
# Appliance Electricity Use in NZ Houses

## Household Energy End-use Project (HEEP)

**Michael Camilleri, BRANZ Ltd.**

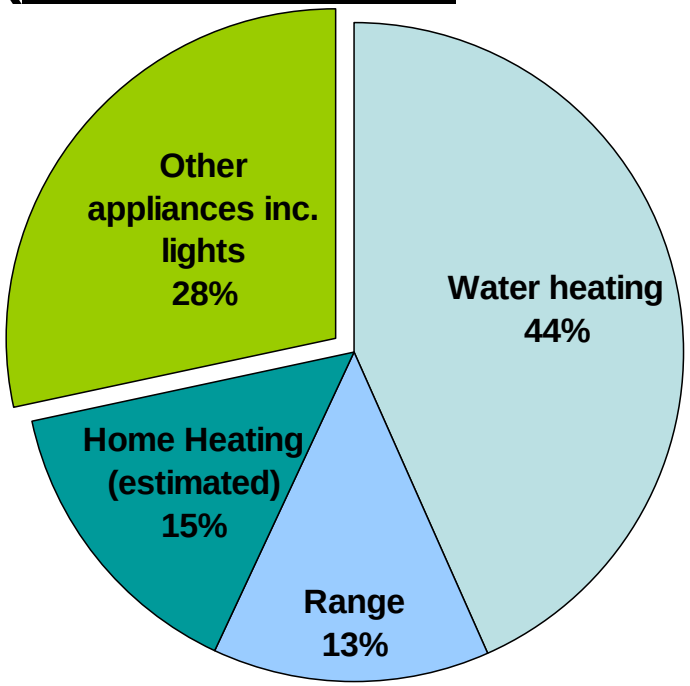
# People use many appliances

# Electricity Use

- **Electricity is a critical residential fuel**
  - 69% of ‘official’ residential energy use
  - 63% house energy = low temp. (water, air)
  - Most electricity NOT used for heating
- **So where do we use electricity ?**

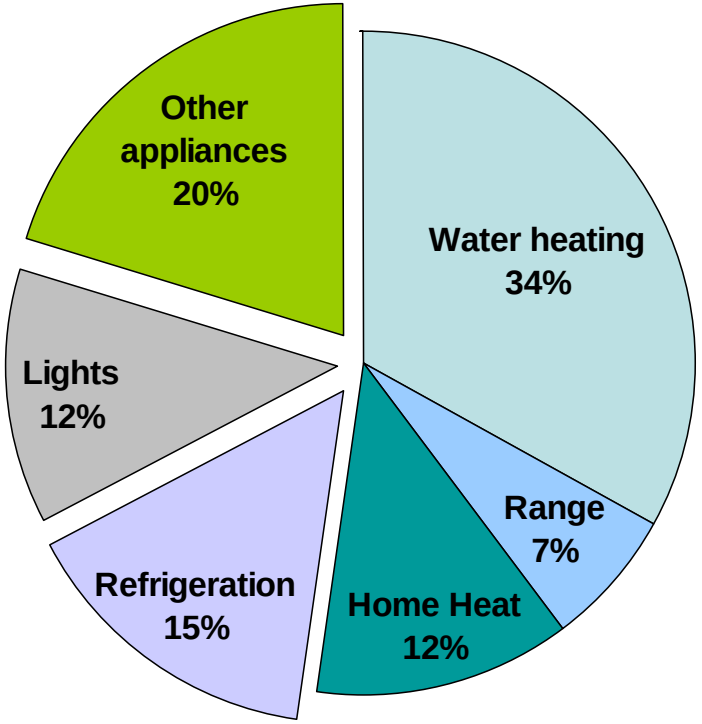
# What was/is electricity used for?

