Remaking Suburbia

# INDUSTRY AND POLICY DIMENSIONS

**Ass. Prof. Alan Pears**
Ass. Director Centre for Design,
Director Sustainable Solutions P/L

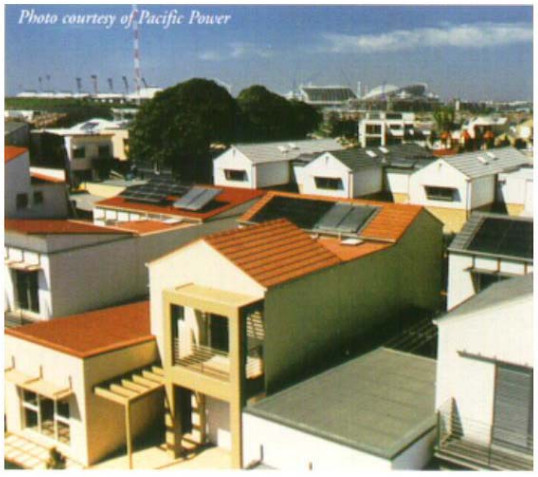
www.rmit.edu.au

Centre for Design
sustainability | research | solutions

Global Cities

RMIT UNIVERSITY

# Houses and Households: current and emerging environmental load issues




Adjunct Prof Alan Pears

Associate Director RMIT Centre for Design

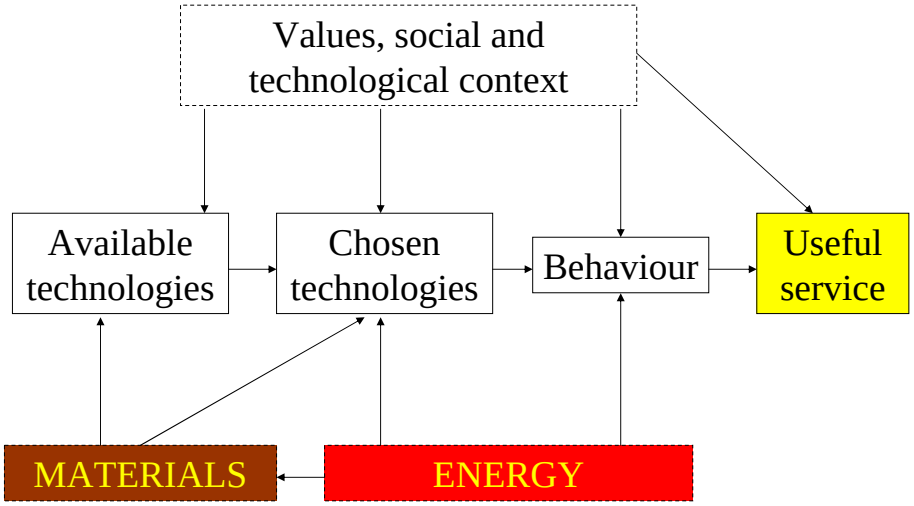
RMIT Environment & Planning

Director, Sustainable Solutions P/L

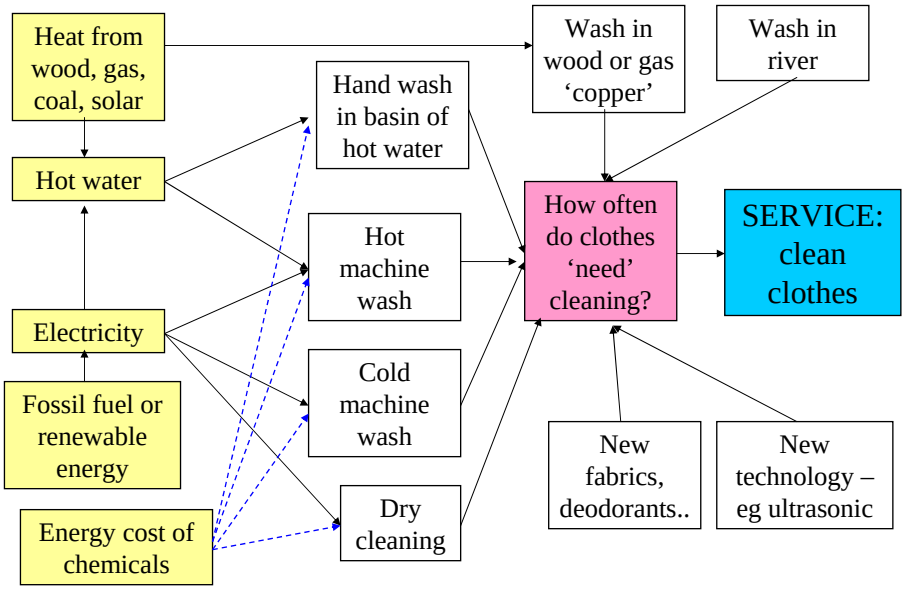
RMIT Centre for Design Conference, March 2009

