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U3A Climate Change Group
Discussion

Eco project pitfalls, examples & discussion

www.mesh-energy.com

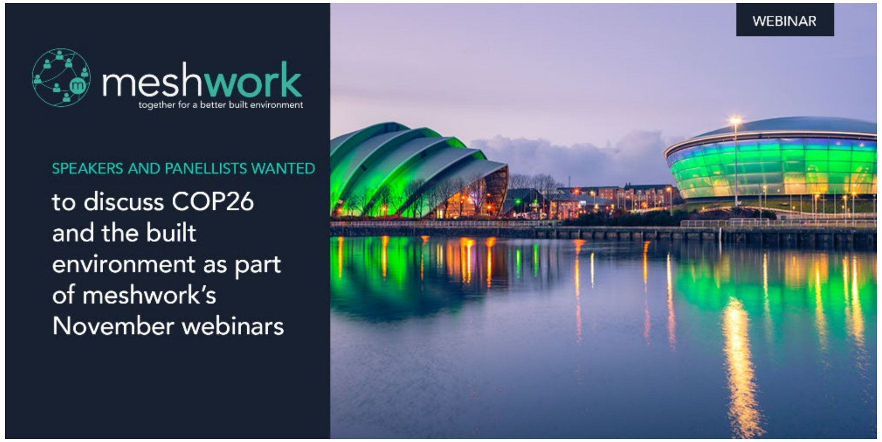
Meshwork

Meshwork is a unique network, run in partnership with Mesh Energy, bringing together architects, developers, installers, students and anyone else who is interested in low-energy and sustainable building design.

At Meshwork, our values are:

- Collaboration
- Engagement
- Sustainability

Each month we run CPD webinars on a range of topics, which you can access for free!



Who are Mesh Energy?

We are independent energy consultants

Purpose
"To inspire and forge a sustainable legacy"

Mission
"To instil confidence and pride in low energy projects through intelligent design"

How can we help you?
- Holistic and independent
- Deliver intelligent design and feedback
- Your partner in 'simplifying the sustainable energy landscape'
- Support at every project stage

The Mesh Team

In Today's Webinar We'll Cover…

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Part 1

- Quick introduction
- Most common eco project pitfalls

Break

Part 2

- Case study (Victorian Home)
- Wider discussion

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Eco project pitfalls

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The eco-project 'minefield'