## 1971/72 Electricity Study (not all-electric houses)



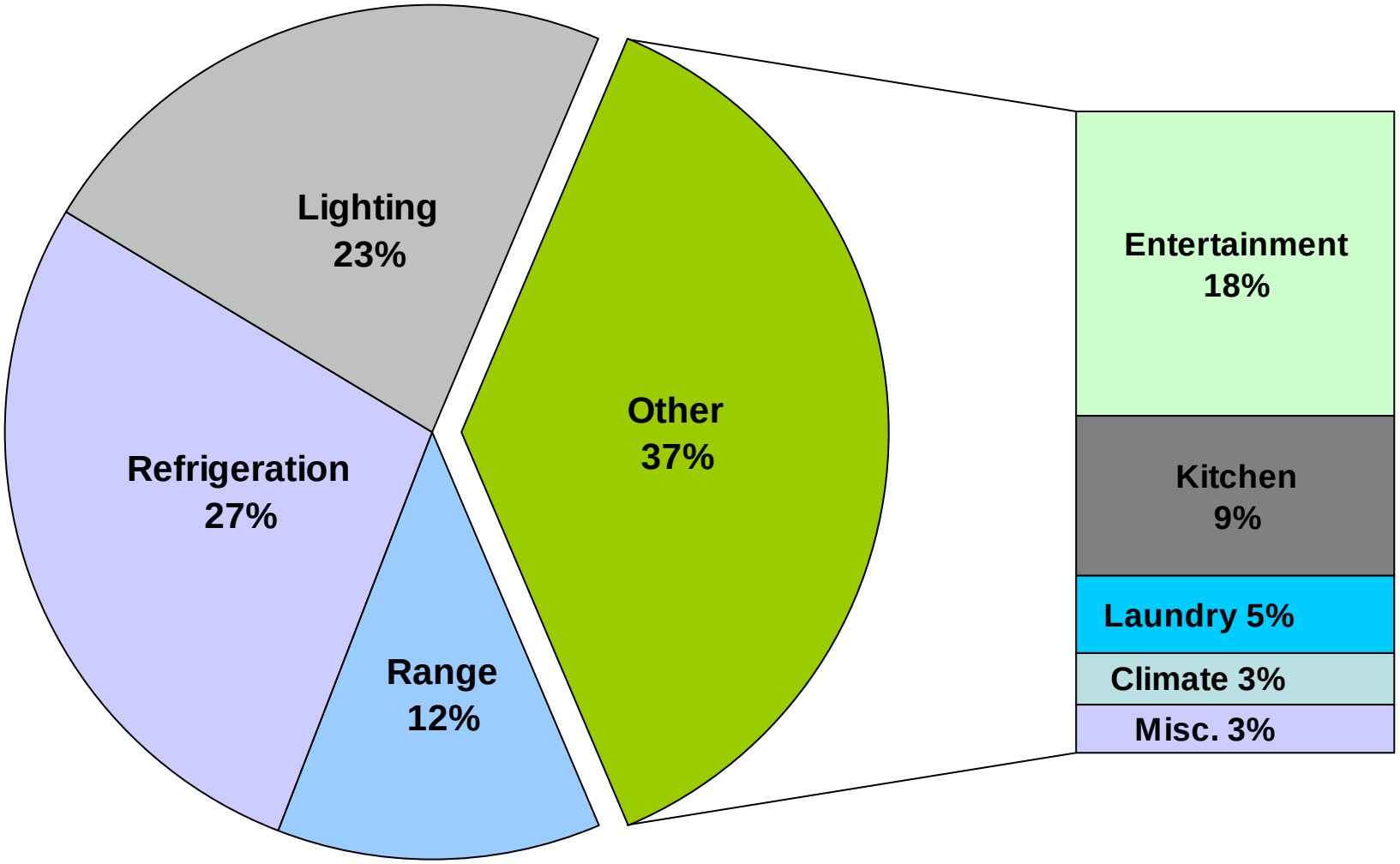

Average per house = 8,400 kWh/yr
(Statistics NZ & NZ Electricity Dept)

## HEEP NZ Average 2004




Average per house = 7,750 kWh/yr
(HEEP Yr 10)

# Non-heating Electricity

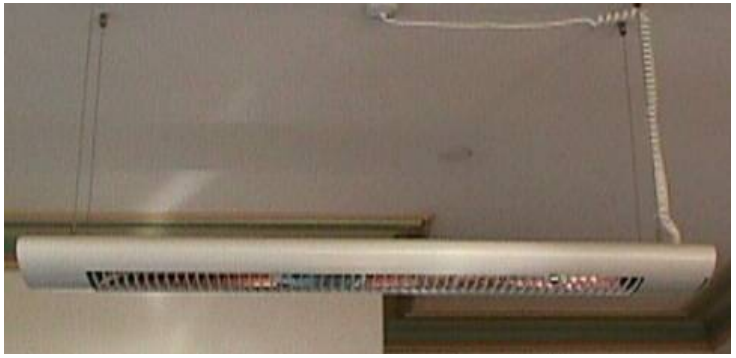


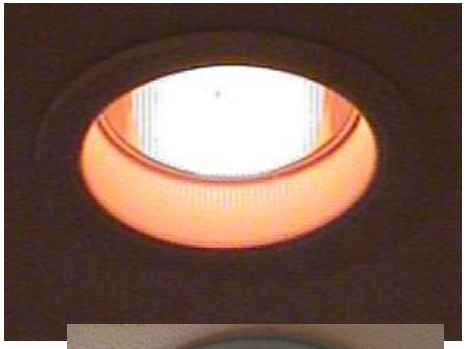

**Note:** Excludes Domestic Hot Water & Space heating

# Overview

- Lighting
- Refrigeration
- Range
- Entertainment
- Other Appliances
- Standby and Baseload
- Drivers Overview
- Into the future

