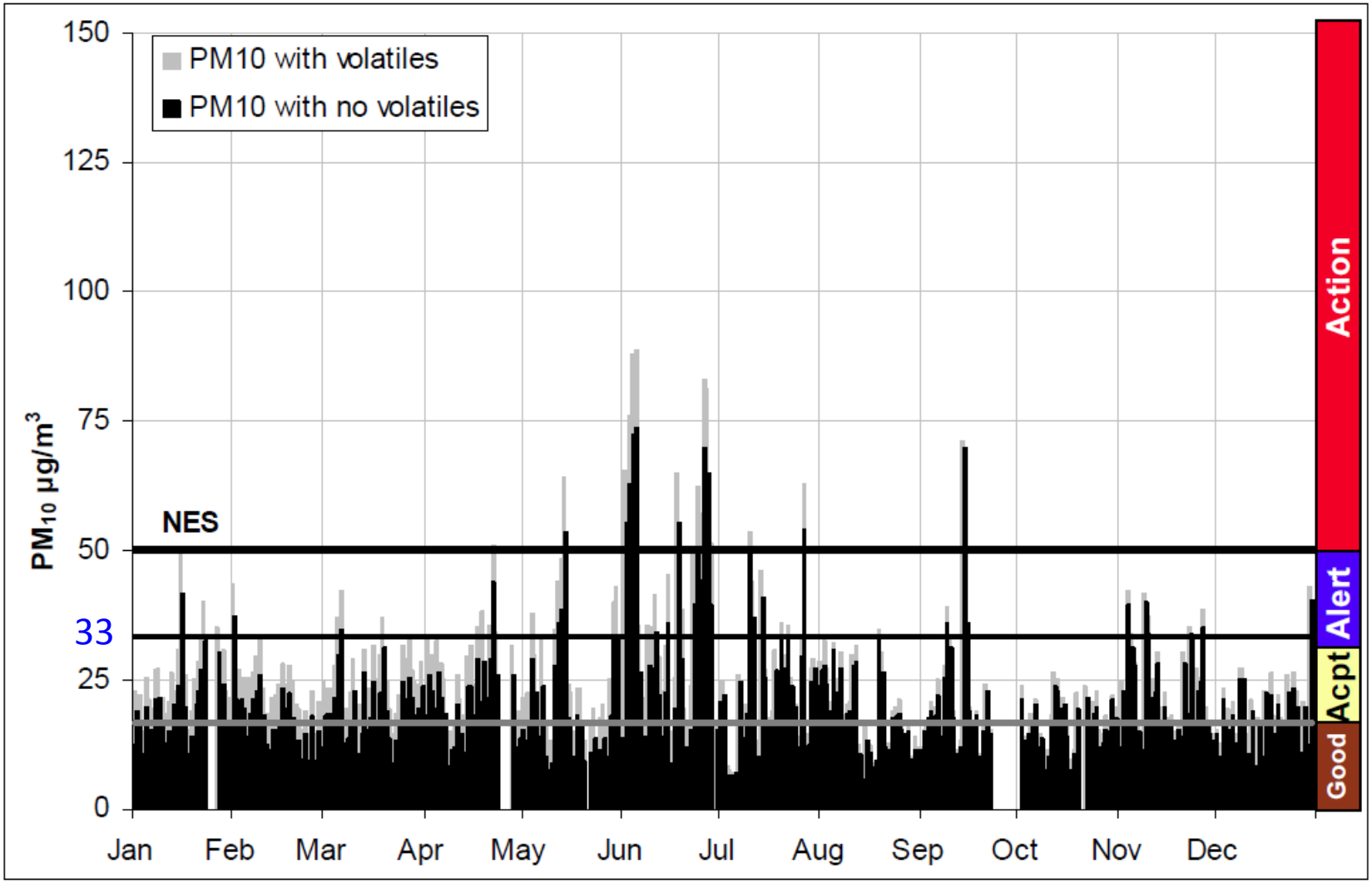
