac.uk/strategy/>

UK Government Low Carbon Transition Plan

UK Government Annual Report On Carbon Budget

2. *Biodiversity Conservation at the University of Manchester*

The University of Manchester has a set of aspirational environmental sustainability targets including the 2020 40% CO₂ emissions reduction. As part of these strategies is the implementation of a Living Campus plan, which is due in the next upcoming months. The key Environmental Sustainability objectives cover four key areas: research with impact, socially responsible graduates, responsible purchasing and engaging our communities. Across campus there are over 240 University buildings situated across 270 hectares, containing differing levels of environmentally friendly structures. Different Green walls and roofs are placed across campus, and can be used to improve local biodiversity. These Green Roofs are located at the Whitworth Art Gallery, Graphene Building, Sam Alex Building and the Alan Gilbert Learning Commons. Different areas across campus target enhancing local biodiversity such as the Michael Smith quad, which is established as a biodiversity garden. There are also a variety of beehives and renewable energy projects that cater towards improving local biodiversity. With these greenspaces on campus there is variety of potential student projects available. Biodiversity challenges are likely to require data-collection, primarily through visual analysis and survey allocation.

- **Monitoring Pollinators:** We would like an analysis of the types and numbers of pollinators on campus. We would also like the positive (or negative) side-effects of implementing pollinators on campus. Access to the Tree Trail, types of pollinators on campus and numbers of bee-hives are available.
- **Greenspace and Biodiversity:** Through the completion of a visual analysis and literature review, we would like to understand the effect greenspace has on local biodiversity. Suggestions as to

how greenspace should be altered to suit local biodiversity should also be made. The campus Tree Plan could be analysed here.

- Green Infrastructure: We would like some analysis of how building design implementation is allocated due to local biodiversity. A study of local green walls, green roofs and wildlife gardens can be made. The Campus Masterplan can be used as part of this project.
- Evolution of Local Biodiversity: We would like someone to study the effects of the Manchester urban environment and look at how wildlife evolves to suit this environment. One example would be the taming of urban foxes. Another could be how plant life has evolved to survive in areas with substandard air quality.
- Historical Biodiversity: This would be a historical analysis of how biodiversity has changed within perhaps 30 years. This could be on a building scale, a campus scale or a Manchester scale.
- Comparative studies: A comparative study of different wildlife areas on campus could be implemented. A habitat area study can be created using the campus biodiversity index. We would like an analysis of different biodiversity areas across campus.
- Positive Biodiversity: A survey to be completed that will analyse the overall improved wellbeing biodiversity and greenspace has on staff and students. Can link in to wellbeing strategy.

DATA: <https://www.manchester-i.com/>

University of Manchester Living Campus plan: <http://www.sustainability.manchester.ac.uk/strategy/>

Biodiversity site locations: Beehives, Green Roofs, biodiversity conservation areas

Biodiversity Data Journal

National Biodiversity Network

Global Biodiversity Information Facility

3. *Sustainable Travel at the University of Manchester*

The University of Manchester is aiming to increase the amount of sustainable travel by promoting different methods of sustainable travel. In 1999 51% of staff travelled to work by car – this number has now decreased to 30% (2010). Various schemes have been put in place to help reduce overall travel emissions, such as the Cycle to work scheme, the Low Emission Vehicle Scheme and the University Electric Pool Car. The University of Manchester is heavily involved with reducing Scope 1 & 2 emissions. Whilst Scope 3 emissions are harder to calculate, due to classification as indirect emissions, themes such as Travel fall within this category. There are methods to measure the amount of CO₂ emissions; for example Cargo bikes are also being implemented at The University of Manchester. This again reduces a dependence on diesel engines and reduces Scope 3 emissions. Information such as CO not emitted, overall speed and cost to charge are all included. This links in to TfGM data which indicates occupancy, state and capacity. A primary dataset source for transport is the University Electric Pool Car (EV). The EV runs at 2-4p per mile and runs up to 100 miles. The car is 100% electric and markedly reduces the amount of CO₂ emitted within Scope 3. The EV is monitored and collects travel data which could be used within students' projects. From the data sources available there are a variety of student projects potentially on offer.

- Shelter Occupancy: We would like to understand the levels of bike shelter occupancy across campus to ascertain a growing trend in bike users. TfGM could offer data in regards to numbers of daily cyclists on the Oxford Road corridor.
- Local Environmental Impact: It is clear that a bike journey uses less CO₂ than a car journey or public transport. We would like this environmental impact to be measured and calculated across

the University (using average bike users numbers). We would also like an analysis of potential future uptake in bike commuter intake.