# Lighting



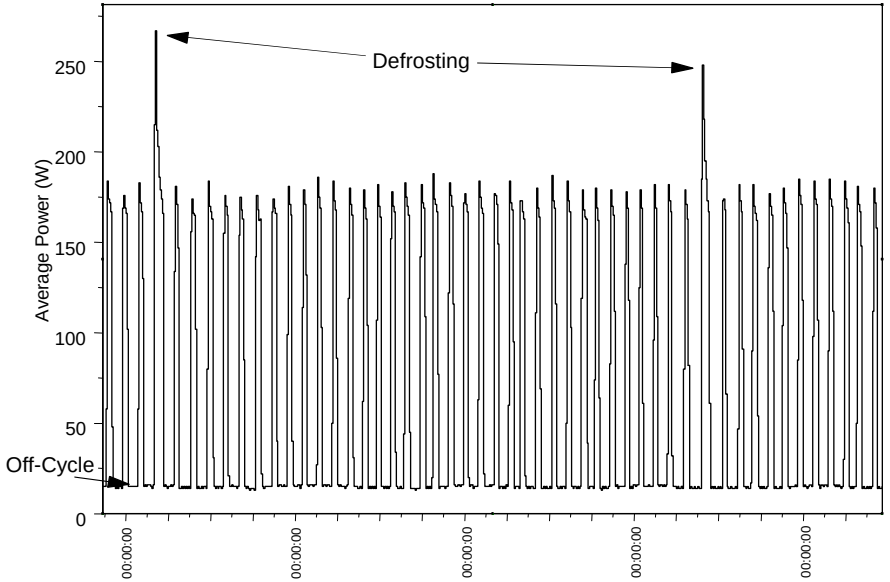


# Lighting

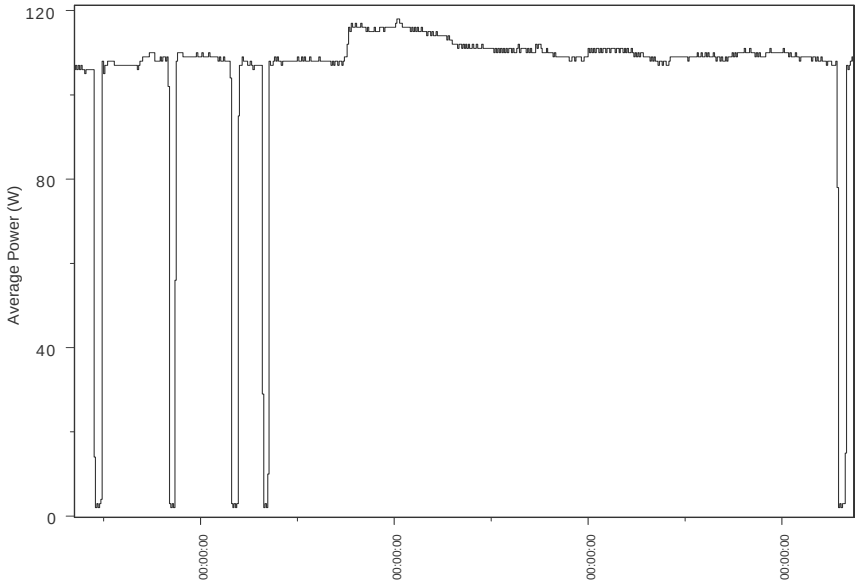
- **12% of electricity consumption**
- **Important peak load**
- **Still mainly incandescent**
- **Large improvement with CFL and future lighting technologies**
- **What drives lighting consumption?**
  - Floor area and number of occupants

