



INDEPENDENT PRICING AND REGULATORY TRIBUNAL



## **Independent Pricing and Regulatory Tribunal**

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### ***Mid-Term Review of Sydney Water's Demand Management Strategy***

July 2002

**FINAL REPORT**



**MWH**  
MONTGOMERY WATSON HARZA

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# **Independent Pricing and Regulatory Tribunal**

## ***Mid-Term Review of Sydney Water's Demand Management Strategy***

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## **EXECUTIVE SUMMARY**

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### **1. Introduction**

Since incorporation in 1995, Sydney Water (SWC) has been required under the Operating Licence to develop and implement a strategy to reduce per capita demand for water from 506 Lcd in 1991 to 364 Lcd in 2004/5 and 329 Lcd in 2010/11. This is a targeted reduction of 35% over the 1991 demands. Compared with other programs across the globe, these targets are highly ambitious particularly considering the size of the customer base and the timeframe for implementation SWC's program is possibly the leading Australian program with the potential to be the one of the best programs in the world. The program is expected to continue to expand over the next five years.

Currently water demand is estimated to be approximately 411 Lcd (based on preliminary Census data), which is a major reduction (18.6%) over the 1991 baseline demand. A range of factors has contributed to this reduction in demand, including SWC's demand management initiatives, the permanent effect of drought related water restrictions and water pricing changes such as the introduction of quarterly billing.

SWC has been active, particularly since 1999/2000, in the development and implementation of a range of demand management initiatives aimed at achieving the water conservation targets. Progress towards the targets has been made by SWC however these have been partially offset by other factors such as recent dry weather, changing demographics and strong economic activity.

This review of the Sydney Water Demand Management Strategy is part of the IPART Mid-Term Licence Review process. The form and level of water conservation targets were reviewed both in terms of international practice and consideration of current issues and trends for urban water management. As part of the strategy review, a number of stakeholders were consulted to provide a broad perspective of SWC's performance.

It should be noted that during the period of the review SWC was finalising an internal review of the Strategy and changes to the program may have occurred recently. Such changes affect the future program initiatives outlined in this report.

### **2. Objectives of Review**

The terms of reference outlines the objectives of the review of Sydney Water's Demand Management Strategy:

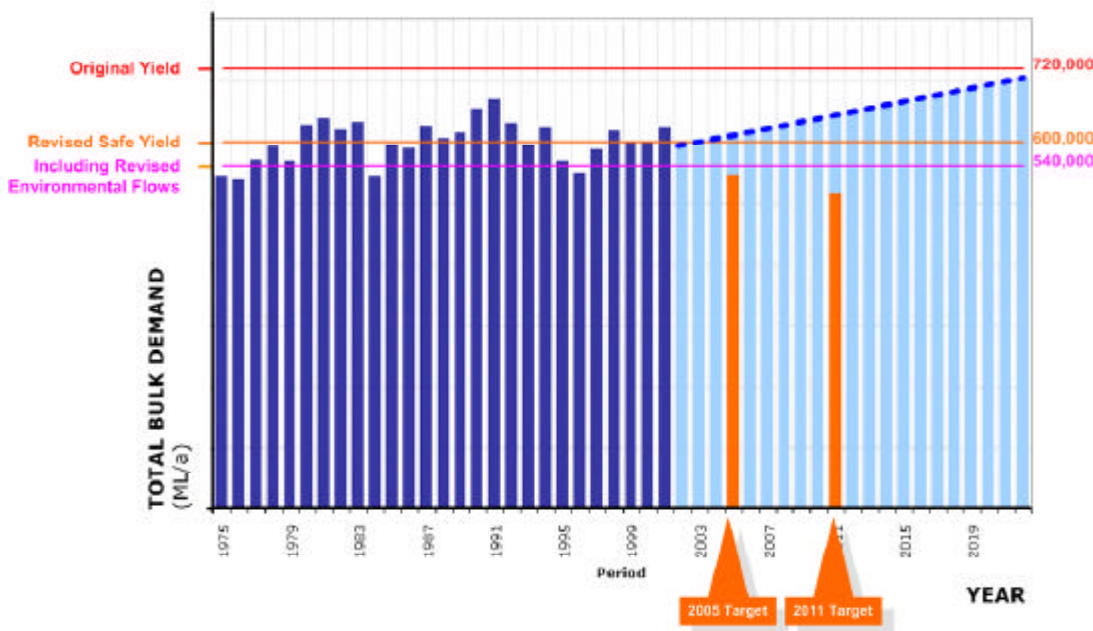
1. To review the effectiveness of the strategy to meet the water conservation targets defined in the Operating Licence.
2. To identify adjustments that may be made to improve current effectiveness, including the introduction of additional initiatives to achieve the targets.
3. To assess whether the current incentives for SWC to reduce water demand are sufficient or whether other incentives may be more effective in ensuring target compliance.
4. To review the appropriateness of the current targets and to assess the form and level of these targets.
5. To determine if a target should be set for 2014/15.

### 3. Sydney's Future Water Needs

Figure E1 shows the historical performance of Sydney's annual water demand since 1975 together with the projected water requirements up to 2022, assuming that the current overall per capita demand of 411 Lcd will be maintained and that 1999/2000 was an average water use period. Population projections for Sydney were provided in recent documentation (Reference 17). SWC's commitment to demand management will reduce the per capita demand and the subsequently the overall demand, however the figure shows the quantum of reduction required to meet the targets. It should be noted that natural conservation due to new water efficient development has not been included, and therefore the projection is marginally conservative.

In addition, the graph indicates that in 1995 the safe yield of Sydney's raw water sources was estimated to be 720 GL/a. As a result of the mid 1990's drought, additional hydrologic catchment modelling reduced the safe yield to 600 GL/a. An Expert Panel is undertaking a further review of environmental flows and SWC advice is that the yield may be reduced further to approximately 540 GL/a.

**Figure E1: Sydney's Historical Water Usage and Future Water Requirements (Extrapolated Using Current Demand of 411 Lcd)**



Based on the projections provided in Figure E1, it is evident that:

- Current water use approximates to the yield of available water storages. Lower rainfall in 2001/2 may have increased Sydney's demand.
- Achievement of the 2004/5 water conservation targets would reduce total demand on the raw water storages to a level marginally below the revised yield of 540 GL/a.
- A demand reduction of approximately 80 GL/a will be required to meet the 2004/5 target.



- Achievement of the 2010/11 water conservation targets would reduce total demand to 10% below the yield.

## 4. Sydney Water's Performance Since 1995

### 4.1. Summary of Actions and Estimated Savings

Sydney Water has focused the Demand Management Strategy into four main programs:

- **Residential Program** focussed on improving water use efficiency of residential users.
- **Business Program** aimed at improving efficiency in the commercial, industrial and government sectors.
- **Leakage Reduction Program** focussed on reducing system losses from SWC infrastructure.
- **Recycled Water Program** aimed at reusing reclaimed water from Sewerage Treatment Plants to replace current potable usage.

A summary of the water usage in each of these sectors and an estimate of water savings to date from demand management actions by Sydney Water is given in Table E1. In addition, the savings that are expected to accrue from actions proposed for 2002/3 are also presented. Based on the available information a shortfall in the required water savings is likely.

**Table E1: Summary of Programs and Water Savings 1995 to 2005**

Strategy Component	Estimated Water Savings (GL/a)		
	1995 to 2002	2002 to 2005 #	Total to 2005
EDC Residential Indoor Program	3.87	13.26	17.13
EDC Residential Outdoor Program	0.64	6.24	6.88
EDC Business Program	0.45	3.29	3.74
Leakage Reduction	5.11	13.14	18.25
Recycling Program	12.12	16.02	28.14
Pricing	0	0	0
<b>Total Estimated Savings</b>	<b>22.19</b>	<b>51.85</b>	<b>74.14</b>
<b>Estimated Savings Required by end 2005</b>		<b>80.00</b>	

Note: # Based on SWC estimates based on the reviewer's understanding of the program, complete details of which are not available due to a major review of the program over the past six months.

It should be noted that more than 90% of the water savings to date may be attributed to the following initiatives:

- Residential retrofit program
- Leakage reduction program
- Water recycling at SWC's Sewerage Treatment Plants

### 4.2. Program Expenditure

Table E2 outlines expenditure for the major strategy components since the commencement of implementation in 1998/9. Table E3 compares strategy expenditure and budgets.



**Table E2: Actual and Planned Expenditures By Program (\$m)**

Program	1998/99 Actual	1999/00 Actual	2000/01 Actual	2001/02 Actual	2002/03 Planned
Residential	0.05	4.23	10.95	6.52	10.91
Indoor	0.05	4.00	10.20	6.05	7.10
Outdoor		0.23	0.75	0.24	3.50
Other				0.21	0.31
Business		1.15	1.00	0.46	1.50
Project Investment Fund					2.00 <sup>1</sup>
General			0.01	0.18	0.40
Planning & Management		0.45	1.00	1.81	2.22
Leakage Reduction		0.30	1.40	2.37	3.37
<b>Totals</b>	<b>0.05</b>	<b>6.13</b>	<b>14.36</b>	<b>11.34</b>	<b>18.40</b>

Note (1) The investment funding is a nominal amount and may change where projects are identified as having merit.

**Table E3: Budgeted and Actual Expenditure (\$m)**

Year	Original Budget	Actual Expenditures	Difference	Issues Related to Expenditure
1998/99	4.41	1.13	-3.28	Leakage project delayed.
1999/00	8.25	6.13	-2.12	Retrofit program delayed due to completion of pilot area
2000/01	16.46	14.36	-2.10	Retrofit program startup
2001/02	11.15	11.34	+0.19	Retrofit program implementation
<b>Total</b>	<b>\$40.27m</b>	<b>\$32.96m</b>	<b>-\$7.31m</b>	

The SWC Board committed to an indicative expenditure of \$50m for the strategy to be expended by 2005. Based on the current program this budget will be reached in the 2003/4 financial year.

The strategy commenced in earnest in 1998/9, and substantial funds were expended from 2000/1, when a broad scale retrofit program was implemented. Typically a large program requires approximately three years to ramp to full implementation. This may explain the low expenditure in the first three years.

The SWC Board has approved a major increase in budgeting and associated resources for 2002/3. This proposal to accelerate the program is seen as an acknowledgment by SWC that major expenditure is necessary to achieve the 2004/5 target.

### 4.3. Findings on Performance Since 1995

The key findings of the assessment of Sydney Water's performance in relation to the Demand Management Strategy may be summarised as follows:

#### 1. Overall Program:

- a) **Corporate Commitment:** SWC's corporate commitment to demand management started slowly in the 1995 to 2000 period. Since 2000, support for the program has increased significantly and is currently at a high level. Commitment to demand side management is demonstrated by the

recent executive level negotiations relating to the Department of Housing program, resource level improvement and the recent funding increases. Board level commitment would be further strengthened through the reinforcement of the strategy goals (through a water balance study) and the success of initiatives. Recent urgency shown by the organisation will need to be maintained and translated to successful initiatives to achieve the conservation targets.

- b) Program Expenditure:** SWC did not commence program implementation until 1999/0. The late start resulted from delays due the water quality crisis and a belief that water reductions that occurred during the 1990's would continue. A total of approximately \$30m has been expended to date, which represents a shortfall of \$10m compared to the budget.
  - c) 2002/3 Budget:** The SWC Board has approved an increased budget of \$18.4m for 2002/3. Expenditure is increasing and the \$50m budget committed by the Board in 1999 will be surpassed in 2003/4.
  - d) Program Resourcing:** Program resourcing has increased since the formation of the Water Conservation and Recycling Unit in 2000. A higher level of resourcing is to be provided in 2002/3 as part of the recent Board decision to accelerate the program. Although community market research undertaken by SWC staff is of a very high standard, it is believed that the strategy would benefit from additional full time resources skilled in marketing planning and implementation.
  - e) Evaluation of Options:** SWC has developed a Least Cost Planning Model to rank initiatives for implementation on a cost effectiveness basis. On the other hand the approach does not currently undertake comparison of demand side and supply side options as required by the licence. The effectiveness of the existing LCP approach could be improved through the reporting of a traditional benefit/cost ratio which is clearly understood by corporate, regulatory and other stakeholders.
  - f) Research versus Implementation:** A higher level of research exists in the Sydney program than for other similar programs. Although a certain level of initial research is necessary to develop the programs, most initiatives may be implemented with data collected during the course of the program to allow for adjustments and improvements.
- 2. Residential Program Performance:** The retrofit program has been efficiently and successfully implemented to date, with significant water savings from a higher than expected level of participation. In 2002/3 SWC will extend this program to the Department of Housing program and a targeted area retrofit program. The decision not to continue the program using the successful approach from the past 2 years should be reconsidered based on recent success in second round offers. Based on the success of the project to date and knowledge of programs in other areas, the following aspects of the residential program could be improved:
- Baseline end use data (for targeting and monitoring)
  - Implementation and marketing plans to support programs
  - A clear approach to retrofitting the existing multi family residential sector to compliment regulations for new development
  - Knowledge of other (global) programs
  - A greater number of planned programs to meet the targets (the extension program will provide improvement).
- 3. Business Program Performance:** A program (One-2-Five) has been developed over the past eighteen months for major water users. Expansion of

the program is proceeding through expanded resources, a low interest loans program, co-funded water audits and other services to assist implementation by businesses. The following opportunities exist for improving the program:

- Development of an effective marketing framework and implementation plans for smaller water users
- Increasing knowledge of other successful programs
- Program to gain support of government customers
- Acceleration of implementation and improved level of skilled marketing resources to support the roll out.

**4. Leakage Reduction Program Performance:** This program is proving to be successful and has gained significant corporate support. SWC has invested in operational improvements to support the program, however accurate measurement of water savings requires further investment. Opportunities to improve the current program include:

- Improve Dividing Valve maintenance and install flow monitoring to support the quantification of water savings.
- Improve quantification of leakage savings through analysis of Minimum Night Flows, using zones designed to provide sound data.
- Implement of the Infrastructure Leakage Index and Benchloss approaches to leakage benchmarking.
- Reduce zone sizes to provide a long term, sustainable leakage management program.
- Shorten leakage repair times.
- Progress the implementation of pressure management if planned trials prove effective.

**5. Recycled Water Program Performance:** Although the program has significant potential, there has been difficulty in securing customers, due to a diverse range of reasons including the perceived high price of recycled water, customer preferences and market development. The approach to assessment of cost effectiveness needs to take account of the cost of the next increment of potable water supply not the current marginal cost of potable water.

**6. Achievement of Targets:** SWC's recent decision to accelerate the program is seen as acknowledgment that additional expenditure is required to meet the 2004/5 targets. To achieve such the target will require a demand reduction of approximately 12% over current demand trends in an extremely short time frame.

## 5. Appropriateness of Current Targets and Incentives

### 5.1. Appropriateness of Current Targets

Currently the water conservation targets utilise per capita demand as the primary performance indicator. Although the Operating Licence requires demand to be corrected for climate variation, many groups of factors impact water demand from year to year and even day to day:

- Demographics
- Socio-economics
- Soils and vegetation
- Development type and distribution

- Metering accuracy
- Population estimates

Due to the many factors affecting demand and the inherent accuracy of a climate corrected demand model the adoption of per capita targets for a large scale program such as SWC's must be questioned. Demand management success, in terms of a reduction of overall water demand may not immediately follow the implementation of individual initiatives. These issues will continuously cause debate regarding actual program success, as has been the case in other parts of the world where this approach has been adopted.

It is the recommendation of the reviewer that the per capita targets not be used as the primary water conservation target, but rather as one of the performance tracking mechanisms along with total volume drawn from reservoirs. However, until such time as a revised system is implemented, the per capita on targets should remain in use.

## **5.2. Alternative Approaches to Target Setting**

Based on a review of international practice the following options were proposed:

- **Sector Target Approach**

This could take the form of:

- A per capita water use target for residential use.
- A per account target for non-residential use.
- A volumetric or Infrastructure Leakage Index (ILI) target for leakage reduction.
- A volumetric target for recycled water.

- **Best Practices Program Approach**

- *Option A:* Develop an MOU with stakeholders, comprising a range of activities (Best Management Practices – BMPs, or Reasonable Conservation Outcomes - RCMs), through a stakeholder consensus process.
- *Option B:* Mandate, using the current regulatory framework, a requirement to develop and implement specific activities (BMPs or RCMs).

Each of these sub-options would include separate targets for leakage reduction and recycled water use.

## **5.3. Preferred Approach to Target Setting**

The reviewer's preference is a hybrid approach based on the BMP and MOU consensus model which has been successfully implemented on a large scale in California. It is believed that SWC would benefit from a more direct involvement of stakeholders in the process of developing the Demand Management Strategy. Under the current regulatory framework such an approach is not ideal as a process for public review of the operating licence. It is therefore proposed to adopt a hybrid approach to the setting of performance targets, which will include a range of targets:

- *Water Efficiency Program:* Includes for targets involving specified actions to be termed **Water Efficiency Activities** or **WEAs** for the residential and business sectors.

- *Leakage Reduction Program*: Includes targets for reduction of leakage and possibly for reduction of Unbilled Authorised Consumption through increased metering.
- *Recycled Water Target*: Includes a volumetric target for recycled water projects.

As well as using cost effectiveness to assess the quantum of these targets, certainty of delivery needs to be considered. For example, SWC may choose to adopt a low target for Recycled Water due to the uncertainty of project delivery, and compensate for this in some other area. Alternatively the targets may be adjusted through the licence period if recycling projects do not eventuate.

Stakeholder consultation will be undertaken as part of the regulatory process as well as through Demand Management Forums, to be convened twice per licence term as a minimum.

