Response from BuroHappold Engineering to the BEIS/Ofgem consultation on a Smart, Flexible Energy system.

Preamble

BuroHappold Engineering is an international engineering consultancy with expertise in cities and the built environment. We have a long history of sustainable design, with experience in delivering energy efficient and low carbon buildings all over the world. We also have dedicated energy, smart cities, and sustainability teams, and have delivered a number of district heating feasibility studies for UK local authorities, funded by the Heat Networks Development Unit. We have also delivered strategic local energy studies in London[1] and in the West of England[2], and for National Grid[3].

We welcome this consultation. However, we are aware of the importance of the links between heat, gas and electricity, and believe that BEIS and Ofgem would benefit from taking a wider focus, beyond electricity, when considering smart and flexibility in the energy system. Our studies on waste heat recovery in London, and on the use of CHP in district heating projects show the importance that heat can play. We are also concerned at the lack of mention of climate change or carbon within this consultation, as an important driver for a more flexible energy system, and the lack of mention of energy efficiency or demand reduction.

Demand reduction is an essential part of every coherent low carbon energy strategy, and has received insufficient policy support, particularly in recent years. All forms of energy production have environmental and social impacts, and are limited by land availability, whether this is in the UK or elsewhere. The cost of renewable energy is rapidly reducing to become competitive with fossil fuels, but there will still be limits to the total amount of energy that can be produced, due to land. Without effective policy support for energy efficiency, with a combination of building regulations, financial support or direct investment, energy risks entering into an affordability crisis similar to the housing crisis.

Based on our experience with integrated infrastructure planning, we see an important role for energy management at the local authority level. The role of the local level is mentioned in the context of the 'local unit' in section 5, but this lacks detail.

We have views on several sections of the consultation, but have focused our responses on section 4, a system for the consumer; section 5, the role of different parties; and section 6, innovation.

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[1] https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/secondary-heat-study-londons-zero-carbon-energy

[2] http://www.bathnes.gov.uk/sites/default/files/woe_low_carbon_initiative_-_renewable_low_carbon_energy_in_the_west_of_england_low_res_0.pdf

[3] http://www.smarternetworks.org/NIA_PEA_Docs/NIA_NGGT0071_Spatial_Final_report_pdf_160721075813.pdf

BuroHappold response to Section 4: A system for the consumer

Consumer Protection and Cyber Security

40. Please provide views on what interventions might be necessary to ensure consumer protection in the following areas:

- Social impacts
- Data and privacy
- Informed consumers
- Preventing abuses
- Other

A smart energy system should include mechanisms to enable prosumers to participate in providing services with whole-system value, including at the local level.

To release the full social and system value of smart meters, regulation should make space for innovation in community approaches, which can support peer learning and motivation of domestic demand response[4]. Protecting this potential positive social impact requires that smart meter data should be made available to community based third parties, with data protection processes and regulation accessible to small community groups, without unachievable regulatory burden. Peer learning can be a crucial mechanism for enabling informed consumers. This is discussed in Melville et al., (under review, attached).

It would also be valuable to roll out smart meters in a way that enables area-based or local approaches, as seen by the initiative taken by the GLA[5], and in Cornwall through the Cornwall Energy Island project[6]. This is also supported by the conclusions of the Bristol Smart Energy City Collaboration[7].

BuroHappold response to Section 5: The roles of different parties in system and network operation

General comments

We welcome the increase in coordination that is taking place between the TNO/TSO, and DNO/DSO roles. We also welcome the shift from DNO to DSO, and the acknowledgement that the relationship between TSO and DSO will need to be clarified to ensure their roles are coordinated effectively. However, we would like to see consideration of other energy vectors (natural gas, heat, hydrogen etc) included in this consultation, as a whole system approach. We would also like to see a greater role for the local, including municipal, community and private initiatives.

