

The interaction between water and energy supply and use

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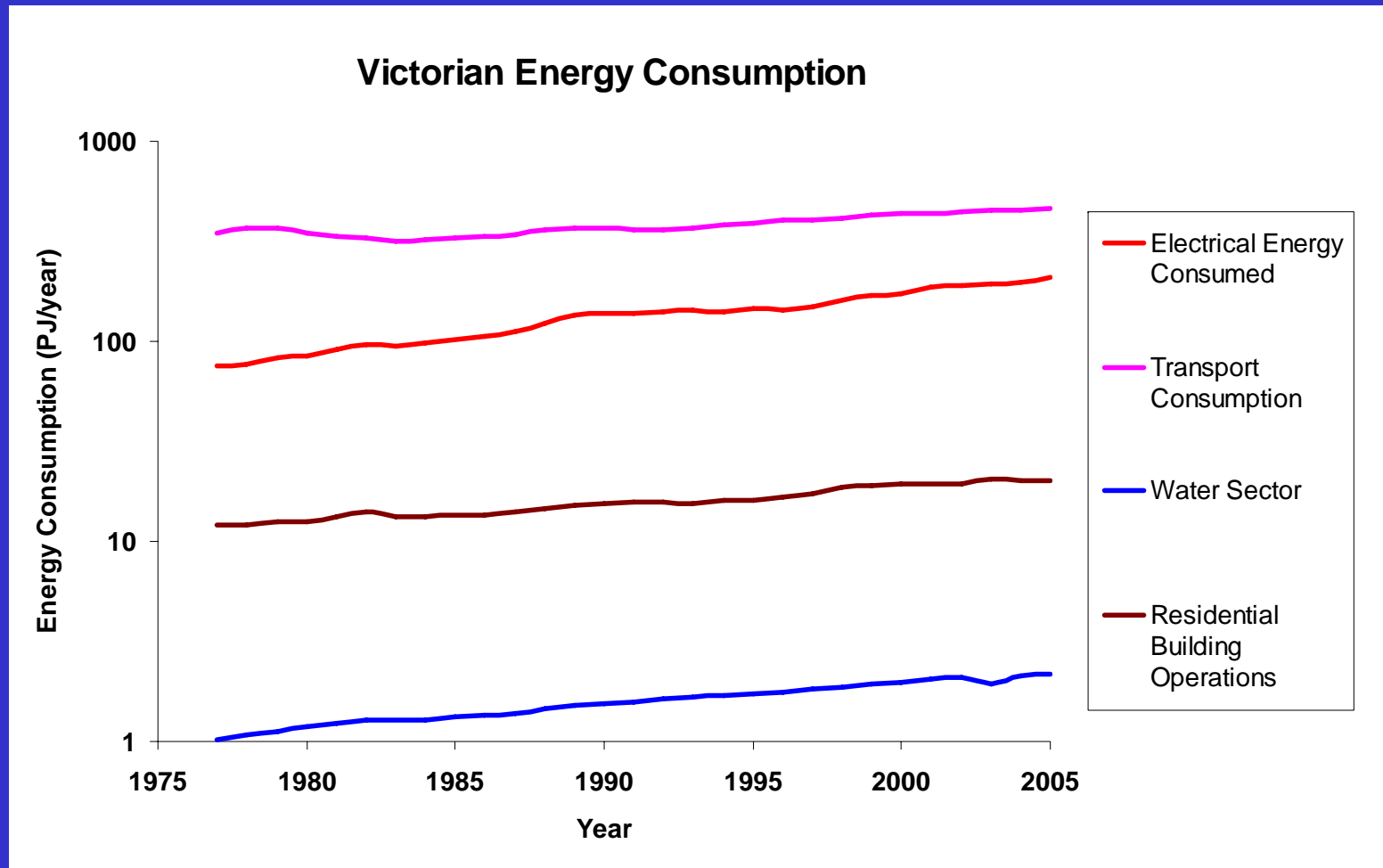