#### **5.4. Supply Demand Balance**

Defining the supply/demand balance is a critical element in the development of water demand management goals. The weighting given to the various programs is determined taking into account the cost effectiveness of a range of options including supply augmentation in a least cost planning framework. Such an approach takes account of the costs related to the next increment of supply (possibly desalination), compared to the cost and benefits of a range of demand management programs. Non-quantifiable issues such as social and environmental issues must also be considered. Only this process can provide a balanced, cost effective plan for the development of Sydney's water supply system.

#### **5.5. Existing Incentives**

The reviewer believes that a major incentive has become the volume of water available for development and therefore demand management activities have become a major focus of SWC. Certainly, this is the view of the executive and board. This considered, amendments to the existing incentives are not recommended at this stage.

For the 2005 licence, consideration should be given to providing more defined financial incentives for the Water Efficiency and Leakage Reduction Programs. Any financial incentives for the Recycled Water Program must take into account the uncertainty of the market for this product.

#### **5.6. Water Conservation Targets for 2014/15**

It is the reviewer recommendation that new per capita targets should not be set for 2014/15. The preferred approach is to develop activity targets based on the evaluation of required strategy outcomes determined using least cost planning techniques to assure cost effectiveness.

The implementation cycle for the revised strategy is recommended to be 10 years. If a new program is in place by 2005 then, in effect, there will be a 2014/15 target and to complete implementation of programs by that time or before.

## 6. Recommendations

Based on the review of Sydney Water's Demand Management Strategy and the related regulatory framework, a range of short term (2000 Licence) and medium term (2005 Licence) recommendations have been developed. Recommendations are grouped into those relating to the regulatory framework and high priority actions that should be implemented or considered to improve the effectiveness of the current SWC programs. Recommended implementation target dates are provided, however the timing of these actions will depend on the completion of tasks which are outside of SWC's control, such as the finalisation of environmental flows and security of supply issues.

### 6.1. Preferred Regulatory Model

#### 6.1.1. Recommendations relating to the Mid Term Licence Review

The following recommendations are made in relation to changes to the 2000 Operating Licence:

1. **Per Capita Targets:** Current per capita targets should be retained pending development of a revised approach for the 2005 licence.
2. **Water Efficiency Activities:** SWC should be required to commit to, and report on, activities that are designed to meet the demand reductions implicit in the water conservation targets. At present these activities will be limited to the Residential and Business Programs. This approach will provide effective performance monitoring and auditing.
3. **Leakage Reduction Program:** Annual reporting should include activities, estimated water savings and the basis on which the savings were calculated including a confidence grading.
4. **Water Recycling Program:** Annual reporting based on metered consumption for all activities. A distinction needs to be made between general reuse and reuse relevant to the demand management program.
5. **Overall Program Monitoring and Reporting:** In addition to the above, SWC should be required to report on the performance of the overall program and Sydney's water demand as follows:
  - Per Capita reporting (without climate correction) since 1990
  - Customer sector performance since 1990
  - Total annual production performance since 1975
6. **Implementation Plan:** The following program should be implemented:

Proposed Action	Responsibility	Target Date
Define 2002/3 Program Activities and Estimated Related Savings	SWC	September 2002
Review/Approval of 2002/3 Activities	IPART	October 2002
Develop Reporting Framework	SWC	October 2002
Approve Reporting Framework	IPART	November 2002



Proposed Action	Responsibility	Target Date
Define 2003/4/5 Program Activities	SWC	April each year
Review/Approval of 2003/4/5 Activities	IPART	June each year

### 6.1.2. Recommendations Relating to the 2005 Licence

The following recommendations relate to the development of the 2005 Operating Licence and include actions required to develop the licence conditions:

- 1. Water Conservation Targets:** The preferred approach for the Sydney program is the use of the following targets:
  - *Leakage Reduction Program* – targets based on both an Infrastructure Leakage Index (ILI) and the volume of water saved (ML/d)
  - *Recycled Water Program* – target based on volume of water saved (ML/d)
  - *Water Efficiency Program* – Water Efficiency Activity (WEA) targets for prioritised initiatives.

Revised targets would be based on the evaluation of the supply/demand balance using a least cost planning assessment of supply and demand options. The Water Demand Management Strategy would set out a 10 year conservation plan.

- 2. Licence Incentives:** Individual financial incentives should be considered as part of the development of the 10 year water conservation plan.
- 3. Monitoring and Reporting:** The licence should define the monitoring and reporting requirements as well as methods of measurement and data accuracy required.
- 4. Consultation:** In addition to the existing regulatory review process, the Operating Licence should require SWC to convene regular Demand Management Forums (minimum twice per licence period) to achieve stakeholder support and input to the development and improvement of the program.
- 5. Implementation Plan:** To prepare for the drafting of the 2005 licence the following actions are required:

Proposed Action	Responsibility	Target Date
Water Demand Management Forum	SWC	October 2003
Improve LCP approach by including a cost benefit analysis approach	SWC	June 2003
Finalise water balance and assess demand/supply side options using a cost benefit approach.	SWC/Task Force	December 2003
Define goals and objectives for the Demand Management Strategy over the period 2005 to 2015.	SWC	March 2004
Define WEAs and other targets for the Demand Management Strategy for period	SWC	June 2004



Proposed Action	Responsibility	Target Date
2005/10 for inclusion in licence		
Define monitoring and reporting procedures	SWC	June 2004
Water Demand Management Forum	SWC	August 2004

## 6.2. SWC's Demand Management Strategy

It is evident from the review of SWC's performance that a significant expansion of the strategy is required to meet the water conservation targets and to overcome the imbalance in the supply/demand equation. To achieve the reductions in the short term SWC need to implement initiatives that will cost effectively achieve major water reductions. The reviewer identified a range of actions that should be considered to improve the effectiveness of the programs up to 2005.

### 6.2.1. Overall Program – High Priority Actions

Actions that should be considered to improve the effectiveness of the overall demand management strategy up to 2005 are:

1. **Implementation:** Develop implementation and marketing plans for demand management initiatives.
2. **Resources:** Increase resource levels and provide full time marketing resources in the Water Conservation and Recycling Unit.
3. **Expenditure Tracking:** Improve individual program expenditure reporting.
4. **Performance Monitoring:** Improve monitoring of program initiatives in accordance with the revised licence requirements.

These actions are essential to the cost effective implementation and success of all programs and should be implemented immediately.

### 6.2.2. Specific Programs – High Priority Actions

High priority actions that need to be considered to improve the effectiveness of individual programs over the period 2002/3 are:

1. **Water Efficiency Programs - Residential**
  - a) Continue the successful retrofit program
  - b) Accelerate the Department of Housing retrofit to be completed in 1 to 2 years.
  - c) Expand rebate incentives program to support the communication program.
  - d) Expand and improve the communication program.
2. **Water Efficiency Programs - Business**
  - a) Adopt a "capacity buy-back" approach as an alternative to the current program, providing flexibility to meet business customer needs.
  - b) Streamline the major user program and audits and review the use of incentives including free audits

### **3. Leakage Reduction Program**

- a) Develop a best practice approach to measurement of savings, through improved dividing valve management and flow measurement.
- b) Improve speed of repairs to maximise water savings.
- c) Adopt a zonal approach to water balance using the Infrastructure Leakage Index (ILI) and implement leakage targets on this basis.

### **4. Water Recycling Program**

- a) Reassess opportunities using a cost effectiveness approach taking into account the cost of the next increment of supply.

#### **6.2.3. Specific Programs – Medium Priority Actions**

Actions, which should be considered for implementation in the medium term (2003 to 2005), are as follows:

##### **1. Water Efficiency Programs - Residential**

- a) Establish a customer end use baseline.
- b) Develop and implement a program targeting multi unit dwelling efficiency
- c) Develop a Department of Defence housing retrofit program
- d) Implement, in conjunction with Planning NSW, a policy for the regulation of water efficiency in new development.

##### **2. Water Efficiency Programs - Business**

- a) Improve access for lower water using customers through the *WaterCheck* program, including audits and incentives.
- b) Develop partnerships with government agencies such as the departments of Health and Education.

##### **3. Leakage Reduction Program**

- a) SWC should assess alternative approaches to leakage management, particularly pressure management

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## 1. Introduction

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### 1.1 Overview

Since incorporation in 1995, Sydney Water (SWC) has been required under the Operating Licence to develop and implement a strategy to reduce per capita demand for water from 506 Lcd in 1991 to 364 Lcd in 2004/5 and 329 Lcd in 2010/11. This is a targeted reduction of 35% over the 1991 demands. Compared with other programs across the globe, these targets are highly ambitious particularly considering the size of the customer base and the timeframe for implementation. SWC's program is possibly the leading Australian program with the potential to be the one of the best programs in the world. The program is expected to continue to expand over the next five years.

Currently water demand is estimated to be approximately 411 Lcd (based on preliminary Census data), which is a major reduction (18.6%) over the 1991 baseline demand. A range of factors has contributed to this reduction in demand, including SWC's demand management initiatives, the permanent effect of drought related water restrictions and water pricing changes such as the introduction of quarterly billing.

SWC has been active, particularly since 1999/2000, in the development and implementation of a range of demand management initiatives aimed at achieving the water conservation targets. Progress towards the targets has been made by SWC however these have been partially offset by other factors such as recent dry weather, changing demographics and strong economic activity.

This review of the Sydney Water Demand Management Strategy is part of the IPART Mid-Term Licence Review process. The form and level of water conservation targets were reviewed both in terms of international practice and consideration of current issues and trends for urban water management. As part of the strategy review, a number of stakeholders were consulted to provide a broad perspective of SWC's performance.

### 1.2 Review Process

Since early 2002, SWC has been engaged in a major review of the Demand Management Strategy, particularly with respect to the Residential and Business programs. The reviewer has attempted to accommodate this dynamic process through the inclusion of the most recent information. As the review was undertaken in a short timeframe during May 2002, it is possible that aspects may have changed since this time or may be part of the emerging program. The intent of the review is to review progress and provide suggestions for SWC's consideration in improving and expanding the program.

### 1.3 Objectives of Review

The project brief outlines the objectives of the review of Sydney Water's Demand Management Strategy:

1. To review the effectiveness of the strategy for the reduction of water usage to meet the water conservation targets defined in the Operating Licence.
2. To identify adjustments that may be made to the program to improve the current effectiveness, including the introduction of additional initiatives that may be implemented to achieve the targets.

3. To assess whether the current incentives for Sydney Water to reduce water demand are sufficient or whether there are other incentives which would be more effective in ensuring that targets are achieved.
4. To review the appropriateness of the current targets and to assess the form and level of these targets.
5. To determine if a target should be set for 2014/15.

## **1.4 Organisation of Report**

A description of the various sections of the report is as follows:

### **Section 1: Introduction**

Outline and objectives of the review.

### **Section 2: Background**

Provides background information relating to the results of Operating Licence audits undertaken since 1995, as well as an overview of the agencies involved in demand management in NSW.

### **Section 3: Principles of a Successful Demand Management Strategy**

An outline of the principles of a successful demand management program is provided to assist the evaluation of Sydney Water's program.

### **Section 4: Evaluation of Sydney Water's Performance Since 1995**

An overview of SWC's progress to date is provided including an evaluation of corporate commitment to demand management; a summary of demand trends and impacts on demand from 1991 to 2002; a review of the current Least Cost Planning model; a review of the actions taken undertaken to date.

### **Section 5: How Sydney Water Could Improve the Effectiveness of Programs**

An outline of the ways that the current program can be improved including the expansion of non-price measures being targeted, improvements to the marketing strategies employed, introduction of best practice in areas such as leakage management and the opportunities available from conservation pricing.

### **Section 6: Evaluation of Targets and Incentives**

An evaluation of the current targets and incentives is presented along with an assessment of alternative approaches to progressing the demand management program. Incentives to ensure the performance of the program are discussed. Assessment of options was undertaken considering best practice in urban water management and the issues relating to the Sydney water balance.

### **Section 7: Recommendations**

A summary of recommendations for the improvement of the program and an outline of the preferred approach to delivering the program is provided in this section. A timetable for implementation is recommended.

### **Appendices**

Background information including detailed data on demand trends and international approaches to demand management, leakage reduction and conservation pricing are provided in the Appendices. A summary of consultation undertaken as part of the project is included, together with a list of relevant web sites, which provide information on international practice.

## 2. Background

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### 2.1 Licence Requirements for SWC's Demand Management Strategy

#### 2.1.1 2000 Licence Requirements

Sydney Water's obligations relating to Water Conservation and Demand Management are defined in Section 8 of the 2000 to 2005 Operating Licence. Section 8.1.1 of the licence states:

*Sydney Water must take action to reduce the quantity of water (other than Re-use water) it draws from all sources to the following target levels ("water conservation targets"):*

- (a) 364 litres per capita per day by 2004/5 (being a reduction of 142 litres per capita per day or 28% from the 1990/1991 baseline);*
- (b) 329 litres per capita per day by 2010/2011 (being a reduction of 177 litres per capita per day or 35% from the 1990/1991 baseline);*
- (c) Such target level for 2014/2015 as determined as part of the Mid-term review of this licence conducted under Clause 2.3.1.*

Clause 8.1.2 of the licence outlines that Sydney Water's progress towards these targets is to be determined based on data *adjusted for the effects of weather on water usage*. It is also stated that the targets are for *an average year*.

Sydney Water's corporate commitment to the implementation of demand management processes and principles is required under Clause 8.2.2 where it is stated that:

*Sydney Water must give priority consideration to demand side management as the basis for planning the future provision of its Services, including addressing Unaccounted water losses.*

The licence also requires a Demand Management Strategy Implementation Report to be submitted on an annual basis. Details of the required contents are contained in Clause 8.2.4, and include a requirement (part (f)) to evaluate water conservation plans *in terms of their cost and contrast with the cost of alternative water supplies*. It is further stated in Clause 8.2.4 (g) that Sydney Water *prioritise and schedule the implementation of courses of action found to be cost effective*.

Reduction of demand through use of sewage effluent for non-potable applications is required under Clause 8.3.

Finally the licence in Clause 8.4, requires Sydney Water to support the National Water Conservation Rating and Labelling Scheme, and to encourage manufacturers to improve water use efficiency of appliances.

#### 2.1.2 2000 Licence Incentives

Incentives for compliance are outlined in Clause 2.6, which states that the Minister may take action under Section 19 of the Sydney Water Act 1994. This act has three specific penalties:

- (a) A requirement for Sydney Water to rectify the contravention

- (b) A letter of reprimand
- (c) A monetary penalty of up to \$1 million.

### 2.1.3 Contrast of 1995 and 2000 Operating Licence Provisions

The major differences between the requirements of the 1995 and 2000 licences with respect to demand management are as follows:

- The 1995 targets stated that the per capita demand reductions were defined to be reductions in the *quantity of water drawn from all storages*. The words "all storages" have been removed from the 2000 licence and replaced with "all sources".
- The 1995 licence included a target of 15% for the reduction of Unaccounted water losses.
- Clause 5.15 of the 1995 licence required Sydney Water to give equal weight to supply side and demand side planning. The current licence requires Sydney Water to give priority consideration to demand side management.

## 2.2 Audit Performance Since 1995

Audits of Sydney Water's performance are undertaken on an annual basis. Although audits of the 1995 and 1996 performance identified that SWC appeared to be on track to achieve the targets, consideration of the fact that the majority of the savings up to 1996 came from actions related to drought management and other factors may not have been given sufficient weight. As a consequence the development and implementation of a pro-active demand management strategy was not commenced in earnest until 1999/00.

Audits undertaken in 1999 and 2000 were critical of the efforts of SWC with respect to the development of a strategy and the lack of evaluation of the cost effectiveness of the selected initiatives. These audits also identified that SWC did not appear likely to achieve either the 2004/5 or 2010/11 water conservation targets.

In addition to the water conservation targets, the audits reviewed the performance of Sydney Water in relation to the following licence requirements:

- **National Water Conservation Rating and Labelling Scheme.** SWC achieved a high compliance rating in respect of their actions relating to the development and promotion of this scheme.
- **Unaccounted Water Loss Reduction.** SWC achieved a high compliance rating for efforts relating to the reduction of unaccounted water losses to less than 15% at 2000.
- **Recycled Water Target.** A recycled water target of 58 ML/d was determined by SWC and gazetted in 1995. The 1999 audit outlined that SWC had achieved approximately 26 ML/d within their sewage treatment plants and that the remainder was achieved through internal recycling by industrial customers.