## Energy and materials – inputs to services

(Pears 2004 – IEA paper)




## An example of an energy service: supply of clean clothes (adapted from Pears & Versluis, 1993)



Do we need large screen TV? What services do we really want? How much energy might *really* be needed? How important is energy in decisions – annual plasma TV energy cost = 8 DVDs….

**PLASMA TV**

**42”**
**250W**

**vs.**

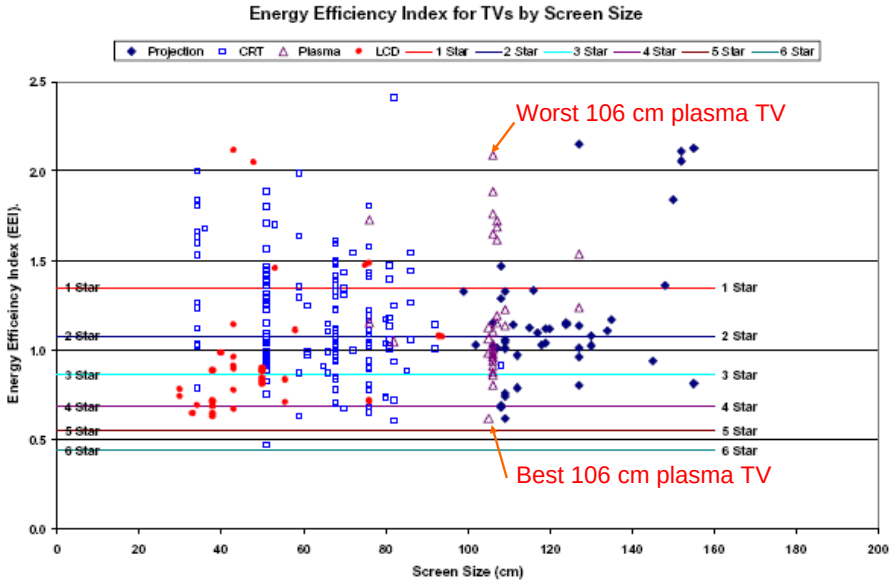
**27”**
**100W**

**Consumes 2.5x more energy**

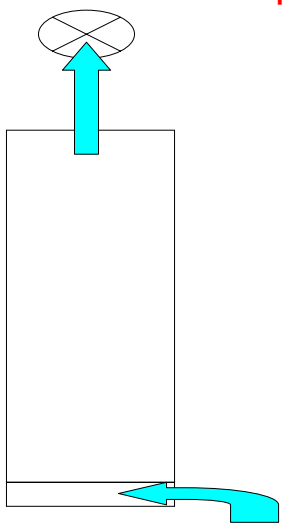
http://www.myvu.com/Products/universal/ - #


About 1 watt

*2004 AGO study shows wide range of performance for each type of TV, proposes energy label ratings – still waiting*

