Siemens' Response to the Draft London Plan

Introduction

We are pleased to respond to the Mayor's 'The London Plan' as both a business user and major supplier of infrastructure technology in the UK and around the world. We are very supportive of the overall approach of the draft Plan. We agree with and endorse the Plan's overall objectives of the integrated economic, environmental, transport and social framework towards the development of London over the next 20-25 years. In particular, the focus on sustainable development exemplifies the Plan's direction and efforts towards economy, society and the environment. The concept of Good Growth is an approach that Siemens supports. The implementation of innovative technologies will develop good quality, affordable homes, better public transport connectivity, accessible and welcoming public space and social, physical and environmental infrastructure.

However, in our view the London Plan does well to set out the 'what' but needs more detail on the 'how'. This response is mainly based around two of the key themes: Transport and Sustainable Infrastructure. We believe electrification, automation and digitalisation of urban infrastructure will reap many benefits to London in offering new services and improving existing ones to ensure London retains its position as a leading global city which works for all Londoners.

1.0 Transport

We endorse the Plan's draft strategic approach to transport. In particular we support the focus on health, clean air, passenger experience and transport–led regeneration projects such as Crossrail 2. At present, Siemens is delivering effective sustainable transport solutions across the city showing our commitment towards the future of London's transport and the Mayor's 'Good Growth' strategy. These projects have aimed to improve reliability, capacity utilisation and efficiency whilst reducing local air pollution and greenhouse emissions. Below are few of the many projects we are undertaking.

- Delivering 1,140 Desiro City carriages for Thameslink, Class 707 SWT and Class 717 GN commuter trains as well as the new Eurostar trains
- Upgrading the signalling on the Victoria line to increase service frequency from 28 to 36 trains per hour and supporting the introduction of the night tube
- Re-signalling the Thameslink route and London Bridge station to increase frequency from 16 to 24 trains per hour
- Signaling, control and communications and tunnel ventilation for the core of Crossrail allowing 24 trains per hour between Paddington and Liverpool Street
- Operational management of the congestion charge and the Low emission zone
- Electric vehicle charging equipment and infrastructure

1.1 Digital connectivity

Policies T1 and T3 consider the connectivity and accessibility of existing and future public transport. The city's transport policies and forthcoming projects that provide travel options to rest of the nation and internationally should allow for the sustainable development of London. Siemens have developed certain technologies that can aid this process of connectivity.

1.1.1 Integrated mobility

Siemens' Integrated Mobility Platform is an IT platform that connects distinct providers of urban and long haul passenger transport. It greatly simplifies multi-modal transport for travelers and operators. This platform provides real time information on the transportation network and a plan for multi-modal routes door-to-door. It co-ordinates every mode of transport creating a free flowing network that maximizes mobility, conserves fuel and reduces greenhouse gas emissions. This can help towards the Plan's strategy of creating a connective and efficient way to travel around and from London.

1.2 Healthy Streets

The Plan's transport policy towards clean air and healthy streets is highly welcome. In combination with the Port of London's draft Air quality Strategy it will be possible to

create a healthier environment on the river and the roads. Siemens have developed certain technologies that can aid the effect for healthier streets.

1.2.1 eHighway – electrification of road freight transport

In response to Policy T7 Freight and Servicing, Siemens' have developed the technology for an eHighway which makes it possible to reduce use of fossil fuels and truck operating costs. At the same time it eliminates local emissions such as CO_2 and nitrogen oxides. Having been trialed in Los Angeles and Sweden this technology has the ability to make freight trips in and around London environmentally efficient. The A13 that runs from Central London to Shoeburyness is a key road for freight transport and could benefit from Siemens' eHighway technology.

1.2.2 eBuses and Charging Infrastructure

Currently London has one the largest electric bus fleets in Europe with more than 2,500 hybrid and 71 full electric buses. With reference to Policy T2, these electric hybrid or fully electric buses will reduce car dominance, vehicle emissions and noise whilst increasing public transport use. In order to accommodate this growing sector Siemens has developed in-bus systems and eBus charging infrastructure. This technology will utilise the advantages of electric buses: less energy consumption in comparison to buses with combustion engines, use of renewable energy, less noise, lower particulate emissions, less CO_2, lower lifecycle costs, and reliable servicing.

