Energy Performance Certificates for New Zealand

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Why Energy Performance Certificates?

- Increase the information available to prospective owners/tenants to help them value a building appropriately.
- Develop a national common language beyond “meets code” to describe the energy performance of buildings
- Encourage developers to build beyond code as the extra resources invested will have a observable effect in an improved rating.
- Encourage owners to retrofit (either for themselves or tenants) as doing so will have a observable effect in an improved rating.
- More easily allow future regulation on the quality of rental properties.

- (Many) other countries already do this
- Both Labour and the Greens mentioned energy performance certificates in their pre-election plans

Anatomy of an energy performance rating

Pretty, interpretative attention grabbing,

Often an estimate of annual energy use under standard conditions. (probably lots of assumptions) – Technical

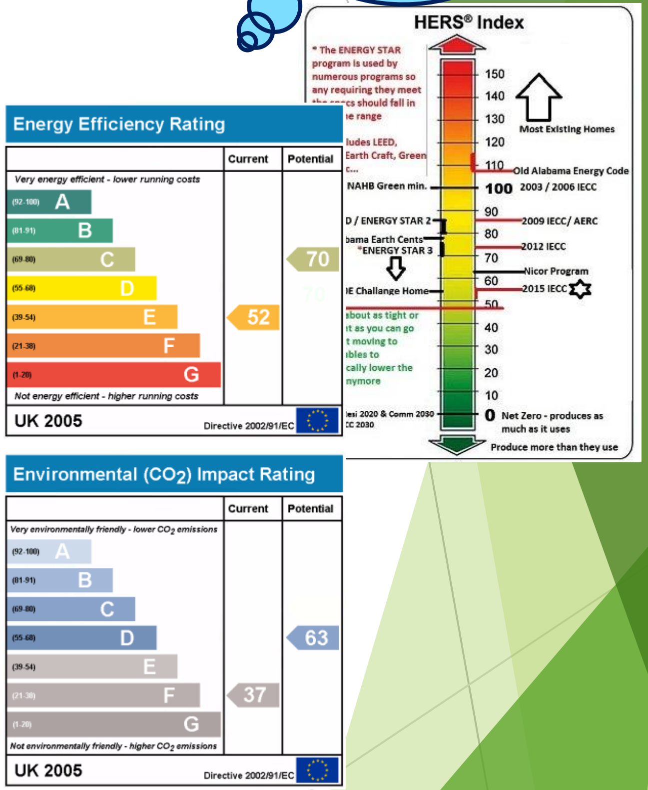
A measure of energy use

A measure of value of the space

a scale

transformed onto

A common metric to help compare different spaces



Measuring the value of space

- Area?
  - Other countries certificates often use a transformation based on the area.
- Something else?

MBIE consultation last year on operational energy efficiency (for new buildings) apparently chose direct area as the value of space for energy without justifying the choice. But used a per person measurement for water use.

What if for housing we looked at how many people could live in a dwelling for energy too?

	Initial Cap	Intermediate Cap	Final Cap
Operational Emissions Cap CO_2-e/(m²a)[12]	The cap will be a reporting mechanism for the total of the operational emissions from the three components		
Fossil Fuel combustion emissions[13] CO_2-e/(m²a)	18	9	0
Electricity Use kWh/(m²a)[14]	180	90	45
Thermal performance (demand) kWh/(m²a)	60	30	15
Services efficiency (delivered) kWh/(m²a)	60	30	15
Water use l/p/d[15] (to be converted to m³/m² based on occupancy of the building type)	145	110	75

Area based methods

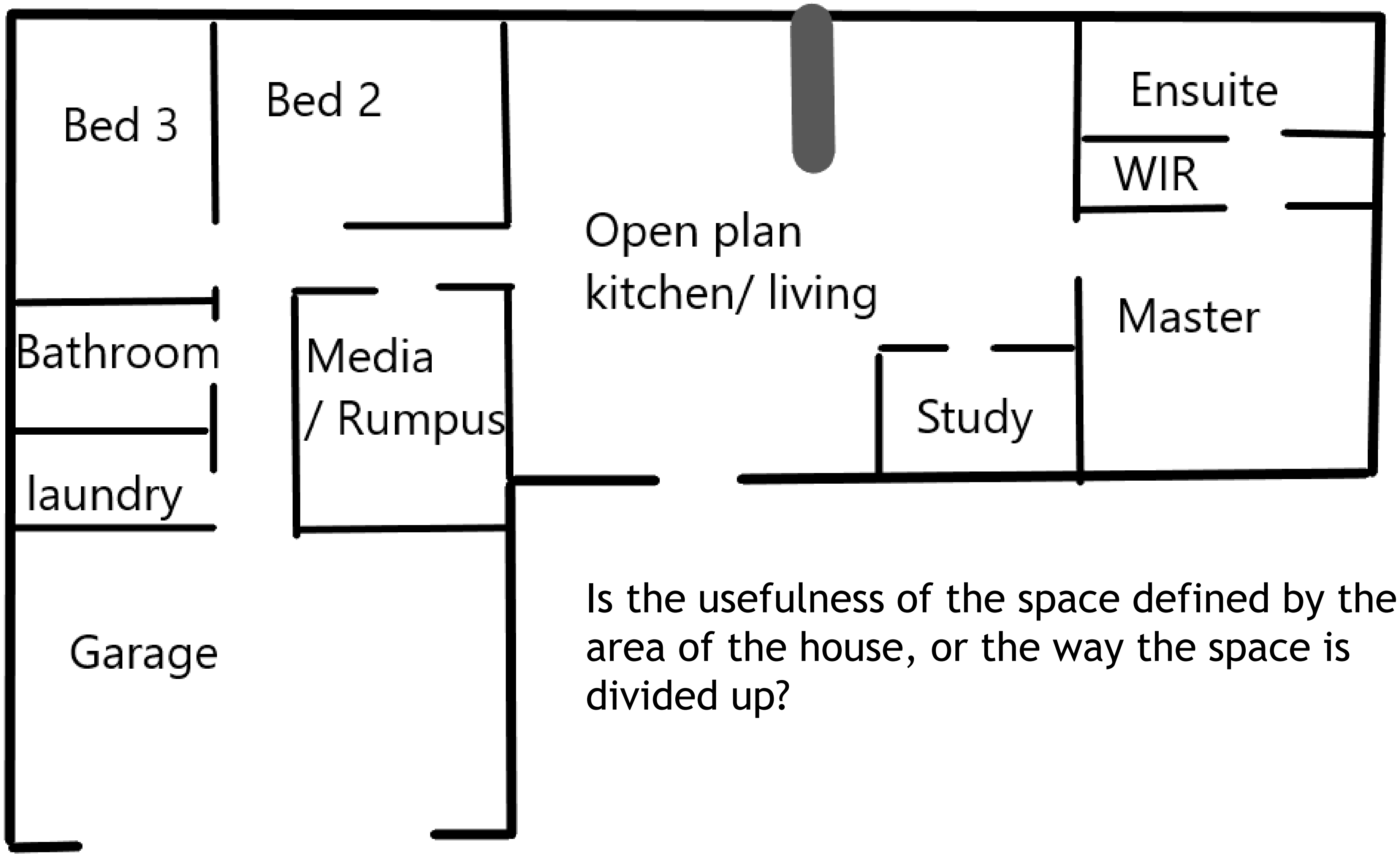
For comparison – without any further transformation