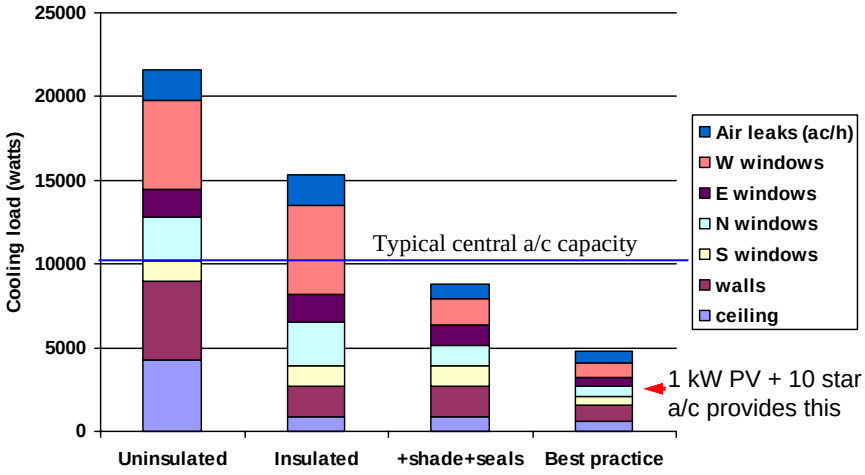


## Shower facilities and water-efficient showers – interpretation vs reality



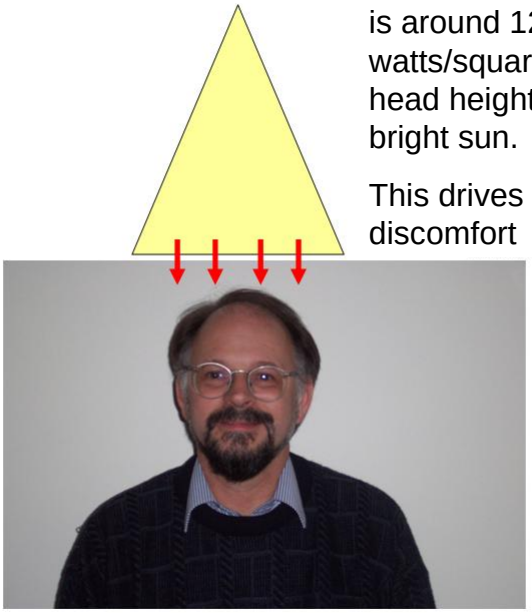
- People complain about cold legs under 3-star shower
- Conclusion: they're no good!
- Outcome: replaced by water guzzler
- Reality: 3* shower delivers less heat
- Cold air drawn over legs by exhaust fan evaporatively cools them
- Solution: exhaust fan switched separately from room light and NOT located above shower cubicle
- OR sealed glass door on shower cubicle

## Afternoon cooling requirements for a house on a very hot afternoon – a complex system



Lighting for this room costs $50/year for lamp replacements, 12 cents/hour – over $220 each year for energy (used 5 hours/day). Energy-efficient lighting would cost $35 pa

Removal of insulation around halogens for fire safety reasons can cut effective insulation R value from R4 to R2!



Heat from a halogen lamp is around 120 watts/square metre at head height – about 1/5 of bright sun.

This drives summer discomfort

6 News Sunday Age 22/7/07

# Thousands at risk from halogen-light death traps

MARK RUSSELL

THOUSANDS of Victorian homes fitted with halogen downlights are potential death traps, with 57 house fires in Melbourne over the past 18 months directly caused by the fashionable lights igniting roofing insulation.

Most worryingly, firefighters warn that as the blazes spread rapidly in the roof cavity, ceiling-mounted smoke alarms are unable to detect the inferno and most residents only become aware of the fire when the roof starts to collapse around them.

Unless tougher regulations on the use and installation of halogen downlights are introduced, it is only a matter of time before someone is killed, the Metropolitan Fire brigade has told *The Sunday Age*.