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Result/Implications

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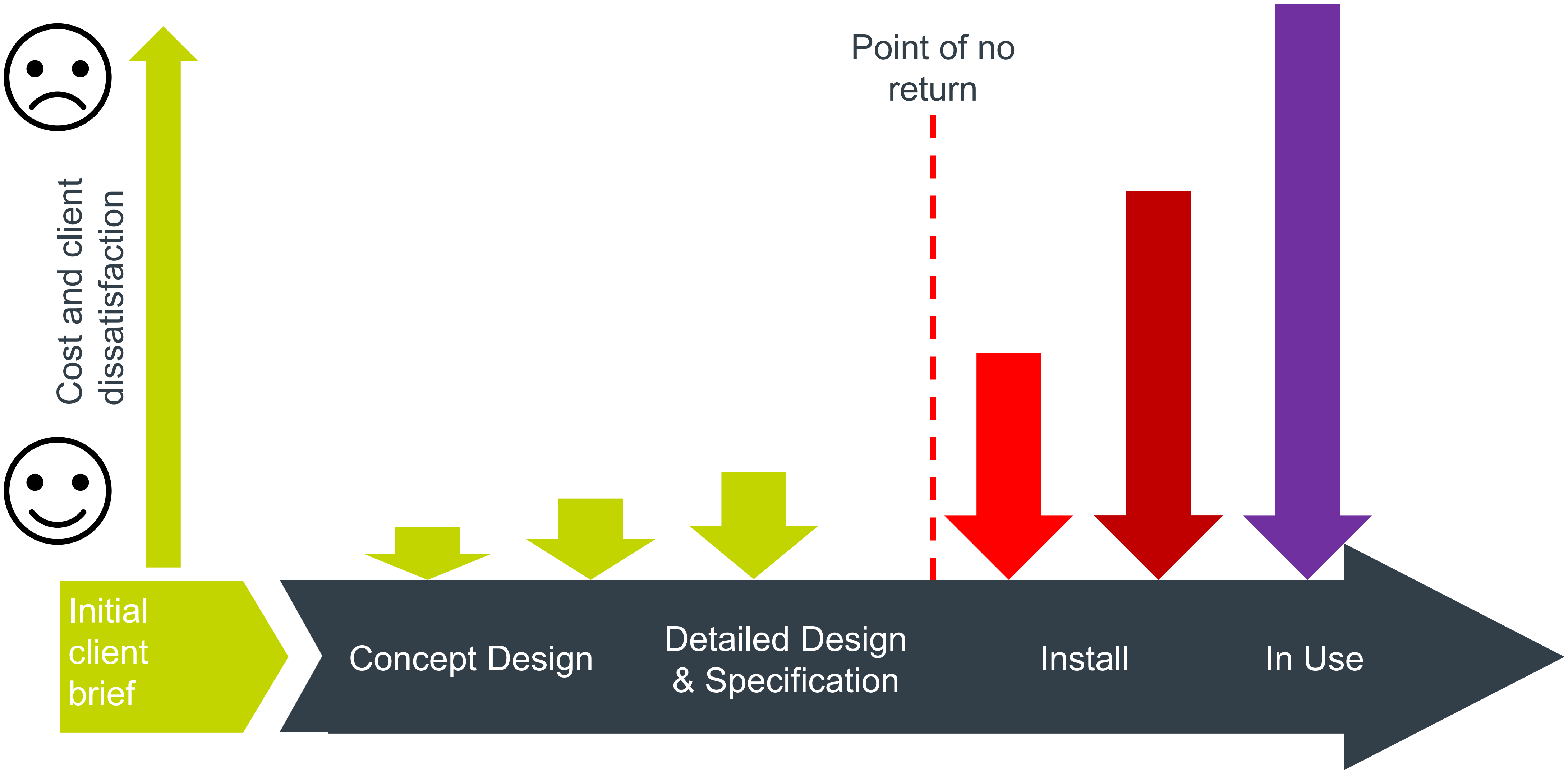
Client:
- High running cost building
- Not comfortable or fully functional in all seasons
- Frustration, anger & loss of faith
- Legal action

Design Team:
- Embarrassment
- Loss of faith in ability
- Increased project risk
- Damage to reputation

Delayed effect of mistakes



The critical success ‘chain’

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Five key links for project success

Pitfalls

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Top 7 most common and costly pitfalls:

1. 'Skimping' on early-stage strategy planning
2. Not focusing on fabric first
3. Insufficient tender specification
4. Poor installer choice
5. Little attention to construction detail
6. Poor systems commissioning

Plus…a bonus pitfall!

Pitfall #1: 'Skimping' on early-stage energy strategy planning

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Why is it done?
- Cost saving
- Unknown risks/inexperience
- Rushing to get through design and on to site
- Bias from installers and 'knowledgeable' family members/friends

Practical risks:
- Sub-optimal solution
- Disparate and fragmented building function
- Complicated end result for client
- Expensive down line to correct mistakes (if actually possible)

Pitfall #1: ‘Skimping’ on early-stage energy strategy planning

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Benefits of getting it right
- Cleaner and more considered design
- Confidence in optimal solution
- Increased client ‘buy in’
- Clarity and cohesion for key stakeholders

How to succeed
- Consider energy strategy at pre-planning stage
- Get some independent and experienced advice
- Consider budget, client goals, site and available services…together
- Allocate additional funds for this stage

Pitfall #2: Not focusing on ‘fabric first’

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Why is it done?
- We are creatures of habit
- Familiarity with what you normally do
- Benefit not fully understood
- Seen as additional cost, not investment

Practical risks:
- Higher running costs (now and future)
- Reduced choice of low energy tech options
- Increased cost of heating & ventilation technology solutions
- Poor SAP rating

Pitfall #2: Not focusing on 'fabric first'

