ARCHETYPING FOR RETROFIT: BEST PRACTICE METHODOLOGY

Archetyping is a well-used and powerful tool to understand or segment a building stock. This document will help those identifying archetypes, and designing retrofit interventions based on archetypes, to produce good quality results, fit for their specific use case.

NATIONAL RETROFIT HUB

This guide is supported by

City of Westminster

1 INTRODUCTION

This document gives guidance on: identifying archetypes for retrofit to suit specific use cases, and the production of retrofit guidance for identified archetypes.

CONTENTS

ABOUT THIS GUIDE

This document is for:

- Retrofit designers looking to produce archetype retrofit guidance for buildings under consideration
- Building owners or others looking to procure the identification of archetypes and associated retrofit guidance

Archetype guidance should not be:

- Interpreted as a complete solution
- Used to procure construction works
- Assumed to perfectly suit each building exemplified by an archetype

WHY ARCHETYPE?

Archetyping can enable an increase in the pace, ease and quality of retrofitting in many ways, including:

- Providing an accessible start to planning retrofit projects.
- Allowing portfolio holders to quickly understand their stock.
- Enabling research, planning and procurement collaboration between portfolio holders with shared archetypes.
- Taking existing stock model data and making it tangible by unveiling patterns in the visual, volumetric and qualitative.
- Providing an accessible route for those without access to, or the ability to interpret, large quantities of data at an aggregate level.
- Enabling the de-risking of projects, by identifying common risks in different building types up-front.
- Allowing retrofit projects to be aggregated based on similar building types or buildings with similar retrofit plans.
- Providing householders with initial information on what might be right for their home, beyond recommendations in an EPC.
- Informing supply chain forecasting.
- Storing knowledge and lessons-learnt on an archetype-by-archetype basis: increasing quality and optimising cost.

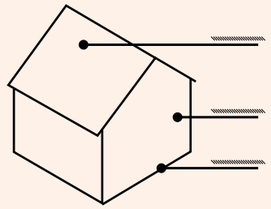
2 IDENTIFYING ARCHETYPES

This document will support you to produce or procure retrofit guidance for buildings grouped by selected characteristics. The identification and definition of archetypes will vary depending on the context of the building stock you are considering, and the level of detail intended for subsequent guidance.

2.1 CHARACTERISTICS

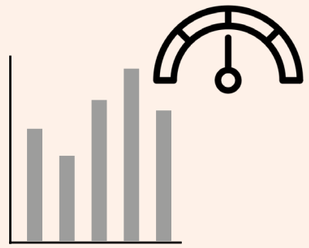
Types of information that can be used to identify archetypes include:

BASIC TYPOLOGY



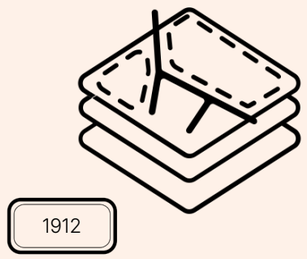
Form of construction
Wall type
Roof types
Floor types

ENERGY AND PERFORMANCE



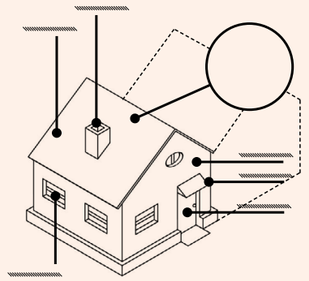
Space heat demand
Energy demand
Airtightness

DETAILED TYPOLOGY



Location
Local vernacular
Exposure
Age
Heritage & conservation
Glazing proportions
Size

SPECIFIC BUILDING INFORMATION

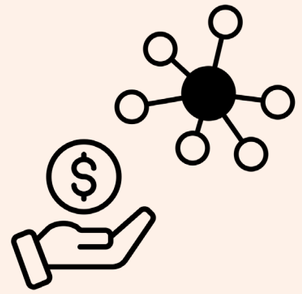


Form factor
Connections
Relationship to street
Junction types: extensions, insets and projections
Existing servicing
Space a for heat pump

OCCUPANCY AND BEHAVIOUR

Use
Tenure
Occupancy numbers
Occupancy patterns
Resident types
Suitability for disruptive work

CONNECTIONS AND FINANCE



Connections to:
- local networks
- community advocacy groups

Eligibility for:
- Funding & grants
- Finance
- Incentives

We anticipate that some of the most useful guides will be specific to a local vernacular and able to incorporate specific local constructions, climates, cultural norms and heritage considerations.

Depending on your needs, buildings might be grouped by relatively fixed characteristics, or by a combination of fixed and changeable characteristics.