Two young children almost died in separate blazes when roofs crashed onto their beds while they were sleeping, brigade investigation and analysis unit officer Rod East said.

Melbourne blazes alone have caused an estimated $17 million damage in the past 18 months.

Halogen lights, which produce heat of up to 370 degrees at the base, are not dangerous until they come into contact with combustible roofing insulation, Mr East said.

"I don't think people realise the dangers," he told *The Sunday Age*. "We're very lucky no one's been killed in these fires."

MFB officers met representatives of Energy Safe Victoria, the state's statutory independent electricity, gas and pipeline safety and technical regulator, on Thursday to discuss tightening regulations on the use of halogen lights, as many are installed incorrectly and without non-flammable casings.

Mr East said other downlights did not appear to pose the same risk. Home owners needed to use licensed electricians to install halogen lights correctly, ensuring a clear space around them of at least 30 centimetres, he said.

Insulation such as the blow-in variety made from paper pulp was meant to be fire-retardant, but this often lasted only a few years. "There's a lot of subcontractors out there where you really worry about the quality of their product," Mr East said.

"You know they pump it in in the morning and at night the joint's burning down."

So far this year, 21 house fires in Melbourne have been sparked by halogen downlights igniting blow-in insulation. This compares to 36 similar house fires last year and 32 in 2005.

Mr East described halogen light fires as "horrific . . . they are burning in the roof before anyone knows".

In the most recent near-fatal fire, a boy aged about 10 became trapped when the roof fell on his bed on his family's first night back in their newly renovated Sandringham home. He scrambled free and a firefighter carried him to safety.

Sustainability Victoria's Roger Kluske said he was shocked by the number of house fires caused by halogen lights.

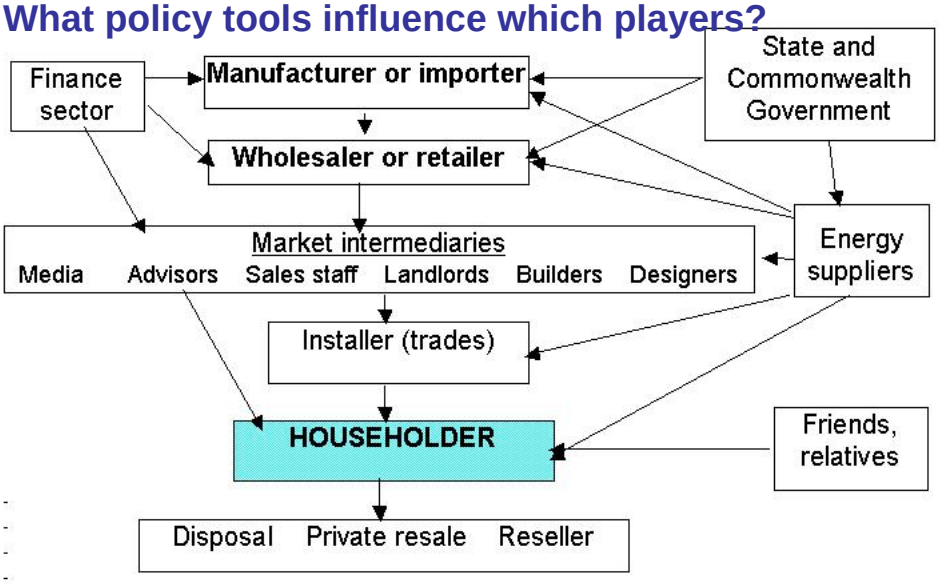
"Halogens are a bloody nightmare and they're everywhere, in homes, office buildings, cafes . . . The easiest thing to do would be to ban them," he said.

