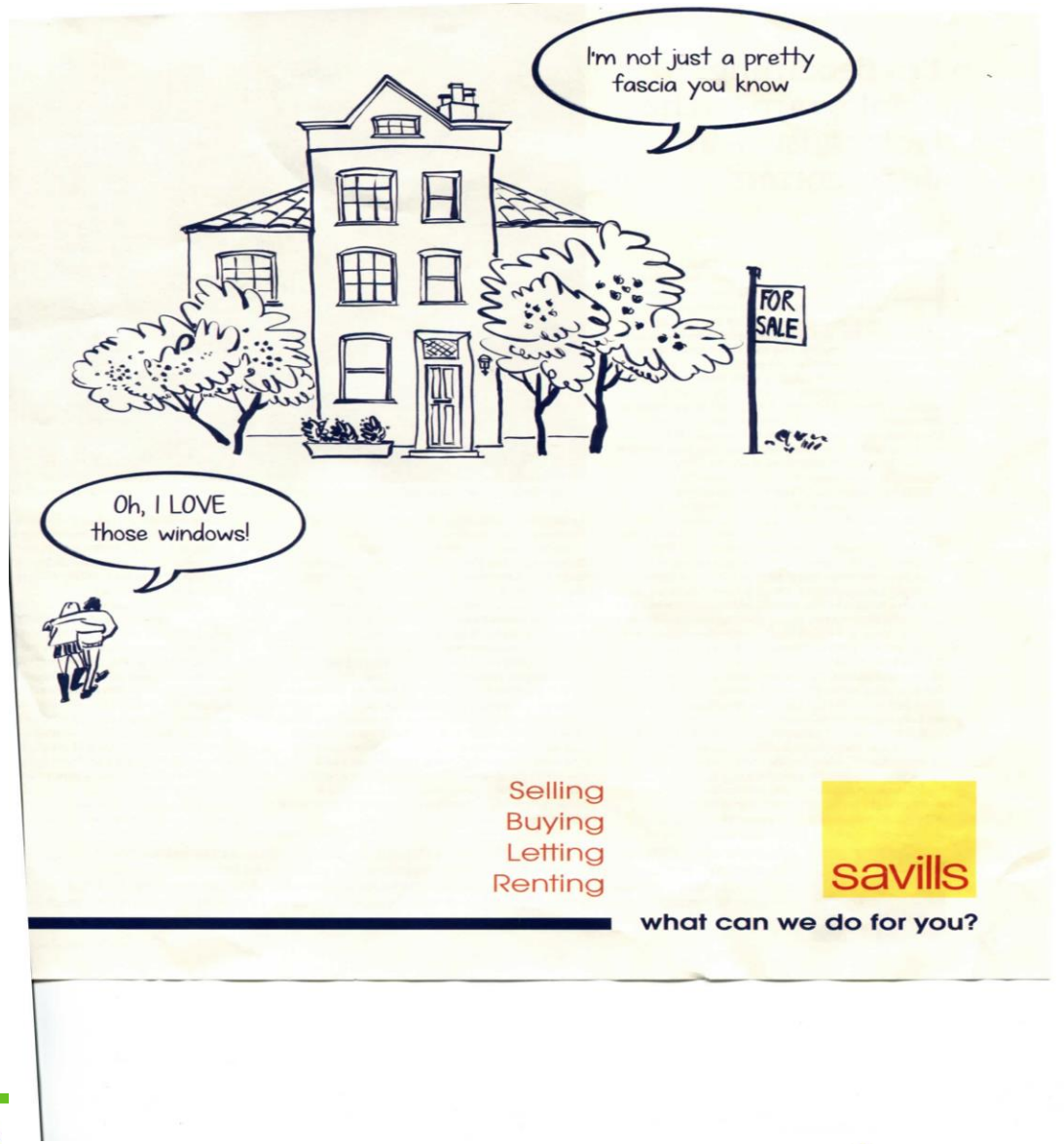
Windows and doors…..balancing light, warmth and ventilation in your project

Creating an energy-chic home

Highgate Society

15/3/17



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70% Retrofit Case Study

Before

The building before the work took place was typical of the UK's building stock - single glazed windows with some secondary glazing, and an uninsulated roof, walls and floor. An 'antique' boiler provided hot water at vast expense as well as producing excessive Green House Gas emissions.

