

ENVIRONMENTAL SUSTAINABILITY STRATEGY

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1. INTRODUCTION

This sustainability strategy and its associated documents provide the guiding framework that will lead Arden Cross to achieve its potential as a dynamic, thriving and sustainable development. While the focus of this strategy is environmental sustainability, it is supported by a suite of strategies covering topics including:

- Community and Social Value
- Utilities
- Land Use and Delivery

Together, these capture a holistic approach to sustainability at Arden Cross; which includes acting within environmental limits, establishing a strong social foundation, and contributing to a prosperous and regenerative economy.

This suite of strategies demonstrate the potential of Arden Cross to deliver sustainability throughout its lifetime and provides a practical framework with guidance for future delivery partners to help make that vision a reality. Arden Cross Ltd (ACL) recognise that there will be uncertainties and challenges as the development moves through the various stages of planning, design and delivery. These documents are intended to be aspirational and show what is possible. The specific interventions will need to be refined at each stage to incorporate any new information.

1.1 Developing the Arden Cross Narrative

Arden Cross has significant opportunities to create a sustainable development that integrates the HS2 station, makes best use of the surrounding assets and contributes to boosting the Midlands and UK economies. To support delivery of this vision, the 'Arden Cross Narrative' was developed, bringing together strategic priorities for the site and its stakeholders and creating the sustainability framework for the suite of strategy documents.

Members of Mott MacDonald, Phil Jones Associates (PJA), ACL, and Solihull Metropolitan Borough Council (SMBC) held a strategy workshop in December 2020. The team considered the current and future context of Arden Cross over the development horizon and potential future drivers for change. This included changes to nearby land use, policy and legislation, society and individual behaviour, through to 2050 and beyond. Recommendations for adapting and responding to these drivers were captured and grouped to identify overlapping opportunities that could deliver sustainable outcomes, considering the costs and benefits of each intervention.

From this exercise, four strategic sustainability themes emerged: Arden Cross must be Adaptable & Resilient, Nature-led, Accessible, and Healthy. Each of the recommended interventions has the potential to deliver against at least one of these. Together, these themes were adopted as the Arden Cross Narrative sustainability framework. At its core, the Arden Cross development will be **adaptable to changing** needs of the site, its users, and adjacent developments, while being **resilient to external challenges and uncertainty** around land use, market forces and climate change. Maximising nature-led solutions will deliver holistic benefits for biodiversity, water and air quality for Arden Cross and the surrounding landscape. Embedding permeability and habitat connectivity between the sites existing natural assets like Hollywell Brook and Denbeigh Spinney will protect and enhances nature for all.



Arden Cross will be accessible by maximising its central position close to major transport hubs like Birmingham Airport and HS2 Interchange, while providing flexible and active modes of travel on site; physical proximity to work, education, open space; and access to information technology and social connectivity.

Making Arden Cross an attractive place to live, work and study means **delivering affordable**, **safe**, **diverse** housing and community facilities; **creating healthy, clean spaces for active lifestyles**; all designed strategically to integrate seamlessly into a vibrant landscape.

1.2 Format and structure of the strategies

Each strategy provides some current and future context relevant to the topic of the strategy, considering national, regional and local ambitions that could affect Arden Cross. Key drivers for change and are presented for each topic, and recommendations grouped under the themes of the Arden Cross Narrative.

The remaining sections of this strategy are dedicated to the environmental sustainability approach for Arden Cross, covering important aspects of biodiversity, landscape, climate change, air quality and resource use. Other strategies include:

- Land Use and Delivery
- Utilities
- Community and Social Value.

2. Environmental Sustainability Context

2.1 Drivers of change

The UK must achieve rapid and transformational change in all sectors to achieve 'net zero' carbon emissions by 2050 to meet its targets under the Paris Agreement. The agreement includes an ambitious target to reduce the UK's emissions by at least 68% by 2030, compared to 1990 levels. Solihull Metropolitan Borough Council have committed to achieving net zero carbon emissions within the borough by 2041 in line with the West Midlands Combined Authority, and as a council are aiming to become a net zero organisation by 2030.

