CLIMATE JOBS

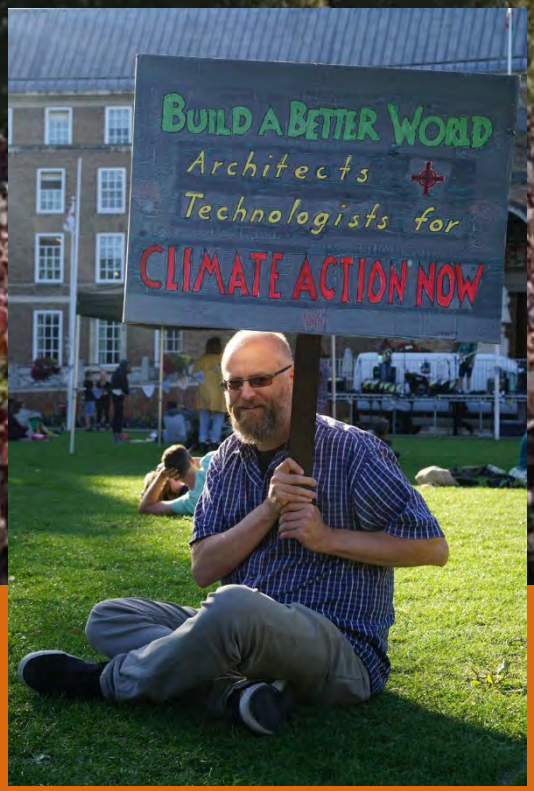
building a workforce for the climate emergency