- $HeatLossNorm_{Direct} = \frac{HeatLoss}{FloorArea}$

Multiple methods for different purposes common – one method chosen from each country (UK is SAP, UK is HERS, Aus is based on NatHERS)

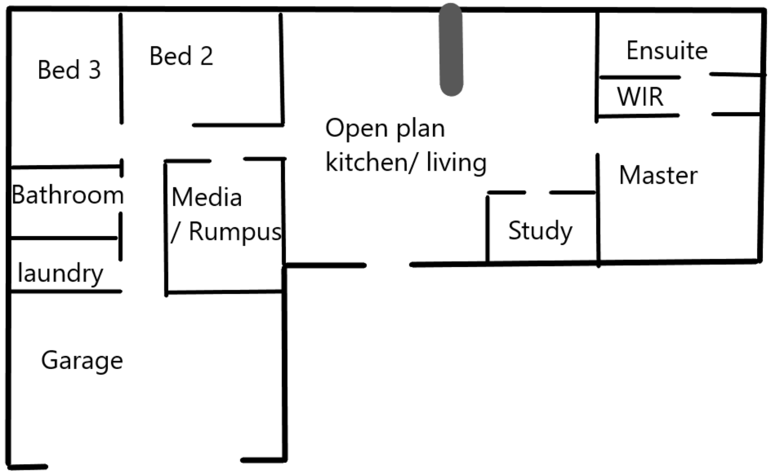
- $HeatLossNorm_{UK} = \frac{HeatLoss}{FloorArea+45}$
- $HeatLossNorm_{US} = \frac{HeatLoss}{QestLoss_{floorarea,std\ glazing}}$
- $HeatLossNorm_{AUS} = \frac{HeatLoss_{actualhouse}}{FloorArea} \frac{HeatLoss_{200sqm,std\ glazing,square\ house}}{HeatLoss_{floorarea,std\ glazing,square\ house}} \frac{FloorArea}{200}$

How many people can live in this house appropriately ?



Is the usefulness of the space defined by the area of the house, or the way the space is divided up?

How many people 2?



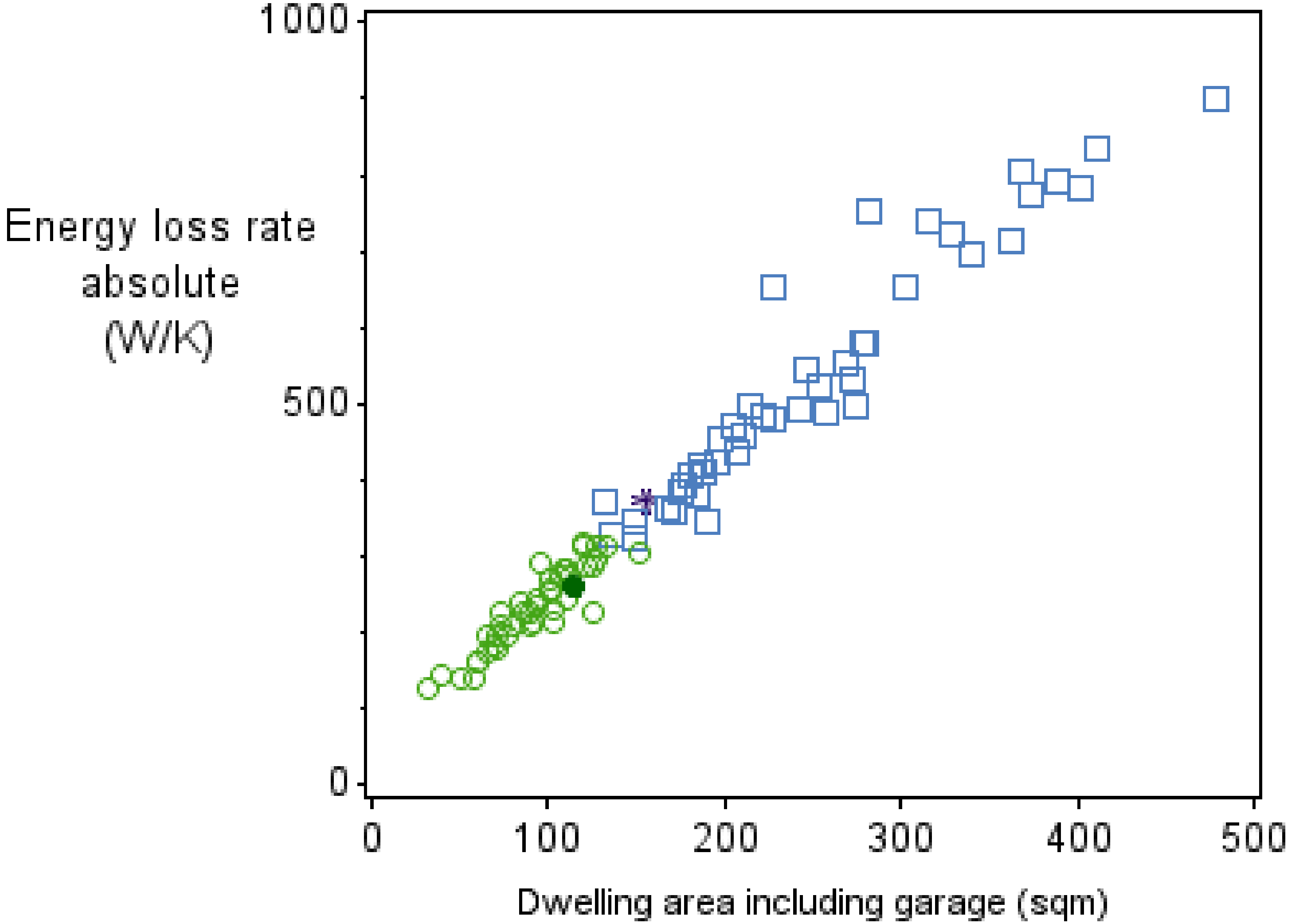
- Cultural Aspirational = *2 in master + 1 in other labelled bedrooms* = 4
- Basic CNOS= *up to 2 per bedroom or study area* = 8
- 1947regs sizes = *people by floor area of bedrooms + study* = maybe 9 (4 in master, 2 each in bedoomrs 2 & 3, 1 in study)
- 1947regs sizes toil /bath CNOS= people by floor area of bedrooms + study, *capped at 2 people per room; capped at 7 per access to bathroom/toilet without violating privacy* = 7
- 1947regs sizes toil /bath CNOS= people by floor area of bedrooms + study + *secondary living areas suitable for bedrooms* , capped at 2 people per room; capped at 7 per access to bathroom/toilet without violating privacy = 9

