What Air Quality Data Means

PM_{10} Workshop

(Christchurch, 10 October 2005)

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Data is Everything

"We can theorise, analyse, model, make assumptions, guess, display our preconceived prejudices….but its not until we have measurements that we can really know what's going on"

BUT….

1. **Measuring can be expensive**
2. **How do we know we are doing it right?**
3. **How do we know we are measuring the right things?**
4. **In the right places?**
5. **At the right times?**
6. **To the right accuracy?**

AND WHAT DO THOSE MEASUREMENTS TELL US?

PM_{10}

Why?

Because everyone does it? Maybe

Because there are standards? Better

Because we know there are health effects? Best

Requirements for each of these can be different

Today

Not going to cover measurement techniques – others
Not going to cover NES, SLiPs, CLiPs – too hard
Not going to cover data quality - later
Not going to look at other measures – later
Not going to look at network design – next talk

Do want to discuss what the measurements mean and how we act on them

Simplistic – site, measure, analyse….compliance

…or fail….

…..and need to do something!

End of story? Well there's still what to do, and will it work?

What's the relationship between measurements and emissions?

Weather

Cold weather makes people burn more

Calm periods allow pollution to build up

Clear skies and light winds lead to inversions that trap pollution

All sorts of others – recirculation, fumigation, cross boundary transport, photochemical, "Guy Fawke's" effects – but for most of NZ these are not that important.

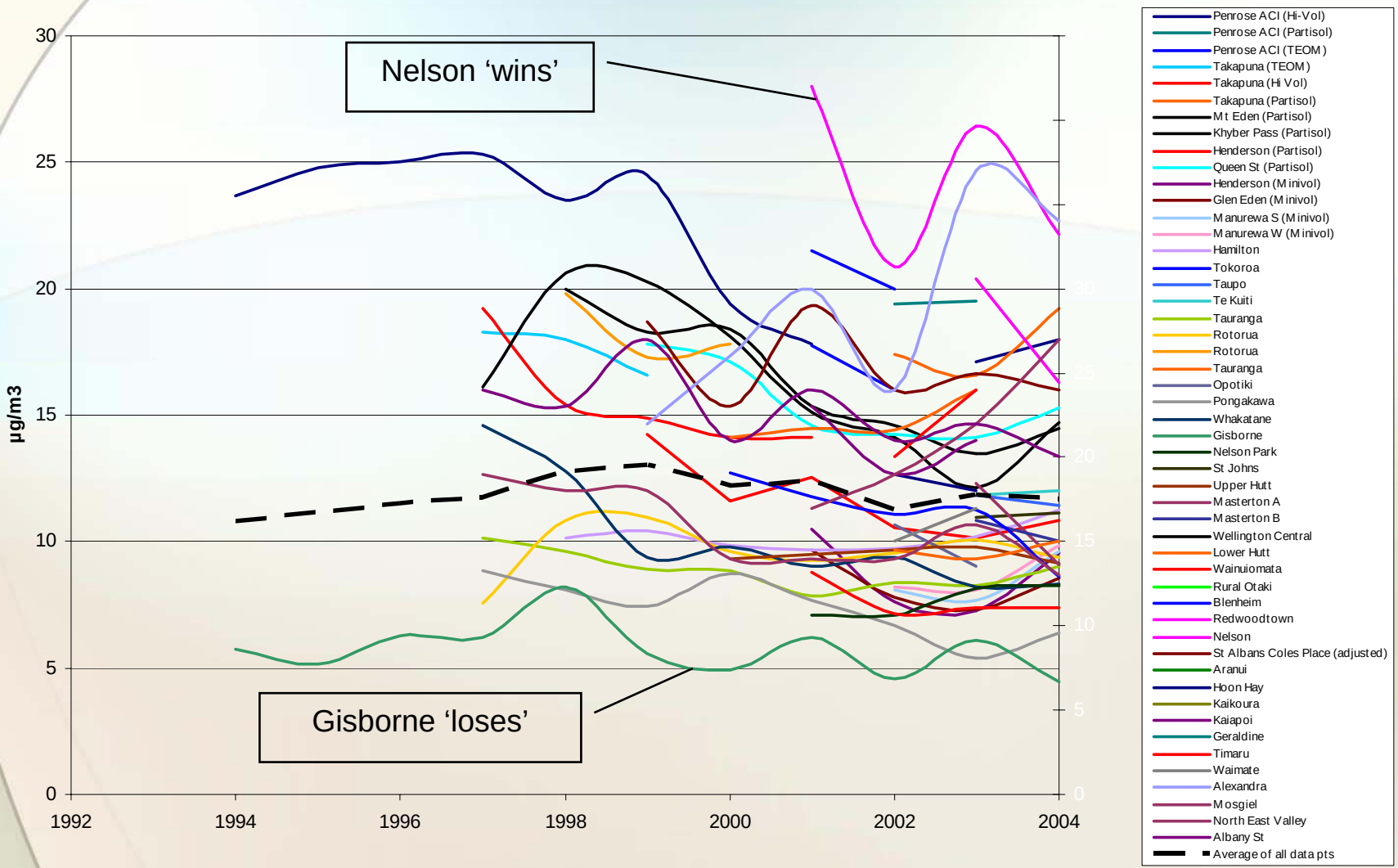
Where to start?

