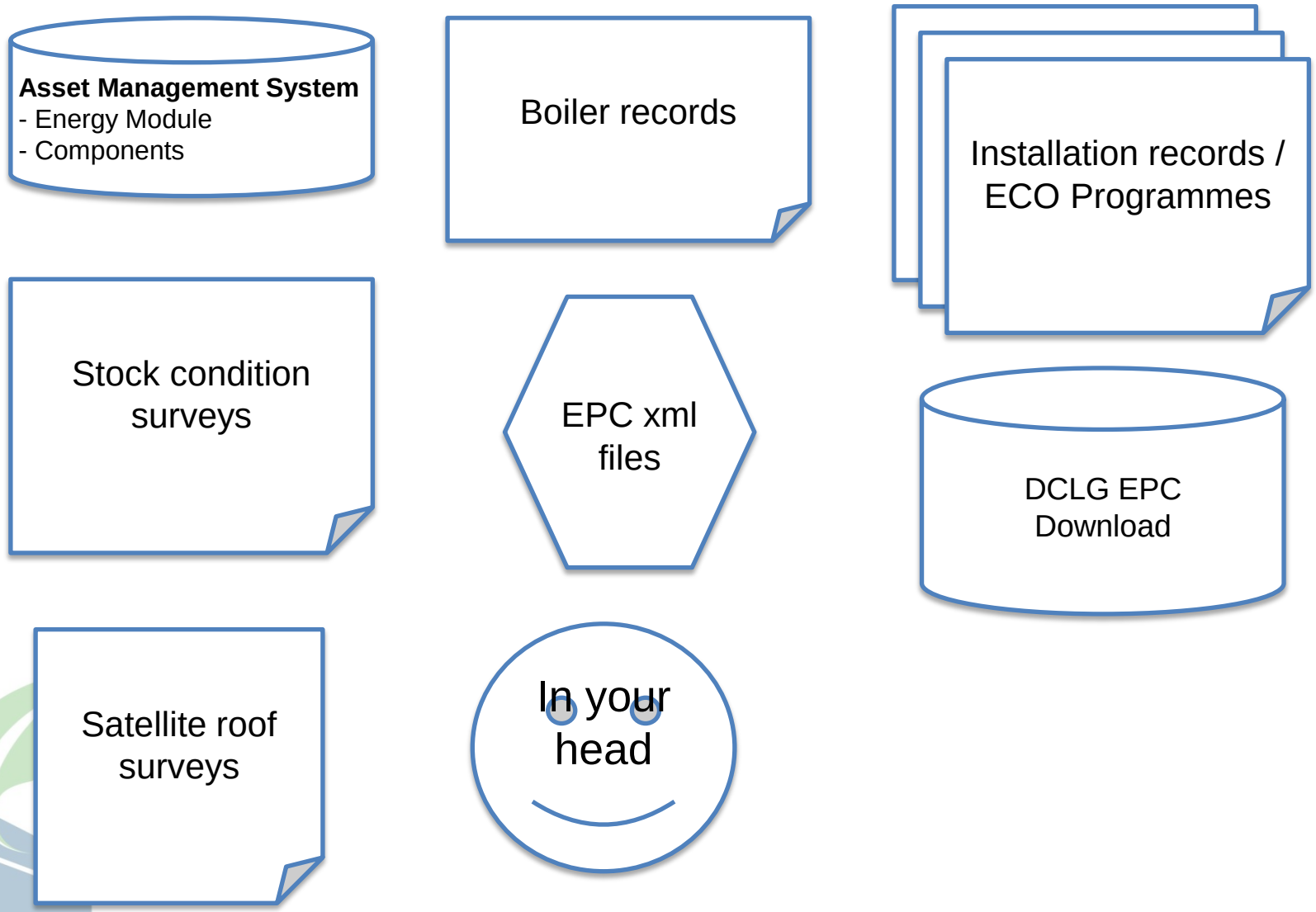
How to develop a (cost) effective energy efficiency strategy

Barriers

- Lack of strong board/executive level support
- Traditional asset management resistance
- Nay-sayers
- Staff turnover and stretch
- Contractor/subbie issues
- Historic bad news stories
- Funding changes / chasing funding
- Inexperience
- Cost
- Strategy

1. Data collation
2. Data improvement
3. Baselining
4. Corporate targets
5. Scenario analysis 1
6. Current programme scope
7. Acceptable changes – procurement etc
8. Scenario analysis 2
9. Tracking progress

1. Data Collection



2. Data Improvement

Stock condition surveys

Traditionally it has been a % of stock each year

Move to multi pronged approach:

- targeted stock condition surveys
- worst performing properties – SAP/Fuel bill/CO_2
- properties with lowest confidence scores
- properties with highest expected expenditure – more later

