Sharing energy to warm up homes

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Welcome to Islington
Local Context

- Islington is the most densely populated borough in the UK
- Third smallest district in England.
- Around 4,500 listed buildings
- 55% of the homes in Islington are Council owned or managed
- Ambitious target of Net Zero Carbon by 2030
- Average fuel poverty levels around 10% with some Council estates peaking at 25%
Identifying opportunities: Heat mapping

- 2009 – Borough-Wide Decentralised Energy Strategy
- 2014 – District Heating Masterplan
Council vision

Heat map

Heat network vision

King’s Cross

Citigen

Shoreditch
Future scheme development

9 clusters:
15 projects

Expand clusters & convert individual boiler heating

Individual clusters

District scheme
Bunhill Heat Network - 2012

- 1.9MWe CHP plant
- 115m³ thermal store
- 1.5km pipe network

Currently provides heat to:
- 598 council homes
- 212 private homes
- 4 office buildings
- 2 leisure centres

Electricity generated is sold to the national grid
Reduced carbon emissions by 2,000 tonnes CO₂e
Vision for GreenSCIES

GreenSCIES aims to deliver a concept and design of a technically and commercial viable integrated, local, smart energy network

➢ Deliver low carbon, affordable energy
  1. Efficient use of heat
     Capturing waste heat and using renewable energy sources
  2. Balancing loads
     Delivering low carbon heating & cooling by sharing heat between applications
  3. Integration of new technologies
     Transition to EV and V2G

➢ Design able to be used & operated in an urban environment
  • 5th generation district heating network with energy storage and AI optimization

➢ Develop a local energy market
  • Engaging stakeholders & develop a suitable business model

➢ Pathway for Replicability
Challenges: Addressing the local context

Developing circular relationships with end users

Distribution of power
Challenges: Addressing the local context

Creating value throughout the system

- End users
- Prosumers
- Community energy groups
- Researchers
- Energy suppliers
- Policy makers
- Fuel poverty/price
- Sustainability

Anticipating the unknowns

- Prosumers
- Developers/Consultancies
- End users
- Community energy groups
- Energy suppliers
- Risk and reliability

Disruption

- End users
- Prosumers
- Energy suppliers
Challenges: How to finance it?

Delivery structures for a 5th generation smart energy network:

- Project Sponsor ESCo
- Joint venture ESCo
- Concession
- 3rd Party ESCo
- In-house delivery
Challenges: Identification of benefits & impacts

Method

- Determine the potential benefits of the smart integrated system
- To quantify the benefits and impacts of the community energy system
- Create a design framework to support the realization of key benefits and impacts in the design phase of project.
Identification of benefits & impacts
Identification of benefits & impacts

**DESIGN FOR IMPACT**

**PRINCIPLES**

**Economic**
- Reduce end user bills and operational costs through systems efficiencies, such as utilizing waste, smart management etc.

**Replicable**
- Source agnostic, adaptable approach that provides the framework for an integrated system anywhere in the UK

**Service based**
- Provide low cost, low carbon comfort through community led system operation

**Collaborative**
- Community and industry led, focused on prosuming and distributed assets

**Efficiency from systems**
- Reducing costs, material, waste through smart management and integration of sectors

**Decentralised**
- Use of existing small scale assets, providing additional value to system and owners through prosuming

**Control**
- Smart management of system in an open transparent manor with participants, prosumers and community.

**Low Carbon**
- Reduce carbon emissions of the scheme, through renewable generation, storage and efficiency

**Future proofed**
- Adaptable and expandable scheme, supporting the transition to a post fossil fuel era.

**VISION 2045**

The provision of smart green power, heat and mobility solutions whose combined presence enables the efficient storage and transferal of energy in a decentralised and renewable energy system. Providing low cost, low carbon comfort in a community led, transparent, post fossil fuel era.
Identification of benefits & impacts

GreenSCIES 1 smart energy networks currently covers approximately 8% of LBI

- > 10,000 residents connected to the network
- Low carbon heating and cooling to more than 3500 homes
- Renewable power generation enough to supply nearly 500 homes
- > 160 new EVs connected to the smart energy network

Estimated total carbon savings > 80%
Operational revenue increase > £2,000,000/year
End user bill costs reduced by 25% in total

<table>
<thead>
<tr>
<th>Boroughs/Councils involved</th>
<th>No of residents connected</th>
<th>No of homes (social, private)</th>
<th>No of business/commercial/non-domestic</th>
<th>Energy sources</th>
<th>Addressing fuel poverty [number of residents]</th>
<th>Technologies to be included/explored</th>
<th>Integration readiness level (IRL)*</th>
<th>Potential carbon savings [tonnes of CO2e] (Current carbon factors)</th>
<th>Estimated potential pollution emission reduction in area [%]</th>
<th>Potential revenue savings (£/year)</th>
<th>Meeting 3rd 4th &amp; 5th carbon budgets and delivering zero carbon by 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>GreenSCIES1 (Conceptual design for two clusters in Islington)</td>
<td>Islington</td>
<td>&gt;10,000</td>
<td>&gt;3,500</td>
<td>8 (TfL, Level3, Volta, Museum, 5 Schools/University)</td>
<td>Solar, Ground water, London Undergrou nd, Data centres</td>
<td>2000 (20% of 10,000)</td>
<td>Heat pumps, PV, Batteries, Ecars, V2G, Thermal and electrical stores, Smart control</td>
<td>4</td>
<td>9,100 (&gt;80% reduction)</td>
<td>6</td>
<td>&gt;2,000,000</td>
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Thank you!