Weather is complex – ha –
weather is extra-ordinarily tough!
Let's try some simple climate analysis first

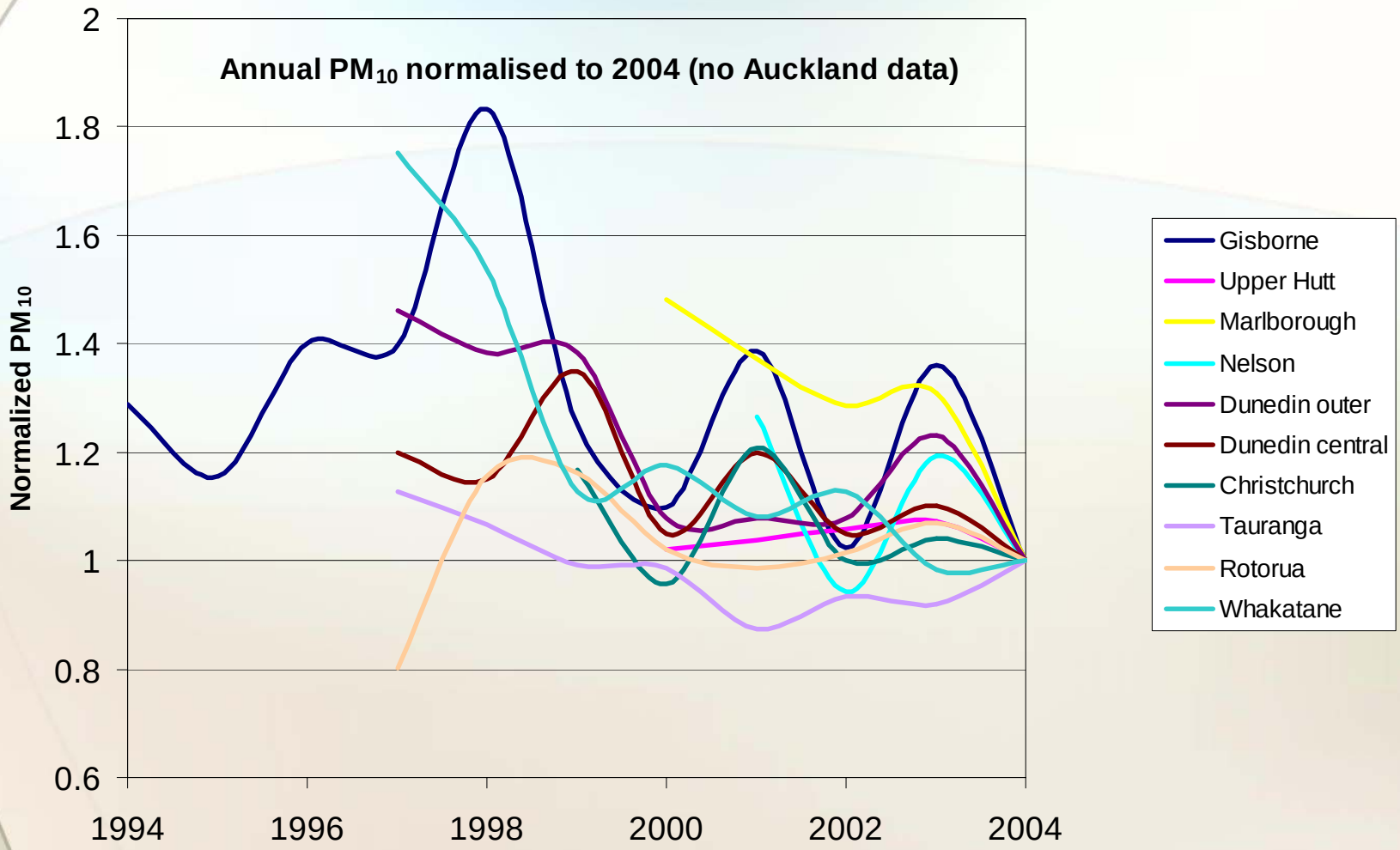
We don't have a long period of PM_{10} monitoring in NZ. Auckland holds the record for TSP – 40 years or so, but Gisborne holds the record for PM_{10} – since 1993 at one site (Ok and Penrose).

