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AWCRRP SEMINARS 2004

**WATER RECYCLING IN AUSTRALIA -  
THE BIG PICTURE**

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**AUSTRALIA'S EFFLUENT  
RESOURCES - RECENT POLICY  
OUTCOMES**

1990s – “Creation, ascendancy of EPAs”  
The need to meet or avoid discharge limits

2000s – “We are running out of water”  
Effluent, stormwater, & rainwater seen as resources

*Maybe we should save and reuse some!*




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**AUSTRALIA'S WATER USE**

70 % to agriculture, but this water not readily  
accessible to capital cities except Adelaide

The 22 major cities:-

Total Domestic use - 2 100 GL  
Gardens & Toilet flushing - 658 GL  
Total Industrial/Commercial use - 576 GL  
Non-drinking requirement - ?




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**WATER RECYCLING 2001-2**

Region	Effluent GL/yr	Recycled GL/yr	%
QLD	339	38	11.2
NSW	694	61.5	8.9
ACT	30	1.7	5.6
VIC	448	30.1	6.7
TAS	65	6.2	9.5
SA	101	15.2	15.1
WA	126	12.7	10.0
NT	21	1.1	5.2
<b>AUST</b>	<b>1824</b>	<b>166.5</b>	<b>9.1</b>

Figures from State Agencies



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### CAPITAL CITY WATER RECYCLING 2001-2

State Capital	%
SYDNEY	2.3
MELBOURNE	2.0
BRISBANE	6.0
ADELAIDE	11.1
PERTH	3.3
HOBART	0.1

Almost none of this saves any drinking water!

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### THE RECYCLING ALTERNATIVES

#### Disposal on Land

- Urban & County Amenities – ovals, gardens
- Agriculture & Forestry – substitution  
*eg.* Werrabee River, Northern Adelaide Plains
- Agriculture & Forestry – economic development  
*eg.* Southern Vales, Picton, Shoalhaven, Balliang,
- Water Mining – *eg* Canberra, Albert Park, Flemington, South Pine

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### BUT IS THE SCHEME VIABLE?

#### LOCKYER VALLEY PROPOSAL

Aim was to take from Brisbane, Ipswich, and Logan 150GL/an. of Class A reuse water for horticulture/vegetables (Lockyer Valley), and class C water for field crops (Darling Downs). Capital cost \$600m, annual operating cost \$30m?

UNVIABLE –and no drinking water saving either!

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### LAND APPLICATION IN NSW, 2000

Uses of Effluent	No. of STPs (incl. multiple use)
Golf Courses	46
Pastures (Dairy, beef, sheep)	32
Sports fields, Ovals	19
Woodlots	14
Schools	4
Cemetery	1
Hydroponics	1
Dune stabilisation	1

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**THE RECYCLING ALTERNATIVES**

**Replacing drinking water**

Industrial use –  
*eg* Georges River, Illawarra-BlueScope Steel

New Industrial Development –  
*eg* Kwinana, Luggage Point

New Housing developments – dual reticulation  
*eg* Rouse Hill, Mawson Lakes, Springfield, Aurora

On site recycling – *eg* ACF Carlton, Six Canberra houses, Michael Mobbs' house, Future High Rise? 

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**THE RECYCLING ALTERNATIVES**

**Stormwater**  
*eg* Salisbury SA

Integrated recycled effluent and stormwater  
*eg* Olympic Park, NSW, Mawson Lakes, SA

**Rainwater –**  
*eg* HWS use, Fig Tree Place, Aurora

Integrated recycled effluent, stormwater, rainwater – *eg* Pimpama-Coomera – Gold Coast Water 

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**ISSUES FOR THE FUTURE**

**LAND APPLICATION OR MARINE DISCHARGE?**

There is rapidly increasing interest in water recycling, with strong incentives to apply more recycled water to land. There are some risks:-

- Inadequate modelling for proposed applications
- Rising water-tables and salinity
- Waterlogging

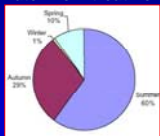
Rising water tables are now evident in Virginia quaternary aquifers. Discharge to land does not always lead to the best environmental outcomes

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**ISSUES FOR THE FUTURE**

**MATCHING SUPPLY AND DEMAND**

Varying seasonal domestic and agricultural demands are unlikely to match the supply of recycled water from treatment plants



Season	Demand (%)
Summer	60%
Autumn	20%
Winter	20%
Spring	10%


Modellled outside demand for water, Aurora subdivision (McLean 2003) 

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**ISSUES FOR THE FUTURE**  
**THE CHANGING DRIVER**

Water resource limits are now acting as the principal recycling driver, due to:

- competition for water (urban vs industrial/agric.)
- more conservation of water for the environment, de-rating of water storages,
- opportunity to replace potable with recycled water for non-potable uses.



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**ISSUES FOR THE FUTURE**  
**COSTING AND PRICING RECYCLED WATER**

Great variability in costing and pricing – there is no transparency in pricing mechanisms

**RECYCLED WATER PRICES**

Northern Adelaide Plains - Virginia	7-15c/KL*
Sydney – Rouse Hill	28c/KL (→ incr. use?)
Ipswich Water – Springfield	43c/KL
Christies Beach – Southern Vales	53c/KL*
SOPA / Newington	83c/KL

\* Supplied to reticulator by STP operator without charge



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**ISSUES FOR THE FUTURE**  
**COSTING AND PRICING RECYCLED WATER**

**ESTIMATES OF TRUE COSTS**

Ipswich Water Springfield (consultant)	\$1.45/KL
SOPA Olympic Park (operating cost only –SOPA)	\$1.60/KL
Cost, integrated hydrological system (consultant)	\$2.50/KL
Melbourne Eastern STP (consultant)	>\$3.00/KL
Rouse Hill (Sydney Water)	\$4 to \$7/KL

WHAT DO WE COST? - Direct operating only?  
 Environmental externalities? Capital?, Profit for Treasury?