Collect data to inform retrofit programmes

- access
- potential placement of plant
- roof orientation, slope, size, shading

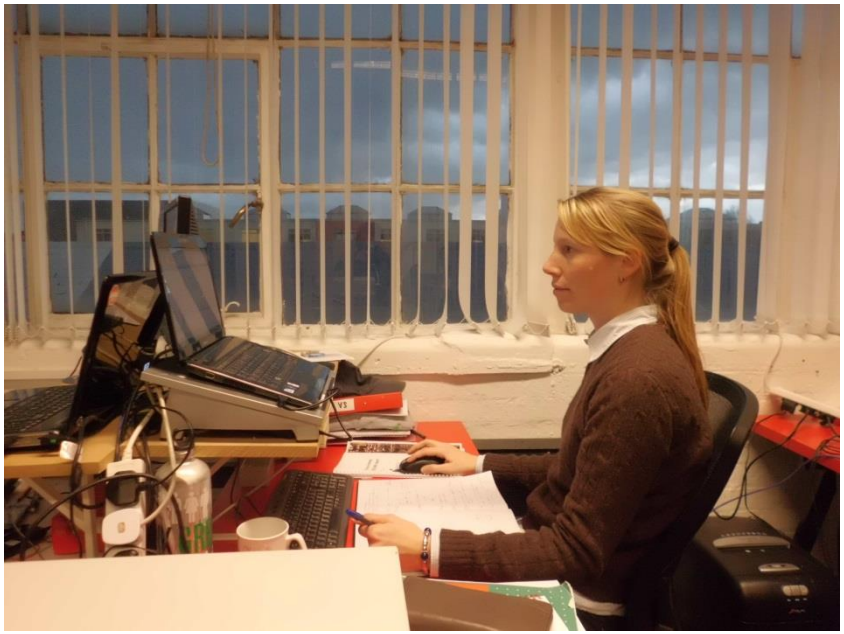
2. Data Improvement

Enhanced annual gas safety check

- heating controls
- cylinder information

- Space for Flue Gas Heat Recovery units
- Heat pump options

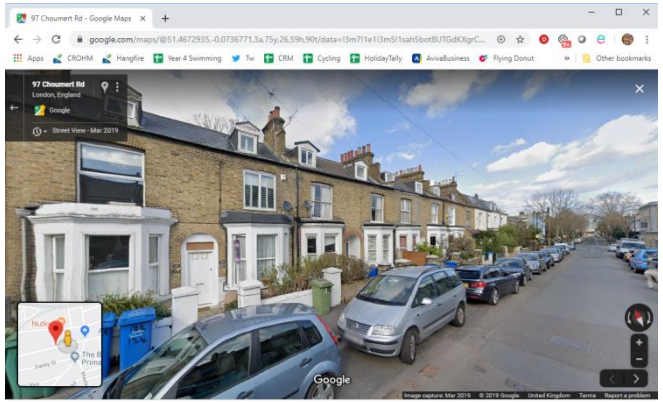
- Flat location
- Property attachment
- Roof orientation



2. Data Improvement

Targeted element surveys

- Unknown wall constructions
- Flat locations
- Google streetview



Just in time data improvement

- Appreciate that data will never be perfect
- Where area/estate works are be undertaken, build in time for surveys

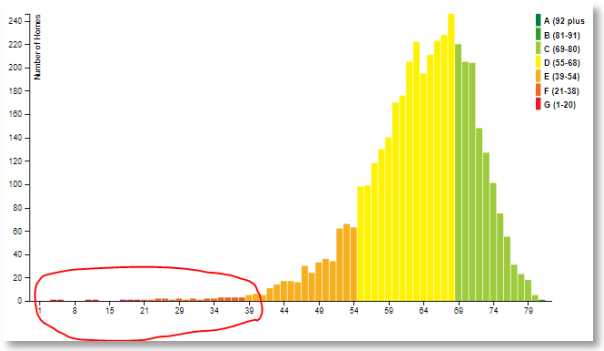
3. Baselining

Having a deeper understanding of your stock will allow your organisation to grabble with the scale of the challenge and make it tangible.

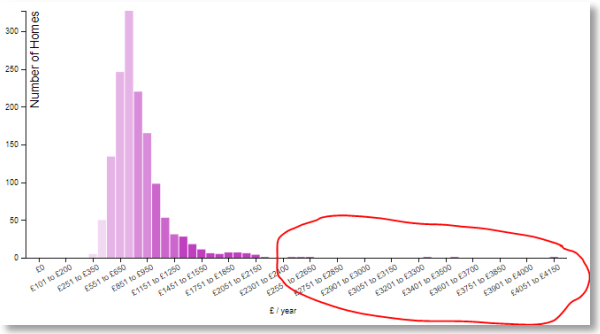
It has long been the case that executive level have been able to either set targets with the unspoken knowledge of all that they won’t be achieved, or set them so unambitious with a sweep of the hand about it all being too expensive.

3. Baselining

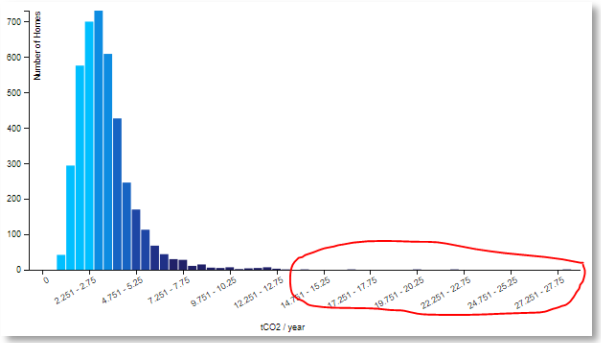
Low SAP



High bills



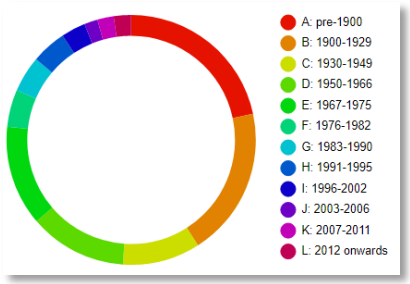
High CO_2

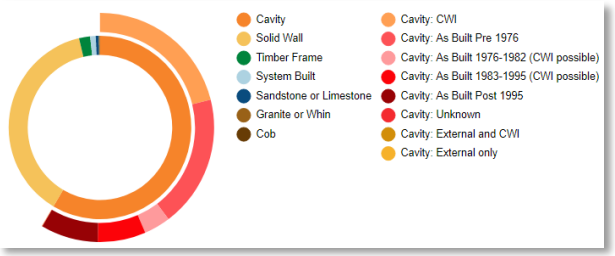


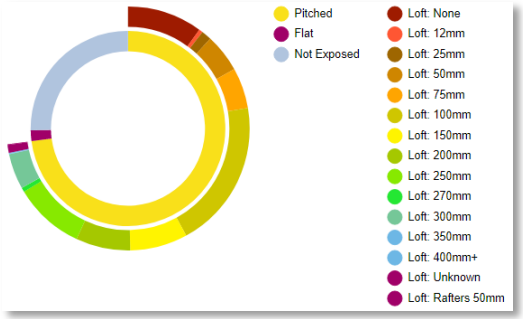
3. Baselining

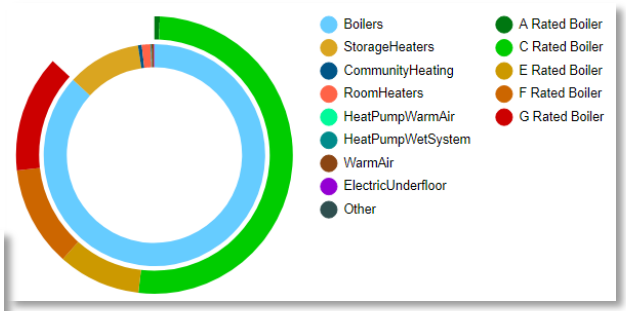
Outlier archetypes

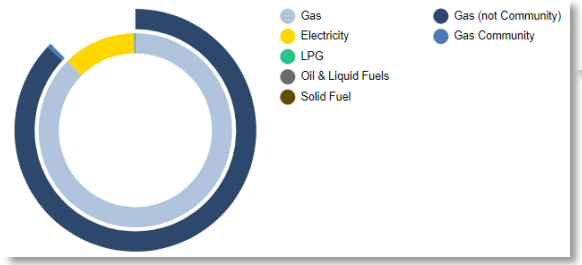
- Age
- Wall types
- Roof insulation
- Heating systems
- Fuels