The adopted Solihull local plan expires in 2028, however in light of the fastpaced nature of change linked to the borough's commitment to climate action, and rapid growth planned for the next decade, SMBC has brought forward its review and already consulted on an updated draft plan. Priorities from the local plan will influence future decisionmaking at Arden Cross, and are set to include investment in natural capital, clean air, active travel and electric vehicle infrastructure. Over half of the borough is designated green belt and some of this will be released for new housing in the coming decades. There is real pressure on Arden Cross to effectively manage the relationship between the natural and built environment to deliver a healthy, environmentally sustainable and diverse hub, to minimise the impact of losing this green space.

Since 2012, the United Nations Sustainable Development Goals have provided a clear framework shaping policy and decision making for sustainable outcomes at all levels of government, however they will likely be replaced by a new set of goals when they expire in 2030. The Arden Cross development will need to be adaptable and ready to respond to future policy goals when seeking stakeholder approval and consent. In 2020, the UK government announced their 10-year plan for a green industrial revolution. Focusing on creating jobs that achieve climate targets and accelerate progress towards net-zero by 2050, they set out a several targets including:

- Planting 30,000 trees a year
- Installing 60,000 heat pumps a year and improving the energy efficiency of existing housing stock and public buildings
- Investment in diversified energy including wind, nuclear and hydrogen, including a proposed £500million hydrogen-powered neighbourhood
- Mainstreaming the use of Electric Vehicles (EVs) and phasing out production of petrol and diesel vehicles by 2030
- Adoption of carbon capture technology with intent to remove 10MT of CO2 by 2030

Arden cross has an opportunity to capitalise on this investment by ensuring it is ready to adapt to and accommodate new technologies and provide opportunities in these sectors.

2.2 Environmental Context

The site is physically severed from its surrounding landscape by three major routes on the strategic road network (SRN). Its proximity to the airport creates unique challenges for biodiversity because of the need to avoid attracting birds that could be hazardous to airport operations.

Hollywell Brook is a defining feature of the Arden Cross landscape that joins the River Blythe downstream. It provides opportunities for diverse habitat creation and restoration for priority species, connectivity, flood management and climate resilience, and amenity value. Environmental planning for the site will need to consider both upstream and downstream drivers of change over time, such as the impact of nearby projects, to ensure the site is resilient to future conditions. There are multiple, large scale projects delivering environmental mitigation within the area or very nearby, including the HS2 line, HS2 Interchange Station, and M42 junction 6 upgrades. Plans should seek to either use, enhance or further develop these. Arden Cross will seek opportunities to work alongside or with other projects for an integrated outcome delivering more biodiversity value by creating a more resilient and better-connected landscape. Working closely with SMBC and Natural England will ensure that local knowledge of the area underpins all decision making at Arden Cross when it comes to meeting targets around biodiversity net gain.

3. Adaptable and Resilient

3.1 Climate change resilience

Climate change will be one of the most significant external influences on Arden Cross in the coming decades. By 2050, local weather is expected to become progressively more extreme, with winters becoming warmer, more intense and prolonged rainfall events, and summers becoming drier and bringing more days of hotter than average temperatures. Many of these climatic changes will become typical, regardless of efforts to halt carbon emissions. This will mean the site is more vulnerable to flooding in winter, but more droughtprone in summer, resulting in possible knock-on effects such as water scarcity, flash-flooding, wildlife decline, soil erosion and health impacts.

3.1.1 Recommended interventions

Drainage and site landscaping will be designed for future flood levels, protecting adequate space to store excess flood water and integrating this into the site layout through a network of sustainable drainage systems (SuDS). This will minimise strain on the capacity of Hollywell Brook and nearby waterbodies such as Pendigo Lake. SuDS should be connected to a natural flood management approach that considers land use changes upstream and downstream of the site. Native plants, trees and vegetation that are resilient to a range of climatic factors will be selected over ornamental species. The 'blue green strategy' includes soft landscaping, green roofs and green walls, which will help to reduce urban heat island effects.

The design of buildings and infrastructure must also include climate resilience to prolong the life of the asset. Grey water and black water recycling will further minimise the risk of water scarcity, while careful building orientation and glazing design will minimise solar heat gain as much as possible. Materials with high resilience to climatic factors should be selected, especially for mechanical and electrical systems that may be vulnerable to extreme fluctuations in temperature.

Transport operators should consider how to protect their assets during extreme weather events and develop response plans to withstand worst-case scenarios. ACL will need to be involved in any emergency planning, along with stakeholders such as the Environment Agency and the local drainage board.