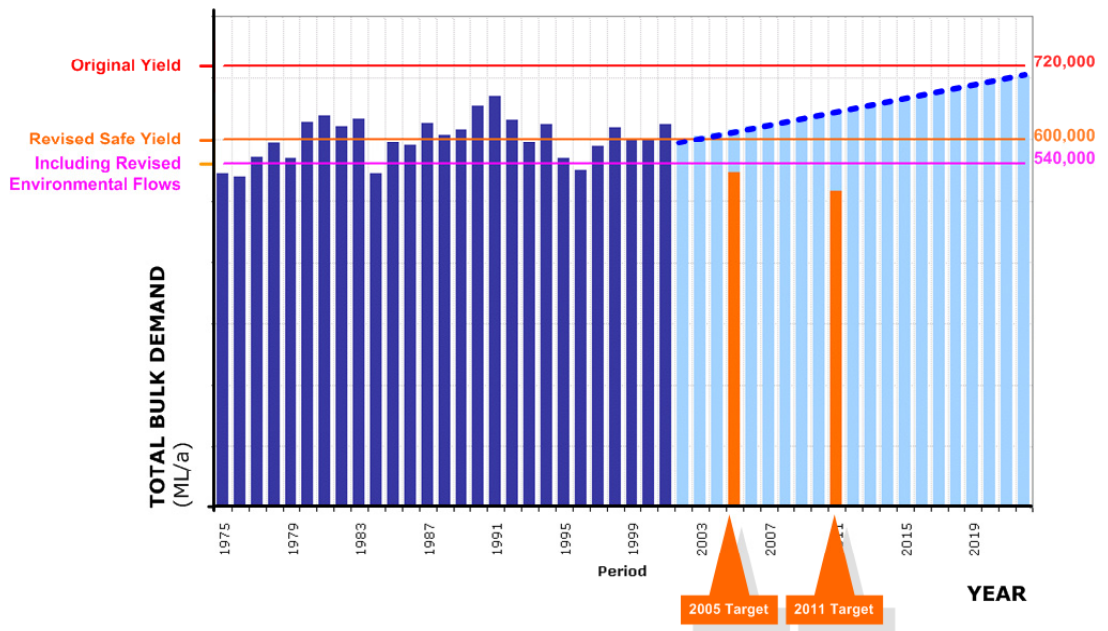
## 2.3 Sydney's Future Water Needs

An understanding of Sydney's past and future demand for potable water is essential to provide context to the quantum of the water conservation targets. Based on discussions with SWC and the PENGOS it was determined that the targets were set through negotiation as part of corporatisation in 1994/5. Graph B in the 1995 *Demand Management Strategy* (Ref 1) shows the targets slightly below the per capita projection line.

**Figure 3.1** shows the historical performance of Sydney's annual water demand since 1975 together with the projected water requirements up to 2022, assuming that the current overall per capita demand of 411 Lcd will be maintained and that 1999/2000 was an average water use period. Population projections for Sydney were provided in recent documentation (Ref 17). SWC's commitment to demand management will reduce the per capita demand and the subsequently the overall demand, however the figure shows the quantum of reduction required to meet the targets. It should be noted that natural conservation due to new water efficient development has not been included, and therefore the projection is marginally conservative.

In addition, the graph indicates that in 1995 the safe yield of Sydney's raw water sources was estimated to be 720 GL/a. As a result of the mid 1990's drought, additional hydrologic catchment modelling reduced the safe yield to 600 GL/a. An Expert Panel is undertaking a further review of environmental flows and SWC advice is that the yield may be reduced further to approximately 540 GL/a.

**Figure 3.1: Sydney's Historical Water Usage and Future Water Requirements (Extrapolated Using Current Demand of 411 Lcd)**



Based on the projections provided in Figure E1, it is evident that:

- Current water use approximates to the current yield of the available water storages. Demand is influenced by many factors and lower rainfall in 2001/2 will have increased Sydney's demand.



- Achievement of the 2004/5 water conservation targets would reduce total demand on the raw water storages to a level marginally below the revised yield of 540 GL/a.
- A demand reduction of approximately 80 GL/a will be required to meet the 2004/5 target.
- Achievement of the 2010/11 water conservation targets would reduce total demand to 10% below the yield.

## 2.4 Stakeholder Consultation

The consultation process for this review identified a number of key stakeholders in the Sydney Demand Management Strategy. These key groups and their influence on the program are as follows:

**State Regulators.** A range of state government departments have regulatory responsibility of parts of the water cycle. The main regulators are as follows:

- Department of Land and Water Conservation (DWLC) is responsible for the regulation of rivers, streams, and storages as well as for water policy across NSW, including environmental flow requirements and the NSW Water Conservation Strategy.
- Planning NSW regulates state and regional planning systems and promotes sustainable land use and development in NSW.
- Environmental Protection Agency (EPA) is responsible for the regulation of activities having an impact on the environment. The
- EPA licences sewage treatment facilities and ensures that effluent discharges do not harm receiving waters. The department also has an overarching environmental education role from a sustainability perspective.
- NSW Health has responsibility for all aspects of public health regulation including the quality and safety of potable water and recycled water.

### **Other State Government Agencies:**

- The CEOs Task Force has been formed to provide a cross government review of water issues relating to the Sydney Region. The related Expert Panel is a group responsible for providing technical assistance to the Task Force in areas such as environmental flows, riparian uses and demand management.
- Sydney Catchment Authority (SCA) is responsible for the control and management of Sydney's dams and catchments. As part of their Operating Licence, the SCA must manage water conservation consistent with the demand management requirements in SWC's licence. The SCA, when considering any augmentation of the catchment infrastructure works, must consider whether there is any additional scope for cost effective demand management strategies by SWC.
- Department of Education is a major user of water as well as being involved in the education of students on water conservation and sustainability.
- Department of Housing is a major customer with approximately 55,000 residential units in Sydney.
- Department of Public Works and Services is responsible for public building design and maintenance.

**Other Groups:**

- Healthy Rivers Commission of NSW reviews issues relating to the environmental health of NSW rivers. The most recent study involved the *Independent Inquiry into the Georges River – Botany Bay System* (Ref 2). The findings of this inquiry in relation to demand management and the water cycle may be summed up in the following paragraph extracted for the report:

*The Government's commitment to providing environmental flows in these rivers, coupled with its recent decision to defer construction of Welcome Reef Dam, means that demand for water must be reduced and alternative sources of supply must be harnessed if the current security of the metropolitan water supply is not to be placed at risk. In that context, future decisions about the urban water cycle must be made in an appropriate manner, considering water requirements of all users, provision of environmental flows, options to reduce water demand, and options for the reuse of stormwater and sewage effluent.*

- Peak Environment Non-Government Organisations (PENGOS) represent the various NSW environmental groups. In the Sydney region demand management is vigorously pursued as a component of the objective of negating the requirement for new dams. This group is represented on SWC's Corporate Customer Council and actively advises on environmental issues.
- Local Councils in the Sydney region are major customers as well as being responsible for local town planning and building approvals.
- Water Services Association of Australia (WSAA) represents the major water providers, including SWC, and undertakes many tasks including benchmarking and efficiency improvement in the industry.

## 3. Principles of a Successful Demand Management Strategy

### 3.1 Essential Elements

The essential elements for a successful demand management strategy are:

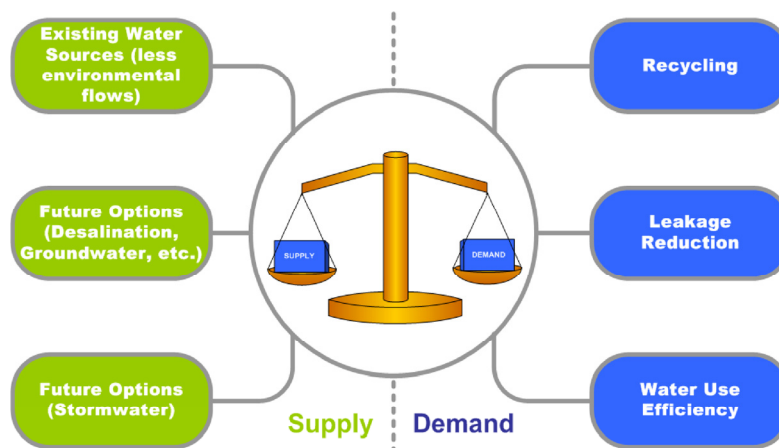
- **Defined Goals and Objectives:** A well-defined and comprehensively reasoned goal focussed on the objectives of the strategy.
- **Understanding of Users:** An understanding of the water users in sufficient detail to enable various users and practices to be targeted by the program.
- **Options Evaluation:** A comprehensive approach to evaluation of the cost effectiveness of the demand management initiatives.
- **Implementation Plans:** A detailed implementation plan focussing on the marketing, resourcing and delivery of the selected initiatives.
- **Monitoring Plan:** A plan to enable the measurement of success and to enable corrections to be made to the strategy.

### 3.2 Defined Goals and Objectives

As for any major strategy, defined goals and objectives are essential to success. For water demand management programs the definition of goals must take account of a diverse range of stakeholders positions including technical, economic and environmental. The following process is followed:

- An understanding of the context of the program is required – in Sydney's case the program is to be generally focused on reduction of average demand to delay source expansion.
- The required level of demand reduction needs to be defined. To achieve this the water balance needs to be defined. The water balance may be represented as shown in Figure 3.1. The balance is defined as the cost effective balance between supply and demand.
- Consideration is also given to other issues such as reduction of greenhouse gas emissions and environmental objectives.

**Figure 3.1: Defining the Water Balance**



## **3.3 Understanding of Water Users**

### **3.3.1 Detailed Understanding**

A detailed understanding of water users is essential to tailoring a successful demand management strategy. Such understanding defines:

- Which user groups are worth targeting
- Which behaviours need to be changed to reduce water use
- The quantum of potential savings
- The mix of measures needed to achieve the desired behavioural change (eg educational, incentive, regulatory)
- Opportunities to reach target groups through other channels or partnerships
- The likelihood of success for different options.

### **3.3.2 Principles of Behaviour Change**

The experience from major social change programs such as road safety, litter reduction and health promotion provides a reliable guide to workable approaches for demand management behaviour. Water conservation is generally seen as a social "good" and positive attitudes are commonly expressed in surveys. However, this is insufficient to create or sustain optimal conservation behaviour. People need to know how to behave, and conserving water needs to be made easier than to wasting water. Major principles in behavioural reform are:

- Behaviour is rarely homogeneous, may be inconsistent over time and is often unrelated to attitudes stated in surveys. For example, behaviours vary according to socio-economic and cultural factors, eg. the acceptability of restrictions change when people believe there is a shortage of water.
- Cost effective measures to achieve change can be drawn from the very large body of consumer behaviour marketing practice.
- Behaviour is not necessarily difficult to change, but to optimise success requires knowledge of the drivers for water use or overuse, and the specific attitudes, motivations and behaviours that are open to influence or change. There are many examples where positive attitudes develop after, rather than before, the behaviour change. For example, improved awareness and commitment to conservation after periods of water restriction during droughts, a time when water conservation education has the most likelihood of success.
- Education alone can only succeed if there are no other factors that maintain the previous behaviour. Education based approaches generally require ongoing investment to maintain the behaviour and to reach new target groups. The cost of educating a large diverse target group is often greatly underestimated. The education strategy should therefore be developed as a part of the mix of measures that most cost effectively results in the changes needed.
- If long term changes are needed, options that "hardwire" the behaviour (such as installing more water efficient appliances) are generally

preferable to those that rely on frequent individual decisions. Consumer marketing principles should be used to select the mix of options including use of rebates, customer service, e-commerce, industry and retail partnerships etc.

- Regulation or the setting of standards also reduces the reliance on positive attitudes or education. As with all regulation, benefit/cost assessments should determine whether water conservation regulation is acceptable, viable or justified.

### **3.3.3 Baseline Measures of Behaviour**

Baseline data on the water using characteristics of customers and fixtures is essential to measure progress towards making homes and businesses more water efficient. It provides the basis on which to judge whether retrofit programs should continue or whether programs are having the intended effect. Collection of such data on say a 5 year cycle has the following advantages:

- Understanding progress toward the maximum attainable level of water efficiency by type of customer.
- The ability to calculate the cost-effective level of conservation by type of customer.
- Monitoring the rate of natural replacement of fixtures with water efficient fixtures in the absence of SWC programs.

As well as information specific to water use, general knowledge of consumer behaviour will often be applicable, for example, communication preferences, survey response rates, size of rebates needed to trigger purchase decisions, preferences for relationship based industry to industry marketing.

A key issue is the level of research needed before a strategy should be implemented. Practices vary among user groups and individual customers, however the amount of research is generally dictated by the urgency of achieving change and the level of risk associated with the program. Research alone does not contribute to water savings. The trade off in delayed programs for the sake of perfect information would not be considered best practice.

## **3.4 Options Evaluation**

To develop an effective demand management strategy requires a comprehensive options assessment to identify measures that will most effectively, in terms of cost and practicality, meet the goals of the strategy. The overall objective is to identify the conservation measures that are best suited to a specific authority and then to project the potential water savings and costs of water saved throughout the design period. The following basic steps outline the activities undertaken to undertake evaluation of options:

- Step 1. Review historic demands and quantify impact of existing conservation measures.
- Step 2. Develop a reliable demand forecast by customer sector.
- Step 3. Review existing supply capacity and planned augmentations (cost of next increment of supply).
- Step 4. Determine the marginal cost of potable water (existing and future).

- Step 5. Identify the potential for demand management using a baseline study.
- Step 6. Compile a long list of possible water conservation measures.
- Step 7. Screen measures to determine applicable and feasible measures.
- Step 8. Perform a traditional Benefit/Cost analysis and rank options.
- Step 9. Select conservation measures based on economic and non-cost criteria.
- Step 10. Develop an overall strategy by combining selected programs and measures to achieve the strategy goal.

### **3.5 Implementation Plans**

Best practice implementation of demand management and other social change strategies are characterised by:

- clear behavioural objectives
- stakeholder support
- clear strategies and project plans
- solid marketing, and
- appropriate resourcing.

Demand management programs are essentially marketing exercises. To succeed, programs should be run as marketing campaigns backed by customer focused strategies and detailed implementation plans. A marketing approach takes into account key issues that affect implementation such as market acceptance, stakeholder support, policy and regulatory context. This does not mean technical input is unimportant. The options that make up the program must be technically sound and the measures and analysis of water use are essential elements in customer communication.

Whether or not a marketing approach is used, successful implementation depends on adequately justifying the approach to the satisfaction of key stakeholders who seek reassurance it will deliver cost effective water savings.

The final key element is finding and applying suitable resources to implement the plan. This includes project managers, marketing and technical staff, contractors and partners in industry, government and the environmental spheres.

### **3.6 Monitoring Plan**

Pre-defined monitoring plans for the strategy and for individual programs or initiatives are critical. These plans provide feedback to the stakeholders on progress as well as enabling informed changes to programs. In addition monitoring allows for benchmarking with other authorities and provides information back to the cost effectiveness evaluation.

Monitoring plans need to be developed prior to the commencement of a program to ensure that data of sufficient quantity and quality is collected. Data collected must match the needs of the program and stakeholders.

## 4. Evaluation of Sydney Water's Performance Since 1995

### 4.1 Approach to Evaluation

SWC's strategy was evaluated against the principles of a successful demand management program to determine:

- Adequacy of Least Cost Planning approach to evaluating cost effectiveness of programs
- Estimates of water savings from activities undertaken since 1995
- Level and type of resources applied for the strategy implementation
- Per capita performance compared to the water conservation targets
- Corporate commitment to the strategy.

As noted in the Introduction, SWC has been undertaking a major review of the Demand Management Strategy during 2002. Changes to the future program were being considered as part of the budget process, which was being finalised during this study. Therefore future budgets and proposed actions for 2002/3 may have changed since the evaluation was undertaken.

### 4.2 Evolution of the Demand Management Strategy

Development of the SWC's Demand Management Strategy was a requirement of the 1995 Operating Licence. A Demand Management Forum was held with interested stakeholders in 1995 and the initial Demand Management Strategy was published. The strategy described a wide range of proposed activities. However, demand was falling due mainly to the imposition of water restrictions related to drought conditions and little progress was made in implementation or the application of resources.

In 1998, SWC developed a Least Cost Planning Model to assist the evaluation of demand management initiatives. This led to the first detailed program of works to implement the strategy. The program has evolved with frequent changes through to the most recent review in 2001/2, which includes the Least Cost Plan Version 3, along with an extension program that provides further options for achieving the per capita targets.

An outline of the evolution of the Demand Management Strategy is given in **Table 4.1**.

**Table 4.1: Evolution of Demand Management Strategy**

Year	Action
1995	WaterPlan 21, SWC
1995	Demand Management Strategy, SWC
1996	Demand Management Forum
1998	Least Cost Planning Version 1, ISF
1999	Demand Management Strategy, SWC
1999	Water Recycling Strategy, SWC
2000	Least Cost Planning Version 2, ISF
2000	NSW Water Conservation Strategy, NSW
2001	Towards Sustainability Report, SWC



Year	Action
2001	Least Cost Planning Version 3, ISF
2002	Sydney Water Extension of Demand Management Program, ISF

## 4.3 Demand Management Initiatives Since 1995

### 4.3.1 Development and Use of the Least Cost Planning Model

#### 4.3.1.1 Overview of Approach

The Least Cost Planning (LCP) model was to provide a framework to:

- Provide base data for evaluation of options.
- Shortlist programs and initiatives for detailed evaluation.
- Evaluate the cost effectiveness of initiatives.
- Rank options in terms of benefit cost.

The model calculates the *levelised cost*, which represents the cost to the community to achieve a certain level of water savings and is expressed in terms of \$/kL saved, from the communities perspective. This provides an economic ranking of the options, rather than a benefit cost ratio, which transparently indicates if an initiative is cost effective ie. has a B/C ratio of greater than 1.0.

The disadvantage of using levelised cost is that the concept is not universal and therefore is not generally grasped by all stakeholders, including executive, board members and regulators.

The traditional benefit/cost ratio provides a conventional indicator of the cost effectiveness of a particular option. The ratio may be evaluated from either SWC's and/or the community's perspective.

#### 4.3.1.2 Model Assumptions

The LCP model algorithms contain numerous assumptions. A review was undertaken and detailed findings are provided in Appendix 2. Assumptions are derived from limited industry experience and surveys as well as research such as 1987 ABS water usage survey. Also, research undertaken by the Institute of Sustainable Futures (ISF) has provided data for the model.

In summary the review revealed that:

- A number of assumptions require verification. Examples of such assumptions are high, and probably unrealistic, participation rates and water savings assumed for residential outdoor programs and washing machine rebate programs.
- In some cases the interaction of conservation measures with each other was not considered. If overlapping programs target a fixture, then the overall saving is less than the summation of savings from each program.

