Programme Area: Smart Systems and Heat

Project: WP3 Business Model Development

Title: Five promising consumer business models to transform low carbon heating and well-being in the home. Appendices to Main Report.

Abstract:

A presentation describing five consumer business models that could transform low carbon heating and well-being in the home.

Context:

The case for heat decarbonisation is widely acknowledged, with studies showing that it is more cost effective to tackle CO2 emissions from buildings than cutting more deeply in other sectors. The real challenge is establishing new heating solutions that substantially remove natural gas use from homes whilst making the solutions financially viable and attractive to consumers. Around 20,000 homes each week will need new heating system installations between 2025 and 2050 to meet decarbonisation targets; a rate fifty times greater than achieved to date. The current market will not deliver at scale for residential low carbon heat transition given: unappealing consumer propositions, a fragmented industry structure, a lack economic drivers and need for holistic policy framework. The Energy Technology Institute commissioned the Energy Systems Catapult to deliver a business model development project to develop a number of specific business propositions that could stimulate new thinking for models to be introduced into the market from just before 2020 through to the late 2020's.

Five promising consumer business models to transform low carbon heating and well-being in the home

CATAPULT Energy Systems

"a clean, intelligent, energy system that works for people, communities and businesses"

Smart Systems and Heat Phase 1

Appendices to Main Report
October 2016

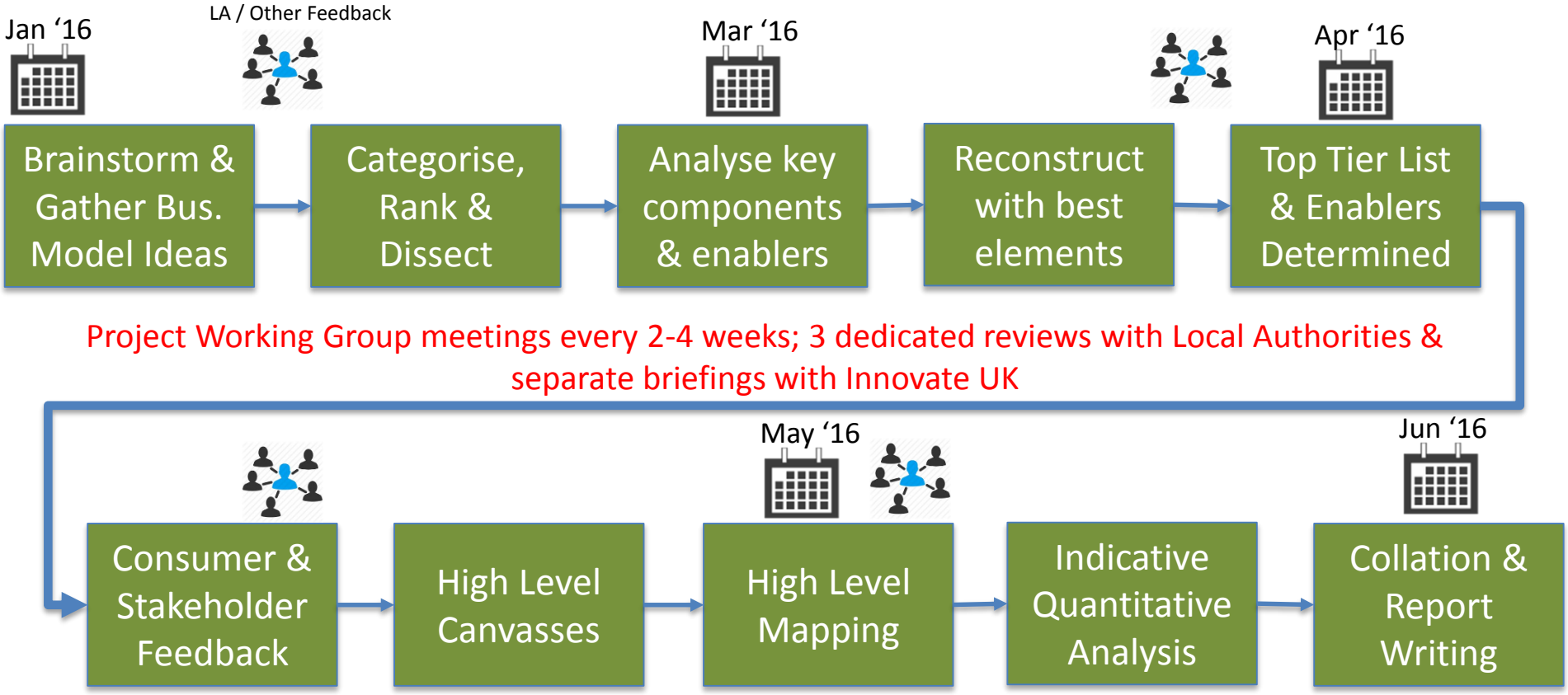
CONFIDENTIAL

Contents - Appendices to Main Report

Project Approach

"a clean, intelligent, energy system that works for people, communities and businesses"

Project process overview



Project Working Group

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EDF	Alastair Davies, Sarah Bee, Bogi Hojgaard
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DECC	Jon Saltmarsh, Shane Long, Ioannis Orfanos

Greater Manchester Combined Authority
Newcastle City Council
Bridgend County Borough Council
Innovate UK
Andrew Haslett

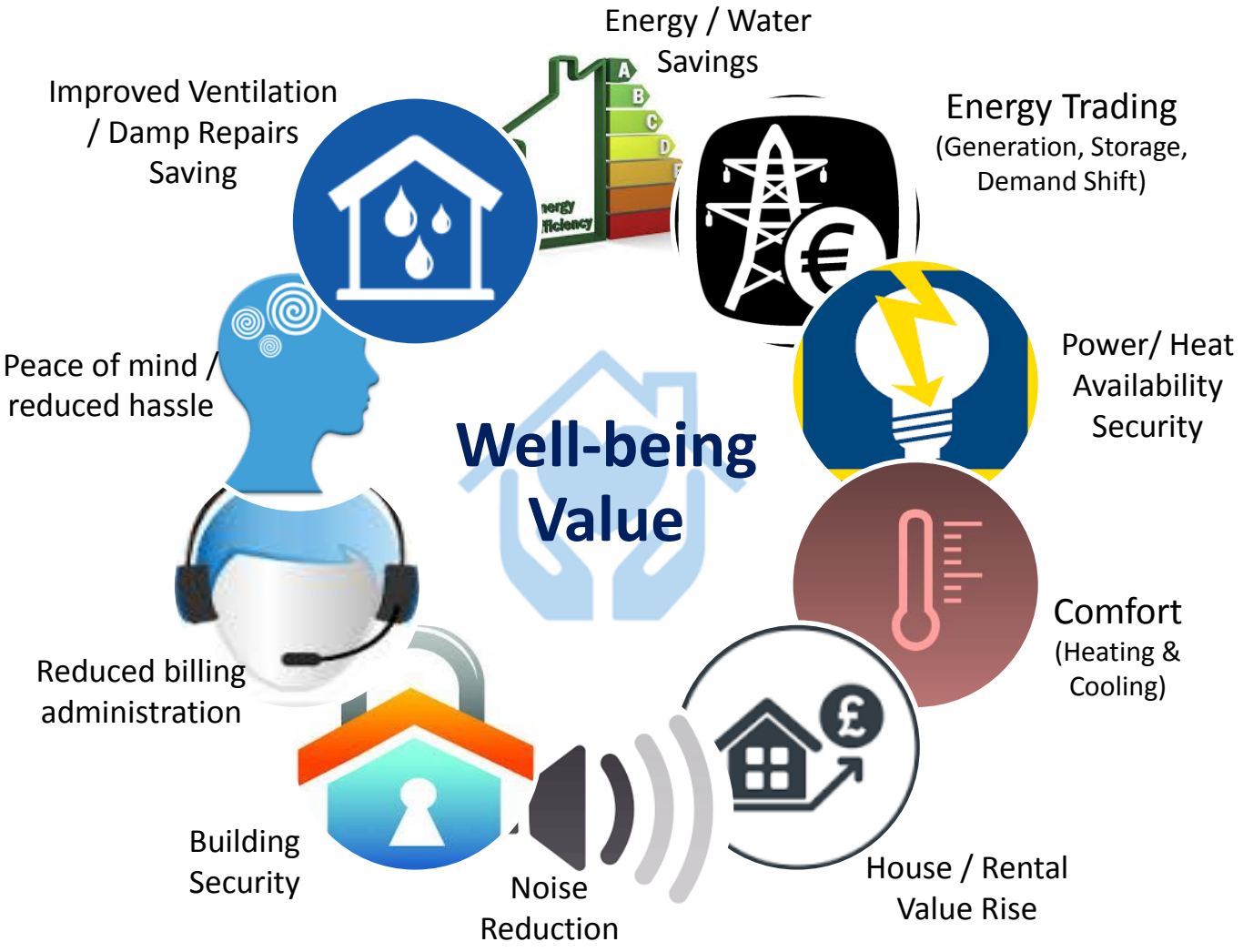
Residential comfort is achieved in a manner that is atypical of today's consumer market place

Producer Orientated (e.g. Energy Sector)	Transition Enabled By	Consumer Orientated (e.g. Home improvement, media services)
Energy sold in technical units	Data / ICT	Sold against desired outcomes
Confusing technical choices		Focus on outcome not technology
Reactive / distress purchase	Policy	Proactive & planned home upgrade
High capital cost demands		Smoothed financing
Bill uncertainty – client takes risk	Business Models	Bill predictability & peace of mind
No assurance of comfort		Comfort assured
Varying trust in providers	Integrated & new technology	Accredited & trusted providers

Our starting point:
More value in well-being than kWh of heat …

Enablers

- Home Energy Management
- Energy Trading Platforms
- Policy & Tax/Benefits Redistribution
- New Energy Technologies
- New Business Models / Entrants



*Moving from Cost of Heating to **Cost of Wellbeing** in the home*

Business Model Idea Capture and Ranking

CATAPULT Energy Systems

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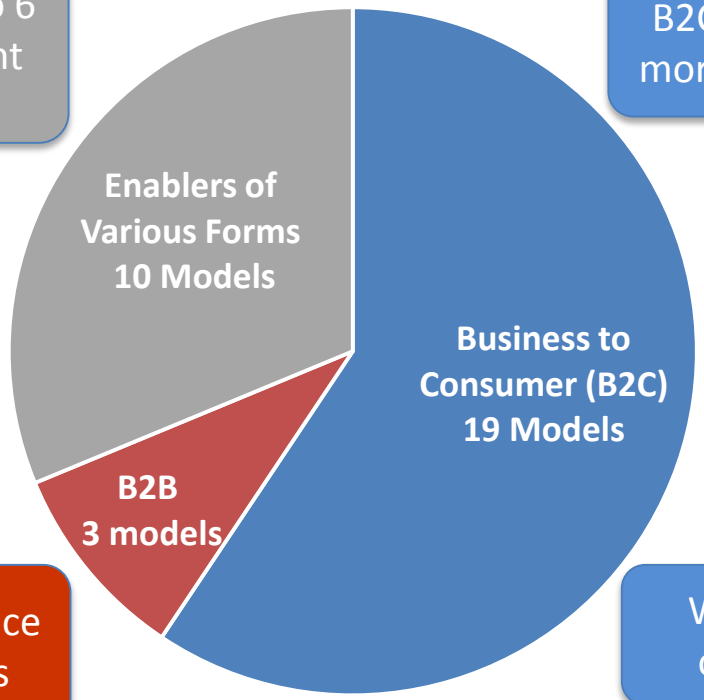
High Level Template – To capture ideas

Name & Description:		
Stakeholders / Partners	**Consumer Value Proposition**	**Customers / Market Share**
Costs / Risks	**Revenues / Benefits**	
Adaptability		
ID No.	Categories Covered:	Similar To:

32 business model ideas in brainstorming phase – (over 20 sources of input)

Enablers can be categorised into 6 key types influenced by different stakeholders



B2C models comprise one or more of 9 underlying modules

Some could be applied to enhance some of the target B2C models

Within these B2C models – opportunities for merging

19 out of the 32 were strictly B2C models

Summary of business models – Long List

V0.5 4 Feb 16				Ideal ICT ✓ or Necessary ICT ☑			Of Interest to Government			Target or Possible Effect of Business Model on Energy Use				Other Characteristics			
ID	Model Name	Code	Model Type	Segment Applicability	HEMS	Energy Market incl. Trading	New Provider IT System	Regulation / Policy Change Needed	Taxation / Benefits Change / Shift	Carbon Benefit Timing	Demand Reduction	Demand Management	Energy Storage	Energy Generation	Utilities that can be covered	Refurb / Upgrade Level	How Disruptive	UK Network Link & Energy Trading
1	Energy Outcomes	EOU	B2C		✓		✓	✓		Med	?	?			E G	⚒	💣	
2	Energy Mutual	EMU	B2C				✓			Med	✓		?	?	E G	⚒	💣	
3	Community Energy	COE	B2C			✓		✓		Fast	✓	?	?	?	E G	⚒⚒	💣💣	↗⇔↗
4	Power Buffer	PBU	B2B			☑		✓		Fast		✓	✓		E	⚒⚒	💣💣	↗⇔↗
5	Nandos	NAN	B2C		✓		✓			Med	✓				E G	⚒	💣	
6	SimCity	SIC	B2C						✓	Fast	✓			?	E G	⚒	💣	
7	Market Maker	MMA	B2C		☑	✓	✓	✓		Slow	?				E		💣💣	↗⇔↗
8	HoSCO	HOS	B2C		☑	☑	☑	✓		Med	✓	✓	?	?	E G W Tx Tel	⚒	💣💣💣	↗⇔↗
9	Micro Utility	MUT	B2C		✓	☑	✓	✓		Fast	✓	✓	✓	✓	E G	⚒	💣💣	↗⇔↗
10	Block Refurb	BRE	B2C		✓	✓	✓		?	Fast	✓	✓	?	?	E G +	⚒⚒	💣💣	↗⇔↗
11	Re-E-Generation	REG	B2B		✓	✓	✓	?	?	Fast	✓	?	?	?	E G W Tx Te	⚒⚒⚒	💣💣💣	↗⇔↗
12	House Blanket	HBL	B2B/C		✓	✓			?	Fast	✓	?			E G W	⚒⚒	💣💣	↗⇔↗
13	Industry Heat Buddy	IHB	B2B/C		✓	✓		?	?	Fast	✓	✓	?	✓	E G	⚒	💣💣	↗⇔↗
14	Pay to Waste	PTW	B2C		✓			✓	✓	Fast	✓	?			E G		💣💣	
15	Money Maker	MOM	B2C		☑	☑	✓			Slow		✓			E	⚒	💣	↗⇔↗
16	Energy Butler	EBU	B2C		✓			✓		Slow					E G		💣	
17	Appliance, Heat & Light	AHL	B2C		✓		✓	✓		Med	✓	✓			E G	⚒	💣💣	
18	Cleantech Cost Cruncher	CCC	B2B							Med	✓	✓	✓	✓	E G	⚒	💣💣	↗⇔↗
19	Clean-E-Pioneers	CEP	B2C		✓	✓			✓	Fast	✓	✓	✓	✓	E G	⚒	💣	↗⇔↗
20	Cleantech Pension Builder	CPB	B2C		✓	✓	✓	✓	✓	Fast	✓	?	?	?	E G	⚒	💣	
21	Home Office Heat Balance	HOH	B2B/C		✓		✓			Fast	✓	✓	?	✓	E G	⚒	💣💣	↗⇔↗
22	Interested Green Landlord	IGL	B2C		✓				✓	Fast	✓	?			E G	⚒⚒	💣💣	?
23	ESP Emission Reducers	EER	B2B		✓			✓		Fast	✓	✓	?	?	E G	⚒	💣	↗⇔↗
24	Rent-a-wall	RAW	B2C		✓					Fast	✓				E G	⚒	💣	
25	Dynamic Bandwith Trading	DBT	B2B		☑	☑	☑	✓		Med		✓			E G		💣	↗⇔↗
26	Cross Country CHP trading	CCT	B2B		✓	☑	✓			Fast	✓	✓	?	✓	E G	⚒	💣	↗⇔↗
27	Citizen Carbon Account	CCA	B2C		✓		✓	✓	✓	Slow	✓				E G		💣💣💣	
28	Local Saving Recycling	LSR	B2C		✓	✓	✓	✓	✓	Med	✓	?	?	?	E G	⚒	💣💣	↗⇔↗
29	Energy Stockmarket	ESM	B2C		✓	☑	☑	✓		Med	?	✓			E G		💣💣	↗⇔↗
30	Winter Fuel to Refurbishment	WFR	B2B						✓	Fast	✓	?			E G	⚒	💣	
31	Cloud & Free Heat	CFH	B2C		✓					Fast	✓				E	⚒⚒	💣💣	
32	International Home C Trader	IHC	B2B/C		✓					Fast	✓				E G		💣💣	↗⇔↗

Simplifying the Long List …

How could these support B2C models?

Further combinations of 9 modules both B2C/B2B?

Long List

32 business model ideas as of 05/02/16

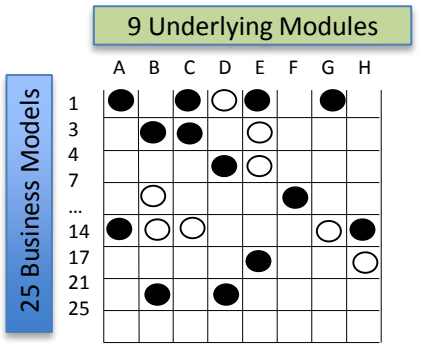
separate

Pure B2B models

Real B2C Business Models

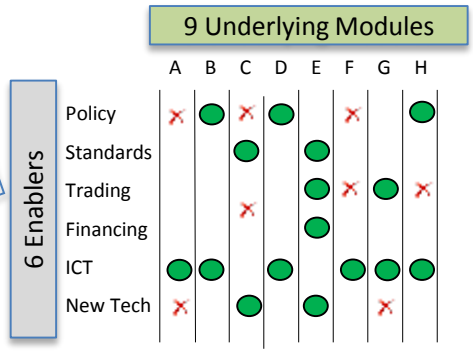
Policy or Enabler Concepts

Categorise modules



Major or minor component matching

Map enablers to models



Assessing need for or enhancement potential of enablers

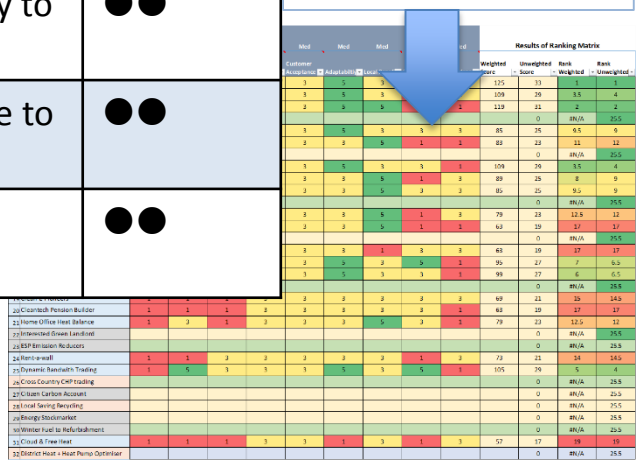
The underlying enablers & B2B models and their potential to enhance (in CO_2, £, uptake etc..) or make possible certain business models will be an important element of the analysis phase our project

How much could each enabler enhance business model?

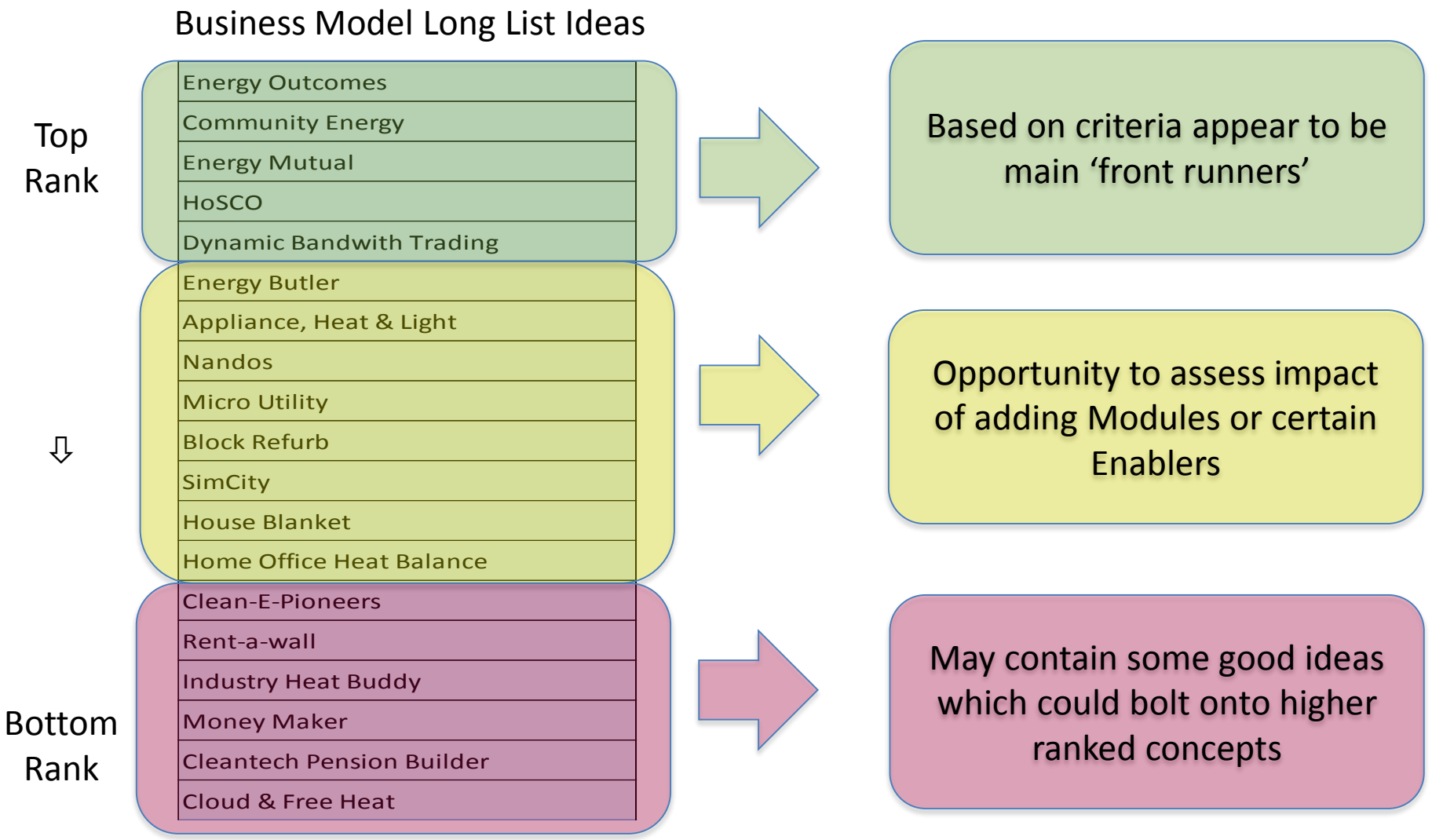
Ranking criteria for ideas Long List

Criterion	Assessment Guide	Weighting
CO_2 reduction potential	Likely carbon savings at aggregate level from power source to home affected by business model	●●●
National Economic Benefit	Likely financial benefits in energy value chain – both hard & soft	●●●
Speed of Penetration	How quickly & widespread could model be implemented in UK to have a high level of impact	●●●
Likely Customer Acceptance	Likely appeal of proposition to consumers in relevant segments	●●●
Adaptability / Future Proof	How robust is model to changes in technology, market, demographics, policy etc.	●●
Local Economic & Social Benefit	Potential impact on local jobs when model deployed at scale	●●
Financial Risk for Provider of Model	Level of risk to those providing the finance necessary to implement the business model	●●
Policy Dependence	To what degree is model dependent on or vulnerable to policies in UK or EU	●●
Proof of Concept Cost	Total funding likely to be needed to effect demonstrations prior to commercialisation	●●

Criteria applied to ideas



Initial ranking of 19 B2C ideas against key criteria



Following this ranking we decided to dissect the ideas into components

There are 9 underlying modules covering the business model ideas in the Long List …

ID	Key Module	Description	Benefits
A	Energy Monetisation	Trading value of storage, generation or demand management at aggregated or individual dwelling unit / energy asset level	• Enhances business case for interventions • Improves asset utilisation in wider network
B	Financing Options	New methods of paying for energy / comfort improvements or accessing funding for them	• Deals with upfront cost for consumer • Brings in new additional sources of capital
C	Service (Outcome) Bundling	Paying for an outcome (e.g. temperature level) for householder rather than individual utility / hardware elements. Can cover utilities beyond heat & power.	• Provider delivers most effective solution • Reduces overheads of similar services • Allows cross-financing or assets • Reduces admin burden & risk for consumer
D	(Better) Asset Utilisation	Sharing assets, utilising better or exploiting by-products (heat) to reduce asset cost element of heat/power provision	• Lower capex for consumer / provider • Lower emissions
E	Higher (Energy) Efficiency	Reducing energy consumption of house or improving efficiency / running costs of appliances	• Lower energy costs with better comfort • Lower emissions
F	Lean Supply Chain	Changing channel, standardising product or its format to reduce cost of product / interventions – including hardware, installation and maintenance	• Lower capex cost of interventions • Potential local / UK job opportunities • Faster / simpler deployment
G	Energy Brokering	Sourcing best deal / provider for energy with option of reducing cost risk / volatility for consumer	• Lower energy costs / price risk to consumer • Reduces consumer admin / anxiety
H	Increasing Willingness to Pay	Changing the way energy is viewed so that focus is on outcomes (e.g. comfort), convenience and peace of mind. View upgrades akin to other home improvements	• Moves thinking away from pure payback • Puts higher value on soft benefits of upgrades • Efficiency upgrades move up list of priorities
I	Behaviour Change	Encouraging by incentives, penalties, lifestyle options or information consumers to lower or shift energy use	• Stimulates more energy saving interventions • Reduces energy use / emissions

19 B2C Models matched to Modules

V0.8 24 Feb 16			Business Model Modules Included							
			A	B	C	D	E	F	G	H
ID	Model Name	Code	SubType	Energy Monetisatio	Alternative Finance	Service Bundling	Asset Utilisation	Higher Efficiency	Lean Supply Chain	Energy Brokering	Behaviour Change
1	Energy Outcomes	EOU	Stand Alone	◑	◑	●	○	◑	○	●	○
2	Energy Mutual	EMU	Stand Alone	○	●	◑	○	◑	○	◑	◑
3	Community Energy	COE	Stand Alone	○	○	◑	●	◑	○	○	○
5	Nandos	NAN	Stand Alone	○	◑	◑	○	◑	○	●	●
6	SimCity	SIC	Stand Alone	○	●	○	○	◑	○	○	○
8	HoSCO	HOS	Stand Alone	◑	◑	●	○	◑	◑	●	○
9	Micro Utility	MUT	Stand Alone	●	◑	○	○	●	○	○	○
10	Block Refurb	BRE	Stand Alone	◑	●	●	●	●	◑	◑	◑
12	House Blanket	HBL	Stand Alone	◑	●	○	○	●	◑	○	○
13	Industry Heat Buddy	IHB	Stand Alone	◑	○	◑	●	●	○	○	○
15	Money Maker	MOM	Bolt On	●	○	○	○	○	○	◑	○
16	Energy Butler	EBU	Stand Alone	○	◑	◑	○	○	○	●	○
17	Appliance, Heat & Light	AHL	Stand Alone	◑	◑	●	○	◑	◑	●	◑
19	Clean-E-Pioneers	CEP	Stand Alone	◑	●	○	○	◑	◑	○	○
20	Cleantech Pension Builder	CPB	Bolt On	○	●	○	○	●	○	○	○
21	Home Office Heat Balance	HOH	Stand Alone	○	○	○	●	○	○	○	○
24	Rent-a-wall	RAW	Stand Alone	○	●	○	○	●	○	○	○
25	Dynamic Bandwith Trading	DBT	Bolt On	●	○	○	○	○	○	○	○
31	Cloud & Free Heat	CFH	Stand Alone	○	◑	○	●	○	○	○	○

● Main component of business model ◗ Partial component

Initial Scoring of Business Models

The results of an initial assessment against agreed criteria – for Workshop Discussion

V0.8 24 Feb 16				High	High	High	Med	Med	Med	Med	Med	Med	Results of Ranking Matrix			
	Model Name	Code	SubType	Carbon Reduction	National Economic B	Speed of Penetratio	Cost to Demonstra	Customer Acceptanc	Adaptabilti	Local Bene	Financial Risk	Policy Dependen	Weighted Score	Unweighted Score	Rank Weighted	Rank Unweighte
1	Energy Outcomes	EOU	Stand Alone	5	3	5	3	3	5	3	3	3	125	33	1	1
2	Energy Mutual	EMU	Stand Alone	3	3	5	3	3	5	3	1	3	109	29	3.5	4
3	Community Energy	COE	Stand Alone	5	5	3	3	3	5	5	1	1	119	31	2	2
5	Nandos	NAN	Stand Alone	1	1	3	3	3	5	3	3	3	85	25	9.5	9
6	SimCity	SIC	Stand Alone	1	3	3	3	3	3	5	1	1	83	23	11	12
8	HoSCO	HOS	Stand Alone	5	5	1	3	3	5	3	3	1	109	29	3.5	4
9	Micro Utility	MUT	Stand Alone	3	3	1	3	3	3	5	1	3	89	25	8	9
10	Block Refurb	BRE	Stand Alone	1	3	1	3	3	3	5	3	3	85	25	9.5	9
12	House Blanket	HBL	Stand Alone	1	3	1	3	3	3	5	1	3	79	23	12.5	12
13	Industry Heat Buddy	IHB	Stand Alone	1	1	1	3	3	3	5	1	1	63	19	17	17
15	Money Maker	MOM	Bolt On	1	1	1	3	3	3	1	3	3	63	19	17	17
16	Energy Butler	EBU	Stand Alone	3	1	3	3	3	5	3	5	1	95	27	7	6.5
17	Appliance, Heat & Light	AHL	Stand Alone	3	3	3	3	3	5	3	3	1	99	27	6	6.5
19	Clean-E-Pioneers	CEP	Stand Alone	1	1	1	3	3	3	3	3	3	69	21	15	14.5
20	Cleantech Pension Builder	CPB	Bolt On	1	1	1	3	3	3	3	3	1	63	19	17	17
21	Home Office Heat Balance	HOH	Stand Alone	1	3	1	3	3	3	5	3	1	79	23	12.5	12
24	Rent-a-wall	RAW	Stand Alone	1	1	3	3	3	3	3	1	3	73	21	14	14.5
25	Dynamic Bandwith Trading	DBT	Bolt On	1	5	3	3	3	5	3	5	1	105	29	5	4
31	Cloud & Free Heat	CFH	Stand Alone	1	1	1	3	3	1	3	1	3	57	17	19	19

Cost to demonstrate (in Phase 2) not assessed because of difficulty to evaluate

Customer acceptance is WIP by ESC Consumer Insight team – also to get input at Workshop

This matrix will be combined with 'gut feel' and yardstick markers to determine Short List

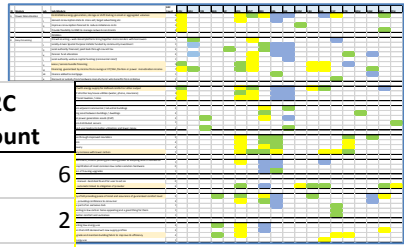
Some Bolt On models may be worth adding to other models, despite low individual ranking

Consumer assessment – initial view

Model Name	Consumer benefits	Comfort/ Peace of Mind	Resource	Relationships	Convenience	Hygiene		Total appea	Consumer types addressed	2	Level of concern
Energy Outcomes	Less hassle; peace of mind (cost); (But, want to be able to open windows whenever wanted e.g. to dry laundry)	5	3	3	5	1		**3**	B,C		**1**
Energy Mutual	Cheaper to improve the home	3	5	3	3	3		**1**			**3**
Community Energy	Less hassle to maintain; feel part of the community: saves money	5	5	5	5	3		**5**	A,B,C		**5**
Nandos ?How different to energy outcomes?	Less hassle; peace of mind (cost);	5	3	3	5	3		**3**	B, C		**1**
SimCity	Feel part of the community; reduces cost of home improvements; contribute to improvement of the local area	3	5	5	1	3		**3**	B		**3**
HoSCO	Less hassle; cheaper; ease of financial planning	3	5	3	5	3		**3**	C		**3**
Micro Utility	Saves money; engage in energy system, scope to bring community together; (But, lose peace of mind that resources will be available when needed)	1	5	5	1	3		**1**			**3**
Block Refurb	Easy; readily available DHW & space heating; (But, loss of control - fear I won't have what I want when I need it)	1	5	1	5	5		**3**	C		**1**
House Blanket	Less disruption than some options. (But, taking a loan does not appeal to people who want to save money)	5	1	3	1	3		**3**	B		**1**
Industry Heat Buddy	No clear consumer benefit							**1**			
Money Maker	No clear consumer benefit							**1**			
Energy Butler	Convenience; simple; (But, fear of loss of control)	5	5	3	5	3		**5**	A,B,C		**3**
Appliance, Heat & Light	Less maintenance/repair hassle; reassurance that the most efficient models are being used; (But, loss of control - worry that I won't be able to use when needed)	3	5	3	5	3		**3**	C		**3**
Clean-E-Pioneers	Status appeals to early adopters; cost saving brings installation within reach for those already interested.	3	5	3	1	3		**1**			**1**
Cleantech Pension Builder	Cost saving brings installation within reach for those already interested.	3	5	3	3	3		**1**			**1**

Sub-Modules – initial analysis …

Assessed the characteristics for each of the 19 B2C Business Model Ideas



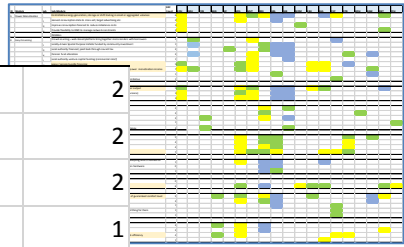
More ideas here?

ID	Module	Sub	Sub-Module	B2C Count
A	Power Monetisation	i	Controllable energy generation, storage or shift trading in small or aggregated volumes	6
		ii	Harvest consumption data to cross-sell, target advertising etc.	2
		iii	Improve consumption forecast to reduce imbalance costs	3
		iv	Provide flexibility to DNO to manage network constraints	2
B	Financing Options	i	Crowd-sourcing – web-based platform bring together micro-lenders with borrowers	2
		ii	Locally-driven Special Purpose Vehicle funded by community investment	1
		iii	Local authority financed; paid back through council tax	2
		iv	Pension fund allocation	2
		v	Local authority venture capital funding (commercial rate?)	1
		vi	Lease / service bundle financing	5
		vii	Financing guaranteed by income from savings or FIT/RHI /Carbon or power monetisation income	7
		viii	Finance added to mortgage	1
		ix	Discount or subsidy from hardware manufacturer who benefits from initiative	1
C	Service Bundling	i	Low - Bundling of asset with energy supply for defined comfort or other output	5
		ii	Med - Incorporation of all other key house utilities (water, phone, insurance)	3
		iii	High - Incorporation of local taxation / rates	3

Easy Financing Module, unsurprisingly, had the largest number of possibilities (Sub-Modules)

Sub-Modules – initial analysis (2)

Assessed the characteristics for each of the 19 B2C Business Model Ideas



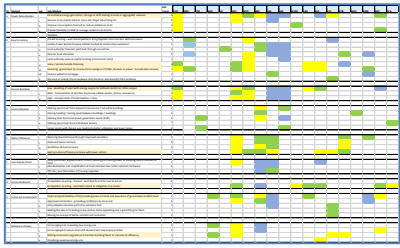
D	Asset Utilisation	i	Utilising spare heat from adjacent commercial / industrial buildings	2
		ii	Sharing heating / cooling asset between buildings / dwellings	2
		iii	Utilising heat from local power generation assets (CHP)	2
		iv	Utilising spare heat from distributed servers	1
		v	Larger assets with shared user leading to better utilisation and lower capex	2
E	Higher Efficiency	i	Reducing thermal losses through improved insulation	5
		ii	Improved home controls	4
		iii	Ventilation & heat recovery	4
		iv	Heat provision efficiency increase with lower carbon	7
F	Lean Supply Chain	i	Local authorities & government, HOSCO pooling purchasing power & adopting direct channels to OEM	1
		ii	Standardisation and simplifcation of most common low carbon solution hardware	0
		iii	Off-site / pre-fabrication of housing upgrades	1
G	Energy Brokering	i	Competitive sourcing - manual - best deal found for user to act on	0
		ii	Competitive sourcing - automatic linked to obligation of provider	6

Grouping opportunity

The Higher Efficiency approach could combined all Sub-Modules

Sub-Modules – initial analysis (3)

Assessed the characteristics for each of the 19 B2C Business Model Ideas



H	Increased Engagement	i	Improved predictability of bill providing peace of mind and assurance of guaranteed comfort level	5
		ii	Approved contractors - providing confidence to consumer	2
		iii	Early adopters become part of an exclusive club	1
		iv	Making the idea of investing in low carbon home appealing and a good thing for them	1
		v	Moving to concept of better comfort and outcomes	1
I	Behaviour change	i	Encouraging and rewarding low energy use	2
		ii	Encouraging behaviours that shift demand wrt new supply profiles	2
		iii	Making consumers upgrade and maintain building fabric to improve its efficiency	4
		iv	Penalising excessive energy use	1

Have separated Engagement from Behaviour Change.

