



Lower Lea Valley Sustainable Utilities Infrastructure report

Executive Summary

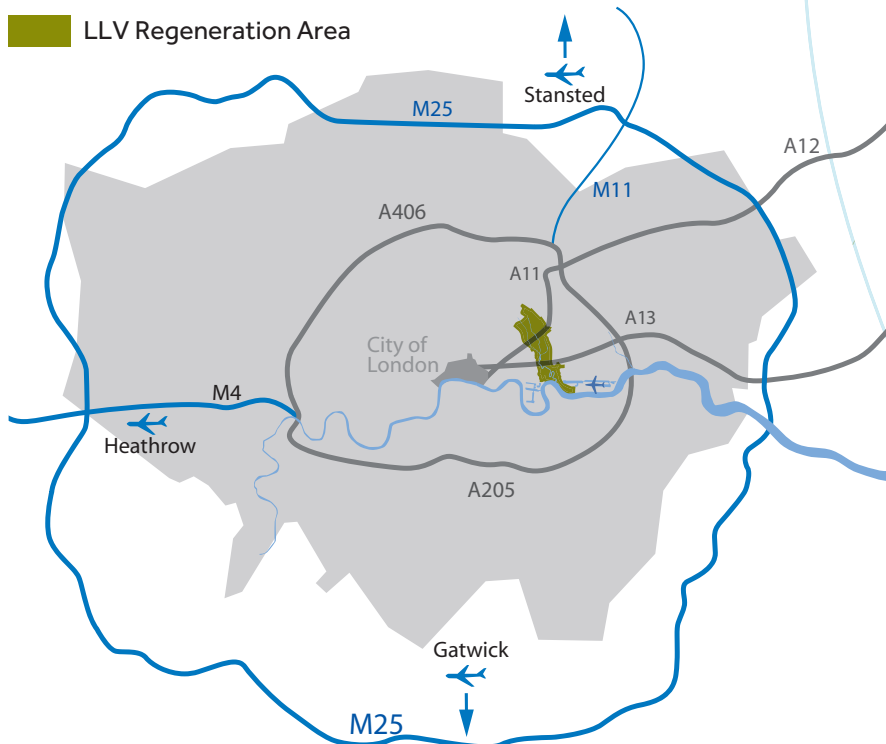


Thames Gateway
Institute for Sustainability

Contents

1.1	The opportunity	Page 4
1.2	Sustainable utilities infrastructure strategy	Page 4
1.3	Key policies and drivers	Page 5
1.4	Findings from the infrastructure inventory and utilities demand analysis	Page 5
1.5	Opportunities in the Lower Lea Valley	Page 6
1.6	Sustainable Infrastructure Areas	Page 8
1.7	Delivery issues around funding and investment	Page 8
1.8	The role of planning	Page 9
1.9	Proposed projects for phase II	Page 9
1.9.1	Location specific projects	Page 10
1.9.2	Enabling delivery	Page 10
1.9.3	Awareness and understanding	Page 10
1.10	Next steps	Page 11

Lower Lea Valley (LLV) Regeneration Area



1.1 The opportunity

The Lower Lea Valley (LLV) is a large and complex area extending from the Olympic Park in the North to the River Thames in the South. It covers land in four London boroughs; the majority is located in Newham, but it extends into Hackney, Tower Hamlets and Waltham Forest. Most of the portion in Waltham Forest is occupied by the Olympic Park. There are considerable public sector landholdings as well as strategic industrial sites that have previously accommodated waste and energy infrastructure and could continue to do so.

The LLV represents the largest regeneration opportunity in inner London, providing capacity for more than 50,000 homes and for supporting amenities for 100,000 new residents. It offers a huge opportunity for London to lead the way in demonstrating how a previously industrial and underutilised area of London can be transformed into a thriving metropolitan hub where people can lead healthy, low carbon lifestyles, with increased access to information and education in an environment that is resilient to the future impacts of climate change and which will be attractive to businesses and industries that will lead the shift to a resource efficient economy.

