Towards a Smart Energy City:

Mapping a path for Bristol

Simon Roberts OBE

Edinburgh, 22 September 2016

@cse_bristol #SmartEnergyCity

Centre for Sustainable Energy

BRISTOL 2015 EUROPEAN GREEN CAPITAL

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THE ASPIRATION

By the early 2020s, having taken an integrated approach to smart meter roll-out & city-wide data capture & analytics, Bristol will have a public-interest organisation orchestrating smart use, distribution and supply of heat & power across the city

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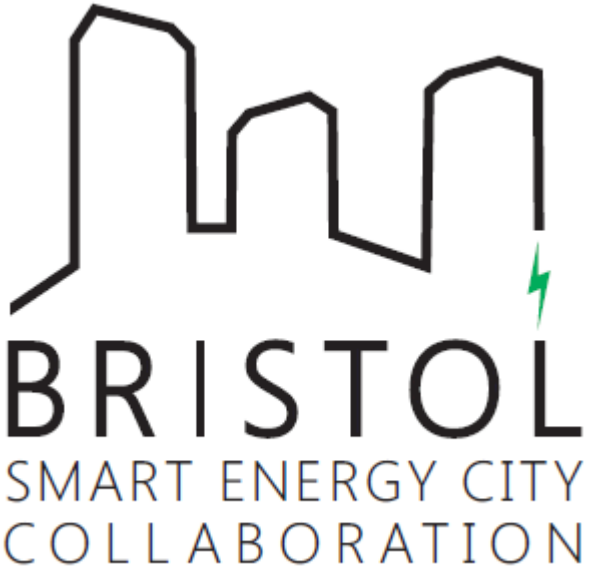
CITY COUNCIL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SECURE