These characteristics could map onto those within a digital building logbook, to find out more and view our introductory document:
CLICK HERE

2 IDENTIFYING ARCHETYPES

The characteristics you choose to use to define archetyes will depend on the guide's intended: target audience, purpose, scope, specificity, and the level of detail required.

2.2 USE CASE

The use case for the archetype guide is determined by its target audience and purpose. Audiences might include: householders, SME builders, installers, landlords, housing providers, local authorities or retrofit designers who will take the archetype documents, and develop these into building-specific retrofit plans. The audience will also help determine the purpose of the guide, which might be to:

- Engage the public in retrofit, by providing homeowners with more information on their homes, and what works could be suitable .
- Enable the planning and delivery of retrofit projects across a portfolio of homes.
- Inform strategic budgeting and asset management planning.
- Develop planning policy.
- Assist in the creation of design codes.

Defining the audience and purpose of the guide is the first step in planning the archetyping process. Clients should procure archetypes that are defined by a set of characteristics that will meet their use case.

2.3 SCOPE, SPECIFICITY AND DETAIL

Define whether the guidance being produced for a hypothetical set of buildings applicable across a whole region or for a specific and defined set of known buildings.

Depending on the audience and purpose the archetype guidance could provide a broad-brush approach to suitable measures, or more information on specific details and specifications.

Archetype guidance could range from a RIBA stage 1-2 level of design, potentially with accompanying indicative or typical details.

Use Case Example 1:

Hazel is an architect and is doing work for a housing association that plans to apply for some retrofit funding. She needs to assess which properties from within the Housing Association's stock are likely to gain funding, and then group those properties into homes that will need similar retrofit measures.

She starts by sorting the homes by **space heat demand**, eliminating those that already perform relatively well.

She then groups the remaining homes by **type,** ie: flats, bungalows, terraced houses. She also considers the **heritage** considerations and **geometry** of the homes, including form factor and floor to ceiling heights.

Within these groupings she looks at the **form of construction**, creating sub-groups with the same **wall, roof and floor types, and window proportion**.

More detailed information will be necessary before carrying out design and installation of the retrofit works, but these groupings of homes will be used to create an initial high level plan and budget.

Use Case Example 2:

Etude were appointed by a County Council create a Housing Decarbonisation Strategy. They needed to understand which homes were heat pump ready, and what sorts of measures others would need, to get them there.

They started by using **age**, as an indicator of **wall and floor construction**, and **internal floor area** to get an idea of **total heat load**. They also considered **form factor**.

This enabled them to separate homes into five types, in two categories: **heat pump ready** and **enabling works first**. They then modelled the estimated heat load for each type, using a range of scenarios and assumptions – which resulted in a range of heat loads for each type. This enabled them to set a decarbonisation pathway, with recommended enabling works, for each type of home, giving the county council strategic oversight of the level of works required to both buildings and the electricity grid infrastructure.

3 CONTENTS OF GUIDANCE

The detail and scope of guidance produced will be determined by the archetype's use case. This section provides guidance on a standard set of information that should be provided within all archetype guides, and gives ideas for further detail that could be provided where useful.

Archetype guides will contain three sections of information:

Building Information

Detail on the archetype to enable identification and develop user's understanding.

Targeted Outcomes

Clarity on what the retrofit measures suggested are designed to achieve.

Suggested Measures

Potentially suitable packages of retrofit measures designed to meet target outcomes.

3 CONTENTS OF GUIDANCE

3.1 BUILDING INFORMATION

Guidance produced should actively seek to improve the user's knowledge and understanding of their building and identify and help mitigate potential risks.

Archetype building information **should** always include:

- ☐ Definition or selected naming of the archetype.
- ☐ Photographs of the typology with key features labelled.
- ☐ Explanation of how the typology typically deals with ventilation and moisture, including key unintended consequences associated with retrofitting the typology.
- ☐ Likely areas requiring maintenance, repair or remediation, commonly found in the typology or characteristic types identified, before and during retrofit works, with photographic examples.
- ☐ Likely risks inherent with the archetype that need to be considered including, for example: the potential presence of asbestos and structural safety issues.
- ☐ Heritage and planning constraints.
- ☐ The overheating and flood risk the archetype likely faces, and how this is impacted by location, orientation and future climate scenarios.
- ☐ Any assumptions or generalisations made in the modelling of the archetype, eg: geographic location of the climate file, orientation.