- Health Effects on Bike Commuters: This study should rely on previous work within this field whilst combining the UoM local air quality datasets
- Transport Feasibility Factors: We would like a survey-based study ascertaining why people choose to use the transport they do. What factors obstruct them from using public transport? Or using a bike to commute? If business travel is analysed what forms of travel are most commonly used?
- Hazard Perceptions: A potential survey would be what hazards students believe can affect themselves in regards to Transport. This should be aimed towards bike safety, pedestrian safety and potentially car safety. A list of potential hazardous areas could be compiled. Training could be provided if bike/car safety is a concern. TfGM have a Speed Camera Locations / community concerns / road causality accidents datasets.
- Weather Correlation: We would like to know the correlation between commuter travel and weather. If a period has markedly bad weather will this thereby mean an increase in the amount of car commutes? Assumedly bike commutes will decrease, however we want to know how this primarily affects public transport. Weather datasets and Aquatic Centre datasets should be used here.
- Hazard Perceptions: A potential survey would be what hazards students believe can affect themselves in regards to Transport. This should be aimed towards bike safety, pedestrian safety and potentially car safety. A list of potential hazardous areas could be compiled. Training could be provided if bike/car safety is a concern. TfGM have a Speed Camera Locations / community concerns / road causality accidents datasets.
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DATA: Live-data gathered from CargoBikes, including Geolocation datasets and Journey information datasets <https://www.manchester-i.com/>

Car park datasets gathered through TfGM

University of Manchester Sustainable Travel Plan: <http://www.sustainability.manchester.ac.uk/strategy/>

Data.gov.uk

4. Measuring student engagement with sustainability on campus

The University of Manchester has recently released its Environmental Strategy, which aims to engage the academic community (staff and students) more closely with sustainability issues on campus. This project could explore current levels of student awareness about key sustainability challenges and initiatives on campus, and ideas for how to engage more effectively. It could also examine or evaluate initiatives and good practice elsewhere to distill potential lessons that could be applied here.

5. *Universities and Sustainable Development Goals*

The SDGs, launched in 2015, comprise 17 goals and invite all organisations to measure their progress against them. The University of Manchester is currently considering how best to do this. This project would look at how other organisations, including universities, are meeting this challenge and make recommendations to the University of Manchester.

6. *Sustainability impact of research*

Universities produce research that has a range of real world impacts, not least in sustainability terms. This project would involve analyzing the University of Manchester's 2014 research impact cases that were submitted as part of its Research Excellence Framework to capture and evaluate its sustainability impact. This could involve benchmarking against other university returns, or against the SDGs, or producing summative assessments that capture the cumulative impacts across projects. It should also pay some attention to relative contributions from different disciplines.

Contact: Emma Gardner, emma.l.gardner@manchester.ac.uk

Data: <http://impact.ref.ac.uk/CaseStudies/Results.aspx?HEI=163>

Corridor Manchester

The Corridor Manchester partnership was established in 2008 between Manchester City Council, the University of Manchester, Manchester Metropolitan University, and the Hospital Trust. The Partnership's core objective is to maximise the economic potential of the area by harnessing the investment currently being made by key institutions, by stimulating future improvement and growth at key locations within the area, and by capturing economic benefit from this investment for disadvantaged local residents in the wards surrounding the area and in the city as a whole. The Oxford Road corridor is slated to become a 'physical global exemplar of knowledge-based growth' through strategic capital investments based on five integrated themes: transport; environment and infrastructure; research and innovation; employment, business and skills; and sense of place. Over the coming years, the corridor will receive significant upgrades to the transportation and communication networks, high tech business activities, cultural amenities, and effectively double the number of workers in this part of the city. The economic potential of the corridor is promoted as being critical to the fortunes of Manchester, the North West and the UK as a whole; it is recognized as having 'the most significant concentration of knowledge-based assets and potential for growth in the UK today' (Corridor Manchester, 2010).

7. *Cycle-hire Appraisal*

Context: In the summer of 2017 Mobike commenced their operations in Manchester, the first European city to have the scheme in operation.

Key questions: The scheme covers a wide area and the project is to look at the usage of the scheme in the Corridor area, the availability of bikes and the public perception of the scheme. Is the Mobike scheme replacing bus and taxi journeys or walking?

8. *Electric Vehicles and EV charging, utilization and growth*

The corridor suffers from poor air quality and the partner institutions have begun to invest in electric vehicles as part of their environmental strategies. This challenge would involve understanding the reasons for adoption and levels of use of electric vehicles on the Corridor. Primary data may be available from the Triangulum project to support this work.

CONTACT: Claire Igoe, Manchester University NHS Foundation Trust claire.igoe@mft.nhs.uk

DATA:

<https://www.dropbox.com/s/kn1j3izjcu3ymlp/D2%205%20Impact%20Report%20MASTER.docx?dl=0>
<https://www.manchester-i.com/>

9. Interstitial spaces

Within the Oxford Road Corridor, there are a multiplicity of organisations, with well-managed campuses and estates. However the success of the area as an innovation district depends on the cross connections and overall appeal of the area. How can the 'spaces between the places' be developed and enhanced to create an improved perception of place?

CONTACT: Estates Directorate, University of Manchester tim.mckenzie@manchester.ac.uk

10. Animating the Space

Successful places attract residents, workers, businesses, visitors and tourists. Within the Oxford Road area there is a wealth of activity, however most could be said to be 'hidden'. How can we create activity within the area which is obvious and invites others to interact, discover and engage?

