Examples of Uses for BEES data

- **Total Energy Use (kWh) limited value**
- **'Normalise' to allow comparison**
- **Energy Use Index (EUI)**
  Annual Energy Use ÷ Floor Area (kWh/m² per yr)
- **Equipment Peak Load**
  Peak Power Demand ÷ Floor Area (W/m²)
- **Full Load Equivalent**
  Equipment hours of use (1 yr = 8760 hr)

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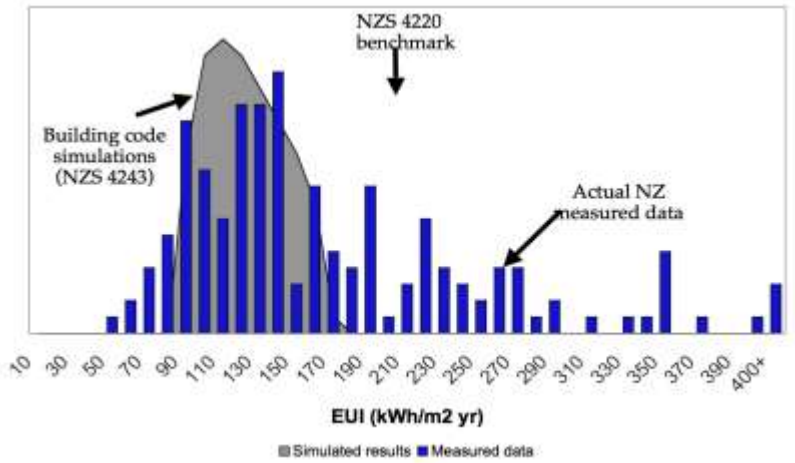
Historical NZ Energy Use Indices (EUI)



NZS 4220:1982 – Code Of Practice For Energy Conservation In Non-residential Buildings based on measured offices data in Auckland & Wellington

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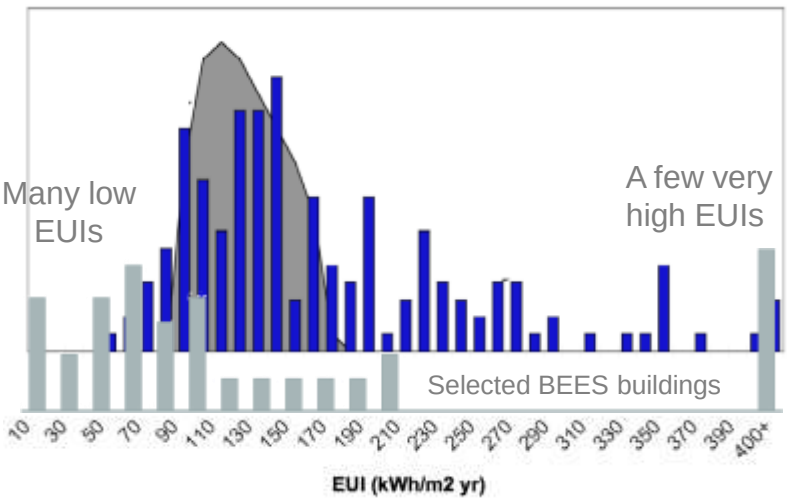
Initial BEES measured EUIs



BEES randomly selected smaller buildings.

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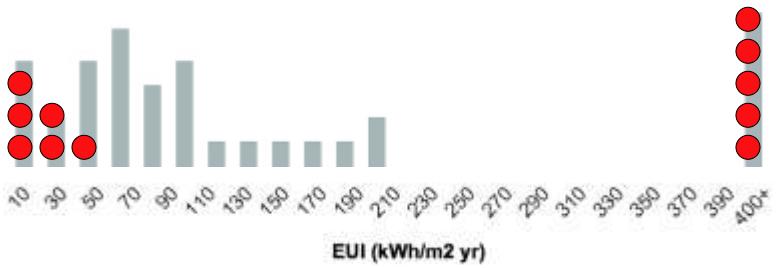
Analysis

BRANZ

Low and High EUI premises were analysed to find out 'why'



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High & Low EUI – some numbers

BRANZ

Use	Area (m^2)	People (count)	People density (m^2/person)	EUI (kWh/m^2y)	Power density (W/m^2)
Butcher shop	216	18	12	777	225
Fish and Chips	69	10	7	723	693
Supermarket	3,621	210	17	459	83
Liquor store	298	20	15	401	86
Restaurant	165	39	4	302	101
Retail/Factory	405	16	25	45	28
Worship	85	48	2	43	55
Building supplies	1,680	29	58	37	15
Garden shop	303	22	14	25	13
Office/Warehouse	1,543	15	103	25	8
Hardware store	384	4	96	14	11

- EUI offers only consistent method for comparison

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EUI – Similarities & Differences

Low EUI	kWh/m²/yr
Hardware Store	14
Garden Shop	25
Office / Warehouse	25
Building Supplies	37
Worship building	43
Retail / Factory	45
High EUI	
Restaurant	302
Liquor Store	401
Supermarket	459
Fish and Chips	723
Butcher Shop	777

- Low EUI
  - Low or infrequent occupancy
  - Uncontrolled conditions
  - Limited area/time of use
- High EUI
  - Food handling
  - &/or High refrigeration
  - &/or Cooking loads.
- Results not surprising but interesting