#### 4.3.1.3 Use of the LCP Model

Levelised cost is not the only parameter used to evaluate options. Other issues such as meeting a market opportunity and the confidence in achieving water savings are critical criteria that are used to select programs.

The LCP model and related reports appear to be used as a defacto framework to guide the programs. This results in a lack of implementation and marketing plans specifying program details.

The usefulness of an LCP approach should not be underestimated as the output, combined with program results, provides information that is required to gain corporate support for demand management programs. If the outputs from the model fail to provide clear and justifiable results, then support for the program may suffer.

### 4.3.2 Residential Water Efficiency Programs

#### 4.3.2.1 Every Drop Counts Program - 1995 to 2002

Sydney Water has a significant residential program called "Every Drop Counts". The activities undertaken as part of the Residential Program since 1995 are summarised in Table 4.2.

**Table 4.2: Summary of Residential DM Initiatives – 1995 to 2002**

Program or Initiative	Description	Implementation Success	Issues Identified by SWC
<b>Incentive Programs</b>			
Smart Showerhead Program	Co-funded (SEDA) rebate of \$10 on AAA showerhead purchased at retailers	8,900 rebates during 1999/00	Rebate not supported at point of sale by retailers
Retrofit and Audit Program	Home tune up, incl. AAA showerhead, tap regulator, flush arrester and leak repair. Cost to customer \$22. Subsidy \$108	180,000 retrofits from 2000 to 2002. Estimated savings of 20 kL/a/household Good response to further offers (outdoor) from participant households	Wide demographic variation in participation, High participant satisfaction Participation rate high on second round offers.
Outdoor Voucher Mail-out	Incentive voucher mailed to 80,000 homes. Vouchers for savings on outdoor products at 23 businesses.	Limited follow up. Estimated saving of 8 kL/a/household	Good marketing improved program effectiveness. Targeted program at high users.
It's a Living Thing Showerhead Program	Co-funded (EPA) program including a one month media based education campaign and subsidised showerhead purchase at SWC offices	6,000 sales in 2001/2. Estimated saving of 17 kL/a/household. Small but significant positive attitude shifts of 8%	
<b>Educational Programs</b>			
EDC Campaigns	Various public education campaigns using brochures, print media and television.	Clear key messages and good quality material. Unknown, penetration or level of water savings.	
Public Displays	Displays at garden shows, shopping centres (timed with retrofit program)	Unknown, but low level of water savings.	No forward program
GreenSmart Village	Four homes in display village at Rouse Hill, used for promoting water efficiency.	6,000 visitors per week.	
Community Resource Efficiency	Support for community programs such as NCC's Cool Communities.	Unknown.	
<b>Regulatory Programs</b>			
National Performance	Assistance to WSAA to develop new ASA/NZSA standards for water efficient	Revised, combined standard completed and	

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<b>Program or Initiative</b>	<b>Description</b>	<b>Implementation Success</b>	<b>Issues Identified by SWC</b>
Standards	devices. Negotiations now aimed at mandatory standards.	manufacturers involved in changes.	
Water Efficient Housing	Assistance provided to Planning NSW to develop regulations and guidelines for sustainable development through the planning approvals process. Currently in trial phase.	In trial mode	Many initiatives being trialed including stormwater reuse. May take time to implement.
<b>Other Programs</b>			
Sustainable Housing Projects	Assistance with sustainable housing developments at Leichhardt and Parramatta.	Project in planning stage	

The estimated savings from the residential program up to June 2002 are summarised in **Table 4.3**.

**Table 4.3: Residential Program – Estimated Savings to June 2002**

<b>Program Initiative</b>	<b>Number of Participants</b>	<b>Estimated Water Saving</b>	
		<b>KL/a/account</b>	<b>GL/a</b>
Smart Showerhead Program	8,907	17	0.15
Residential Retrofit Program	180,000	20	3.60
It's A Living Thing Program	6,000	17	0.12
Outdoor Vouchers Program	80,000	8	0.64
<b>Total Estimated Annual Savings</b>			<b>4.51</b>

4.3.2.2 Every Drop Counts Residential Program - 2002 to 2005

The Demand Management Strategy is currently under review and new initiatives are planned for the period up to 2005. Table 4.4 summarises the programs to be undertaken in 2002/3 based on information available at the end of June. The finalised program details are currently being finalised.

**Table 4.4: Summary of Residential Program – 2002 -2005**

<b>Program or Initiative</b>	<b>Description</b>	<b>Expected Savings</b>
<b>Incentive Programs</b>		
Dept of Housing Retrofit Program	Retrofitting of 7,000 houses. Similar approach to Residential program. Savings to fund future retrofits ie. low interest loan.	Estimated saving of 20 kL/a/household
Targeted Retrofits	Tagreting high usage households aiming at 25% uptake across Sydney by 2012	Estimated 20 kL/a per participating household
EDC Outdoor Program	Focussed program to reduce outdoor water use in high usage areas of the city. Education and incentive based. Program development only in 2002/3	Included in Usage Conditions saving
Washing Machine Program	Provision of rebate for water efficient washing machines to increase sales from 10% to 20%	Up to 20% of water participating households
Retrofitting Agents Program	Hot water maintenance companies to install showerheads	17 kL/a for each participating household
Rainwater Tank Rebate	A rebate of up to \$500 for installation of a rainwater tank	Estimated to be up to 80 kL/a per participating household

<b>Program or Initiative</b>	<b>Description</b>	<b>Expected Savings</b>
Residential Landscaping Assessment	Development of a garden retrofit service for efficient irrigation systems	Not known
<b>Regulations</b>		
Water Usage Conditions	Odds/evens watering days	7 % of outdoor usage
National Performance Standards	Further assistance for mandatory standards.	Nil
Water Efficient Development Regulations	Possible new planning regulation for AAA showerheads in new housing developments	17 kL/a/household
<b>Education Programs</b>		
Website Development	Development of the EDC component of the website including the on-line store.	Unknown, low level excluding sales.
Public Education	Continuation of education process. No plan available.	Unknown

**Table 4.5** provides a summary of the proposed activities for the Residential Program to the end of 2005. Estimated savings based on SWC documentation (Ref 17) are provided. Some of these savings are believed to be ambitious and may be revised following review of the LCP.

**Table 4.5: Residential Program – Estimated Savings – 2002 to 2005**

<b>Program Initiative</b>	<b>SWC Savings Estimate (GL/a)</b>
DoH Retrofits (15,000 No.)	0.3
Targeted Retrofits	3.23
EDC Outdoor Program	5.70
Washing Machine Program	0.70
Retrofitting Agents Program	0.36
Rainwater Tank Rebate	0.54
Residential Landscaping Assessment	7.66
Development Regulations	#1.02
<b>Total Estimated Savings</b>	<b>19.50</b>

Note: # Assuming commencement in 2003 and 20,000 new housing units per year.

#### 4.3.2.3 Areas for Improvement of Program

A number of areas for improvement were identified during the review:

- **Baseline Customer Information for Targeting and Measurement:** While SWC has excellent survey information on community water conservation attitudes and stated intentions, there is a lack of a clear picture of existing fixtures in residences. A comprehensive segmentation of the residential market according to the information available in surveys, billing data, and the detailed information collected during the retrofit program is planned for 2002/3. This information is critical to make judgement on program completion eg. the retrofit program and development of new programs such as the outdoor program.

- **Multi Family Residential Retrofit Approach:** A clear strategy is required to deal with the different customer needs and issues of this group (such as need to deal with body corporates, agents and developers). Given predictions are for the trend to increase in this living pattern, this initiative should be combined with proposed Planning NSW development regulations to provide a comprehensive approach.
- **Implementation and Marketing Plans:** Such documents are required to provide clear direction for the programs. Without guiding plans frequent changes in direction and less than optimal resource allocation may occur. The plans would assist in justifying the programs internally, to the Board, to auditors and to other external stakeholders. Addressing issues during the planning phase will ensure that projects maintain momentum and support.
- **Skilled Resources:** Increased resources are required for this program, to enable the current programs to be implemented and new programs to be planned. Full time marketing staff should be employed for the program or alternatively in the Water Conservation and Recoiling Unit.
- **Planned Programs to Meet Targets:** SWC currently have only limited programs ready to implement. As time is of the essence SWC should take advantage of experience of others, particularly the US authorities, who have been implementing programs for many years.

#### 4.3.3 Business Water Efficiency Program

##### 4.3.3.1 Every Drop Counts Business Program – 1995 to 2002

The *Every Drop Counts Business* program targets customers in the industrial, commercial and government sectors. Non-residential customers currently account for 30% of all water drawn from storages, or around 166 GL/a. This compares to 48% of total demand in 1990/1. The sector was identified in the 1998 Least Cost Planning report (Ref 16) as being a significant opportunity for water efficiency improvement and Hospitality Audits initiative were implemented pre 2000.

Since that time SWC has refocused the program through development of new approaches and has increased resources to service the program. Table 4.6 summarises the initiatives undertaken to date.

**Table 4.6: Summary of EDC Business Program – 1995 to 2002**

Program or Initiative	Description	Implementation Success	Issues Identified
<b>Incentive Programs</b>			
Hospitality Audits Program	Free audits and retrofit advice to hotels in lead up to 2000 Olympics	Limited	Difficult to get commitment
Business Water Audits Program	Free audits for business.	Limited	Various reasons for lack of implementation
One-2-Five® Water Program	Program for large users to gain initial management support. Refer to discussion below table.	Approximately 70 diagnostics and 50 MOUs signed. Top users commenced.	High cost of audits.
<b>Educational Programs</b>			
EDC Business Program	Development of brochures to promote water efficiency, the business program and successes to date.	Literature well accepted in workplace	

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Management Strategy**

<b>Program or Initiative</b>	<b>Description</b>	<b>Implementation Success</b>	<b>Issues Identified</b>
Schools Program	Includes Streamwatch, proposed water audit trial and education program to be piloted in 2002. Only government schools included.	In start up mode. Well regarded by teachers	Funding of retrofits not finalised. Very small penetration of school population with 10 in first year and no clear path for following years
Best Practice Guidelines	Guidelines developed for the hospitality industry based on water audits.	Well accepted by industry.	Opportunity to use overseas information to fast track development of guidelines for other industries
<b>Other Programs</b>			
Business Market Segmentation	Detailed segmentation of the business users including ANZSIC classification and water usage profiling.	Data being used to target high users and to identify potential of program	Data difficult to extract from billing system.
Laundry Sector Recycling Trial	Trial of water recycling equipment proven in the US.	Start up phase. Potential savings of 1.2 GL/a	High capital cost of installation.
Local Council MOU Program	Signing of business agreements for cooperation on water efficiency projects including metering of all water usage and possible DCPs for water saving devices.	8 MOUs signed in 2002.	Councils currently not charged for parks water use.
Government Program	Negotiations with major customer departments such as Health and Education.	Limited results. Audits of Wollongong Uni, 2 Correctional Centres, leakage reduction for Dept of Defence	Water efficiency is low priority to customers. Limited understanding of customer operations.

The One-2-Five® Water Program has been developed over the past 18 months for major water users, with a strong emphasis on gaining senior management commitment through the following process:

- Undertaking a water management diagnostic.
- Signing of an MOU to commit to implementation.
- Co-funding of a water audit and improvement plan.
- Provision of a range of services to remove barriers to implementation.
- Investment in a retrofit program with returns generated from the water and energy operating cost savings.

To date approximately 70 firms have shown interest in the approach.

Estimated savings from the business program up to June 2002 are summarised in **Table 4.4**.

**Table 4.4: Business Program – Estimated Savings to June 2002**

Program Initiative	Estimated Water Savings (GL/a)	
	Potential from Audits	Achieved to Date
Hospitality Audits	0.13	0.09
Education Audits (Wollongong Uni)	0.06	0
Correctional Centre Audits	0.13	0
Industrial Audits	0.15	0
Other Business Audits	0.67	0
Dept of Defence Leakage Rectification	0.36	0.36
<b>Total Estimated Water Savings</b>	<b>1.50</b>	<b>0.45</b>

#### 4.3.3.2 Every Drop Counts Business Program – 2002 to 2005

The business program is to be expanded through the following initiatives:

- **One-2-Five® Water Program:** This program is proposed to be the driver for major user (top 500 users) participation. Seed funding of \$2m will be used in 2002/3 to commence projects to save water. The investment funding is a nominal amount and may increase where projects are identified as having significant potential to save water. Savings, expected to be around \$0.5m will be reinvested in 2003/4 and so forth.
- **Water Check Program:** A program is currently being developed for smaller business users (approximately 170,000 users), through a simplified approach.
- **Local Council MOU Program:** Continued expansion, development and implementation of this program and associated water saving initiatives.
- **Schools Program:** Possible retrofitting of the schools involved in the audit trial.
- **Government Program:** No specific actions planned.

SWC has estimated that over the period to 2005, the EDC Business program will provide savings of **3.29 GL/a**. Based on progress to date and the planned activities such savings may be difficult to achieve.

#### 4.3.3.3 Areas of Improvement of Performance

Based on the review the following areas of improvement were identified for the Business Program:

- **Marketing and Implementation Framework:** Market segmentation has been commenced and will continue to improve over 2002/3. This will enable clear articulation of objectives and priorities, as well as allowing the determination of the cost of "sales" and the allocation of resources. Customer focus will be improved through this approach.
- **Remove Barriers:** The program should provide greater incentive for participation, such as free and less complex audits. SWC can take advantage of experience of others, particularly the US authorities, who have carried out numerous water use audits and amassed significant knowledge of industry and process related water use practices.



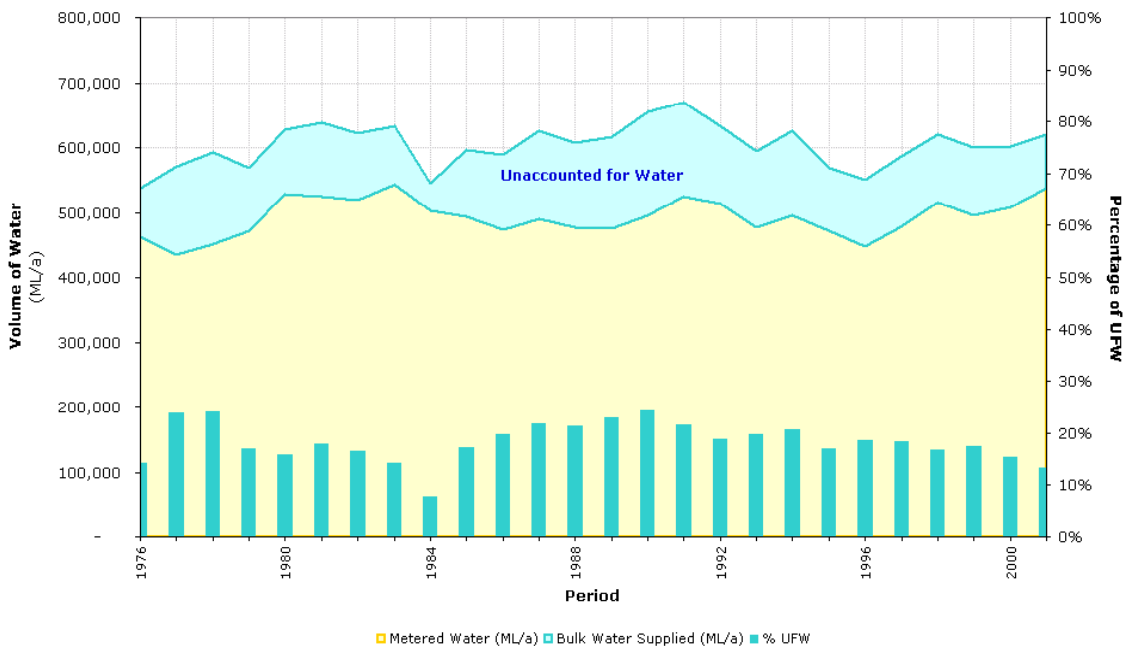
- **Expansion of Program:** The program has only been in place for 18 months and additional initiatives are being developed. Implementation should rapidly expanded to include markets other than the major water users, to meet the impending targets.
- **Government Customer Support:** SWC should plan to gain the support of major government customers for water efficiency. Success has been demonstrated through the recent DoH agreement. Like any major customer it is necessary to understand the drivers and the impediments to committing to the program. Success requires a clear focus, resources and executive support.
- **Increase Resources:** This program requires a high level of skilled resources as it is both technically and marketing based. Therefore a mix of skills is required, as a reasonable level of knowledge of water using equipment is essential. Permanent marketing staff would be advantageous to the program.

#### 4.3.4 Unaccounted Water Loss Reduction Program

##### 4.3.4.1 Overview of Program

As part of the 1995 Operating Licence, SWC was required to reduce unaccounted losses to a maximum of 15% by 2000. In the 2000 audit SWC reported a reduction of Unaccounted For Water (UFW) to 14%. It is understood that this was achieved through bulk meter recalibration and quantification of Unbilled Authorised Consumption eg. fire usage, un-metered parks usage etc. Only limited work was undertaken to reduce leakage during this period. The performance of UFW for the Sydney system since 1976 is shown in **Figure 4.1**. It should be noted that these figures have not been adjusted for Unbilled Authorised Consumption.

