MILTON KEYNES:

MAKING A GREAT CITY GREATER

Commission Working Paper 17

Milton Keynes: A Low Carbon City

Shared Intelligence

Milton Keynes Futures 2050 Commission

MILTON KEYNES FUTURES: 2050

SHARED INTELLIGENCE

CWP17 A Low Carbon Economy

JUNE 2016

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1. The purpose of this Working Paper is to consider how Milton Keynes (MK) can become a truly low carbon city. The paper draws on our understanding of global trends and the extant work underpinning MK's Low Carbon Strategy including the results from various pilots completed or now underway. A separate Commission Working paper is being produced on water security.

2. Over the last decade Milton Keynes has made major strides towards becoming an energy efficient city and reducing carbon emissions in line with European and UK targets. Milton Keynes hosts a range of advanced energy installations, such as the Falcon smart grid, an extensive electric vehicle charging infrastructure, and a district heating system. Carbon emissions per head of population are high compared with other UK cities but are reducing, (although this may in part be due to the recession).

3. Demand for energy will increase as the city expands with a subsequent impact on infrastructure requirements. This has been considered for MK's growth up to 2026 with arrangements in place but beyond this timescale there are no plans or any understanding of potential opportunities. This Working Paper identifies: what could MK do to become self-sustaining with respect to energy; the options for larger-scale renewable energy generation, and potential infrastructure requirements.

4. This paper comprises three sections:

    - world trends;
    - the current position in MK;
    - how MK can harness and lead the energy transition towards a low carbon city.

5. The final section identifies a potential way forward for consideration by the Commission in building a set of alternative scenarios and a preferred vision.

WORLD TRENDS

6. The world of energy is changing. New clean generation technologies are replacing oil, coal and to some extent gas. Bloomberg New Energy Finance (BNEF) tells us that global investment in renewable energy was $329 billion in 2015. Renewables and nuclear power are likely to take a vast majority of the total $12.2 trillion energy investment to 2040 with solar alone expected to attract $3.7 trillion against $2.6 trillion for all fossil fuels. According to Faith Berol, Chief Economist IEA "affordable renewables are set to dominate the emerging power systems of the world." A fundamental "**energy transition**" is well underway.

HIGH COST FOSSIL FUELS AND MORE COMPETITIVE RENEWABLES

7. This energy transition has come about for a number of reasons, not least because until mid-2014 the cost of oil and other fossil fuels had been very high for most of the previous decade. This placed significant pressure on individuals, businesses and economies – spikes in oil price have directly preceded most global recessions since the second world war – but importantly also led to research and investment into renewables.

8. During this period the cost of many renewable technologies has fallen dramatically and is expected to continue to do so. Most notably solar has dropped by some 80% since 2010. While the market price of oil and gas has also dropped since 2014, production costs and new build electricity generation from fossil fuels remain high. This is making the cost of generating renewable power relatively cheaper year-on-year compared to fossil fuels. BNEF research[1] shows that globally, the lifetime cost of generating a megawatt of onshore wind is now as cheap or cheaper than coal, gas or nuclear. Solar is expected to reach this point within the next decade, and sooner in many markets. Crucially, lifetime costs for fossil fuel and nuclear power generation is trending upwards while the opposite is true for renewables.

9. The renewables sector in the UK alone employs 460,000 people and according to Sir David King, UK Foreign Secretary's Special Representative for Climate Change, in his speech at the COP21 climate conference in Paris in December 2015, "it is the fastest growing sector in the British economy, and it is growing exponentially".[2]

10. But while much of the focus to-date has been on generation, a decentralised zero carbon energy system requires the creation of a complex network of energy storage and management systems to ensure demand and supply are in balance, regardless of the variability of some renewables. Here too innovation and cost reductions are contributing to the rapid transformation of the global energy system both in developed markets, seeking low carbon alternatives and security of supply, and developing countries which are bypassing centralised generation altogether. Energy storage can take many forms, including traditional pumped storage hydro, but it is electricity battery storage that is seeing the biggest growth. Led by the burgeoning electric vehicle market, costs of lithium ion batteries – as used in laptops and mobile phones – have dropped 60% since 2010 and expectations are that this trend will continue.