BUILDINGS

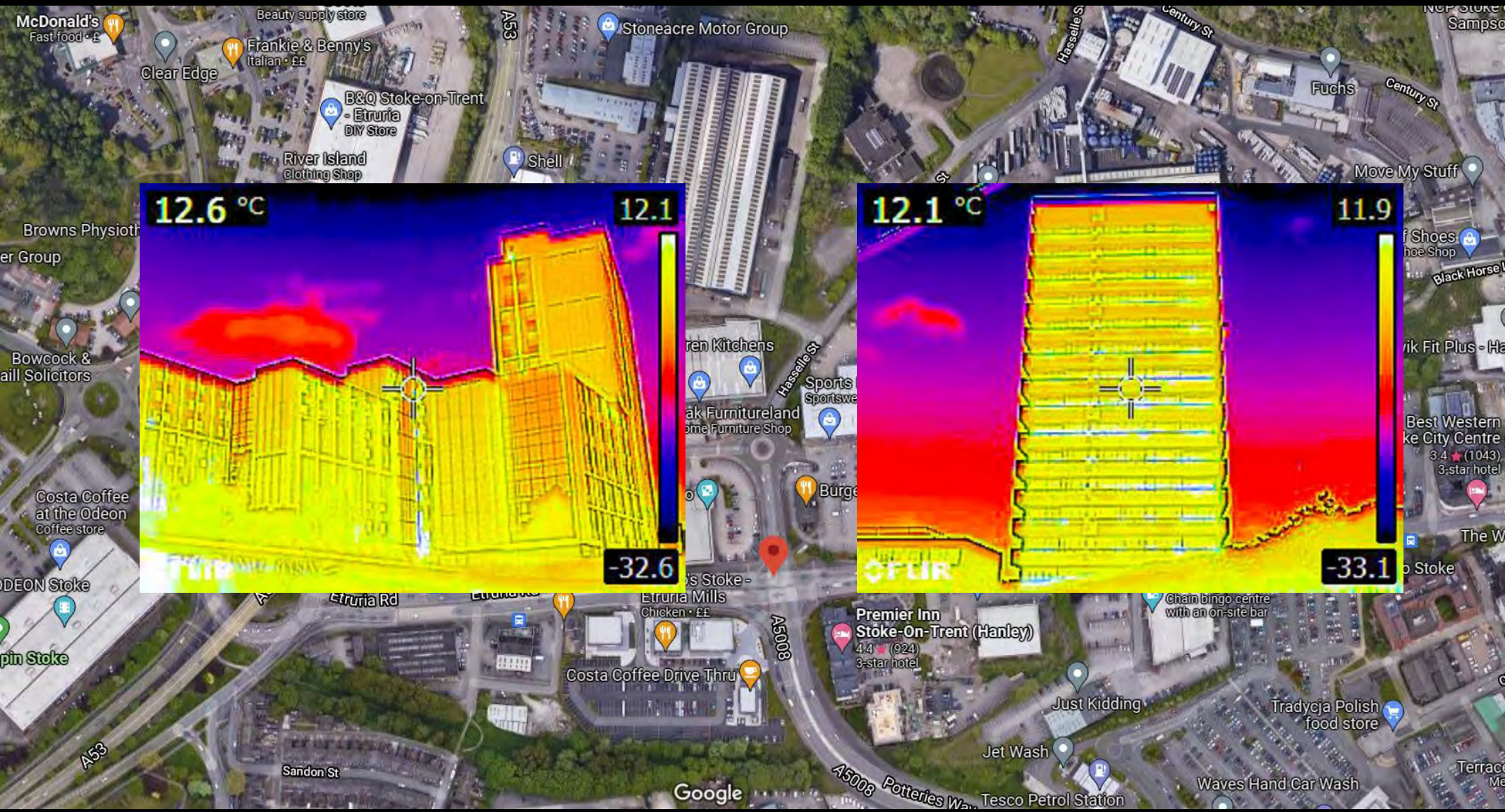
NUMBERS AND METHODS

wolfgang.kuchler@virgin.net

2019


BUILD A BETTER WORLD
Architects
Technologists for
CLIMATE ACTION NOW

BUILDINGS GENERALLY…

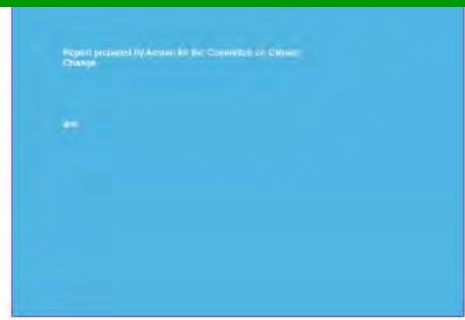


… but I am going to focus on

HOUSING

CLIMATE CHANGE COMMITTEE

Paul Watkiss Associates



10 July 20

Briefing not

Briefing not

climate syst

Read more

10 July 2019

10 July 2019

Updating an assessment of the costs and benefits of low-regret climate change adaptation options in the residential buildings sector

This report, by Wood, accompanies the CCC's UK housing: Fit for the future? report, published in February 2019.

It was commissioned by CCC's Adaptation Committee for the purpose of presenting updated cost curves for a range of building scale adaptation measures for the UK, updating previous workings developed by Davis Langdon (2011) as part of the "Research to identify potential low-regrets adaptation options to climate change in the residential buildings sector" project.

Topics

ADAPTATION | CARBON BUDGETS AND TARGETS

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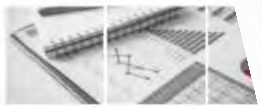