We expect that this view would be supported by several researchers (e.g. MSUCOs research at the University of Leeds[8]; Local Supply options[9]; Transition Pathways – distributing power[10]), innovators

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[4] http://business.kingston.ac.uk/sites/all/themes/kingston_business/charmproject/smartcommunities.pdf ; http://www.recckn.org.uk/

[5] https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/secondary-heat-study-londons-zero-carbon-energy

[6] http://static.burohappold.com/media/2016/04/BuroHappold-Cornwall_Energy_Island_White_Paper-web.pdf

[7] https://www.cse.org.uk/downloads/reports-and-publications/policy/community-energy/insulation-and-heating/planning/renewables/towards-a-smart-energy-city-maping-path-for-bristol.pdf

[8] http://www.arcc-network.org.uk/land-of-the-muscos/

[9] http://opus.bath.ac.uk/46460/

[10] https://www.strath.ac.uk/media/departments/architecture/cpd/Elizabeth_Robertson.pdf

(e.g. EnergyLocal, Tower Power, Sunshine Tariff) and intermediary organisations (e.g. RegenSW, CSE, Community Energy Scotland, Switched on London).

Integrated, multi-utility, locally based energy systems are enabled by the increasing decentralisation of energy technologies, and licensing arrangements should be changed to facilitate this.

Examples of cross-vector flexibility include: the use of heat storage to allow CHP to be used for flexible electricity generation, rather than in a heat-led manner; the injection of hydrogen produced from excess renewable energy generation into the gas grid; the use of interseasonal heat storage with district heating and heat pumps using electricity from solar PV as a heat source, which could create a viable business model for generators with flexible connection agreements/overcome grid constraints for generators. We are aware that peak demand hours pose a challenge for the gas network operator as well as for the electricity system, and that gas network operators are thinking about their long term role in a low carbon energy future. As such, we would welcome greater integrated thinking on all energy vectors.

43. Do you agree with the emerging system requirements we have identified (set out in Figure 1)? Are any missing?

We welcome the clarity and detail in Figure 1. However, we identify additional elements that are missing:

Missing drivers for system change:

Climate change, as a driver of innovation and the need to transition to low carbon technologies has not been mentioned. In particular, this leads to:

- The need to reduce demand altogether driven by climate change and limited availability of land-based renewable resources
- The need to include an adequate GHG price in the cost of energy, in order to achieve a level playing field and a well-functioning market. With current subsidisation of fossil fuels, and reduction in support for renewable energy, a 'level playing field' is an illusion, and socially harmful due to the externalities of climate change that are not taken into account.

Additionally:

- Several parties (supply, distribution and transmission) have incentives for electricity consumption to go up, as their income is per kWh. This creates a challenge in a situation where demand reduction is needed in order to achieve sustainability. In particular:
    - Distribution and transmission networks could face reduced utilisation rates due to increased local generation and prosumption, whilst still playing a crucial role in balancing. This leads to an emerging system requirement to explore alternative charging methods, including availability charging, and to re-evaluate the allocation of responsibility for the cost of electricity infrastructure.
    - Suppliers also have a vested interest in high energy consumption of their customers, leading to potential incumbent resistance to effective demand reduction measures. Alternative income structures and tariff structures should be considered, including cross subsidisation through progressive tariffs that ensure all can afford a basic level of consumption, and that high consumption pays a premium.
- Visibility of the existing and future network should be in the public domain

    - There are several public interest uses of smart meter data, at the local and national levels[11].
    - Open data, including live electricity consumption at city or at substation level, could be used for effective engagement of consumers in understanding the impact of peak consumption.
    - Making existing and future network constraints available would allow potential providers of flexibility to site their assets appropriately.
- Prime sites for flexibility assets risk being monopolised by incumbents with ready access to capital. To mitigate this, a community right to provide, similar to the community right to bid in the Localism act, and the community right to buy in Scotland[12], could retain local economic benefit, and enable the development of flexible energy districts motivating active demand response.

45. With regard to the need for immediate action:

a) Do you agree with the proposed roles of DSOs and the need for increased coordination between DSOs, the SO and TOs in delivering efficient network planning and local/system-wide use of resources?

We agree with the need for increased coordination between DSOs, the SO and TOs.

b) How could industry best carry these activities forward? Do you agree the further progress we describe is both necessary and possible over the coming year?