KPMG

WESTERN POWER
DISTRIBUTION
Serving the Midlands, South West and Wales

ARUP

Centre for
Sustainable
Energy

University of
BRISTOL

Demand
LOGIC

KWMC
KNOWLE WEST MEDIA CENTRE

DNV·GL

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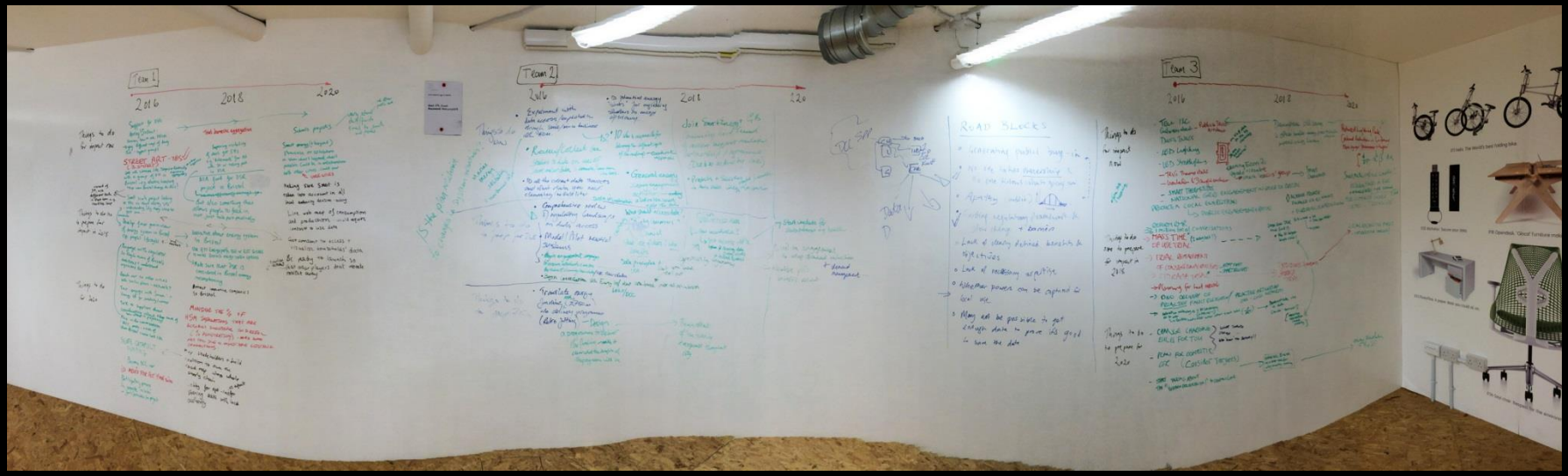
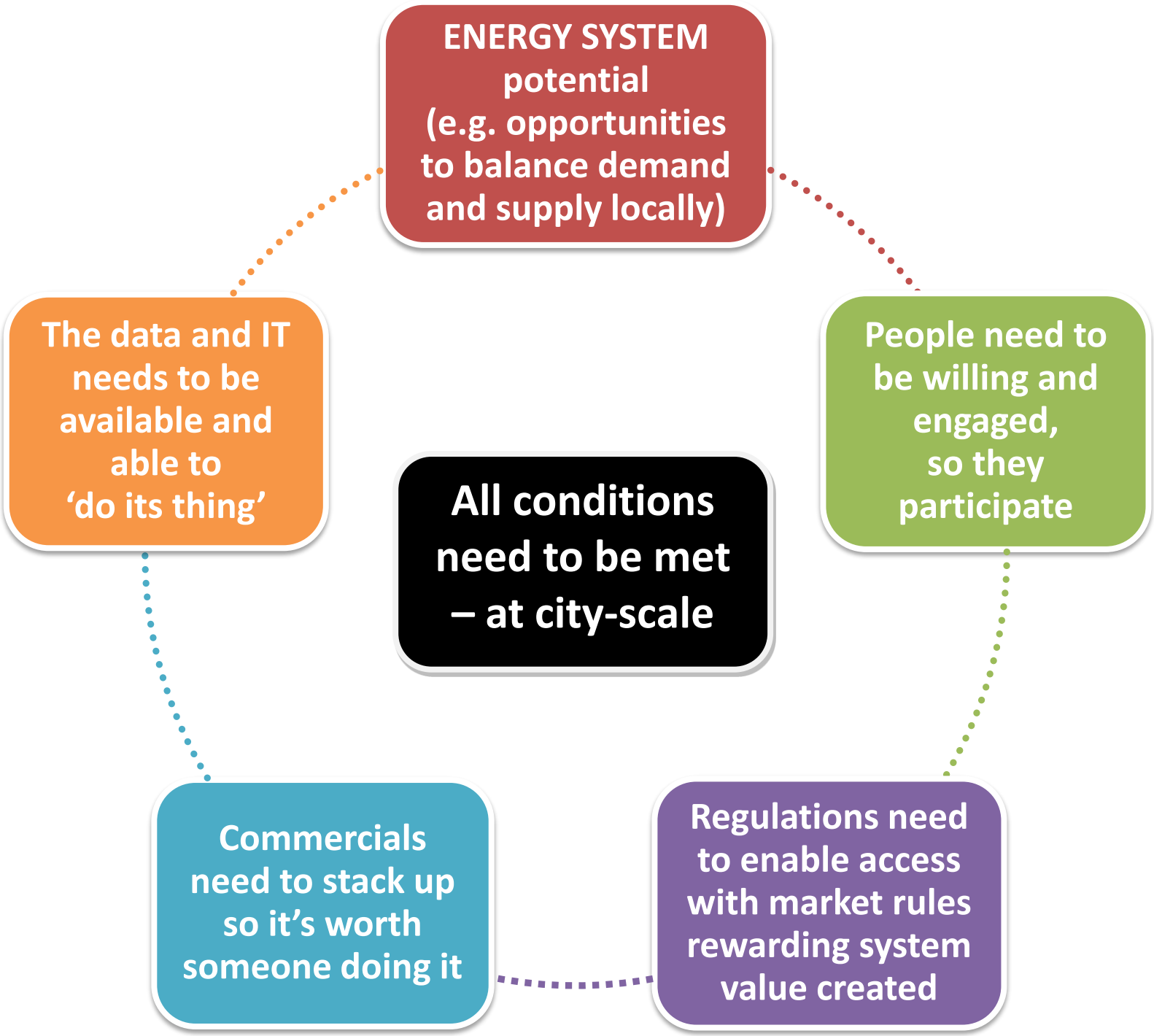
The Wall™
29m² of inspiration
Team 1
Team 2
2016
2018
2020