Benefits of getting it right
- Decreased cost of heating & ventilation technology solutions
- Increased choice of low energy tech options
- Reduced services routing and plant space issues
- Improved SAP rating

How to succeed
- Make it a top priority for design team
- Early-stage heat loss calculation
- Investigate and understand limits
- Understand wider cost savings by better insulating building

Pitfall #3: Insufficient tender specification

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Why is it done?
- Confusion
- Lack of experience or naivety
- Trust in product installers
- An attempt to save money

Practical risks:
- Lack of clarity
- Sub-optimal installer selected solutions
- Doubling up of or holes in services offered
- Variation in returned tenders
- Wasted time making sense of returned tenders

Pitfall #3: Insufficient tender specification

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Benefits of getting it right
- Clarity on exact equipment and services
- More accurate tender returns
- Easier tender comparison
- Saved time and money

How to succeed
- Don't rely on installer 'freebies'
- Be specific about equipment sizing, makes and models as well as contractor interface
- System schematics
- Plant, service and site layout drawings

Pitfall #4: Poor installer choice

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Why is it done?
- Confusion as to where to go and what to look for
- Rushing through tender process
- Trust in product installers
- ‘Best salesman’ effect

Practical risks:
- ‘Profit-based’ sale
- Increased risk of unqualified installer
- Compromise overall energy strategy

Pitfall #4: Poor installer choice

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Benefits of getting it right
- Value for money
- Quality installation, commissioning & aftersales
- Excellent project team member
- Smoother project running

How to succeed
- Nail down overall strategy for project
- Get an experienced recommendation
- Give it time
- Speak to more than one
- Ensure installer can put in the right products
- Check credit worthiness

Pitfall #5: Little attention to construction detail (on site)

Why is it done?
- Lack of understanding of importance
- Lazy workmanship
- Not detailed properly by design team

Practical risks:
- Late-stage modifications – money & stress
- Poor air tightness and pressure test result and energy rating
- Cold bridging and condensation issues
- Failure to meet target construction standards

Pitfall #5: Little attention to construction detail (on site)

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Benefits of getting it right
- Highly energy efficient home
- Sense of satisfaction from design and build team
- Great building energy rating
- Happy client!

How to succeed
- Properly detail at the design stage
- Find a great builder with a motivated team
- Instil in builder and workforce the importance of detailing
- Allocate detailing and airtightness ‘champions’

Pitfall #6: Poor system commissioning

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Why is it done?
- End of project rush
- Fractured end of project completion
- Unintentional interference by others
- Forgotten about!

Practical risks:
- System not optimised for occupants
- Higher running costs
- Shorter equipment service life

Pitfall #6: Poor system commissioning

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Benefits of getting it right
- Optimised system
- Low running costs
- Increased feeling of building comfort
- Simpler operation by client

How to succeed
- Have a commissioning plan & checklist
- Have a third-party check work
- Monitor electricity usage carefully