Councils supplied us an update earlier this year – thanks - this is the basic data set (report is on the web site www.niwascience.co.nz/ncces/air_quality)

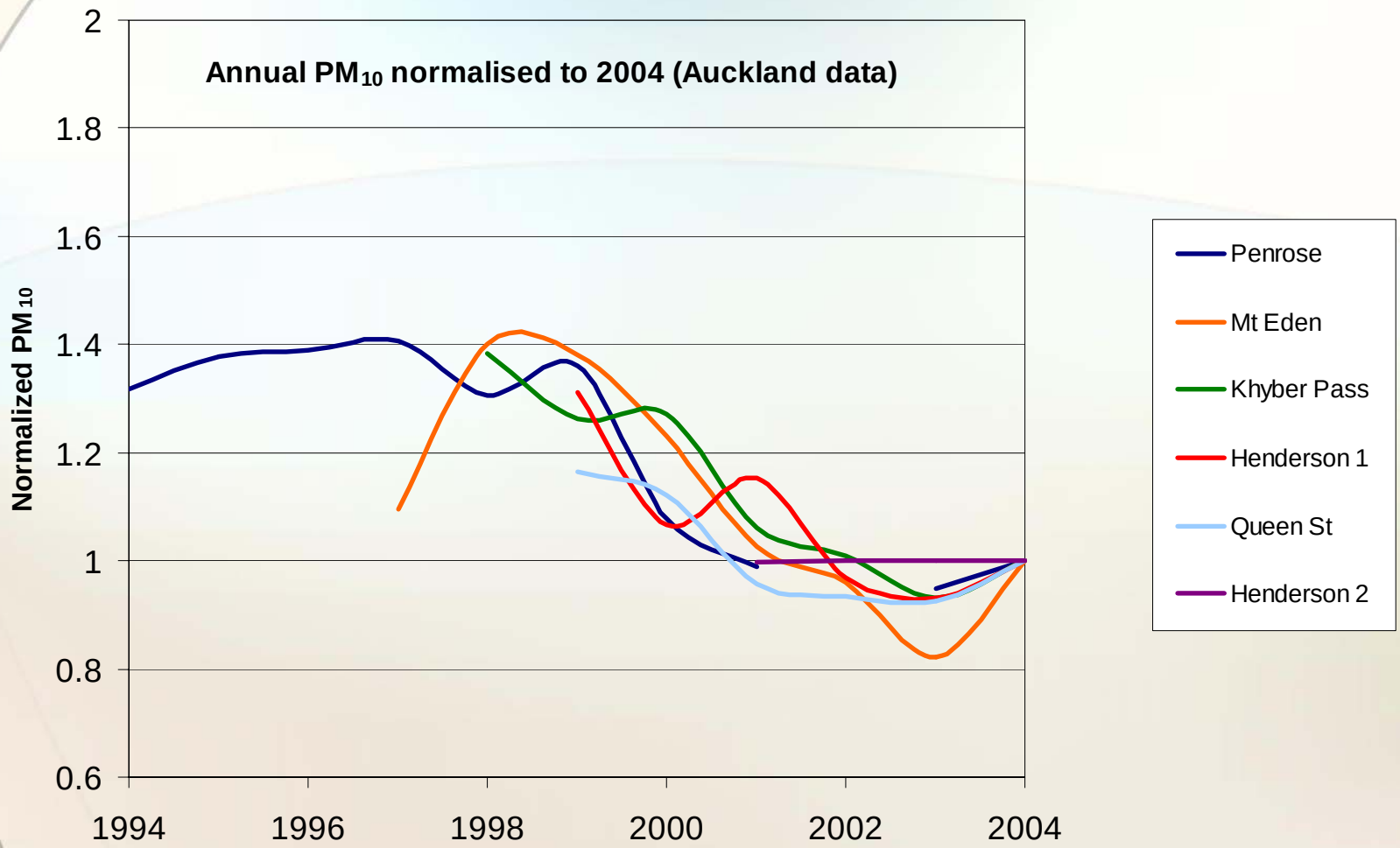
First look


Nelson ‘wins’
Gisborne ‘loses’
µg/m3
30
25
20
15
10
5
0
1992
1994
1996
1998
2000
2002
2004
Penrose ACI (Hi-Vol)
Penrose ACI (Partisol)
Penrose ACI (TEOM)
Takapuna (TEOM)
Takapuna (Hi Vol)
Takapuna (Partisol)
Mt Eden (Partisol)
Khyber Pass (Partisol)
Henderson (Partisol)
Queen St (Partisol)
Henderson (Minivol)
Glen Eden (Minivol)
Manurewa S (Minivol)
Manurewa W (Minivol)
Hamilton
Tokoroa
Taupo
Te Kuiti
Tauranga
Rotorua
Rotorua
Tauranga
Opotiki
Pongakawa
Whakatane
Gisborne
Nelson Park
St Johns
Upper Hutt
Masterton A
Masterton B
Wellington Central
Lower Hutt
Wainuiomata
Rural Otaki
Blenheim
Redwoodtown
Nelson
St Albans Coles Place (adjusted)
Aranui
Hoon Hay
Kaikoura
Kaiapoi
Geraldine
Timaru
Waimate
Alexandra
Mosgiel
North East Valley
Albany St
Average of all data pts

