Sydney's water ~ going to waste ?

Summary Report

4th Sydney Water Project

Acknowledgements

Summary report for the 4th Sydney Water Project written by Michael Dean based on the full report written by Michael Dean and Ellen O'Brien.

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Background

The PENGOs are a collaboration of independent non-government environment organisations which have experience, skills and interest in environmental protection.

Contents

It has been nine years since the PENGOs presented the strategic policy document A New Course for Sydney Water which examined the water/wastewater/stormwater system within the context of the total water cycle and made a series of recommendations for future action by Sydney Water. Since then, Sydney Water has implemented a number of the recommendations and technology has rapidly advanced.

The 4th Sydney Water Project revisited this advice, given the advances in technology and the service delivery approach by Sydney Water (rather than purely providing potable water supply and removal of wastewater).
The project:

- **Reviewed Sydney Water's progress** since A New Course for Sydney Water in 1995;
- **undertook independent research** into water cycle modelling, resource recovery (both Next Energy) demand management (Peter Coombes Urban Water Cycle Solutions) and life cycle assessment of innovative decentralized solutions for Sydney's growth (UNSW Centre for Water and Water Technology);
- **consulted with environmental groups and government agencies** on key issues and new directions.

Statement

The report concludes that Sydney Water's progress toward sustainability is too slow, with weak demand management and recycling strategies and implementation. To meet its legislative obligations, Sydney Water must act as an effective advocate for sustainable water use.

In order to avoid a water supply crisis, the environment groups call on Sydney Water, together with government and the wider community, to build an 'invisible dam' from strong water conservation and recycling measures applied to all existing customers and new development and redevelopment in Sydney.

Findings

Sydney Water's poor performance against its core targets for water conservation and recycling can be attributed to underspending on demand management and recycling programs and on the Corporation's use of a "least cost planning" to select demand management options. The 2002 mid-term review by the Independent Pricing and Regulatory Tribunal (IPART) found that "... the approach does not currently undertake comparison of demand and supply side options as required by the licence" and calls for "reporting of a traditional cost-benefit ratio which is clearly understood by stakeholders". The PENGOs found that priorities change significantly when environmental cost and benefits are included.

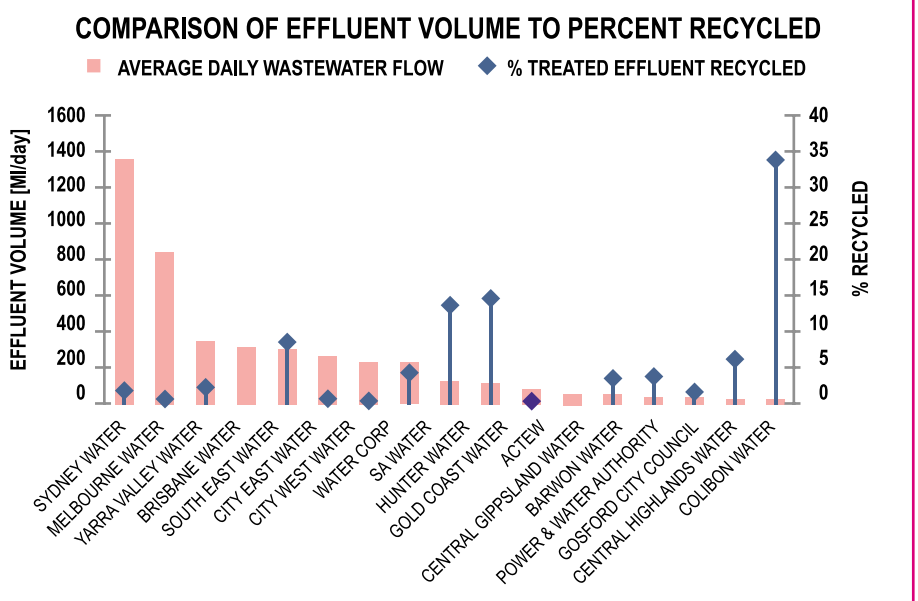
Sydney Water's current approach is not consistent with ecologically sustainable development, and the Corporation must change its decision-making practice in order to select options meet sustainability targets. To ensure Sydney's water cycle is ecologically sustainable, we must aim for a total water consumption target of 500 GL/annum, augmented by increased recycling, to supply adequate environmental flows in the Hawkesbury-Nepean and avoid the need to a new dam on the Shoalhaven. Ideally this consumption target should be achieved without relying on inter-basin transfers.

Sydney Water has made **good progress** in inland waste-water treatment, recycling of sewage sludge (biosolids);

Sydney Water has made **reasonable progress** in energy efficiency, energy recovery, leakage reduction and improved environmental reporting;

Sydney Water has made **unacceptably poor progress** against critical WATER CONSERVATION AND RECYCLING TARGETS in the OPERATING LICENCE:

- The 1999 effluent recycling targets have been abandoned;
- 2001/2 demand management targets have not been met, 2004/5 and 2011/12 targets in serious doubt;
- less than 2% of total water used is recycled (30ML/day out of 630 GL/year for Sydney is approximately 1.7%);
- Sydney Water discharges 450 GL of wastewater as sewage effluent each year, and the 30ML/day which is recycled equates to just 11 GL/year (a recycling rate of only 2.5%).