2016
2018


Team 1
Team 2
Team 3
2016
2018
2020
ROAD BLOCKS


ENERGY SYSTEM potential (e.g. opportunities to balance demand and supply locally)
People need to be willing and engaged, so they participate
Regulations need to enable access with market rules rewarding system value created
Commercials need to stack up so it's worth someone doing it
The data and IT needs to be available and able to 'do its thing'
All conditions need to be met – at city-scale

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Smart Energy City 'Opportunities'

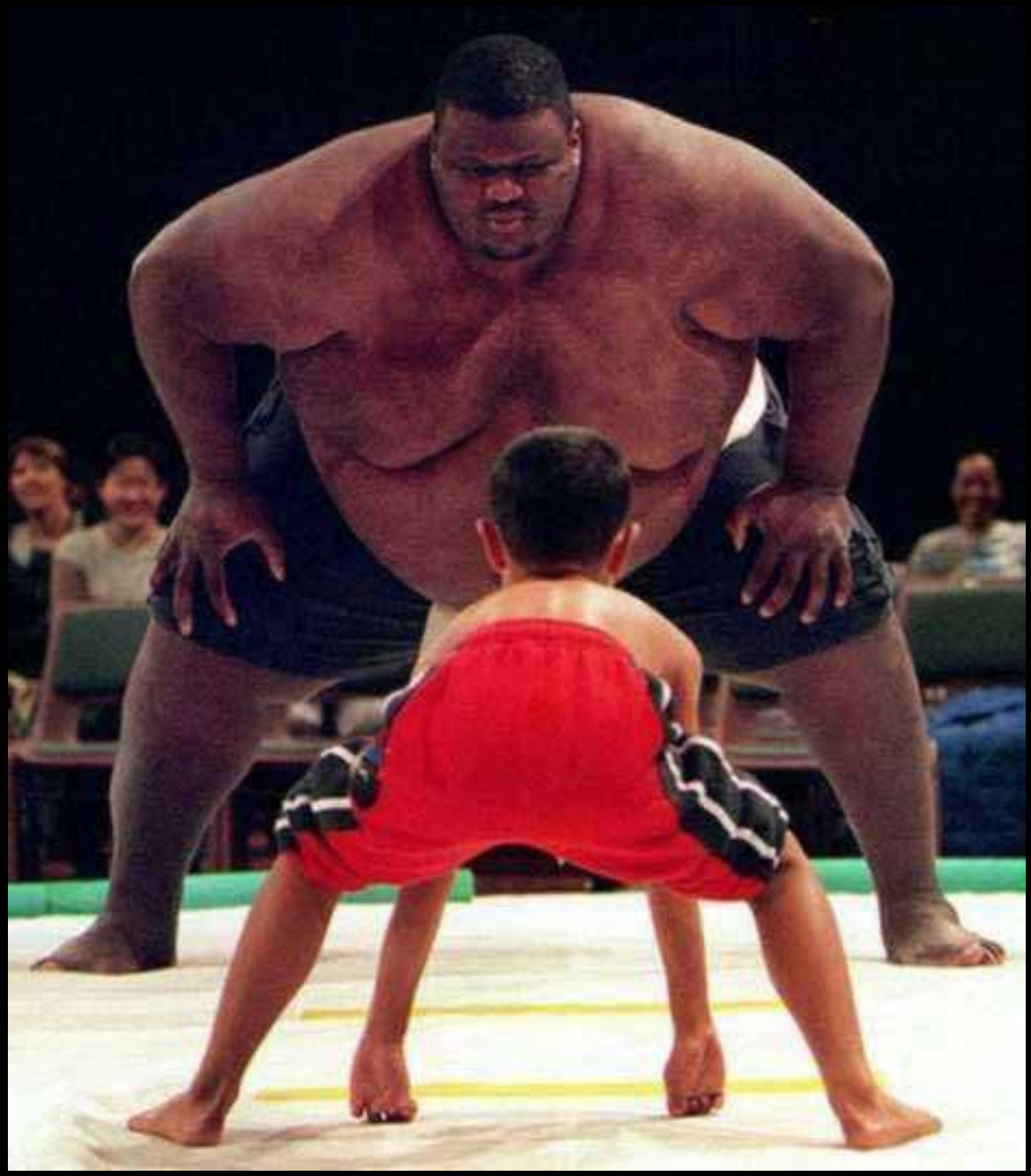
- Curbing energy waste and peak demand
- Enhancing the value of local renewable energy generation
- Smarter approaches to tackling fuel poverty
- Stimulating & capturing the economic benefits of being smarter
- Developing fine grain understanding of city energy system

Does

size or

place

matter?