Second look


Annual PM10 normalised to 2004 (no Auckland data)
Normalized PM10
2
1.8
1.6
1.4
1.2
1
0.8
0.6
1994
1996
1998
2000
2002
2004
Gisborne
Upper Hutt
Marlborough
Nelson
Dunedin outer
Dunedin central
Christchurch
Tauranga
Rotorua
Whakatane

Just Auckland

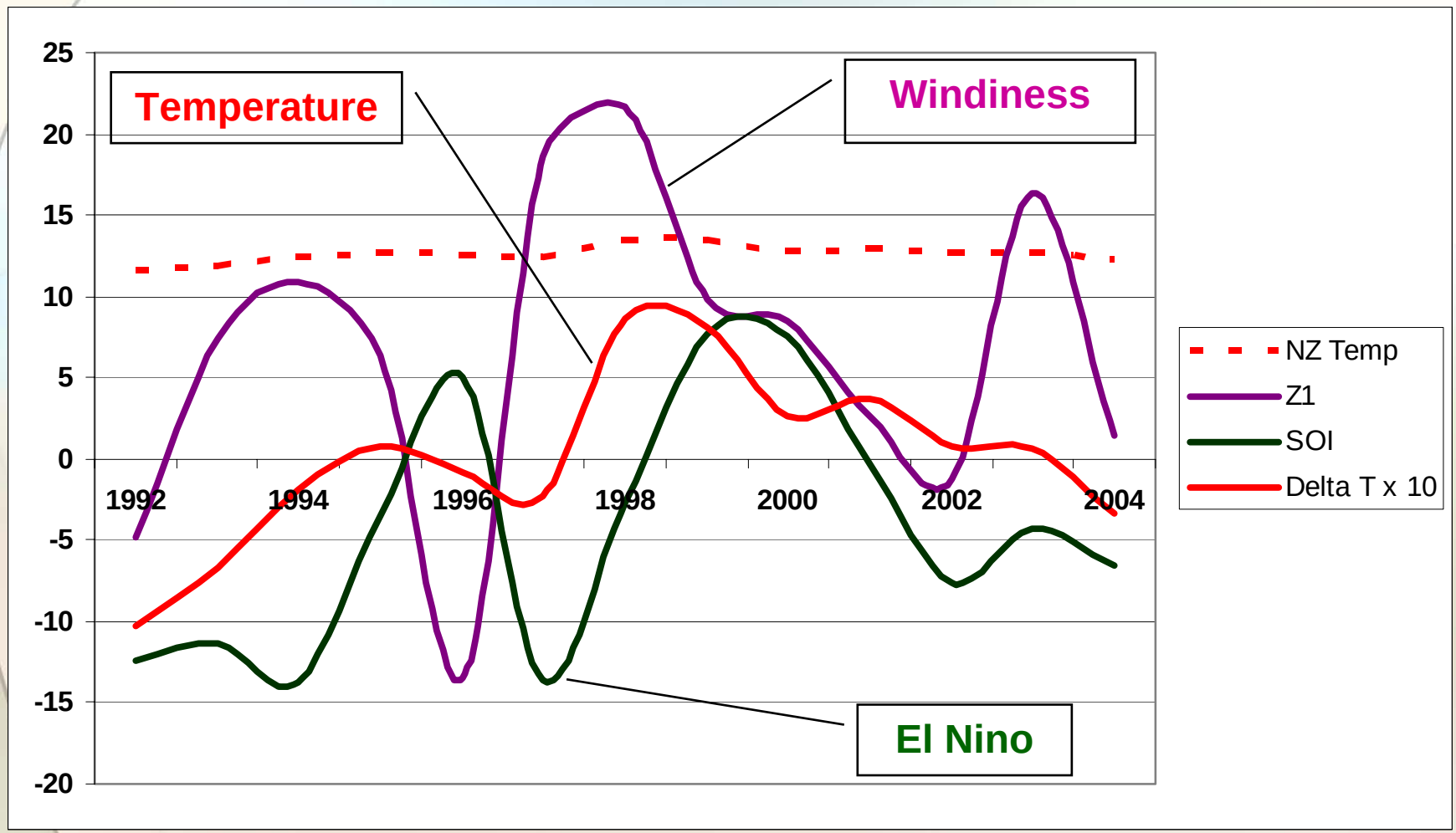


What's going on here?

- Some places going down (e.g. much of Auckland – but not at all sites!)
- Some places going up (e.g. Alexandra, Mosgiel, Tauranga)
- Some places hovering