SOURCE: SYDNEY WATER

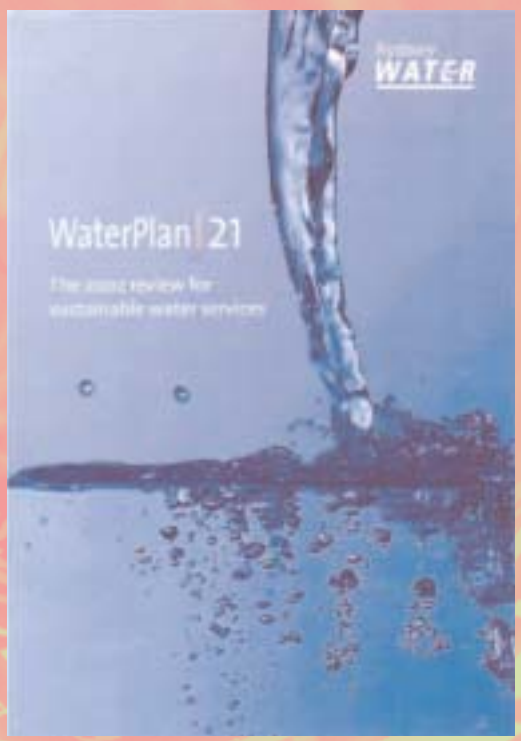
Issues

Sydney's water supply is drawn from dams on the Hawkesbury-Nepean and Shoalhaven River systems and piped to the city. Despite its huge capacity, Warragamba dam suffers from a low rainfall catchment. Meanwhile, rainwater runs off a nearly a million rooftops and goes to waste via stormwater drains in the high rainfall coastal areas of the city.

Sydney Water prepared its WATERPLAN 21 strategy in 1997, and conducted the first review in 2003. The revised strategy contains 5 broad goals:

- Clean, safe drinking water;
- Sustainable water supplies;
- Clean beaches, ocean, rivers and harbours;
- Wise resource use;
- Smart growth.

However, the revised strategy contains no performance targets against which to measure progress.



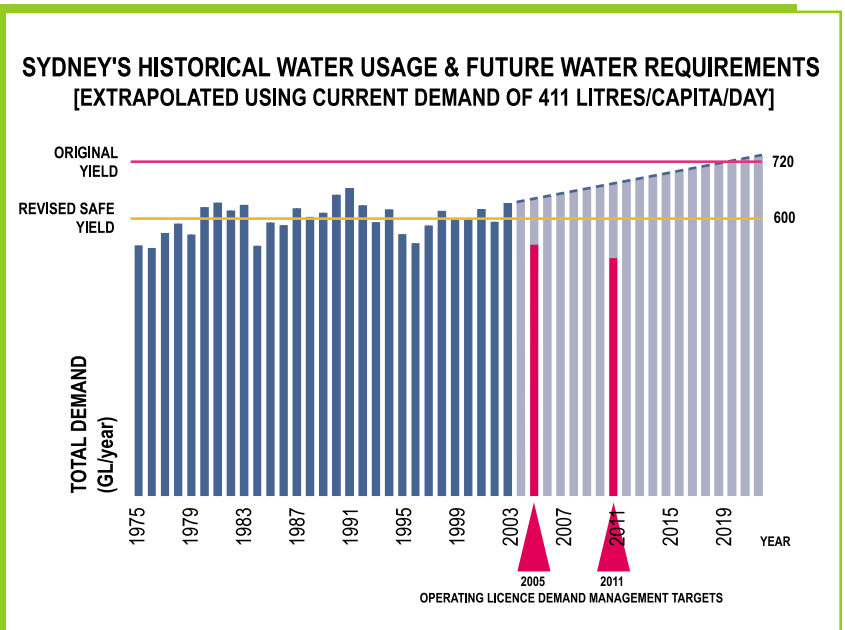
New goals in Sydney Water's revised WATERPLAN 21 provide a better framework for sustainability. the vague language of the review leaves critical issues unanswered:

'Safe drinking water' means controlling disinfection byproducts as well as pathogens.

- Sydney Water must effectively monitor risks to public health from byproducts of disinfection (Chlorine/Bromine etc is used to control pathogens in the aging water supply system). Disinfection byproducts (total trihalomethanes-TTHM – and five haloacetic acids – HAA5) increase risk of cancer and birth deformities. Monitoring must commence, based on new US EPA rules;
- water supplied locally from rainwater or stormwater can be managed with safer UV or ozone disinfection, avoiding chlorine and other disinfection byproducts.

'Sustainable water supplies' means water conservation (including demand management) and recycling must dramatically increase.

- Sydney Water currently draws 630 GL from the Hawkesbury-Nepean and Shoalhaven River systems and discharges more than 450 GL of wastewater into rivers and oceans. The safe yield was thought to be 600 GL/year but this does not account for supply of an environmental flow;
- Sydney Water's business as usual projections (from WP21 LCA) suggest 650 GL/year in 2021 but this assumes water conservation (demand management) targets are met, if demand management fails, as it has to date, projections are over 720 GL/year;
- both the demand management and recycling programs are token efforts, compared to the magnitude of change needed;
- quantitative targets for reducing demand for water and recycling sewage effluent were the key elements of the PENGOs' NEW DIRECTION FOR SYDNEY WATER and were written into the OPERATING LICENCE. None of the targets have been met.



SOURCE: IPART

'Clean beaches and harbours' must not be at the cost of long term goals.

- Beach and harbour pollution has been reduced by deep ocean outfalls and the storage tunnel, but "big pipe" engineering methods have worked against other long term goals in the TOWARD SUSTAINABLITY REPORT, for example, and diverted resources away from recycling and zero discharge objectives.

'Wise resource use' is improving, but achievements are overstated.

- Reuse of sewage sludge (biosolids) captured at STPs is very good (over 95% reuse) but low rates of solids recovery at ocean STPs mean about half the total sewage solids are dumped in the ocean. This is not reported publicly (in the TSR, for example);
- energy from renewables is 5.8% of total energy used by Sydney Water. 2.5% of the total is purchased as green power, most of the remainder is co-generation of electricity from methane produced by STPs. Energy recover from sewage treatment is progressing well but total energy consumption is increasing at a greater rate. Purchase of renewable energy must increase.

'Smart growth' must start now and apply to all future growth.

- Development of decentralised total water cycle servicing solutions (for new growth and priority sewage program areas) has stalled;
- need to keep pace with improving technologies: eg 2.5/4 litre dual-flush toilets (UK); decentralised neighbourhood scale wastewater systems (US & NZ) on-site vermiculture (Aust), potable rainwater and stormwater harvesting (UK & Europe);
- innovation can achieve substantial results. Modelling for the PENGOs estimates rainwater tanks (with mains top-up) supplying water for indoor and outdoor uses in all new residential development could save 19-30 GL year by 2020, with similar savings from mandatory water efficient appliances.