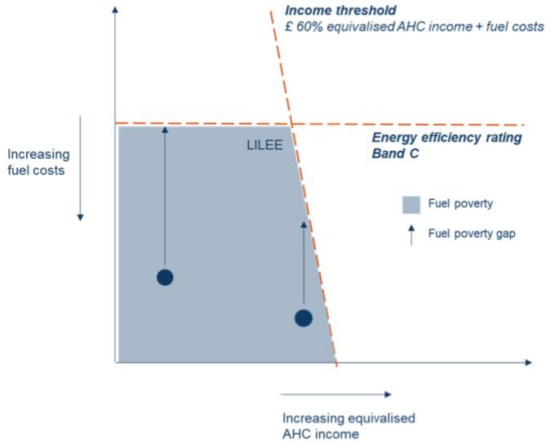




4. Corporate Targets

Fuel poverty

- usually find that social housing has low incidences of fuel poverty as few of the worst performing properties, often due to size.

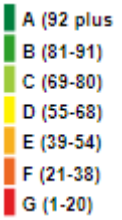


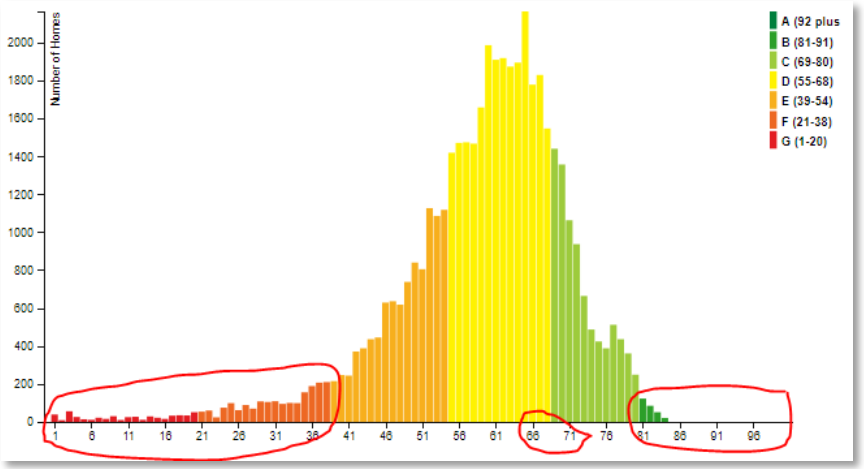
- Conflict with CO_2 targets

4. Corporate Targets

SAP target

- End goal
- Interim targets
- Usually a multi pronged approach e.g.
  - target very worst properties now
  - intermediate stretch target for some work programmes
  - ambitious targets for cyclical and voids

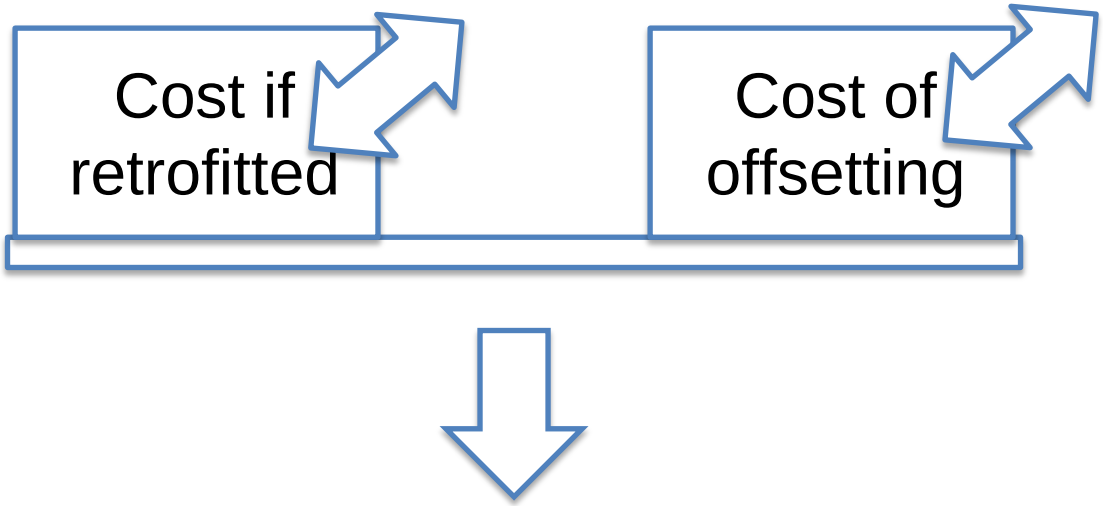




4. Corporate Targets

Zero Carbon

- Can be in conflict with SAP targets, but not usually
- changing CO_2 content of fuels over time
- balance of diminishing returns vs offsetting



4. Corporate Targets

Key decisions:

Gas boilers vs Heat pumps (air and shared loop)

Suddenly lots of talk about this!

Practicalities

Space, Conservation areas, Flats….

Supply chains

Cost

Improving COPs

Decarbonisation of electric grid

4. Corporate Targets

Key decisions:

- Community heating

  By 2050 CCC estimate that around 18% of UK heat from heat networks

Large disruption
In use efficiencies
Overheating

Lower maintenance costs
Low CO_2 depending on source – biomass, waste heat

5. Scenario Analysis : Strawman

Building Blocks:

- Target (SAP/CO_2)
- Measures to include / exclude
- [excluded properties]
- [budgets]

e.g. SAP 81, excluding FGHR, WWHR, Community, PV
e.g. Zero CO_2, excluding gas boilers
e.g. Current programmes