Through the Climate Change Act (2008) the UK has established a legally binding target to reduce UK carbon emissions (CO₂) by 80% on 1990 levels by 2050. This will require new approaches to the way we generate and supply energy and manage energy demand in the LLV and how we promote and enable low carbon modes of transport. It will also require new approaches to the way we manage waste, with London's waste becoming a valuable resource for the production of low carbon heat and power.

London's built environment, water supply and water treatment systems will need to be designed and adapted to be resilient to the impacts of climate change and we have the opportunity to use advances in information technology to increase access to learning, to encourage and enable us to use resources more efficiently and to help manage utility demands and supply networks more efficiently in real time.

These outcomes will only be achieved for the LLV by the public and private sectors working together to plan the required infrastructure at a strategic level and to develop delivery mechanisms that offer mutual benefit. This requires a clear understanding of the existing and planned infrastructure in the LLV and the opportunities for delivering it in a more joined up and sustainable way.

1.2 Sustainable utilities infrastructure strategy

This report sets out the findings from the first phase of a two phase study. The aims of this first phase were to:

- Prepare an inventory of heat, power, waste, water and telecommunications infrastructure; existing and planned.
- Assess the likely growth of utility demands over the next 20 years.
- Explore how this inventory and demand data could be made more accessible to stakeholders.
- Use the data to identify opportunities for the more sustainable delivery of infrastructure within the area and develop a strategy for delivering these in the next 15 to 20 years.
- Identify key projects that could be delivered in the short to medium-term (next five years), to be studied further as part of a separately commissioned second phase of work.
- Obtain feedback from key stakeholders in the LLV on emerging opportunities and to discuss how challenges to delivery could be overcome.

1.3 Key policies and drivers

A review of relevant policy drivers identified the following issues to be addressed in a strategy for the LLV:

- The Mayor's ambition for London to be a "Zero Waste to Landfill Capital" by 2031, with an associated shift in London's waste out of landfill and into facilities within London boroughs.
- The need to deliver a 60% reduction in London's CO₂ emissions by 2025, with 25% of London's energy met by low carbon, decentralised energy networks by 2025.
- The need for low carbon energy supplies that can help new development meet tightening Building Regulations, including zero carbon for all homes built after 2016.
- The need to reduce water demands in both new and existing stock and enable development

beyond 2016 to meet the 80 litres/person/day water standard proposed in the Mayor's draft water strategy.

- The need to deliver resilient smart grids that can cope with the increased levels of embedded generation required to meet UK renewable and CO₂ reduction targets, accommodate future demand for electric vehicles, and enable and incentivise occupants to understand and reduce their demands for utilities.
- The need to develop area wide retrofit programmes to reduce CO₂ emissions, water use and waste from London's existing building stock.

An integrated strategy for delivering against these drivers will remove barriers to development, enable regeneration and position the LLV as a world class eco region. It can also help address pressing social issues, including fuel poverty and health.

1.4 Findings from the infrastructure inventory and utilities demand analysis

General issues that have emerged from compiling the inventory of existing and planned infrastructure and the assessment of future utility demands are set out below:

- The difficulty experienced in accessing up-to-date data across the LLV as a whole, has highlighted the need to make infrastructure data more accessible to stakeholders. An accessible web portal with GIS capabilities appears a good solution and the London Development Agency's (LDA) Brownfield Database would offer an ideal platform.
- The London Thames Gateway Development Corporation (LTGDC) predicts that 53,332 new homes could be delivered in the LLV in the period between 2010 and 2030, although there are obvious uncertainties in the timing of delivery.
- Capacity to meet expected utility demands is not generally an issue in the short to medium-term. Utility companies have statutory obligations to meet the demands of development and set out plans to do this in Long-Term Development Statements. However demand reduction measures introduced now will help avoid supply reinforcement in the longer term.