Building the 'invisible dam'

Sydney's next dam will not be built with a massive wall of concrete across a magnificent stretch of river, drowning farmland and bushland alike. Instead, the PENGOs believe that residences, businesses and government buildings across Sydney can and should collect the rainfall which otherwise goes to waste down the city's network of stormwater drains. This is one of a suite of water conservation and recycling measures, which Sydney can build into a virtual dam to dramatically extend the water supply.

As the water crisis deepens, the NSW government is starting to move forward on key initiatives. Restrictions on indoor use of rainwater have been lifted, and the rebate for rainwater tanks, which was only introduced last year, has been extended to the next operating licence review in 2005. The restrictive plumbing code, an impediment to innovation, also gives way to an Australian Standard. Sustainable water pricing is promised, with increased charges for high water users and penalties for Sydney Water. The PENGOs propose a simple scorecard to track progress

Sustainable water scorecard

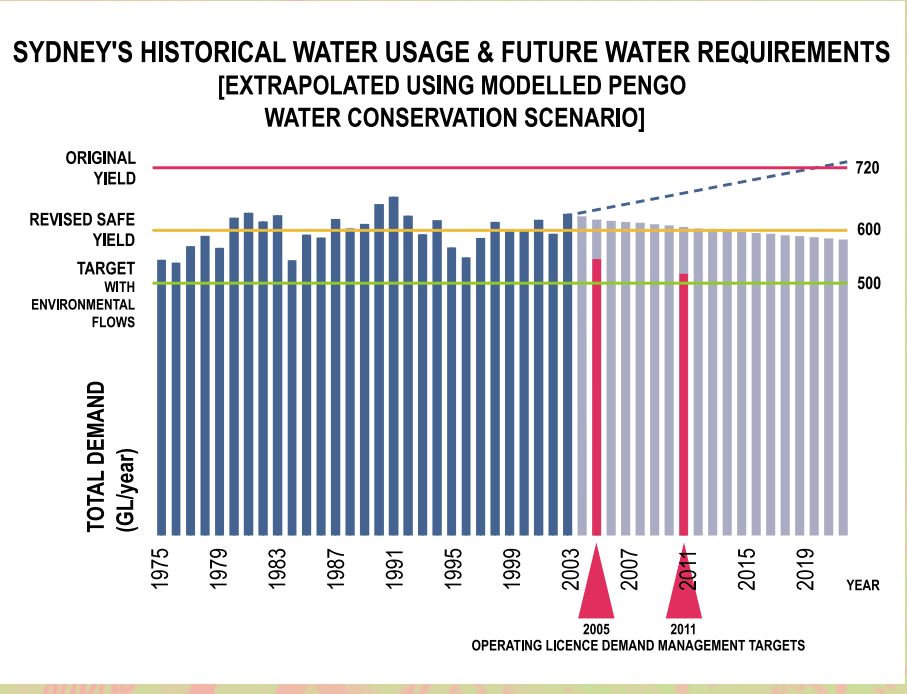
	PENGO PROPOSED	GOVERNMENT PROMISED	DELIVERED
TOTAL CONSUMPTION TARGET (500GL)	●		
PERMANENT WATER RESTRICTIONS	●		
REVISE SECURITY OF SUPPLY	●		
MANDATORY WATER-EFFICIENCY (NEW DEV'T)	●		
SYDNEY-WIDE RETROFIT (EXISTING DEV'T)	●		
UNRESTRICTED RAINWATER USE	●	●	●
RAINWATER TANK REBATE (EXTENDED)	●	●	●
PENALTY PRICING FOR SYDNEY WATER	●	●	
WATER EFFICIENCY CREDITS	●	●	
SUSTAINABLE PRICING FOR WATER USERS	●	●	
WATER RECYCLING TARGET	●		
REFORM IPART PROCESS	●		

Years of inaction and denial may finally be behind us, but much more needs to be done to ensure that Sydney's water cycle is ecologically sustainable. Critically, we need to take less water out of our rivers to return them to health. As these measures are delivered, Sydney's water cycle will move away from waste toward true sustainability. These solutions are described in more detail on the following pages.

SOLUTIONS

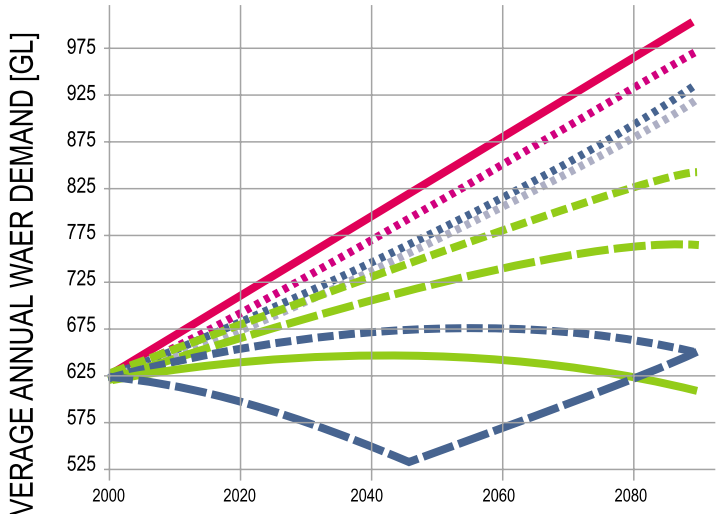
Sydney's water supply must be managed to avoid the need for a new dam, which will irreparably damage another major river (the proposed Welcome Reef dam on the Shoalhaven). Life cycle assessment for Sydney Water and PENGOs demonstrates that hard engineering solutions to augment supply, such as desalination, also come at high environmental cost.