# Refrigerators

## Healthy Refrigerator

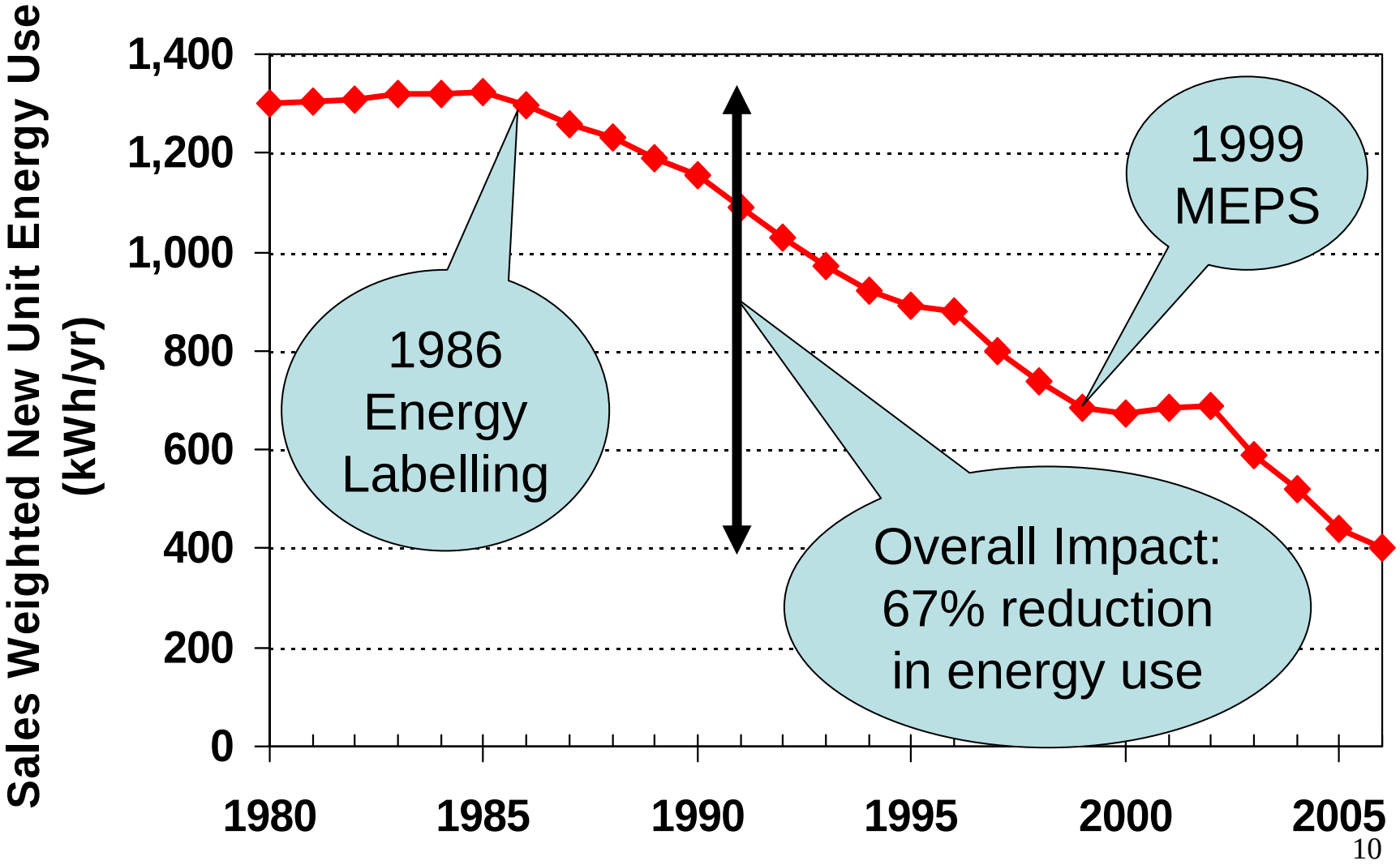



## Unhealthy Refrigerator




- **Refrigerators ~ 15% of household electricity**
- **Type and age (CFC refrigerants stopped 1994):**
  - Fridge Freezer: 50% older than 1994
  - Fridge: 55% older than 1994
  - Freezer: 80% older than 1994
- **1 in 6 are a problem (9% faulty + 7% marginal) ~ 450,000**

# Energy Use of New Frost-free Fridge-Freezers in Australia






Source: Australian Greenhouse Office, 2005

# Garage Fridge – Gladiator series by Whirlpool ~$US900

BRANZ

## CHILLERATOR® GARAGE REFRIGERATOR ENERGY COMPARISON

**TOTAL SAVINGS OVER 15 YEARS**

| | | |
|---|---|---|
| 20* | SAVE $58 PER YEAR | $870 |
| 15* | SAVE $43 PER YEAR | $645 |
| 10* | SAVE $20 PER YEAR | $300 |

*YEAR OLD PRODUCT

**SOURCE: AHAM'S INDUSTRY ENERGY DATA**

ESTIMATED ENERGY SAVINGS OF REPLACING YOUR 10, 15, AND 20 YEAR OLD REFRIGERATOR WITH A NEW GLADIATOR® CHILLERATOR® GARAGE REFRIGERATOR; 2004 NATIONAL AVERAGE RESIDENTIAL ENERGY COST OF 8.60 CENTS PER KWH.