- The biggest supply challenge is to switch to low carbon and renewable energy generation consistent with targeted CO₂ emissions reductions.
- Some substations in the LLV have limited capacity and will need to be reinforced and upgraded to meet the expected demands of planned development. This presents an opportunity to introduce smart grid capabilities to maximise the potential of the existing network and to enable the integration of decentralised energy generation.
- The LLV benefits from good broadband coverage. Both of the telephone exchanges in the LLV are 21CN enabled (BT's network transformation programme which aims to switch the UK telephone network to an Internet Protocol system and deliver additional services, such as on-demand interactive TV services).
- Further benefits could be achieved by delivering "fibre to the home" infrastructure capable of delivering the full range of entertainment and communications services for the longer term.

1.5 Opportunities in the LLV

Analysis of the inventory and demand trajectory has identified a range of opportunities for delivering sustainable utilities infrastructure in the LLV.

These cover three key themes:

- **Delivering low carbon energy**
- **Smarter grids and smarter homes**
- **Creating a sustainable water cycle**

Delivering low carbon energy

London Plan policies are likely to require future development to connect into district heating schemes. To enable zero carbon policy to be met, these will ideally be served by renewable and low carbon sources of energy supply.

In terms of cost per tonne of carbon saved and based on the current grid mix, district heating served by biomass combined heat and power (CHP) is currently one of the most cost-effective solutions for the supply of low carbon heat. A key opportunity for community scale, low carbon energy supply is to link planned biomass CHP and advanced waste to energy facilities into area wide, district heating networks. Two or three large scale facilities could potentially provide the full power and heating demands of all new homes planned in the LLV.

Known proposals for large biomass CHP or advanced waste to energy facilities in the LLV include Tower Hamlets' plans for an advanced waste to energy facility and Quintain's proposals for a waste wood, biomass CHP facility at their Carlsberg Tetley site.

Apart from the district heating network being delivered for the Olympic Park and Stratford City, there are no existing networks of a scale to justify connection to a biomass CHP plant or waste to energy facility.

Two large networks have been proposed: one connecting existing housing developments and the Whitechapel Hospital in Tower Hamlets and the London Thames Gateway Heat Network. Neither is likely to be delivered soon without a concerted effort to aggregate a sufficiently dense, diverse and secure customer base to justify the necessary infrastructure investment. Successful implementation is likely to involve planning bodies leading efforts to work with private sector partners to develop an area wide approach to aggregating demands, accessing funds and planning delivery.

This and earlier work by the LDA identified six areas that could provide a focus for the delivery of large district heating networks (see Sustainable Infrastructure Areas). These include the extension of the Olympic Park district heating network, which provides an immediate opportunity to deliver low carbon heat to development in the Olympic fringes. In the longer term, the addition of CHP engines to the Olympic Park Energy Centre that are capable of running on a mixed gas input (to include syngas or biogas) would enable further reductions in CO₂ emissions.

There are a range of barriers to taking these schemes forward and a number of enabling projects have been identified that could be developed further as part of the phase II work (see proposed projects for phase II).

In addition to the generation of heat for distribution in heat networks, there is an opportunity to use advanced waste to energy plants to generate bio-methane for direct injection into the gas network. This approach would avoid the need for investment in new distribution infrastructure and would contribute to reducing CO₂ emissions from existing buildings. However, CO₂ emission reductions will be maximised where gas is used in CHP engines to displace grid supplied electricity.

Embedded renewable energy generation offers further reductions in CO₂ emissions. There is limited opportunity for large scale wind and small scale hydro generated energy in the LLV. The biggest opportunity in the short-term will be the use of photovoltaics driven by feed in tariffs and tightening Building Regulations. The distribution network will need to be able to accommodate this increased embedded generation.

Smarter grid and smarter homes

A key element of the sustainable utilities infrastructure strategy is to ensure that, through new development and retrofit programmes, the LLV is equipped with the smart grid needed to accommodate a changing mix of supplies and demand, which can enable demand reductions in homes and businesses.