**Figure 4.1: Historic Performance of Unaccounted For Water (1976-2001)**



Assessment of SWC's system leakage levels based on available data reveals that:

- Using the **Integrated Flow Method**, and assuming that leakage is 60% of UFW indicates leakage of approximately 176 ML/d or 64 GL/a.
- Using the recently developed international benchmarking index termed the **Infrastructure Leakage Index** or **ILI**, a figure of 2.45 was determined for Sydney (calculation shown in Appendix 4). This is considered to be high when compared with other areas:
  - For England and Wales - 1.5 to 2.5 (Ref 15)
  - For WSAA members - 0.87 to 3.68 with an average of 2.08 (Ref 7)
  - For a well-managed system in very good condition an index of 1.0

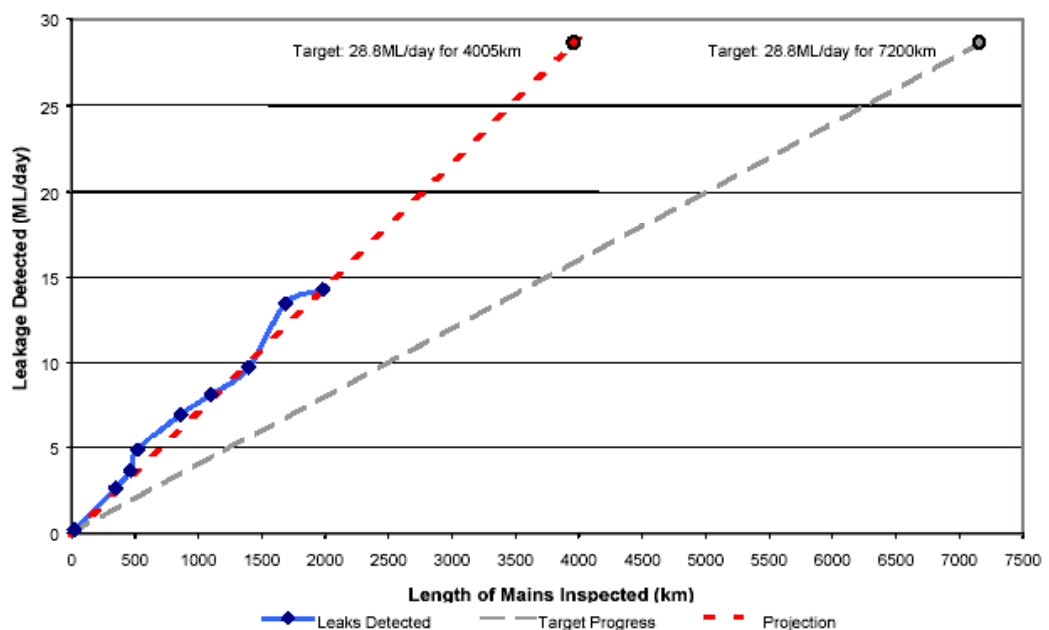
As part of the UFW reduction program, SWC embarked in 1999/00 on a Leakage Reduction Program through active leakage management. SWC developed their approach as follows:

- Examine available SCADA data to provide a prioritised list of zones based on minimum night flow data.
- Carry out a pilot study for a range of leakage detection technologies.
- Develop a program to systematically inspect and repair a sufficient length of main to achieve the target reduction of 7.2 Lcd by 2005 as set by the Least Cost Planning Model assuming a cost of \$3.7m/a. An economic level of leakage was not calculated, and the cost to maintain the leakage level was not considered.

In addition SWC is reviewing, through a pilot, opportunities in the reduction of high pressures as a means of reducing losses from leakage and pipe bursts.

**Figure 4.2** summarises the results to date based on SWC's evaluation of water saved. As can be seen, it is expected that the savings from the program will achieve the target of 28.8 ML/d saving (or 10.5 GL/a) through the inspection of 4,000 km compared to the original estimate of 7,200 km. This may indicate that the level of leakage in the Sydney system is actually higher than the estimated 176 ML/a or that the results of the program are being overestimated.

**Figure 4.2: Performance of Leakage Program (Ref 8)**



## 4. Evaluation of Sydney Water's Performance Since 1995

### 4.1 Approach to Evaluation

SWC's strategy was evaluated against the principles of a successful demand management program to determine:

- Adequacy of Least Cost Planning approach to evaluating cost effectiveness of programs
- Estimates of water savings from activities undertaken since 1995
- Level and type of resources applied for the strategy implementation
- Per capita performance compared to the water conservation targets
- Corporate commitment to the strategy.

As noted in the Introduction, SWC has been undertaking a major review of the Demand Management Strategy during 2002. Changes to the future program were being considered as part of the budget process, which was being finalised during this study. Therefore future budgets and proposed actions for 2002/3 may have changed since the evaluation was undertaken.

### 4.2 Evolution of the Demand Management Strategy

Development of the SWC's Demand Management Strategy was a requirement of the 1995 Operating Licence. A Demand Management Forum was held with interested stakeholders in 1995 and the initial Demand Management Strategy was published. The strategy described a wide range of proposed activities. However, demand was falling due mainly to the imposition of water restrictions related to drought conditions and little progress was made in implementation or the application of resources.

In 1998, SWC developed a Least Cost Planning Model to assist the evaluation of demand management initiatives. This led to the first detailed program of works to implement the strategy. The program has evolved with frequent changes through to the most recent review in 2001/2, which includes the Least Cost Plan Version 3, along with an extension program that provides further options for achieving the per capita targets.

An outline of the evolution of the Demand Management Strategy is given in **Table 4.1**.

**Table 4.1: Evolution of Demand Management Strategy**

Year	Action
1995	WaterPlan 21, SWC
1995	Demand Management Strategy, SWC
1996	Demand Management Forum
1998	Least Cost Planning Version 1, ISF
1999	Demand Management Strategy, SWC
1999	Water Recycling Strategy, SWC
2000	Least Cost Planning Version 2, ISF
2000	NSW Water Conservation Strategy, NSW
2001	Towards Sustainability Report, SWC

Year	Action
2001	Least Cost Planning Version 3, ISF
2002	Sydney Water Extension of Demand Management Program, ISF

## 4.3 Demand Management Initiatives Since 1995

### 4.3.1 Development and Use of the Least Cost Planning Model

#### 4.3.1.1 Overview of Approach

The Least Cost Planning (LCP) model was to provide a framework to:

- Provide base data for evaluation of options.
- Shortlist programs and initiatives for detailed evaluation.
- Evaluate the cost effectiveness of initiatives.
- Rank options in terms of benefit cost.

The model calculates the *levelised cost*, which represents the cost to the community to achieve a certain level of water savings and is expressed in terms of \$/kL saved, from the communities perspective. This provides an economic ranking of the options, rather than a benefit cost ratio, which transparently indicates if an initiative is cost effective ie. has a B/C ratio of greater than 1.0.

The disadvantage of using levelised cost is that the concept is not universal and therefore is not generally grasped by all stakeholders, including executive, board members and regulators.

The traditional benefit/cost ratio provides a conventional indicator of the cost effectiveness of a particular option. The ratio may be evaluated from either SWC's and/or the community's perspective.

#### 4.3.1.2 Model Assumptions

The LCP model algorithms contain numerous assumptions. A review was undertaken and detailed findings are provided in Appendix 2. Assumptions are derived from limited industry experience and surveys as well as research such as 1987 ABS water usage survey. Also, research undertaken by the Institute of Sustainable Futures (ISF) has provided data for the model.

In summary the review revealed that:

- A number of assumptions require verification. Examples of such assumptions are high, and probably unrealistic, participation rates and water savings assumed for residential outdoor programs and washing machine rebate programs.
- In some cases the interaction of conservation measures with each other was not considered. If overlapping programs target a fixture, then the overall saving is less than the summation of savings from each program.

#### 4.3.1.3 Use of the LCP Model

Levelised cost is not the only parameter used to evaluate options. Other issues such as meeting a market opportunity and the confidence in achieving water savings are critical criteria that are used to select programs.

The LCP model and related reports appear to be used as a defacto framework to guide the programs. This results in a lack of implementation and marketing plans specifying program details.

The usefulness of an LCP approach should not be underestimated as the output, combined with program results, provides information that is required to gain corporate support for demand management programs. If the outputs from the model fail to provide clear and justifiable results, then support for the program may suffer.

### 4.3.2 Residential Water Efficiency Programs

#### 4.3.2.1 Every Drop Counts Program - 1995 to 2002

Sydney Water has a significant residential program called "Every Drop Counts". The activities undertaken as part of the Residential Program since 1995 are summarised in Table 4.2.

**Table 4.2: Summary of Residential DM Initiatives – 1995 to 2002**

Program or Initiative	Description	Implementation Success	Issues Identified by SWC
<b>Incentive Programs</b>			
Smart Showerhead Program	Co-funded (SEDA) rebate of \$10 on AAA showerhead purchased at retailers	8,900 rebates during 1999/00	Rebate not supported at point of sale by retailers
Retrofit and Audit Program	Home tune up, incl. AAA showerhead, tap regulator, flush arrester and leak repair. Cost to customer \$22. Subsidy \$108	180,000 retrofits from 2000 to 2002. Estimated savings of 20 kL/a/household Good response to further offers (outdoor) from participant households	Wide demographic variation in participation, High participant satisfaction Participation rate high on second round offers.
Outdoor Voucher Mail-out	Incentive voucher mailed to 80,000 homes. Vouchers for savings on outdoor products at 23 businesses.	Limited follow up. Estimated saving of 8 kL/a/household	Good marketing improved program effectiveness. Targeted program at high users.
It's a Living Thing Showerhead Program	Co-funded (EPA) program including a one month media based education campaign and subsidised showerhead purchase at SWC offices	6,000 sales in 2001/2. Estimated saving of 17 kL/a/household. Small but significant positive attitude shifts of 8%	
<b>Educational Programs</b>			
EDC Campaigns	Various public education campaigns using brochures, print media and television.	Clear key messages and good quality material. Unknown, penetration or level of water savings.	
Public Displays	Displays at garden shows, shopping centres (timed with retrofit program)	Unknown, but low level of water savings.	No forward program
GreenSmart Village	Four homes in display village at Rouse Hill, used for promoting water efficiency.	6,000 visitors per week.	
Community Resource Efficiency	Support for community programs such as NCC's Cool Communities.	Unknown.	
<b>Regulatory Programs</b>			
National Performance	Assistance to WSAA to develop new ASA/NZSA standards for water efficient	Revised, combined standard completed and	

Program or Initiative	Description	Implementation Success	Issues Identified by SWC
Standards	devices. Negotiations now aimed at mandatory standards.	manufacturers involved in changes.	
Water Efficient Housing	Assistance provided to Planning NSW to develop regulations and guidelines for sustainable development through the planning approvals process. Currently in trial phase.	In trial mode	Many initiatives being trialed including stormwater reuse. May take time to implement.
<b>Other Programs</b>			
Sustainable Housing Projects	Assistance with sustainable housing developments at Leichhardt and Parramatta.	Project in planning stage	

The estimated savings from the residential program up to June 2002 are summarised in **Table 4.3**.

**Table 4.3: Residential Program – Estimated Savings to June 2002**

Program Initiative	Number of Participants	Estimated Water Saving	
		KL/a/account	GL/a
Smart Showerhead Program	8,907	17	0.15
Residential Retrofit Program	180,000	20	3.60
It's A Living Thing Program	6,000	17	0.12
Outdoor Vouchers Program	80,000	8	0.64
<b>Total Estimated Annual Savings</b>			<b>4.51</b>

#### 4.3.2.2 Every Drop Counts Residential Program - 2002 to 2005

The Demand Management Strategy is currently under review and new initiatives are planned for the period up to 2005. Table 4.4 summarises the programs to be undertaken in 2002/3 based on information available at the end of June. The finalised program details are currently being finalised.

**Table 4.4: Summary of Residential Program – 2002 -2005**

Program or Initiative	Description	Expected Savings
<b>Incentive Programs</b>		
Dept of Housing Retrofit Program	Retrofitting of 7,000 houses. Similar approach to Residential program. Savings to fund future retrofits ie. low interest loan.	Estimated saving of 20 kL/a/household
Targeted Retrofits	Tagreting high usage households aiming at 25% uptake across Sydney by 2012	Estimated 20 kL/a per participating household
EDC Outdoor Program	Focussed program to reduce outdoor water use in high usage areas of the city. Education and incentive based. Program development only in 2002/3	Included in Usage Conditions saving
Washing Machine Program	Provision of rebate for water efficient washing machines to increase sales from 10% to 20%	Up to 20% of water participating households
Retrofitting Agents Program	Hot water maintenance companies to install showerheads	17 kL/a for each participating household
Rainwater Tank Rebate	A rebate of up to \$500 for installation of a rainwater tank	Estimated to be up to 80 kL/a per participating household

Program or Initiative	Description	Expected Savings
Residential Landscaping Assessment	Development of a garden retrofit service for efficient irrigation systems	Not known
<b>Regulations</b>		
Water Usage Conditions	Odds/evens watering days	7 % of outdoor usage
National Performance Standards	Further assistance for mandatory standards.	Nil
Water Efficient Development Regulations	Possible new planning regulation for AAA showerheads in new housing developments	17 kL/a/household
<b>Education Programs</b>		
Website Development	Development of the EDC component of the website including the on-line store.	Unknown, low level excluding sales.
Public Education	Continuation of education process. No plan available.	Unknown

**Table 4.5** provides a summary of the proposed activities for the Residential Program to the end of 2005. Estimated savings based on SWC documentation (Ref 17) are provided. Some of these savings are believed to be ambitious and may be revised following review of the LCP.

**Table 4.5: Residential Program – Estimated Savings – 2002 to 2005**

Program Initiative	SWC Savings Estimate (GL/a)
DoH Retrofits (15,000 No.)	0.3
Targeted Retrofits	3.23
EDC Outdoor Program	5.70
Washing Machine Program	0.70
Retrofitting Agents Program	0.36
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Residential Landscaping Assessment	7.66
Development Regulations	#1.02
<b>Total Estimated Savings</b>	<b>19.50</b>

Note: # Assuming commencement in 2003 and 20,000 new housing units per year.

#### 4.3.2.3 Areas for Improvement of Program

A number of areas for improvement were identified during the review:

- Baseline Customer Information for Targeting and Measurement:**  
 While SWC has excellent survey information on community water conservation attitudes and stated intentions, there is a lack of a clear picture of existing fixtures in residences. A comprehensive segmentation of the residential market according to the information available in surveys, billing data, and the detailed information collected during the retrofit program is planned for 2002/3. This information is critical to make judgement on program completion eg. the retrofit program and development of new programs such as the outdoor program.



- **Multi Family Residential Retrofit Approach:** A clear strategy is required to deal with the different customer needs and issues of this group (such as need to deal with body corporates, agents and developers). Given predictions are for the trend to increase in this living pattern, this initiative should be combined with proposed Planning NSW development regulations to provide a comprehensive approach.
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Since that time SWC has refocused the program through development of new approaches and has increased resources to service the program. Table 4.6 summarises the initiatives undertaken to date.

**Table 4.6: Summary of EDC Business Program – 1995 to 2002**

Program or Initiative	Description	Implementation Success	Issues Identified
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<b>Educational Programs</b>			
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To date approximately 70 firms have shown interest in the approach.

Estimated savings from the business program up to June 2002 are summarised in **Table 4.4**.

**Table 4.4: Business Program – Estimated Savings to June 2002**

Program Initiative	Estimated Water Savings (GL/a)	
	Potential from Audits	Achieved to Date
Hospitality Audits	0.13	0.09
Education Audits (Wollongong Uni)	0.06	0
Correctional Centre Audits	0.13	0
Industrial Audits	0.15	0
Other Business Audits	0.67	0
Dept of Defence Leakage Rectification	0.36	0.36
<b>Total Estimated Water Savings</b>	<b>1.50</b>	<b>0.45</b>

#### 4.3.3.2 Every Drop Counts Business Program – 2002 to 2005

The business program is to be expanded through the following initiatives:

- **One-2-Five® Water Program:** This program is proposed to be the driver for major user (top 500 users) participation. Seed funding of \$2m will be used in 2002/3 to commence projects to save water. The investment funding is a nominal amount and may increase where projects are identified as having significant potential to save water. Savings, expected to be around \$0.5m will be reinvested in 2003/4 and so forth.
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- **Local Council MOU Program:** Continued expansion, development and implementation of this program and associated water saving initiatives.
- **Schools Program:** Possible retrofitting of the schools involved in the audit trial.
- **Government Program:** No specific actions planned.

SWC has estimated that over the period to 2005, the EDC Business program will provide savings of **3.29 GL/a**. Based on progress to date and the planned activities such savings may be difficult to achieve.

#### 4.3.3.3 Areas of Improvement of Performance

Based on the review the following areas of improvement were identified for the Business Program:

- **Marketing and Implementation Framework:** Market segmentation has been commenced and will continue to improve over 2002/3. This will enable clear articulation of objectives and priorities, as well as allowing the determination of the cost of "sales" and the allocation of resources. Customer focus will be improved through this approach.
- **Remove Barriers:** The program should provide greater incentive for participation, such as free and less complex audits. SWC can take advantage of experience of others, particularly the US authorities, who have carried out numerous water use audits and amassed significant knowledge of industry and process related water use practices.