**Lighting our lives**

- Low-voltage halogen downlights combine halogen gas with tungsten in a quartz shell to produce a hotter, brighter light.
- They last up to 2000 hours – twice as long as incandescent globes, but cost more to buy.
- Halogens are more energy-efficient, producing 15 lumens (a measure of how much light is produced) per watt of consumed energy while incandescents produce 10 lumens.
- Fluorescent tubes are the most efficient, producing 100 lumens.
- The Federal Government plans to phase out incandescent bulbs, but not halogens, within three years. New homes will be fitted with compact fluorescents from 2010.

New ‘micro-fluorescent’ versus halogen: 7 watts+ ballast (~3W) vs 50 watts + transformer (10-15W). LED rapidly improving – will eventually be twice as efficient as fluoro

## What policy tools influence which players?




Overview of household appliance market system – each link in the chain of decisions must be considered

Partial example of a matrix of policy options responding to 'chain' of decision-making for an appliance

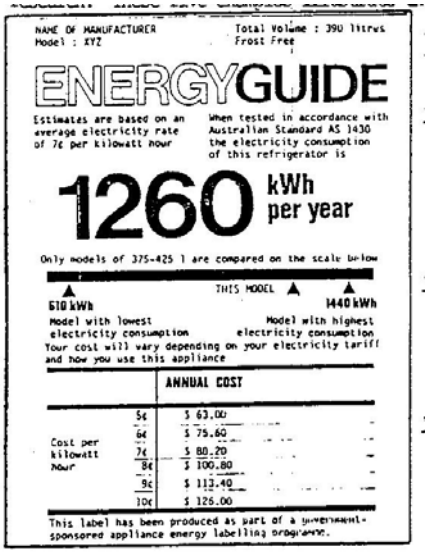
| **Participant** | Designer (technical, aesthetic) | Manufacturer<br>Importer | Advisers (sales, friends, architects, | Buyer (for own use or others) |
|---|---|---|---|---|
| **Roles** | Selects materials, components, operating efficiency | Sets design parameters<br>Chooses RD&D priorities | Information<br>Linkages<br>Frame choice criteria | Selects, pays!<br>Organises installation<br>Uses |
| **Drivers** | Consumer expectations<br>Image<br>Profitable | Market position<br>Profit<br>Compliance<br>Interpretation of consumer, retailer expectations | Their reputation<br>Perceived user needs/priorities<br>Aesthetics<br>Minimum hassle<br>Experience with | Cost (upfront, operation)<br>Reliability<br>Convenience<br>Service quality<br>Image |
| **Policy tools or programs** | Training<br>Accountability<br>Awards | RD&D incentives<br>Consumer pull | Training<br>Incentives<br>Consumer pull | Information<br>Standards<br>Social norms |

The harsh reality: in a survey of office-based businesses

77% of actions affecting energy consumption were not seen as energy-related decisions

(Weber, L, ACEEE Conference 2000)

# Early Australian draft energy label based on US format and market research


NAME OF MANUFACTURER
Model : XYZ
Total Volume : 390 litres
Frost Free

ENERGYGUIDE

Estimates are based on an average electricity rate of 7¢ per kilowatt hour

When tested in accordance with Australian Standard AS 1430 the electricity consumption of this refrigerator is

1260 kWh per year

Only models of 375-425 l are compared on the scale below

THIS MODEL

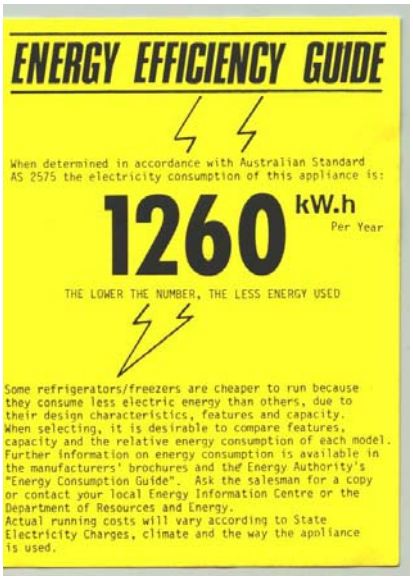
610 kWh
Model with lowest electricity consumption

1440 kWh
Model with highest electricity consumption

Your cost will vary depending on your electricity tariff and how you use this appliance

| Cost per kilowatt hour | ANNUAL COST |
|---|---|
| 5¢ | $ 63.00 |
| 6¢ | $ 75.60 |
| 7¢ | $ 88.20 |
| 8¢ | $ 100.80 |
| 9¢ | $ 113.40 |
| 10¢ | $ 126.00 |

This label has been produced as part of a government-sponsored appliance energy labelling programme.

