



Programme Area: Smart Systems and Heat

Project: WP3 Business Model Development

Title: Business Model Main Report

Abstract:

The deliverables have been produced by the Energy Systems Catapult as part of the Smart Systems and Heat Phase 1 Business Model Development Project within Work Package 3 as Listed Deliverable WP3 – LD1. The Listed Deliverable package comprises a main and summary report (with supporting appendix) outlining five promising consumer business models to transform low carbon heating and well-being in the home in support of ETI Framework Agreement Outputs 3.1a and 3.1g. This aims to stimulate new thinking for business models to be introduced into the market from 2020 that are attractive to customers and investors, to test thinking about wider policy and market development and provide options for future demonstration projects within the Smart Systems and Heat Programme.

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.

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Innovative Business Models for Smart Systems & Heat Transition

Main Report – Final

Sustainable

Innovation

Jobs

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

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

Delivered by the Energy Systems Catapult for the
Energy Technologies Institute

25 October 2016

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	Page
• Glossary	3 - 4
• Introduction	5 - 6
• Executive Summary	7 - 14
• New Ways of Positioning Low Carbon Solutions	16 - 18
• Business Model Development Approach	19 - 20
• The Identification of the Key Enablers	21
• The Business Model Game (Toolkit)	22
• The Five Business Models	23 - 25
• High Level Process Maps for Business Models	26 - 31
• Policy and Market Structures	32 – 33
• How Business Models Address the Fuel Poor	34
• Initial Consumer Feedback on the Business Models	35
• Quantitative Analysis of the Business Models	36 – 39
• Taking the Business Models to Commercialisation	40 – 41
• Conclusions and Recommendations	42

Glossary

The following terms will be referred to through the report:

Term	Definition
Accredited Provider	The entity selling services to the customer, which acquires a certification of competence and integrity for delivery as per its licence conditions, including Integrator obligations. Regular accreditation auditing of entity delivery to include customer feedback.
Added Value	Non-financial benefits to business model customers such as reduced hassle, reduced risk (real or perceived), or a higher quality of heat or comfort.
Annualised Cost	Used to express variable costs in yearly terms even though the variables do not directly apply to a year and where appropriate the equivalent annual cost for owning, operating and maintaining an asset over its entire life.
Business Model	A business model describes the rationale of how an organisation creates , delivers, and captures value.
Business Model Canvas	A shared language for describing, visualising, assessing, and changing business models. The nine business model building blocks (<i>Key Partners, Key Activities, Key resources, Value Proposition, Customer Relationship, Channels, Customer Segments, Cost Structure, Revenue Streams</i>) form the basis of the Business Model
Business Model Customers	The entities to which the business model provider sells services or products. These customers could be end-customers (households) or business operating in the energy value chain (e.g. an energy retail business, a network business or a generation business).
Business Model 'Enabler'	Business environment factors such as ICT, policy, technology and financing which are enhancing or vital for the success of a business model. Examples of enablers in other sectors include the internet, mobile technology, safety legislation and 3D printing.
Business Model High Level Process Map	Shows the primary activities involved in defining what the business entity does, who is responsible, to what standards a process should be completed, and how the success of a business processes can be determined.
Business Model Services	The value proposition or the services provided by the business model. For example, for smart facilities management these could include heat outcomes, selling energy, risk management, reduction in hassle etc.
B2C	Business to Consumer transactional model
B2B	Business to Business transactional model (i.e. not selling to householders)

Glossary continued

Term	Definition
Counterfactual	Describes what would have happened in the absence of the introduction of the business model. This provides a baseline against which changes are assessed. From the point of view of an individual consumer, the counterfactual refers to the outcomes (bills etc.) under their best alternative option in the absence of the business model.
HESG	Home Energy Services Gateway (Under development by Energy Systems Catapult) – a non-restricted, commercially ‘open’ data platform for home heating and power service providers to deliver new, bespoke and innovative products and services & empower the customer through better information and control.
HEMS	Home Energy Management System. References to HEMS can also be read as HESG (when developed and at market).
Integrator ‘role’	The entity / Accredited Provider that is responsible for design & delivery of whole home system approaches for heating technologies and insulation that meets CO ₂ reduction obligations for the housing stock under its control.
‘Pay By The Hour Heat’	A B2B contractual arrangement between an Accredited Provider (supplier) and a heat producer facilitating an hourly price for a level of heat supplied. Energy centre performance and risk sits with heat producer. A domestic customer could also have a proposition based on the same principle.
Price	The price business model customers pay for the business model services. This will be defined in terms appropriate to the business model under consideration. The price and terms can vary for different customer groups & different years.
SPV	Special Purpose Vehicle - legal entity created solely to serve a particular function, such as the facilitation of a financial arrangement or creation of a financial instrument. These are common for district heating and renewable energy projects.
Trading	The ability to monetise demand flexibility, storage & generation at individual household level. This may be though an existing or new marketplace (which is an Enabler).
Value Proposition	Describes the bundle of products and services that create value for a specific customer segment. A single business model may be associated with a number of different value propositions, tailored to different customer groups and customers.
Well-being value	The aggregated monetary and added-value benefit that a customer perceives from a number of home management services that deliver their required well-being and health and which may include enhanced comfort, peace of mind, power /heat availability, simple billing administration and enhanced house value.
Willingness to Pay	The maximum amount a business model customer is willing and able to pay for the services provided by a business model. This will be equal to the sum of monetary benefits and perceived added value.

- The Energy Systems Catapult (ESC) has assumed responsibility for the delivery of the Energy Technologies Institute's (ETI) **Smart Systems & Heat Programme** (SSH), which aims to create future-proof and economic local heating solutions for the UK.
- The UK has signed up to legally binding targets to reduce greenhouse gas emissions by 80% over 1990 levels by 2050. 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 approach being developed by the Programme aims to help **build the capability and confidence** in the market required to deliver a coherent **energy system transition**.
- Seen as essential (*as evidenced in the next Foreword page*) in the above mission is the development of **new innovative business models**. Following previous ETI insights on value management and barriers for smart systems and heat transition, the ETI has commissioned the ESC 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;
 - be attractive to customers and investors to test thinking about wider policy and market development;
 - provide options for ESC large-scale **demonstration projects** with the new business models or components being piloted by existing or new market players.

The ESC formed a regular **working group** to provide input and help shape analysis:

ESC:	John Farrington (Project Lead), Jonathan Watkins, (Specialist Advisor) Alkesh Acharya (Enterprise Systems Architect), Rebecca Wilkes (Consumer Insight)
DECC:	Jon Saltmarsh, Shane Long, Ioannis Orfanos
EDF Energy:	Alastair Davies, Sarah Bee, Bogi Hojgaard
Hitachi:	Ram Ramachander, Seiji Sato

Consultancy Support for Quantitative Analysis: Frontier Economics; Delta Energy & Environment

Local Authorities: Greater Manchester Combined Authority, Bridgend County Borough Council, Newcastle City Council. All are partners for the ESC SSH demonstration phase and have been consulted and have provided input.

Market Context Today

- **Existing business models** for the retail of energy supplies, **home heating equipment, and building fabric refurbishment are almost completely separate from one another**. This is mainly for historical reasons – deriving from the scope of the nationalised utilities – but with the necessity of reducing carbon emissions from homes, which account for one-fifth of all UK carbon emissions, the integral nature of these activities must be recognised.
- Energy supply is a licensed activity. This means that it is easy for Government to place obligations on suppliers, such as the purchase of low-carbon energy (the Renewable Obligation), the provision of discounts to vulnerable customers, or the reduction of carbon emissions from buildings (ECO). These obligations have been an effective policy tool for driving change in the energy system. By contrast, installation of **gas boilers and building work, such as solid wall insulation, is minimally regulated, and the market is largely fragmented** amongst ‘one man bands’.
- There is a **limit to the ability of energy suppliers to deliver large-scale emissions reductions in buildings, within the framework of today’s business models**.
- The scale of the capital expenditure on low-carbon home heating equipment and on improved insulation is vastly beyond what can be recovered through energy retail tariffs. (Another possible factor is that trust in some energy suppliers with weak brands is probably too low for them to be able to intervene in homes in this way.)
- Technological innovation is creating opportunities for new business models in all sectors. **A digital transformation is underway of consumers’ expectations** of the products and services they’re offered with the home of significant importance.

Barriers to low carbon heat transition

- The ETI undertook an extensive piece of work with Frontier Economics to assess the barriers to the adoption of low carbon residential heating* and the measures needed to overcome these. It identified the requirement to address a number of barriers across the design of **Markets**, the characteristics of **Interventions** and the fulfilment of **Consumers** needs.
- **Harnessing the initiative of business was identified as crucial** to overcome barriers to uptake, **finding added value for consumers** similar to many other markets, and **dealing with the complexities of new low carbon installations** potentially using new, **innovative Home Energy Management Systems** and new commercial roles and offerings.

* Overcoming Barriers to Smarter Heat Solutions in UK Homes – Frontier Economics Report for the ETI, March 2015

Executive Summary – 1

Market will not deliver at scale for residential low carbon heat transition given:

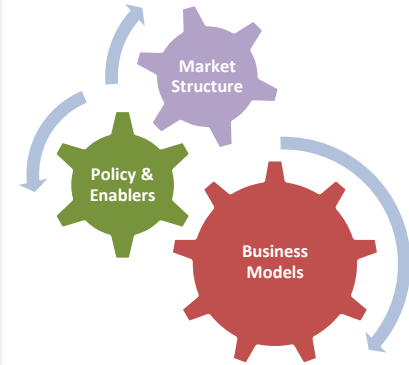
- Unappealing consumer propositions
- Fragmented industry structure
- Lack of economic drivers
- Need for a holistic policy framework



In response, we propose:

- **Five complementary business models** to stimulate new thinking; Addressing affordability & engagement in residential low carbon heating for all homes & consumers, including the fuel poor.
- Market **enablers**, vital for or enhancing for the new business models
- New market structure opportunity; **Integrators (Accredited Providers)** to be responsible for design & delivery of whole home system, optimising use of heating technology & insulation
Integrators are made **accountable for CO₂ reduction** obligations for customer portfolio
- **Internalising the cost of carbon** for domestic heating solutions

Business models cannot work alone...



Market Enablers

Novel Financing	Using methods common in other sectors for smoothed and planned long-term financing at competitive rates
Policy & Regulation	Permitting new providers to sell energy as a service and bundle utility offering, all with an obligation to reduce CO ₂ .
ICT Platforms	Home Energy Services Gateway: an 'open' platform for service providers to deliver new, bespoke and innovative products and services & empower customer.
Technical Standards	Standardising equipment specifications and installation to reduce cost and facilitate skills base.
Trading	The ability to monetise demand flexibility, storage & generation at individual household level
New Technology	For example, to reduce cost or increase capacity of energy storage

The 5 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, 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.
Home Moderniser	An aspirational home upgrade offering improved occupant well-being through major improvement of insulation, controls, low carbon heating system within a full home 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 supplemented, as necessary, by in-home heating technologies.
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 & more efficient use of land.

The change in market structure

Just as CO₂ targets for new homes are delivered by housebuilders, integrators can take responsibility for **finding the most cost-effective solution for existing homes.**

Executive Summary - 2

Changing from 'technical' to 'consumer' orientated selling

- Homeowners value **well-being** but cannot assign value or benefits to kWhs. Hence selling method should change.
- The **high upfront cost** of low carbon technology and home insulation are a **barrier to adoption**. Long-term financing via a **fixed monthly charge** reduces fear of unexpected costs and eases affordability.
- **Bundled services** will be attractive to some consumers who value the **removal of hassle**.
- Trusted and **accredited providers** will be required to make the market work, particularly for longer-term contracts
- Consumers suggest a **need for real home evidence** to inspire confidence in the viability and benefits of new models
- **Fuel poor**, can be offered a guarantee of well-being (comfort) through accredited providers leveraging welfare payments

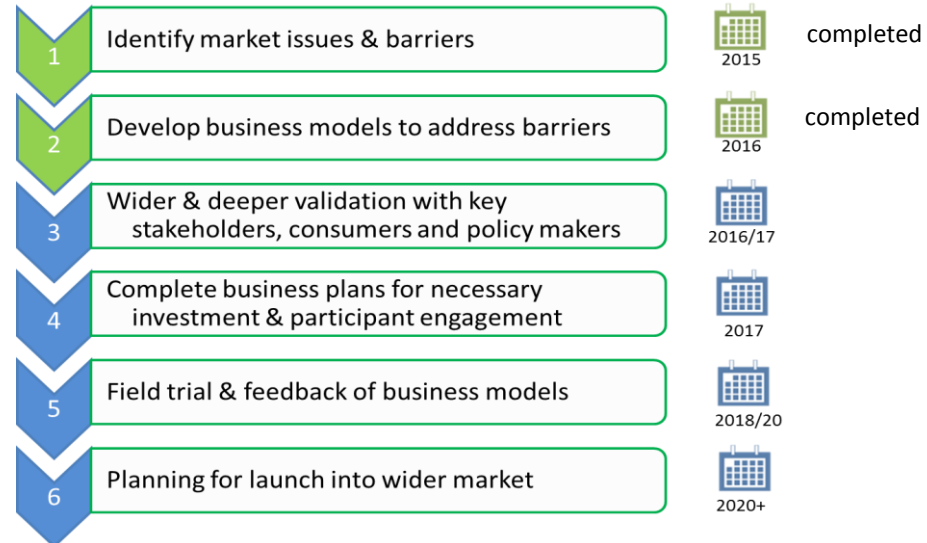
The key differences between the business models

	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

Recommended Next Steps – taking to market

- More **extensive stakeholder consultation** – including consumer groups, utilities, local government, regulators and landlord associations
- Wider UK-representative **consumer validation** with a **statistically-relevant sample size** covering multiple house types and segments. This will help inform the **potential value** of new services which may be offered by the accredited providers.
- Understand the **challenges of practical deployment** of the business models including **set-up costs** of supporting infrastructure (including skills and ICT)
- Continue thinking to **help inform policy change** to permit new engaging **marketing approaches** to achieve low carbon homes
- Engage the market on new thinking to help inform options for new business model selection in low carbon **demonstrators / market trails** in the near future.

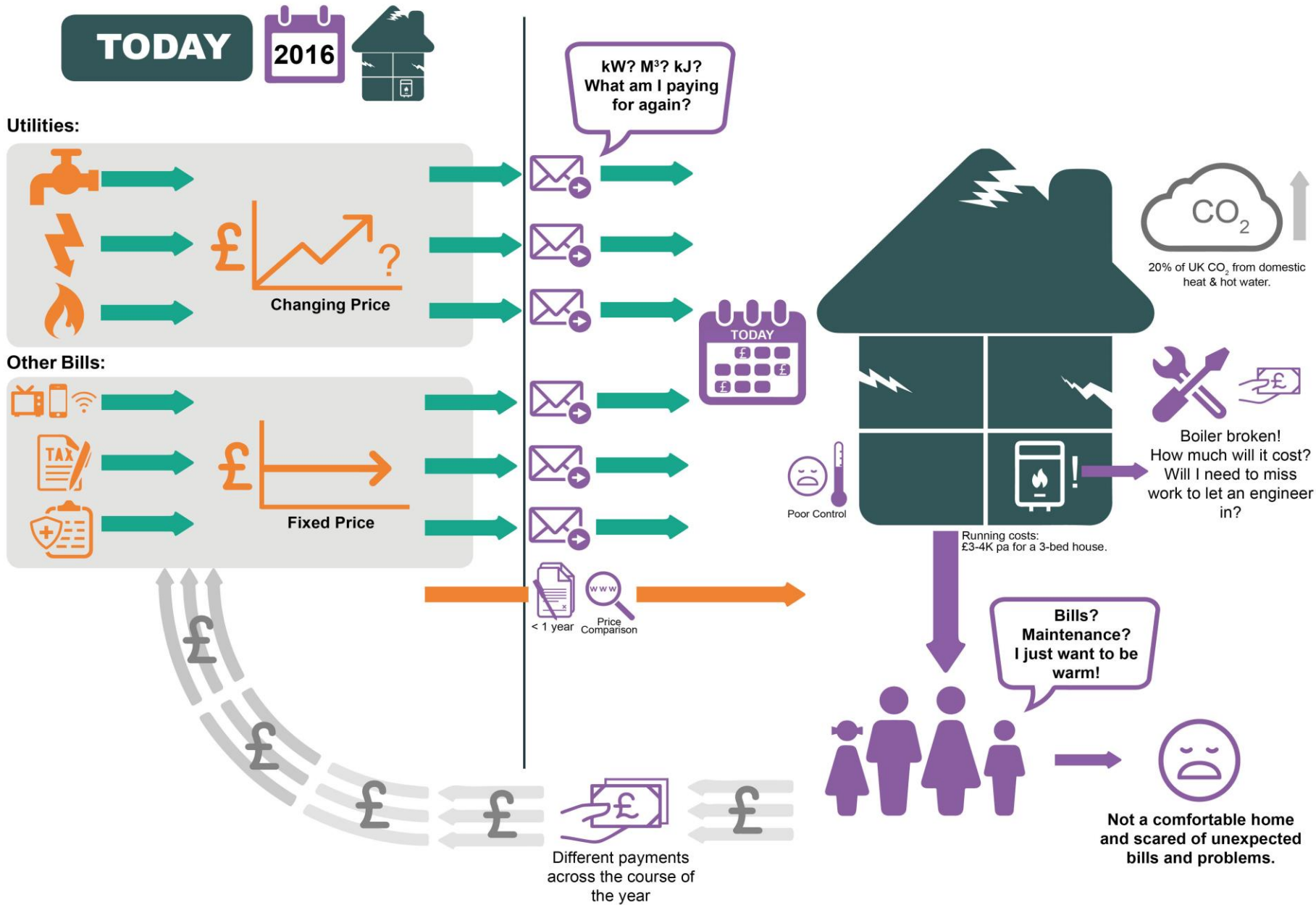
Possible deployment timing



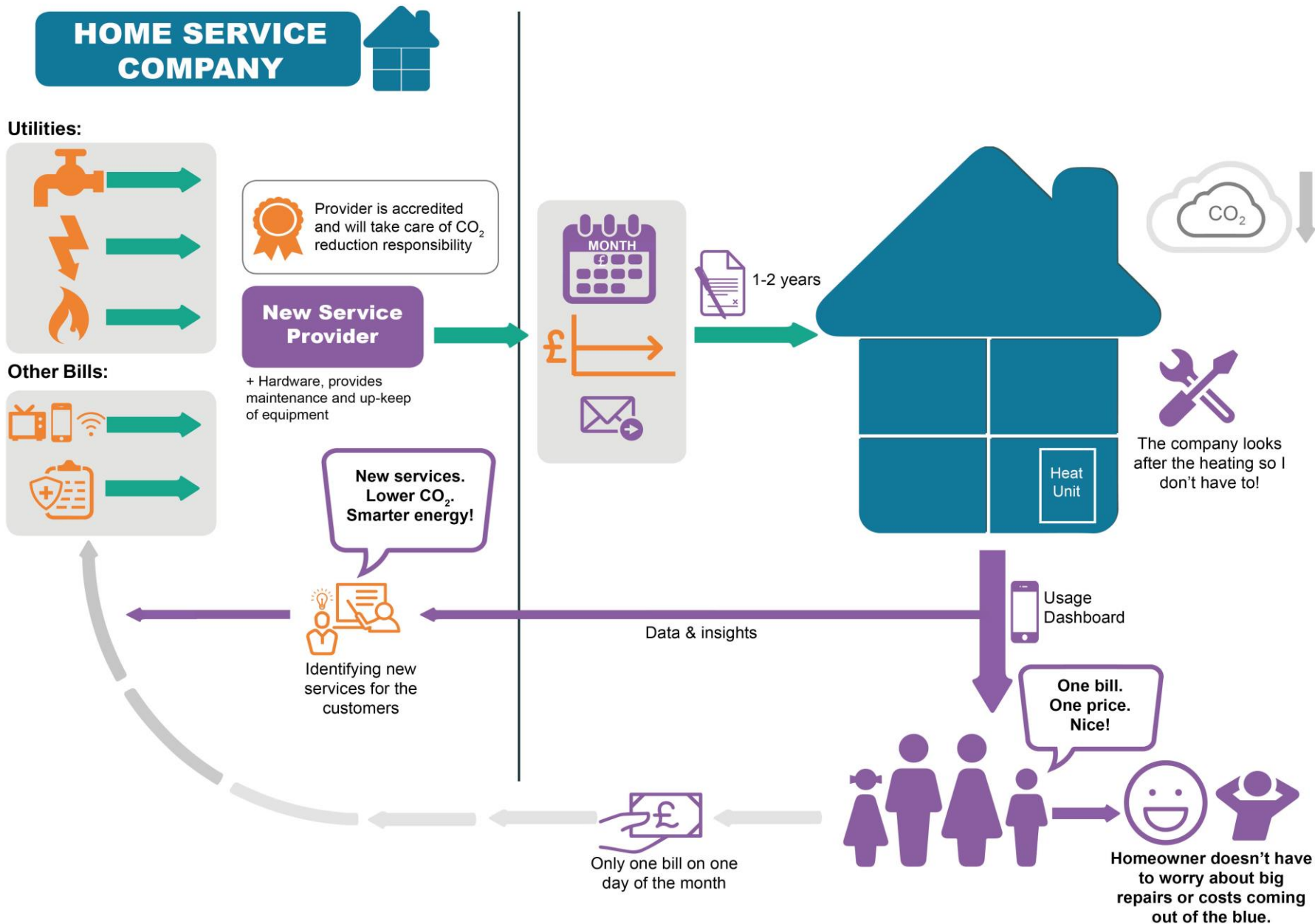
Representation of Business Models

- The following pages are **simple graphical representations** of the current state and the business model proposals
- **Urban Renewal is not covered.** This is generally understood by policymakers and the public but can take many forms which have not been examined in detail in this study.
- The objective was to **convey the essential elements** of each business model:
 - Range of services provided & by whom
 - The flow and timing of payments
 - The parties involved
 - The state of the home before and after the business model
 - Key benefits
 - Environmental effects
- These graphical overviews may help to **introduce the business model concepts at a high level** to both the **public** (for consumer insight work) and to **energy sector stakeholders**.
- More detailed process maps and business model canvasses, which will form the basis for designing the business processes and detailed value propositions, are provided later in the report.

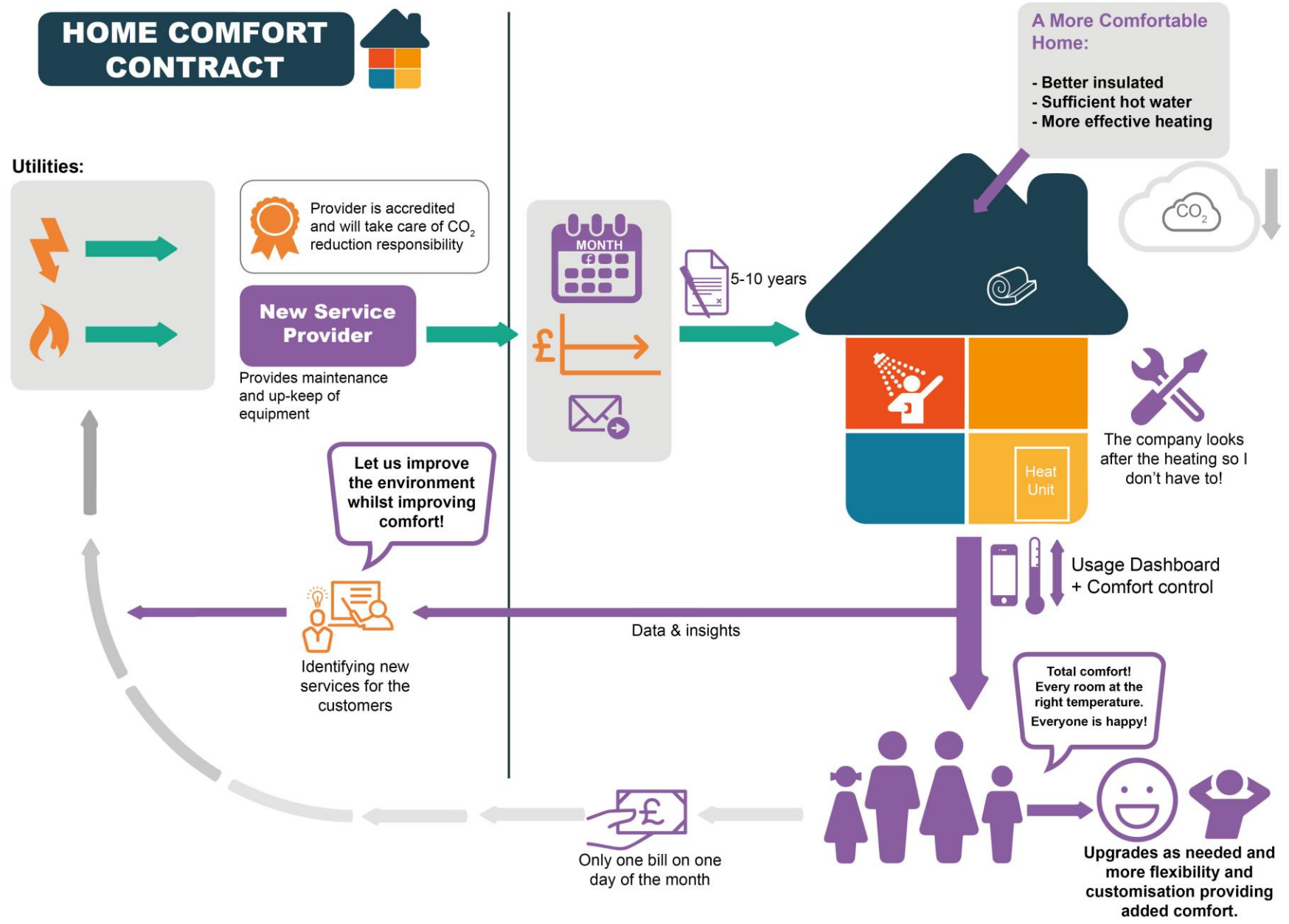
Simplified Representation of Current State Business Model



Simplified Representation of Home Service Company Business Model

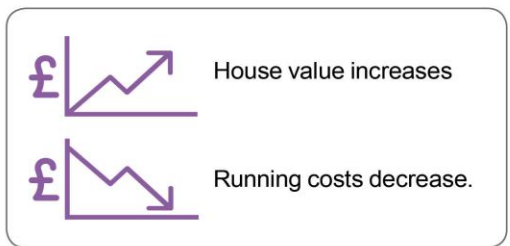
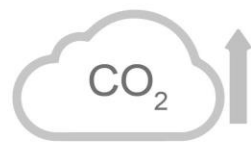


Simplified Representation of Home Comfort Contract Business Model

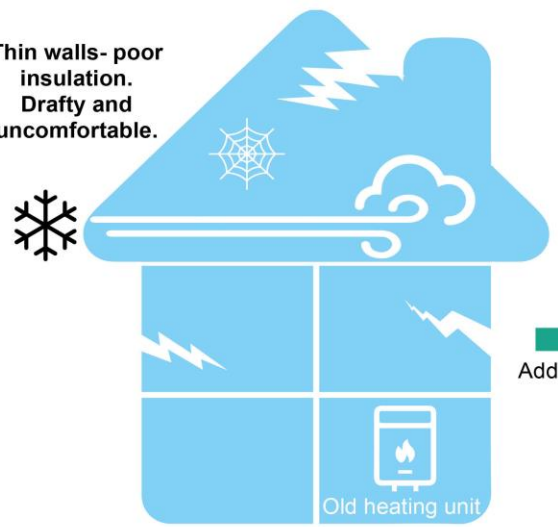


Simplified Representation of Home Moderniser Business Model

HOME MODERNISER



Thin walls- poor insulation. Drafty and uncomfortable.



Add cost to mortgage



< 10 days

Accredited renovation company:
 Prefabricated improvements for rapid fit & high quality.
 Modernisation can take place during house purchase, holiday or other convenient times.



House value?
 Energy bills?
 Too much £££
 Difficulty selling house.



Total comfort!
 Everyone is happy!
 Home and comfort transformed.



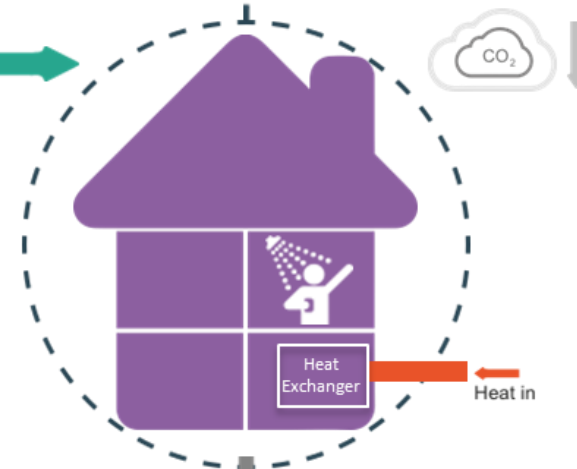
Health benefits -
 no damp, better air quality,
 no asthma.

Simplified Representation of Neighbourhood Heat & Electricity Business Model

NEIGHBOURHOOD HEAT & ELECTRICITY



Local Heat & Power Assets:



**New services.
Lower CO₂.
Smarter energy!**

Data & insights

**No boiler! Less risk & hassle
Feel part of the community!**

Only one bill on one day of the month



Main Report



New ways of positioning low carbon solutions to householders



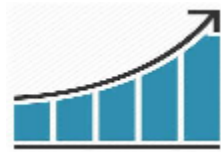
Consumer Engagement



Affordability



Low Carbon Penetration



Moving away from payback ...

Current business models have mostly **focused on payback** against energy savings and retained a **technical sales approach of separate items** linked to units of energy rather than outcomes. Financing is mostly **upfront cash** payments & **unpredictable**.

The need for & value of energy efficiency and low carbon heating are constant but the **current sales approach is underdeveloped** when compared with the marketing of other consumer products & services. As a result, there is **limited interest in & uptake** of low carbon heating solutions.

Let us change the way we sell products & services for comfort ...



Consumer Orientated



Finance Options for all



Full System Approach

... towards outcomes

Almost all successful consumer products & services are sold based on the **value of outcomes & aspiration** by **trusted providers**. Technology is usually a secondary issue and **hardware & services** are frequently **packaged together**. In addition, a range of **financing options** to ease purchase are readily available (e.g. car & mobile phone sectors) thereby reducing the affordability barriers. Turnkey **system offerings** are common.

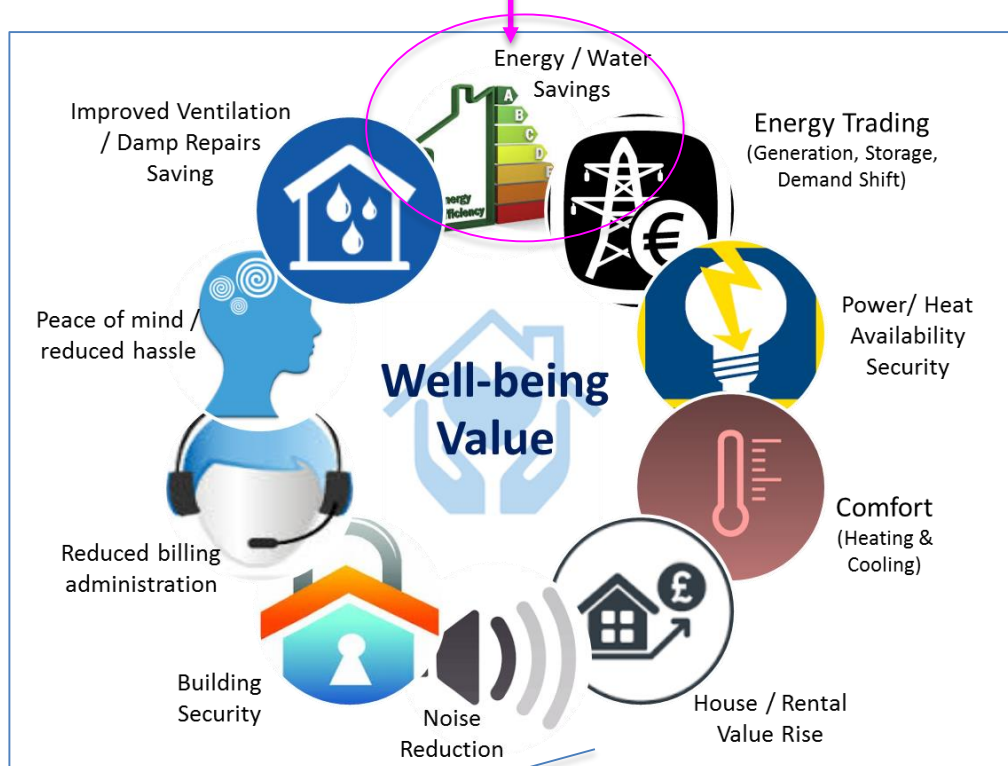
Technology is important to the solution but should not be hook to engage the customer.

*New Businesses Models can help overcome 'Barriers' provided that there is aligned supporting **policy** and **industry structure** that provides an economic case*

There is more value in well-being than kWhs - we propose a move to an outcomes-based marketing approach

Payback vs energy cost savings has been the dominant measure of low carbon viability. But how many consumers buy products & services based on payback?

Payback periods may not be the best way of selling to consumers



The **value of well-being** and comfort in a home goes far beyond the single vector of energy savings.

There are **many other issues and benefits** that are influenced by the choice of heating technology, state of building insulation, approach to appliance servicing and method of selling & payment.

These may have a greater bearing on **perception of value** and create more **engagement** than an uncertain forecast of savings in kWh & annual spend.

Marketing home insulation or new heating technologies against energy savings & **payback alone**, offers **little chance of success**. **Payback periods** are often over 10 years & frequently longer than the product lifetime.

By harnessing all the sources of value and changing the way in which financing and benefits are presented and packaged to the consumer, there is an opportunity to **demonstrate affordable & enhanced well-being** linked to home and heating system upgrades.

During the study a surprising finding was an indication of additional potential value associated with the community credentials of the energy supplier

The value of benefits may more than compensate for the additional cost of low carbon

Compared with predicted energy bill savings for home & heating upgrades of £10's to low £100's per annum, the **value** associated with improved health (e.g. reduced risk of asthma, better ventilation etc.), better control & comfort, peace of mind (e.g. no surprise bills or risk of costly repairs) and house value, could be much larger and perhaps more than **offset the additional cost** (after the impact of cost & policy enablers) of the low carbon upgrade (e.g. insulation, new heating and controls) when considered at the **annualised cost or value basis**.

Some of the themes proposed in this work are already being explored by other parties

John Lewis
Home & Garden Electricals Women Beauty

We're developing new services for your home
Help us understand which might be best for you by selecting your preferred option from the four below.

Home maintenance service
Subscribe and receive up to six all-day visits a year from a John Lewis handyman. Just photograph what needs to be done, list it on our app and we'll take care of it.

Moving home service
We manage all the niggling tasks of moving, from the disconnection of services to technology upgrades, advice on insurance, sourcing a boiler and more.

Home design
Our interior design and technology experts offer you a personal, in-home consultation helping you to upgrade your home, working with you to inspire and recommend solutions that suit your life.

Household management service
Under a single John Lewis Home Management Account, we pay all your bills, you pay one monthly fee. We provide quarterly statements and take care of switching to ensure you're getting the best deal.

Minus 7 – looking at an optimised full home system approach combining refurbishment with controls & new technology to lower bills and improve comfort

Minus 7
a heating revolution

Home About Minus 7 The System How It Works Benefits Case Studies News Contact

Minus 7 presentation

Hot water always available plus Heat pump operation

John Lewis looking at exploiting its trusted brand for the provision of home services and aggregation of utilities

Whilst these models address financing and peace of mind the providers carry no CO₂ obligation

Panellists were introduced to six hypothetical future energy models

Local energy models	This could be where both generation and supply – for example either a local authority or a community energy company.
Peer-to-peer energy	This could be the ability to get your energy from a neighbour, for example buying or selling solar energy.
Power of attorney	This could be where a company with 'Power of Attorney' can continuously switch a customer's tariff or supplier on their behalf, switching to the best option available.
Longer term contracts	This could be where consumers enter into longer term contracts with suppliers in return for better rates or more tailored services.
Pay-as-you-go power	This could be where consumers buy packs of energy for either a period of time or certain volume; they would only purchase energy every time the deal ran out.
Energy service models	This could be where a company charges consumers a fixed price to guarantee that they are comfortable – e.g. that they are heated to a minimum temperature.



Ofgem conducting consumer research in to new models for providing energy to consumers

Hasle Free Boilers
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Buying your new boiler just became easier
With Hasle Free Boilers there is a payment option to suit everyone. Scroll down to find out more about the different ways you can purchase a new boiler from us.

Hasle Free Option
Our flagship product. We offer a space-saving boiler that includes your own boiler and our after-sales care and maintenance cover plan. This means that you are completely covered from breakdowns, repairs, call outs as well as any repair and parts that may need making. Your boiler is also covered during your cover with our 10-year guarantee, which is not covered for us with any other.

Low Rate Finance
You can choose to have any of our new A-rated energy efficient boilers on finance (subject to status and terms). We offer no deposit options with low rates. You can also get 10% off your boiler and installation between 1 and 3 years, and if you decide to buy a deposit upfront then your monthly payment will be much lower. You are in complete control.

Buy outright
Many people simply choose to pay for their new boiler outright. All Hasle Free Boilers are covered with our 10-year, no deposit warranty, so you can relax, system built and new.

Provision of a boilers and maintenance over long term contract thereby removing the barrier of upfront cost

North Star Solar launches pioneering solar and storage scheme for colliery town



Residents of a coal mining town in County Durham will be offered a clean energy retrofit with no upfront cost, as part of pioneering council-backed scheme

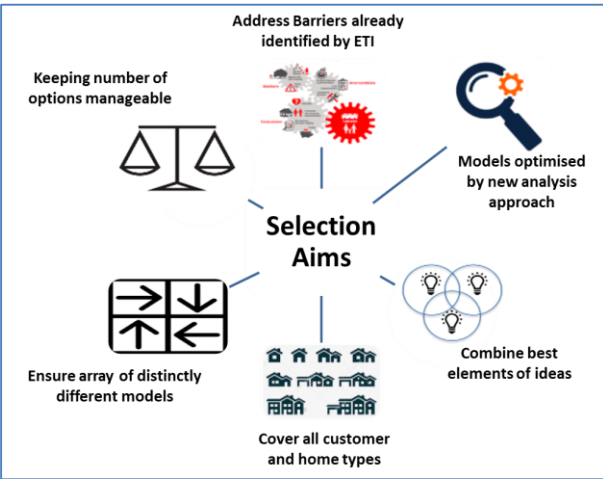
More than 35,000 households in the former mining town of Stanley in County Durham will be offered the chance to install solar panels, battery storage technology and LED lighting at no upfront cost thanks to a new partnership between Stanley town council and North Star Solar (NSS).

The initiative, called Stanley Town Power - was announced earlier this week, and will work independently of government subsidies. Instead, the technology will be installed using finance from institutional investors, with the cost paid back over a 23-year period through the energy savings households enjoy.