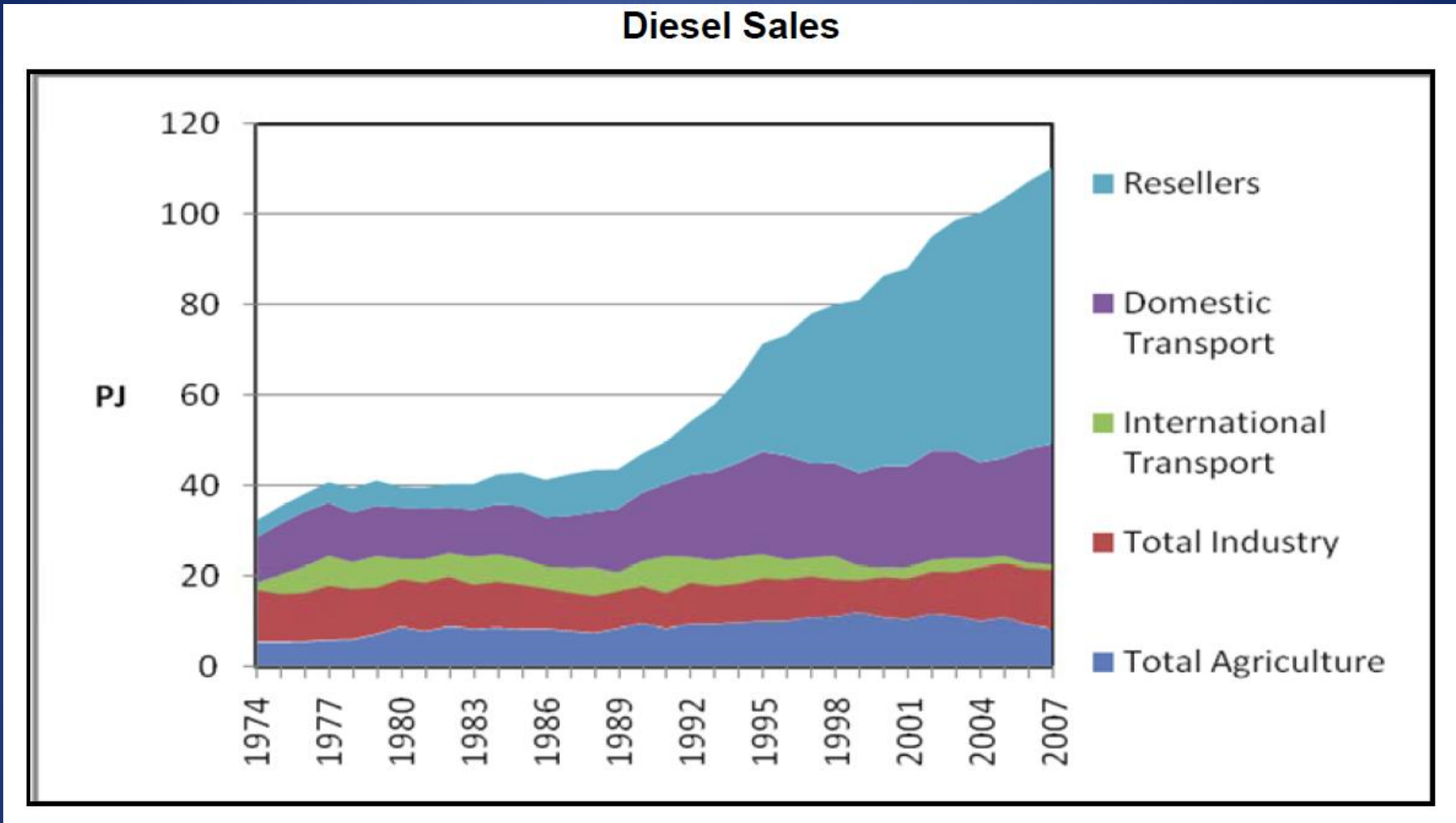


