
DO SOMETHING, YOU BUNCH OF MANIACS!
WELL! IT'S EASY TO JUST CRITICIZE, YOUNG LADY...
...AND I SUPPOSE YOU'VE GOT AN ALTERNATIVE ALL WORKED OUT, HAVE YOU?
HYSTERICAL ECO-FANATICS! ALWAYS TELLING PEOPLE HOW TO LIVE...
GET YOURSELF A PROPER JOB!
Polyp.org.uk
POLICE
$$ ECONOMIC GROWTH

a viable future?

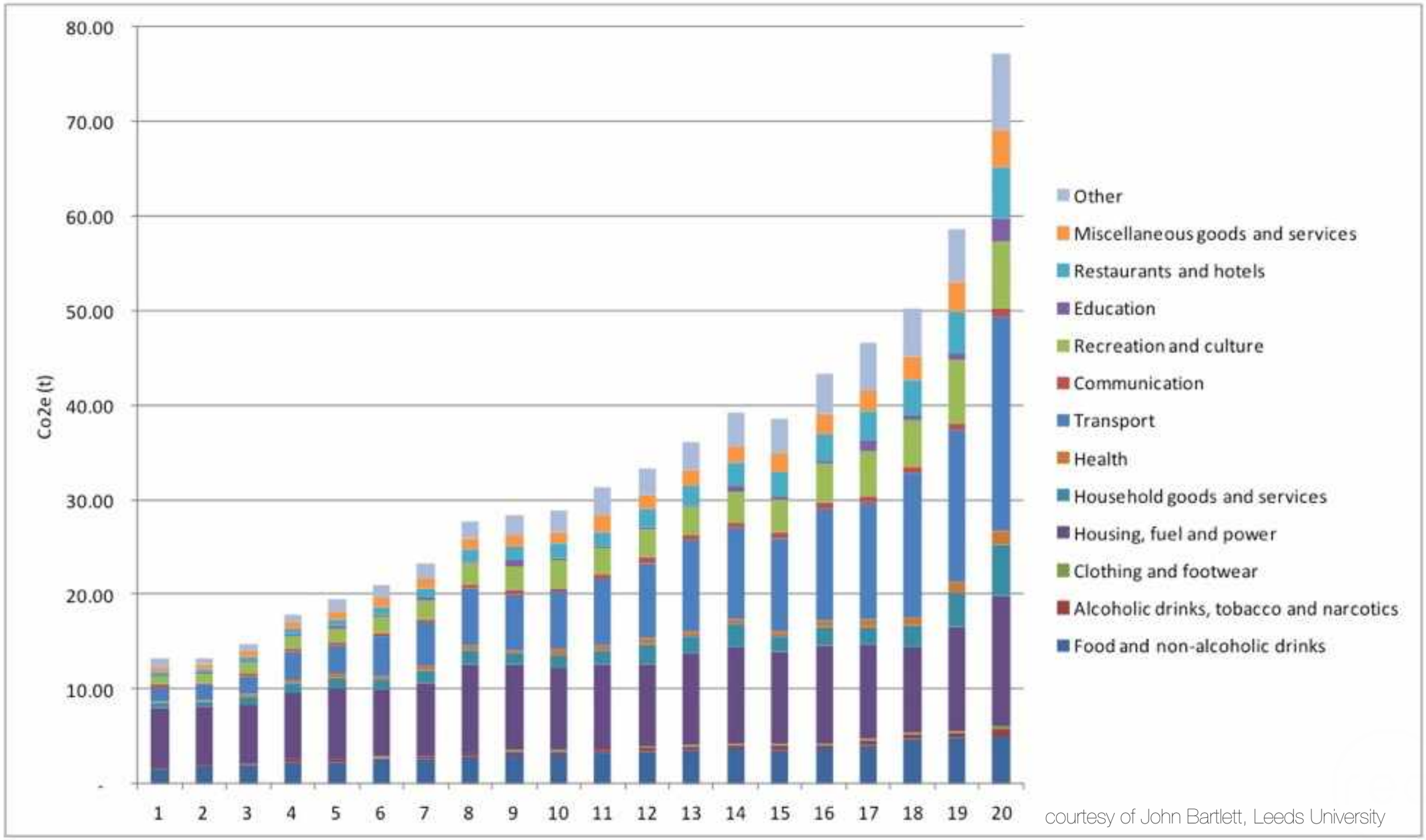
"I don't want your hope. I want you to panic.
I want you to feel the fear I do.
Every day.
And I want you to act.
I want you to behave like our house is on fire.
Because it is."

Greta Thunberg

our share of emissions is not equally spread

Carbon Emissions by income

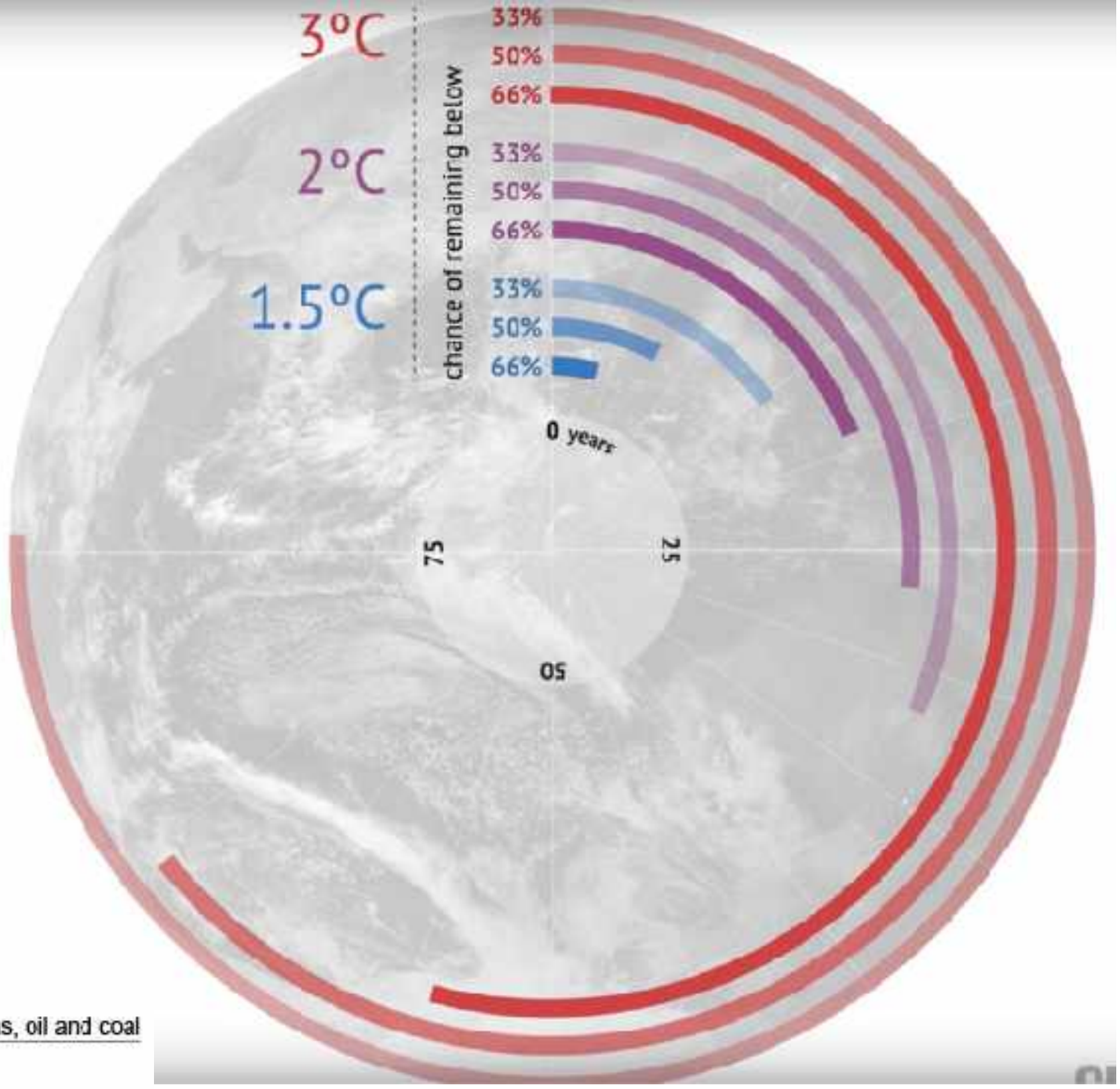
UNIVERSITY OF LEEDS

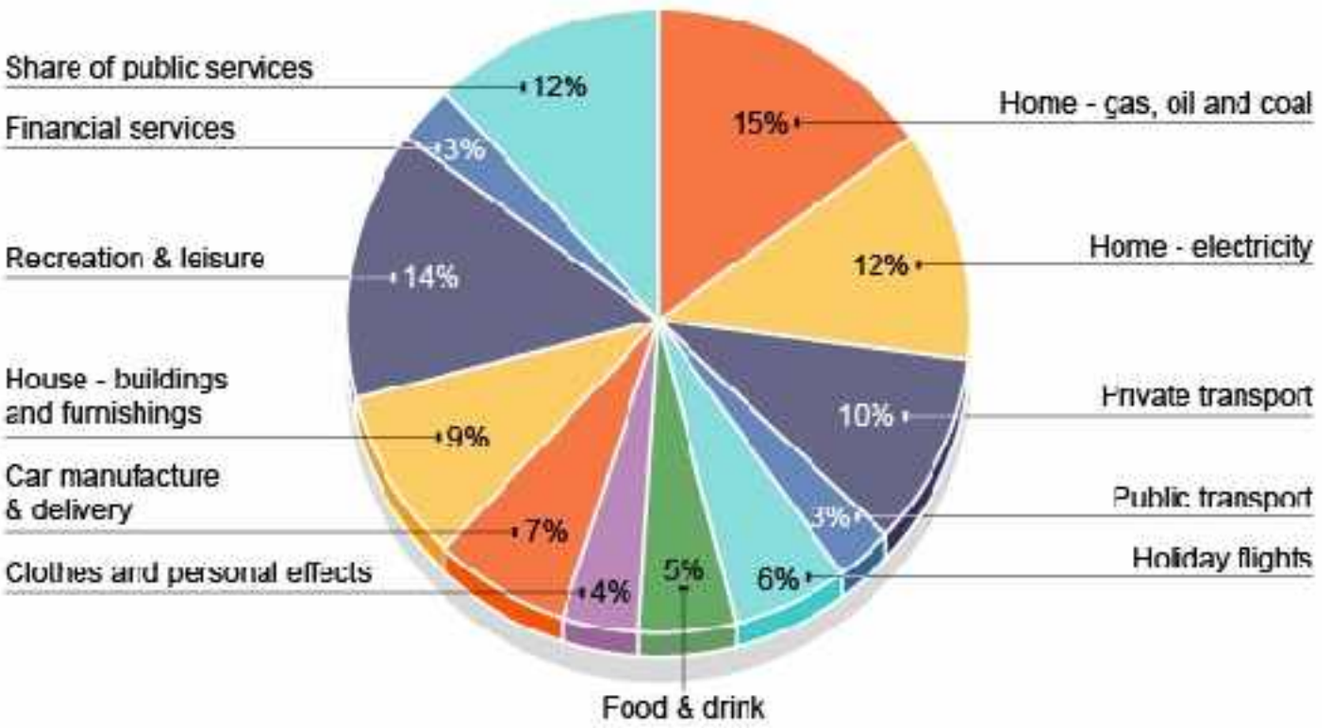


courtesy of John Bartlett, Leeds University

Carbon Countdown

How much time is left before we use up our carbon budgets for different levels of global warming?





carbon budgets

red

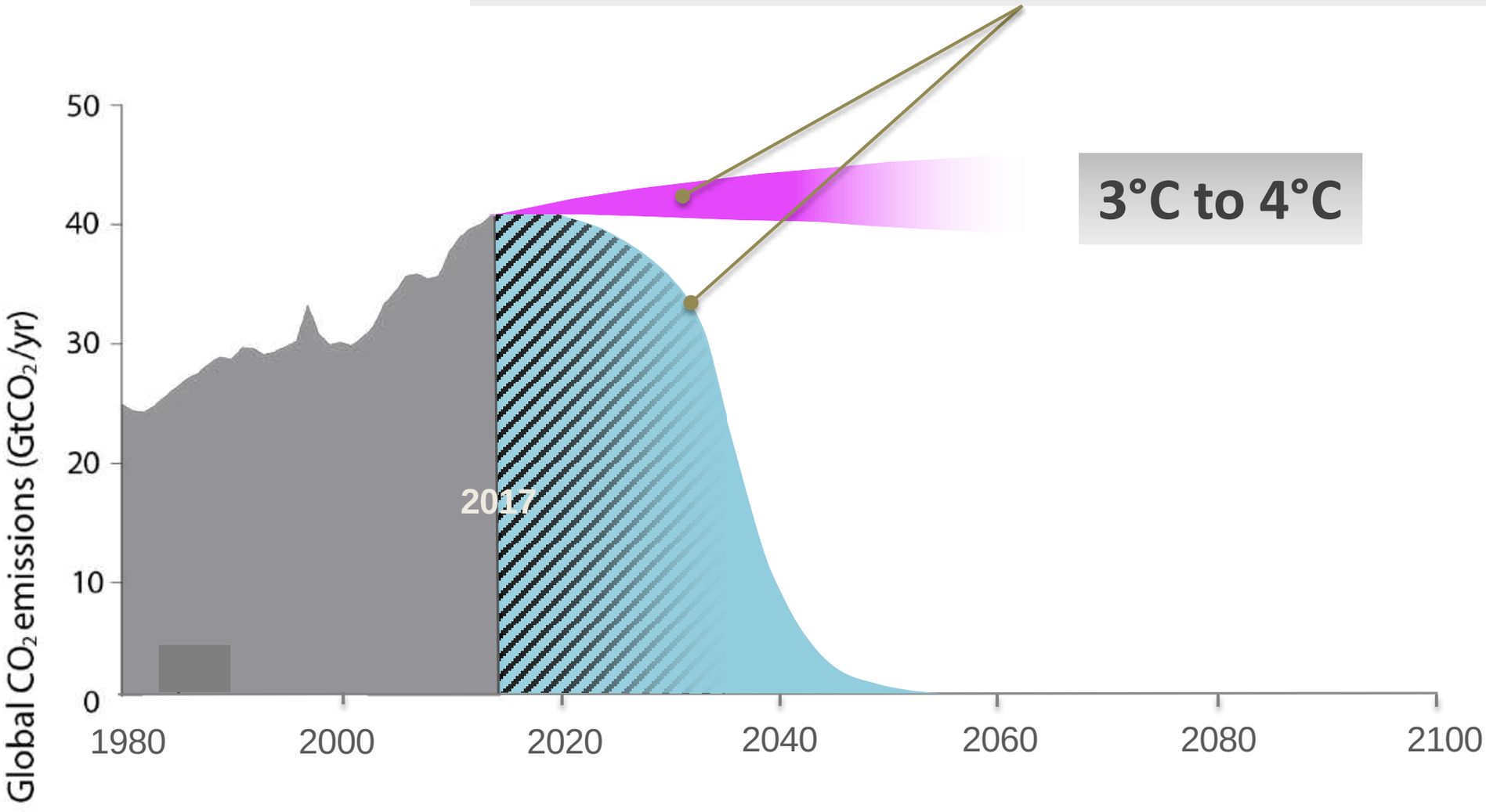
13% reductions per year, starting NOW!

75% reduction in CO_2 by 2025

fully decarbonised by 2035-2040

To move rapidly from current to 2°C pathways, requires

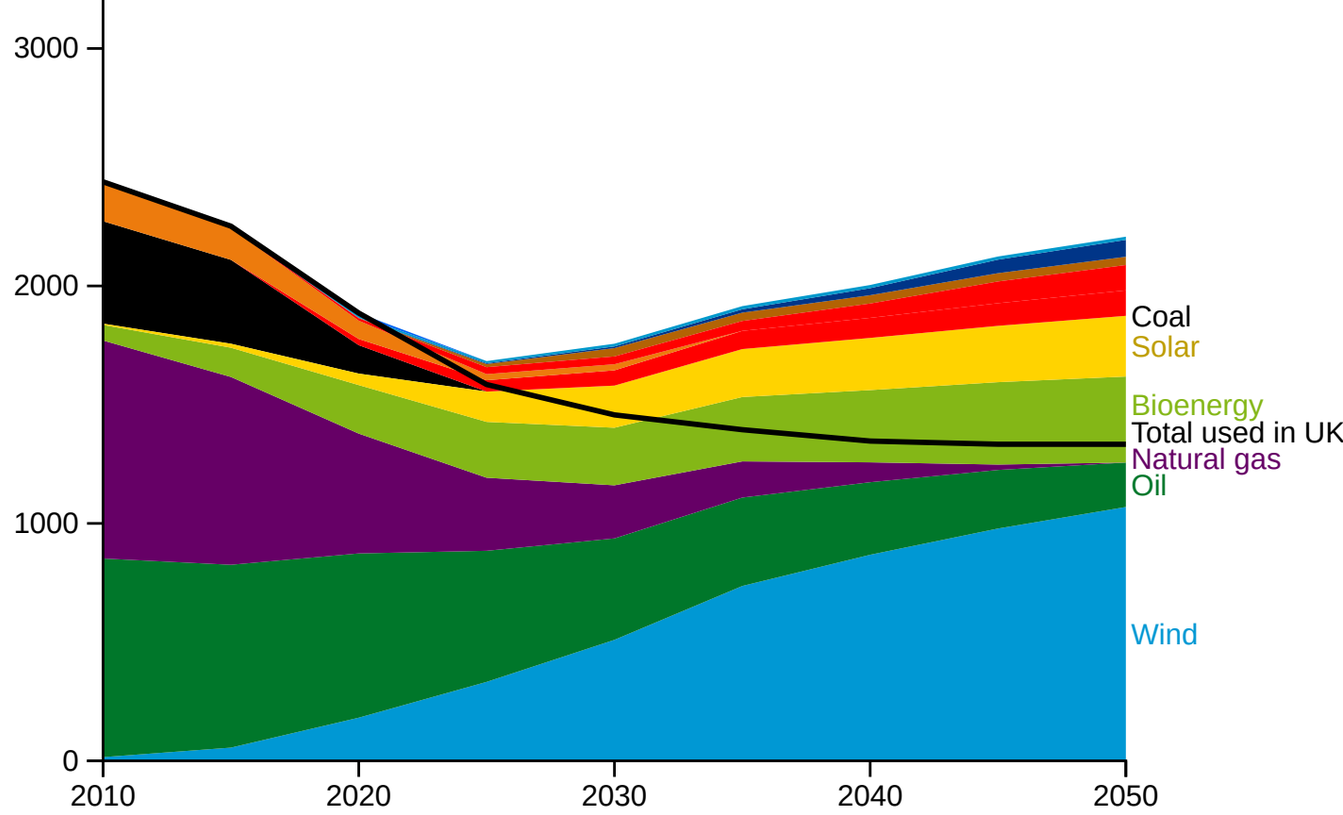
Immediate & deep cuts in ENERGY DEMAND



courtesy of Kevin Anderson, Tyndall Centre @kevinclimate

DECC 2050 calculator #2

Domestic transport behaviour	?	1	2	3	4
Shift to zero emission transport	?	1	2	3	4
Choice of fuel cells or batteries	?	A	B	C	D
Domestic freight	?	1	2	3	4
International aviation	?	1	2	3	4
International shipping	?	1	2	3	4
Average temperature of homes	?	1	2	3	4
Home insulation	?	1	2	3	4
Home heating electrification	?	A	B	C	D
Home heating that isn't electric	?	A	B	C	D
Home lighting & appliances	?	1	2	3	4
Electrification of home cooking	?	A	B		
Growth in industry	?	A	B	C	
Energy intensity of industry	?	1	2	3	
Commercial demand for heating and cooling	?	1	2	3	4
Commercial heating electrification	?	A	B	C	D
Commercial heating that isn't electric	?	A	B	C	D
Commercial lighting & appliances	?	1	2	3	4
Electrification of commercial cooking	?	A	B		



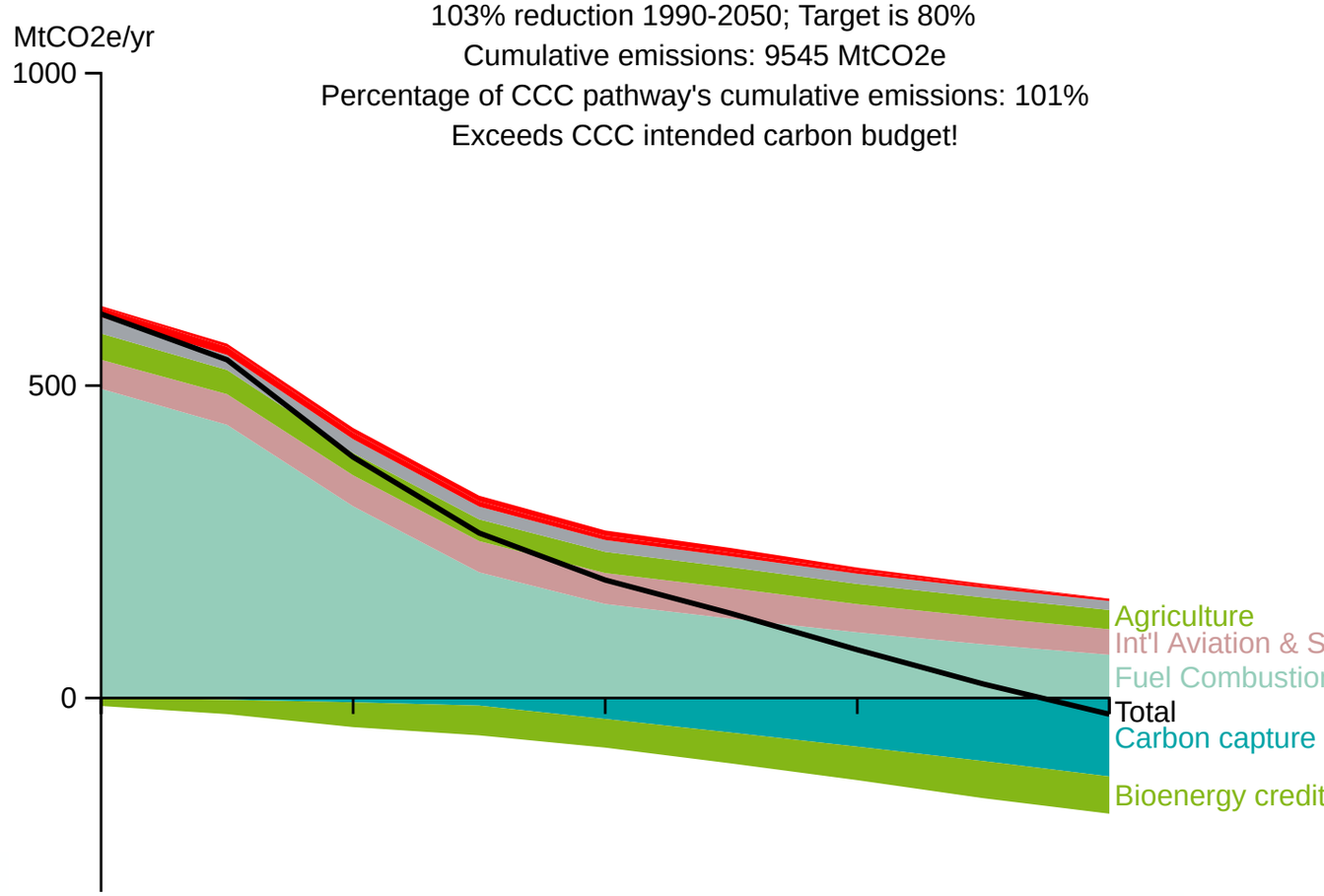
Greenhouse Gas Emissions

103% reduction 1990-2050; Target is 80%

Cumulative emissions: 9545 MtCO2e

Percentage of CCC pathway's cumulative emissions: 101%

Exceeds CCC intended carbon budget!