# Refrigeration Model

- **Electricity consumption only depends on the refrigerator**
  - Type
  - Size
  - Age
- **Type, size, age and number of refrigerators depends on the occupants**
- **~2 refrigerators per house**

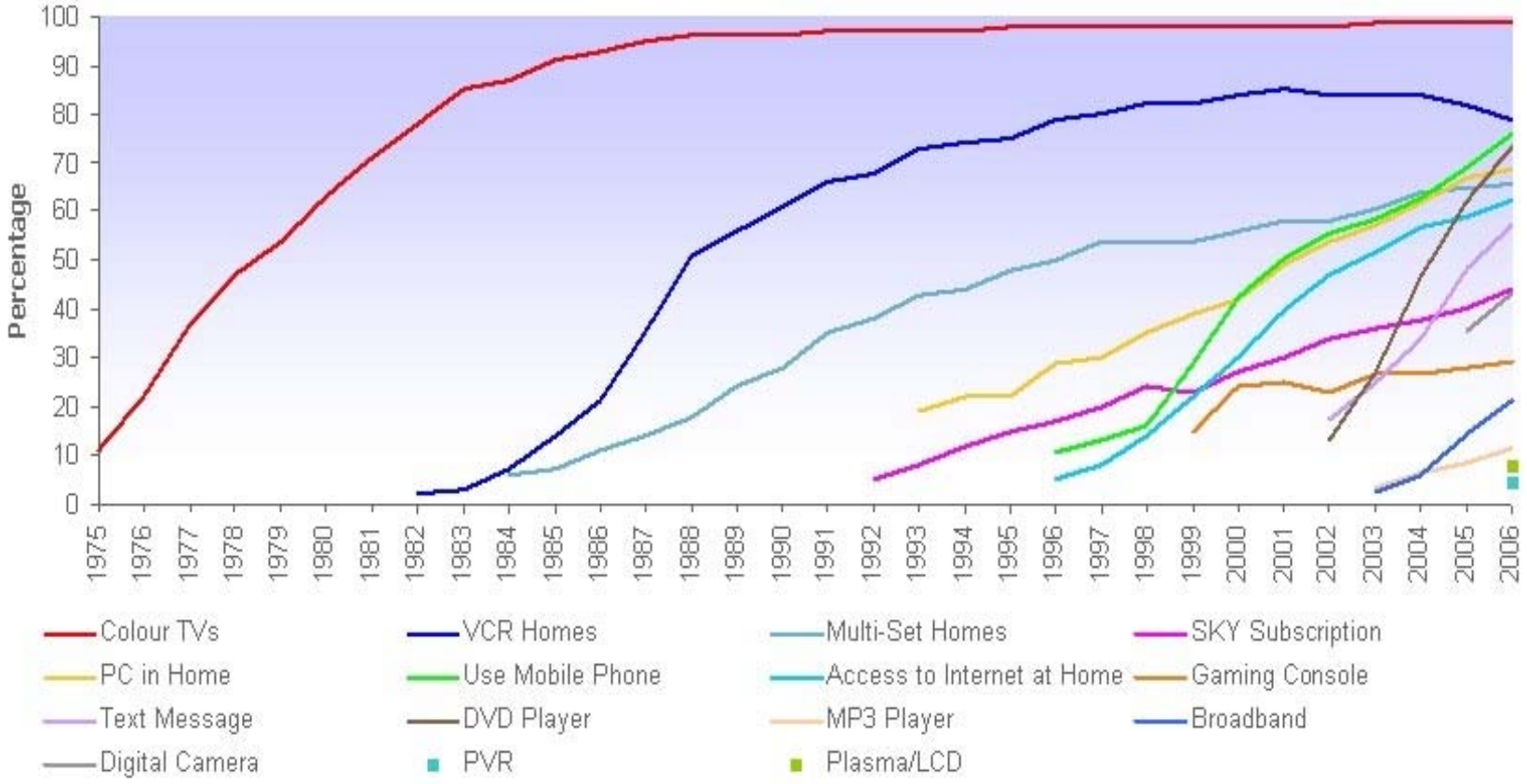
# Range

- Reduced over the last 35 years
- Less home cooking, smaller families, fewer appliances connected to range
- Little scope for energy efficiency
- Range use affected mainly by the number of occupants and floor area (-ve)
- Use of microwave reduces range use
- No overall reduction partly due to standby