11. At the same time, a raft of innovative companies, such as LimeJump, Wattstor and Sonnen, are developing new business models for balancing supply and demand. Nevertheless, experts struggle to predict how these trends will impact on global energy demand and the sources that will supply it. In 2009 the International Energy Agency (IEA) was assuming 20GW of solar worldwide by 2014 whereas the real figure was around 180GW. The same organization, along with BP, Shell and Exxon, see rising demand for fossil fuels through much of this century despite evidence to the contrary. Daily Telegraph journalist Ambrose Evans-Pritchard gives a flavour of shifts that are being mirrored all over the world: "[China] aims for peak greenhouse emissions by 2030, if not before. It plans 200 gigawatts (GW) of wind and 100GW of solar by then, and a reduction in coal use from 2020 onwards. There will be a carbon emissions trading scheme as soon as 2017".[3]

CONCERNS OVER CLIMATE CHANGE

12. Over the past decade, national governments, local government, businesses, and consumers have recognized the need to take meaningful action on climate change. Many believe that the Paris Agreement is an historic step, creating a powerful new incentive for global action to limit the rise in global average temperatures to 2°C, with an ambitious goal to keep it closer to 1.5°C. The increasing competitiveness of renewable energy has been a significant factor in this agreement.

[1] http://about.bnef.com/press-releases/wind-solar-boost-cost-competitiveness-versus-fossil-fuels/
[2] http://sputniknews.com/europe/20151208/1031422760/uk-carbon.html
[3] http://www.telegraph.co.uk/finance/economics/11958916/Paris-climate-deal-to-ignite-a-90-trillion-energy-revolution.html

There remains debate as to the impact of the deal but it is likely to encourage many national governments to promote policies and regulations to achieve these targets. This will give investors the confidence to invest in low carbon projects and technologies.

13. Some argue that it will accelerate divestment from fossil fuels, which has already seen some $2.6 trillion of assets divested, and the possibility of investment in assets that will ultimately become "stranded". Mark Carney, Governor of the Bank of England, stated in September 2015 at Lloyd's of London that meeting the 2°C target "would render the vast majority of reserves 'stranded' — oil, gas and coal that will be literally unburnable without expensive carbon capture technology, which itself alters fossil fuel economics".[4] Although not all agree with this concern, Carbon Tracker, an independent financial think tank, has provided evidence that some reserves will not be exploited.[5] Even the Institute of Economic Affairs, which normally takes a cautious view, concedes that not more than one-third of the proven fossil fuel resources can be burned and still meet the 2°C target.[6] It is important to note that limiting the rise in average temperatures to 1.5°C will require complete de-carbonisation of economies by 2050; achieving the 2°C target will require complete carbonization by 2099. 1,000 mayors at the Paris conference declared that their cities are committing to zero carbon by 2050.

POLLUTION AND AIR QUALITY

14. Many observers, however, are concerned that global efforts to achieve the Paris target will not be achieved because China, the world's largest emitter of CO_2 is still burning so much coal. Indeed, China's coal demand now dwarfs those of other nations, and according to the World Resources Institute CO_2 emissions since 2002 have risen from around 5 billion tonnes to nearly 11 billion. However, China now faces very severe air pollution challenges. Many believe that the need to address these challenges is now driving the country's rapid shift towards low carbon technologies. BNEF expect China's coal demand to peak in the 2020s and mines and power plants are already being shut before they reach the end of their economic lives.

THE ENERGY TRANSITION IS WELL UNDERWAY.