Our task, besides providing a much needed attic refurbishment, was to increase the thermal efficiency of the house, to reduce energy bills, and to lower its carbon footprint.

Chart 1: Breakdown of the emissons per building element

= 17,858 kWh a year
or
= 5,294 kgCO_2 a year

Alexandra Park Road, Muswell Hill

After

To reduce the heat losses from the house, we undertook a number of different insulation and energy saving strategies. These included
insulating the floors, wall and roof with natural materials, instaling triple glazed windows and also adding Solar Hot Water Panels next to the dormer window. These improvements will help reduce energy bills as well as CO_2 emissions.

By improving the fabric of the building to above the required standards by building regulations, this house will be more efficient and as a result will be much cheaper to run, as well as less damaging to the environment.

This leads to a ***predicted***:
= 4,955 kWh a year
or
= 2,297 kgCO_2 a year

A predicted 73% reduction in Energy Consumption and 57% reduction in CO2 emissions

In Detail

Insulation

The existing structure of the roof was little more than plasterboard, joists and tiles. By increasing the thermal resistance to above building regulations, further savings can be made. We only specify natural insulation, as we believe the embodied energy in producing materials is just as important, as is the environment in which our clients live.

An airtightness membrane reduces heat losses further to produce an efficient building envelope.

	Walls	Roof	Window	Doors	Floor
Existing U Values	2.0	1.9	5.4	3.0	0.61
Building Regulations (Part L1b 2006)	0.35	0.25	2.2	2.2	0.25
Improved Building Fabric	0.22	0.24	1.2	1.1	0.21

Table 1: *improvements to the U Values of the building fabric*

We believe that the requirements Building Regualtions are woefully inadequate.

We aim to improve the building fabric to much higher level, saving the customer money in reduced energy bills, and lowering CO2 emissions.

Window and Doors

All the windows and doors fitted were high specification; sustainably sourced and triple glazed . The original entrance door had a U Value of above 3W/m²K; the doors installed were almost three times more insulative. Last but not least, we didn't then just cut a big hole in it for a letterbox... we installed a lockable one on the wall adjacent... the postman seems happy enough too!

To reduce the possibility of overheating, we installed external thermal shading to the south facing loft windows and doors. Predictions for the UKs temperature in the next 40 years suggest we will may require less heating and more cooling in our buildings, so shading devices such as these will naturally futureproof this building against excessive cooling costs... and render our clients' loft a much more pleasant place in summer!!!

Solar Thermal Panels

The solar panels installed will produce more than 1,500 kWh of hot water a year, which is almost 45% of the owner's requirements. It will also save nearly 500kg of CO_2 in reduced Gas consumption.

Boiler

The boiler installed was an 'A' rated, 91+% efficient System Boiler, with Weather compensation to ensure it only consumes as much gas as minimally necessary to achieve internal target temperatures relative to prevailing external temperatures.

Wood Fired Stove

A wood fired stove, with an insulated flue liner, was also installed. This will be used for ground floor space heating during the coldest times of the year. This means a reduced usage of the gas fired central heating system, and consequently lower CO_2 emissions.

Internal Wall Insulation

Taking care o insulate carefully in between the floor plates, we applied 100mm of natural, breathable woodfibre insulation on the inside face of the northern external wall, and 60mm to the party wall... adding not only a nice warm blanket to the building, but also making it a quieter place!