87 house plans

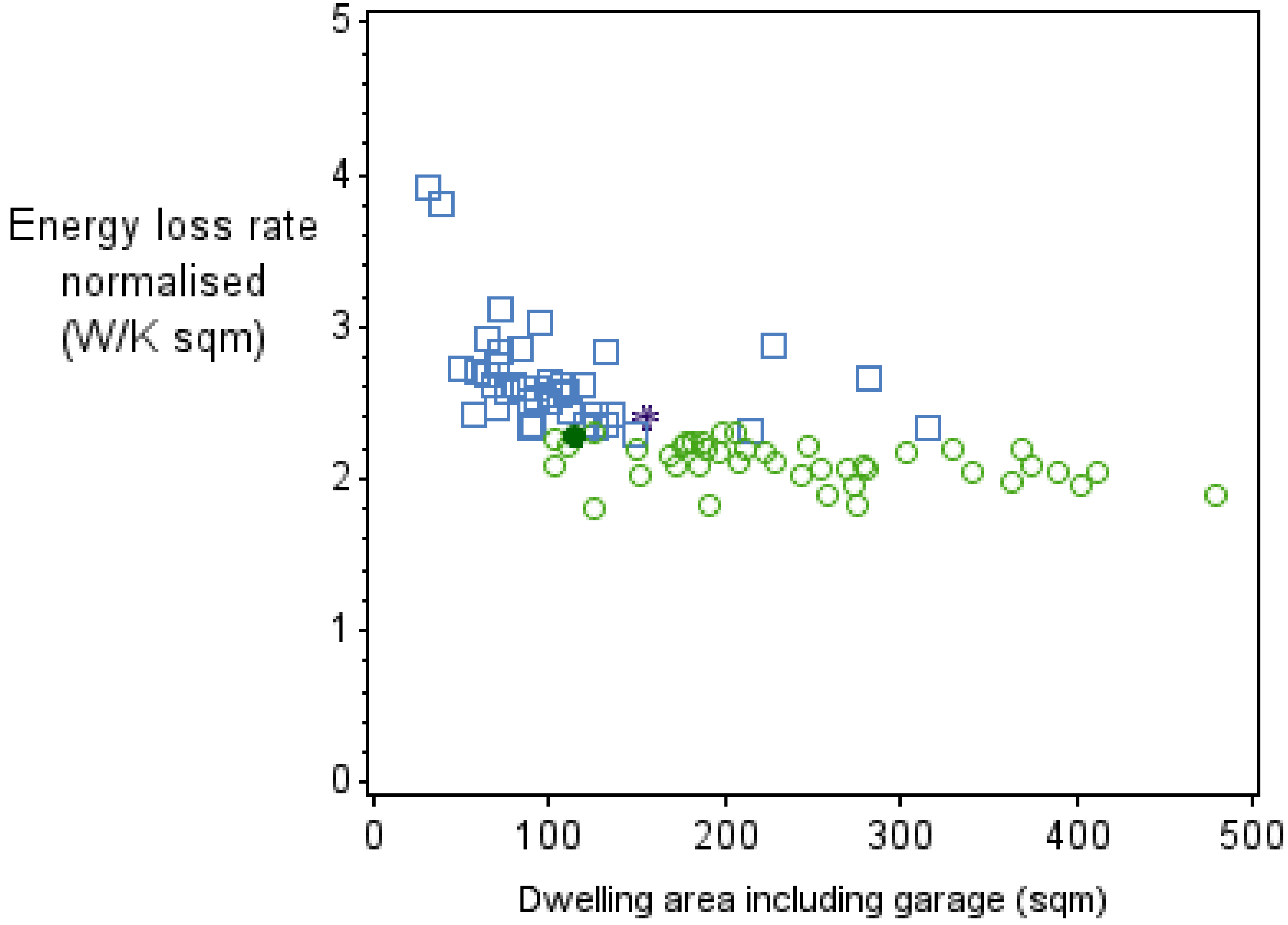
- 2 tiny houses
- 23 State house plans from 1940s to 1960s (stratified sampling on house size)
- 62 Plans of modern houses from 10 developers websites (stratified sampling on developer size and house size)

- Simple measurements taken from plans – to estimate potential heat loss and occupancy
- (Very) simple thermal modelling. Crucially all dwellings plans here assumed built to same standard.