15. Ambrose Evans-Pritchard sums up the mood well: "The old energy order is living on borrowed time. You can, in a sense, compare what is happening to the decline of Britain's canals in the mid-19th century when railways burst onto the scene and drove down cargo tolls, destroying the business model. Technology takes no prisoners. Nor does politics. World leaders have repeatedly stated that they would defend the line of a 'two-degree planet', and now they are taking the concrete steps to do so. Fossil investors have been warned".[7]

IMPLICATIONS OF THE ENERGY TRANSITION

16. Going forward, the immediate uncertainties lie with government policy and technology. The Secretary of State Amber Rudd's energy policy "reset" in November 2015[8] made clear that Government expects gas and nuclear to form the backbone of a low carbon energy system, with the proportion of offshore wind dependent upon continued cost reductions. All existing coal

[4] http://www.bankofengland.co.uk/publications/Pages/speeches/2015/844.aspx
[5] http://www.carbontracker.org/library/#stranded-assets
[6] IEA World Energy Outlook 2012 http://www.iea.org/publications/freepublications/publication/English.pdf
[7] http://www.telegraph.co.uk/finance/economics/11958916/Paris-climate-deal-to-ignite-a-90-trillion-energy-revolution.html
[8] https://www.gov.uk/government/speeches/amber-rudds-speech-on-a-new-direction-for-uk-energy-policy

plants will close by 2025 assuming gas deployment delivers as planned. Large-scale solar and on-shore wind will no longer receive subsidies and those for small scale projects, including domestic, have been significantly reduced.

17. However, electricity wholesale prices are currently low, at around £40MWh (megawatt hour), and although it is unclear for how long they are expected to remain so, it is likely to be for some time. The lifetime cost of the cheapest new build power plant is significantly higher (currently onshore wind at around £60MWh, followed by gas at around £80MWh, according to BNEF[9], and solar which evidence from developers suggests is around £80MWh). Therefore, without some form of subsidy, the development of new generation capacity is not financially viable. With the Government's current desire to minimise the impact of energy policy on consumer bills this leads to significant investor uncertainty.

18. Thus, today UK Government policy is not fully aligned with the broad direction of policies elsewhere, the global efforts to tackle climate change and economics of energy. The outcome is likely to be either a new round of subsidies targeted at gas and/or another energy policy "reset" later in this Parliament. Ultimately, however, it is renewable energy technologies are most likely to delivering subsidy free energy over the next decade; in fact, a number of UK solar and wind energy developers are already developing subsidy free business models.

19. Technology is another uncertainty making policy planning very difficult, both nationally and for Milton Keynes. For example, five years ago few would have predicted that there would be 12GW plus of solar generated power on the national network by 2016, but it is rapidly becoming the dominant renewable technology. Energy storage looks to be set for similar levels of growth over the next few years, as prices come down and project developers and network operators look for innovative ways to deliver subsidy free generation projects or address grid constraints. Research and development is likely to see new commercially viable technologies and innovations coming forward, which will shape the evolution of the energy transition.

20. Notwithstanding these uncertainties in policy and technology, it is possible to see an emerging direction of travel to avoid the development of "stranded" energy assets. This could inform the development of alternative scenarios and a preferred vision for MK. This "low or no regrets" emerging direction of travel might appear as follows.

    - Energy is likely to be significantly electrified and decentralised, comprising millions of separate generators. Solar will almost certainly play a major role but will be supported by a host of other technologies from heat pumps and combined heat and power (CHP) up to wind and solar farms and energy from waste plants connected into micro-grids and local distribution networks.
    - Large scale centralised power generation will still be required. It is likely that this will rely on gas generation for some decades and Government is keen to develop nuclear, including small-scale modular projects.[10] The challenge will be to make new plant

[9] http://about.bnef.com/press-releases/wind-solar-boost-cost-competitiveness-versus-fossil-fuels/

[10] The 2015 Spending Review and Autumn Statement commits to investing at least £250 million over the next 5 years into nuclear research and development that aims to revive the UK's nuclear expertise and position the UK as a global leader in innovative nuclear technologies. This will include a competition to identify the best value small modular reactor design and pave the way towards building one of the world's first small modular reactors in the UK in the 2020s. Detailed plans for the competition will be brought forward early 2016. Para.