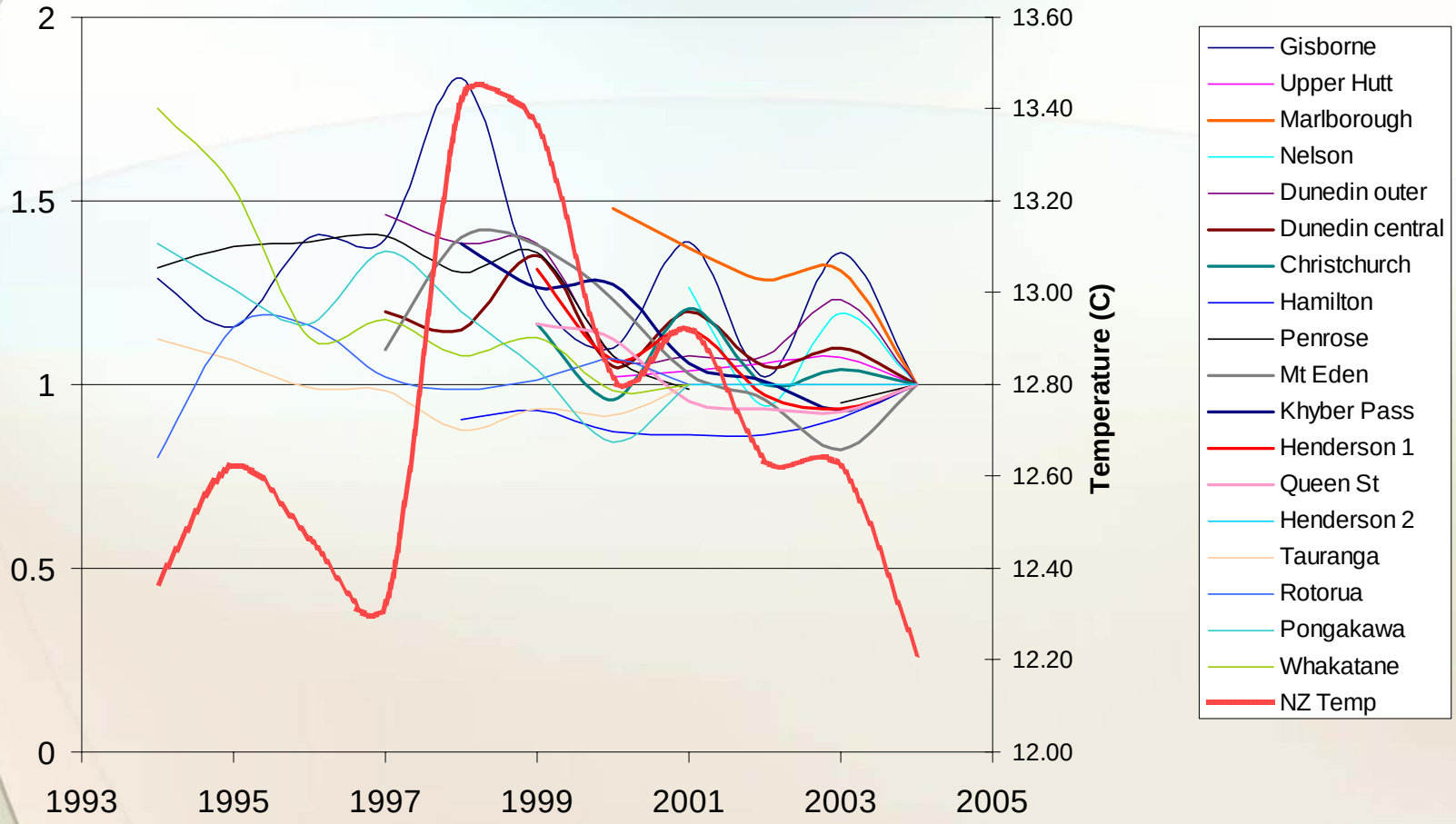
- General overall trend is down slightly – is this because emissions management is working – or is it because of weather and climate factors – that could turn around anytime?