Most Common Business Module Elements

ID	Category	Module Element	Score
B7	Finance Options	Financing guaranteed by income from savings or FIT/RHI [internalising cost of carbon] or power monetisation income	32
H10	Increased Willingness to Pay	Recognising value for money - greater transparency, understanding of offer	32
E2	Higher Efficiency	Improved home controls	28
H2	Increased Willingness to Pay	Approved contractors - providing confidence to consumer	28
D6	Asset Utilisation	Asset owned and operated as a service [By Local Authority or 3rd party]	26
F2	Lean Supply Chain	Standardisation and simplifcation of most common low carbon solution hardware	26
F4	Lean Supply Chain	Simplifying / reducing installation time / cost	26
E1	Higher Efficiency	Reducing thermal losses through improved insulation	24
E4	Higher Efficiency	Lower carbon & more efficienct heating devices to provide heat in the home	24
H5	Increased Willingness to Pay	Moving to concept of better comfort and outcomes	24
F1	Lean Supply Chain	Local authorities & government, HOSCO pooling purchasing power & adopting direct channels to OEM	23
A1	Energy Monetisation	Controllable energy generation, storage or shift trading in small or aggregated volumes	22
B2	Finance Options	Locally-driven Special Purpose Vehicle funded by community investment	18
A3	Energy Monetisation	Improve consumption forecast to reduce imbalance costs	17
H1	Increased Willingness to Pay	Improved peace of mind i.e. predictability of bill	16
H6	Increased Willingness to Pay	Provision of turnkey service and removal of hassle	16
E7	Higher Efficiency	Heat storage system	15
G2	Energy Brokering	Competitive sourcing - automatic linked to obligation of provider	14
E3	Higher Efficiency	Ventilation & heat recovery [including summer cooling option]	13
B6	Finance Options	Lease / service bundle financing	12
F5	Lean Supply Chain	Standard efficiency, reliability & lifetime assessment for new heating / cleantech devices	12

From mapping of elements across all of the chosen business models

Sub-Modules taken forward to next stage

I	Key Module	Si	Module Element (to be part of a composite Business Model)
A	Energy Monetisation	i	Controllable energy generation, storage or shift trading in small or aggregated volumes
A	Energy Monetisation	ii	Harvest consumption data to cross-sell, target advertising etc.
A	Energy Monetisation	iii	Improve consumption forecast to reduce imbalance costs
A	Energy Monetisation	iv	Provide flexibility to DNO to manage network constraints
A	Energy Monetisation	v	Monetising (spare) heat
B	Finance Options	i	Crowd-sourcing – web-based platform bring together micro-lenders with borrowers
B	Finance Options	ii	Locally-driven Special Purpose Vehicle funded by community investment
B	Finance Options	iii	Local authority financed; paid back through council tax
B	Finance Options	iv	Pension fund allocation
B	Finance Options	v	Local authority venture capital funding (commercial rate?)
B	Finance Options	vi	Lease / service bundle financing
B	Finance Options	vii	Financing guaranteed by income from savings or FIT/RHI or power monetisation income
B	Finance Options	viii	Finance added to mortgage
B	Finance Options	ix	Discount or subsidy from hardware manufacturer who benefits from initiative
B	Finance Options	x	Charitable donations towards fuel poor renovations
C	Service Bundling	i	Low - Bundling of asset with energy supply for defined comfort or other output
C	Service Bundling	ii	Med - Incorporation of all other key house utilities (water, phone, insurance)
C	Service Bundling	iii	High - Incorporation of local taxation / rates

Sub-Modules taken forward to next stage

I	Key Module	Su	Module Element (to be part of a composite Business Model)
D	Asset Utilisation	i	Utilising spare heat from adjacent commercial / industrial buildings
D	Asset Utilisation	ii	Sharing heating / cooling asset between buildings / dwellings
D	Asset Utilisation	iii	Utilising heat from local power generation assets (CHP)
D	Asset Utilisation	iv	Utilising spare heat from distributed servers
D	Asset Utilisation	v	Larger assets with shared user leading to better utilisation and lower capex
E	Higher Efficiency	i	Reducing thermal losses through improved insulation
E	Higher Efficiency	ii	Improved home controls
E	Higher Efficiency	iii	Ventilation & heat recovery
E	Higher Efficiency	iv	Heat provision efficiency increase with lower carbon
F	Lean Supply Chain	i	Local authorities & government, HOSCO pooling purchasing power & adopting direct channels to OEM
F	Lean Supply Chain	ii	Standardisation and simplifcation of most common low carbon solution hardware
F	Lean Supply Chain	iii	Off-site / pre-fabrication of housing upgrades
F	Lean Supply Chain	iv	Simplifying / reducing installation time / cost
G	Energy Brokering	i	Competitive sourcing - manual - best deal found for user to act on
G	Energy Brokering	ii	Competitive sourcing - automatic linked to obligation of provider

Sub-Modules taken forward to next stage

I	Key Module	Su	Module Element (to be part of a composite Business Model)
H	Increased Willingness to Pay	i	Improved predictability of bill providing peace of mind and assurance of guaranteed comfort level
H	Increased Willingness to Pay	ii	Approved contractors - providing confidence to consumer
H	Increased Willingness to Pay	iii	Early adopters become part of an exclusive club
H	Increased Willingness to Pay	iv	Making the idea of investing in low carbon home appealing and a good thing for them
H	Increased Willingness to Pay	v	Moving to concept of better comfort and outcomes
H	Increased Willingness to Pay	vi	Provision of turnkey service and removal of hassle
I	Behaviour change	i	Encouraging and rewarding low energy use
I	Behaviour change	ii	Encouraging behaviours that shift demand wrt new supply profiles
I	Behaviour change	iii	Making consumers upgrade and maintain building fabric to improve its efficiency
I	Behaviour change	iv	Penalising excessive energy use

Consumer Solutions - Conclusions

Module Element (to be part of a composite Business Model)	Ranking for incorporation into Top Tier	Comments / rationale for ranking
Low Level - Bundling of Home services (without assets)	High	Basic requirement for many models, unlocks value, reduces hasle etc.
Med Level - Bundling of asset with energy supply for defined comfort or other output	High	Basic requirement for many models, unlocks value, reduces hasle etc.
Competitive sourcing - automatic linked to obligation of provider	High	Removes hassle, essential for many models
Improved peace of mind i.e. predictability of bill	High	Basic feature for most value propositions
Approved contractors - providing confidence to consumer	High	Required for customer confidence, ensure roll-out is successful
Early adopters become part of an exclusive club	High	Important to get credibility, good media etc.
Moving to concept of better comfort and outcomes	High	For customers that value
Recognising value for money - greater transparency, understanding of offer	High	Essential for any VP
High Level - Incorporation of all other key house utilities (water, phone, insurance)	Medium	Potential add-on to foundation bundled delivery.
Xtra High Level - Incorporation of local taxation / rates	Medium	Potential add-on to foundation bundled delivery.
Collective switching	Medium	Important for community schemes etc.
Making the idea of investing in low carbon home aspirational and a good thing for them	Medium	Very hard to do, achieve where possible.
Provision of turnkey service and removal of hassle	Medium	For customers that value
Being part of community action / member of club	Medium	For customers that value
Encouraging and rewarding low energy use	Medium	Include where relavent
Encouraging behaviours that shift demand with new supply profiles	Medium	Include where relavent for engaged customers
Penalising excessive energy use	Medium	No customer choice, only makes customers more anti energy

The detail behind it

Key Module	Si	Module Element (to be part of a composite Business Model)	Carbon Reduction	National Economic Benefit	Speed of Penetratio	Cost to Demonstrat	Customer Acceptanc	Adaptabilit	Local Benefi	Financial Ris	Policy Dependenc
Service Bundling	i	Low Level - Bundling of Home services (without assets)	N/A	1	5	5	3	3	1	5	5
Service Bundling	ii	Med Level - Bundling of asset with energy supply for defined comfort or other output	N/A	1	5	5	3	3	1	3	3
Service Bundling	iii	High Level - Incorporation of all other key house utilities (water, phone, insurance)	N/A	3	5	1	3	3	1	3	1
Service Bundling	iv	Xtra High Level - Incorporation of local taxation / rates	N/A	3	3	1	3	3	3	3	1
Energy Brokering	i	Competitive sourcing - manual - best deal found for user to act on	N/A	1	5	5	5	5	1	5	5
Energy Brokering	ii	Competitive sourcing - automatic linked to obligation of provider	N/A	2	4	4	3	5	3	5	3
Energy Brokering	iii	Collective switching	N/A	2	3	5	5	5	3	5	5
Increased Willingness to Pay	i	Improved peace of mind i.e. predictability of bill	N/A	1	5	5	5	5	1	5	5
Increased Willingness to Pay	ii	Approved contractors - providing confidence to consumer	N/A	1	5	5	5	5	3	3	5
Increased Willingness to Pay	iii	Early adopters become part of an exclusive club	N/A	1	5	5	3	5	1	5	5
Increased Willingness to Pay	iv	Making the idea of investing in low carbon home aspirational and a good thing for them	N/A	3	3	3	3	3	3	5	5
Increased Willingness to Pay	v	Moving to concept of better comfort and outcomes	N/A	3	3	3	3	5	1	3	1
Increased Willingness to Pay	vi	Provision of turnkey service and removal of hassle	N/A	3	3	3	3	5	1	3	3
Increased Willingness to Pay	v	Being part of community action / member of club	N/A	3	3	5	5	5	1	5	5
Increased Willingness to Pay	v	Recognising value for money - greater transparency, understanding of offer	N/A	3	3	5	1	3	1	5	5
Behaviour change	i	Encouraging and rewarding low energy use	3	3	5	5	5	5	1	5	5
Behaviour change	ii	Encouraging behaviours that shift demand with new supply profiles	1	3	2	3	3	3	1	3	3
Behaviour change	iii	Making consumers upgrade and maintain building fabric to improve its efficiency	3	5	1	1	3	1	3	1	1
Behaviour change	iv	Penalising excessive energy use	3	3	3	3	1	3	1	5	1

Technical Solutions - Summary of rankings

Module Element (to be part of a composite Business Model)	Ranking for incorporation into Top Tier
Utilising heat from local power generation assets	High
Asset owned and operated as a service	High
Improved home controls	High
Lower carbon & more efficienct heating devices to provide heat in the home	High
Standardisation and simplifcation of most common low carbon solution hardware	High
Simplifying / reducing installation time / cost	High
Sharing heating / cooling asset between buildings / dwellings	Medium
Larger assets with shared user leading to better utilisation and lower capex	Medium
Reducing thermal losses through improved insulation	Medium
Ventilation & heat recovery	Medium
Local authorities & government, HOSCO pooling purchasing power & adopting direct channels to OEM	Medium
Utilising spare heat from adjacent commercial / industrial buildings	Low
Utilising spare heat from distributed servers	Low
Off-site / pre-fabrication of housing upgrades	Low

Summary of findings – Finance/ICT group

Module Element (to be part of a composite Business Model)	RR Ranking	IO Ranking	AA Ranking
Controllable energy generation, storage or shift trading in small or aggregated volumes	High	High	High
Harvest consumption data to cross-sell, target advertising etc.	High	High	High
Improve consumption forecast to reduce imbalance costs	High	Medium	High
Provide flexibility to DNO to manage network constraints	High	Medium	High
Monetising (spare) heat	Medium	Medium	Medium
Crowd-sourcing – web-based platform bring together micro-lenders with borrowers	Low	Medium	Low
Locally-driven Special Purpose Vehicle funded by community investment	Medium / High	Medium	Medium /
Local authority financed; paid back through council tax	Medium / High	Medium	Medium /
Pension fund allocation	Medium/Low	High	Medium/Lo
Local authority venture capital funding (commercial rate?)	Medium / High	Low	Medium /
Lease / service bundle financing	Medium	High	Medium
Financing guaranteed by income from savings or FIT/RHI or power monetisation income	Medium	Medium	Medium
Finance added to mortgage	Medium/Low	High	Medium/Lo
Discount or subsidy from hardware manufacturer who benefits from initiative	Low	High	Low
Charitable donations towards fuel poor renovations	Low	Medium	Low

The Enablers fit into 6 categories

V0.7 22 Feb 16			Enabler Type					
Il	Model Name	Code	Policy & Regulation	Technical Standards	Trading Markets	Alternative Financing	ICT Platfori	New Clean Tech
14	Pay to Waste	PTW	X					
22	Interested Green Landlord	IGL	X					
23	ESP Emission Reducers	EER	X					
30	Winter Fuel to Refurbishment	WFR	X					
27	Citizen Carbon Account	CCA			X			
29	Energy Stockmarket	ESM			X			
4	Power Buffer	PBU						X
7	Market Maker	MMA					X	
11	Re-E-Generation	REG				X		
18	Cleantech Cost Cruncher	CCC		X				

Technical Solutions - Enablers

Module Element (to be part of a composite Business Model)	Trading Markets Innovation	Alternative Financing	ICT Platforms	Technical Standards	New Cleante	Policy Changes	Suggestions for most effective Enabler concepts
Utilising spare heat from adjacent commercial / industrial buildings	Enhancing	Enhancing	Enhancing	Neutral	Neutral	Enhancing	Tax relief for company providig waste heat
Sharing heating / cooling asset between buildings / dwellings	Neutral	Enhancing	Enhancing	Neutral	Neutral	Enhancing	Clarify planning / ownership legal issues
Utilising heat from local power generation assets	Enhancing	Vital	Enhancing	Neutral	Enhancing	Enhancing	Tax relief for generator
Utilising spare heat from distributed servers	Neutral	Enhancing	Enhancing	Enhancing	Neutral	Enhancing	planning issue (running a business from home?)
Larger assets with shared user leading to better utilisation and lower capex	Enhancing	Enhancing	Enhancing	Neutral	Neutral	Enhancing	Clarify planning / ownership legal issues
Asset owned and operated as a service	Neutral	Neutral	Neutral	Neutral	Neutral	Enhancing	Deregulation of energy suplier markets
Reducing thermal losses through improved insulation	Neutral	Vital	Neutral	Enhancing	Enhancing	Vital	Enforce building standards. Subsidies for retrofit.
Improved home controls	Enhancing	Enhancing	Enhancing	Enhancing	Enhancing	Enhancing	Avoid lock-in between boiler manufacturer and controls manufacturer
Ventilation & heat recovery	Neutral	Enhancing	Neutral	Enhancing	Enhancing	Enhancing	Enforce building standards. Subsidies for retrofit.
Lower carbon & more efficienct heating devices to provide heat in the home	Enhancing	Vital	Enhancing	Enhancing	Enhancing	Vital	Policy to drive change & internalise carbon
Local authorities & government, HOSCO pooling purchasing power & adopting direct channels to OEM	Neutral	Neutral	Enhancing	Enhancing	Neutral	Enhancing	Publiscise best practice and remove inevitable regulatory barriers
Standardisation and simplifcation of most common low carbon solution hardware	Neutral	Neutral	Neutral	Vital	Enhancing	Enhancing	working group and only support standardised products
Off-site / pre-fabrication of housing upgrades	Neutral	Enhancing	Neutral	Enhancing	Enhancing	Enhancing	Innovation demonstration programmes
Simplifying / reducing installation time / cost	Neutral	Neutral	Enhancing	Enhancing	Vital	Enhancing	Innovation programmes

Enablers Analysis

Key Module	Su	Module Element (to be part of a composite Business Model)	Trading Markets Innovation	Alternative Financing	ICT Platforms	Technical Standards	New Cleantec	Policy Changes	Suggestions for most effective Enabler concepts
Service Bundling	i	Low Level - Bundling of Home services (without assets)	Neutral	Neutral	Enhancing	Neutral	Neutral	Enhancing	Policy to allow consolidation of individual utility costs. Innovative ICT platform.
Service Bundling	ii	Med Level - Bundling of asset with energy supply for defined comfort or other output	enhancing	Enhancing	Enhancing	Neutral	Enhancing	Vital	combined; with customer transparency if they require.
Service Bundling	iii	High Level - Incorporation of all other key house utilities (water, phone, insurance)	enhancing	Enhancing	Vital	Neutral	Enhancing	Vital	services costs to be combined; with customer transparency if they require.
Service Bundling	iv	Xtra High Level - Incorporation of local taxation / rates	enhancing	Enhancing	Vital	Neutral	Enhancing	Vital	services costs to be combined; with customer transparency if they require.
Energy Brokering	i	Competitive sourcing - manual - best deal found for user to act on	neutral	Neutral	Enhancing	Neutral	Neutral	Neutral	Innovative ICT, digital approaches
Energy Brokering	ii	Competitive sourcing - automatic linked to obligation of provider	neutral	Neutral	Enhancing	Neutral	Neutral	Neutral	Innovative ICT, digital approaches
Energy Brokering	iii	Collective switching	neutral	Neutral	Enhancing	Neutral	Neutral	Neutral	Innovative ICT, digital approaches
Increased Willingness to Pay	i	Improved peace of mind i.e. predictability of bill	Neutral	Neutral	Vital	Neutral	Enhancing	Neutral	Innovative ICT, digital approaches
Increased Willingness to Pay	ii	Approved contractors - providing confidence to consumer	neutral	Neutral	Neutral	Enhancing	Neutral	Enhancing	technologies, installation. Regulations for installation.
Increased Willingness to Pay	iii	Early adopters become part of an exclusive club	enhancing	Enhancing	Neutral	Neutral	Enhancing	Neutral	Increasing new cleantech will drive potential for early adopters
Increased Willingness to Pay	iv	Making the idea of investing in low carbon home aspirational and a good thing for them	neutral	Neutral	Neutral	Neutral	Enhancing	Neutral	New cleantech will potentially enable new services & features / compensating benefits
Increased Willingness to Pay	v	Moving to concept of better comfort and outcomes	enhancing	Enhancing	Vital	Neutral	Enhancing	Vital	Policy change required to be able bill customers on outcomes i.e. Temperature
Increased Willingness to Pay	vi	Provision of turnkey service and removal of hassle	neutral	Enhancing	Enhancing	Enhancing	Enhancing	Enhancing	Innovative ICT, digital approaches
Increased Willingness to Pay	v	Being part of community action / member of club	neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Digital platforms
Increased Willingness to Pay	v	Recognising value for money - greater transparency, understanding of offer	neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Digital engagement
Behaviour change	i	Encouraging and rewarding low energy use	enhancing	Neutral	Enhancing	Neutral	Enhancing	Enhancing	HEMS-type system with Market Maker trading platform will add significant benefit
Behaviour change	ii	Encouraging behaviours that shift demand with new supply profiles	enhancing	Neutral	Enhancing	Neutral	Enhancing	Enhancing	capability & Market Maker trading platform will add significant benefit
Behaviour change	iii	Making consumers upgrade and maintain building fabric to improve its efficiency	neutral	Enhancing	Neutral	Enhancing	Enhancing	Vital	Regulation required
Behaviour change	iv	Penalising excessive energy use	neutral	Neutral	Enhancing	Neutral	Neutral	Vital	Regulation required with customer monitoring

Key enablers needed to support Business Models – pre-quant analysis

	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbour-hood Heat & Electric	Urban Renewal
Internalising Cost Carbon	✪✪✪ Critical	✪✪✪	✪✪✪	✪✪✪	✪✪✪
HEMS / ICT	✪✪✪	✪✪✪	✪✪✪	✪✪✪	✪✪✪
Service Provider obligation for CO2 Reduction	✪✪✪	✪✪✪		✪✪✪	
Energy Trading Systems	✪✪✪	✪✪✪	✪ Helpful	✪✪✪	✪✪✪
Cleantech cost crunching / std'n / novel manufacturing	✪✪ Enhancing	✪✪	✪✪✪	✪✪	✪✪✪
Robust Building Regulations			✪✪✪	✪✪	✪✪✪
Ability to Bundle Services	✪✪✪	✪✪			✪✪
Supply Licence on Outcomes		✪✪✪			
Landlord Tax Policy – Fabric investment		✪✪✪	✪✪		
Simple mortgage / property charge financing		?	✪✪✪	?	
DNO Flexibility	✪	✪			✪✪
Accredited System Designers		✪✪	✪✪		
New repayment methods – via rent or council tax			✪✪	✪	✪✪
Standard assessment of energy systems TCOO		✪✪			
Market Maker		✪			✪✪
Stamp duty policy			✪		

Enablers Scoring Overview

Impact on Common Modules of Business Models

ENABLER	Monetising	Financing	Bundling	Utilisation	Efficiency (HP, Insul)	Supply Chain	Brokering	Willingness	Behaviour
Trading									
Finance									
ICT	Vital								
Standards	Neutral								
Clean Tech	Enhance								
Policy									

Assessment so far suggests focus areas where action MUST be taken:

1. **Policy and Financing** innovation will have biggest effect on home heating efficiency
2. **ICT** and **Trading** help improve financing and extracting extra value
3. **Standardisation** could help drive down costs of supply chain providing home upgrades

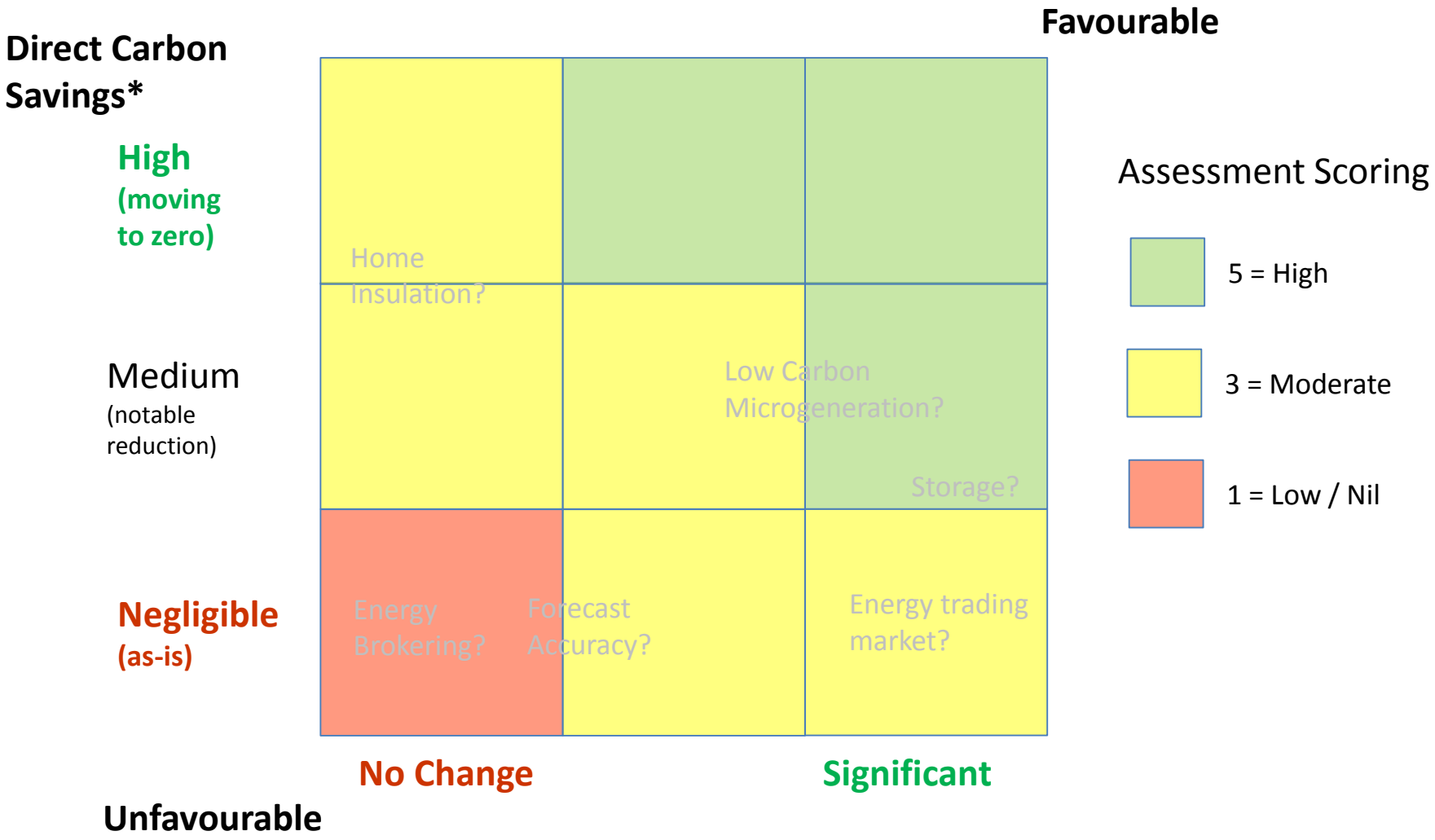
Policy and ICT have the most wide ranging enhancing effects
New Technology is not vital but helps

Sub-Module Assessment Scoring/Ranking Methodology

"a clean, intelligent, energy system that works for people, communities and businesses"

Carbon Reduction Assessment

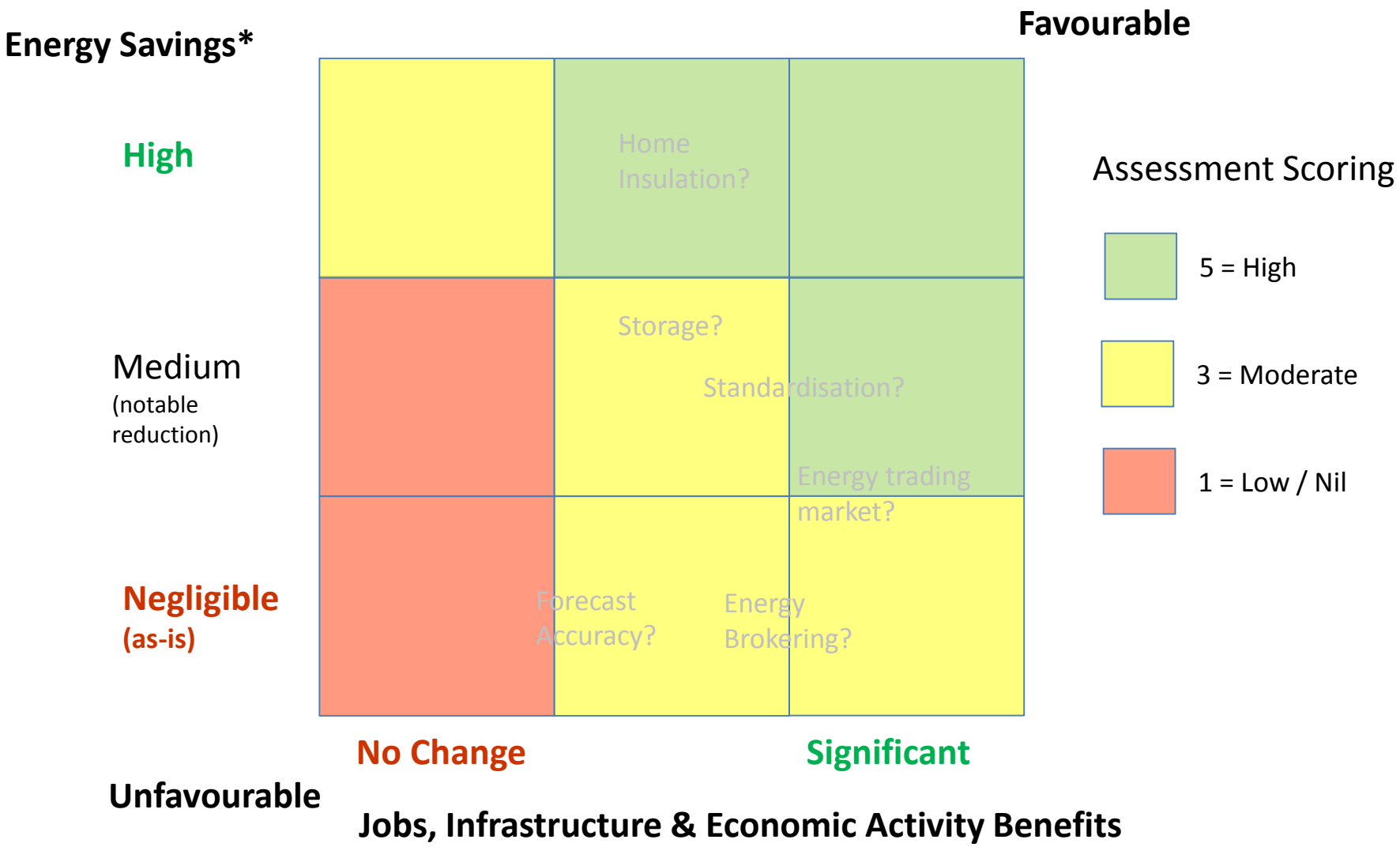
(Relating to adopting the business model or module at target commercial scale)



* Relative carbon saving x no of applicable home ** Consequential savings via enabled renewables, grid carbon intensity etc.

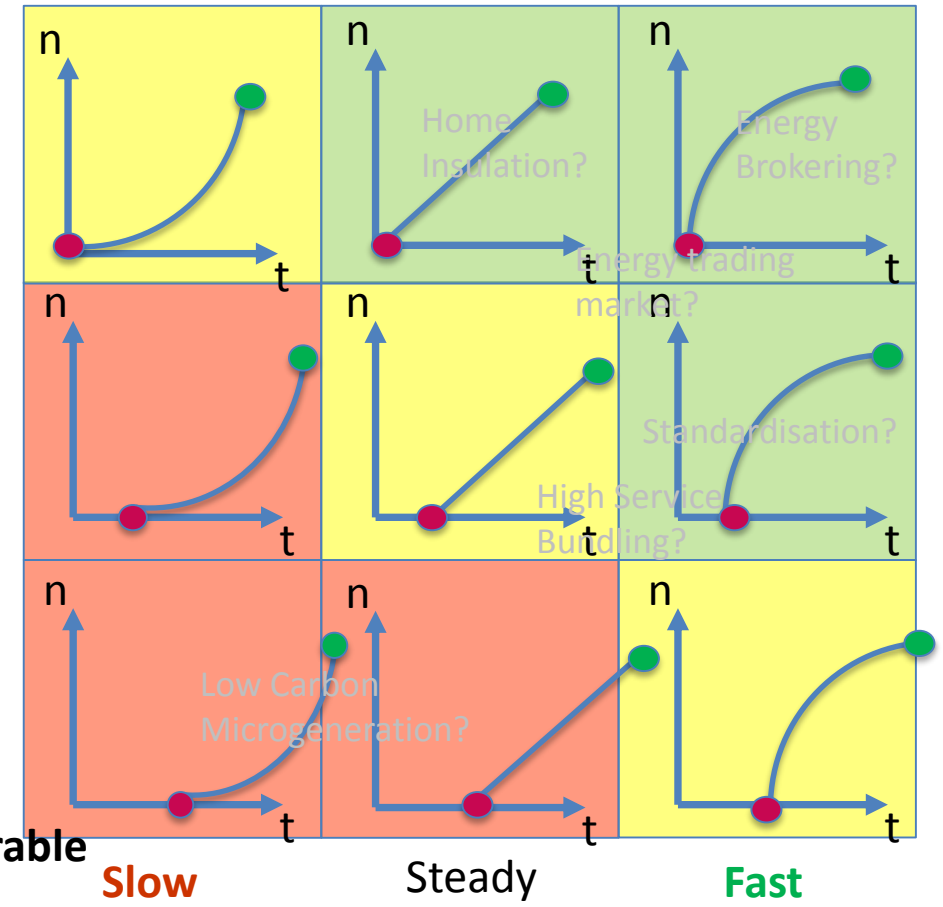
National Economic Benefit Assessment

(Relating to adopting the business model or module at target commercial scale)



* Based on potential take up of model within UK housing stock

Market Penetration Assessment



Assessment Scoring

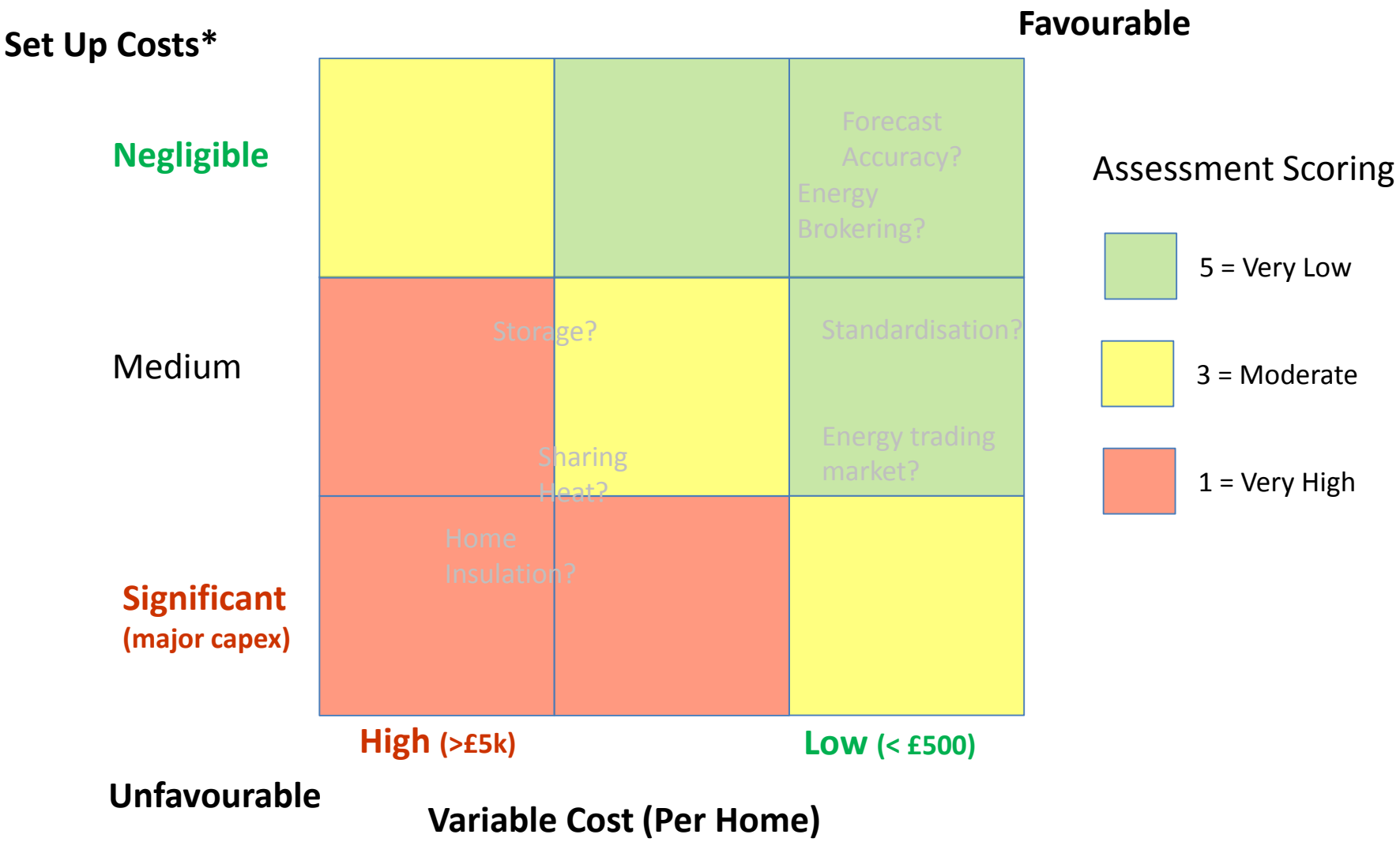
5 = Rapid penetration

3 = Steady penetration

1 = Slow penetration

Cost to Demonstrate Assessment

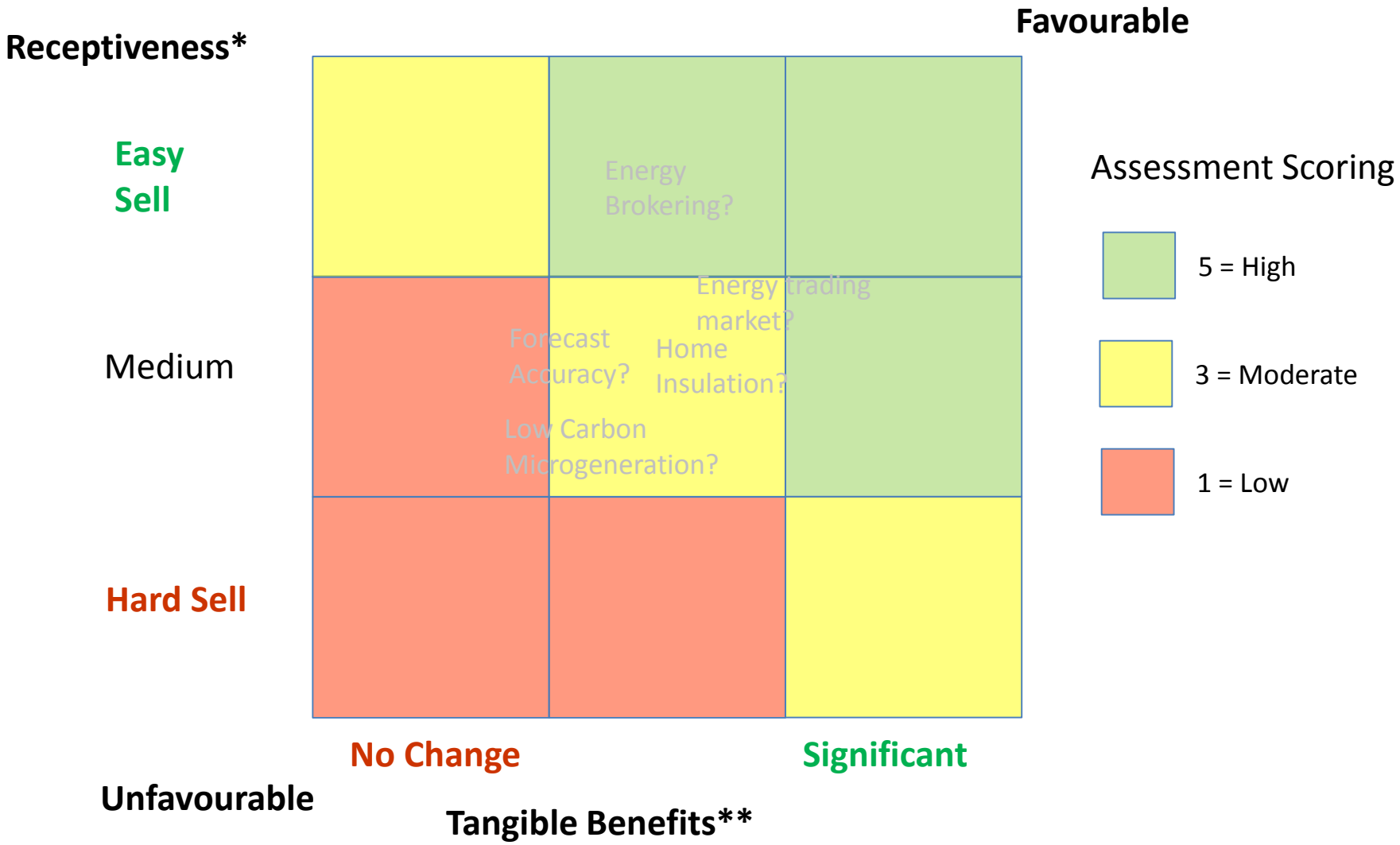
(Relating to demonstration for 6,000 home initiative in Phase 2)



* Cost of setting up entities, trading platforms, ICT, common engineering, central CHP / heat networks

Customer Acceptance Assessment

(Relating to adopting the business model or module at target commercial scale)



* Regarding financing, lock-in, data use, inconvenience ** Improvements in bills, comfort, house value … etc.