A report for the Committee

The costs and benefits of tighter

Committee on Climate Change

PROGRESSIVE REPORTS

NEW ECONOMICS FOUNDATION

BUILDING A GREEN STIMULUS FOR COVID-19

A RECOVERY PLAN FOR A GREENER, FAIRER FUTURE

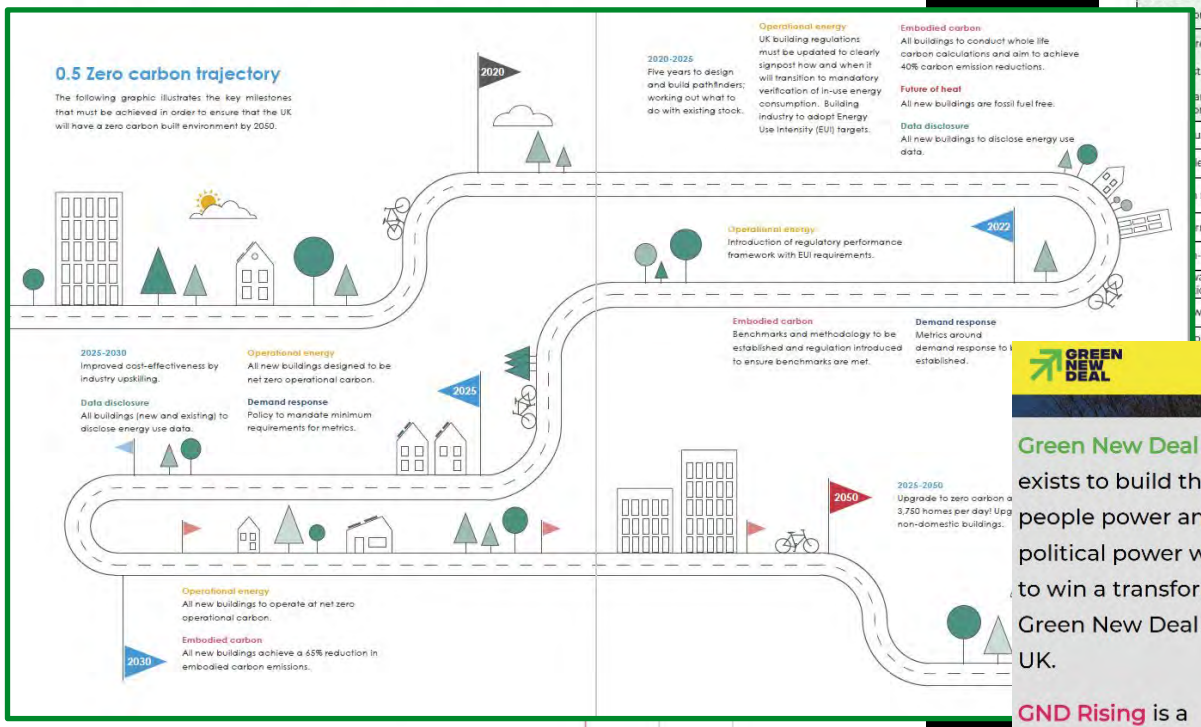

Table 3. Framework, analysis and selected projects for our illustrative green infrastructure project.

Project	Timeliness	Labour intensity	Narrowly or broadly targeted	Enabling potential	Total abatement ($MtCO_2e$)	Social distancing compatible
District heating networks	Fast	Strong	Broad	High Enabler	High	High
Reskilling & training	Fast	Strong	Broad	High Enabler	n/a	High
Evs and EV charging networks	Fast	Strong	Broad	Moderate Enabler	High	High
Tree planting & nature restoration	Fast	Strong	Broad	Moderate Enabler	Moderate	High
Broadband	Fast	Strong	Broad	Moderate Enabler	Low	Moderate
Home insulation	Fast	Strong	Broad	Low Enabler	High	High
Heat pumps	Fast	Strong	Broad	Low Enabler	High	Moderate
Cycling and walking infrastructure	Fast	Strong	Broad	Low Enabler	Low	High
Recycling initiatives	Fast	Strong	Broad	Low Enabler	Low	High
Smart meters	Fast	Strong	Broad	Low Enabler	Low	Moderate
Onshore wind	Fast	Strong	Moderate	Moderate Enabler	High	High
Solar projects	Fast	Strong	Moderate	Moderate Enabler	High	High
Flood and drought resilience	Fast	Strong	Moderate	Low Enabler	Low	High
Waste and manure management	Fast	Strong	Moderate	Low Enabler	Low	High
onservation	Fast	Strong	Moderate	Low Enabler	Low	High
reforestation	Fast	Strong	Narrow	Low Enabler	Low	High
tructure	Fast	Medium	Broad	Low Enabler	Low	High
ansmission & on infrastructure	Moderate	Strong	Broad	High Enabler	High	High
uses	Moderate	Medium	Broad	Low Enabler	Low	High
ectrification	Moderate	Medium	Broad	Low Enabler	Low	High
refuelling	Moderate	Strong	Narrow	Low Enabler	High	High
rmentation	Moderate	Strong	Narrow	Low Enabler	Low	High
-fuelled boiler	Moderate	Strong	Narrow	Low Enabler	High	High
water ion	Moderate	Strong	Narrow	Moderate Enabler	Low	High
wind	Slow	Strong	Narrow	Moderate Enabler	High	High
production/						