http://2050.hellings.opalstacked.com

DECC 2050 calculator #2

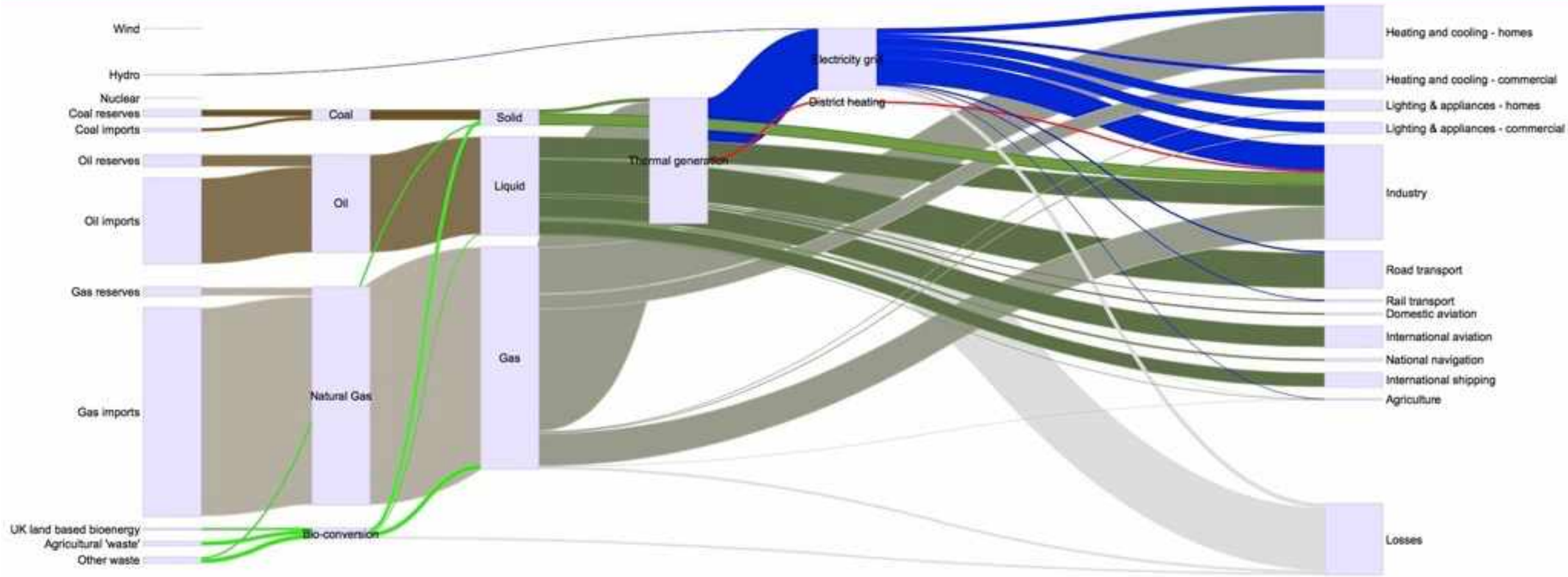
Nuclear power stations	?	1	2	3	4
CCS power stations	?	1	2	3	4
CCS power station fuel mix	?	A	B	C	D
Offshore wind	?	1	2	3	4
Onshore wind	?	1	2	3	4
Wave	?	1	2	3	4
Tidal Stream	?	1	2	3	4
Tidal Range	?	1	2	3	4
Biomass power stations	?	1	2	3	4
Solar panels for electricity	?	1	2	3	4
Solar panels for hot water	?	1	2	3	4
Geothermal electricity	?	1	2	3	4
Hydroelectric power stations	?	1	2	3	4
Small-scale wind	?	1	2	3	4
Electricity imports	?	1	2	3	4
Land dedicated to bioenergy	?	1	2	3	4
Livestock and their management	?	1	2	3	4
Volume of waste and recycling	?	A	B	C	D
Marine algae	?	1	2	3	4
Type of fuels from biomass	?	A	B	C	D
Bioenergy imports	?	1	2	3	4
Geosequestration	?	1	2	3	4
Storage, demand shifting & interconnection	?	1	2	3	4

headlines:

- **Nukes are too slow,**
- **we can do this without CCS,** (which is good as its not a doesn't exist)
- **we need all kinds of renewables**
- **but we need to make better use of our land and eat less meat**

http://2050.hellings.opalstacked.com

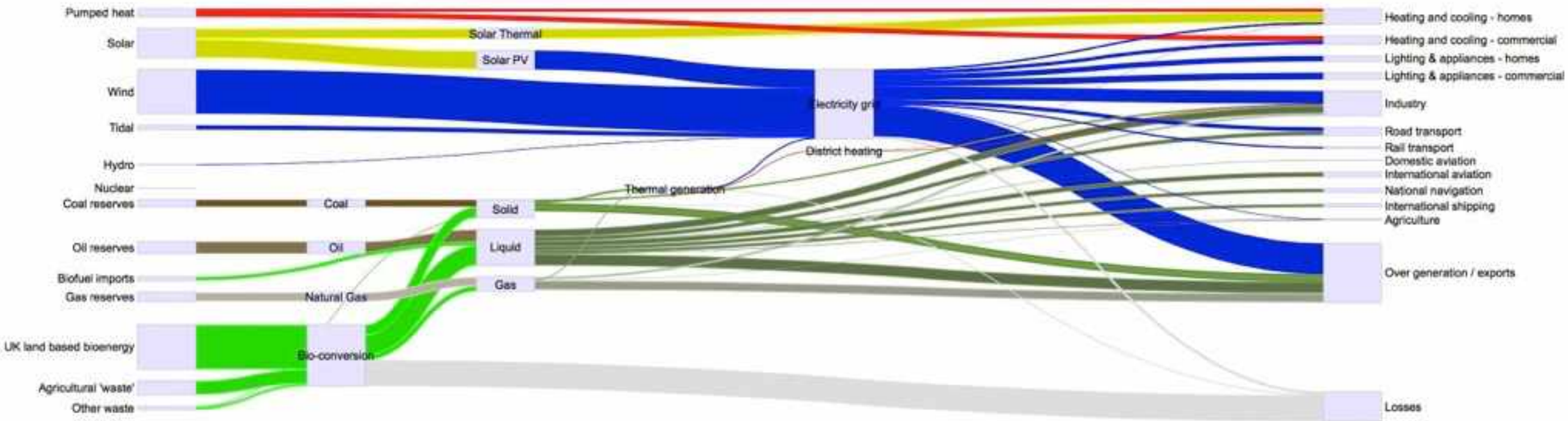
DECC's 2050 Pathway Calculator #2



this takes the massive flows of fossil fuels...

red

DECC's 2050 Pathway Calculator #2



...& reduces them to what can be delivered through zero carbon fuels

red

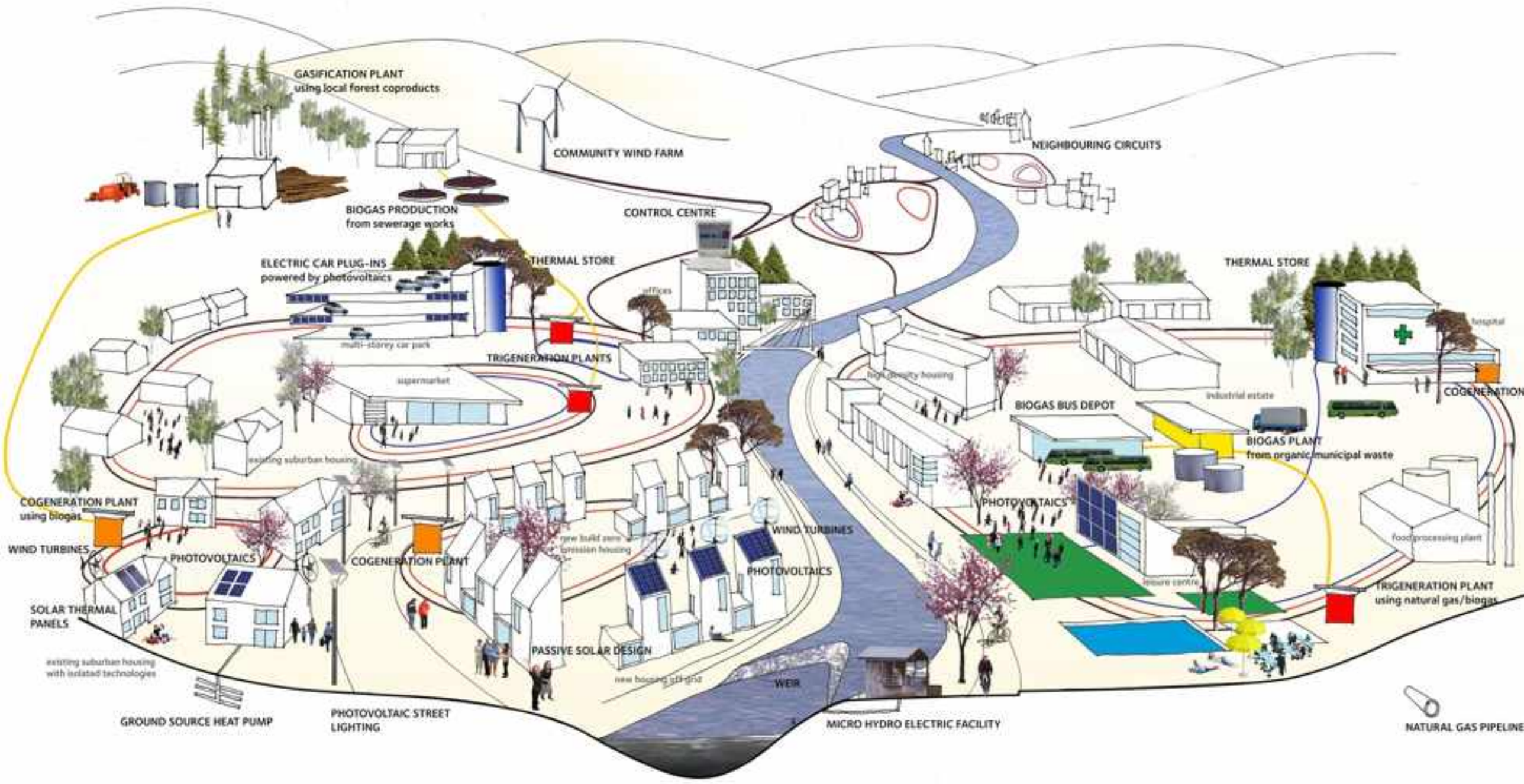
renewable generation

adding value
to waste

community renewables: fuel from used cooking oil

sundance renewables co-operative

Decentralised energy vision



renewable generation

who owns our energy supply?
why isn't it the people?

the co-operative option:

bay wind

bristol energy co-op

brighton energy co-op

brighton & hove energy saving co-op

ad that's just B

there's 200 of them in the UK

renewable generation

who owns our energy supply?
why isn't it the people?

co-ops like energy4all and sharenergy.coop have raised funds and helped out a lot of them

Scaling Up Retrofit

a revolution from the comfort of our own homes?

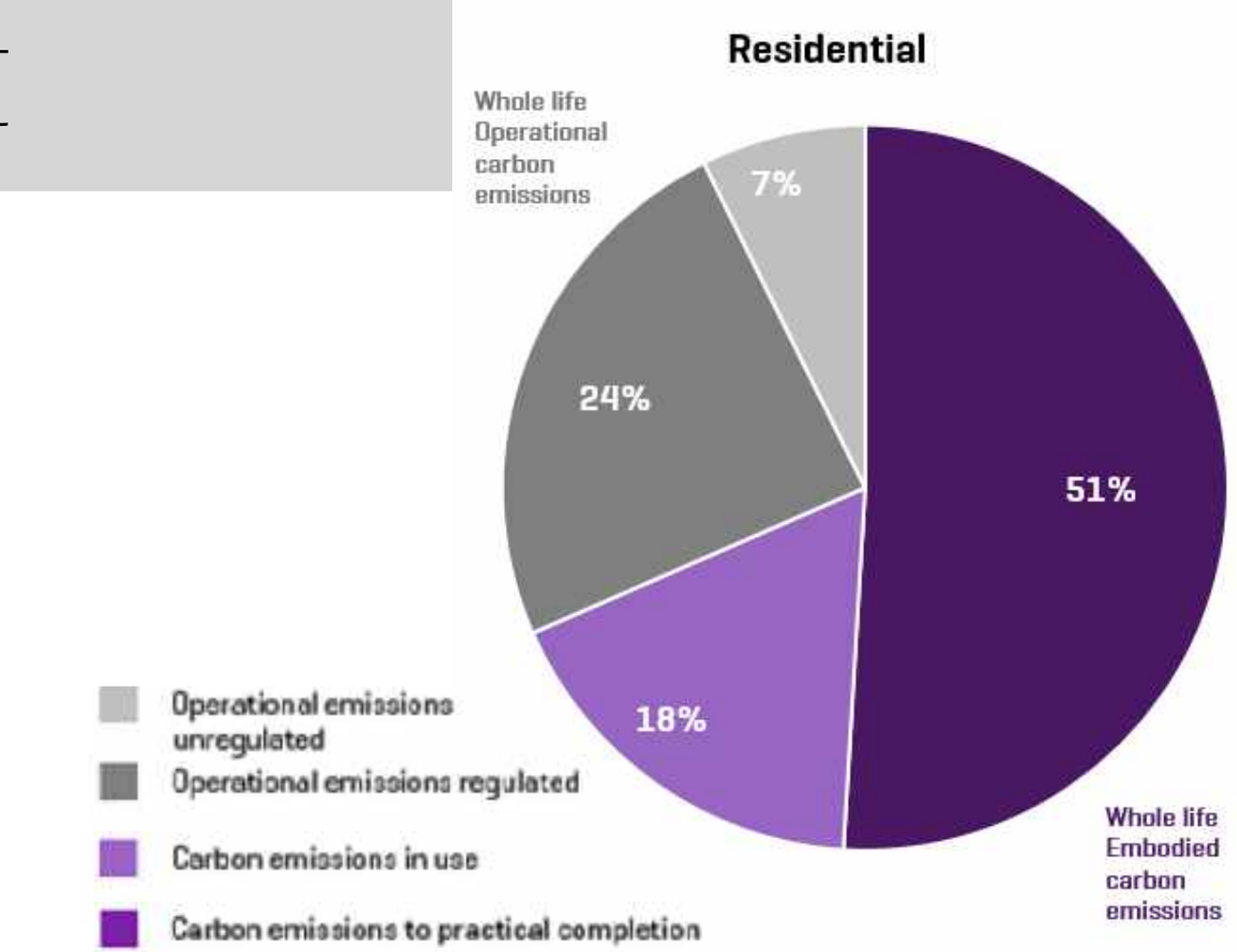
building the change we want or shouting for others to do it to us?

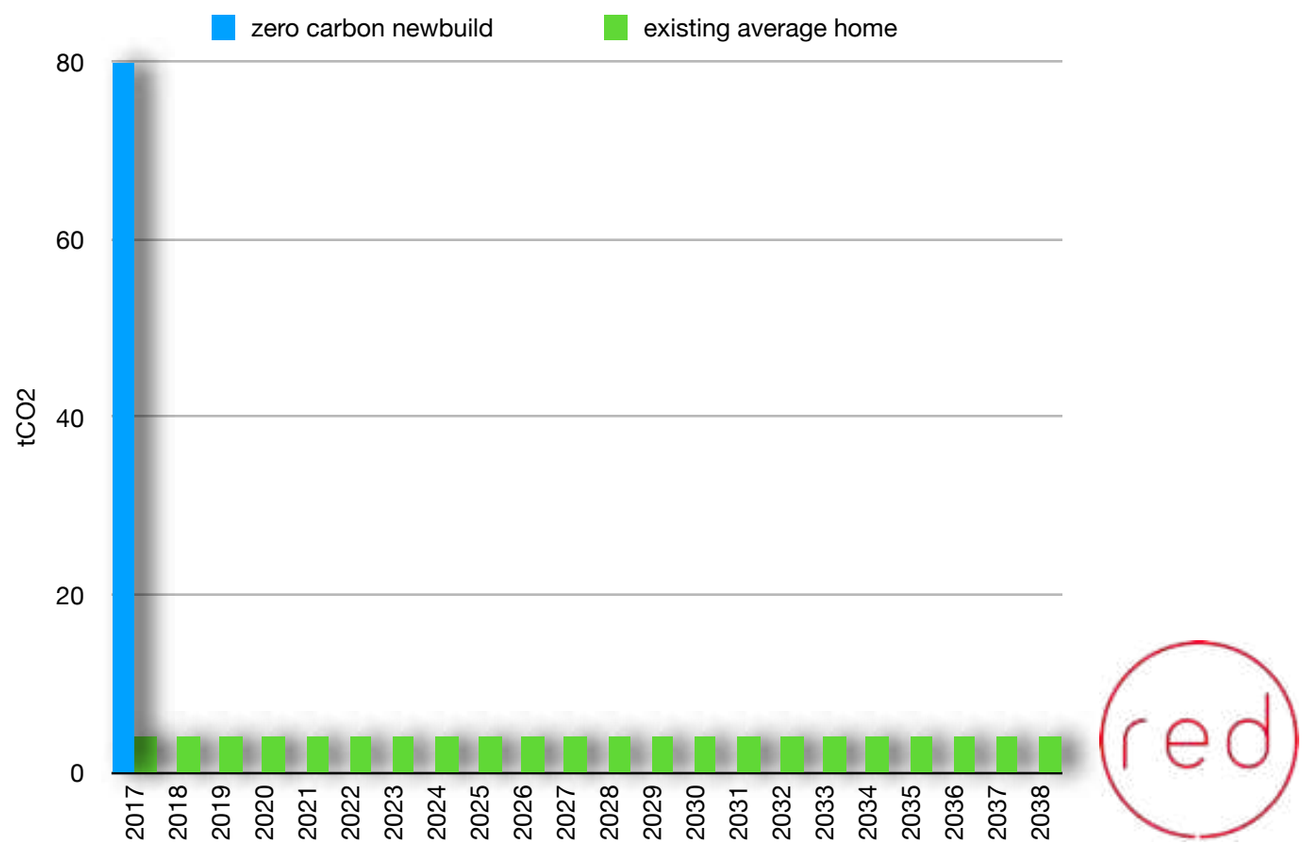
red

reuse/
retrofit/
renewable
design/
development/
delivery

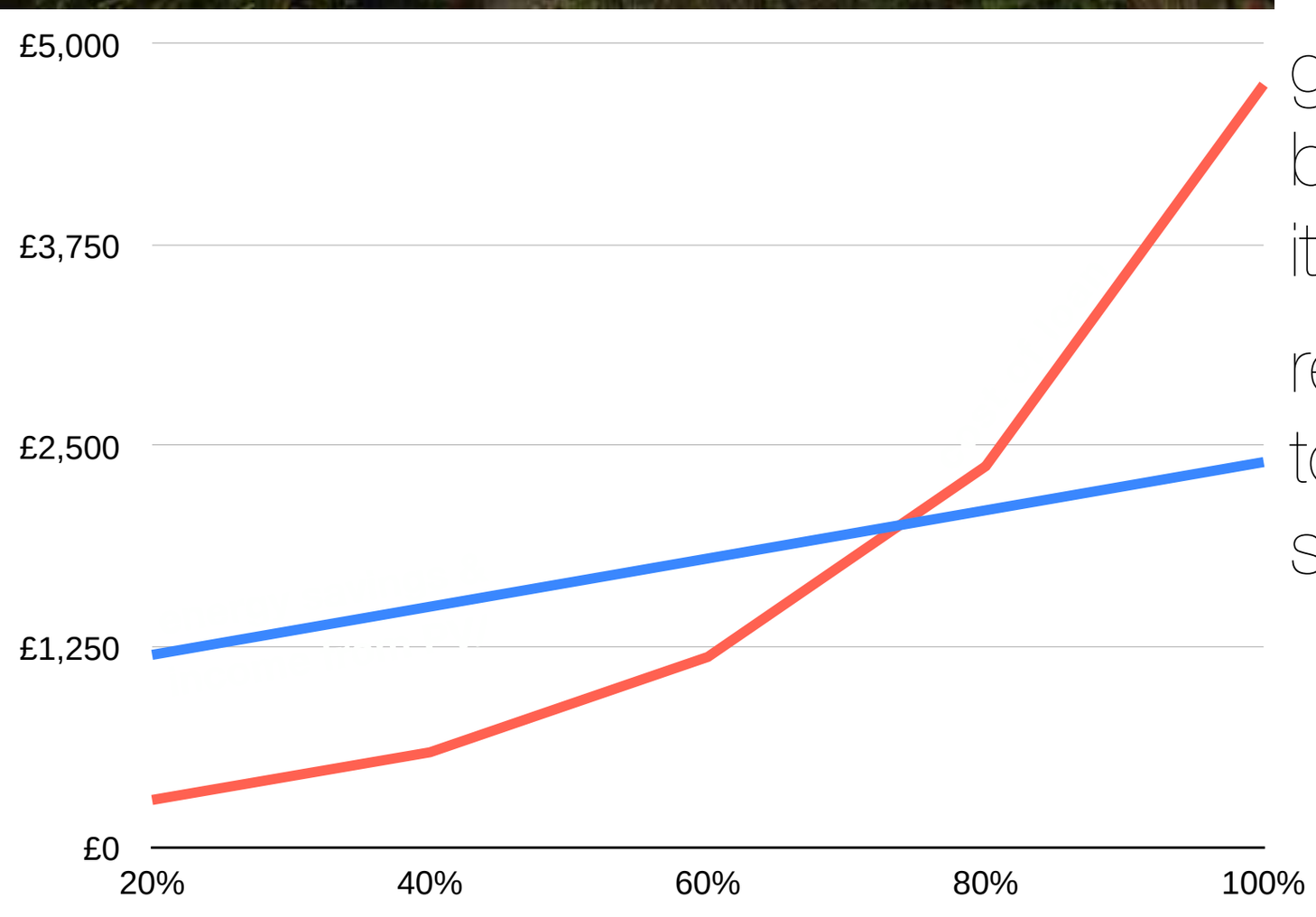
the carbon elephant

- 1.17 million homes
  37% of GM emissions
  4.1tCO_2/home pA
- by 2040
  98% of today's homes will still be standing at current replacement rates
- each new home currently consumes 50-80tCO_2 to build.
  a 'zero carbon' house cannot only be zero carbon to operate
- we have to make much better use of our existing buildings