Figure A2-4: Christchurch Woolston 24-hour PM_{10} concentrations in 2009
(recorded by a TEOM fitted with a FDMS, change of instrument on June 29)



Liquid Fuel Use in New Zealand

Prepared for: Ministry of Economic Development **November 2008**

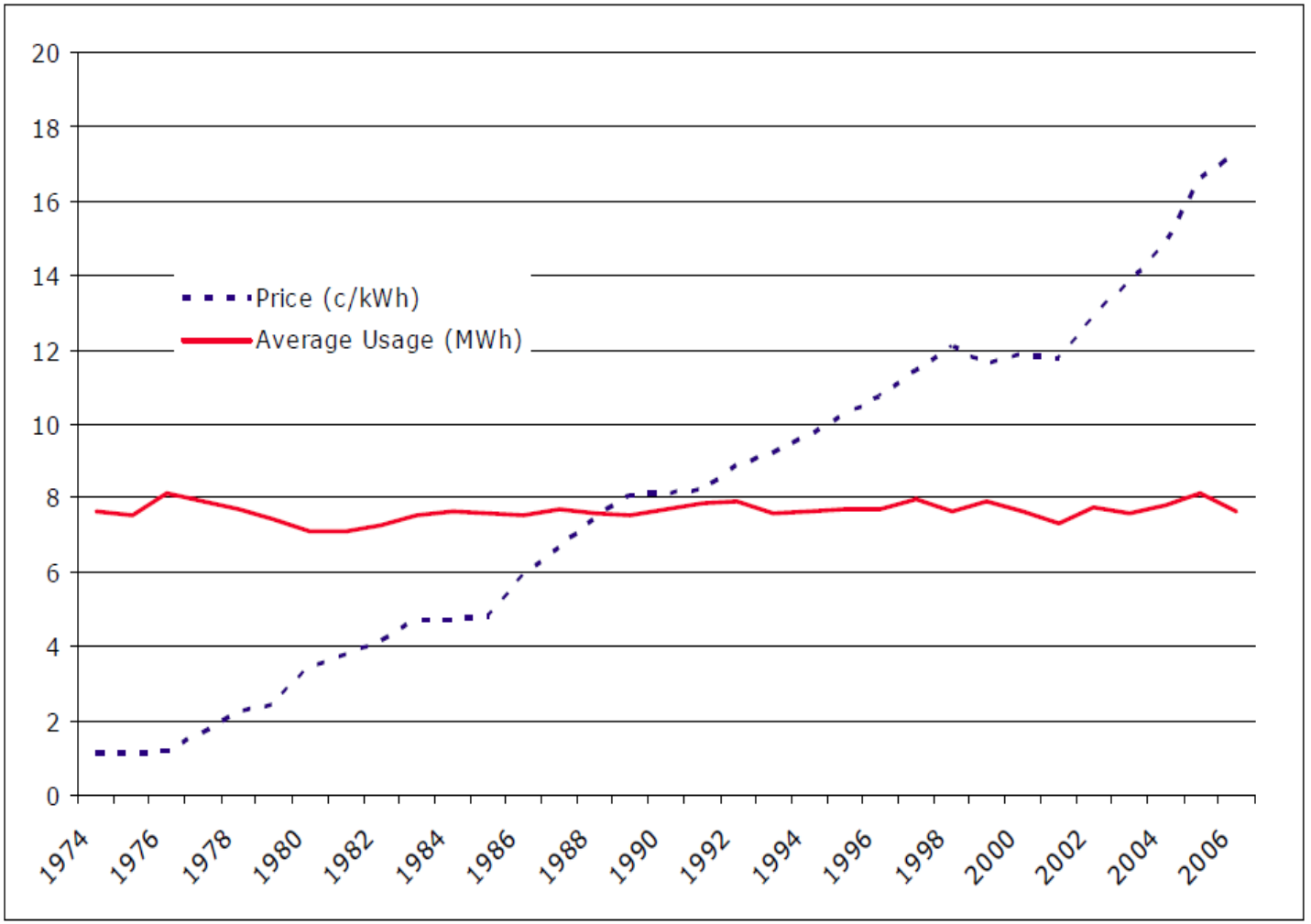
King Edward Terrace Monitoring Station, Woolston

