

**LBEG Meeting and AGM
Thursday 6 April 2017**

Kindly sponsored by Aqualor Energi

Aqualor Energi

Minutes

Attendees

Name	Organisation
Trevor Whittaker	Aqualor Energi
Bob Fiddik	Croydon (Chair)
Gilbert Lennox-King	Demand Logic
Sonny Masero	Demand Logic
Andrea Latter	Enfield
Saeed Atlas	Harrow
Sam Grimwood	Islington
Gonzalo Jimenez	Kensington & Chelsea
Shadia Rahman	Kingston
Andy Morgan	LASER/Kent CC
David Bell	Merton
Liz Warren	SE ² (Secretariat)
Stephen McKinnell	SOAS
Nigel Lee	Surrey County Council
Quinten Babcock	TfL
Beata King	TfL
Anis Robinson	

Apologies

Name	Organisation
Neil Luscombe	Brent
Lucy Padfield	Islington

1. Welcome and introductions

Bob Fiddik, LB Croydon and LBEG Chair

- 1.1 Bob Fiddik welcomed everyone to the meeting and thanked TfL for hosting.
- 1.2 By way of policy update: Central Government have been occupied with other things, so there is very little coming out of BEIS apart from some technical consultations (eg, removal of embedded generation benefits, which could affect you if you have CHP).
- 1.3 On the Mayoral front, we're all waiting. Most of what's due to be produced is scheduled for "Spring" so there are several months of leeway.
- 1.4 From an LBEG point of view, we have had a refresh of the website. **Please have a look at the new site and provide any feedback to rachael.mills@se-2.co.uk. The site is currently being hosted at <https://lbeg.jimdo.com>.**

2. AGM

- 2.1 Members voted in favour of the Committee as nominated. Bob will continue as Chair but invited expressions of interest from people who would like to take this on.

The Committee for 2017/18 is therefore as follows:

Bob Fiddik	Croydon	Chair
Beata King	TfL	Treasurer
Andrea Latter	Enfield	Re-elected
Saeed Atlas	Harrow	Re-elected
Lucy Padfield	Islington	Re-elected
Gonzalo Jimenez	Kensington and Chelsea	Re-elected
Andy Morgan	Kent County Council / LASER	Re-elected

- 2.2 Beata King provided a Treasurer's report (see Appendix 1). We have reintroduced membership payments, though they are voluntary. Last year, we invoiced 12 members and received payments from 8. We are looking to increase income, and we will be issuing invoices for the new financial year shortly. It's important for LBEG to be able to maintain its cashflow, rather than using reserves.

3. Large scale heat pumps – technology, funding and procurement

Trevor Whittaker, Aqualor Energi

(see slides)

- 3.1 What we're doing is very relevant to the current economic and environmental climate. The UK has a target for renewable heat and has a big requirement for more sources. Gas CHP currently counts as low carbon heat but this is to change in London for example with the new London Plan.
- 3.2 People think about heat pumps only producing heat at 70-75 degrees but now they're producing at up to 92 degrees – which means you could put heat into a network or a building operating at a higher temperature. Schemes are operating at scale in mainland Europe, up to 180MW from systems of multiple heat pumps. Reliability can go up to 95% so there is no need for back-up boilers.

3.3 Water has a higher thermal mass than ground or air, so it's well suited to larger schemes. There's a 2MW water source heat pump (WSHP) at Wandsworth Riverside Quarter which draws from the aquifer under London, and a similar residential scheme, Riverlight in Battersea; the Tate Modern has a WSHP which takes water from the gravels next to the Thames; there's a WSHP in Clerkenwell which draws from the underground lake there. WSHPs also complement CHP well where the latter is existing but more heat required, or there is a requirement for some private wire power.

3.4 We're working with TfL looking at sources of excess heat, particularly related to deep lines (Piccadilly, Central, Bakerloo) where there is a considerable excess heat issue [due to get worse due to more frequent services, additional air conditioning to new trains and to stations where platform doors are going to be introduced, which reduces airflow]. We're also looking at re-use of heat from sewers, substations and flooded mines which are comparatively warm.

3.5 Ambient temperature networks are particularly good for new build housing; use of a small WSHP in each dwelling (as opposed to a single large heat pump) means the cost of capital equipment rollout can be deferred to suit phases of building, there is no requirement for expensive heat meters or pipe insulation, the pipework network picks up additional heat from the ground and each occupier feels in control of their own heating cost.

