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Energy Consumption for Urban Water Use – Capital City Projections

Water for A Healthy Country

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Key Messages

Draws on 2008 reports in press for WSAA and CSIRO analysis of Melbourne.

In 2006-2007,12.05 million people in 6 major cities average residential water use of 220 L/cap/d:

~ water utilities used 7 PJ energy (0.2% of urban system);

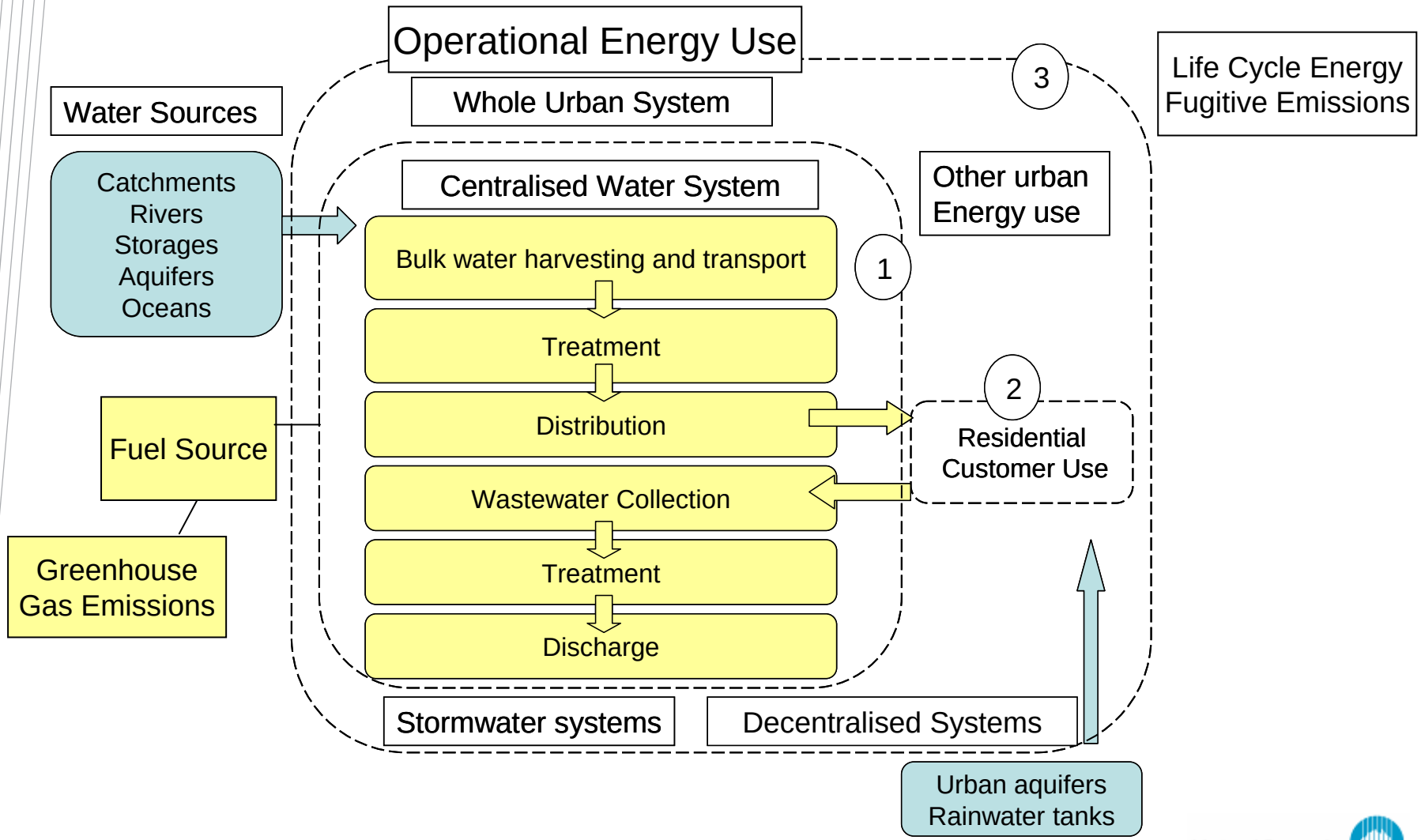
~ residential water heating used at least 46 PJ;

In 2030 with 15.8 million people using 225 L/cap/d (170 L/cap/d indoor):

~ energy use for water provision could triple (growing to ~21 PJ/a) if desalination the sole new source;

~ if desal is 40%; reuse 40% and conventional sources 20% then energy use grows to ~16 PJ/a