Archetype building information **could** also include, where useful for the intended user:

- ☐ Breakdown of estimated energy use within the building, with commentary on the impact of different types of occupancy and building use on the energy use.
- ☐ Heat losses associated with different parts of the building fabric, expressed (as a minimum) as a percentage.
- ☐ Historic and cultural context of the typology.
- ☐ Narrative on how the building type has likely changed over time.
- ☐ Thermal imaging photographs of examples of the archetype.

3 CONTENTS OF GUIDANCE

3.2 TARGETED OUTCOMES

The potential benefits of retrofit are diverse. Considering the use-case, target outcomes should be identified for retrofit proposals suggested for each archetype.

Outcomes to consider include:

- Reducing energy bills
- Reducing energy demand
- Reducing carbon emissions
- Improving thermal comfort (preventing both cold and overheating)
- Overcoming known issues associated with the archetype
- Flood risk mitigation
- Building repair and longevity

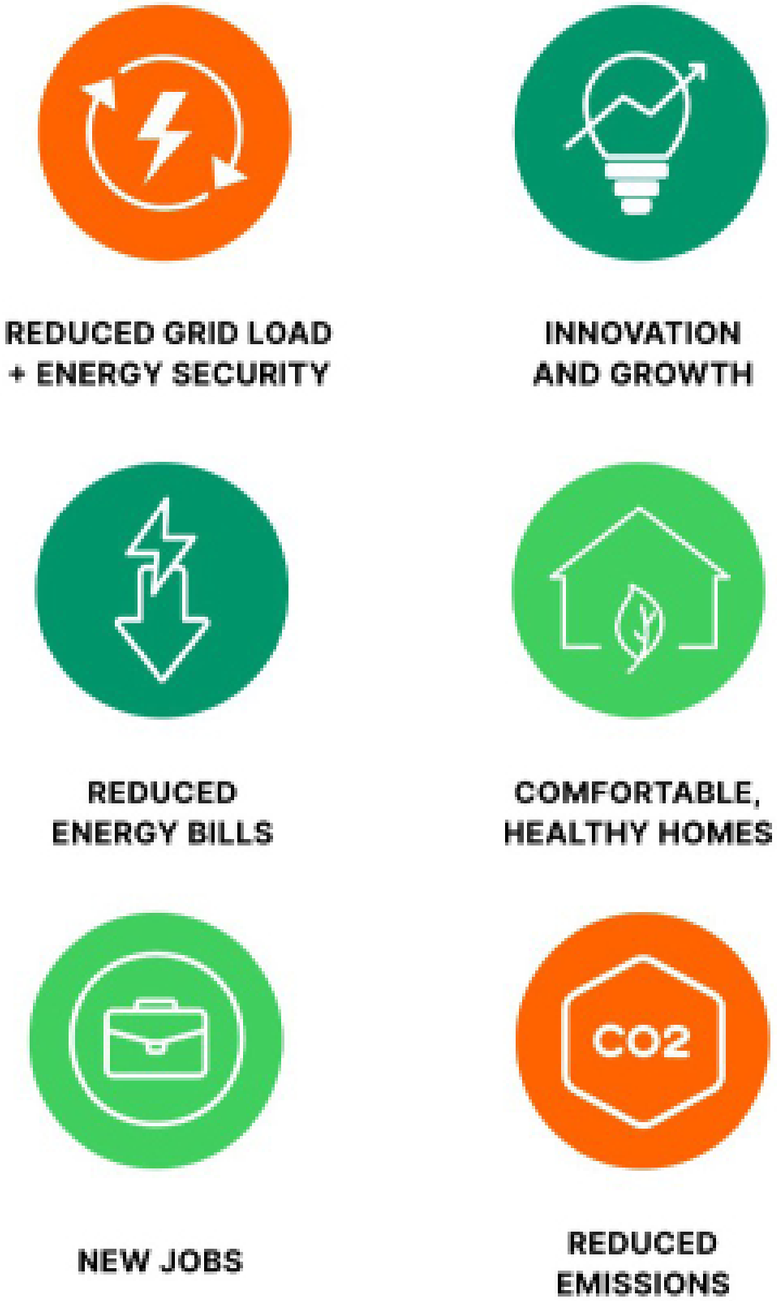
Packages of retrofit measures could consider as priorities:

- Reducing disruption to tenants
- Cost-effectiveness
- Works than can be conducted within or alongside existing asset maintenance plans

Targets will be driven by funding and finance requirements, occupant needs, and building owner objectives.