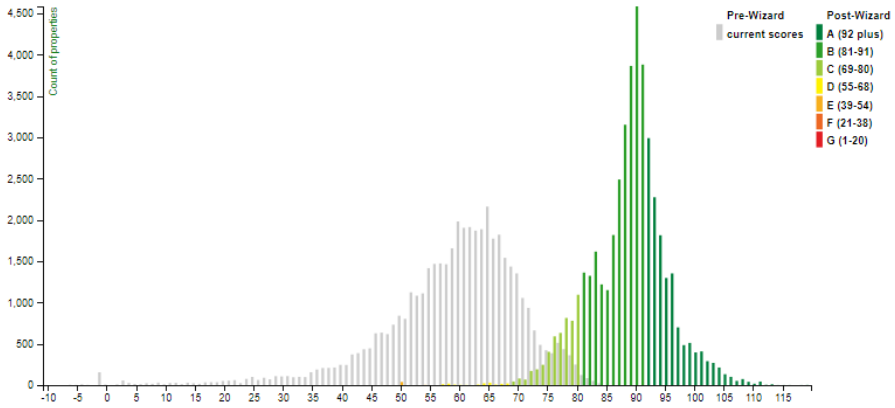
5. Scenario Analysis : Strawman

Total Wizard Cost: £902,645,350

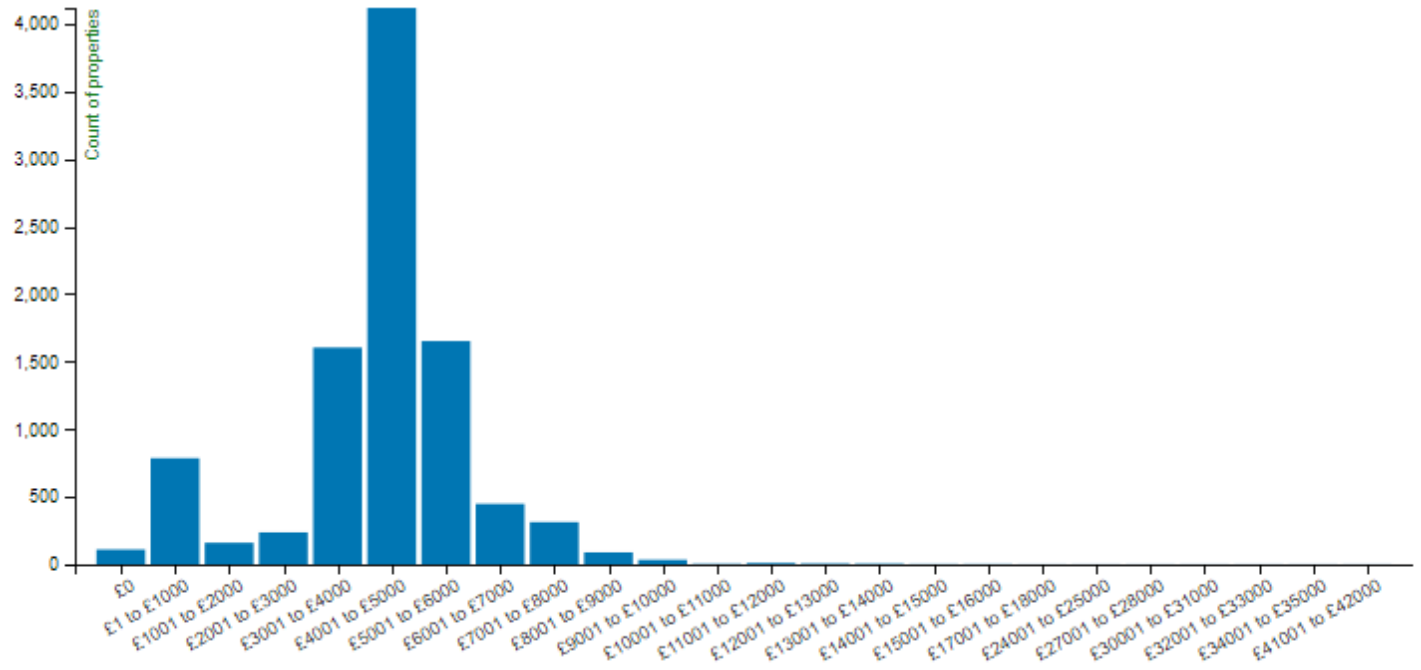
Cost per Home Affected: £19,966

Homes Missing Target: 45208

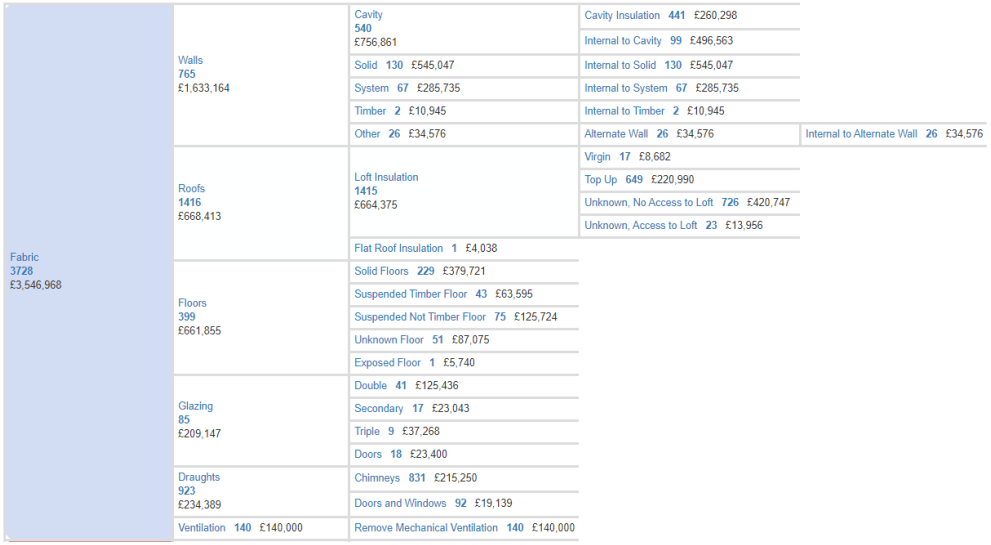
	Homes Affected	Homes Considered	Complete Stock
Homes	45208	45208	45208
Mean SAP	88.56 B (+29.37)	88.56 B (+29.37)	88.56 B (+29.37)
Mean EI	87.34 B (+33.72)	87.34 B (+33.72)	87.34 B (+33.72)
Mean Fuel Bill	£181.19 (-725.36)	£181.19 (-725.36)	£181.19 (-725.36)
Mean tCO_2	0.942 (-3.77)	0.942 (-3.770)	0.942 (-3.770)
Mean Heating Bill	£448.44 (-381.44)	£448.44 (-381.44)	£448.44 (-381.44)
Mean TThreshold	18.72°C (minimal) (+0.11)	18.72°C (minimal) (+0.11)	18.72°C (minimal) (+0.11)