New UK start-up offering long term affordable financing for PV & storage installations

The 5 business models proposed were formed by combining the best ideas

Selection factors for business models



Models combined the best ideas & aimed to cover all housing segments

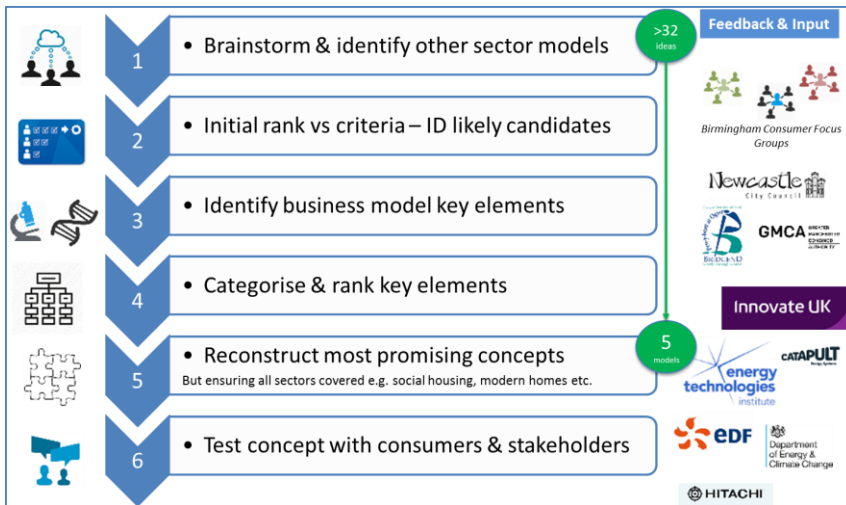
The selection process aimed to **address barriers** identified in previous ETI studies, key success criteria (as in the table below) and **cover the full range of house types & consumers**. Against this was the need to provide a **manageable number of distinct, flexible and potentially combinable options** that could be evaluated.

Instead of a funnel process of down-selection of best ideas, the process evolved to allow the **reconstruction of the best elements** from the full set of long list business model concepts generated at the brainstorming stage.

The final Top Tier model concepts were **built around some of the best ideas** from the brainstorming (as assessed against the criteria below) and against the need to cover a range of building states – from modern well-insulated to old and poorly-insulated.

It should be noted that none of the models specifies the technology solution to be used.

Taking models from ideas through to consumer validation



The selection process included the **dissection of underlying elements** and the **reconstruction of the best ideas** using the card game toolkit. **Consumer focus group feedback** helped identify any ‘red flags’ and further model refinements

Criteria used to rank business model concepts

Criterion	Assessment Guide	Weighting
CO₂ 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	●●

The identification of the Top Tier models used **assessment criteria from the working group** to assess the impact of **both business model concepts and individual component elements**.

Analysis of many ideas revealed an underlying architecture of business models for the sector

How business model ideas were broken down

From **over 32 business model (BM) ideas assessed** (arising from review of current models as well as new concepts developed by the team), certain **underlying components** were **identified**.

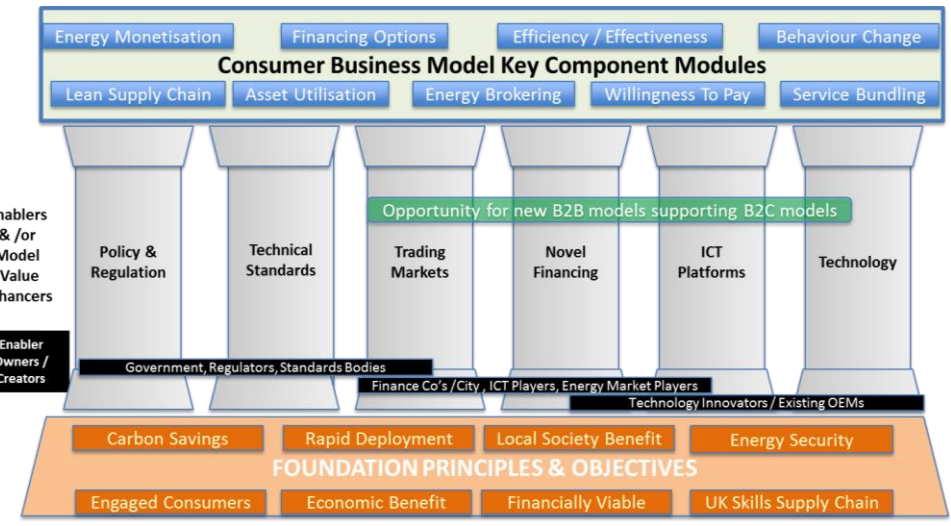
These were **categorised** – described as the 9 ‘Key Modules’. For each Key Module there were between 2 and 10 **sub-module elements identified** (e.g. Financing Options sub-modules included among others mortgage-based financing, allocation of FIT/RHI income, lease financing ...).

None of the 32 concepts in their original form utilised elements from all Key Modules or the most suitable sub-module elements, giving rise to the opportunity to insert new modules to enhance existing BM ideas or use the palette of over 55 module elements to devise brand new BM concepts – i.e. **combine the best ideas together**.

Key Modules Identified within Business Models

Key Module	Description	Benefits
Energy Monetisation	Trading value of storage, generation or demand management at aggregated or individual dwelling unit / energy asset level	<ul style="list-style-type: none"> Enhances business case for interventions Improves asset utilisation in wider network
Financing Options	New methods of paying for energy / comfort improvements or accessing funding for them	<ul style="list-style-type: none"> Deals with upfront cost for consumer Brings in new additional sources of capital
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.	<ul style="list-style-type: none"> Provider delivers most effective solution Reduces overheads of similar services Allows cross-financing or assets Reduces admin burden & risk for consumer
(Better) Asset Utilisation	Sharing assets, utilising better or exploiting by-products (heat) to reduce asset cost element of heat/power provision	<ul style="list-style-type: none"> Lower capex for consumer / provider Lower emissions
Higher (Energy) Efficiency	Reducing energy consumption of house or improving efficiency / running costs of appliances	<ul style="list-style-type: none"> Lower energy costs with better comfort Lower emissions
Lean Supply Chain	Changing channel, standardising product or its format to reduce cost of product / interventions – including hardware, installation and maintenance	<ul style="list-style-type: none"> Lower capex cost of interventions Potential local / UK job opportunities Faster / simpler deployment
Energy Brokering	Sourcing best deal / provider for energy with option of reducing cost risk / volatility for consumer	<ul style="list-style-type: none"> Lower energy costs / price risk to consumer Reduces consumer admin / anxiety
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	<ul style="list-style-type: none"> Moves thinking away from pure payback Puts higher value on soft benefits of upgrades Efficiency upgrades move up list of priorities
Behaviour Change	Encouraging by incentives, penalties, lifestyle options or information consumers to lower or shift energy use	<ul style="list-style-type: none"> Stimulates more energy saving interventions Reduces energy use / emissions

The Business Model Architecture identified during the project



Enablers identified to support the business models

Another insight from the analysis of 32 initial BM concepts was the identification of **6 types of market Enabler** (shown as pillars in the diagram). These **facilitate or may even be vital** for the success of a BM or the applicability of a BM component.

Examples of Enablers include internalisation of carbon, standardisation of heat pump designs (to reduce cost), HEMS & new trading licences to sell outcomes. These Enablers are **critical additional components** that must be developed in parallel with the BMs.

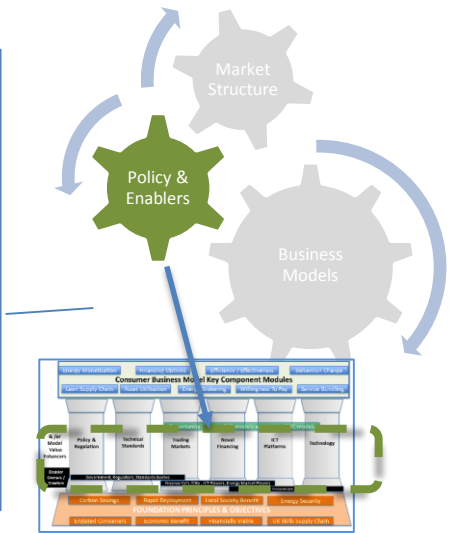
At the base of the BM architecture are the **target outcomes** for the business models.

Enablers play an important role in the success of any new business model

Enablers were identified ...

6 types of Enabler were identified through the examination of the 32 ideas and construction of new business model architecture.

Enablers are often linked with specific players in the Market Structure and interact with Business Models, making them more effective or indeed viable



... and grouped under 6 different categories

Novel Financing	Using methods common in other sectors for smoothed and planned long-term financing at competitive rates
Policy & Regulation	Permitting new providers to sell energy as a service and bundle utility offering, all with an obligation to reduce CO ₂ .
ICT Platforms	Home Energy Services Gateway: an 'open' platform for service providers to deliver new, bespoke and innovative products and services & empower customer.
Technical Standards	Standardising equipment specifications and installation to reduce cost and facilitate skills base.
Trading	The ability to monetise demand flexibility, storage & generation at individual household level
New Technology	For example, to reduce cost or increase capacity of energy storage

Policy, ICT and Technical Requirements Standardisation were deemed to have the greatest potential impact

Analysis of the working group suggests that the most significant Enablers would be **Policy, ICT and Standardisation**. It is notable that none of the business models depends on new clean technology per se and that financing typical for other sectors could be sufficient to move the market forward. Trading, whilst helpful, was after initial indicative quantitative analysis, deemed to have a minor impact in the value or cost of the home heating provision.

Policy has a vital or enhancing effect on almost all of the business models and proposals that have been outlined earlier. Aside from the assignment of CO₂ reduction obligations on new providers using the business models, policy could enhance the financial case in favour of low carbon heating versus gas boilers.

ICT such as HESG (including improved smart controls) would be **vital for assured levels of comfort** and provision of heating & power at the optimum cost. Transfer of **ICT approaches used in the commercial sector** could also enhance ability to **trade** demand shift at an aggregated level, provide **condition monitoring** of heating systems and offer **machine learning** to optimise control.

Standardisation of technical requirements into logical families of products with **common ratings & features and installation methods** could have a profound **effect on the cost** for heating technology. The existing value chain from heating appliance OEM to the market is a reactive one (boilers are a usually a distress purchase) comprising installers and wholesalers, each taking margin & each having their own brand and technology preferences. Installation is mixed in quality & represents a significant share of total system cost. An agency setting an optional UK standard for heat pumps coupled with nationwide tendering process could drive **consolidation of designs & supply chains** in a manner similar to the automotive sector to reduce cost and **reduce installation & service complexity**.

A business model game (toolkit) was developed

How the best underlying elements of ideas were combined

Dissection of all the original business model concepts revealed over **55 elements** which could be categorised under one of the 9 Key Modules (Energy Monetisation, Lean Supply Chain, Novel Financing ...).

In order to **facilitate** the development of **new business model ideas and their optimisation**, a **toolkit in the form a card game** was devised. Each of the 55 elements was captured on a card coloured according to its Key Module category.

Using this 'palette' of 55 elements captured on cards, new **business models could be constructed** with the ability to explore how elements could **be combined or be phased** over time or be added as optional extras within a business model.

Using the business model toolkit to create new models



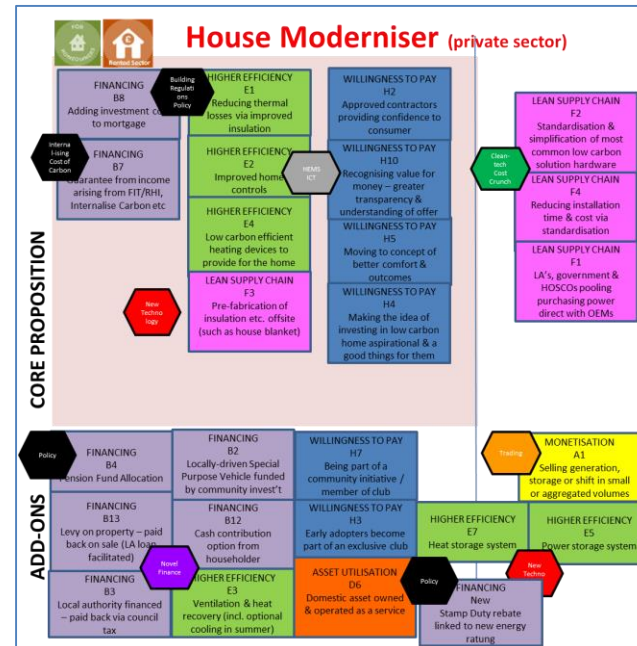
The game proved particularly **effective as a creative tool** for teams to **collaborate and develop** new model ideas. The above shows the output from a meeting involving the ESC with three of the Local Authorities

An extract from the list of business model elements & scoring

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 simplification 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 efficient 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

Some of the 55 elements extracted from the long list of ideas – later represented by individual cards in the card game toolkit

The output from a business model development session:



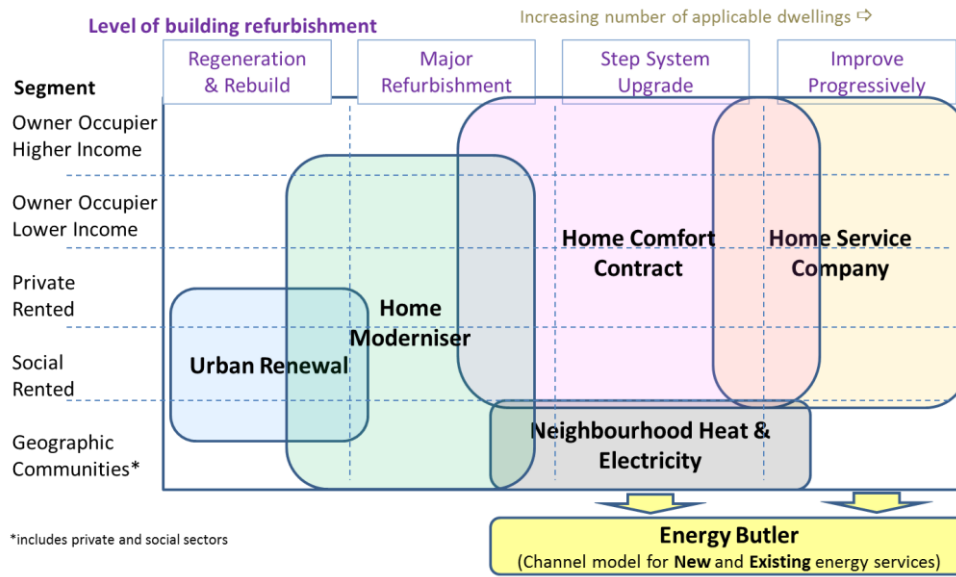
The business model idea created or refined using the card game was photographed and then captured in a form that could be presented to or discussed with other parties

The project identified 5 promising business models

<p>Home Service Company</p>	<p>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.</p>
<p>Home Comfort Contract</p>	<p>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.</p>
<p>Home Moderniser</p>	<p>An aspirational home upgrade offering improved occupant well-being through major improvement of insulation, controls, low carbon heating system within a full home system approach. Financed via the mortgage and/or cash contribution from the homeowner</p>
<p>Neighbourhood Heat & Electricity</p>	<p>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 supplemented, as necessary, by in-home heating technologies.</p>
<p>Urban Renewal</p>	<p>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 & more efficient use of land.</p>

The 5 business models are distinctive and offer a choice for every house and consumer segment

How the business models map across to segments



The 5 models cover all consumer segments & house types

5 business models are proposed that **cover the spectrums of consumer segments & house conditions**. These models are **not exclusive** & can take effect with existing & other new business models – & **can be combined** (e.g. Home Comfort Contract with Home Service Company). Some households will have 2 or more business models that would sensibly apply.

Given that approximately three quarters of the UK housing stock will require lower levels of home insulation upgrade, with a focus on conversion to low carbon heating systems, **Home Comfort Contract** and **Home Service Company** are likely to be the dominant models. Urban Renewal is not consumer choice but will play a part to deal with the very worst housing stock during a long term local authority-led plan.

A 6th model, **Energy Butler** is a channel for consumers to select the best value model & provider suitable for a household

The 5 models are distinctive and offer different propositions

The 5 main models offer different propositions in terms of **service aggregation, level of renovation and financing term**.

3 models - Home Service, Home Comfort Contract and Neighbourhood - provide a **continuous service** to householders. The other 2 – Home Moderniser and Urban Renewal – are **one-time events to transform efficiency & comfort** of the home, following which one of the other 3 business models could be adopted for ongoing heat provision.

Bundling of utilities delivery is the underlying principle of Home Service Company; and for Home Comfort and Neighbourhood Heat & Electricity, **heat, power & heating maintenance is bundled**.

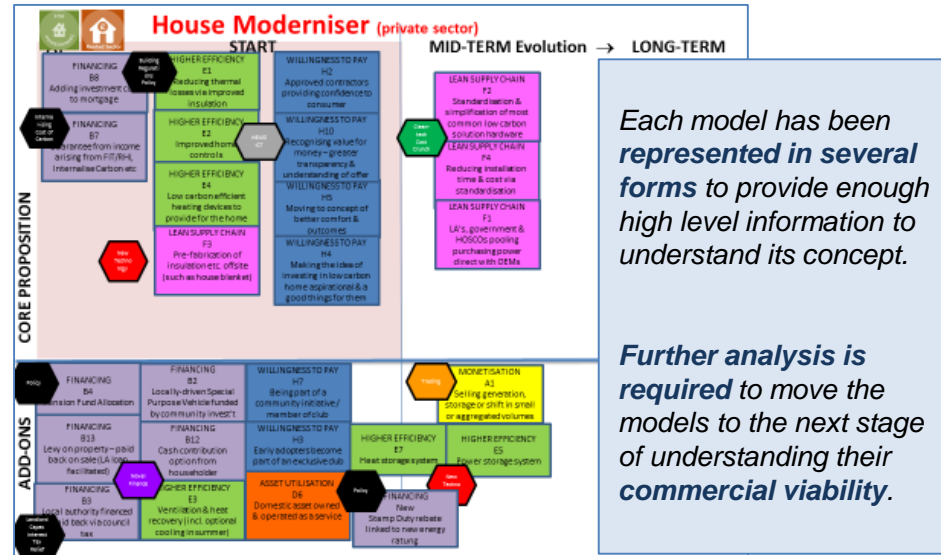
Financing varies by model. For insulation, controls and low carbon heating supply, **long term leasing or financing** is the main approach. For major overhaul, **mortgage financing** is proposed.

A comparison of the business models for the householder

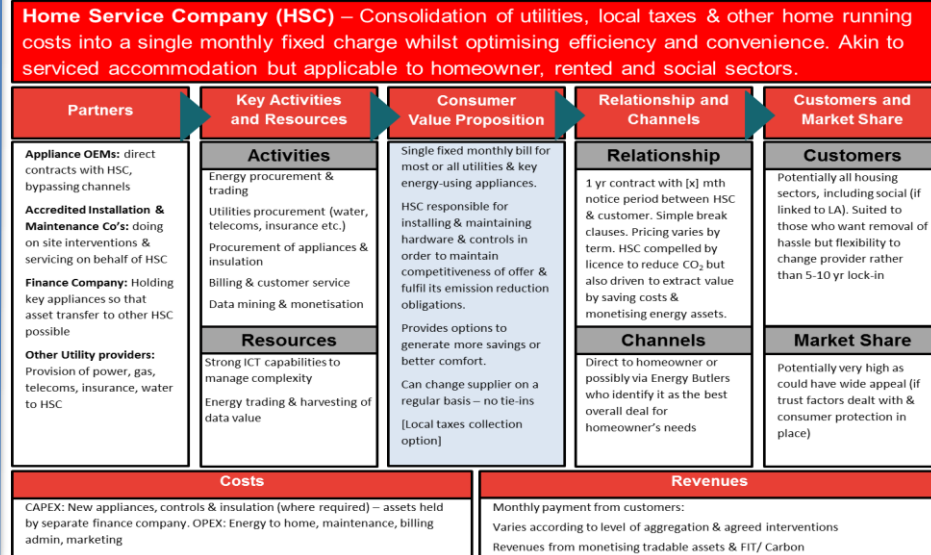
	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood Heat & Electricity	Urban Renewal
Novelty	High	High	High	Medium	Medium
Service Aggregation	High	Medium	As-Is	Medium	Could vary
Degree of renovation	Low – Medium	Medium	Medium – High	Low-Medium	Total – rebuild
Contract term	12 months +	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

Models are described in several complementary forms

A: Card deck: Business Model Elements (see appendices)



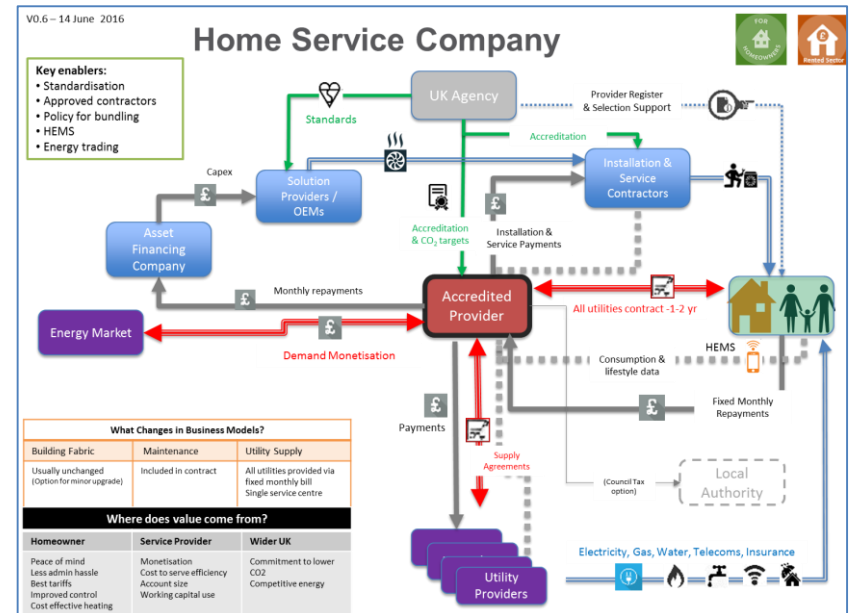
B: Business Model Canvass (see appendices)



C: Participant Roles Overview (see appendices)

Party	Core Model Role	Options / future role
Accredited Provider	<ul style="list-style-type: none"> 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 CO₂ reduction targets Assumes repayment responsibility for hardware changes in home Monetises demand shift, forecasting, data in the market 	<ul style="list-style-type: none"> Collects council tax on behalf of LA
Installation & Service Contractors	<ul style="list-style-type: none"> Install and manage any relevant energy appliances in home (paid for by Provider) 	
Utility Providers	<ul style="list-style-type: none"> Provide utilities to Homeowner via contract with Provider 	
Asset Financing Company	<ul style="list-style-type: none"> Provides finance for new low carbon systems in home Takes asset ownership with repayments via Provider 	
Hardware Providers	<ul style="list-style-type: none"> Manufacture heating hardware against standards set by UK agency Deliver direct to installers but paid by Financing Company 	
Catapult / UK Agency / Skills bodies	<ul style="list-style-type: none"> 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 	
Local Authority		<ul style="list-style-type: none"> May become a HSC itself Collects taxes via HSC

D: Business Model High Level Process Map (see appendices)



Business Model High Level Process Maps

- The following process maps for the business models explain at a general level the flows of **money, approvals, data** and other information, **utility or service supply** and where there are **contracts** between parties.
- These flowcharts, combined with the business model canvasses provide a **starting point for the design** of the detailed processes necessary for implementation of the business models.
- **Enablers** that are key to the success of the business model are highlighted in the top left and in the lower left corner highlights of the key changes and benefits vs the status quo are given

Entities within the process maps:

UK Agency: An evolved or new standards and/or regulatory body which may act to accredit new providers or integrators, offer impartial advice to consumers and set technical standards governing new low carbon technology.

Solution Providers / OEMs: Companies involved in the design and manufacture of low carbon heating solutions, including heat pumps, other low carbon heat devices (possibly CHP), advanced controls, heat recovery systems, insulation and other materials for improving the energy efficiency of the home.

Asset Financing Company: A bank or other financial organisation that will fund the capital cost of low carbon solutions for the business model. This company will receive returns on the investment via monthly payments relating to the service provided to the consumers.

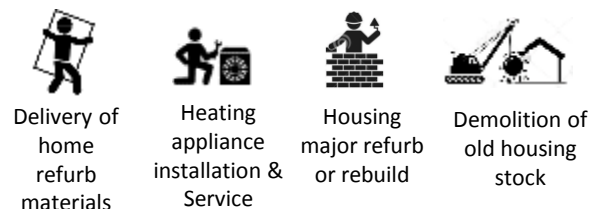
Accredited Provider: The entity selling services to the customer which acquires a certification of competence and integrity for delivery as per its licence conditions. Regular accreditation auditing of entity delivery to include customer feedback.

Installation & Service Contractors: These may be part of or contracted by the Accredited Provider and have a role to install and maintain the low carbon solutions in the home.

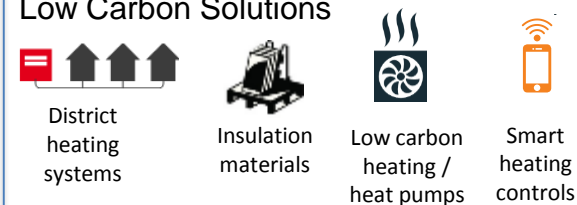
Utility Providers: In most cases the physical supplier of electricity, gas, water and telecoms (and onto which insurance could be added). They may themselves become Accredited Providers.

Icons used within flowcharts

Home upgrade



Low Carbon Solutions



Contracts & Regulatory



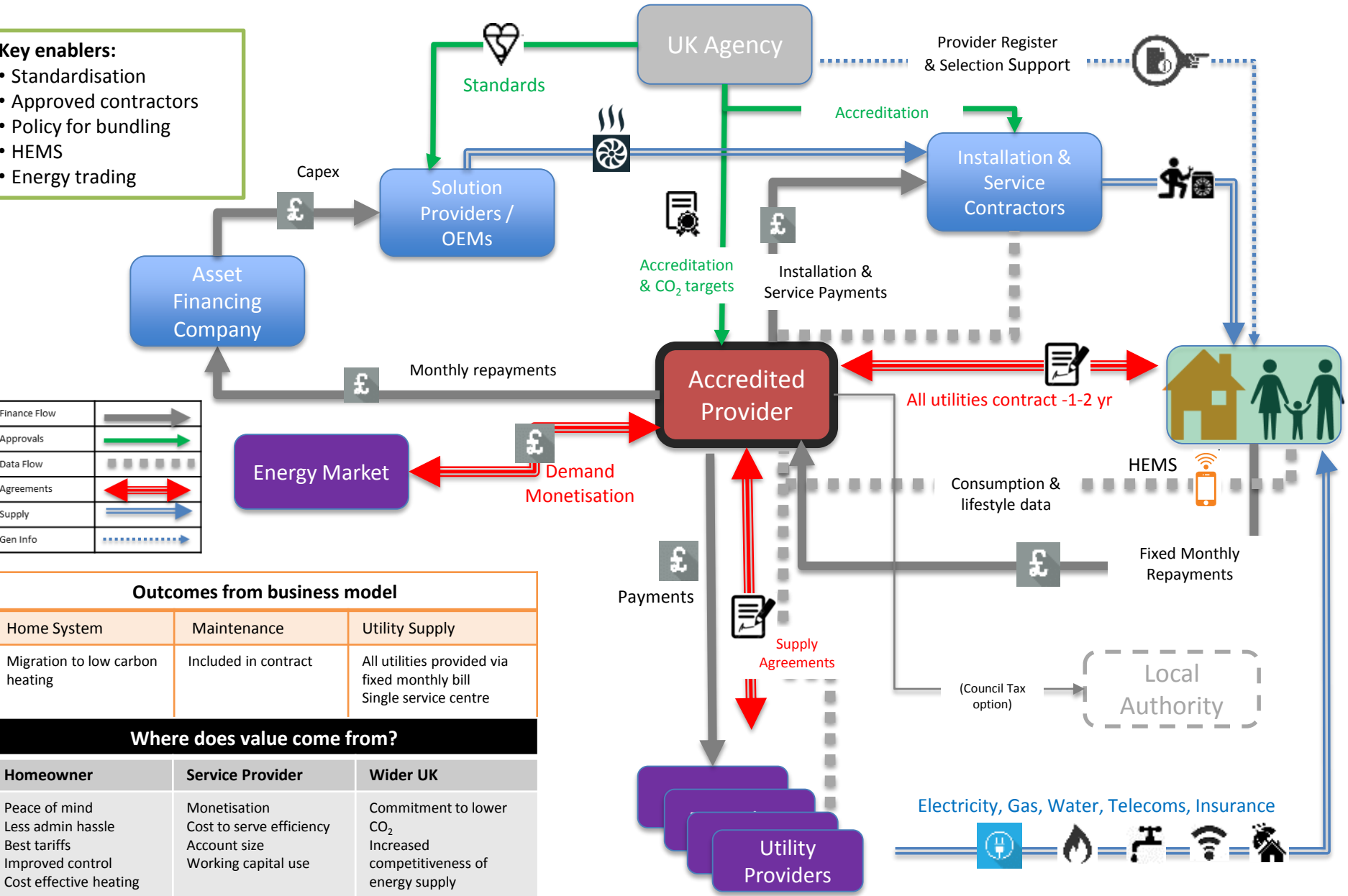
Utilities



Home Service Company – Process Map



- Key enablers:**
- Standardisation
 - Approved contractors
 - Policy for bundling
 - HEMS
 - Energy trading



Finance Flow	→
Approvals	→
Data Flow	↔
Agreements	↔
Supply	→
Gen Info	⋯

Outcomes from business model		
Home System	Maintenance	Utility Supply
Migration to low carbon heating	Included in contract	All utilities provided via fixed monthly bill Single service centre

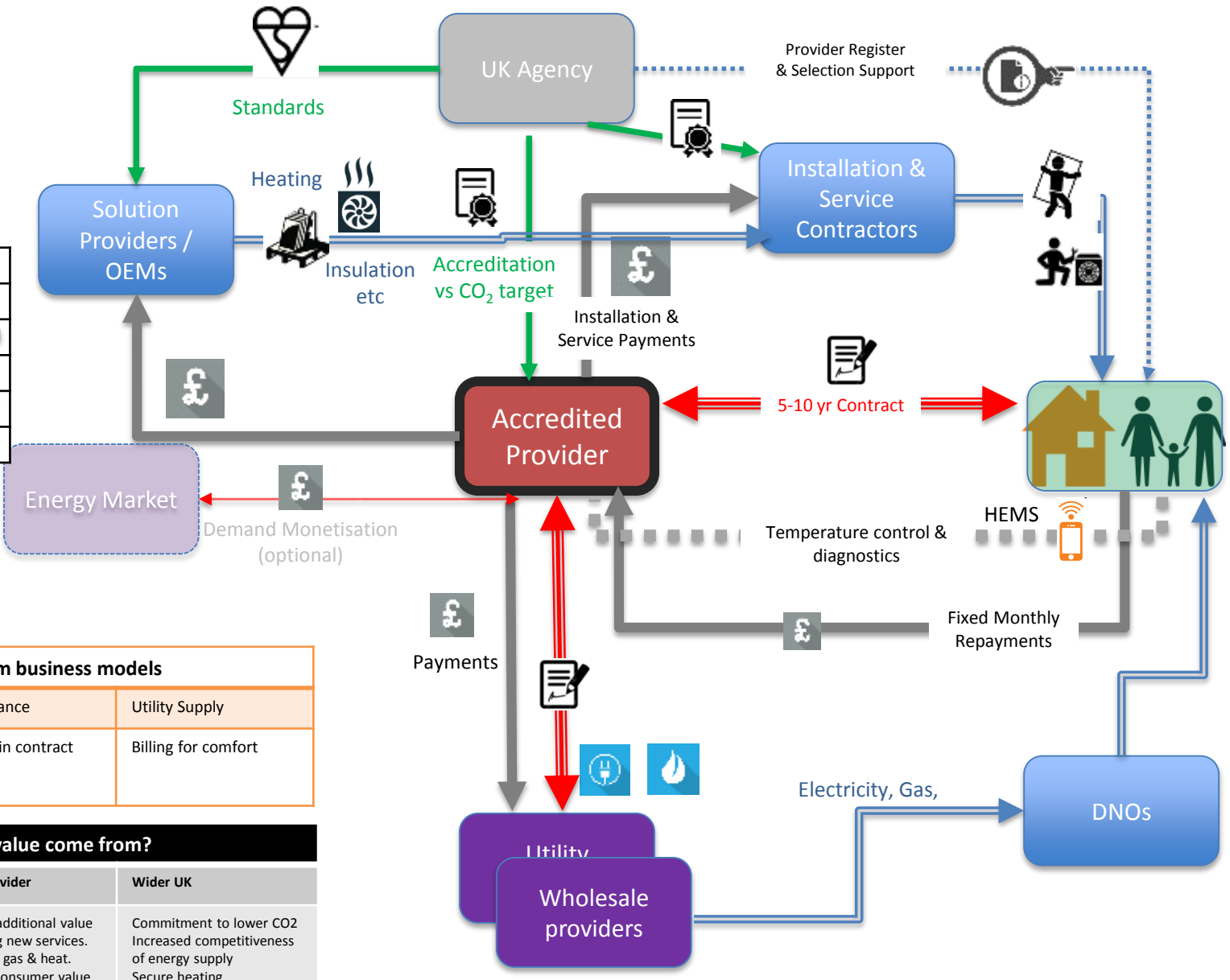
Where does value come from?		
Homeowner	Service Provider	Wider UK
Peace of mind Less admin hassle Best tariffs Improved control Cost effective heating	Monetisation Cost to serve efficiency Account size Working capital use	Commitment to lower CO ₂ Increased competitiveness of energy supply

Home Comfort Contract – Process Map



- Key enablers:**
- Standardisation
 - Approved contractors
 - Approval to bill on outcome vs kWh
 - HEMS

Finance Flow	→
Approvals	→
Data Flow	⋯
Agreements	↔
Supply	→
Gen Info	⋯



Outcomes from business models

Home System	Maintenance	Utility Supply
Usually upgraded to improve comfort & efficiency	Included in contract	Billing for comfort

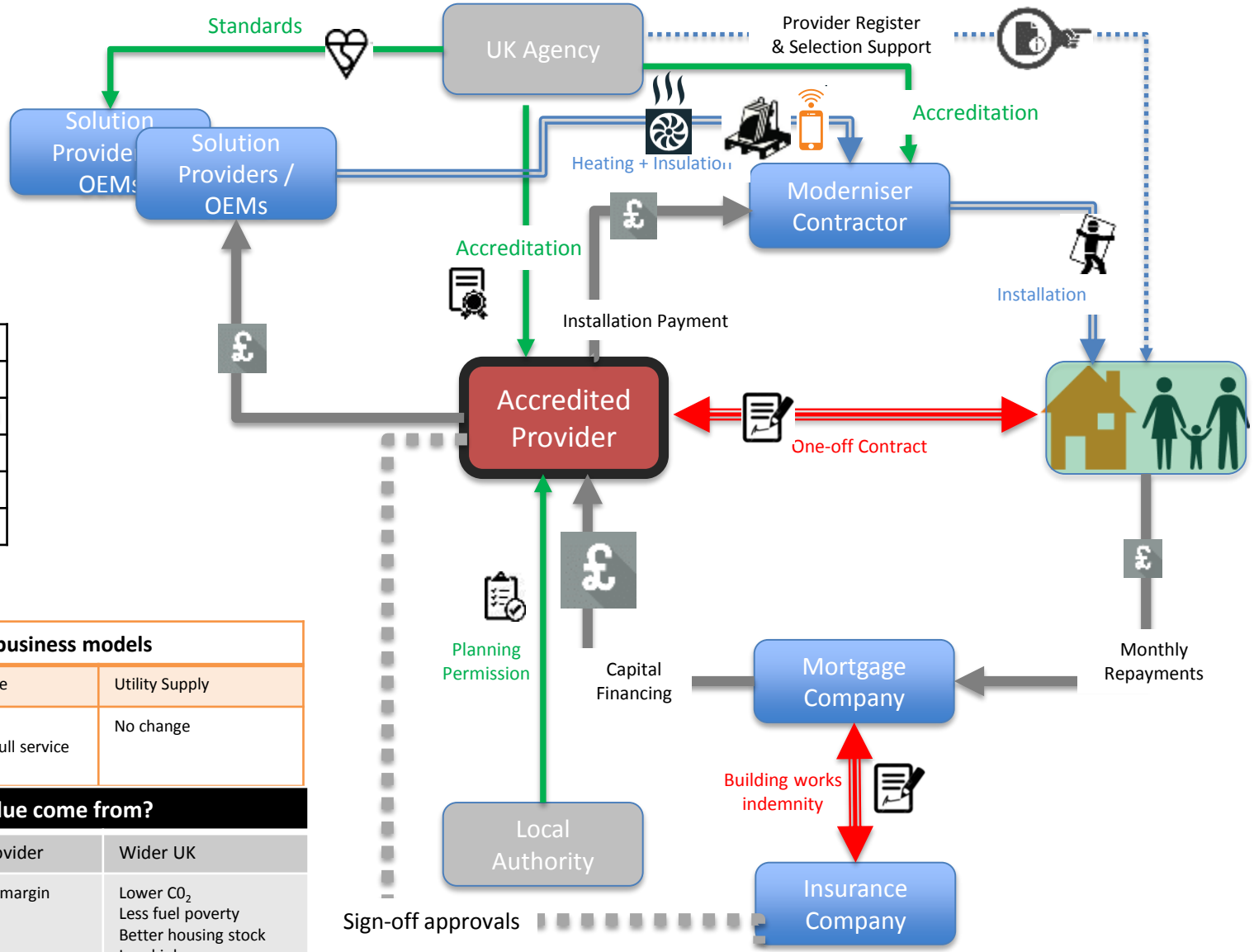
Where does value come from?

Homeowner	Service Provider	Wider UK
Comfort guarantee Peace of mind Less hassle Improved home	Extracting additional value from selling new services. Sourcing of gas & heat. Enhanced consumer value	Commitment to lower CO2 Increased competitiveness of energy supply Secure heating

Home Moderniser – Process Map



- Key enablers:**
- Standardisation
 - Approved contractors
 - Mortgage financing



Finance Flow	→
Approvals / Accred.	→
Data Flow	→
Agreements	↔
Supply	→
Information	→

Outcomes from business models

Home System	Maintenance	Utility Supply
Completely modernised – v.low carbon	No change (Option for full service provision)	No change

Where does value come from?