1.2.3 Cycle detection system – keeping cyclists safe

Creating a safe and heathy environment for cyclists (Policy T5) is key to increasing the use of bikes. Siemens' WiMag Cycle detection uses in-ground wireless detectors and microwave radar technology to identify and count bicycles of all types, including those constructed from carbon fibre. This system can be used to detect the presence of bicycles, provide count information and enable traffic signalling phasing to be tailored based on cycle demand. The system can be used in conjunction with the WiMag Vehicle Detection System, sharing the same communications infrastructure and using access points and repeaters.

1.2.4 Autonomous vehicles

Connected and autonomous vehicles will soon play a major role in the transportation industry. We would encourage the Plan and TfL to take a more proactive stance in shaping how CAVs will operate in London. This will require the organisations to consider the implications of CAVs including how they can support existing public policy, complement public transport and mitigate potential risks from their uptake. The plan should also work with the 32 London boroughs and the Corporation of London to ensure that a coordinated approach is adopted across the capital – each borough may adopt CAVs in a unique way which mirrors their goals, but there should also be regional consistency. An approach closely developed with the boroughs will help to ensure aspects such as network-connectivity, road management, and transport equity are all managed in a unified manner. The Plan should consider the long-term infrastructure needs of Connected and Autonomous Vehicles, for example, 5G networks and network-connected infrastructure such as traffic lights, crosswalks, parking, charging stations.

We also believe that based on research the implementation and use of CAVs will impact land use in inner and outer London. There is a possibility that CAVs will lead to more people traveling from the suburbs and outer London into the city centre, and as a result real estate prices in the inner city may decrease with it being easier to travel from outside of London. CAVs could support and direct good growth, increasing the potential for new jobs and homes to be unlocked in underdeveloped parts of inner and outer London. The *Fourth Plan,* by the RPA in New York suggests that CAVs could allow them to retrofit train station car parks into housing blocks, unlocking land for a quarter of a million homes. We would encourage London to also consider how unlocked land could help achieve the city's broader urban agenda. In addition there will be an impact on the energy grid due to the extensive charging network needed to accommodate the number electric CAVs.

Reference Projects:

● UK CITE (Connected Intelligent Transport Environment) Consortium In the UK, we are partnered with nine other firms to develop testing sites for connected and autonomous vehicles in Coventry and Warwickshire. Our role is to develop, supply and install roadside units which communicate between the vehicle and the traffic infrastructure.

● PAVE (People in Autonomous Vehicles in Urban Environments) Consortium This partnership between Siemens, Oxbotica, RACE, Amey, and Westbourne is tasked to better understand what people think of driverless cars, and if Culham Science Centre should be used as a testing site.

1.3 Healthy Rivers

For London to develop sustainably in needs to take into account not just the streets but the increasing use of the river for transport and freight. Siemens has developed technology that can reduce emissions from vessels

1.3.1 Electric ferries

In collaboration with Fjellstrand, a Norwegian shipyard, Siemens has developed the technology for the world's first electrically-powered car ferry. Diesel engines are replaced with large battery packs that function as an electric propulsion while in motion. The batteries on the ferry are efficiently recharged when dropping off passengers in dock. As a result the Norwegian ship owner has reduced its fuel costs by 60% and significantly has reduced its carbon dioxide emissions. For longer journey's that require a higher capacity, a hybrid solution is more appropriate. In Denmark, for example, this hybrid solution has led to the reduction in the ferry's fuel consumption. This has led to a 15% reduction in carbon emissions. This technology is also applied to passenger ferries in Venice, fishing boats, cruise liners and ships.

1.3.2 Clean on-shore power

Siemens has developed a connection system that can reduce emissions from vessels by providing clean on-shore power also referred to as 'cold ironing'. SIHARBOR is an

on-shore connection system for berthed ships. This connection means vessels can withdraw needed energy from the on-shore power grid via a cable handling system, the SIPLINK connection, and shut down their generators. This will reduce the amount of harmful particulate matter combusted into the local environment as has been the case in Hamburg's Hafencity.