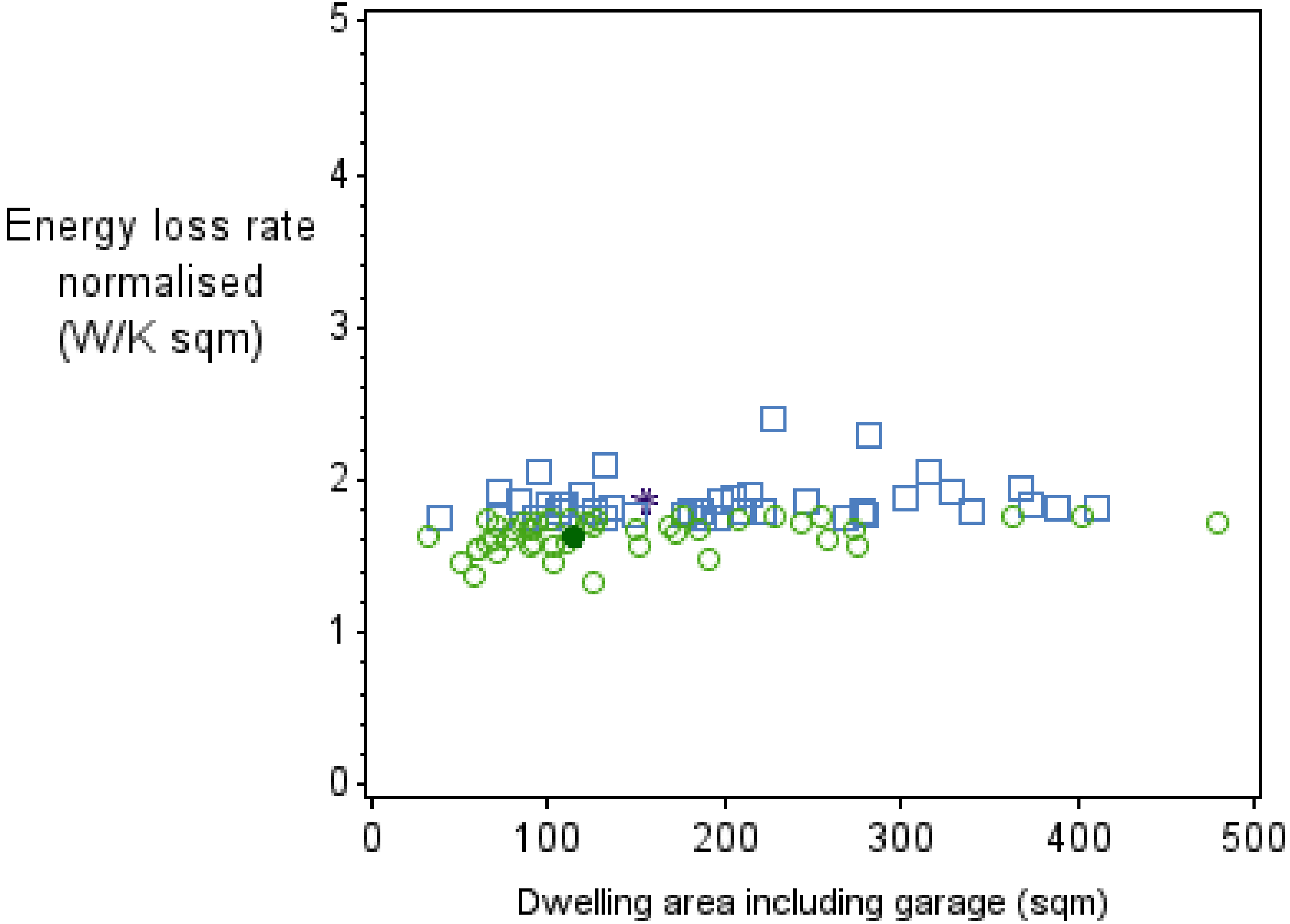
Energy loss rate - absolute



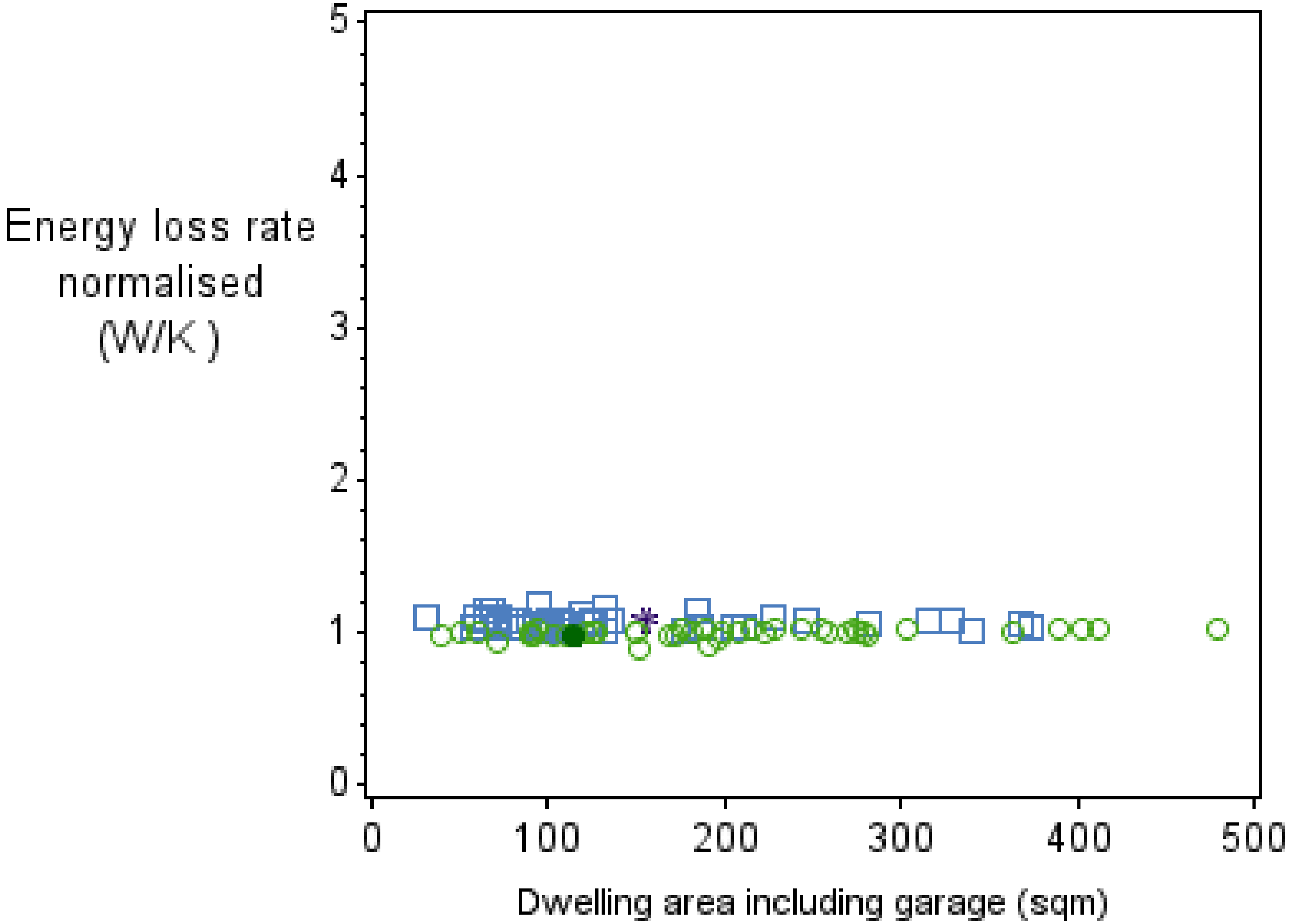
Energy loss rate - direct - per square meter