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5-6 Lonsto House Princes Lane
London N10 3LU
t: 02 0 8444 2512
e: enquiries@ecodomus.co.uk
w: www.ecodomus.co.uk

Company Registration no. : 6490712
VAT Registration no. : 929 7057

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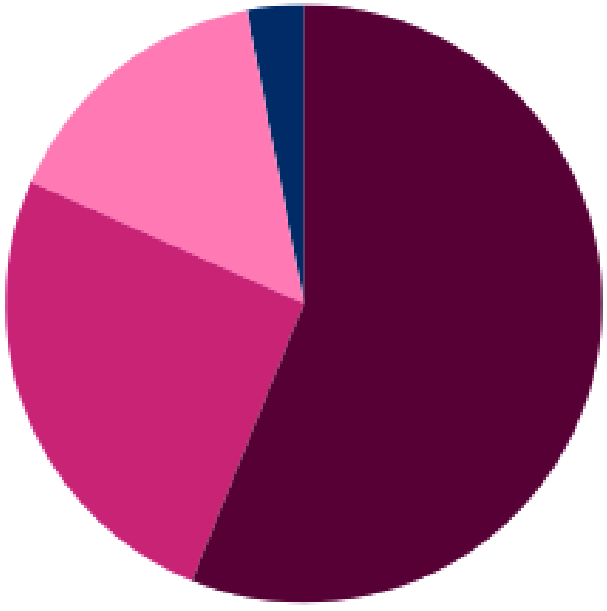
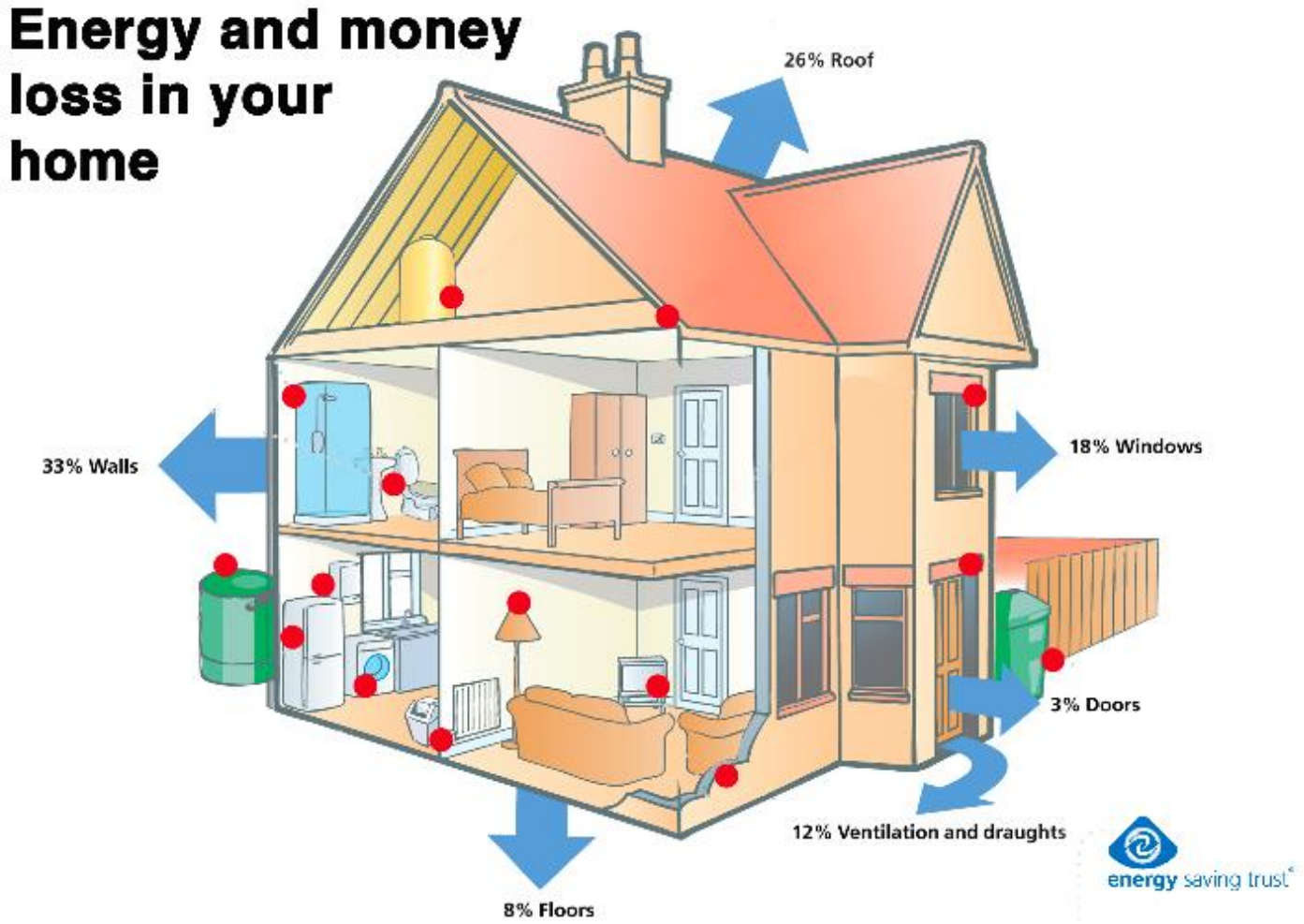
Household
Energy use