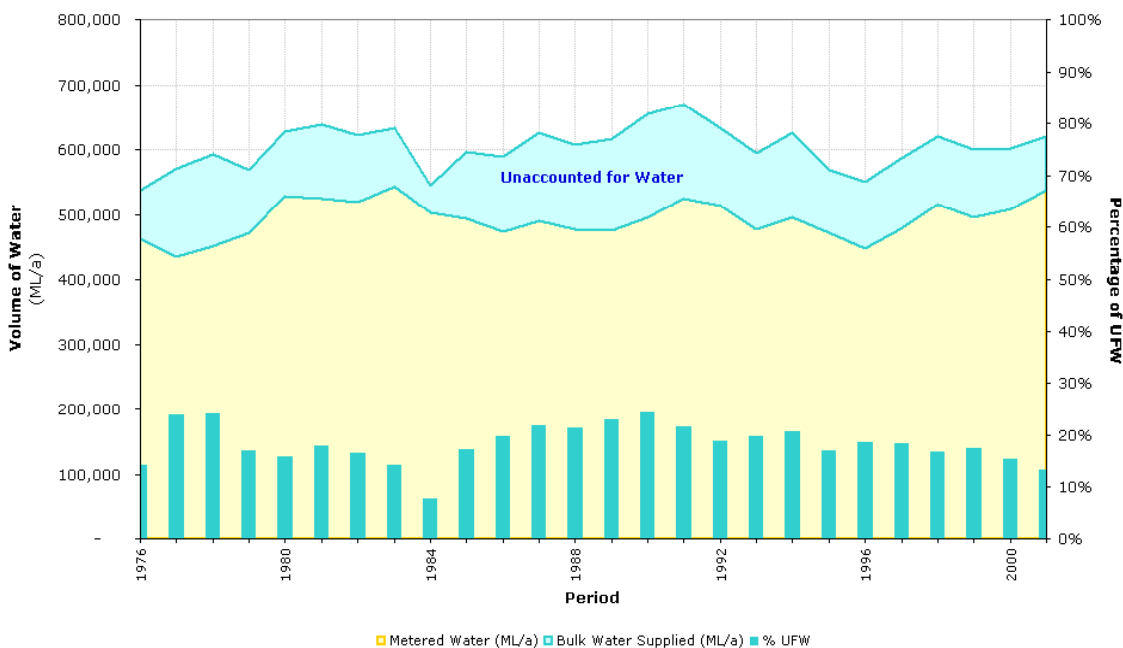
- **Expansion of Program:** The program has only been in place for 18 months and additional initiatives are being developed. Implementation should rapidly expanded to include markets other than the major water users, to meet the impending targets.
- **Government Customer Support:** SWC should plan to gain the support of major government customers for water efficiency. Success has been demonstrated through the recent DoH agreement. Like any major customer it is necessary to understand the drivers and the impediments to committing to the program. Success requires a clear focus, resources and executive support.
- **Increase Resources:** This program requires a high level of skilled resources as it is both technically and marketing based. Therefore a mix of skills is required, as a reasonable level of knowledge of water using equipment is essential. Permanent marketing staff would be advantageous to the program.

#### 4.3.4 Unaccounted Water Loss Reduction Program

##### 4.3.4.1 Overview of Program

As part of the 1995 Operating Licence, SWC was required to reduce unaccounted losses to a maximum of 15% by 2000. In the 2000 audit SWC reported a reduction of Unaccounted For Water (UFW) to 14%. It is understood that this was achieved through bulk meter recalibration and quantification of Unbilled Authorised Consumption eg. fire usage, un-metered parks usage etc. Only limited work was undertaken to reduce leakage during this period. The performance of UFW for the Sydney system since 1976 is shown in **Figure 4.1**. It should be noted that these figures have not been adjusted for Unbilled Authorised Consumption.

**Figure 4.1: Historic Performance of Unaccounted For Water (1976-2001)**



Assessment of SWC's system leakage levels based on available data reveals that:

- Using the **Integrated Flow Method**, and assuming that leakage is 60% of UFW indicates leakage of approximately 176 ML/d or 64 GL/a.
- Using the recently developed international benchmarking index termed the **Infrastructure Leakage Index** or **ILI**, a figure of 2.45 was determined for Sydney (calculation shown in Appendix 4). This is considered to be high when compared with other areas:
  - For England and Wales - 1.5 to 2.5 (Ref 15)
  - For WSAA members - 0.87 to 3.68 with an average of 2.08 (Ref 7)
  - For a well-managed system in very good condition an index of 1.0

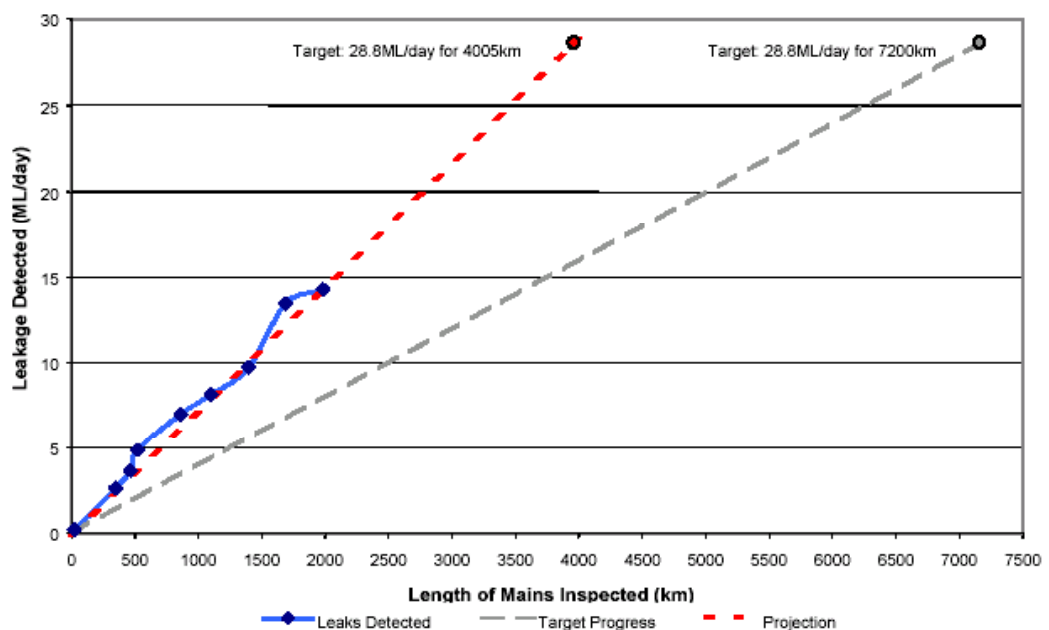
As part of the UFW reduction program, SWC embarked in 1999/00 on a Leakage Reduction Program through active leakage management. SWC developed their approach as follows:

- Examine available SCADA data to provide a prioritised list of zones based on minimum night flow data.
- Carry out a pilot study for a range of leakage detection technologies.
- Develop a program to systematically inspect and repair a sufficient length of main to achieve the target reduction of 7.2 Lcd by 2005 as set by the Least Cost Planning Model assuming a cost of \$3.7m/a. An economic level of leakage was not calculated, and the cost to maintain the leakage level was not considered.

In addition SWC is reviewing, through a pilot, opportunities in the reduction of high pressures as a means of reducing losses from leakage and pipe bursts.

**Figure 4.2** summarises the results to date based on SWC's evaluation of water saved. As can be seen, it is expected that the savings from the program will achieve the target of 28.8 ML/d saving (or 10.5 GL/a) through the inspection of 4,000 km compared to the original estimate of 7,200 km. This may indicate that the level of leakage in the Sydney system is actually higher than the estimated 176 ML/a or that the results of the program are being overestimated.

**Figure 4.2: Performance of Leakage Program (Ref 8)**



It has also been estimated by SWC that the Benefit/Cost ratio of the program is 1.18, not including costs and savings related to the identification and repair of zonal dividing valves. Based on the apparent success of the program, funding has been accelerated from \$2.0m in 2001/2 to \$3.7m in 2002/3. It is estimated that the accelerated program will achieve a reduction of 50ML/d prior to 2005.

#### 4.3.4.2 Areas for Improvement to the Program

Review of the leakage program identified a number of areas where SWC's program could be improved to migrate to best practice:

- **Quantifying Leakage Reduction:** It is understood that the majority of the identified leakage reduction has been estimated from field evaluation of loss rates. Issues relating to variability in the nature of the leaks and the fact that the rate of loss will vary with system pressure must cast doubt on the accuracy of the estimate. Reduction in leakage is possibly being overestimated.
- **Zone Size and Operational Efficiency:** The average size of SWC's zones is around 25,000 persons or 9,191 properties (assuming occupancy ratio of 2.72). These zones are too large for the measurement of MNF to be used for operational purposes, ie. to direct inspectors to the zones of highest leakage.
- **Dividing Valve Maintenance:** SWC recognise this as a major issue and are currently working to improve maintenance of DVs, which will enable effective and sustainable leakage management to be achieved. This will enable MNF readings to be collected to reliably quantify existing leakage in order to prioritise detection activity, and allow SWC to monitor leakage reduction.
- **Availability of Night Flow Data:** Upgrading of zonal flow metering that will allow continuous night flow monitoring is essential to directing resources to the zones with highest leakage.
- **Background Leakage.** SWC has commenced calculating background leakage, which is estimated at approximately 50 ML/day (28.4%) of total leakage. This figure is important in assessing the correct mix of leakage policies, since the higher the figure the less can be achieved by find and fix operations and more can be achieved by pressure reduction and mains replacement.

#### 4.3.5 Recycled Water Program

##### 4.3.5.1 Performance of Program

In 1999, SWC published the *Water Recycling Strategy* (Ref 19) which outlines the recycling opportunities to 2020. The strategy comprises effluent reuse projects based on market assessment. A summary of the projects completed is as follows:

- **Rouse Hill Scheme:** 12,000 houses connected to a dual system will provide a maximum of 3.2 ML/d or 1.17 GL/a of recycled water.
- **Effluent Recycling at SWC Treatment Plants:** A total of 28 ML/d or 10.95 GL/a is reused in lieu of potable water at SWC's sewage treatment plants. It is noted that the major coastal plants, which treat

in excess of 80% of Sydney's sewage, are not included in this program as the effluent quality is not of a sufficient standard.

- **Taronga Park Zoo:** A small scheme has been in place for irrigation since the 1970's and was upgraded in 1996 with the assistance of SWC for toilet flushing and garden watering.

The strategy indicates that the following opportunities exist for future recycling in the near future:

- **BHP Port Kembla.** Project to be completed by end of 2003 with a capacity of 20 ML/d or 7.3 GL/a.
- **Georges River Recycled Water Pipeline.** This project is currently in pre-design stage. Due to the limited market and high capital cost, SWC believe that the water price will need to be significantly subsidised. One of the possible major customers, Visy Paper at Smithfield, is considering internal recycling and is presently undertaking research to review such options. In addition to industrial reuse the pipeline could provide recycled water for the Malabar treatment plant.
- **Cronulla Industrial Reuse.** In 2001, Sithe Industries withdrew from a planned reuse scheme involving 3.1 ML/d. Negotiations are underway to supply a co-generation plant at Caltex as well as possible process water replacement on the site.
- **Homebush Bay Sewer Mining Project.** Supply of raw sewage to the Homebush Bay complex to provide recycled water for toilet flushing and other uses. The potential water saving is small compared to the major industrial projects.

**Table 4.5** outlines the estimated water savings resulting from recycling up to 2005. These figures are estimated from information provided in the 2001 implementation report and adjusted for the current known status of the program.

**Table 4.5: Estimated Annual Savings from Recycling to 2005**

Project Description	Commissioning Year	Estimated Water Savings (GL/a)	
		Savings to 2002	Potential Savings to 2005
STP Recycling	On-going	10.95	
Rouse Hill Reuse Scheme	On-going	1.17	
BHP Port Kembla	2003		7.30
Georges River Pipeline Reuse Scheme	Approx 2004		7.30
Cronulla Reuse	Post 2004		1.13
Sewer Mining Projects	2004		0.29
<b>Estimated Water Savings by 2005</b>		<b>12.12</b>	<b>16.02</b>

#### 4.3.5.2 Areas for Improvement of the Program

The major issue raised by SWC relating to the marketing of water recycling projects is the high cost of recycled water when compared to the current price of potable water. This issue needs to be viewed differently to take account of the unit cost for water relating to the cost of the next increment of supply rather than the current cost of potable water. Determination of the cost of the next increment of supply requires the finalisation of strategic planning and issues such as security of supply and environmental flows.



### 4.3.6 Water Pricing

#### 4.3.6.1 Performance of Water Pricing

Sydney Water investigates water pricing options and makes submissions to IPART for consideration on a three-year cycle. Prices are set by IPART determinations, the most recent being in the year 2000 (Ref 9). The history of pricing change since 1990 is as follows:

- **Quarterly Billing:** Introduced in 1990/1, quarterly billing had a positive effect in reducing demand. An allocation of 250 kL was given with the base charge. This allocation was less than the average demand and approximated the average indoor usage. Excess water was charged at \$0.45/kL up to 500kL and \$0.65 above 500kL. This was essentially a three tier tariff structure with a clear price message.
- **Single Tier Structure:** Introduced in 1993/4 this structure removed the allocation and provided a single tier of \$0.65/kL. This change had no effect on demand. In fact demand increased during the subsequent dry period. Since 1993/4 SWC has argued for successive \$0.05/kL increases and initially believed that an elasticity effect of -0.2 would be achieved. Based on overseas studies (Ref 10) such a result would be unlikely due to such small increases in price.

#### 4.3.6.2 Issues Related to Water Pricing

The review has identified that at present water bills are sent with sewerage and drainage bills on a quarterly basis. This system has very limited ability to target messages to the customer about their individual water performance. Based on the current system there could only limited understanding of water usage by customers.

## 4.4 Summary of Water Savings for 1995 to 2005

**Table 4.6** summarises the work undertaken by SWC from 1995 to 2002 and the programmed activities to 2005.

**Table 4.6: Summary of Programs and Water Savings 1995 to 2005**

Strategy Component	Estimated Water Savings (GL/a)		
	1995 to 2002	2002 to 2005	Total to 2005
EDC Residential Indoor Program	3.87	13.26	17.13
EDC Residential Outdoor Program	0.64	6.24	6.88
EDC Business Program	0.45	3.29	3.74
Leakage Reduction	5.11	13.14	18.25
Recycling Program	12.12	16.02	28.14
Pricing	0	0	0
<b>Total Estimated Savings</b>	<b>22.19</b>	<b>51.85</b>	<b>74.14</b>

Estimated water savings from the program to date, and the works proposed at the time of drafting this report, would fail to meet the 2004/5 targets by approximately 28 GL/a.

## 4.5 Strategy Expenditure and Resources

### 4.5.1 Expenditure Versus Budget

Table 4.7 outlines expenditure for the major strategy components since the commencement of implementation in 1998/9. Table 4.8 compares strategy expenditure and budgets.

**Table 4.7: Actual and Planned Expenditures By Program (\$m)**

Program	1998/99 Actual	1999/00 Actual	2000/01 Actual	2001/02 Actual	2002/03 Planned
Residential	0.05	4.23	10.95	6.52	10.91
Indoor	0.05	4.00	10.20	6.05	7.10
Outdoor		0.23	0.75	0.24	3.50
Other				0.21	0.31
Business		1.15	1.00	0.46	1.50
Project Investment Fund					2.00 <sup>1</sup>
General			0.01	0.18	0.40
Planning & Management		0.45	1.00	1.81	2.22
Leakage Reduction		0.30	1.40	2.37	3.37
<b>Totals</b>	<b>0.05</b>	<b>6.13</b>	<b>14.36</b>	<b>11.34</b>	<b>18.40</b>

Note (1) The investment funding is a nominal amount and may change where projects are identified as having merit.

**Table 4.8: Budgeted and Actual Expenditure (\$m)**

Year	Original Budget	Actual Expenditures	Difference	Issues Related to Expenditure
1998/99	4.41	1.13	-3.28	Leakage project delayed.
1999/00	8.25	6.13	-2.12	Retrofit program delayed due to completion of pilot area
2000/01	16.46	14.36	-2.10	Retrofit program startup
2001/02	11.15	11.34	+0.19	Retrofit program implementation
<b>Total</b>	<b>\$40.27m</b>	<b>\$32.96m</b>	<b>-\$7.31m</b>	

The SWC Board committed to an indicative expenditure of \$50m for the strategy to be expended by 2005. Based on the current program this budget will be reached in the 2003/4 financial year.

The strategy commenced in earnest in 1998/9, and substantial funds were expended from 2000/1, when a broad scale retrofit program was implemented. Typically a large program requires approximately three years to ramp to full implementation. This may explain the low expenditure in the first three years.

The SWC Board has approved a major increase in budgeting and associated resources for 2002/3. This proposal to accelerate the program is seen as an acknowledgment by SWC that major expenditure is necessary to achieve the 2004/5 target.

The cost of water saved is determined as \$0.5m per ML/d of water savings. Although this cost appears to be very high, in reality it is too early to judge the cost

effectiveness of the program in this way, since the program is only in its third year. Nevertheless, such a measure (\$/unit water saved) should be evaluated on an on-going basis.

#### **4.5.2 Strategy Resources**

SWC currently has 12 staff members dedicated in the Water Conservation and Recycling Unit. It is anticipated that additional staff will be employed in early 2002/3 as part of the expansion of the strategy. Staff levels have only increased significantly since the unit was formed in 2000.

The strategy has a range of senior project managers allocated either part or full time to develop and manage implementation. Therefore responsibility appears to be fragmented.

Staff interviewed generally demonstrated a high level of personal commitment to their work and the program. However they are frustrated by the requirement to continually justify their work and by the difficulty of "being on a learning curve". This is symptomatic of deficiencies in the program's formulation and implementation as described earlier in this review.

The mix of skills and experience of the staff could be improved. SWC's community market research is of very high standard, however skills in marketing planning and implementation are not well represented in the unit. The unit is able to draw on some marketing skills from within the Customer Services division, however this is a major program, which requires full time allocation of these skills.