Climate indicators

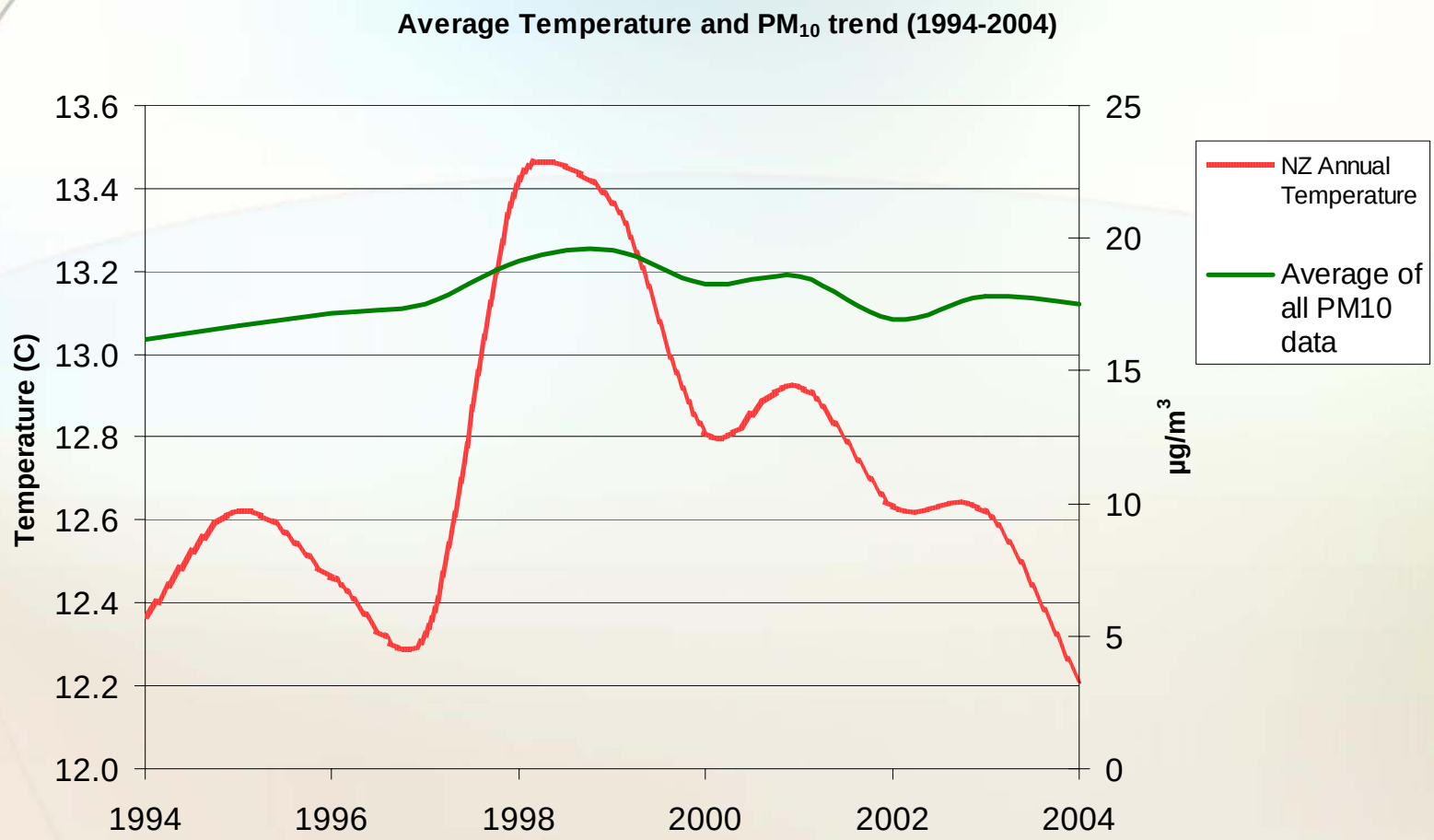


Match them up

All data and NZ average temperature



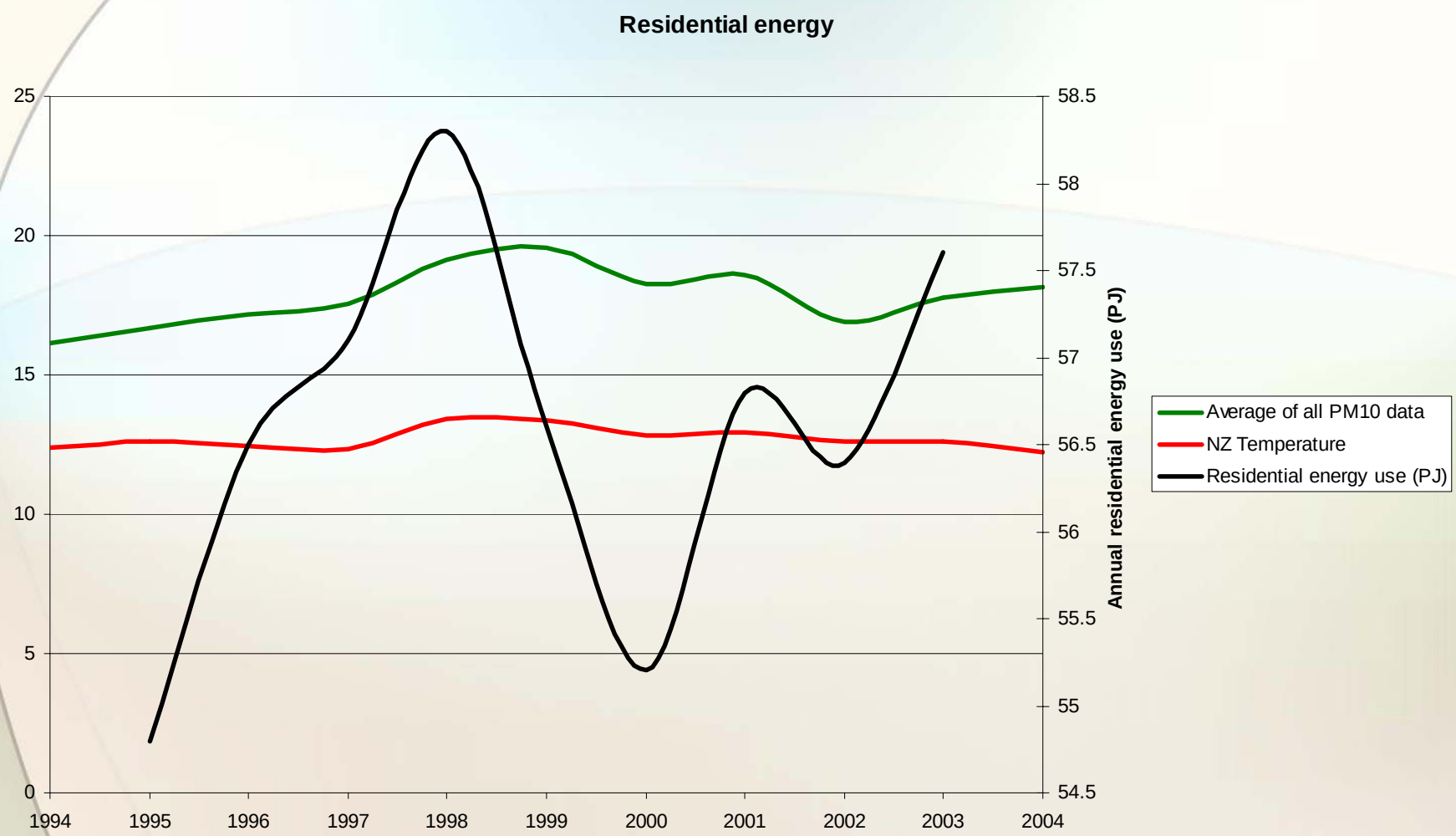
Bit simpler