GREEN NEW DEAL

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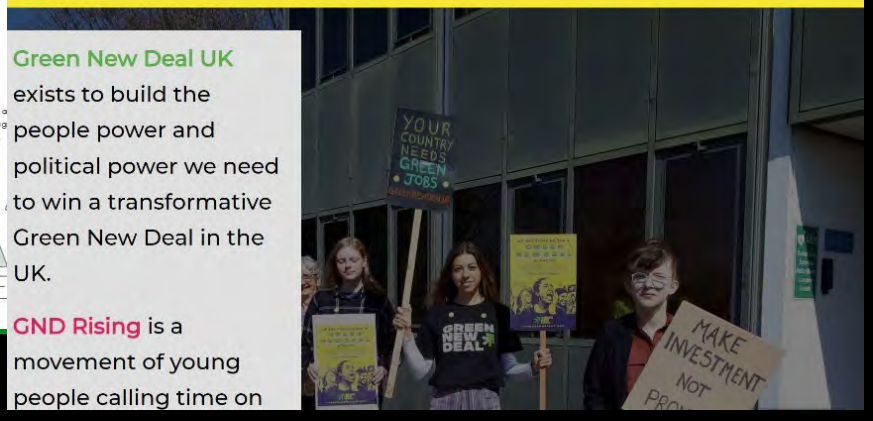


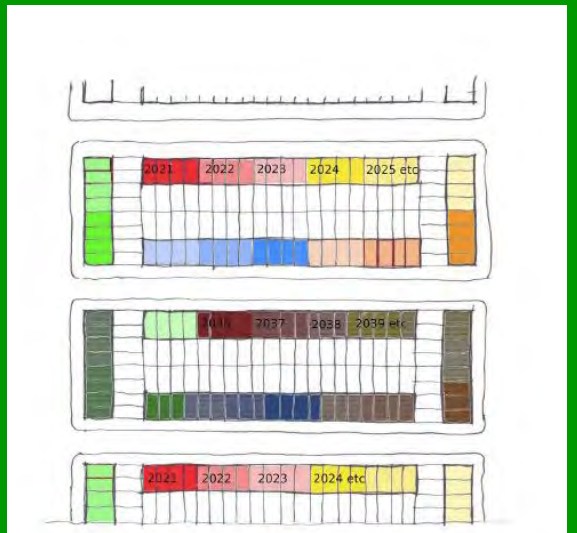
Green New Deal UK exists to build the people power and political power we need to win a transformative Green New Deal in the UK.

GND Rising is a movement of young people calling time on

SO HOW COULD IT BE DONE?

Green homes investment can benefit everyone in a post-Covid world

Adapting the UK's housing stock is crucial to tackling climate change, and the task can create jobs in an economy harmed by coronavirus. By using and sharing our city's expertise, Bristol can show the way forward.



EXAMPLE OF HOW TERRACES IN BS5 COULD BE REDEVELOPED IN PHASES WITH ONLY 3% APPROX BEING RENOVATED AT ANY ONE TIME, AND STILL FINISH CITYWIDE BY 2050

POST CORONA RETROFIT PROJECT - SOME EXAMPLE FIGURES

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	
																														30,000 homes
																														30,000 homes
																														30,000 homes
																														30,000 home
build phases, 15,000 homes in each (10% of total)																														30,000 homes
																														150,000 homes
S	P	E	N	D	@	1	5	9	0	0	ph																			£2.4 billion
																														5000 jobs (1)
																														£1.48 billion benefits saving (2)
																														£33m a year cost
																														£132 a year (3)

15/01/21

CLIMATE RETROFIT JOBS – SCALING UP THE NUMBERS

A CALENDAR YEAR	B PROG YEAR	C NUMBER OF TRAINERS	D NUMBER OF TRAINED WORKERS	E NUMBER OF WORKERS AVAILABLE OVERALL	H NUMBER OF HOMES GIVEN ENERPHIT OR AECB LEVEL RETROFIT	I NUMBER OF HOMES GIVEN WORKS TO GET EPC [C+] WITH UPGRADE LATER	J NUMBER OF NEW JOBS IN CONSTRUCTION ON SITE (each yr)	K NUMBER OF NEW JOBS IN SUPPLY CHAIN (0.8)	L
2021	0								
2022	1	1000	500	2000	500	7000	1500	1200	
2023	2	1200	24000	96000	24000	336000	94000	75200	
2024	3	1440	52800	211200	52800	739200	115200	92160	
2025	4	1730	87400	349600	87400	1223600	138400	110720	
2026	5	2080	129000	516000	129000	1806000	166400	133120	
2027	6	2500	179000	716000	179000	2506000	200000	160000	
2028	7	3000	239000	956000	239000	3346000	240000	192000	
2029	8	3600	311000	1244000	311000	4354000	288000	230400	
2030	9	4320	397400	1589600	397400	5563600	345600	276480	
2031	10	5200	501400	2005600	501400	7019600	416000	332800	
2032	11								
2033	12								
2034	13								
2035	14								
TOTALS		**5200**	**501400**	**2005600**	**1921500**	**26901000**	**2005100**	**1604080**	

TOTAL JOBS **3609180**

Please see separate notes on assumptions & methodology for each column WK/CCC 210115

(360000 average a year)

HOW DO YOU COUNT – AND FILL – JOBS?