3.2 Net zero carbon emissions

Arden Cross must support SMBC to achieve net-zero carbon emissions by 2041. In the earlier phases of development, the site will be planned and designed with carbon neutral end-uses in mind, while ensuring the phased delivery of the site uses the available techniques for minimising its carbon footprint.

3.2.1 Recommended interventions

Designing and delivering Arden Cross to be carbon neutral will ensure its resilience to the impact of future uncertainties from technology, regulation and behaviour change associated with a carbon neutral future.

Onsite renewable energy generation will reduce its reliance on the national energy grid. Buildings and infrastructure will be designed to the highest energy efficiency specifications and guidance, such as the 'Climate emergency design guide' by the London Energy Transformation Initiative (LETI) or equivalent. The transport networks and 'car free' site layout will optimise carbon-neutral living with car free gateways, walking and cycling corridors, automated people movers and integrated sustainable transport network.

Where carbon emissions at Arden Cross can't be eliminated, the carbon sequestration and storage potential of the site's green infrastructure will be calculated and, if necessary, offsite opportunities for offsetting emissions will be investigated. ACL will aim to offset emissions as close to the site as possible and will take a holistic approach to planting any new offsetting vegetation to maximise benefits for flood management and biodiversity gain. Wet woodland and fast-growing trees are examples of habitat types with high sequestration potential that should be investigated further.

Understanding the scope of emissions attributable to the site will be essential to calculating its carbon emissions profile. Ongoing monitoring of the site's emissions profile should also be undertaken once operational.







The government's 10-part plan for the green industrial revolution incorporates technological solutions that are likely to evolve rapidly over the next 20 years. For example, preparation for the ban on the sale of petrol and diesel cars in 2030 will include charging infrastructure across the site to support widespread use of electric vehicles.

3.3 Resource use

In their draft local plan SMBC have stated a need to move towards secondary and recycled aggregates, and on a regional scale the West Midlands Combined Authority are developing a circular economy route map to close the loop on resource production, consumption and waste.

Arden Cross requires development on an enormous scale, introducing a huge demand for materials, energy and water. Whether through the availability of raw materials, or increasingly stringent requirements on waste disposal and recycling, the site will need to be able to work within circular economy principles and manage resource scarcity. Sourcing materials locally from Stonebridge Quarry and in partnership with the adjacent recycling and recovery site will be essential.

3.3.1 Recommended interventions

Adopting circular economy principles in planning and design will help to prepare the development for a low-carbon transition and respond to possible requirements from local authorities and suppliers.

ACL will work with development partners, suppliers and tenants on the site to establish service-based asset management strategies where possible. This will change the responsibility for maintaining and disposing of equipment from the asset 'owner' to the service 'provider', which will help to convert potential waste into resources instead.

A centralised waste recovery centre with an intelligent resource database could be introduced to manage waste generated by the site occupants, and food waste could be converted to energy.

With so many major projects happening within and around the site, a collaborative approach to sharing resources will help to eliminate waste and improve efficiency of construction. A shared materials database and shared construction compounds would facilitate this.



4. Nature-led

4.1 Ecosystem services

The Solihull draft local plan acknowledges the value of natural assets to the borough and speaks of the need to protect them from encroaching development. SMBC are developing a Natural Capital Investment Strategy to capture the opportunities presented by the borough's substantial assets.

4.1.1 Recommended interventions

The site has a good existing stock of natural capital. Quantifying the financial value of the assets on the site using tools like INVEST will assist in prioritising types of green and blue infrastructure that can offer multiple benefits.



Waterbodies and wetland habitat provide urban cooling, habitat for a diverse range of species, carbon storage, water storage and rainwater filtration

2 Mature trees and vegetation remove CO2 from the atmosphere, provide habitat, ground stability and nutrient cycling

 Hedgerows, trees and green walls provide habitat connectivity, air purification and noise absorption

Parks, green roofs and gardens provide amenity value, slow down surface water runoff, and help pollinators thrive

Ecosystem services provided by Arden Cross assets

4.2 Biodiversity net gain

Policy trends indicate an increasing focus on protecting and enhancing the UK's biodiversity, with the UK government setting out aspirations through the Environment Bill for future developments to achieve biodiversity net gain. SMBC are expected to set a requirement for development projects to achieve a minimum of 10% net gain to secure consent.