A 500 GL/year total consumption target allows for return of environmental flows to the Hawkesbury-Nepean River system, while water conservation reduces demand. In addition, it creates a viable water conservation market for private investment. To achieve water efficiency targets, conservation must be supported by increased water recycling (see page 11). PENGO studies have found that decentralised local recycling requires less energy and materials than the centralised solutions preferred by Sydney Water.



Establish a total consumption target of 500GL/year (allowing environmental flows);

- **permanent low-level water restrictions on outdoor water uses** (e.g. daytime use of sprinkler systems, hosing paths) for residential, commercial and public uses – to make water available for environmental flows and promote long-term behavioural change;
- **immediate change to the security of supply criteria to 95%** (from existing 97%.) – that is, increasing the percentage of time from 3% to 5% when it is likely that water restrictions may be imposed taking into account the need for environmental flows. PENGOs suggest that 90% security of supply (10% chance of restrictions) may be reasonable in a dry continent;
- **effective monitoring of risks from chlorine disinfection by-products** in drinking water;



WATER CONSERVATION SCENARIOS

SOURCE: AFTER COOMBES 2003

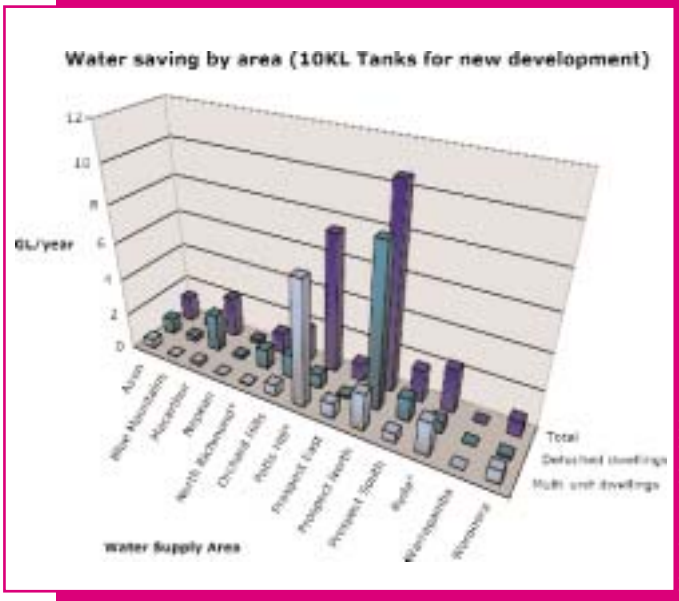
DEFERRING THE DAM: WATER CONSERVATION SCENARIOS AND SECURITY OF SUPPLY

KEY	SCENARIO	CODE	AUGMENTATION YEAR BY FREQUENCY OF RESTRICTIONS 1%	3%	5%	10%
	Base case		2003	2006	2020	2046
	AAA showerheads	(AAA_1)	2003	2006	2025	2050
	Demand management	(DM_2)	2003	2006	2029	2061
	Rainwater Tanks – Toilet/Outdoor only	(TT_2)	2003	2006	2028	2051
	Rainwater Tanks – Hotwater/Toilet/Laundry/Outdoor	(TH_1)	2003	2027	**>2090**	**>2090**
	Rainwater Tanks – Hotwater/Toilet/Laundry/Outdoor	(TH_2)	2003	2077	**>2090**	**>2090**
	Rainwater Tanks 0.25% + DM 1%	(TDM_025)	2003	2006	2030	2084
	Rainwater Tanks 0.5% + DM 1%	(TDM_05)	2003	2007	2043	**>2090**
	Rainwater Tanks 1% + DM 1%	(TDM_1)	2003	2090	**>2090**	**>2090**

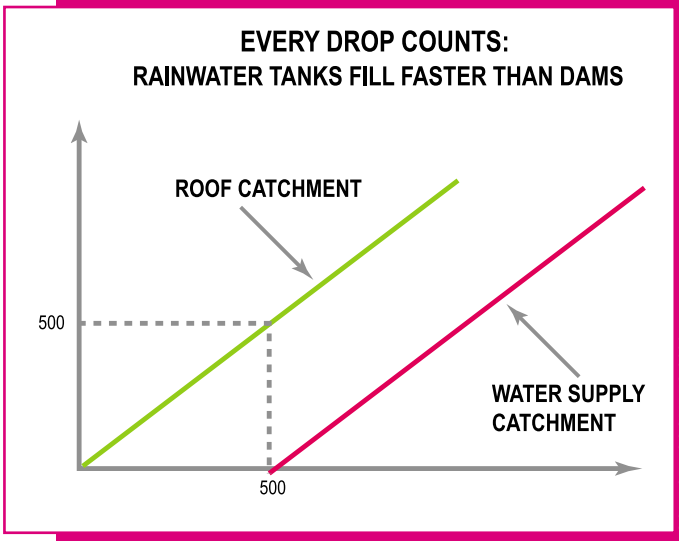
% indicates adoption rate per year (eg 1% means the scenario is implemented for half of Sydney's households in 50 years)

