Indirect energy impacts of urban water choices

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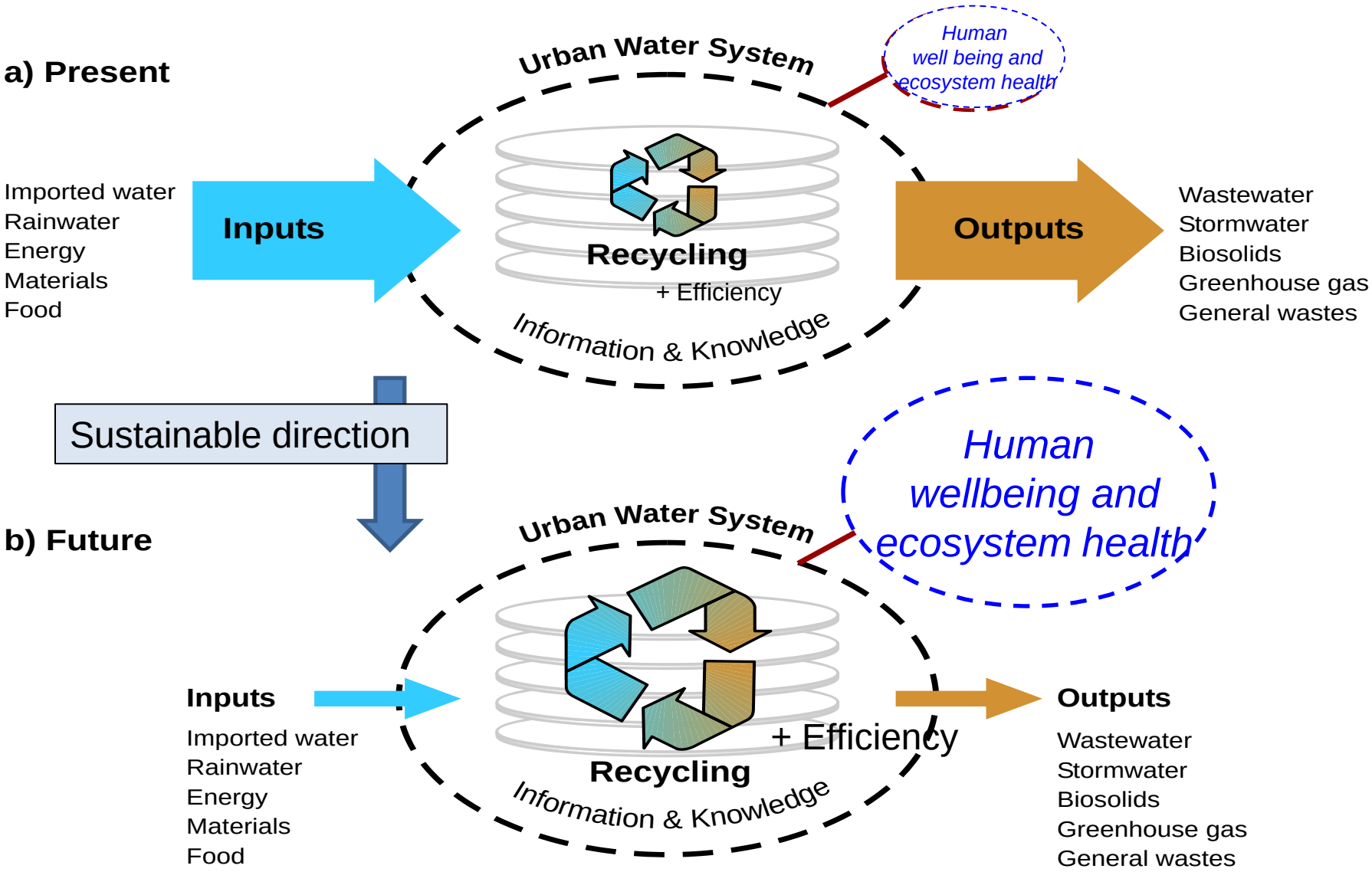
Key Messages

Utility energy use is set to grow 300-500% by 2030. If we aim to reduce greenhouse gas emissions 80% by 2050 a 25-fold gap exists between desired and actual pathways.

The water sector has a large indirect influence on total urban energy use (3-6%) estimated.

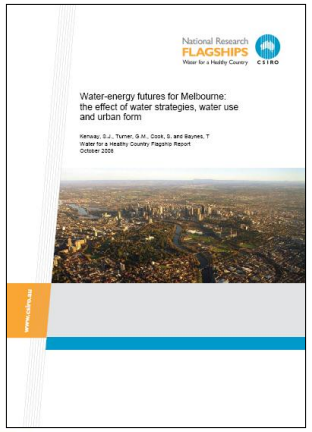
Urban metabolism principles will help identify solutions and opportunities.