fabric 1st but not fabric only



we propose:

get the space heating demand below 40kWh/m²/A, it's often 5 times that

reduce energy demand to what can be produced by solar PV on roof or nearby

red

building retrofit

EWI

external wall insulation
0.2 W/m².K

this saves the 50-80tCO_2 emissions of a newbuild

building retrofit

IWI

internal wall insulation
0.3 W/m².K

roof

0.1 W/m².K for loft
0.15-0.2 W/m².K for room in roof

building retrofit

floors

0.15 W/m².K fully insulated
0.4 W/m².K perimeter insulation

lots of
variety
lots of
problems
to solve not
avoid

red

building retrofit

windows & doors

0.85 W/m².K windows
1.0 W/m².K doors

building retrofit

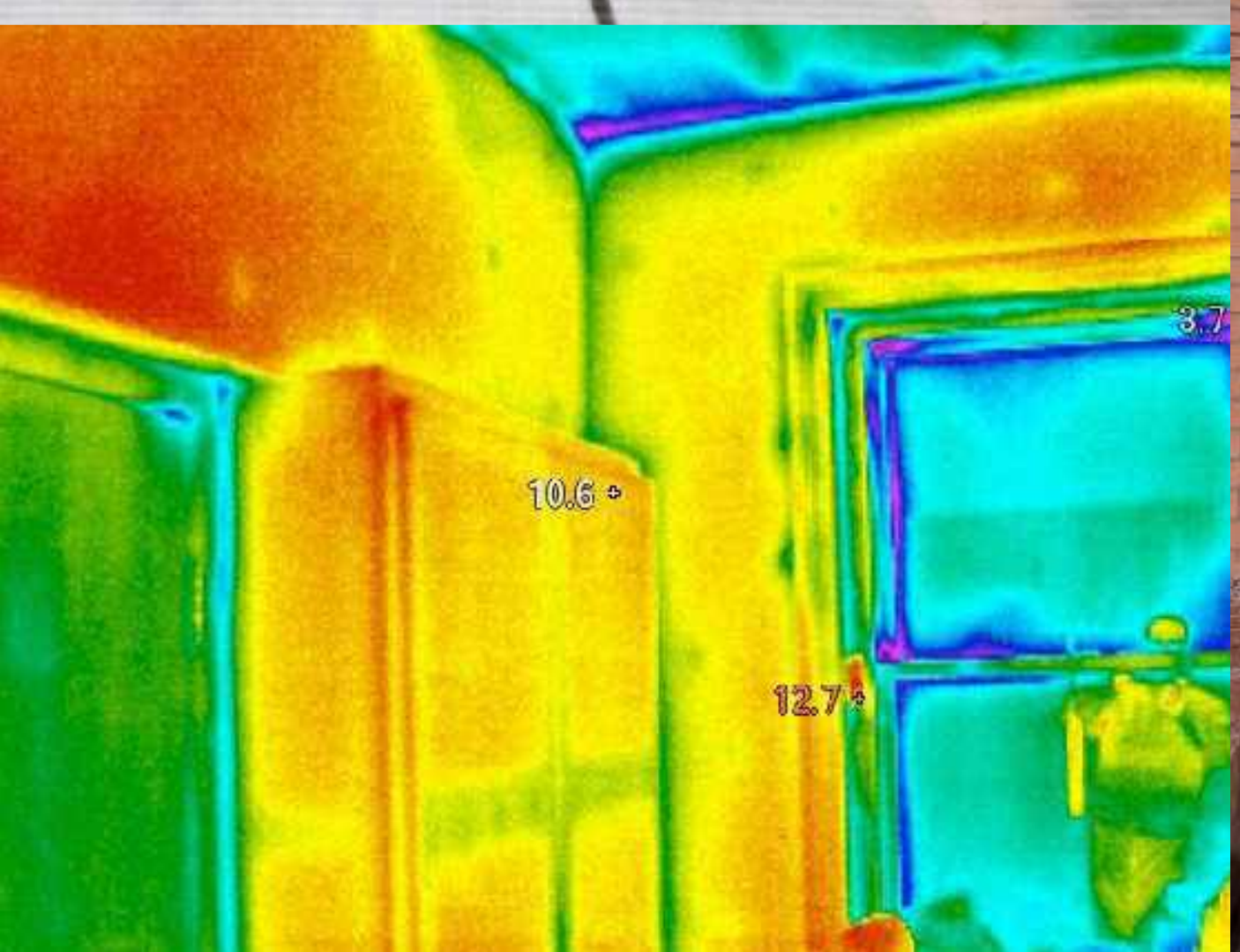
windows & doors

retained windows 2 - 3 W/m².K

cold bridging & airtightness

y-value: max 0.08,
pref 0.04,
stretch 0.02 W/m²

max 5,
pref 3,
stretch 1.5 m³/m²/hr @50pa



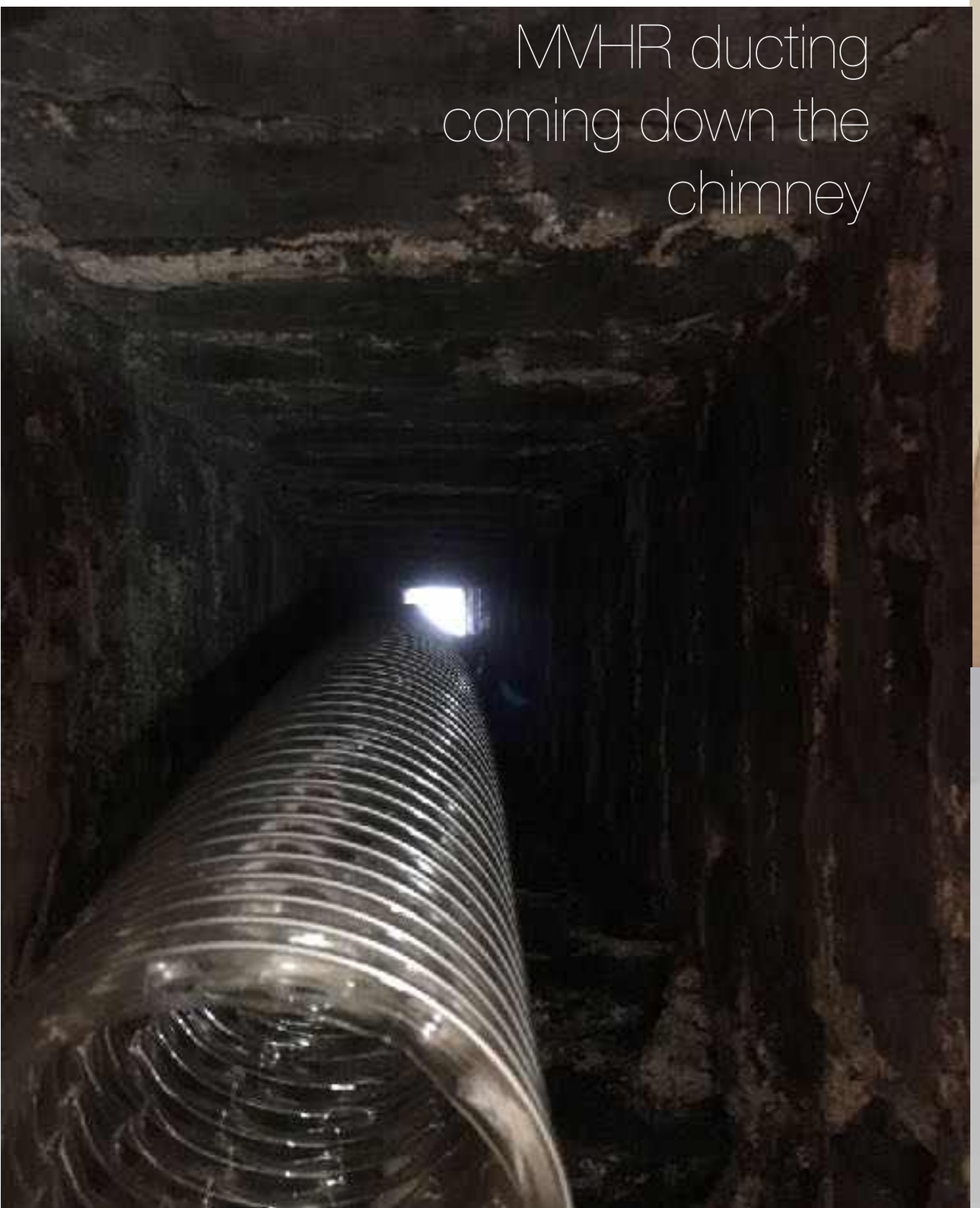
building retrofit

services

soil pipes: you can embed them in the EWI because moving them to the outside may be a shame

building retrofit

ventilation



MVHR ducting coming down the chimney

inlet air grill from underfloor void with 600mm of insulation on around

demand controlled extract on passive stack system

renewable generation

5kW of PV + 8-10kWh of energy storage

renewable generation

heat pumps

building retrofit

zero carbon retrofit?

electricity with efficient appliances	3,000kWh +
hot water "	2,000kWh +
space heating at 25kWh/m²/A -> space heating	2,200kWh=
	7,200kWh/A

heat pump (CoP at 3.75) reduces heat & hot water to	1,100kWh_
total energy needed	**4,100kWh/A**

5kW of PV >	approx	**4,200kWh/A**

red

A project led by the West Yorkshire Combined Authority

Scaling Up Better Homes Yorkshire?

whole house retrofit +

renewable energy +

storage =

zero carbon by 2038

zero fuel poverty by 2030

zero net cost to the public purse

University of Salford MANCHESTER

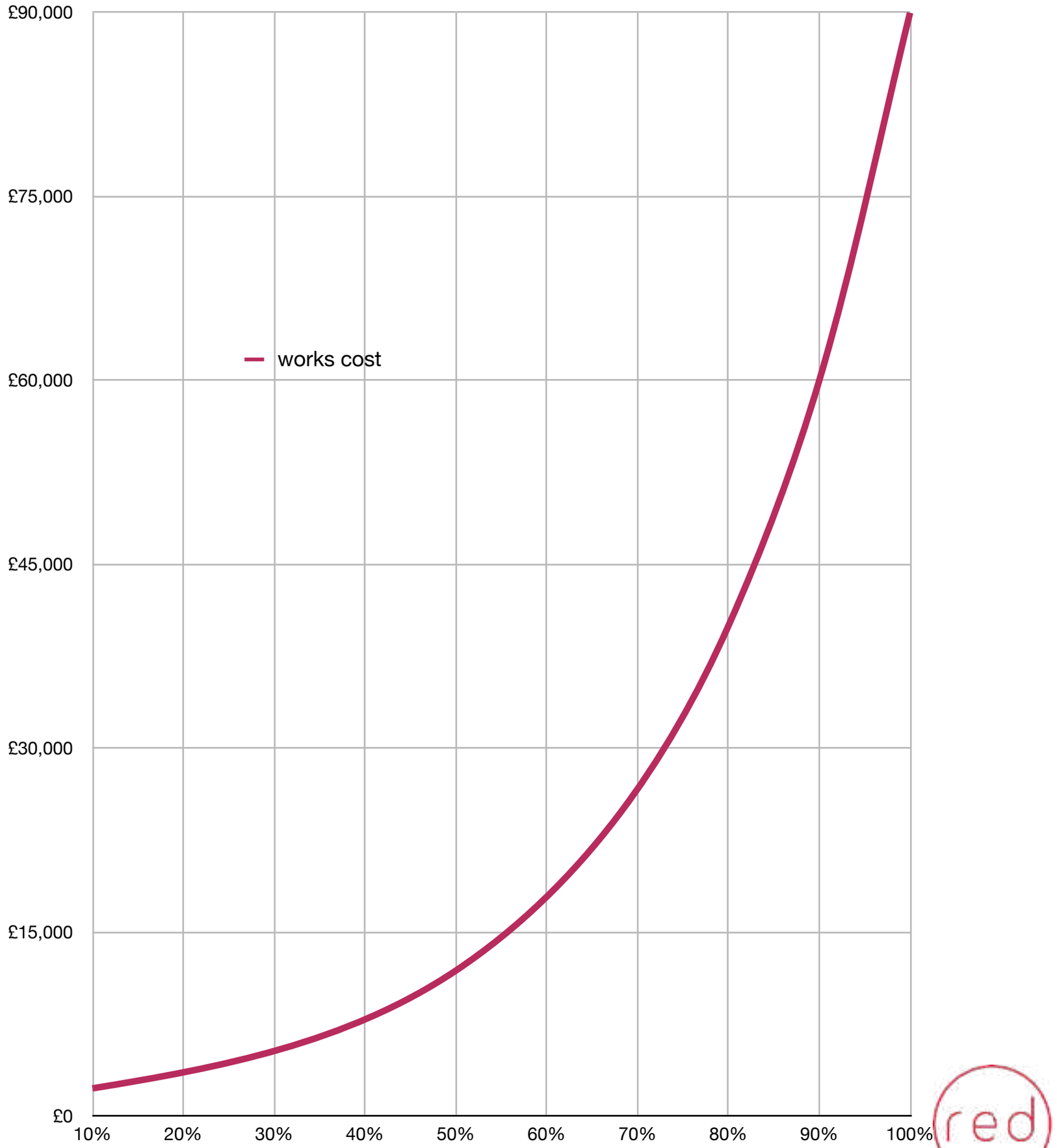
SHAP sustainable housing action partnership

red

reuse/
retrofit/
renewable
design/
development/
delivery

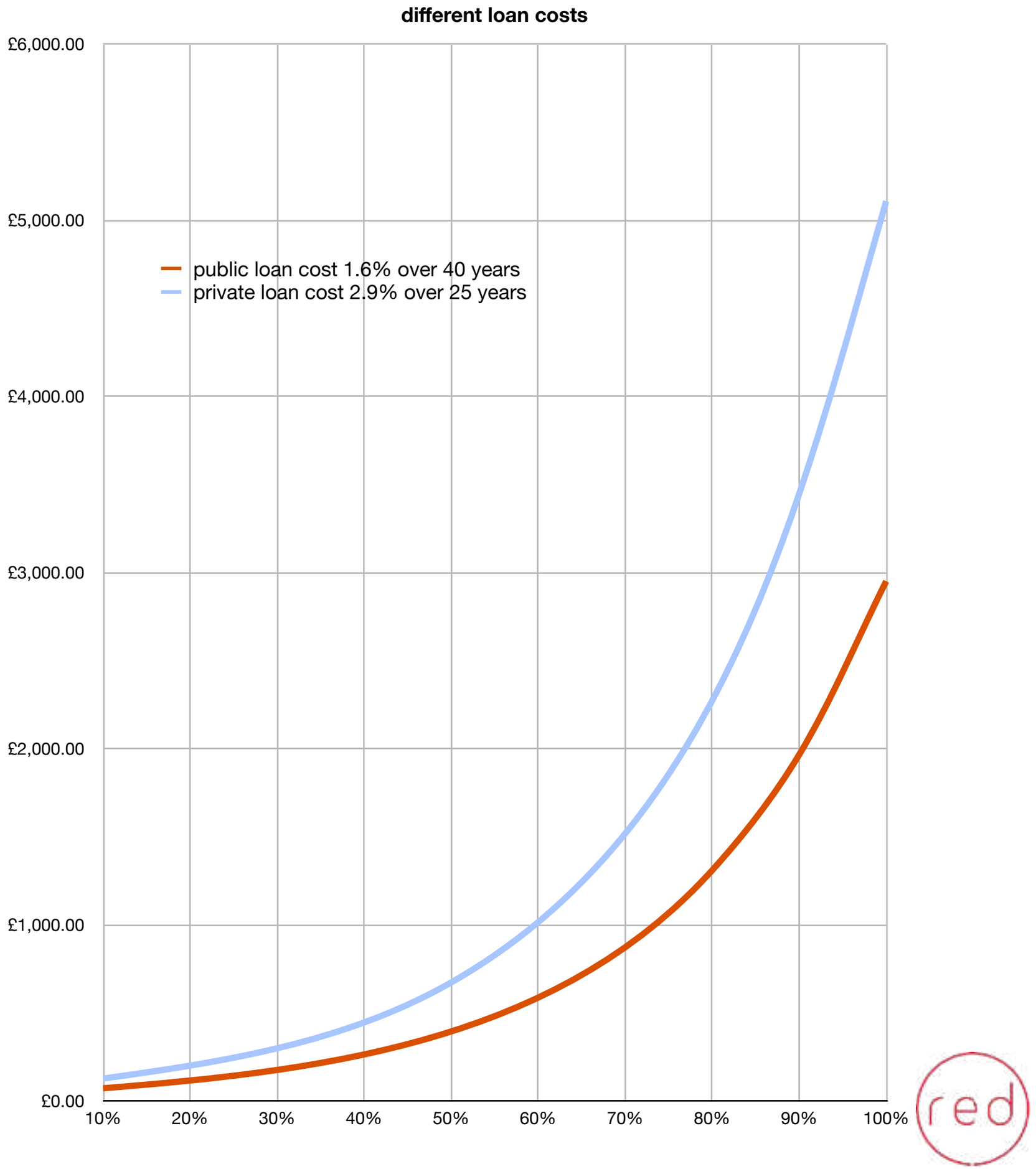
building retrofit

the numbers?



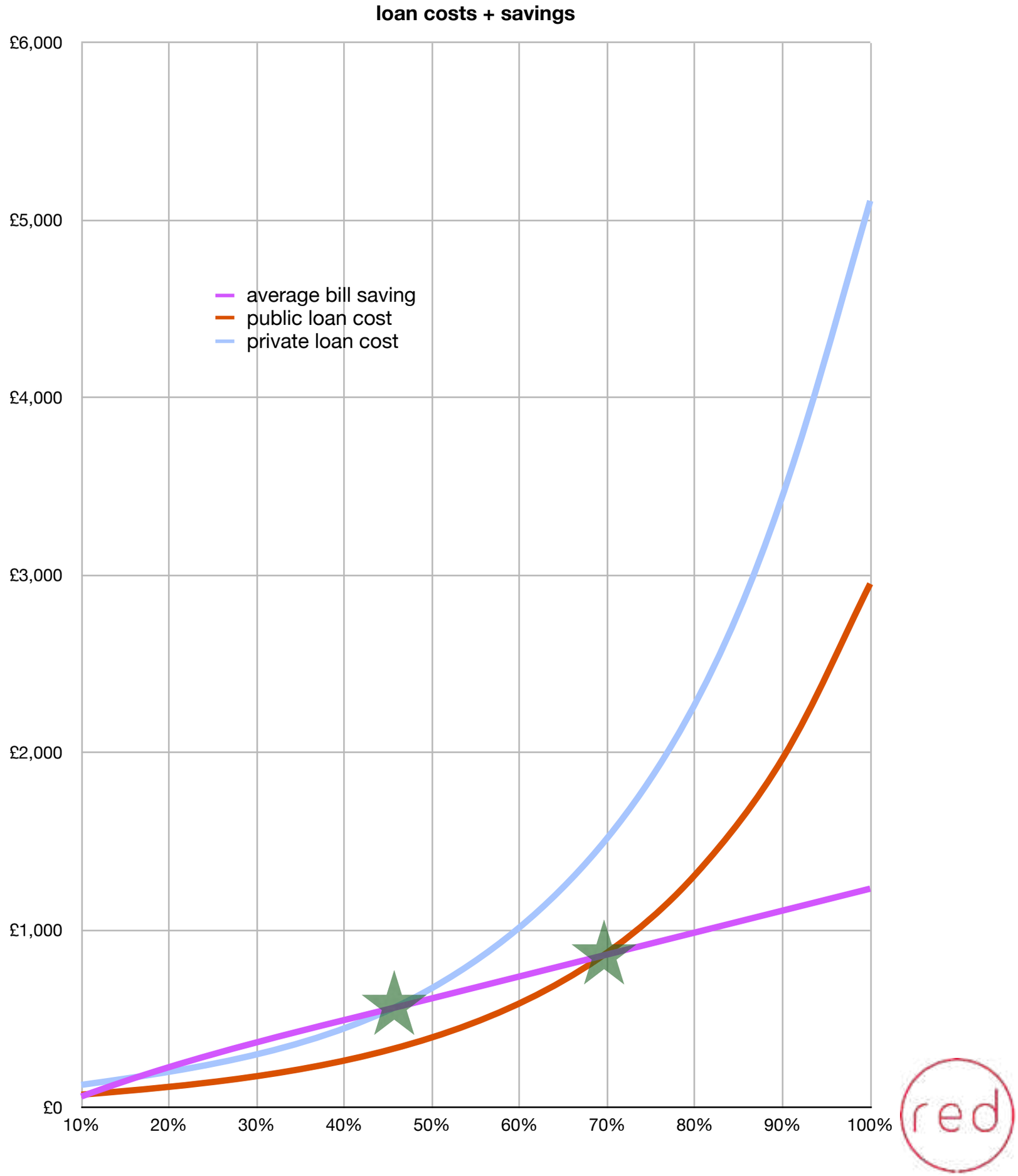
building retrofit

the cost of that borrowing can vary enormously here is a comparison between a standard mortgage and municipal prudential borrowing