attractive to investors without significant long term subsidies. Whilst today, many centralised power stations provide "always available" base load power generation, the "merit order"[11] means that this may well evolve into a back-up role for when renewable sources are insufficient. This is a view shared by many, including Shadow Energy Secretary Alan Whitehead MP.[12]

- Centralised renewable energy from on and offshore wind and tidal lagoon generation is likely to play an important role. Whilst these also require significant subsidies their costs are falling and in due course could become more attractive investments than gas or nuclear.
- The shape of the national distribution grid will change to reflect the more decentralised nature of generation. New power lines will need to be directed at areas with generation resource and the network designed to cope with variable sources. Energy storage (heat and power) will be used across the network to store variable energy when available for use when it is needed. Software and management equipment will ensure the system functions effectively by smoothing peaks and troughs in demand and supply.
- Increasingly, heat and transport are likely to be electrified; this will boost demand for electricity.
- The scalability of many of the technologies and approaches means that individuals, communities and councils will all increasingly be able to own energy generation, supply and management assets and to participate actively in the system.

21. Above all, this energy transition is leading to significant change in the way we generate, distribute, use and think about energy. As set out below, it also means that we need to think differently about urban form, land use, development, regeneration and infrastructure.

CURRENT POSITION IN MILTON KEYNES

22. From its inception as a new town, Milton Keynes has always been innovative and proactive in testing new ideas and setting high standards in many different spheres. MK was home to the UK's first solar powered house, and the Home World and Energy World exhibitions in the 1980s. Policy D4 in the Council's 2005 Local Plan pre-empted national requirements for higher energy standards in buildings. MK has been a test-bed for many technologies and practices, is home to the National Energy Foundation and has attracted a wide range of green businesses. Now, MK is pursuing a wide range of strategic and practical initiatives, probably more than in any other UK city. MK Low Carbon Living and MK Smart provide overarching frameworks.

23. **MK Low Carbon Living** promotes action to reduce CO_2 emissions. These are currently higher than the South East England average due to the high emissions from industry and commerce. Domestic emissions are relatively low and declining due to the newer than typical housing stock built to rising energy efficiency standards. The Strategy seeks to reduce carbon emissions per person by 40% by 2020 and to place MK at the forefront of low carbon living. The accompanying 2012 action

7.7 https://www.gov.uk/government/publications/spending-review-and-autumn-statement-2015-documents/spending-review-and-autumn-statement-2015

[11] The merit order assumes that energy sources with the lowest generating price will be used to meet demand first. So renewable sources, which can effectively generate a unit of power for free, will be preferred to a fossil fuel plant which has a higher unit cost

[12] 2016, January, Alan's Energy Blog: "Low carbon traffic lights and the 'energy reset': Green, Amber, Rudd?" https://alansenergyblog.wordpress.com/

plan sets out specific costed and budgeted measures to reduce emissions across a range of themes. These include amending policies, procedures and functions of organizations, identifying specialist support, communications and marketing. The MK Low Carbon Living programme is the delivery vehicle. Together, the MK Low Carbon Living strategy and action plan form a key part of emission reduction efforts; but as set out below these should be updated.

24. According to DECC, Per capita CO_2 emissions in the borough have declined from 8.7 tonnes in 2005 to 6.8 tonnes in 2013 (the latest year available).[13] Other than a small rise in 2012, the decline has been steady and this broadly mirrors the England-wide figures. According to DECC[14] the main drivers for this were a decrease in the use of coal and gas for electricity generation. Other factors include some above average temperature winters, rising energy costs over this period coupled with challenging economic conditions since 2008, which are likely to have led to some improvements to energy performance along with households and businesses simply cutting back on energy use. Furthermore, in the region of 1,500 new homes per year[15] have been added to the borough's stock, each of which will have been built to rising performance standards. Looking forward, the creation of a decentralised zero carbon energy network, where demand and supply are more efficiently matched and where heat and transport energy is increasingly electrified, the overall CO_2 content of energy used will continue to decline. Action taken locally to deliver this could have a significant impact on the relative performance of Milton Keynes.