Homeowner	Service Provider	Wider UK
Lower bills Higher home value Better comfort Lower maintenance Lower cost of capital	Renovation margin	Lower CO ₂ Less fuel poverty Better housing stock Local jobs Lower peak demand

Neighbourhood Heat & Electricity – Process Map

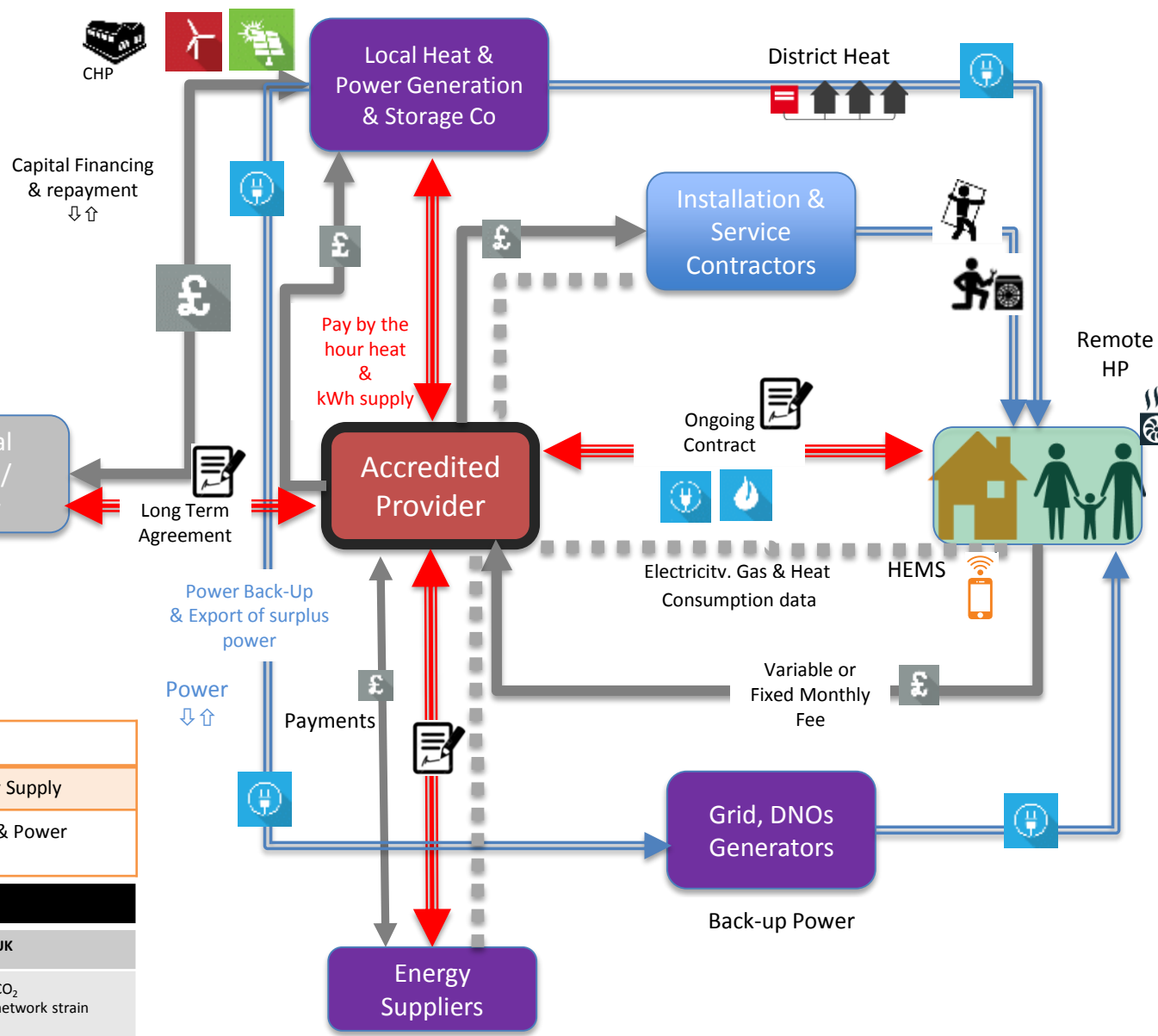


- Key enablers:**
- Approved contractors
 - HEMS
 - Policy including regulation & consumer protection
 - Standardisation

Finance Flow	→
Approvals	→
Data Flow	→
Agreements	↔
Supply	→
Gen Info	→

Outcomes from business models		
Home System	Maintenance	Utility Supply
Change to district heat or heat pump	Included in contract	Heat & Power

Where does value come from?		
Homeowner	Service Provider	Wider UK
Peace of mind Community provider Resilient supply	Selling heat & power Long term supply contract Monetising spare power	Lower CO ₂ Lower network strain (DG) Power security

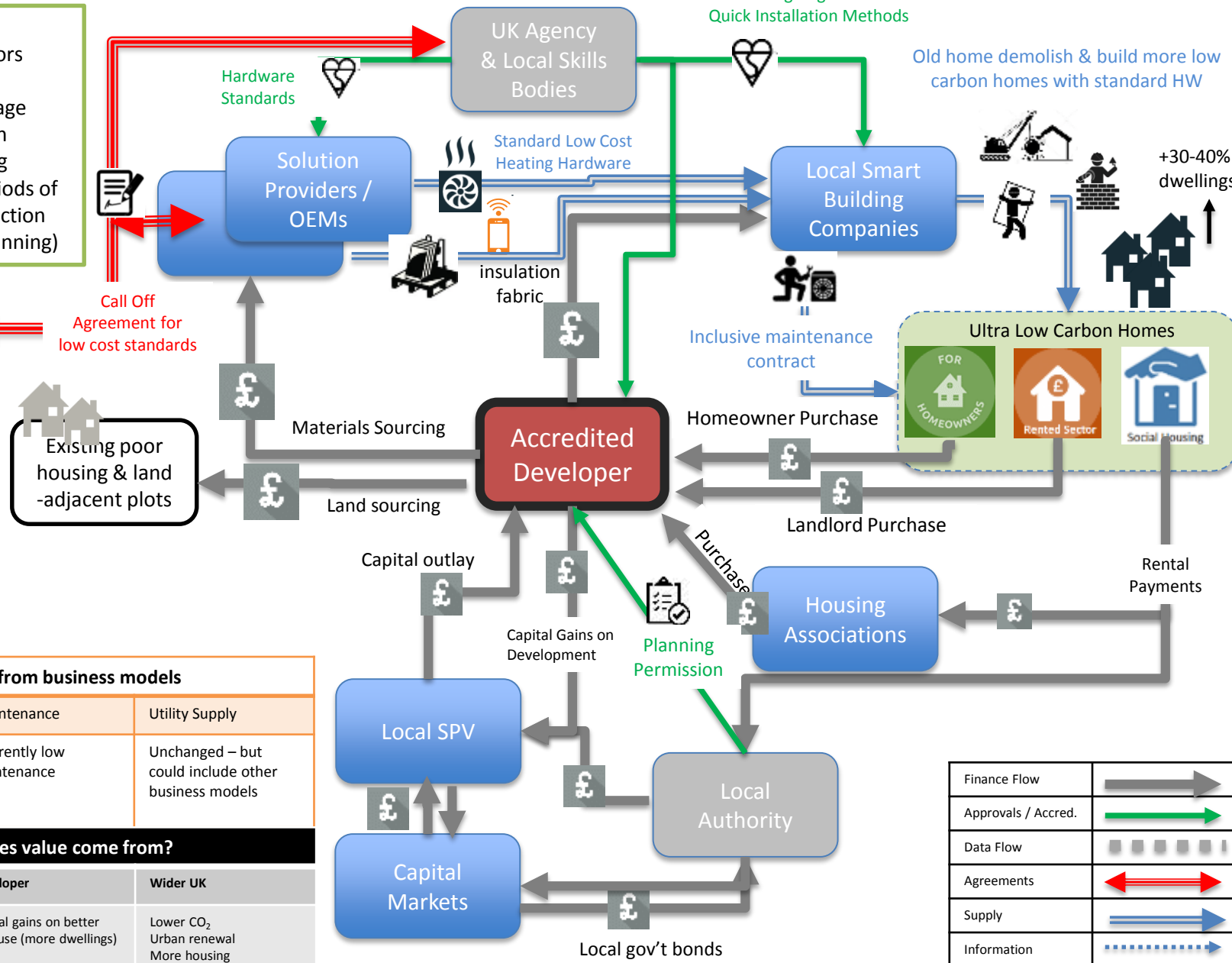


Urban Renewal – Process Map



- Key enablers:**
- Approved contractors
 - Standardisation
 - Procurement leverage
 - Planning Permission
 - Innovative financing
 - Building during periods of low private construction activity (policy / planning)

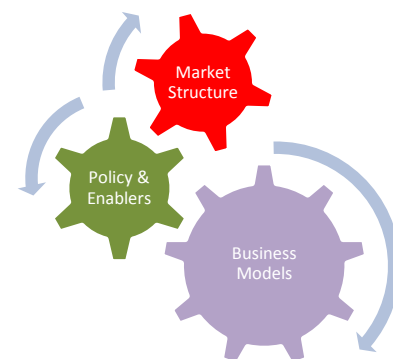
National Local Authorities



Outcomes from business models		
Home System	Maintenance	Utility Supply
More dwellings. All v low carbon Better quality More secure	Inherently low maintenance	Unchanged – but could include other business models
Where does value come from?		
Homeowner	Developer	Wider UK
Lower energy bills Higher comfort Better living environment	Capital gains on better land use (more dwellings)	Lower CO ₂ Urban renewal More housing

Finance Flow	→
Approvals / Accred.	→
Data Flow	⋯
Agreements	↔
Supply	→
Information	⋯

Effective policy & market structures are critical for successful implementation of new business models



*Although the focus of the project was on new business models for low carbon, it became clear early in the project that both **policy and market structure** would have significant bearing on the **impact of the new models** when deployed in the market.*

*Accordingly a number of **policy changes are required** before significant penetration of new models is possible.*

Issues to Address	Some Suggestions for Policy & Structure Solutions
New business models could make gas boilers more attractive. Need low carbon bias	New licences for accredited provider with obligation to reduce CO₂ within their customer portfolio housing stock, in line with UK targets, in exchange for access to market & ability to use new form of billing / tariff options (using the business models). Showcasing and real-home demonstrators of new technology to increase consumer awareness and confidence.
Longer & bundled supply contracts require high trust & consumer protection	New providers to be accredited with guarantees providing protection for consumers with regard natural monopolies (e.g. for Neighbourhood Heat & Electricity) and early termination of long contracts (e.g. Home Comfort) in case of poor service. Consumer protection e.g. Supplier of Last Resort (obligation of other providers to continue delivery), from the impact of business bankruptcy either by commercial failure due to market changes or government policy.
Accountability for and technical approach to reducing carbon for current homes unclear	Provider assumes position of home heating & energy system integrator to select what, how and when changes to the home (using best value combination of heating unit, controls, insulation etc.) are effected, whilst ensuring delivery of well-being at a fair competitive monthly charge.
The needs of the fuel poor	Government and local authorities could issue a minimum well-being outcome obligation on new providers, supported by the direct channelling of benefits (such as winter fuel allowance) to the provider. Fixed and fair monthly fees should assist budgeting & reduce fear of not being warm.
Current home taxation & benefits allocation does not relate to CO ₂ & efficiency	Internalising the cost of carbon for residential gas would enhance the case for low carbon heating systems in the new models. In addition, any tax relief for landlord mortgages, council tax and stamp duty could be directed at carbon intensity of a house and thereby stimulate investment in improvements such as building renovation & insulation , new controls and more efficient heating systems. Some scenarios may need restrictions on landlords passing costs through to tenants.
Imbalance of environmental charges between gas & electricity	Rebalancing environmental charges with a greater weighting on gas will favour increased adoption of low carbon electric heating.

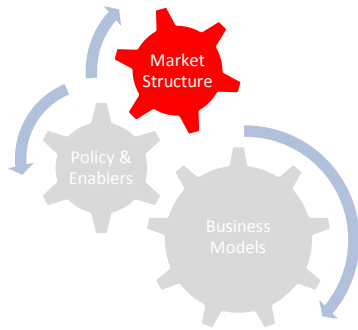
*The obligations on the new providers operating the business models will require a **new or evolved regulator**, assuring **consumer protection** and the attainment of **reducing carbon emissions** of the housing stock*

Effective business model deployment requires an integrator within the market structure for existing homes

Current market structure may not be optimised

Appropriate & clear allocation of scope and responsibilities between OEMs, energy suppliers and government form a key element for effective market transition.

Current industry structures & responsibilities may not provide the most effective solution for the existing housing stock.

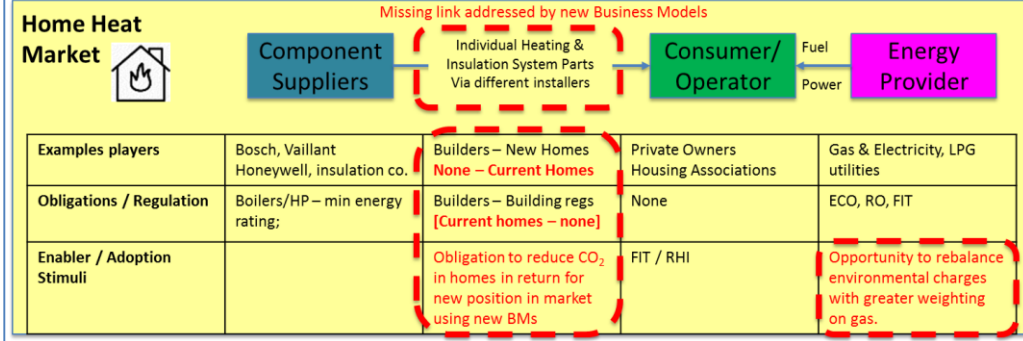
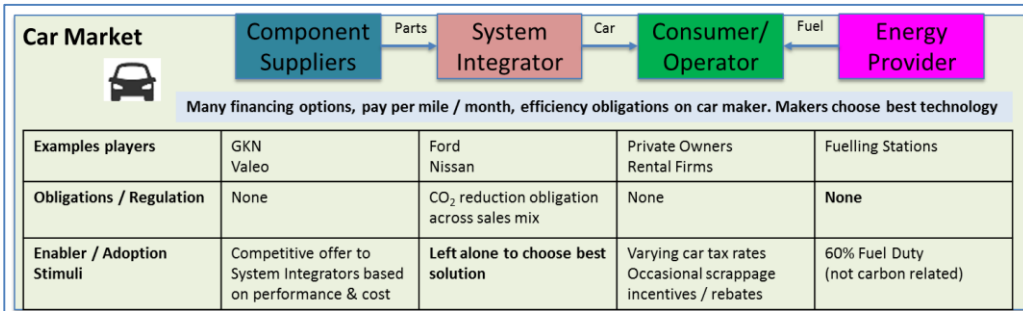


The auto sector uses long term financing effectively

59% of UK private vehicle purchases in 2015 used personal contract plans, which deliver a simple monthly cost for use & availability.

For new technology (EVs), **leasing** dominates as the selling method, particularly for companies where **total cost of ownership** is key factor

Let us look at how the car & heating markets compare ..



UK's old housing stock lacks an integrator

	Car Market (New)	Car Market (Old Stock)	Housing Market (New)	Housing Market (Old Stock)
Renewal Rate	HIGH Average age at scrappage 14 yrs Average age of vehicle 7.8 yrs*		VERY LOW 143k new homes in 2015 27m existing homes	
Government Intervention	Emissions Targets Trajectory	Scrappage incentives MOT checks	Building Regs Home Quality Mark Etc...	Various misaligned upgrade incentives
Efficient Solution Owner	System Integrator	None	System Integrator	None

The new housing sector has an integrator in the form of a builder bound by building regulations - but an **integrator is required for the current housing stock**, where the renewal rates are significantly lower than for old cars being replaced by new efficient ones .

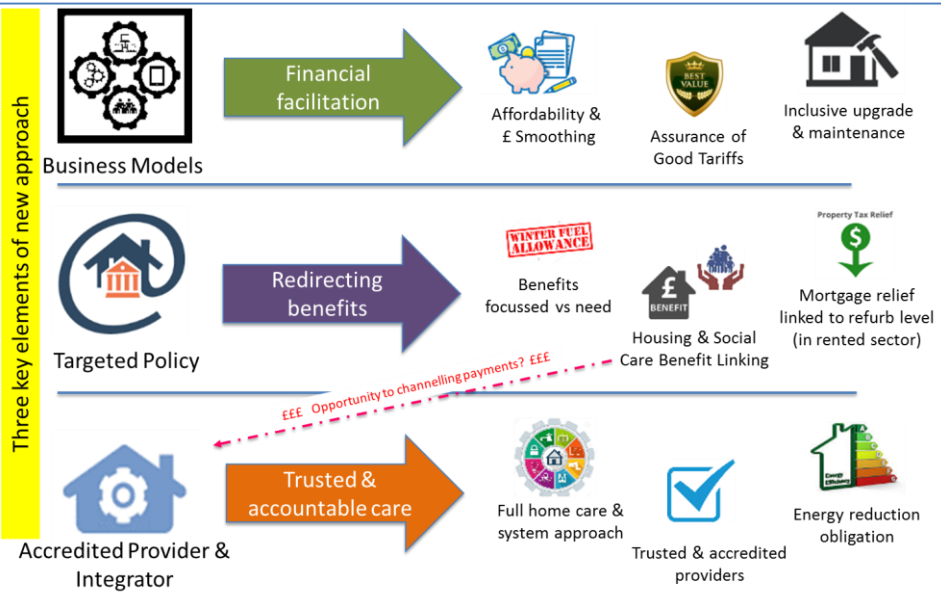
And OEMs have succeeded in commercialising new technology

The **auto sector** has used a **successful combination** of technical innovation, policy (reducing emission targets & carbon-related taxation) & **clear responsibility** (market structure) for **system integrators** (car OEMs) to effect steady improvement in efficiency whilst keeping the solutions **affordable** & the consumers engaged. The OEMs have the **freedom to select according to techno-economic criteria** the best **components & controls** to incorporate into the vehicle, using sophisticated engine management & driver support systems (akin to HEMS) to **optimise performance**.

In contrast to the residential energy suppliers, the **automotive fuel suppliers do not have any responsibility** for carbon reduction. Transportation fuel is taxed but at a level **not directly linked to the value of carbon**, although its high level has helped support the case for new low emission vehicles (e.g. EVs). There is an **opportunity to review the carbon taxation** for residential fuels which would help stimulate preferred low carbon technologies.

The new models offer new possibilities of supporting the fuel poor

Three key elements of the new approach to help the fuel poor



Combining the three elements effectively

The new business models can **help the fuel poor** by providing **affordable long term financing and insurance** against financial shocks associated with unforeseen repairs or replacement. In addition the utility **aggregation models** such as Home Service Company and Home Comfort Contract can serve to ensure that the **most appropriate & competitive tariffs are secured** for a consumer group often not in a position to identify best deals or lowest cost payment method.

Policy could **reallocate and concentrate the existing pool of benefits** (such as winter fuel payments and social care) so that they, via the accredited provider, **guarantee the well-being** of the residents. For the **rented sector**, policy related to landlord mortgage tax-relief for instance, could drive **greater fabric upgrade**, addressing efficiency and well-being simultaneously in a sector with some of the worst housing stock.

An **accredited provider will be in an ideal position to find the most effective means of delivering its obligation of well-being to the fuel poor.**

All the business models assist the fuel poor in some way

Given that all models are associated with improving energy efficiency in a competitive market, **running costs** for a given comfort level **should reduce**. In most cases the financing method will **remove upfront cost burdens**. **HEMS or similar control systems** that, by default, will be part of the business model offering will help monitor and assure warmth.

The incentive for landlords to improve homes

With **policy stimulus**, landlords may find it attractive via **directed tax relief with efficiency thresholds** to participate in Home Comfort Contract and Home Moderniser business models to make a **step change** in housing condition and tenant comfort.

Issues to Address for the Fuel Poor	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood Heat & Electricity	Urban Renewal
Proportion of income spent on fuel	✓	✓	✓	✓	✓
Cannot afford cost of upgrade	✓	✓	✓	✓	✓
Exposed to shock costs (repairs/bills)	✓	✓	✓	✓	✓
No safeguard for warmth		✓	✓	✓	✓
Health issues linked to poor housing		✓	✓		✓
Unlikely to secure best utility terms	✓	✓		✓	
Poor quality (rented) housing		✓	✓		✓

Positive initial consumer feedback but some issues to address

Focus Group methodology & objectives



3 focus groups, each 120 minutes long were conducted in Birmingham in April 2016 ^{*}

Group	Size*	Ages	Home ownership profile
1	n=9	25 – 34	Local homeowner with mortgage
2	n=3	35 – 49	Local homeowner with mortgage
3	n=6	50 – 65	Local homeowner –no mortgage

- **Explore consumer reactions** to a **rough outline** of the business model concepts (excluding Urban Renewal)
- Understand the **benefits and concerns** identified by consumers – and identify any ‘red flags’
- Uncover potential **refinements** needed to optimize the models and increase their appeal to target consumers

**Group sizes were smaller than commissioned because of participants cancelling at last minute.*

Focus Group findings

Participants **responded positively** to **all** the high level models. **Comfort outcomes, fixed bills, & one aggregated household bill** were particularly well received being perceived as easier & reducing hassle. Neighbourhood Heat was felt to be more efficient, cheaper & safer than home boilers. Some participants suggested **combining all 4 models**.

However, **participants struggled to understand** how each model would impact them because limited detail was available on the implementation of models at the time.

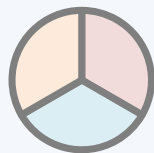
Participants also highlighted that **models must offer flexibility** to the consumer and be **supported by success stories** to give confidence. A **lack of trust in heating providers & installers** arises from the complicated nature of heating systems and heating costs being opaque and difficult to control.

Aligning to how consumers make decisions on comfort

Previous ETI work **showed that consumers can be broadly divided into 3 categories based on the factors they prioritise when making decisions about buying and using heat**. The full list of 32 ideas was assessed against these consumer drivers. The feedback from the **focus groups identified benefits** of the high level model ideas that were well **aligned to the needs** of these different groups e.g. Home Comfort aligned with the needs of those prioritising comfort or balancing comfort & resource. Home Service aligned with those disinterested or balancing comfort & resource.

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.

Suggested Next Steps

Models to be developed further to set out more **detailed consumer value propositions** in line with needs & priorities and address **how** they will be **implemented**. 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

Opportunities for further research might include:

- Needs-based concept development
- **Developing consumer value propositions** & price points
- Evaluating appeal & **potential uptake rates** of the final models

We carried out a triangulation analysis of the indicative analysed cost & value of each business model

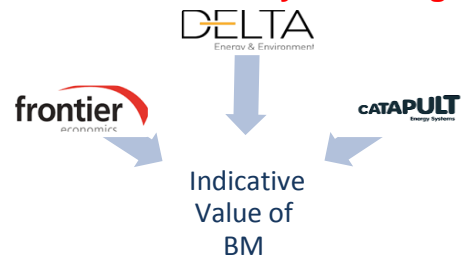
Three high level estimations were used ...

The **models are at an early stage** in their development & validation. Accordingly, the qualitative (consumer research) and quantitative analysis were conducted at a high level to understand the **indicative viability** of a model and any key **sensitivities and concerns** whilst models can be easily adapted.

...for a single use case (house type) per model

For the **indicative quantitative analysis a single use case per model** was chosen, with as much **commonality across the models** as possible whilst ensuring the type of house was relevant to the type of heating and fabric change of that model. A **3-bedroom semi-detached house**, being a prevalent dwelling type, was chosen with headline assumptions for each model outlined below.

Quantitative Analysis Triangulation Contributors



It was deemed appropriate at this conceptual stage to **triangulate the perspectives of three parties** rather than have a single organisation analyse in depth, which is more suited to a later validation stage.

Frontier Economics was selected as it had carried out extensive studies for the ETI and had developed the **BMET tool** to quantify the financial and emissions effects of low carbon heating interventions. Frontier used BMET assumptions and algorithms in some part to facilitate the analysis. **Delta Energy & Environment** has extensive experience in researching the consumer attitudes and energy savings for low carbon technologies for the residential market. The **Energy Systems Catapult** and project team was able to draw upon its data and market intelligence sources.

The use cases applied for the indicative analysis:

	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 Counterfactual 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

A set of fabric change **assumptions** covering **insulation, heating system upgrades and utility aggregation** were selected (details in appendices). In all cases, **HEMS installation was assumed** as well as an appropriate form of **heat pump or district heating system**. For houses of energy band D or lower, insulation upgrades were assumed as being included in the business model offer.

The limitations of the analysis

The analysis assessed the **indicative annual running cost of home well-being** for each business model in **2020** and compared this to the 2020 counterfactual (using 2016 as a baseline with inflation assumptions). **Extensive additional analysis will be required** to determine the financial viability for the **full range of house and occupancy variations**. **It did not consider set up costs** for evolving businesses, new entities, IT systems, accreditation, new agencies and marketing. No allocation of value in the supply chain was made. The **soft** (willingness to pay) and **hard benefits** need further study **detailed consumer insight** for each model is **required**.

For **Urban Renewal**, whilst some analysis was carried out, the quantitative method proved **too uncertain** as it was overly sensitive to assumptions in **land value** and change in **housing density**. Further analysis is required involving redevelopment specialists.

Three Enablers – **cost reduction via appliance standardisation, assembly time reduction and internalisation of cost of carbon in natural gas** were also applied to the business models

Looking at well-being as an annualised cost to change perceptions of value and affordability

Relatively little of a typical household income is spent on keeping warm

For a typical 3-bedroom semi-detached home with 2 adults and 2 children, the **annualised cost of running the home** (apart from major non-heating repairs and mortgage) came in at **£4,580** based on the average of Frontier & Delta figures. This compares with a UK government estimate of median household disposable income of £25,600. Therefore **<20% of income spent on home well-being** and given that about of 1/3 of this is for heating & power **<7% is spent on keeping warm & clean**.

For 2 adults in a home, well-being works out at ~ **£7/day per person** or ~1 hr of work at minimum wage.

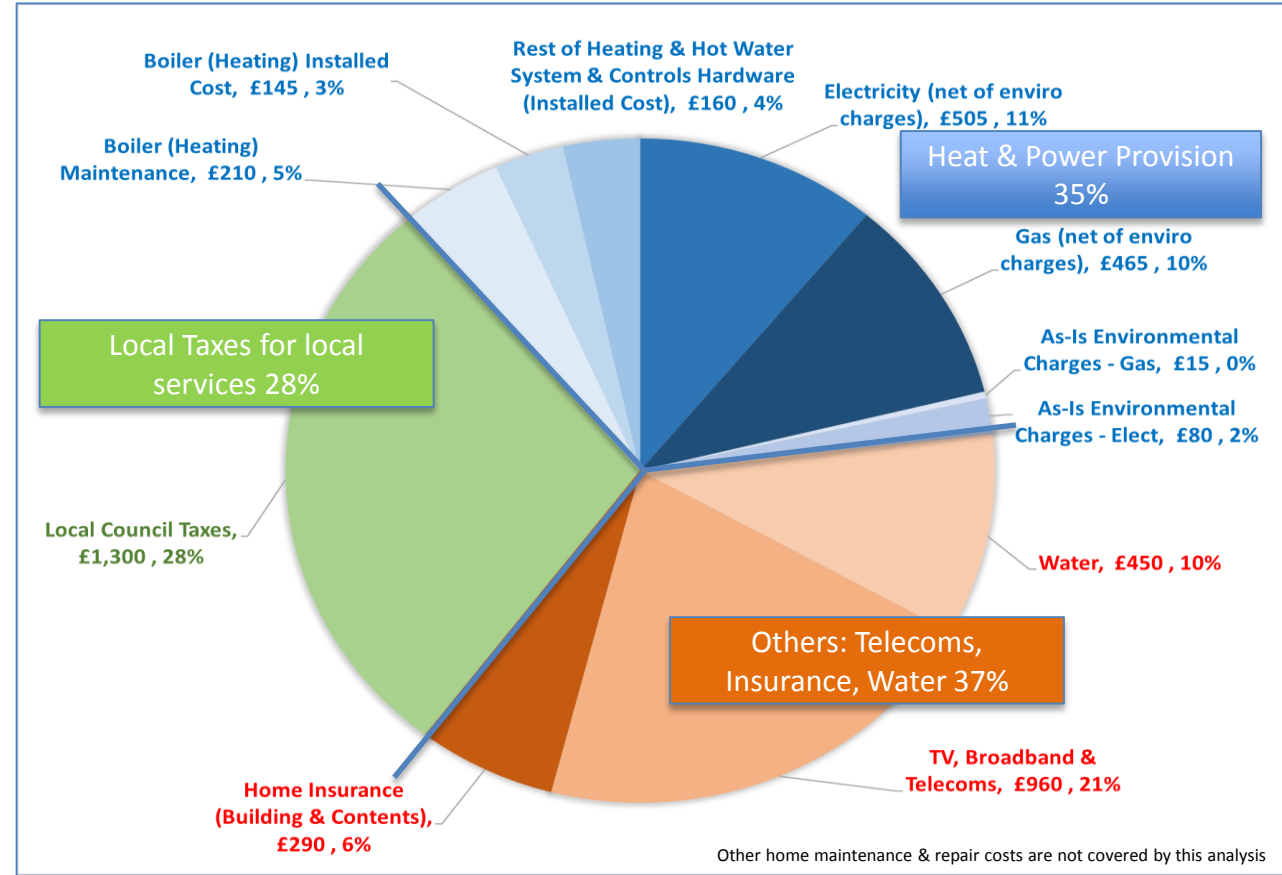
Heating & power (including the heating appliances and running costs on an **annualised basis**) comes to just ~ **£2.50 per day per adult**.

Long term financing can help affordability of improvements

When considering investments to improve the quality of the home comfort, **annualising the capital cost through long term financing** such as a mortgage (or perhaps equity release for older homeowners) can make the change in monthly outgoings **affordable** and perhaps seemingly favourable compared to the benefits of increase house value, better comfort, reduced damp and lower maintenance costs.

Annualised current running cost of a typical 3 bedroom semi-detached house

Based on average of Frontier & Delta estimates. Excludes mortgage & non-heating repairs



Home Upgrade Costs vs Average UK Disposable Income		Short Term Loan 8% over 5 years	Mortgage 4% over 25 years
£5,000	Annual Cost	£ 1,212	£ 312
	% of annual disposable income	5%	1%
£10,000	Annual Cost	£ 2,436	£ 636
	% of annual disposable income	10%	2%
£25,000	Annual Cost	£ 6,084	£ 1,584
	% of annual disposable income	24%	6%

High level analysis suggests the models could create householder value

A high level first evaluation of potential feasibility by 3 parties The estimated impacts of the business models (average)...

The analysis was conducted at very high level, with the assessment of the soft (willingness to pay) benefits, in particular, being quite subjective. Therefore further consumer insight work is needed.

The approach of annualising the cost of well-being (rather than looking at payback periods) demonstrates that the business models may create a viable value proposition for the householder versus the 2020 counterfactual.

As mentioned earlier, the Urban Renewal is very difficult to assess, leading to widely varying perceptions of value.

Upon carrying out more detailed assessment of the practical deployment of the business models there may be further costs to include. Moreover some of the benefits of the Enablers may take longer to realise.

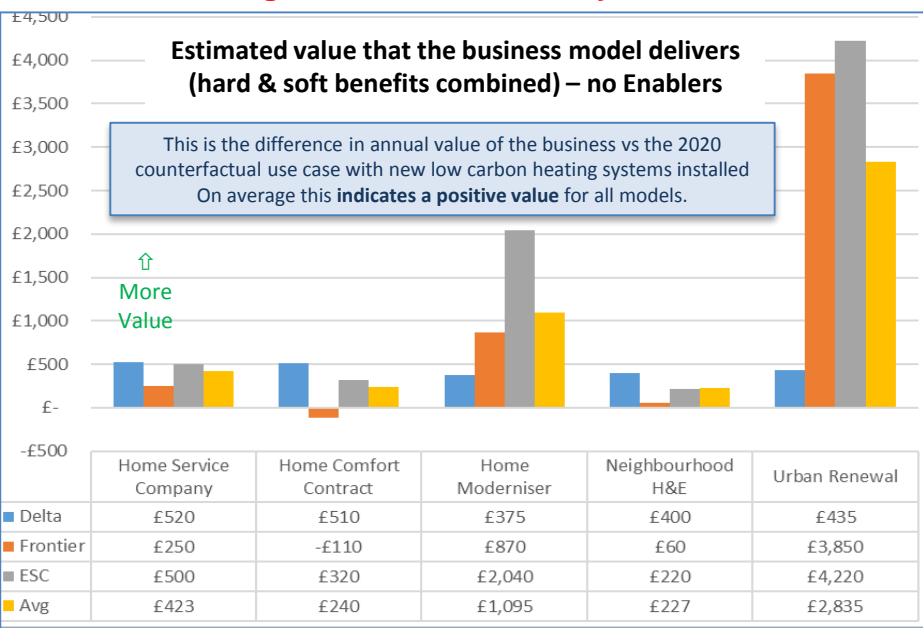
Model	Counterfactual 2020	Home Modifications	Bus. Mod. Hard Benefits	Bus. Mod. Soft Benefits	Additional Enablers Effect	Potential Annualised Cost
Home Service	£ 4,620	£ 300	-£ 350	-£ 80	-£ 240	£ 4,250
Home Comfort	£ 4,757	£ 90	-£ 160	-£ 80	-£ 280	£ 4,327
Home Moderniser	£ 4,890	£ 880	-£ 540	-£ 560	-£ 560	£ 4,110
Neighbourhood	£ 4,693	-£ 70	-£ 100	-£ 130	-£ 170	£ 4,223
Urban Renewal	£ 4,820	£ 2,900	-£ 120	-£ 2,720	-£ 460	£ 4,420

Counterfactual 2020 – adjusted household costs using 2016 baseline
Home Modifications – includes annualised cost of heating / fabric changes in homes
Hard Benefits – est. monetary savings or value created as a direct result of the business model
Soft Benefits – estimated value of willingness-to-pay premium for the business model
Enablers Effect – additional hard savings possible in capex, installation & carbon

Estimated hard benefits of all the models (average)

Hard Benefits of Business Model	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood H&E	Urban Renewal
Energy Trading Opportunity	£ 30	£ 30	£ 10	£ 10	£ 30
Improved Forecasting Benefits	£ -	£ -	£ -	£ -	£ -
Lower power distribution costs	£ 10	£ 10	£ -	£ -	£ -
Extracting Value of Consumer & Consumption data	£ 10	£ 10	£ 10	£ 10	£ 10
Change in admin costs from a bundled service	£ 40	£ 10	£ 10	£ 10	£ -
Lower switching costs with longer contracts	£ 30	£ 20	£ 10	£ 10	£ 10
From business model financing method	£ 40	-£ 30	£ 440	£ -	£ -
Savings from optimising sourcing	£ 160	£ 110	£ 70	£ 70	£ 70
Net Costs of ICT Enhancements	£ 10	£ -	£ -	£ -	£ -
Total	£ 330	£ 160	£ 550	£ 110	£ 120

The estimated ranges of value created by the business models



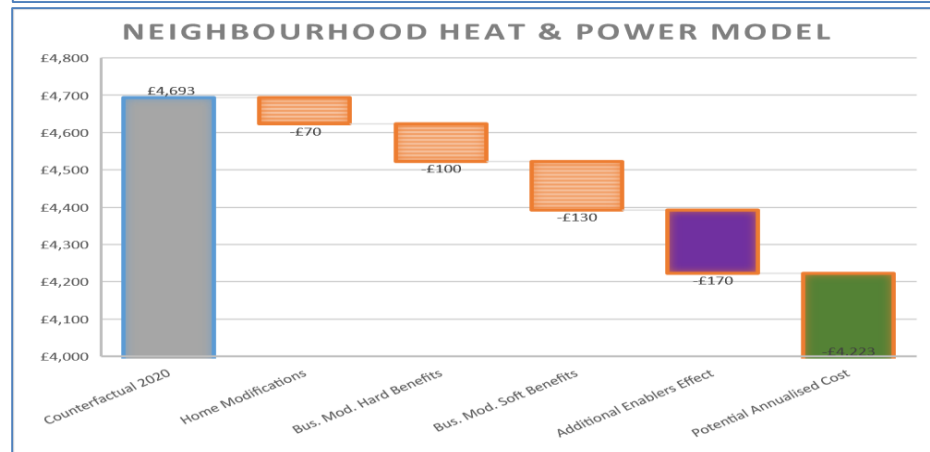
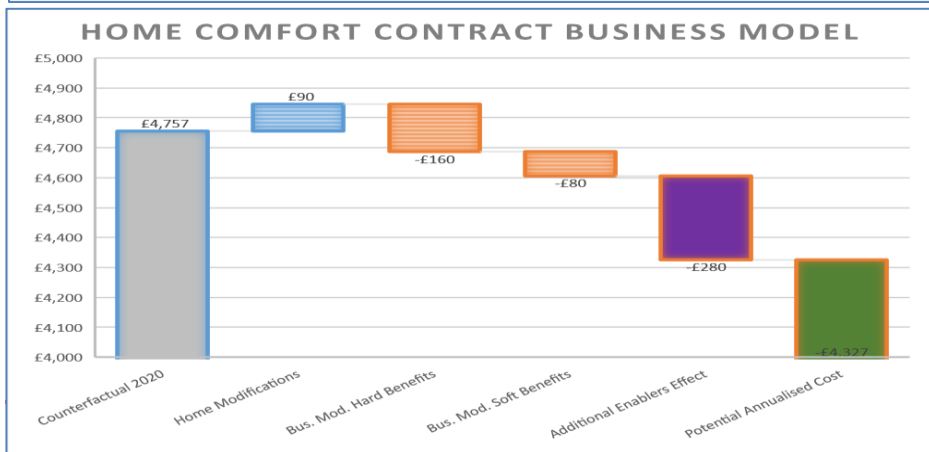
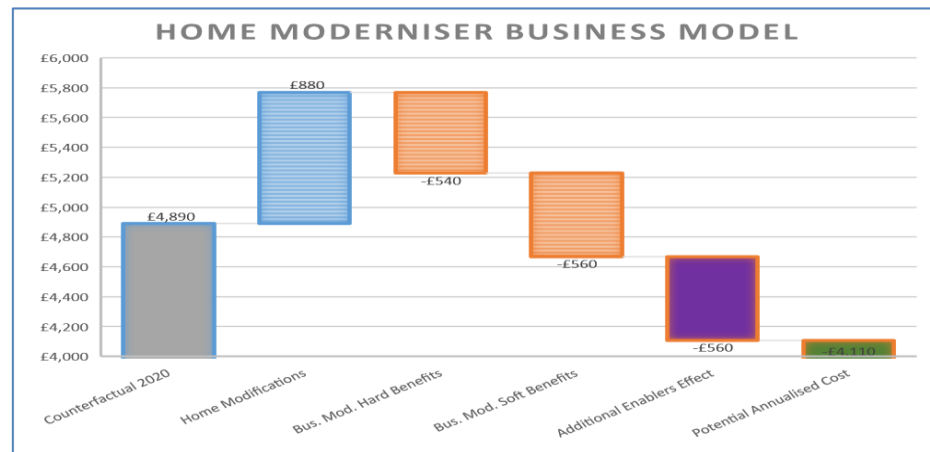
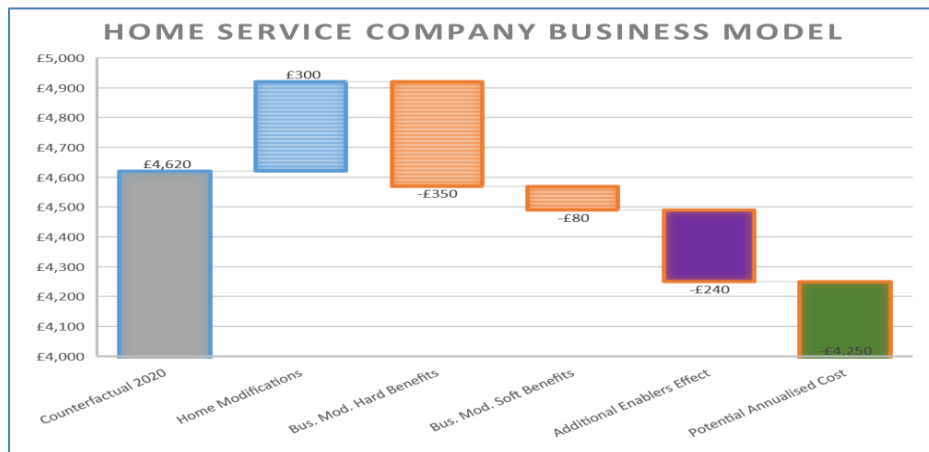
Soft benefits (willingness-to-pay) estimates (average)...