APPENDIX 2 - WHERE WILL THE WORKERS COME FROM?

The numbers involved look large. However, after much discussion and circulation for comment, I think they are realistic.

In terms of what is needed: we have less time to do more
inherited reality.

And in terms of workers who will be available, who will n

EXISTING RETROFIT BUILDERS

There are an estimated 160,000 workers currently workin
of buildings. Our premise is that these workers can becor
need the training, or the "leadership" of trained workers.
acknowledged in construction, it's also corroborated by t
Grant, in massive part because of the shortage of certifie

EXISTING OTHER BUILDERS

Beyond these are the remaining 2 million plus building w
projects including large-scale roadbuilding, HS2, speculat
developments in selective market hotspots, and out-of-tc
scenario these sectors will decline, and workers will beco

OTHER WORKERS LOSING JOBS

But the central premise of the NCS is that it will allow red
redundant in industries affected by decarbonisation.

It's important that we all recognise the level of change th
then to create a stable and fair world economy which car
over the following decades/centuries, will mean more th
require a significant shift in the way that we do things: co
repairable and shareable; homes will need to include mo
amenities that make that work; work-related transport w
leisure will need to become the norm. More people will t
tending the landscape, repairing things - less people will
products from oil-plastic or high carbon materials, and fa
fighting over market share etc.

So not only would we expect sectors like fossil fuel extrac
to decline, there will be - needs to be - a decline in othe
Climate Jobs pamphlet overall is based on finding roles fo
need not fear an absolute shortage of workers, even thou
to other new sectors like renewable energy, sustainable a

APPENDIX 1 - HOW DO YOU CALCULATE JOBS? A COMPARISON

The commonest way we have seen this done is in "new jobs-for-a-year per £million spent" (or job-years per £million)

So for example Forbes, El-Haram et al 2012 paper "Forecasting the number of jobs c
construction" examines a number of studies, including the use of the Labour Foreca
developed for the Construction Industry Training Board. It concludes that while a fig
per £million had been used (for example by Scottish Enterprise) based on an indust
looking at outcomes down the line a figure of 8.5 jobs per £million was more realist

The NEF Green Stimulus paper which informs our own argument above, includes fig
generate about 9 jobs per £million:

9 million homes done in 4 years by average of 295,000 workers = 7.5 homes per wo

If the average cost of the energy measures is £15,000 (based on limited measures t
C, then that means each worker "costs" (or installs/creates) 7.5 x £15k = £112.5k ea

In which case £1million gives you just under 9 "job-years"

We have chosen to reduce the "productivity" slightly above (to 7 homes per worker
the more labour-intensive package of work that we would propose. This gives us 9.5
£million.

Another way is knowledge of how long it takes to do a particular job. This is only po
nature of the work is broadly consistent and builders and practitioners can use their
gauge output. Thus for "deep" retrofit, where a house may be taken apart and put b
have consistent figures suggesting the optimum approach is a team of 4 doing an av
home every 6 months. I have had this approximate figure from Scots retrofit archite
(speaking at the PassivHaus conference 2020), John Palmer LETI member and Passiv
research & policy director, and Malcolm McMahon at the Green Register.

That means one worker can complete on average 0.5 retrofit homes. The figure refl
labour intensity of the task, and the difficulty of "rushing" it. With these retrofits ha
in at around £75,000 a property over the last decade, that gives a "cost" of £37,500
year, or 27 job years per £million.

We have chosen to reduce the average spend to £50,000 per home - we believe this
effective whole-house intervention, once we have the process running efficiently - v
of £25,000 per job-year if the time taken remains the same (this would also mean th
would need to be extra subsidised, at least initially). These figures give 40 job years

The figures for deep retrofit illustrate why we have chosen to limit the number of th
initially. The figures for the lighter package of measures are however consistent with
modelling.