Key aims of a smart grid strategy for the LLV are:

- To enable increased decentralised energy generation, increased use of electric vehicles, and to enable demand management technology in homes and businesses.
- To incorporate smart appliances, services, metering and IT infrastructure in homes and businesses to enable occupant feedback, time of use charging structures and automated demand control. Smart devices could monitor and respond to changes in water and waste use, as well as energy.
- To build on the availability of faster on demand IT connections and telecommunication systems to increase access to information for residents enabling more informed and sustainable choices regarding their use of resources and modes of travel.
- To ensure smart grid technology is installed as part of planned upgrades to sub-stations in the LLV and as part of all new development plans and retrofit programmes enabling real time demand management across networks by utility companies.

The Electricity Networks Strategy Group, an industry body led by DECC and Ofgem, has developed a Smart Grid Route Map for the UK. This has identified the need for pilot projects to demonstrate smart grid concepts. Ofgem has made £500 million available to District Network Operators on a competitive basis to help fund suitable pilots through the Low Carbon Network Fund.

A major pilot demonstration project, focused initially on Canning Town or Bromley by Bow but with the potential for replication across the LLV, is proposed.

A sustainable water cycle

The capacity to meet the LLV's water demands was found not to be a significant issue until 2026. However, the more water demand can be reduced, the less reliant London and the LLV will be on energy intensive supplies such as those from Beckton desalination plant.

A key objective is to reduce water demand through water efficiency measures integrated into new development and as part of retrofit programmes.

As well as the use of water efficient sanitary ware, this could include smart water metering to enable new charging arrangements and enable water companies to identify leakage within their networks.

The study reflects accumulating evidence that small scale decentralised supply and treatment, such as rainwater and greywater systems, do not necessarily offer sustainability benefits compared to centralised supply. Workshops held as part of the phase I project identified the need for further study of the lifecycle impacts and costs of alternative water supply and demand management systems. A proposed non-potable water treatment system being planned for the Olympic Park provides an opportunity to monitor and assess costs and sustainability benefits.

The LLV is potentially at risk of both pluvial and fluvial flooding. A key element of the approach to flood risk management is to ensure that water is not retained unnecessarily within the built environment. This is contrary to the normal objectives of sustainable urban drainage to retain rainwater on site and thus reduce and delay flows to water courses.

An existing problem in the LLV has been the discharge of sewerage to the River Lea and River Thames in the event of heavy rainfall. This will largely be resolved by the construction of the Lee Tunnel between Abbey Mills and Beckton treatment works. A sensible long-term objective is to reduce the loading at Beckton by reducing the number of combined rainwater and sewerage inflows to the sewerage systems. The paving over of gardens in urban areas is an additional contributory factor. It is proposed that retrofit programmes could seek to reverse this trend, while at the same time restore the character of London's streets.

The waterways are a distinguishing feature of the LLV. A key thrust of regeneration activity is to make them more accessible to the public. Improving water quality in the Lea Valley's rivers and canals has been identified as a key issue by the Environment Agency and would offer significant benefits in terms of recreation, health and biodiversity. This should be a key focus for cross-agency working in the LLV.

1.6 Sustainable Infrastructure Areas

Six Sustainable Infrastructure Areas have been identified as a focus for delivering a joined up package of sustainable utilities infrastructure and demand reduction measures, as well as providing a focus for monitoring and behaviour change programmes.

These areas were identified based on a combination of the scale of new development planned, public sector land ownership and existing building demands. These areas should form the basis of a public sector led approach to developing partnership arrangements with developers, Registered Social Landlords and utility providers for the procurement of sustainable infrastructure at scale.

- Canning Town and Custom House
- Bromley by Bow, Three Mills, Sugar House Lane and Stratford High Street
- Poplar Riverside
- Blackwall Reach, Leamouth Peninsular and Wood Wharf
- Fish Island and Hackney Wick
- The Olympic Park in legacy

1.7 Delivery issues around funding and investment

One of the key challenges facing delivery will be constraints on public spending and the availability of public sector funding for infrastructure. This will require public and private sector bodies to work together to develop funding and procurement models that can aggregate and access those public funds that are available and create the required conditions for investment by the private sector.