Bonus Pitfall: Not considering electricity services…early

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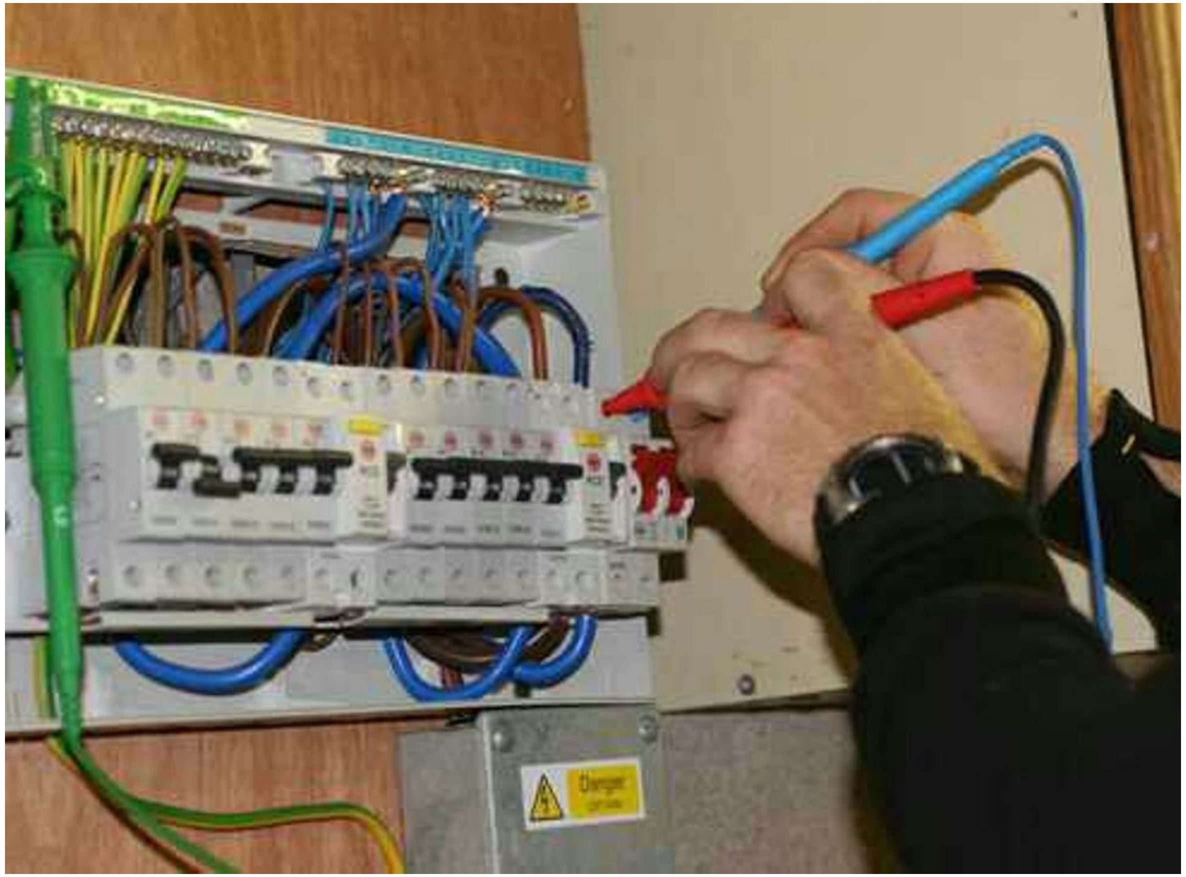
Why is it done?
- Other more important things to do
- Left until after electrical designer is appointed
- Seen as something to sort out once on site

Practical risks:
- Electricity network cannot handle upgrade
- High costs
- Severe disruption to overall energy strategy



Bonus Pitfall: Not considering electricity services…early

Benefits of getting it right
- Clarity on costs
- Greatly reduced risk of progressing on with ‘electrified’ home

How to succeed
- Early-stage technology feasibility
- Get a network upgrade application into the District Network Operator (DNO) ASAP
- Engage with project electrical engineer early

Key Take-aways

Key Take-aways:

1. Put a holistic energy strategy together
2. Make fabric first design a priority
3. Focus on tender specification detail
4. Carefully consider product installers choice
5. Pay particular attention to construction detail and finishing
6. Thorough system commissioning is key

Bonus: Investigate electricity service upgrade cost (…early)

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Renewables Refurb:

‘How to get your home renewable technology ready!’

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Renewable Technology Feasibility Basics

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Feasibility Areas
- Building fabric
- Draughts
- Emitters (i.e. underfloor heating and radiators)
- Temperature control
- Hot water requirements
- Plant room space (in and out)
- Electricity supply