CLIMATE JOBS - BUILDINGS - NUMBERS & PROGRAM NOTES

WK update 210308

To be read with: spreadsheet of jobs, NEF Green Stimulus report July 2020 (Donal Brown Hanna Wheatley et al), and WK notes on that report 201208

CONTENTS:

1. SUMMARY
2. NOTES ON ASSUMPTIONS & METHODOLOGY
3. FROM 2030 ON
4. OTHER ADVANTAGES OF HYBRID APPROACH & CONCLUSION
APPENDIX 1 - HOW DO YOU CALCULATE JOBS?
APPENDIX 2 - WHERE WILL THE WORKERS COME FROM?

1. SUMMARY

The spreadsheet accompanying this (and pasted in as fig 1 below) shows:

- a realistic training and recruitment scenario (including new job numbers)
- based on using half the available workforce on AECB building standard target level "deep" retrofit
- with the other half implementing selected measures on a larger number of homes (based loosely on the "shopping basket" of measures in the NEF report) to reach min EPC (C) level
- both modelled to complete in a 10 year implementation programme

The deep retrofit scenario alone could only do 3.8 million homes in that period
The NEF-based scenario could treat all 29m homes in the UK by late 2028

A hybrid scenario, where half the newly trained workforce works on the basket of EPC works and the other half does deep retrofit, would be perfect, and give us over 2 million new site jobs on homes alone by 2030, which could continue till 2050.

Using the NEF assumptions as they stand that would allow by 2030:

1.9m deep retrofits
28.8m EPC works ie more than needed*

and then the entire workforce can move on to upgrading the EPC (C) stock to the higher level, over the following years (1.2m deep retrofits a year from 2031 would achieve 26m total properties at enerPHit or close levels by 2050 ie 90% of existing homes)

**The EPC basket of works is skewed towards heat pumps and PV - I propose to "rebalance" it by adding more insulation draughtproofing and window works which will reduce the numbers achieved each year slightly - see below.*

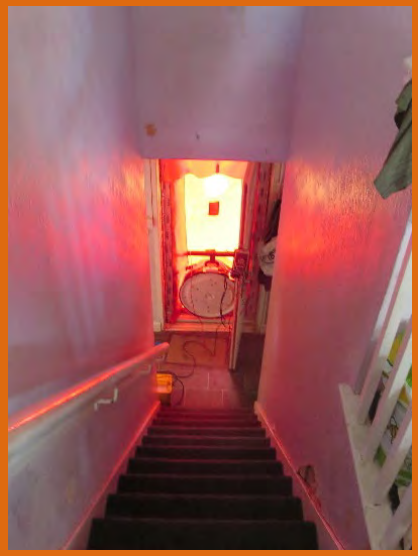
- hundreds of documents
- hundreds of emails
- lots of debate
- some facts changing all the time
- some solutions maybe becoming out of date
- other arguments may no longer hold
- all done in people's spare time

reviewed and advised by:
AECB Green Register PHT members
local councillors
architects and builders
council maintenance manager
energy co-op members
academics
and others...

... and data continues to change

ON SITE *(photos from URBEd – please contact wolfgang.kuchler@virgin.net if you want to reproduce them anywhere public)*

ON SITE *(photos from URBED as note on previous slide)*



WHY WOULD I TRAIN TO RETROFIT?

Skilling a workforce for the climate emergency

There is a skills crisis. Like the rest of the public sector, further education, which could play such a significant role in teaching and delivering the skills needed for a transition, has been decimated by funding cuts and failed policy initiatives.

The problem lies in the approach of successive governments which is dominated by market-led thinking. The government's Skills for Jobs White Paper, published in January 2021, contained only one sentence on the green economy. This, in the same year as the UK government hosted the COP26 climate talks. The plans prioritise yet again narrow business interests over the demands of students for an education which equips them for the future, in skills and training for the work that could deliver solutions to the escalating climate emergency.

Every job requires green skills. There are jobs in "climate critical" sectors such as energy, transport, retrofitting homes and workplaces, nature conservation and an expansion in agro-ecological approaches to agriculture. To deliver the work and build the type of workforce outlined in this

report will
investment
skills.

Young w
who want t
able to acce
training in t
Cost and availability of suc
courses must not be an
obstacle to training this
workforce.