CONTACT: Debbie Bell, HOME, debbie.bell@homemcr.org

11. App development for wayfinding

Pedestrian routes are essential for ensuring the area functions effectively. These routes need to be promoted and easily accessible – what opportunities are there for app development for wayfinding, and what other complementary features could be added. How would a wayfinding app integrate with other apps developed specifically within in the area (e.g. through the CityVerve project) or those generally accessible (e.g. Walk-it)

CONTACT: Marie Saddoo, Oxford Road Partnership, m.saddoo@mmu.ac.uk

12. Green Infrastructure and Greenspace

A number of changes have been made to Green Infrastructure in recent years. The Cross City Bus Priority has led to changes on-street, with tree removal, replanting (3:1) and new planting areas adjacent to bus stops. The scheme as a whole has enabled a new park to be created – Brunswick Park, and there are significant GI interventions through other development works. The study could be to look at measuring the social/economic/ecological value of the space

CONTACT: Estates Directorate, University of Manchester, tim.mckenzie@manchester.ac.uk

13. Retail

There are a number of key new retail destinations within Oxford Road Corridor: HATCH under the Mancunian Way beside Manchester Technology Centre, Circle Square (coming soon), University Green (coming soon). What gaps are there in the retail and Food & Beverage provision within the Oxford Road Corridor? This challenge could involve an analysis of the retail or F&B outlets with consideration of target markets.

CONTACT: Marie Saddoo, Oxford Road Corridor, m.saddoo@mmu.ac.uk

14. Street Markets

Levy Market operates a street-food market on a Tuesday lunchtime during term-time on Bridgeford Street, close to the Manchester Museum. An analysis of the opportunities for market activity within the area would be useful, including different types of markets and areas these could be potentially

sited. It must be noted that Oxford Road (except for the pavement area immediately in front of Grosvenor Park (Also known as All Saint's Park) is designated as a 'prohibited street'
CONTACT: Estates Directorate, University of Manchester, tim.mckenzie@manchester.ac.uk

15. Wellness and Wellbeing

Manchester's Oxford Road Corridor is on course to be a world leading innovation district is also working towards having one of the healthiest workforces. There a number of health and well-being assets available to staff, students and the general public within Corridor. How can we increase the total % of participation? How can we encourage the highest risk students and workforce of Corridor to participate in health and well-being activities? What is the best approach for successful health and well-being implementation in the area of Corridor, an area that has lots of different institutions such as; hospitals, universities and Art Galleries? Can a "one size fits all" approach be adopted or would drawing on a personalised approach render a better result? How can all the many institutions and facilities available upon Corridor contribute to an innovative approach to health and well-being for the residents, staff and students of the area?

CONTACT: Helen Ashworth, PA to Professor Jackie Oldham, University of Manchester, helen.ashworth-2@manchester.ac.uk

Friends of the Earth Manchester

Friends of the Earth Manchester is an environmental group, creatively campaigning on local, national and international issues. Friends of the Earth work on a diverse range of issues including food, sustainable transport, climate change, biodiversity, resource use and justice. The group are closely aligned with city-level policy change. They campaign for Greater Manchester, lobbying for action, and they work closely with Manchester: A Certain Future, the city's Climate Change Action Plan and stakeholder steering group.

16. Estimating the cycling sector in the Greater Manchester Low Carbon Economy

The 2016 report "Deep Dive: 06 Low Carbon and Environmental Goods and Services" attempts to provide an overview of the 'The Low Carbon and Environmental Goods and Services' (LCEGS) sector in Greater Manchester.

However, the report used a definition of LCEGs which doesn't include active travel (walking and cycling). Greater Manchester has a growing number of cycle-related businesses involved in cycle training, cycle logistics, cycle shops, sports and recreational cycling and cycle tourism. This project would aim to examine the scale of the cycle-related sector within Greater Manchester. Report available here:

https://www.greatermanchesterca.gov.uk/download/downloads/id/242/deep_dive_report_low_carbon_and_environmental_goods_and_services.pdf

17. Environmental footprint of car parking space(s)

A car parking space typically takes up a minimum of 12 square metres for each car. Across the UK 7 million front gardens have been concreted over for car parking. [1] Surface parking lots create "heat islands" and are sources of polluted storm water runoff. [2] View the Trafford Centre on Google Earth to see how much space is taken up with the 11,500 car-parking spaces. [3] And yet, for up to 96% of the time the car sits unused and empty [4] and we do not calculate (or charge) the true costs of parking. Yet, there is no such thing as free parking – the true costs are borne by society. This project will seek to estimate the environmental and climate change footprints of parking space in Greater Manchester.

- [1] <http://www.racfoundation.org/research/mobility/spaced-out-perspectives-on-parking>
- [2] How Parking Spaces Are Eating Our Cities Alive <https://www.citylab.com/transportation/2014/07/how-parking-spaces-are-eating-our-cities-alive/374413/>
- [3] <https://intu.co.uk/traffordcentre/centre-information/parking>
- [4] the average car is parked at home for 80% of the time, parked elsewhere for 16% of the time and is only on the move for 4% of the time. <http://www.racfoundation.org/research/mobility/spaced-out-perspectives-on-parking>
- [5] <http://www.racfoundation.org/research/mobility/spaced-out-perspectives-on-parking>