Willingness To Pay Factors	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood H&E	Urban Renewal
Change in house value	£ -	£ -	£ 420	£ -	£ 2,560
Convenience & removal of hassle	£ 10	£ -	-£ 20	£ -	£ -
Comfort and Control	£ 20	£ 30	£ 20	£ 20	£ 10
Noise insulation	£ -	£ -	£ 50	£ -	£ 50
Community value / benefit	£ -	£ -	£ -	£ 20	£ -
Damp / air quality / health	£ -	£ 50	£ -	£ -	£ 50
Security of power supply & heat	£ -	£ -	£ -	£ 20	£ -
Predictability / fixed billing peace of mind	£ -	£ -	£ -	£ -	£ -
Elimination of surprise costly repairs	£ 10	£ 10	£ -	£ 10	£ -
Avoiding upfront cost of capex	£ -	£ -	£ -	£ 10	£ -
Higher rent earning power	£ -	£ -	£ -	£ -	£ -
Trusted providers (with guarantees)	£ 30	£ 30	£ 20	£ 30	£ 20
Space Savings	£ -	£ -	£ -	£ -	£ -
Perceived safety benefits	£ -	£ -	£ -	£ 10	£ 10
Others ...	£ 10	£ 10	£ 10	£ 10	£ 10
TOTAL	£ 80	£ 80	£ 550	£ 130	£ 2,710

Estimates for these soft factors are difficult to make. Further research is recommended

Comparison of the indicative annualised effect of the business models

Annualised value waterfalls for the main business models based on typical & applicable 3 bedroom semi-detached houses



Note that the analysis does not attempt to present how any potential annualised value is spread or redistributed across the value chain.

Enablers make an important difference to the viability of the business models but need further examination...

The annualised impact of the Enablers shown to the right are averages of the estimates from the three parties (ESC, Delta, Frontier).

Note that the negative value of internalising carbon for the Neighbourhood Heat & Electricity model arises from two of the data inputs assuming that the gas-fired district heating plant were to face carbon prices after 2020.

Enablers that could enhance business models	Home Service Company	Home Comfort Contract	Home Moderniser	Neighbourhood H&E	Urban Renewal
Reduction in assembly time of improvements	£60	£63	£287	£17	£213
Reduction in capex of heating systems for business model	£100	£97	£93	£203	£63
Effect of internalising carbon	£80	£123	£177	-£50	£183
Additional Effect of Enablers	£ 240	£ 283	£ 557	£ 170	£ 460

The models could be introduced progressively to consumers to provide assurance and time to modify thinking

The rationale for a staged approach

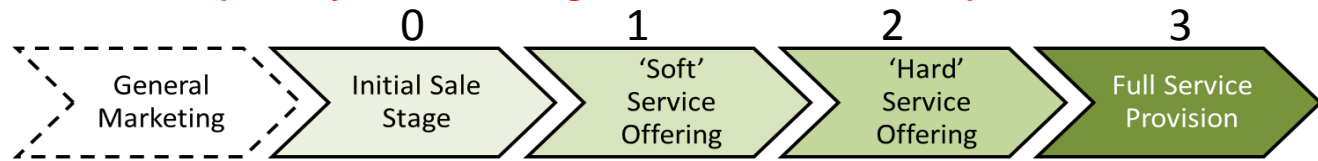
The new business models for the ongoing supply of comfort (Home Comfort, Home Service and Neighbourhood Heat) are likely to have several **emotional barriers** to overcome **with consumers**:

- **Lack of trust** in providers, particularly **new unknown brands**
- **Concerns regarding long contract terms** for some models
- **Fears over ability to deliver reliably** new aggregated services
- **Hesitation over handing over house (temperature) control** to providers if required

Mistrust and **willingness to adopt** novel business models **varies** among consumers; some will be willing to engage quickly and others may prefer a **slow staged approach**.

The physical changes in the house and cost commitments for the consumer are greatest with a change in heating system, rather than for controls or billing, which is easily reversed and a perceived **low risk** step forwards.

Potential pathway for introducing new models for comfort provision to consumers



Duration	1-3 months	After 1-6m	After 1-12m	After 1-24 m
Purpose	<ul style="list-style-type: none"> • Introduce suitable BM concept & benefits • Gain customer confidence • De-risk outcomes 	<ul style="list-style-type: none"> • Get customer used to remote control of heating • Build trust with provider • Show initial benefits 	<ul style="list-style-type: none"> • Introduce improved appliances where appropriate • Take over appliance ownership & service 	<ul style="list-style-type: none"> • 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				●

Progression stages: ○ = optional ; ● = provided

A progressive offer

- 0 – Introduce BM concept – HESG/HEMS as potential trial option (Initial Sale Stage)
- 1 – Introduce new fixed billing & HESG/HEMS controls
- 2 - Introduce appliance/fabric upgrades as necessary & full maintenance service
- 3 - Introduce demand shift agreements & option to offer other services to consumer



Offering HESG early

HESG could be offered immediately to consumers during a **trial period** so the usage **profile of the householder** can be determined and the **commercial & technical proposition tuned** in the best interests of the consumer.

The business models still have work to be done before they are investable & market ready

Further work is required before taking models to market

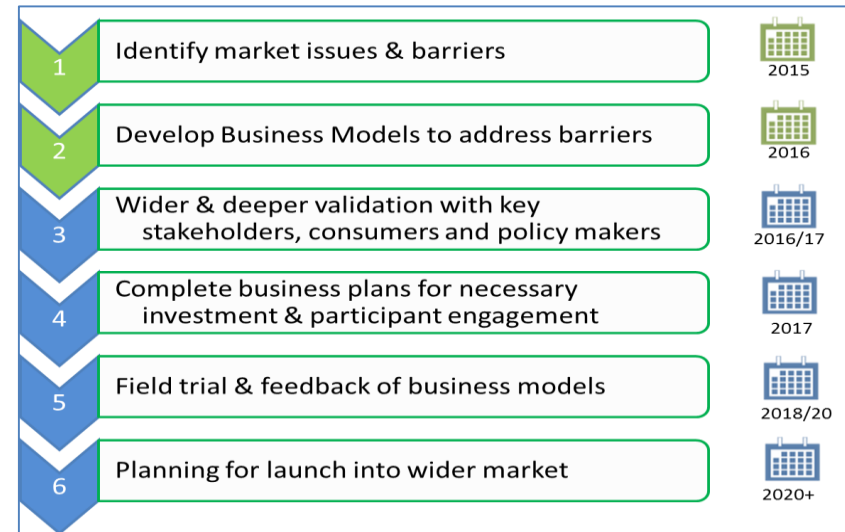
There is **still much work to be done** to develop any of the 5 business models into commercial reality.

The business models are at a **concept stage** (Stage 2 on the diagram on the right) and **require additional validation** and perhaps refinement before they are **robust enough to warrant significant investment and commitment** by stakeholders and commercial partners who will deliver them.

Most importantly, perhaps, is the need to determine, via **consumers, the pricing and likely take-up** level of the models.



Making progress towards commercialisation



Recommended Next Steps – taking to market

- More **extensive stakeholder consultation** – including consumer groups, utilities, local government, regulators and landlord associations
- Wider UK-representative **consumer validation** with a **statistically-relevant sample size** covering multiple house types and segments. This will help inform the **potential value** of new services which may be offered by the accredited providers.
- Understand the **challenges of practical deployment** of the business models including **set-up costs** of supporting infrastructure (including skills and ICT)
- Continue thinking to **help inform policy change** to permit new engaging **marketing approaches** to achieve low carbon homes
- Engage the market on new thinking to help inform options for new business model selection in low carbon **demonstrators / market trails** in the near future.



Many stakeholders need to be consulted to ensure success

Given the **wide-ranging impact** of the models on the market, there are **many parties** that need to be involved in order to take them forward. As well as consumers and other groups representing their interests, there are **policy makers, finance providers, landlord associations, technical experts, product manufacturers (OEMs) and utilities**. These parties will continue to work with **the local authorities**, supported by experts from the ESC.

The very next stage (3) should involve **deeper financial analysis** mapped to a more **detailed segment mapping** and use cases (i.e. beyond the simple single 3-bed semi case used for the initial triangulation analysis) and, importantly, a thorough assessment of the models with **relevant consumer groups**, such that the genuine commitment to buy a business model proposition can be better qualified and used to support the business case.

Conclusions & Key Recommendations

1. The business models **address all home & consumer segments**, are **flexible** and **can be combined**
2. The models arise from a **change in thinking** from technical- to **consumer-orientated selling**
3. **Consumers appear to be receptive** to the new models but require **more detailed information & evidence**
4. **Enablers**, particularly policy, ICT and standardisation, play a **critical role**
5. The business **model game (toolkit)** can engage stakeholders and **inspire the creation of new models**
6. The new models could assist a **staged approach** for transitioning to **low carbon for existing homes**
7. Looking at home **well-being as an annualised cost** is new way to position **affordability to consumers**
8. Initial analysis suggests some promise in the **value proposition** of the models
9. Need for an **effective system integrator** to optimise solution & own CO₂ reduction obligation
10. The new provider / integrator could take ownership of **safeguarding the fuel poor**
11. There are potential wider (and local) **economic benefits** associated with the business models
12. **Policy** could be **refocussed** to support investment in low carbon, helping **minimise the dependence on government**
13. Models are still in development & will require **further validation**, particularly with **consumers & key stakeholders**
14. We need to **engage the market** with new thinking to help **accelerate the transition to low carbon heat**

Innovative Business Models for Smart Systems & Heat Transition

Appendices to Main Report

Sustainable

Innovation

Jobs

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

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

Delivered by the Energy Systems Catapult for the
Energy Technologies Institute

25 October 2016

Authors

Jonathan Watkins

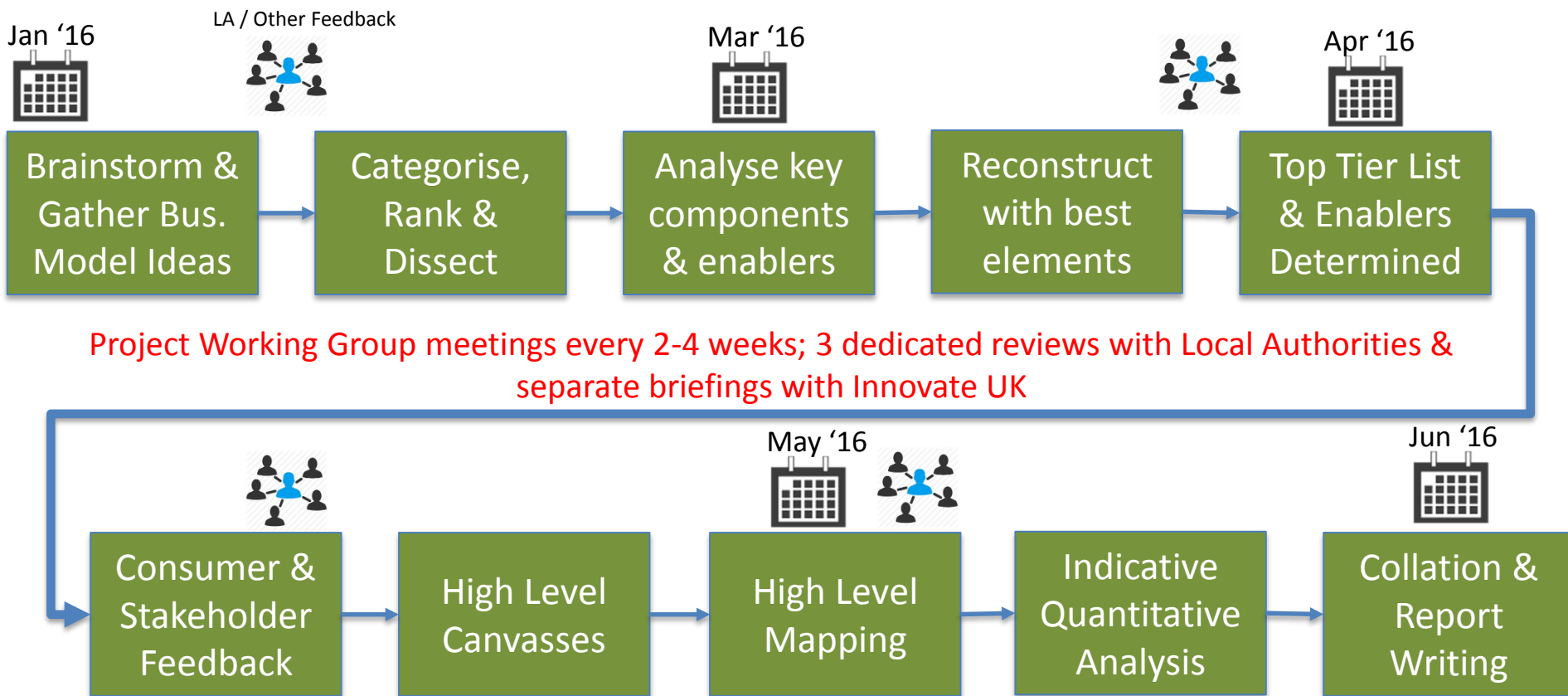
John Farrington

Contents - Appendices to Main Report

	Page
• Project Approach	4 - 6
• Business Model Idea Capture & Ranking	8 – 33
• Sub-module assessment scoring/ranking methodology	35 – 43
• Enablers	45 – 50
• Business Model Game / Toolkit	52 – 62
• Business Model Architecture	64 – 65
• Getting to the Top Tier Business Models	67 – 71
• Quantitative Analysis	73 – 83
• Business Model Details	85 – 102
• Qualitative Analysis (Consumer Insights on Top Tier Business Models	104 – 135
• Application of Business Model Evaluation Tool (BMET)	137
• Evolution of Business Models	139 – 140
• Long List Ideas from the initial brainstorming phase	142 – 181

Project Approach

Project process overview



Project Working Group

- ESC John Farrington, Jonathan Watkins, Alkesh Acharya, Raj Gadepalli, Rebecca Wilkes – consumer insight
- EDF Alastair Davies, Sarah Bee, Bogi Hojgaard
- Hitachi Ram Ramachander, Seiji Sato
- 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)

Energy sold in technical units

Confusing technical choices

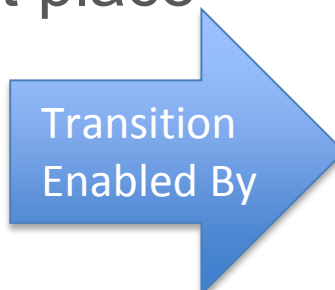
Reactive / distress purchase

High capital cost demands

Bill uncertainty – client takes risk

No assurance of comfort

Varying trust in providers



Consumer Orientated

(e.g. Home improvement, media services)

Sold against desired outcomes

Focus on outcome not technology

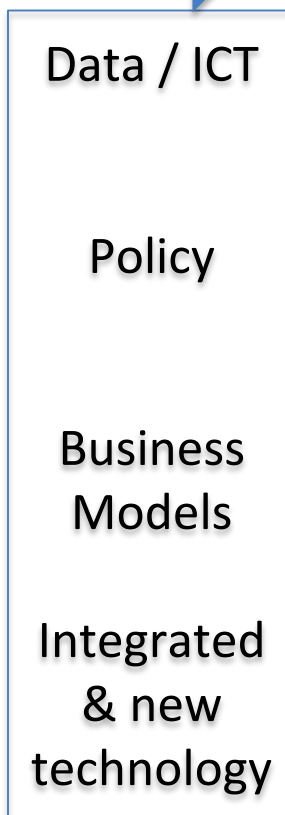
Proactive & planned home upgrade

Smoothed financing

Bill predictability & peace of mind

Comfort assured

Accredited & trusted providers



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

Enablers

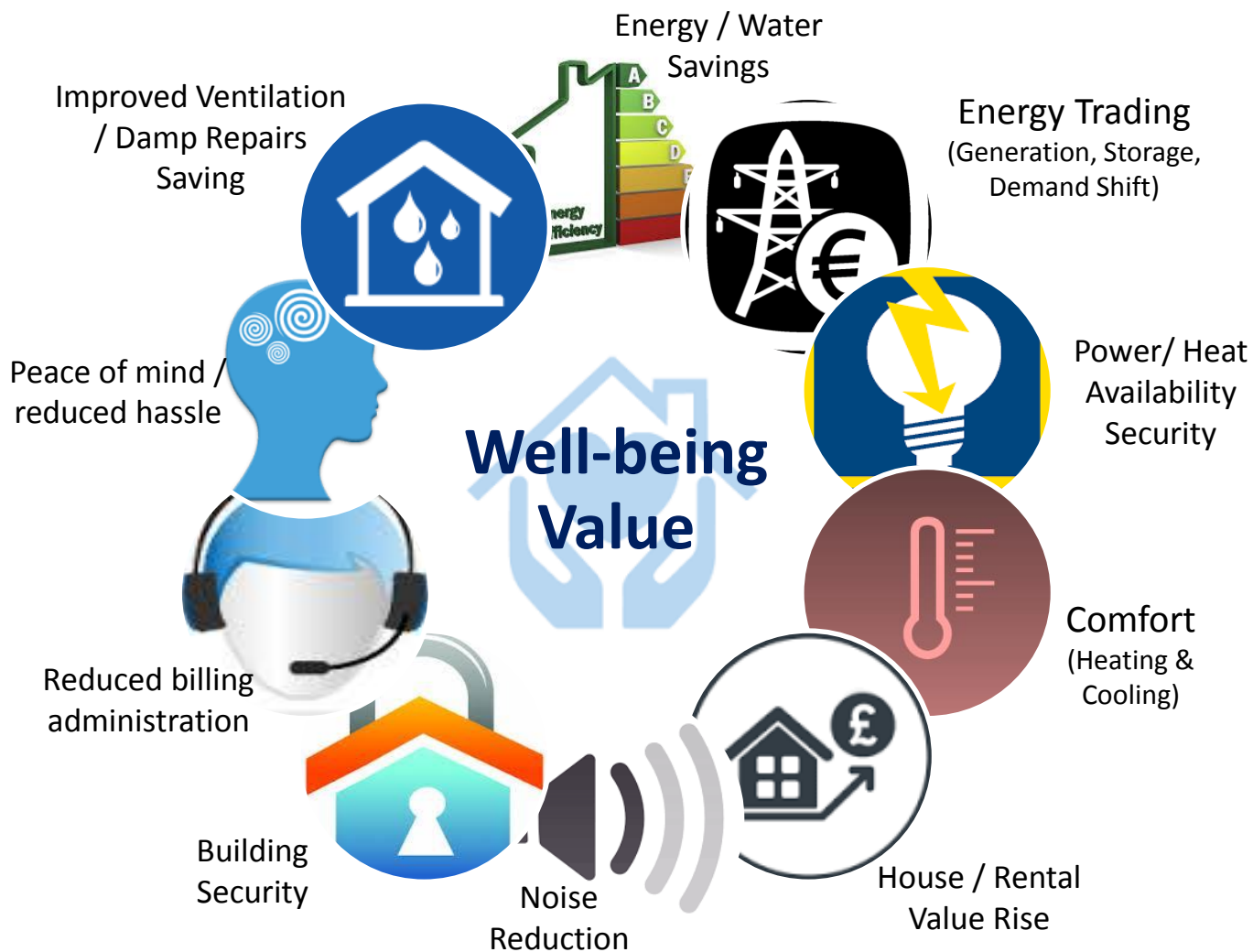
Home Energy Management

Energy Trading Platforms

Policy & Tax/Benefits Redistribution

New Energy Technologies

New Business Models / Entrants



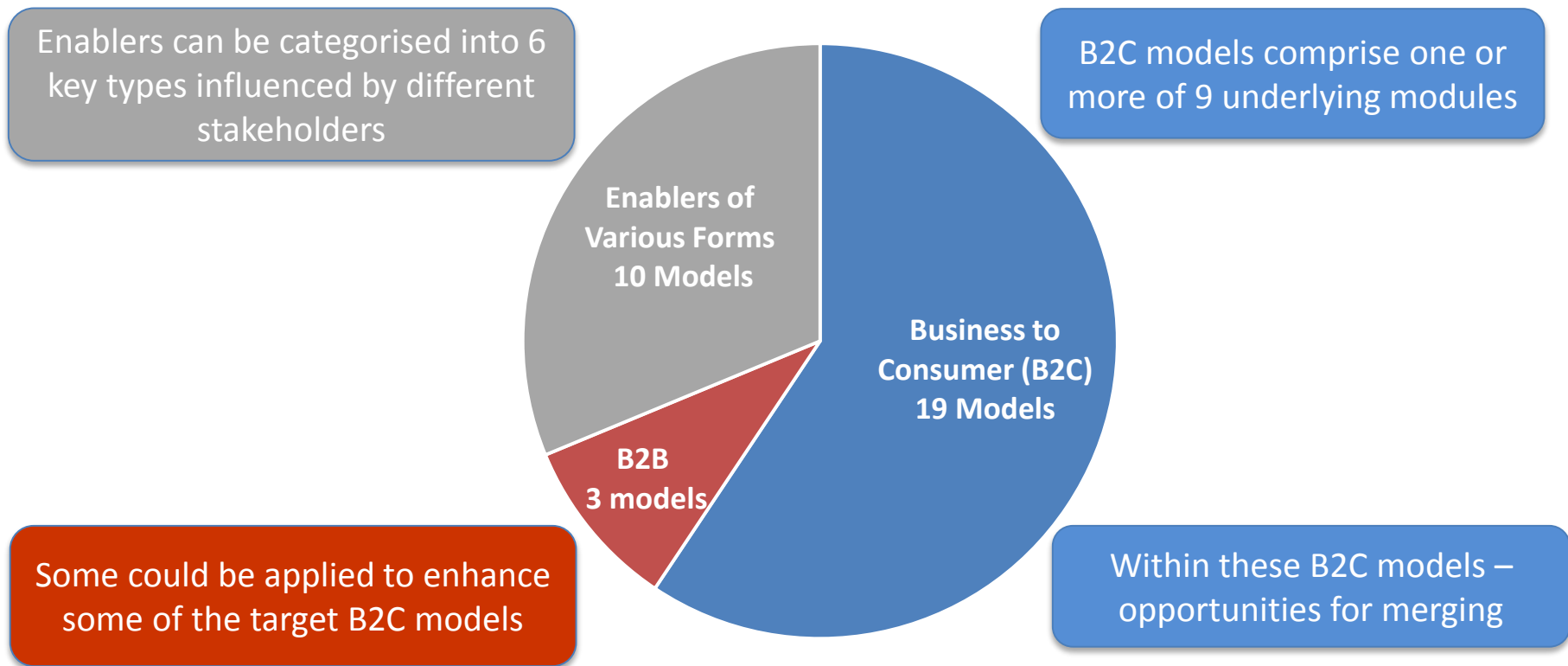
*Moving from Cost of Heating to **Cost of Wellbeing** in the home*

Business Model Idea Capture & Ranking

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)



19 out of the 32 were strictly B2C models

Summary of business models – Long List

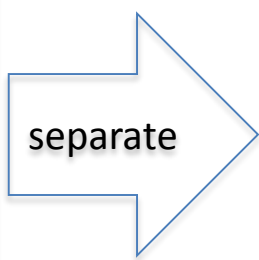
VO.5 4 Feb 16					Ideal ICT <input checked="" type="checkbox"/> or Necessary ICT <input checked="" type="checkbox"/>			Of Interest to Government			Target or Possible Effect of Business Model on Energy Use				Other Characteristics			
ID	Model Name	Code	Model Type	Segment Applicability	HEMS	Energy Market 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		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Med	?	?	?	?	E G	✘		
2	Energy Mutual	EMU	B2C				<input checked="" type="checkbox"/>			Med	<input checked="" type="checkbox"/>		?	?	E G	✘		
3	Community Energy	COE	B2C			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		Fast	<input checked="" type="checkbox"/>	?	?	E G	✘✘		\rightleftharpoons	
4	Power Buffer	PBU	B2B			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		Fast		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E	✘✘		\rightleftharpoons	
5	Nandos	NAN	B2C		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			Med	<input checked="" type="checkbox"/>			E G	✘			
6	SimCity	SIC	B2C						<input checked="" type="checkbox"/>	Fast	<input checked="" type="checkbox"/>		?	E G	✘			
7	Market Maker	MMA	B2C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Slow	?			E			\rightleftharpoons	
8	HoSCO	HOS	B2C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Med	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	?	?	E G W Tx Tel	✘		\rightleftharpoons
9	Micro Utility	MUT	B2C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Fast	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E G	✘		\rightleftharpoons	
10	Block Refurb	BRE	B2C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		?	Fast	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	?	?	E G +	✘✘		\rightleftharpoons
11	Re-E-Generation	REG	B2B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	?	?	Fast	<input checked="" type="checkbox"/>	?	?	E G W Tx Te	✘✘✘		\rightleftharpoons	
12	House Blanket	HBL	B2B/C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			?	Fast	<input checked="" type="checkbox"/>	?		E G W	✘✘		\rightleftharpoons	
13	Industry Heat Buddy	IHB	B2B/C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		?	?	Fast	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E G	✘		\rightleftharpoons	
14	Pay to Waste	PTW	B2C		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Fast	<input checked="" type="checkbox"/>	?		E G				
15	Money Maker	MOM	B2C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Slow		<input checked="" type="checkbox"/>		E	✘		\rightleftharpoons	
16	Energy Butler	EBU	B2C		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Slow				E G				
17	Appliance, Heat & Light	AHL	B2C		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Med	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		E G	✘			
18	Cleantech Cost Cruncher	CCC	B2B							Med	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E G	✘		\rightleftharpoons	
19	Clean-E-Pioneers	CEP	B2C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	Fast	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E G	✘		\rightleftharpoons	
20	Cleantech Pension Builder	CPB	B2C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Fast	<input checked="" type="checkbox"/>	?	?	E G	✘			
21	Home Office Heat Balance	HOH	B2B/C		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			Fast	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	?	E G	✘		\rightleftharpoons	
22	Interested Green Landlord	IGL	B2C		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	Fast	<input checked="" type="checkbox"/>	?		E G	✘✘		?	
23	ESP Emission Reducers	EER	B2B		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		Fast	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	?	E G	✘		\rightleftharpoons	
24	Rent-a-wall	RAW	B2C		<input checked="" type="checkbox"/>					Fast	<input checked="" type="checkbox"/>			E G	✘			
25	Dynamic Bandwidth Trading	DBT	B2B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Med		<input checked="" type="checkbox"/>		E G			\rightleftharpoons	
26	Cross Country CHP trading	CCT	B2B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Fast	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	?	E G	✘		\rightleftharpoons	
27	Citizen Carbon Account	CCA	B2C		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Slow	<input checked="" type="checkbox"/>			E G				
28	Local Saving Recycling	LSR	B2C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Med	<input checked="" type="checkbox"/>	?	?	E G	✘		\rightleftharpoons	
29	Energy Stockmarket	ESM	B2C		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Med	?	<input checked="" type="checkbox"/>		E G			\rightleftharpoons	
30	Winter Fuel to Refurbishment	WFR	B2B						<input checked="" type="checkbox"/>	Fast	<input checked="" type="checkbox"/>	?		E G	✘			
31	Cloud & Free Heat	CFH	B2C		<input checked="" type="checkbox"/>					Fast	<input checked="" type="checkbox"/>			E	✘✘			
32	International Home C Trader	IHC	B2B/C		<input checked="" type="checkbox"/>					Fast	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		E G			\rightleftharpoons	

Simplifying the Long List ...

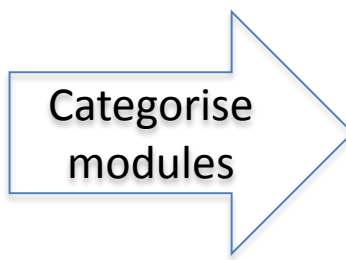
How could these support B2C models?

Further combinations of 9 modules both B2C/B2B?

Long List
32 business model ideas as of 05/02/16



- Pure B2B models
- Real B2C Business Models
- Policy or Enabler Concepts

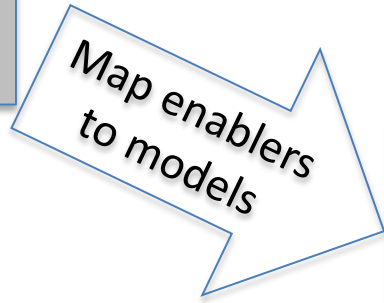


9 Underlying Modules

	A	B	C	D	E	F	G	H
1	●		●	○	●			●
3		●	●		○			
4								
7		○		●	○			
...						●		
14	●	○	○				○	●
17					●			○
21		●		●				
25								

25 Business Models

Major or minor component matching



9 Underlying Modules

	A	B	C	D	E	F	G	H
Policy	×	●	×	●		×		●
Standards			●		●			
Trading					●	×	●	×
Financing			×		●			
ICT	●	●		●		●	●	●
New Tech	×		●		●		×	

6 Enablers

The underlying enablers & B2B models and their potential to enhance (in CO₂, £, 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?

Assessing need for or enhancement potential of enablers

Ranking criteria for ideas Long List

Criterion	Assessment Guide	Weighting
CO₂ 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

Results of Ranking Matrix

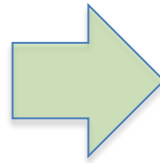
Customer	Weighted Score	Unweighted Score	Rank	Baseline
1	125	11	3.5	4
2	119	21	2	2
3	105	26	3.5	4
4	105	26	3.5	4
5	105	26	3.5	4
6	105	26	3.5	4
7	105	26	3.5	4
8	105	26	3.5	4
9	105	26	3.5	4
10	105	26	3.5	4
11	105	26	3.5	4
12	105	26	3.5	4
13	105	26	3.5	4
14	105	26	3.5	4
15	105	26	3.5	4
16	105	26	3.5	4
17	105	26	3.5	4
18	105	26	3.5	4
19	105	26	3.5	4
20	105	26	3.5	4
21	105	26	3.5	4
22	105	26	3.5	4
23	105	26	3.5	4
24	105	26	3.5	4
25	105	26	3.5	4
26	105	26	3.5	4
27	105	26	3.5	4
28	105	26	3.5	4
29	105	26	3.5	4
30	105	26	3.5	4
31	105	26	3.5	4
32	105	26	3.5	4
33	105	26	3.5	4
34	105	26	3.5	4
35	105	26	3.5	4
36	105	26	3.5	4
37	105	26	3.5	4
38	105	26	3.5	4
39	105	26	3.5	4
40	105	26	3.5	4
41	105	26	3.5	4
42	105	26	3.5	4
43	105	26	3.5	4
44	105	26	3.5	4
45	105	26	3.5	4
46	105	26	3.5	4
47	105	26	3.5	4
48	105	26	3.5	4
49	105	26	3.5	4
50	105	26	3.5	4
51	105	26	3.5	4
52	105	26	3.5	4
53	105	26	3.5	4
54	105	26	3.5	4
55	105	26	3.5	4
56	105	26	3.5	4
57	105	26	3.5	4
58	105	26	3.5	4
59	105	26	3.5	4
60	105	26	3.5	4
61	105	26	3.5	4
62	105	26	3.5	4
63	105	26	3.5	4
64	105	26	3.5	4
65	105	26	3.5	4
66	105	26	3.5	4
67	105	26	3.5	4
68	105	26	3.5	4
69	105	26	3.5	4
70	105	26	3.5	4
71	105	26	3.5	4
72	105	26	3.5	4
73	105	26	3.5	4
74	105	26	3.5	4
75	105	26	3.5	4
76	105	26	3.5	4
77	105	26	3.5	4
78	105	26	3.5	4
79	105	26	3.5	4
80	105	26	3.5	4
81	105	26	3.5	4
82	105	26	3.5	4
83	105	26	3.5	4
84	105	26	3.5	4
85	105	26	3.5	4
86	105	26	3.5	4
87	105	26	3.5	4
88	105	26	3.5	4
89	105	26	3.5	4
90	105	26	3.5	4
91	105	26	3.5	4
92	105	26	3.5	4
93	105	26	3.5	4
94	105	26	3.5	4
95	105	26	3.5	4
96	105	26	3.5	4
97	105	26	3.5	4
98	105	26	3.5	4
99	105	26	3.5	4
100	105	26	3.5	4

Initial ranking of 19 B2C ideas against key criteria

Business Model Long List Ideas

Top Rank

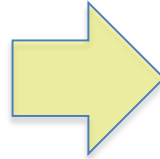
Energy Outcomes
Community Energy
Energy Mutual
HoSCO
Dynamic Bandwith Trading



Based on criteria appear to be main 'front runners'



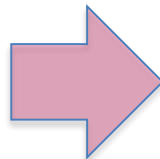
Energy Butler
Appliance, Heat & Light
Nandos
Micro Utility
Block Refurb
SimCity
House Blanket
Home Office Heat Balance



Opportunity to assess impact of adding Modules or certain Enablers

Bottom Rank

Clean-E-Pioneers
Rent-a-wall
Industry Heat Buddy
Money Maker
Cleantech Pension Builder
Cloud & Free Heat



May contain some good ideas which could bolt onto higher ranked concepts

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Lower capex for consumer / provider • Lower emissions
E	Higher (Energy) Efficiency	Reducing energy consumption of house or improving efficiency / running costs of appliances	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Stimulates more energy saving interventions • Reduces energy use / emissions

19 B2C Models matched to Modules

			Business Model Modules Included							
			A	B	C	D	E	F	G	H
Model Name	Code	SubType	Energy	Alternative	Service	Asset	Higher	Lean Supply	Energy	Behaviour
			Monetisation	Finance	Bundling	Utilisation	Efficiency	Chain	Brokering	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 E	Speed of Penetratio	Cost to Demonstra	Customer Acceptance	Adaptabili	Local Bene	Financial Risk	Policy Depend	Weighted Score	Unweighted Score	Rank Weighted	Rank Unweight	
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 Bandwidth 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

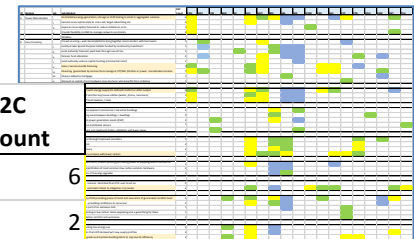
Some Bolt On models may be worth adding to other models, despite low individual ranking

Consumer assessment – initial view

Model Name	Consumer benefits	Comfort/ Peace						Total appeal	Consumer types addressed	Level of concern
		of Mind	Resource	Relationships	Convenience	Hygiene				
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 <i>?How different to energy outcomes?</i>	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



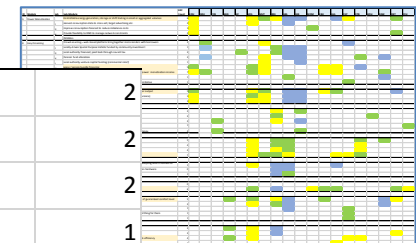
ID	Module	Sub	Sub-Module	B2C Count
A	Power Monetisation	i	Controllable energy generation, storage or shift trading in small or aggregated volumes	6
		ii	Harvest consumption data to cross-sell, target advertising etc.	2
		iii	Improve consumption forecast to reduce imbalance costs	3
		iv	Provide flexibility 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 simplification 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

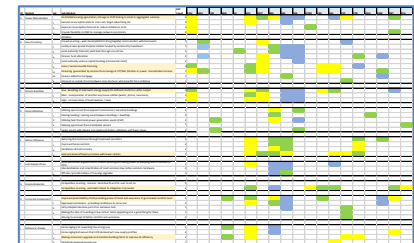


} Grouping opportunity

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 simplification 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 efficient 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	Sub	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 simplification 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	Si	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 hassle etc.
Med Level - Bundling of asset with energy supply for defined comfort or other output	High	Basic requirement for many models, unlocks value, reduces hassle 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 relevant
Encouraging behaviours that shift demand with new supply profiles	Medium	Include where relevant for engaged customers
Penalising excessive energy use	Medium	No customer choice, only makes customers more anti energy

The detail behind it

Key Module	St	Module Element (to be part of a composite Business Model)	Carbon Reduction	National Economic Benefit	Speed of Penetration	Cost to Demonstrat	Customer Acceptance	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	3	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 efficient heating devices to provide heat in the home	High
Standardisation and simplification 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 / High
Local authority financed; paid back through council tax	Medium / High	Medium	Medium / High
Pension fund allocation	Medium/Low	High	Medium/Lo
Local authority venture capital funding (commercial rate?)	Medium / High	Low	Medium / High
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						
II	Model Name	Code	Policy & Regulation	Technical Standards	Trading Markets	Alternative Financing	ICT Platform	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	Publicise 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	St	Module Element (to be part of a composite Business Model)	Trading Markets Innovation	Alternative Financing	ICT Platforms	Technical Standards	New Cleantech	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	High	High	Medium	Medium	Medium	Low	Low	Low	Medium
Finance	High	High	Medium	Medium	High	Low	Low	Low	Low
ICT	Vital	Medium	High	Medium	Medium	Low	Medium	Medium	Medium
Standards	Neutral	Low	Low	Low	High	High	Low	Low	Low
Clean Tech	Enhance	Medium	Medium	Low	Medium	Medium	Low	Medium	Medium
Policy	High	High	High	Medium	High	Medium	Low	Medium	High

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

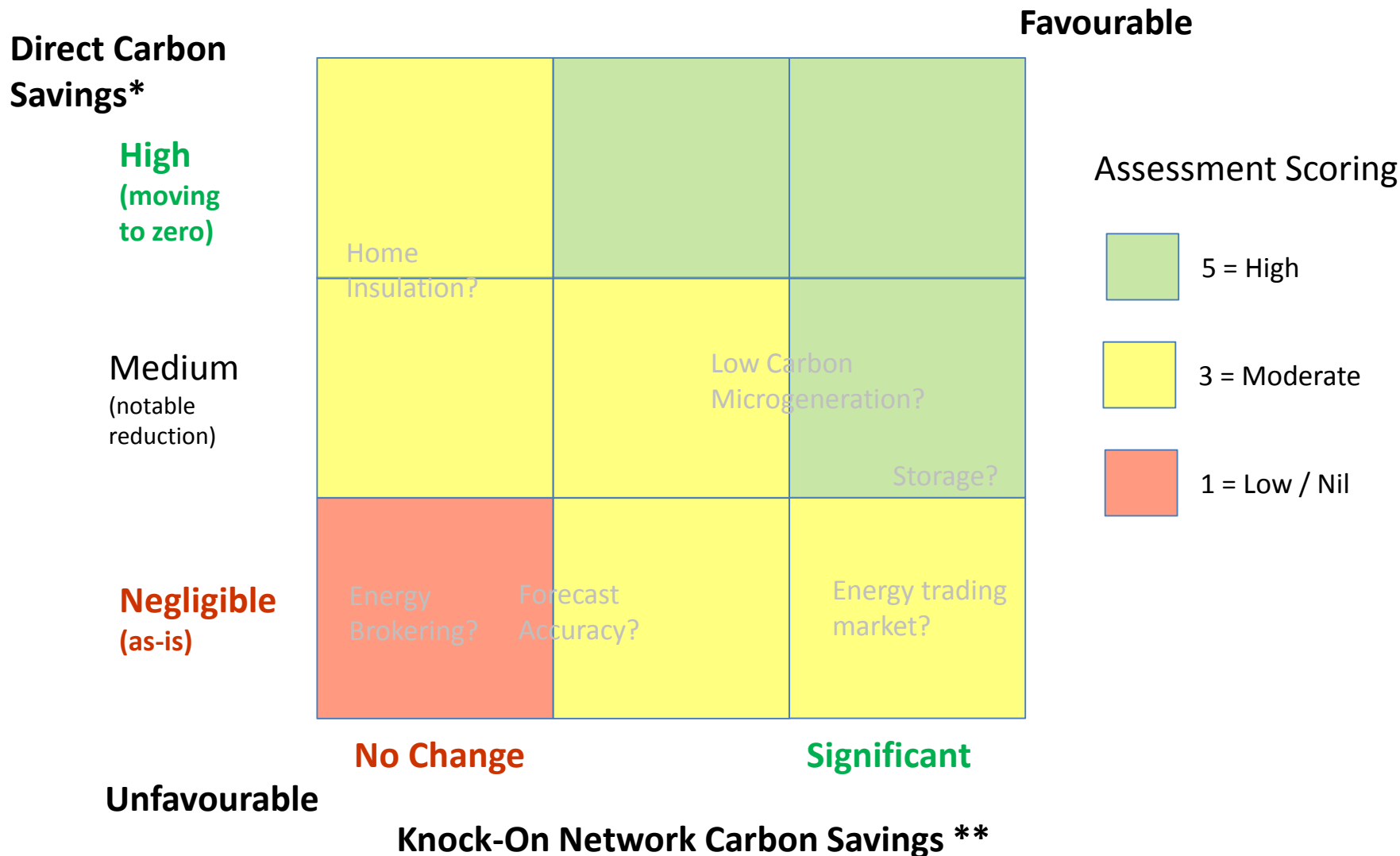
Policy and ICT have the most wide ranging enhancing effects
 New Technology is not vital but helps

Sub-module assessment scoring/ranking methodology



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)

Energy Savings*

Favourable

High

Medium
(notable
reduction)

Negligible
(as-is)

		Home Insulation?	
		Storage?	Standardisation?
		Forecast Accuracy?	Energy Brokering?
			Energy trading market?