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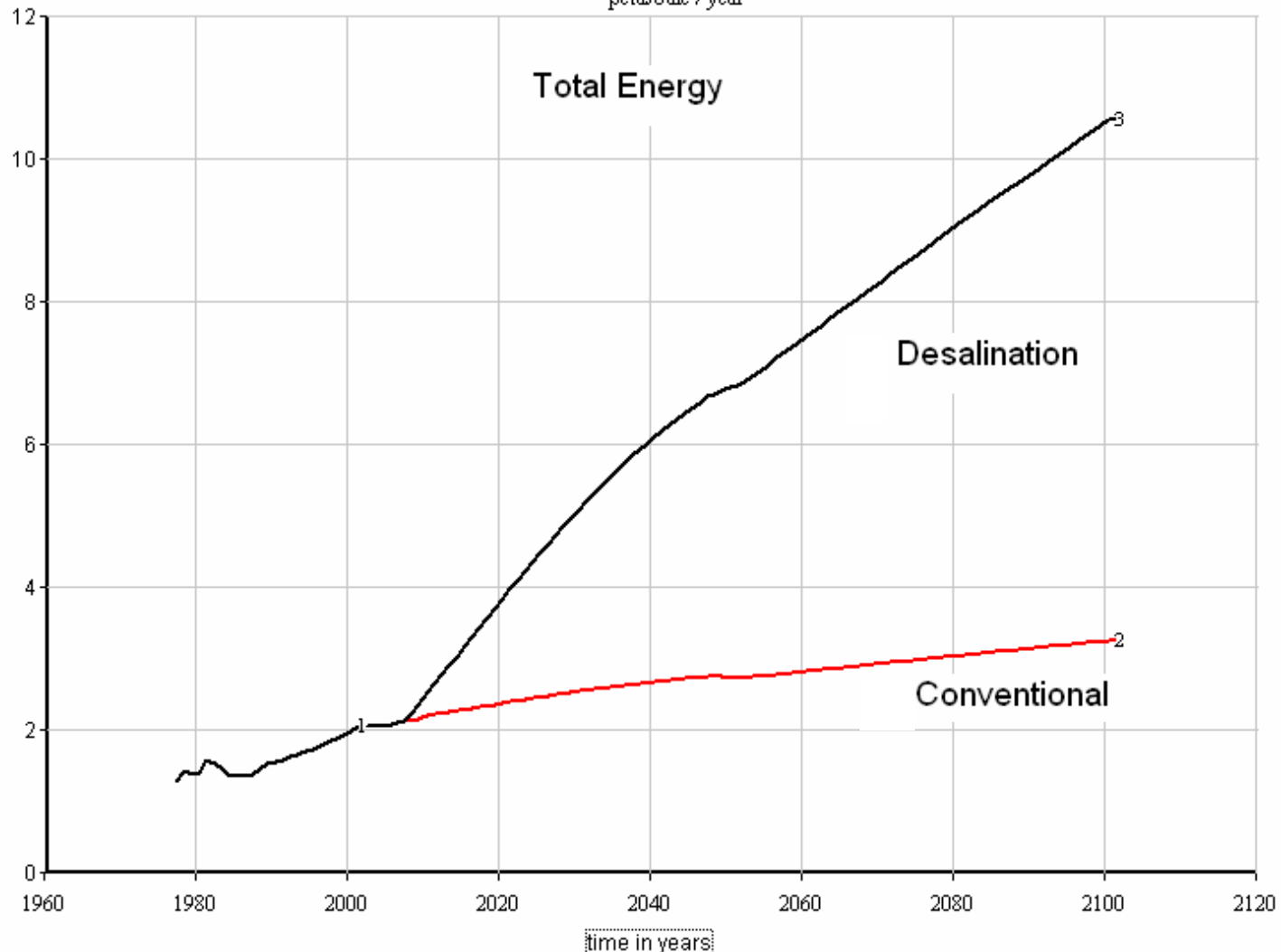
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Energy used for water supply: a comparison