Focus on (1) centralised system; (2) residential use and (3) total urban system



Energy use in water provision, consumption and “total urban system” for 2006-07

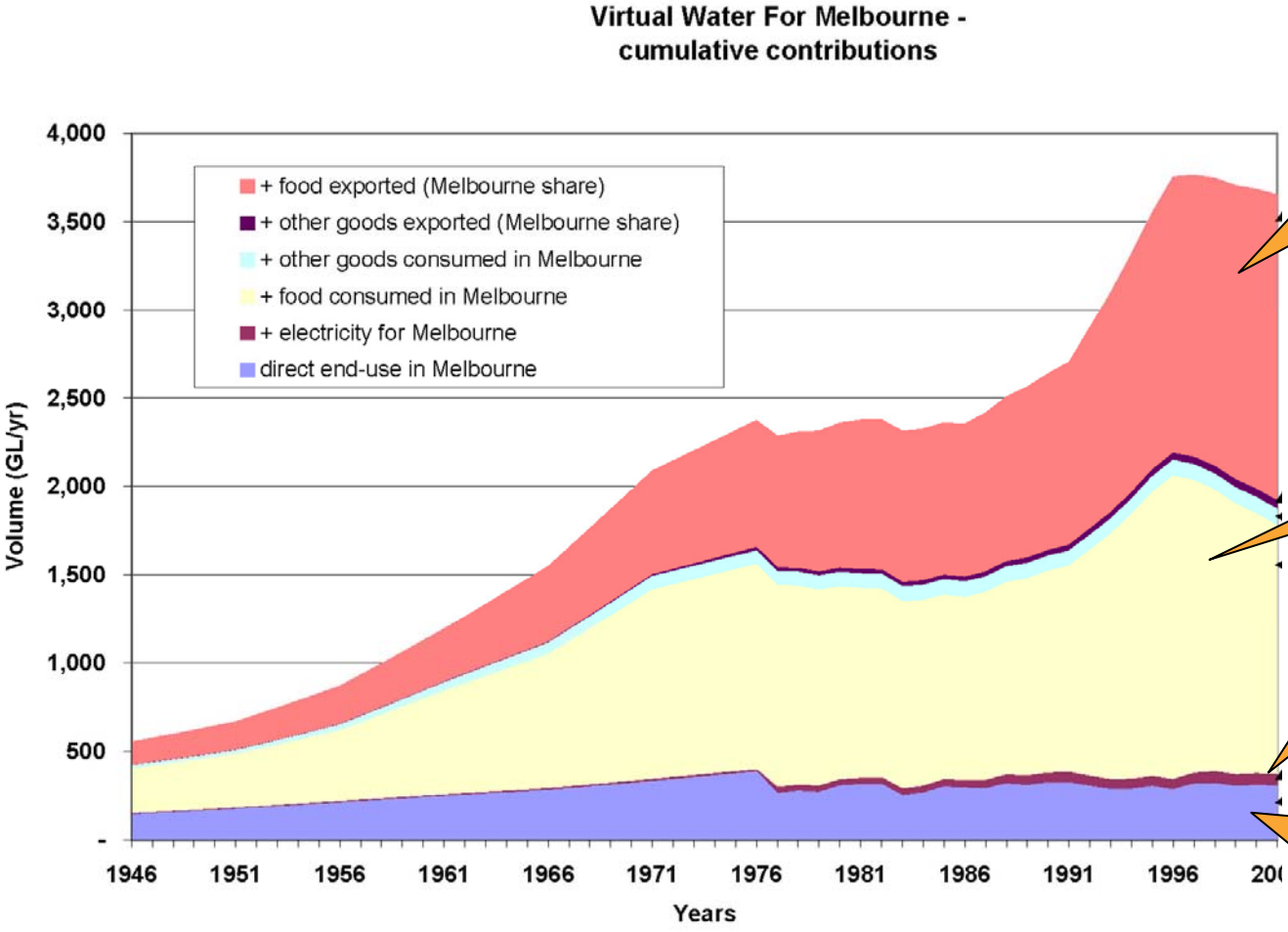
City	Energy Use (PJ/a)			Energy (% of urban system)		Utility energy use as % of hot water energy use
	Water Utility (W)	Res Hot Water (R)	Urban system (T)	Water utility =W/T	Res hot water =R/T	
Sydney	2.7	14	949	0.3%	1.5%	19%
Melbourne	1.3	15	1045	0.1%	1.4%	9%
Brisbane	0.5	3	561	0.1%	0.5%	15%
Gold Coast	0.2	2	157	0.1%	1.3%	11%
Perth	1.1	6	597	0.2%	1.0%	19%
Adelaide	1.3	6	242	0.5%	2.5%	21%
TOTAL	**7.1**	**46**	**3552**	**0.2%**	**1.3%**	**15%**

Additional energy in water provision and use in 2030

Residential Demand (Indoor Demand)	Additional water supply required	Water Source	Additional Energy required for water treatment	Additional Total energy required	Additional energy for residential water heating
L/cap/day	GL/year		(PJ/a)	(PJ/a)	(PJ/a)
300 (195)	1388	40% Desal, 40% Reuse, 20% New surface	10	19	34
		Desalination	19	29	
225 (175)	665	40% Desal, 40% Reuse, 20% New surface	5	9	24
		Desalination	9	14	
150 (130)	-57	-	0	0	6

Assumes 15.8 million people in 2030 in Sydney, Melbourne, Perth, Brisbane, Gold Coast and Adelaide (up from 12.05 million in 2006-07) and that existing supplies yield as per 2006-07.

Direct and embedded water flows -Melbourne



Pro-rata volume for water in all products exported from Australia (1600 GL)

Water to feed and clothe Melbourne (1400 GL)

Water for electricity for Melbourne (60 GL in 2002)

Water used “directly” in Melbourne for residential and industrial purposes (400 GL)

Total embedded water for Melbourne (upper curve). Each curve shows the cumulative embedded water as component are added – excludes water embedded in product entering Melbourne internationally

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Conclusions

- Direct energy use in urban water is a small proportion of total urban energy use (0.2%). But growing rapidly.
- When residential hot water (1.2%); water heating in non-residential applications (similar to residential energy use); energy in N, P and C lost in wastewater; decentralised systems, life-cycle energy use and fugitive emissions are considered; then water sector policy has an influence on a much greater pool of energy and ghg emissions.
- Water service provision could move beyond “carbon neutrality” by considering these wider energy flows;
- Further analysis, better definitions and data are needed in many areas

Recommendations and suggested principles

- Improve monitoring, reporting and incentives for energy management including decentralised systems;
- “Whole of water cycle” analysis – including use - is needed to identify least cost outcomes and overcome “fragmentation of the water cycle”;
- Clarify the “urban system” energy use/ghg to help establish a consistent and quantitative analysis framework;
- Unite and encourage water-related energy / ghg research efforts which have commenced e.g. through a co-ordinated National Program.

Some references

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