# Entertainment

- **Includes TV, video, DVD, computers etc**
- **Rapid proliferation of new types – e.g. DVD recorders, hard disk recorders**
- **FreeView TV will increase consumption**
- **Fast uptake of large LCD and Plasma**
- **Most appliances not covered by MEPS**
  - Satellite decoders - raised by HEEP in 2001
- **Rapid growth in electricity consumption**

# Appliance Growth




**Source: Neilsen Media Research for NZ TV Broadcasters Council. www.nielsenmedia.co.nz/MRI_pages.asp?MRIID=37**

# Other 19%

- **Dishwashers, dryers, and washing machine already dealt with by MEPS and labelling**
- **Widespread use of cold water washes**
- **Is energy efficiency being countered by convenience?**
- **Lots of small appliances each consuming little energy**

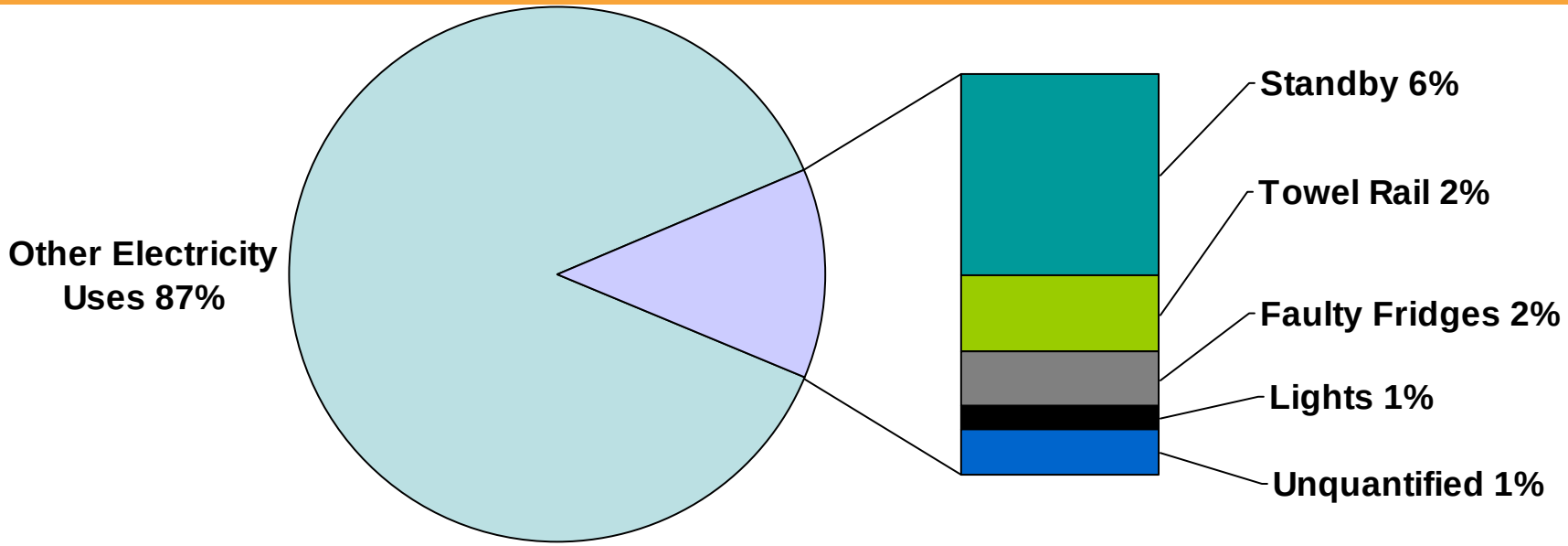
# Other 19%

- Alarm Clock
- Answerphone
- Audio Component
- Bench top mini-oven
- Breadmaker
- Burglar Alarm
- Ceiling Mechanical Ventilation
- Cellphone Charger
- Charger
- Coffee Maker
- Computer
- Computer Monitor
- Cordless Phone
- Crockpot
- Cupboard Heater
- DVD Player
- Dehumidifier
- Dishwasher
- Dryer
- Electric Blanket
- Electric Fence
- Electric Hobs
- Electric Lawnmower
- Electric Organ
- Electric Oven
- Electric Power Tool
- Extractor Fan
- Fan
- Fax Machine
- Food Processor
- Freezer
- Freezer
- Fridge
- Fridge Freezer
- Frying Pan
- Games console
- Garage Door Opener
- Hairdryer
- Halogen Lights-fixed
- Heat Pump Hot Water
- Heated Fish Tank
- Heated Towel Rail
- Heatlamp
- Intercom
- Iron
- Jug
- Juicer