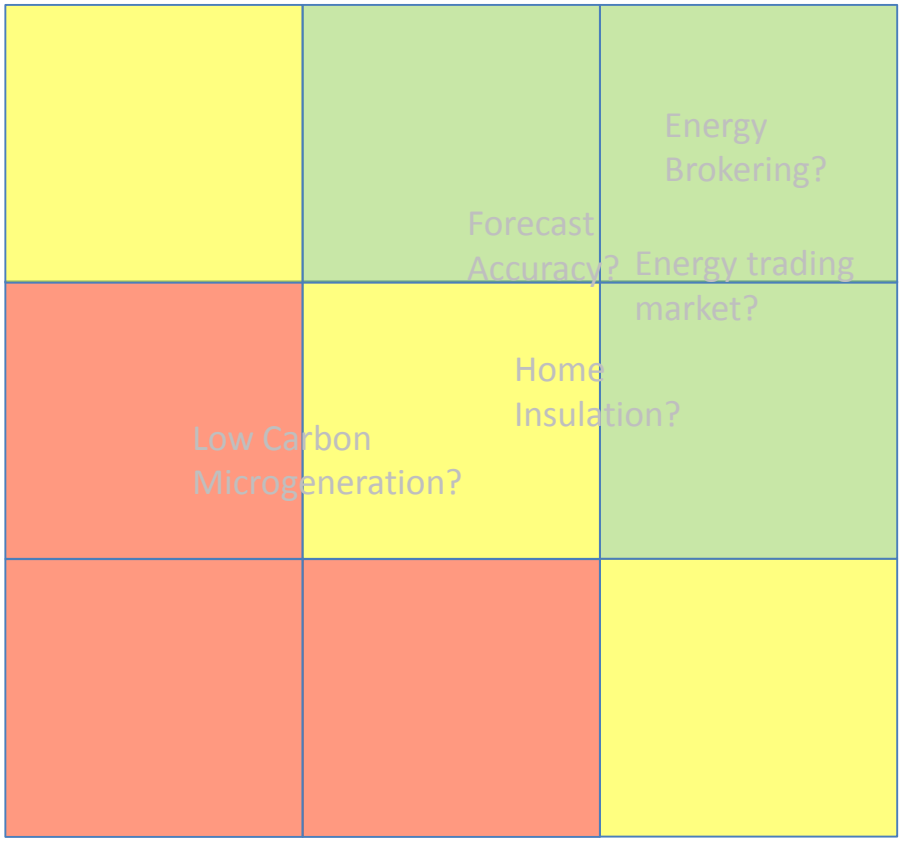
Adaptability Assessment

(Relating to adopting the business model or module at target commercial scale)

Flexibility in market & policy*

Favourable

Highly flexible



Assessment Scoring

5 = Very adaptable

3 = Moderately adaptable / vulnerable

1 = Very vulnerable

Very rigid & vulnerable

Rigid **Flexible**

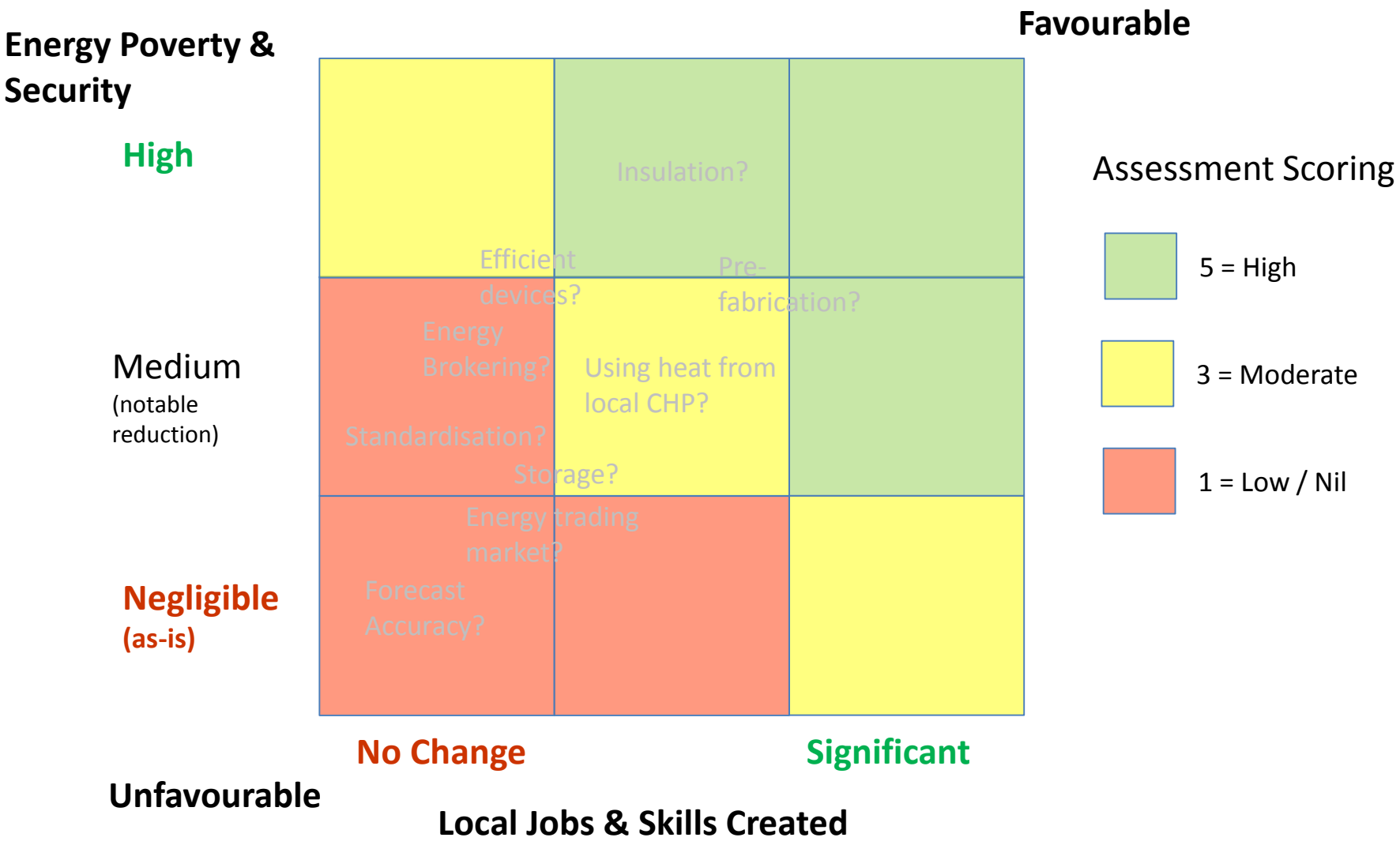
Unfavourable

Flexibility wrt technology changes / disruptions **

* Regarding energy prices, demographics, policy ** New better technologies – both hardware & software

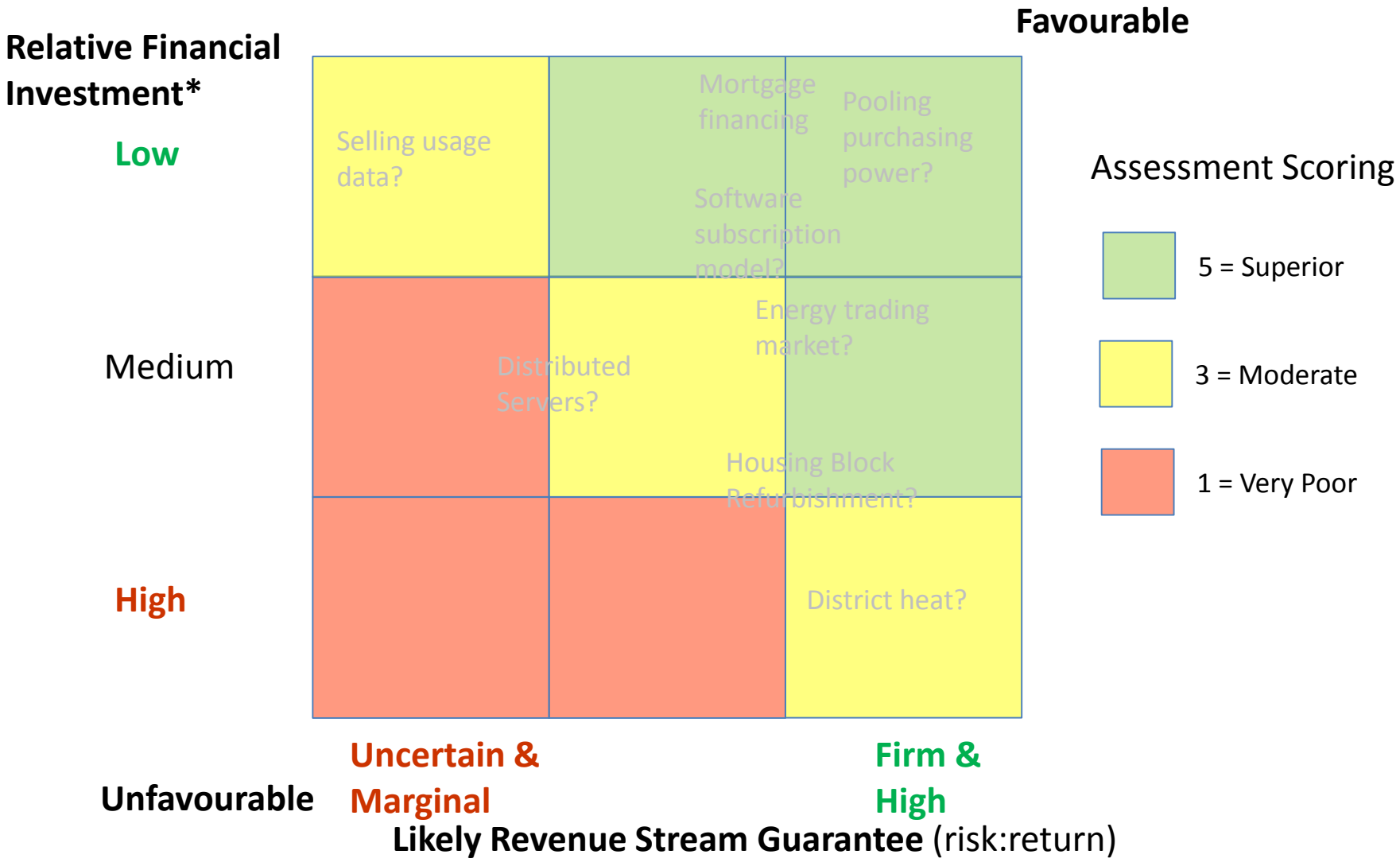
Local Benefit Assessment

(Relating to adopting the business model or module at target commercial scale)



Financial Risk Assessment

(Relating to adopting the business model or module at target commercial scale)



* Includes cost to set up any business (capex) and investment per intervention

Policy Dependence Assessment

(Relating to adopting the business model or module at target commercial scale)

Dependence on Financial Policies*

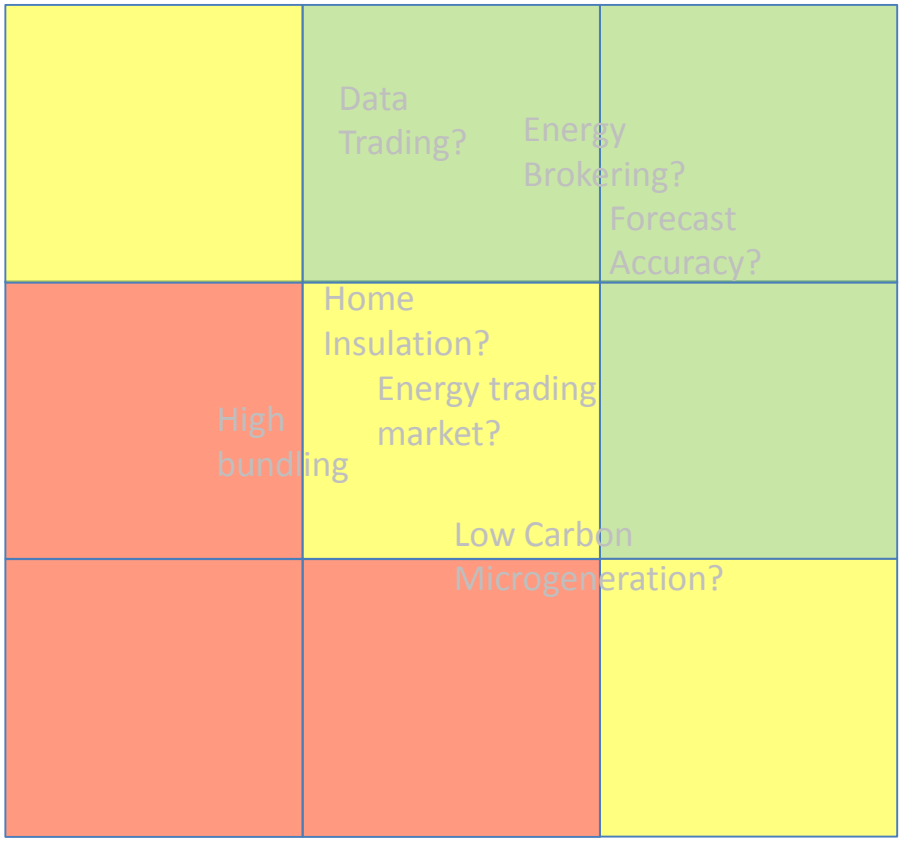
Favourable

Can work as is / low dependence

Could be helped or hindered slightly

Major policy changes or safeguards req'd

Unfavourable



Major policy changes or safeguards req'd

Can work as is / low dependence

Dependence on non-financial policies**

Assessment Scoring

- 5 = No change need
- 3 = Moderate changes
- 1 = Major changes need

* e.g. FIT, subsidies, taxation, carbon pricing … ** Consumer regulations, competition regs, building regs, LA freedom …

Enablers

"a clean, intelligent, energy system that works for people, communities and businesses"

Enabler: Trading Markets

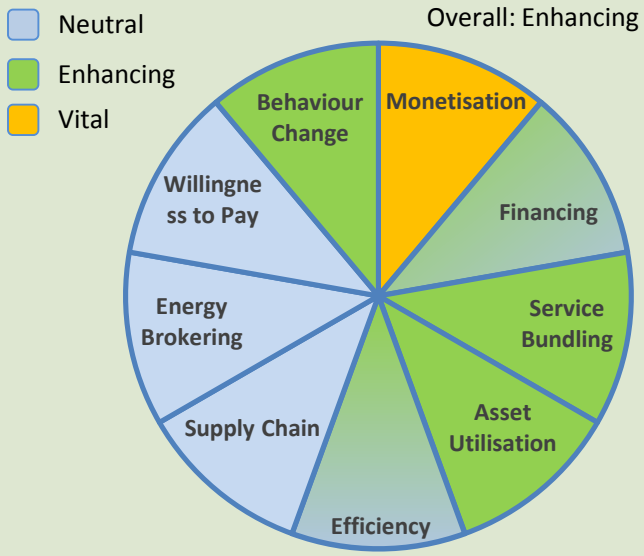
Description

Creating a market so that demand shift, generation and storage of power can be traded both at a large or aggregated level and eventually at the individual dwelling level. This may also cover trading of heat.

General Benefits / Opportunities

Creates a revenue stream that can be used to finance new technology / heating systems in the home – improving the business case & encourage demand shift and distributed generation & storage uptake. Allows trading of comfort

Impact on Business Models



Ideas / Suggestions within this Enabler type

- Energy 'stock market' for both small and large consumers
- Integrator carbon account (if internalised cost of carbon deployed)

Most Affected Model Elements

- Monetising shift, storage, generation
- Trading comfort level vs bill level

Key Issues to Address

- Needs to be combined with sophisticated ICT solution

Who Can Help Make It Happen?

- UK Financial Players
- Government
- ICT companies

Enabler: Novel Financing

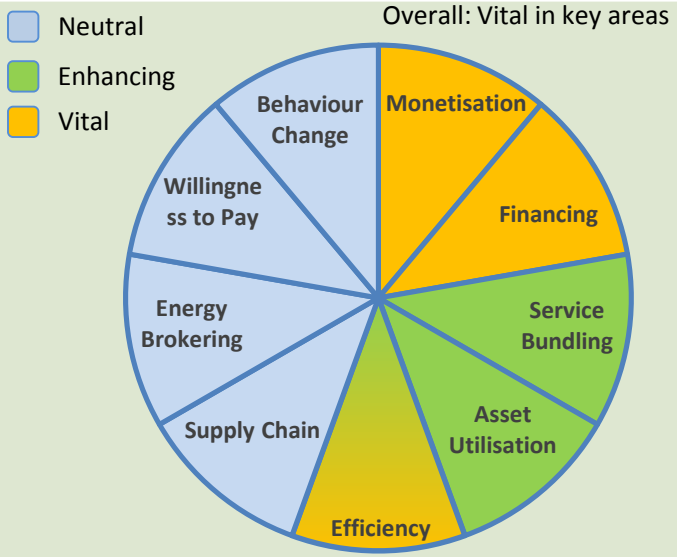
Description

New financing structures and possible diversion of funds from other sources (pension, tax, benefits, mortgage etc..) that help lower cost of capital and improve liquidity for funding energy improvements. Utilising some of the disruptive internet-based funding platforms being pioneered in other sectors.

General Benefits / Opportunities

Improves affordability, channels more funds into low carbon sector and offers more choices to customer, that are typical for other products (car, furniture, major home improvements)

Impact on Business Models



Ideas / Suggestions within this Enabler type

- Enhanced pension contribution allowance for heat upgrades
- Charitable donations to fuel poor / community benevolent fund (contribute to your neighbour's or family's bill)
- Using capital gains in regeneration to support fabric upgrades

Most Affected Model Elements

- Insulation of homes
- New heating system installation
- Local heat energy systems

Key Issues to Address

- Strongly linked to policies for taxation etc.

Who Can Help Make It Happen?

- UK Financial Players
- Government

Enabler: ICT

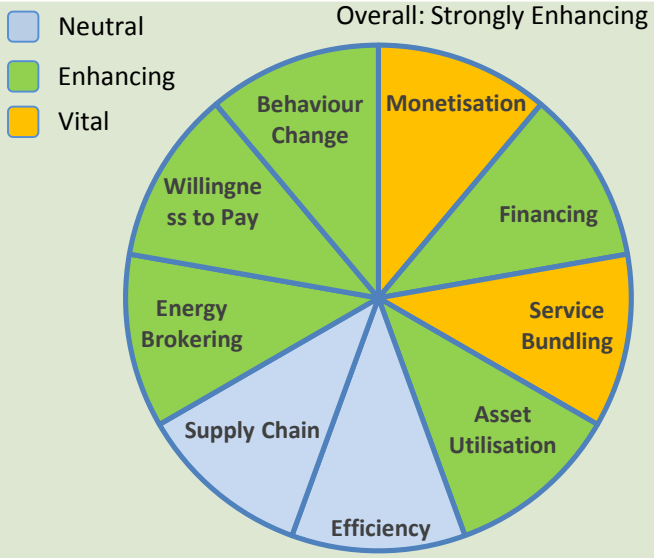
Description

New monitoring and control systems in homes combined with IT to facilitate real-time trading and more sophisticated supply/ service company systems to optimise offering to consumer and identify energy and cost saving measures proactively.

General Benefits / Opportunities

Allows trading, better comfort in home, optimised energy use and bundling of services. Can improve consumer engagement and deployment can be rapid. Strong enabler of business models.

Impact on Business Models



Ideas / Suggestions within this Enabler type

- Market Maker – data used to offer deals to consumer
- Home Energy Services Gateway– a non-restricted, commercially 'open' data platform for home heating and power service providers

Most Affected Model Elements

- All forms of monetising power
- Highly integrated bundling

Key Issues to Address

- High upfront costs
- Need to have progressive approach & test early

Who Can Help Make It Happen?

- ESC
- Major ICT companies

Enabler: Technology Standards

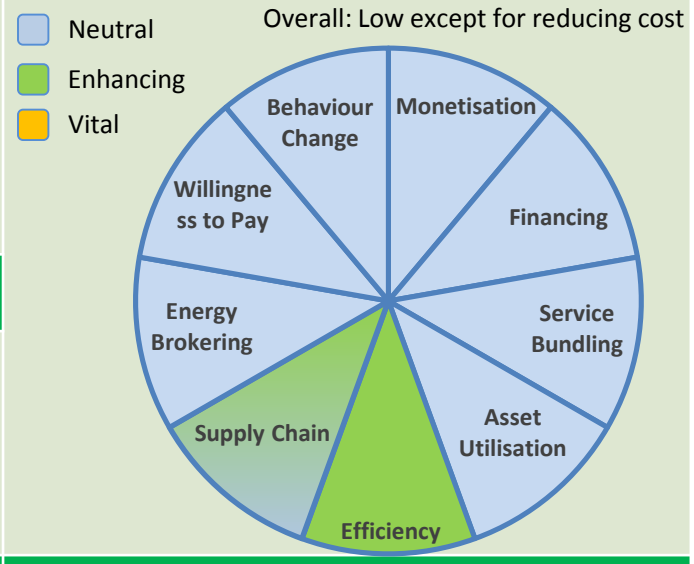
Description

Standardisation of core heating, controls and installation elements to meet national needs, reduce cost and facilitate rapid uptake. Could for example, define a family of standard UK heat pump, controls and fittings/spares specs that are then used as part of competitive tendering process.

General Benefits / Opportunities

Simplifies heating system selection, sourcing, installation and lowers cost. Could enable new suppliers in UK to emerge. Strips out non-essential costly variation. Aids skills pool through simplification

Impact on Business Models



Ideas / Suggestions within this Enabler type

- 'Cleantech Cost Cruncher' – a standard technical specification family of heat pumps for the UK market, made in high volumes to drive down unit cost and simplify installation.

Most Affected Model Elements

- Standardising new heat technologies to lower cost
- Simplifying installation & lower cost

Key Issues to Address

- OEM reaction
- Funding the upfront specification work
- Avoiding stifling innovation
- EU harmonisation

Who Can Help Make It Happen?

- Engineering / standards bodies
- Government / Innovate UK
- New OEM partners

Enabler: New Technology

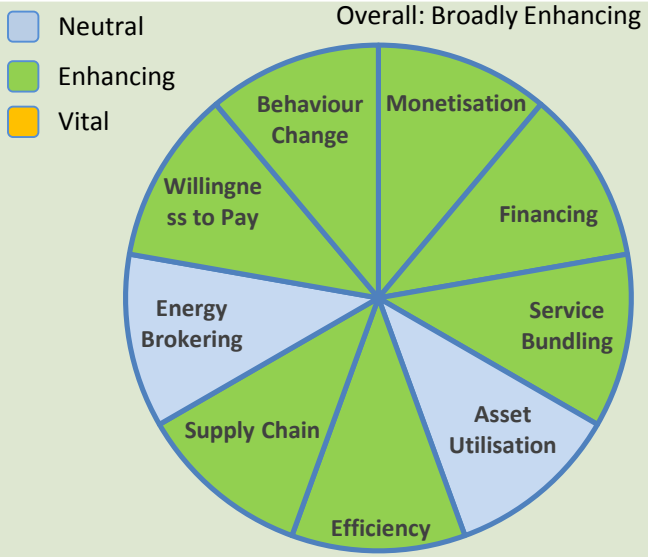
Description

New higher efficiency or more flexible, cheaper technologies for heating, insulation, storage, generation or other means of creating comfort and carbon benefit.

General Benefits / Opportunities

Improves efficiency, enables more demand management / distributed generation and storage. Could bring down costs. Could enhance customer appeal and change of energy consumption patterns.

Impact on Business Models



Ideas / Suggestions within this Enabler type

- Power Buffer (Long List idea)
- Use of micro-CHP - e.g. fuel cell devices

Most Affected Model Elements

- Efficiency / Effectiveness improve most elements

Key Issues to Address

- Trialling and moving to demonstration in credible volumes
- Risks in early years – reliability and high costs
- Getting to volume and low cost quickly

Who Can Help Make It Happen?

- Innovate UK / Government
- OEMs
- R&D

Enabler: Policy & Regulation

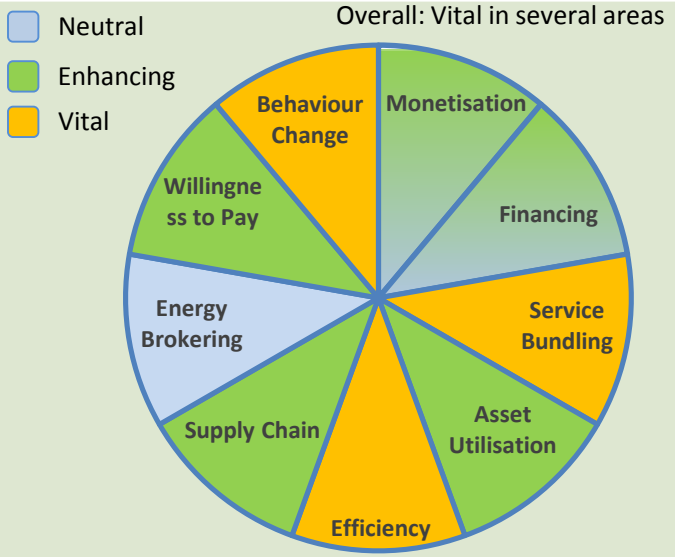
Description

Changes in policy regarding taxation, internalising carbon, building regulations, consumer protection, deregulation, data protection, heat network regulation, benefits allocation, incentives etc.. which either free up the market to make changes and innovate or encourage/force change in direction.

General Benefits / Opportunities

Enables new financing regimes, trading and service bundling. Will have dramatic impact on adoption of insulation and new heating technology.

Impact on Business Models



Ideas / Suggestions within this Enabler type

- New integrator role (see policy section in main report)
- From Long List: Pay to Waste – progressive energy tariffs; Interested Green Landlord; ESP Emission Reducers; Winter Fuel to Refurbishment

Most Affected Model Elements

- Insulation & heat pump
- High level of service bundling
- Penalising excessive energy use

Key Issues to Address

- Adverse consumer reactions
- Setting level & method of carbon pricing
- Forcing stricter building regulations

Who Can Help Make It Happen?

- Government

Business Model Game/Toolkit

"a clean, intelligent, energy system that works for people, communities and businesses"

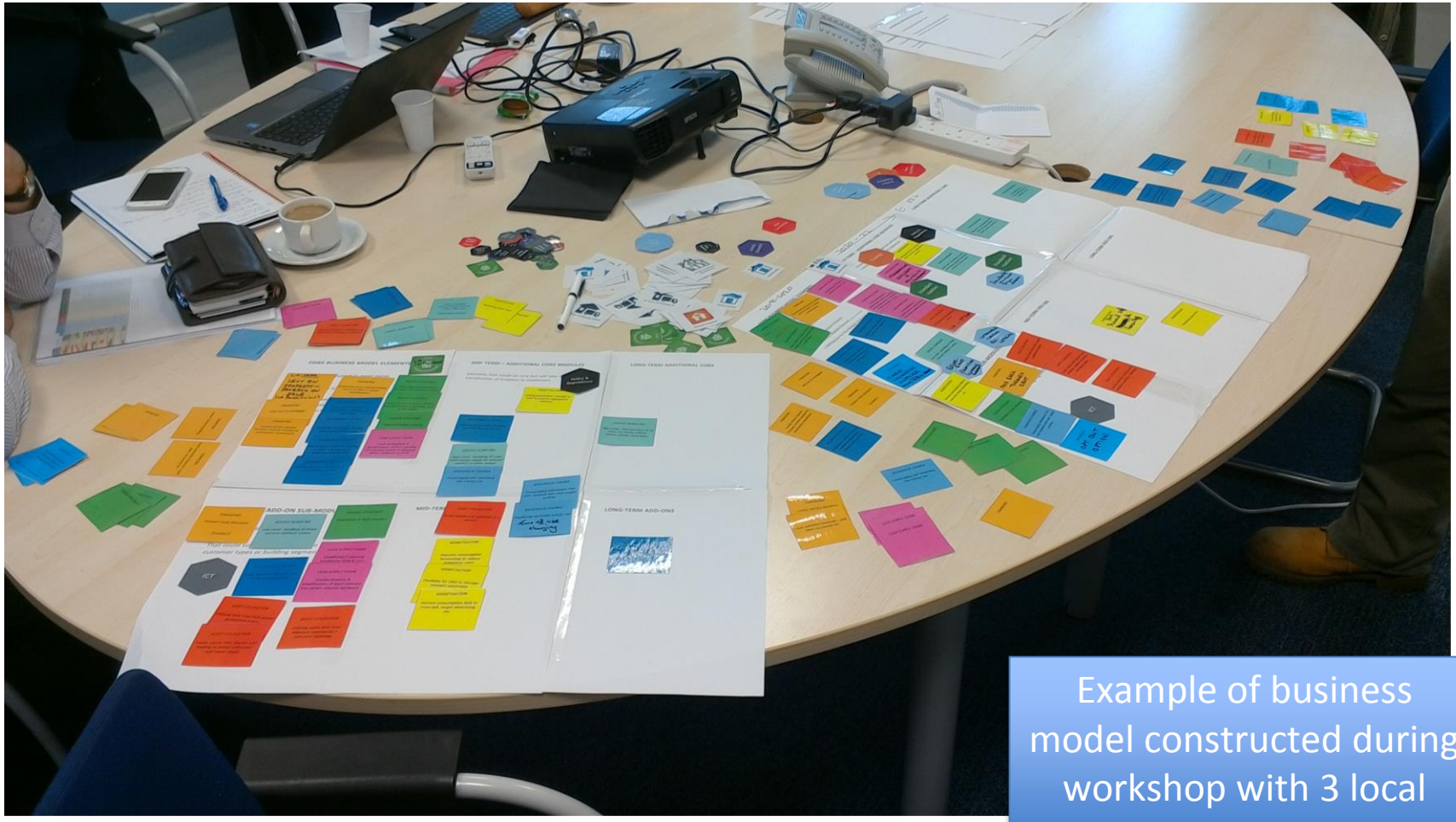
Public: Slides 51-62

‘Business Model Game’ A tool created to build & refine models

- Cards created to allow simple and team-based model development
- All Sub-Modules and Enablers listed - priorities from ranking noted
- Cards overlaid onto template:
  - Core model: key elements that always must apply (most valuable)
  - Add-ons: Optional depending on client & desire for simplicity (but less valuable)
  - Timescale applied: Starting – Medium Term – Long Term
- Blank cards available for new sub-module ideas arising from process
- Once cards in place, review and take photo
- Card model layouts then written up
- Canvasses developed from these

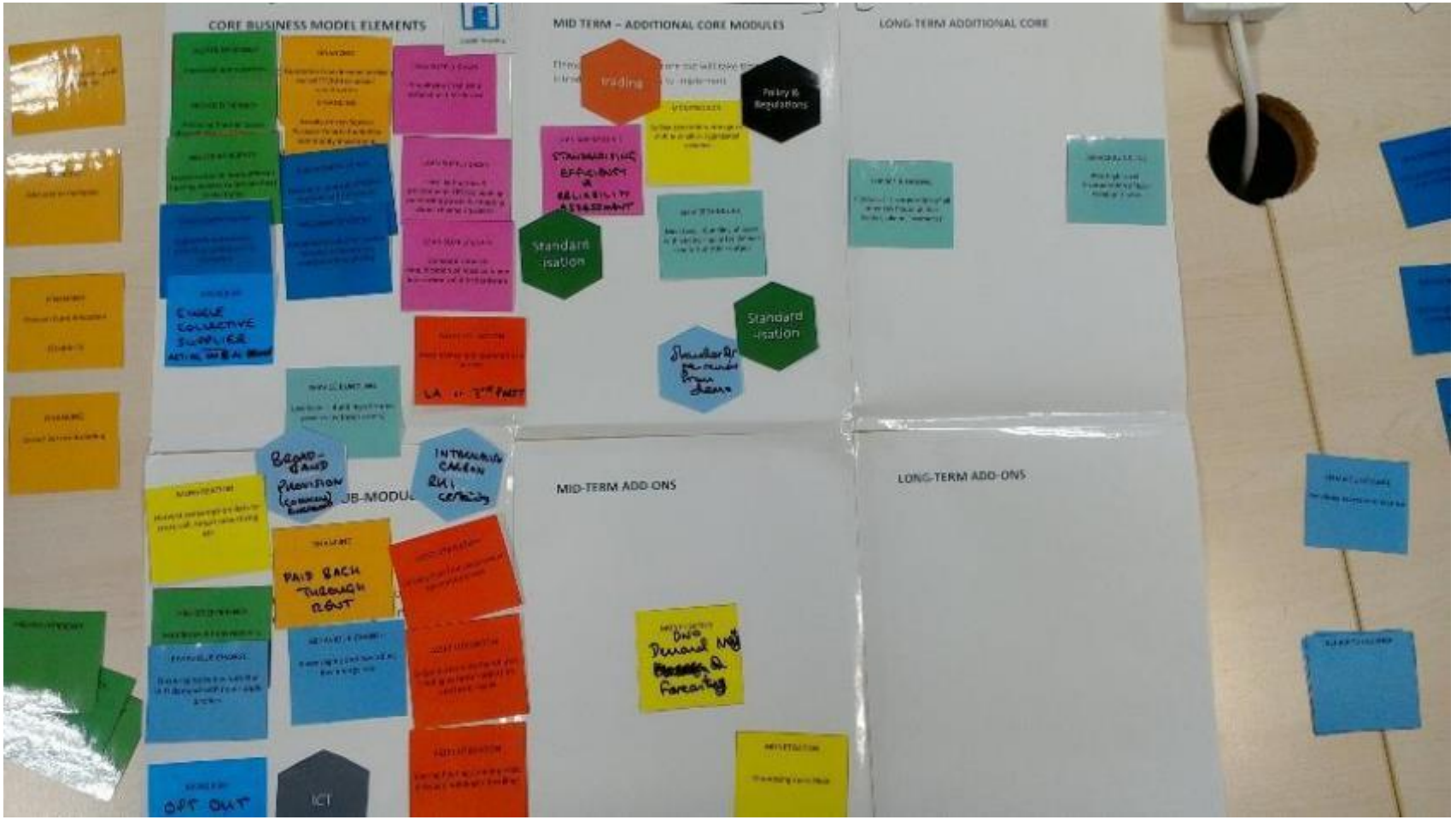
A tool kit that enables strong team-working and development of new ideas

55 sub-module elements were identified … Card game devised to create new business models



Example of business model constructed during workshop with 3 local authorities

Card Game enabling building and refining of models from sub-modules



Output from a session with the three Local Authorities held in March

Card Deck - Marketing

SERVICE BUNDLING
C1
Low Level - Bundling of Home services (without assets)

SERVICE BUNDLING
C2
Med Level - Bundling of asset with energy supply for defined comfort or other output

SERVICE BUNDLING
C3
High Level - Incorporate all other key house utilities (water, phone, insurance)

SERVICE BUNDLING
C4
Extra High Level - Incorporation of local taxation / rates

BROKERING
G1
Competitive sourcing – for user to act on

BROKERING
G2
Competitive sourcing – automatic linked to obligation of provider

BROKERING
G3
Collective switching

BROKERING
G4
Opt-out option for collective schemes

BROKERING
G5
Single collective supplier acting on social housing behalf

WILLINGNESS TO PAY
H1
Improved peace of mind including predictability of bill

WILLINGNESS TO PAY
H2
Approved contractors providing confidence to consumer

WILLINGNESS TO PAY
H3
Early adopters become part of an exclusive club

WILLINGNESS TO PAY
H4
Making the idea of investing in low carbon home aspirational & a good things for them

WILLINGNESS TO PAY
H5
Moving to concept of better comfort & outcomes

WILLINGNESS TO PAY
H6
Provision of turnkey service & removal of hassle for householder

WILLINGNESS TO PAY
H7
Being part of a community initiative / member of club

WILLINGNESS TO PAY
H8
Property is more appealing to rent

WILLINGNESS TO PAY
H9
Accredited home well-being system design providers –full spec

WILLINGNESS TO PAY
H10
Recognising value for money – greater transparency & understanding of offer

WILLINGNESS TO PAY
H11
Trusted design & selection assistance information source

BEHAVIOUR CHANGE
I1
Encouraging & rewarding low energy use

BEHAVIOUR CHANGE
I2
Encouraging behaviours that shift demand with new supply profiles

BEHAVIOUR CHANGE
I3
Having to manage within agreed consumption limits

BEHAVIOUR CHANGE
I4
Penalising excessive energy use

Card Deck – Monetisation & Financing

MONETISATION
A1
Selling generation, storage or shift in small or aggregated volumes

MONETISATION
A2
Harvest consumption data to cross-sell, target advertising etc..