Other resources in the corporation are potentially available to fill gaps for specific strategies, including customer relationships, education and stakeholder management. For example, it was mentioned that trade waste customer managers could implement some education or best practice development with smaller commercial customers. However, without an implementation plan that highlights these opportunities, it is unlikely the potential will be realised.

Staff have limited access to detailed billing information on water usage patterns due to the cumbersome nature of computer billing system, which is currently being upgraded. In the interim, additional specialist skills are needed to interrogate the existing data to obtain segmentation and other essential ongoing data to target and refine programs.

## **4.6 Demand Performance of the Strategy**

### **4.6.1 Overall Per Capita Demand**

Daily water production volumes and quarterly water billing data on a sectoral basis was analysed to assess Sydney's demand performance and to identify any trends relating to the achievements of the water conservation targets.

#### **4.6.1.1 Overall Decline In Per Capita Use**

Figure 4.3 provides an overview of the performance of Sydney's per capita demand since 1991. Demand shown in this graph is not climate corrected as required by the Operating Licence, as doubt exists of the accuracy of the available model.

An overall reduction of some 16% has been achieved since 1991 as highlighted in Figure 4.1. (Note: Based on recently released preliminary Census data the

reduction is likely to increase to 18.6%). Possible reasons contributing to this reduction in demand are:

- Introduction of quarterly billing in 1990/1
- Introduction of two part tariff in 1993/4
- Implementation of drought restrictions between 1994 and 1996
- Reductions due to demand management activities from 1999 to 2002. An estimated demand reduction of between 6 and 16 Lcd (or 24 and 64 ML/d or 9 to 24 GL/a) has resulted from the program.

#### 4.6.1.2 Factors Impacting Per Capita Demand

Many groups of factors impact water demand from year to year and even day to day:

- Climate
- Demographics
- Socio-economic
- Soils and vegetation
- Type of development
- Accuracy of meters
- Population estimates

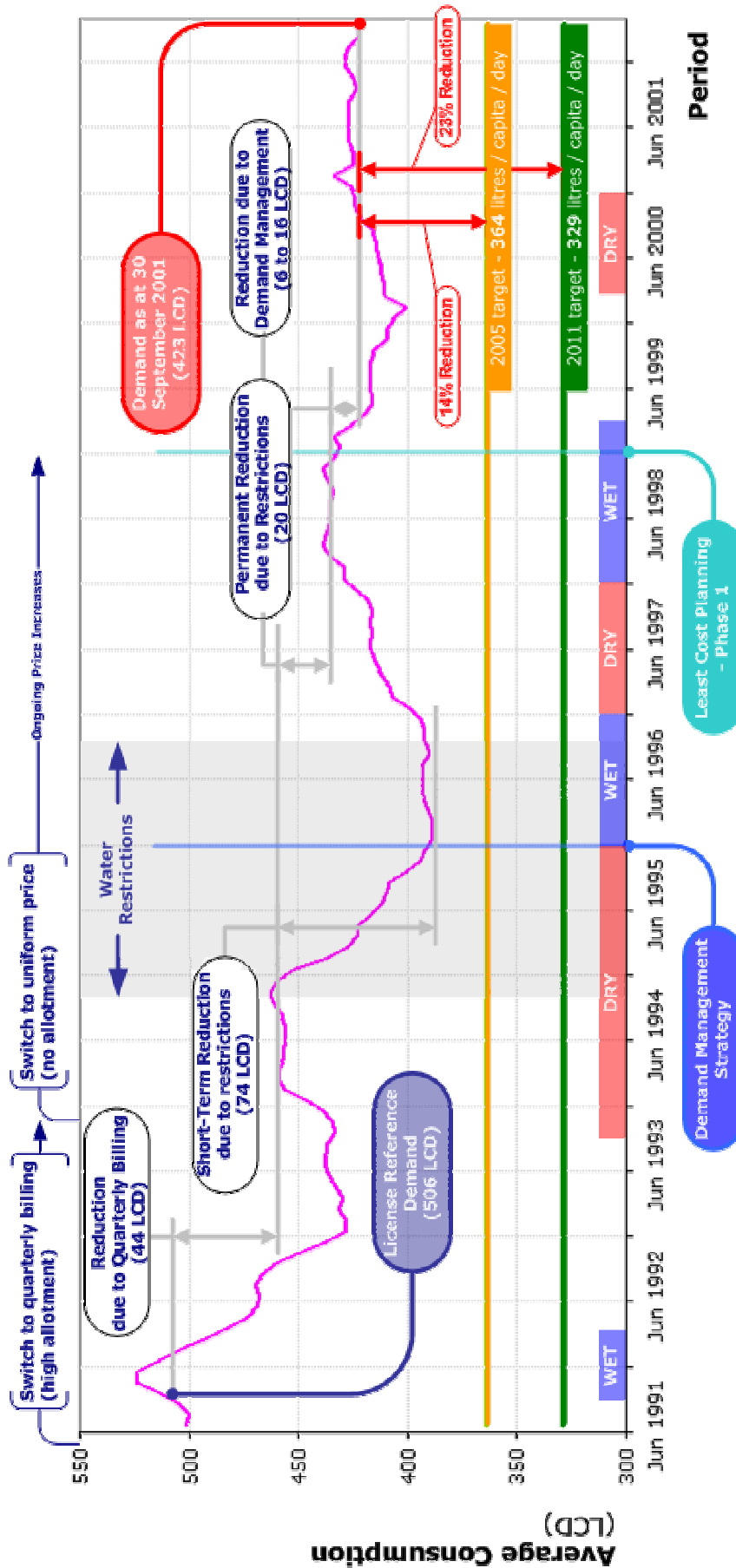
Accounting for all of the variables in each of the groups to differentiate the individual impact is impossible. It is however possible to get a reasonable correlation between demand and climate variables, however the accuracy has to be understood. As an inaccurate science, climate correction should not be used as a target variable unless the changes to the measured variable are sufficient to be noticeable. In SWC's case a reduction of 4% of the per capita demand is difficult to identify using a model with an accuracy of say  $\pm 5\%$ . Similarly if demand varies by  $\pm 5\%$  due to climate in any one year it is difficult to identify small demand changes.

#### 4.6.2 Sector Based Demand Performance

Demand analysis was undertaken by customer sector, based on quarterly account billing records (Refer to Appendix 1). The following summarises the sectors in which demand has changed since 1990/1:

- **Residential.** The percentage of residential demand has increased from 52% in 1980, to 63% in 1990, to 69% in 2001.
  - *Single family residential properties* – Although demand has fallen since 1991, the current annual average demand of 805 L/account/d is approximately equal to the long term average.
  - *Multi-family properties* – Demand has increased over the last ten years from 475 to 490 L/account/d. The trend towards multi-unit living in Sydney may have increased the number of persons per unit and the number of water using appliances per person.
- **Commercial.** The commercial sector has been a relatively steady level of 4,250 L/account/d over the analysis period, although the 2001 demand was the highest on record since 1990. This is likely to relate to the level of employment in this sector and the state of the economy.
- **Industrial.** The industrial sector has seen a significant decrease of approximately 43% in demand to 8,400 L/account/d, which is due to the changing focus of industry from manufacturing to service industry.

**Figure 4.3: Impacts on Sydney's Per Capita Demand Since 1990**



### **4.6.3 Progress Towards Water Conservation Targets**

Based on assessment of demand trends, the 18.6% demand reduction may be attributed to:

- Water savings related to demand management since 1999, which are estimated to between 6 and 16 Lcd (these figures may be higher due to population corrections). This is equivalent to around 1.0 %/a which is similar to other major programs such as East Bay Municipal District in California.
- The decline of demand in the industrial sector has compensated for the growth in the residential sector, allowing overall demand levels to be maintained. There is a risk that this trend may not continue, which would result in increase demand on storages.
- Demand in all sectors, except multi-unit residential, is lower than 1990/1 levels.

Analysis presented in Section 4.3 indicates that the estimated savings from individual programs are approximately 16 Lcd (22.17 GL/a) which is at the upper limit of the range indicated by the per capita trends.

Based on current performance further demand reductions of 14% and 23% are required to achieve the 2004/5 and 2010/11 targets respectively (these figures may be reduced to 12% and 21% based on revised population forecasts).

## **4.7 Corporate Commitment to Demand Management**

Based on the evolution of the demand management strategy, it is apparent that strong corporate commitment has occurred recently. Increased funding and resource levels are evident since the formation of the Water Conservation and Recycling Unit in February 2000. In 1999 SWC committed to a 5 year program of \$50m. SWC's actions are reflective of the reducing demand trends prior to 1998.

### **4.7.1 Program Responsibility**

Overall responsibility for the Demand Management Strategy is allocated to the Customer Service Division of Sydney Water. An organisation chart for Sydney Water is contained in Appendix 9. Within this division the Water Conservation and Recycling Unit develops and implements the program, using a number of contractors and internal corporate services such as marketing support. Other divisions are responsible for key areas as follows:

- Environment and Innovation – Corporate Water Strategy (WaterPlan 21) and strategic objectives for water programs.
- Asset Management - leakage program and SWC recycling.
- Asset Solutions Division – major capital works projects.
- Corporate Finance – analysis of water pricing options.
- Corporate Affairs - corporate communication and stakeholder relations.

Interviews with the Chairman of Sydney Water's Board, Managing Director and General Managers confirmed that demand management is currently a priority issue for the Corporation. It was stated that the priority reflects strategic sustainability goals, regulatory pressure and the current discussions relating to source yield,

supply for growth and environmental flows. These issues are also the subject of the CEO's Task Force and Expert Panel.

The Managing Director believes there is no logical alternative to SWC being responsible for demand management, citing the reasons that the organisation has the following unique attributes:

- Relationship with customers
- Degree of credibility
- Pricing and commercial relationship
- Capacity to deliver synergies in the water cycle context.

Regulatory targets are considered by the executive to be a part of the business, which must be managed to achieve prescribed goals.

#### **4.7.2 Key Corporate Issues**

SWC is required by the Operating Licence to give priority to demand side management. A recent sense of urgency has been shown by SWC to meet targets. This is evidenced by the Managing Director's involvement in the DoH agreement, the increase in leakage and overall program funding in 2002/3 as well as increased program resources over the past two years.

The strong agreement on the priority of the program has not yet translated into a united and focused corporate response for the program as a whole. Funding for the different elements of the program has been debated at executive and Board level with mixed views on the relative merits in cost/benefit terms. It seems clear that both the Board and Executive remain to be fully convinced about the viability and justification for the relatively high expenditure on particular program elements such as the retrofit program. However, this issue has not affected the recent increase in the program budget.

Based on the historic levels of funding and resourcing of the strategy a greater and more focussed commitment will be required from the Executive and Board in future to meet the 2004/5 target.

### **4.8 Summary of SWC Performance**

The key findings of the assessment of Sydney Water's performance in relation to the Demand Management Strategy may be summarised as follows:

#### **1. Overall Program:**

**a) Corporate Commitment:** SWC's corporate commitment to demand management started slowly in the 1995 to 2000 period. Since 2000, support for the program has increased significantly and is currently at a high level. Commitment to demand side management is demonstrated by the recent executive level negotiations relating to the Department of Housing program, resource level improvement and the recent funding increases. Board level commitment would be further strengthened through the reinforcement of the strategy goals (through a water balance study) and the success of initiatives. Recent urgency shown by the organisation will need to be maintained and translated to successful initiatives to achieve the conservation targets.

**b) Program Expenditure:** SWC did not commence program implementation until 1999/0. The late start resulted from delays due the water quality crisis



and a belief that water reductions that occurred during the 1990's would continue. A total of approximately \$30m has been expended to date, which represents a shortfall of \$10m compared to the budget.

- c) **2002/3 Budget:** The SWC Board has approved an increased budget of \$18.4m for 2002/3. Expenditure is increasing and the \$50m budget committed by the Board in 1999 will be surpassed in 2003/4.
- d) **Program Resourcing:** Program resourcing has increased since the formation of the Water Conservation and Recycling Unit in 2000. A higher level of resourcing is to be provided in 2002/3 as part of the recent Board decision to accelerate the program. Although community market research undertaken by SWC staff is of a very high standard, it is believed that the strategy would benefit from additional full time resources skilled in marketing planning and implementation.
- e) **Evaluation of Options:** SWC has developed a Least Cost Planning Model to rank initiatives for implementation on a cost effectiveness basis. On the other hand the approach does not currently undertake comparison of demand side and supply side options as required by the licence. The effectiveness of the existing LCP approach could be improved through the reporting of a traditional benefit/cost ratio which is clearly understood by corporate, regulatory and other stakeholders.
- f) **Research versus Implementation:** A higher level of research exists in the Sydney program than for other similar programs. Although a certain level of initial research is necessary to develop the programs, most initiatives may be implemented with data collected during the course of the program to allow for adjustments and improvements.

**7. Residential Program Performance:** The retrofit program has been efficiently and successfully implemented to date, with significant water savings from a higher than expected level of participation. In 2002/3 SWC will extend this program to the Department of Housing program and a targeted area retrofit program. The decision not to continue the program using the successful approach from the past 2 years should be reconsidered based on recent success in second round offers. Based on the success of the project to date and knowledge of programs in other areas, the following aspects of the residential program could be improved:

- Baseline end use data (for targeting and monitoring)
- Implementation and marketing plans to support programs
- A clear approach to retrofitting the existing multi family residential sector to compliment regulations for new development
- Knowledge of other (global) programs
- A greater number of planned programs to meet the targets (the extension program will provide improvement).

**8. Business Program Performance:** A program (One-2-Five) has been developed over the past eighteen months for major water users. Expansion of the program is proceeding through expanded resources, a low interest loans program, co-funded water audits and other services to assist implementation by businesses. The following opportunities exist for improving the program:

- Development of an effective marketing framework and implementation plans for smaller water users
- Increasing knowledge of other successful programs
- Program to gain support of government customers
- Acceleration of implementation and improved level of skilled marketing resources to support the roll out.

**9. Leakage Reduction Program Performance:** This program is proving to be successful and has gained significant corporate support. SWC has invested in operational improvements to support the program, however accurate measurement of water savings requires further investment. Opportunities to improve the current program include:

- Improve Dividing Valve maintenance and install flow monitoring to support the quantification of water savings.
- Improve quantification of leakage savings through analysis of Minimum Night Flows, using zones designed to provide sound data.
- Implement of the Infrastructure Leakage Index and Benchloss approaches to leakage benchmarking.
- Reduce zone sizes to provide a long term, sustainable leakage management program.
- Shorten leakage repair times.
- Progress the implementation of pressure management if planned trials prove effective.

**10. Recycled Water Program Performance:** Although the program has significant potential, there has been difficulty in securing customers, due to a diverse range of reasons including the perceived high price of recycled water, customer preferences and market development. The approach to assessment of cost effectiveness needs to take account of the cost of the next increment of potable water supply not the current marginal cost of potable water.

**11. Achievement of Targets:** SWC's recent decision to accelerate the program is seen as acknowledgment that additional expenditure is required to meet the 2004/5 targets. To achieve such the target will require a demand reduction of approximately 12% over current demand trends in an extremely short time frame.

## 5. How Sydney Water Could Improve Strategy Effectiveness

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### 5.1 Overview

This section of the report discusses options for improving the performance and effectiveness of SWC's Demand Management Strategy. Detailed assessment of alternatives has not been undertaken as part of this review as the evaluation model is not available to undertake accurate determination of costs and benefits. The suggestions outlined in this section are for consideration in both the short and long term and address the program inadequacies identified in Section 4. Options for program improvement are discussed in the context of the principles of a successful Demand Management Strategy outlined in Section 3.

It should be noted that SWC may have commenced a number of these improvements through the adoption of an accelerated program. The improvements outlined in this section are based on the experience of the reviewer and provide suggestions for SWC to consider when developing further initiatives for the strategy.

It is evident from the review of SWC's performance to date that a significant expansion of the program is required to meet the water conservation targets and to overcome the imbalance in the supply/demand equation. To achieve the reductions required in the short term SWC need to address those options that will achieve major water reductions such as:

- Accelerating the DoH program and other retrofit programs
- Expansion of incentive programs
- Expanding/streamlining the business program
- Acceleration of the leakage reduction
- Marketing of the recycling program
- Expansion of community education to achieve behavioural change
- Regulating water efficiency in new development through regulations.

### 5.2 Overall Strategy Improvements

#### 5.2.1 Define the Water Balance

The demand management strategy must be based on a clear and agreed understanding of the supply/demand balance. SWC together with the SCA and other stakeholders, should define this balance and agree goals and objectives for the continued management of water in the Sydney catchment. As discussed earlier in this report, various bodies, such as the CEO's Task Force are currently reviewing the variables in the supply/demand balance. Considerable knowledge exists in SWC's Environment and Innovation Group through WaterPlan 21, which is based on consideration of the full water cycle. SWC is not, however in a position to define all elements of the water cycle and a coordinated, cooperative approach is required.

### **5.2.2 Develop a Cost Effectiveness Model**

Evaluation of program cost effectiveness is required by the Operating Licence and presumably by the SWC Board to make decisions on the program budget. SWC needs a transparent and reliable economic analysis model that will be suitable for this task.

This model should also be used to make better decisions about timing for suspension of existing programs such as the Residential Retrofit Program. In most cases programs should continue until the costs, implementation rates, water savings or other factors change and cause the cost of water saved (\$/kL) to rise above some predetermined threshold. This threshold could be the cost of meeting objectives or new water supply by some other means. When a program is no longer cost effective it should be terminated and resources placed elsewhere. It is not apparent that SWC has taken this approach for the retrofit program where considerable potential savings exist.