Canterbury Natural Resources Regional Plan

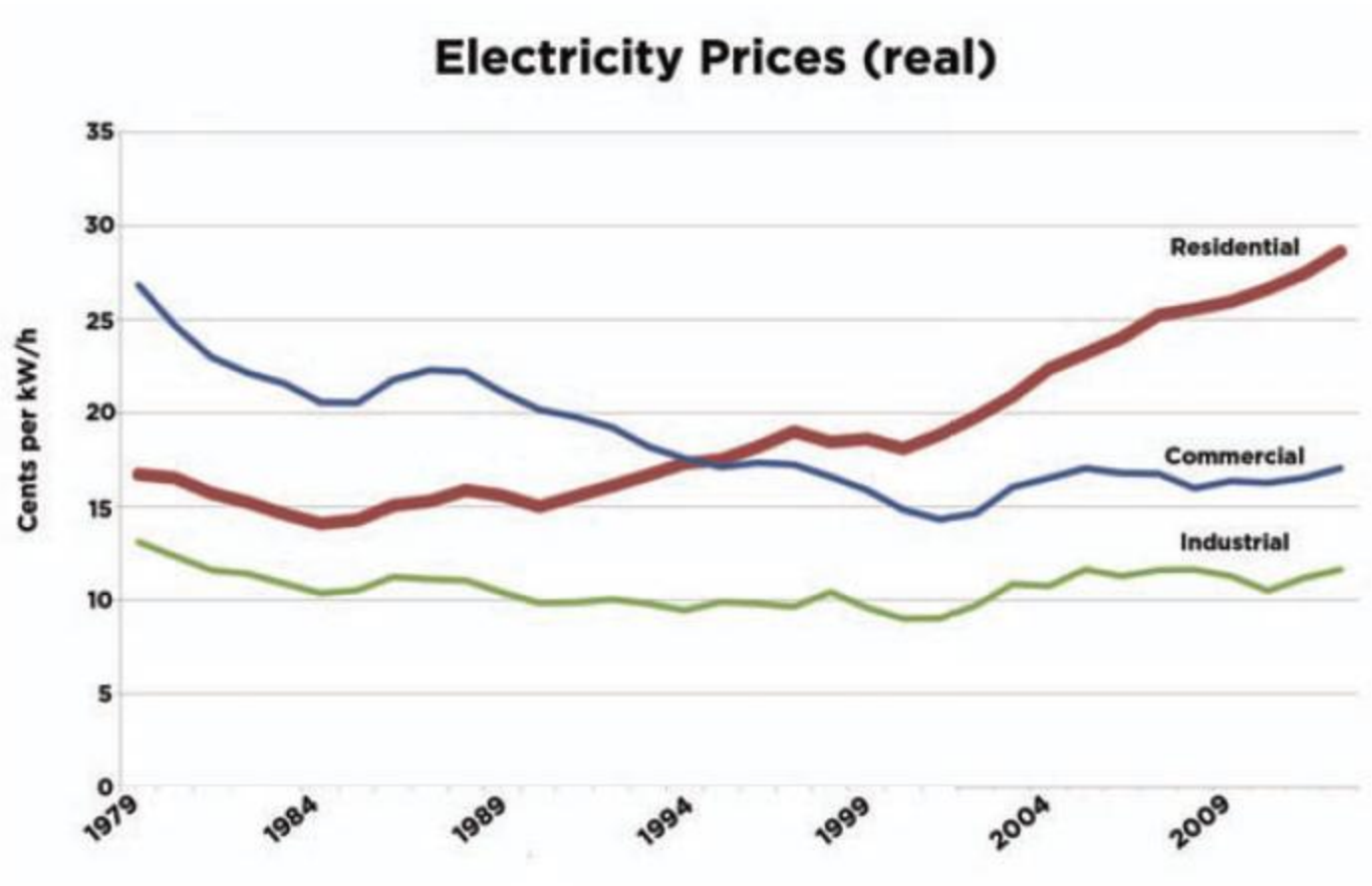
Rule AQL16 External combustion of diesel and kerosene greater than 100 kW to 2 MW or less, gas greater than 5 MW to 20 MW or less, and internal combustion of diesel, petrol or gas greater than 300 kW in the Christchurch Clean Air Zones 1 and 2 – controlled activity

Rule AQL15 Internal combustion of diesel, petrol or gas 300 kW or less in the Christchurch Clean Air Zones 1 and 2 – permitted activity

According to US EPA emission factors, the emission rate of PM_{10} from internal combustion engines can be up to 33 times higher than the emission rate from a boiler burning the same amount of diesel oil. Because of the potentially significant contribution from such internal combustion sources to ambient and localised PM_{10}, SO_2 and NO_2 concentrations, the use of these generators as a permitted activity is restricted to maintenance and emergency purposes only. Consequently, operating time is restricted to less than ~~100~~ 150 hours per year.