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Does city-scale make sense?

Strengths

- Active network management
- Faster social norming and cultural change
- Smart interventions to tackle fuel poverty
- Heating, cooling, storage and electric vehicles

Weaknesses
(Bristol twist possible?)

- Smart meter roll-out co-ordination
- Early adopter concentrations
- Local data capabilities
- Capitalisation of demand-side services

Weaknesses

- Energy market rules and regulations
- Establishing a locus for action

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Does city-scale make sense?

A meaningful Smart Energy City will only emerge in the early 2020s in Bristol (or anywhere in the UK) if, over the next 2-3 years, there are purposeful, co-ordinated, and ambitious smart energy initiatives in the city which can demonstrate enough benefit and gain to disrupt and shift the current market trajectory.

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Road mapping the Smart Energy City 'Opportunities'

- Curbing energy waste and peak demand
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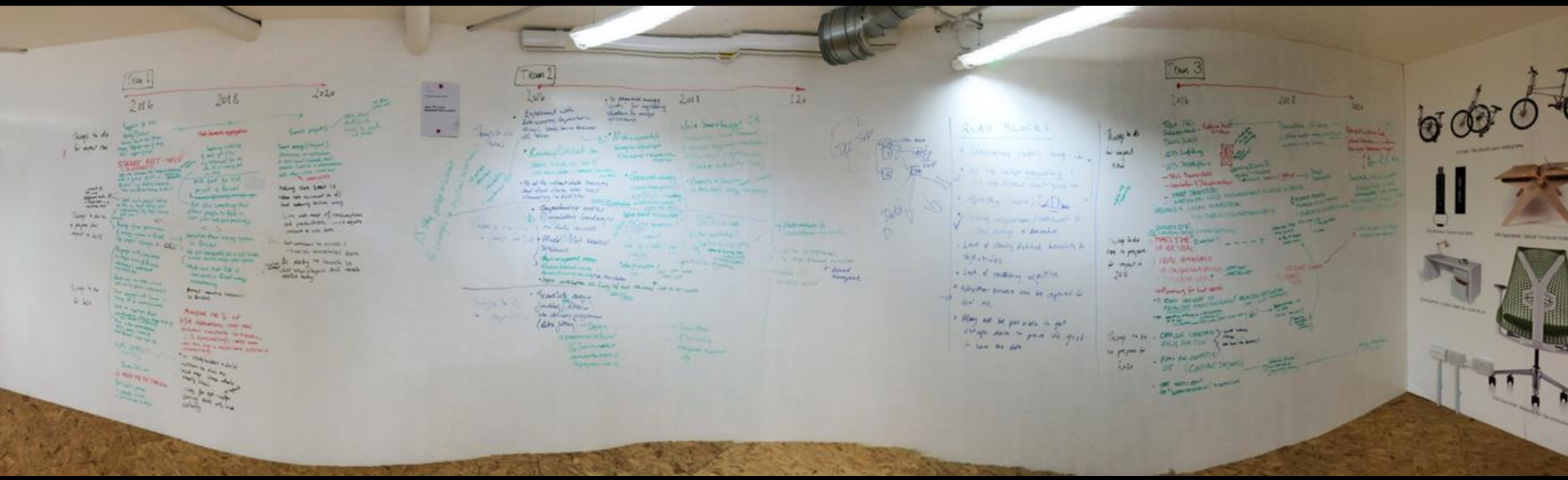
Team 1
2016
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2018
ROAD BLOCKS