MONETISATION
A3
Improve consumption forecasting to reduce imbalance costs

MONETISATION
A4
Flexibility for DNO to manage network constraints

MONETISATION
A5
Monetising spare heat

MONETISATION
A6
Optimising heat power and storage with district heating system

FINANCING
B1
Crowd-sourcing web-based micro-lending

FINANCING
B2
Locally-driven Special Purpose Vehicle

FINANCING
B3
Local authority financed – paid back via council tax

FINANCING
B4
Pension Fund Allocation

FINANCING
B5
Local Venture Capital Funding

FINANCING
B6
Lease / Service Bundling

FINANCING
B7
Guarantee from income arising from FIT/RHI, Internalise Carbon etc.

FINANCING
B8
Adding investment cost to mortgage

FINANCING
B9
Preferential Discount from OEMs

FINANCING
B10
Charity Donation to Fuel Poor

FINANCING
B11
Pay back via higher rent (vs savings)

FINANCING
B12
Cash contribution option from householder

FINANCING
B13
Levy on property – paid back on sale (LA loan facilitated)

Card Deck – Assets & technology

ASSET UTILISATION
D1
Utilising spare heat from adjacent commercial/industrial buildings

ASSET UTILISATION
D2
Sharing heating / cooling asset between buildings or dwellings

ASSET UTILISATION
D3
Utilising heat from local power generation assets

ASSET UTILISATION
D4
Utilising spare heat from servers

ASSET UTILISATION
D5
Larger assets with shared use - better utilisation & lower capex

ASSET UTILISATION
D6
Domestic asset owned & operated as a service

ASSET UTILISATION
D7
Pay by the hour/ B2B system to CHP/ Power unit operator

HIGHER EFFICIENCY
E1
Reducing thermal losses via improved insulation

HIGHER EFFICIENCY
E2
Improved home controls

HIGHER EFFICIENCY
E3
Ventilation & heat recovery (incl. optional cooling in summer)

HIGHER EFFICIENCY
E4
Low carbon efficient heating devices to provide for the home

HIGHER EFFICIENCY
E5
Power storage system

HIGHER EFFICIENCY
E6
High efficiency community heat & power system

HIGHER EFFICIENCY
E7
Heat storage system

HIGHER EFFICIENCY
E7
Rebuild home to zero carbon specification

LEAN SUPPLY CHAIN
F1
LA's, government & HOSCOs pooling purchasing power direct with OEMs

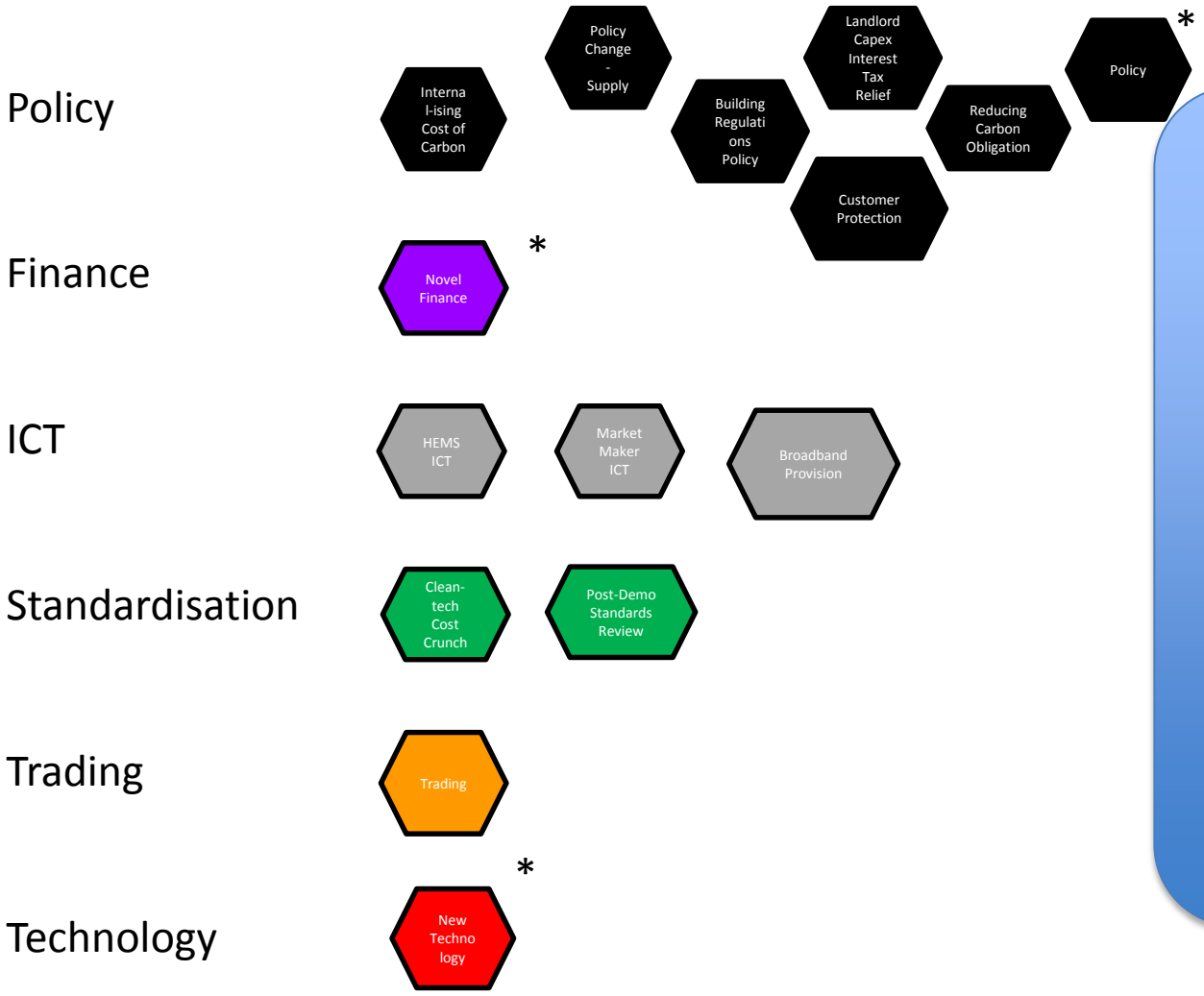
LEAN SUPPLY CHAIN
F2
Standardisation & simplification of most common low carbon solution hardware

LEAN SUPPLY CHAIN
F3
Pre-fabrication of insulation etc.. offsite (such as house blanket)

LEAN SUPPLY CHAIN
F4
Reducing installation time & cost via standardisation

LEAN SUPPLY CHAIN
F5
Standardising efficiency & reliability assessment

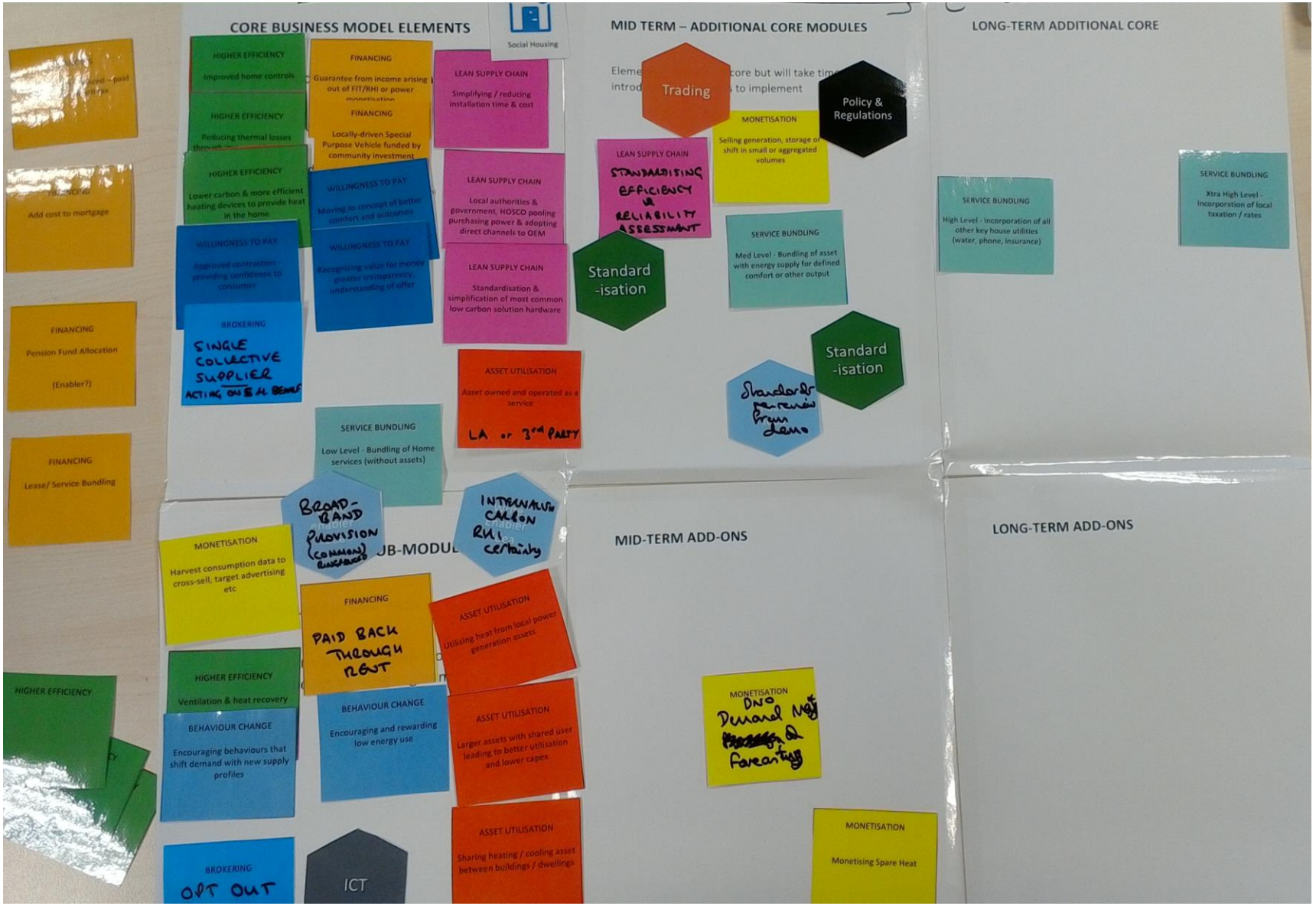
The Enabler cards to add to card model constructs



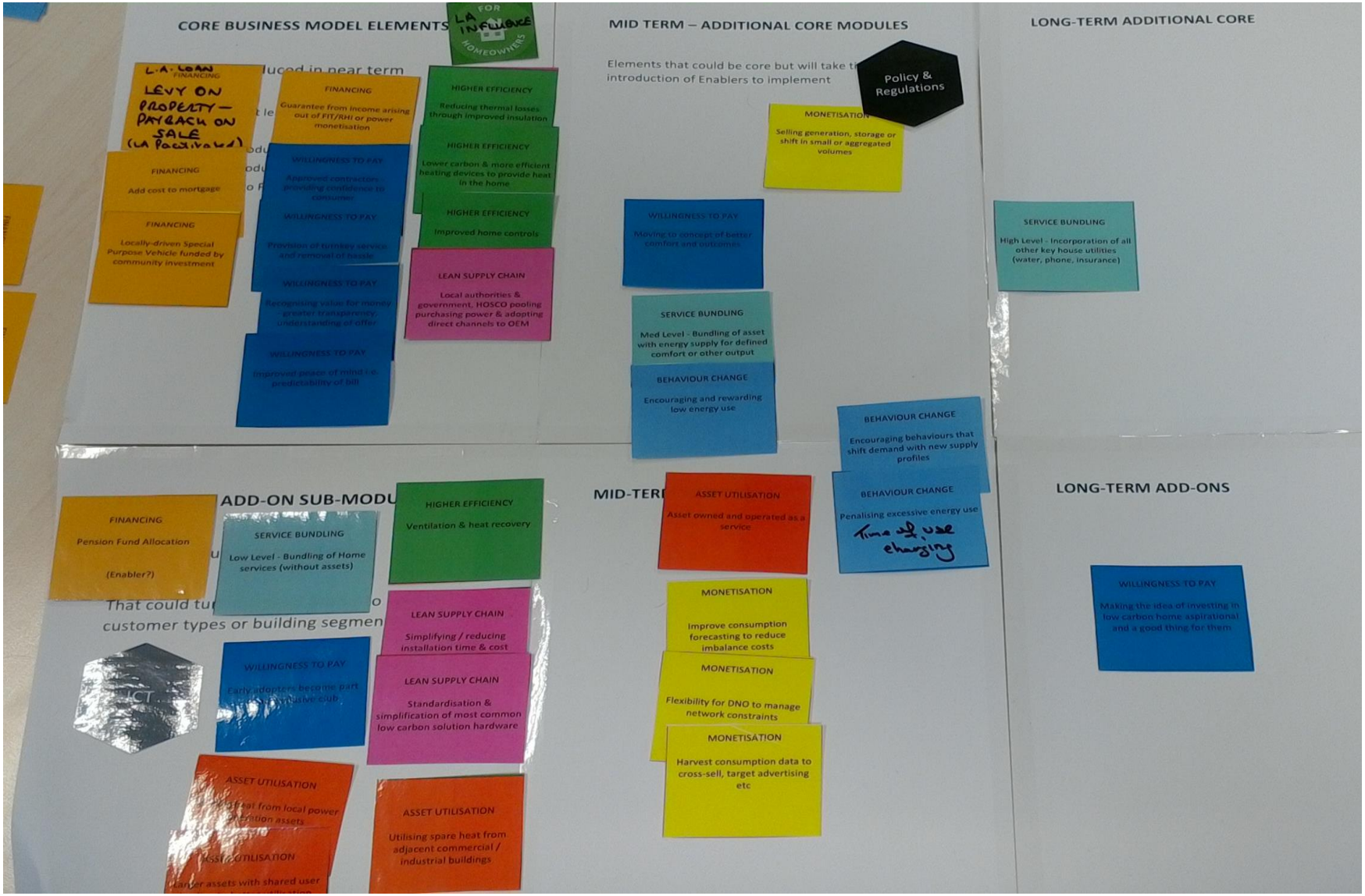
Enabler cards are placed in the business card construct to signify where an Enabler is necessary or enhancing

Some from the original Long List analysis – some have arisen from working sessions

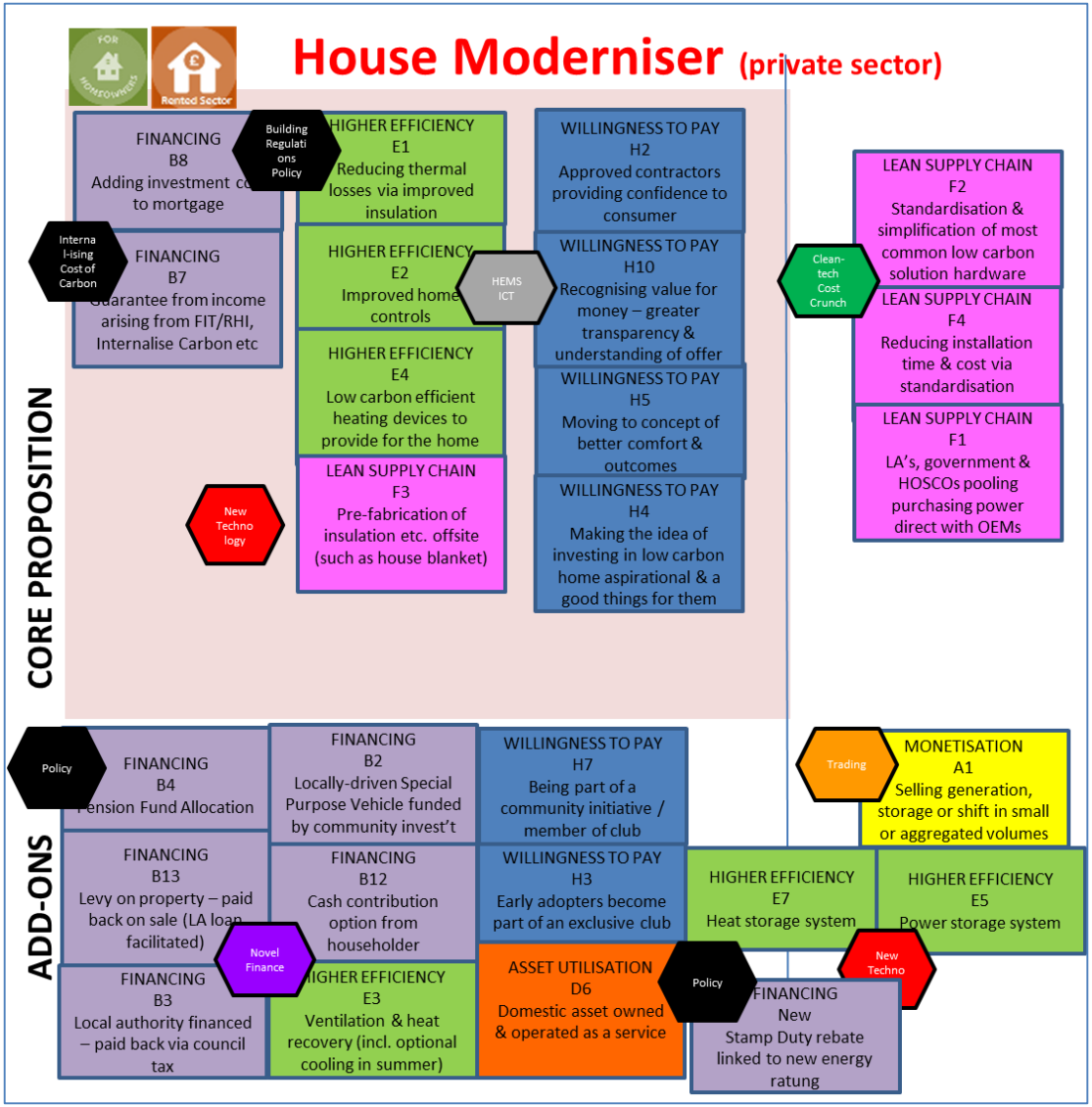
Local Authority Workshop Idea 1



Local Authority Workshop Idea 2

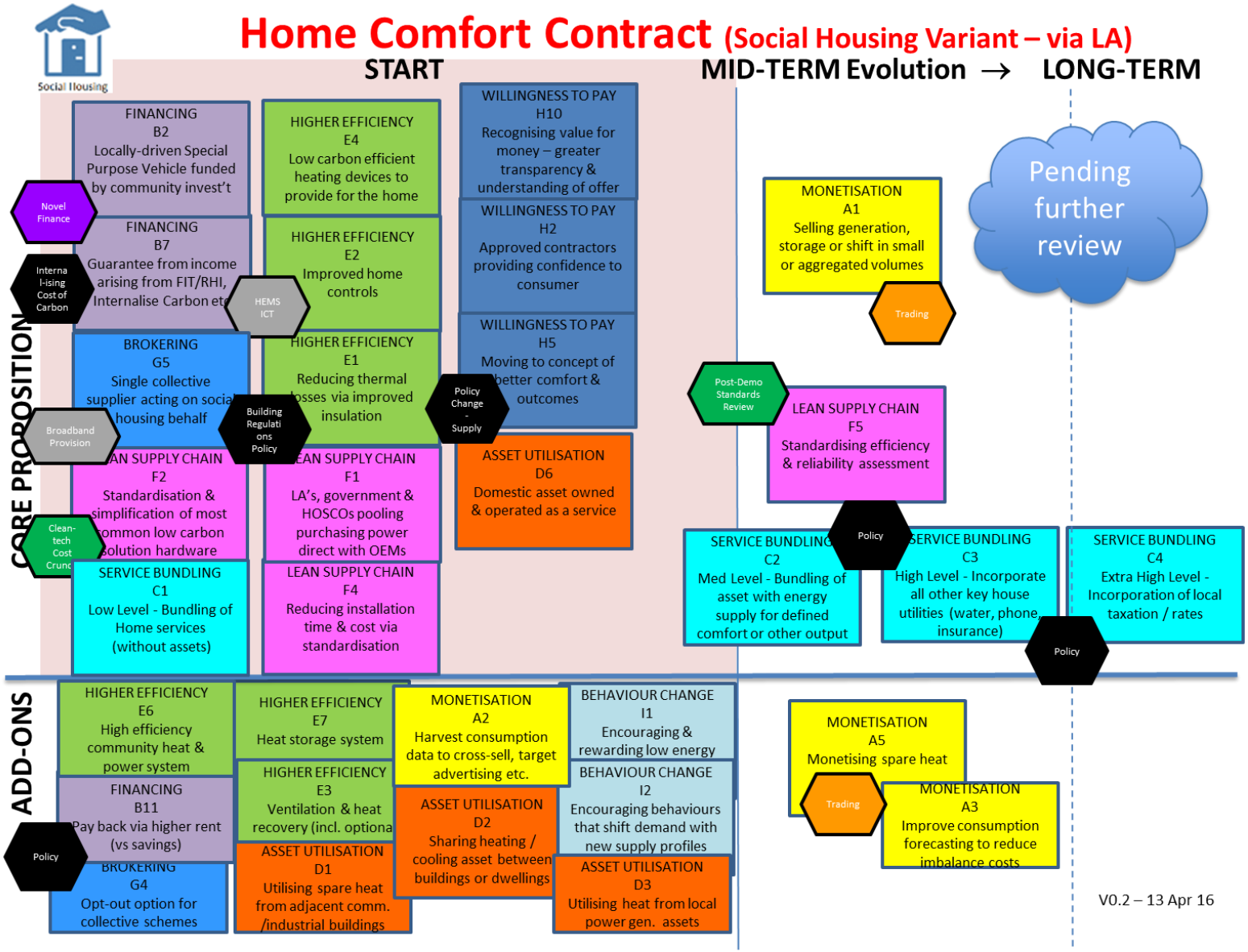


The cards were photographed in situ and transcribed into a permanent record



Another record from the card game …

CATAPULT Energy Systems

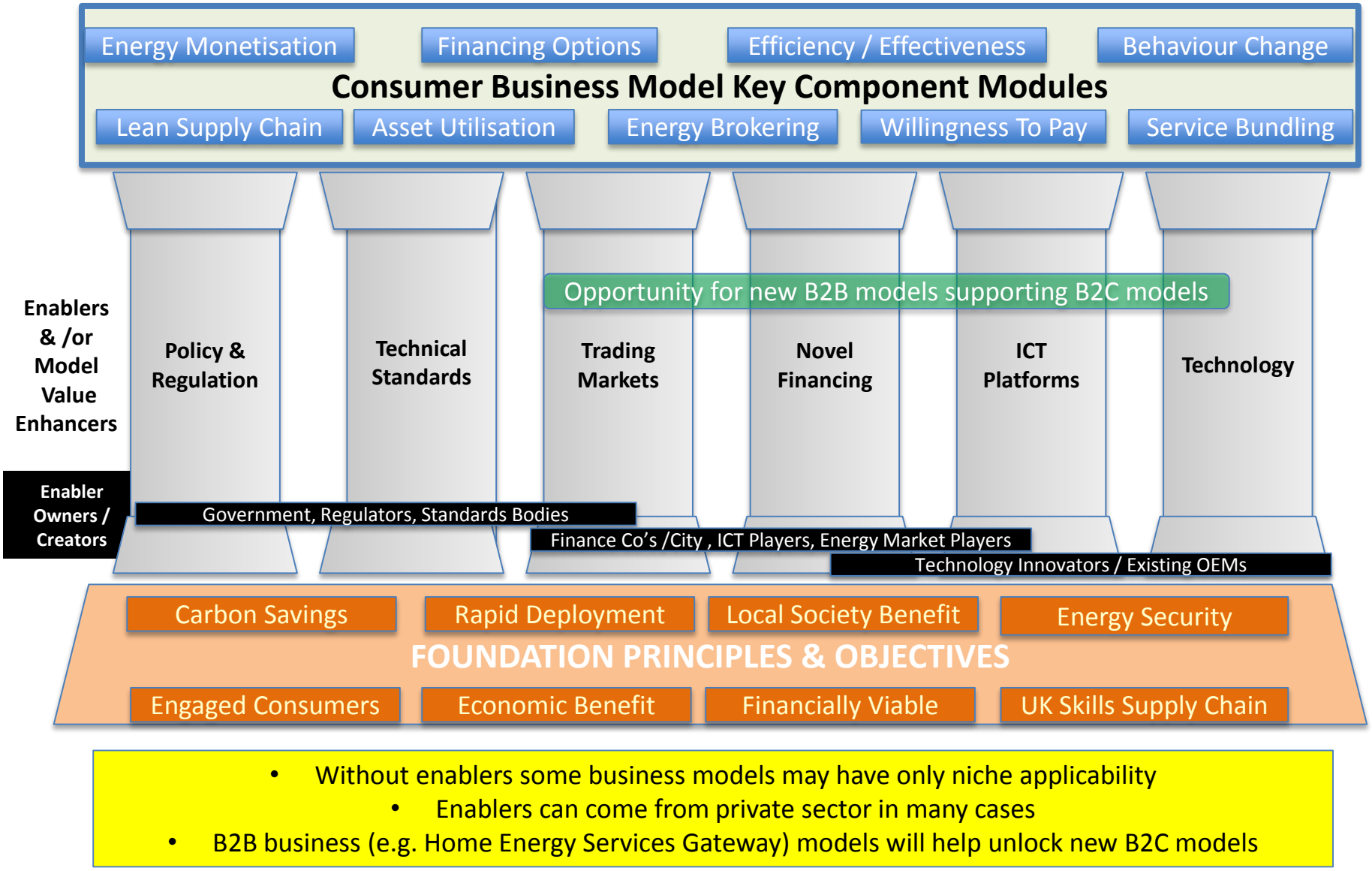


V0.2 – 13 Apr 16

Business Model Architecture

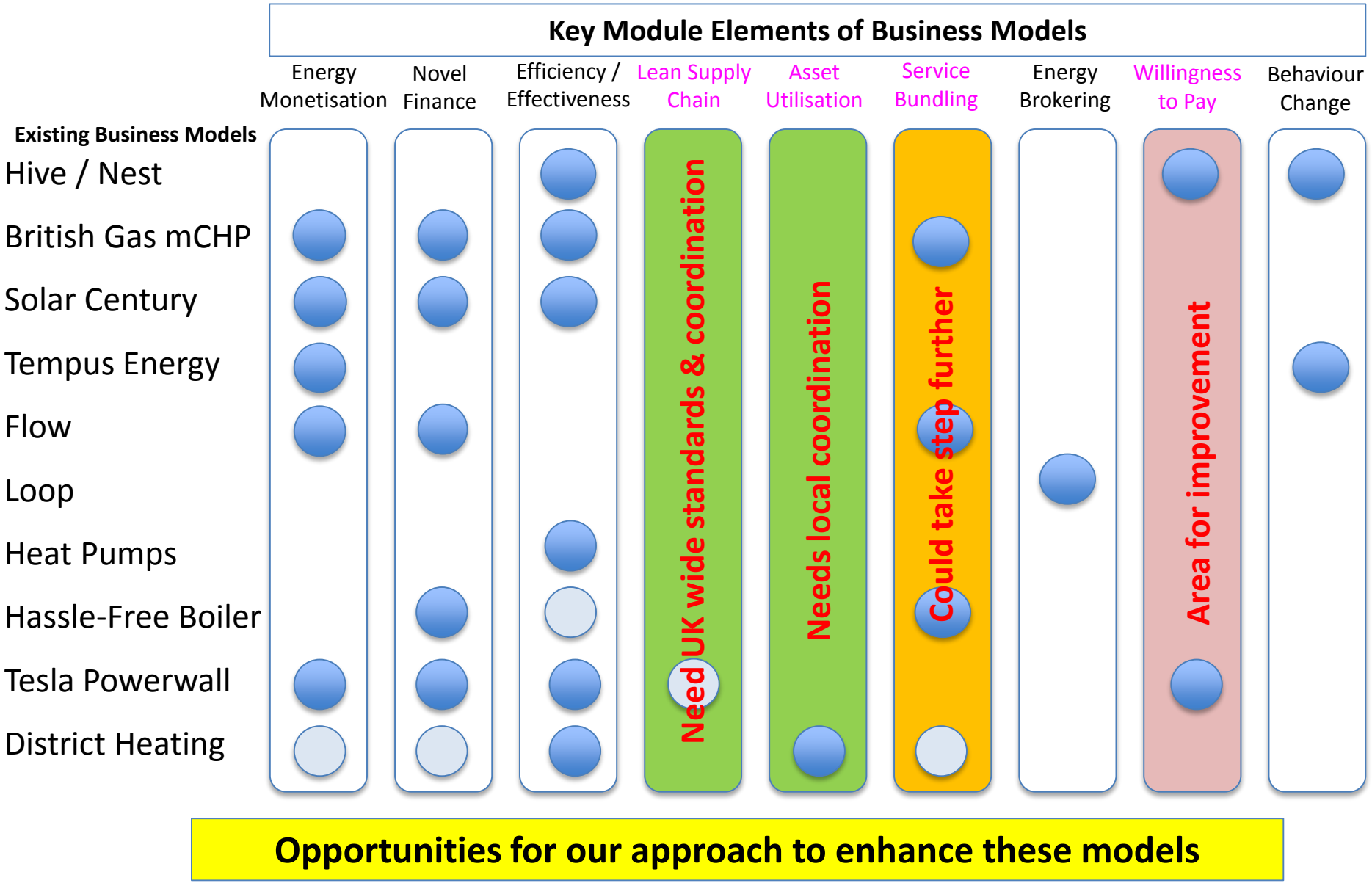
"a clean, intelligent, energy system that works for people, communities and businesses"

New Business Model Architecture



- Without enablers some business models may have only niche applicability
- Enablers can come from private sector in many cases
- B2B business (e.g. Home Energy Services Gateway) models will help unlock new B2C models

Mapping Existing Models across the Key Components



Opportunities for our approach to enhance these models

Getting to the Top Tier Business Models

CATAPULT Energy Systems

"a clean, intelligent, energy system that works for people, communities and businesses"

Getting to the Top Tier Business Models

Phase 1

Idea Generation & Analysis

☑ Complete

Jan-Feb

32 Business Model Ideas Captured

Feb

9 Assessment Criteria Defined

Feb

Initial Ranking vs Assessment Criteria

Feb

Identified 9 Module Elements, 6 Enablers

Mar

'Front Runner' Business Model Ideas

Mar

Identified ~45 Sub-Modules & Ranked

Phase 2

Identifying Best Top Tier Options

Blank canvass

Mar

Brand New Composite Ideas (Blending of Best Sub-Modules)

From HL template

Mar

Re-Engineer 'Front Runner' BM Ideas

Mar

Appraise Propositions vs Criteria & Rank

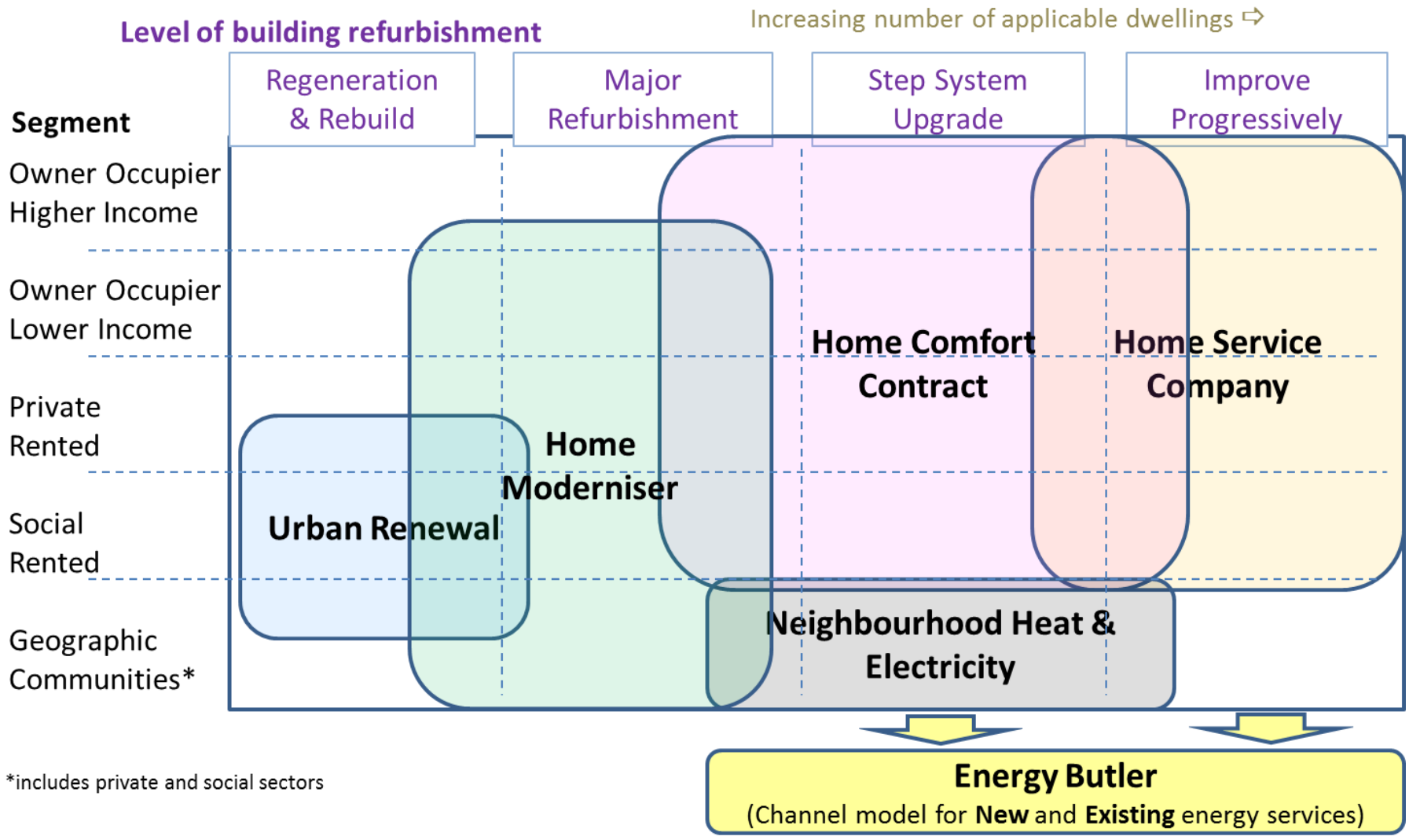
By 8th April

Final Assessment to Formal Top Tier List [4-6]

Challenges / Insights in forming Top Tier models

- Terminology & descriptions
  - Different parties have quite differing interpretations
  - Need to refine these and agree best terms
- Temptation to throw all the Sub-Modules into a business model
  - Risk of complication
  - Creating high degree of overlap – losing distinctiveness of model
- Rankings of Sub-Modules and Enablers
  - Need to balance academic scoring approach vs what good sense tells us
  - Top Tier models normally incorporate best ranked Sub-Modules, but not always
- Keeping flexible
  - New process stimulates new ideas – need to allow this
  - Business models will continue to evolve but we shall keep their essence

Following reconstruction approach 5 optimised business models were devised



'A business model for every home'

Top Tier Business Models

Home Service Company	Consolidation of utilities, local taxes & other home running costs into a single monthly fixed charge whilst optimising efficiency and convenience. Akin to serviced accommodation but applicable to homeowner, rented and social sectors.
Home Comfort Contract	Long term contract whereby the supplier undertakes to guarantee and cover all necessary investments for an agreed comfort / temperature level for a fixed monthly price. Electricity retail offer combined.
Home Moderniser	An aspirational home upgrade & improved occupant well-being through major improvement of insulation, controls, low carbon heating system within a full system approach. Financed via the mortgage and/or cash contribution from the homeowner.
Neighbourhood Heat & Electricity	A community-scale low carbon heating & power solution option with a strong local identity. Using distributed generation and storage assets run for the community providing heat via local networks or via heat pumps in some homes.
Urban Renewal	Accelerated regeneration of old, poor quality & lower density housing stock to provide more housing, urban renewal & near zero carbon homes, funded in part from the value created by higher dwelling density & home value / rental enhancements & better use of land.