# Other 19%

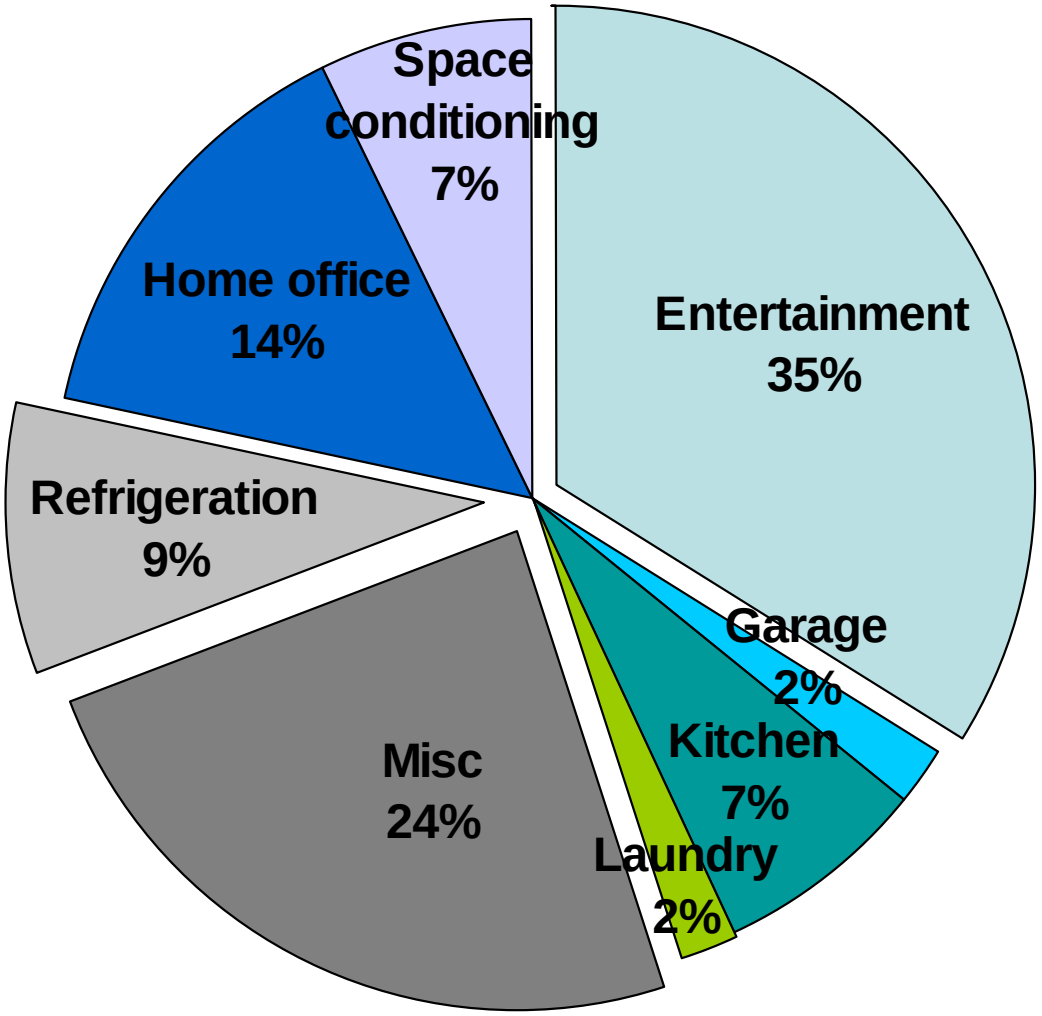
- Kiln
- Lamp
- Microwave
- Misc Entertainment
- Misc Gear
- Misc Household Appliance
- Misc PC Peripherals
- Misc Personal
- Mixer
- Plug Ins
- Pool Pump
- Printer
- Radio
- Rangehood
- Rice Cooker
- Separate Electric Grill
- Separate Radio Cassette
- Sewing Machine
- Shaver
- Sky/Saturn Decoder
- Small Kitchen appliance
- Spa Bath
- Spa Pool
- Stereo
- Television
- Toasted Sandwich Maker
- Toaster
- Toothbrush
- Vacuum
- Video
- Washing Machine
- Wastemaster
- Water Pump
- Waterbed
- Weedeater

# Standby & Baseload




- **Average (~ $150/yr) (13% elect.)112 W**
  - Standby – common appliances 57 W
  - Baseload – heated towel rails 21 W
  - Faulty refrigeration (~1 in 6) 15 W
- **NZ Electric heating (for 8,670 hr yr)105 W**