Tantalising alignment of peaks and troughs (no emissions trends in here yet)

Notice higher PM in warmer years – what's going on?

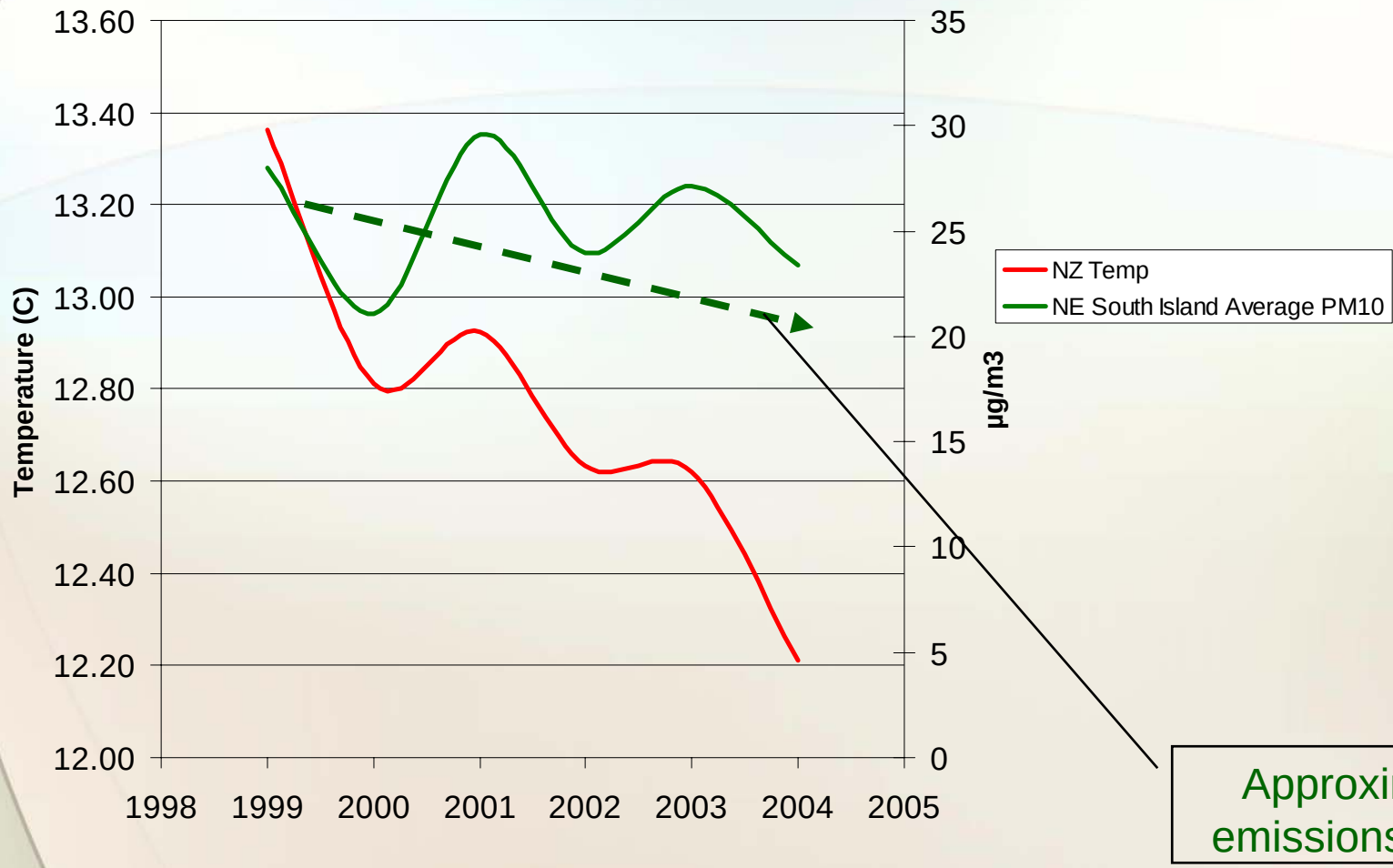
Energy use?