Comparison of Business Models

	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood Heat & Electricity	Urban Renewal
Novelty	High	High	High	Medium	Medium
Service Aggregation	High	Medium	As-Is	Medium	Could vary
Degree of renovation	Low – Medium	Medium	Medium – High	Low-Medium	Total – rebuild
Contract term	12 months +	10 yrs + with flexibility	None	Continuing contract	n/a
Financing	Pay-as-you-go + lease option	Long Term Lease Contract	Upfront on mortgage	Pay-as-you-go	Via capital gains
Emotional outcome	Removal of hassle	Guarantee of comfort	Aspirational new feel home	Community empowerment	New homes
# of providers	Few nationals & some locals	Choice of local & nationals	Wide choice of accredited	Single provider	Regional / LA backed

V0.4 22 Apr 16

Models covering all sectors with distinct features for consumer

Quantitative Analysis

"a clean, intelligent, energy system that works for people, communities and businesses"

Analysis Stage Triangulation – an illustration

Assessment Parties

Frontier

Delta

Energy Systems Catapult

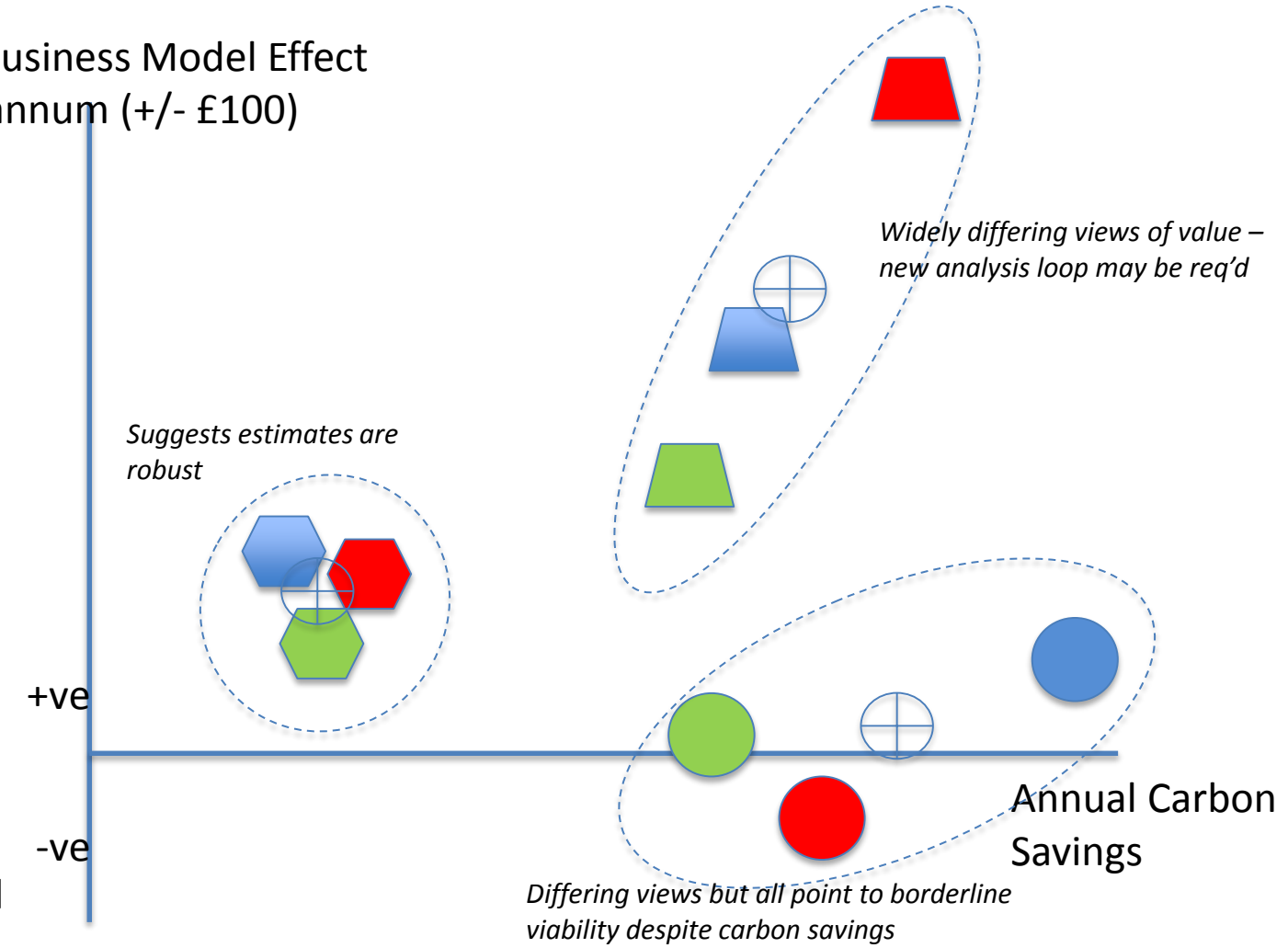
Business Model Types

Home Comfort

Home Service

Neighbourhood

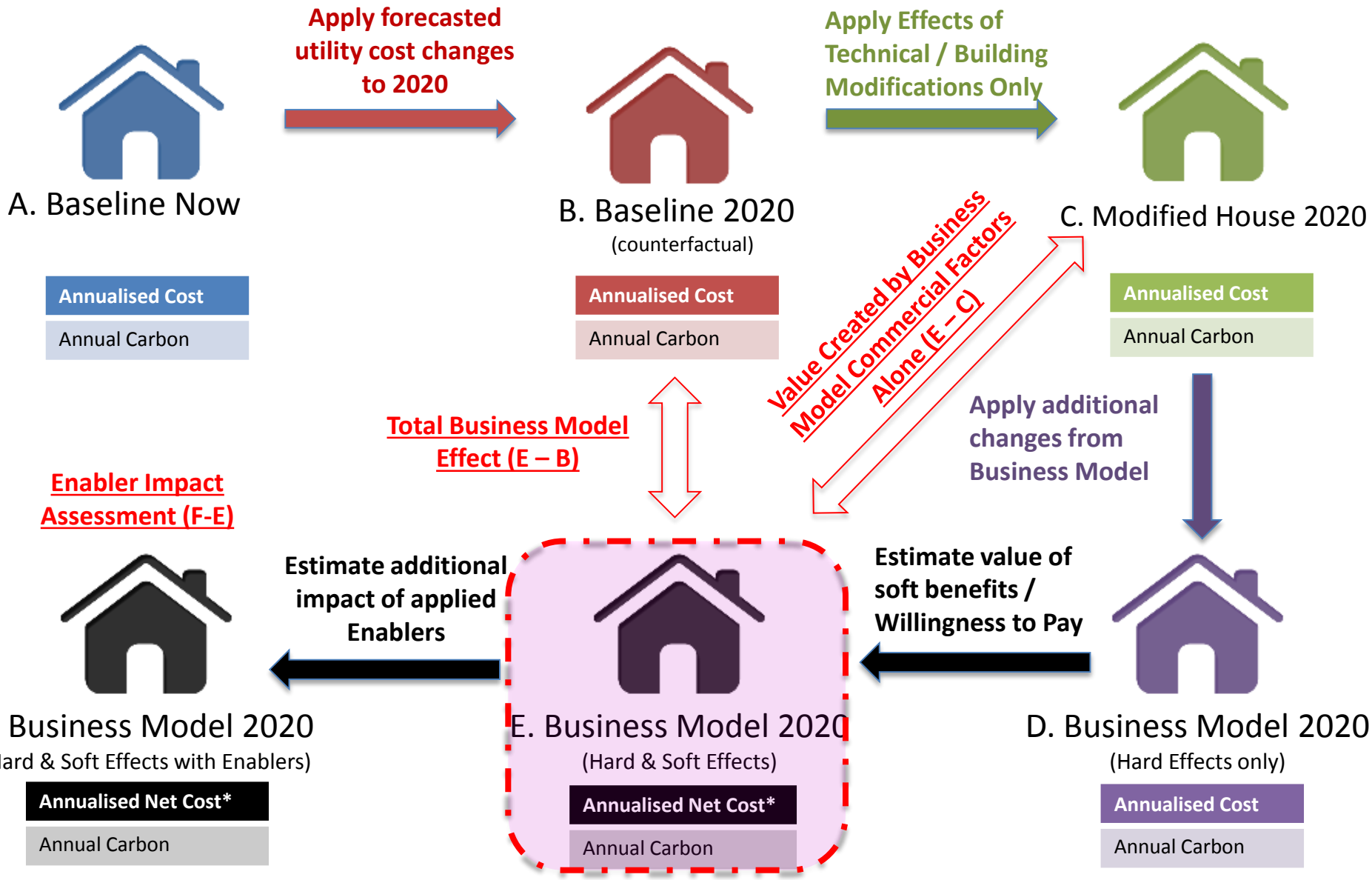
… etc.



All based on 3 bed semi with age and energy rating related to best matching segment

Analytical Cases for Each Business Model

* Net cost = Hard Cost & value of soft benefits / Willingness to Pay (WTP)



V0.2 04/05/16

Suggested Use Cases for Each Business Model

	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood Heat & Electricity	Urban Renewal
House Type (all owner occupied)	3-bed semi Midlands	3-bed semi Midlands	3-bed semi Midlands	3-bed semi Midlands	3-bed semi Midlands
Current & 2020 C/F Heating	Gas Boiler CH Class B	Gas Boiler CH Class B	Gas Boiler CH Class B	Gas Boiler CH Class B	Gas Boiler CH Class B
Age	Post 1990	1965-1990	Pre-1965	1965-1990	Pre-1965
House Energy Band	C	D	E	D	F-G

V0.1 03/05/16

Base cases with all homes as owner occupied. 2 adults 2 children

Technology Interventions by Business Model Type

	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood Heat & Electricity	Urban Renewal
Controls	HEMS smart controller	HEMS smart controller	HEMS smart controller	HEMS smart controller	HEMS smart controller
Heating System	Gas Air Source Hybrid Heat Pump	Gas Air Source Hybrid Heat Pump	To Air Source low temp heat pump	To district heating (removal of gas boiler)	To Ground Source Heat Pump
Walls Change	None	To cavity insulation	To latest spec external insulation	None	To latest building regulations
Loft Change	None	To latest spec insulation	To latest spec insulation	None	To latest building regulations
Windows	None	None	To latest specification	None	To latest building regulations
High Energy Appliances	(Ignore for this analysis)	None	None	None	None
Rest of Building	None	None	PV Roof installed Doors upgraded	None	New construction
			Moving to a very low Carbon Home		Note: Very Low Carbon Home

V0.2 04/05/16

Analysis of Business Models – Commercial assumptions

	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood Heat & Electricity	Urban Renewal
Capital Cost Financing	Leasing	Leasing	On Mortgage	Covered in energy bill	Land use optimisation
Servicing of Heating	Included	Included	Excluded	Included	Excluded
Major Energy Appliances	Optional (leave out of analysis for now)	Excluded	Excluded	Excluded	Excluded
Supply of Electricity & Gas	Included	Included	Excluded (assume as-is)	Included	Excluded (assume as-is)
Best deal sourcing	Included	Included	Excluded (assume as-is)	Excluded	Excluded (assume as-is)
Supply of Other Services	Water, Insurance, Telecoms	Excluded	Excluded	Excluded	Excluded
Asset Owners	Independent finance co.	HCC company	Homeowner	Local Power Company / SPV	Homeowner
Contract term	2 years	10 years	No contract – one-time upgrade	Continuous	No contract – one-time upgrade
Billing	All utilities & appliance upkeep. Monthly fixed incl lease costs	Elect, Gas, Appliance Upkeep & Refurb repayment. Monthly fixed	Assume as-is (Variable monthly)	Single energy bill (heat and power)	Assume as-is (Variable monthly)

Monetisation & financing options to be incorporated

	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood Heat & Electricity	Urban Renewal
RHI / FIT Income	Include	Include	Include	Include	Include
Selling demand shift	Include	Include	Exclude	Include	Include
Improving consumption f/c	Include	Include	Exclude	Include	Include
Value of consumer data incl. consumption	Include	Include	Exclude	Include	Exclude
DNO Flexibility to manage constraints	Exclude	Exclude	Exclude	Include	Include

V0.2 04/05/16

Enablers to assess impact of

	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbour-hood Heat & Electric	Urban Renewal
Internalising Cost of Carbon (value of carbon saving incorporated into business model in one or more ways – existing or new approaches)	Based on energy use and mix post intervention as per Business Model				
Standardisation and direct sourcing of simplified heat pump design & manufacture and revised standardised approach to installation & spares	Apply to Heat Pump installed capex	Apply to Heat Pump installed capex	Apply to Heat Pump installed capex & pre-fabricated insulation, roof panels etc.	Apply to Heat Network installed capex	Apply to Heat-Pump installed capex

Calculate the annualised savings, revenues or costs of the above Enablers

Quantitative Analysis Outputs

	Case A: Baseline			
Business Model	**Delta**	**Frontier**	**ESC**	**Avg**
Home Service Company	£ 4,340	£ 4,820	£ 4,950	£ 4,700
Home Comfort Contract	£ 4,440	£ 4,880	£ 5,250	£ 4,857
Home Moderniser	£ 4,540	£ 4,950	£ 5,360	£ 4,950
Neighbourhood H&E	£ 4,400	£ 4,640	£ 5,250	£ 4,763
Urban Renewal	£ 4,440	£ 4,950	£ 5,250	£ 4,880
	Case B: 2020 Counterfactual			
Business Model	**Delta**	**Frontier**	**ESC**	**Avg**
Home Service Company	£ 4,420	£ 4,660	£ 4,790	£ 4,620
Home Comfort Contract	£ 4,530	£ 4,720	£ 5,020	£ 4,757
Home Moderniser	£ 4,630	£ 4,800	£ 5,240	£ 4,890
Neighbourhood H&E	£ 4,510	£ 4,460	£ 5,110	£ 4,693
Urban Renewal	£ 4,540	£ 4,800	£ 5,110	£ 4,820
	C: Technical Changes			
Business Model	**Delta**	**Frontier**	**ESC**	**Avg**
Home Service Company	£ 4,820	£ 4,910	£ 5,020	£ 4,920
Home Comfort Contract	£ 4,850	£ 4,790	£ 4,890	£ 4,843
Home Moderniser	£ 5,900	£ 5,710	£ 5,710	£ 5,773
Neighbourhood H&E	£ 4,500	£ 4,340	£ 5,040	£ 4,627
Urban Renewal	£ 4,108	£ 9,570	£ 9,470	£ 7,720
	D. Hard Benefits of Business Model			
Business Model	**Delta**	**Frontier**	**ESC**	**Avg**
Home Service Company	£ 380	£ 240	£ 420	£ 347
Home Comfort Contract	£ 370	-£ 120	£ 230	£ 160
Home Moderniser	£ 260	£ 660	£ 690	£ 537
Neighbourhood H&E	£ 260	£ 10	£ 30	£ 100
Urban Renewal	£ 320	£ -	£ 30	£ 117
	E. Willingneess To Pay			
Business Model	**Delta**	**Frontier**	**ESC**	**Avg**
Home Service Company	£ 140	£ 10	£ 80	£ 77
Home Comfort Contract	£ 140	£ 10	£ 90	£ 80
Home Moderniser	£ 115	£ 210	£ 1,350	£ 558
Neighbourhood H&E	£ 140	£ 50	£ 190	£ 127
Urban Renewal	£ 115	£ 3,850	£ 4,190	£ 2,718
	F. Enablers Effect			
Business Model	**Delta**	**Frontier**	**ESC**	**Avg**
Home Service Company	£ 230	£ 160	£ 340	£ 243
Home Comfort Contract	£ 270	£ 200	£ 380	£ 283
Home Moderniser	£ 380	£ 260	£ 1,030	£ 557
Neighbourhood H&E	£ 220	£ 120	£ 170	£ 170
Urban Renewal	£ 150	£ 200	£ 1,030	£ 460

Further detail available upon request

Willingness to Pay (WTP) Elements –suggested applicability

Soft / Willingness to Pay Benefit	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbour-hood Heat & Electricity	Urban Renewal
Change in house value			✓		✓
Ongoing convenience & removal of hassle	✓	✓		✓	
Comfort and Control	✓	✓	✓	✓	✓
Noise insulation		✓	✓		✓
Community value / benefit				✓	✓
Damp / air quality / health		✓	✓		✓
Security of power supply & heat				✓	
Predictability / fixed billing peace of mind	✓	✓		✓	
Elimination of surprise costly repairs	✓	✓		✓	
Avoiding upfront cost of capex	✓	✓	✓	✓	
Higher rent earning power		✓	✓		
Trusted providers (with guarantees)	✓	✓	✓	✓	✓
Space Savings				✓	
Perceived safety benefits				✓	

Analysts to assign upper and lower range of WTP for each business model

Elements of household cost & savings

Cost Elements

					Where Business Model Has An Interaction				
Household Cost Element	**Variable**	**Fixed**	**Capital**	**…**	**Home Comfort Contract**	**Home Service Company**	**Neighbourhood Heat & Electricity**	**Home Moderniser**	**Urban Renewal**
Electricity (net of enviro charges)	x				●	●	●	●	●
Gas (net of enviro charges)	x				●	●	●	●	●
As-Is Environmental Charges	x				●	●	●	●	●
Water	x	x			○	◑	○	○	○
TV, Broadband & Telecoms	x	x			○	◑	○	○	○
Home Insurance & Security		x			○	◑	○	○	○
Local Taxes		x			○	◑	○	○	○
Boiler (Heating) Maintenance	x	x			●	●	●	●	●
High Energy Use Appliances			x		○	◑	○	◑	●
Boiler (Heating) Installed Cost			x		◑	◑	●	●	●
Heating & Hot Water BOP Installed Cost			x		◑	◑	◑	●	●
Comfort Related Building Fabric			x		◑	◑	○	●	●
New Building Construction			x		○	○	○	○	●
Interest on capital costs above	x				◑	◑	●	●	●

Household Savings / Benefits Elements

Incremental Benefits / Costs of Business Model	WTP	Hard Ben	Soft Benefit
Change in house value	x	x	
Convenience & removal of hassle	x		x
Comfort and Control	x		x
Noise / insulation	x		x
Community value/benefit	x		x
Monetisation benefits		x	
Damp / air quality / health	x	x	x
Security of supply & heat	x		x
Network cost savings (Elect)		x	
Improved house aesthetics	x		x
Reduced financial risk (emergency repairs)	x		
Supply Chain Improvements		x	
Asset utilisation benefits		x	
Brokering Effects		x	
Reduced admin costs		x	

Detailed breakdown of benefits

Suggested Summary Level for reporting & comparison

Suggested Simplified	WTP	Hard Ben	Soft Benefit
Consumption benefits		X	
Enviro Cost benefits		X	
Cost of capital benefits		X	
Monetisation benefits		X	
House value benefit	X		X
WTP benefit - other factors	X		X

Business Model Details

"a clean, intelligent, energy system that works for people, communities and businesses"

House Moderniser (private sector)

START

MID-TERM Evolution →

LONG-TERM

CORE PROPOSITION

ADD-ONS

FINANCING
B8
Adding investment co
to mortgage

Building Regulations Policy

HIGHER EFFICIENCY
E1
Reducing thermal losses via improved insulation

WILLINGNESS TO PAY
H2
Approved contractors providing confidence to consumer

Internalising Cost of Carbon

FINANCING
B7
Guarantee from income arising from FIT/RHI, Internalise Carbon etc.

HIGHER EFFICIENCY
E2
Improved home controls

HEMS ICT

WILLINGNESS TO PAY
H10
Recognising value for money – greater transparency & understanding of offer

HIGHER EFFICIENCY
E4
Low carbon efficient heating devices to provide for the home

WILLINGNESS TO PAY
H5
Moving to concept of better comfort & outcomes

New Technology

LEAN SUPPLY CHAIN
F3
Pre-fabrication of insulation etc.. offsite (such as house blanket)

WILLINGNESS TO PAY
H4
Making the idea of investing in low carbon home aspirational & a good things for them

Clean-tech Cost Crunch

LEAN SUPPLY CHAIN
F2
Standardisation & simplification of most common low carbon solution hardware

LEAN SUPPLY CHAIN
F4
Reducing installation time & cost via standardisation

LEAN SUPPLY CHAIN
F1
LA's, government & HOSCOs pooling purchasing power direct with OEMs

Policy

FINANCING
B4
Pension Fund Allocation

FINANCING
B2
Locally-driven Special Purpose Vehicle funded by community invest't

WILLINGNESS TO PAY
H7
Being part of a community initiative / member of club

Trading

MONETISATION
A1
Selling generation, storage or shift in small or aggregated volumes

FINANCING
B13
Levy on property – paid back on sale (LA loan facilitated)

FINANCING
B12
Cash contribution option from householder

WILLINGNESS TO PAY
H3
Early adopters become part of an exclusive club

HIGHER EFFICIENCY
E7
Heat storage system

HIGHER EFFICIENCY
E5
Power storage system

Novel Finance

FINANCING
B3
Local authority financed paid back via council tax

HIGHER EFFICIENCY
E3
Ventilation & heat recovery (incl. optional cooling in summer)

ASSET UTILISATION
D6
Domestic asset owned & operated as a service

Policy

New Techno

FINANCING
New
Stamp Duty rebate linked to new energy ratung

Landlord Capex Interest Tax Relief

V0.2 – 13 Apr 16

Home Moderniser – An aspirational home upgrade offering improved occupant well-being through major improvement of insulation, controls, low carbon heating system within a full system approach. Financed via the mortgage and/or cash contribution from the homeowner.

Partners

Insulation / Upgrade Pre-fabricators: UK manufacturers of panels, modules that are shipped to home

Accredited Installation & Maintenance Companies: Skilled & able to undertaken rapid and reliable updates

Mortgage / Loan providers: Financing

Local Authorities: providing trusted channel and planning & energy rating accreditation

UK Accreditation Agency

Key Activities and Resources

Activities

Home surveying and system design

Off-site pre-fabrication of upgrades (optional)

Insulation upgrades, new heating systems, controls & possibly ventilation systems

Resources

Design teams

Sourcing / procurement capabilities

Project management

Consumer Value Proposition

Significant improvement in comfort, noise, damp, security, look of home combined with lower running costs & an enhancement in home value.

Simple long term financing at lowest cost through bolt-on to mortgage.

Intervention takes between 1-5 days (on-site) as much of it is pre-fabricated & standardised.

Financing variant for social sector

Relationship and Channels

Relationship

One-off procurement of the upgrade to the home supported by a 20+ year guarantee of durability and certified step change in energy efficiency of home. Spares / modifications services maint through life. Trigger points: on purchase, change of tenant, major holiday, pension pot etc..

Channels

Directly marketed or recommended via a network of approved independent specifiers / or trusted LA organisation.

Customers and Market Share

Customers

Potentially all sectors – particularly poor quality housing stock. Affluent private sector may have alternative options to improve property. Rented sector may need tax incentive.

Market Share

Limited (<10%) as it may not suit many properties. Building geometry variations will be an issue.

Costs

CAPEX: Insulation, controls, energy / heating devices – cost put onto mortgage or covered by LA / other loan. **OPEX:** System maintenance and energy to run house. (Possible Stamp Duty Incentive)

Revenues

Renovator company receives payment directly or indirectly from loan or mortgage company. Option to transition to Home Service Company or Home Comfort Contract. Carbon price internalisation.

Home Moderniser – Defining Participant Roles

Party	Core Model Role	Options / future role
Accredited specifier and provider	• Surveys House & Specifies Interventions • Determines new, 'U' and likely CO2, £ running cost values • Confirms & Guarantees Cost & Timing • Signs-off and guarantees works • Signs-off qualification for available policy incentives	• Runs heating appliances as a service under ongoing contract • Coordination of house appliance upgrades (e.g. heat / power storage, controls) • Managing demand shift / generation / storage monetisation & credit to homeowner / mortgage co
Renovation Contractors (independent or part of provider)	• Coordinates receipt of hardware • Installs building fabric changes • Installs new low carbon appliances	• Installation of future upgrades (e.g. heat / power storage)
Homeowner	• Commits to contract & mortgage / charge	• Payment to council via council tax (low income) • Upfront cash contribution (high income)
Mortgage Company	• Provides finance against increased mortgage payments or charge on property	• Coordinates with LA linked for charge on property
Renovation hardware manufacturers	• Pre-fabrication of house upgrade fabric • Manufacture appliances (e.g. GSHP)	• Enhanced hardware – such as cooling / ventilation
Local Authority	• Provides planning permission	• Creates SPV for financing in low income / social sector • Pooling purchase power against long term contracts for provision to low income sectors
UK Agency / Catapult	• Accreditation of providers • Providers of objective choices / information	• Providing lower cost technical standards for renovation materials, equipment and installation

Home Service Company

STARTING OFFER | MID-TERM → LONG-TERM

CORE

FINANCING
B6
Lease / Service Bundling

Novel Finance

Interna l-ising Cost of Carbon

FINANCING
B7
Guarantee from income arising from FIT/RHI, Internalise Carbon et

HEMS ICT

MONETISATION
A1
Selling generation, storage or shift in small or aggregated volumes

Trading

MONETISATION
A2
Harvest consumption data to cross-sell, target advertising etc..

MONETISATION
A3
Improve consumption forecasting to reduce imbalance costs

HIGHER EFFICIENCY
E4
Low carbon efficient heating devices to provide for the home

HIGHER EFFICIENCY
E2
Improved home controls

Reducing Carbon Obligation

SERVICE BUNDLING
C2
Med Level - Bundling o asset with energy supply for defined comfort or other outpu

Policy

ASSET UTILISATION
D6
Domestic asset owned & operated as a service

WILLINGNESS TO PAY
H1
Improved peace of mind including predictability of bill

WILLINGNESS TO PAY
H6
Provision of turnkey service & removal of hassle for householder

WILLINGNESS TO PAY
H10
Recognising value for money – greater transparency & understanding of offer

BROKERING
G2
Competitive sourcing – automatic linked to obligation of provider

Clean-tech Cost Crunch

LEAN SUPPLY CHAIN
F1
LA's, government & HOSCOs pooling purchasing power direct with OEMs

LEAN SUPPLY CHAIN
F2
Standardisation & simplification of most common low carbon solution hardware

LEAN SUPPLY CHAIN
F4
Reducing installation time & cost via standardisation

LEAN SUPPLY CHAIN
F5
Standardising efficiency & reliability assessment

SERVICE BUNDLING
C3
High Level - Incorporate all other key house utilities (water, phone, insurance)

HIGHER EFFICIENCY
E5
Power storage system

New Techno logy

ADD-ONS

FINANCING
B12
Cash contribution option from householder

BEHAVIOUR CHANGE
I3
Manage within agreed consumption limits

BEHAVIOUR CHANGE
I1
Encourage & rewarding low energy use

HIGHER EFFICIENCY
E1
Improved Insulation

HIGHER EFFICIENCY
E6
High efficiency community heat & power system

BEHAVIOUR CHANGE
I2
Encouraging behaviours that shift demand with new supply profiles

WILLINGNESS TO PAY
H5
Moving to concept of better comfort & outcomes

WILLINGNESS TO PAY
H2
Approved contractors providing confidence to consumer

Policy

MONETISATION
A4
Flexibility for DNO to manage network constraints

HIGHER EFFICIENCY
E3
Ventilation & heat recovery (incl. optional cooling in summer)

HIGHER EFFICIENCY
E7
Heat storage system

Policy

SERVICE BUNDLING
C4
Extra High Level - Incorporation of local taxation / rates

V0.2 – 13 Apr 16

Home Service Company (HSC) – Consolidation of utilities, local taxes & other home running costs into a single monthly fixed charge whilst optimising efficiency and convenience. Akin to serviced accommodation but applicable to homeowner, rented and social sectors.

Partners

Appliance OEMs: direct contracts with HSC, bypassing channels

Accredited Installation & Maintenance Companies: doing on site interventions & servicing on behalf of HSC

Finance Company: Holding key appliances so that asset transfer to other HSC possible

Other Utility providers: Provision of power, gas, telecoms, insurance, water to HSC.

UK Accreditation Agency

Key Activities and Resources

Activities

Energy procurement & trading

Non energy utility procurement (water, telecoms, insurance etc..)

Procurement of appliances & insulation

Billing & customer service

Data mining & monetisation

Resources

Strong ICT capabilities to manage complexity and harvesting of data value

In-house or outsourced sourcing / procurement & back-office capability.

Consumer Value Proposition

Single fixed monthly bill for most or all utilities & key energy-using appliances.

HSC responsible for installing & maintaining hardware & controls in order to maintain competitiveness of offer & fulfil its emission reduction obligations.

Provides options to generate more savings or better comfort / well-being.

Customer can change supplier on a regular basis – minimal tie-ins

[Local taxes collection option]

Relationship and Channels

Relationship

1 yr contract with [x] mth notice period between HSC & customer. Simple break clauses. Pricing varies by term. HSC compelled by licence to reduce CO_2 but also driven to extract value by saving costs & monetising energy assets.

Channels

Direct to homeowner or possibly via Energy Butlers who identify it as the best overall deal for homeowner's needs

Customers and Market Share

Customers

Potentially all housing sectors, including social (if linked to LA). Suited to those who want removal of hassle but flexibility to change provider rather than 5-10 yr lock-in

Market Share

Potentially very high as could have wide appeal (if trust factors dealt with & consumer protection in place)

Costs

CAPEX: New appliances, controls & insulation (where required) – assets held by separate finance company. OPEX: Energy to home, maintenance, billing admin, marketing

Revenues

Monthly payment from customers:

Varies according to level of aggregation & agreed interventions

Revenues from monetising tradable assets & FIT/ Carbon

Home Service Company–Participant Roles

Party	Core Model Role	Options / future role
Accredited Provider	• Procures at best cost & consolidates all utilities • Manages all billing and customer service • Monitors and manages home energy systems and procures service contracts from contractor • Identifies and effects changes to meet its CO_2 reduction targets • Assumes repayment responsibility for hardware changes in home • Monetises demand shift, forecasting, data in the market	• Collects council tax on behalf of LA
Installation & Service Contractors	• Install and manage any relevant energy appliances in home (paid for by Provider)	
Utility Providers	• Provide utilities to Homeowner via contract with Provider	
Asset Financing Company	• Provides finance for new low carbon systems in home • Takes asset ownership with repayments via Provider	
Hardware Providers	• Manufacture heating hardware against standards set by UK agency • Deliver direct to installers but paid by Financing Company	
Regulator / UK Agency / Skills bodies / Catapult	• Provides licence to Provider to operate the multi-utility model and audits compliance with CO_2 reduction targets • Providers accreditation for installer companies • Provides low lifetime cost appliance standards to Hardware OEMs	
Local Authority		• May become a HSC itself • Collects taxes via HSC

Neighbourhood Heat & Electricity

START

MID-TERM Evolution → LONG-TERM

CORE PROPOSITION

ADD-ONS

FINANCING
B2
Locally-driven Special Purpose Vehicle

Novel Finance

FINANCING
B7
Guarantee from incol arising from FIT/RHI, Internalise Carbon etc.

Interna l-ising Cost of Carbon

MONETISATION
A3
Improve consumption forecasting to reduce imbalance costs

Trading

MONETISATION
A1
Selling generation, storage or shift in small or aggregated volumes

MONETISATION
A4
Flexibility for DNO to manage network constraints

Policy

HIGHER EFFICIENCY
E2
Improved home controls

HEMS ICT

HIGHER EFFICIENCY
E6
High efficiency community heat & power system

ASSET UTILISATION
D7
Pay by the hour/ B2B system to CHP/ Power unit operator

ASSET UTILISATION
D5
Larger assets with shared use - better utilisation & lower capex

WILLINGNESS TO PAY
H1
Improved peace of mind including predictability of bill

WILLINGNESS TO PAY
H10
Recognising value for money – greater transparency & understanding of offer

WILLINGNESS TO PAY
H6
Provision of turnkey service & removal of hassle for householder

WILLINGNESS TO PAY
H7
Being part of a community initiative / member of club

HIGHER EFFICIENCY
E7
Heat storage system

LEAN SUPPLY CHAIN
F2
Standardisation & simplification of most common low carbon solution hardware

Clean-tech Cost Crunch

LEAN SUPPLY CHAIN
F4
Reducing installation time & cost via standardisation

HIGHER EFFICIENCY
E5
Power storage system

New Techno logy

BEHAVIOUR CHANGE
I3
Having to manage within agreed consumption limits

ASSET UTILISATION
D2
Sharing heating / cooling asset between buildings or dwellings

FINANCING
B11
Pay back via higher rent (vs savings)

Building Regulati ons Policy

HIGHER EFFICIE
E1
Reducing thermal losses via improved insulation

ASSET UTILISATION
D1
Utilising spare heat from adjacent comm. /industrial buildings

ASSET UTILISATION
D3
Utilising heat from local power gen. assets

Trading

MONETISATION
A5
Monetising spare heat

WILLINGNESS TO PAY
H2
Approved contractors providing confidence to consumer

WILLINGNESS TO PAY
H5
Moving to concept of better comfort & outcomes

V0.2 – 13 Apr 16

Neighbourhood Heat & Electricity – a community-scale low carbon heating & power solution with a strong local identity. Using distributed generation and storage assets run for the community providing heat via local networks supplemented, as necessary, by in-home heating technologies.

Partners

Local Heat & Power, Generation & Storage Operator/s: operate and sell heat & power by the hour to B2C accredited provider.

Infrastructure Owner / SPV: Funds capex against Long Term Agreement from Provider

B2B Installation & Maintenance Contractors

Energy Suppliers

Grid, DNOs, Generators

In-Home Accredited Installation & Maintenance Companies

Key Activities and Resources

Activities

Billing & customer service

Trading within community & externally (surplus/deficit)

Community engagement

Community financing if applicable.

Resources

Retail team – engaging with customers and local community

Local energy asset systems operating 24/7 including heat/power storage

Consumer Value Proposition

Competitively priced heat and electricity solution that is part of and influenced by the local community.

High level of reliability of heat & power provision – less reliance on assets outside control (with grid as back-up / top-up)

Lower carbon heating / power provided by different value propositions: by comfort level, hours of heat or by kWh

Insulation option where technically suited

Relationship and Channels

Relationship

Direct relationship with Community Energy Co and or Local Authority.
Strong local identify.
Perhaps some local profits recycled back into community projects.
Consumer protection measures in place.
Heat regulator.

Channels

Requires high level of collective engagement. LA can drive in social sector but could also facilitate schemes in private

Customers and Market Share

Customers

All consumer types but mainly those in natural geographical communities.

Market Share

Limited but high penetration of a segment, particularly urban and some rural areas with high carbon intensity.

Costs

CAPEX: Delivery of heating/power asset and local heat network where applicable. OPEX: PPA for energy/ heat including maintenance and energy input, customer service. Pay by the hour contact between Provider and energy center operating company

Revenues

Monthly bill based on customer tariffs or unmetered i.e. heat with rent. plus metered electricity and contribution to upfront cost.

Home Comfort Contract arrangement option.

Neighbourhood Heat & Power –Participant Roles

Party	Core Model Role	Options / future role
Accredited Provider	• Assures provision of heat (and power where applicable) to neighbourhood homes • Oversees installation of heat network and ongoing maintenance • Provides customer service • Procures heat & power from Local Power & Heat Facility • Trades power (both ways) with Energy Suppliers • Underwrites financing of Local Power & Heat Facility	• Monetising spare heat in adjacent buildings? • Utilising heat from industrial & commercial buildings • Providing insulation deals for homeowners
Installation & Service Contractors	• Install heat network • Manage ongoing maintenance (paid by Provider)	• Installing insulation
Grid, DNOs & Generators	• Transmit power generated by Local Facility through network • Provide backup power as needed	
Local Power & Heat Facility	• Provides heat and power via blend of assets (possibly including renewables) • Provision by PPA / pay-by-hour arrangements • Manages asset maintenance and performance	• Include power storage
Energy Suppliers	• Trade power with Provider	
Generating Hardware Suppliers	• Provide low carbon heat/power generating assets	• Possibly take role in running Local Power & Heat Facility
Financing Vehicle	• Provides financing against long term contract from Provider	
Regulator / UK Agency / Skills bodies / Catapult	• Provides licence to Provider to operate the multi-utility model and audits compliance with CO2 reduction targets • Providers accreditation for installer companies • Provides low lifetime cost appliance standards to Hardware OEMs	

Urban Renewal

Social Housing | Rented Sector

STARTING OFFER

MID-TERM → LONG-TERM

CORE

FINANCING
B2
Locally-driven Special Purpose Vehicle

Building Regulations Policy

FINANCING
B14
Financed from extra building capital gains

Novel Finance

FINANCING
B7
Guarantee from income arising from FIT/RHI, Internalise Carbon etc.

Internalising Cost of Carbon

HIGHER EFFICIENCY
E9
Complete new house with state-of art energy systems & comfort

ASSET UTILISATION
D6
Domestic asset owned & operated as a service

HEMS ICT

WILLINGNESS TO PAY
H2
Approved contractors providing confidence to consumer

LEAN SUPPLY CHAIN
F1
LA's, government & HOSCOs pooling purchasing power direct with OEMs

LEAN SUPPLY CHAIN
F2
Standardisation & simplification of most common low carbon solution hardware

Clean-tech Cost Crunch

LEAN SUPPLY CHAIN
F4
Reducing installation time & cost via standardisation

HIGHER EFFICIENCY
E5
Power storage system

New Technology

ADD-ONS

FINANCING
B3
Local authority financed – paid back via council tax

FINANCING
B11
Pay back via higher rent (vs savings)

Novel Finance

Policy

HIGHER EFFICIENCY
E6
High efficiency community heat & power system

HIGHER EFFICIENCY
E3
Ventilation & heat recovery (incl. optional cooling in summer)

Policy

MONETISATION
A1
Selling generation,

MONETISATION
A3
rove consumption
forecasting to reduce imbalance costs

Trading

MONETISATION
A2
Harvest consumption data to cross-sell, target advertising etc..

Policy

OKERING
G2
itive sourcing –
tomatic linked to
gation of provider

SERVICE BUNDLING
C3
High Level - Incorporate all other key house utilities (water, phone, insurance)

Policy

Policy

SERVICE BUNDLING
C4
Extra High Level - Incorporation of local taxation / rates

V0.2 – 13 Apr 16

Urban Renewal – Accelerated regeneration of old, poor quality & lower density housing stock to provide more housing, urban renewal & near-zero carbon homes, funded in part from the value created by higher dwelling density & home value / rental enhancements & better use of land.

Partners

Planning authorities

Heating / Controls Manufactures: direct dealing against standard specs (Cost-crunched)

Local Building Companies: Contracted to demolish and build.

Architects / Developers:

Accredited Installation & Maintenance Companies

Key Activities and Resources

Activities

Urban planning

House very low / zero carbon design

Contractor engagement

Procurement

Community engagement

Financing

Resources

Planning & system design

Contacting / legal

Project management

Marketing / Show home

Consumer Value Proposition

A [30-40%] uplift in dwelling density that is also near zero carbon and bringing local environmental and economic benefits

Part of a long term regeneration plan that supports local contactors

Existing homeowners (in old homes due for replacement) are offered preferential terms for upgraded new home

Developer gains from value of new homes & land

Relationship and Channels

Relationship

Part of a 20-30 year regeneration plan exploiting periods of low activity in the building sector. Done in small or large blocks of dwellings with ample notice to manage transition of accommodation.

Channels

Managed by local authority or similar enterprise with contractors.

Customers and Market Share

Customers

Mainly social sector with some private (owned/rented) sector new home owners who play a part in funding development.

Market Share

Limited to urban areas with clusters of poor housing stock. But could have disproportionate carbon benefit

Costs

CAPEX: Demolishing and new build costs **OPEX:** None – unless migrate to a bolt-on business model post build in social housing sector

Revenues

Higher rental income vs lower energy & better buildings. Monetisation of carbon/RHI/FIT. Profit share from developers for the additional new build properties. Higher land values.