Assessment Scoring



5 = High



3 = Moderate



1 = Low / Nil

No Change

Significant

Unfavourable

Jobs, Infrastructure & Economic Activity Benefits

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

Market Penetration Assessment

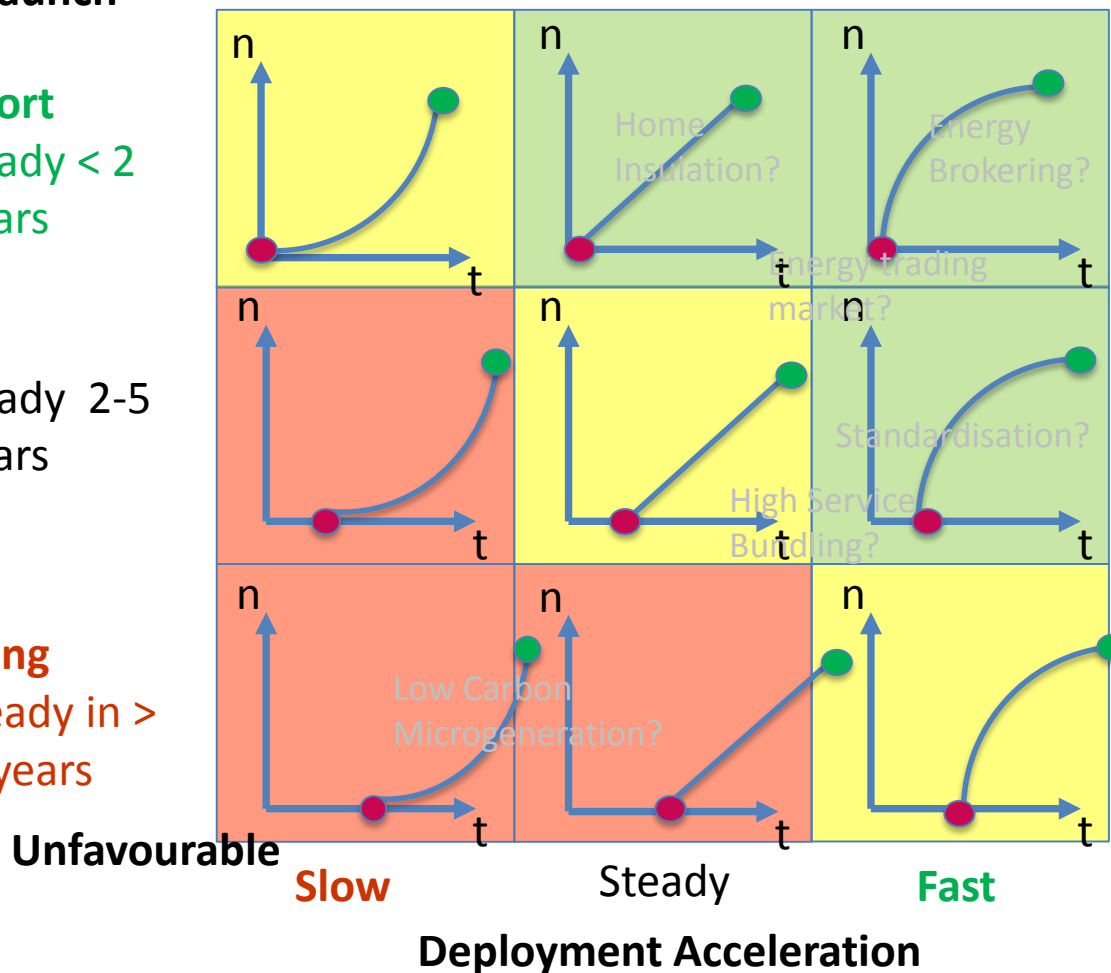
Lag To Launch

Favourable

Short
Ready < 2
years

Ready 2-5
years

Long
Ready in >
5 years



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)

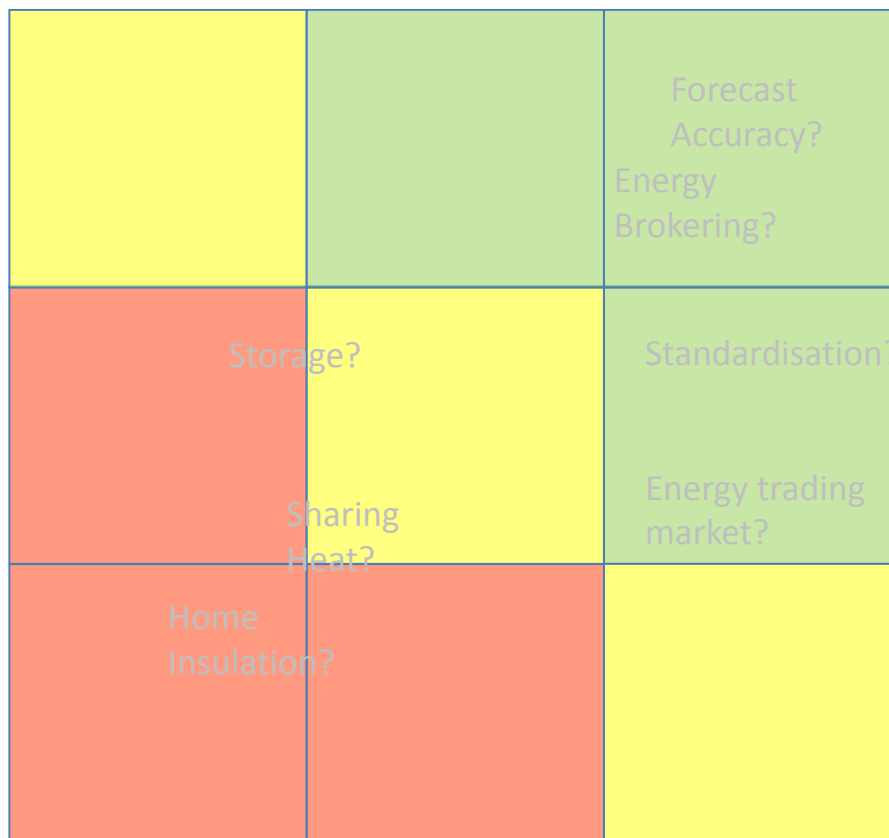
Set Up Costs*

Favourable

Negligible

Medium

**Significant
(major capex)**



Assessment Scoring



5 = Very Low



3 = Moderate



1 = Very High

High (>£5k)

Low (< £500)

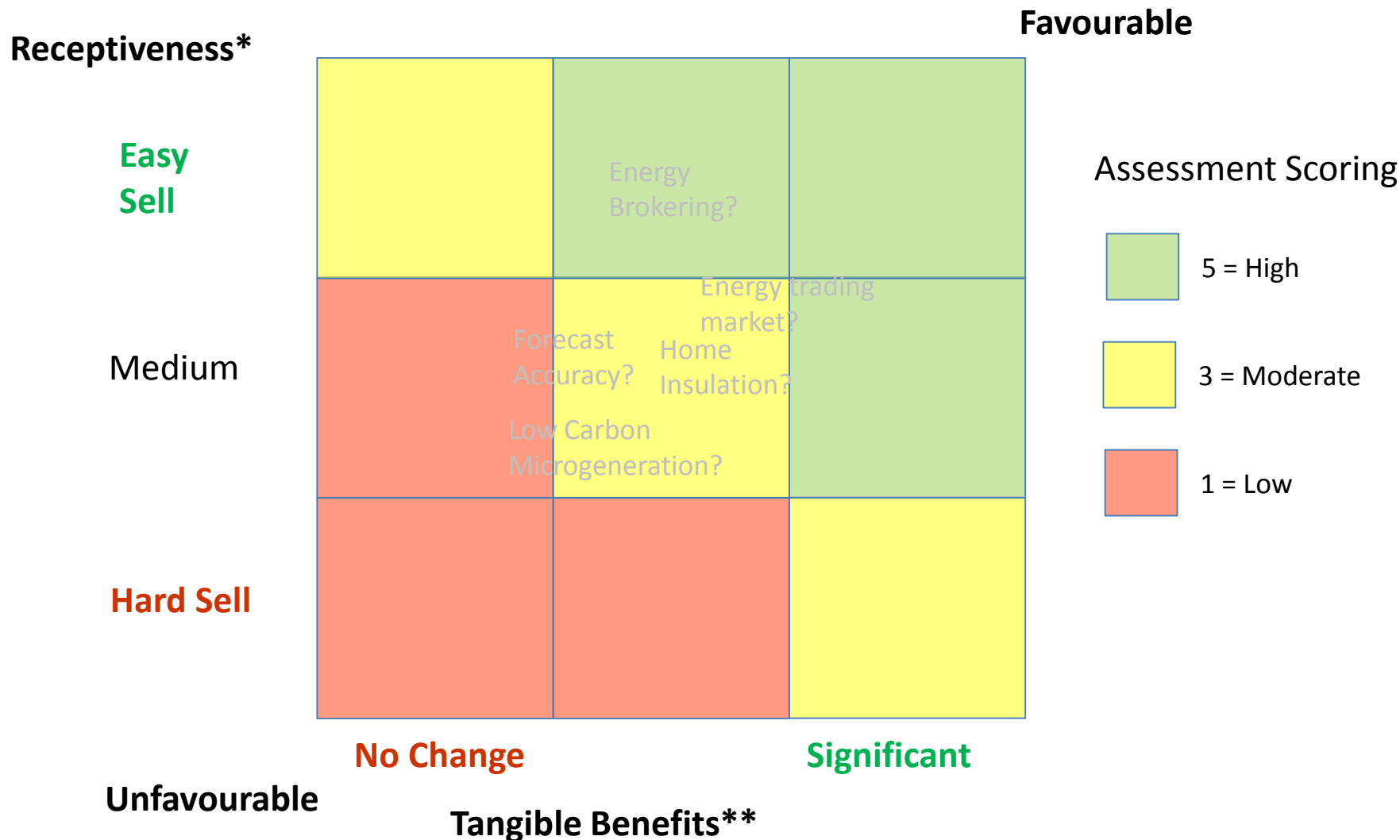
Unfavourable

Variable Cost (Per Home)

* 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

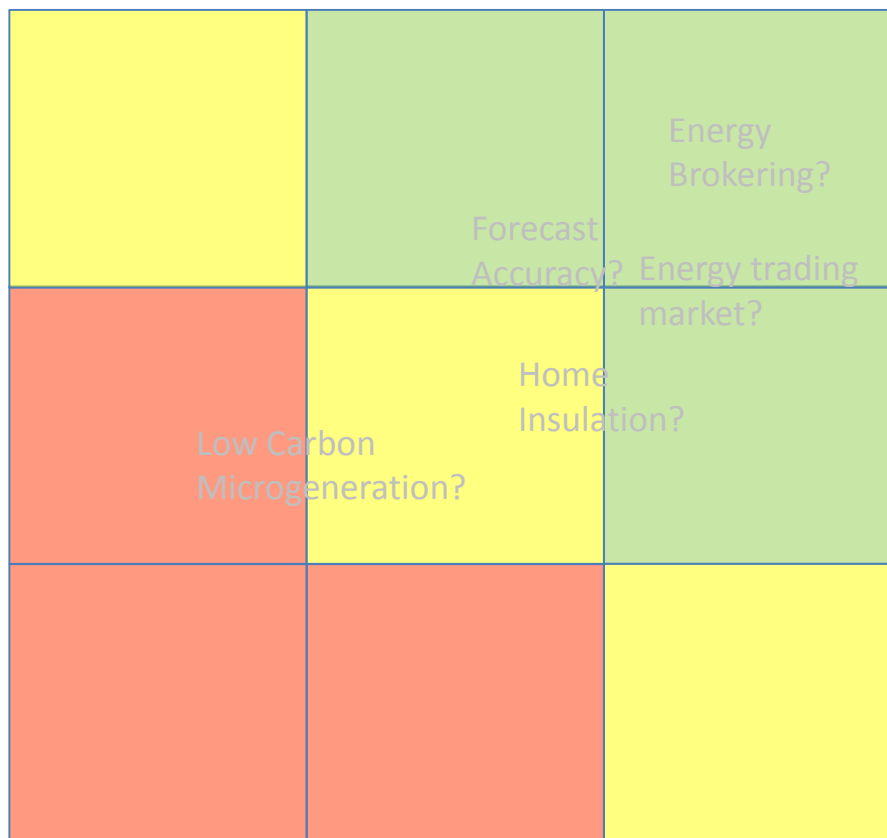
(Relating to adopting the business model or module at target commercial scale)

Flexibility in market & policy*

Highly flexible

Very rigid & vulnerable

Favourable



Assessment Scoring



5 = Very adaptable



3 = Moderately adaptable / vulnerable



1 = Very vulnerable

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)

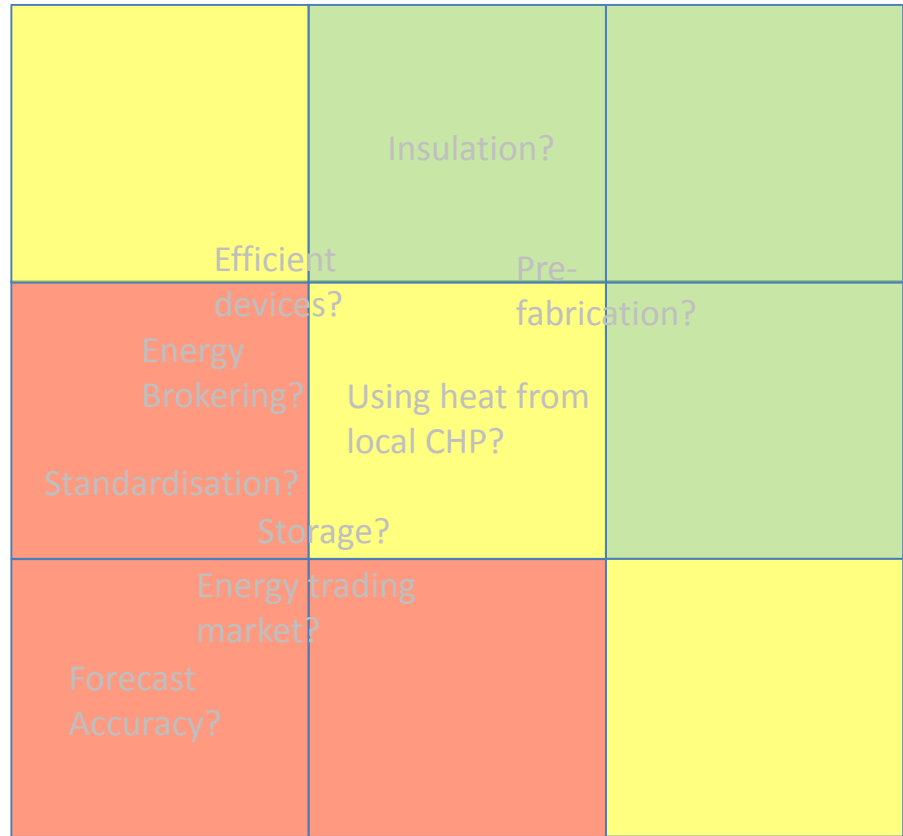
Energy Poverty & Security

High

Medium
(notable reduction)

Negligible (as-is)

Favourable



Assessment Scoring



5 = High



3 = Moderate



1 = Low / Nil

No Change

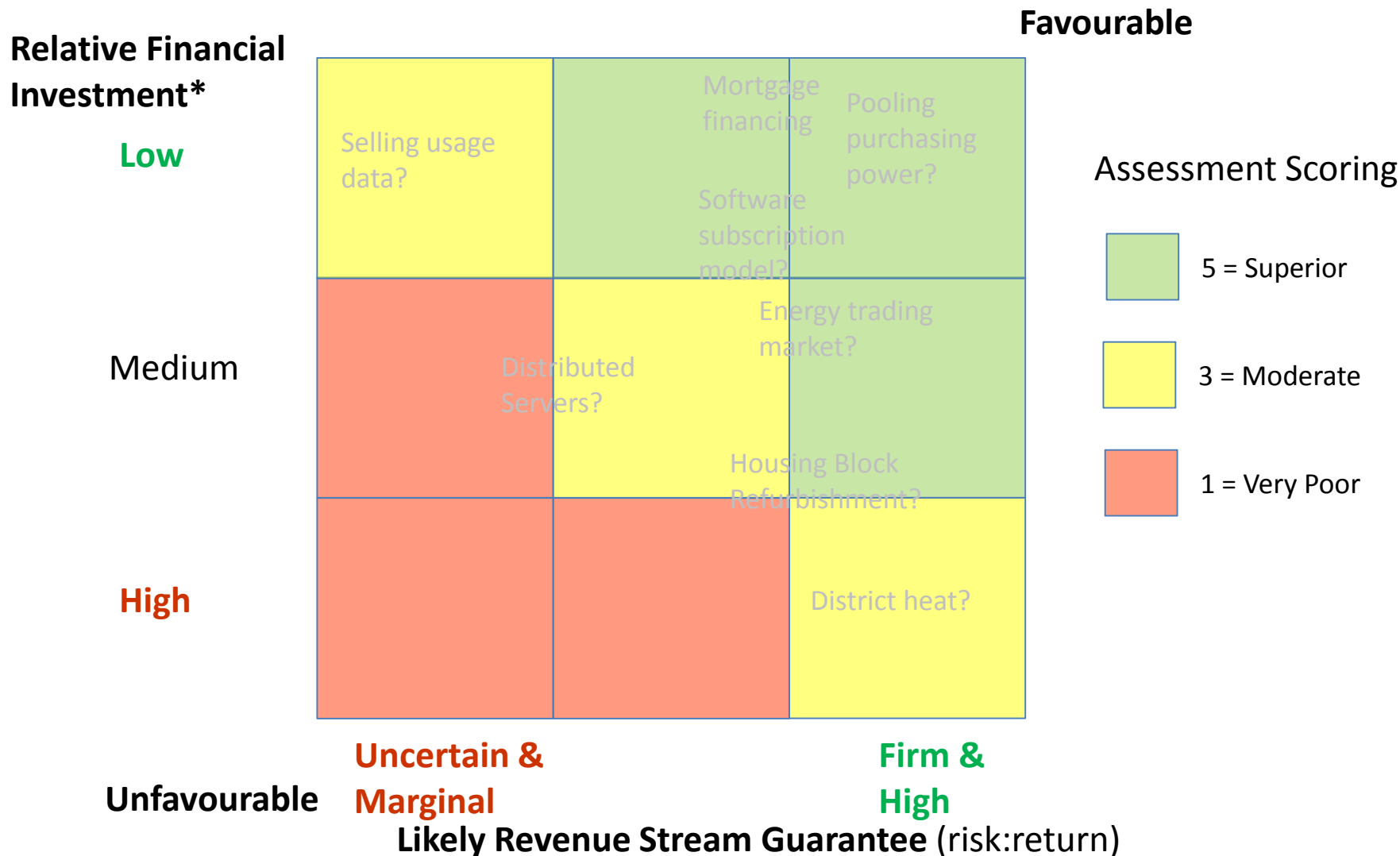
Significant

Unfavourable

Local Jobs & Skills Created

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

	Data Trading? Energy Brokering? Forecast Accuracy?	
	Home Insulation? Energy trading market? High bundling	
	Low Carbon Microgeneration?	

Assessment Scoring



5 = No change need



3 = Moderate changes



1 = Major changes need

Unfavourable

Major policy changes or safeguards req'd

Can work as is / low dependence

Dependence on non-financial policies**

* e.g. FIT, subsidies, taxation, carbon pricing ...

** Consumer regulations, competition regs, building regs, LA freedom ...

Enablers

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

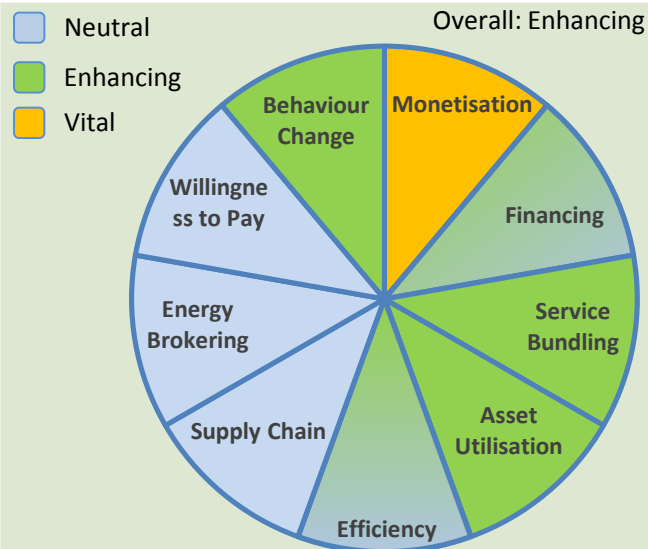
Ideas / Suggestions within this Enabler type

- Energy ‘stockmarket’ for both small and large consumers
- Integrator carbon account (if internalised cost of carbon deployed)

Key Issues to Address

- Needs to be combined with sophisticated ICT solution

Impact on Business Models



Most Affected Model Elements

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

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)

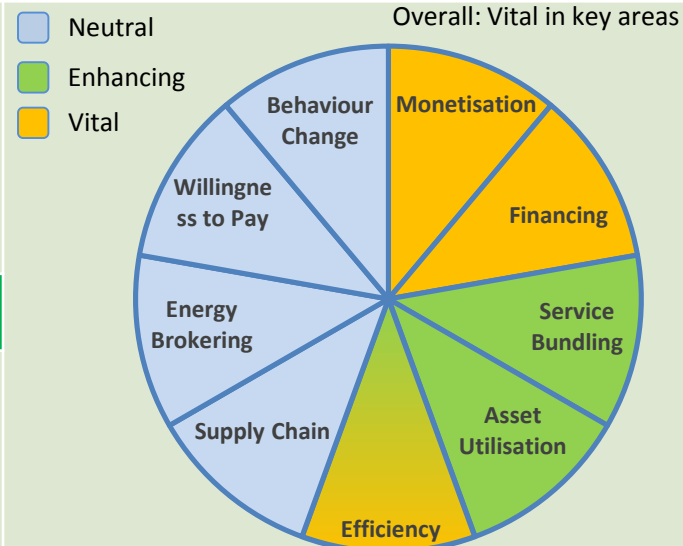
Ideas / Suggestions within this Enabler type

- 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

Key Issues to Address

- Strongly linked to policies for taxation etc

Impact on Business Models



Most Affected Model Elements

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

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.

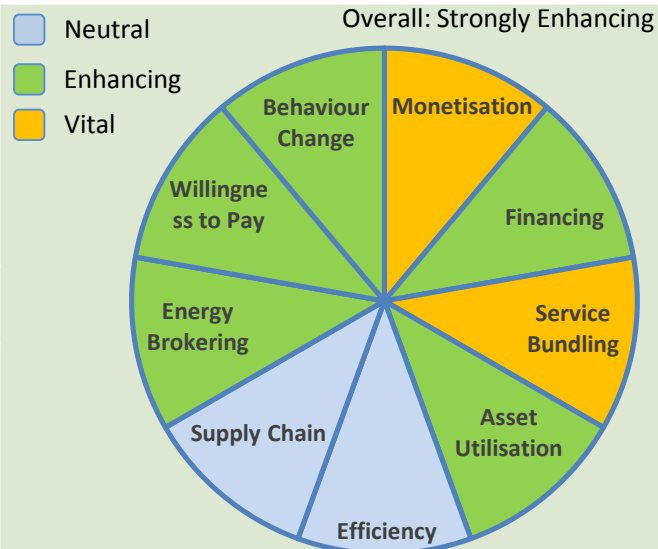
Ideas / Suggestions within this Enabler type

- 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

Key Issues to Address

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

Impact on Business Models



Most Affected Model Elements

- All forms of monetising power
- Highly integrated bundling

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

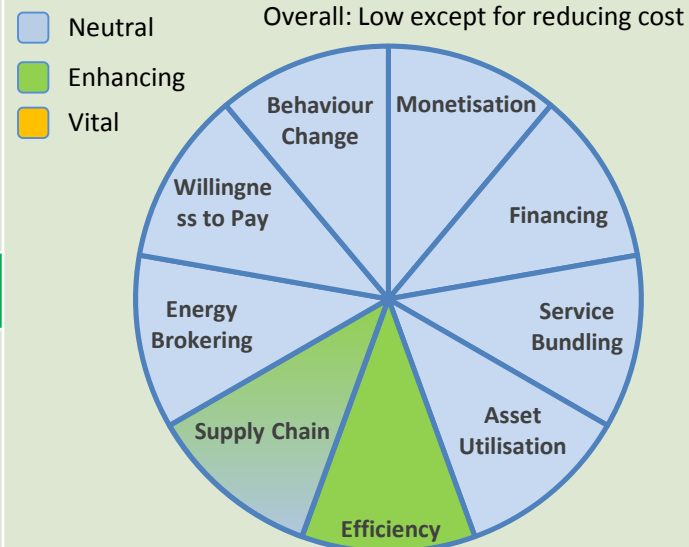
Ideas / Suggestions within this Enabler type

- ‘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.

Key Issues to Address

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

Impact on Business Models



Most Affected Model Elements

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

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.

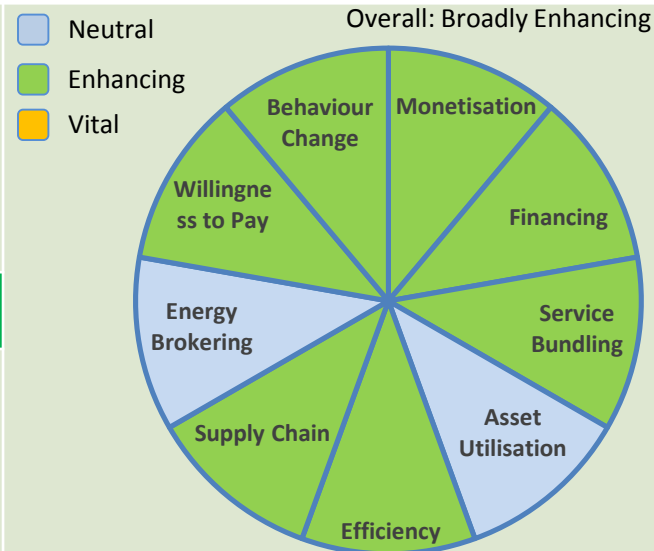
Ideas / Suggestions within this Enabler type

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

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

Impact on Business Models



Most Affected Model Elements

- Efficiency / Effectiveness improve most elements

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.

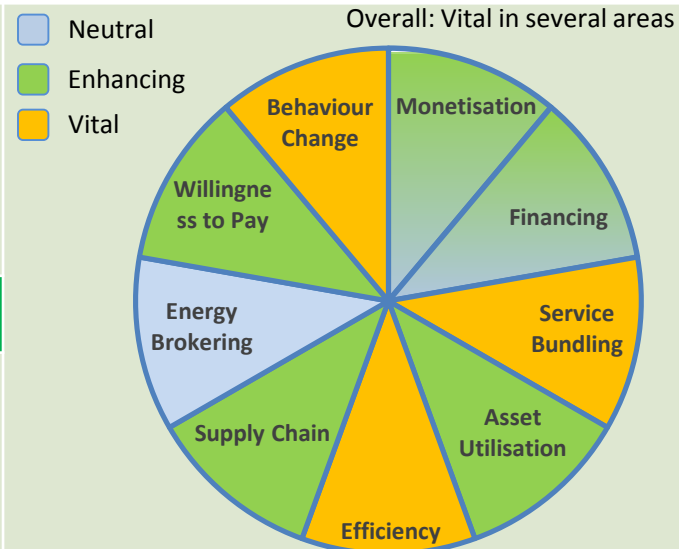
Ideas / Suggestions within this Enabler type

- 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

Key Issues to Address

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

Impact on Business Models



Most Affected Model Elements

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

Who Can Help Make It Happen?

- Government

Business Model Game / Toolkit

'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

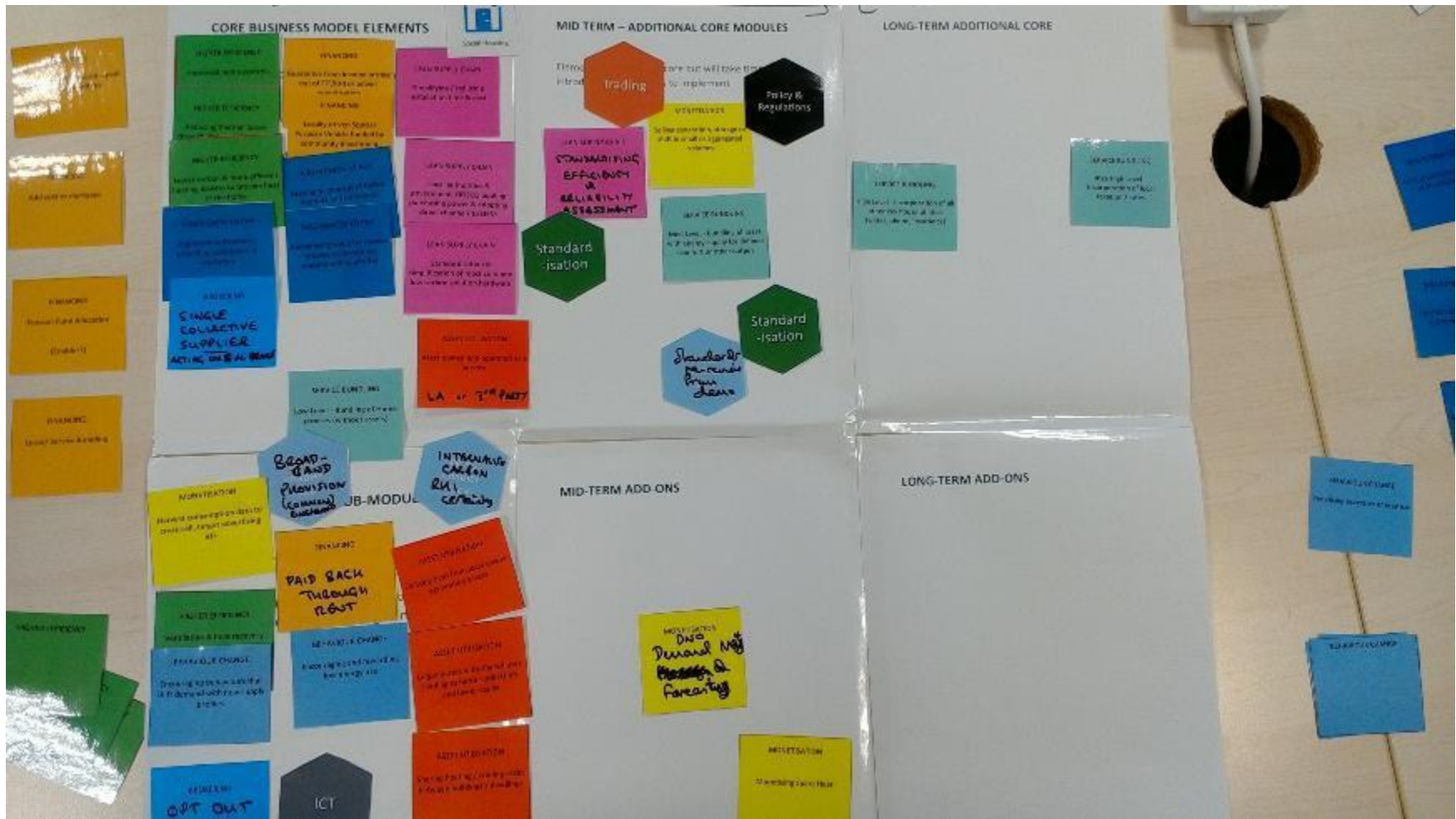
A tool kit that enables strong team-working and development of new ideas

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)

**BROKERING
G1**
Competitive sourcing – for user to act on

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

**BEHAVIOUR CHANGE
I1**
Encouraging & rewarding low energy use

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

**BROKERING
G2**
Competitive sourcing – automatic linked to obligation of provider

**WILLINGNESS TO PAY
H2**
Approved contractors providing confidence to consumer

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

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

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

**BROKERING
G3**
Collective switching

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

**WILLINGNESS TO PAY
H8**
Property is more appealing to rent

**BEHAVIOUR CHANGE
I3**
Having to manage within agreed consumption limits

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

**BROKERING
G4**
Opt-out option for collective schemes

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

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

**BEHAVIOUR CHANGE
I4**
Penalising excessive energy use

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

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

**BROKERING
G5**
Single collective supplier acting on social housing behalf

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

**WILLINGNESS TO PAY
H11**
Trusted design & selection assistance information source

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

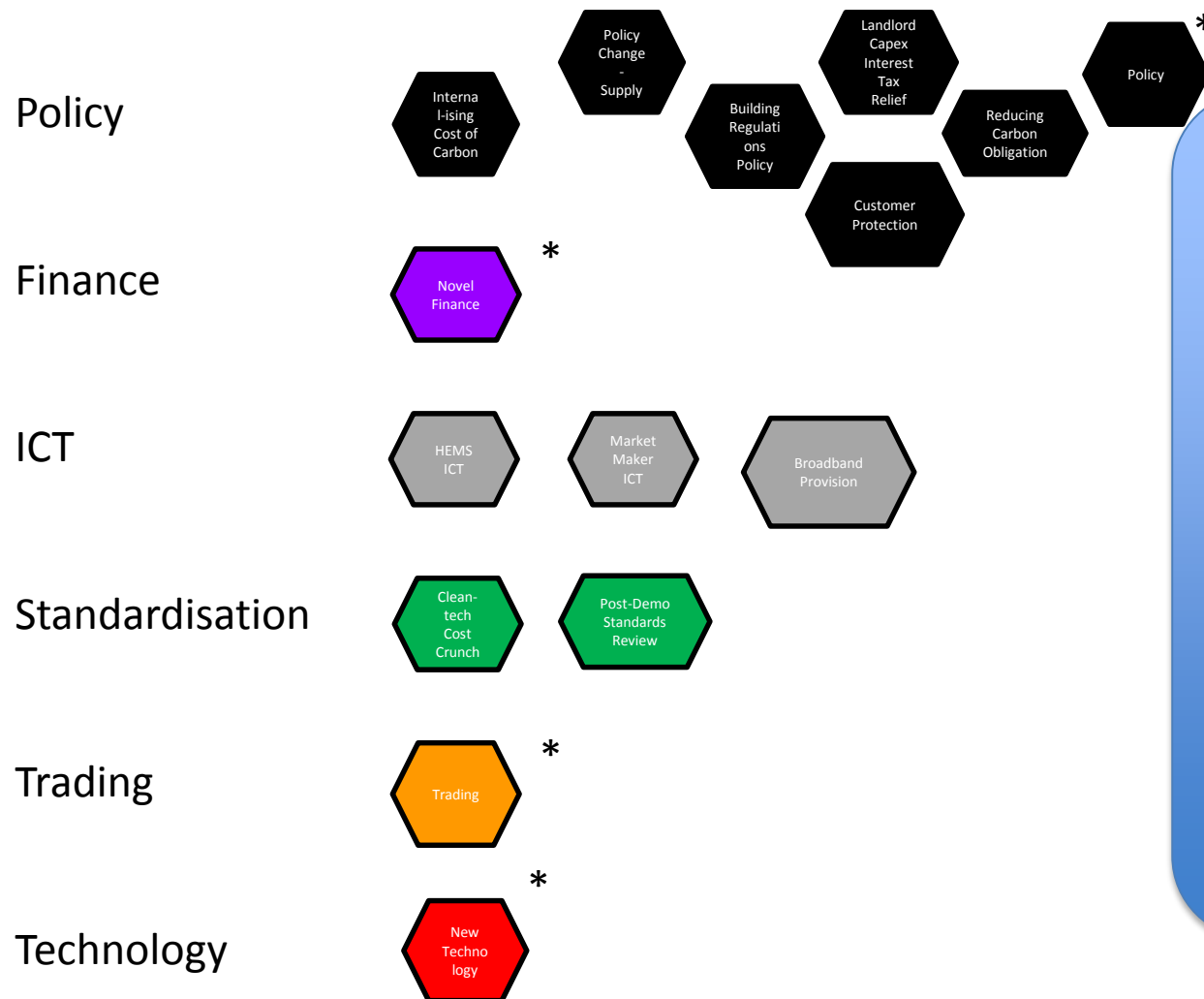
LEAN SUPPLY CHAIN
F2
Standardisation & simplification of most common low carbon solution hardware