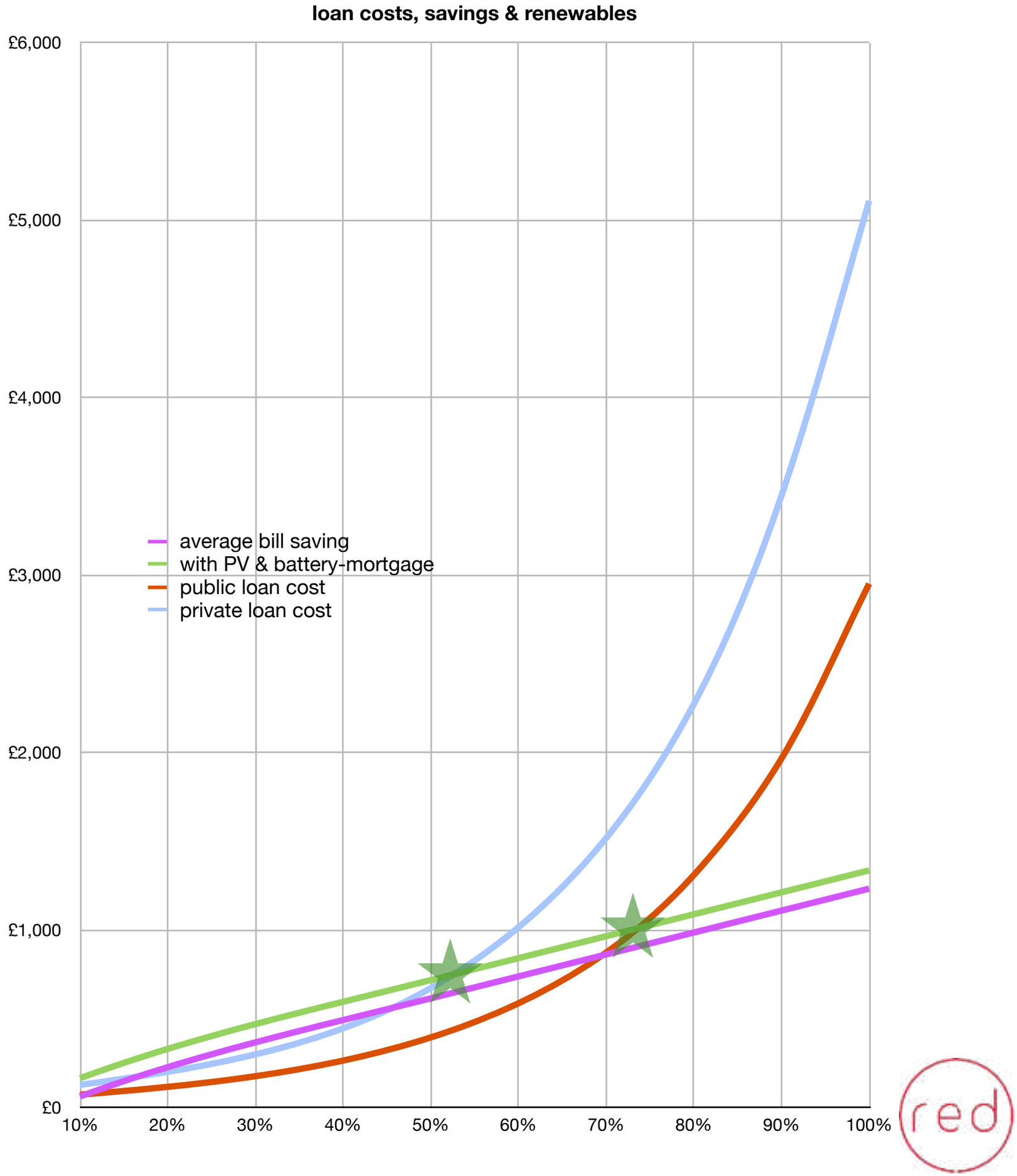
building retrofit

costs are exponential, savings are linear



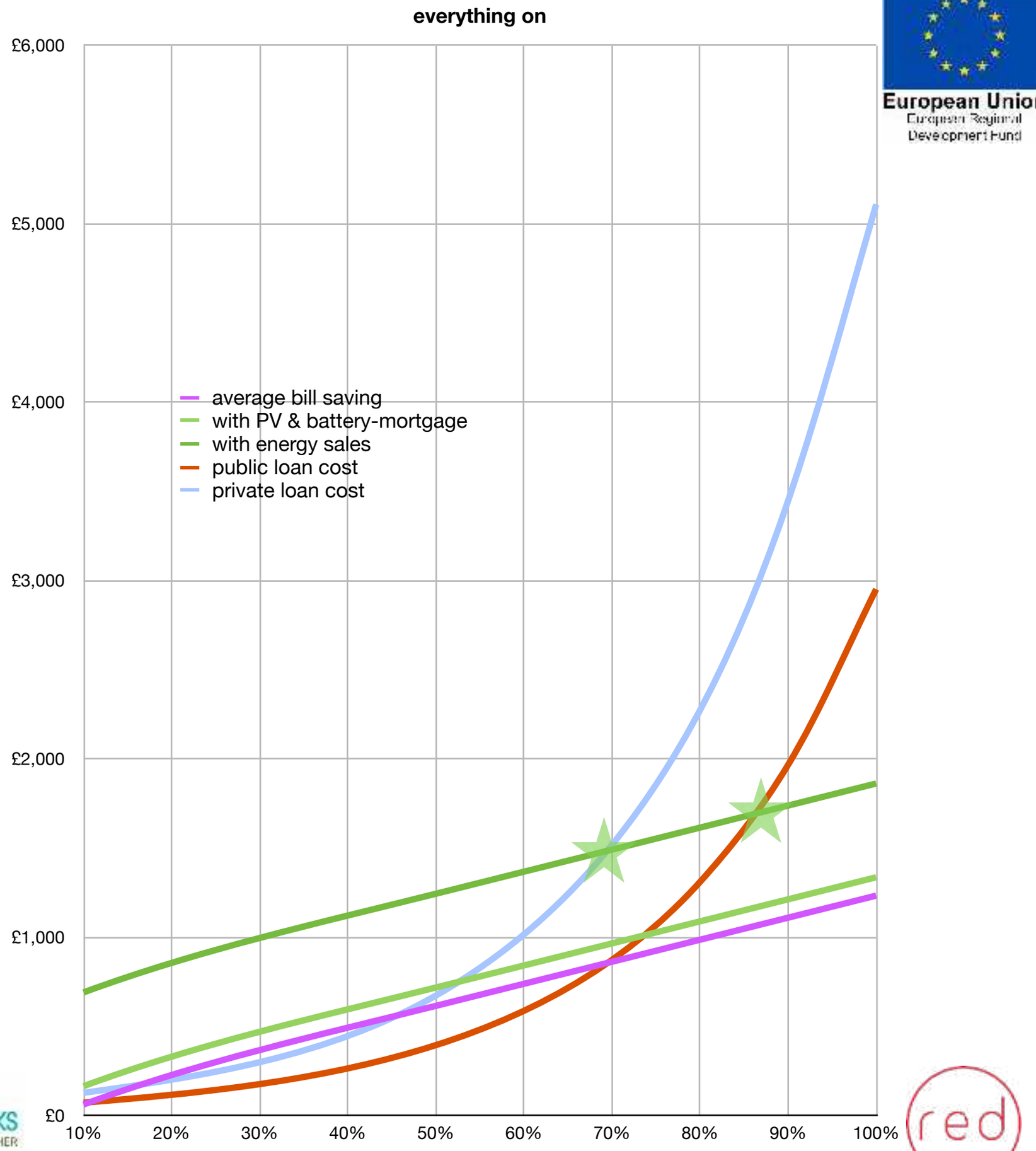
building retrofit

PV + battery enable more savings but also have to be paid for so the sweet spot hasn't moved far yet



building retrofit

the leap is with aggregated sales of energy from thousands of homes (more later)



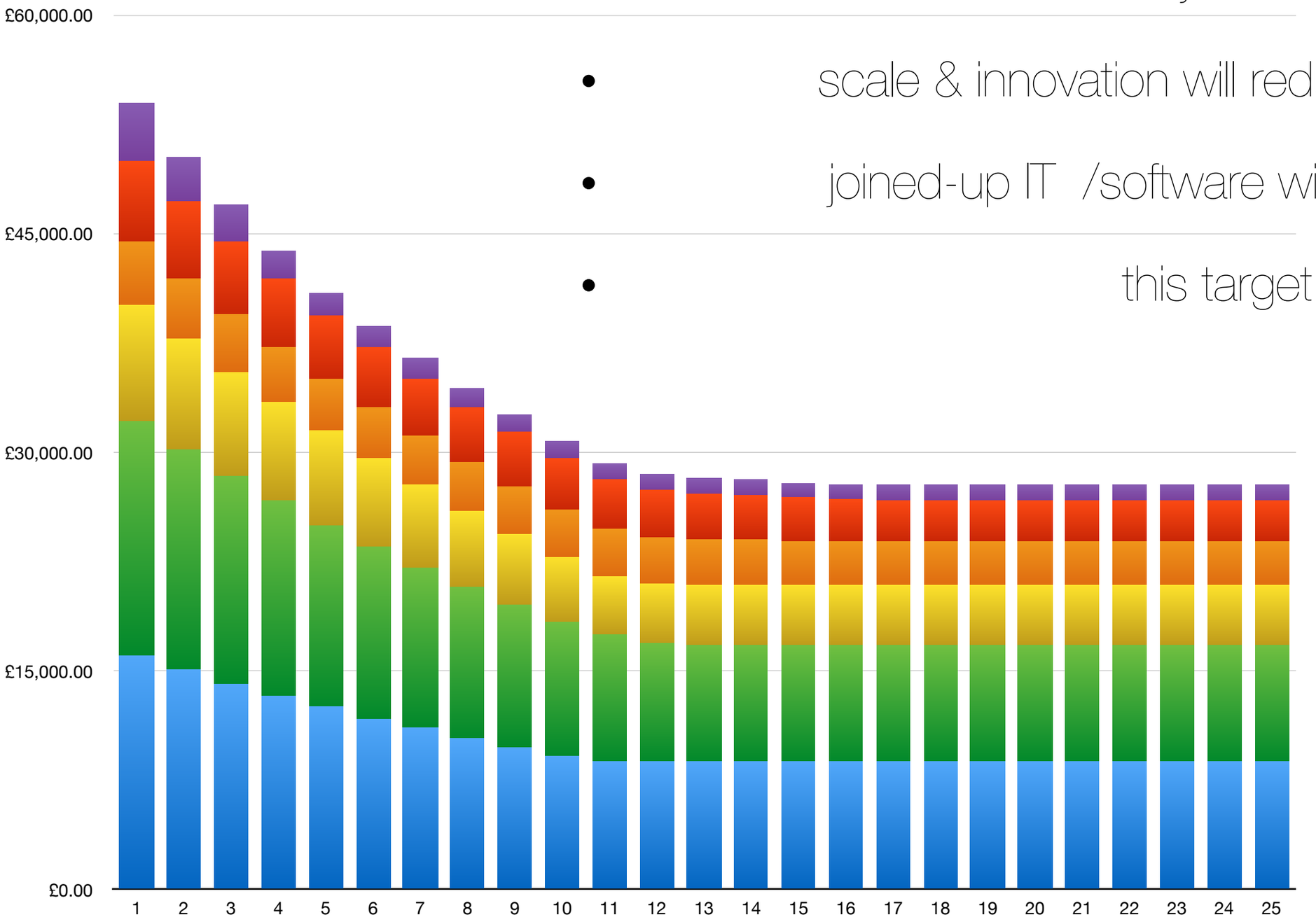
European Union
European Regional Development Fund

RETROFIT WORKS
BUILDING EFFICIENCY TOGETHER

red

costs of retrofit are currently too high

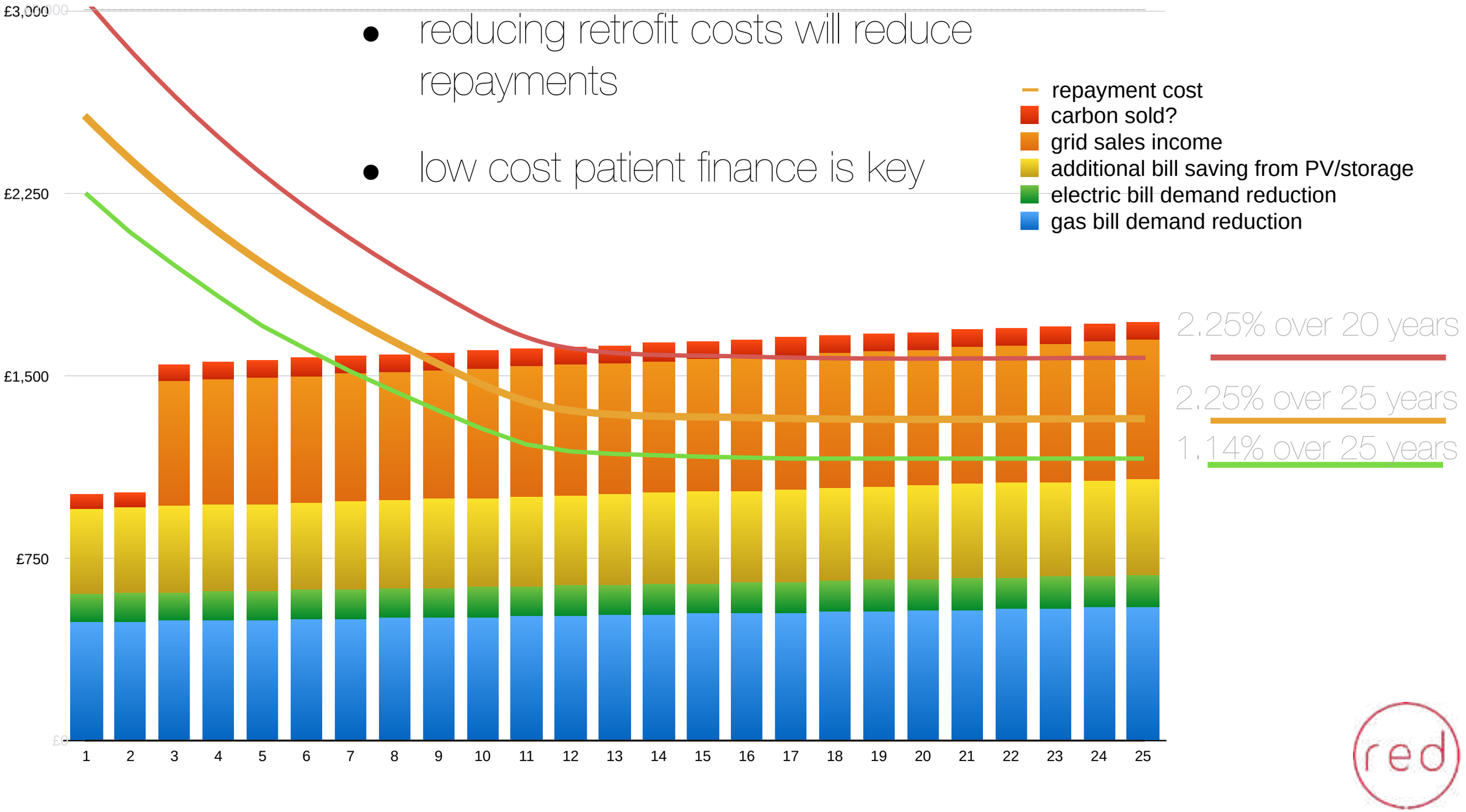
- supply & demand can push prices up if bottlenecks are not addressed early but…
- efficiency will reduce labour costs
- scale & innovation will reduce material costs
- joined-up IT /software will reduce on-costs



this target is shared by BEIS

repayments & how they can be covered

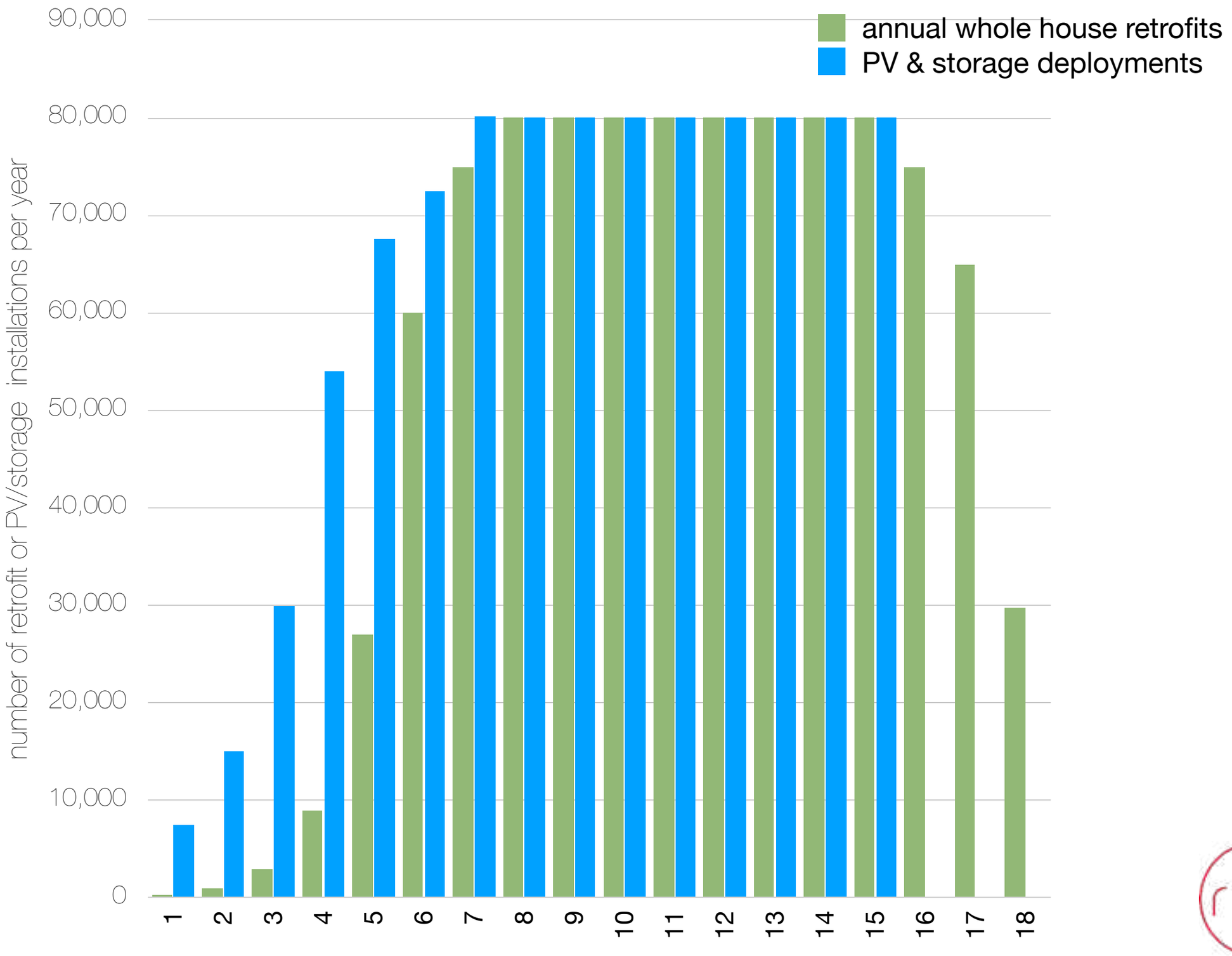
- various sources of revenue/savings - the revenue stack
- reducing retrofit costs will reduce repayments
- low cost patient finance is key



building retrofit

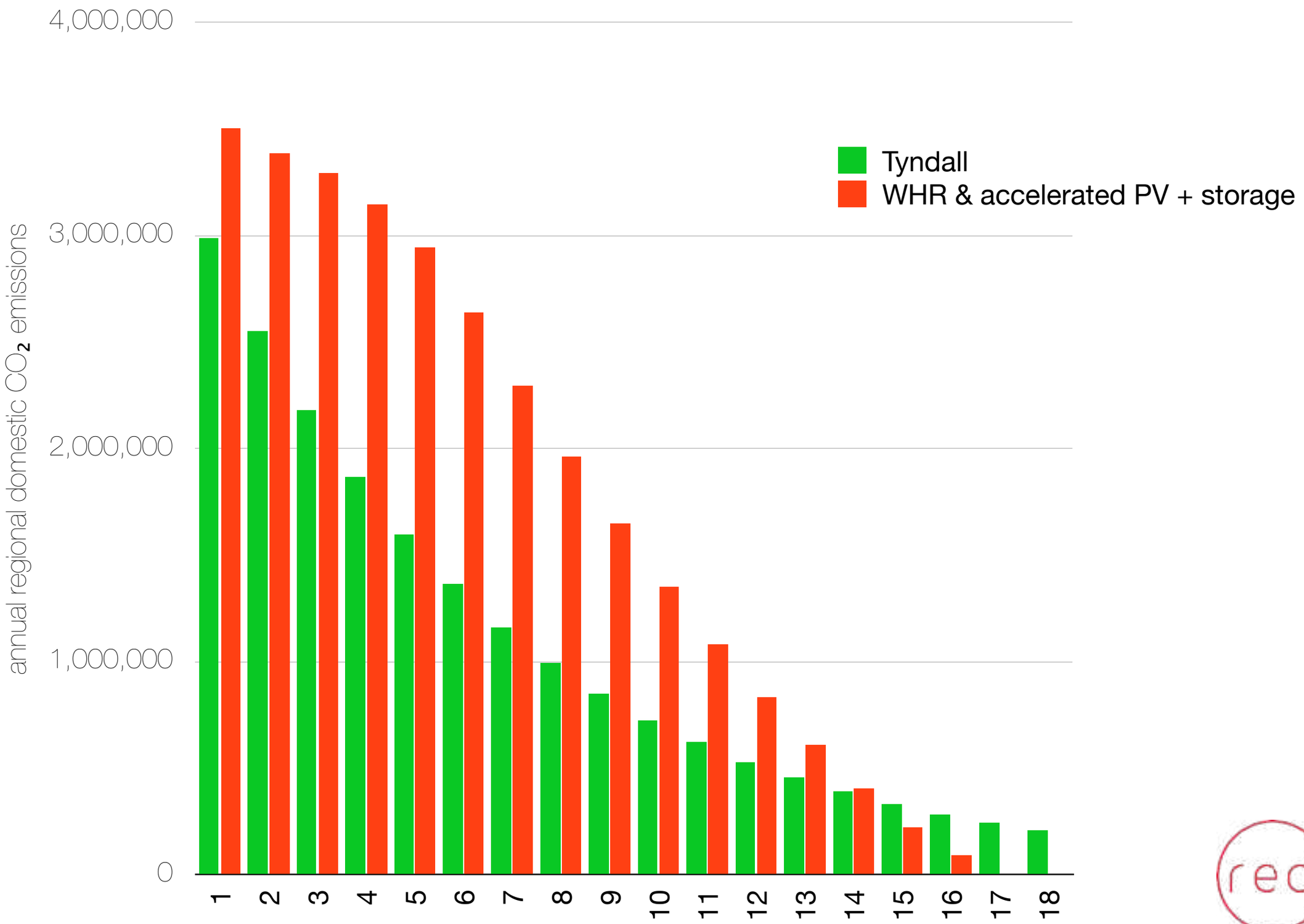
- scale up the PV & storage programme faster than the remand reduction will create early years revenues