Urban Renewal – Defining Participant Roles

Party	Core Model Role	Options / future role
Accredited Developer	• Acquires poor quality low density housing stock • Manages low carbon housing build and fit out with low carbon heating system • Finances hardware & materials for contractors against national spec/call off	
Local Smart Building Contractors	• Demolishes old housing stock • Builds new higher density/better housing • Installs low carbon fabric, heating system, & controls • Sets up run as service for heating HQ	• Additional systems such as heat and power storage & ventilation & cooling
SPV & Capital Markets	• Funding vehicle for financing of project	
Housing Associations	• Ownership of some of the properties • Collection of FIT/RHI income	
Hardware OEMS	• Pre-fabrication of house upgrade fabric • Manufacture appliances (e.g. GSHP)	• Enhanced hardware – such as cooling / ventilation
Local Authority	• Defines local area renewal plan & targets • Coordinates SPV relating to social sector • Provides planning permission • Collection of rents and payment of capital	
UK Agency / Skills bodies / Catapult/	• Accreditation of providers • Providing lower cost technical standards for renovation materials, equipment and installation • Assurance and certification of local contractors	

Home Comfort Contract (Private Sector)

STARTING OFFER

CORE

FINANCING
B6
Lease / Service Bundling

Novel Finance

Internalising Cost of Carbon

FINANCING
B7
Guarantee from income arising from FIT/RHI, Internalise Carbon etc

HEMS ICT

BROKERING
G2
Competitive sourcing – automatic linked to obligation of provider

BEHAVIOUR CHANGE
I3
Having to manage within agreed consumption limits

SERVICE BUNDLING
C2
Med Level - Bundling of asset with energy supply for defined comfort or other output

HIGHER EFFICIENCY
E4
Low carbon efficient heating devices to provide for the home

HIGHER EFFICIENCY
E2
Improved home controls

HIGHER EFFICIENCY
E1
Reducing thermal losses via improved insulation

MONETISATION
A1
Selling generation, storage or shift in small or aggregated volumes

Policy Change - Supply

MONETISATION
A3
Selling generation, storage or shift in small or aggregated volumes

Trading

ASSET UTILISATION
D6
Domestic asset owned & operated as a service

WILLINGNESS TO PAY
H1
Improved peace of mind including predictability of bill

WILLINGNESS TO PAY
H2
Approved contractors providing confidence to consumer

WILLINGNESS TO PAY
H5
Moving to concept of better comfort & outcomes

WILLINGNESS TO PAY
H6
Provision of turnkey service & removal of hassle for householder

WILLINGNESS TO PAY
H10
Recognising value for money – greater transparency & understanding of offer

ADD-ONS

FINANCING
B8
Adding investment cost to mortgage

FINANCING
B10
Charity Donation to Fuel Poor

HIGHER EFFICIENCY
E3
Ventilation & heat recovery (incl. optional cooling in summer)

HIGHER EFFICIENCY
E7
Heat storage system

WILLINGNESS TO PAY
H4
Making the idea of investing in low carbon home aspirational & a good things for them

MID-TERM →

Clean-tech Cost Crunch

LEAN SUPPLY CHAIN
F2
Standardisation & simplification of most common low carbon solution hardware

LEAN SUPPLY CHAIN
F1
LA's, government & HOSCOs pooling purchasing power direct with OEMs

LEAN SUPPLY CHAIN
F4
Reducing installation time & cost via standardisation

LEAN SUPPLY CHAIN
F5
Standardising efficiency & reliability assessment

Market Maker ICT

MONETISATION
A2
Harvest consumption data to cross-sell, target advertising etc..

Policy

MONETISATION
A4
Flexibility for DNO to manage network constraints

LONG-TERM

V0.2 – 13 Apr 16

Home Comfort Contract (Rented Sector Variant)

Rented Sector

START

MID-TERM Evolution → LONG-TERM

CORE PROPOSITION

FINANCING
B6
Lease / Service Bundling

Novel Finance

Internalising Cost of Carbon

FINANCING
B7
Guarantee from income arising from FIT/RHI, Internalise Carbon etc

HEMS ICT

FINANCING
B8
Adding investment cost to mortgage

Landlord Capex Interest Tax Relief

Building Regulations Policy

FINANCING
B11
Pay back via higher rent (vs savings)

ASSET UTILISATION
D6
Domestic asset owned & operated as a service

HIGHER EFFICIENCY
E4
Low carbon efficient heating devices to provide for the home

HIGHER EFFICIENCY
E2
Improved home controls

HIGHER EFFICIENCY
E1
Reducing thermal losses via improved insulation

Policy Change - Supply

WILLINGNESS TO PAY
H8
Property is more appealing to rent

BROKERING
G2
Competitive sourcing – automatic linked to obligation of provider

WILLINGNESS TO PAY
H1
Improved peace of mind including predictability of bill

WILLINGNESS TO PAY
H2
Approved contractors providing confidence to consumer

WILLINGNESS TO PAY
H5
Moving to concept of better comfort & outcomes

WILLINGNESS TO PAY
H6
Provision of turnkey service & removal of hassle for householder

WILLINGNESS TO PAY
H10
Recognising value for money – greater transparency & understanding of offer

Clean-tech Cost Crunch

LEAN SUPPLY CHAIN
F2
Standardisation & simplification of most common low carbon solution hardware

Designer Accreditation

LEAN SUPPLY CHAIN
F1
LA's, government & HOSCOs pooling purchasing power direct with OEMs

LEAN SUPPLY CHAIN
F4
Reducing installation time & cost via standardisation

LEAN SUPPLY CHAIN
F5
Standardising efficiency & reliability assessment

ADD-ONS

Policy

FINANCING
B4
Pension Fund Allocation

SERVICE BUNDLING
C2
Med Level - Bundling of asset with energy supply for defined comfort or other output

HIGHER EFFICIENCY
E7
Heat storage system

HIGHER EFFICIENCY
E3
Ventilation & heat recovery (incl. optional cooling in summer)

BEHAVIOUR CHANGE
I1
Encourage & reward low energy use

BEHAVIOUR CHANGE
I3
Having to manage within agreed consumption limits

Trading

MONETISATION
A1
Selling generation, storage or shift in small or aggregated volumes

MONETISATION
A4
Flexibility for DNO to manage network constraints

Policy

V0.2 – 13 Apr 16

Home Comfort Contract (Social Housing Variant – via LA)

Social Housing

START

MID-TERM Evolution → LONG-TERM

CORE PROPOSITION

ADD-ONS

FINANCING
B2
Locally-driven Special Purpose Vehicle funded by community invest't

Novel Finance

FINANCING
B7
Guarantee from income arising from FIT/RHI, Internalise Carbon etc

Interna l-ising Cost of Carbon

BROKERING
G5
Single collective supplier acting on social housing behalf

Broadband Provision

AN SUPPLY CHAIN
F2
Standardisation & simplification of most common low carbon solution hardware

Clean-tech Cost Crunc

SERVICE BUNDLING
C1
Low Level - Bundling of Home services (without assets)

HIGHER EFFICIENCY
E4
Low carbon efficient heating devices to provide for the home

HIGHER EFFICIENCY
E2
Improved home controls

HEMS ICT

HIGHER EFFICIENCY
E1
Reducing thermal losses via improved insulation

Building Regulati ons Policy

EAN SUPPLY CHAIN
F1
LA's, government & HOSCOs pooling purchasing power direct with OEMs

LEAN SUPPLY CHAIN
F4
Reducing installation time & cost via standardisation

WILLINGNESS TO PAY
H10
Recognising value for money – greater transparency & understanding of offer

WILLINGNESS TO PAY
H2
Approved contractors providing confidence to consumer

WILLINGNESS TO PAY
H5
Moving to concept of better comfort & outcomes

Policy Change - Supply

ASSET UTILISATION
D6
Domestic asset owned & operated as a service

MONETISATION
A1
Selling generation, storage or shift in small or aggregated volumes

Trading

Pending further review

Post-Demo Standards Review

LEAN SUPPLY CHAIN
F5
Standardising efficiency & reliability assessment

Policy

SERVICE BUNDLING
C2
Med Level - Bundling of asset with energy supply for defined comfort or other output

SERVICE BUNDLING
C3
High Level - Incorporate all other key house utilities (water, phone, insurance)

SERVICE BUNDLING
C4
Extra High Level - Incorporation of local taxation / rates

Policy

HIGHER EFFICIENCY
E6
High efficiency community heat & power system

FINANCING
B11
Pay back via higher rent (vs savings)

Policy

BROKERING
G4
Opt-out option for collective schemes

HIGHER EFFICIENCY
E7
Heat storage system

HIGHER EFFICIENCY
E3
Ventilation & heat recovery (incl. optiona

ASSET UTILISATION
D1
Utilising spare heat from adjacent comm. /industrial buildings

MONETISATION
A2
Harvest consumption data to cross-sell, target advertising etc..

ASSET UTILISATION
D2
Sharing heating / cooling asset between buildings or dwellings

BEHAVIOUR CHANGE
I1
Encouraging & rewarding low energy

BEHAVIOUR CHANGE
I2
Encouraging behaviours that shift demand with new supply profiles

ASSET UTILISATION
D3
Utilising heat from local power gen. assets

MONETISATION
A5
Monetising spare heat

Trading

MONETISATION
A3
Improve consumption forecasting to reduce imbalance costs

V0.2 – 13 Apr 16

Home Comfort Contract – Long term contract, with flexibility, whereby the supplier undertakes to guarantee and cover all necessary investments for an **agreed comfort / temperature level for a fixed monthly price**. Electricity retail offer combined.

Partners

OEMs: direct contracts with HCC provider, bypassing channels.

Accredited Installation & Maintenance Companies: doing on site interventions & servicing on behalf of provider.

Wholesale Utility Providers: Provide power and gas via HCC provider

UK Agency: Provides accreditation to providers and installers and licence to provider to sell based on outcomes against CO2 reduction targets.

Key Activities and Resources

Activities

Energy procurement & trading. Risk Management

Procurement of heating / cooling assets, insulation etc..

Condition monitoring & temperature control

Billing & customer service

Asset monetisation

Resources

Controls & home energy systems design & ongoing assessment expertise.

Finance to fund upfront costs of interventions such as insulation.

Marketing / Show home

Consumer Value Proposition

Single fixed monthly bill for target temperature / comfort profile, which has price banding flexibility to fit with lifestyle patterns and changing circumstances.

Monthly fee a function of level of comfort & flexibility demanded. Customer chooses from options price matrix.

Provider responsible for putting in necessary measures to delivery comfort & meet licence obligations for CO2.

Fabric Insulation minimums will be a core element

Relationship and Channels

Relationship

10 year + (with flexibility) supplier contract that allows covering of capex cost. HCC provider compelled by licence to reduce CO_2. Consumer protected for minimum service levels during long term contract. Cash-back / buy-out / novation options for moving home etc...

Channels

Direct to homeowner or possibly via Energy Butlers who identify it as the best overall deal for homeowner's needs

Customers and Market Share

Customers

House-holds looking for peace of mind & to avoid hassle and upfront cost.

Potentially all sectors.

LA/Social Care players could be very interested.

Requires a mind-set change away from kWh.

Market Share

Potentially very high as could have wide appeal (if trust factors dealt with & consumer protection in place)

Costs

CAPEX: New appliances controls & insulation (where required) – assets normally owned by supplier. **OPEX:** Energy to home, maintenance, billing admin, marketing. Option for high refurbishment costs to be added to mortgage.

Revenues

Monthly payment from customers:

Varies according to level of comfort, agreed adjustments, additional services.

Revenues from monetising tradable assets & FIT/ Carbon

Home Comfort Contract–Participant Roles

Party	Core Model Role	Options / future role
Accredited Provider	• Procures at best cost, gas & power for heating • Manages all billing and customer service • Monitors and manages home via HEMS to meet agreed comfort level • Identifies and effects changes to meet its CO2 reduction targets • Procures, finances & manages installation of insulation and new home heating systems • Monetises demand shift, forecasting, data in the market	• Provision of ventilation offer • Heat storage capability • Bundling of other services
Installation & Service Contractors	• Install and manage any relevant energy appliances in home (paid for by Provider)	
Wholesale Providers	• Provide utilities to Homeowner via contract with Provider	
Hardware Providers	• Manufacture heating hardware & insulation against standards set by UK agency • Deliver direct to installers but paid by Provider	
Regulator / UK Agency / Skills bodies / Catapult	• Provides licence to Provider to operate outcomes model and audits compliance with CO2 reduction targets • Providers accreditation for installer companies • Provides low lifetime cost appliance standards to Hardware OEMs	

Potential roles for the Local Authority in new business models

Delivery

- Planning

- Installation Resource

- Billing

- ESCO

- Customer Contact Centres

Funding / Finance

- Guarantor
  - Finance
  - Equipment call-offs

- Funding

- Special Purpose Vehicle

Engagement

- Community

- Customers

- Branding

- Provider Register & Selection Support

- Show Home

Ownership

- Heat Network Assets

- Homes

Qualitative Analysis

"a clean, intelligent, energy system that works for people, communities and businesses"

Consumer Insights on Top Tier Business Models

CATAPULT Energy Systems

"a clean, intelligent, energy system that works for people, communities and businesses"

Contents

In Summary

- Participants in this research responded positively to the high level ideas behind all four of the models tested: Home Comfort Contract, Home Modernizer, Home Service Contract and Neighbourhood Heat and Energy.
- The concepts of buying energy in experience packs, fixed bills and one aggregated household bill were particularly well received because they are perceived to be easier and to reduce hassle for the household.
- Neighbourhood heat is perceived to be more efficient, cheaper and safer than individual home boilers by the participants in this research.
- However, participants struggle to understand how each model will be implemented in practice and so the benefits they identify in each model are perceived to be of low value.
- Participants also lack trust in energy providers and other big companies, and so seek reassurances about any new provider or service in the energy sector. They favour familiar brands that are proven in the energy sector and supported by word of mouth.

Further development is now needed to **detail out the practicalities** of how each model would be implemented.

An **increased focus on the consumers' needs** and priorities is required within each model canvass to ensure that these are clearly met within the refined models.

Different consumers have very different needs and priorities and it is important that the refined models address these differing needs.

Methodology

"a clean, intelligent, energy system that works for people, communities and businesses"

Methodology

- **3 focus groups** with consumers
  - Each group 120 minutes long
  - Conducted in Birmingham
  - On April 14th 2016

- Research objectives:
  - **Explore consumer reactions** to 4 business models
  - Understand the **benefits and concerns** identified by consumers
  - Uncover **refinements** needed to optimize the models

Focus group icon created by Anatoli Babli from Noun Project

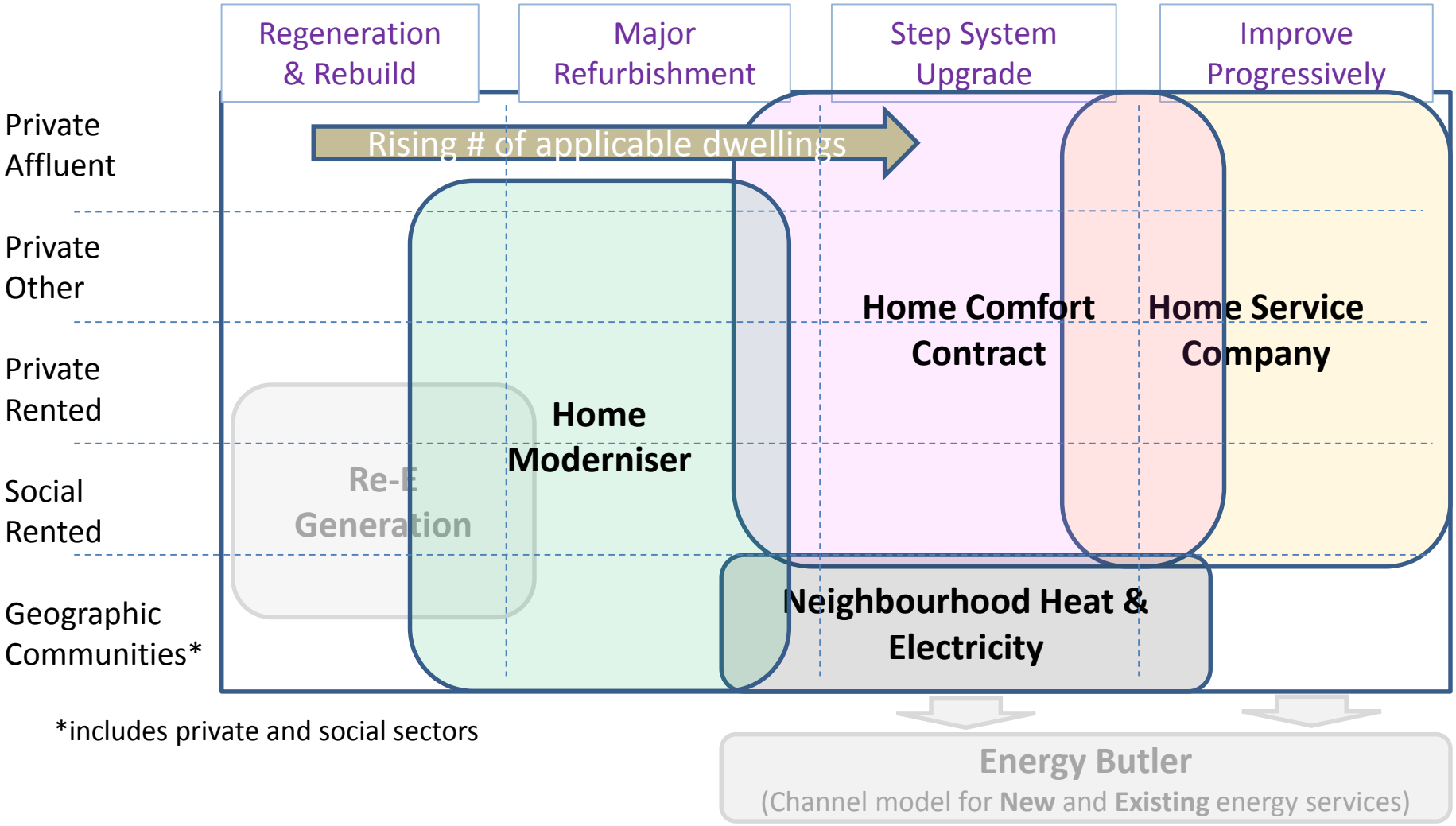
Sample

- Respondent profiles:
  - All home owners
  - All influence decisions about energy suppliers and/or home improvements
  - All have gas central heating
  - A mix of genders, incomes, household types
  - A range of levels of interest in installing energy saving / environmentally friendly technologies in their home

	Number of consumers	Age	Home ownership profile
Group 1	n=9	25 – 34 yrs.	Own their home and have a mortgage
Group 2	n=3	35 – 49 yrs.	Own their home and have a mortgage
Group 3	n=6	50 – 65 yrs.	Own their home outright

* Icon created by Anatoli Babli from Noun Project

Top tier models evaluated



*includes private and social sectors

NB. Re-E Generation and Energy Butler not tested in this research

Context

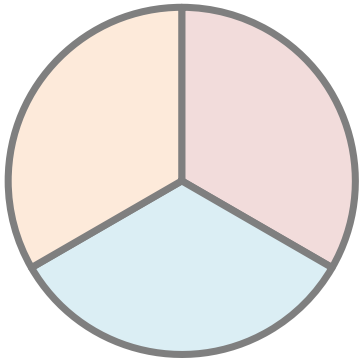
"a clean, intelligent, energy system that works for people, communities and businesses"

When buying and using energy, consumers can be separated in to 3 broad groups

- Previous work has shown that consumers can be broadly divided in to 3 categories based on the factors they prioritise when making decisions about buying and using heat:

Prioritising comfort

Prioritise their own, or others, comfort above everything else.



Disinterested

Not interested in their heating, this group gravitate to the easiest options.

Balancing comfort and resource

Balance their need for comfort against their concern to save energy or money.

Participants express challenges with thermal comfort, damp and making changes to their heating system or energy supplier

- Consumers in this research identified several challenges with heating their homes:
  - Getting the home to the desired temperature at the desired time
    - Some cannot get warm enough
    - Others struggle to reach a constant comfortable temperature and sometimes overheat
  - Condensation / damp in the home, and its adverse effect on occupants' health
    - A few participants link damp in their home to sinus problems amongst the inhabitants
  - Confidently selecting the right boiler when a replacement is needed
    - Many different options are available
    - Participants struggled to understand what is right for their socio-technical environment
  - Switching energy suppliers is time consuming and a hassle
    - Several participants have not switched their energy supplier

Trust is a significant consideration

Heating systems are complicated

Can cause confusion and problems for consumers, leading to dissatisfaction:

- Perception that quotes received for a new boiler are excessively high
- Bills rising after a new boiler is installed
- Problems experienced with new systems being installed incorrectly

Heating costs are not transparent and are difficult to control for consumers

Again leading to dissatisfaction:

- Switching energy suppliers does not always make a noticeable difference to the cost of energy bills
- Incorrect meter readings can lead to overcharging

- Consequently, participants in this research showed a lack of trust in big companies, and energy providers in particular
- There was also mistrust of the workmen who install heating systems, and offer other home renovations, amongst participants
- Throughout the discussion consumers highlight that they need to see or hear about successful examples to give them confidence in new business models

Icon created by Robert Bjurshagen from Noun Project

Participants seek out familiar brands that are supported by word of mouth recommendations

To give confidence in an energy supplier or provider of the business models tested, participants in this research highlighted a desire for:

- A familiar name in the energy sector
  - A company that is already proven to deliver a reliable service
  - Brands that are trusted in other sectors might not be trusted in energy

"I'd trust them with my groceries, not my energy!" [36-49]

- Supported by recommendations from friends and/or family
  - A minority of participants also identified online forums and people they perceive to be unbiased experts (e.g. Martin Lewis) as sources of recommendation that they trust

- A company that is perceived to behave credibly
  - Does not cold call or sell door-to-door
  - Staff are felt to be professional and expert rather than salesmen
  - Delivers work in the timeframe agreed

- A small number of participants suggest that small companies are more trustworthy than large companies
  - These participants feel that large companies don't always value their customers

Reactions to Business Models

"a clean, intelligent, energy system that works for people, communities and businesses"

Home Comfort Contract

Respondents were shown the following description of Home Comfort Contract:

- A choice of different levels of heat experience, paid for in a fixed monthly bill
- A new heating system is installed and maintained as part of the monthly fee
- The cost of the heating system can be paid back over a 10 year contract, the balance settled, or the contract transferred to a new owner

COMFORT LEVEL	TEMP	MINS	HEAT SYSTEMS & MAINTENANCE	FIXED COST
GOLD	°C		✓	£ XXX
SILVER	°C		✓	£ XX
BRONZE	°C		✓	£ X

Participants find experience packs and fixed bills to be easy and reassuring

- ☑ Describing, and buying, energy in experience levels is received positively by participants
  - Felt to be easier to understand
  - Also easier to assess the suitability of an offer against the consumers' needs and priorities
    - For some, this gives reassurance that their heat needs will be met by the comfort level selected
- ☑ Fixed bills are also received positively by those taking part
  - Receiving regular bills of a consistent cost reassures participants that they will be able to afford each bill

"You know you're never going to get a nightmare bill!" [under 35]

- ☑ A small number identify a benefit from this model encouraging more efficient, and therefore lower, energy use by the supplier
- ☑ Many of the consumers who took part in this research feel this model would be an effective way to deliver heat to those in fuel poverty

- ☑ A minority of participants also identified further benefits:
  - Monitoring the heating system and home temperature could allow the service provider to identify when a fault occurs so that it can be fixed quickly
  - Suggestion that this model enables different zones to be kept at different comfort levels for different occupants
  - Households on low incomes can replace their heating system without taking out a loan

Some query how Home Comfort contracts can give consumers the flexibility they need and want

- Many participants raise questions and concerns about how this model could be implemented
  - Unclear how the model will offer flexibility within each experience level to enable consumers to react to short term changes in need e.g. colder weather or visitors to the home result in more hours of heat used
  - Some participants fear that they will loose control of the temperature of their home
  - Some participants are reluctant to pay the same amount in summer when heat use is lower
- Participants appeared to lack confidence that they would select the right package, leading to concerns about bills being unnecessarily high
- There were some concerns that a 10 year contract is too long, particularly because of consumers lack of trust in energy suppliers
  - A small number suggested this could make it difficult to sell the home during the contract

- A minority of participants also raised other concerns:
  - Fear that companies could refuse to supply a home if it was believed to be too energy inefficient
  - Suggestion that some people might actually increase their heating use to get the most value out of the comfort level they purchase

"I have unlimited downloads on my broadband and I use it to the max!" [under 35]

Participants request support in choosing the right comfort level and increased flexibility through shorter contracts and top-up options

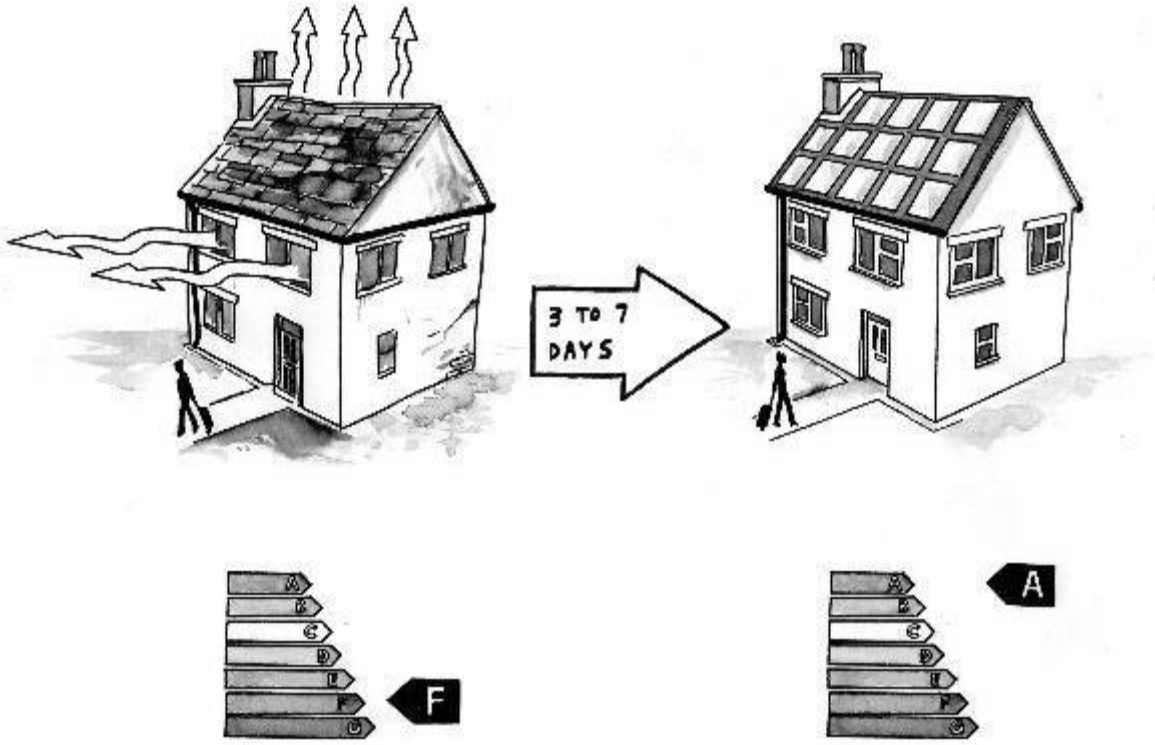
Participants suggested a range of refinements to the Home Comfort model:

- Several participants would prefer a shorter contract length
  - A few participants suggest that 12 months is an appropriate contract length
  - A minority suggest that a shorter trial period is needed, e.g. offering a 6 month break clause
- A small number request a profiling tool to help them identify which service level would be right for their comfort requirements
- A small number suggest offering top-up options to allow consumers to use more heat when needed
- Some participants suggest including an incentive for households to reduce their heat use:
  - Bonuses for those using less heat than their plan
  - An option to reduce the service level within the 10 year contract

Home Modernizer

Respondents were shown the following description of Home Modernizer:

- Major home improvements made to increase energy efficiency and comfort
- New insulation, heating system, windows and solar panels are installed in under 1 week
- The cost can be added to your mortgage



Improvements to home security, efficiency and value appeal to consumers but are not clearly expressed in Home Modernizer

- The benefits of Home Modernizer are less obvious to the participants in this research

- Improvements in home security, damp conditions, home value and energy bills are equally important to the participants

☑ These benefits are all recognised when prompted
  - ☑ Several participants agree that increased home value is a benefit of this model
  - ☑ Some agree that energy bills could be reduced
  - ☑ Some agree that Home Modernizer could improve home security and damp conditions

☑ But, only an increase in home value is spontaneously identified by participants, and then only by a minority

Reactions to the idea of funding the Modernizer through a mortgage appeared to vary according to the respondent's age, attitude to debt, and intentions to sell their home

- The younger group, with longer left on their mortgage, were generally more open to this idea
- The older focus group, who have paid off their mortgage, typically appeared less keen to take out another large loan

- A small number also suggest that this is a useful approach for consumer who might not be able to take out other loans

Participants raise concerns that the cost of Home Modernizing would be too great and not recovered by the increase in value of their home

- Some participants raise concerns about the cost of 'Modernizing'
  - Worry that costs would not be recouped if selling their home
  - Perception that adding the cost to the mortgage would lead to higher interest payments and a greater total cost than consumers would be willing to pay

- A minority of participants also raised other concerns:
  - Needing to move out of the home during renovations could be inconvenient and add costs
  - A small number of participants expect that the companies offering Home Modernizer would use unfavourable sales techniques such as cold calling
  - A minority worry that Home Modernizer would be offered at a heavy discount for those on a low income whilst others paid significantly more, leading to unfairness in the market

- For the majority of participants, the length of time taken to conduct the home improvements is not a significant barrier to uptake
  - A timeframe of greater than 1 week is expected, and is acceptable IF the work is completed in the timeframe promised when commissioned
  - A minority of participants are suspicious that the standard of work would be very poor if a home was fully renovated within 1 week

Participants prefer to stay in their home during any renovations and seek a guarantee of quality for the work

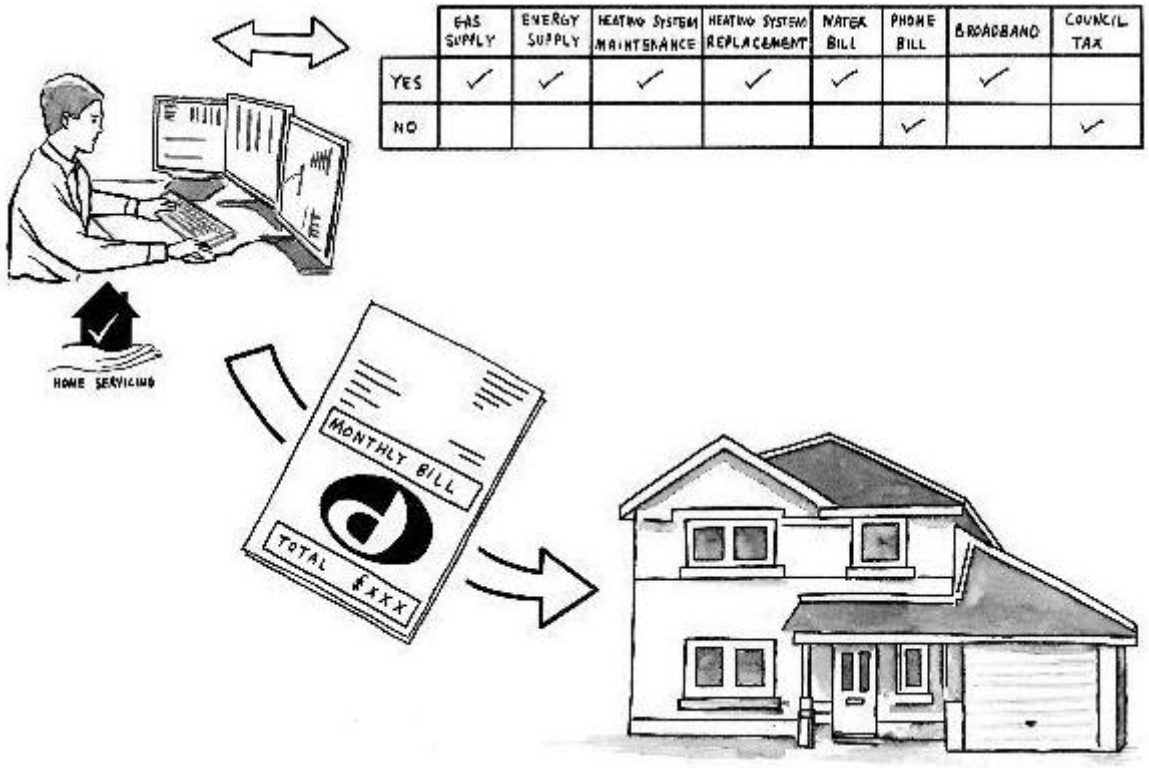
Participants suggested only a small number of refinements to the Home Modernizer model:

- Many of the participants indicate that they would prefer to stay in their home during the refurbishment work
  - Due to a desire to supervise the work and the people in their home
  - Some suggest that work should be carried out in stages to allow this
- Several participants suggest they would need some reassurance of the quality of the work that would be carried out:
  - Approved / licensed companies
  - A guarantee of the parts used and work conducted
- Some also suggest that tailored packages of Modernization should be offered
  - Reflecting that some homes are more efficient, so require less work, than others
  - Accounting for differences in the types of retrofit than can be performed on different types of building

Home Service Company

Respondents were shown the following description of Home Service Company

- Manages the supply and payment of all of your utilities and local taxes and sends you a single fixed monthly bill
- A new heating system is installed and maintained as part of the fee
- Option to include other services e.g. lights, phone
- Able to switch suppliers after 12 months



	GAS SUPPLY	ENERGY SUPPLY	HEATING SYSTEM MAINTENANCE	HEATING SYSTEM REPLACEMENT	WATER BILL	PHONE BILL	BROADBAND	COUNCIL TAX
YES	✓	✓	✓	✓	✓		✓	
NO						✓		✓

One aggregated bill appeals to participants because of the reduced hassle and time needed to manage household bills

- ☑ Receiving one aggregated bill is very appealing to some participants in this research
  - Perceived to be easier and less hassle for the household
  - Offers a time saving for busy people
  - A small number of participants state that 1 bill would make budgeting easier
- ☑ Having the flexibility to tailor the services included in the package for each household is considered important

- ☑ A minority of participants also identified further benefits:
  - The Home Service company will ensure the consumer always receives the best deals
  - Some participants assume that they will save money compared to their current bills

Some participants do not trust that a Home Service contract will offer them the best prices or the flexibility they need and desire

- Some participants question how a Home Service contract could be implemented to deliver the flexibility needed to best meet their requirements
  - Some doubt that they will be able to tailor every service sufficiently to meet their precise needs
  - Concerns that they may not be able to adjust services or add new ones mid-contract e.g. if the birth of a child increases heat needs, a new gadget becomes available
- Many of the participants also distrust the motivations behind a Home Service contract and fear that this model will reduce consumer choice by limiting the number of suppliers
- Consequently, there are concerns about the suitability of the service and price offered
  - Some doubt that one company can provide a good experience across so many services
  - Fear that the company might not pass on an adequate proportion of any savings made
  - Feeling that one aggregated bill could be open to abuse if a clear breakdown of service costs is not provided

- A minority of participants also raised other concerns:
  - A small number feel that the service is not needed because they find it easy to manage their bills
  - Some participants fear that there would be continual disruptions to their services when the company is switching providers
  - A few participants believe it would be impractical to start a new contract for many services on one day because their current home service contracts expire on different dates

Participants suggest a need to allow households to add or adjust services in the Home Service Contract

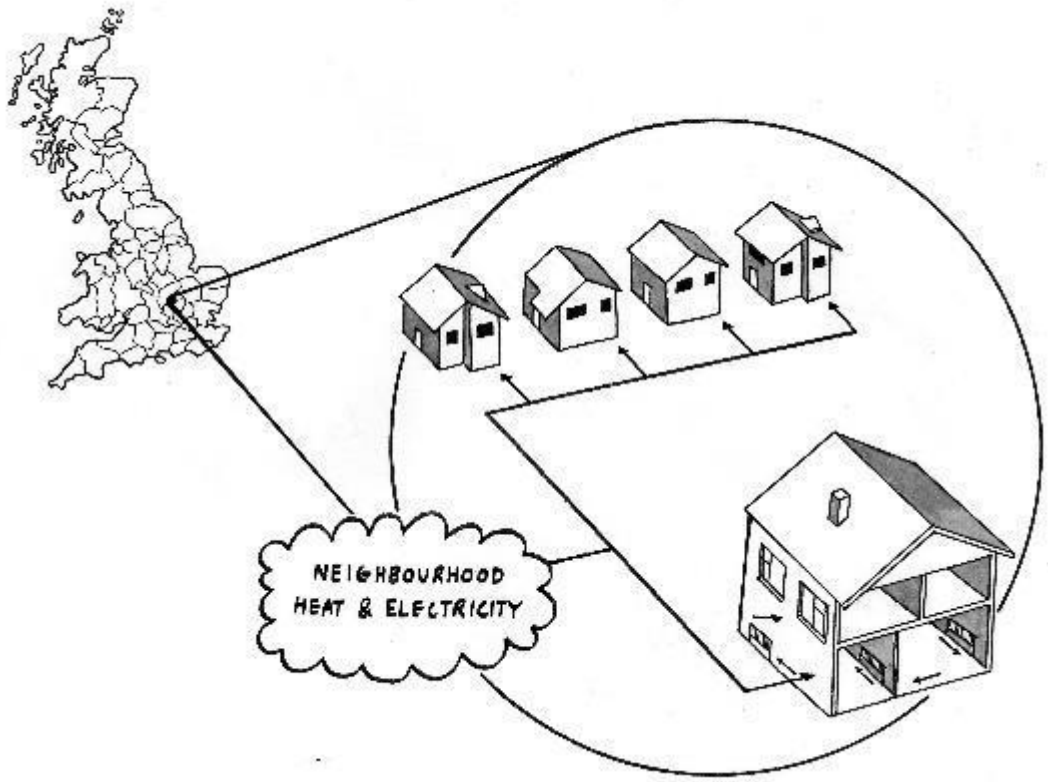
Some of the participants suggested refinements to the Home Service Contract model which may address their concerns:

- Several participants request proof to reassure them that prices are fair
  - Transparent bills with a clear breakdown of the price per service
  - An indication of the service cost associated with Home Service company's activities
- Some would like a mechanism to help them begin a Home Service contract without having to wait for all their current contracts to expire
  - Perhaps gradually adding services during the first year of the contract
- Some participants ask for flexibility to be built in to the contract so that they can add or amend products and services as their needs change

Neighbourhood Heat & Energy

Respondents were shown the following description of Neighbourhood Heat and Energy

- A community operator generates and distributes heat to the community, electricity is also supplied
- Homes no longer need their own gas boiler
- People can get involved in their local service



Neighbourhood Heat and Energy is perceived to be more efficient, cheaper and safer by some

- ☑ Several participants felt that community generated heat could be more efficient and cheaper than individual home boilers
- ☑ Some feel that removing the boiler from the home is safer for the household
  - No risk of carbon monoxide escape form the heating system
  - No risk of a boiler exploding
- ☑ Some participants also liked the idea of no longer being responsible for maintaining a boiler, and freeing up the space that a boiler currently takes in their home

- ☑ A perception amongst some participants that this model could bring communities together and forge a community spirit that is currently lacking

- ☑ A minority of participants highlighted further benefits of the Neighbourhood Heat and Energy model:
  - A small number believe that community generated heat could be a more environmentally friendly approach than having a boiler in each home because
    - A new, therefore more efficient, heat system would be installed
    - Further efficiencies would be gained by producing heat at larger scale
  - A minority suggest that connecting a home to a heat network could be faster than replacing a boiler in the home, assuming the network is already in place

Participants raise some implementation concerns for Neighbourhood Heat and Energy

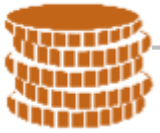
- Many participants raise questions and concerns about how this model could be implemented
  - Query whether this model can be implemented if some homes opt in and others opt out
  - Concerns that any problem with the heating system will affect many homes
- Many participants lack trust that their local authority or a new 'player' in the energy sector could deliver neighbourhood heat reliably
- The majority of participants in this research would not want to be personally involved in establishing or running a Neighbourhood Heat service

- A minority of participants also raised other concerns about Neighbourhood Heat and Energy:
  - A small number suggest that building the infrastructure for a neighbourhood heat network could be very disruptive, for example with roads being dug up to install pipes
  - A minority feel that the provision of heat at a neighbourhood level could limit the opportunity for other low carbon energy solutions to develop
  - A few participants indicate a general mistrust of this model because they are familiar, and comfortable, with having a boiler in their home and they see neighbourhood heat as unproven

Several participants suggest that they might be willing to pay more for Neighbourhood Heat if profits fund community developments

Participants suggest very few changes to the neighbourhood heat model

- A few participants suggest including water and electricity in the neighbourhood package
- A minority suggest that this model could be best implemented by building it in to new housing estates/streets whilst they are being constructed
  - Avoids the disruption of having to dig up roads etc.. to lay the infrastructure for neighbourhood heating
  - Communities begin to develop as people move in to a new housing estate, providing an opportunity to establish Neighbourhood Heat as part of the community



- Several participants suggested that they might be willing to pay slightly more for Neighbourhood Heat than they do for their current energy bills
- IF they can see a direct improvement in their community

Conclusions and Next Steps

"a clean, intelligent, energy system that works for people, communities and businesses"

More work is needed to describe the models and their benefits effectively to consumers

- Participants' questions and concerns about all of the models tested focus on:
  - Practical implementation of the idea
  - Cost

- This suggests that high level ideas, e.g. fixed and aggregated bills, may be appealing
- But, that participants struggle to understand how each model will really impact them
- Consequently, the benefits they identify are perceived to be of low value
  - This is well illustrated by the Home Comfort Contract and Home Service Company models. Several participants find fixed bills and 1 aggregated bill appealing but are not willing to pay more for these services
  - Participants also raised concerns that the Home Modernizer would not pay for itself through the increased value of the home, indicating a low willingness to pay for its benefits.