A key element of this will be to create the scale and certainty of a customer base and revenue streams that can attract private investment or enable access to public sector rolling investment models such as the Greater London Authority's (GLA's) proposed Decentralised Energy Urban Development Fund.

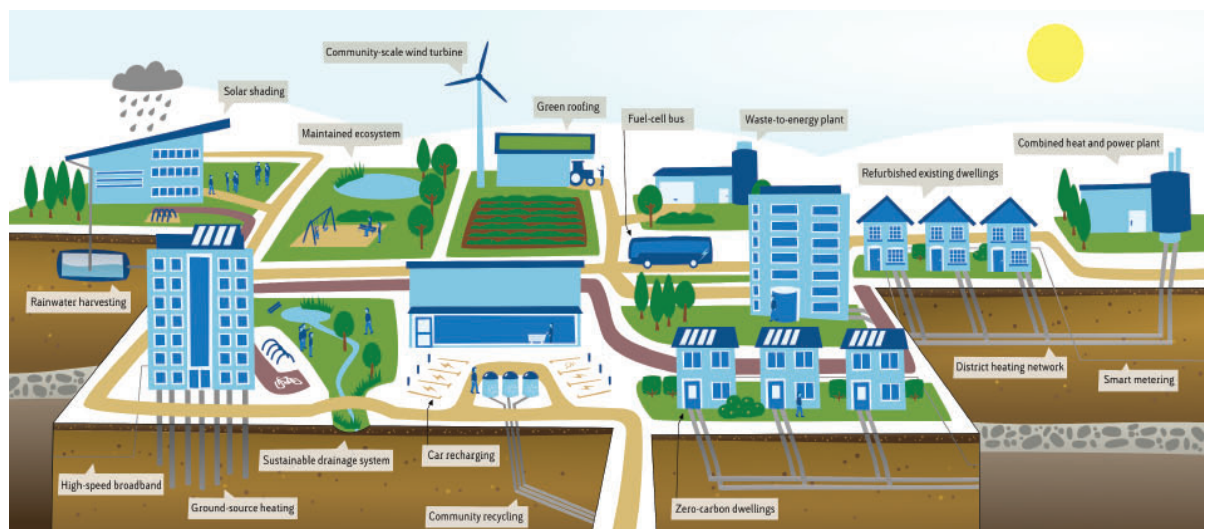
This work and current work by the Sustainable Development Commission, suggests this might best be done by taking an area wide approach to delivery,

with the public and private sector partners in each area working together to plan and procure a broad package of sustainable community infrastructure in a way that is mutually beneficial to the partners concerned.

This will not be easy and there may be cases where timing and phasing issues and differing commercial priorities of partners may prevent it, but attempting this aggregation forms a key element of the strategy.

Appendix D of this report outlines possible funding mechanisms for sustainable utilities infrastructure. A recommended project for phase II will be to explore the partnership arrangements and the funding and procurement models that could be exploited to drive delivery in the six Sustainable Infrastructure Areas identified. Opportunities for funding may arise following the launch of the Mayor's Green Enterprise District in May 2010, which includes the Lower Lea Valley.

Delivering Neighbourhood Retrofit. Forthcoming study by the Sustainable Development Commission in draft at the time of writing.



1.8 The role of planning

The GLA, LTGDC, Olympic Delivery Authority (ODA), LDA and the London boroughs all have a key role to play in planning, leading and enabling sustainable utilities infrastructure in the Lower Lea Valley.

Opportunities include:

- Safeguarding of strategic industrial sites and wharves for low carbon energy production and advanced waste to energy solutions. However, there needs to be a balance between using local waste to produce local energy, and locating energy from waste facilities at wharves that encourage the shipment of waste over long distances.
- Planning and safeguarding key infrastructure corridors and crossing points to enable, for example, connections from the Olympic Park to fringe areas or from Canning Town to the Leamouth Peninsula.
- Using masterplanning area briefs, development agreements and planning policy to encourage or

require connection to planned networks where phasing allows, and working with energy services companies to create consistent technical standards for connection.