Further Education (FE) colleges and universities are key to imparting the knowledge and skills required by young people and the existing workforce for a transition to a green economy and coordinating work-based training provision.

An expansion of vocational education and training should not only train young people but

involvement of yo
teachers and lect
their communitie

Vocational edu
training is a vital p
response to the c
This requires a hu
in public funding
sector to enable t
happen, reflectin
role education, tra
skills have to play
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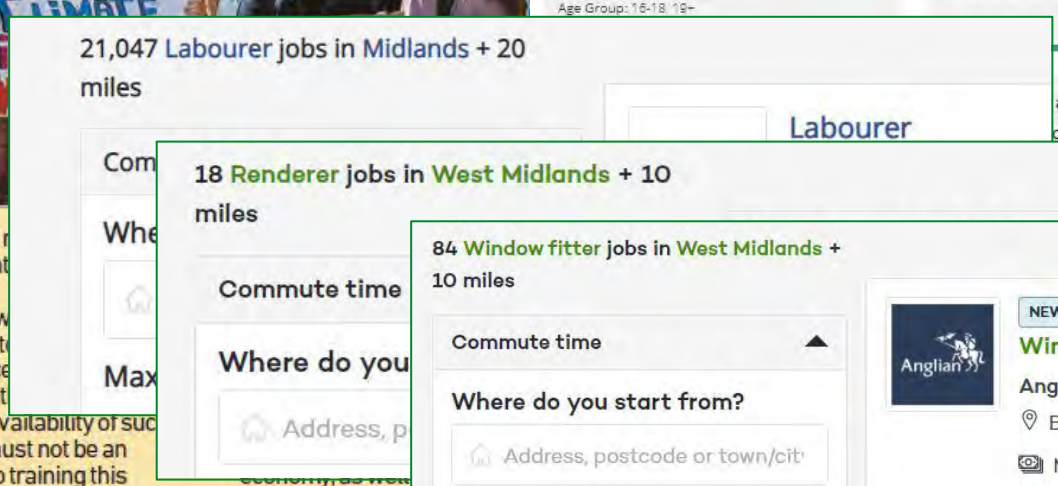

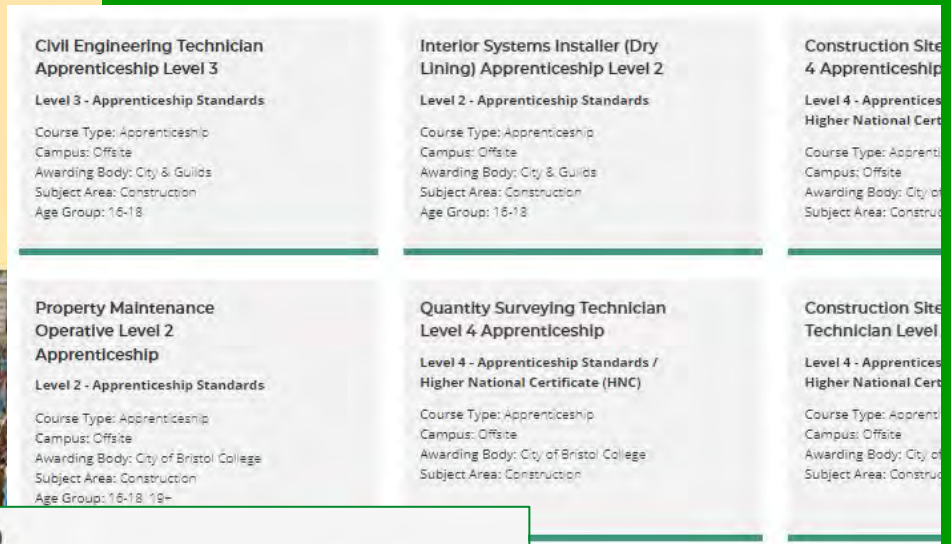

QUESTIONS WE ARE ADDRESSING

- massive skills shortage – how can you plan to retrofit millions of buildings without the workforce?
- how can workers in aviation and other sectors best use their skills, and keep decent jobs?
- massive cuts to local authorities – how can you coordinate a national plan?
- what is the best way to spend time and money when we are up against the climate clock?
- how realistic is mass retrofit? will people want to be involved?
- how do you upgrade homes in a fair way, given different incomes and tenures?

ACTION

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looking after the
old
the young
and the sick
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clean transport
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baking bread