# Standby Energy Consumption

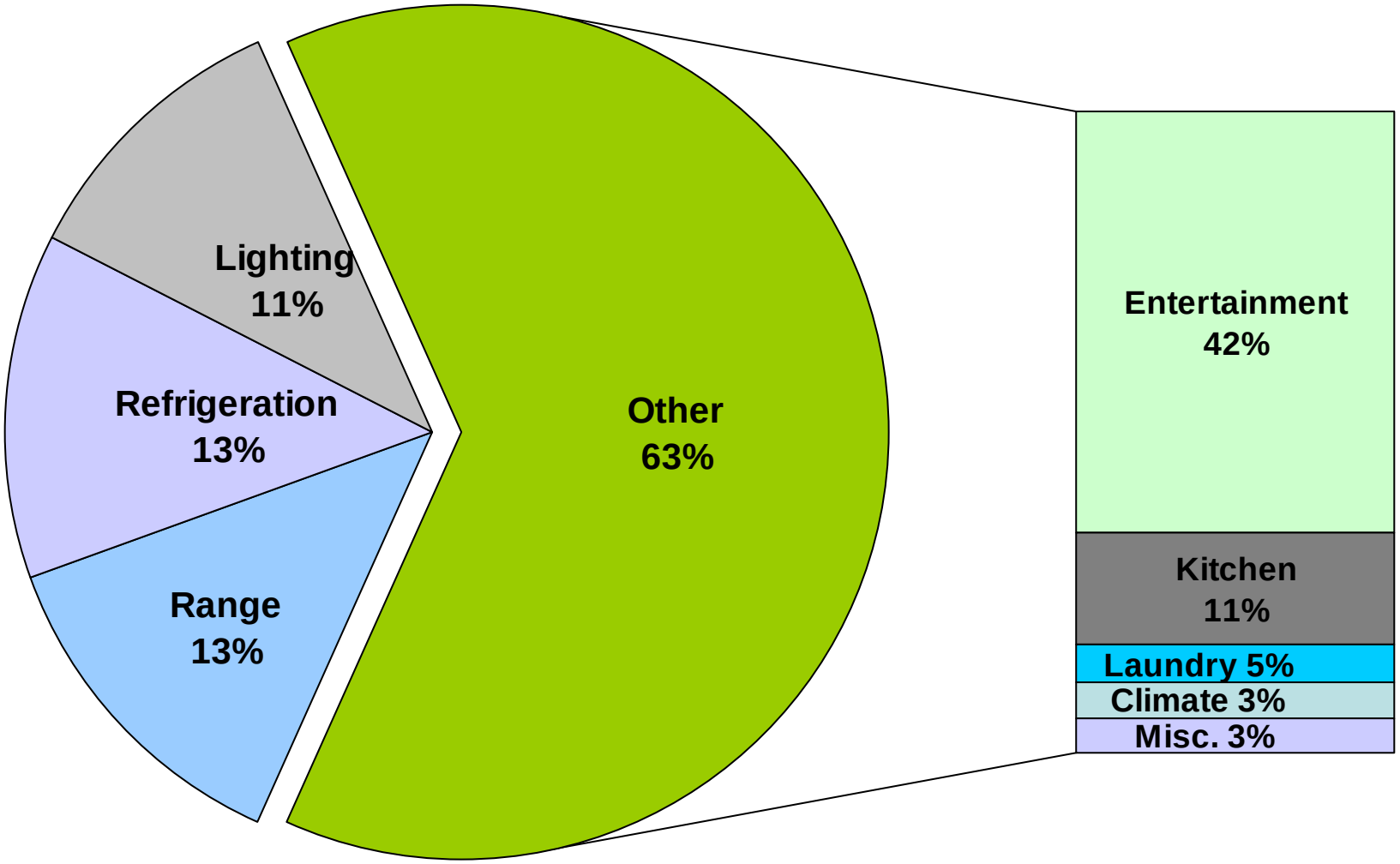


# Energy Consumption Drivers

| | Floor Area | No. Occupants | Income | Other |
|---|---|---|---|---|
| Lighting | Y | Y | | |
| Range | Y | Y | | |
| Refrigerators | | | | Y |
| Other | Some | Some | | Y |

- Income not an important driver of appliance energy consumption, but does influence ownership
- Floor area on its' own explains little
- No. occupants on its own explains a bit more

# A possible future ??




**Note:** Excludes Domestic Hot Water & Space Heating

# Key points

- **Non-heating appliances main use of electricity**
- **Possible appliance efficiency improvements**
- **House not major driver of appliance energy**
- **Entertainment electricity use = electric heating**
- **Entertainment demand rapidly increasing**
  - May become ***the*** major use of electricity
  - Unless heat pumps get there first!
- **MEPS need to catch up**
  - New appliance classes appear and decline rapidly
  - Performance levels need regular revision