CONNECTIVITY A complete biodiversity strategy must consider how to maximise habitat connectivity within the development as well as how to enhance its connectivity to the wider region, using corridors like Hollywell Brook. Acknowledging the significant impact of nearby development such as the HS2 high speed rail line and the HS2 Interchange station at the heart of Arden cross is necessary. The introduction of major infrastructure projects will impact the existing ecosystems and habitat corridors around the site, and there will be a need to continuously review how this affects flora and fauna.

4.2.1 Recommended interventions

Arden Cross will develop a biodiversity net gain strategy that focuses on restoring habitat for local native species, including those that may be declining or require specific conditions. It will also look outward from the Arden Cross site to deliver regional habitat connectivity. Collaboration with other projects, landowners and stakeholders will increase the opportunities for habitat restoration and enhancement and identify the best solutions for biodiversity in the region.



- Active travel routes with tree lined streets will provide permeability across the site, shade and urban cooling. Native and climate resilient species will be selected, providing local habitat connectivity.
- 2 Native trees selected for their biodiversity value will screen the site boundary, providing some protection to residential areas from the noise and air quality impacts of the adjacent road network.
- Retaining the historic landscape of hedgerows and mature trees around Hollywell Brook will provide ample habitat for Black Redstarts and other urban species, while retaining the original landscape character of the area.
- Green roofs and high rise buildings provide opportunities for urban species to thrive. Wildflower mixes and native species will be selected first, creating habitat for locally significant and vulnerable species such as Duke of Burgundy butterflies.
- 5 Habitat with high biodiversity net gain potential like wetland or wet woodland will be well suited to more sensitive species that are unlikely to thrive in the new urban environment within Arden Cross, such as otter and barn owl.
- 6 ACL will work closely with Packington Estate to provide larger-scale habitat, linking with mitigation strategies of HS2 and other developments.
- Applying natural flood management measures upstream of the site will reduce flood risk to Arden Cross and downstream sites. This could incorporate the wetland or wet woodland provided for biodiversity gain.

5. Accessible

5.1 Physical mobility

Making the site accessible through the provision of sustainable public transport will reduce reliance on private car ownership and have major benefits for air quality and carbon emissions. SMBC is developing an area-wide access strategy that will guide the approach to transport provision at Arden Cross.

5.2 Spatial proximity

Active travel like walking and cycling supports low-carbon lifestyles that offer easy access to community services like local shops, GP's and schools, all within a short distance from people's homes, sometimes referred to as the '20-minute neighbourhood'. The mix of residential, industrial and commercial spaces across the site (discussed further in the land use and delivery strategy) will support this. SMBC are seeking to develop a Cycling and Walking Strategy for the borough that will inform plans for Arden Cross.

5.2.1 Recommended interventions

The network of multimodal transport corridors through the site provide a variety of low-carbon transport alternatives to driving, including regional connectivity to HS2, Sprint, Coventry Very Light Rail, all reducing the need to drive. Shared vehicle and cycle schemes will give people more flexible transport options along with public transport.

Removing the majority of private vehicles from the road network and replacing them with sustainable transport options will make significant progress towards SMBCs target of net-zero carbon by 2041. Active travel corridors for cycling and walking will be strategically placed to connect the major transport hub of HS2 Interchange with other key areas of the site, and will link up to the wider regional network of public rights of way and cycle routes into Birmingham and Solihull, to encourage low carbon journeys.



The sustainability narrative theme of 'Accessible' is based on the triple access model, which describes sustainable access in terms of spatial proximity, physical mobility and digital connectivity. This includes reducing the need to travel, shortening journeys and offering sustainable transport options when travel is necessary.

5.3 Digital connectivity

Access to data and information is proven to lead to better decision making as it allows patterns, interfaces and risks to be seen more clearly. For individuals, access to data can inform decisions about spending, consumption and lifestyle choices. For environmental sustainability, monitoring the consumption of resources and the health of the natural environment is critical to helping the site thrive in the long term.