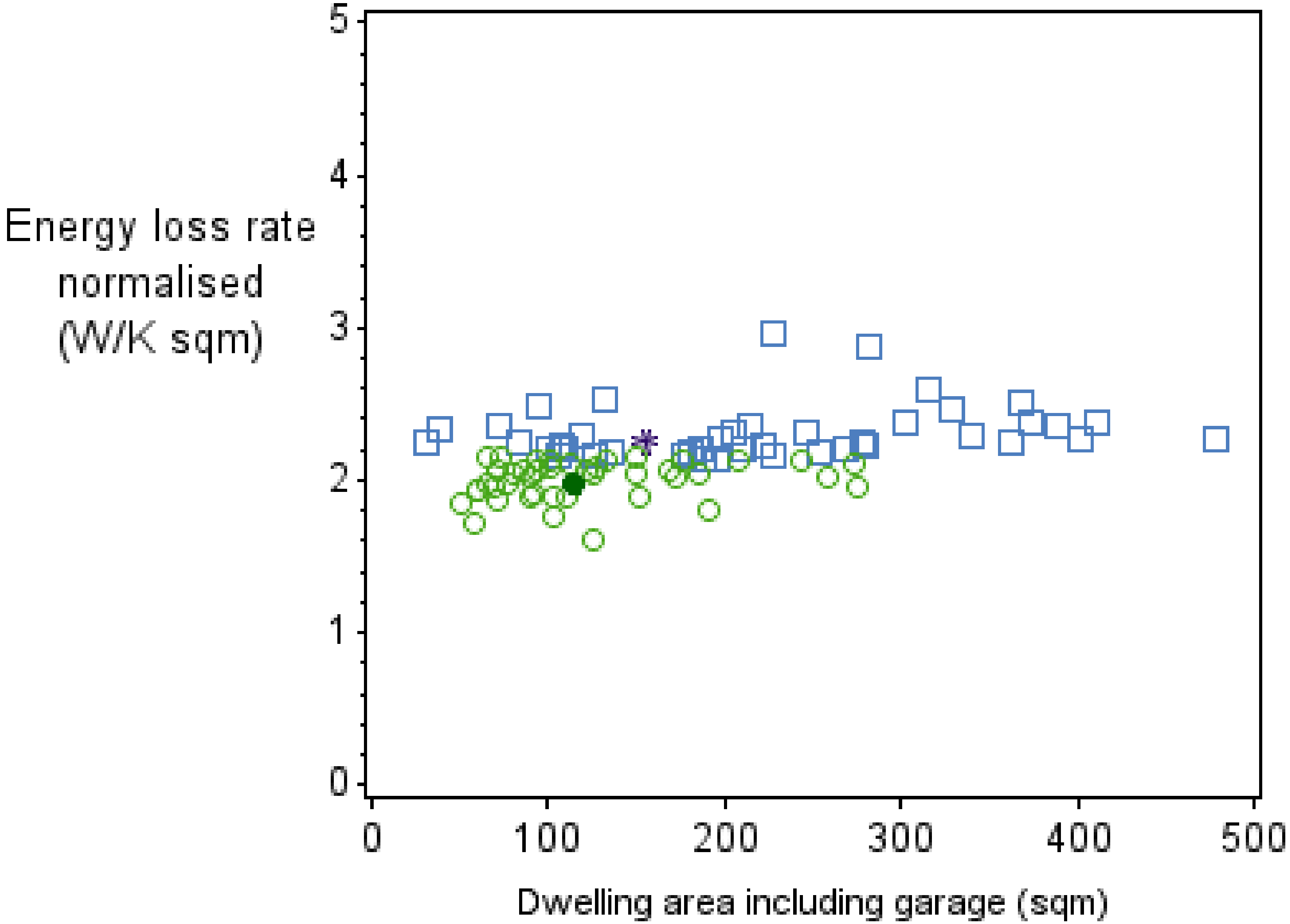
Energy loss rate - UK - per square meter rescale