18. *How fast can your granny run?*

Congestion is often only seen as a problem that affects motorised traffic. Indeed the introduction to the Greater Manchester ‘congestion conversation’ noted that congestion “costs our economy, increasing the time people spend commuting to work by car or bus, delaying deliveries and increasing business costs.” Although the Traffic Management Act describes the duty of the local authority in these terms, the definition of ‘traffic’ has been widened to include cyclists and pedestrians. But all too often it appears that many local authorities interpret their duty under the Traffic Management Act to secure the ‘avoidance, elimination or reduction of road congestion’ and securing and facilitating the “expeditious movement of traffic on road networks’ as only applying to motorised traffic. This can directly contradict the wider goal of making roads suitable for all users and encouraging modal shift towards public transport, walking and cycling. Widening roads and increasing speeds result in communities being severed, higher noise levels and insufficient time for people to cross roads. An example of the social impact of road widening policies is the difficulty some people may face when crossing roads. A 2017 study reported that “most older people do not walk fast enough to cross the road in time. Even the majority of the wealthiest and healthiest people aged 60 years and older do not walk fast enough to cross pedestrian crossings in the allocated time.’ It recommended that ‘crossing times should be increased to allow for older people’s slower walking speeds or other policies considered to improve walkability, and to help avoid injuries and social isolation.” In the UK, Living Streets are calling on national Government and Local Authorities to increase crossing times by “three seconds more” to give older people or people with impaired mobility adequate and comfortable time to cross roads. This project will examine the crossing times provided in Greater Manchester and whether they are aimed at facilitating motorised traffic or pedestrians and cycles.

19. *Impact of pool bikes*

Some businesses have provided their employees with a pool of bikes to use for work activities, such as travel to meetings and site visits. This is generally a part of wider initiatives to promote more sustainable travel behaviour. The bikes provide an alternative to private car use, therefore helping to reduce the number of single-occupant car trips during working hours. In some cases such a facility can reduce the perceived need for staff to bring their own car into work, therefore opening up other travel-to-work options such as walking, cycling or public transport. In promoting modal shift for journeys for work and to work, such a facility can help towards a company’s Corporate Social Responsibility goals, reduce its operational carbon footprint, give employees opportunity for healthy exercise, and cut expenditure on the provision and maintenance of car parking. Examples of businesses providing this facility include Creative Concern in Manchester, which has a pool of folding bikes; University of Manchester, which has a pool of cargo bikes; and Forster Communications in London, who provide pool bikes and free ‘cycle confidence’ training. This research project aims to identify and explore case studies in these and other organisations and to assess the impact of such schemes. This impact may include, but not be limited to: the level of use of the pool bikes; the effect

of the scheme in causing modal shift – i.e. providing an alternative to car journeys; the impact upon the employees' perceptions of cycling and their levels of confidence on the road.

20. Visualising air pollution

This project would examine how we can make air pollution more visible. The EU legal limit for Nitrogen Dioxide (NO₂) of 40 micro grammes per m³ and 25ug/m³ for PM 2.5 means very little to most people. Some of the questions that this project could examine include: how we can we make air pollution visible, technical information and representations, representation of pollution levels inside cars/vehicles, representing how air pollution varies with height, and communicating perceptions of air pollution.

21. Availability and effectiveness of air quality sensors for citizen science

What air quality sensors and data are available? The GreatAir Manchester website provides data from 16 (13 operational) air monitors across the whole Greater Manchester area. There are a range of DIY and commercial monitoring devices available such as Air Quality Egg , Citisense , Iphone/iSpex , NO₂ Diffusion tubes etc. This project would examine what air quality monitors are available, suitable and cost effective for citizens and community groups to use to undertake citizen science and other data gathering activities. Some of the questions that this project could examine include: Do these devices function effectively? How accurate are they? Are these devices available to community groups with limited funding? What situations can they be used in – e.g. can they measure air quality inside cars, prams etc.? Links:

DATA: <https://friendsoftheearth.uk/sites/default/files/downloads/unmasked-story-air-youre-breathing-103872.pdf>

<http://www.greatairmanchester.org.uk/>

<http://www.londonair.org.uk/london/asp/publicdetails.asp?region=0>

<http://airqualityegg.com/>

<http://inhabitat.com/citisense-is-a-portable-air-pollution-monitoring-device-that-sends-data-to-your-smart-phone/1-smallportabl/>

22. Options for incentivising sustainable modes of transport

Encouraging people to make more sustainable travel options benefits not only the health and finances of an individual but wider society with improved air quality, reduced road congestion and improved health outcomes. The provision of adequate storage for cyclists, and discounted annual travel passes are two examples of positive incentives used by businesses to encourage a shift away from car use. In contrast, the removal of free or discounted car parking is a 'negative' incentive. This research project aims to identify and explore case studies of businesses and organisations in Greater Manchester using incentives / or disincentives to increase active travel (cycling or walking) and public transport, and to assess the impact of such schemes for the effect of each incentive in contributing to modal shift.

Manchester City Council

The City Council are interested in issues of governance and leadership of cities in the context of sustainable and smart cities. In particular, this involves finding exemplars of effective leadership and municipal structures to inform strategic policy objectives, targets and structures for delivery, which enable genuine transformation of public services and the economy.

23. Zero Carbon 2050

Manchester City Council's current ambition is to reduce our carbon consumption by 41% in 2020 from a 2009/10 baseline. The Our Manchester Strategy has set out an ambition for the city to be on a path to being Zero Carbon in 2025 by 2025. The existing Manchester City Council activity is summarised in the annual report to Neighbourhoods and Environment Scrutiny Committee below which contains a significant amount of data. The questions for this work are: how have other large organisations achieved a significant CO2 reduction and have any of them actually achieved a Zero Carbon objective? What should the immediate priorities be for Manchester City Council beyond the existing 2016-2020 Climate Change Action Plan? Links: http://www.manchester.gov.uk/meetings/meeting/3032/neighbourhoods_and_environment_scrutiny_committee (item 5).