3.6 On funding, particularly for heat networks, HNDU talks about projects below 12% Project IRR as not being viable, which we feel is too high as a general rule. It also doesn't take account of a blend of public and private ownership and finance, which can make schemes with a Project IRR of 9% (or below) attractive. The public sector does not always want to develop and operate technical pieces of equipment. However, there is strong merit in the public sector owning the network, so they can choose to extend it for social reasons, rather than waiting for the commercial case to add up (which is what the private sector would do).

Q1: Is there a minimum distance that you'd want from the water body to the heat user?

A1: Ideally as close as possible to your energy source because the pipework is an additional cost that the scheme has to pay for. It always comes down to the particular project.

Q2: With WSHPs, there's obviously some new technology but we tend to hear a lot about the Kingston Heights project – how popular is it in the UK?

A2: There are examples for every type of water source – rivers (eg, Nottingham apartments), canals (eg, Glaxo Smithkline HQ in Brentford, for cooling the computer suite), flooded mines (eg, two distribution warehouses with WSHPs in Gateshead; also Coal Authority regional offices near Nottingham), sea (eg, RNLI have three lifeboat stations with heat pumps, National Trust property on Anglesey), sewers (eg, Galashiels College). What's happening now is that people are building bigger WSHP schemes, such as the Wandsworth and Battersea schemes mentioned earlier. There are lots of these schemes around, though perhaps not as well known as the Kingston Heights scheme.

Q3: Is the application process straightforward for WSHPs, compared to say biomass?

A3: The Environment Agency are supportive of WSHPs as they help reduce the temperature of water bodies, and they are well-versed in the sector. Equipment, such as filters, are readily available as they have long been used for cooling power stations and industrial sites.

Q4: If your primary interest is cooling, and you're pushing heat back into the water, would the Environment Agency still be supportive?

- A4: You can put spare heat into a borehole under a development to draw out as you need it, rather than dumping it back into the river. Planners also can be receptive because of the reduction in air quality emissions on site. By using heat pumps in the basement plantroom to provide cooling (as well as heat) there is no need for roof mounted chillers that would exhaust waste heat to atmosphere. A key issue in the central London is the lack of roof space for chillers. In respect to residential the space for chillers can be replaced by penthouses and achieve further developer profit.
- Q5: Was there much of an environmental impact assessment (EIA) when you're tapping into underground aquifers?
- A5: There's a standard approach provided by the Environment Agency.
- Q6: What are the limitations of WSHPs, for example thermal insulation, space?
- A6: Compared to a GSHP installation, the only difference is the energy source: is there water available?
- Q7: With ambient temperature networks, are the heat pumps furthest away having to work harder with a heavy load?
- A7: No, because it is a closed loop the load on each is the same.
- Q8: How sensitive are the economics to the price of electricity?
- A8: It's a function of the coefficient of performance, so it's not that sensitive.
- Q9: Your use of power is greatest in the winter months when presumably the CoP is going to be the worst because of external temperatures. The whole power system is moving more towards time of use, seasonal charging – what impact might that have, including on distribution charges?
- A9: It depends on the energy source. Below-ground sources stay at a constant temperature across the seasons. It's an issue because of the "electrification of everything" but as it happens there is more off peak power than ever, and you can use off peak power to generate heat at night, then store and release at the start of the next day. You can also be paid to guarantee that you won't use your heat pump at peak time.

4. Making the most of your BEMS

Gilbert Lennox-King, Demand Logic

(see slides)

- 4.1 Demand Logic – described as a "fitbit" for buildings. We aim to provide insights that will help you run your buildings better in 24 hours. We're tapping into your control units to see what's happening in your buildings. This could relate to commissioning of new buildings, but also to maintenance, productivity and conditions in existing buildings. It's a more collaborative approach to facilities management.
- 4.2 A single Data Acquisition Device plugs in to the Building Management System typically within a day. If there is insufficient sub-metering, we can create a virtual meter to identify how much energy an area is using.
- 4.3 Ultimately, you have a better performing building and you can see how your contractors are performing. We're seeing major landlords writing into their FM contracts that issues need to be rectified within a certain number of days or that a proportion of spaces stay within agreed comfort levels. Results are: 2-9 month paybacks on energy savings, better use of maintenance time, and better productivity and comfort for staff.

Q1: What were the occupancy levels in the case study described? You could be regulating a room that's not occupied. Also, how are you measuring staff productivity?