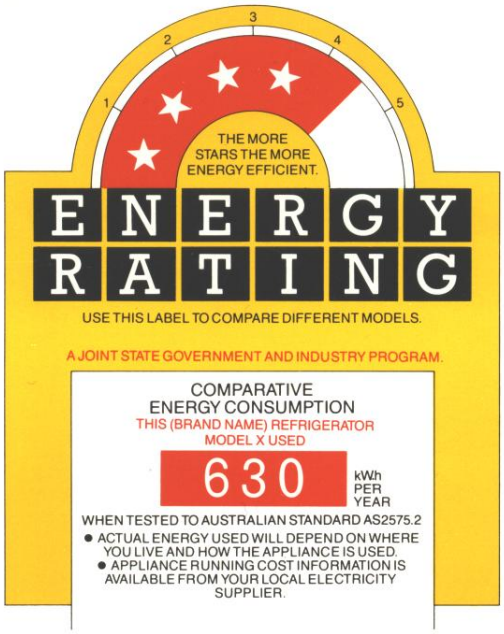

ENERGY EFFICIENCY GUIDE

When determined in accordance with Australian Standard AS 2575 the electricity consumption of this appliance is:

1260 kW.h Per Year

THE LOWER THE NUMBER, THE LESS ENERGY USED

Some refrigerators/freezers are cheaper to run because they consume less electric energy than others, due to their design characteristics, features and capacity. When selecting, it is desirable to compare features, capacity and the relative energy consumption of each model. Further information on energy consumption is available in the manufacturers' brochures and the Energy Authority's "Energy Consumption Guide". Ask the salesman for a copy or contact your local Energy Information Centre or the Department of Resources and Energy.
Actual running costs will vary according to State Electricity Charges, climate and the way the appliance is used.


1 2 3 4 5

THE MORE STARS THE MORE ENERGY EFFICIENT.

ENERGY RATING

USE THIS LABEL TO COMPARE DIFFERENT MODELS.

A JOINT STATE GOVERNMENT AND INDUSTRY PROGRAM.

COMPARATIVE ENERGY CONSUMPTION
THIS (BRAND NAME) REFRIGERATOR MODEL X USED

630 kWh PER YEAR

WHEN TESTED TO AUSTRALIAN STANDARD AS2575.2

- ACTUAL ENERGY USED WILL DEPEND ON WHERE YOU LIVE AND HOW THE APPLIANCE IS USED.
- APPLIANCE RUNNING COST INFORMATION IS AVAILABLE FROM YOUR LOCAL ELECTRICITY SUPPLIER.