SOURCE: AFTER COOMBES 2003

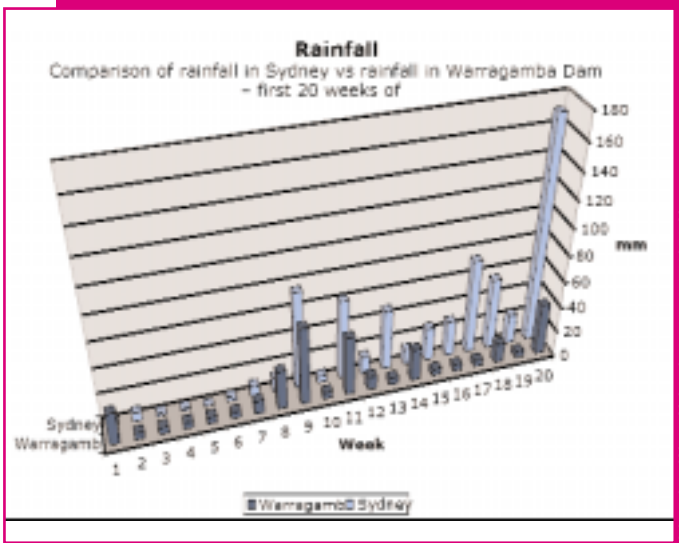
- **mandatory rainwater tanks, greywater/effluent recycling, and water efficient appliances** for all new development and redevelopment;
- **continued rebates** for rainwater tanks (refocus the rebate on indoor uses) and extend rebates to water efficient appliances;
- **restructure the price Sydney Water pays for bulk water supply** to the Sydney Catchment Authority to remove the conflict of interest between selling water and conserving water –
  - one price for water supplied up to the water consumption target
  - higher price for water supplied in excess of the target
  - funds directed to water conservation and recycling measures identified below;
- **create market for innovative/ecoefficient/ total water cycle solutions via strong incentives:**
  - competition for innovation with substantial rewards (e.g. $10M per year)
  - water conservation credits trading scheme, to encourage private sector involvement
  - subsidies currently available to Sydney Water (including government grants, community service obligation payments and cross-subsidies) for conventional systems must be madeavailable to any service provide to promote innovation and water conservation;
- **further water pricing reform:**
  - rising block pricing for higher quantities
  - discount/rebates for pensioners and low-income.