A1: We're not taking over the BMS – that's down to the control strategy in the BMS. We take the occupation schedule that the client provides.

Comment: You can get one or two people coming in and triggering everything. Monitoring occupancy would be a helpful thing.

Comment: As a user of Demand Logic, we know that they assume a best case scenario and start flagging whenever anything is running outside that. That led us to do a survey of our Building Managers, so we could feed back to Demand Logic on known different occupancy patterns. We also sent our security guards around to see who's using the building out of hours. In some buildings, we're not getting data for whole buildings. We are ramping up tons of plant when we don't need to.

A1 cont: You could put occupancy sensors in that link up to your BMS. We can pick up anything that comes through the BMS.

Comment: It would be great if you could tap into the card access systems, so we could see who is where and when. It's brilliant data but it's hard to pull that out into a BMS.

A1 cont: On productivity, it's based on the University of Berkeley study (see reference in slides). It's based on a lot of assumptions.

Comment: We've just rolled out a Powerdown campaign to switch off PCs; someone said that it was a waste of money because of lost productivity time if you're switching off your PC every day or whenever you have a tea break.

Q2: Is productivity the only number for payback?

A2: We talk about energy as our starting point but anything else is a bonus. There's a 2-9 month energy payback on installation of the platform, and then it depends on how well your team is working to deliver actions based on the findings of the platform. Some people can be quite defensive because everyone can see how the building is being managed, but if you can get past that and focus on delivering a more efficient building, it's very powerful.

Comment: Some of our buildings are very complicated with a lot of units. We can structure our contracts for FM based on data and monitoring.

Q3: What types of actions came up in the case study?

A3: Some were to do with major plant operating out of hours or 24/7, so working to switch those off or change the timers. Also, we found units heating and cooling at the same time – the BMS might say it's at 21 degrees but you have both systems operating. It's all looking at operational issues rather than capital works.

Q4: What if we bring you along and our system's broken or our BMS is broken?

A4: We start with operational things because these save you money straight away, but we will also look at other things that might require capital investment. We're freeing up money to invest in other projects.

Comment: We are going to replace our boilers in our main building and a big chunk of the project is fine-tuning the building. One of the big things that came from the fine-

tuning is that the BMS is old and you'll never improve the building without upgrading the BMS.

Comment: One solution could be putting a new system in place.

Comment: Croydon looked at this – it's dependent on the information coming through your sensors being correct. We had issues with this because of poor commissioning.

Comment: At TfL, we picked up that we had fan coil units with chilled and LTHW actuators on the wrong way round. The BMS was demanding more cooling and then turning on the heating. It's obvious things like that which you have to push for in commissioning. Commissioning always gets squeezed.

A4 cont: On the quality of the BMS – what we need is good connectivity. We're not worried about how the BMS is working – we communicate directly with all of the plant rather than relying on the BMS.

Comment: It would be helpful for us to look at occupancy as a priority. That can help us to identify which buildings we're heating when they're not being used and where we prioritise our work.

Comment: It also makes a good case for shutting down your buildings and looking at how you're decanting people. New buildings don't lend themselves easily to massive increases in occupancy per floor; you can only ramp up a certain amount before you go outside temperatures.

Comment: We tried to benchmark occupancy / kilowatt / m². The Carbon Trust are looking at benchmarks for different types of buildings. This will help us to budget and plan for the future, and invest our money on buildings which will deliver better value over time. Any benchmarking data is very good.

Comment: [Quinten Babcock, TfL] I'm chair of the Better Buildings Partnership benchmarking group. We do a lot on office buildings, particularly those with air conditioning. You look at data by occupancy and it doesn't have any correlation to energy use. It's down to the kit that is used and how poorly used it is. We are now putting more focus on in-use performance rather than design performance, to look at new buildings and get a commitment to an in-use performance.

Q6: On the collaboration piece: we have a regeneration site owned by British Land, which is going to be retail. So what do I want from them in planning to make sure that they operate it and maintain it in varying temperatures? What relationship does a local authority want with them? Do we care? We're not going to get financial savings. But what could we put in the contract?

A6: With developers, you can shift from design standards for energy to operational standards – we're very supportive of this because we don't believe that design standards work.

Q7: We also have lots of leased buildings which provide income – how can this type of system reduce our costs for maintaining leased buildings? And can we link it to M&V for projects through RE:FIT? We also have lots of PV installations as part of new developments and want to see if PV is meeting performance – how does all of that link together?