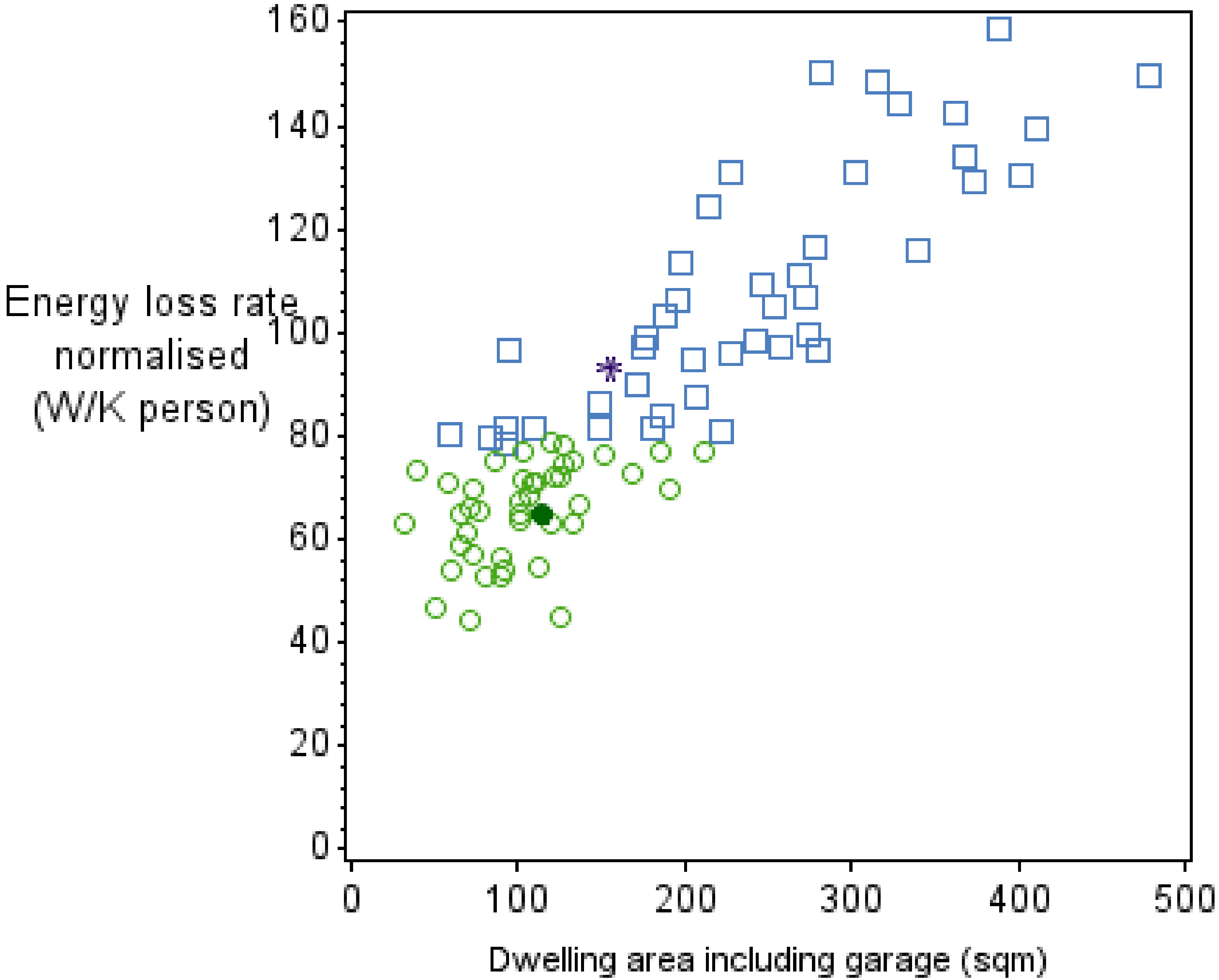
Energy loss rate - US - rescale

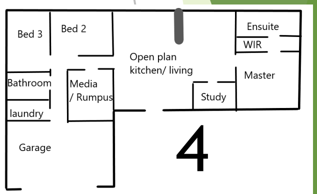


Energy loss rate - Australian - rescale

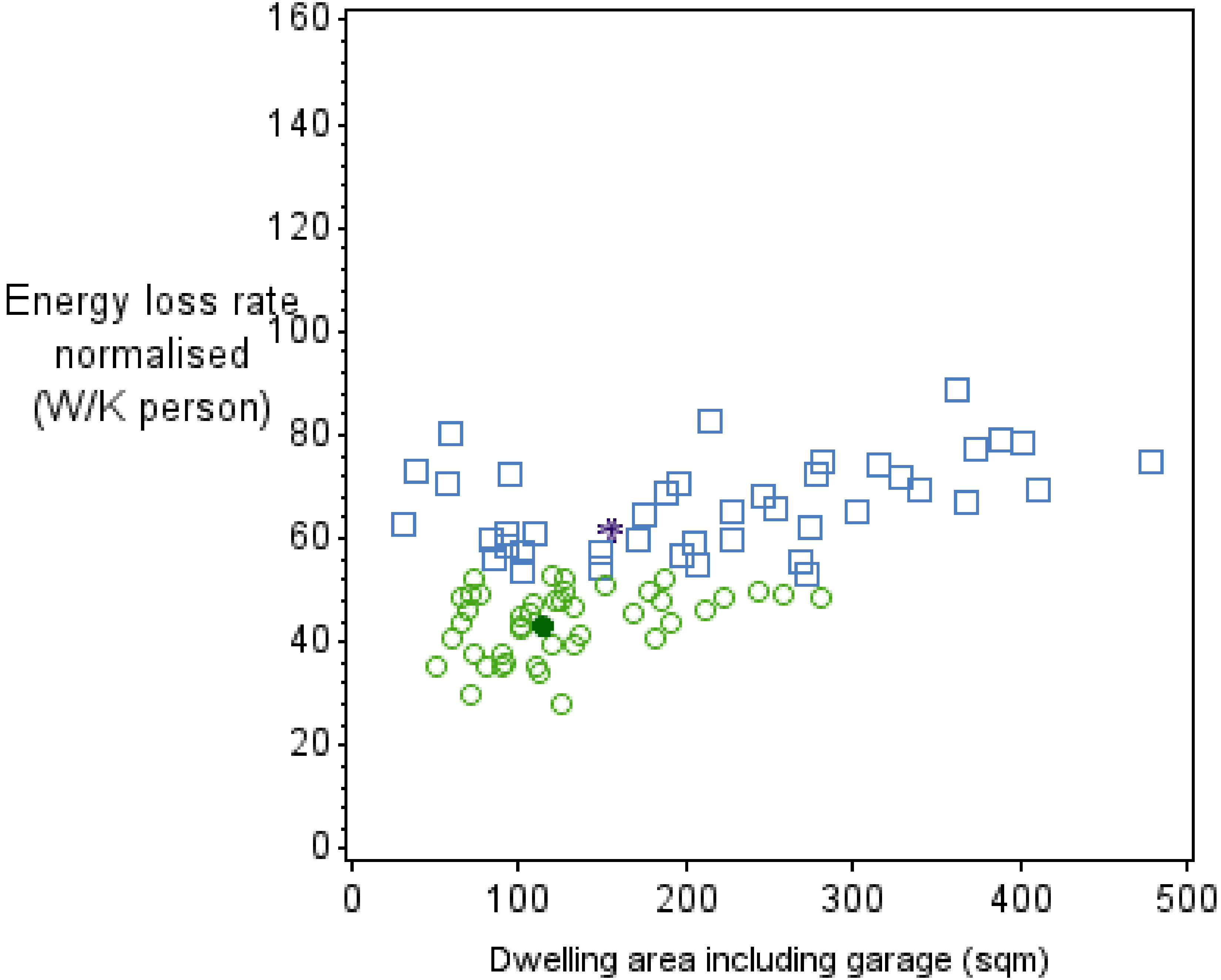


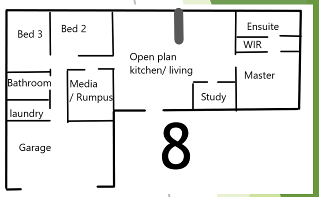
Energy loss rate - Cultural Aspirational - rescale