Source: ABARE (2006)

Annual Energy Required for Water Services
petaJoule / year



CSIRO

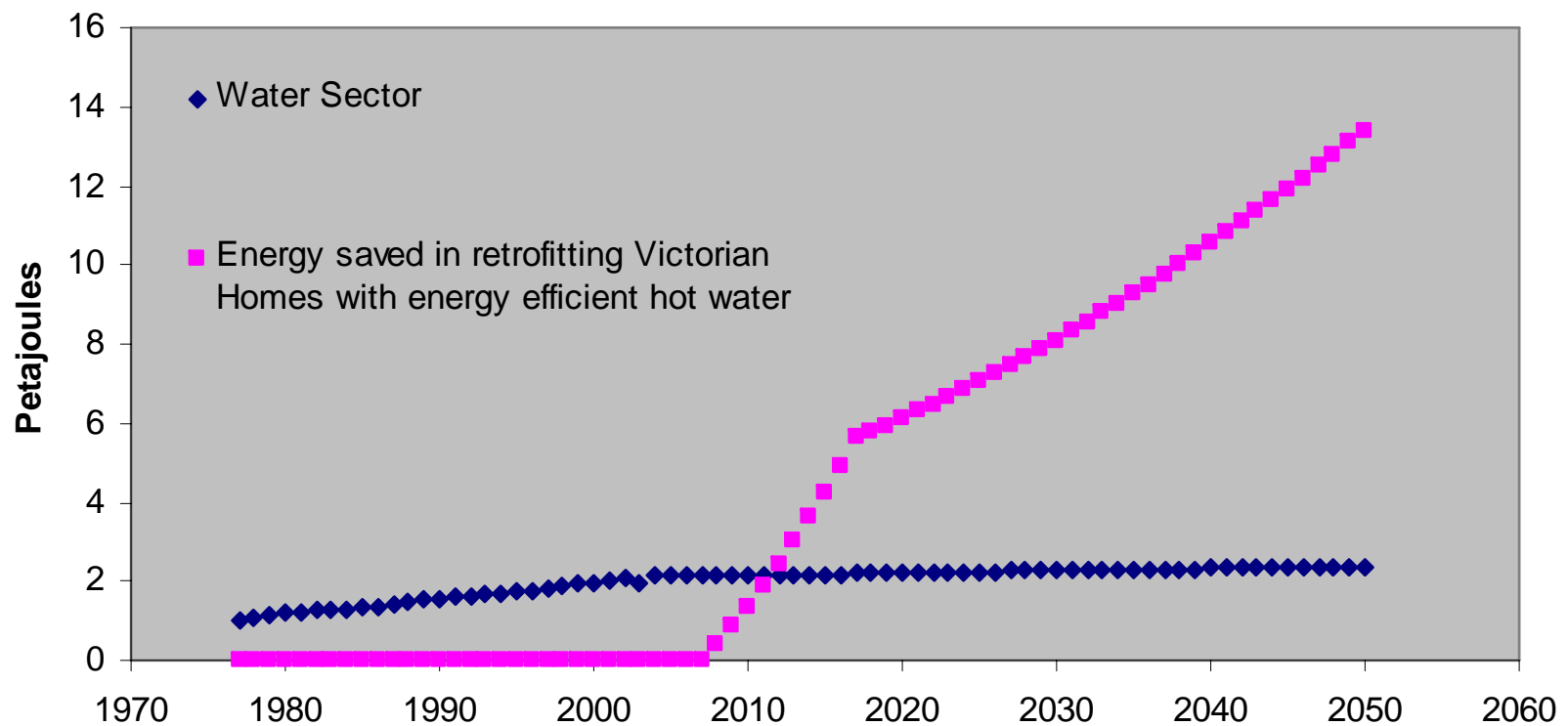
Household energy end use

Space heating & cooling	44.7%
Water Heating	24.6%
Appliances	22.3%
Lighting	4.6%
Cooking	3.8%

End Use Allocation of Emissions, 2002, www.greenhouse.gov.au/inventory/enduse

Electricity saved in water use

Energy Saved with Retrofitting Compared with Energy used by Entire Water Sector in Victoria