- Offering existing public buildings or public sector led regeneration schemes as anchor loads for heating networks.
- Leading cross agency approaches to dealing with issues such as water quality in the River Lea, surface water management, etc.
- Planning how revenue streams such as Community Infrastructure Levy and the "allowable solutions" proposed for Building Regulations could be used to deliver infrastructure.
- Making existing data more accessible to public and private sector stakeholders. The phase II enabling work could explore further how planning powers could be used to greatest benefit in the LLV.

1.9 Proposed projects for phase II

While this study has explored a time horizon of 15 to 20 years, most of the actions needed to ensure delivery are in the short-term. This partly relates to the urgency of mitigating climate change and improving security of energy supply, but also the timing of new development, with many of the major regeneration areas already having masterplans or development briefs and others in the process of preparing them. The four London boroughs with planning responsibilities for the LLV are in the process of preparing their Core Strategies. The GLA is preparing strategic planning guidance for the Olympic Park.

To ensure opportunities are not missed, priority projects have been identified for delivering sustainable utilities infrastructure over the next five years. They are initially focused on the Sustainable Infrastructure Areas but should be later rolled out across all areas, learning from the initial experience gained. A number of enabling projects would be carried out in parallel to help address known barriers to delivery. These projects are summarised on page 10 with further details provided in chapter 7 of the main report.

1.9.1 Location specific projects

1 Extension of the Olympic Park district heating network

As the only large scale, district heating scheme to have been developed within the LLV, there is an immediate opportunity to explore how the Olympic Park scheme could be expanded into the Olympic fringes and the potential for renewable or lower carbon heat generation.

2 Procurement of community scale, low carbon district heating networks

The objective would be to engage public sector partners, private sector developers, Registered Social Landlords (RSLs) and major heat users to plan community scale heating networks served by existing or new low carbon heat sources and to aggregate a diverse and secure customer base that would help enable investment in the required infrastructure.

3 "Smart Valley" - smart grid demonstration

The aim is to deliver a groundbreaking Smart Valley pilot project that would integrate and demonstrate a variety of the components and concepts necessary to create smart grids.

4 Sustainable retrofit programme

This project would deliver an area wide package of sustainable infrastructure measures as part of a major retrofit programme, covering energy, water, waste and telecommunications.

1.9.2 Enabling delivery

5 Funding and delivery models

This study would examine the potential stakeholder partnerships and funding and procurement models that could be used to aggregate the customer base and demand and use the resulting scale to create viable conditions for investment.

6 Putting planning powers into action

This project would examine in detail the enabling role that each of the planning bodies could take for delivering the identified outcomes in each of the Sustainable Infrastructure Areas.

7 Dynamic, decentralised energy masterplanning

This would build on previous work carried out by the LDA in the LLV to develop a dynamic, decentralised energy masterplan and corresponding strategy that would be accessible to stakeholders and regularly updated as networks develop.

8 Expansion of infrastructure inventory

The inventory produced as part of this study could be expanded to include data on existing and planned transport and green infrastructure to create a complete inventory of sustainable community infrastructure.

9 Making data accessible

The data obtained for this study could be made available in GIS using the London Brownfield Sites database as a platform. The next stage of the work would be to agree with the LDA which data should be made publicly available and obtain formal consent from data providers.

1.9.3 Awareness and understanding

10 Carbon and wider sustainability implications of the water cycle in the Lower Lea Valley

A study would aim to address the lack of accessible data and further develop knowledge on the comparative life cycle impacts and overall sustainability of alternative water demand reduction and supply reinforcement options.

1.10 Next steps

This executive summary and the full report, including the inventory and maps, will be made widely available via the Institute for Sustainability's website:

www.instituteforsustainability.org.uk

The projects arising from the report are being prioritised and the Institute for Sustainability is establishing a strategic steering group to oversee implementation. In addition, contributors and partners are being identified to help scope and scale projects so we can move quickly to bring parties together and deliver tangible, demonstrable progress. Organisations interested in adding value to this process are asked to contact Neil Johnston, Director of Delivery at the Institute:

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