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**ISSUES FOR RECYCLED WATER**  
**REGULATION**


Inconsistent, inadequate regulation between the States – Environmental, Planning, and Health

Inconsistent States' classification systems

Conflicts of interest – Treasury return vs Conservation

Who can collect and sell water (State or Local Govt?)

Disconnects between agencies – (ponderous, lengthy decision-making processes, discouraging for investors)




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### ISSUES FOR RECYCLED WATER

**A RANGE OF OTHER ISSUES**

- Integration of rainwater, stormwater, treated effluent, grey water – who owns what and who services what?
- Treatment plants – big or small?
- Energy costs, Greenhouse impacts, Installation standards
- Experience learned overseas
- Public perceptions influenced by market opportunism (food, real estate), political opportunism (votes)?

**Health, public confidence – the future of water recycling**



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### PUBLIC ACCEPTANCE CRUCIAL

#### PERCEPTIONS

- Psychological objection vs. the conservation ethic
- Non-contact use preferred
- Credibility, risk, trust
- Building community support
- Overseas experience

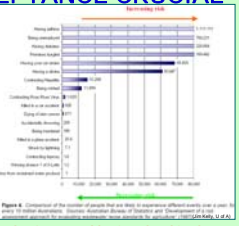


Figure 8. Comparison of the number of respondents that are likely to experience objection versus use of recycled water for various purposes. Source: CSIRO-ARC Water Use Survey, 2002. (CSIRO, 2002)

**Community must be given the facts and be involved in the choice of strategies to be adopted – e.g. Gold Coast Water developing Pimpama-Coomera area.**

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### THE ULTIMATE ISSUE

**DO WE RECYCLE BACK TO DRINKING WATER?**

- Technically feasible and safe, already practised indirectly
- Can evoke aesthetic insecurity among potential recipients
- Seems OK if goes down a river before enters reservoir (Adelaide – [1] various town STPs to River Murray →→ and [2] Hahndorf STP to Hahndorf Ck. →→ Mt Bold reservoir ?)
- Old, NT committed to no direct recycling to drinking water
- Successfully practised in Windhoek, Singapore

**WE AREN'T READY FOR DIRECT POTABLE YET!**



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### PERCENTATGE OF AUSTRALIANS OPPOSED TO USING RECYCLED WATER

Purpose	CSIRO-ARCWIS (2002)	Sydney Water (1999)
Drinking	74	69
Cooking at Home	-	62
Bathing at Home	52	43
Washing clothes	30	22
Home toilet flushing	4	4
Home lawn/garden	4	3
Irrigating local park	-	3
Irrigating golf course	2	-

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### INTEREST BY GOVERNMENT

Natural Resource Management Ministerial Council  
(April 2003) - Report requested on Water Recycling & WSUD

(October 2003) - Requested new NWQMS Guidelines for Water Recycling

Prime Minister's Science, Engineering, Innovation Council  
(November 2003) – Better education, pricing policies, a *Sustainability Scorecard*, encourage demo projects & science

CoAG (August 2003)  
National Water Initiative – Incr. urban reuse and stormwater

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### OBJECTIVES

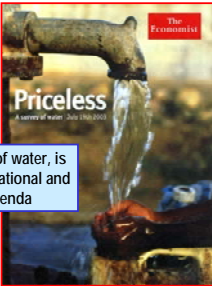
**SYDNEY:** Reduce *per capita* water use by 35%

**CANBERRA:** 20% Recycling by 2013 (incl. Parliament House?)

**MELBOURNE:** 20% recycling by 2010

**PERTH:** recycle 20% wastewater by 2012

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Water, including recycling of water, is rapidly rising up the local, national and international policy agenda

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### ATSE REPORT RECOMMENDATIONS

- Recycled, storm and rainwater are resources, not problems
- Maintenance of trust of water authorities paramount
- Need community-wide appreciation of hydrologic cycle
- Use “drinking water” not “potable water”
- Consider defining “Water Resource Caution Areas”
- Use more recycled water where do not need drinking water
- Water Title policy extended to provide recycled water titles
- Revise NWQMS Guidelines for Recycled, Storm & Rainwater
- Harmonise plumbing and drainage regulations

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**ATSE REPORT RECOMMENDATIONS (continued)**

- Industry/Consumers need awareness of system separation
- Headworks charges more equitable, allow recycling savings
- More attention to possible small STP options and benefits
- "In house" recycling considered in new high rise buildings
- Need national approach to all water costing and pricing
- Must define recycled water markets before proceeding
- Residual liabilities in *Trade Practices Act* clarified
- Put new non-drinking water-using industries close to STPs
- More wetlands for remediation, but ensure maintenance

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**ATSE REPORT RECOMMENDATIONS (continued)**

- STP role in biodiversity conservation recognised
- More research – see PMSEIC report recommendations
- Stimulate investment in community scale recycling projects
- No separation of responsibilities for policy management of water and wastewater
- Solve portfolio conflicts of interest at whole-of-government eg between conservation and revenue generation obligations
- Ensure public participation in decision-making to gain public confidence and trust in future water recycling initiatives and encourage acceptance of recycling

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**WATER RECYCLING**  
**IT IS ESSENTIAL WE GET THE POLICIES RIGHT!**



One publicised failure could undermine every recycling scheme. This would put at risk all the capital invested.  
**There is no security of demand in the face of disaster**

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More details:-  
The ATSE Report

**WATER RECYCLING IN AUSTRALIA**

ARC sponsored – 250pp  
Copies available - no charge  
E-mail [ianr@atse.org.au](mailto:ianr@atse.org.au)