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

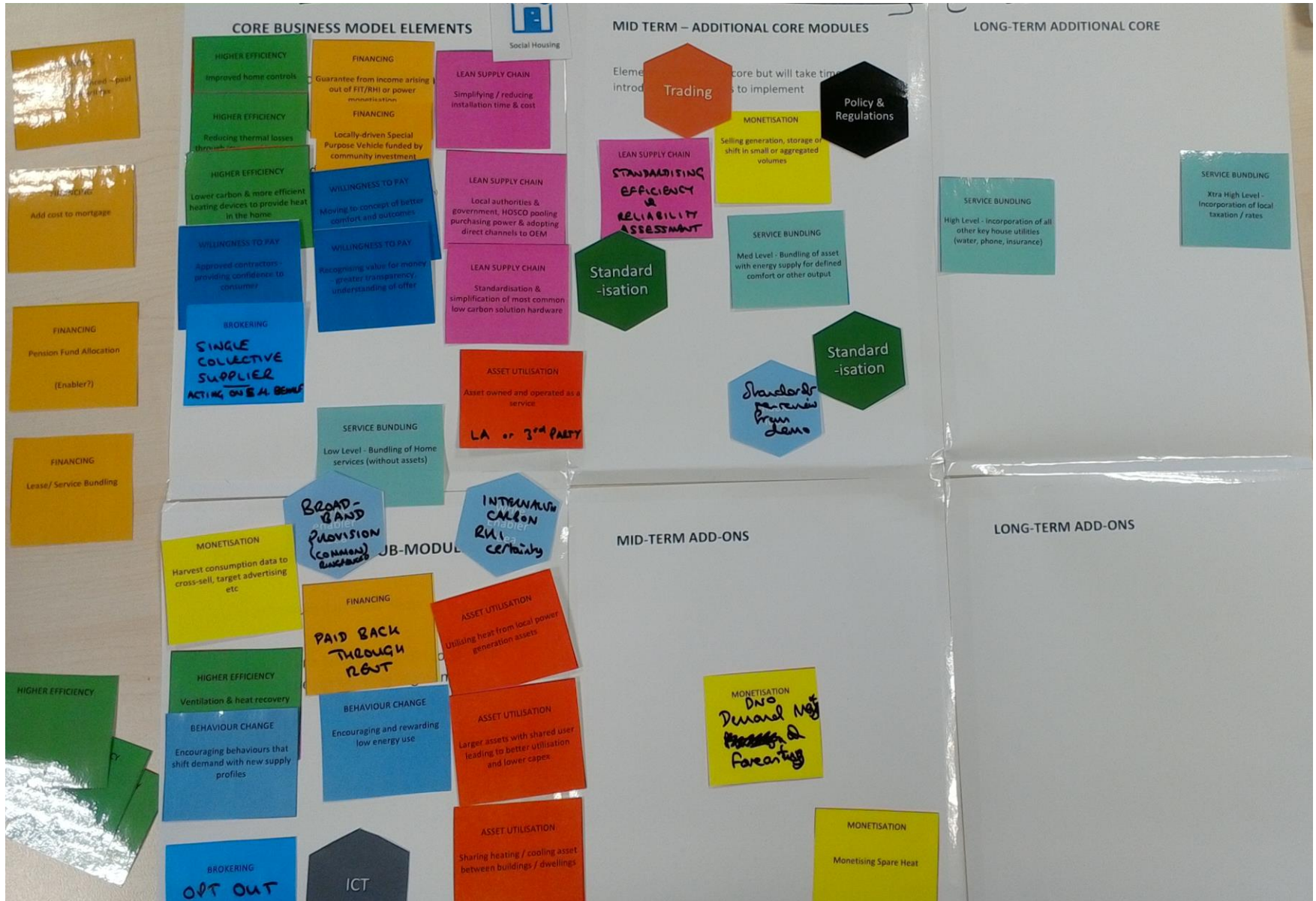


Enabler cards are placed in the business card construct to signify where an Enabler is necessary or enhancing

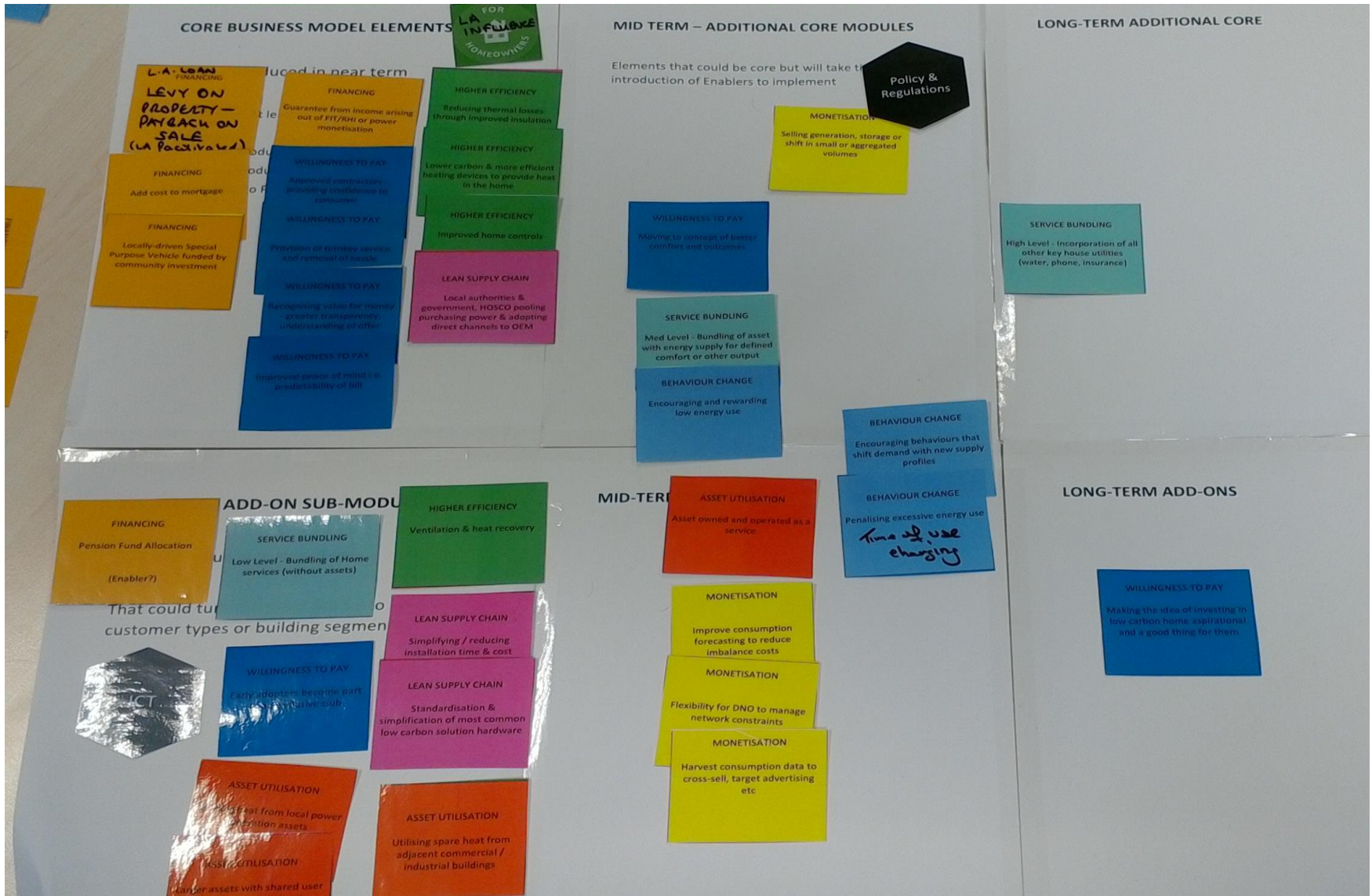
Some from the original Long List analysis – some have arisen from working sessions

*Marker for Enabler known to being required/desirable against a particular Sub-Module – descriptor to be defined later

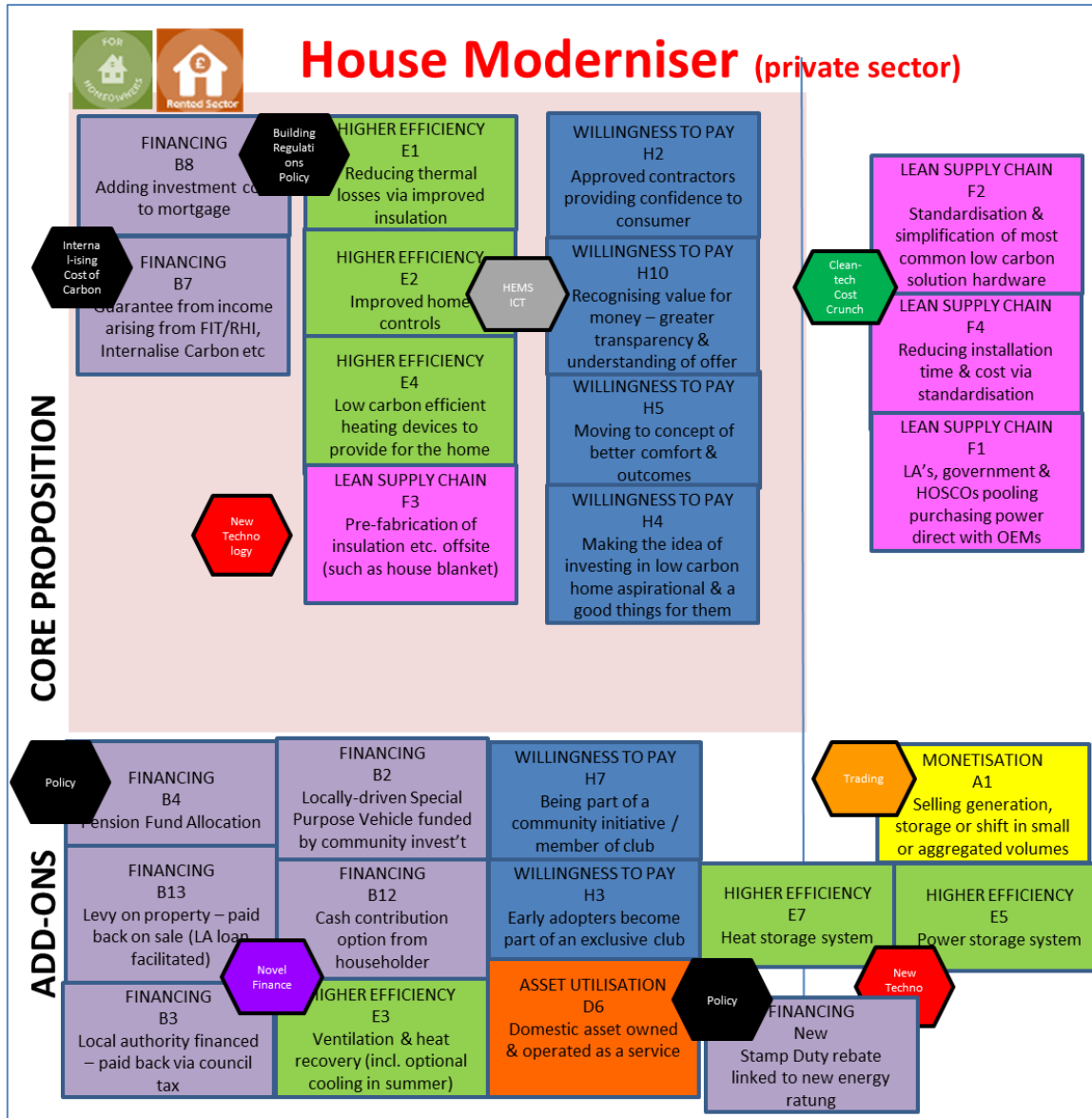
Local Authority Workshop Idea 1



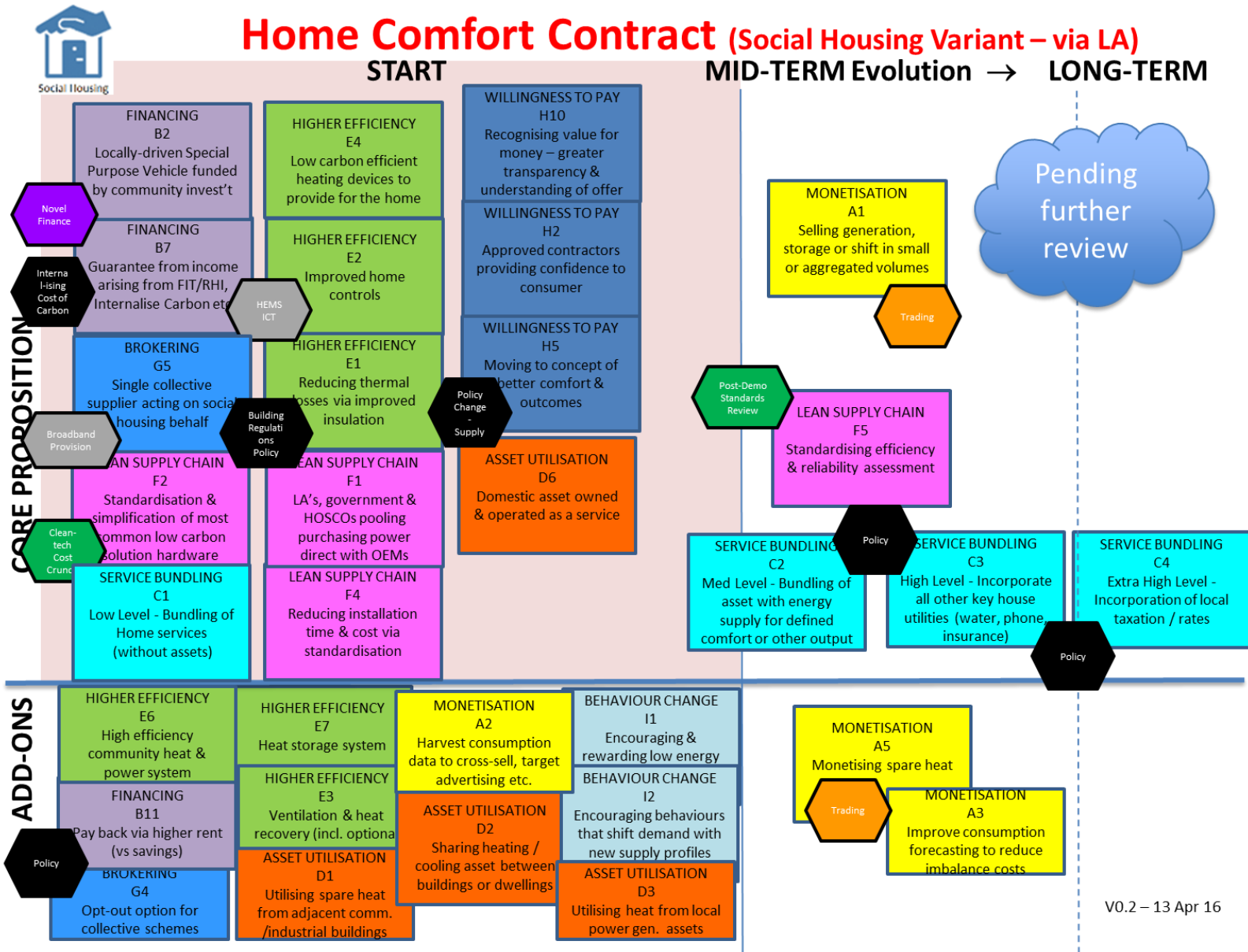
Local Authority Workshop Idea 2



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



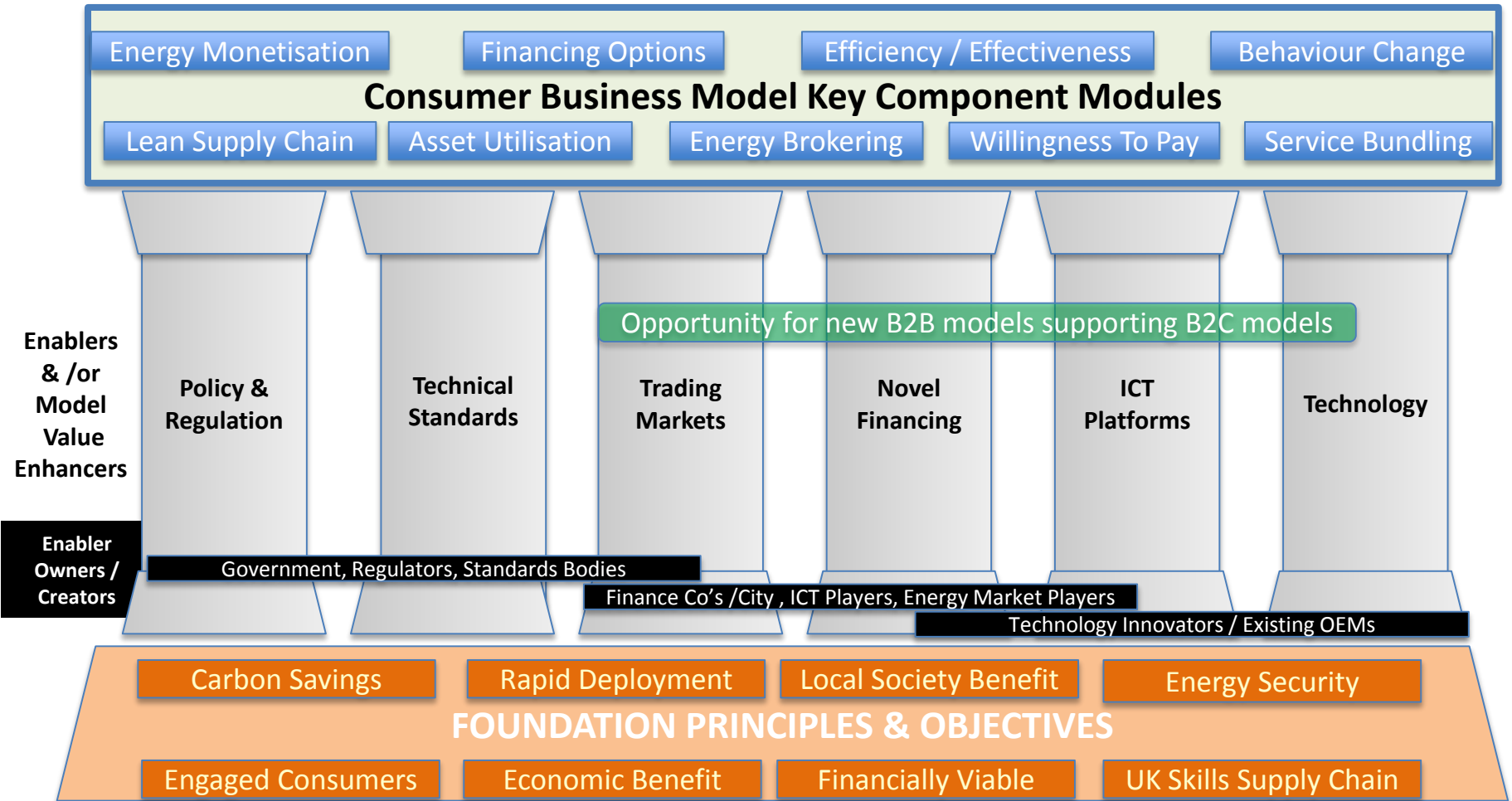
Another record from the card game ...



V0.2 – 13 Apr 16

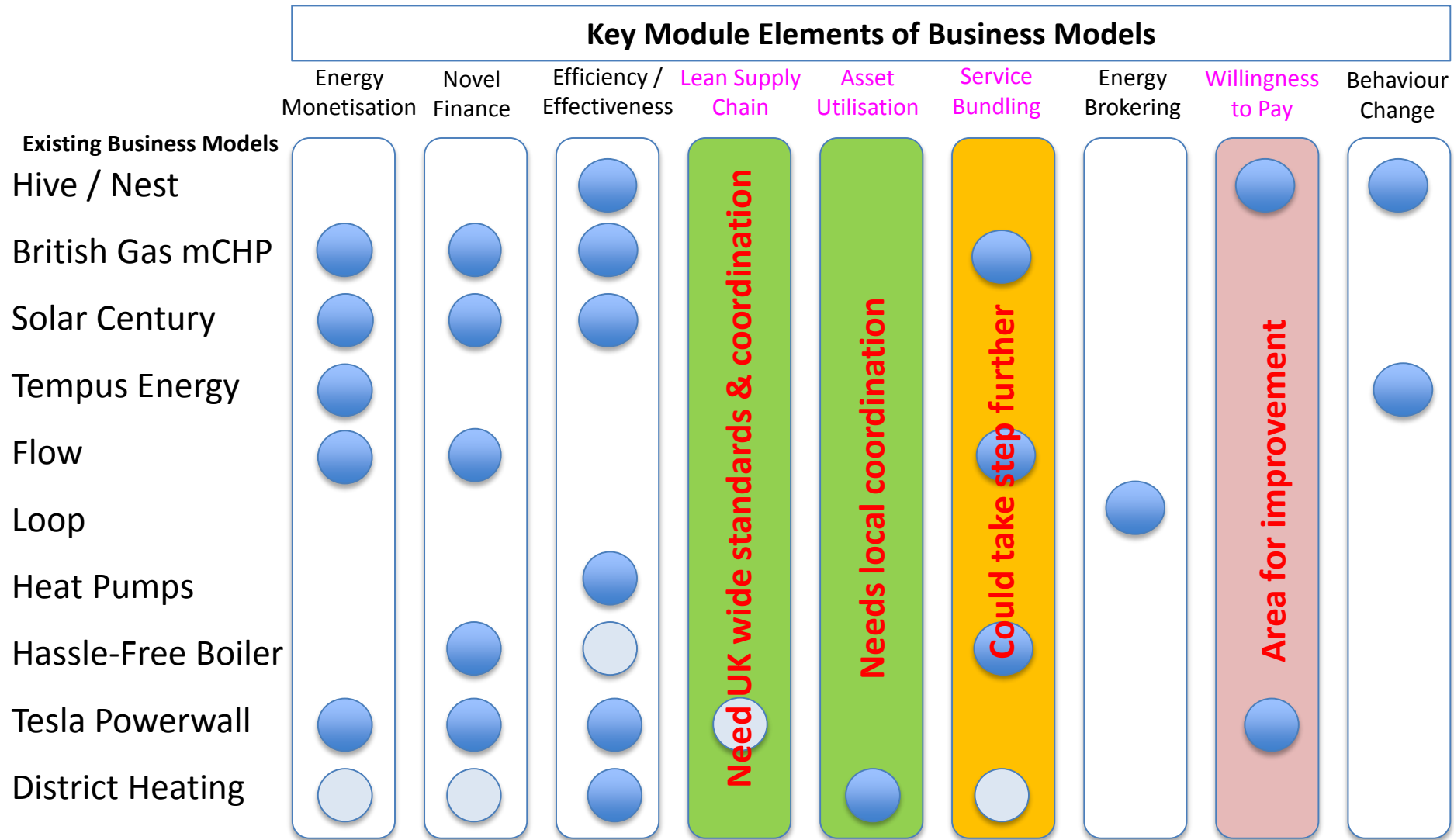
Business Model Architecture

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

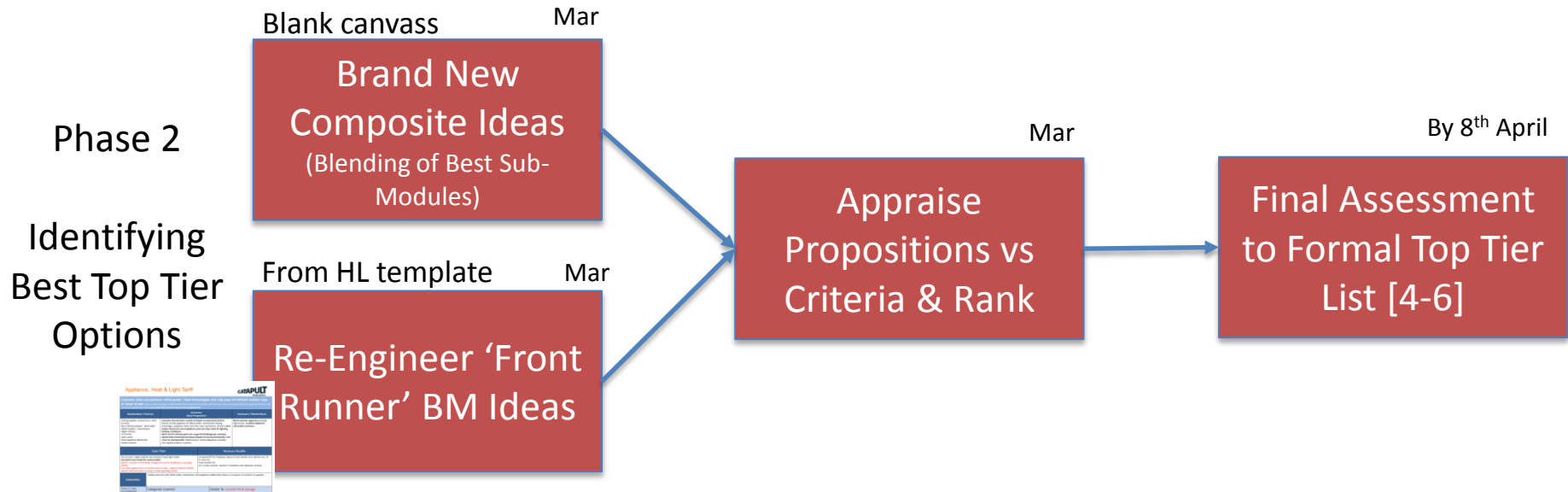
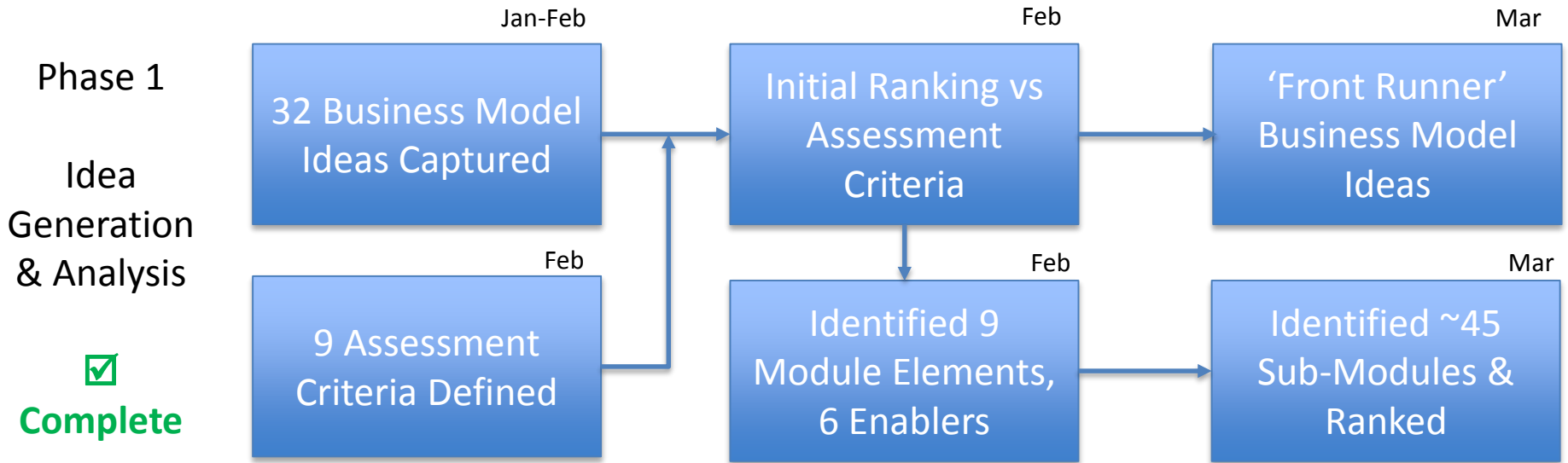
Mapping Existing Models across the Key Components



Opportunities for our approach to enhance these models

Getting to the Top Tier Business Models

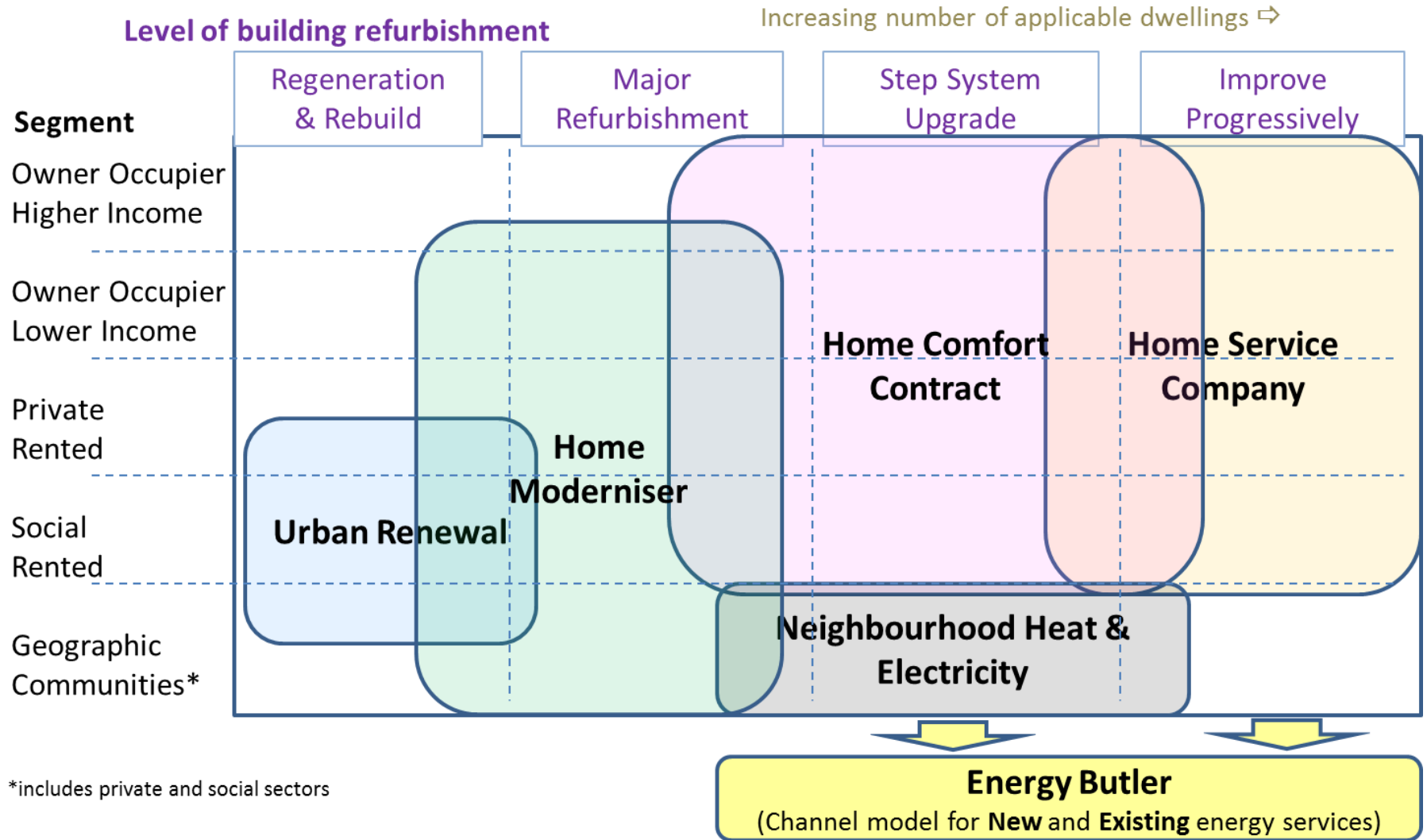
Getting to the Top Tier Business Models



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

Models covering all sectors with distinct features for consumer

Quantitative Analysis

Analysis Stage Triangulation – an illustration

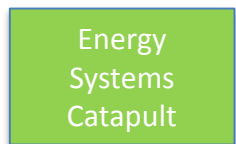
Assessment Parties



Frontier



Delta



Energy
Systems
Catapult

Total Business Model Effect
£ per annum (+/- £100)

Business Model Types



Home Comfort

+ve



Home Service

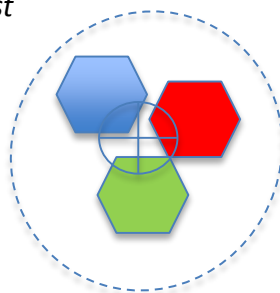
-ve



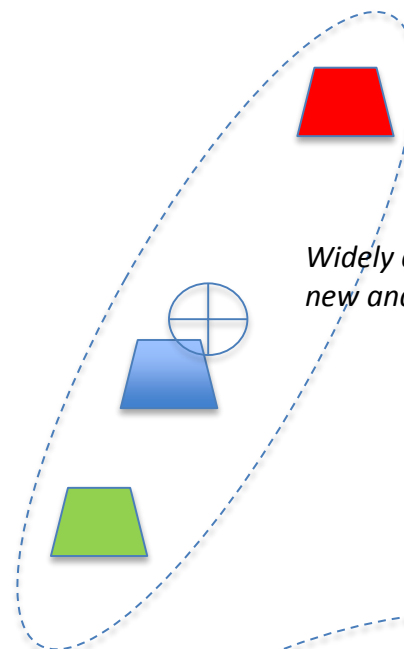
Neighbourhood

... etc

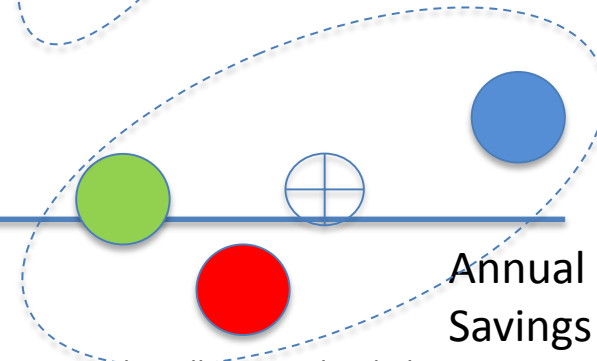
Suggests estimates are robust



Widely differing views of value – new analysis loop may be req'd



Differing views but all point to borderline viability despite carbon savings

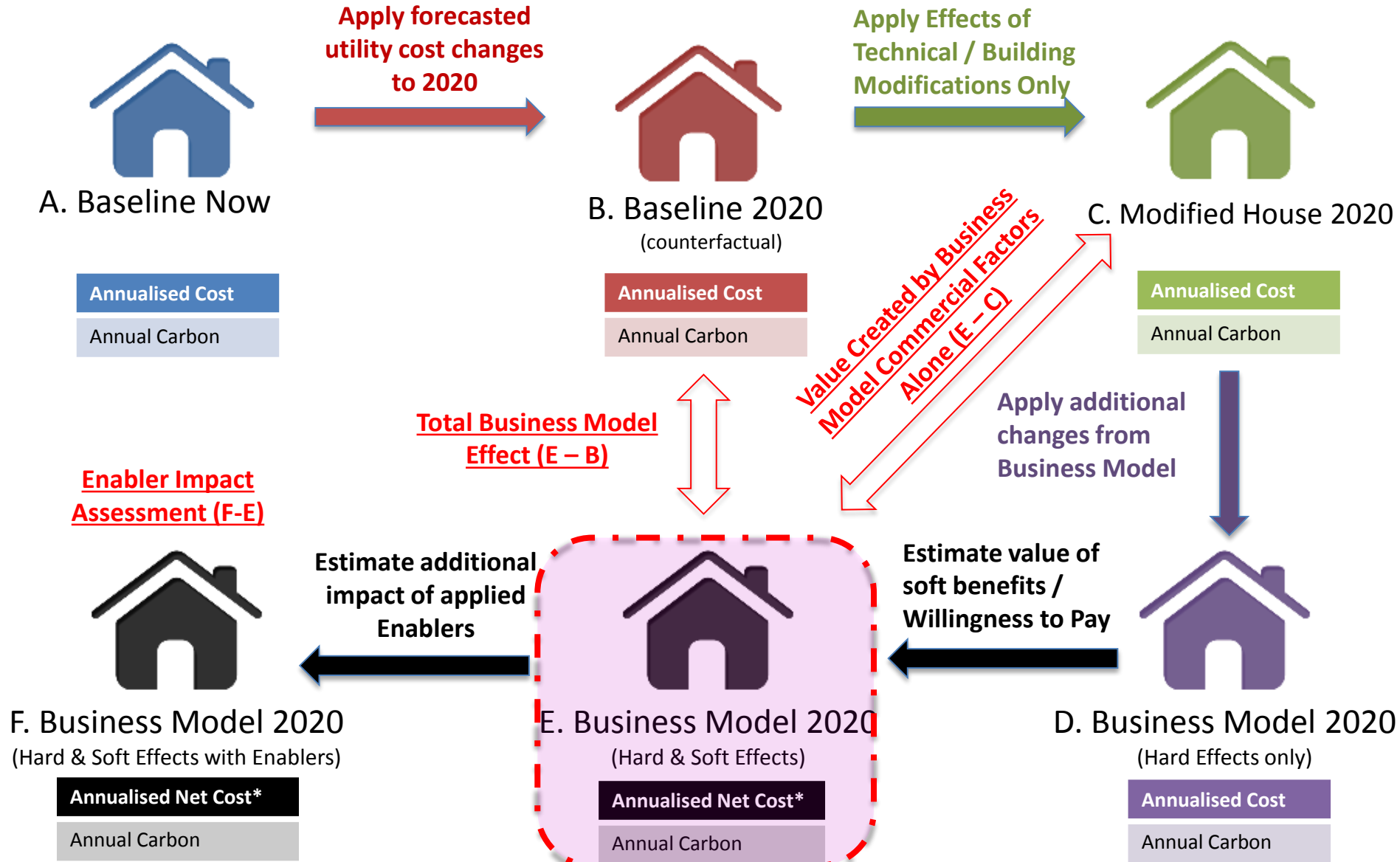


Annual Carbon Savings

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)



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

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

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 <small>(leave out of analysis for now)</small>	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)

V0.3 16/05/16

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

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. Willingness 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	Neighbourhood 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

Household Cost Element	Variable	Fixed	Capital	...	Where Business Model Has An Interaction				
					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



House Moderniser (private sector)

START

MID-TERM Evolution → LONG-TERM

CORE PROPOSITION

ADD-ONS

FINANCING B8
Adding investment cost to mortgage

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

HIGHER EFFICIENCY E1
Reducing thermal losses via improved insulation

HIGHER EFFICIENCY E2
Improved home controls

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

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

WILLINGNESS TO PAY H2
Approved contractors providing confidence to consumer

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

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

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

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

Internalising Cost of Carbon

Building Regulations Policy

HEMS ICT

Clean-tech Cost Crunch

New Technology

FINANCING B4
Pension Fund Allocation

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

FINANCING B3
Local authority financed paid back via council tax

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

FINANCING B12
Cash contribution option from householder

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

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

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

ASSET UTILISATION D6
Domestic asset owned & operated as a service

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

HIGHER EFFICIENCY E7
Heat storage system

HIGHER EFFICIENCY E5
Power storage system

FINANCING New
Stamp Duty rebate linked to new energy rating

Policy

Novel Finance

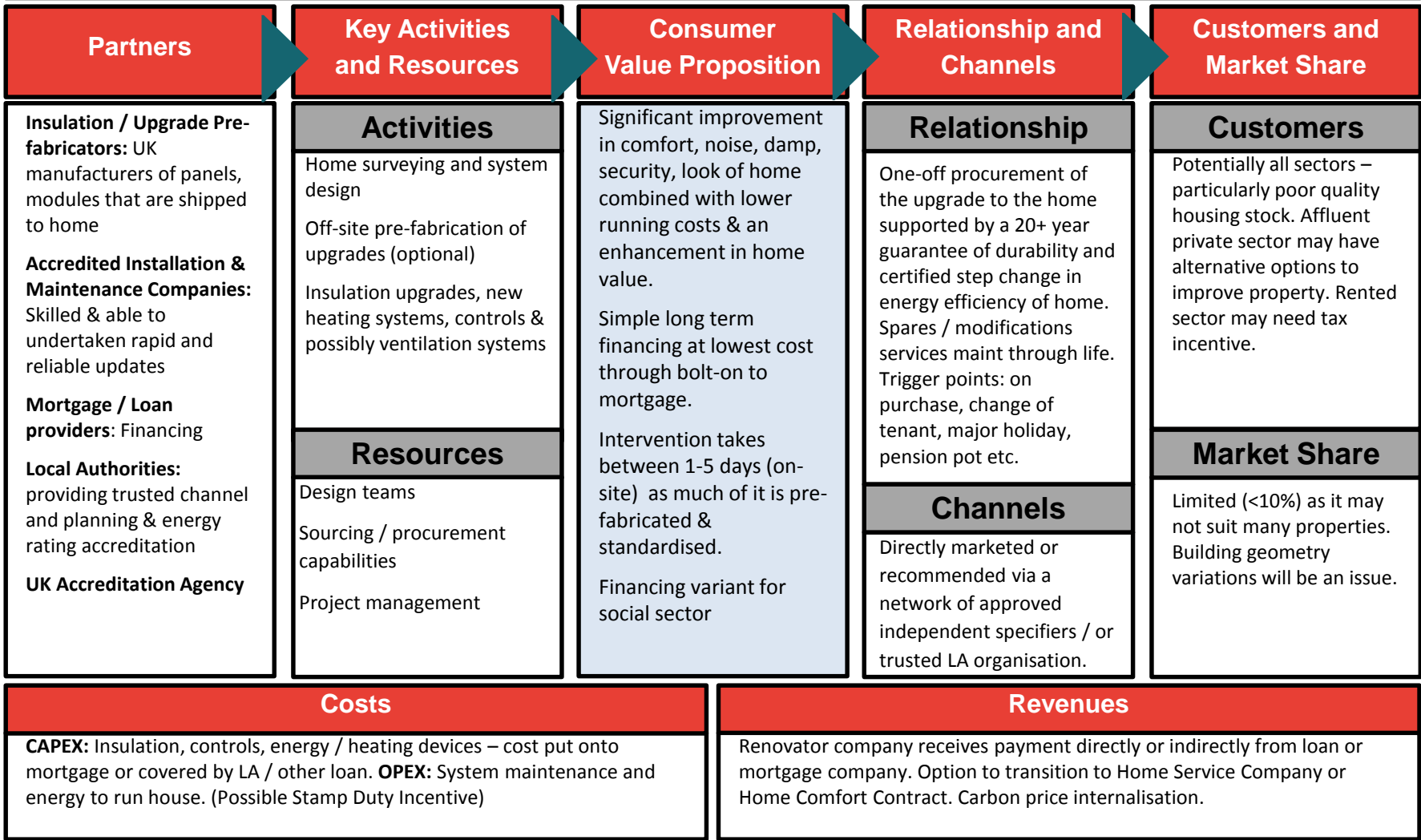
Trading

Policy

New Techno

Landlord Capex Interest Tax Relief

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.