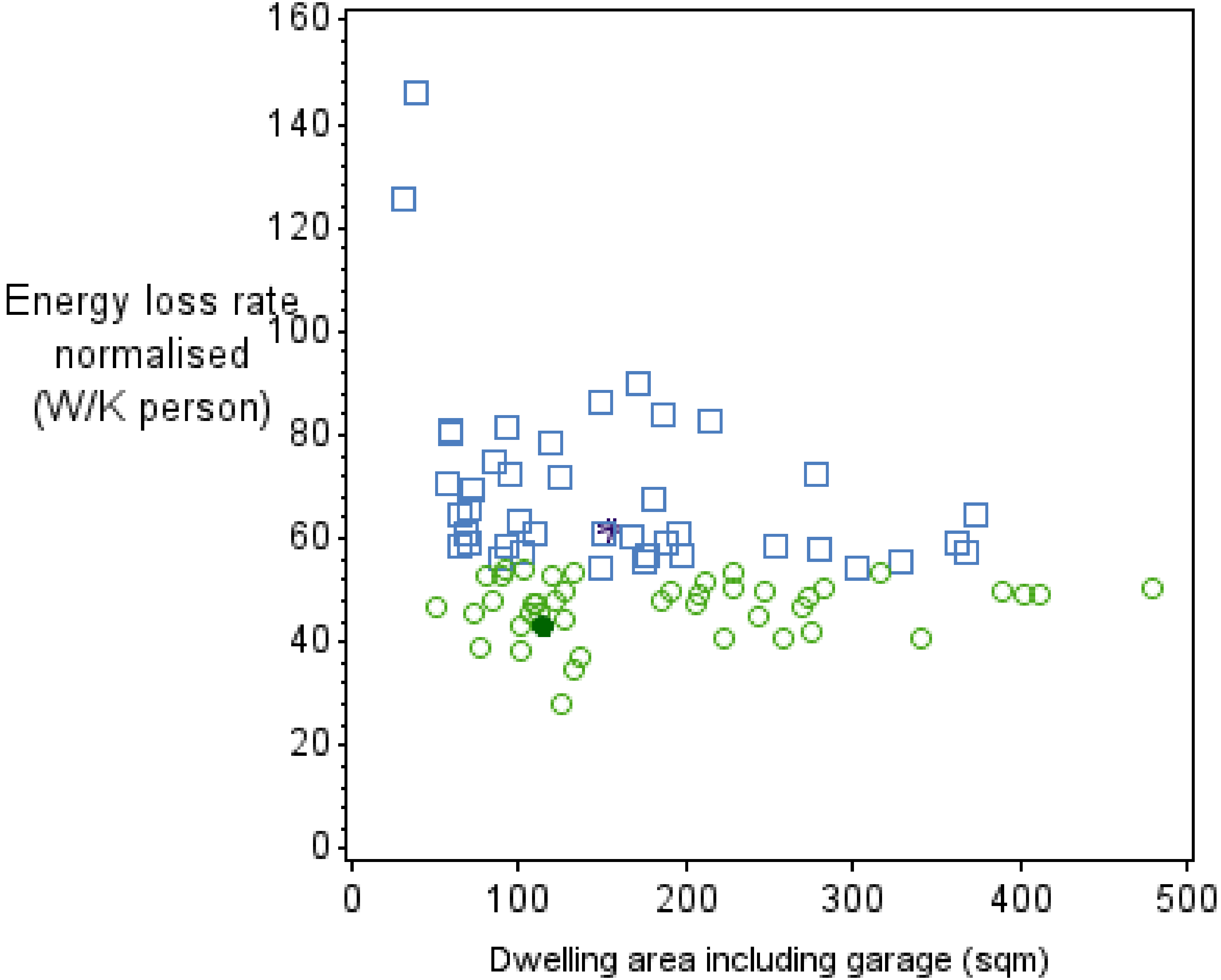


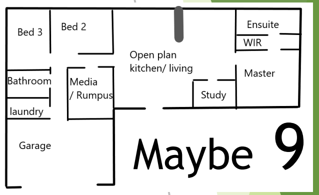
Energy loss rate - CNOS (2 per bedroom) - rescale