Road map 1: Using smart energy data to curb energy waste and peak demand

The five conditions

Energy | Social/cultural | Regulatory/policy | Commercial | IT/data

	2016	2018	2020
DOING Things to do now for impact now	Secure mass take up of Demand Logic style diagnostic services to enhance energy data analytics in commercial and public buildings Commission public art to reveal city's daily demand peaks LED lighting swap initiative (reducing demand and peak in domestic sector) Trials of approaches to engaging households with energy advice during and after smart meter installation Establish portal within Bristol data commons initiative for people to share and visualise their energy data	Test commercial and public users demand response aggregation potential across city Peak alert apps to encourage load shedding (linked to 'use now' app function to make most of local renewable generation – in Roadmap 2) Deliver Bristol smart meter roll-out support service, co-ordinated with all suppliers and with data capture and engagement driver Smart-enabled household demand response – trial aggregation on small scale Tests of domestic DSR automation & ToU tariffs Actively promote take-up of key smart energy technologies within the city, tying technology suppliers and service providers into Smart Energy City plans	Bristol Smart Energy City up and running
PREPARING Things to do now to prepare for action and impact in 1–2 years	Engage with suppliers and Smart Energy GB on what would constitute an irresistible offer from Bristol to justify 'all in one year' smart meter rollout Enlist larger local loads (e.g. universities, hospitals etc) to create group sharing data and exploring opportunities for aggregated demand response Engage with National Grid on how city-scale demand response can feature in their planning Develop community-scale household demand reduction trial Put funding bid together for local experiments and market innovation Spec out framework for data capture and analysis for city-scale initiative, including consent and access requirements Understand market readiness/penetration of different technology and services plan integration with Smart Energy City initiatives and explore with developers and suppliers their interest in Bristol as pilot city-scale initiative	Establish governance and commercial model for Bristol Smart Energy City Map out compliance requirements Commercial viability modelling for 2020 operation Local policies to require smart enabled technology in new build	
EXPLORING Creating conditions which make impact possible in future	Engage with Ofgem and DECC on market rules and governance and opportunity to carve out 'space to experiment' for Bristol Articulate a clear purpose for Bristol Smart Energy City Consider how to embed Smart Energy City aspirations into new build in Bristol Knowledge tracking and R&D opportunities – both with academics and market innovators		

Background against which events on this timeline are taking place

DCC goes live and domestic smart meter mass roll-out starts | ToU tariff trials | CADs widely available | Smart Energy GB engages with local partners | New Supplier Obligations in place | 'Next day' supplier switching goes live | Energy Settlement to half-hourly | Plans for RIIO-ED2 emerging | Rollout complete

Road map 2: Enhancing the value of local renewable generation

The five conditions

Energy | Social/cultural | Regulatory/policy | Commercial | IT/data

	2016	2018	2020
DOING Things to do now for impact now	Commission public art to reveal city's renewable energy production and real time electricity demand Large scale trial of storage linked to local renewable generators Establish portal within Bristol data commons initiative for households and businesses and local generators to share and visualise their energy data	Peak alert apps to encourage load shedding and 'use now' alerts to improve matching of demand with local generation output Pilot Power Matching City (or equivalent approach) Tests of commercial sector and domestic DSR automation & ToU tariffs to reflect local generation availability Trial new distribution charging methodology to reflect better the distance between generator and supply customer Local smart electricity system design blueprint, incl. generation, demand management, storage options	Bristol Smart Energy City up and running
PREPARING Things to do now to prepare for action and impact in 1–2 years	Enlist larger local loads and local renewable generators (eg City Council, Triodos Renewables, Ecotricity etc) to create group sharing data and exploring opportunities for aggregated demand response and local system balancing Prepare for pilot of Power Matching City (or equivalent approach) Engage with National Grid on how city-scale system balancing can feature in their planning Put funding bid together for local experiments and market innovation Spec out framework for data capture and analysis for city-scale initiative, including consent and access requirements Explore new distribution charging methodology which reflects local supply initiatives which reduce system use (learning from WPD project SYNC)	Establish governance and a commercial model for Bristol Smart Energy City Map out compliance requirements Commercial viability modelling for 2020 operation	
EXPLORING Creating conditions which make impact possible in future	Engage with Ofgem and DECC on market rules and governance and opportunity to carve out 'space to experiment' for Bristol Review Power Purchase Agreement and financing terms with local renewable generators to understand potential for changing future supply arrangements Articulate a clear purpose for Bristol Smart Energy City Knowledge tracking (e.g. learning from Low Carbon Network Fund projects) and R&D opportunities – both with academics and market innovators.		

