CESI
National Centre for Energy Systems Integration
Taking a whole systems approach to future energy

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Blockchain

Transactional platform that enables P2P exchange without intermediaries

Public-key cryptography  Hash functions  Distributed Consensus  Smart contracts
Why can blockchain be disruptive?

• Distributed platforms without need for trusted intermediary
• Removes top-down control with consensus
• Open for all, censorship-resistant
• Can create a new type of platform economy
• No need for centralised data synchronisation and concurrency control, efficiency gains on top of existing structures
• Underlying philosophy of distributed consensus, open source, transparency and community
### Deep retrofit

<table>
<thead>
<tr>
<th>Sample group</th>
<th>Before technical intervention</th>
<th>After technical intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mainly showers</td>
<td>Baths or showers</td>
</tr>
<tr>
<td>Information intervention</td>
<td>2 (15%)</td>
<td>1 (8%)</td>
</tr>
<tr>
<td>No information intervention</td>
<td>4 (31%)</td>
<td>2 (15%)</td>
</tr>
<tr>
<td>Total</td>
<td>6 (23%)</td>
<td>3 (12%)</td>
</tr>
</tbody>
</table>

Table A11: Controlling drafts.

### Do you try to control drafts in your home to stop heat escaping?

<table>
<thead>
<tr>
<th>Sample group</th>
<th>Before technical intervention</th>
<th>After technical intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequent</td>
<td>Occasional</td>
</tr>
<tr>
<td>Information intervention</td>
<td>9 (69%)</td>
<td>0</td>
</tr>
<tr>
<td>No information intervention</td>
<td>10 (77%)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>19 (73%)</td>
<td>0</td>
</tr>
</tbody>
</table>
Retrofit for high rise

Shieldfield Fabric Refit, 7.5% Discount Rate

Cumulative Tenant Benefits
Cumulative Association Benefits
Cumulative NHS Benefit
Remainder to Pay
Why can deep retrofit be disruptive?

• Research has shown that significant life changes can lead to new practices, including changes to energy behaviours
• Significant technical learning for landlord/installer
• Can take a wider societal view of cost benefits
• Can be life changing for tenant/occupier
Whole systems approach
Why can whole system approach be disruptive?

• Multiple optimisation criteria
• New business models
• Solutions considered can be more than just hardware
• Systems not just organisations, also PEOPLE
EPSRC Supergen Energy Networks

Supergen Energy Networks hub
- Addressing Energy Network research challenges with a Whole Systems View
- Awarded to Prof Phil Taylor & Dr Sara Walker, Newcastle University

Co-creation of the Supergen Hub Phase 2 proposal
Website : http://www.cesienergy.co.uk
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