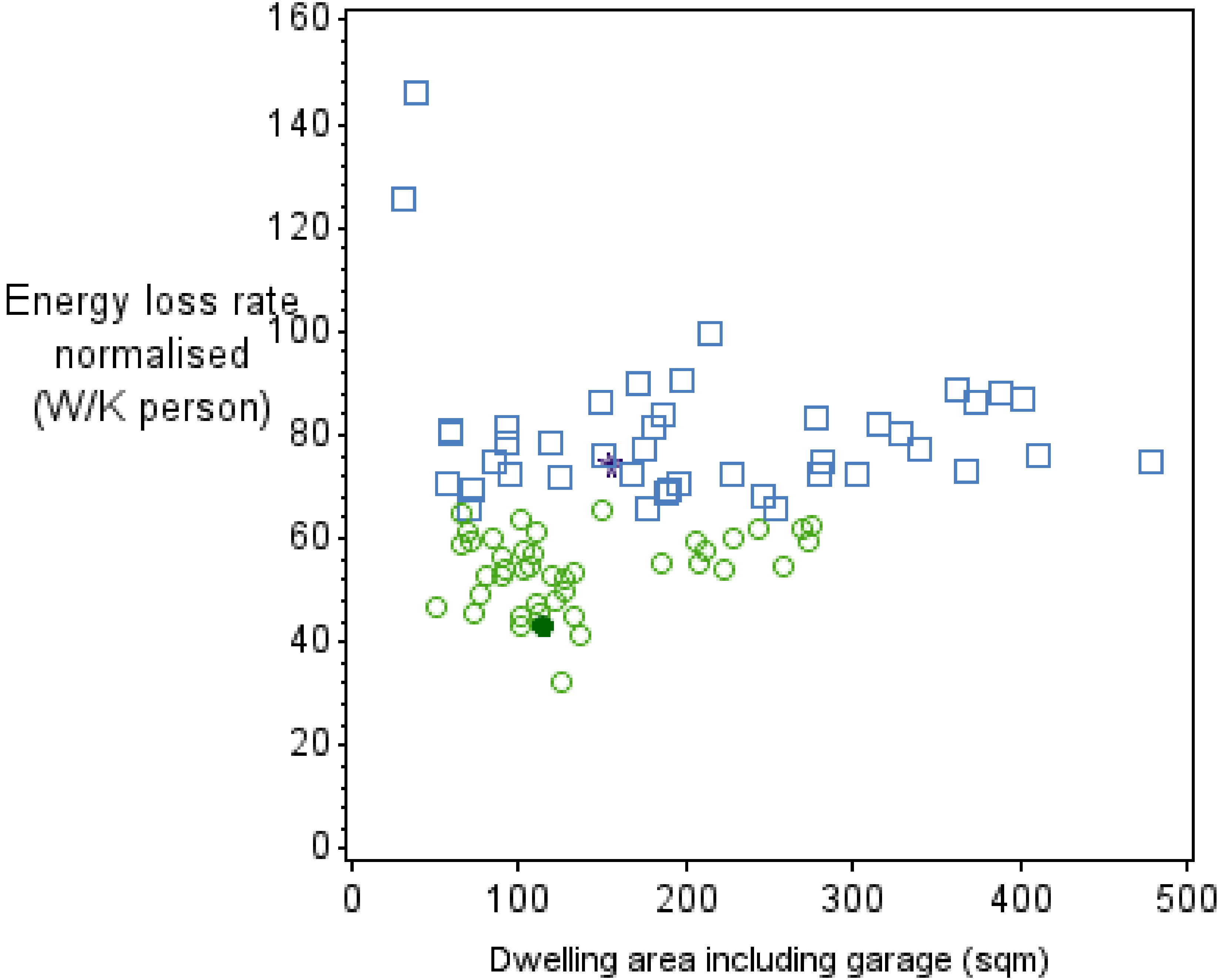


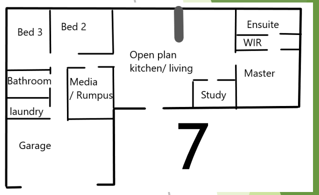
Energy loss rate - 1947 adult reg - rescale



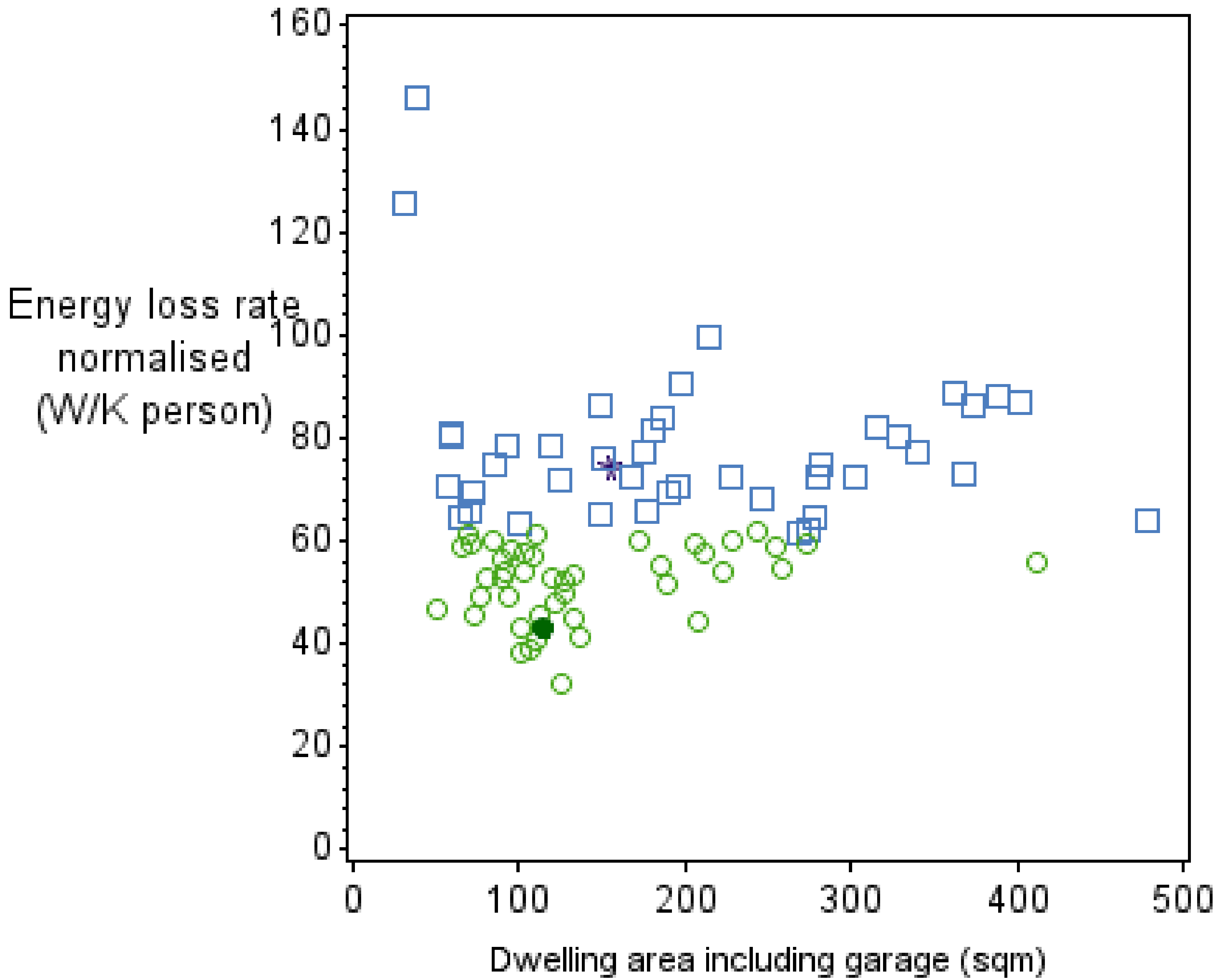


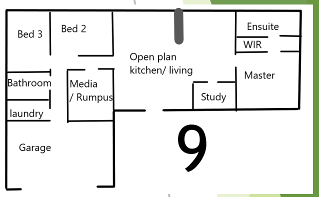
Energy loss rate - 1947 adult reg/CNOS + bathrooms/toilets- rescale





Energy loss rate - 1947 adult CNOS + baths/tois +living spaces- rescale





- 87 sets of plans
- 1 in the best half of all 10 parametizations, 1 in worst half. 85 in between.
- Of the final 8 parametizations, 4 always in worst half, 6 always in best half

- The type of normalisation matters.

Summary

- NZ by having waited has the opportunity to get this right
- Large houses tend to use more energy
- What do we want our dwellings to do? Do we want to encourage large dwellings?
- The method of normalisation matters
- Either the Australian method which includes effective corrections for both form and size; or one based on thoughtful occupancy appear appropriate.