Water used in Electricity generation

60,000GL needed - 59 729 GL put back = 271 GL actually consumed

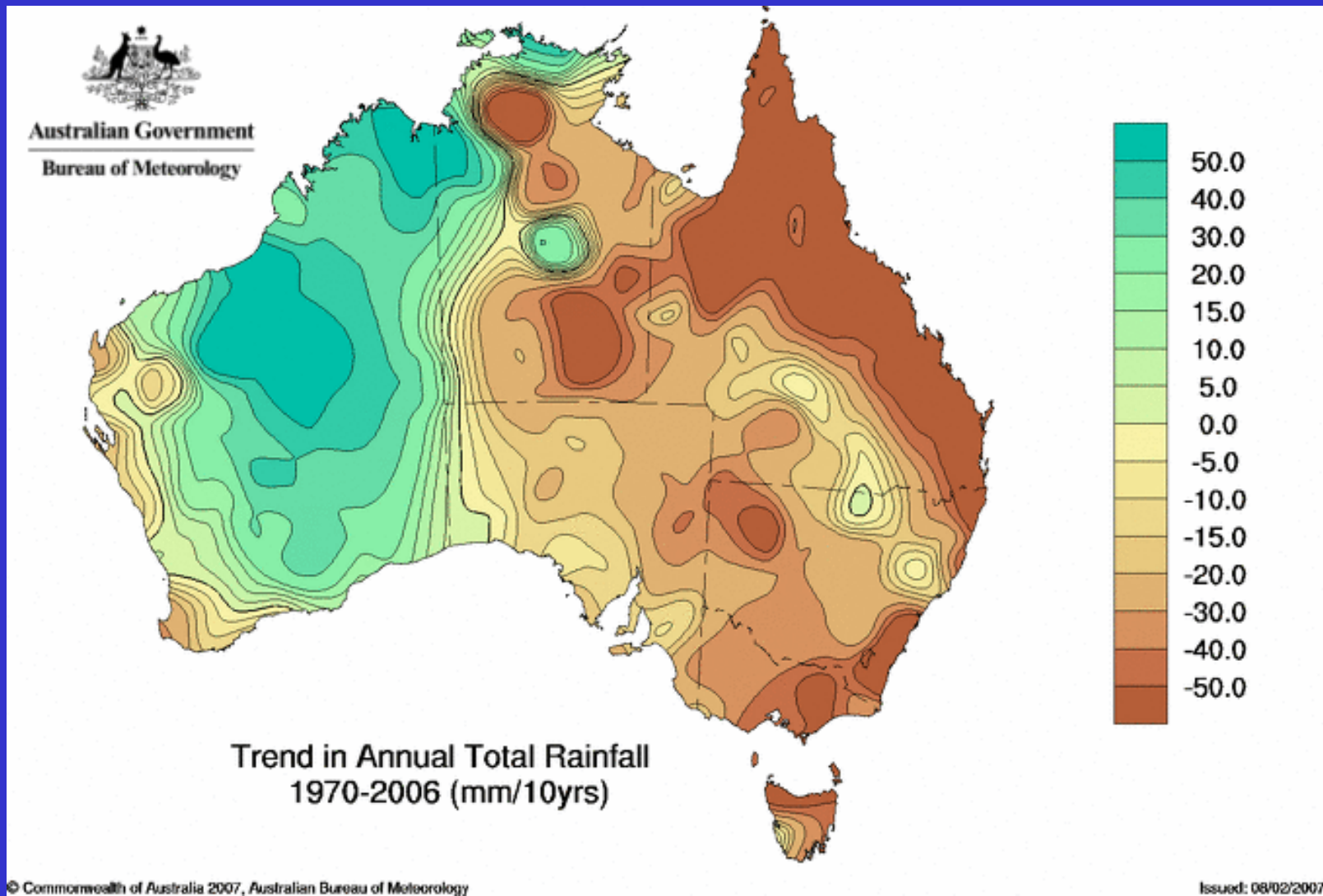
6.7

ELECTRICITY GENERATION, by fuel type—2004–05

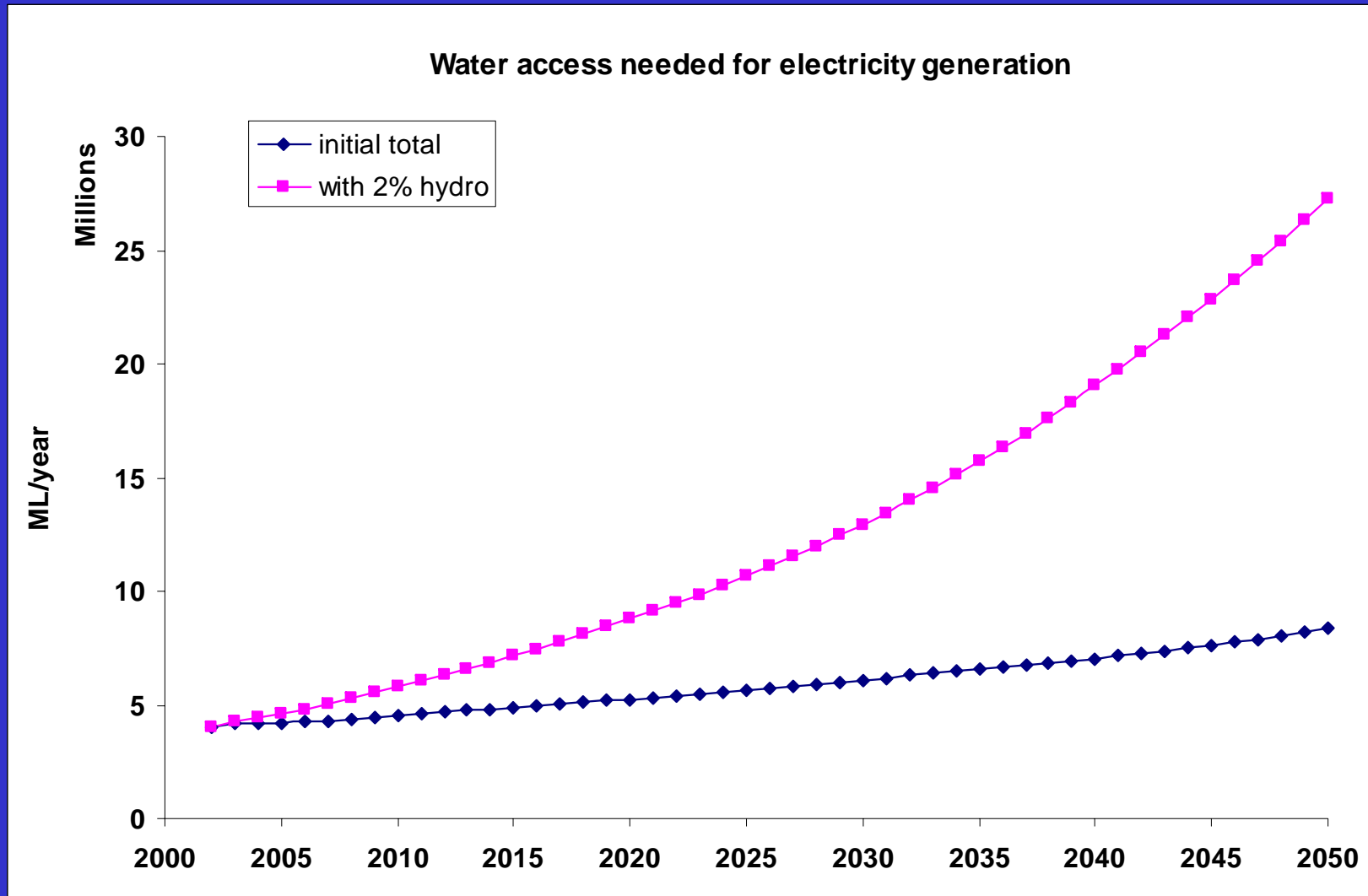
	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Australia
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Hydro	4 596	794	826	—	215	9 560	—	—	<u>15 991</u>
Black coal	54 231	—	38 290	—	9 659	—	—	—	102 180
Brown coal	—	49 341	—	4 700	—	—	—	—	54 041
Gas	1 182	1 179	4 145	5 401	6 117	934	1 828	—	20 786
Other	820	—	231	38	110	226	48	—	1 473
Total	60 829	51 314	43 492	10 139	16 101	10 720	1 876	—	<u>194 471</u>

ABS Water Account 2004-05, p 95 (Catalogue Number 4610.0)