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DCC goes live and domestic smart meter mass roll-out starts | ToU tariff trials | CADs widely available | Smart Energy GB engages with local partners | New Supplier Obligations in place | 'Next day' supplier switching goes live | Energy Settlement to half-hourly | Plans for RIIO-ED2 emerging | Rollout complete

Road map 3: Smarter ways to tackle fuel poverty and associated vulnerabilities

The five conditions

Energy | Social/cultural | Regulatory/policy | Commercial | IT/data

DOING

Things to do now for impact now

2016

- Pilot different approaches to local vulnerable customer support programme for smart meter rollout
- Data sharing and mapping of Priority Service Register customers (WPD, WWU and willing suppliers)
- Trial Smart PPM post-installation support for vulnerable homes
- Trial data communication solutions for smart meters in flats (as national exemplar)
- CSE and Knowle West Media Centre to integrate efforts on smart energy and 'Internet of Things' opportunities for vulnerable households

2018

- Embed lessons from trials in full roll-out of service across city
- Trial smart data enabled vulnerable customer support with WPD/WWU
- Cold home thermal safeguarding trials with health service
- Assess quality and value of range of different CAD applications for vulnerable households
- Establish long-term funding and/or commercial case for smart energy services for energy vulnerable people
- Ensure Bristol Smart Energy City governance reflects need for inclusivity and shared benefits

2020

Bristol Smart Energy City up and running

PREPARING

Things to do now to prepare for action and impact in 1–2 years

2016

- Map out Bristol-wide service to engage/support vulnerable households for smart meter rollout, engaging Energy UK and Smart Energy GB to test for integration with national planning
- Explore with WPD and WWU smart data opportunities for vulnerable customer support
- Undertake local trials of 'thermal safeguarding' for households vulnerable to under-heating
- Engage with health service over cold home thermal safeguarding trials
- Test data visualisation approaches with different types of vulnerable household
- Analyse vulnerable customer segmentation and improve demand profile understanding to assess potential for demand response and aggregation
- Explore opportunities to link vulnerable household support services with City Council Telecare and other care support and monitoring services
- Identify and/or design CAD applications which suit vulnerable households

2018

- Establish governance and a commercial model for Bristol Smart Energy City
- Map out compliance requirements
- Commercial viability modelling for 2020 operation

EXPLORING

Creating conditions which make impact possible in future

2016

- Build consensus over Smart Energy City serving public interest and inclusivity
- Ensure city strategy specifically includes smart energy as part of goal to achieve 'digital inclusion'

Background against which events on this timeline are taking place

- DCC goes live and domestic smart meter mass roll-out starts
- ToU tariff trials
- CADs widely available
- Smart Energy GB engages with local partners
- New Supplier Obligations in place
- 'Next day' supplier switching goes live
- Energy Settlement to half-hourly
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- Rollout complete

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The first next steps (2016-17)

- Public arts project to reveal demand peaks and local supply outputs
- *Demand Logic* style data analytics in commercial/public buildings
- Develop local roll-out engagement and support service (incl vulnerable support) and 'sell' to suppliers and Smart Energy GB
- Spec out framework for data capture, management, and analysis, together with informed consent issues
- Enlist local 'loads' and local generators to capture and analyse data for balancing potential (leading to Power Matching City?)
- Engage with Ofgem and DECC on activities to secure 'space to experiment'
- Build consensus on purpose of Bristol Smart Energy City

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Taking the next steps..