SOURCE: PENGOs 2003

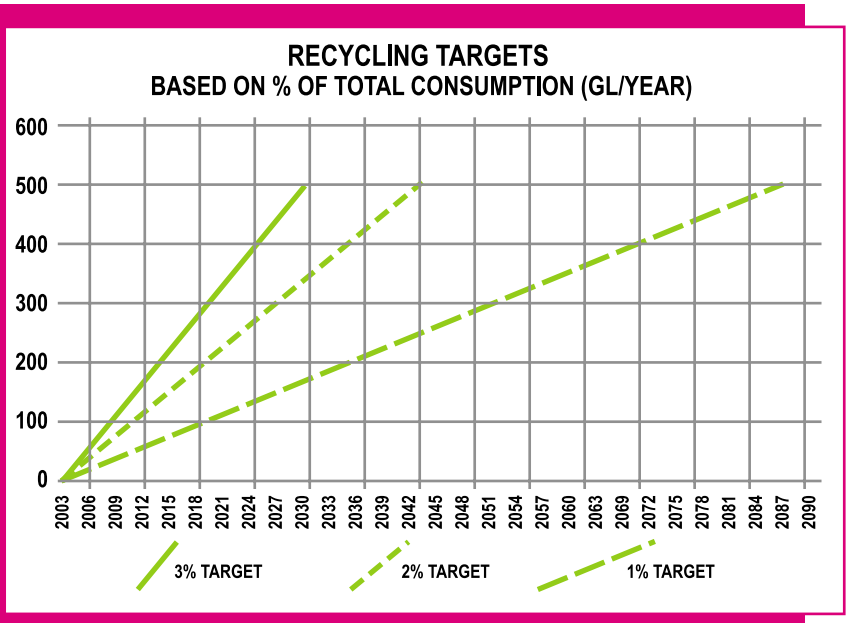


SOURCE: COOMBES 2003

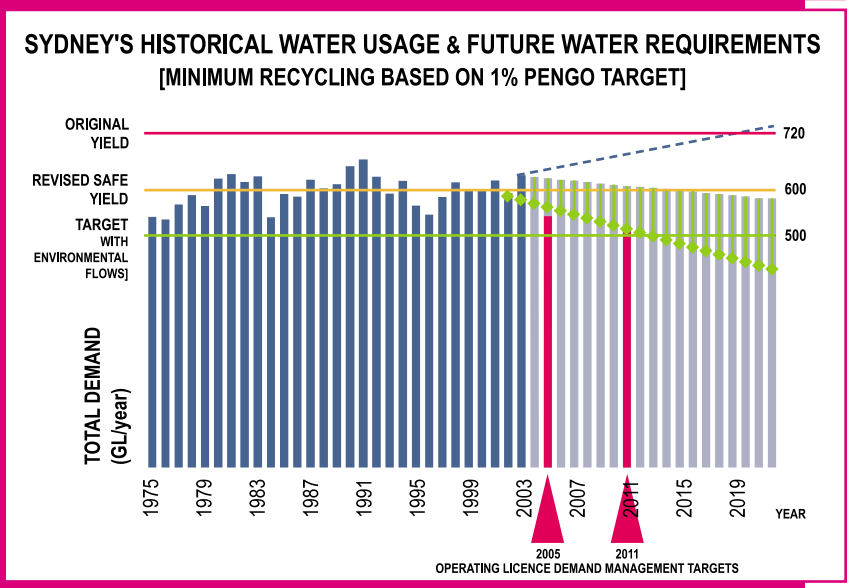


SOURCE: SYDNEY CATCHMENT AUTHORITY

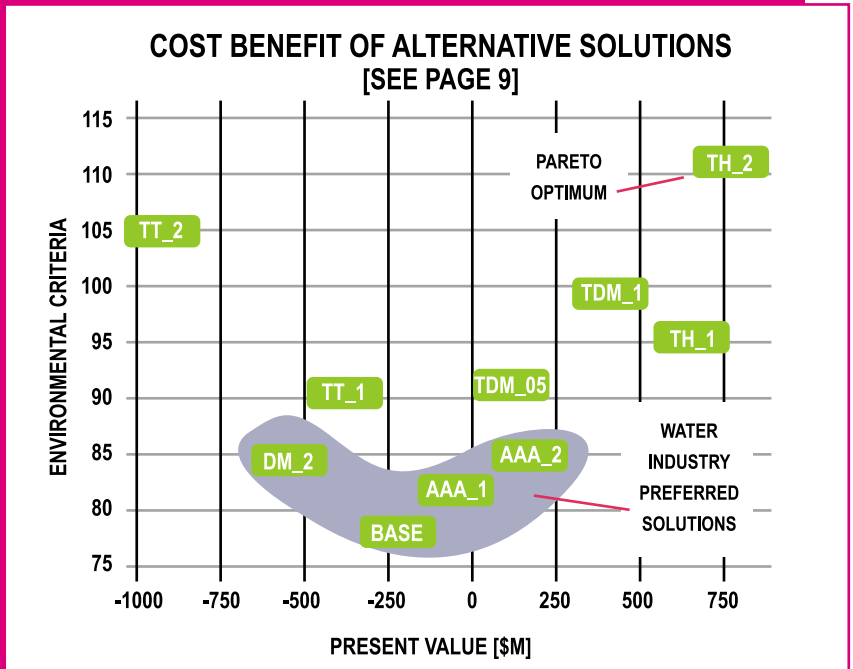
- **re-establish water recycling targets** to achieve the Corporation's statutory long term objective to reduce discharges to oceans and waterways (Sydney Water Act s.27) –
  - specific targets for effluent reuse and reduction of discharges to waterways
  - annual or periodic recycling targets linked to consumption levels;
- **reasonable charges for bulk water extractions** (from the Hawkesbury-Nepean) to support the market for water recycling;
- **harvest stormwater** as an alternative supply source and restore degraded urban streams;
- **environmental priorities submitted to IPART jointly by Sydney Water, environment groups and EPA** for pricing paths to achieve sustainability;
- reform and **change of focus toward sustainability for IPART**, including an environmental expert on the tribunal;
- **reform Sydney Water's strategic and program decision-making –**
  - publish long-term and annual program of water service needs (including water conservation and recycling)
  - require early public review
  - open tending for service delivery solutions
  - economic evaluation based on full cost-benefit (not least cost), so environmental costs/benefits are accounted.



SOURCE: PENGOs 2003



SOURCE: AFTER IPART



SOURCE: COOMBES

RECOMMENDATIONS

The following recommendations outline a detailed programme of improvements that Sydney Water and the NSW Government will need to implement in order for Sydney Water to make substantive progress towards sustainability. There are some recommendations which are considered to require immediate action. .

IMMEDIATE ISSUES

In order for Sydney Water to achieve the objectives of the WaterPlan 21, the following programmes should be actively developed and urgently implemented:

Safe, Sustainable Water Supply

1. Undertake comprehensive research into contaminants of drinking water supplied through the reticulation system. The results of any and all research to date and in the future must be made public.
2. Initiate permanent low-level water restrictions on specified outdoor uses (e.g. daytime use of sprinkler systems, hosing paths) for residential, commercial and public sector users to make water available for environmental flows and promote long-term change in water use behaviour.
3. Revise the security of supply criteria relating to acceptable frequency of additional water restrictions in association with Recommendation No. 2 (above). The security of supply should be set at 95% (compared to the current 97% level) to provide additional water for environmental flows, and consideration given to further revision to 90%.
4. Fast track retrofit of enhanced demand management for existing development (housing stock, commercial and industrial) in the Sydney Water operational area (including rainwater/stormwater tanks and mandatory water efficient appliances). Sydney Water must promote the use of water efficient devices through mechanisms such as rebates and inclusion of such devices must be mandatory for development and re-development
5. Revise demand management targets to ensure safe yield and sustainable yield for Hawkesbury-Nepean and Shoalhaven rivers systems (both aggregate and per capita targets).
6. Set penalty pricing for Sydney Water (for bulk water purchased from the Sydney Catchment Authority) applicable where the Corporation exceeds demand management targets, based on per capita and proposed total water use targets. Revenue raised must be hypothecated for demand management programmes.
7. Reassess the outlook for potable water recycling in addition to non-potable and establish trial process (ideally at a location where high-grade reuse can be undertaken).
8. Set meaningful short, medium and long term targets for water recycling, for example, an increase equivalent to 3% of total water consumption per annum to achieve the Corporation's statutory long term goal to reduce discharges to oceans and waterways (Sydney Water Act s.27). This would allow the recycling objective to be met by approximately 2030, and provide incentive to reduce total water use at the same time. Quality of recycled water should be based on meeting appropriate levels that are fit-for-purpose.
9. Establish a clear, effective pricing signal to reflect natural resource scarcity for water, such as a rising block pricing regime for retail water with equity provisions including low-income rebates and pensioner discounts.
10. Review water pricing, including bulk water extractions from the river system, to incorporate environmental externalities (such as impact on river flows) and correct market failure (where price does not indicate resource scarcity) to provide a viable market for recycled water.

Clean Beaches, Oceans, Rivers and Harbours

11. Assign a lower priority to proposed end-of-pipe upgrades to major ocean STPs than to upgrades for the protection of more sensitive waters. The preferred approach in the ocean outfall catchments is to progressively de-volume sewerage system flows in order to meet Sydney Water's obligations under the s.27 of the Sydney Water Act, 1994.
12. Divert financial resources proposed for end-of-pipe solutions, including upgrade and amplification of ocean STPs, into distributed supply-treat-reuse solutions at multiple locations in growth and infill areas in these sewerage zones.
13. Develop progressive targets to reduce flows and discharges to the ocean in order to guide progress in de-voluming ocean outfall sewerage systems.
14. Develop and implement a comprehensive monitoring program for ecosystems affected by discharge of sewage from the deep ocean outfalls, including sediments.

Wise Resource Use

15. Reduce the impacts of Sydney Water's use of carbon energy by increasing the use of green power to 10% of total electricity use (including any green power generation by the Corporation – representing an increase of 4.2% from the current total of 5.8%) and set short, medium and long term targets for increasing sustainable energy use (for example, a series of targets at five year intervals) beyond this level.

16. Present IPART with clear environmental priorities set jointly by the EPA, Sydney Water and environment groups. This will allow IPART to devise price paths to fund the priorities at its next pricing inquiry.