24. What is the international impact of Manchester's 'Soft Power'

Much of Manchester's international work can be categorised as 'soft power'. Manchester City Council and other partners strive to present the city as open, international, welcoming and progressive. Although difficult to measure, it is assumed that this has a significant impact in relation to developing partnerships, attracting investment and leading to high profile delegations such as the visit of President Xi Jinping in 2015. Examples of activity include hosting inbound political, educational and sports delegations; hosting international cultural events. The questions for this work are: Is it possible to make a link between the level of international activity in the city and its economic performance? What other examples are there of cities undertaking this activity and what have been the outcomes?

Contact: David Houlstan, Policy and Partnerships Manager d.houlstan@manchester.gov.uk

25. Digital transformation pilots at Manchester City Council

Manchester City Council have (via the Cityverve project) commissioned 3 digital experiments using to support city centre management. The key questions that this project might address include: understanding the impact of the solutions for the city based on an established Key Performance Indicators / evaluation framework; and whether relevant key data sources - data will be available via the systems / apps / suppliers.

Contact: Martine Tommis m.tommis@manchester.gov.uk

26. Impact of climate change and planning policy on population health outcomes

Greater Manchester has significant health inequalities and life expectancy is below the national average, as is poorer levels of healthy life expectancy. Greater Manchester has the third most significant NO2 concentrations after London and the West Midlands. A correlation has been observed nationally between high pollution levels, poorer public health outcomes and poorer neighbourhoods. Key questions: How does current climate change and city planning policy influence population health outcomes? How could these policies positively impact population health outcomes and what improvements could be made?

DATA: Greater Manchester Population Plan - <http://www.gmhsc.org.uk/assets/GM-Population-Health-Plan-Full-Plan.pdf>

Manchester Air Quality Reports

http://www.manchester.gov.uk/downloads/download/4166/air_quality_reports

Greater Manchester Air Quality Plan - <https://www.greatermanchester-ca.gov.uk/airquality>

Public Health England Wider Determinants of Health - <https://fingertips.phe.org.uk/profile/wider-determinants>

Public Health Manchester Annual Report - Manchester City Council 2016-17

http://www.manchester.gov.uk/downloads/download/6794/public_health_annual_report_2016-2017

Born in Bradford - <https://borninbradford.nhs.uk/>

CONTACT: Rosie Rees-Bann (Reform and Innovation Manager) - r.rees-bann@manchester.gov.uk

Vicky Clark (Strategic Lead - Reform) - v.clark@manchester.gov.uk

27. Urban Energy and fuel poverty

Urban areas are now producing local energy, but what impact can these local energy assets have on addressing fuel poverty? This project might examine a new energy asset such as the Birley Fields Energy Centre and local City Council assets to examine how they can support each other and also distribute energy surplus to the community. It could also examine how energy efficiency improvements for large organisations could be linked to Corporate Social Responsibility and distributed to address fuel poverty, or how energy on prescription could be used to promote behaviour changes through offering homes access to energy credits.

28. Civic innovation models

Civic innovation involves opening up public service challenges to the private sector (from corporates through to start-ups) in order to develop new solutions. This often involves making data openly available and incentivising private organisations or individuals to develop ICT based solutions to challenges such as traffic management. That said a number of challenges exist, including how to convince data holders to share data openly, and how to develop an interested community of private entrepreneurs. There is seemingly no model in the UK of how this would / could / should evolve to protect the public interest and maximise the value of the data in both commercial and civic uses. Where does this approach work well and what could Manchester learn?

ARUP

ARUP is a global Engineering Consultancy and a world leader in urban sustainability. These challenges relate to their current work helping Greater Manchester to develop a holistic and integrated approach to the digital agenda placing it on a trajectory to it becoming a leading global digital region, rivalling places like Barcelona, Singapore and New York. In these leading cities digital plays a critical role in: enhancing the lives of those who live and work there; enabling its citizen to live more fulfilling lives; creating the right conditions for growth and investment; and improving long term environmental quality and sustainability whilst at the same time delivering efficiencies.

29. The health and wellbeing gap in Natural Capital

Natural capital is increasingly being used to structure decision-making in cities (see recent Greater London Authority strategy). It represents an approach for the consideration of broader value of the urban environment, including social and environmental benefits. However, health and wellbeing are commonly missed in these practices. Key questions include: to what extent are health and wellbeing missing from natural capital studies? Should they be included? How? What extra insight would it bring?

Contact: Kelly Watson, Consultant, Arup: Kelly.watson@arup.com

30. Social value of day-lighting hidden rivers

The myriad, hidden water courses underneath our feet in modern day cities have considerable potential to add value in urban environments. Day-lighting is the technical engineering process of opening up these channels to create blue-green spaces in cities. There is considerable evidence for the environmental value of day-lighting, in terms of water quality, biodiversity, carbon storage, etc. However there is little research or evidence to understand the social value of creating new natural spaces for people. Key questions include: what evidence exists for the social value of day-lighting? Who benefits/how can local communities benefit? Are there any examples where a social value perspective has been taken in a day-lighting scheme?

Contact: Kelly Watson, Consultant, Arup: Kelly.watson@arup.com

31. Mersey Tidal Power and fuel poverty

The Atlantic Gateway strategy of the Liverpool waterfront took a holistic sustainable development perspective. More recently, detailed studies for Mersey Tidal Power have confirmed its technical, but not necessarily its economic, social and environmental feasibility. As energy security becomes increasingly vital to the UK economy, the Mersey remains a real asset for future exploitation as a renewable energy source. Key questions include: Can MTP produce sustainable development in the city region? What are the links between private wire schemes and regeneration? Are there any examples of using private wire schemes to generate social value? Could MTP tackle fuel poverty?