- Sustain the Collaboration rather than force ‘structure’ at this stage
- Include all active parties and focus on projects and initiatives
- Share learning and develop joint funding proposals

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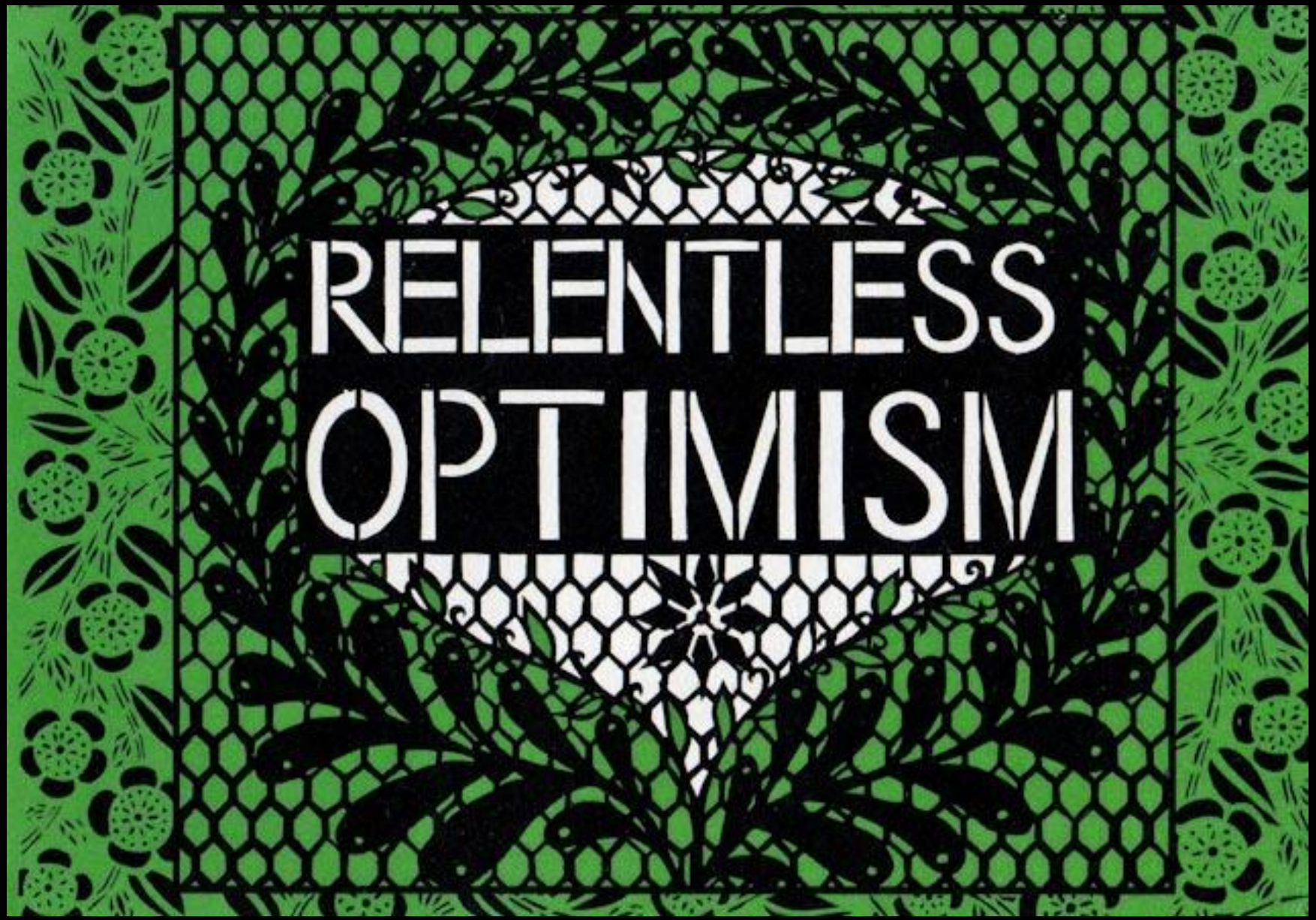
The first year report and three road maps

Download at https://www.cse.org.uk/news/view/2069

The Wiki

https://bristol-smart-energy.cse.org.uk/wiki/Main_Page

Thanks to Sainsbury Family Charitable Trusts' Climate Collaboration for their generous funding to CSE and to all the Collaborators and those who took part so constructively in the expert workshops



Rose Vickers, Jamaica Street Artists, Bristol

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Thank you

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