5. Scenario Analysis : Strawman



5. Scenario Analysis : Strawman



6. Current programmes scope

Annual boiler maintenance

Voids

External decorations

Reactive repairs

Measures specific programmes

7. Acceptable changes – procurement etc

Annual boiler maintenance
- Data improvement

Voids
- Internal wall insulation

External decorations
- External wall insulation
- PV
- Air source heat pumps

Reactive repairs
- Light bulbs, data improvement

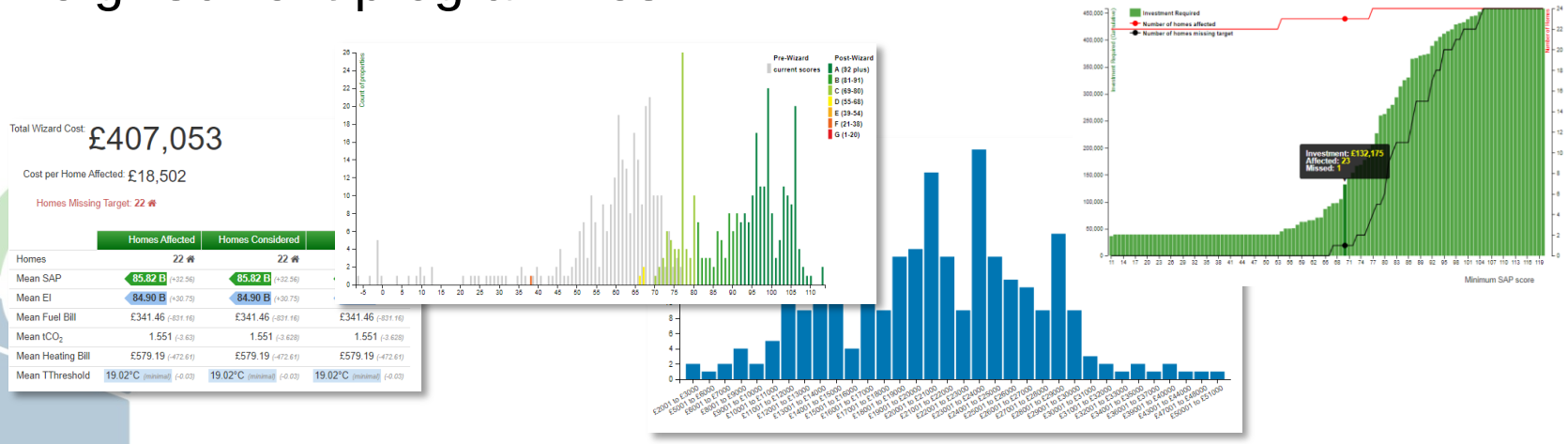
Measures specific programmes
- PV, ASHP

8. Scenario Analysis : Iterations

Building Blocks:

- Target (SAP/CO_2)
- Measures to include / exclude
- [excluded properties]
- [budgets]

e.g. SAP 81, excluding FGHR, WWHR, Community, PV
e.g. Zero CO2, excluding gas boilers
e.g. Current programmes

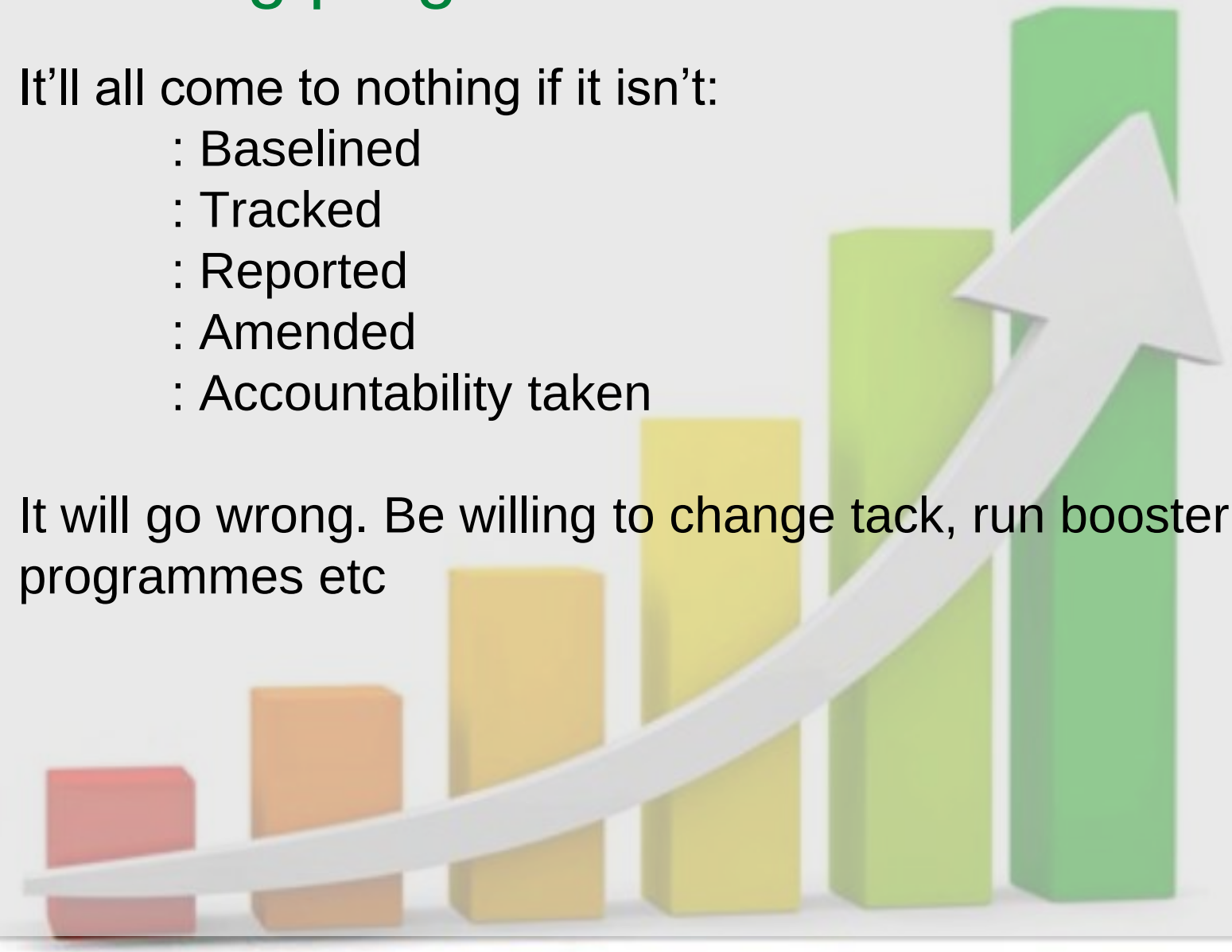


9. Tracking progress and Feedback

It'll all come to nothing if it isn't:

: Baselined
: Tracked
: Reported
: Amended
: Accountability taken

It will go wrong. Be willing to change tack, run booster programmes etc



End Goal:
Property by Property Routes

For each and every property, through the above process determine its route to [target] and stick with it

e.g.