Contact: Kelly Watson, Consultant, Arup: Kelly.watson@arup.com

32. City of Trees impact and evaluation

The case for green infrastructure in cities is clear, yet GI is inconsistently delivered on the ground. City of Trees is a partnership approach to GI in the Greater Manchester region, aiming to plant a tree for every resident of GM in a generation. Capturing and communicating the impact of City of Trees is crucial to demonstrate the value of investing in greener city environments. Key questions include: What is the economic, social and environmental impact of urban street trees? What methods can be used to capture the data required? What existing data can be used for a long term evaluation programme at a city scale? What bespoke approaches could be taken in local areas of interest?

Contact: Kelly Watson, Consultant, Arup: Kelly.watson@arup.com

33. Wellbeing outcomes in the public realm

The impact of urban environments is increasingly being recognised as a significant driver of public health in cities. Health and wellbeing are important co-benefits of built environment schemes, yet capturing mental health impacts is difficult. Wellbeing valuation is an innovative new approach to understanding the ways that urban spaces and places can impact on the people that live, work and play there. Key questions include: how do green and blue spaces in cities impact on people's wellbeing? Can we build an evidence base for wellbeing in cities? What form should this take and who will listen?

Contact: Kelly Watson, Consultant, Arup: Kelly.watson@arup.com

34. Citizen impact on air quality

This project would examine how we can raise citizens' awareness of their own impact on air quality, thereby encouraging positive behaviour change. Some of the questions that this project could examine include: how can we make the everyday behaviours that create air pollution more visible, such as waiting in cars with the engine running? This project could also include exploring how emerging science around air quality, for example that suggests air quality inside cars is worse than

outside, or that removing trees from front gardens increases pollution in the home by 50%, can be popularised and communicated to promote behavioural change.

35. Digital inclusion / exclusion

Digital technology is significantly changing the ways in which people engage with government services and each other. This project could address the lack of digital confidence amongst the elderly, with a focus on how the digitalisation of key services in our day to day life and how to mitigate digital exclusion. This topic could also examine the potential of technology to bring people together, specifically in terms of alleviating social isolation (for example through new video technology, or robots).

Contact: Steve.turner@arup.com

36. Smart cities and local authorities

Local authorities are encouraged to embrace smart city solutions, but struggle to identify the best way to do so. This project could focus on designing a performance (impact benefit) framework for evaluating the deployment of Smart City technologies in a local authority, or examine ways to introduce more innovation into local government procurement processes. In terms of procurement a key challenge involves how to equip local authority employees to understand the potential benefits of procuring smart services, and enabling SMEs to engage in the procurement process.

Contact: Steve.turner@arup.com

37. Special educational needs and disabilities transport

Local authorities in the UK spend an average of £1 billion on SEND Transport, some of which could be directed to other frontline services. What smart technologies could be used to improve the efficiency of SEND transport? Is there a business case for Smart City technology in the delivery of SEN Transport?

Contact: Steve.turner@arup.com

Manchester Climate Change Agency

Manchester City Council has adopted a devolved approach to climate change policy-making and implementation. This stakeholder approach informed Manchester: A Certain Future (2009), the city's Climate Change Action Plan (CCAP) for 2010-2020. The City Council supported the establishment of Manchester Climate Change Agency in 2015 to facilitate the further development and implementation of stakeholder-led climate change policy. In December 2016 Manchester's Climate Change Strategy for 2017-50 was launched, built on the views of stakeholders from across the city. www.manchesterclimate.com/plan

38. Devolved climate change policy and implementation: city case studies

The challenge is to identify other European cities that could form part of a network to share knowledge and lessons learned. Cities should be both 'frontrunners' i.e. those already implementing this approach, and 'followers' that are looking to adopt a devolved approach. The research will be used to inform a potential bid by Manchester to form part of an Urbact 'Transfer Network' <http://urbact.eu/open-calls-networks>

39. Devolved climate change policy and implementation in Manchester: citizen views

In order to be successful, all citizens and organisations in Manchester will need to take action that contributes towards the 2017-50 strategy. There is evidence that a growing proportion of Manchester's citizens are taking action, but that it remains small in relation to the scale of the

challenge. To bring about the scale of action needed, the 2017-50 strategy sets out the need for a comprehensive programme of education and engagement activities. The challenge is to undertake a critical appraisal of existing education and engagement activities and to identify good and best practice from other European cities that Manchester could learn from. The research will be used to inform the development of Manchester's programme of education and engagement activities, being led by Manchester Climate Change Agency.