- Only the Neighbourhood Heat and Energy model has a benefit that consumers might be willing to pay slightly more for

Next steps

- Further development is now needed to detail out the practicalities of how each model would be implemented
  - Addressing the concerns that consumers raise
  - Ensuring flexibility within the consumer offer
  - Providing reassurance of service delivery
- An increased focus on the consumers' needs and priorities is required within each model canvass to ensure that these are clearly met within the refined models
- Different consumers have very different needs and priorities which must be addressed
  - For example, feedback from this research suggests that the Home Comfort model meets the different consumer types needs when buying & using energy in the following ways

Prioritising comfort	Comfort/ resource balancers	Disinterested
Reduces the hassle needed to achieve comfort	Increases control over what is spent to get comfortable	n/a

- An understanding of how different consumers' priorities vary when upgrading their home and interacting with their community would support the alignment of the models with consumer needs.
- Involving consumers in the design process is important to ensure that the business propositions deliver real value.

Application of Business Model Evaluation Tool (BMET)

"a clean, intelligent, energy system that works for people, communities and businesses"

A perspective of the Business Model Evaluation Tool (BMET) & its applicability to evaluating the business models ideas

An initial perspective of BMET

*BMET is a **detailed and comprehensive tool** for evaluating the benefits, applicability & potential economic value arising from a model with the capability to map against time & a large number (12) of market segments.*

*The **level of sophistication** enables a detailed level of theoretical numerical scrutiny for a chosen and well defined business model but in itself **cannot be a sole source of validation**. The deployment **practicalities of a business model cannot be reviewed by BMET**; and the practicalities and consumer appeal are perhaps the main drivers of a model's chance of success.*

*Given that this business model project aimed to **create new concepts** to **stimulate thinking** and act as a platform for more defined models in the future, **BMET** as a means of assessment is **probably inappropriate**. At this stage in thinking, a much **simpler quantitative tool** with 1-2 significant figure resolution is required **to understand directionally** the likely range of outcomes. From a simple assessment the most promising models can be short listed and developed.- when BMET may then apply.*

Initial Observations Following Using BMET

*As is often the case with highly sophisticated models, for an occasional user, BMET can be **difficult to get to grips wit**h. It takes time to get acquainted with the inputs, outputs and how data is displayed and represented and getting under the skin of how the model calculates the outputs can take some time. These aspects present a **barrier to use** by people other than analysts who have the time and mindset.*

Whilst BMET is a tool for determining key value drivers, it is in its current form a academically-biased model. It does, however have the capability to add in the soft benefits (willingness-to-pay), which in the author's (J Watkins) view is the main driver of business model viability. The willingness-to-pay categories will need to be updated.

***BMET's power will be appreciated as the business model concepts are refined with a view to taking to market** when one or two models have had practicalities validated and it is question of doing commercial **sensitivity analysis** against a tightly defined proposition.*

How BMET was used in the Project

*The project benefited from the fact that the **key input parameters** necessary for the **quantitative analysis** had already been determined by Frontier.. These parameters provided **a short cut to the analysis** reducing both the time and cost of the analytical stage with Frontier & ESC. Delta EE did not use the BMET parameters.*

*The **methodology of calculation** and the **comparative approach** drew on some of the BMET principles, although the major difference was that for this business model project, a fully annualised approach was applied, incorporating a wider spectrum of utilities and benefits than BMET.*

*The assessment of **willingness to pay** as a major element of the customer proposition also incorporated some of the thinking from the BMET approach.*

Potential future modifications & applicability

*BMET either as a whole or via is sub-modules may become **applicable** as **one of the several ways** of validating the macro and consumer economic cases.*

This may be best done following a revision of BMET which draws upon the new ways of assessing and categorising the outputs of business models, and simplifies the user interface so that it could be used by more people.

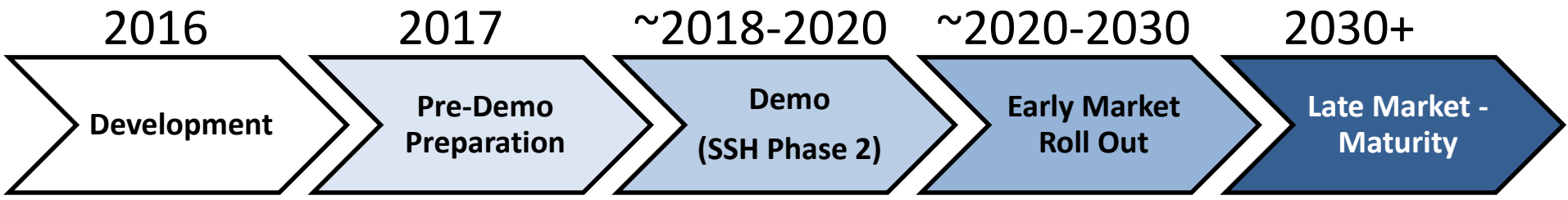
Moreover, the level of detail could be reduced (2 significant figures is sufficient) and the sensitivities more clearly demonstrated.

*Rather than consumer segments, the **housing types** need to be able to be overlaid easily – as these will drive the applicable interventions.*

Evolution of Business Models

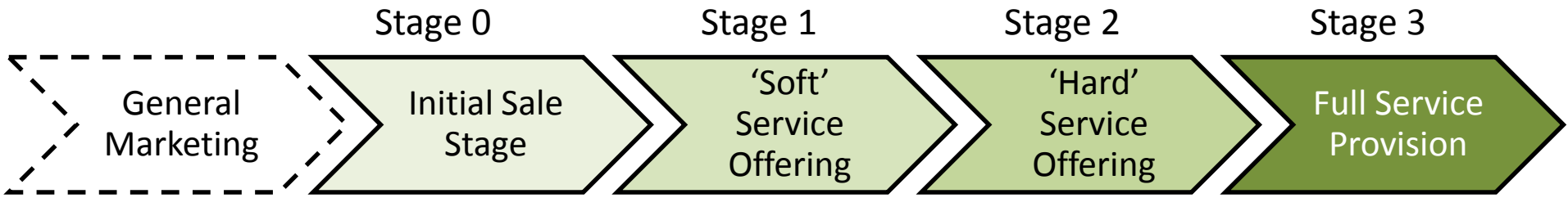
"a clean, intelligent, energy system that works for people, communities and businesses"

Evolution of Business Models



# Homes per Model	200+ (survey stage) Start demo sites identif'n	500 - 2000	50k to 0.5M per annum (to 20k / wk all models)	100k to 2M per annum
Number of Providers	Securing delivery partners	3-5 (some under LA)	3+ per model	7+ per model
Enablers Needed / Pref'd				
ICT Platforms including HEMS / HESG	Lab Testing & Early Trials in Homes	Deployment of upgraded version	Further deployment & upgrades	Further deployment & upgrades
Policy & Regulation	Detailing	Virtualised	Commence National Roll-out	Roll-Out Complete
Novel Financing	Validation	Pilot Schemes	Early market providers	Mature market providers
Trading Markets	New Concept Development	Design of future state & Initial Trials	Launch into market	Fully deployed
	Identifying existing potential providers	Testing of B2B models	Shake out of best schemes	Continued evolution
Technical Standards	Scope Development	Design & validate	Easy options deployment	Full range deployed
New Technology	Not required (but may enhance) (exception HEMS / HESG & integration)	Feasibility assessment	Piloting & early sales	Mass market penetration

Commercial offering transition (to test in demonstrator / trials)



Duration	1-3 months	After 1-6m	After 1-12m	After 1-24 m
Purpose	• Introduce suitable BM concept & benefits • Gain customer confidence • De-risk outcomes	• Get customer used to remote control of heating • Build trust with provider • Show initial benefits	• Introduce improved appliances where appropriate • Take over appliance ownership & service	• Start extracting value from data, energy trading • Upsell other services / offerings
Changes Applied				
HEMS	○	●	●	●
Remote Control		○	○	○
Energy / Utility Sourcing		●	●	●
Appliance Service		○	●	●
Hardware Ownership Transfer		○	●	●
New Hardware in Home or DH connection		○	●	●
Energy Trading & Monetisation				●

Long List Ideas from the Initial Brainstorming Phase

"a clean, intelligent, energy system that works for people, communities and businesses"

Energy Outcomes

Energy Outcomes - Provision of Comfort for a predictable monthly fee. Not per kWh. Electricity retail offer combined.
Removes the consumers' burden of asset ownership, repair and maintenance and transfers the risk of fluctuating energy costs.
A technology led Energy System Integrator who sees the opportunity for a profitable business based on reducing energy supplied to homes.

Partners

Smart Data IT Ltd. Home data links

Home Transformation Ltd: Installer of retrofit, heat-pumps, storage, controls HEMS, smart data & home improvements.

Energy Saving Component Manufacturers: Tier 1 product / material suppliers.

Electricity Wholesale / Retail Partners Ltd. A Generator or wholesale electricity provider.

Residential Maintenance Management Ltd: Home asset care and consumer support.

(Storage System Providers ltd. Option to provide domestic heat and electricity storage)

Key Activities and Resources

Activities

Assess current energy use and enable reduced future needs for each household.

Develop compelling consumer offerings and secure multi-year contract.

Drive supply chain product and process improvement as Systems Integrator.

Co-ordinate installation.

Resources

Assessment and design methodology to manage risks of variable future household consumption.

Retail billing organisation approved by regulator.

Consumer Value Proposition

A trusted and relevant brand removing the anxieties and hassle of current energy systems in return for a predictable monthly cost, spread over a suitable contract period.

Choose your comfort level and the amount of change to your home;

Energy Outcomes offers options for:

- Fixed and variable charging.
- Different levels of retrofit.
- Other home improvement
- Investment or zero upfront cost.
- Storage options for better response or lower cost.

A leading edge technology brand to improve your home.

Relationship and Channels

Relationship

5yr+ contract with house-hold for delivery of a fixed level of comfort. Outcomes provider upgrades and manages household energy assets, and supplies energy needed to maintain comfort.

A 2 way relationship where the provider supports users to achieve their changing needs cost effectively.

Channels

Branded alternative option offered through U-Switch.

Local Authority community groups.

Home improvement firms adding additional value.

Customers and Market Share

Customers

Risk-averse households wishing to avoid hassle and happy to let others manage the energy system for them

Energy users with a large energy savings potential to offset system investment.

Those with gas / oil heating systems at or near the end of their useful life.

Market Share

Likely to be a slow take up with a very different value proposition for consumers.

May require 'loss leader' contracts to prime the market.

Costs

Start-up : Expert design system development and brand creation.

CAPEX: Capital for up-front investment in customer properties

OPEX: Wholesale energy, marketing, maintenance and customer care costs.

Revenues

Monthly payment from customers.

- Up to 3 Levels of Comfort tariff: Simple to understand.
- Energy cost element can be fixed or floating.

Energy Mutual

Energy Mutual- A brokerage enabling households unable or unwilling to invest, to access finance for energy saving improvement.
A mechanism for overcoming householders' inertia to take energy saving action; by developing a compelling business case they or others can invest in.
A web-based trading platform which enables the matching of borrowers with lenders and investors with investment opportunities.

Partners

Retrofit & Smart Data Installation Partners Ltd. Trusted property assessment and delivery partner.

Safe and Secure Online Payment Partners Limited. The mechanism for parties to transact.

Web based Trading Partners Limited. The brokering tool provider.

Community Mutual Matching Association A special interest group to match the Energy Mutual brand and offers with a target market.

Energy Retailer Ltd. (Bulk purchase of energy).

Key Activities and Resources

Activities

Brokering deals between investors, borrowers and households for energy system improvement.

Inspiring those with potential to improve their energy costs.

Attracting quality investors & high saving retrofit projects.

Unbeatable transaction speed, cost & transparency

Resources

Strong first to market brand advantage (Ebay / Paypal).

Trading platform and transactional security

High calibre customer service team to explain technical solutions and financial offers.

Consumer Value Proposition

A branded web-led proposition, engaging households, investors and installers on an energy saving journey;

Offers households a clear path to both finance and technical `.

Offers households unwilling or unable to invest to trade their business case to other investors.

A unique web based portal to match energy investors and energy borrowers cheaply, quickly and transparently.

Corporate borrowers may use loans to invest in 3rd party projects. (rent-a-roof)

"Enabling Investment in all our tomorrows".

Relationship and Channels

Relationship

Respected and valued by borrowers and investors for its clear social purpose.

Acclaimed by consumer champions & money-saving gurus.

Portal for locating approved and reputable vendors.

Great source of advice even without the funding.

Channels

Web based portal.

Linked to and embedded in provider, government and social enterprise web sites.

Community Group 'Shops'.

Regular media exposure.

Customers and Market Share

Customers

Investors:

Individuals / Communities.

Charities, Local or National Government, Pensions.

Installers / manufacturers.

Borrowers:

Householders, Landlords. Housing / School Trustees, Retrofit businesses.

Market Share

Removes the financial barrier to householders taking up retrofit, but, requires delivery excellence to grow successfully.

Costs

Start-up : Gaining licence to trade. Brand building.

CAPEX: Integration of off the shelf trading and online transaction vehicles.

OPEX: On-going marketing to consumers, partners and institutional investors

Revenues

Fixed or % price per trade for borrowers and investors.

Commission from Retrofit Installation team for each Mutual matched contract.

Potential for web based advertising.

Community Energy & Storage

Community Energy & Storage - A community scale energy supplier with high fuel efficiency and a strong local brand.
Generating locally required heat & electricity with CHP/Heat Pumps , distributing heat, selling power at scale to the grid and customers.
A locally driven Special Purpose Vehicle created between a broad range of partners. Distribution level electrical and heat storage.

Partners

Community Base-load
The key customer RSL/LA

System Partners Ltd
CHP / electrical storage manufacturer / installer.

Network Capital Delivery Partners Ltd.
Heat network installers.

Electricity Retail Partners Ltd. Customer for exported power.

Community Retrofit Ltd Home system installer.

Fuel Partners Ltd.
Gas or other fuel supply.

Residential Maintenance Management Ltd:
Home asset care and consumer support.

Key Activities and Resources

Activities

Specify, commission and operate a community scale heat, power & electrical plant. Manage a heat network and storage, with plans to grow the system & capacity.

Trade with energy retailers for the import/export of lower carbon power.

Deliver home retrofit at scale and / or HEMS.

Resources

Local (multiple) CHP plants operating 24/7 in winter, scaled back for summer.

Community retail team for direct engagement with owner occupiers for network expansion.

Consumer Value Proposition

A competitively priced heat and electricity solution; with a compelling community brand appeal.

Provision of responsive heat and hot water to all consumer groups.

Managed and maintained by others, to minimise cost and householder hassle.

A step change in fuel efficiency, designed to scale as demand grows.

Options to increase scale:
- Key offer retrofit and heat
- Energy outcomes plans
- Just energy outcome and retrofit for households too isolated to join heat grid.

Relationship and Channels

Relationship

1:1 relationship with a key customer (Local Authority).

Close personal links with the community served: A living community partnership.

Must gain, maintain and protect consumer trust at all costs

Stimulate local interest.

Channels

Show property presenting the solutions and benefits.

Directly at the "come and see our site" outlet.

Partner locations: Local Authority or Landlord sites.

Customers and Market Share

Customers

All Consumer Group types

Technically possible for up up-to 7.5m households in urban centres above 50k.

Of which high potential:
- 2m off gas urban.
- 2.3m Urban Social Housing
- 1m in other target flats.(some overlap)

Market Share

An excellent base load development can generate demand from private house-holds to accelerate expansion of the network.

Costs

CAPEX: Capital delivery of community heat network (£6k-£10k per home), Connection to the electricity grid (and possible local grid). Future expansion.

OPEX: Power by the hour, billing, customer acquisition, system maintenance.

Revenues

Monthly bill based on per kWh tariff, or unmetered restricted flow charge. plus metered electricity and repayment of retrofit investment cost.

Option to include Outcomes based payment for comfort.

Power Buffer

Power Buffer - Provider of electrical storage capacity to balance network load and trade power on a variable price basis.
The business designs, procures, installs and commissions storage capacity across technologies at distribution scale.
The services from this capacity are traded with the System or Network Operator or Retailer as a managed service, or pay per use facility.

Partners

Distribution Network Operator (DNO) at the point of connection

Storage Technology Partners :
Original Equipment Manufacturers (OEMs Siemens, Hitachi, GE, ABB, Isentropic)

Network Storage Installation Partners:
Capital delivery of large assets (where not plug and play)

Key Activities and Resources

Activities

Design, procure, install and commission electricity storage capacity connected at multiple points and different voltages on the distribution network.

Sell flexibility services to DNOs and System Operator

An arbitrage mechanism to buy low priced power and sell at a profit to retailers.

Resources

System design capability at distribution scale (ie City-community) across storage technologies.

Creation and successful management of JV's

System Value Proposition

An energy storage solution which provides the electricity network with a mechanism for levelling the load on the local and national grids and back-up for power outages.

This acts as extra capacity and can be traded on an annual facility, or pay per use basis.

This postpones the need for investment in increased distribution network capacity

Off-peak power bought and stored until it can be used/ sold more profitably.

Rental or temporary capacity to protect consumers from network upgrade or repair.

Relationship and Channels

Relationship

Joint Venture with DNO or TNO or large power user and a technology provider.

Multiple year contracts for (semi) permanent storage assets on the basis of:

- leased asset.
- managed service
- pay per use facility

Channels

Business to Business –

- Energy Buffer direct approach to DNOs
- Direct offer to energy retailers
- Market research for large power users

Customers and Market Share

Customers

DNOs seeking to level peak loads in near capacity network links / nodes.

Energy Retailers for peak capacity.

National Grid for balancing function.

Community Energy plants

Large energy generators / users for trading ToU.

Market Share

A new market, separated from the network operators by regulation. Or

A specialist storage provider sub-contracted to network operators.

Costs

CAPEX: Battery or other technology. Network connection cost.

OPEX: Off peak electrical power purchase price. Arbitrage trading costs.

Revenues

Arbitrage trading payments per kWh and kW.

Network balancing payments from DNO / System operator per kW reduction of peak demand.

Nando's

Nando's: A Home Management Service where customers pay a fixed cost for energy usage and maintenance to an aggregator (such as M&S or Tesco)

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Customer service aggregator • Utilities & service providers • OEM & maintenance companies • ICT providers (HEMS etc.)	• Customers would have a plan setting out a **sequence of energy efficient interventions** (e.g. HEMS, insulation, ASHPs) to be carried out on their property over the life of the contract. • Points based **rewards for lower energy use** & credit to upgraded appliances with network of hardware and service providers	Homeowners, small businesses, landlords

Costs / Risks	Revenues / Benefits
• Ensuring good deal for customers and fairness of points systems linked to technologies and benefits • Management cost could be high versus benefits – each householder different ([Hitachi] • Need to consider behavioural of consumer and real incentive to change consumption [Hitachi] • Switchability • Data protection	• Energy savings pays for credits on upgrades • **Aggregator** harvesting of customer

Adaptability		
ID No. 5 / NAN V0.2	Categories Covered: Bundling,	Similar To: HoSCO

Simcity

SimCity: A community-led business model focussed on improving the neighbourhood and increasing value of property

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Local authorities Homeowners Installers	Small groups within a local **community would band together** and agree a **set of low carbon interventions** to be carried out at their individual properties. The cost of the interventions would be **financed by the local authority** and **paid back through their Council Tax** (lower heating bills will should offset the increase). Once the works were complete, the neighbourhood would be designated as a "Green Area" and benefit from **more favourable treatment by the local authority** e.g. lower council tax bills. A **paying network of licensed, verified contractors**.	Homeowners within a community Social Housing

Costs / Risks	Revenues / Benefits
• Local authority financing (bonds?) • Collaboration required – need to homogenise community efforts – will require strong leadership [Hitachi] • Achieving specification uniformity to bring down costs	• Lower energy bills net of council tax repayments of initial capital outlay

Adaptability	

ID No. 6 / SIM V0.2	Categories Covered: Community,	Similar To: US Hero Program

Market Maker

Market Maker: Creating the right environment in which low carbon business models and value proposition can be successful

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• UK Government • IT providers • Utilities • Sensor / Hardware providers	• **New data platform** captures energy and home systems usage profiles and provides analytics to identify and support new services and propositions which benefit home occupier, utilities and service providers, leading to the **viability of low carbon solutions** for the home and additional benefit of demand management. • Could be turned into a **reverse auction** profile with controlled access that can be up for live biding from providers • Market **players pay for access to platform** in exchange for value created from **new services and business models that include low carbon technologies**	**All homes** – that have smart meters and enabled devices

Costs / Risks	Revenues / Benefits
• **High cost for platform** development at a national level • Conflict with HEMS • Data acquisition privacy [RR] • Need to make it **scalable and flexible** for the future • Is it an all or part solution? • Lock-in and **monopolistic position** of system owner • Who pays for sensors etc.? • Need to ensure data is accurate to get best deals for consumer [5/2] • Need to show value of data [5/2] • How to accredit suppliers / data sources to avoid misleading customers [5/2]	• ESCOs / HoSCOs / OEMs **pay royalty** to Market Maker • Information allows new business models and smart capabilities to be stimulated and exploited that **will eventually lead** to more attractive **propositions for low carbon technologies** • A pay to view shop window offering cost-effective and precise set of consumer profiles that enable the most profitable solution for both parties [JMW] • Could apply Big Data & Data Aggregation with intelligent learning to inform householder [RR 5/2] • Utilities: can use data to improve service and retain & offer other services[5/2]

Adaptability	
	• Could **start at a pilot level** with minimal breadth and depth • Could be linked to and **advance with HEMS system** • **Design it with near infinite scalability** to capture new products and IoT items

ID No. 7 / MMA V0.3 (22/02/16)	Categories Covered: HEMS,	Similar To: Reverse auction / LinkedIn for recruiters

‘HoSCO’ – Home Services Company

Home Services Company (HoSCO): Bundling of utilities, relevant hardware, controls, maintenance and local taxes for a fixed monthly fee linked to comfort, service level and consumer profile.

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Local service company / ‘HoSCO’ • Local Authorities • Insurance companies • Utilities • Appliance companies • Financial regulators / banks • Landlords • ICT system provider (HEMS, Trading)	• The householder pays **a single monthly bill** for **all utilities and taxes** – **energy, water, insurance, servicing** or energy-related **appliances**, local taxes, internet/phone – all linked to a tiered level of availability and comfort and weighted by level of consumption validated by smart meters, water metering and usual appraisal of risk. **Could include house rent too**. • Allows future **link of local taxation to resources use** in home • **Single point of collection & contact**. • **HoSCO profitability determined by it using best hardware & control strategies** to install in home - tradability, reliability, energy saving.	• Private and rented sector • Houses and flats • All customers with appropriate credit risk

Costs / Risks	Revenues / Benefits
• **Sophisticated IT** for aggregation of information & customer service • HoSCO skills and trading **complexity** • Current players & equipment cos suffer from **disintermediation** • Need to avoid dominance of HoSCO – **abuse of position** • **Data privacy** – HoSCO will have huge insights • **Switchability** of provider and installed assets in home	• Revenues: **Large aggregate subscription for HoSCO to harvest**. Income from **demand response** / comfort level inducements. • Significant reduction in total level of service **administration costs** • Customer has **one bill & point of contact** for all house issues • **Taxation collection** issues nearly eliminated – could **eliminate house valuation issues** and **tax as a function of resource intensity** • **Technology agnostic** • **Low carbon technologies encouraged** and demand response **reduce emissions relatively quickly and progressively**

Adaptability	
	• **Start small** with bundling of utilities first, migration to hardware choice and management later. Taxation can come at any time. • Becomes much **more viable (and lower total carbon) with HEMS and Energy Trading platforms** • Scale will require introduction of **competing HoSCOs** • Some **local authorities** many have the means to set up HoSCOs and privatise later

ID No. 8 / HOS V0.1	Categories Covered: ESCO, Bundling, Capex Elimination	Similar To:

Home Micro-Utility

Home Micro-Utility: Home owner incentivised to invest in low carbon technologies, storage and controls to act as mini generator or source of 'megawatts' for ESCO that aggregates thousands of such homes

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Utilities / ESCO • Appliance companies • ICT system provider • Financing companies	• The householder is induced to invest in technologies that create, ideally despatchable, **electricity (microgenerator) or negawatts to sell to grid** • He/she decides **technology based on merits** / income generated • Householder gains from combination of **lower energy consumption**, **trading income and better comfort / control** to offset investment in technology/ upgrades. • **Equipment financing** may be offered by utilities / finance companies linked to purchase / supply agreement with householder • **Utility / ESCO aggregates thousands / millions of homes** to create virtual power stations / storage facilities	• Private sector – **larger homes & small businesses** • Best suited to those that can **shift demand**, have **high heat demand** (for CHP) and have **higher overall energy demand** • **Off gas / on gas grid homes**

Costs / Risks	Revenues / Benefits
• Dependent upon **smart metering / trading capability** • Capital **costs of technologies** and servicing – payback may be marginal • Need **energy trading system** that values demand response at resident level • **Financing** of technology investment • **Grid connection** standards / changes? • **Switchability** of utility and installed asset financing • Need for scale to make business viable for provider company{Hitachi]	• Revenues: At aggregate level – demand response and generating asset with **progressive low capital investment and little disruption** (no planning permission / ugly new power stations). Client get generation / negawatt **income of energy bill credits** • Cost Reduction: Potentially **low effective cost per MW** • **Potential for power back-up and heat guarantee** • **Technology agnostic –** favours high level of flexibility and supply flexibility. **Reduces emissions** & gives **valuable low carbon flex power**

Adaptability	
	• Initial offering using **proven technologies** produced in volume – **migrating to newer technologies** such as micro CHP / fuel cells / heat batteries etc.. • **Energy trading system is key** – until that is in place the despatchability value of the home systems could be deemed in tiers • Gas devices could migrate to increased use of local biogas / surplus H2 if FC vehicles set off

ID No. 9 / MUT V0.1	Categories Covered: ESCO, Capex Elimination	Similar To:

Social Block Refurb

Social Block Refurb: Entire blocks of buildings / apartments are refurbished together.

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Local authorities • Building companies • Equipment OEMs / installers • ICT providers • Housing associations • ESCOs / Utilities	• Whole **blocks of apartments or houses** under control of local authority / housing associations **renovated together** with **inter-linked common** energy systems, controls, insulation, security (see Netherlands e.g.). Significant heat reduction & associated **emissions** • **Energy bills reduced**, comfort and control improved and look of building enhanced. **User intervention in energy reduced** – automatic. **Standardisation** and simultaneous refurb reduces capital cost and increases competitive tendering effectiveness • **Rentals could be increased** slightly linked to lower energy bills.	• Collective **social housing** • **Adjacent houses or flats** • Groupings of 10-100 dwellings • Start with **least efficient dwellings** with close proximity / in same block in **highest heat demand regions of UK**

Costs / Risks	Revenues / Benefits
• **Availability of skills for refurbishment** • **Initial capital for refurbishments – who pays (against taxation)** • **Fragmentation** of blocks if **right-to-buy** comes into place • **Disruption** of heating / living space - need relocation • Limitations on future saleability of home (policy)	• Revenues: Housing association could **trade demand response** of interlinked and smart controlled systems & any generation assets. • **Higher rents** possible to pay **towards capex** • Tenants have lower energy costs and higher comfort • Cost Reduction: Purchasing power of large projects and standardisation – potential **showcasing support from OEMs** for early schemes. **Lower maintenance costs** – can delay with **linked system redundancy**. Can have **larger shared systems** with **lower cost per kW.** • **Technology agnostic** but with **significant reduction in emissions.**

Adaptability	• Best to start with **larger clusters** with **supportive local authorities** • Bolt-ons could include community heating, energy plants • ICT trading platforms allow further value capture

ID No. 10 / BRE V0.1	Categories Covered: Refurbishment,	Similar To: SimCity

Housing Re-E-Generation

Housing Re-E Generation: The reconstruction of low-dwelling-density housing stock and replacement with increased dwelling capacity with comfort, efficiency, sustainability and better living environment

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Local authorities • Landlords • Homeowners • Building companies (local and national) • Skills training centres • Equipment OEMs / installers • ICT providers • Housing associations • ESCOs / Utilities • Financing providers • Water / transport players • EU / Government?	Dealing with **housing shortage**, energy **efficiency** and urban **regeneration simultaneously** at a scale and over a time period that supports **local and national skills** and **building sector stability**. Building timing to balance low points in house build cycle, offering better economies and **supporting smaller local building companies -** this provides a better payback than building during peak activity. To occupiers: High quality, **attractive & secure** homes with **very low running costs** & ability to **control / trade comfort level**. Local power/heating backup To owners / developers: **Capital gains** achieved by **higher property values / dwelling density** – these and **lower running costs** fund the regenerations Local / National: **Integration with community heat** / local power gen and charging / **linking homes systems together** / use of sewage for heat pumps	• Old **most-poorly insulated and poor space** utilisation housing stock in **urban / suburban areas** • Perhaps a **100-150k properties per annum** done during downturns in core housing market (lower cost / skills base issue)

Costs / Risks	Revenues / Benefits
• **Availability of skills for refurbishment** • **Initial capital for refurbishments – who pays (against taxation)** • **Who gets and what share of capital gains** • Works best if there is all or very **wide participation** • **Takes housing out of play** for a long period –resettlement needed?	• Helps address **housing shortage**, efficiency and **urban regeneration** • Long term stability and **viability in building sector; local economy boost** • **Immediate emissions reduction; technology agnostic** • **Higher security/lower noise and lower water use etc..** • **Lower heating costs and higher housing value**

Adaptability	
	• Best to start with larger clusters with supportive local authorities • Bolt-ons could include community heating, energy plants • ICT trading platforms allow further value capture

ID No. 11 / REG V0.1	Categories Covered: Refurbishment,	Similar To: SimCity

Dutch Zero-Meter House Blanket

Social Block Refurb: Mortgage premium-funded rapid energy efficiency upgrade via pre-fabricated shell put on top of house.

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Local authorities • Home owners • Pre-fabricated insulated panel manufacturers • Equipment OEMs / installers • ICT providers • Housing associations • ESCOs / Utilities	• New **highly insulated skin** put on house including collection of **controls, new heating systems** & **solar** roof. Skin **prefabricated** and bolted onto outside within a day or so. Little disruption • Lower energy bills and higher house value supports higher mortgage payments (e.g. £20k costs £100 pm) • Homeowner has higher comfort, higher security, aesthetics, lower maintenance and lower noise and possibly rainwater collection built in.	• **Old poorly insulated homes** where other solutions very expensive • **Simple housing design** for outer walls • Homes that can **tolerate aesthetic changes** • **Minor market share** • Private and social

Costs / Risks	Revenues / Benefits
• **Manufacturing network does not exist – needs to scale** • **Planning permission** • **Crane access/ space around home**	• Revenues: Homeowner **lower bills and higher house value** pays for mortgage. • **Technology agnostic**

Adaptability	
	• Start with simple common design homes where there is opportunity for same panels and benefits of scale • Start in one region (transport intensive) and replicated in hubs around country • Future bolt on of energy trading and linked houses

ID No. 12 / HBL V0.1	Categories Covered: Refurbishment,	Similar To: Dutch model

House Blanket (Netherlands)

Heat Pumps / Advanced Heating

Ultra-High Spec Insulation

Solar Roof

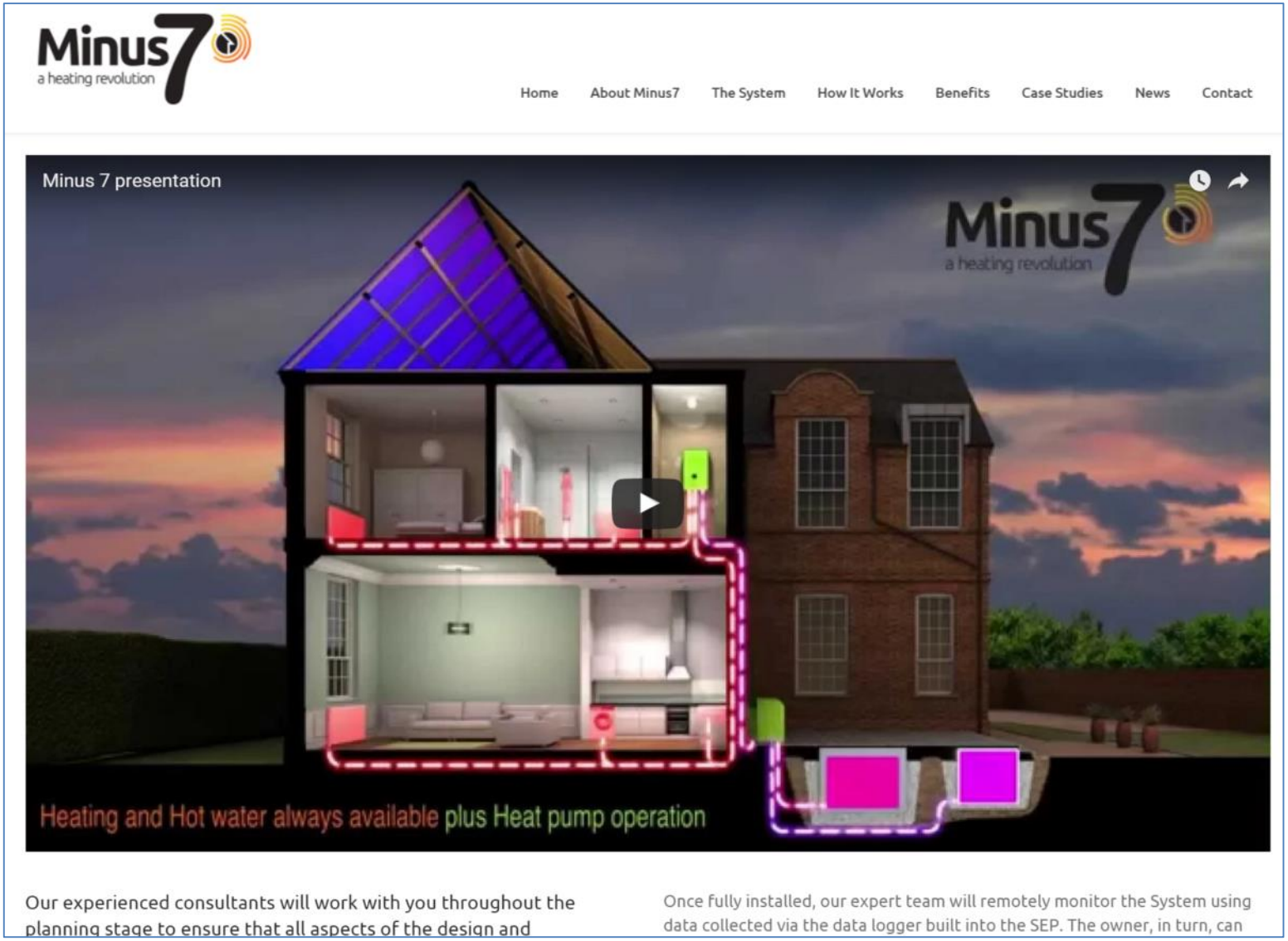
Advanced Controls

Heat Recovery

Costs built into mortgage

Expensive –need to understand potential hardware cost when done at scale

A UK full system approach retrofit



Industrial Heat Buddy

Industrial Heat Buddy: Co-ordinated approach between commercial CHP investment and local housing creating stronger case for distributed generation investment

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Commercial companies • Local heat network providers • Energy regulators • Network operators • Planning in local government	• Commercial customers have **surplus heat that can be sold** during winter via **district heating network** for new housing / refurbishment in urban areas • **Business case** for investment in commercial and industrial case CHP **improved** because there is a **greater value in the heat**, particularly where the company has limited heat demand. It can **tip balance towards more distributed generation** high efficiency assets.	• Housing near large office buildings, data centres and small industrial cos –with ICE or fuel cell CHP • Rural communities (with **biogas** CHP)

Costs / Risks	Revenues / Benefits
• Need **heat balance** between commercial user and domestics • **Cost of local heat network** – need for high density / high proximity of homes	• Revenues: **Heat value of generating assets** sold to local communities • Encourages **more DG assets** – lower emissions and more flexible and requiring less grid infrastructure investment. • Lower carbon emissions – 85-90% potential efficiency (heat & power).; More if use rural biogas. • Larger generating assets have **better economics per installed kW** • **Rural power system robustness** • **Technology agnostic**

Adaptability	
	• **Start with gas engine CHP** and move towards more efficient technologies such as **fuel cells (per USA models)** • **Link to Power Purchase Agreements** for community home networks or adjacent companies

ID No. 13 V0.1	Categories Covered: District Heating, CHP	Similar To: Community Heat

Pay To Waste (Progressive Energy Tariffs)

Pay to waste: Progressive tariffs for power and heat use to create added stimulus for investing in efficiency upgrades and change in control approaches. Premium supports low income groups & paybacks

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Government • Energy companies • ICT / HEMS provider	• **Progressive energy tariffs** starting at very low tariff (below current) rising in steps to much higher tariffs for excessive use • **Similar approach to car tax** – with bands linked to consumption / emissions. • **Reverses current charging method** where unit price is effectively lower as use rises	• **Larger homes** – higher energy users for whom energy costs are not currently an incentive to act

Costs / Risks	Revenues / Benefits
• Need **policy intervention** • Customer reaction – a strong **stick approach** (but worked for car emission tax bands) • Impact on poorly insulated **low income households** – need to counter with rapid **parallel refurbishment programme**	• Revenues: High use **surcharges fund either low income regeneration** or can be credited back upon **investment in better heat & power systems, controls and behaviour** • Creates **immediate stimulus** in higher use homes to invest in **lower carbon devices / behaviour** • **No capex cost for government** • Can **eliminate need for winter fuel payments** – low users are cross-subsidised by wasteful users. • **Reduces overall energy use** – particularly in the high income groups where energy is viewed as cheap

Adaptability	• Start with high threshold for premium tariffs reducing with time • Can use smart meters to introduce peal/time of use penalty

ID No. 14 / PTW V0.1	Categories Covered:	Similar To:

Energy Money Maker

Customer gets simple cash back choices on Fixed Price Duel-Fuel energy tariffs : HEMS with DSR functionality installed and included in the energy contract price. Key objective to improve Settlement forecasts / hedging strategy and provide aggregated DSR capability. Gas Hybrid Heat Pump increases opportunity / value.