fig 2.1retrofits & PV + storage installs/year

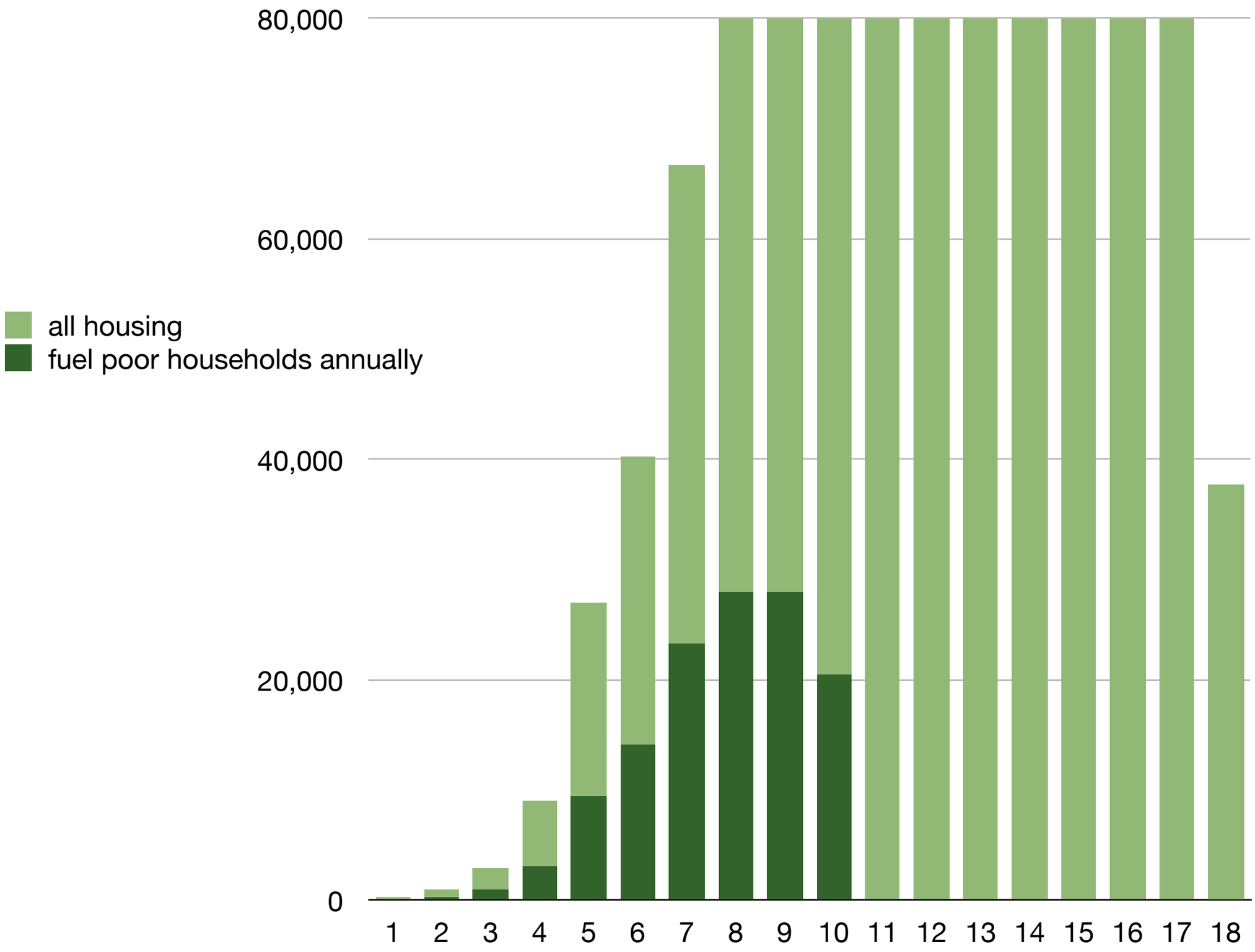


building retrofit

- help stay nearer the carbon budget…



- additional income will enable forms of lending to be able to eradicate fuel poverty within a decade



the 10 components

1. customer journey
2. assessment + calculation
3. monitoring + data
4. IT + software
5. specification + detailing
6. contracting + guarantees
7. additional revenues
8. financial vehicles
9. scalability
10. workforce development

https://shap.uk.com/shap-projects-page/scaling-up-better-homes-yorkshire-2/

			local	federal	national	trusted offer	building the market	fit for purpose	paying fir it	delivery
1	customer journey	a	consistent independent advice							
		b	knowledge of status of every home							
		c	market intelligence							
		d	show homes							
2	assessment & calculation	a	accurate whole house assessment							
		b	cost benefit							
		c	accurate costing works							
3	monitoring & data	a	pre- & post-works monitoring							
		b	identify & quantify best practice							
		c	user & contractor feedback							
		d	data repository							
4	IT & software	a	interoperable software development							
		b	mass customisation							
		c	site management							
		d	on site works remote monitoring							
5	specification & detailing	a	specification improvement							
		b	retrofit pattern book							
6	contracting & guarantees	a	contract models							
		b	warranties							
		c	performance guarantee							
		d	quality control							
7	additional revenues	a	roof top PV							
		b	domestic or street scale energy storage							
		c	energy production & storage aggregation							
		d	carbon sales?							
		e	rented housing cost recovery methods							
8	finance vehicle	a	multiple sources of finance							
		b	policy driven lending							
		c	multiple bottom lines on surpluses							
9	scalability	a	develop delivery infrastruture							
		b	demonstrators to increase scale							
		c	competitions							
		d	pipeline development							
		e	supply chain development							
		f	connect new & existing delivery infrastructure							
10	workforce development & skills	a	audit of skills, providers & methods							
		b	training provision study							
		c	awareness raising							
		d	schools introductions							
		e	apprenticeship dev't							
		f	college & university engagement							
		g	DLO & TU engagement							
		h	industry participation							
		i	work with LA's on COVID recovery plans							

components

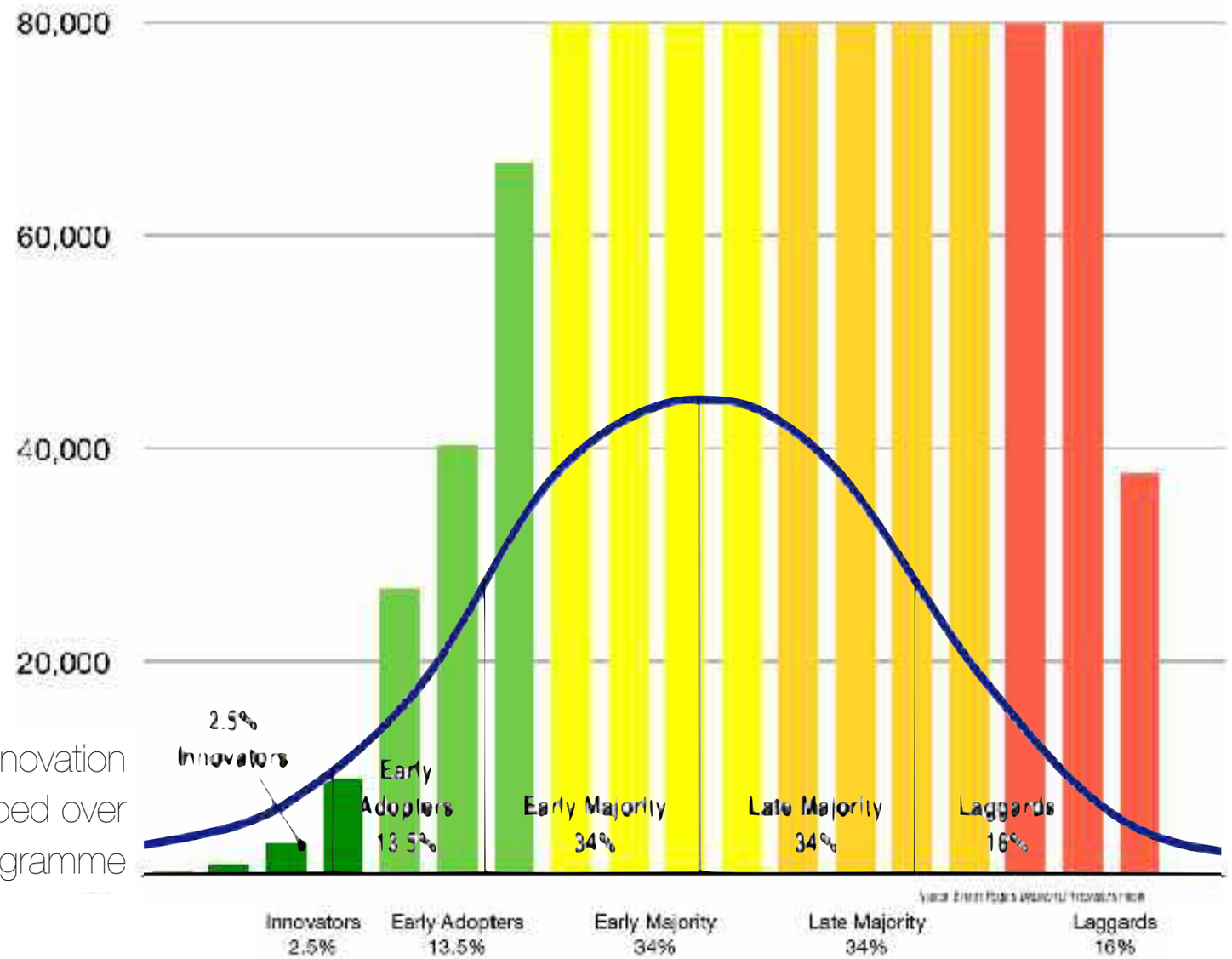
- action is needed across many fronts
- we mustn't just sit & wait for others
- this can & must be a collective effort

red

1 customer journey

work with those that want to go now to create: choice, certainty & trust

- Interest/ engagement
- Assessment
- Costing/ proposal
- Decision/ finance
- Contractor instructed
- Works
- Post works



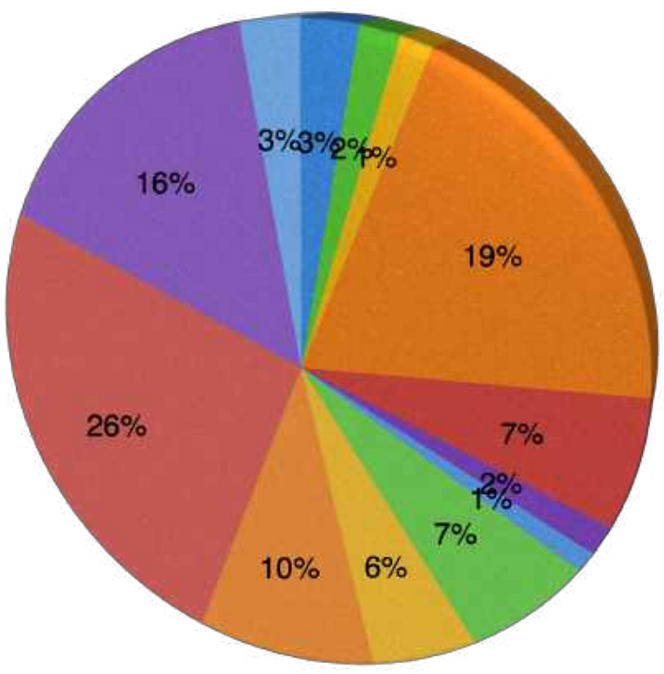
Rogers Adoption/Innovation curve mapped over programme

2 assessment & calculation

reliable, accurate methods of assessment & calculation of measures, including cost & their impact on running costs

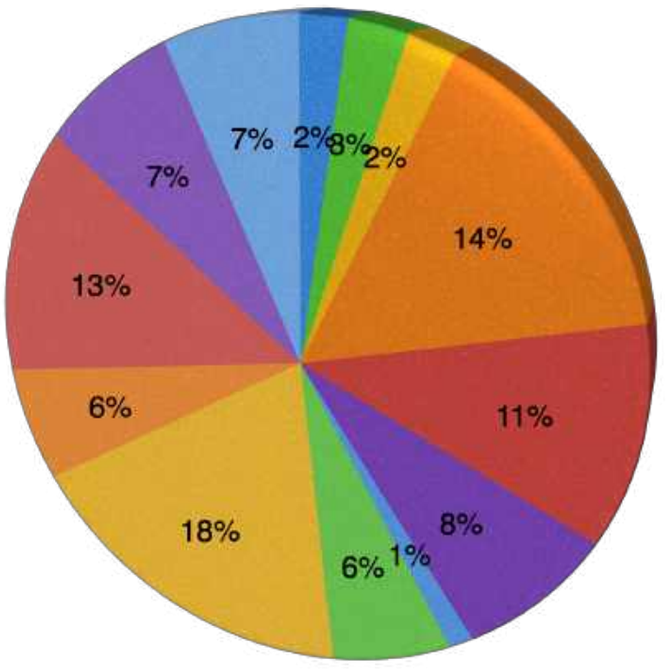
whole house assessment retrofit plans

space heating demand
before:120-160 kWh/m^2.A



- Front door
- Back door
- Kitchen door
- Double Glazing
- Single glazed window
- Patterned single glazing
- Obscured Double glazing
- Suspended ground floor
- Solid kitchen floor
- Front wall
- Side wall
- Rear wall
- Main roof

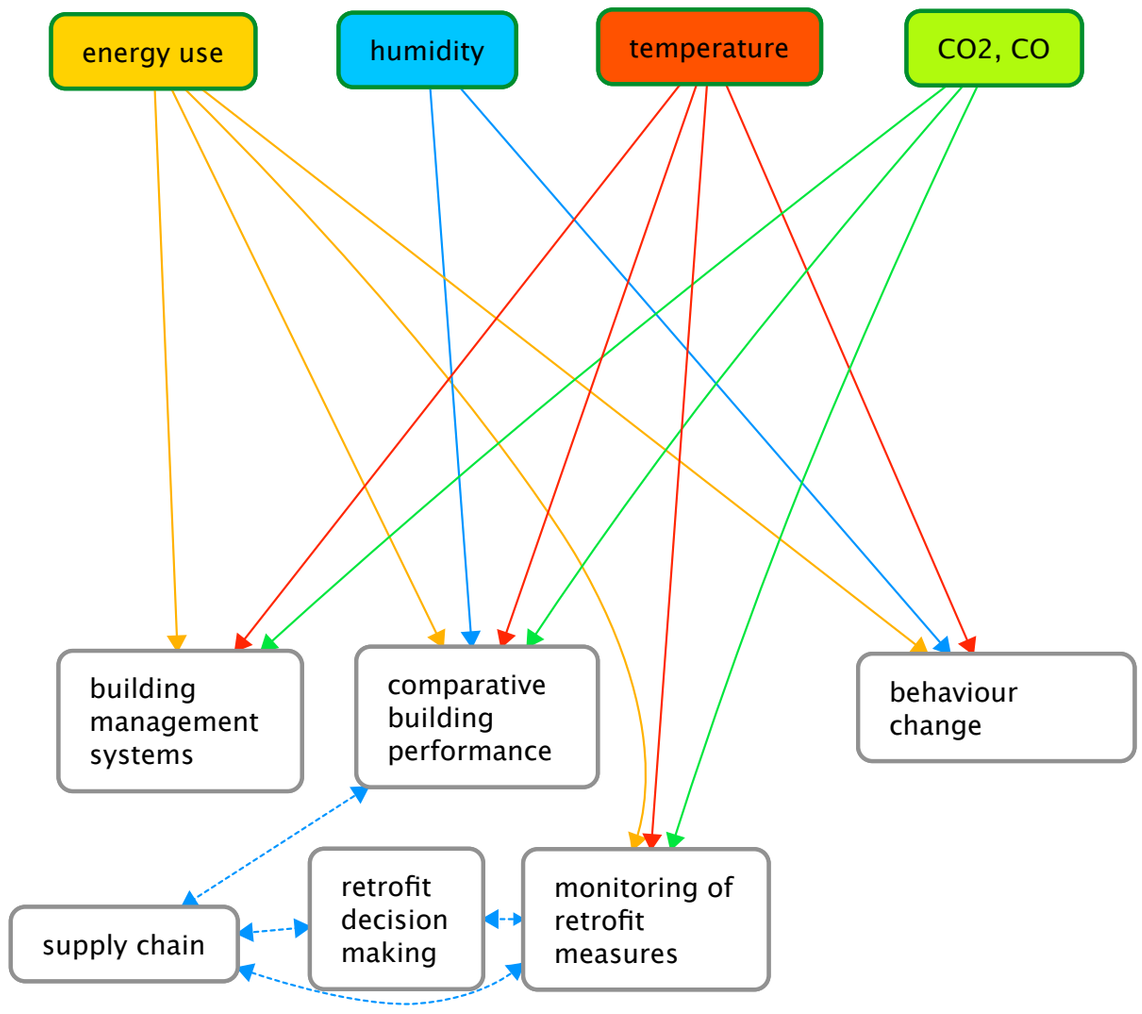
space heating demand after:
25-40 kWh/m^2.A



red

3 monitoring & data

Pre- & post-works monitoring, at much lower cost, on all properties

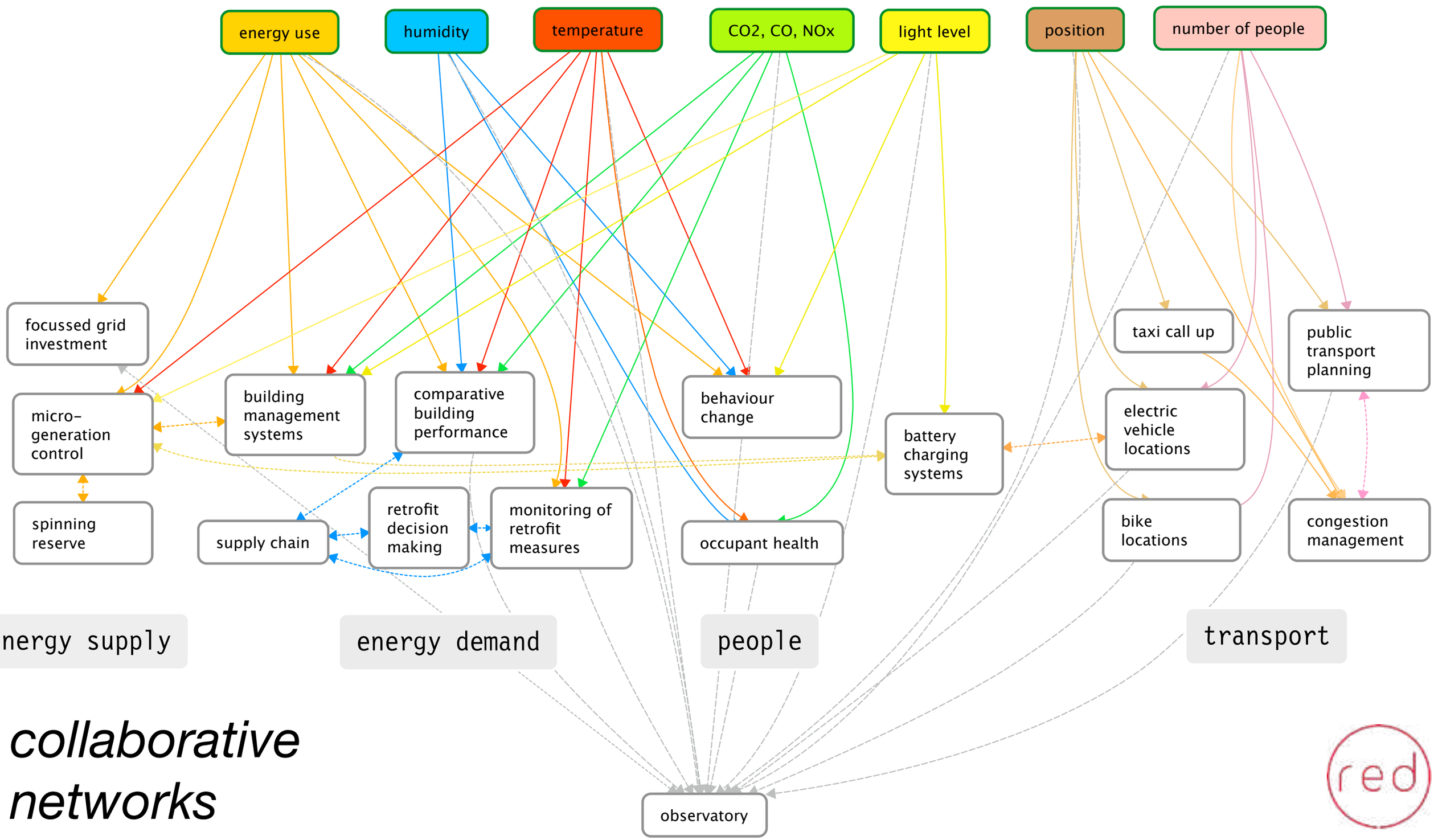


to gather data to develop, prove then disseminate best practice as well as identify problems.