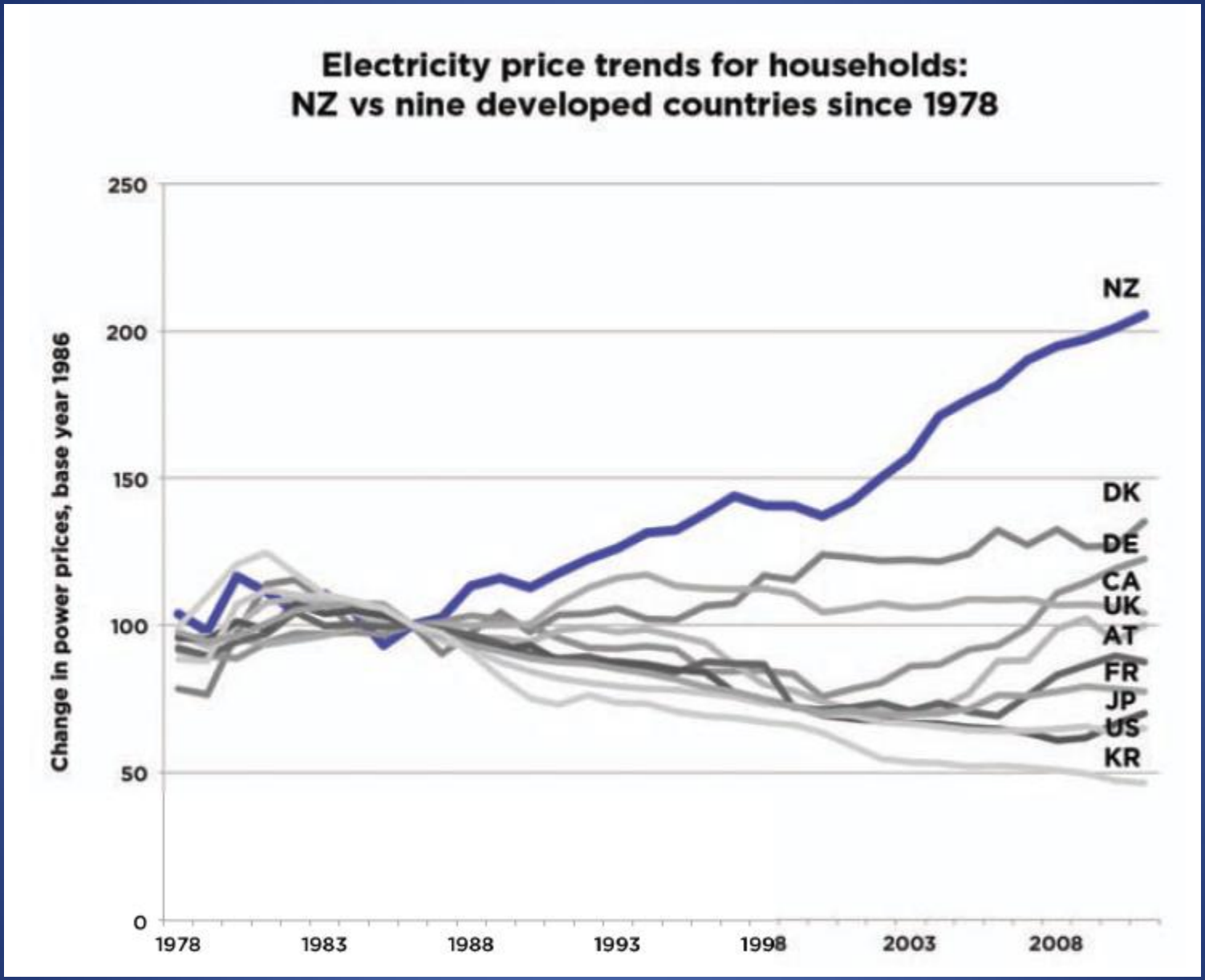


Domestic Electricity Prices, 1974 - 2006



MED, Annual Electricity Prices (Real)

Electricity price trends for households: NZ vs nine developed countries since 1978



International Energy Agency, *Energy Prices and Taxes* online database, 2012

National Environmental Standards for Clean air mandate the use of NZS's 4012/3

- Cumbersome being laboratory methods only, and even then difficult and limited.
- 4012/3 apply only to wood in log form and only to air heating devices.
- 4012/3 have failed to deliver clean air
- Various studies show that real life emissions are anywhere from 3 to 50 times higher.