54 Acadia Avenue

Route 1 (Estate Regeneration) + Route 3 (Basic Void)

23 Friern Road

Route 2 (PV Programme) + Route 4 (Cyclical 2021) + Route 3 (Basic Void)

7 Tower View

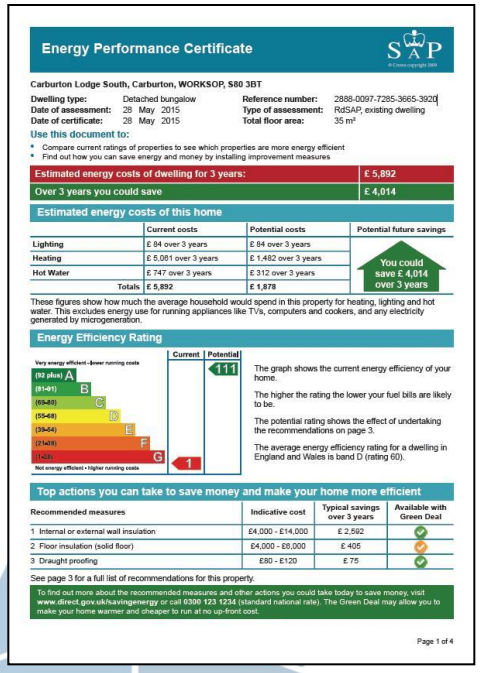
Route 3 (Deep Void) + Route 5 (EWI programme)

41 Old Road

Route 6 (General Maintenance) + Disposal

What is an EPC?

- a 4 page document describing a home's energy performance



Energy Performance Certificate

SAP

Carburton Lodge South, Carburton, WORKSOP, S80 3BT

Dwelling type:	Detached bungalow	**Reference number:**	2888-0097-7285-3665-3920
Date of assessment:	28 May 2015	**Type of assessment:**	RdSAP, existing dwelling
Date of certificate:	28 May 2015	**Total floor area:**	35 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy and money by installing improvement measures

Estimated energy costs of dwelling for 3 years:	£ 5,892
Over 3 years you could save	£ 4,014

Estimated energy costs of this home

	Current costs	Potential costs	Potential future savings
Lighting	£ 84 over 3 years	£ 84 over 3 years	You could save £ 4,014 over 3 years
Heating	£ 5,081 over 3 years	£ 1,482 over 3 years	
Hot Water	£ 747 over 3 years	£ 312 over 3 years	
Totals	£ 5,892	£ 1,878	

These figures show how much the average household would spend in this property for heating, lighting and hot water. This excludes energy use for running appliances like TVs, computers and cookers, and any electricity generated by microgeneration.

Energy Efficiency Rating

The graph shows the current energy efficiency of your home.

The higher the rating the lower your fuel bills are likely to be.

The potential rating shows the effect of undertaking the recommendations on page 3.

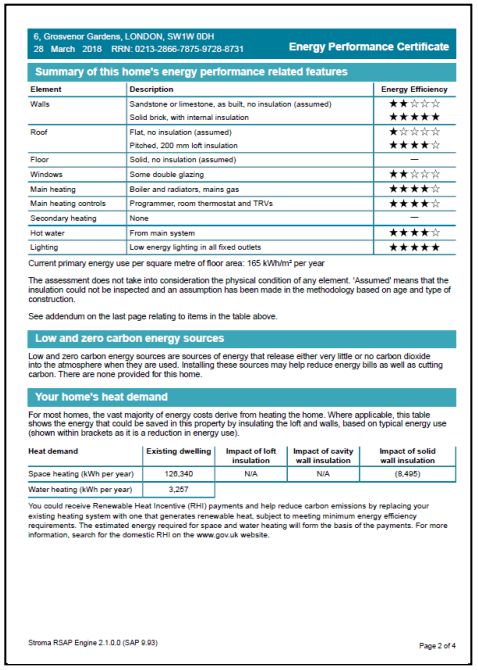
The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

Top actions you can take to save money and make your home more efficient

Recommended measures	Indicative cost	Typical savings over 3 years	Available with Green Deal
1 Internal or external wall insulation	£4,000 - £14,000	£ 2,592	✓
2 Floor insulation (solid floor)	£4,000 - £6,000	£ 405	✓
3 Draught proofing	£80 - £120	£ 75	✓

See page 3 for a full list of recommendations for this property.

To find out more about the recommended measures and other actions you could take today to save money, visit www.direct.gov.uk/savingenergy or call 0300 123 1234 (standard national rate). The Green Deal may allow you to make your home warmer and cheaper to run at no up-front cost.



Summary of this home's energy performance related features

Element	Description	Energy Efficiency
Walls	Sandstone or limestone, as built, no insulation (assumed)	★★☆☆☆
	Solid brick, with internal insulation	★★★★★
Roof	Flat, no insulation (assumed)	★☆☆☆☆
	Pitched, 200 mm loft insulation	★★★★☆
Floor	Solid, no insulation (assumed)	—
Windows	Some double glazing	★★☆☆☆
Main heating	Boiler and radiators, mains gas	★★★★☆
Main heating controls	Programmer, room thermostat and TRVs	★★★★☆
Secondary heating	None	—
Hot water	From main system	★★★★☆
Lighting	Low energy lighting in all fixed outlets	★★★★★

Current primary energy use per square metre of floor area: 165 kWh/m² per year

The assessment does not take into consideration the physical condition of any element. 'Assumed' means that the insulation could not be inspected and an assumption has been made in the methodology based on age and type of construction.

See addendum on the last page relating to items in the table above.

Low and zero carbon energy sources

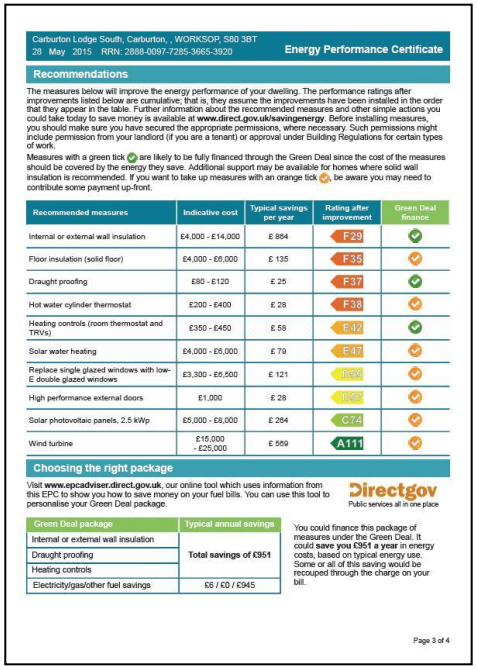
Low and zero carbon energy sources are sources of energy that release either very little or no carbon dioxide into the atmosphere when they are used. Installing these sources may help reduce energy bills as well as cutting carbon. There are none provided for this home.