Over three-quarters of the energy we use in our homes is for heating




Energy and money loss in your home
26% Roof
33% Walls
18% Windows
3% Doors
12% Ventilation and draughts
8% Floors
energy saving trust

For most of us…. ……. **The weakest link !**

- Surface heat loss
- Draughts

- Single glazing u value + - 6.0W/m²K
- Best performing new windows/doors achieve ≤ 0.73W/m²K (Whole window / Uninstalled)

- Current building regulations target a U value for windows of 2 or below.
- Types
- The 3 treatment methods…draught, secondary, and replacement

Window-treatment options

DRAUGHTS:

• To Reduce air infiltration by up 33% -mend cracks and eliminate gaps.

• Add draught proofing to reduce draughts by as much as 86%

SURFACE HEAT LOSS

• Closed thick curtains and plain can reduce heat loss through glass and frames by 30-40%

•Good quality secondary glazing, can deliver u value of 1.7.

• Well-fitted, closed shutters, also produce similarly good results.

Windows-secondary glazing

Secondary double glazing

With a **Danklit** secondary double glazing, you can in a cost efficient way optimize existing buildings to the new standards for energy savings, and that way also support the preservation of older and historic buildings.

Danklit will be delivered with double glazing, and in combination with existing single or double glazing, you can achieve an extreme low Uw value, and a significant reduction in soundproofing.

The **Danklit** construction has all the wellknown characteristics for Vrogum®, i.e use of slow growing finger jointed heartwood pine timber, smooth external surface with silicone seal, and glazing beads on the inside with hidden nail holes.

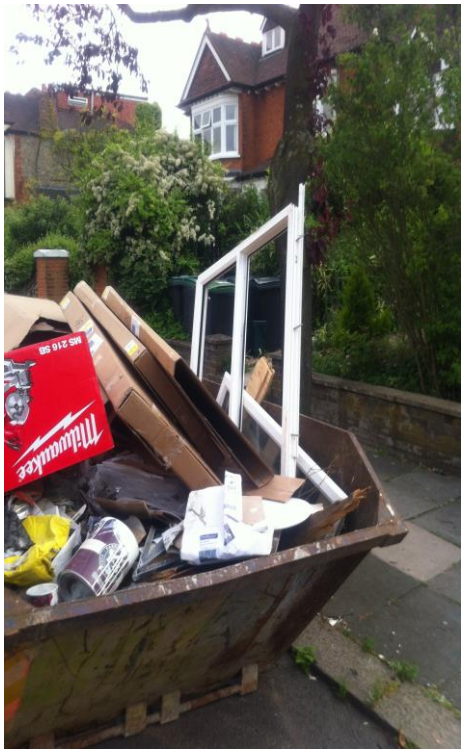
CONSIDERATIONS FOR WINDOW REPLACEMENT

1. Aesthetic, Dimensional constraints and Planning Issues
2. Condensation/ventilation implications
3. Energy Performance
5. Environmental impact-
    - Raw materials at source
    - At end of life disposal
    - From manufacturing
    - Environmental impact in use- energy performance terms + maintenance cycle requirements