25. **MK:Smart** is a smart city partnership being led by the Open University in partnership with BT and MK Council to test and apply innovative energy, water and transport management. The MK Open Energy Map documents available low carbon technologies and actions and assesses opportunities. Achieving the CO_2 reduction target requires a reduction of 3.2 tonnes CO_2 per person by 2020; accounting for population growth giving a total reduction of 368,000 tCO_2. The study concluded that this target could be achieved most effectively with the "high efficiency/high renewables scenario" assuming grid connected renewables were included and would not be achieved in the "modest measures scenario."

26. This work is helpful but features several bold assumptions. For example, expansion of the district heating network operated by Thameswey in CMK is likely to be difficult without strong planning policies requiring that new developments are connected to the system and higher density development. (Density proposals in the emerging Site Allocations Plan[16] currently only require densities above 40dph in CMK; this is almost certainly still too low for district heating). MK: Smart will also require significant deployment of renewables, including biomass and large wind; in the current national policy environment could be challenging without areas being allocated in the local plan. As this work was prepared in 2012, it certainly significantly underestimates opportunities for solar generation.

27. MK:Smart is also focusing on other components of the energy transition, e.g. electric vehicles, electricity demand shifting and smart grid responses via the Falcon programme. Additionally, the

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[13] 2005 to 2013 UK local and regional CO_2 emissions full dataset
https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2013

[14] DECC (2015) Local Authority carbon dioxide emissions estimates 2013
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/437384/2005_to_2013_UK_local_and_regional_CO2_emissions_statistical_release.pdf

[15] http://www.mkiobservatory.org.uk/Default.aspx

[16] http://www.milton-keynes.gov.uk/planning-and-building/planning-policy/site-allocations-plan

city-wide “internet of things” network being developed under the banner of the MK Future City programme l could have important beneficial implications for the energy transition. Again, as set out below, MK: Smart benefits from a regular update.

28. Over a decade ago, in MK, **Planning Policy D4** broke new ground by introducing a local carbon offset fund. Now the standards set in national building regulations are now higher than those in Policy D4 but, recent government announcements have lowered the ambition for emissions reductions via new development. This was anticipated in the Plan: MK Topic Paper on Climate Change and Sustainability Topic Paper. Since ‘allowable solutions’ were scrapped along with the government’s Zero Carbon Homes policy in 2015 the continuation and potentially broadening out of the carbon offset fund becomes even more important. As set out below, developing challenging but deliverable policies and targets locally through the Plan: MK process is key to moving forward.

29. In addition, it is fruitful to keep in mind that the MK Development Partnership and MK Regeneration could also play central roles in ensuring that Milton Keynes is a low carbon city. MK Council has considerable assets which it purchased from the Homes and Communities Agency as well as other development land.

30. The current remit of the **MK Development Partnership (MKDP)** is to dispose of the HCA land to secure receipts significantly in excess of the Council’s acquisition and holding costs. In making these disposals, MK Council could also formulate development briefs for all MKDP sites which requires that all new construction on these sites achieves high standards of energy efficiency and sustainability generally subject to still meeting the original land acquisition and holding costs. Such an approach could be extended to all Council owned sites. These MKDP (and Council) sites could be flagships – restoring MK’s position as a city which is leading the UK’s energy transition. (In addition, MK Council and MKDP could consider renewable energy generation activities as temporary or “meanwhile uses,” on sites which are not scheduled for development for several years).

31. **MK Regeneration** is a community-led, commercial partnership between the Council and Mears Group. It has responsibility for regenerating seven of the most deprived parts of the city – Beanhill, Netherfield, Coffee Hall, North Bradville, Fullers Slade, Tinkers Bridge and Lakes Estate. Some 5,000 homes will be affected with actions determined following a stock condition survey. It is anticipated that the new investment programme will be a mix of refurbishment and redevelopment with a significant element of private housing. Possibly, the gross density of new development will increase substantially. As set out below, the MK Regeneration communities could be a further set of flagships in MK’s leadership of the UK’s energy transition.