Maybe – but not striking

Local effects stronger

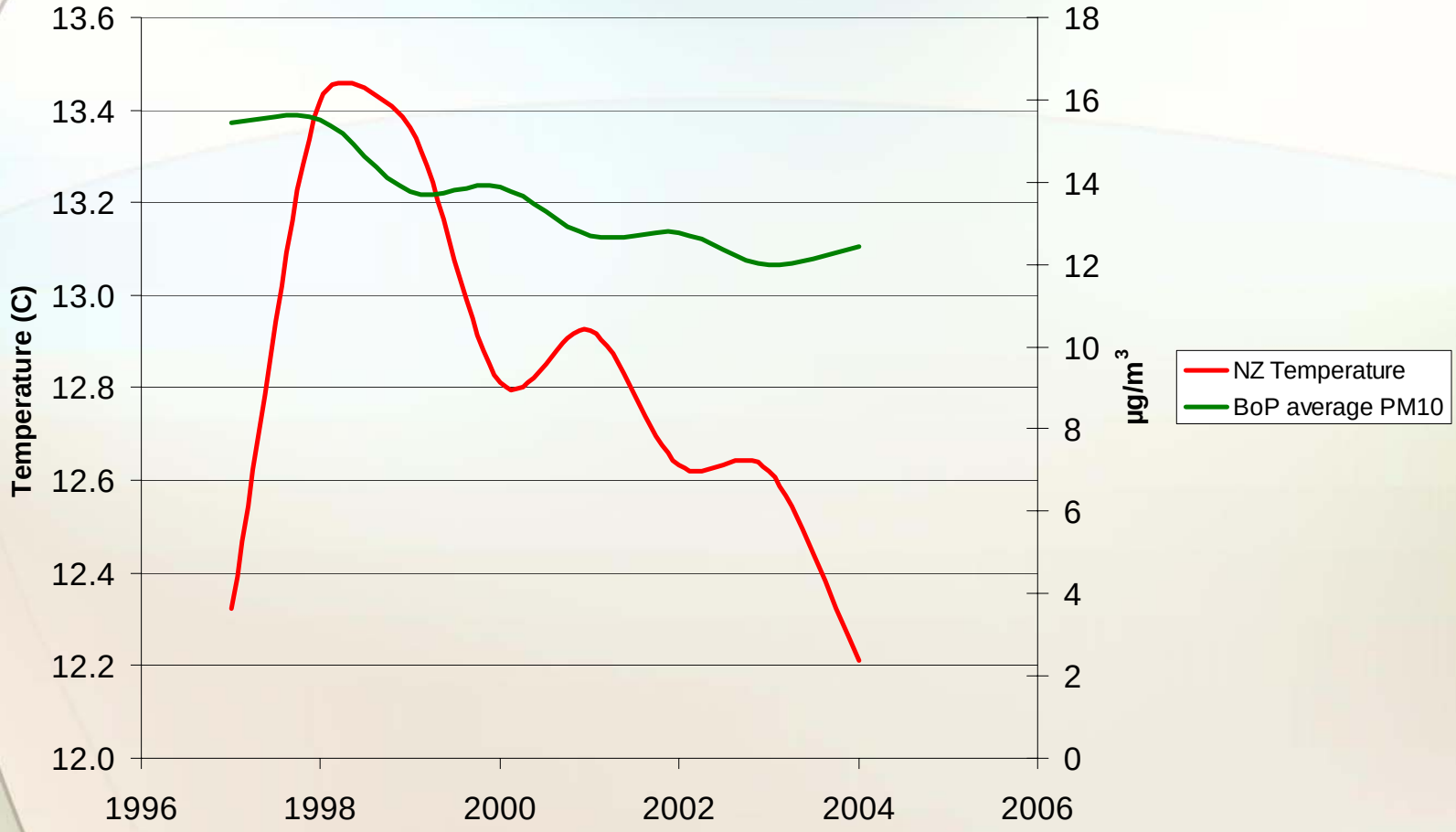
Just using Christchurch, Nelson, and Blenheim



Notice this is not 'normal' – concentrations go up when temperature goes up!

Different local effects

Just using Rotorua, Tauranga, Whakatane and Pongakawa



Notice this is 'normal' – concentrations go down when temperature goes up

And so….

- This is just a start – work in progress
- Obviously going to be differences between places (e.g. winter home heating) – account for South Island vs. Bay of Plenty effects?
- This is just annual – who cares – there are no annual standards (yet).
- Next…
  - Want to do it monthly
  - Want to look at peak days
  - Want to take account of emissions trends
  - Want more data! Roll on 2005 results!