Building Fabric

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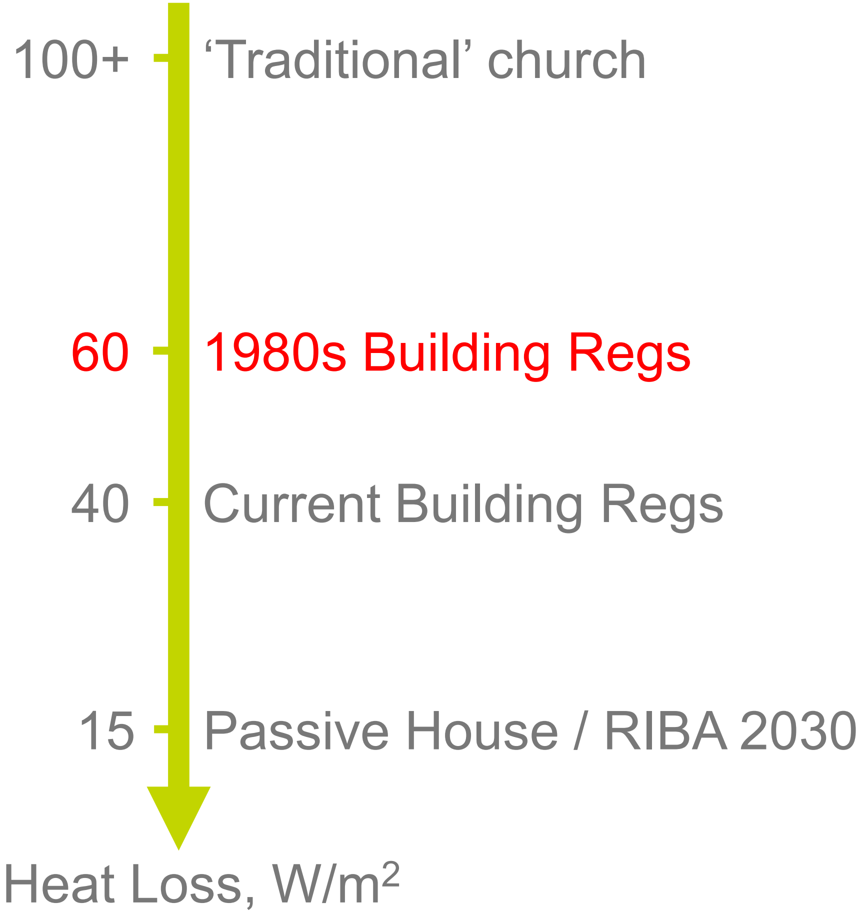
Building Fabric

- Aim is to reduce heat load of the building below 60W/m^2
- Insulation of all external elements ideal BUT not always practical
- Have to work 'harder' where proportion of external walls to floor area is greater
- Solid walls and single glazing OK IF other thermal elements compensate for these
- Target areas that will benefit from insulation and reduce draughts simultaneously (i.e. leaky, old windows or suspended floors)



Draughts

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Draughts
- Really affect feeling of comfort even in a well-insulated building
- Need to balance ‘healthy’ ventilation whilst minimising ‘nuisance’ draughts

Sources
- Open fireplaces
- Suspended floors
- poorly fitting windows and doors
- Pipe work penetrations through walls
- Light and power socket fittings
- Poorly fitting loft hatches and loft penetrations