Final energy label introduced in 1986 – note 6 stars due to political compromise

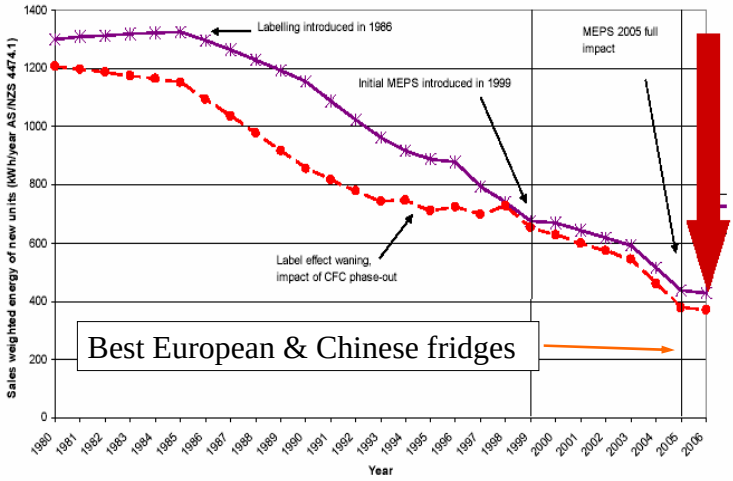

## Revised 2000 energy label

Effectiveness depends on

- Sales staff interpretation
- Government signals about importance of energy
- Rate of industry innovation
- Profile of energy issues – climate change, cost trends, peer pressures, etc

Impact of Energy Labelling and Minimum Performance Standards

- Trends in energy efficiency of family sized refrigerators (1980 – 2005)