it already happens with heat pumps

3 monitoring & data

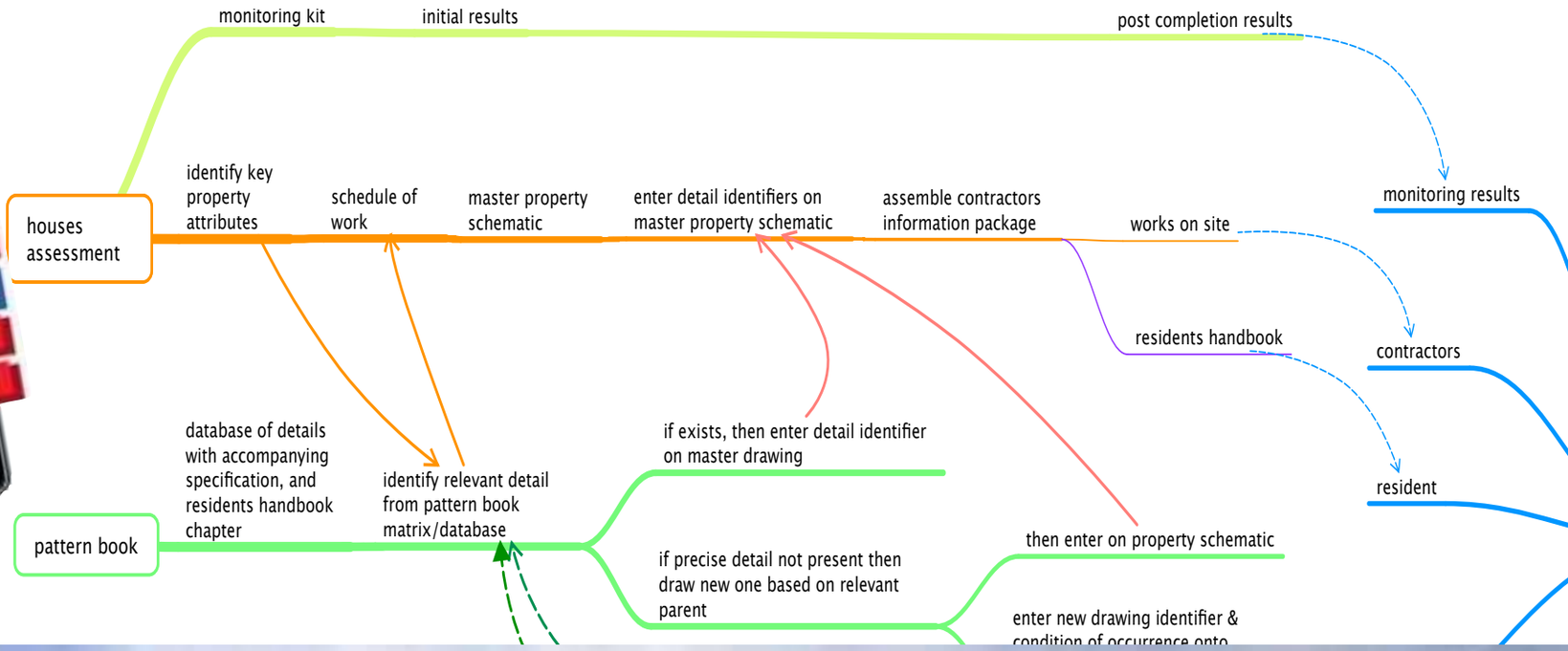
change how innovation is stimulated, disseminated and rewarded…

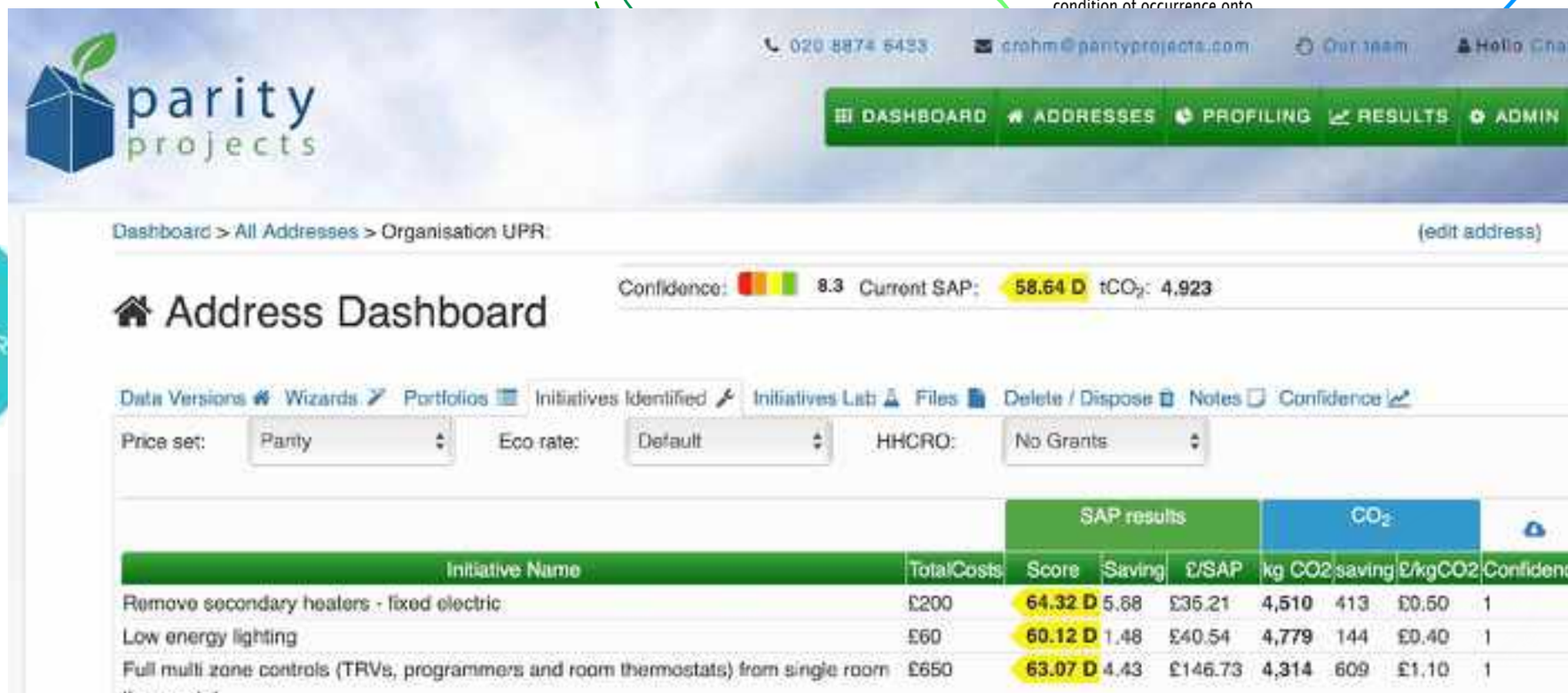


collaborative networks

4 IT & software

Development of IT systems & **interoperable** software to allow mass customisation, more streamlined design, site management & cost control.

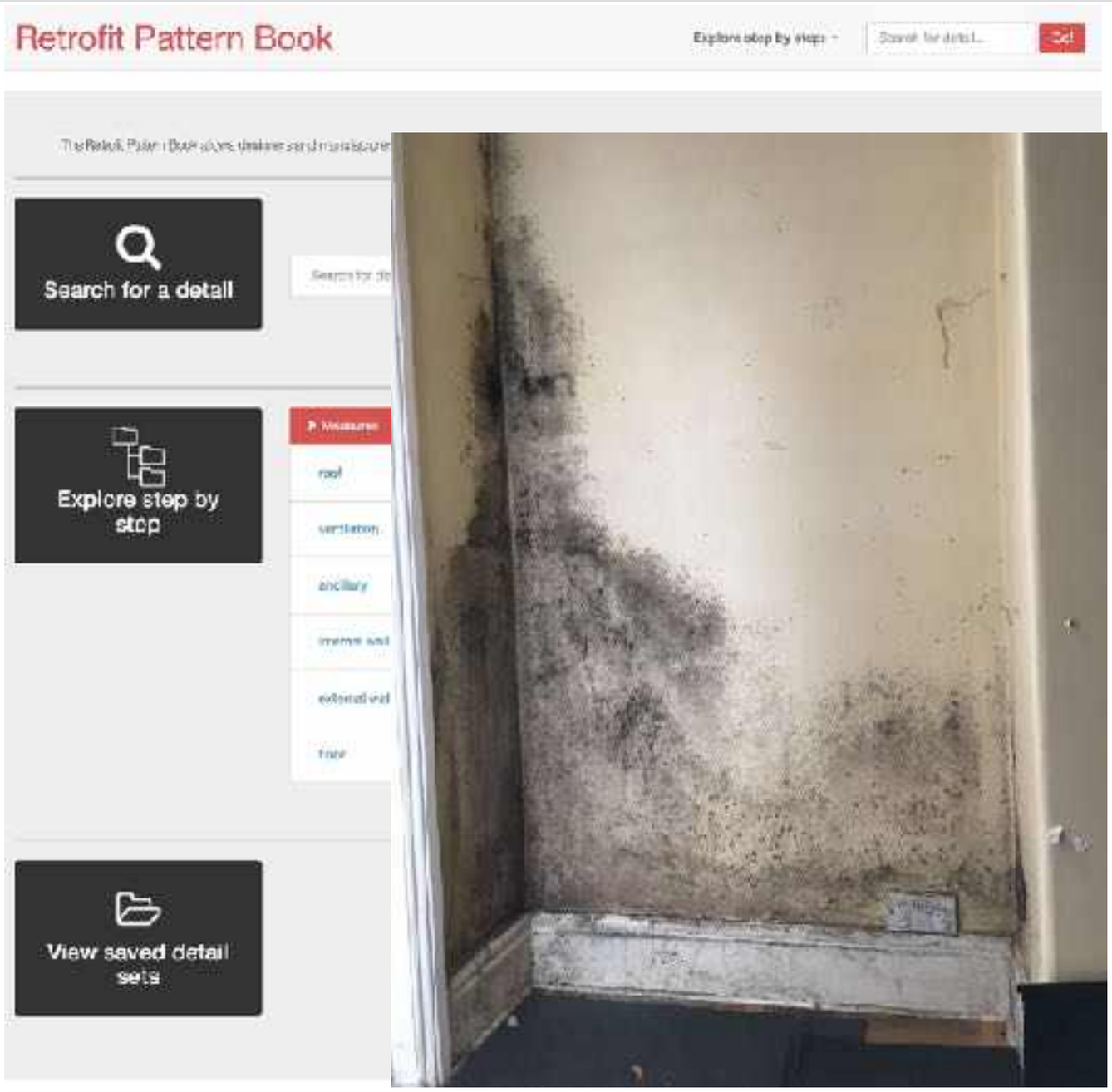


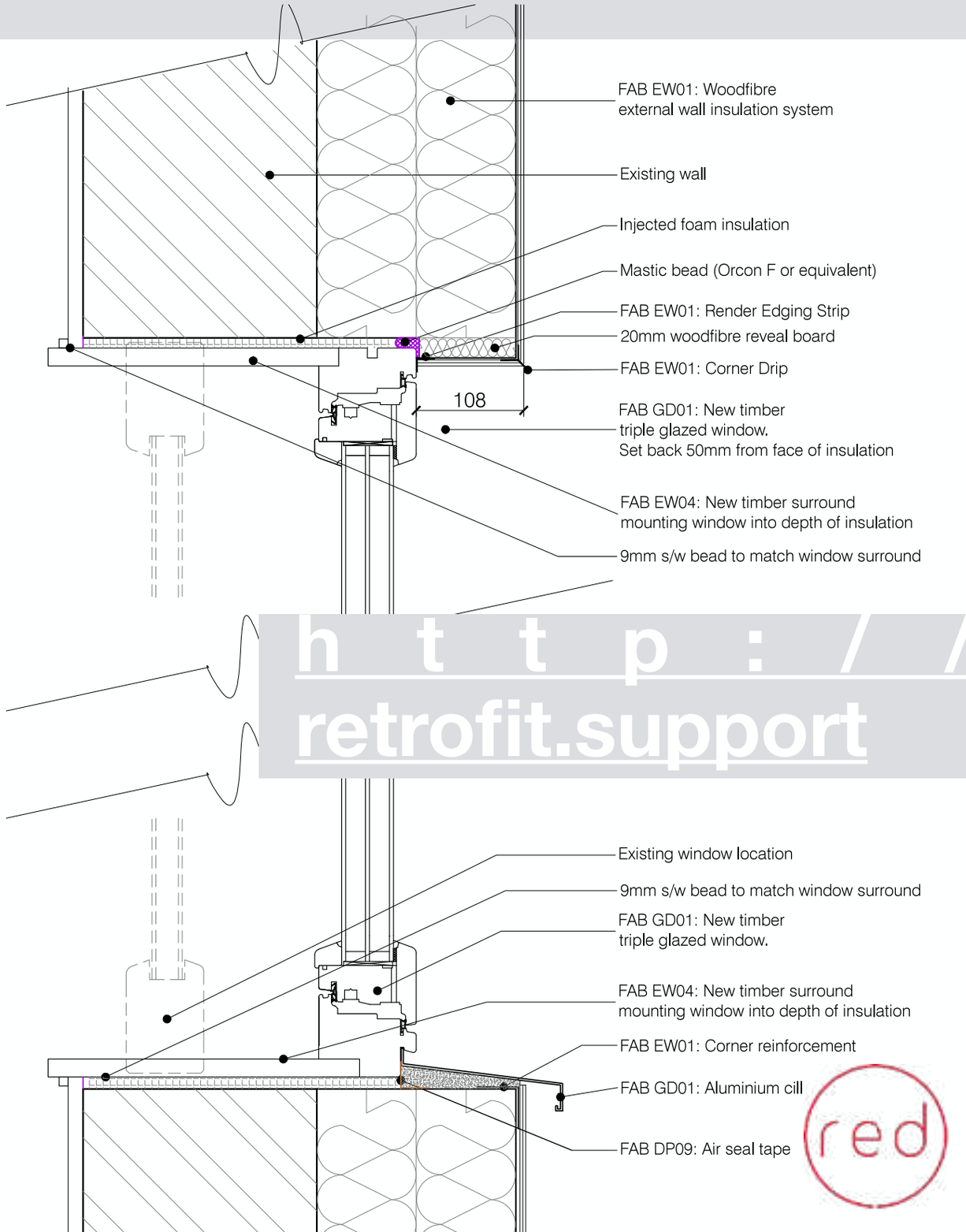


		SAP results			CO_2			
Initiative Name	TotalCosts	Score	Saving	£/SAP	kg CO2	saving	£/kgCO2	Confidenc
Remove secondary heaters - fixed electric	£200	64.32 D	5.68	£35.21	4,510	413	£0.50	1
Low energy lighting	£60	60.12 D	1.48	£40.54	4,779	144	£0.40	1
Full multi zone controls (TRVs, programmers and room thermostats) from single room	£650	63.07 D	4.43	£146.73	4,314	609	£1.10	1

5 specification & detailing

science & risk based **specification**, not just lowest cost material selection,
proper **detailing** to reduce underperformance, defects & health effects.



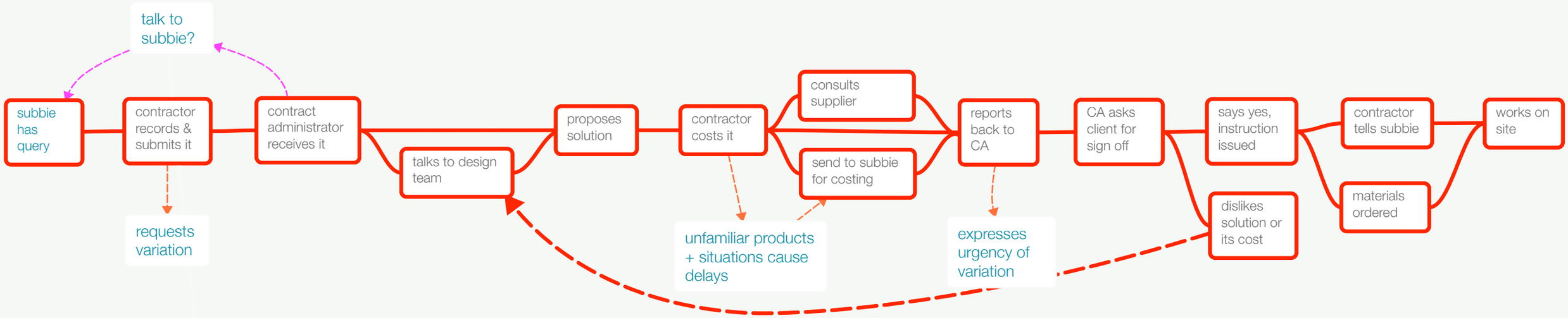


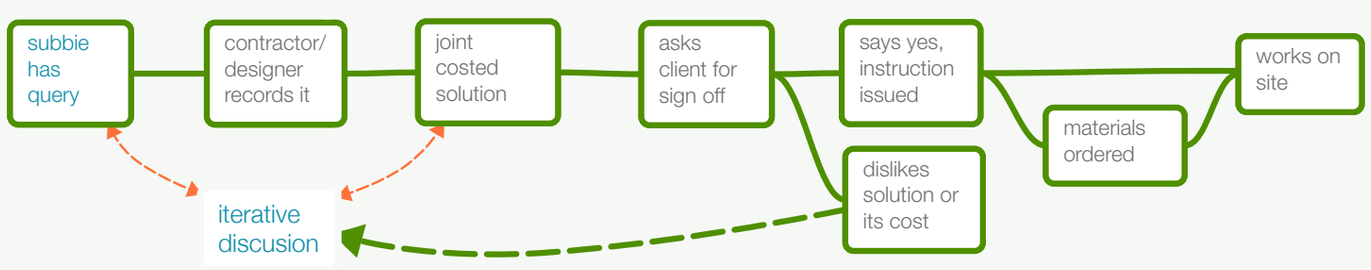
http://retrofit.support

red

6 contracting & guarantees

Better contract models, delivery structures + energy performance guarantees.





- the current models are not fit for purpose,
- involve trades in the process
- on-site access to project docs -Refurbify
- enabling problems to be spotted and sorted more effectively
- basically **co-operate** more

RETROFIT WORKS
BUILDING EFFICIENCY TOGETHER

red

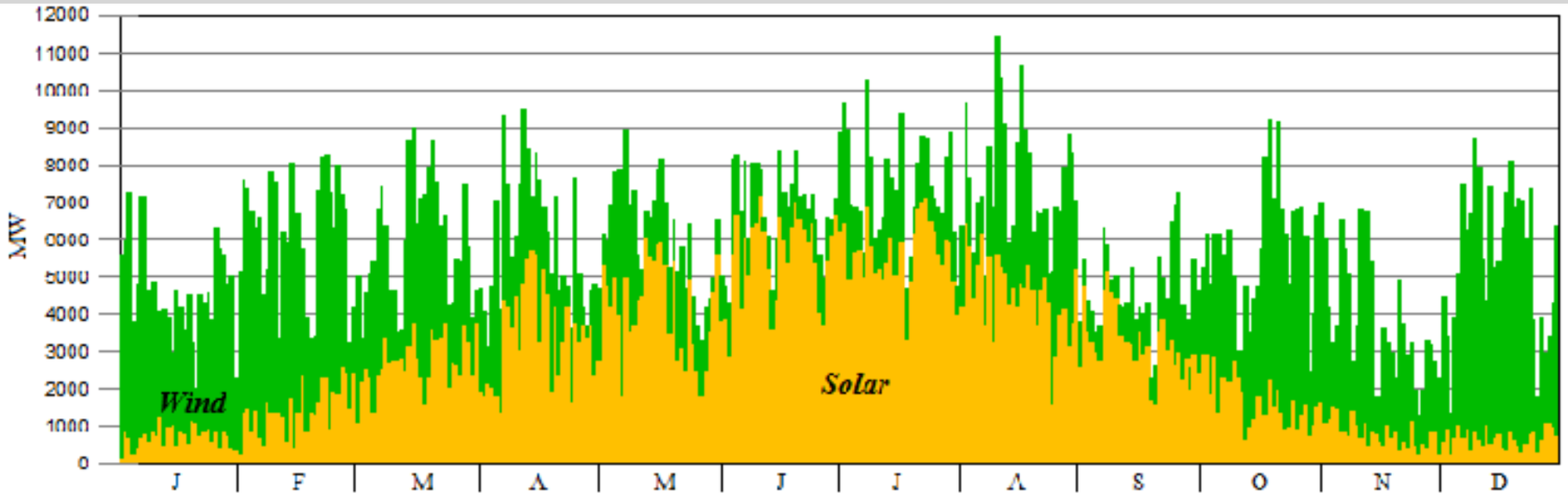
energiesprong - netherlands

off-site construction - zero net energy

performance guarantee for 30 years

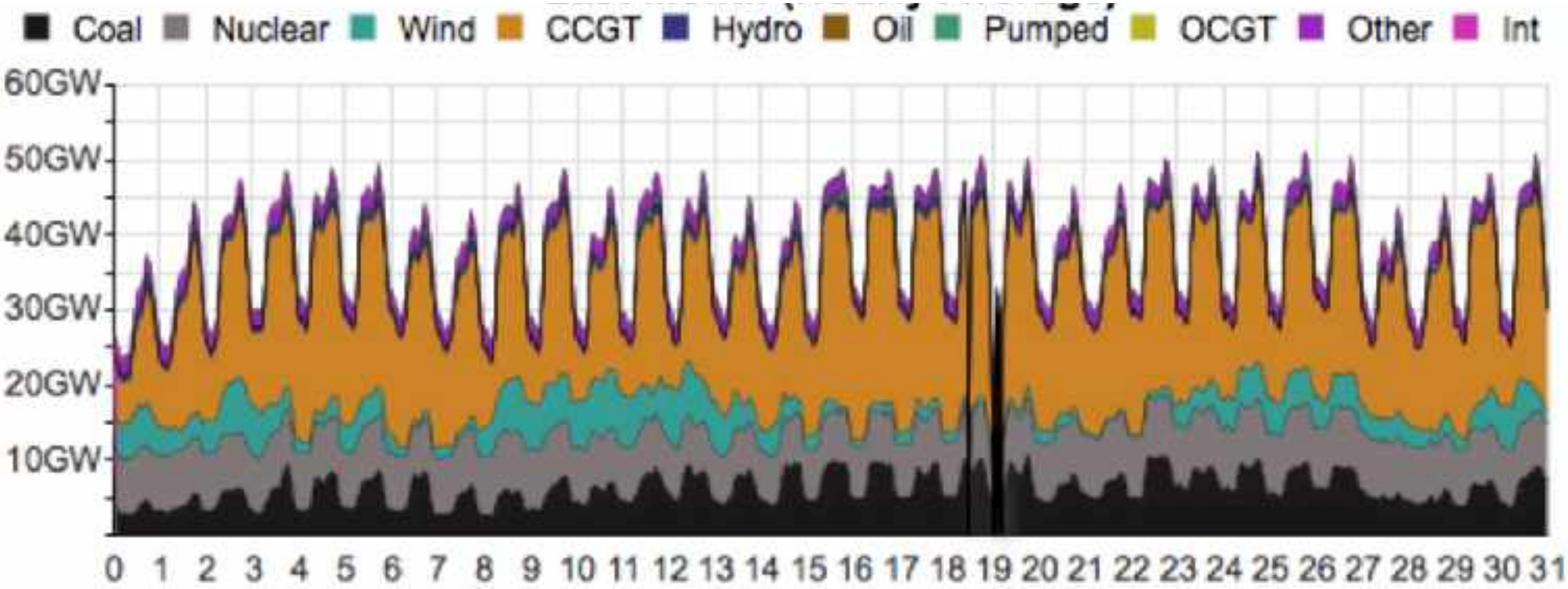
7 additional revenues

the new component is energy storage



annual renewable energy variations

- move energy from when it's generated to when it's needed
- enabling more self-consumption
- and future income from energy sales



daily energy supply variations

red

the new component is energy storage

energy storage income is not subsidy,

it is the energy market

1. demand shifting
   Time of day tariff costs 4-8p/kWh instead of 14p/kWh
   average UK bill at 3,800kWh then if sufficient battery to provide whole day then annual saving > 3800 x difference = approx £300