1.4 Return on Investment

As ever, part of the challenge for authorities is demonstrating return on investment, a study commissioned by Siemens concluded that cities can significantly boost their GDP by investing in public transport. The study suggests an annual economic opportunity of nearly $800 billion.

A further recent study by Siemens and Arup proposes a methodology for quantifying return on investments in digital urban infrastructure, based on an analysis of five European cities, including London. The report showed the average value of total cumulative return from smart transport systems across four cities is €566m.

Finally in order to support cities and regions to prioritise investment in buildings, energy and transport infrastructure, Siemens has developed the City Performance Tool and has used it with cities around the world and is currently using it to support the GLA's Environment team.

2.0 Sustainable Infrastructure

2.1 Sustainable Buildings

We endorse the Plan's policies to promote sustainable infrastructure in new and existing developments.

The Crystal building in the Royal Docks is a model for future sustainable developments which should be encouraged across London and beyond. The Crystal achieves BREEAM Outstanding and LEED Platinum accreditation making it one of the most sustainable buildings on the planet. The Crystal is an all-electric building that uses solar panels, solar thermal and ground source heating and cooling. The building incorporates rainwater harvesting, black water treatment and automated building management systems. The Crystal is also home to one of the world's largest exhibitions on the future of cities and home to Siemens global centre of competence for cities.

2.2 Improving Air Quality

The Air Quality section identifies and appropriately addresses one of the largest environmental challenges London faces; it is clear the GLA takes this crisis seriously. We advise that given the ambition of the reaching the EU and the WHO targets, the city begins to look for mechanisms so that they can respond actively to air pollution spikes. Improved air quality forecasting can aid in efforts to help Londoners reduce their exposure to high levels of PM and NOx but also acting on this information is key. A mobile sensing, monitoring and modelling system can help to identify opportunities for new policies and actions to tackle air pollution.

2.3 Climate Change Mitigation and Energy

We support London's goal to reach zero carbon by 2050. As a company, Siemens feels very strongly about reducing the environmental impact and we have committed to be carbon neutral by 2030 with a 50% reduction by 2020.

Siemens has developed a tool called the City Performance Tool to help cities in prioritising investment in building, energy and transport infrastructure by demonstrating

the impact on CO2, Air Quality and additional job creation. The initial findings for London suggest that home automation will provide the greatest opportunity to improve energy efficiency of buildings and thus reduce CO2 and this could be considered along with the schemes to improve building insulation.

The LES supports the installation of smart meters in residential buildings in order to raise awareness of energy usage. In order to drive real reductions in energy use the GLA should define how they want to use data from smart meters; advocating for the rollout of smart meters is not enough to change people's energy usage or their interest in the matter. Having a clear idea from the beginning would also make feedback to design better smart meters possible. It is acknowledged that installations for smart meters are behind plan but the strategy gives no insight to how roll-out could be sped up in the future.

The strategy further acknowledges that household boiler systems need to be replaced, it does not however specify with what alternative. Some clarification around what new energy sources will be adopted would help clarify how the GLA will achieve their goals up to 2050.

As the climate does continue to change, the city should also consider how cooling buildings will impact London's energy usage; as temperatures continue to rise globally, how do we ensure that the process for cooling buildings is as efficient as possible? Siemens' Crystal Building demonstrates an example of using smart, digital technology to regulate temperature in an energy efficient manner.

The GLA should raise awareness of issues such as climate change and air quality among businesses in London and perhaps set targets for them to reach. Competitions, or publishing data publicly are effective tools to raise awareness and motivate the private sector to reach environmental targets. In addition this could also be leveraged to direct investment into energy efficient building and retrofitting.

In the process of finding new solutions in energy efficiency, building efficiency, data collection and usage, and finding new ways to direct financial investment, cities need to share this new knowledge.