40. Devolved climate change policy and implementation in Manchester: what will you do?

In order to be successful, all citizens and organisations in Manchester will need to take action that contributes towards the 2017-50 strategy. Action will, in many cases need to be initiated and delivered by empowered, self-motivating citizens and groups. The challenge is to test this approach. What can you do to make a measurable contribute to Manchester's climate change objectives? What barriers did you face? What barriers need to be overcome to scale-up your action? Which organisations need to be involved? This will be an action research project where you deliver action that brings about physical and/or behavioural change. You should consider the potential to work with a group of citizens from one of Manchester's diverse communities. The research will be used to inform the development of climate change engagement projects being led by Manchester Climate Change Agency

41. What does it all add up to? From projects to transformation

Manchester has hosted upwards of 100 EU funded projects focusing on various urban challenges, from smart cities through to low carbon development. This projects would examine the legacy of some of these projects and develop an understanding of what wider impacts they did and did not have. In particular it would be useful to identify what needs to happen for the successes of these projects to become more widely adopted in Greater Manchester.

e-Forum

The Forum for European e-Public Services (e-FORUM) e-FORUM is a “not-for profit” best practice network that has specialised in EU-China smart city and governance issues for many years. They coordinated the EU-China Smart Cities Dialogue, taking forward the EU urban agenda in relation to China.

42. Sustainable urbanisation: transferring lessons from Europe to China

China is rapidly urbanising, and is funding various joint initiatives with the UK and EU. This project asks what lessons are there to be found in Manchester's experience of smart and sustainable urban development which could be shared with different types of Chinese cities. This project should focus on either smart energy or Nature-Based Solutions. An added element could consider whether there lessons which Manchester might take from the Chinese situation as well as what is of value to China. Contact: shaun.topham@yaproject.eu

43. Northern Powerhouse and JingJinJi: identifying knowledge needs for metropolitan mega-regions

Increasingly governments are endeavoring to create metropolitan super-regions that contain a number of tightly networked cities. In the UK the Northern Powerhouse seeks to improve transport and digital networks between Liverpool, Manchester and Leeds, while in China the new JingJinJi region aims to link Beijing, Tianjin and create an new city to house the governmental functions. This area will be home to ~100 million people. This project examines the challenges and specific knowledge needs involved with creating these metropolitan mega-regions. It could focus specifically on the JingJinJi region, or the Northern Powerhouse, or the potential parallels between the two. It may also want to focus on a particular sector, for example transport or digital infrastructure.

Contact: shaun.topham@yaproject.eu

44. Blockchains and urban challenges

Blockchains are a form of Distributed Ledger Technology that improves the accountability of processes without the need for any central verification system. The most well-known examples are crypto-currencies like Bitcoin, but the technology is now being applied to numerous certification challenges, for example around sustainable supply chains. This project requires some creative thinking to assess whether blockchain technology has any potential application within a smart city setting. What is existing best practice in its utilisation and could any of this be of value to Manchester?

Contact: shaun.topham@yaproject.eu

The Old Abbey Taphouse

The Old Abbey Taphouse is a community-run pub located in the science park adjacent to the University campus. It functions as a 'hub in a pub', a space for events, creativity and learning with a focus on bringing together the knowledge institutions along Oxford Road with the local Hulme community. The pub also works as a Living Lab, testing out new technologies and collaborations, from e-bikes to school gardening days. As a small enterprise based on social values, the Old Abbey is an example of a grassroots actor within the wider urban governance landscape. The challenges reflect this position and relate to projects that are currently being discussed and developed.

45. A feasibility study of bee keeping

Urban bee keeping has become an important means for supporting dwindling bee populations and raising awareness about the importance of green space and biodiversity in cities. This challenge explores the feasibility of installing a bee hive on the Old Abbey premises. It will require research into the existing capacities for additional beehives along Oxford Road, an understanding of the required conditions to set up a new hive and an identification of practical next steps. This could include green space mapping, research into favourable planting regimes, expert interviews and identification of interested stakeholders.

Contact: jana.wendler@gmail.com

46. Stakeholder mapping of Hulme community organisations

The Old Abbey is situated in Hulme, one of the most deprived wards in Greater Manchester but also one with a great potential for innovation, creativity and community resilience. In order to support its socially engaged work and network building around creative learning, this challenge focuses on an in-depth stakeholder mapping of community groups and organisations in Hulme and Moss Side. The key questions are what kind of creative community-based initiatives exist, what are their aims and needs, and how do they connect to each other and bigger stakeholders in the city. Alongside a better understanding of the community landscape, this research could produce a visual representation to be shared among these organisations.

Contact: jana.wendler@gmail.com

47. Scoping the circular economy for small enterprises

The circular economy is an approach to consumption and production that is quickly gaining attention. It focuses on re-use, recycling and integrated systems that minimise waste and resource inputs. This challenge explores the potential of a circular economy approach for a small community-

based enterprise such as the Old Abbey. It would consist of a literature review pulling together the key ideas and mechanisms, and would further investigate best practices amongst small businesses (in particular those related to food and drink).

Contact: jana.wendler@gmail.com

Collaboratory for Urban Resilience and Energy

The Collaboratory for Urban Resilience and Energy (CURE) forms part of the Manchester Urban Institute. Part funded by the European Research Council, CURE is home to more than 20 academics working on urban intelligence and innovation, urban living labs and urban sustainability. CURE was established in 2000 and collaborates extensively with local and regional authorities, public and private institutions in research projects and activities relating to urban sustainability and urban living labs. The challenges here relate specifically to current projects.

48. Smart City of Sensors

Digital sensors are often promoted as a necessary infrastructure to help manage cities more smartly and sustainably. They range from energy monitors in individual buildings, or traffic and pedestrian sensors on lampposts, to air quality sensors on buildings. The streets and buildings of Manchester are home to hundreds of digital sensors, often the legacy of myriad funded projects, and yet there is no central intelligence concerning where they are, who owns them, or what they can do. Manchester is essentially a laboratory without a kit-list. This project would seek to map the sensor capacity across Manchester, including practical elements concerning ownership and access. It would form part of the scoping work for the £1m EPSRC funded project 'CORONA: City Observatory Research platform for iNnovation and Analytics'.