Home Moderniser – Defining Participant Roles

Party	Core Model Role	Options / future role
Accredited specifier and provider	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Coordinates receipt of hardware • Installs building fabric changes • Installs new low carbon appliances 	<ul style="list-style-type: none"> • Installation of future upgrades (e.g. heat / power storage)
Homeowner	<ul style="list-style-type: none"> • Commits to contract & mortgage / charge 	<ul style="list-style-type: none"> • Payment to council via council tax (low income) • Upfront cash contribution (high income)
Mortgage Company	<ul style="list-style-type: none"> • Provides finance against increased mortgage payments or charge on property 	<ul style="list-style-type: none"> • Coordinates with LA linked for charge on property
Renovation hardware manufacturers	<ul style="list-style-type: none"> • Pre-fabrication of house upgrade fabric • Manufacture appliances (e.g. GSHP) 	<ul style="list-style-type: none"> • Enhanced hardware – such as cooling / ventilation
Local Authority	<ul style="list-style-type: none"> • Provides planning permission 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Accreditation of providers • Providers of objective choices / information 	<ul style="list-style-type: none"> • Providing lower cost technical standards for renovation materials, equipment and installation



Home Service Company

STARTING OFFER

MID-TERM



LONG-TERM

CORE

ADD-ONS

FINANCING B6
Lease / Service Bundling

Novel Finance

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

Internalising Cost of Carbon

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

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

HEMS ICT

HIGHER EFFICIENCY E2
Improved home controls

Reducing Carbon Obligation

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

Clean-tech Cost Crunch

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

Trading

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

Policy

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

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

ASSET UTILISATION D6
Domestic asset owned & operated as a service

BROKERING G2
Competitive sourcing – automatic linked to obligation of provider

MONETISATION A3
Improve consumption forecasting to reduce imbalance costs

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

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

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

HIGHER EFFICIENCY E5
Power storage system

New Technology

FINANCING B12
Cash contribution option from householder

HIGHER EFFICIENCY E1
Improved Insulation

HIGHER EFFICIENCY E6
High efficiency community heat & power system

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

WILLINGNESS TO PAY H2
Approved contractors providing confidence to consumer

Policy

BEHAVIOUR CHANGE I3
Manage within agreed consumption limits

BEHAVIOUR CHANGE I1
Encourage & rewarding low energy use

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

MONETISATION A4
Flexibility for DNO to manage network constraints

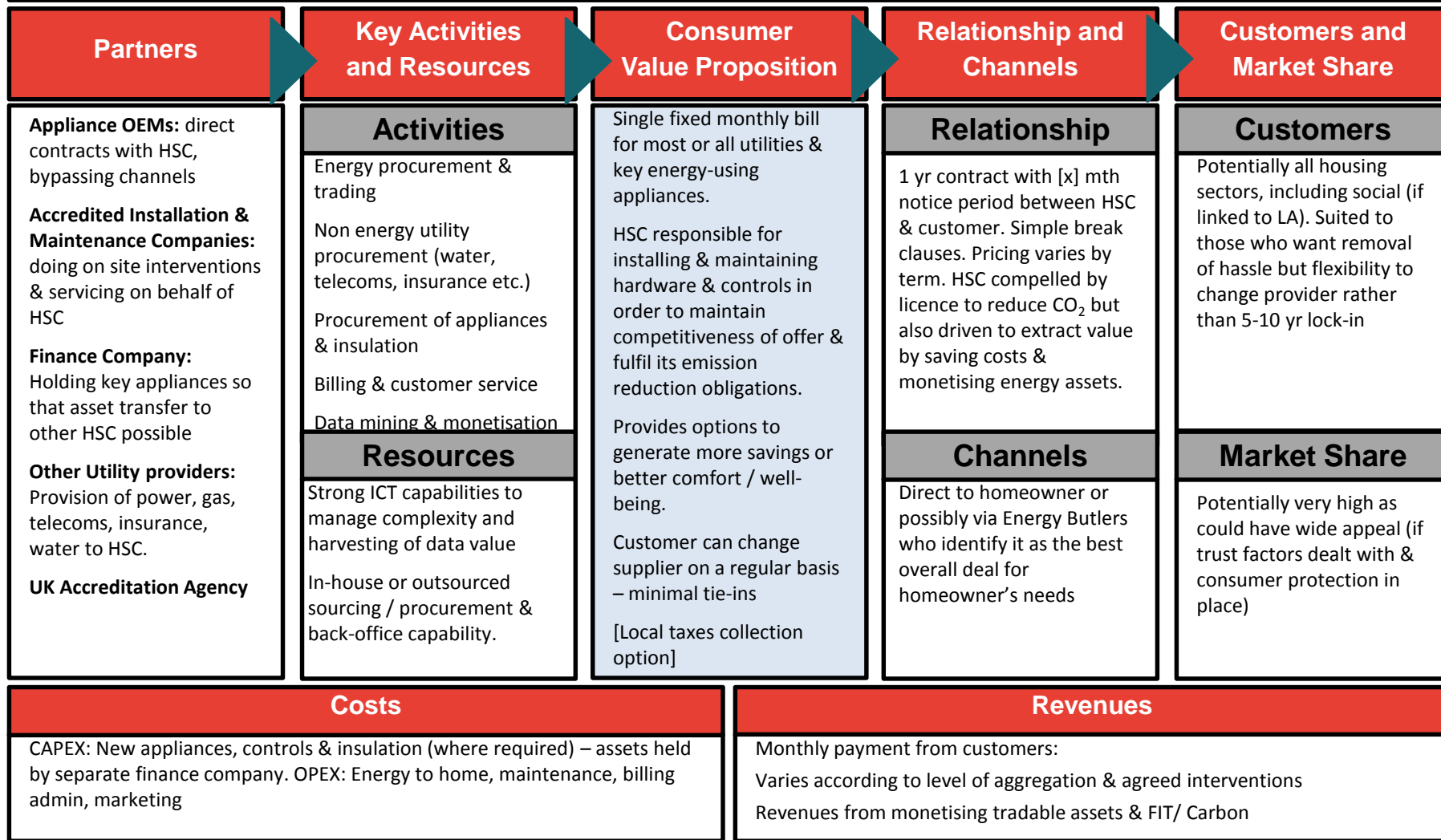
HIGHER EFFICIENCY E3
Ventilation & heat recovery (incl. optional cooling in summer)

HIGHER EFFICIENCY E7
Heat storage system

Policy

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

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.



Home Service Company–Participant Roles

Party	Core Model Role	Options / future role
Accredited Provider	<ul style="list-style-type: none"> • 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 CO₂ reduction targets • Assumes repayment responsibility for hardware changes in home • Monetises demand shift, forecasting, data in the market 	<ul style="list-style-type: none"> • Collects council tax on behalf of LA
Installation & Service Contractors	<ul style="list-style-type: none"> • Install and manage any relevant energy appliances in home (paid for by Provider) 	
Utility Providers	<ul style="list-style-type: none"> • Provide utilities to Homeowner via contract with Provider 	
Asset Financing Company	<ul style="list-style-type: none"> • Provides finance for new low carbon systems in home • Takes asset ownership with repayments via Provider 	
Hardware Providers	<ul style="list-style-type: none"> • Manufacture heating hardware against standards set by UK agency • Deliver direct to installers but paid by Financing Company 	
Regulator / UK Agency / Skills bodies / Catapult	<ul style="list-style-type: none"> • Provides licence to Provider to operate the multi-utility model and audits compliance with CO₂ reduction targets • Provides accreditation for installer companies • Provides low lifetime cost appliance standards to Hardware OEMs 	
Local Authority		<ul style="list-style-type: none"> • May become a HSC itself • Collects taxes via HSC



Neighbourhood Heat & Electricity

START

MID-TERM Evolution → LONG-TERM

CORE PROFIT

ADD-ONS

FINANCING B2
Locally-driven Special Purpose Vehicle

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

MONETISATION A3
Improve consumption forecasting to reduce imbalance costs

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

MONETISATION A4
Flexibility for DNO to manage network constraints

HIGHER EFFICIENCY E2
Improved home controls

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

LEAN SUPPLY CHAIN F4
Reducing installation time & cost via standardisation

HIGHER EFFICIENCY E5
Power storage system

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)

HIGHER EFFICIENCY 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

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

Novel Finance

Internalising Cost of Carbon

Trading

Policy

Building Regulations Policy

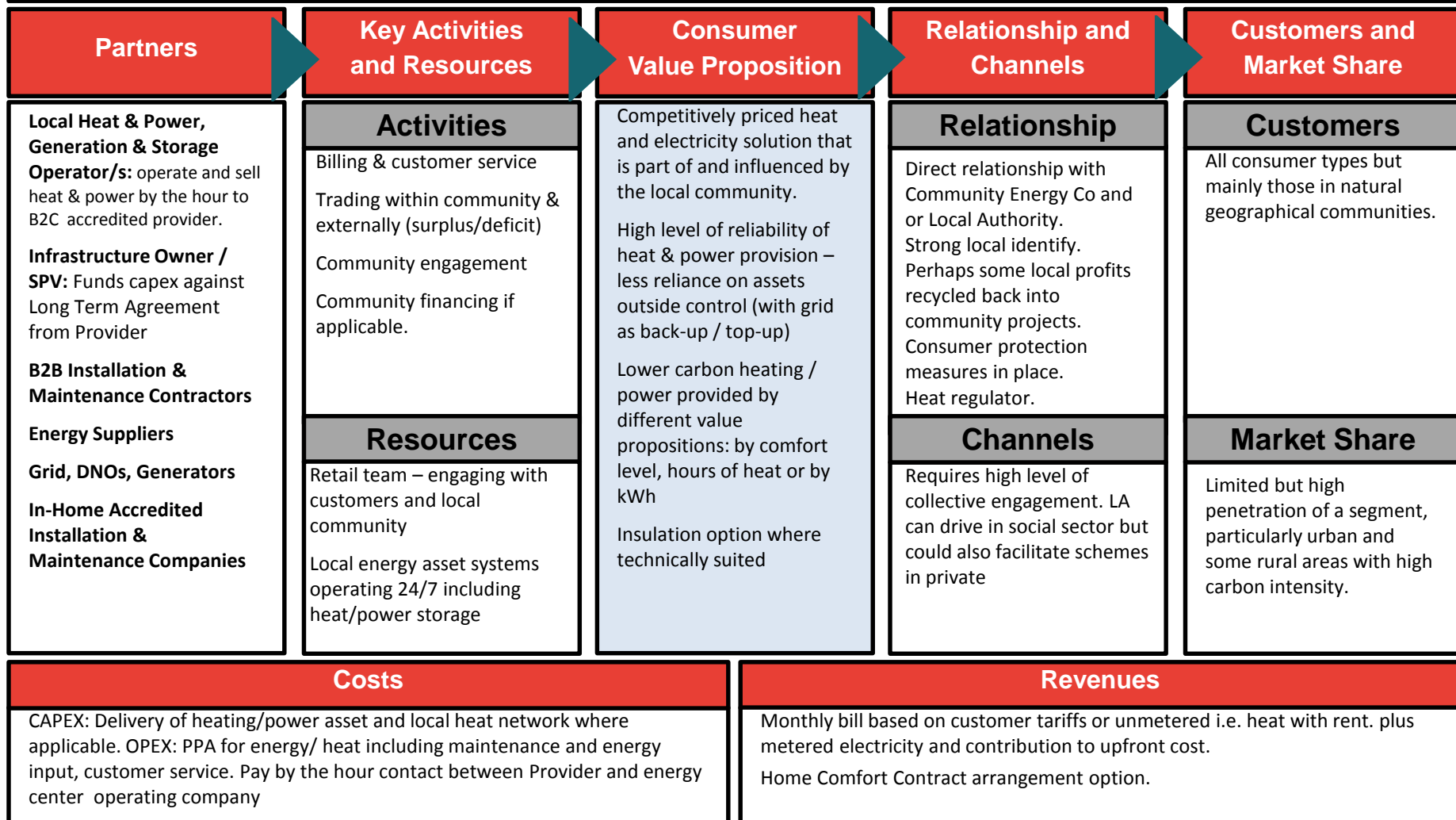
Trading

Clean-tech Cost Crunch

New Technology

HEMS ICT

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.



Neighbourhood Heat & Power –Participant Roles

Party	Core Model Role	Options / future role
Accredited Provider	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Monetising spare heat in adjacent buildings? • Utilising heat from industrial & commercial buildings • Providing insulation deals for homeowners
Installation & Service Contractors	<ul style="list-style-type: none"> • Install heat network • Manage ongoing maintenance (paid by Provider) 	<ul style="list-style-type: none"> • Installing insulation
Grid, DNOs & Generators	<ul style="list-style-type: none"> • Transmit power generated by Local Facility through network • Provide backup power as needed 	
Local Power & Heat Facility	<ul style="list-style-type: none"> • Provides heat and power via blend of assets (possibly including renewables) • Provision by PPA / pay-by-hour arrangements • Manages asset maintenance and performance 	<ul style="list-style-type: none"> • Include power storage
Energy Suppliers	<ul style="list-style-type: none"> • Trade power with Provider 	
Generating Hardware Suppliers	<ul style="list-style-type: none"> • Provide low carbon heat/power generating assets 	<ul style="list-style-type: none"> • Possibly take role in running Local Power & Heat Facility
Financing Vehicle	<ul style="list-style-type: none"> • Provides financing against long term contract from Provider 	
Regulator / UK Agency / Skills bodies / Catapult	<ul style="list-style-type: none"> • Provides licence to Provider to operate the multi-utility model and audits compliance with CO2 reduction targets • Provides accreditation for installer companies • Provides low lifetime cost appliance standards to Hardware OEMs 	



Urban Renewal

STARTING OFFER

MID-TERM



LONG-TERM

CORE

ADD-ONS

Building Regulations Policy

Novel Finance

Internalising Cost of Carbon

HEMS ICT

Clean-tech Cost Crunch

New Technology

Trading

Novel Finance

Policy

Policy

Policy

Policy

FINANCING B2
Locally-driven Special Purpose Vehicle

FINANCING B14
Financed from extra building capital gains

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

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

ASSET UTILISATION D6
Domestic asset owned & operated as a service

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

LEAN SUPPLY CHAIN F4
Reducing installation time & cost via standardisation

HIGHER EFFICIENCY E5
Power storage system

FINANCING B3
Local authority financed – paid back via council tax

FINANCING B11
Pay back via higher rent (vs savings)

HIGHER EFFICIENCY E6
High efficiency community heat & power system

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

MONETISATION A1
Selling generation, ...

MONETISATION A3
Improve consumption forecasting to reduce imbalance costs

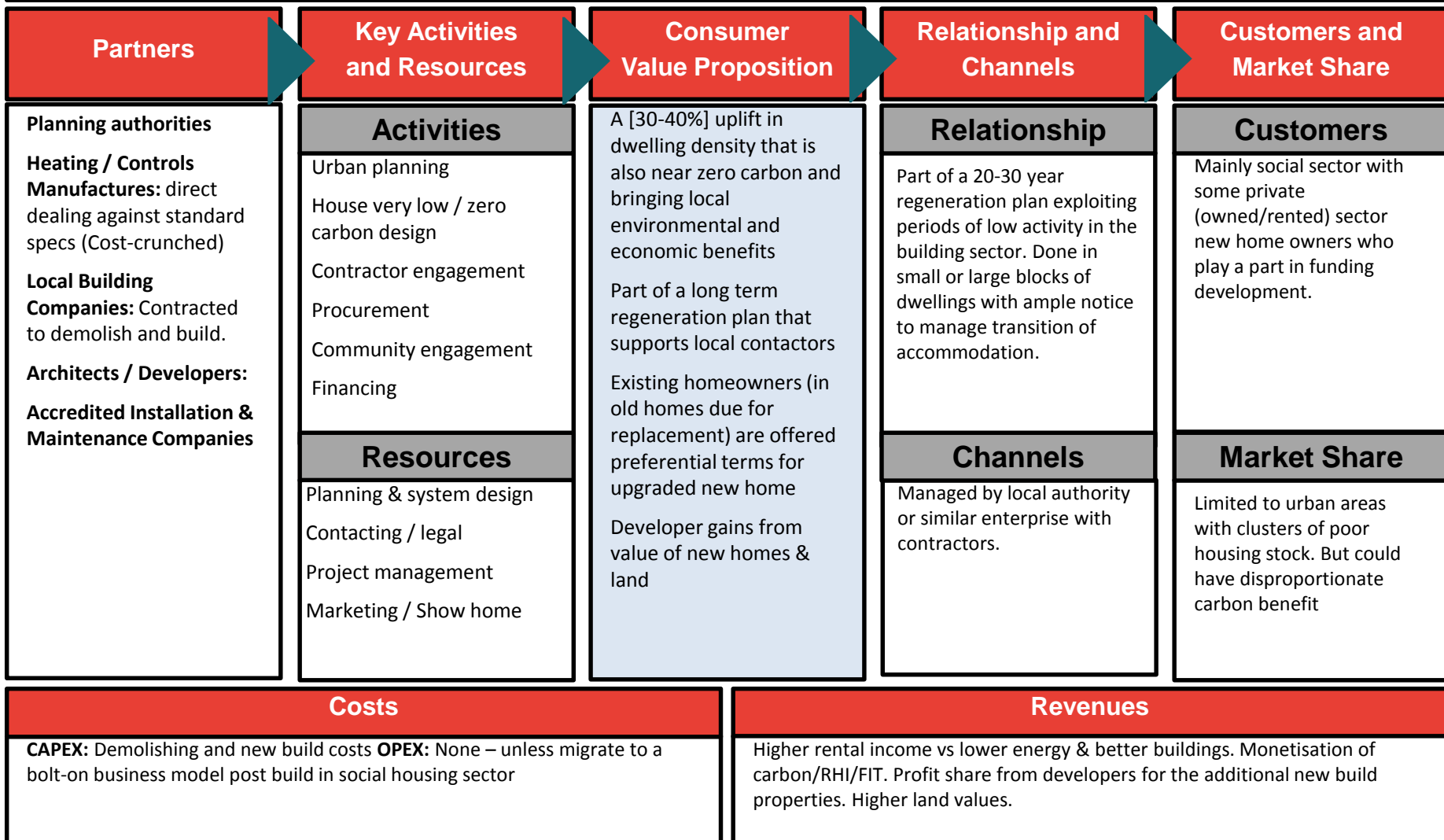
MONETISATION A2
Harvest consumption data to cross-sell, target advertising etc.

WORKING G2
Competitive sourcing – automatic linked to negotiation of provider

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

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.



Urban Renewal – Defining Participant Roles

Party	Core Model Role	Options / future role
Accredited Developer	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Additional systems such as heat and power storage & ventilation & cooling
SPV & Capital Markets	<ul style="list-style-type: none"> • Funding vehicle for financing of project 	
Housing Associations	<ul style="list-style-type: none"> • Ownership of some of the properties • Collection of FIT/RHI income 	
Hardware OEMS	<ul style="list-style-type: none"> • Pre-fabrication of house upgrade fabric • Manufacture appliances (e.g. GSHP) 	<ul style="list-style-type: none"> • Enhanced hardware – such as cooling / ventilation
Local Authority	<ul style="list-style-type: none"> • 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/	<ul style="list-style-type: none"> • 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

MID-TERM



LONG-TERM

CORE

FINANCING
B6
Lease / Service
Bundling

Internalising
Cost of
Carbon

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

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

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

HIGHER EFFICIENCY
E2
Improved home
controls

WILLINGNESS TO PAY
H2
Approved contractors
providing confidence to
consumer

BROKERING
G2
Competitive sourcing –
automatic linked to
obligation of provider

HIGHER EFFICIENCY
E1
Reducing thermal
losses via improved
insulation

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

BEHAVIOUR CHANGE
I3
Having to manage
within agreed
consumption limits

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

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

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

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

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

ASSET UTILISATION
D6
Domestic asset owned
& operated as a service

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

ADD-ONS

FINANCING
B8
Adding investment cost
to mortgage

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

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

FINANCING
B10
Charity Donation to
Fuel Poor

HIGHER EFFICIENCY
E7
Heat storage system

Market
Maker
ICT

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

Policy

MONETISATION
A4
Flexibility for DNO to
manage network
constraints

Home Comfort Contract (Rented Sector Variant)



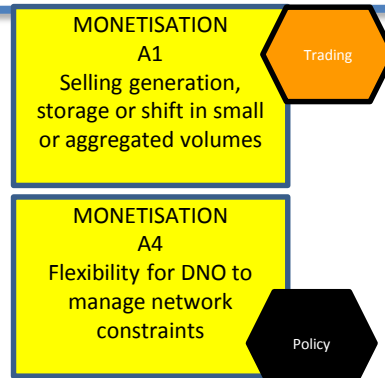
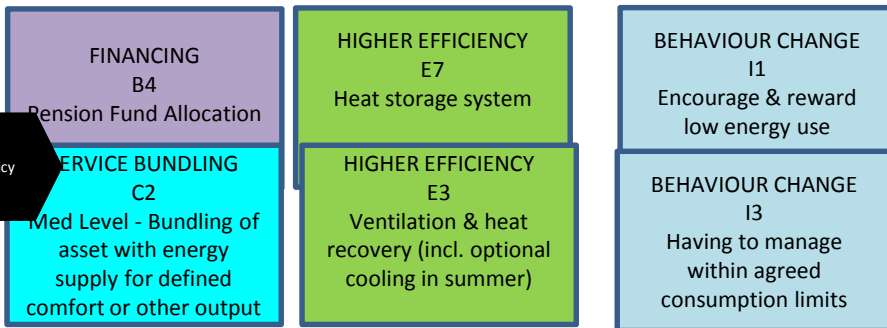
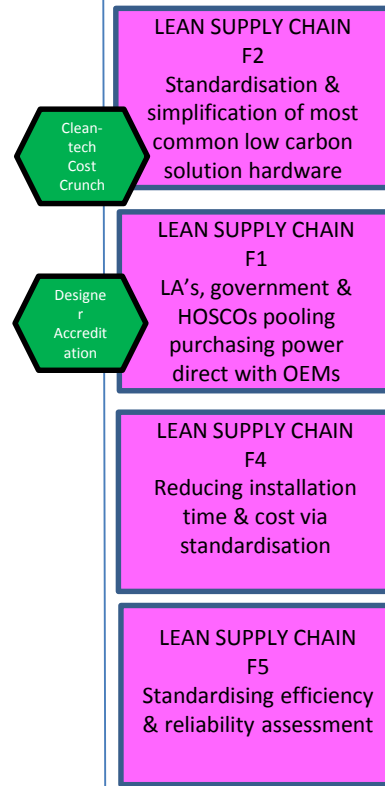
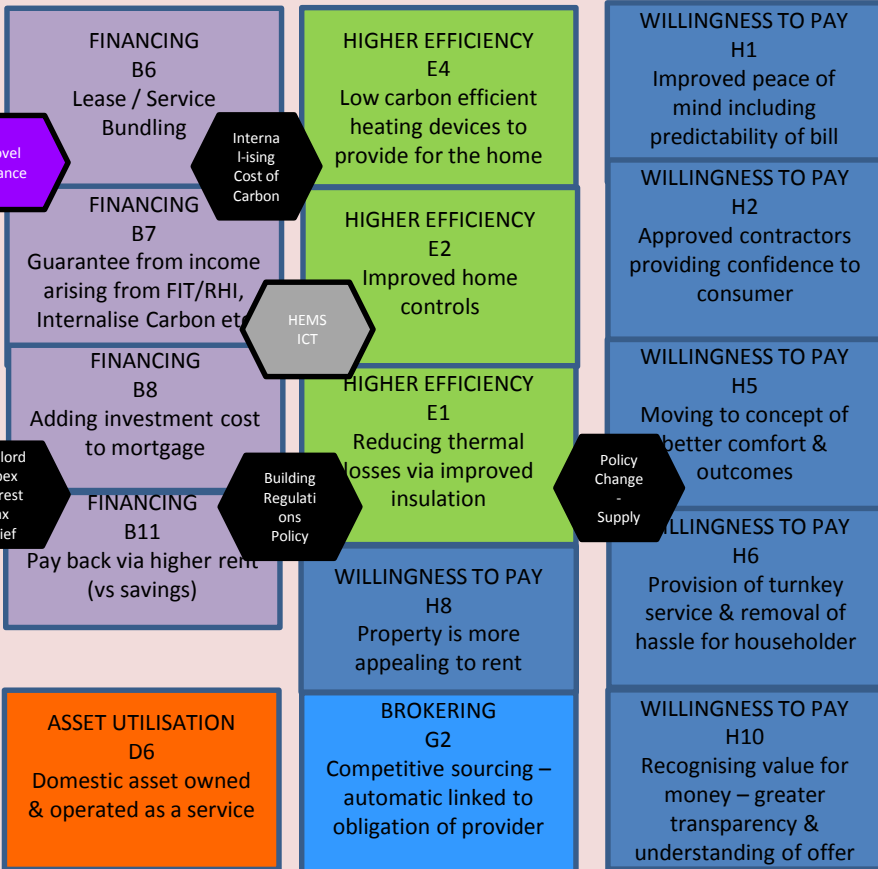
START

MID-TERM Evolution

LONG-TERM

CORE PROPOSITION

ADD-ONS





Social Housing

Home Comfort Contract (Social Housing Variant – via LA)

START

MID-TERM Evolution → LONG-TERM

CORE PROPOSITION

ADD-ONS

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

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

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

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

HIGHER EFFICIENCY E2
Improved home controls

WILLINGNESS TO PAY H2
Approved contractors providing confidence to consumer

BROKERING G5
Single collective supplier acting on social housing behalf

HIGHER EFFICIENCY E1
Reducing thermal losses via improved insulation

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

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

ASSET UTILISATION D6
Domestic asset owned & operated as a service

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

LEAN SUPPLY CHAIN F4
Reducing installation time & cost via standardisation

HIGHER EFFICIENCY E6
High efficiency community heat & power system

HIGHER EFFICIENCY E7
Heat storage system

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

FINANCING B11
Pay back via higher rent (vs savings)

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

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

BROKERING G4
Opt-out option for collective schemes

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

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

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

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

LEAN SUPPLY CHAIN F5
Standardising efficiency & reliability assessment

MONETISATION A5
Monetising spare heat

MONETISATION A3
Improve consumption forecasting to reduce imbalance costs

Pending further review

Novel Finance

Internalising Cost of Carbon

Broadband Provision

Clean-tech Cost Crunch

HEMS ICT

Building Regulations Policy

Policy Change - Supply

Post-Demo Standards Review

Trading

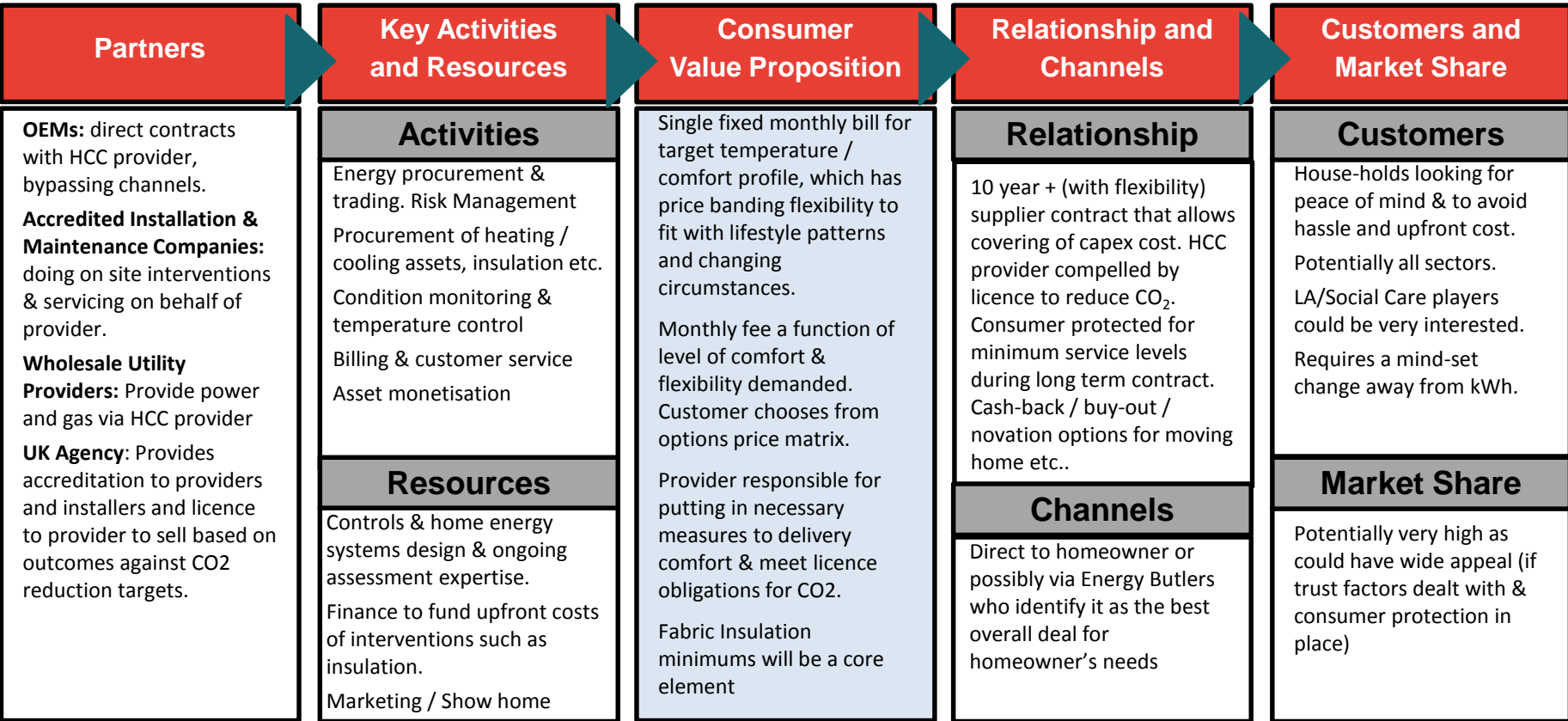
Policy

Policy

Trading

Policy

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.



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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Provision of ventilation offer • Heat storage capability • Bundling of other services
Installation & Service Contractors	<ul style="list-style-type: none"> • Install and manage any relevant energy appliances in home (paid for by Provider) 	
Wholesale Providers	<ul style="list-style-type: none"> • Provide utilities to Homeowner via contract with Provider 	
Hardware Providers	<ul style="list-style-type: none"> • Manufacture heating hardware & insulation against standards set by UK agency • Deliver direct to installers but paid by Provider 	
Regulator / UK Agency / Skills bodies / Catapult	<ul style="list-style-type: none"> • Provides licence to Provider to operate outcomes model and audits compliance with CO2 reduction targets • Provides 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

Consumer Insights on Top Tier Business Models



Contents

- Summary
- Methodology
- Context – the consumer environment
- Response to business models
 - Home Comfort Contract
 - Home Moderniser
 - Home Service Contract
 - Neighbourhood Heat and Energy
- Conclusions and next steps
- Appendix
 - Business model canvasses

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

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

Sample

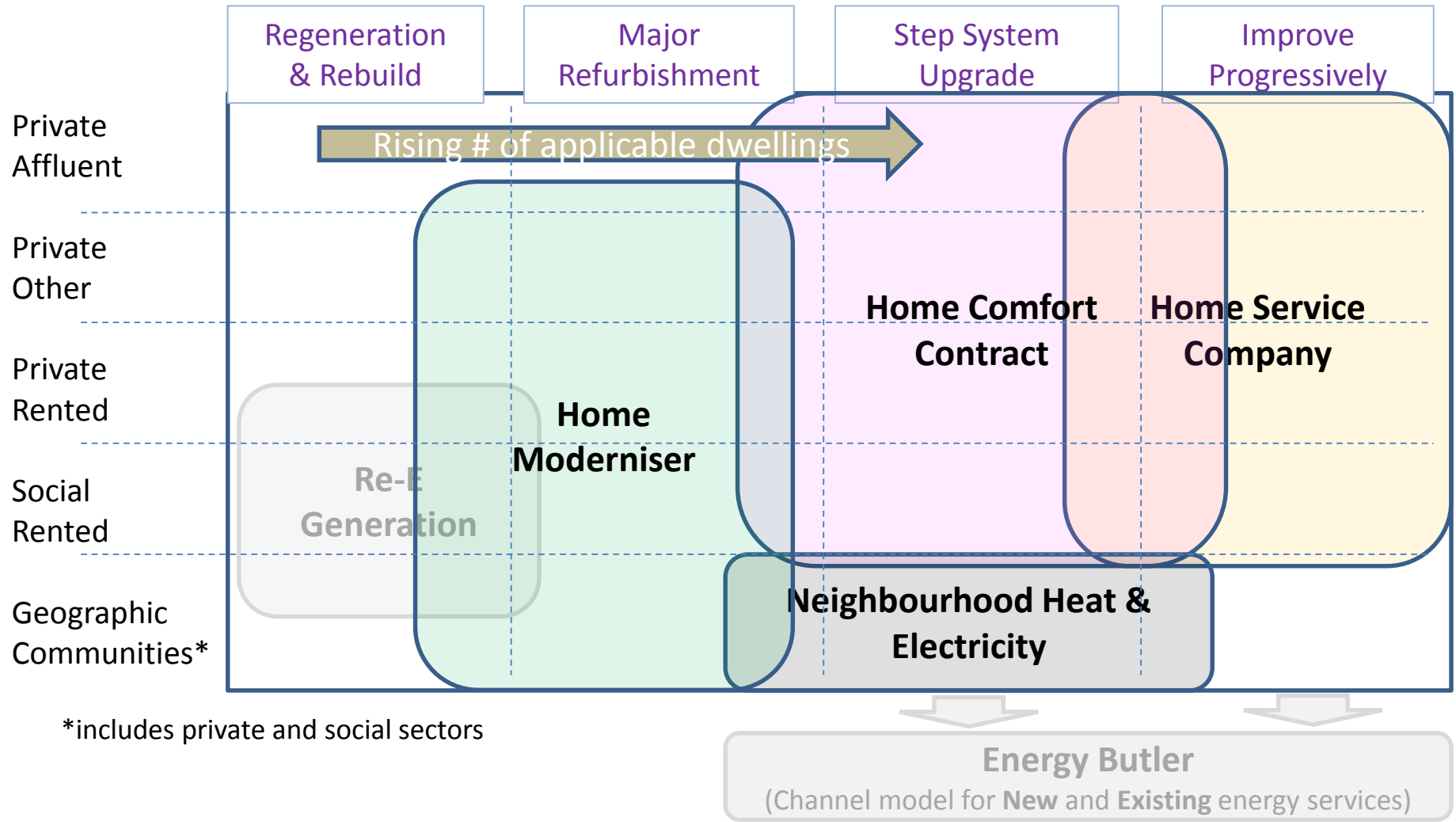


- Respondent profiles:
 - All home owners
 - All influence decisions about energy suppliers and/or home improvements
 - All have gas central heating
 - A mix of genders, incomes, household types
 - A range of levels of interest in installing energy saving / environmentally friendly technologies in their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



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

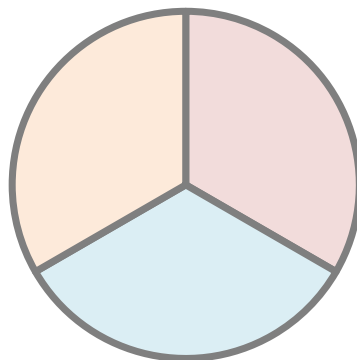
Context

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

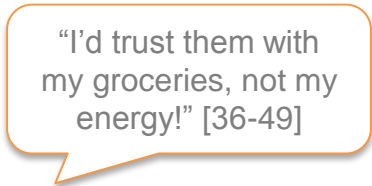


- Consequently, participants in this research showed a lack of trust in big companies, and energy providers in particular
- There was also mistrust of the workmen who install heating systems, and offer other home renovations, amongst participants
- Throughout the discussion consumers highlight that they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

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
- 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









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

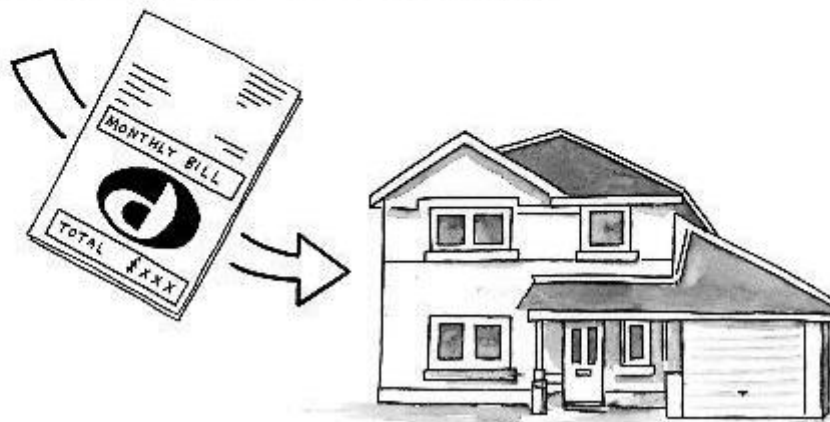
Reactions to Business Models

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 lose 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