32. The **National Energy Foundation** works to improve energy efficiency and reduce fuel poverty and is an important asset in MK. They could play a valuable role to play in supporting both the MKDP disposal programme and the MK Regeneration programme.

HOW MK CAN HARNESS AND LEAD THE ENERGY TRANSITON TOWARDS A LOW CARBON CITY

33. Across the globe, and in the UK, the growing investor certainty that comes with the Paris climate change agreement will drive the pace of the emerging energy transition. MK is in an exceptionally strong position to harness and contribute to leading the UK’s part in this and bring clear economic benefits to the city. These strengths include MK’s qualities as a new town, MK’s Low Carbon and

Smart City programmes, and the potential offered by the MKDP disposal and MK Regeneration programmes.

34. Nevertheless, in considering how best to build on these strengths, it is essential to recognize that the energy transition means that the terms of reference for the city's vision, strategy and development plans through to 2050 will necessarily be different to those when the city was first conceived in the late 1960s. The original Plan for Milton Keynes was exceptionally innovative and designed the foundations for the development of Britain's fastest growing city – but it did not consider, at all, how energy would be produced locally or consumed in the most efficient ways. Now, the city needs an equally innovative plan going forward – but it must start with an understanding of how best to harness the global energy transition.

35. In preparing their alternative scenarios, and a preferred vision, Commissioners are invited to consider the following approach to moving towards a zero carbon energy city. This approach could have four components which embrace an understanding of how the energy transition to a zero carbon city:

    - needs bold leadership and a clear vision;
    - provides a driver for economic growth and opportunities for income generation.
    - shapes spatial planning decisions; and
    - shapes the types of development we need.

36. Taking each of these in turn……

BOLD LEADERSHIP AND A CLEAR VISION

37. MK Council is ideally placed to again provide bold leadership and a clear vision of how MK intends to continue to move to a low carbon, or zero carbon, city. In recognition that the global energy transition brings with significant economic growth opportunities, MK has already established MK Low Carbon Living and MK: Smart. Along with the opportunities arising from the city's two flagship development programmes – MKDP's land disposal, and MK Regeneration, MK could easily create a new "low carbon," or "zero carbon" brand. This would strengthen the city's competitive advantage in harnessing private investment to create the new infrastructure required to enable the energy transition and, more generally, attract inward investment.

38. It is essential that MK Council leads the development and delivery of this vision to realise these economic benefits. This would include a refresh of MK Low Carbon Living, ongoing updates of MK: Smart, and envisaging the sites in the MKDP disposal programme and MK Regeneration as flagship energy transition projects. More generally, the vision of a low carbon or zero carbon city should cascade down through the Council's corporate and spatial plans, as set out below, with the opportunities and benefits clearly articulated. This would include a funded energy delivery infrastructure programme.

39. The Commission may wish to encourage MK Council to (again) take on this leadership role.

OPPORTUNITIES FOR INCOME GENERATION FOR THE COUNCIL

40. The most notable features of many zero carbon energy technologies and an electricity-led strategy is scalability, flexibility and replicability by a range of stakeholders. Projects can start small and grow, they can be led by businesses, communities or the public sector. Technologies

can be applied incrementally to suit the location and pace of development. The absence of large initial infrastructure means responding to changes in technology, development choices or economic circumstances is easier – in other words there is less risk and the benefits can be retained locally.

41. Thus, the energy transition offers the potential to create new revenue streams for MK Council and local communities. These will bring clear economic benefits to the city. In particular, opportunities now exist to generate revenue streams from developing, owning and operating generating plant or from managing grid infrastructure against which connection fees and use of system charges can be levied. MK Council has the power to set up as an Independent Distribution Network Operator, or as a supply energy company just as Nottingham City Council has done with Robin Hood Energy, and use energy pricing and infrastructure provision to deliver on economic objectives, e.g. lower energy costs for companies or sectors considered key to economic growth. Similarly, MK Council or communities (as social or commercial enterprises) could develop new electricity networks, to provide benefits to local communities and direct investment to particular parts of the borough.