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49. Over Hulton Neighbourhood Forum

Neighbourhood planning gives communities direct power to develop a shared vision for their neighbourhood and shape the development and growth of their local area. Bolton Council has recently designated a Neighbourhood Area and Neighbourhood Forum for Over Hulton. The community are in the process of developing their neighbourhood plan. There is a recognition of strong interconnections between natural and cultural heritage and of the need for their integrated management. This challenge is set in an area of both and involves reviewing the natural and cultural heritage of this area, considering if there are any opportunities for development that also provides enhancement and protection. There is also opportunity to consider the natural capital of this area alongside proposed development and preservation/enhancement of natural and cultural heritage.

Contact: Emma Gardner, emma.l.gardner@manchester.ac.uk

Learning Loops in the Public Realm (LOOPER)

LOOPER is a project which aims to build a participatory co-creation methodology and platform to demonstrate 'learning loops', which are new ways of decision-making that bring together citizens, stakeholders and policy-makers and incorporate visualisation technologies and experimentation. This process unfolds through the implementation of 'Urban Living Labs' here in Manchester and also in Brussels and Verona with continual exchange and learning taking place across the three sites. During the next two years LOOPER project participants from the Brunswick neighbourhood (currently undergoing large scale regeneration) and its neighbour the University of Manchester will together move through the learning loops. The process begins with discussions of issues of concern

in Brunswick and gradual framing of problems followed by participatory data collection and visualisation in order to fully understand the nature of the identified problems. Based on collective understanding of the problems to be addressed, we will co-design potential solutions, and evaluate their feasibility and likely effectiveness. The most promising solutions will be implemented and the results monitored. (This will probably mean physically changing something in the neighbourhood on a temporary basis.) If an experimental solution works, we will explore how to make the change permanent.

50. Promoting active transport to school in Brunswick

Like many schools, Medlock Primary in Brunswick is clogged with cars bringing children to and from school, augmenting the problems of air pollution and traffic safety which are key concerns in Brunswick. Many of the schoolchildren live a short distance away and it should be easy to walk or cycle with all the benefits of exercise and developing independence that these modes of transport provide. Yet parents continue to drive their children to school. This project involves interviewing parents about why they make this choice and what would make them change their minds. It might also include mapping safe routes to school for children. This will hopefully lead to proposals for measures that could be tried out in Brunswick in the context of the LOOPER project.

CONTACT: Janice Astbury, University of Manchester, janice.astbury@manchester.ac.uk

51. Parking in Brunswick

The Brunswick neighbourhood has been notable for its low car ownership. Two outcomes of the regeneration project have been the introduction of driveways in front of houses and changes to parking regulations on the streets—in parallel with perceived increases in university and hospital users parking in Brunswick. This project will examine the effects of these changes and how people feel about them. (There do seem to be strong feelings about parking.) A better understanding of underlying issues will contribute to discussions about how to potentially change parking arrangements or attitudes and behaviours in ways that will result in more positive social and environmental outcomes.

CONTACT: Janice Astbury, University of Manchester, janice.astbury@manchester.ac.uk

52. Green infrastructure in Brunswick

A key part of the LOOPER project is to test interventions that will address identified issues such as air quality, traffic safety and improving community spaces. It is hoped that green infrastructure can be part of the solution. The goal of this project is to identify low-cost interventions that could be rapidly implemented and subsequently monitored. This will involve participation in walkabouts and discussions with the LOOPER team and local residents to understand the issues and the context followed by desk based research to prepare a catalogue of potential solutions which can then be presented to stakeholders.

CONTACT: Janice Astbury, University of Manchester, janice.astbury@manchester.ac.uk

53. Green roofs on Brunswick sheds

Regeneration in Brunswick has resulted in many new sheds in back gardens, which may be useful storage spaces but are taking up large portions of what little space is available for vegetation and wildlife habitat. Some residents are interested in creating new green spaces and habitat on the shed roofs. This offers an opportunity to experiment with different green roof designs that could both maximise ecosystem services and respond to residents' interests (for example by attracting a certain sort of bird). This project will involve assessing potential back garden sites and residents' interests

and then researching and recommending possible designs for several green roofs that will hopefully form part of a pilot initiative in the area.

CONTACT: Janice Astbury, University of Manchester, janice.astbury@manchester.ac.uk

54. Accessing and using local green spaces

Many people in Brunswick say that green spaces are very important to them but some parks seems underused by local residents. The goal of this project is to understand who is using local parks and how, and why some residents are not using the green spaces available. This will involve observation of parks and surveys of residents. It is hoped that the project will result in recommendations for facilitating better access to and use of parks by Brunswick residents.

CONTACT: Janice Astbury, University of Manchester, janice.astbury@manchester.ac.uk

55. Trees and wellbeing in Brunswick

Several new trees are about to be planted in a park in Brunswick providing an immediate opportunity to assess the effect on local residents. A perception of place tool and wellbeing scale will be adapted and applied before and after the tree planting (due to take place in mid-March). The goal is to better understand how residents perceive and interact with a local green space and what difference the new trees might make in the short term. The conclusions will be fed into subsequent discussion about tree planting in Brunswick.

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