> (e) a 1 g/kg burner (i.e. meeting the standards of Policy AQL11) operates at 3 g/kg in real time operative conditions; and
>
> Canterbury Natural Resources Regional Plan September 2007

- It only measures total particulates, not sub-10 micron.
- 4012/3 are so narrow and prescriptive that they have killed innovation.
- A very slow acknowledgement of this led to the recognition of the need for a better test method.
- The exam question was "How do we improve the testing of log burners to make it closer to real life operation"?
- The WRONG question was asked.
- What about pellets, chip, big logs, coal, central heating boilers ?????? A different method for each?
- The question should have been "How do we create a consistent testing method across all solid fuels and all devices"

The Canterbury Method fails on several counts:

- It is written around something that is a steel box with a door on the front into which we throw wood. It quite specifically excludes pellets, chip, coal, & briquettes.
- It cannot be used for testing emission abatement devices (but it has !!)
- It assumes the methodology of 4012/3.
- After long argument stack loss efficiency and USEPA or ISO particulate testing methods have been accepted, but still alongside dilution tunnels and calorimeter rooms.
- It is very prescriptive. There is a very detailed and complex procedure to follow.
- An alternative method has been written for downdraft burners but that is almost entirely a “cut ‘n paste” from the original.
- It reserves powers of approval to ECan all along the way if a given device cannot conform with the requirements of the test. Sorry ECan, you aren’t competent to judge.
- Manufacturers will still have to test to 4012/3 to sell outside Canterbury

Q: What is important?

A: What goes out the stack.

END

Efficiency vs Emissions

Burner 1
20kW, 65% efficient, 0.5g/kg emissions.
Total wood burn approx 6.2kg/hr

Total particulate emissions, 3.1g PASS

Burner 2
20kW, 50% efficient, 0.25g/kg emissions
Total wood burn approx 8kg/hr

Total particulate emissions, 2g/hr FAIL

REALLY ????????

Which has less impact on our air?

The product of Emissions & Efficiency must be taken. They cannot treated separately

European approach - EN303-5

- Common to 32 European countries and used in several others.
- Been in operation for 30 years now
- Been a partnership with industry and regulators to ENCOURAGE innovation
- Applicable to ALL boilers up to 500kW
- Has been amended several times
- Admits to many ways of meeting emission and efficiency standards
- Not prescriptive about exactly how the test it to be carried out.
- Manufacturers instructions
- What comes out the flue is what they care about. (They also ask for much higher efficiencies than we do.)
- Hundreds of manufacturers of many radically different devices across all fuels
- 6m + tonnes / year of pellets alone burned in Europe now in domestic applications.

Table 1-2 : Summary of EN303-5 Emission classes

Stoking	EN 303 Class				
	Current			Proposed	
	1	2	3	4	5
	Concentrations, mg/m^3 at 10% O_2, dry and STP (0°C, 101.3 kPa)				
Manual	200	180	150	75	60
Automatic	200	180	150	60	40
	Derived emission factors, g/GJ (net thermal input)				
Manual	103	92	77	38	31
Automatic	103	92	77	31	21

Note: Conversions assume wood combustion and are based on US Environmental Protection Agency stoichiometric flue gas volumes and Digest of UK Energy Statistics calorific values. Proposed classes taken from August 2010 prEN 303-5.

German standard from the end of this year

	Nominal output	PM (mg/m^3)	CO (mg/m^3)
Plants built from 22nd March 2010	4-500 kW	100	1000
	>500 kW	100	500
Plants built from 31st December 2014	>4 kW	20	400

Why invent our own narrow, introverted testing standard? WE ARE NOT UNIQUE

•Let's have some vision !!!!!

•Innovation is a cornerstone of our national psyche. Let's encourage it!

•Let's adopt the European approach, (or something very close)

•Let's keep it simple and concentrate on what come out the chimney !

•Let's create a vibrant heating industry. We need lots of different solutions for lots of different situations !!!

•Let's create Canterbury jobs in manufacturing, fuel supply, & installation.

•Let's export !!!

•Let's keep our people economically warm !!!!!!!!!!

•And let's stop going "Baaaahhhhh – Yeeessss Weeeelllinngton"