A7: It reduces energy costs for the tenants, but also the landlord's costs. You take a whole systems approach to supply and demand, and you engage with tenants to see how they are maintaining their floors (eg, out of hours demand). Poor maintenance costs everybody, including from a carbon perspective. M&V: we're tracking all of the actions that take place in the building so we can see how a piece of plant is performing before and after an action.

5. BEMS Case Study

Stephen McKinnell, SOAS

(see slides)

5.1 Looking at the Brunei Gallery, it was built in 1995, and combines a gallery, teaching space, open spaces, conference spaces – it's very mixed use. It had boiler plant, two old chillers and various air handling units. Everything seemed to be obsolete the moment the building was opened! The building was G-rated on its DEC, even though it was the newest one on the SOAS estate.

5.2 We did an energy audit / survey of the controls, which included some adjustments there and then of various settings. That more or less paid for the audit / survey. We then had a series of works – replacement of valve to reduce simultaneous heating and cooling; installation of variable speed drives on fans; installation of PIRs for heating / cooling. For specialist need (eg, in the gallery space), we gave the curator a keyswitch so when the exhibitions were changing over, they could activate it and the setpoints would be relaxed to reduce energy. On hot water, we've put in a deadband to manage temperature of the water more effectively.

5.3 We're still struggling to get the interface between the BMS and a new chiller.

5.4 Our DEC rating improved to a D; heating was reduced by 55%. Hopefully we can maintain it; we have an SLA with Trend to keep on top of this.

5.5 Another example is the Phillips Building: the heating system was a single pipe – we were able to zone it quite effectively around the building to take advantage of the glazing. When it's a sunny day, we can shut down the heating on the south side of the building. This more or less halved heating consumption. We're now looking at double glazing too.

5.6 An important issue is user interfaces – people twiddle old thermostats and think they're doing something (they're not) but they don't complain! But we're now trying to give people more genuine control of temperatures by a degree or two.

Q1: What were the financial savings?

A1: A lot of the projects were Salix funded so we have paid for it over five years. We have saved over £1.2m. Double glazing is coming out of capital, rather than as an energy saving project.

Q2: Do you have a year on year carbon target?

A2: Our main one was 48% by 2020, and I think we're at 52%, compared to 2005.

Q3: Do you compare which systems use most energy?

A3: Because of our district heating system, our electricity costs are very low. So we have previously prioritised work on the heating side. In the Brunei Gallery, humidification and chilling were the higher energy loads so they were the easier targets. The DEC certificate was really the route that made us do something – we had an idea that something was happening.

Q4: Did you have a controls incumbent?

A4: The district heating contractor used to do the maintenance as well. They were a bit protective at first but we made the case for it. The maintenance company get to view things and do minor adjustments but can't do anything more.

Q5: Did you link the metering to Trend?

A5: It's working to some degree, but we've had issues around IT – the Trend system doesn't sit on the network, it's on a VLAN. It goes through a router that's owned by the district heating company so it's hard to get everything working together.

Comment: There are issues which several people have faced about having separate networks for IT and for energy management.

6. Member updates

- Kingston: We have an issue with a schools project and analysing the data arising from it.
- Surrey: We're interested to know where people are securing funding?
 - Kingston: Our own capital, or Salix
 - Croydon: We don't have a revolving fund any more, because we couldn't get the projects to fit the criteria. So we use Public Works Loan Board.

7. AOB

CLG have now released EPC and DEC data in bulk, which could be particularly helpful. See <https://epc.opendatacommunities.org/>

8. Dates for future meetings

- 13 July 2017, Kensington Town Hall

Appendix 1
LBEG Treasurer's Report, 2016-17

2016/17 Invoice Summary				
	Value	Number	LA Members	Associate Members
Invoices issued	£ 2,400.00	12	11	1
Payments received	£ 1,600.00	8	7	1
2016/17 costs				
Secretariat fees	£ 2,880.00			
Catering of forums	£ 455.10			
Web domain and hosting renewal	£ 51.44			
Bank charges	£ 45.60			
Total	£ 3,432.14			
2016/17 Account Summary				
Opening balance	£ 4,695.72			
Income	£ 1,600.00			
Outgoings	£ 3,432.14			
Account balance	£ 2,863.58			

Notes:

1. Secretariat services paid up to December 2016
2. Membership fees received from the following members: Surrey, Laser, Southwark, Croydon, Harrow, TfL, Sutton, RBK