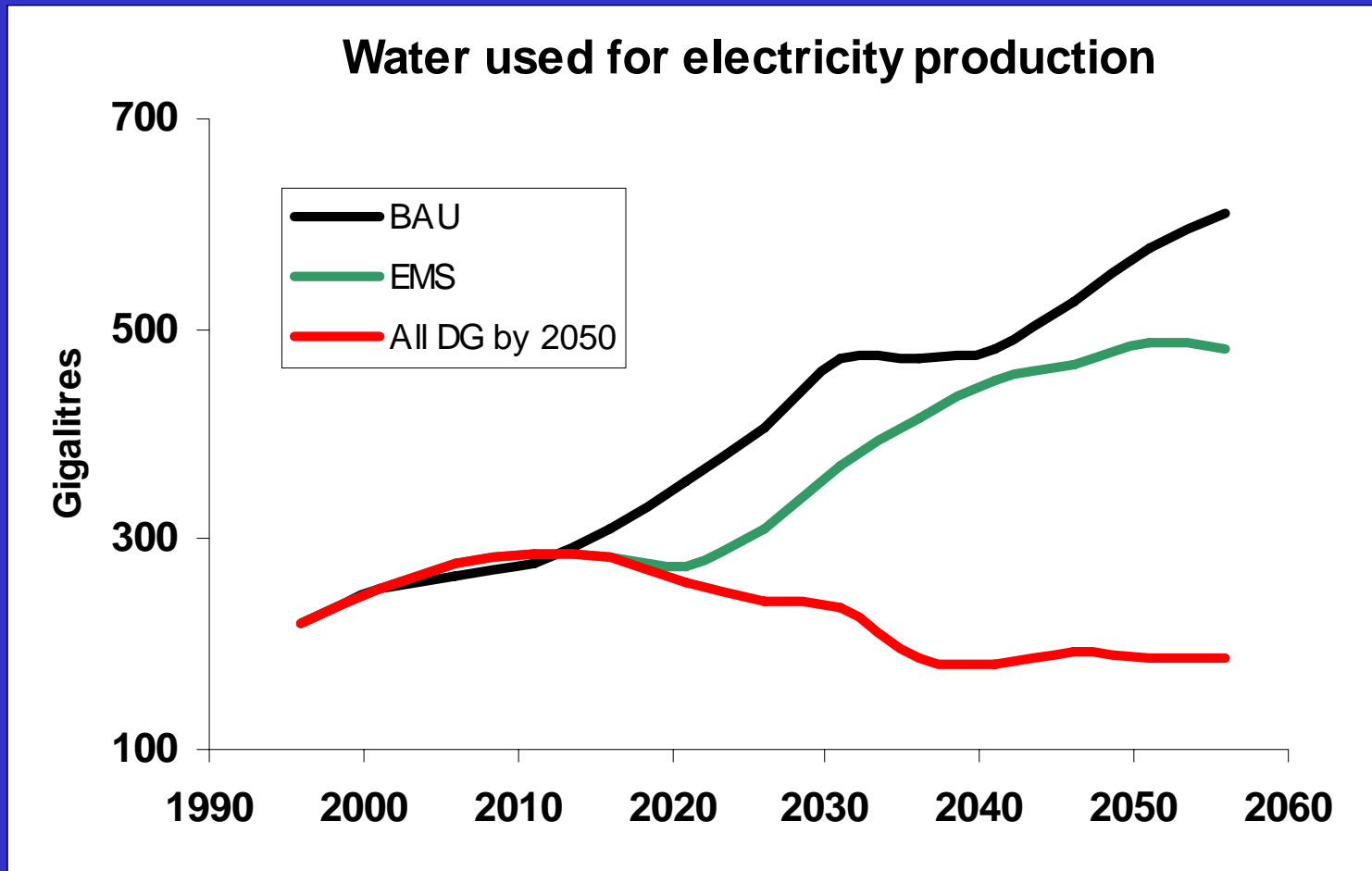
Climate change



Expanding hydro in Victoria to 2% by 2050



Water used in Electricity generation



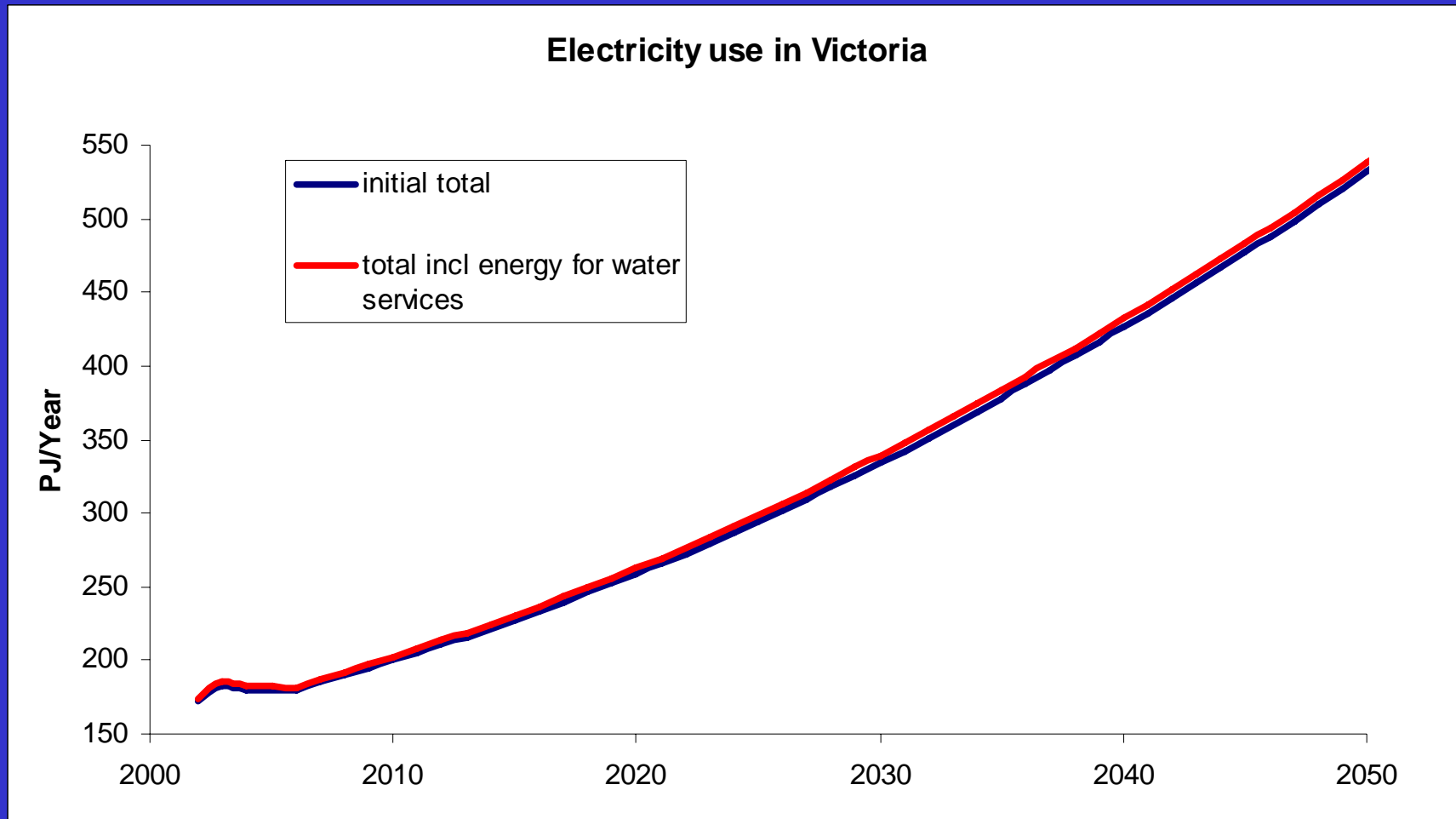
Electricity needs
water for cooling



Water needs
electricity to be
treated and
transported



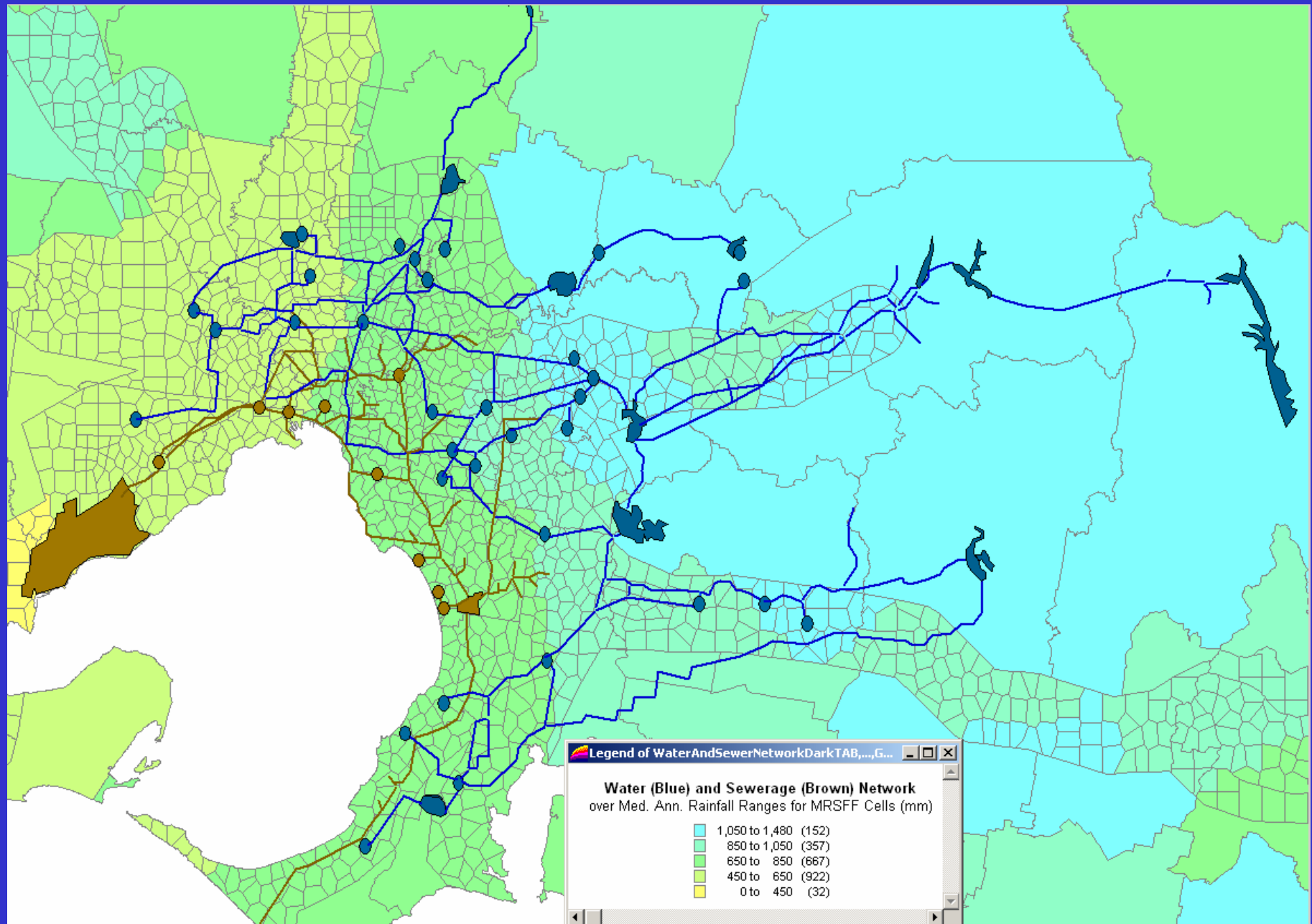
extra energy required after having considered the water-energy feedback



Where does complexity fit in?

- Decisions of the (hot) water users and grey water re-users in cities.
- Location specific criticality e.g climate change and hydropower in TAS.
- Possible co-dependency between electricity and water networks.
- Interaction between utility, regulatory and consumer actors.

Water and Sewerage Networks over Median Rainfall Bands



CONCLUSION

Energy and water sectors are connected

- Directly: through engineering
- Indirectly: through feedbacks
- In a complex way: in behaviour of **users** and **suppliers** and **regulators** and **infrastructure**