Good examples taking place in London already include:

- Sharing Cities: The EU Horizon 2020 Smart Cities and Communities funded programme supports new smart city technologies to maximise their benefit for Londoners and demonstrates that they can be repeated throughout Europe. More can be found on the website http://www.sharingcities.eu/.
- The Crystal: located in the Royal Docks, the Crystal is one of the world's most sustainable buildings, home to the world's largest permanent exhibition on the future of cities and demonstrates in a very real way a corporate commitment to sustainability. More can be found here.

Siemens has noted the accelerating trend towards energy systems being decentralised, and controlled at a local level and, in response to that we have established a new Centre of Competence for Distributed Energy Systems (DES). This aims to work in partnership with cities, local authorities, developers, industrialists, campuses or other energy generators or users, to promote the provision of secure, low-carbon, affordable energy.

Decarbonisation of heat is one of the key challenges that needs to be addressed, as we work together to combat the threat of climate change, and there are a variety of ways in which DES can help cities address that challenge. Combined Heat and Power plants, linked wherever appropriate to District Heating Systems, are among the more promising options for the decarbonisation of heat, and as technologies and techniques develop further we will be working to identify how such approaches can be adopted for existing buildings as well as for new developments.

In parallel with this, we see a clear trend for deployment of renewable energy generation sources as part of Distributed Energy Systems, with clear sustainability benefits. However, for these technologies to be harnessed as fully as possible, we need to make effective use of battery storage systems, and other smart control techniques such as Demand Response Management and Virtual Power Plants. In particular the use of energy storage not only maximises the use of renewables and increase security, but is a key component in community energy systems enabling generators to become prosumers and sell their excess power. All of these technologies

are being developed and deployed as part of Siemens DES commitment, and these are seen as essential elements of the Smart Cities of the future.

2.4 Waste & Circular Economy

The circular economy concept offers a new way of thinking about how individuals and businesses interact and thrive within the London eco-system. The idea is becoming increasingly relevant to cities around the world as attitudes towards ownership, collaboration and consumption change; and environmental concerns drive people towards a more localised use of resources.

Siemens has pioneered a new approach called Eco-System Modeling which enables a city to make sense of the complex web of entities that exist within a district and understand the interrelationships/interdependencies between these entities. It enables the city planners to better understand how the community operates and establish a development masterplan for future growth and expansion of city districts.

The City of Helsinki is already utilising this approach as it plans the new area of Östersundom, a greenfield project which will become a "Smart & Clean" new district of Helsinki. The new district will serve as a test bed for innovative projects, become a new centre for commerce and provide an attractive place to live and develop innovative digital businesses; stimulating economic growth and fostering the development of a fairer social contract. Siemens support has enabled the city planners to capture the economic entities, activities and relationships within a highly visual Business Eco-System model to show residents, investors and businesses how the new district could work for them; and help the city planners and property developers understand what they need to do in order to support the formation of a circular economy.

The GLA’s ambition of sending zero waste to landfill by 2026 is bold and will require swift action. We see opportunity for the waste collection process to be optimised through truck guidance/navigation; planning smarter more efficient routes for waste pick-up will make the entire system more efficient and reducing congestion on city roads. Furthermore, there is vast opportunity in e-mobility for waste collection trucks – reducing air pollution, emissions and noise pollution.

2.5 Adapting to Climate Change

There is immense opportunity for the GLA to leverage data collection when considering how the city will adapt to climate change; sound data collection and analysis will help Londoners when they face potential risks such as flooding, unhealthy temperatures, or water shortage. Siemens' open, cloud-based IoT operating system 'MindSphere' is one such platform that could help the city understand how various data sets interact with one another and can be used to identify key opportunities for climate change adaption and mitigation processes.

Resident behaviour will also play a role as the effects of climate change are more intimately felt in the city. We encourage the city to further monitor residential resource use such as energy and water closely. The GLA could expand in this section to include how the city will likely use more energy in the future to cool buildings and homes due to increasing global temperatures. Moving away from a flat-rate water charge system could also be beneficial, especially as risks of drought increase in the UK. Water meters and usage based pricing models should be adopted so Londoners fully understand the cost of their consumption habits.