42. There is, of course, no statutory requirement for the Council to make any investments in decentralized energy generation or support local communities to take any initiatives. The Council could leave any initiatives to the private developers with the Council to determining speculative applications as they arise. This ought to achieve positive outcomes for the city and its communities but the scale and pace of the energy transition means that the results will be suboptimal.

43. The Commission may wish to consider encouraging MK Council to evaluate various income generation opportunities arising from the energy transition in order to realize a wide range of economic benefits.

HOW THE ENERGY TRANSITION SHAPES SPATIAL DECISIONS

44. Milton Keynes is a unique city, its relatively low density lends itself well to an electricity-led strategy; infrastructure costs are relatively low and space is available for generation, e.g. on rooftops, in the spaces between buildings, in the grid road reservations and or over carparks. Going forward, continuing to keep densities relatively lower would give the city the best chance of getting closer to net self-sufficient in energy with less encroachment by energy infrastructure into surrounding countryside.

45. A largely decentralised energy system does not mean that Milton Keynes operates independently of the national network – but it does mean that more of the benefits and impacts are felt locally. With the Plan: MK process now underway, MK has an opportunity to – again – set very high ambitions covering energy generation and sustainability more generally and to propose policies which set out how these policies can be realized. This is discussed further below.

46. An “Energy Map” for MK has been prepared as part of the MK Smart programme; this assesses and quantifies a range of energy supply and efficiency options and defines the most suitable actions for different building types and appropriate locations of each technology. There would be considerable value in updating this so that it considers how a zero carbon city could be delivered, including grid infrastructure opportunities (involving the distribution network operator and grid specialists), the feasibility of achieving net self-sufficiency, the feasibility of extending

the district heating network when assessed against an electricity-led solution and wider objectives, and opportunities for community involvement. It should form a key piece of evidence to support the Plan: MK process, including allocating areas for different technologies and infrastructure investment decisions.

47. Thus, moving forward, Plan: MK should take account of energy generation and distribution requirements in making proposals about where and how the city grows. For example, choices about the location and type of new development should reflect an area's suitability for renewable energy generation. Or, for CMK, if the update of the Energy Map concludes that extending the district heating system is the most desirable solution, Plan: MK should clearly set out the requirements for higher densities and mix of uses necessary to make this viable.

48. As Plan: MK evolves, the update of Low Carbon MK should feature a delivery plan that sets out and coordinates responsibilities of different stakeholders for funding, implementation and phasing relative to new development. This should also include income generation opportunities for the Council and, more generally, how the Council can take a proactive role as planner, investor, developer and operator.

49. The Commission may wish to consider encouraging MK Council to place policies which will achieve a zero carbon city at the heart of the Plan: MK process, supported by a delivery plan.

HOW THE ENERGY TRANSITION INFLUENCES THE TYPE OF DEVELOPMENT WE NEED

50. Plan: MK will be a high level plan. It is not yet not clear how much detail will be included about specific locations in the city, in the plan itself, or in supplementary documents. In any event, from the perspective of harnessing the global energy transition, there are different opportunities in different kinds of areas in the city: (1) the Regeneration Estates which will be the responsibility of MK Regeneration; (2) sites within the existing built up areas; (3) the already allocated Eastern and Western Expansion Areas, and (4) the new growth areas which will be identified in Plan: MK. Harnessing the global energy transition within new and existing development will entail promoting a common electricity-led, micro-generation (likely mostly solar), energy storage, efficiency and micro-grid solution. This could be approached in each of the four areas as follows:

51. **(Type 1): Regeneration Estates:** Options for the seven estates should consider energy in terms of the contribution they can make to the borough-wide strategy but also to delivering estate objectives. Densities are currently very low and the estates are unlikely to be redeveloped to densities needed to ensure that a district heating network is viable. A micro-generation and energy storage-led micro-grid solution could work well along-side high levels of energy performance improvements, as part of a retrofit or rebuilding programme.