Building Fabric and Draughts

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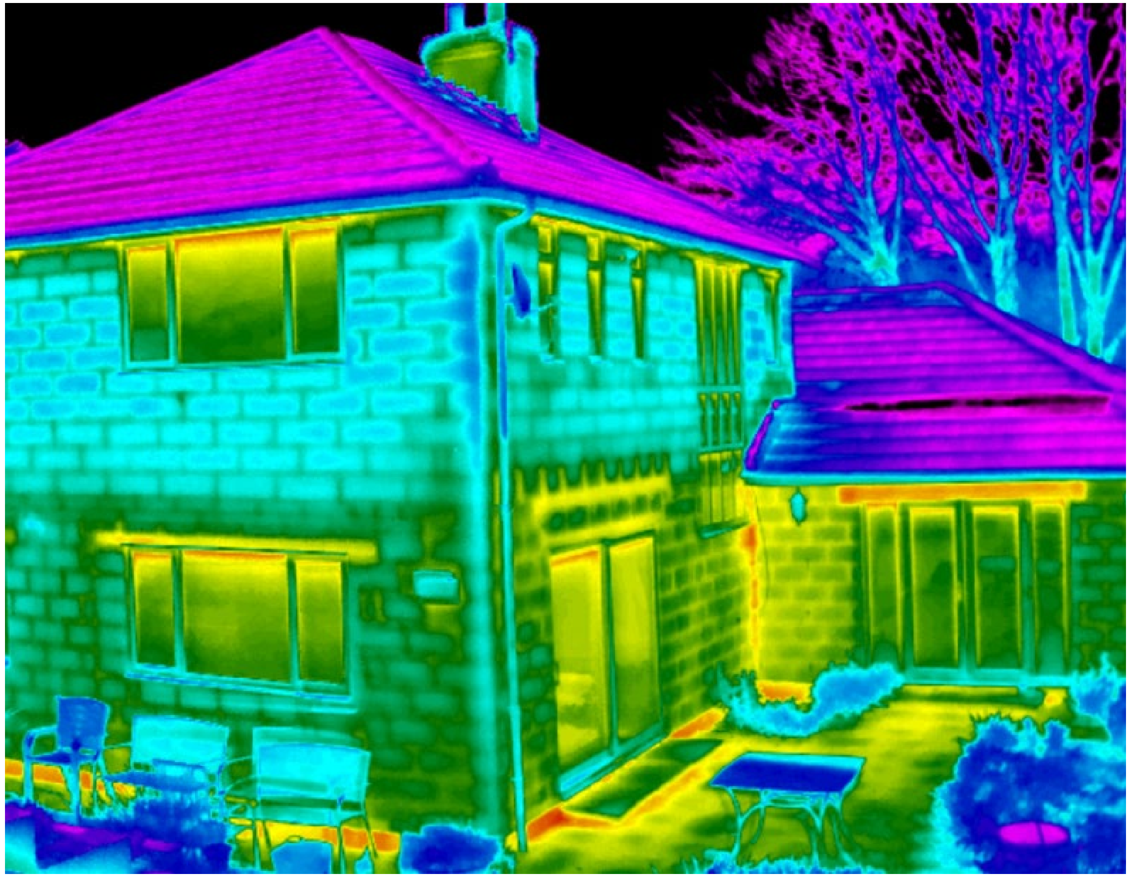
How to identify weak areas

- Cobwebs!
- Smoke pencil to identify draughts
- Thermographic survey for building fabric

Solutions

- Insulation of floor joists and loft where possible
- Blown cavity wall insulation if practical
- High quality secondary glazing
- Open fireplace flues blocked with chimney umbrellas
- Draught proofing tapes and caulks



Emitters (Underfloor Heating and Radiators)

Emitters

- Aim is to reduce flow temperatures in the home to 50 Celsius or below
- Underfloor heating ideal for greatest feeling of comfort
- Issues with floor constructions and weight in older properties
- Where underfloor heating is not practical then low flow temperature radiators should be installed to reduce system flow temperatures
- Don’t be tempted to put in simple and cheap electric underfloor heating at scale!
- Wide range of retrofit wet UFH systems available

Temperature Control

Temperature Control

- Improved temperature and zone control critically important for comfort and year-round energy savings
- Plumbing of building should ideally split floors into separate circuits if possible
- Radiator TRVs still highly effective as simple room temperature control
- Wireless stats can allow easy control without extra wiring
- As a minimum stats should have 7-day control and a nighttime and daytime programming function

Hot Water Requirements

- Check requirements and use of hot water at peak times
- Shower temperatures for modern showers often limited to 41 Celsius
- Very hot water for washing up should be reviewed
- Large volume baths should also be reviewed
- Heat pumps more than capable of producing and storing hot water at 55 Celsius without assistance

Plant Room Space (In and Out)