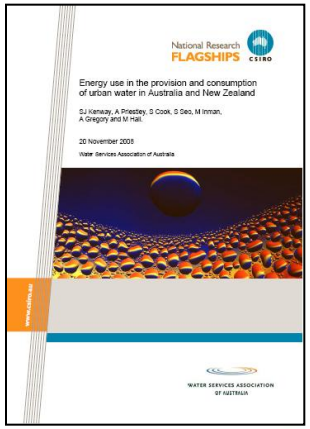
Urban metabolism and water



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%**





Kenway et al 2008 a,b

Energy use in water provision, heating 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
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By 2030, with 25% population growth, existing supplies continue, and new sources with 40% or 100% desalination

26-36PJ (300 L/cap/d) = 260-400% growth
16-21PJ (225 L/cap/d) = 130-200% growth
7PJ (150 L/cap/d) = 0% growth

80, 68 or 52 PJ for heating based on 300, 225 or 150 L/cap/d residential use

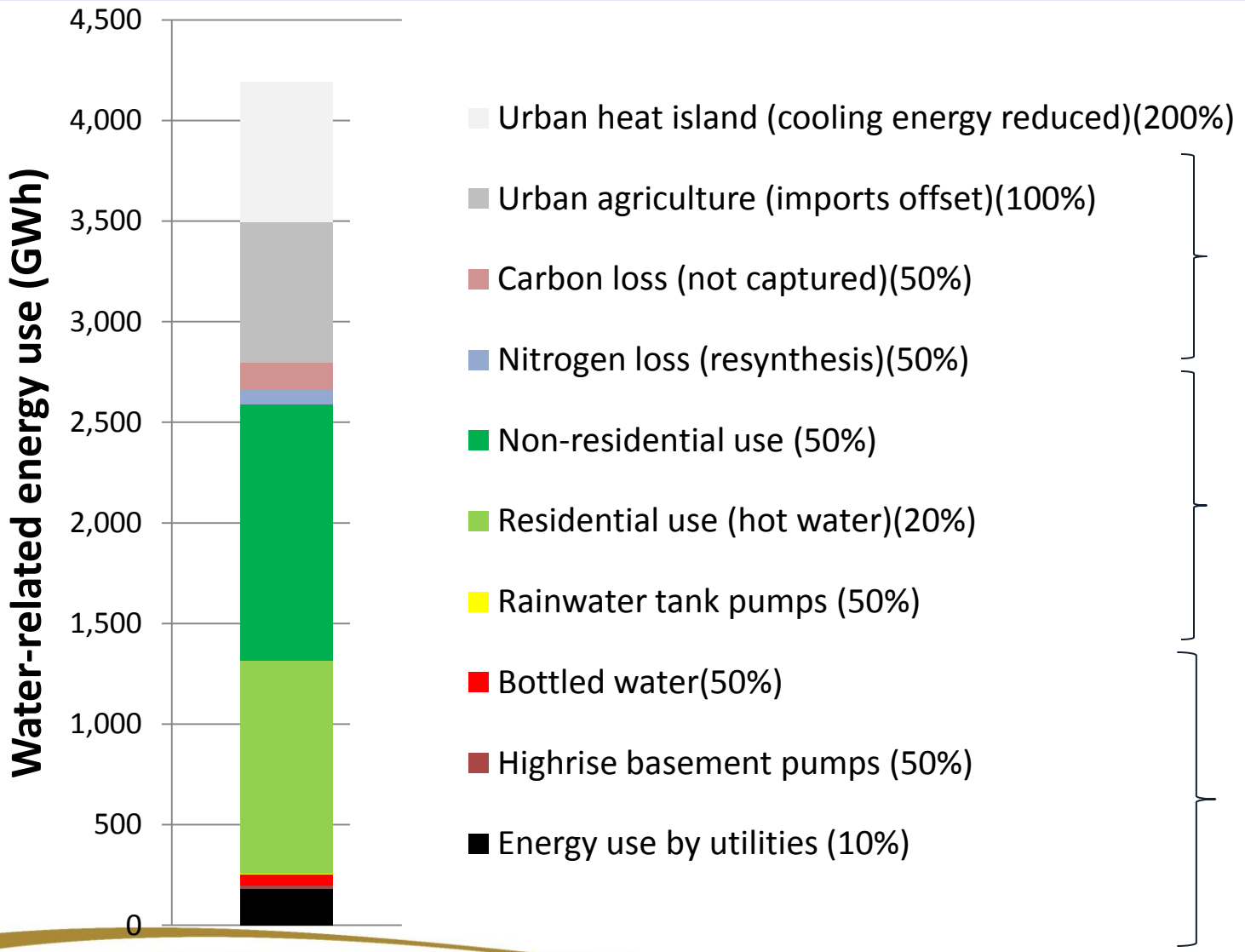
Why study “indirect” effects or “side-effects” or the “links” between water and energy in urban systems?

1/ Indirect effects are substantial……*In California, water-related energy use comprises 19% of State electricity use and 32% of natural gas use (Klein et al 2005).*

2/ Indirect effects are difficult to assess..and they keep changing.

3/ Understanding water-energy links in cities will address the root cause, not just the symptom. It will help us solve the problem, not simply move it from one domain to another.

Water-related energy use - a hypothetical city of 1 million



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Draws on data from Kenway 2008, Klein 2005, Gleick, 2009

Conclusions and discussion points

- Urban water management can play an integral role in driving down the urban metabolic rate. This opportunity has been overlooked and undervalued.
- There is a wide need to report openly, analyse and discuss indirect impacts, much more than is currently the case.
- By addressing water and energy inefficiencies in the design of our cities, and their water systems, we will find technologies and system-based solutions of high value.

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