Your home's heat demand

For most homes, the vast majority of energy costs derive from heating the home. Where applicable, this table shows the energy that could be saved in this property by insulating the loft and walls, based on typical energy use (shown within brackets as it is a reduction in energy use).

Heat demand	Existing dwelling	Impact of loft insulation	Impact of cavity wall insulation	Impact of solid wall insulation
Space heating (kWh per year)	126,340	N/A	N/A	(8,495)
Water heating (kWh per year)	3,257			

You could receive Renewable Heat Incentive (RHI) payments and help reduce carbon emissions by replacing your existing heating system with one that generates renewable heat, subject to meeting minimum energy efficiency requirements. The estimated energy required for space and water heating will form the basis of the payments. For more information, search for the domestic RHI on the www.gov.uk website.



Recommendations

The measures below will improve the energy performance of your dwelling. The performance ratings after improvements listed below are cumulative; that is, they assume the improvements have been installed in the order that they appear in the table. Further information about the recommended measures and other simple actions you could take today to save money is available at **www.direct.gov.uk/savingenergy**. Before installing measures, you should make sure you have secured the appropriate permissions, where necessary. Such permissions might include permission from your landlord (if you are a tenant) or approval under Building Regulations for certain types of work.

Measures with a green tick ✓ are likely to be fully financed through the Green Deal since the cost of the measures should be covered by the energy they save. Additional support may be available for homes where solid wall insulation is recommended. If you want to take up measures with an orange tick ✓, be aware you may need to contribute some payment up-front.

Recommended measures	Indicative cost	Typical savings per year	Rating after improvement	Green Deal finance
Internal or external wall insulation	£4,000 - £14,000	£ 864	F29	✓
Floor insulation (solid floor)	£4,000 - £6,000	£ 135	F35	✓
Draught proofing	£80 - £120	£ 25	F37	✓
Hot water cylinder thermostat	£200 - £400	£ 28	F38	✓
Heating controls (room thermostat and TRVs)	£350 - £450	£ 58	E42	✓
Solar water heating	£4,000 - £6,000	£ 79	E47	✓
Replace single glazed windows with low-E double glazed windows	£3,300 - £6,500	£ 121	D55	✓
High performance external doors	£1,000	£ 28	D57	✓
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£ 264	C74	✓
Wind turbine	£15,000 - £25,000	£ 569	A111	✓

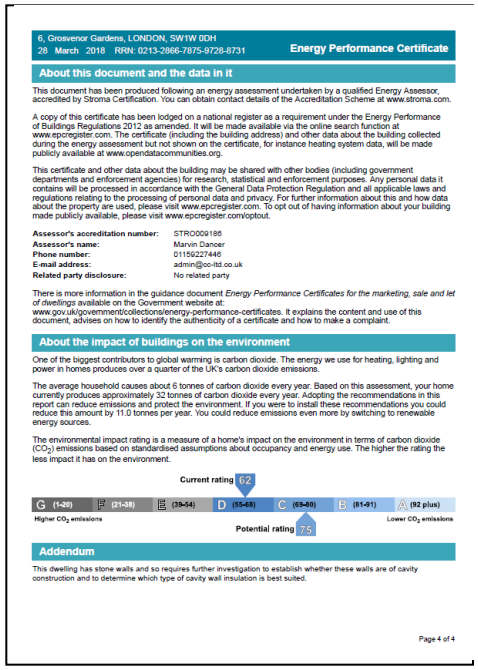
Choosing the right package

Visit **www.epcadviser.direct.gov.uk**, our online tool which uses information from this EPC to show you how to save money on your fuel bills. You can use this tool to personalise your Green Deal package.

Directgov
Public services all in one place

Green Deal package	Typical annual savings
Internal or external wall insulation	Total savings of £951
Draught proofing	
Heating controls	
Electricity/gas/other fuel savings	£6 / £0 / £945

You could finance this package of measures under the Green Deal. It could **save you £951 a year** in energy costs, based on typical energy use. Some or all of this saving would be recouped through the charge on your bill.



About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Stroma Certification. You can obtain contact details of the Accreditation Scheme at www.stroma.com.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at www.epcregister.com. The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at www.opendatacommunities.org.

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. Any personal data it contains will be processed in accordance with the General Data Protection Regulation and all applicable laws and regulations relating to the processing of personal data and privacy. For further information about this and how data about the property are used, please visit www.epcregister.com. To opt out of having information about your building made publicly available, please visit www.epcregister.com/optout.

Assessor's accreditation number:	STRO009186
Assessor's name:	Marvin Dancer
Phone number:	01156227446
E-mail address:	admin@oc-ltd.co.uk
Related party disclosure:	No related party

There is more information in the guidance document *Energy Performance Certificates for the marketing, sale and let of dwellings* available on the Government website at: www.gov.uk/government/collections/energy-performance-certificates. It explains the content and use of this document, advises on how to identify the authenticity of a certificate and how to make a complaint.

About the impact of buildings on the environment

One of the biggest contributors to global warming is carbon dioxide. The energy we use for heating, lighting and power in homes produces over a quarter of the UK's carbon dioxide emissions.

The average household causes about 6 tonnes of carbon dioxide every year. Based on this assessment, your home currently produces approximately 32 tonnes of carbon dioxide every year. Adopting the recommendations in this report can reduce emissions and protect the environment. If you were to install these recommendations you could reduce this amount by 11.0 tonnes per year. You could reduce emissions even more by switching to renewable energy sources.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions based on standardised assumptions about occupancy and energy use. The higher the rating the less impact it has on the environment.

Addendum

This dwelling has stone walls and so requires further investigation to establish whether these walls are of cavity construction and to determine which type of cavity wall insulation is best suited.

What does the EPC cover?

- Heating system
- Heating controls
- Hot water system
- Building fabric and insulation
- Lighting
- Renewables

What does it not cover?

It does not cover ‘things that aren’t bolted down’, i.e.