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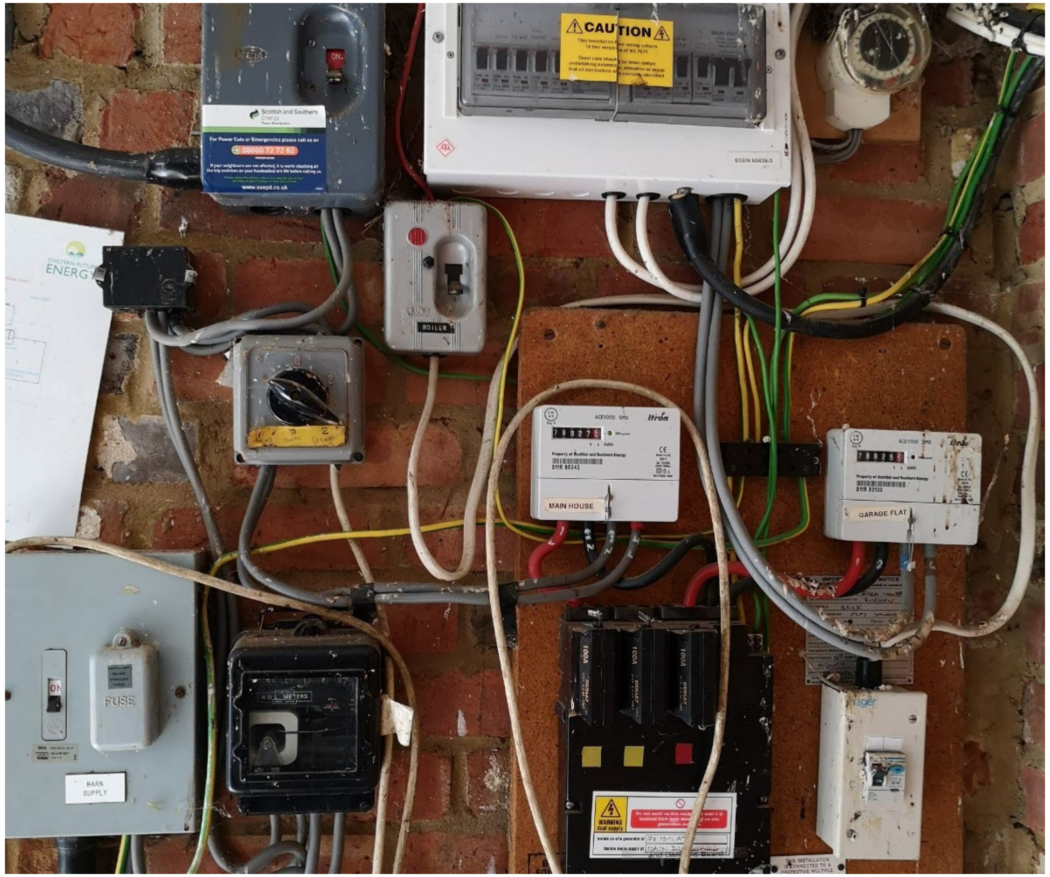
Plant Room Space (In and Out)

- Generally speaking, more plant room space is needed for renewable technologies
- Monobloc air source systems need only room for the hot water cylinder and a few pieces of small hardware
- Ground source heat pumps need utility rooms, garages and dedicated plant rooms
- Identify internal space of $2m^2$ for ASHP and hot water cylinder. $4m^2$ inside for GSHP systems
- Lots of options available for equipment and positioning on ground floors of buildings

Electrical Supply

Electrical Supply

- Review of electricity supply becoming increasingly important
- Most domestic building in UK on 230V Single Phase electricity supply
- If you have (or plan to have) an electric oven, EV car charger and heat pump it is highly likely this supply will struggle to meet demand
- Check with district network operator (DNO) or electrician what you have and what costs are associated with upgrading



Case Study – Victorian Home (built c.1908)

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Case Study – Victorian Home (built c.1908)

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Case Study – Start Condition

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Features

- Built circa 1908 and 100m^2 GIA
- Cavity walls (no insulation)
- Slate DPC (damp issues)
- Double glazing (10 year old) with trickle vents
- ‘Cold’ loft space with old glass wool insulation
- Gas boiler (condensing)
- Suspended floors downstairs with air bricks in external walls
- Lathe and plaster ceilings
- Pressed steel radiators throughout

Case Study – Building Fabric

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Building Fabric Changes

- Windows OK
- Cavity wall left as is
- Suspended floor downstairs lifted and insulated
- Before replacing floor, put in 100mm PIR and wet UFH system
- Loft insulated with 75mm PIR between rafters and roof ventilated to stop condensation issues

Case Study – Draughts, ventilation and damp-proofing

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Draughts and Ventilation

- Floor PIR insulation carefully cut and foam sealed
- Floor insulation and improvement single biggest improvement
- Loft insulation also solved cold draught issues
- No other draught proofing undertaken