Smart Growth and Redevelopment

17. Fast track development and implementation of decentralised water, sewerage and stormwater systems for Sydney's growth areas (including greenfield and infill, detached and multi-unit development) to ensure future sustainability.

18. Extend and further promote the rebate scheme for rainwater tanks indefinitely (i.e. beyond the current deadline of September 2003) and reassess to ensure indoor connections (e.g. toilet) are included. Any remaining impediments to full implementation of the scheme must be removed.

19. Ensure that rainwater tanks are minimum requirements for all new homes and substantial renovations with indoor connection required (e.g. to toilet as a minimum).

20. Undertake a public process/open competition to elicit proposals for non-traditional technologies and in particular, decentralised options, with significant reward commitments ($20 million over two years).

21. Consider the retrofitting of treatment and delivery of recycled water via "third pipe" systems in existing housing areas.

Strategic Planning and Decision-Making (Implementing the Revised WaterPlan 21)

22. Undertake an independent review of decision-making processes within Sydney Water (for both programs and capital works).

23. Undertake an independent review of the economic evaluation methodology used by Sydney Water and develop an appropriate methodology that incorporates full environmental costs and benefits.

24. Develop community engagement programmes that build capacity within the community that empowers public participation in informed decision making for future water, wastewater and stormwater management options (with sustainable solutions tailored for community needs in the context of total water cycle management).

25. Substantially improve information management within Sydney Water so that all knowledge processes including research are shared between the divisions within Sydney Water.

26. Overhaul the link between strategy and innovation so that a comprehensive and co-ordinated research strategy can be integrated into the operation and management of Sydney Water.

27. Develop an integrated water management strategy for the Sydney, Blue Mountains and Illawarra regions that incorporates strengthened demand management strategies, effective reuse programmes and penalty pricing regimes.

28. Integrate the water cycle management system to optimise the various alternatives (including decentralised options) for rain and stormwater collection and recycled water use. (greywater and effluent). The integration of these systems must account for the different characteristics of areas (such as rainfall, access to farmland and industrial uses, social demographics) so that the best combination of solutions is provided for each area.

29. Improve substantially the interpretation of environmental data into information that can be used in the assessment and decision-making processes. Rigorous evaluation of scientific and operational performance data must be undertaken to provide detailed assessment of environmental performance that can be used to inform the day-to-day management of the water cycle.

30. Undertake Life Cycle Assessment widely to assess and compare scenarios and options at the organisation, program and project levels. Wherever LCA is used, identification of the most important impact categories must be based on a realistic approach and normalisation must be undertaken with primary reference to the Sydney Region.

Institutional Reform

31. Amend IPART's legislation to provide a tribunal position for the appointment of a person (not being a government employee) with expertise and experience in the protection of the environment.

32. Review IPART to ensure that determinations by the Authority, including price setting, are truly independent. The Authority should be no less independent than the Auditor-General.

33. Review IPART's legislation to ensure that the Tribunal has proper regard to ecological sustainability, and achieves better pricing and valuation of natural resources.

34. Review IPART to ensure the Authority applies effective penalties if utilities, including Sydney Water, fail to meet environmental targets. Penalties or sanctions affecting senior management are preferred to fines affecting a corporation).

35. Separate regulator and operator functions in the total water services market. For example, transfer Sydney Water's role regulating plumbing standards to the Ministry for Energy and Utilities (with oversight by an independent review body including community, industry and environmental representatives).

36. Make subsidies provided to Sydney Water for centralised water, sewerage and stormwater services available to competitors wishing to provide innovative or decentralised systems.

DETAILED RECOMMENDATIONS

A detailed programme that provides the framework for delivering on the key issues described above, must include the following recommendations:

Sustainable Water Supply

37. Implement more frequent water restrictions that are related to climatic conditions, as well as water storage levels and the use of permanent water restrictions for different water use categories (such as daytime outdoor use and hosing of paths).

38. Alter the pump marks used for water extractions from the Shoalhaven River which will likely increase the reliability of the headworks system. A strategy to increase water transfers from the Shoalhaven River is not supported nor recommended.

39. Change the benchmark for reduction in per capita water demand to the lowest per capita water demand in recent times, so that it reflects drought and water restriction conditions (e.g. 1995 to 1996). In addition, the use of actual demand level during those years should be used as a benchmark for comparison to actual future demands.

Wise Resource Use (Resource Recovery)

40. Include more explicit recognition in the WaterPlan 21 LCA that water recycling and demand management activities may have environmental benefits greater than those indicated by the metrics alone (since there is no metric directly relating to the construction of a new dam such as Welcome Reef for supply augmentation).

41. Revise the draft WaterPlan 21 with respect to the use of biosolids for purposes other than land application and update and enhance the 1999 Sydney Water Biosolids and Residuals Management Strategy. The use of biosolids for land application is strongly supported and the PENGOs encourage Sydney Water to continue research in this area. However, Sydney Water must recognise the requirement for further investigation of sustainable reuse of biosolids. Sydney Water must consider transport mechanisms for biosolids other than road transport (due to inefficient use of fossil fuel). An investigation of sustainable transport options must include existing pipelines (e.g. Northside Sewerage Tunnel) and rail transport.

42. Reassess the market outlook and portfolio targets for agricultural markets and other land application of biosolids in light of developments in commercial, environmental, and regulatory arenas.

43. Undertake a public process/open competition to elicit proposals for emerging biosolids technologies, with significant award commitments (e.g., $5 million per year over four years).

Smart Growth

44. Implement, as a priority, a policy for the compulsory inclusion of rainwater tanks for new homes and renovations (where appropriate) for more effective water demand and stormwater management.

45. Implement on-site and cluster scale wastewater treatment and reuse strategies in new development areas as alternatives to traditional wastewater disposal techniques.

Strategic Planning and Decision Making (Implementing WaterPlan 21)

46. Revise the Sydney Water programme evaluation models of non-zero costs for environmental impacts and ensure that the full range of environmental costs and benefits are properly identified, even if they cannot be fully or precisely quantified.