6. Durability
7. Installation process/techniques…disturbance factors
8. Budgetary & Value for Money

WINDOW MATERIAL TYPES

- Timber and Timber Composite
- Aluminium or steel
- UPVc



Timber-based frames last at least twice as long as PVC-U

The Service Life Planning study is based on ISO 15686-8 methodology and confirms earlier work on timber windows reported by Imperial College London, while extending the research to include modified (acetylated) wood and aluminum-clad wooden frames.

The results are derived by applying design, manufacturing and maintenance factors to established *Reference Service Life* in accordance with ISO 15686-8.

The study finds that timber frames made to WWA specifications can be expected to last around 60 years, twice as long as comparable PVC-U frames, while modified and aluminium-clad timber frames can be expected to last significantly longer.

	years
WWA timber frames:	**56-65**
WWA modified timber frames:	**68-80**
WWA alu-clad timber frames:	**71-83**
PVC-U:	**25-35**

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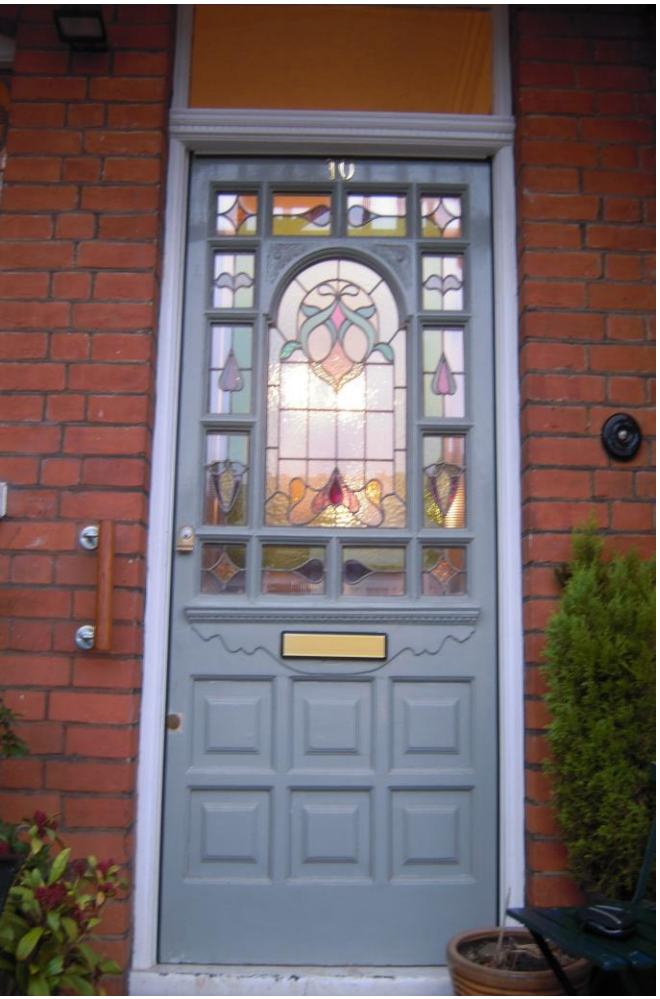
Window replacements- Conservation issues



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- raw materials used
- construction method and quality
- design…air tightness & functionality
- quality of finish

ALL

OF WHICH ARE CRITICAL-

BUT NOT SO CRITICAL AS…….

What does good look like…

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And finally…….