5.3.1 Recommended interventions

A digital twin showing a live model of the site during construction and operation will give a wealth of data to decision makers. The supply and demand balance of water and energy can be quickly and easily understood and adjusted accordingly to avoid shortages, the stock of embodied and stored carbon in physical and natural assets can be reported to investors and authorities, and asset monitoring data can be stored to inform decisions about maintenance and replacement of infrastructure (as part of a circular economy). For maintaining the health of the natural environment, habitat quality and species population data, weather and air quality data can all be collated and stored. Information can be shared with other projects happening in the local area and with stakeholders, for example Natural England, to contribute to regional or national plans.



Installing smart energy and water meters across the site will allow people to take control of their consumption and reduce their costs as well as their carbon footprint. This information can feed into a digital twin model of the site, which will allow suppliers to adapt to the peaks and troughs of demand and provide a reliable supply.

A digital twin for Arden Cross

6. Healthy

6.1 Clean air and green space

For Arden Cross to be a healthy place to live and work, it must be centred on a high-quality environment able to provide clean air, water and open space. Access to open space is known to have mental health benefits and improve quality of life and is noted as a priority in the SMBC local plan.

By delivering a site that supports sustainable and active transport modes and creating natural screening between the site and the surrounding road networks, the residents and workers of Arden Cross will be less likely to experience transport-related air quality issues that impact health.

Poor quality housing can also have detrimental impacts on the health of its occupants, and typically comes from poorly insulated, energy inefficient housing. Indoor air pollution such as dust from poor ventilation, VOCs from low quality paints and furniture can also lead to health problems. Eliminating these air quality issues through sustainable design is a priority for the development. 6.1.1 Recommended interventions

Arden Cross will provide a multifunctional public realm that not only provides green space for wildlife and nature, but also provides recreational green space for exercise, sport and play. These spaces will overlap wherever possible to maximise the benefits, for example by incorporating elevated running and walking tracks across wetland areas, or by adding heritage adventure trails along hedgerows.

Arden Cross will ensure its buildings meet the most stringent sustainable building standards including the BREEAM and WELL ratings, which will ensure health and wellbeing of their occupants. Buildings will be well insulated and efficient to heat, which while making them less resource intensive also makes them more affordable to live in, and therefore more accessible to potential residents.





BREEAM®



6.2 Healthy ecosystems

Maintaining the health of the landscape is one of the most important ways that Arden Cross can protect its longevity and the wellbeing of its occupants. Without the supporting functions of a healthy ecosystem like nutrient rich soil, diverse wildlife and clean water, the landscape will be unable to produce food, provide soil stability for water systems and building foundations, and unable to store carbon.

6.2.1 Recommended interventions

Overcoming habitat severance caused by the strategic road network will strengthen the diversity and resilience of the Arden Cross biosphere by connecting it to the regional network. This will allow species that are more transient to move in and out of the site and encourage cross pollination of plant species to improve diversity. Habitat corridors may be incorporated into pedestrian and cycle links between the site and nearby development. Limiting the use and carefully controlling the disposal of inorganic compounds in chemicals and materials will help to avoid pollution from the processes involved in construction, as well as some of the sites proposed end uses.

Urban farm schemes or allotments may be included on even small spaces like rooftops, or as part of community gardening projects. In addition to providing sustainable and local food, these types of projects can support bee and insect populations that will make a significant contribution to the health of biodiversity at Arden Cross and in the surrounding areas, and will be incorporated in the site layout.



7. Conclusion and Next Steps

7.1 Environmental Sustainability

The environmental sustainability strategy of Arden Cross will ensure the site operates within environmental limits, enhances the natural environment for people and wildlife and is resilient to future shocks. To do this, it is important that:

- Nature-led solutions are utilised to provide holistic ecosystem services such as flood management, biodiversity, carbon management, and healthy public realm;
- Approaches to developing natureled solutions take a regional approach, aligning mitigation and enhancement strategies with HS2 and other projects taking place in the area to maximise ecosystem benefits;
- Carbon-neutral design and construction are prioritised, ensuring suitable readiness for low-carbon end uses;

- Circular economy principles are embedded; utilising data to make informed decisions about supply and demand of resources;
- Climate resilience is built into all aspects of the development;
- The site is ready to adapt to changes in policy, legislation and people's expectations that dictate 'sustainable' lifestyles in the future as efforts to combat climate change increase;
- Engagement with other projects, local landowners and statutory stakeholders like Natural England and the Environment Agency is utilised to ensure local knowledge is put to good use.