47. Extend the modelling process to include life cycle cost-benefit analyses and financial analyses including calculation of resulting water service prices and aggregate costs.

48. Develop a rigorous process to ensure valid and internally consistent results from models.

49. Make clear distinctions between (a) key Sydney Water business decisions (e.g. upgrade of a sewage treatment plant, installation of energy recovery system) that are to be assessed for their costs and benefits; and (b) inputs that are external to Sydney Water.

50. Identify and consider wastewater options that have demand management benefits and ensure that those options are credited with those benefits, including the broader environmental benefits of deferring or eliminating the need for new water supply.

51. Evaluate demand management alternatives from a community perspective using the price of water paid by the community, zero discount rates and whole of water cycle benefits in comparative investment models.

52. Undertake a public process/open competition to elicit proposals for non-traditional technologies, and in particular, decentralised options, with significant reward commitments (e.g. $20 million over two years). The PENGOs could assist Sydney Water in achieving a successful competition by assisting in design of the solicitation, promotion, evaluation and ongoing oversight of the competition and in securing regulatory approval from IPART for recovery of the costs.

53. Include a 1% discount rate based on long-term natural resource and intergenerational equity considerations in addition to the 7% discount rate based on the Weighted Average Cost of Capital (as indicated by NSW Treasury). Where triple bottom line accounting is adopted, discount rates of -1% to 1% may be applied to natural capital goods and services to reflect scarcity, natural resilience and non-substitutability, and the standard rate (i.e. 7%) to applied to built (i.e. human-made or technological) capital goods and services as is current practice to reflect opportunity cost and depreciation.

Decision Making

54. Implement fully a process of strategic environmental assessment that incorporates life cycle assessment of possible modes of integrated water and wastewater service delivery.

55. Further development of economic models that address fully the principles of ecologically sustainable development and to enable an appropriate level of substantiation of the key investment decisions and allow appropriate external scrutiny.

56. Incorporate community participation in the decision-making process, so that option selection for programs and projects delivers the best ESD outcome for the community.

57. Further develop a project appraisal process that identifies strategic planning elements such as interaction with other projects, cumulative effects in terms of environmental impact and social equity.

58. Develop decision tools for achieving ecological sustainability that are based on the key high-level objectives and criteria outlined in the special objectives and specific means identified in the Sydney Water Act 1994 (s.22.1 and s22.2).

59. Develop a strategic investment plan for innovation in technology/operation/performance assessment and related fields to ensure that there is effective management and delivery of innovation into the operational sector of Sydney Water so that the innovation translates into best management practice.

60. Develop implementation plans that are sufficiently detailed that will allow the broad strategies identified in WaterPlan 21, for pursuing and trialling alternative technologies and practices, to be implemented.

61. Adopt emerging sustainability paradigms of water management and investment in alternate technologies and practices.

Reporting and Community Consultation

62. Provide greater transparency in environmental and sustainability reporting by interpreting the substantial volumes of data into information that can be used in environmental assessment, as well as decision-making.

63. Reconsider or redefine the 'ecological footprint' that Sydney Water uses as part of its sustainability assessment, since there is a broader array of environmental indicators identified in the WaterPlan 21 LCA.

64. Develop and implement consultation protocols that engage the community in shared decision-making regarding the selections of options for projects, rather than considering information supply and public exhibition as the only forms of consultation.

Final Word

These reforms must be embraced urgently if Sydney is to escape its growing environmental and water resource crisis. The solutions recommended here are based on a major new report, **Sydney's Water – Going to Waste?** prepared by the PENGOs and is the result of a 12 month project examining Sydney Water's environmental performance.

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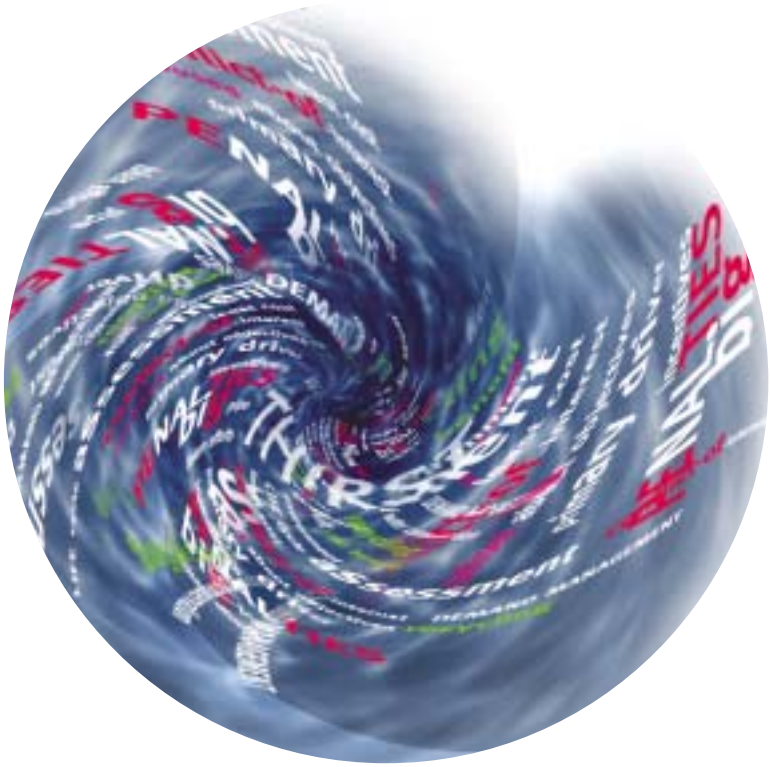
CD Contents

The references for this document, including the PENGO consultants' reports, plus additional background reports, are included on the attached CD. Documents are in Word or Acrobat format. The CD is suitable for Macintosh and Windows computers.

If this CD is missing, documents are available at www.totalwater.info



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