52. Where future plans feature **retro-fit investments**, low densities mean that there is considerable space for solar on rooftops, over parking bays and possibly on some of the greenspace, noting that semi-mature trees could limit opportunities. Energy storage could be installed in individual properties or at neighbourhood scale. Where future plans feature **redevelopment**, this will allow layouts to be designed to achieve zero carbon energy solutions and new properties could be built to the highest energy performance standards. MK Regeneration will be working with communities to develop options for each estate. Training programmes for installers and maintenance will create many job opportunities.

53. **(Type 2): Sites within the existing built up area***:* The nature of these opportunities depends largely on land ownership, location of the sites, their planning and delivery status and timing. For example, sites such as those in Campbell Park contain land being sold by MKDP; this gives more control over outcomes so they could be connected to the district heating network if development densities and mix allow but could equally include a solar, energy storage and efficiency-led micro-grid solution. (As matters stand[17] the extant development brief just requires compliance with Local Plan Policy D4.) More generally, if MK Council takes a proactive approach to promoting energy infrastructure investments around some of these sites, either through direct delivery as an IDNO or packaging the rights for third parties to deliver, this could benefit adjacent communities, as well as the new developments, and still allow developers to pay a fair value for their site. Plan:MK and the Site Allocations Plan could define the appropriate solution for each type of site and incorporate infrastructure investment decisions.

54. *(***Type 3): Eastern and Western Expansion Areas:** Ownership or control of these sites is mostly already with private developers although MK Council owns a significant parcel in the Western Area. The 2005 Development Framework for the Eastern Expansion Area is agreed and work is underway on many of the sites; this severely limits opportunities to introduce new energy transition projects. An Approved Framework for the Western Expansion Area also exists but development is only commencing now. Both Frameworks direct developers to Policy D4 and so opportunities for higher standards through policy are limited. The opportunity does exist, however for MK Council or a third party to install and operate infrastructure, particularly in the Western Expansion Area.

55. **(Type 4): New Growth Areas to be identified in Plan: MK:** These areas will be identified through the current Plan: MK process but development is unlikely to commence within a decade. A very wide range of areas are being considered, including both new satellite settlements and urban extensions. The Plan: MK process could evaluate and then select these areas with reference to how they could contribute to moving towards a zero carbon energy system. Further opportunities then exist to prepare plans for each new growth area to achieve a zero carbon energy system from the start. Strong and enforced planning policy will be key to successful delivery. Moreover, early infrastructure investment would enable 'meanwhile' uses for energy generation until these sites are brought forward for development, while also then servicing that future development. As set out in Commission Working Paper 3, the opportunity may also exist to capture the full uplift in land value in these areas; some of this value could be reinvested in the energy system.

56. The Commission may wish to consider encouraging MK Council to take account of the potential of each alternative location for the future growth of MK to contribute to creating a low or zero carbon city when evaluating and selecting these growth areas.

A FINAL WORD….

57. These are exciting but challenging times for cities and their communities. The Paris climate change agreement and the emerging transition to a zero carbon energy system present unprecedented opportunities to drive local economic growth and wellbeing. But the effects of climate change and the responsibility for delivery sit squarely at the door of local government, communities and businesses. Responding to the Climate Change Act's requirement for an 80%

[17] http://www.mkdevelopmentpartnership.co.uk/assets/files/203/5-Campbell-Park-Development-Brief-Final.pdf

reduction in emissions by 2050, let alone the measures needed in response to a global target preventing temperatures exceeding 1.5^{O}C will be nothing short of transformational for how and where we develop and the way communities function.

58. Milton Keynes has a strong tradition of embracing change and with a clear delivery focused approach that places zero carbon energy at the heart of strategy and decision-making it can become a leader. In doing so it can realise the benefits that decisive action can bring to businesses, communities and the local environment.

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