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Existing / New suppliers Aggregators HEMS installers / maintenance Ofgem (for Demo) ICT Partner Accredited HP installers Customer service centre	**Trusted brand sells Duel-Fuel fixed price contracts** 1, 2 3 years duration with HEMS system included. **Customers offered cash-back choices** via mobile devises which they accept or reject. Two main choices: customers accepts previously agreed impact on heating / other or no impact. If accepted; money credited to customer bank account or banked in separate customer holding account for building a fund to purchase energy saving products and services. Option to novate contract to new householder or early termination settlement. **Option to replace gas boilers etc.. with heat pump / hybrid at no upfront cost.**	**Most customer segments** reducing to suburban and rural for HP option. Potential market share - Large

Costs / Risks	Revenues / Benefits
Upfront costs of HEMS – recoverable over contract duration Option - HEMS provider owns assets and delivers service against performance contract. Paid on days / hours available per home. Risk premium would expect to reduce over time. Very complicated [Hitachi & EDF – 05/02/16]	Customer additional HEMS capability / features Increased cost of service covered by increased WTP. Identify other products & services through HEMS data.

Adaptability	For any level of scale-up beyond demonstration; ICT will require business model or partner to invest scalable architecture – If separate ICT Partner then then opportunity to increase ROE as provider to multiple business models / suppliers.

ID No. 15 / MOM V0.3 [22/2/16]	Categories Covered:	Similar To: Hitachi scheme in Germany for renewables (larger scale – B2B); Tempus Energy has part of this

Home Energy Butler

The outsourced option for customers who want no involvement but can be confident they are paying competitive energy prices and offered only tailored products and services: HEMS installed and included in the energy contract price. Energy Butler manages ALL energy / heat need for customer including network issues, boiler, technology issues etc.. *Note: This is not a recommendation service.*

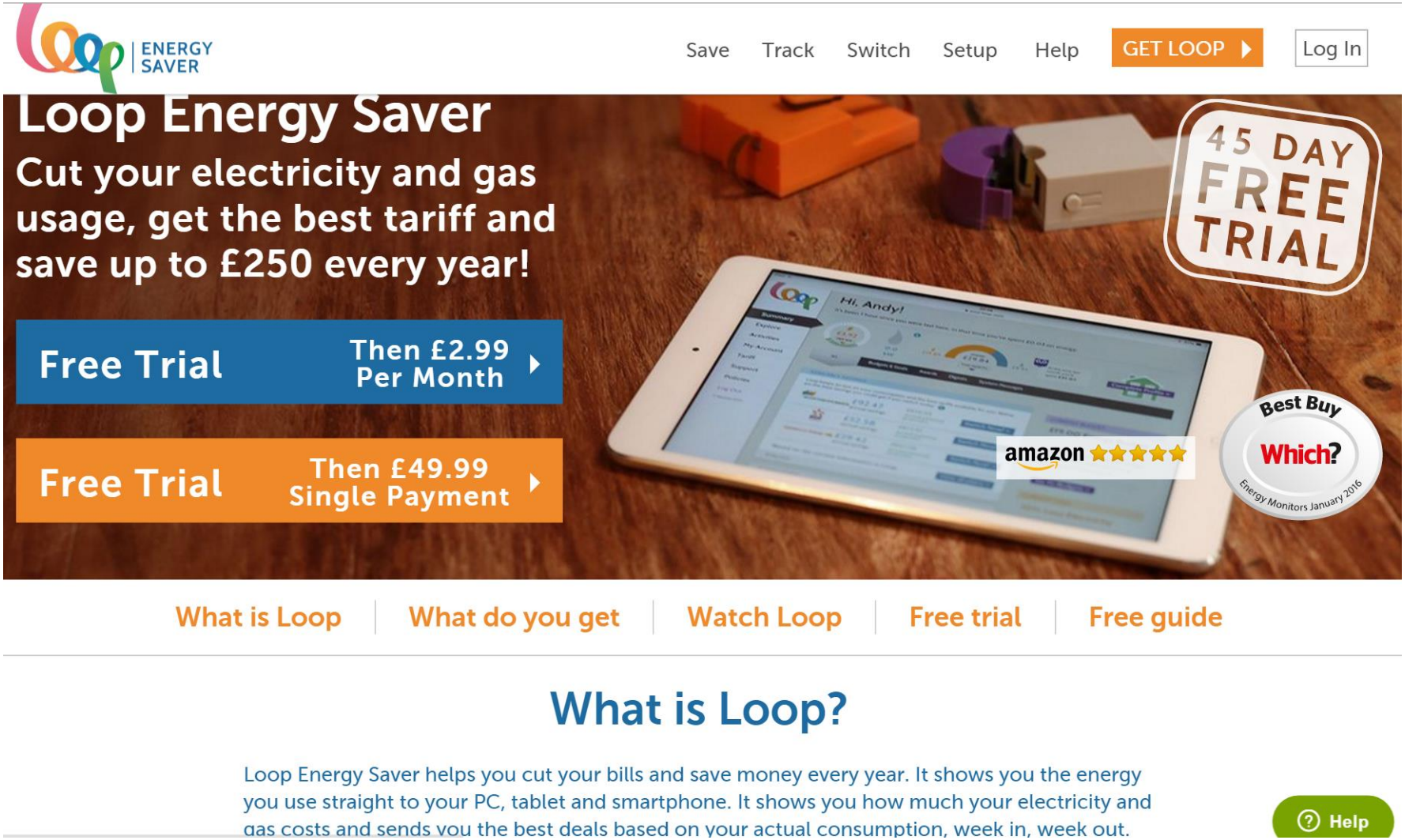
Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Existing Suppliers (Licence Lite + other services) Non traditional players - (asset light) HEMS installers / maintenance Ofgem (for Demo) ICT Partner Multiple service partners. DNO's	For the **customer who is not interested and has no time to manage energy / heat requirements, maintenance, breakdown etc.. Bill from Home Energy Butler – no visibility of change of supplier.** Customer agrees upfront tolerance for how competitive prices need to be – (will determine how frequently change of supplier could be and thus service cost risk). **If low price tolerance then few added services – high tolerance provides increasing services.** **Promoting low carbon services through consumer data.**	**Most customer segments** Potential market share - Medium

Costs / Risks	Revenues / Benefits
Set-up costs / capex could be very minimal. Upfront costs of HEMS – recoverable over contract duration Option - HEMS provider owns assets and delivers service against performance contract. Paid on days / hours available per home.	**Much increased WTP** for Simplicity, Peace of mind, dealing with all heat / energy needs. Fixed monthly DD **Rolling contract - annual opt-out**

Adaptability	Assuming STOD, Dynamic tariffs then opportunity for BM to optimise. For scalability ICT will require business model or partner to invest scalable architecture – may be provider to multiple business models / suppliers and 'HEMS' in production.

ID No. 16 / EBU V0.2	Categories Covered:	Similar To: Loop

Loop – simple form of Energy Butler?



Appliance, Heat & Light Tariff

Customer does not purchase white goods / heat technologies and only pays for defined number days or hours of use: BM provider manages install of HEMS, Smart appliances, Boilers, HP's etc.. (but may not necessarily own assets). Monitors on all non smart appliances / heating. **Includes HP and DHN options when appropriate.**

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Existing Suppliers (Licence Lite + other services) Non traditional players - (asset light) HEMS installers / maintenance Ofgem (Demo) ICT Partner Asset owner Smart Appliance distribution Service network	**Customer chooses from a matrix of simple to understand choices.** Choices include appliance list (BM provider recommends heating technology). Appliance choice and other input parameters derives a **price matrix of price per use of appliance, price per day / week for lighting, heating, cooking etc..** **Alerts sent if customer gets near usage threshold agreed, customer alerted when threshold reached and option to increase threshold / cost 'once' or 'permanently'.** Maintenance / remote diagnostics included. Zero capital outlay for customer.	**Most customer segments** excluding high-income. **Could be helpful for vulnerable customers.**

Costs / Risks	Revenues / Benefits
Set-up costs / capex could be very minimal if asset light model. **Pay by the hour model for asset provider.** Need to combine with building management system & lighting as a package [05/02] Can seem negative from a customer point of view – need to make fair [05/02] Need to add incertainty of pricing to make appealing [05/02]	Increased WTP for Simplicity, Peace of mind, benefit of no upfront cost, 24 hr cover etc.. Fixed monthly DD 10 / 12 year contract. Novate or settlement with appliance removal.

Adaptability	Initially could start with HEMS, boiler maintenance with appliances added when failure or at request of customer to upgrade.

ID No. 17 / AHL V0.3 [22/02/16]	Categories Covered:	Similar To: Current PV & storage

Cleantech Cost Cruncher

Cleantech Cost Cruncher: Government, regeneration agencies and aggregators using standardisation, scale and efficient long term scheduling to drive an efficient value chain for low cost low carbon homes

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Government • Local authorities • EU Low Carbon bodies • International standards bodies • OEMs • New entrants • Supply chain specialists	Householders, landlords, authorities, small businesses and developers have access to **much lower cost range of unbranded** heat-pumps, controls, micro-CHP, storage solutions enabled by UK government agency **aggregation of volumes, direct sales channels** and direct sourcing of simplified **modular range of standards**. Existing or new OEMs have huge **long term call-offs** that justify engineering and new **automotive-type production** lines. **Cost reduced by 30-60%** by volume manufacturing, **simpler value-chain** and **standardisation**.	• **All houses**, all sectors • Particularly for the **most common technologies** that will be deployed in **100k to 1M+ units per annum**

Costs / Risks	Revenues / Benefits
• **Reaction from OEMs** – under threat & risk of best technologies being withheld • Need to **underwrite volumes** to guarantee costs & justify investments • **Competition law** • **IP issues** in defining standards • Costs to support initial studies	• **Brings down capex cost** – helps drive penetration • Standardisation **simplifies skills base** requirements • **Accelerates carbon reduction** • Could create **new manufacturing jobs in UK** • Helps position **UK as a global leader** in clean tech adoption in res sector

Adaptability	• Start with a technology with the highest cost saving opportunity and widest scalability – then add others to the programme

ID No. 18 / CCC V0.2	Categories Covered: Refurbishment,	Similar To: Japanese NEDO project for fuel cells / other technologies

Clean-E Pioneers Club

Clean-E Pioneers Club: Government, regeneration agencies and aggregators using standardisation, scale and efficient long term scheduling to drive an efficient value chain for low cost low carbon homes

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• OEMs • Utilities • DECC • Consumer Associations	**Early adopters** install technologies at **a significant discount** (probably near variable or wholesale cost) in exchange for opening home to **monitoring and providing important field validation** for new technologies that would otherwise be very expensive and numerically limited in deployment. Suitable homeowners **reduce emissions quickly, gain kudos** of new technology; OEMs save cost and can afford to **deploy in the thousands** rather than hundreds. **Limited subsidy or tax rebates** on capital investment. Participants become part of **an exclusive club**, being invited to prestigious events, informed on key developments and can become **ambassadors for new technology**.	• **Early adopters** willing to share the development journey with providers of new hardware of services. **Perhaps 2-5% of private homes**. • **Owner-occupied homes** suited to upgrade and fitting target applications for specific technology • Minor share – but higher penetration in early years

Costs / Risks	Revenues / Benefits
• **Getting sufficient discount** • **Ensuring OEMs / service providers have capacity to handle difficulties** • **Initial capital for refurbishments – getting tax rebate / OEM discount agreed** • **How to involve utilities** • Ensuring technology is a right level of readiness before trial • **What happens if technology does not work – who pays for rectification**	• **Encourages new technologies** introduction into UK market – which becomes a magnet for new technologies, standards and start-ups • **Reduces cost and risks** of new product launches / trials for OEMs and service providers • **Immediate emissions reduction; technology agnostic** • **OEM and user share risk and gains** • **Lower heating costs and higher housing value**

Adaptability	
	• Start small – test model – and use for a small range of technologies – establish monitoring and support protocols • Widen to larger set of technologies

ID No. 19 V0.2	Categories Covered: Refurbishment,	Similar To:

Clean tech pension builder

Cleantech pension builder: Share of tax credited pension contributions are paid towards provider of home upgrades, which improves resale value of home and reduces costs on future and a recoup of investment in form of additional pension 'annuity' in later years

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Government • Pension providers • Equipment financing companies • HoSCOs • New entrants • Accreditation agencies / regulators	Cost of investment in low carbon improvements effectively subsidised by pension **contribution tax relief** against **enhanced pension contributions** which pay back in later years in form of **lower bills** near term, **building capital gains** and future annuities linked to longer term energy savings that apply to the property originally invested in. If homeowner moves the future pension benefit is still paid for the original property and **annuity** could be rolled up into cash payments in later year. Homeowner has **choice of reinvesting savings** near term back into pension. Increases private investment in refurbishment with **annuity compatible with long term pension returns. Pension returns less onerous than near term payback for consumers.**	• Those with **higher income**; homeowners with saving mindset • **Young to early middle age demographic investing well ahead of payback period**

Costs / Risks	Revenues / Benefits
• Administration of financial transaction **complexity** • **Tax relief** thresholds • What happens if investments are removed by subsequent house owners • Quantifying and **qualifying energy savings** to be linked to pension • How to future **guarantee / underwrite** future payments • Preventing **abuse** for tax or other reasons	• Enhances **investment case for renovation** • Could create near term **acceleration in adoption** • Diverts pension **funds towards clean technology** investments • Drive spending away from discretionary – consumption to fabric investments (**better balance in economy**) • Creates an additional form of **ethical pension investment**

Adaptability	
	• Pilot in small population sample first to validate administration and chance of abuse. • Best managed / linked via HoSCO

ID No. 20 V0.3	Categories Covered: Refurbishment,	Similar To: Energy Pension Company

Energy Pension Company (UK)

Energy cost in retirement is a massive challenge and **it is not working.**

The findings of the Energy Pension Company research are a disturbing wake up call for the new Government on affordability for the retired. However, they also contain a bright ray of hope that can shape our approach to ensuring the retired can afford their energy.

The Energy Pension Company (EPC) has undertaken robust research into the challenges pensioners face in managing their energy bills. This includes Focus Groups, rigorous analysis by the Association for the Conservation of Energy into energy in retirement and a large-scale survey of attitudes of the retired to paying for their energy.

Some facts about the retired

Our research shows that the number one concern for those approaching retirement and those in retirement is energy – strikingly ahead of all other concerns. This is true for all social groups, all ages, homeowners and renters alike.

The retired typically spend £97 per month on energy and it is the only household expense that does not go down. Over time the retired cut their spending in all areas but energy but do everything they can to keep a consistent comfort level.

Energy switching levels are increasing with recently over 400,000 people switching in one month. Our research shows that many pensioners have switched to get a better deal.

However they don't like having to switch continually. This is not the solution they want and they switch under duress. They want a good supplier, one steady supplier.

In summary pensioners face an enormous energy cost commitment in their retirement that cannot be cut and the retired do not see regular switching as the solution. Failure to address this challenge will result in ever growing numbers of the retired struggling to manage and afford their energy despite the government's commitment to the protection of the triple lock.

THE ENERGY PENSION COMPANY

What do retired customers **really want?**

Any solution to the energy affordability challenge has to be one that the retired want. Our research has looked at this in great detail.

retired customers want
a good deal that lasts

The retired want lower energy bills throughout retirement. They want to keep their homes at the same level of comfort or higher than before they retired. Indeed those approaching retirement are very worried that they may not be able to maintain their comfort levels.

As important as lower energy prices is price stability. The retired fear 'sticker shock' of the energy bill or the yearly bill review. They worry about how they are going to budget throughout retirement when they have no clear sight of the energy bill over time.

The retired also want real help managing their energy more efficiently and are happy to do this but they do not know how to access it. Anything that helps them to do this is highly desirable.

In summary, The Energy Pension Company research shows that there is real worry about energy bills in retirement, and that the retired want affordability, stability and are receptive to using energy more efficiently and energy efficiency. A solution that provides affordability, stability and using less energy delivering comfort would be a real ray of hope that the retired will be receptive to.

To find out more and stay in touch with our research and solutions please register at www.energypension.com

The Energy Pension Company is a new organisation focused on the challenge of energy cost in retirement. Our remit is to create research, new policy insights, advice and solutions to the growing challenge of affordable energy in retirement and to how best to deliver efficiency and climate objectives.

THE ENERGY PENSION COMPANY

Home-Office Heat Balance

Home-Office Heat Balance: Office / commercial / municipal building adjacent to residential buildings share their heat (and power) assets based on broadly opposing profiles of heat and power consumption during the day and weekends.

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Local planners • Energy system installers • HoSCOs / BiSCOs • Utilities • HEMS providers	A '**mini' district heat network** whereby the heating, cooling and power loads of commercial buildings tend to be high during low occupancy of houses and vice-versa. These two broadly balancing and complementary profiles mean that a single asset could be better utilised when shared across the types of **connected buildings** . Capex cost lower and combined energy use	• **Urban** areas with mixed commercial/municipal and residential buildings in close proximity • **Limited volumes**– mostly **new build** and regeneration projects

Costs / Risks	Revenues / Benefits
• Getting right **heat matching** / magnitude and time signatures • **Administration** and need for accurate billing / measurement • **Vulnerability** of fewer generating assets • What if business moves or **building use changes** • Householder feeling of **loss of control** • **Difficult to retrofit**	• **Lower cost per kW** – because of larger systems • Higher **asset utilisation** and returns • Commercial approaches to system service – may be better maintained • Cheaper than normal district heat networks (less disruptive) • Householder could access **cooling** from commercial neighbour • Supports **investment case for mCHP systems / DG**

Adaptability	• Pilot in limited field trials first linked to HEMS

ID No. 21 / HOH V0.2	Categories Covered: Refurbishment, DG,	Similar To: Industrial Heat Buddy, current district CHP schemes

The 'Interested' Green Landlord

The Interested Green Landlord: **Mortgage tax relief removed from larger private landlords in favour of tax relief on the portion of the mortgage associated with reducing energy & water consumption and is able to recover a higher rate of rent based on house efficiency**

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Government • HMRC • Landlord Associations • Energy system installers • HoSCOs / BiSCOs • Utilities • HEMS providers	Larger landlords' business case is moulded to one that favours investments in energy saving building fabric. **Interest tax relief** is phased out except for that investment associated with energy, water, comfort and security. This encourages investment which is also justified by higher rents that can be charged linked to a monthly energy cost rating system that is included in the rental particulars. Energy rating can **eventually link to Council Tax rates –** again offering a source of value for the investor. **Capital gains in** house deemed related to energy savings are not taxable – others are. Interest tax relief for renovation could be **offered to smaller landlords** affected by recent tax relief removal – encouraging the market further.	• **Private rented** sector. • **Older houses** most suitable for refurbishment

Costs / Risks	Revenues / Benefits
• Adverse impact on **rented market supply** • Need to ensure share of upgrades in most **vulnerable homes** • Getting **accurate ratings** of savings (HEMS?) • **Skills** for rush of refurb work • Ensuring **right technologies** installed	• **Evens playing field** with smaller **buy-to-let landlords** and encourages renovation of a neglected sector with **vulnerable populations** • Increases **relevance of energy ratings** • Enhances **business case for renovations** • Increases **value of house** • Will encourage purchase of older houses for **refurb** where capital gains and interest tax relief is greatest • Could soften some of the blow of recent tax changes for smaller landlords

Adaptability	• Pilot in limited field trials first linked to HEMS	
ID No. 22 / IGL V0.2	Categories Covered: Refurbishment,	Similar To:

Energy Service Providers Emission reducers

ESP Emission Reducers: **ESPs set targets by Government to reduce carbon emissions are not bound by methods prescribed under existing ECO rules but are widened to include all methods to reduce carbon & address fuel poverty**

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Government • Local authorities • Housing associations • ESPs • Energy system installers • Ofgem / DECC	For ESPs: **ESPs allowed to use any approach to reduce emissions (a policy change)** – including heat pumps, lower carbon generation, demand management, controls etc. – **technology agnostic**. Rewarded for meeting or exceeding targets; penalised for missing. Paying for outcomes – the what and not the how For Consumers: The ESP will offer an array or even choice of products and services of varying degrees of disruption and impact on costs and/or comfort	• All sectors – main focus on **social housing, vulnerable households** and worst buildings from an energy perspective

Costs / Risks	Revenues / Benefits
• Qualifying and quantifying benefits from other methods to reduce carbon • Utilities do not have profitable offset segment to blend with ECOP costs – could link with switch to carbon tax [05/02] • In reality a policy change and not a business model [05/02]	• Provides impetus and financial support for the penetration of best and newer carbon saving technologies. ESP collective buying power could be applied. • Brings greater attention to the carbon value of demand management • Technology agnostic – pays for outcomes not a specific solution • May yield faster carbon reductions that are not limited by skills or other practicalities

Adaptability	• Can be deployed in a progressive way as resources and technologies allow • HEMS and similar systems will allow more options to be deployed and benefits assessed more accurately

ID No. 23 / EER V0.2 [23/02]	Categories Covered:	Similar To:

Rent-a-Wall

Rent-a-Wall: The heat equivalent of rent-a-roof common in the solar panel industry linked to asset financing against future FIT revenues and savings.

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• Government • Local authorities • Housing associations • ESPs • Energy system installers • Ofgem / DECC • Financing companies / pension • Insulation system providers	For Consumer: Removes cash barrier to investing in heat loss reduction intervention that may also have benefits in terms of comfort, noise, damp etc.. For Provider: Provides **long term secure income stream** tied to house	• All sectors – main focus on **social housing, vulnerable households** and worst buildings from an energy perspective

Costs / Risks	Revenues / Benefits
• Lack of incentives – could there be a version of RHI for this? • **Pay-backs could be tight** • May need to add to wider refurbishment to make viable [05/02]	• Provider takes returns in form of [full/dominant] share of energy savings attributable to the insulation. This pays for initial capex and provides longer term return • Helps accelerate insulation of old housing stock • **Reduces fuel poverty** / risk of cold for vulnerable populations • Bargaining power of provider may bring down costs

Adaptability	• Can be deployed in a progressive way as resources and technologies allow • HEMS and similar systems will allow more options to be deployed and benefits assessed more accurately	
ID No. 24 / RAW V0.2 [22/02]	Categories Covered: Refurbishment	Similar To: Rent-a-roof

Dynamic Trading of DNO bandwidth

Dynamic Trading of bandwidth: ESP is able to trade savings in live demand management and reduction in local network capacity capex through management of consumer demand

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• ESPs • Ofgem / DECC • DNOs • Energy Trading Platform Provider	ESP using HEMS for individual homes and aggregated through intelligent management system can trade Opex and Capex savings in supply network through an efficient trading market. ESP manages timing, magnitude and mix of supply (e.g. gas and electricity). Could use gas as a load reducer for heat pumps for hybrid heat pumps provided freedom to operate and GNO having pressurised system Homeowner will gain savings in allowing ESP to trade demand management against pre-determined service levels	All homes – get suited to clusters using the same branch of the supply network. Could link to district heat networks and blocks of flats [05/02]

Costs / Risks	Revenues / Benefits
• Little capex assuming trading system exists – most in ICT systems for intelligent processing and control of HEMS • Returns through capex savings lower if clusters of houses do not cooperate to ensure power peak demand is below network upgrade threshold	• ESP monetises demand management Opex and Capex savings

Adaptability		
ID No. 25 / DBT V0.2 [22/02]	Categories Covered:	Similar To: HOSCO / Tempus Energy model

Tempus Energy – Demand Management Model for businesses

how we do it

let the technology do the hard work

Our bespoke technology enables us to manage electricity market prices to match customers with the best available price at all times. It's all automated, so you can sit back and relax as your bill falls.

We use algorithms and smart equipment to automatically shift usage away from expensive times and into periods when prices are lower, such as during the night or times when renewable generation is very active.

unlock the value in your appliances

Demand Flexibility allows us to make the most cost-effective electricity purchases on your behalf, without you needing to actively manage your appliances or track energy prices.

Most people have some flexible equipment or processes. Examples include storage heating, refrigeration, air conditioning, heat pumps, electric vehicles and industrial processes. We make it easy for you to unlock the value of your "flexible load".

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Cross Country CHP trading

Cross Country CHP Trading:

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
ESPs CHP providers Local Government	Linking CHP assets with pure or hybrid heat pumps within the same network area. The CHP unit can provide power for the heat pumps and heat can be harness in district heat	

Costs / Risks	Revenues / Benefits

Adaptability		
ID No. 26 / CCT V0.1	Categories Covered:	Similar To:

Citizen's Carbon Account

Citizen's Carbon Account: Each adult, linked to NI number, has a carbon account that can be credited and debited according to total energy consumption covering residential and non-residential energy use

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Government Banks -type system providers ESPs Energy Intensive Product Suppliers	A form of (CO2 units) 'COTS' currency bank account – like BitCoin – run like a current account and linked to transactions using energy – home energy, transport, major consumption items. Each person gets an annual allowance (Get x COTS for passing Go allowance) which they spend through the year and trade on an App/exchange with other individuals and businesses – like a simple stock market. **Carbon trading for the masses**. Value of each COT linked to carbon price – changing with time	All adults

Costs / Risks	Revenues / Benefits
• Requires micro-trading • Needs a system of carbon assignment beyond simple energy • Heavy policy intervention • Highly **complicated – very hard to make it work** • Security issues / cheating – could it really work [05/02] • Incentive to participate if solution (e.g. community heating forced upon resident) [05/02]	• Changes attitudes and consumer behaviour • Source of income to low users • Creates user awareness of carbon

Adaptability	• Can start with home energy and add on transportation and other consumption items	
ID No. 27 / CCA V0.2 [23/02]	Categories Covered:	Similar To: Carbon trading (for larger entities)

Local Savings Re-E-Cycling

Local Re-E-Cycling: Channelling local savings in energy costs back into local businesses and economic regeneration - thereby improving local 'balance of payments'

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Local authorities Government Local businesses Local Venture Funds	Local government funding bodies get payback from energy saving measures in local authorities and channel these savings into the **venture financing** of local businesses etc.. Potential to linking Venture Capital tax relief schemes	Houses in areas with proactive local authorities.

Costs / Risks	Revenues / Benefits
• Takes power and benefits away from household – controlled by LA or similar • How to address local authority capex / funding [05/02] • How to consider equality of opportunities in region [05/02]	• Retains money within the local economy as opposed to savings being spent on more typical consumption • Encourages use of money towards new ventures and economic growth

Adaptability		
ID No. 28 / LSR V0.2 [23/02]	Categories Covered:	Similar To:

Energy Stock Market

Energy Stock Market: A trading system for the masses allowing commercial and retail exchange of kilowatts/megawatts and megawatts

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Regulator Energy trading platform provider HEMS Aggregator / HOSCO	Consumers have access to trading their energy storage, demand shift and generation assets or behaviours Could be managed by HoSCO on behalf of the consumer as part of the customer account 'mining'	Private housing, social housing, business with a mindset to trade

Costs / Risks	Revenues / Benefits
• Highly complicated • Needs HEMS	• Creates stimulus for demand management and harnessing all generating and storage capabilities no matter how small

Adaptability	• Start at aggregator level before moving to individual home level [05/02] • Deploy in stages using financial trading models which scale and deal with smaller transaction sizes over time	
ID No. 29 / ESM V0.2 [23/02]	Categories Covered:	Similar To: Hitachi doing aggregation for renewable assets [05/02]

Winter Fuel to Refurbishment

Energy Stock Market: **Transferring the £2-3bn spent on winter fuel allowances towards refurbishment of vulnerable population homes**

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Government DECC / Ofgem Local Authorities Housing Associations Landlord Associations	Government: Diverts spend to most needy and towards saving energy and reducing balance of payments deficit rather than funding waste. No net increase in spend for government. Home Owners: Improvements facilitated and comfort arrives earlier. Low bills – savings equivalent of winter fuel allowance or more. Local Government: Funds aggregated that would otherwise go to tenants can be applied more effectively in urban regeneration / refurb	Social housing and the poor

Costs / Risks	Revenues / Benefits
• Political fallout • Covering those vulnerable in transition phase • Resources and skills to effect quick upgrades • Delivery risk – contractors doing job properly – QA/QC [05/02]	• More equitable and boosts renovation market

Adaptability	• Could have transition of policy – reducing winter payments over time

ID No. 30 / ESM V0.2 [23/02]	Categories Covered:	Similar To:

Cloud & Free Heat

Cloud and Free Heat: **Distributing servers within homes and utilising the heat generated to provide free heat to the homeowner, who pays for the initial installation, thereafter have no heating costs.**

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Server company Installers HEMS	In exchange for hosting a server, the homeowner gets the offer of free household heat thereafter.	Limited to cash rich homeowners with suitable property size and heat profile

Costs / Risks	Revenues / Benefits
• Need for replacement every 3-4 years • Heat demand profiles may not match • High capex €5-15k • Covering electricity costs & allocation	• Uses server heat that would otherwise be wasted or drive need for expensive cooling systems • Opportunity for commercial / residential district heating with battery [05/02]

Adaptability	• Do larger homes / small businesses first [05/02]	
ID No. 31 / CFH V0.2 [05/02]	Categories Covered:	Similar To:

Cloud & Free Heat Model (#31)

Germany – 'free heat' business models

DELTA Energy & Environment

Free heat through 'servers' in homes has big potential to disrupt the residential heating market

CLOUD&HEAT
THE CLOUD THAT HEATS HOMES WORLDWIDE

Nerdalize

Business model

Customer pays €5,000 - €15,000 per server package* + No heating bills for lifetime + No Maintenance charge

Heating system replacements in 2025

~50,000 Low uptake scenario

~200,000 High uptake scenario

**Server package replaces the 'boiler'. Server heating can work with hydronic or air heating systems.*

Source: Delta-ee Roadmap Service

District Heat plus Heat Pumps Optimiser

Optimising a system comprising multiple heat / cooling vectors, sources, demands and storage? Within a DNO and between separate DNO's.

Stakeholders / Partners	Value Proposition	Customers / Market Share
Service company/s DNO's NGO HEMS provide Private infrastructure Co's IT partner	Either a specialist service bought in by other business model providers or embedded into primary service provider, ESCo etc.. **Two value drivers (a) Network; capacity management, re-enforcement and losses avoidance (b) commercial optimisation of power between CHP export, HP demand and** storage (and heat if connected sources) Will require ICT platform to control and monitor all assets, including each home.	Any segment

Costs / Risks	Revenues / Benefits
• If specialist provider then capex limited to ICT / systems • Value sufficient to make acceptable ROI • Viability of power trading between assets – Questionable • Network (fixed) cost of power may be high %age [05/02]	• If specialist provider service then Annual charge, monthly fee with performance driver. Delivery to multiple business models. • If embedded into primary business model / service provider then scale needs to be sufficient to get ROI

Adaptability		
ID No. 32 / DHP V0.2 [23/02]	Categories Covered:	Similar To:

NuTech Home Heating Design Ltd

Independent design service for low carbon home heating installations. Full or part rebate of design cost if home owner completes installation. Non-affiliated accredited contractors made available to customer.

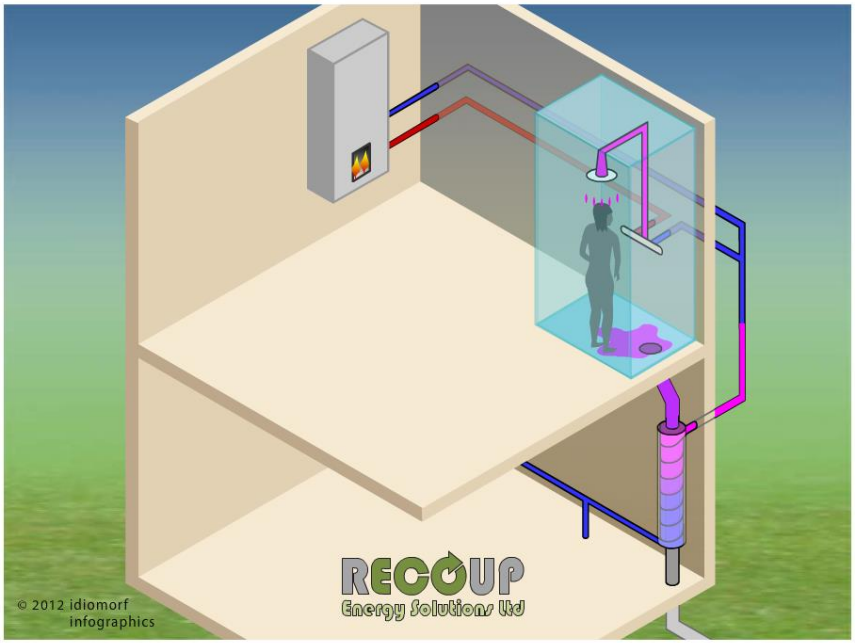
Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
• OEM's • Academics • Research & Design bodies • Design Associations • Accredited contractors • Gov – policy & regulation • Banks • Mortgage providers • Crowd sourcing	• A full detailed design service for the installation of low carbon space, water heating and insulation retrofit. • Provides a request to tender output • Option for comparison of quotations • Option to project manage • Option for induction cooking installation to enable removal of gas connection. • Option for finance choices	Homeowners, small businesses, landlords. Local Authorities

Costs / Risks	Revenues / Benefits
• Set up of standards / regulation • Mainly working capital driven – minimal capital required.	• Fixed fee payable by customer to design company • Customer receives design rebate – size / % of rebate dependent on level of low carbon retrofit. •

Adaptability	• Could start as very simple service but opportunity to expand options • Requires regulation

ID No.	Categories Covered:	Similar To:

How it works...



The above animation shows very simply how shower waste water heat recovery works. To summarise, all of our systems achieve their results by using the following method:

- The hot water from the shower goes down the drain, losing only a couple of degrees
- This hot water either clings to the side of our patented pipe exchanger or drips on to our patented coiled copper exchangers
- The cold feed is brought into the system on the other side of the exchanger
- The heat transfer from the outgoing hot to the incoming cold allows a temperature increase of around 15 degrees
- The pre-heated cold feed then feeds the shower mixer, boiler and/or cylinder

See the animation for the Recoup Trav+ or Recoup Drain+