7.2 Holistic benefits and outcomes

The Arden Cross strategies brought together multiple strands of sustainable development to create a cohesive narrative that will inform the future of the site. 38 site specific interventions were developed and prioritised so that ACL can make an informed choice about how to turn the Arden Cross vision into reality. The most effective, cross cutting interventions recommended for further investigation and implementation are those that contribute to 3 or more of the strategic themes. Priority interventions include:

- Flexible transport solutions, such as Mobility as a service (MaaS), affordable 24/7 mass transit, shared ownership schemes and extensive local and regional active travel networks
- Digitally connected, accessible utilities, with a focus on local ownership including site-generated energy and locally managed water and waste recycling
- High quality and affordable housing, with immediate and equitable access to public realm and community amenities
- Low-carbon design and delivery of buildings and infrastructure, with a high-quality green and blue network to support biodiversity onsite and in the wider region

Some interventions, although only contributing to one or two of the strategic themes, are relatively easy or low-cost to implement and are therefore also recommended for further consideration. The majority of interventions can be easily accommodated within the existing site layout proposed in the masterplan. Interventions 20 and 35 may require space within the site which hasn't already been allocated, depending on the scale at which the intervention is deemed to be appropriate (e.g. micro-renewable sites versus larger energy from waste recovery site).



- 1 MaaS tool for multi-modal journey planning to, from and around Arden Cross
- Reshaping the TfWM travel zone to be UKC2 Centric (e.g. through pricing, ticketing, integration).
- Habitat corridors within and around the site
 Public realm offering community and
- 4 landscape value, e.g. through providing outdoor spaces for children's play or recreation and implementing green spaces. Delivering a place that is socially diverse
- 5 and inclusive, with services that cater for all ages/abilities/social and economic backgrounds.
- 6 Diverse employment opportunities provide a range of employment sectors
- 7 Electrification and electricity balancing

Incorporate climate resilient landscape design. This involves the use of green

- 8 infrastructure to reduce cooling needs, including measures such as green roofs.
- Producing a quantified database of natural
 capital stocks that can be shared with and demonstrate value to investors
- 10 Common ownership of district water treatment
- 11 Inclusion of a range of housing options including % of affordable housing
- 12 Off-site/modular construction of buildings and infrastructure
- Affordable mass transit for local workers 13 and ensuring free/easy access to Accessible
- People Movers (APM) 24/7 14 Outdoor exercise spaces (tennis, basketball, football, etc.)

Shared vehicle scheme (car, cycles,

- 15 scooters, etc.) to reduce traffic and emissions within the public realm Include within public access a network of
- 16 circular walks and running paths to further encourage active travel
- Understand the quantum of travel demand 17 and potential traffic change to monitor and manage the traffic network
- Local regional waste network to divert 100% from landfill
- 19 Build in measures to reduce water demand, including grey/black water recycling
- **20** Centralised waste and recycling collection
- 21 Urban food production initiative
 - Incorporating smart digital infrastructure. This includes smart and integrated car park
- 22 charging across HUB partners and digital connectivity of vehicles and mobile phones
- **23** Off-site strategic park and ride improvements
- 24 Combined use of construction compounds
- **25** Regular market testing of potential land uses All surface water drainage treated and
- 26 attenuated at source and discharged to Hollywell Brook
- 27 Very high energy efficiency standards mandated for all developments
- 28 Reintroduction of lost species and recreation of habitats to host them
- Offsite habitat creation (Biodiversity Net 29 Gain) to improve rural biodiversity and
- regional carbon sequestration
- **30** Provide education facilities at all levels
- 31 High proportion of car parking spaces with EV charging, including for public transport Enhancing permeability and connectivity (overcoming severance) i.e. building
- **32** multimodal bridges such as the M42 and West Coast Main Line bridges for Sprint and EBS Metro
- **33** Shared material database with other projects Sustainable urban drainage systems
- 34 delivering biodiversity benefits while supporting water close loop system
 Build measures to allow on-site energy generation. This includes air and ground
- **35** source heat pumps, on-site hydrogen infrastructure, solar PV systems and energy from food waste.

Micro-mobility solutions for the Hub area and enhancing the micro-mobility network

- 36 around the site, including an enhanced cycling network that connects to the regional network.
- 37 Introducing utility corridors to meet energy demands
- Introducing incentives for behavioural change to increase energy/resource efficiency