2. supply shifting
   assume a 4kW PV installation generating 3,200kWh/A, additional saving = 3200 x 5= + £160

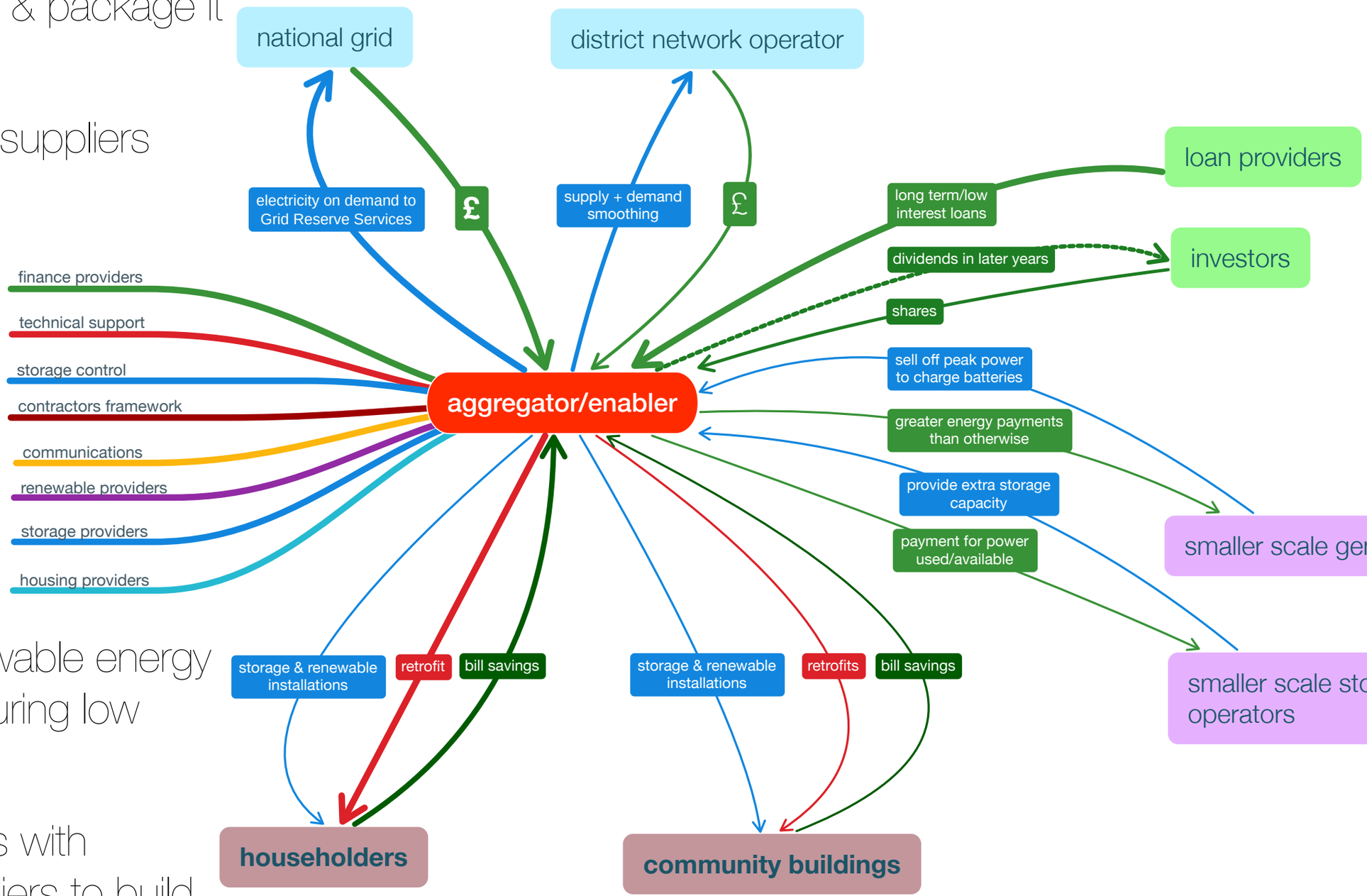
3. aggregated sales to grid
   Short Term Operating Reserve - up to £350
   or Frequency Response up to £300

4. Demand Side Response
   (possibly) DUoS Red band avoidance £60

7. aggregation

intermediaries are needed to access these new revenues

- to take the individual batteries' energy & package it for sale
  - to energy suppliers
  - to the grid

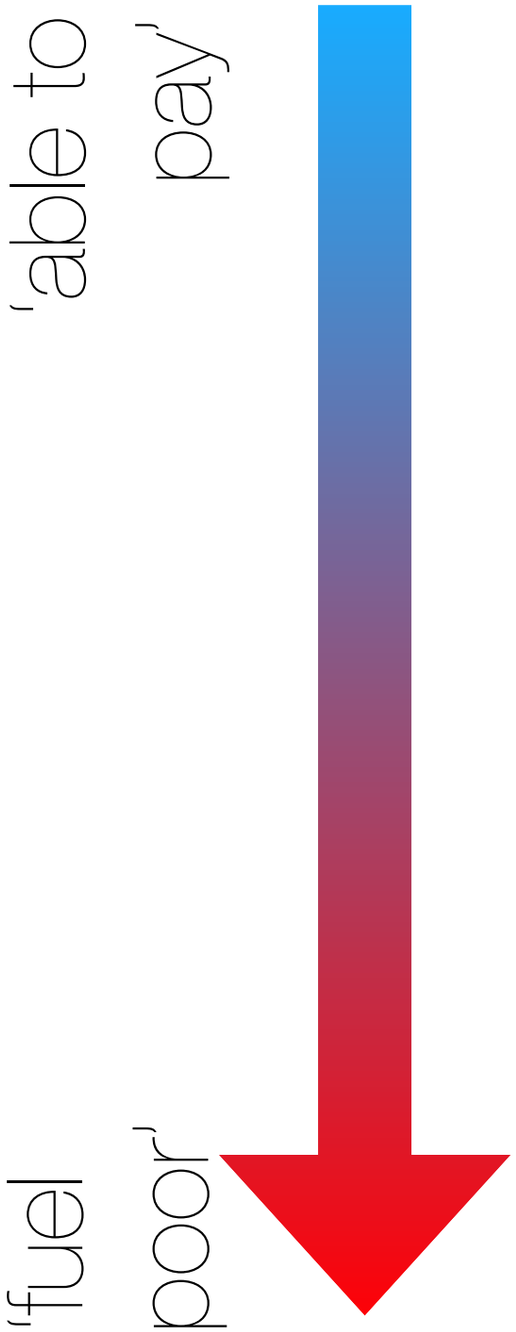


- purchase renewable energy for recharging during low demand
- negotiated PPA's with renewable suppliers to build the market
- this really must be a community controlled vehicle,

8. financial vehicle

- to take in large scale, low cost finance from multiple sources, distribute to fund householders works,
- enable policy led lending, such as progressive equity loans, to less well-off households,
- being the preferred source of finance creates gateway to quality control
- Personal Retrofit Loan Fund

8. financial vehicle

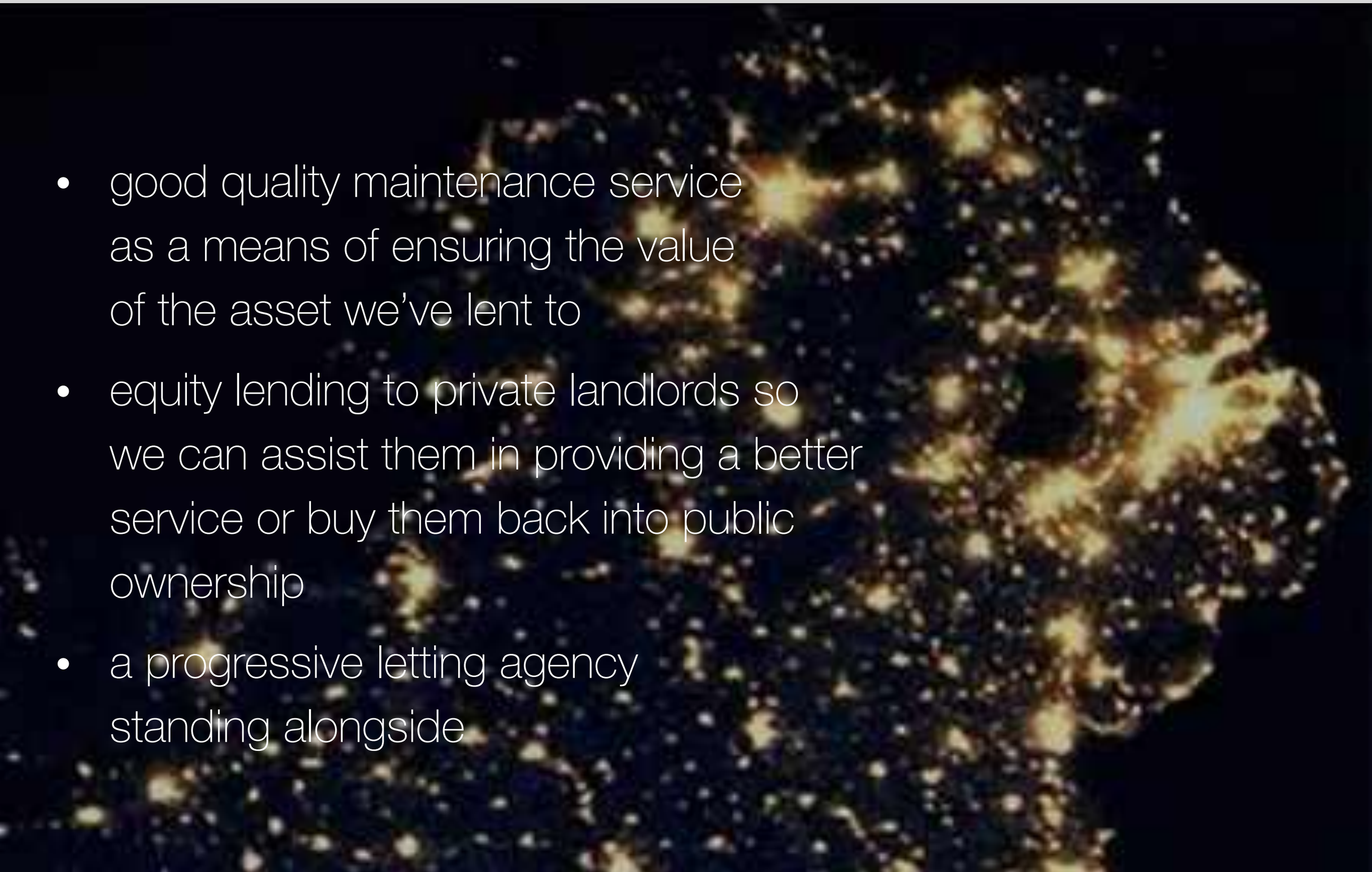


Loans to those able to pay can help those less able to pay

- retrofit bonds
- loans but at sub-high street interest rates
- unsecured loans at sub-high street interest rates
- unsecured loans at cost of finance
- interest only equity loans
- equity loans with no charge until sale of property

8. financial vehicle

it can grow from there:



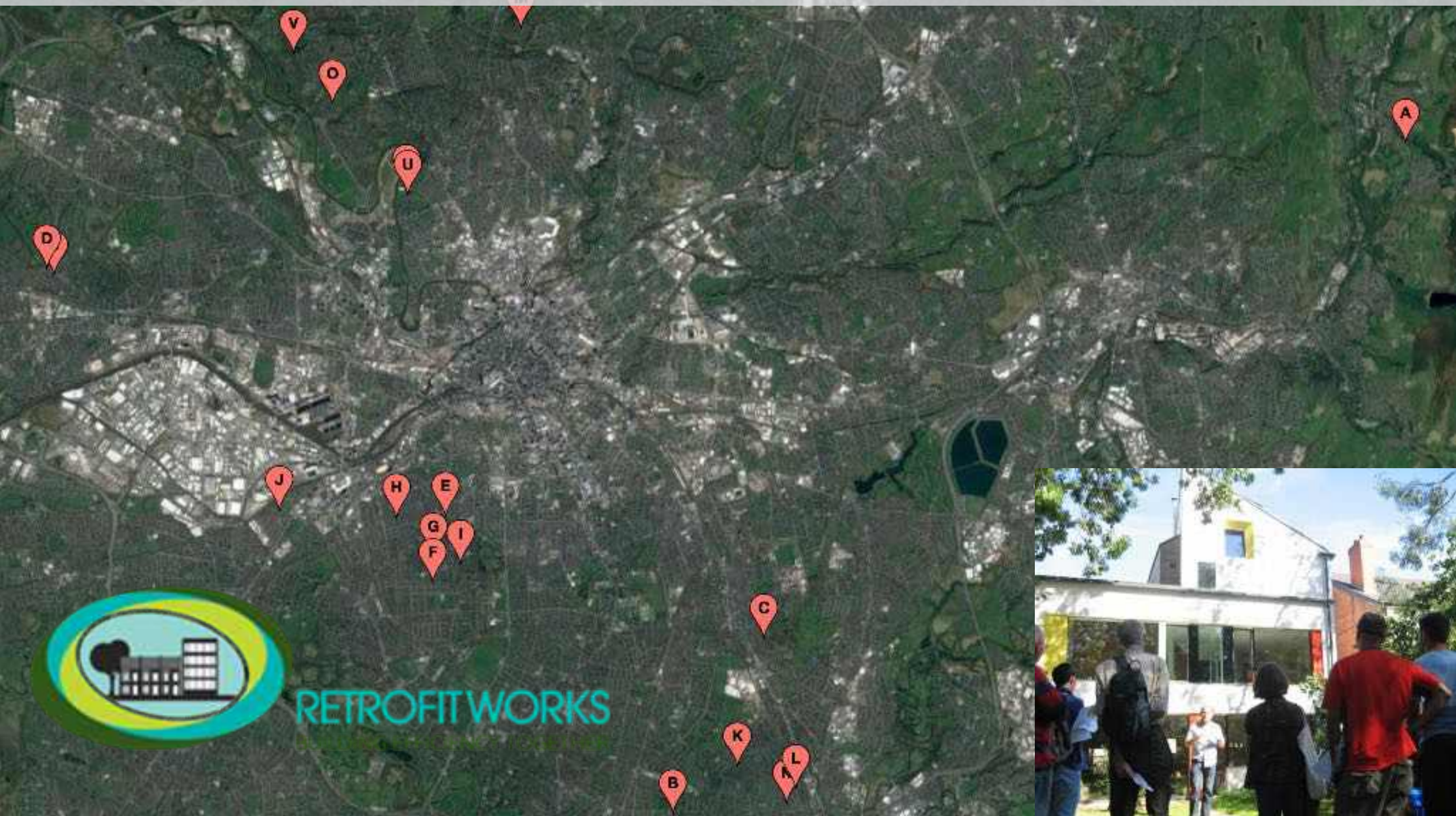
- good quality maintenance service as a means of ensuring the value of the asset we've lent to
- equity lending to private landlords so we can assist them in providing a better service or buy them back into public ownership
- a progressive letting agency standing alongside

8. source of finance

- Green Deal Finance Company was too expensive at nearly 8%
- UK pension pot 1.6% last year
- savers get 1%, 1.5% if lucky
- US bonds during the 1st world war only paid 3.5%.
- a municipal bond? so your savings could help your community
- will PWLB become popular again post-Brexit?
- when will institutional investors become interested
- the quality of the public sector covenant enables the cheapest borrowing
- then there's always the people

9 scalability

Developing capacity: delivery infrastructure, demonstrators, competitions
or rolling competitive funds to develop designer/contractor teams
capable of delivering deep retrofits to roll out at scale



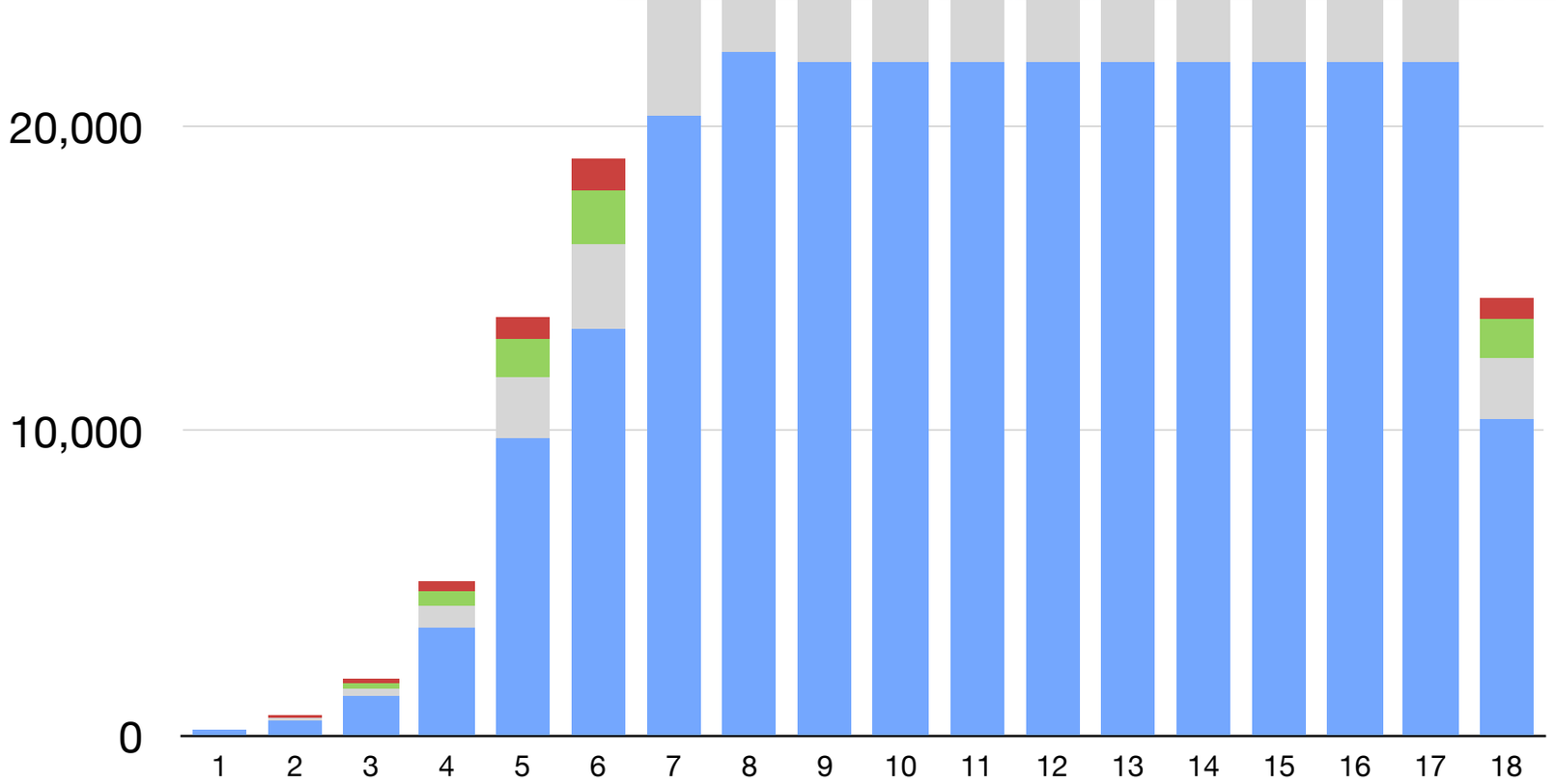
RETROFITWORKS

10. workforce development

Training needs to be developed, and be scalable to respond.

approximate workforce size over the life of the programme

- designers
- renewables & storage installers
- management
- trades

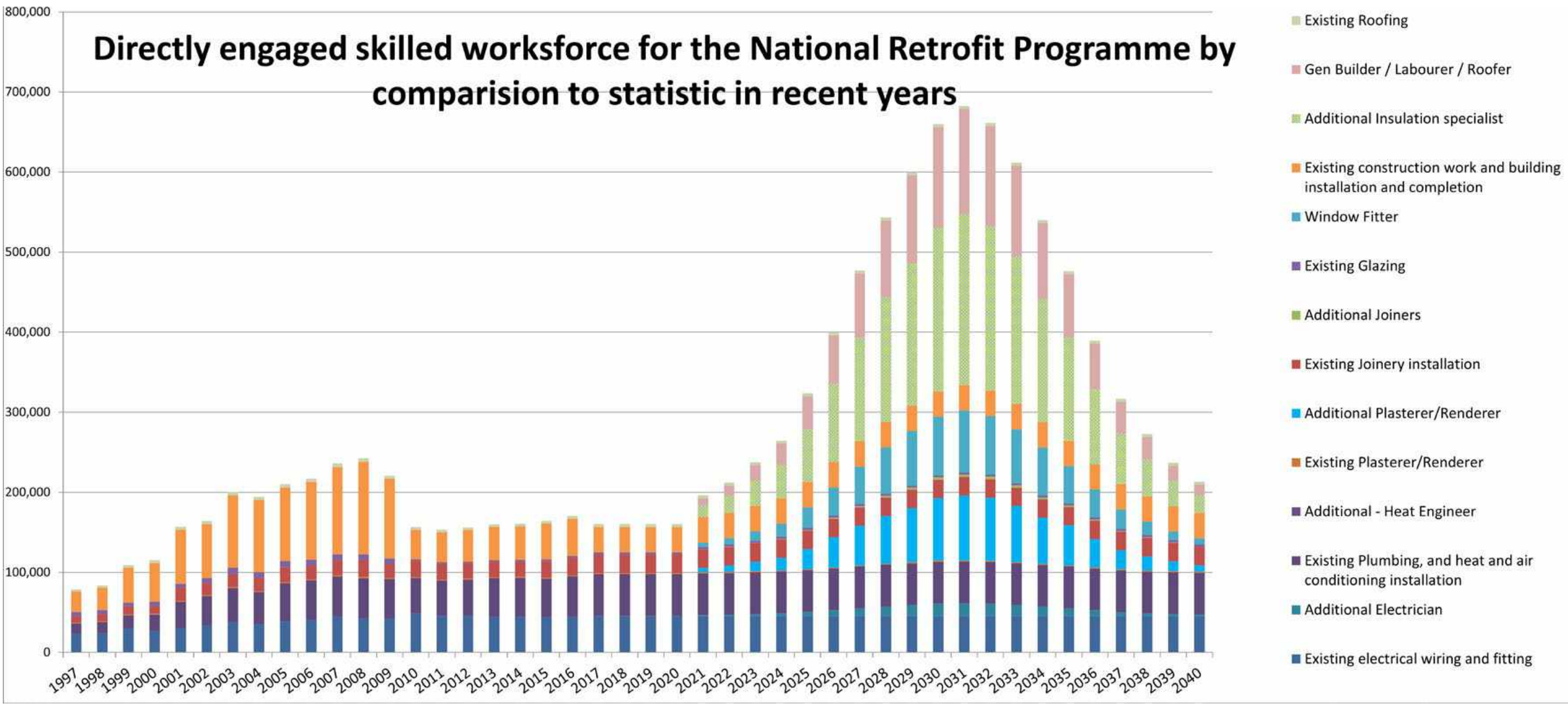


potentially 30,000 new jobs in West Yorks where are they going to come from?