We agree that greater visibility of networks is needed for active network management, and to enable connection of low carbon technologies. This data should be made visible to third parties and local aggregators, flexibility providers and community energy groups. Consideration should be given to the potential for putting this data in the public domain, as part of the move to open data, and ways in which this can be achieved without compromising cybersecurity.

46. With regard to further future changes to arrangements:

a) Do you consider that further changes to roles and arrangements are likely to be necessary? Please provide reasons. If so, when do you consider they would be needed? Why?

We believe that there should be a role for LSO/LNO (local system operator/network operator), and CSO/CNO (community system operator/network operator), with nested levels of balancing, as illustrated in Figure 1. In this model, balancing is carried out as far as is practicable and viable in the local area, aiming to provide balancing services to the regional and national systems where possible. This would involve coordination between the CSO/LSO, DSO and SO, where each is concerned with whole system operation within their geographical remit. Because of their crucial and monopolistic role in the local energy system, such entities should be owned by the public sector or by communities, and properly accountable through democratic processes. This is closest to the Local Unit model, of the three proposed in the consultation.

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[11] https://www.cse.org.uk/downloads/file/teddinet-paper-jess%20-britton.pdf
https://www.cse.org.uk/downloads/file/teddinet-paper-simon-elam.pdf

[12] http://www.gov.scot/Topics/farmingrural/Rural/rural-land/right-to-buy/Community