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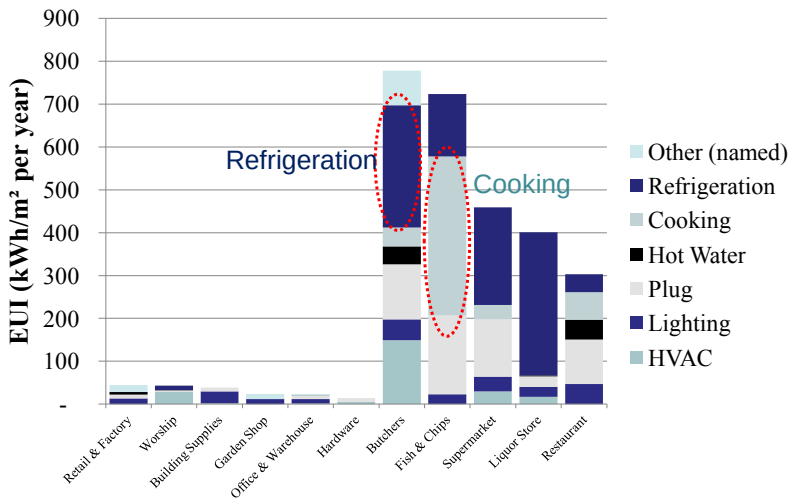
High EUI – largest uses



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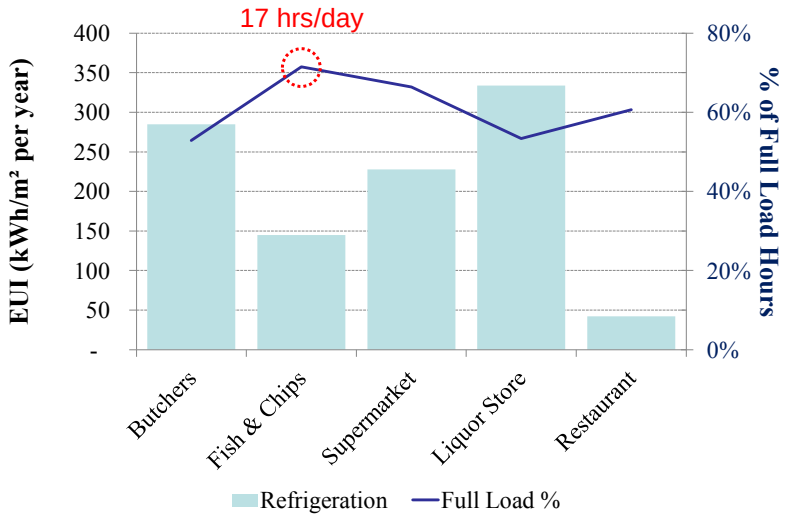
Refrigeration



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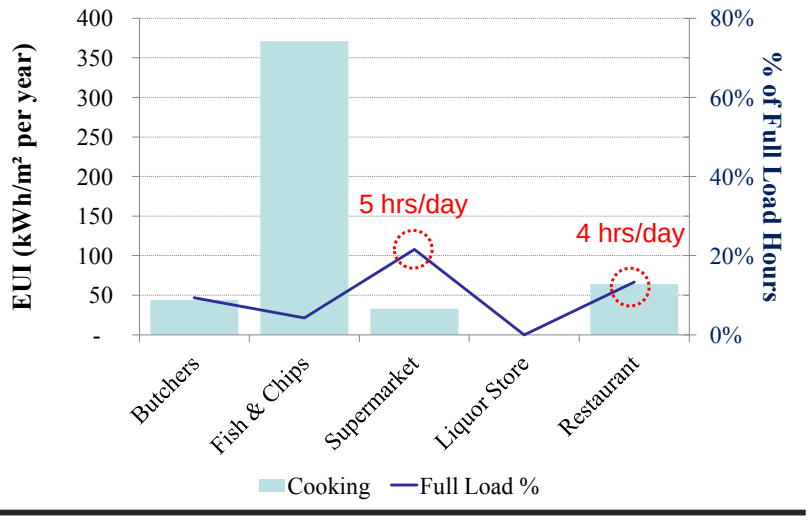
Cooking



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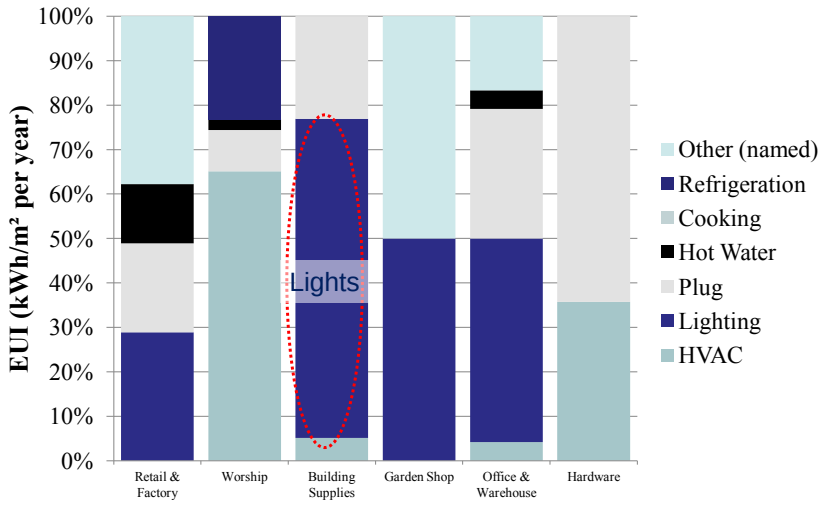
Low EUI – highest uses



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Key Lessons

- **Retail – large variations in**
  - Uses
    - Changing temperature uses energy
    - Up (cooking) or Down (refrigeration)
    - High EUI due to high load and long hours of use
  - Comfort
    - Variable in high and low EUI businesses
  - Controls
    - Energy use **not** well controlled
    - High full-load equivalent hours of use
- **No offices very high or very low EUI**
  - Will be explored further in the coming year

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