10. workforce development

Jobs

there's a very larger number of jobs



this is based on a lower assumption of retrofit energy savings
there's also an argument that having 700,000jobs for only 1 year makes careers choices difficult

even the Construction Leadership Council's National Retrofit Strategy agrees

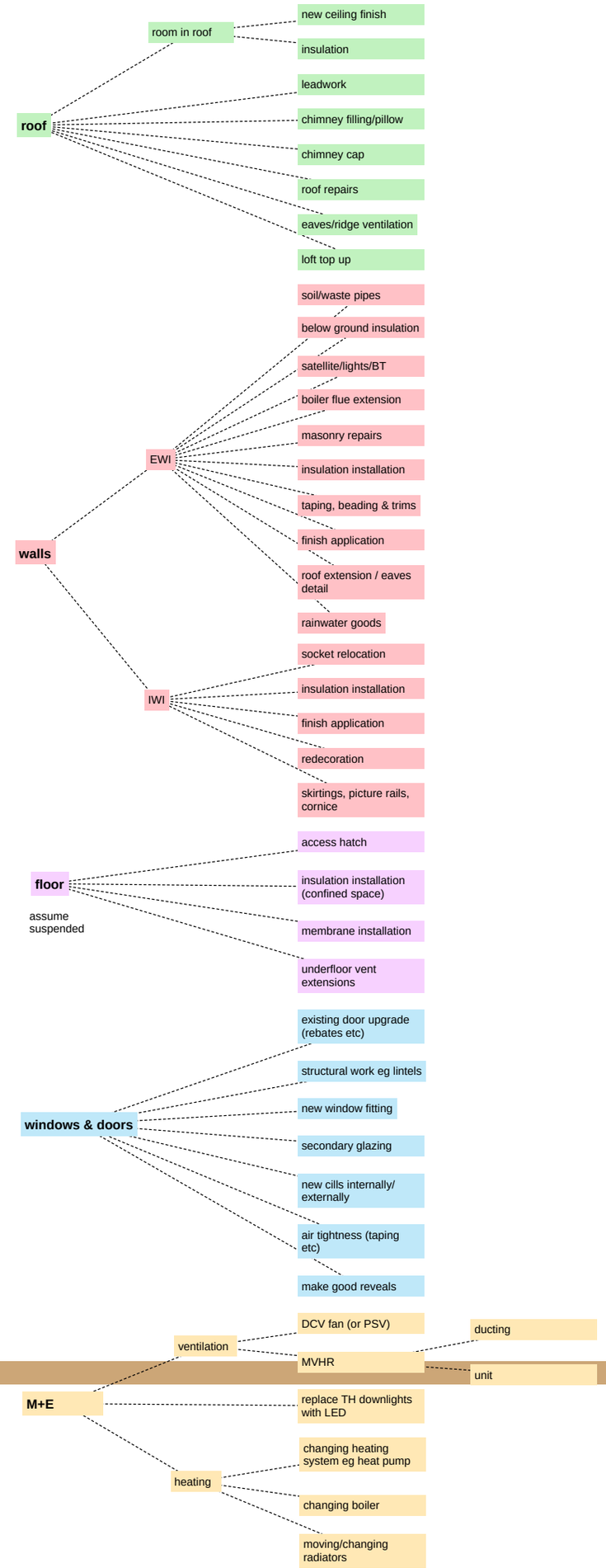
Retrofit
Get in Project
Theatre workers into retrofit

Premise

Matching skills from other fields into construction and retrofitting.

Test what it takes to make a good retrofitter.

Provide work for people who aren’t being supported.



retrofit tasks arranged by trade

which trade?

loft tcp up

chimney filling/pillow

insulation

roof

room in roof

below ground insulation

insulation installation

EWI

air tightness taping

walls

redecoration

insulation installation

IWI

roofing

loadwork

chimney cap

roof repairs

eaves/ridge ventilation

roof extension / eaves detail

rainwater goods

plastering

new ceiling finish

EWI finish application

beading & trims

cornices

IWI finish application

make good reveals

brickwork

masonry repairs

structural work eg lintels

electrical

socket relocation

satellite/lights/BT

fit MVHR unit

DCV fan (or PSV)

air tightness taping

redecoration

insulation installation

ventilation ducting

air tightness (taping etc)

insulation installation (confined space)

membrane installation

underfloor vent extensions

walls

IWI

MVHR

ventilation

M+E

heating

windows/doors

floor (assume suspended)

brickwork

masonry repairs

structural work eg lintels

electrical

socket relocation

satellite/lights/BT

fit MVHR unit

DCV fan (or PSV)

replace TH downlights with LED

heating engineer

boiler flue extension

changing heating system eg heat pump

changing boiler

plumbing

soil/waste pipes

moving radiators

joinery

skirtings, picture rails

existing door upgrade (rebates etc)

new window fitting

secondary glazing

new cills internally/ externally

access hatch

building retrofit

reskilling

practice

LABOUR FOR A GREEN NEW DEAL

Late September
to now
12 people working

on retrofits:

IWI, floor replacement, plastering
decoration. Replacement of bay windows.

Varying skill sets.

Working during Covid.

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Next steps

Creation of a bespoke retrofitting training course.

Using a granular approach to spread out work and train more people.

Setting a “skill level” system to break up work.

PAS:2035 and beyond, remote quality management

summary

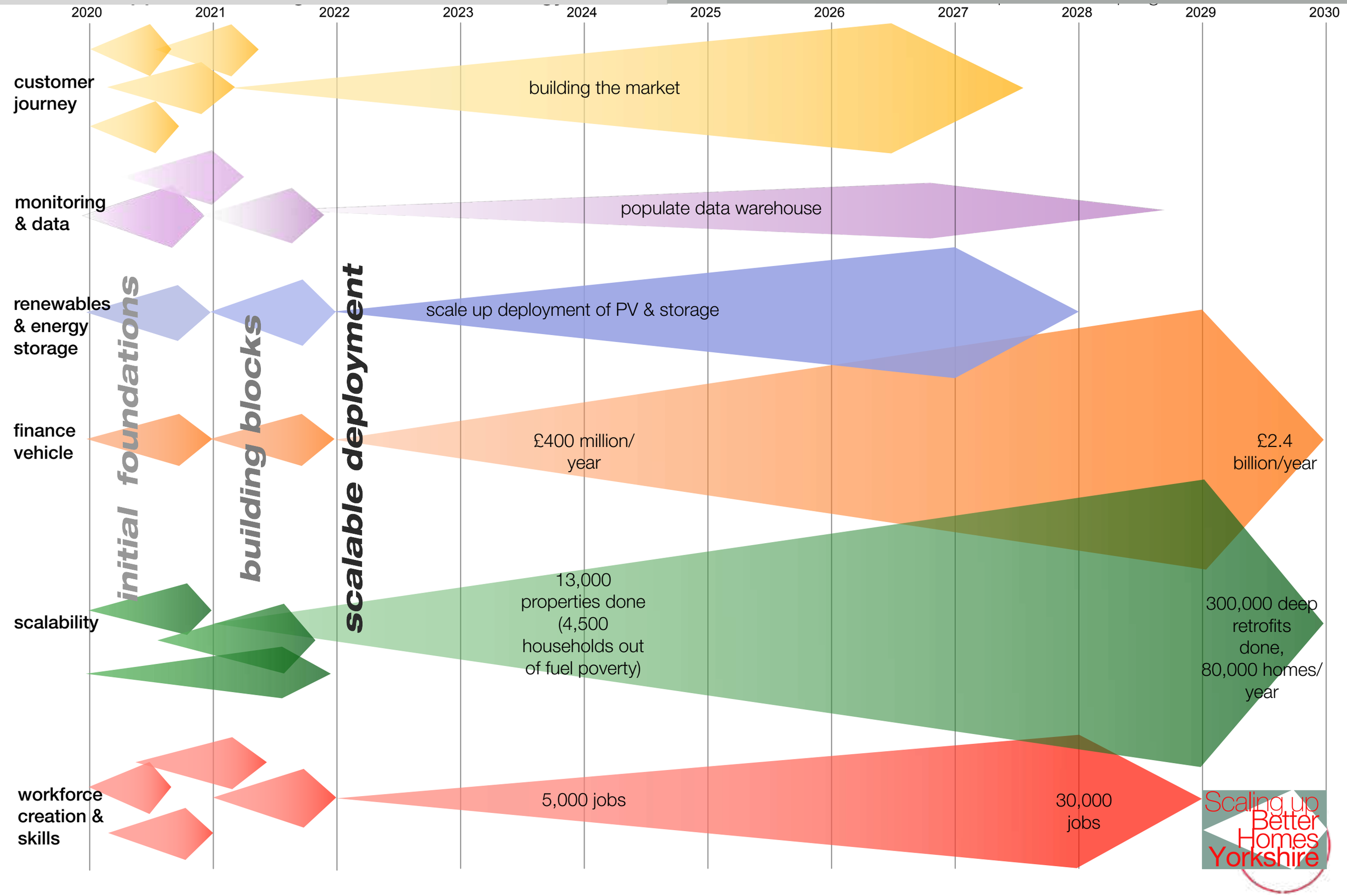
	skill level			room in roof	IWI		average
		hours (excl breaks)	7.5				
unskilled	i	£10.00	£75	7%	6%		7%
1/4 skills	ii	£13.33	£100	29%	29%		29%
1/2 skills	iii	£16.00	£120	46%	53%		50%
fully skilled	iv	£20.00	£150	18%	12%		15%

room in roof insulation

	task	skill level	% of task		
1	Strip previous ceiling, remove previous lighting	i	7%	2	7%
2	Install new rafters on plywood extension pieces beneath existing rafters to create 200mm insulation zone	iii	29%	8	29%
3	Cut and install 2 new layers of woodfibre insulation	ii	14%	4	14%
4	Install vapour control /airtightness layer	ii	7%	2	7%
5	Install plasterboard	iii	18%	5	18%
6	Apply skim coat of plaster	iv	11%	3	11%
7	lighting	iv	7%	2	7%
8	redecorate	ii	7%	2	7%
			100%	28	100%

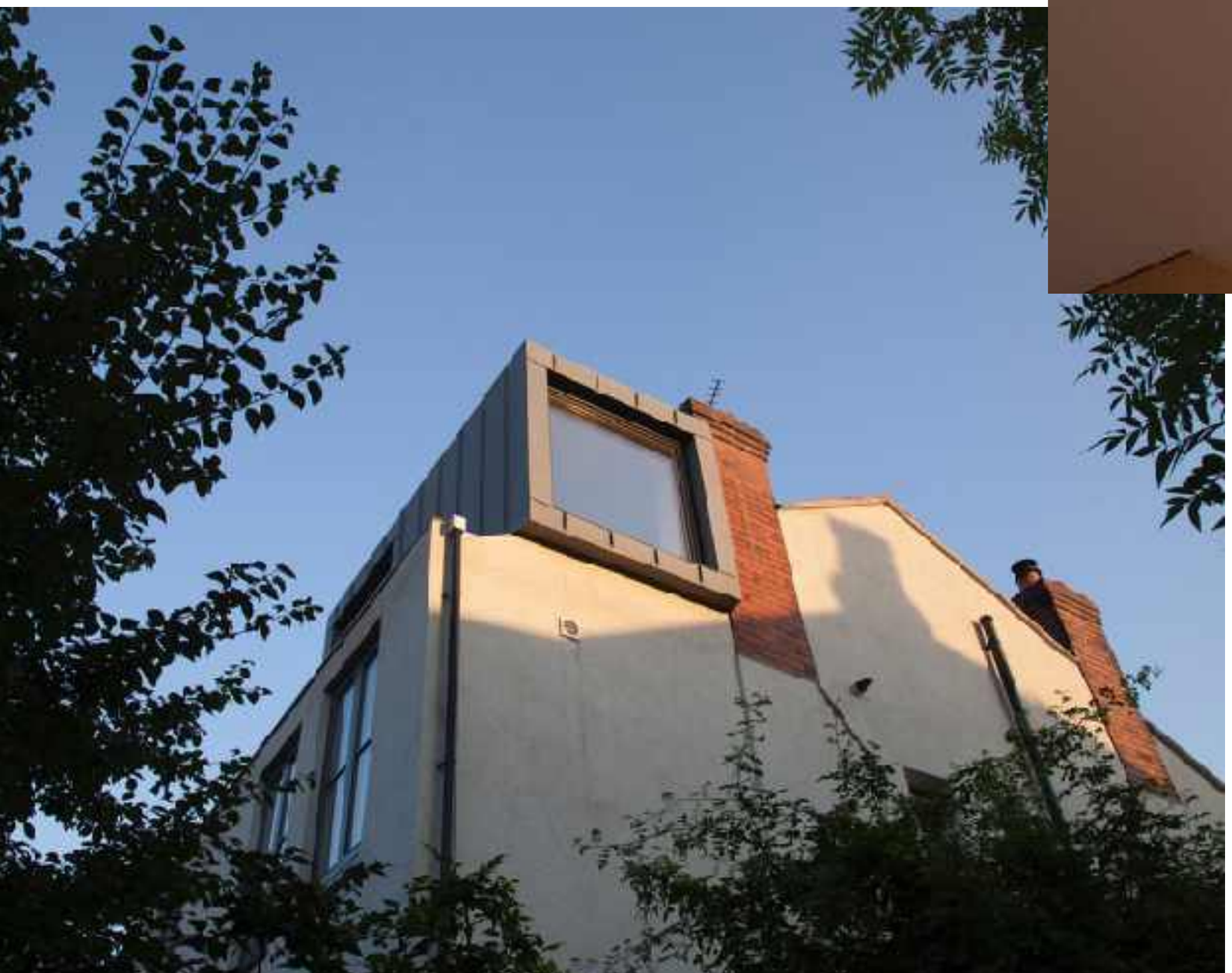
recommendations

a complete system approach



building retrofit

more than just energy efficiency



let's make the best use of the buildings we've got not building new poorly built ones in the wrong places

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more than housing

building retrofit

more than housing

not just housing

- an energy efficiency retrofit can be a trigger for making it look better too

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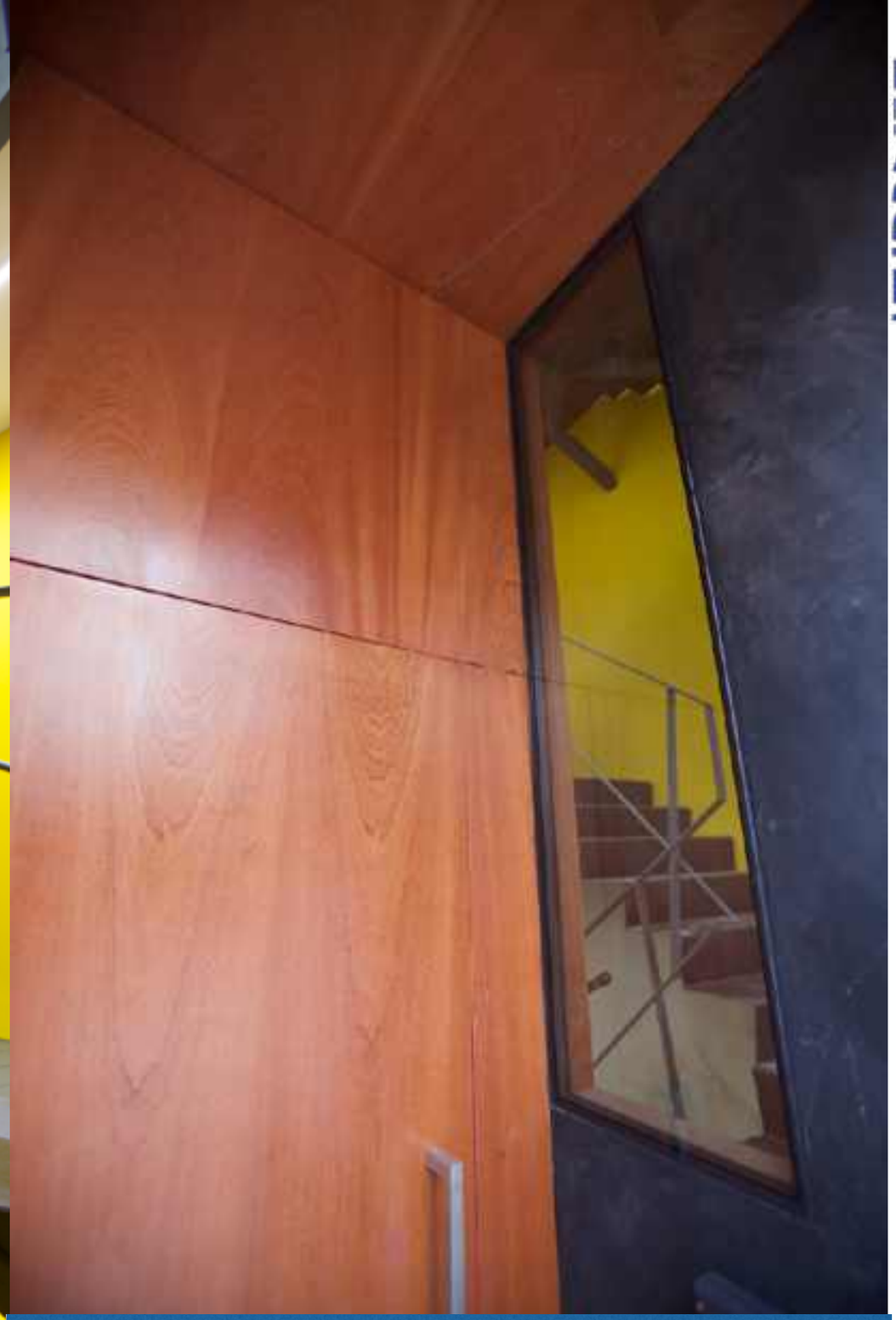


NORTH WEST
REGIONAL CONSTRUCTION
AWARDS ★
2017
FINALIST

MAD LAB

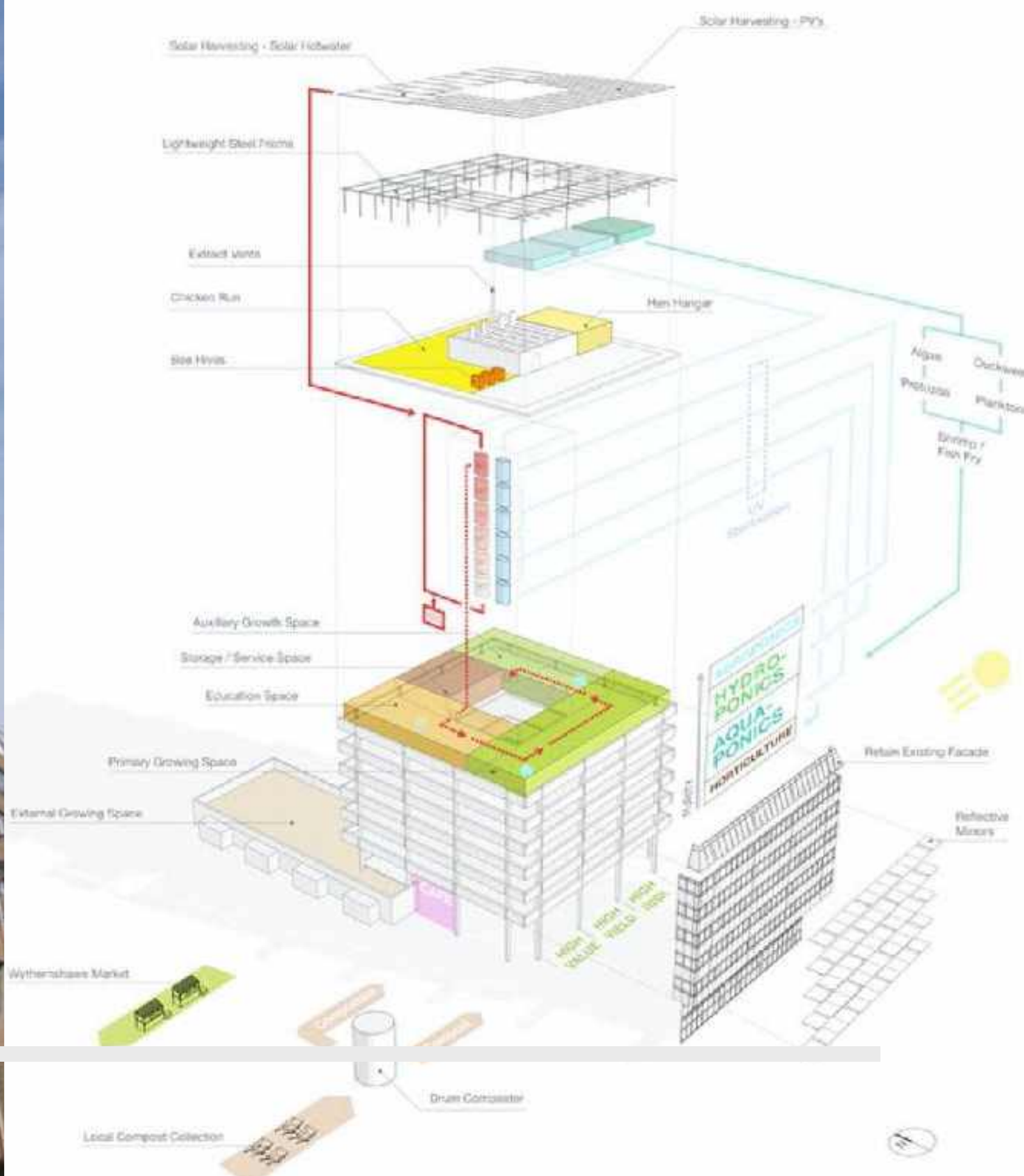
regenerated
& improved

red

not just housing

so any buildings that could be better used

red



we can do much more with left over buildings

a viable future?

imagine a future with:

- regenerated communities
- homes that don't make you ill
- no fuel poverty
- meaningful jobs with a future
- pensions + savings used for the benefit of our community |+ planet
- ....more chance of a future for our children not just an apology

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