- Energy use from appliances
- Cost variations from your choice of energy company deal
- How you use your heating

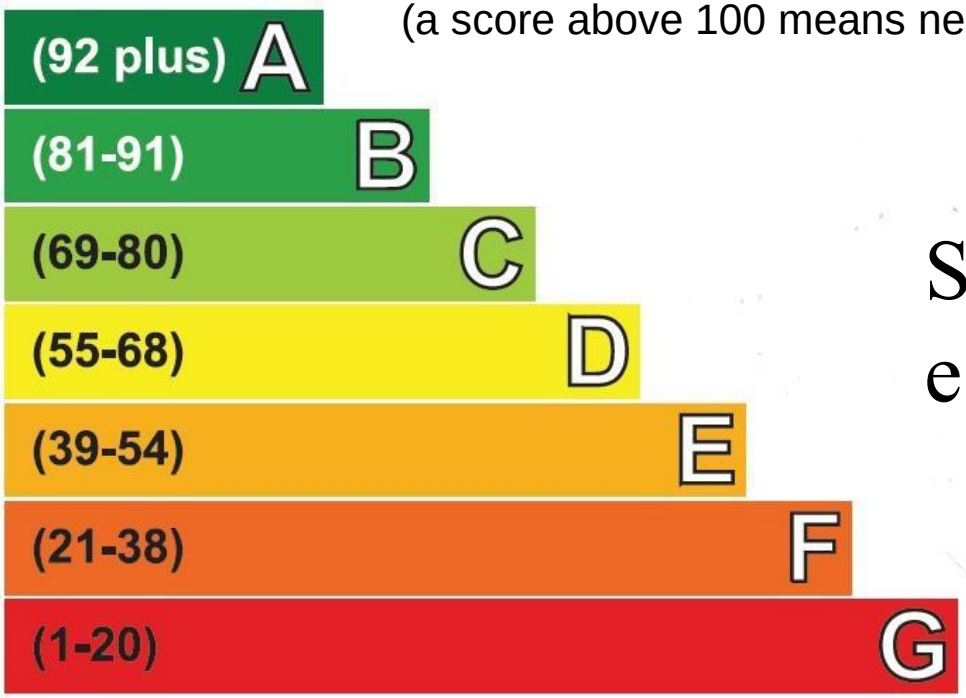
EPC document:
Health Warning

The EPC document is not a guide to what you need to do …

… it's more like **a clue**

SAP scores

100



0

100 means notionally zero bills

(a score above 100 means negative bills - energy generation)

SAP is linked to estimated fuel bills

0 is the lowest score

(but only because negative scores are rounded up to 0)

SAP scores

EI scores

notionally zero CO_2 100

(a score above 100 means negative CO_2 - energy generation)

0 is the lowest score

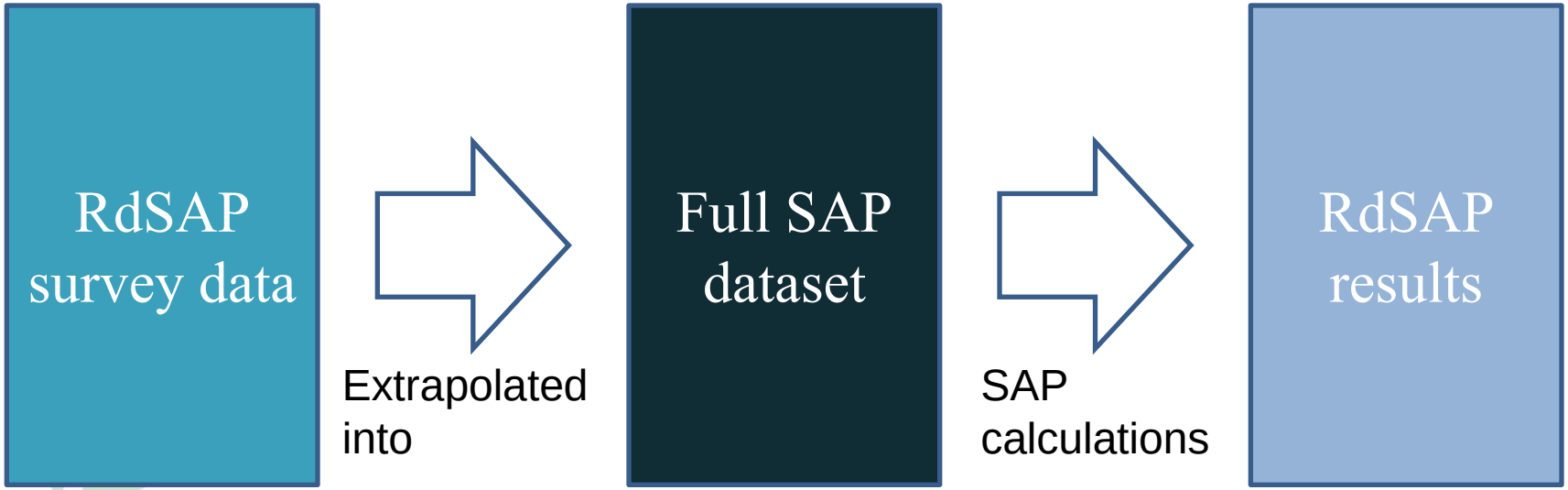
(but only because negative scores are rounded up to 0)

EPC calculations: RdSAP

- RdSAP means **Reduced Data** SAP
- Involves:
  - Measuring a simplified dimension set
  - Has libraries to estimate energy performance of walls, roofs, etc.
  - Survey takes around 30 minutes (before evidence paperwork)

EPC calculations: RdSAP

- How RdSAP calculations work



EPC calculations: RdSAP

RdSAP data is simplified but:

1. The calculations are still robust

2. It is still important to get the data right

Cost-effect is **KEY**

- EPC Recommendations:

Recommended measures	Indicative cost	Typical savings per year	Rating after improvement	Green Deal finance
Internal or external wall insulation	£4,000 - £14,000	£ 864	F29	
Floor insulation (solic				
Draught proofing				
Hot water cylinder th				
Heating controls (roo TRVs)				
Solar water heating				
Replace single glazed windows with low-E double glazed windows	£3,300 - £6,500	£ 121	D55	
High performance external doors	£1,000	£ 28	D57	
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£ 264	C74	
Wind turbine	£15,000 - £25,000	£ 569	A111	

- Incomplete
- Wrong Order

Why use EPCs?

- The EPC certificate is not all that useful
- The list of measures is not extensive
- The prices are default
- It assumes standard occupancy
- It doesn’t cover appropriateness of ventilation

Why use EPCs?

The underlying data is very useful

some systems can import this directly

They are standard

They are quick and cheap to undertake

They cover most aspects of a building energy use

- What is your data like?
- How well do you know your stock?
- Have you got a clear organisation target?
- What was it based on?
- When was it last reviewed?
- Have things changed recently?

chris.newman@parityprojects.com
07932083060