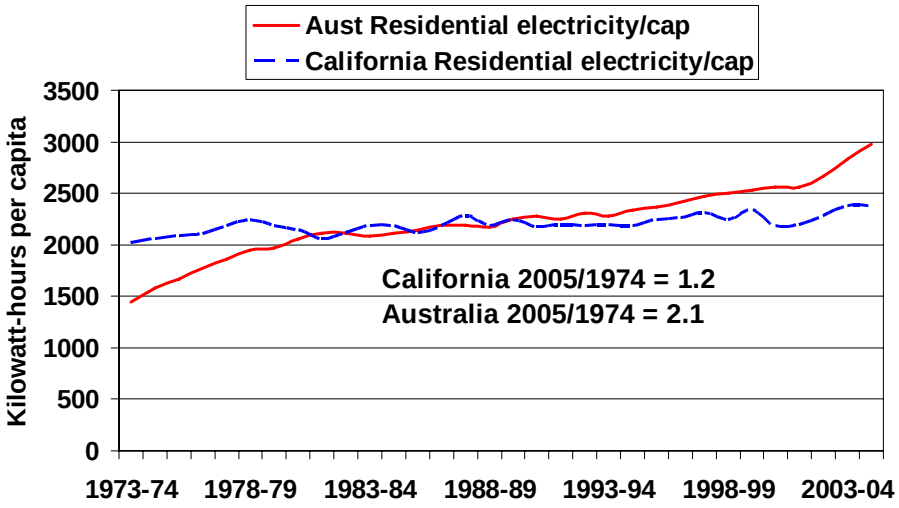



Sales weighted energy consumption has fallen by around 70%

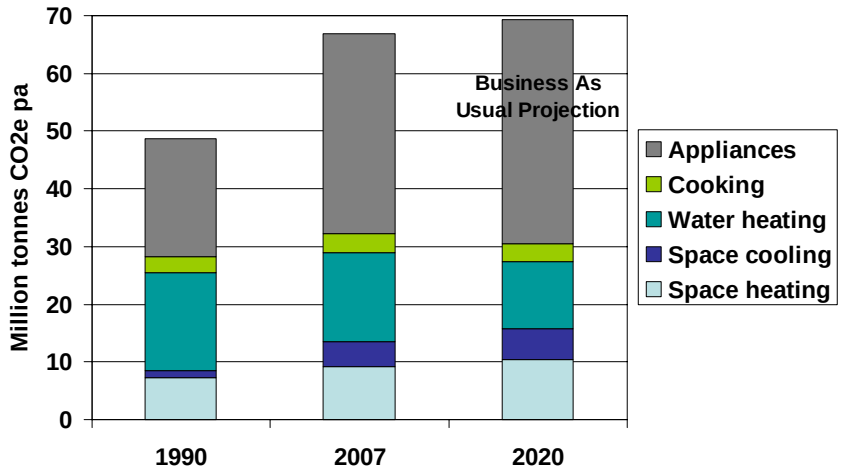
Source: Aust Greenhouse Office

## Comparison: Australia versus California Residential electricity/capita

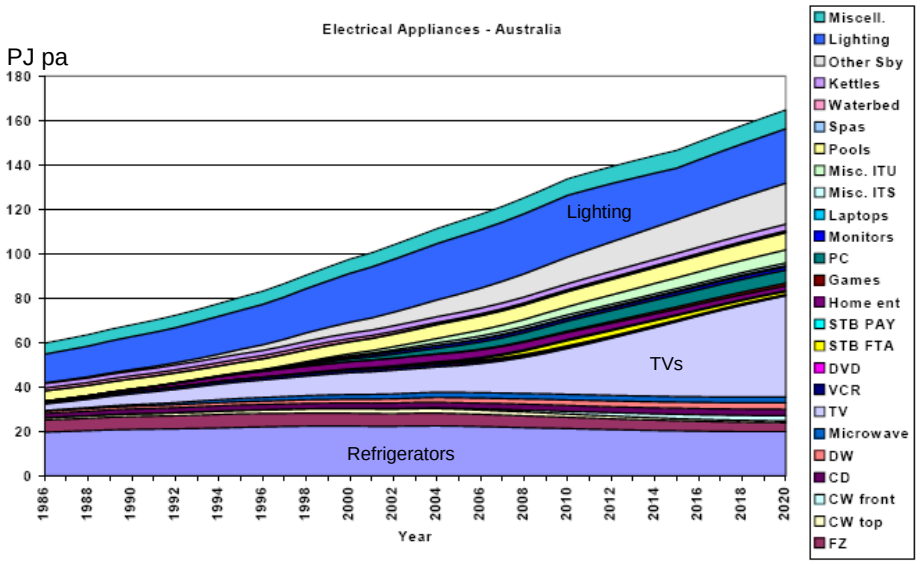
(Data sources ABARE, ABS and Rosenfeld)




## Aust residential sector greenhouse gas emissions from energy use (from Holt 2007 and DECC GH Workbook 2008)



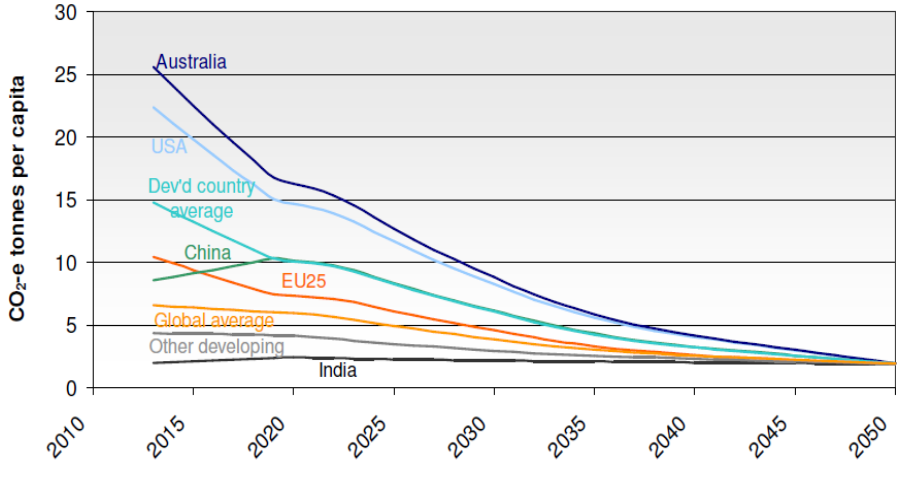
Projected Aust residential sector electricity use by appliances (Holt, 2007)




## ‘Contraction and Convergence’ model for globally equitable greenhouse gas emissions:

Per capita emissions allowances for 450 ppm

(From Garnaut *Supplementary Draft Report* (Sept 2008)). Note 2012 EU and Aust emissions level assume Kyoto compliance, others BAU emissions levels)




"Big house, big car,
big success... that's me baby."
Cairnlea 131 852
The End?