Damp

- Damp proof course (DPC) injected
- Internal walls plaster stripped to 1m high and protected

Case Study – Emitters and Controls

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Emitters and Controls

- Underfloor heating downstairs designed for 45C flow temperature
- All rads upstairs replaced with Jaga Strada low flow temperature radiators
- Low flow temperature rads had convective fan addition
- Underfloor heating controlled with programmable digital Heatmiser thermostat
- All radiators controlled with thermostatic radiator valves (TRVs)

Case Study – Plant Space and Considerations

Plant Space and Considerations

- Split unit chosen to keep ASHP unit away from home
- Outdoor unit put about 10m from property
- Indoor unit put under stairs with hot water cylinder

Case Study – Heating and Hot Water System Changed

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Heating and Hot Water System

- Gas supply capped off
- 8kW Daikin split air source heat pump installed providing 6kW output in depths of winter
- 200 litre hot water cylinder installed
- Heating and hot water costs for the home were about £400/year for electricity

Key Take-aways

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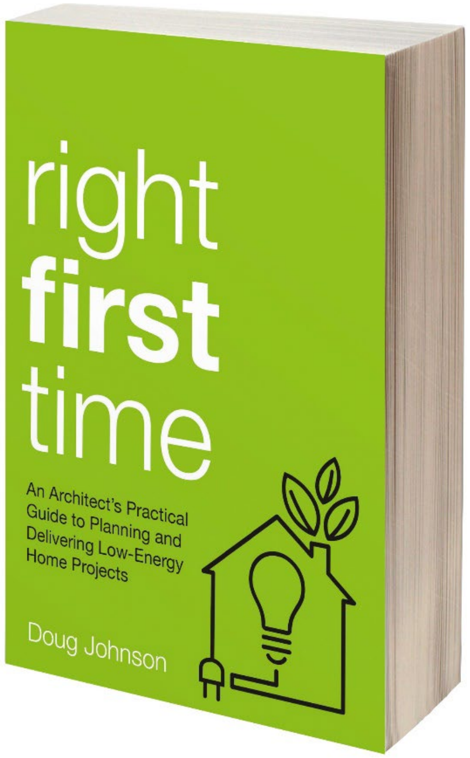
Key Take-aways:

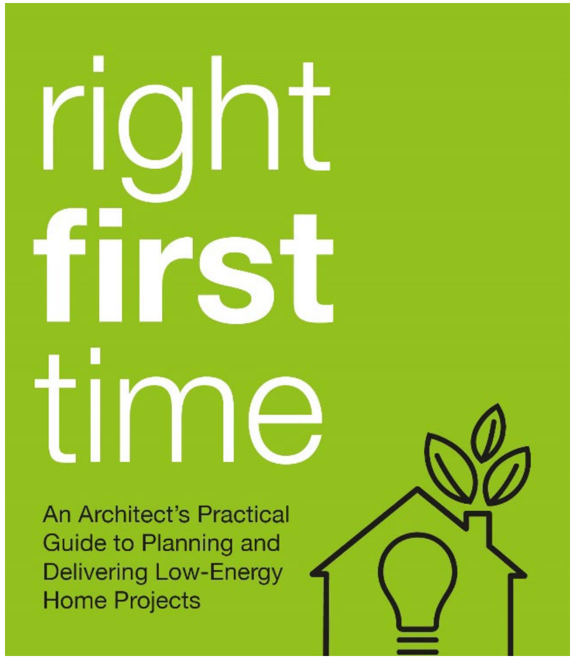
1. Understand the advantages and limitations of low energy tech
2. Always consider fabric first to increase low energy options
3. Reduce draughts as far as possible
4. Consider how to get low temperature energy into the building
5. Better temperature control
6. Run the numbers to prioritise measures
7. It’s all in the ‘blend’!

Further reading

Right first time is a guide to:

- Prioritise key elements of new & building design for maximum energy savings
- A simpler professional life for architects
- Reduce project risk
- Produce happy clients who rave about how hassle-free their low energy home
- Download for FREE





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