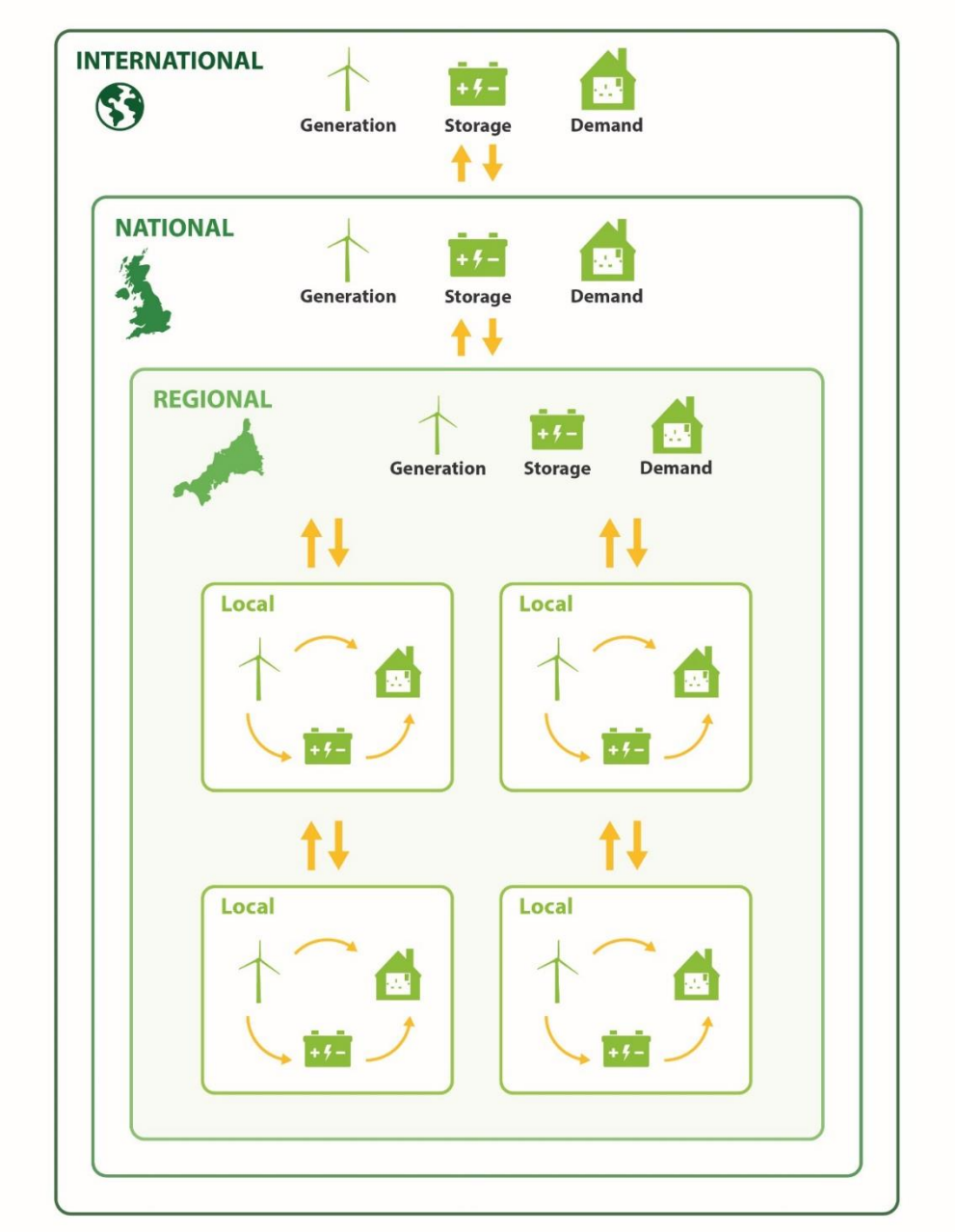

Figure 1 nested electricity balancing arrangements[13].

b) What are your views on the different models, including:

i. whether the models presented illustrate the right range of potential arrangements to act as a basis for further thinking and analysis? Are there any other models/trials we should be aware of?

The flexible energy districts being trialled by the Bristol Energy Network and by Clean Energy Prospector, including the Twos project and the Owen Square project explore some local CSO or CNO roles. The Tower Power project developed by Community Energy Scotland[14] supports community negotiation of energy tariffs and management of local generation.

[13] http://static.burohappold.com/media/2016/04/BuroHappold-Cornwall_Energy_Island_White_Paper-web.pdf

[14] http://www.communityenergyscotland.org.uk/towerpower.asp?term=tower+power

The electric commons model described in Melville et al (under review, attached), is closely aligned to this idea.

The local supply models proposed by Hall and Roelich[15], and the distributed power approaches proposed by the Transition Pathways research group[16] should also be considered.

ii. which other changes or arrangements might be needed to support the adoption of different models?

Space for innovation and testing of diverse arrangements – many actors are developing concepts, but their effectiveness can only be really tested when put into practice. The idea of a regulatory 'sandbox', where innovators can have a space to trial approaches that do not easily fit within current regulatory boundaries, without excessive amounts of compliance, would support this.

BuroHappold response to Section 6: Innovation

48. Do you think these are the right areas for innovation funding support? Please state reasons or, if possible, provide evidence to support your answer.

We welcome the ongoing funding for network innovation in the form of the ENIC, and value much of the research from the LCNF. However, we believe that there should be more innovation funding for projects led by consumer interests, e.g. community energy groups and local authorities, with collaboration of energy industry actors, to complement energy industry led innovation funding such as the ENIC.

There is an urgent need to test new approaches to residential demand side response, and to further investigate the potential for community approaches such as the Smart Communities[17] project, or the RECCKN[18] project, and the electric commons approach described in Melville et al. (under review, attached). This requires funding, and also regulatory space to test disruptive innovations.

We welcome the launch of the Ofgem Innovation Link, and support the suggestion of creating new 'sandbox' spaces for innovation.

There should also be more support for multi utility, or multi-vector projects, and those who trial local whole-system approaches integrating storage of electricity and heat, ultra-low carbon vehicles, consumer behaviour and engagement, smart appliances, tariff structures, and distributed generation, with electricity, heat and gas network management.

Conclusion

Overall, we welcome this consultation, but suggest that it could be strengthened by including more to tackle:

- Demand reduction
- Climate change policy and decarbonisation as an objective
- Integrated approach to energy infrastructure, including heat, gas and other energy vectors/storage
- A greater role for the local, including the local authority and community scale.

[15] http://opus.bath.ac.uk/46460/
[16] https://www.strath.ac.uk/media/departments/architecture/cpd/Elizabeth_Robertson.pdf
[17] http://business.kingston.ac.uk/sites/all/themes/kingston_business/charmproject/smartcommunities.pdf
[18] http://www.recckn.org.uk/