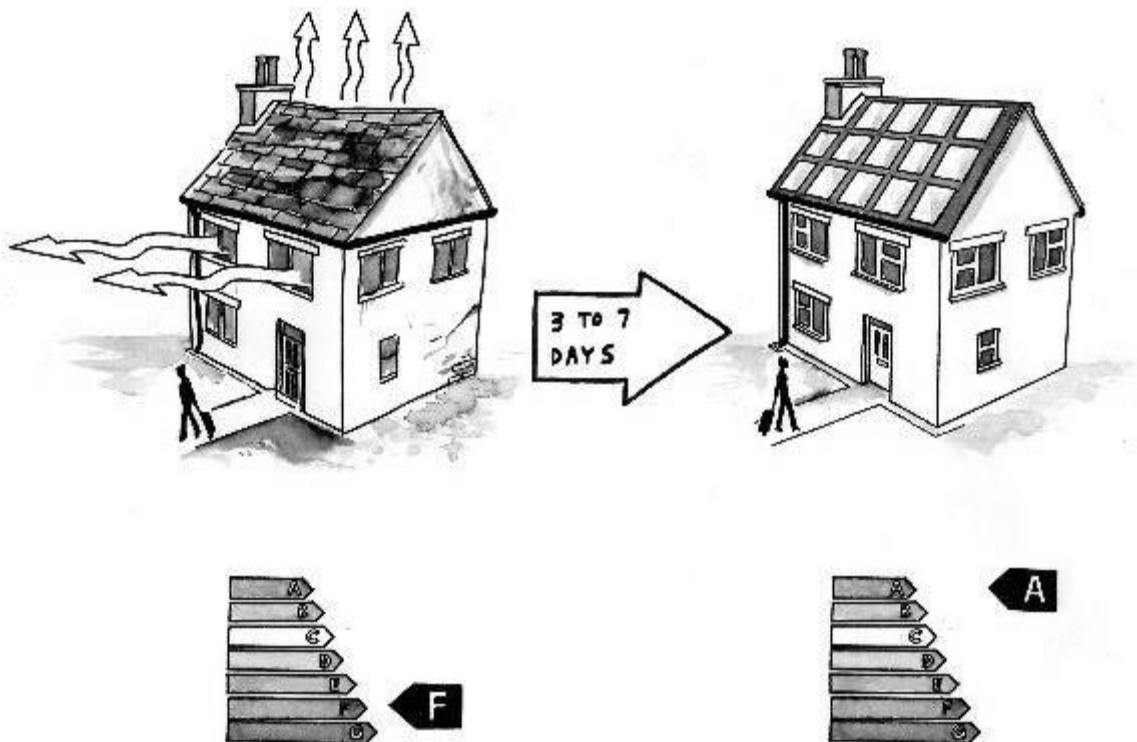
Participants suggested a range of refinements to the Home Comfort model:

- 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

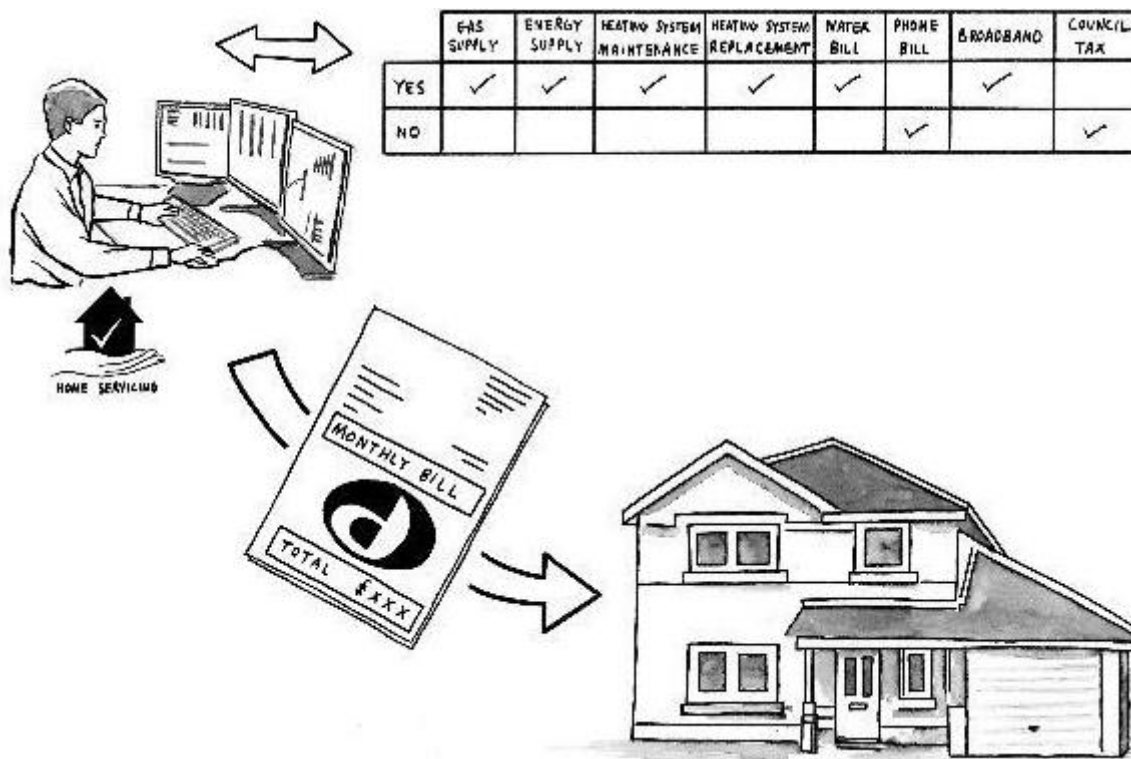
Participants suggested only a small number of refinements to the Home Modernizer model:

- 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



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

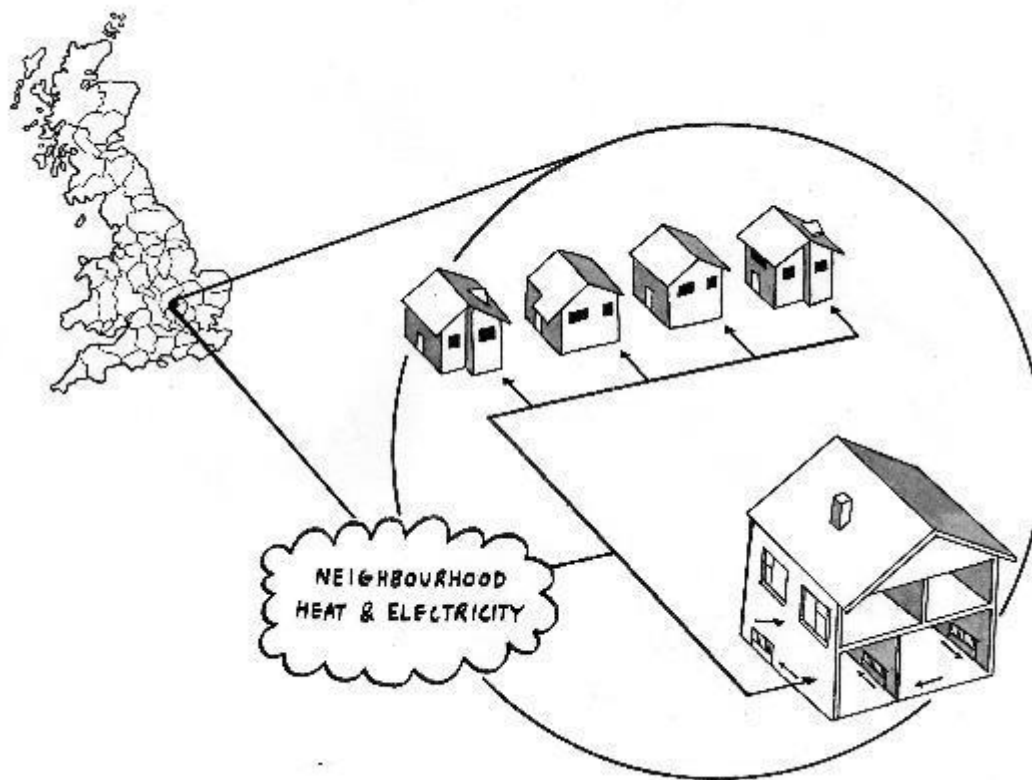
Some of the participants suggested refinements to the Home Service Contract model which may address their concerns:

- 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** from 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

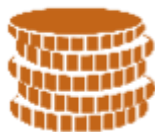
Participants raise some implementation concerns for Neighbourhood Heat and Energy

- ✘ 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 & Next Steps

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 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.

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.

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 with**. 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.

Potential future modifications & applicability

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

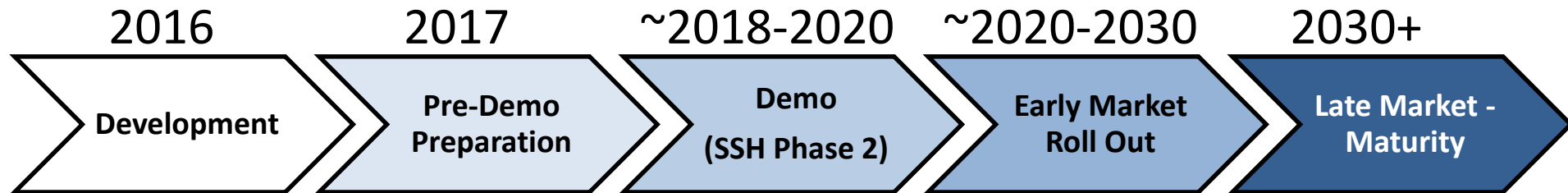
This may be best done following a revision of BMET which draws upon the new ways of assessing and categorising the outputs of business models, and simplifies the user interface so that it could be used by more people.

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.

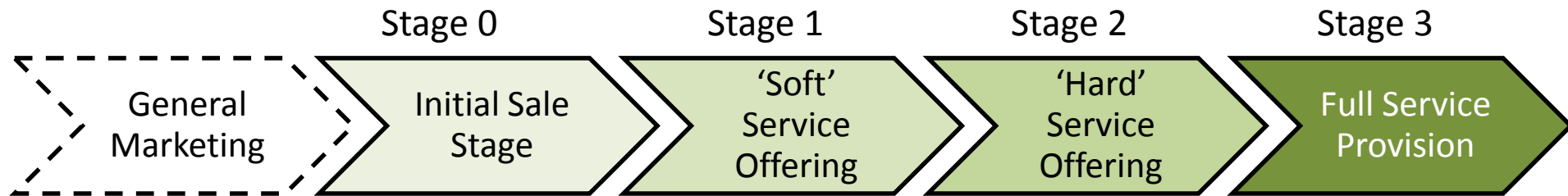
Evolution of Business Models

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)

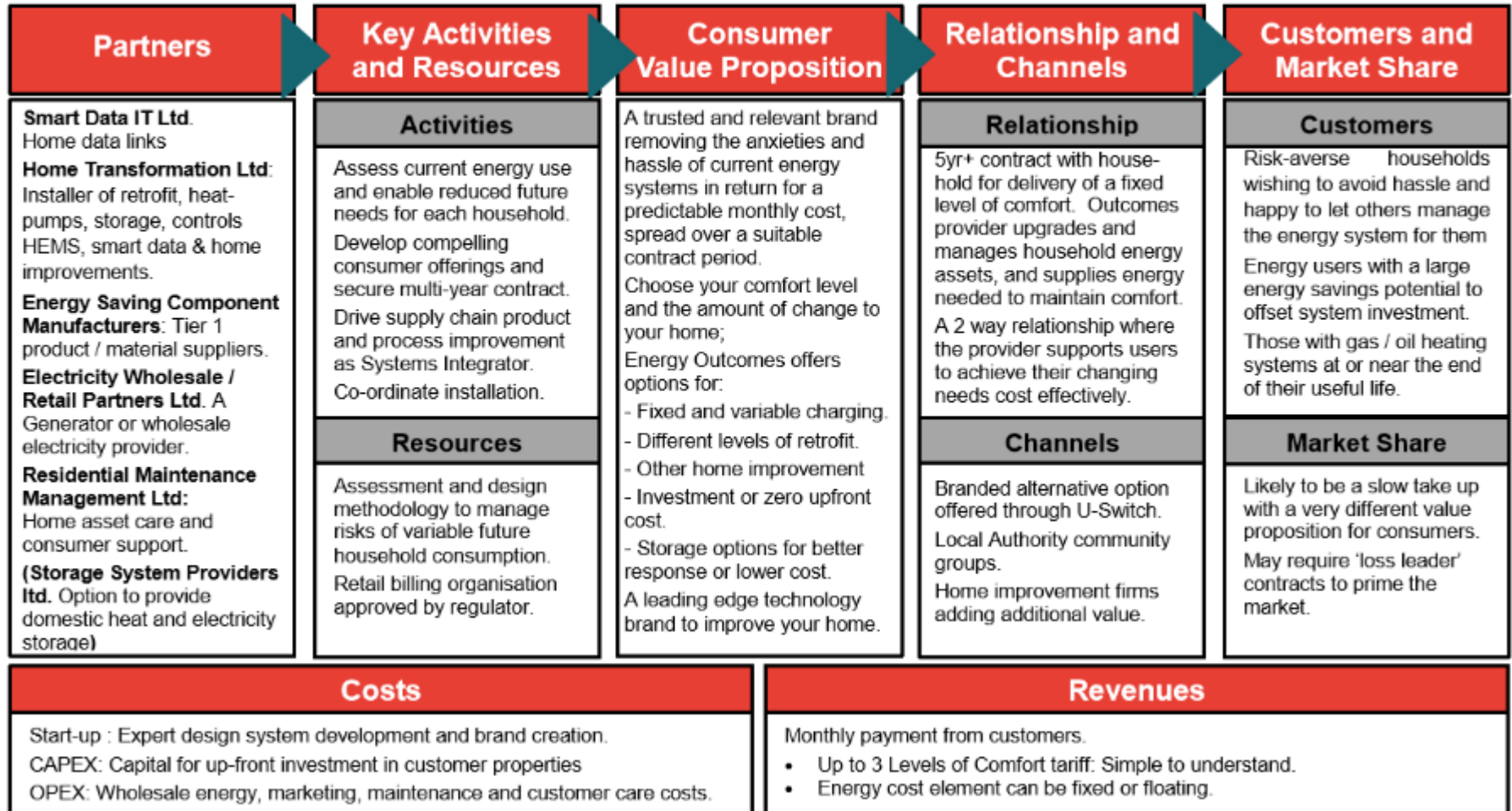


Duration	1-3 months	After 1-6m	After 1-12m	After 1-24 m
Purpose	<ul style="list-style-type: none"> • Introduce suitable BM concept & benefits • Gain customer confidence • De-risk outcomes 	<ul style="list-style-type: none"> • Get customer used to remote control of heating • Build trust with provider • Show initial benefits 	<ul style="list-style-type: none"> • Introduce improved appliances where appropriate • Take over appliance ownership & service 	<ul style="list-style-type: none"> • 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

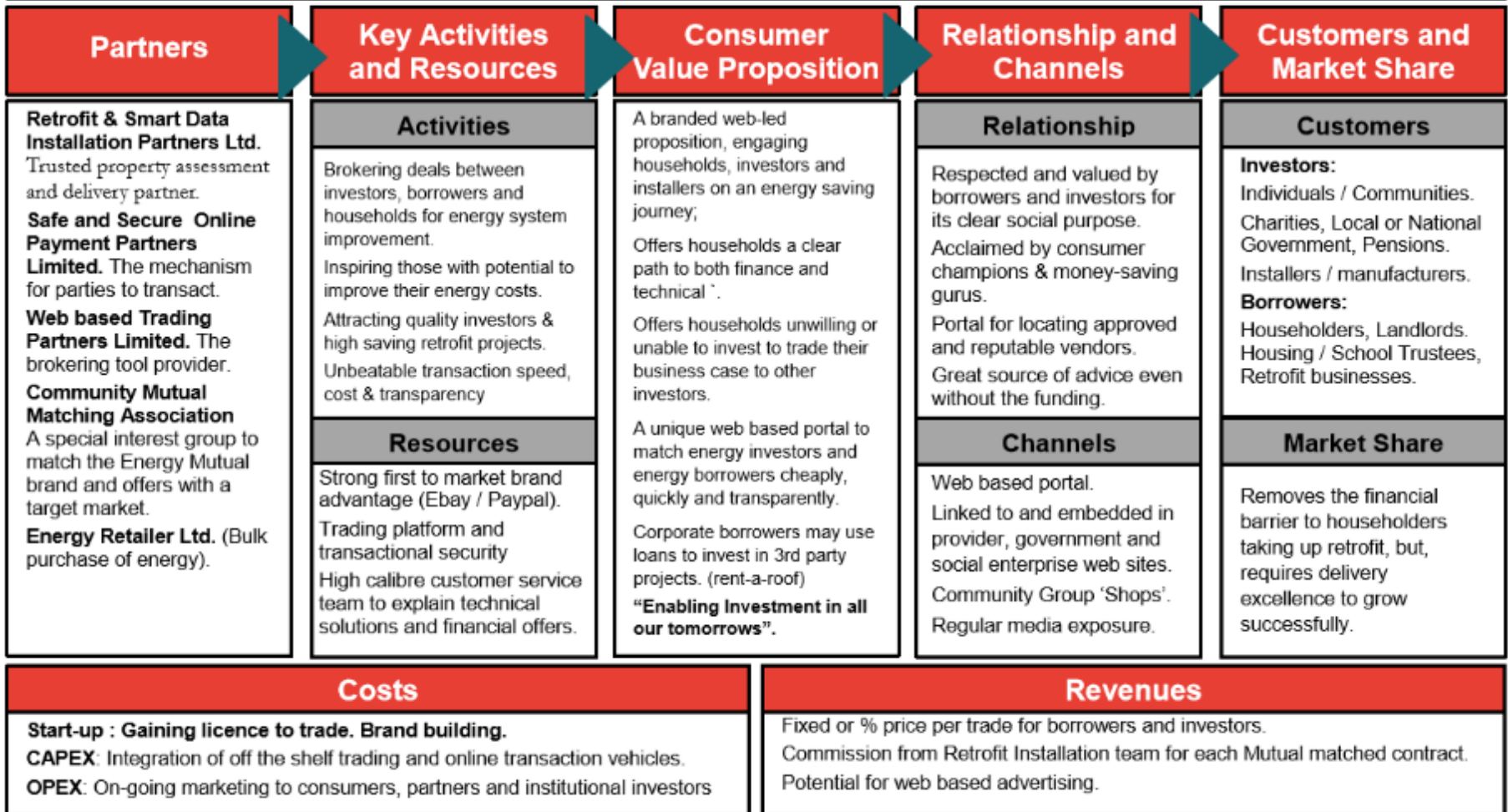
Energy Outcomes

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.



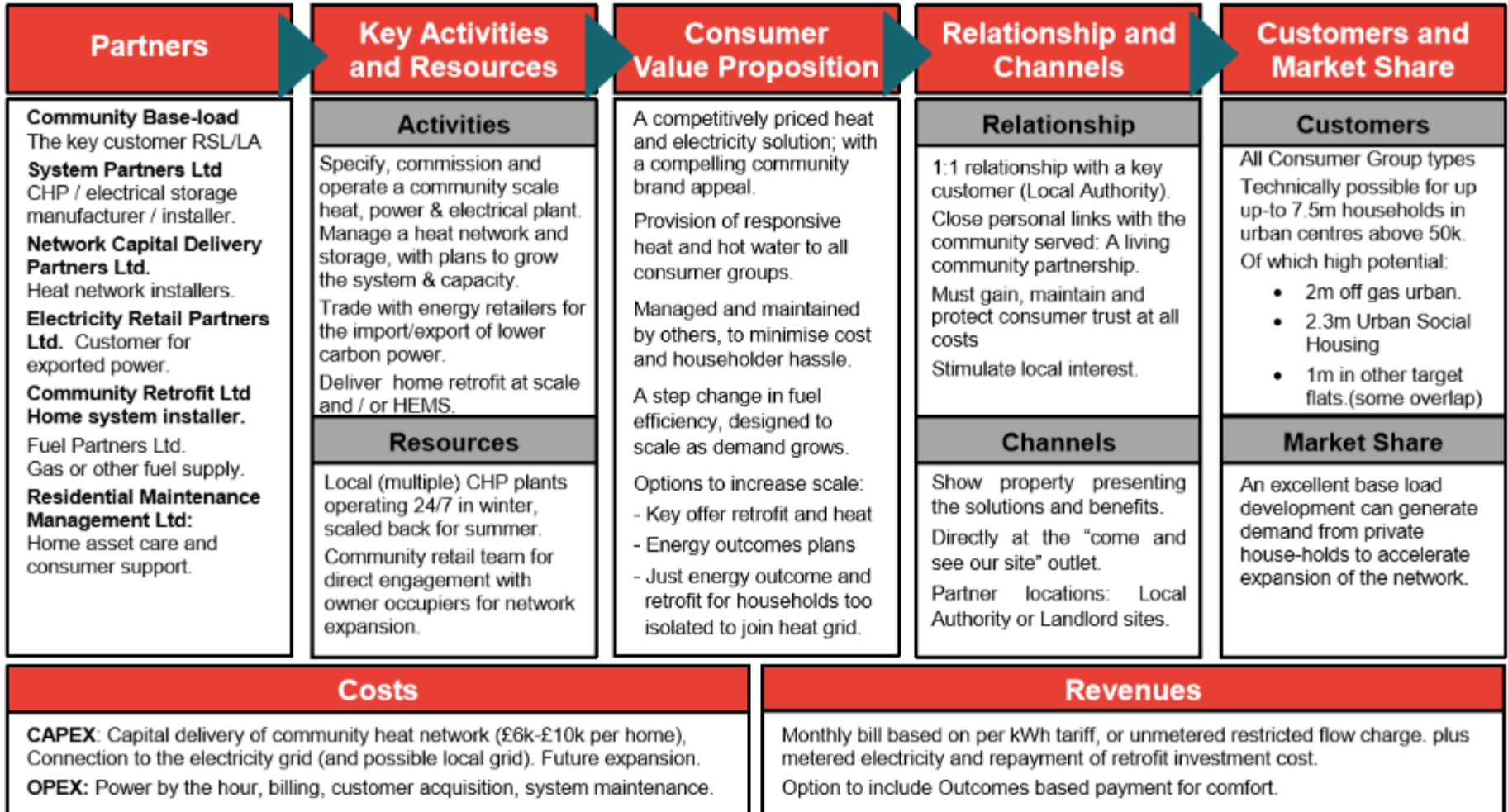
Energy Mutual

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.



Community Energy & Storage

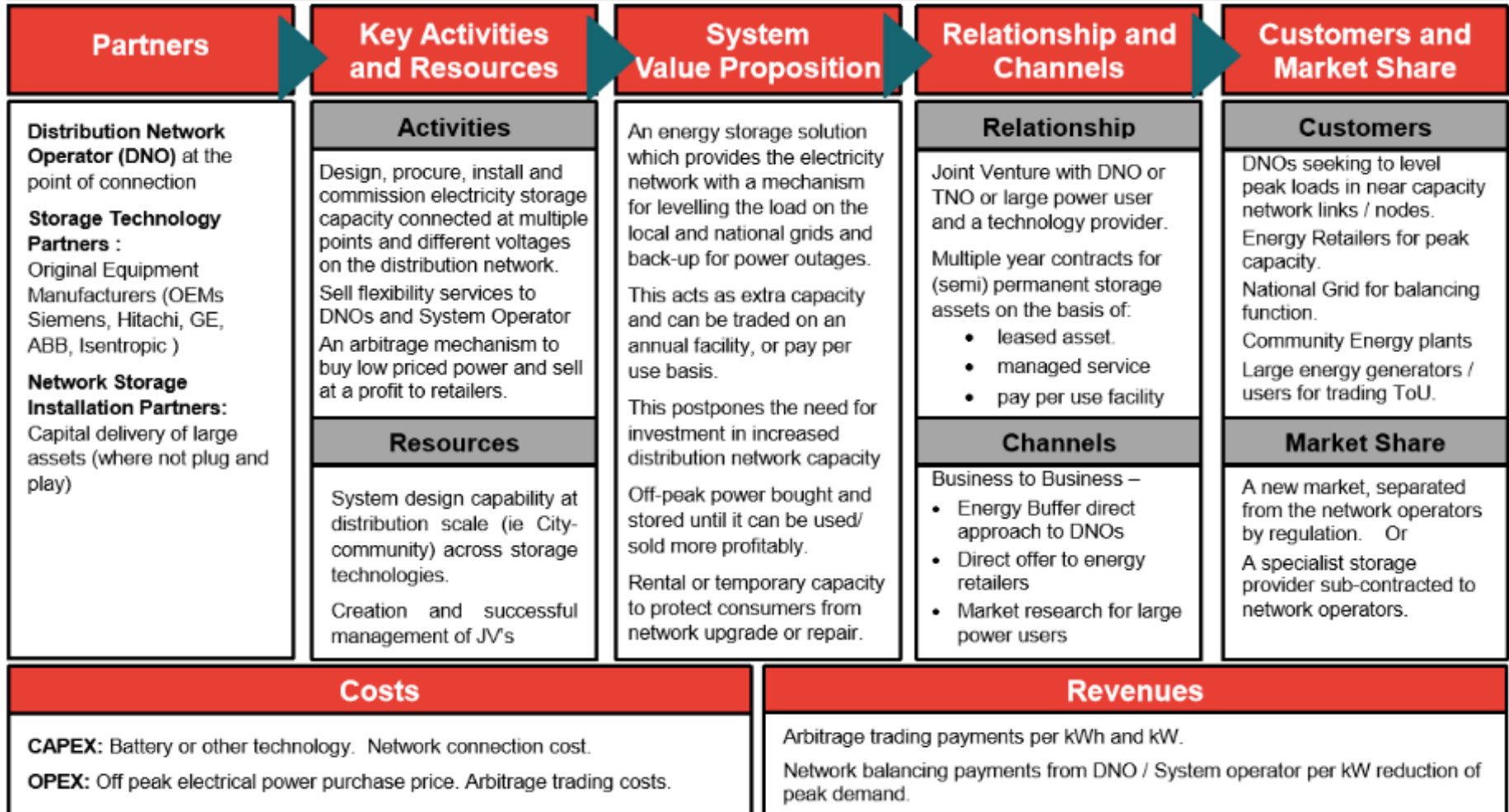
Community Energy & Storage - A community scale energy supplier with high fuel efficiency and a strong local brand.
Generating locally required heat & electricity with CHP/Heat Pumps, distributing heat, selling power at scale to the grid and customers.
A locally driven Special Purpose Vehicle created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



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.



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
<ul style="list-style-type: none"> • Customer service aggregator • Utilities & service providers • OEM & maintenance companies • ICT providers (HEMS etc) 	<ul style="list-style-type: none"> • 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 	<p>Homeowners, small businesses, landlords</p>
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • 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 		<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Local authority financing (bonds?) • Collaboration required – need to homogenise community efforts – will require strong leadership [Hitachi] • Achieving specification uniformity to bring down costs 		<ul style="list-style-type: none"> • 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: Creating the right environment in which low carbon business models and value proposition can be successful

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
<ul style="list-style-type: none"> • UK Government • IT providers • Utilities • Sensor / Hardware providers 	<ul style="list-style-type: none"> • 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 bidding 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 	<p>All homes – that have smart meters and enabled devices</p>
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • 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] 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> Local service company / 'HoSCO' Local Authorities Insurance companies Utilities Appliance companies Financial regulators / banks Landlords ICT system provider (HEMS, Trading) 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Private and rented sector Houses and flats All customers with appropriate credit risk
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 owner incentivised to invest in low carbon technologies, storage and controls to act as mini generator or source of ‘negawatts’ for ESCO that aggregates thousands of such homes

Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
<ul style="list-style-type: none"> • Utilities / ESCO • Appliance companies • ICT system provider • Financing companies 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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} 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> Local authorities Building companies Equipment OEMs / installers ICT providers Housing associations ESCOs / Utilities 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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) 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 VO.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
<ul style="list-style-type: none"> 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? 	<p>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.</p> <p>To occupiers: High quality, attractive & secure homes with very low running costs & ability to control / trade comfort level. Local power/heating backup</p> <p>To owners / developers: Capital gains achieved by higher property values / dwelling density – these and lower running costs fund the regenerations</p> <p>Local / National: Integration with community heat / local power gen and charging / linking homes systems together / use of sewage for heat pumps</p>	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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? 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Local authorities Home owners Pre-fabricated insulated panel manufacturers Equipment OEMs / installers ICT providers Housing associations ESCOs / Utilities 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Manufacturing network does not exist – needs to scale Planning permission Crane access/ space around home 		<ul style="list-style-type: none"> Revenues: Homeowner lower bills and higher house value pays for mortgage. Technology agnostic
Adaptability	<ul style="list-style-type: none"> 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




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Minus 7 presentation



Heating and Hot water always available plus Heat pump operation



Our experienced consultants will work with you throughout the **planning stage** to ensure that all aspects of the design and

Once fully installed, our expert team will remotely monitor the System using data collected via the data logger built into the SEP. The owner, in turn, can

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
<ul style="list-style-type: none"> Commercial companies Local heat network providers Energy regulators Network operators Planning in local government 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Need heat balance between commercial user and domestics Cost of local heat network – need for high density / high proximity of homes 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> • Government • Energy companies • ICT / HEMS provider 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Larger homes – higher energy users for whom energy costs are not currently an incentive to act
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • 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 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Start with high threshold for premium tariffs reducing with time • Can use smart meters to introduce peak/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	<p>Trusted brand sells Duel-Fuel fixed price contracts 1, 2 3 years duration with HEMS system included. Customers offered cash-back choices via mobile devices which they accept or reject. Two main choices: customers accept 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.</p>	<p>Most customer segments reducing to suburban and rural for HP option. Potential market share - Large</p>
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?



Save Track Switch Setup Help

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Loop Energy Saver
Cut your electricity and gas usage, get the best tariff and save up to £250 every year!

Free Trial Then £2.99 Per Month ▶

Free Trial Then £49.99 Single Payment ▶



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[What do you get](#)

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What is Loop?

Loop Energy Saver helps you cut your bills and save money every year. It shows you the energy you use straight to your PC, tablet and smartphone. It shows you how much your electricity and gas costs and sends you the best deals based on your actual consumption, week in, week out.

[? Help](#)

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	<p>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.</p> <p>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.</p>	<p>Most customer segments excluding high-income. Could be helpful for vulnerable customers.</p>
Costs / Risks		Revenues / Benefits
<p>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 uncertainty of pricing to make appealing [05/02]</p>		<p>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.</p>
Adaptability	<p>Initially could start with HEMS, boiler maintenance with appliances added when failure or at request of customer to upgrade.</p>	
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
<ul style="list-style-type: none"> • Government • Local authorities • EU Low Carbon bodies • International standards bodies • OEMs • New entrants • Supply chain specialists 	<p>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.</p>	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • OEMs • Utilities • DECC • Consumer Associations 	<p>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.</p> <p>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.</p> <p>Participants become part of an exclusive club, being invited to prestigious events, informed on key developments and can become ambassadors for new technology.</p>	<ul style="list-style-type: none"> • Early adopters willing to share the development journey with providers of new hardware or 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
<ul style="list-style-type: none"> • 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 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Government • Pension providers • Equipment financing companies • HoSCOs • New entrants • Accreditation agencies / regulators 	<p>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.</p> <p>Increases private investment in refurbishment with annuity compatible with long term pension returns. Pension returns less onerous than near term payback for consumers.</p>	<ul style="list-style-type: none"> • Those with higher income; homeowners with saving mindset • Young to early middle age demographic investing well ahead of payback period
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • 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 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.



facts about the customer

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.

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.

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
<ul style="list-style-type: none"> Local planners Energy system installers HoSCOs / BiSCOs Utilities HEMS providers 	<p>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</p>	<ul style="list-style-type: none"> Urban areas with mixed commercial/municipal and residential buildings in close proximity Limited volumes– mostly new build and regeneration projects
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> • Government • HMRC • Landlord Associations • Energy system installers • HoSCOs / BiSCOs • Utilities • HEMS providers 	<p>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.</p>	<ul style="list-style-type: none"> • Private rented sector. • Older houses most suitable for refurbishment
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • 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 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Government • Local authorities • Housing associations • ESPs • Energy system installers • Ofgem / DECC 	<p>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</p> <p>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</p>	<ul style="list-style-type: none"> • All sectors – main focus on social housing, vulnerable households and worst buildings from an energy perspective
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • Qualifying and quantifying benefits from other methods to reduce carbon • Utilities do not have profitable offset segment to blend with ECO costs – could link with switch to carbon tax [05/02] • In reality a policy change and not a business model [05/02] 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Government • Local authorities • Housing associations • ESPs • Energy system installers • Ofgem / DECC • Financing companies / pension • Insulation system providers 	<p>For Consumer: Removes cash barrier to investing in heat loss reduction intervention that may also have benefits in terms of comfort, noise, damp etc.</p> <p>For Provider: Provides long term secure income stream tied to house</p>	<ul style="list-style-type: none"> • All sectors – main focus on social housing, vulnerable households and worst buildings from an energy perspective
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • 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] 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • ESPs • Ofgem / DECC • DNOs • Energy Trading Platform Provider 	<p>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).</p> <p>Could use gas as a load reducer for heat pumps for hybrid heat pumps provided freedom to operate and GNO having pressurised system</p> <p>Homeowner will gain savings in allowing ESP to trade demand management against pre-determined service levels</p>	<p>All homes – get suited to clusters using the same branch of the supply network.</p> <p>Could link to district heat networks and blocks of flats [05/02]</p>
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • 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 		<ul style="list-style-type: none"> • 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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how we do it
our offer to you
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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 stockmarket. Carbon trading for the masses. Value of each COT linked to carbon price – changing with time	All adults
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • 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] 		<ul style="list-style-type: none"> • Changes attitudes and consumer behaviour • Source of income to low users • Creates user awareness of carbon
Adaptability	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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] 		<ul style="list-style-type: none"> • 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/megatts and negawatts

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
<ul style="list-style-type: none"> Highly complicated Needs HEMS 		<ul style="list-style-type: none"> Creates stimulus for demand management and harnessing all generating and storage capabilities no matter how small
Adaptability	<ul style="list-style-type: none"> 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	<p>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.</p> <p>Home Owners: Improvements facilitated and comfort arrives earlier. Low bills – savings equivalent of winter fuel allowance or more.</p> <p>Local Government: Funds aggregated that would otherwise go to tenants can be applied more effectively in urban regeneration / refurb</p>	Social housing and the poor
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • 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] 		<ul style="list-style-type: none"> • More equitable and boosts renovation market
Adaptability	<ul style="list-style-type: none"> • 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.

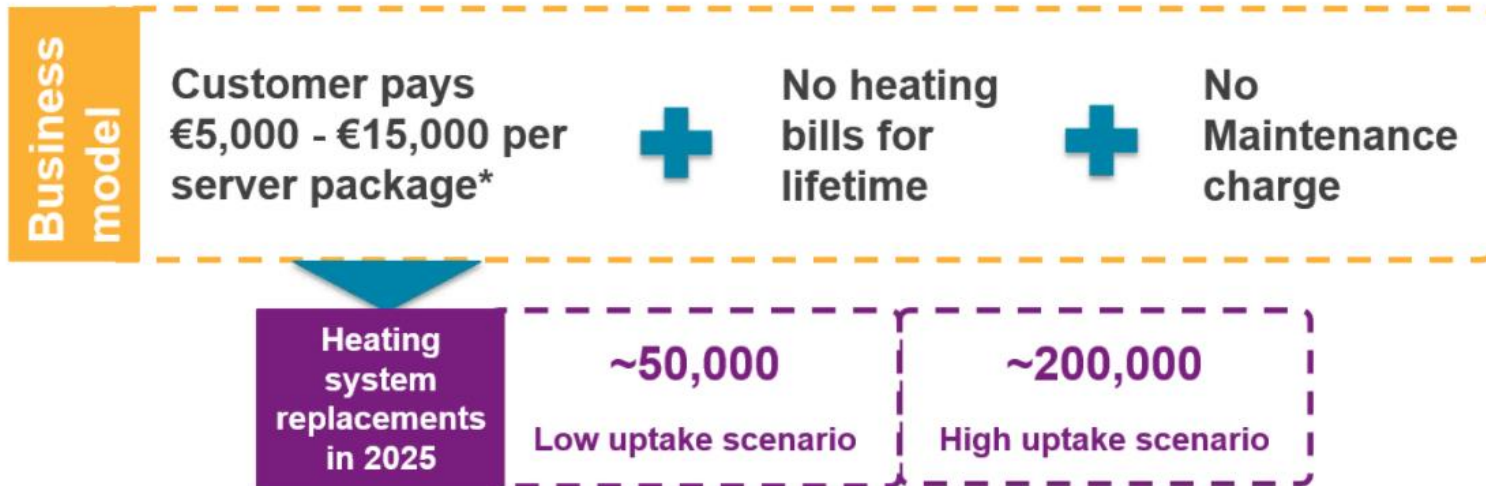
Stakeholders / Partners	Consumer Value Proposition	Customers / Market Share
Server company Installers HEMS	In exchange for hosting a server, the homeowner gets the offer of free household heat thereafter.	Limited to cash rich homeowners with suitable property size and heat profile
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> • Need for replacement every 3-4 years • Heat demand profiles may not match • High capex €5-15k • Covering electricity costs & allocation 		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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



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



*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

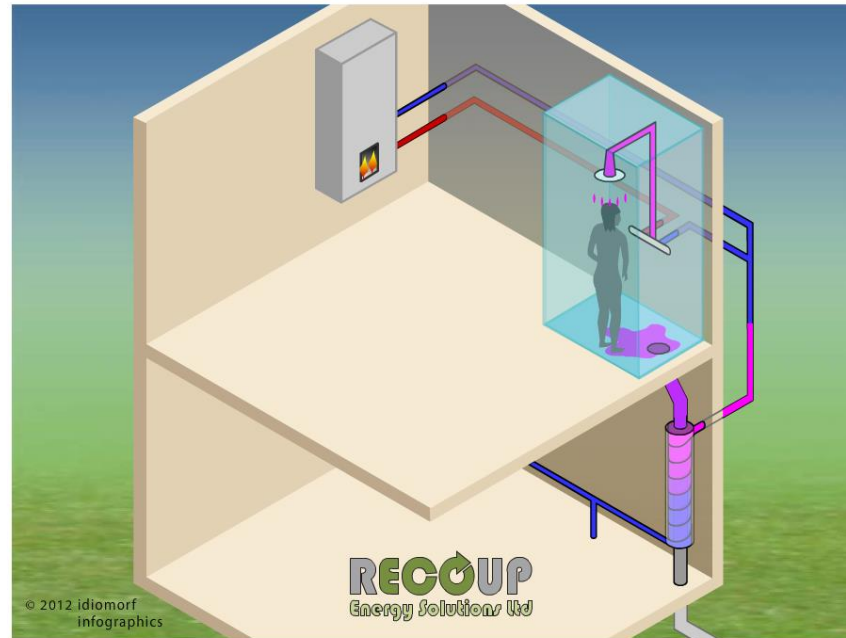
Optimising a system comprising multiple heat / cooling vectors, sources, demands and storage? Within a DNO and between separate DNO's.

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
<ul style="list-style-type: none"> • 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] 		<ul style="list-style-type: none"> • 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:

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
<ul style="list-style-type: none"> OEM's Academics Research & Design bodies Design Associations Accredited contractors Gov – policy & regulation Banks Mortgage providers Crowd sourcing 	<ul style="list-style-type: none"> 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 	<p>Homeowners, small businesses, landlords. Local Authorities</p>
Costs / Risks		Revenues / Benefits
<ul style="list-style-type: none"> Set up of standards / regulation Mainly working capital driven – minimal capital required. 		<ul style="list-style-type: none"> Fixed fee payable by customer to design company Customer receives design rebate – size / % of rebate dependent on level of low carbon retrofit.
Adaptability	<ul style="list-style-type: none"> 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 Tray](#) or [Recoup Drain](#)