Specific targets could be based on:

- EPC ratings
- Fuel cost reduction to mitigate fuel poverty
- Elimination of damp and mould risk
- Specific carbon reduction targets on a pathway to Net Zero
- Standards, such as AECB, Superhomes & PassivHaus EnerPHit

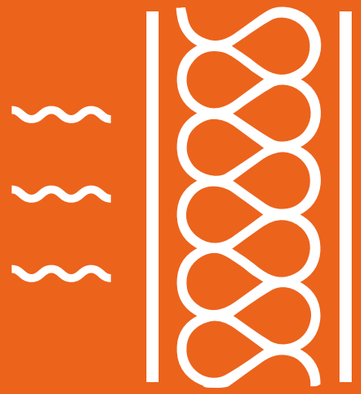


3 CONTENTS OF GUIDANCE

3.3 SUGGESTED MEASURES

Design guidance should start with ‘Easy-wins’ to quickly reduce energy use and improve internal air quality and comfort (eg: fitted carpets and refurbished window seals), with commentary on any associated risk. Include guidance on whether occupants / tenants might be able to install measures themselves and how invasive these might be.

Guidance should then go on to describe potentially suitable packages of retrofit measures, including:



Fabric upgrades
(insulation & airtightness)

Ventilation

Services
(heating, hot water, cooking, controls & lighting)

Renewables

3 CONTENTS OF GUIDANCE

3.3 SUGGESTED MEASURES

Measures should be suggested as part of packages of work that start with understanding the whole building and its components as a system (often called a whole-house approach) to understand the suitability measures as part of this system and prioritise good indoor air quality.

Archetype design guidance on suggested packages of measures **should** include:

- ☐ A clear diagram or sectional drawing showing basic intent of where should be warm / heated and where the airtightness layer should be.
- ☐ Embodied carbon considerations, for each measure, and guidance on how these could be reduced through material choices, reducing waste, etc.
- ☐ Commentary on connected measures.
- ☐ Clarity on any incompatible measures.
- ☐ Estimates for the following,
  - Energy demand reductions: in energy use intensity (kWh/m2.yr), space heating demand (kWh/m2.yr) and as a percentage.
  - Peak heat load reduction: in W/m2 and as a percentage.
  - Carbon emissions and reductions (tCO2/yr), including embodied carbon emissions.

Archetype design guidance on suggested packages of measures **could** also include:

- ☐ Indication of likely heat pump readiness.
- ☐ Recommendations for phasing of works.
- ☐ Information on site processes and potential disruption to plan for. One package of measures could be a ‘minimal disruption choice’.
- ☐ Typical build-up details of individual building elements eg: wall or roof.
- ☐ Drawn details at junctions that represent a high proportion or a defined subset of the typeology, with caveats explaining the context in which the details are relevant, and on-site checks that are required.
- ☐ Indicative costs, noting that this would vary depending on the location and type of building contract(s) (ie, the form of procurement) in £/m2.

Background commentary on the following **should** be included:

Relevant standards and certifications, such as PAS 2035/2038 and MCS.

Relevant legal requirements, eg: Requirements of Principal Designers and Principal Contractors.

4 FURTHER INFORMATION

This document was created with contributions from:

Working group 1 co-chairs Dr Ahsan Khan and Lizzy Westmacott, working group 1 participants, London Councils and participants of the London Councils workshops on archetyping to enable retrofit at scale.

BUILDINGS DATA SOURCES

In order to identify quantities of different archetypes within a region you may need to access to stock model data. Refer to the National Retrofit Hub's data matrix for potentially useful data sources.

ARCHETYPE EXAMPLES

Please visit the National Retrofit Hub's website to view examples of archetyping and archetype guidance.

LICENSING AND SHARING GUIDANCE

The retrofit industry needs information to be shared openly and widely, we therefore urge you to make guidance you produce shareable with others. For information on licensing and sharing visit: Creative Commons.

PEER REVIEW

It is recommended that a peer review of the archetype document is undertaken, particularly for estimated energy and carbon savings, including on the assumptions that are made in any calculations.

GLOSSARY OF TERMS

You may wish to include a glossary of terms, good examples can be found here:

Snugg

Low Energy Building Database

Retrofit Academy

FURTHER HELP

If your organisation needs more help to define your use case, identify most relevant characteristics for archetyping and agree a scope and specificity for guidance produced, get in touch with us on

info@nationalretrofithub.org.uk.

ONGOING WORK

Archetypes used for retrofit should be data interoperable. The NRH is engaging on work to define digital naming conventions for characteristics used to archetype. This would enable: stock models to be enriched with archetype data, and the easy identification of archetypes across a stock.

Archetypes may also provide an effective tool to gather lessons learnt on retrofit that are specific to each archetype. The NRH's longer-term plan is to facilitate a database for the collection and storage of post occupancy evaluation type data.

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