### **5.2.3 Streamline Programs**

Implementation of SWC's programs to date has placed inordinate emphasis on research and pilot programs as if to prove savings "beyond a reasonable doubt" before committing to large scale implementation. Where this might be the best approach for a 20 year program it is obviously not appropriate to meet rapidly approaching targets. This has led to the conclusion that there is no sense of urgency at SWC, rather there is a perfection syndrome.

A better approach would be to gather as much information as is readily available about a new program and then commence implementation. The programs can be refined using data collected during implementation (eg. information collected during the residential retrofits) and ramped up or suspended according to predetermined cost effectiveness thresholds using effectiveness data.

### **5.2.4 Develop Implementation and Marketing Plans**

As outlined in this review, there is no coherent, documented marketing strategy or implementation plan for the demand management program. A marketing strategy would document the objectives for behavioural change and rationale for the mix and timing of program elements, and improve the chances of corporate and stakeholder support to maintain the momentum of the program.

A marketing plan should be developed for each initiative within the framework of an overall strategy that includes:

- Market analysis based on the extensive available data from SW research and other similar markets to clearly support opportunities and priorities for targeting
- Assessment of the knowledge and education gaps, including past investment and influences on conservation awareness or importance.
- Specific short and long term behavioural change objectives for each group.
- Cross market issues and opportunities (Eg opportunities for collaboration with energy suppliers, or other programs within SW).
- Cost effectiveness issues, and opportunities for scale economies, cross subsidies, size and limits on rebates, implications of accelerating programs.

- Branding and communication framework including key messages, links to corporate branding and government programs such as "It's a Living Thing".
- Support needed from SW divisions, government, industry, or other agencies to achieve the changes required.
- Ongoing maintenance or re-runs needed to maintain water savings.
- Annual and total program budget justifying the key cost drivers (scale economies, different standards of quality, different methods of delivery).

Implementation plans will improve the way the project is managed and allow it to be more readily justified internally, to auditors, to the Board and other external stakeholders. Project management will incorporate plans to manage issues, pursue opportunities and apply resources.

Implementation plans should contain project details specific to each target group and should include:

- Scope and objective, background
- Detailed budget (staff, direct costs, marketing, contractors etc)
- Resourcing (including from relevant SW divisions and partners)
- Accountabilities, authorities and approval requirements
- Skills, training and resources required
- A detailed program with milestones
- Details of the incentives and any special financing arrangements
- Channels to reach the target group Communication, key messages and public relations plan
- Details of the customer offer and associated logistics to fulfil the offer
- Reporting (progress and budget)
- Evaluation and review.

### **5.2.5 Improve Program Resources**

There is considerable scope to improve program resourcing. Such a significant program should have a senior project manager allocated full time to develop and manage implementation. These responsibilities are currently fragmented and under-resourced. The project manager should be skilled in marketing and experienced in delivering large scale programs.

Resourcing of individual programs should be based on the rationale outlined in the implementation plan to provide flexibility to move and supplement the resources when required, either from existing staff or with contractors.

The program would benefit from additional specialist skills in marketing, sales, negotiation, stakeholder relationships, and experience in gaining whole of government support.

### **5.2.6 Improve Performance Tracking**

Tracking of the performance of the program should be focussed on four main areas:

- Activities in each of the programs.
- Cost of each program.
- Overall system demand at both a Lcd and ML/a level.
- Sector based demand, including Unaccounted For Water divided into water losses and possibly Unbilled Authorised Consumption. A methodology should be developed and approved for calculation of these components.

The current demand tracking model, whilst being technically accurate and soundly developed, is disadvantaged by the complexity of its mathematical engine. A simpler and proven approach is needed to track Sydney's demand and overall conservation performance.

## **5.3 Residential Program Improvements**

Improvements to the Residential Program should focus in the short term on the major water end uses ie. toilets, showerheads, washing machines and garden/lawn watering. Efficiency in these end uses may be achieved mainly through incentives and regulations. To be successful SWC will need to achieve a shift in community attitudes to water usage.

### **5.3.1 Extend Retrofit Programs**

The following retrofit program extensions were identified as part of the review:

- **Residential Retrofit Program:** Based on the review of the residential program, it is evident that the most successful initiative to date has been the residential retrofit and audit program. SWC propose to suspend this program and concentrate on the outdoor program. The reason for suspending the program is that the program provided a target of 20% market penetration and this has been achieved. This rationale appears to have limited basis, as the cost effectiveness of the program has not been analysed. Until the suspension of this program can be justified, and a feasible alternative residential program is in place, SWC should continue implementation. Continuation of the program may include changes to make the program more cost effective eg. offering only showerhead and toilet improvements.
- **Multi Family Retrofit Program:** There is a need to develop an effective approach (separate program) to improve the market penetration of the retrofit programs to the multi family (unit) sector. This sector accounts for a rapidly increasing proportion of the usage (currently 16% of total water billing). Economies of scale should make this sector an efficient target for retrofits.
- **DoH Retrofit Program:** SWC needs to deliver this program over a much shorter time frame than originally proposed (greater than 5 years). This can only be achieved through investment as the program will operate as a loans program.
- **Department of Defence Retrofit Program:** It is evident that the residential component of this department should be targeted at an executive level to achieve an agreement to proceed with retrofitting.

### **5.3.2 Expand Rebate Programs**

SWC generally adopts a cost sharing approach to its customer programs. There are pros and cons to this approach. It could be argued that if customers have to pay for a device or a service, such as a retrofit or showerhead or a business water audit, then they are likely to take the product and use it more effectively. This approach also reduces the overall cost of the program. On the other hand, the cost of the device or the service is a hurdle to achieving maximum installation. In view of the need for SWC to maximise water savings quickly the participation benefits of offering devices at no cost may outweigh the benefits of cost sharing. For example,

in the US showerheads are almost always given away for free. However, the cost of showerheads in the US is much at around \$5 for the head only. Taking into account the relatively high cost of the retrofit program this option should be considered.

At present, SWC has few rebate programs. As education occurs on a continuous basis, customers need to have frequent or continuous access to water efficiency options. Rebate programs in an environment where a high level of conservation education exists has been shown to be effective in many jurisdictions across the globe. Additional rebates could be provided in many ways to assist customers:

- Residential water audits
- Showerheads
- Washing machines
- Toilets – dual flush cisterns and toilets
- Replacement of turf with low water use (non-irrigated) landscaping
- Water efficient garden watering systems
- Tap timers
- Garden mulches
- Rainwater tank rebates (limited number of rebates for public education value only - generally rainwater tanks are not cost effective)

### **5.3.3 Establish End Use Baseline**

SWC lacks basic information on the water using characteristics of customers and fixtures in homes and businesses. The Australian Bureau of Statistics is to carry out a State Supplementary Survey in 2002 that will provide information from a large representative sample. Data will be collected on water use fixtures, appliances and practices (indoor and outdoor). There are several other ways to obtain this information:

- Use water audits or program evaluation – SWC has significant volume of data collected during retrofit program and not yet analysed.
- Use a telephone survey.
- Conduct a random door-to-door survey.
- Place smart data loggers on randomly selected homes

Such data, collected on a 5 year cycle, should be used to develop programs, to determine if programs should be terminated and to gauge the success of the overall program as well as the difficult to measure education and behavioural change programs. This research is essential to success of a large scale programs such as the Sydney strategy.

### **5.3.4 Accelerate Regulations Implementation**

Regulations are considered the cost effective approach to ensuring water efficiency in new development. SWC are currently working cooperatively with Planning NSW to develop standard regulations for development. This will not necessarily ensure that this initiative is adopted by all councils and therefore SWC will need to work with councils, possibly through the MOU process to ensure success. Conditions may be negotiated with local councils and placed on development, to ensure that a



reasonable level of water efficiency is achieved. This would mean that showerheads and taps should be controlled in the first instance. In the longer term, consideration could be given to other forms of regulation such as turf areas and low water use landscaping.

### **5.3.5 Consider Additional Programs**

There are many additional demand management measures that could be considered by SWC in the medium term. Approximately 50 additional measures that may be cost effective in Sydney are listed in **Appendix 3**. These measures have been applied in many overseas countries. This list is *significantly more* than the total number of measures evaluated in the Least Cost Plans to date, implying that there are more potential conservation opportunities to consider in Sydney. Most of these measures can be implemented through a simple approach that comprises

- learning more about the measure from overseas experience
- evaluating the cost effectiveness for application in Sydney
- developing marketing plans for the best measures
- integration into current plans, programs and budgets.

Examples of initiatives that may be considered are:

- "Zero worsening" approach to new development approval (developer to fund other efficiency initiatives)
- Retrofit on resale of houses and units
- Regulation of sub-metering for new multi family dwellings
- Guidelines for sub-metering for existing multi family dwellings
- Subsidised leak repair for high water using unit buildings

### **5.3.6 Extend Community Behavioural Change Program**

SWC has gathered excellent information on customer attitudes and knowledge about conservation, and will soon have access to additional ABS and census derived demographic information. It is imperative that such information be used to define specific community behaviours and knowledge gaps to be targeted, and identify programs to address these issues. This approach will underpin the marketing and education strategies.

SWC should focus efforts on groups who have already shown positive intentions in order to achieve and consolidate water conservation behaviour. Recommended short term priorities include:

- Ongoing conservation suggestions to participants of retrofit programs.
- Widely promote the success of the program and its environmental and customer benefits (and be ready to respond to the increase demand for program extension).
- Targeted education messages to customers based on billing information.
- Target non-participants that live near participants.
- Use psychographic data and other market information to improve take up of retrofit and rebate offers.

- Accelerate web site development and promotion and add features that let users access rebates, and emphasise customer benefits of water conservation.
- Improve the reach of school education program by offering to all schools.
- Develop and implement an ongoing proactive public relations campaign to target identified groups who can influence customer behaviour or increase the acceptability or priority of regulations that improve water efficiency.
- Extend the range of behaviours targeted in future phases of EPA "It's a living thing" campaign, and support with SWC initiated public relations (as with the current wastewater messages).

## **5.4 Business Program Improvements**

Water efficiency in the non-residential sectors has the potential to deliver considerable water savings as these sectors account for some 30% of water usage. The difficulty in delivering savings is the diverse end uses of water, which results in difficulty in the development of global solutions. An efficient business program requires:

- Efficient targeting through market segmentation and knowledge of water use, and
- An implementation strategy that fits the company's decision making process.

### **5.4.1 Assess a "Capacity Buy-Back" Approach**

Successful programs overseas have adopted a "capacity buy-back" approach to business programs. This approach defines the cost of the next increment of water supply this unit cost (\$/ML) is used as an incentive for business involvement. At present SWC's approach is to provide co-funding for a water audit and a low interest loan for identified efficiency improvement projects.

To gain commitment from business there needs to be additional incentives for participation. If water is required for new development or environmental flows there is an associated cost to SWC. This is the cost that SWC attempts to avoid through demand management. Understanding of the avoided cost will not be accurately understood until the water balance is complete, however SWC has sufficient knowledge at present to define a cost that may be adopted in the interim as part of the business program incentives.

### **5.4.2 Review the Major Water User Program**

Three issues that relate to the pace of implementation need to be addressed for the business program:

- **Targeting of Customers:** SWC should continue to improve the targeting of business customers. This may be achieved through understanding the customer's current water usage (system in hand) and an appreciation of the potential water savings. The latter issue is the key to success and requires resources to gain knowledge of water use. The best approach is to discuss targeting with organisations that have undertaken such programs – this may include local industry groups or overseas jurisdictions that have implemented such programs.

- **Remove Barriers to Participation:** The "management diagnostic" is appropriate for the large customers, but is believed to provide barriers to rapid success. It is believed that the need to sign a "business arrangement" with a customer is reasonable if free audits are provided. The requirement to commit to future work (including up to \$20,000 to co-fund an audit) before water saving, cost effective projects are known may be a major deterrent to participation. It is expected to sign up two customers per month or 24 during 2002, requiring 4 years to complete the top 100 customers.

It is suggested that a better use of the limited staff time might be to identify potential water saving projects and paybacks for more customers and then assist customers who are interested and receptive with implementation of their projects. This could involve presentation of findings to senior management, provision of financial assistance, further technical advice and identification of vendors of recommended water efficient equipment. This is aimed at the need to visit as many customers as time will permit to maximise water savings.

- **Reduce Audit Costs:** Based on the reviewer's knowledge all US based jurisdictions involved in water demand management offer free business audits. The SWC business program, on the other hand, adopts a position of 50% subsidy and an extensive and therefore expensive water audit procedure. Experienced water auditors can prepare a water balance for companies based only on available meter data and usually do not need expensive internal sub-meters. The level of accuracy from such an approach is appropriate, as success will result from the combination of the audit findings and the incentives offered. Based on the review water audits should be about half the current cost, which means that they could be offered at no cost at the current funding levels.

#### **5.4.3 Provide Access to Minor Water Users**

SWC is understood to be developing an approach for minor users. Such an approach should consider the following activities (in preliminary order of priority):

- Free audit offers with associated incentives.
- Rebates on selected commercial water using equipment for replacing inefficient equipment such as:
  - Non dual flush toilets upgrades in high use settings
  - Non AAA showerheads
  - Once through cooling systems
  - Commercial dishwashers
  - Non recycling car washes
- Internet based self auditing program and associated incentives.
- Regulations for efficient water use in new development.
- Providing guidelines for general business water efficiency.
- Education at industry association level.
- Certification and awards programs for water efficient businesses.

Rebate programs are relatively easy to set up and can be administered by contractors who do not the same set of special skills that say contracted water auditors would need. Rebate amounts should be preset for certain types of

equipment to simplify the process. For one-of-a-kind installations a rebate should take into account SWC's avoided cost of water.

#### **5.4.4 Develop Partnerships with Government Customers**

Partnerships with the major government customers, including the Departments of Education and Health as well as local councils are an effective way of focusing the program to achieve water efficiency. Such partnerships should specify the obligations of the parties and provide a list of activities to be carried out and the cost sharing arrangements. The present business arrangements are not considered to be suitable for the implementation at an activity level.

A sustained effort by SWC is required to develop an approach for Health and Education as a priority. Executive level involvement may be necessary, however SWC needs to better understand these customers prior to such an approach.

### **5.5 Leakage Reduction Program Improvements**

The leakage reduction program has the potential to provide up to 50% of the targeted water savings. To improve the program a number of existing issues need to be addressed:

- **Measurement.** It was the famous British physicist, Lord Kelvin (1824-1907), who once said, "If you don't measure it you can't manage it". This is certainly true of leakage management.
- **Derivation of the Leakage Target.** There are grounds for revisiting the least cost planning study of 1998 to re-assess the role of leakage reduction towards achieving the demand management target. Assumptions in the LCP model do not appear to have reasonable justification.
- **The balance of the leakage detection program.** SWC's reports refer to the four complementary methods of managing real losses, however it is noted that the majority of this effort is directed to active leakage control. Other solutions such as pressure management need to be reviewed.

The following options are identified for the SWC leakage reduction program:

- **Prioritise Measurement of Savings.** Currently zones are being prioritised for leakage control on the basis of unreliable and incomplete information. For example, in a recent internal memorandum the losses in Pymble zone have been extrapolated from neighbouring zones and an allowance was made for the *suspected open DV between Pymble reduced and Killara*. SWC has found that regional issues relating to identification of DVs and the repair of leaks by Civil Maintenance has necessitated a geographically based program rather than a priority based program. As well as identifying a number of zones for leakage management in the short term, SWC should also give priority to resolving the measurement issues for the sixty zones without MNF measurement. This would enable high leakage zones to be prioritised in the program.
- **Improve System Operation and Speed of Repairs.** The speed of repair of identified leaks resulting from the leakage detection program directly impacts on the annual savings from the program. In addition, the efficient and effective operation of the distribution and reticulation systems requires certainty in the security of zone Dividing Valves. These issues should be addressed as a priority to improve the success of the program.

- **Undertake Zonal Water Balances, using WSAA Approach.** In October 2000, the IWA developed a standard terminology and definitions of water balance components for international use. This approach was also adopted by WSAA, although its use is currently voluntary. Following this approach and using standard definitions will assist in the identification of 'Real losses' as distinct from 'Apparent Losses' (metering inaccuracies and unauthorised consumption). The starting point needs to be an evaluation of current leakage, (not 'unaccounted for water').
- **Develop Leakage Target based on Least Cost Planning.** In a revised least cost analysis several different leakage management options could be considered, for example:
  - District metering to create DMAs of 3 - 5,000 properties
  - Pressure management, with say three activity levels, with the most obviously cost effective schemes considered first.
  - Active leakage detection, again with three activity levels representing different levels of leakage detection resource.

With this approach, component based modelling (using Benchloss) would be required in order to evaluate the leakage reduction that could be achieved with additional detection and repair resources and the savings likely to accrue from pressure reduction. The savings from leakage reduction would be optimised in relation to all the demand management options. This is the recommended approach set out in the recent UK regulatory publication *Future Approaches to Leakage Target Setting for the Water Companies of England and Wales*.

- **Prioritise Activities Using Performance Indicators.** Once a target has been established SWC needs to prioritise zones for leakage detection activity. With a density of connections of 68/km the appropriate IWA level 1 indicator is litres/connection/day (rather than kL/km/d). However the use of a single parameter – number of service connections – does not allow for several key system specific factors that influence the lowest technically achievable level for Real Losses. These factors are:
  - Density of service connections, per km of mains
  - Location of customer meters, relative to street/property boundary
  - Average operating pressure
  - Infrastructure condition.

For each zone the Infrastructure Leakage Index (ILI) can be assessed. The ILI for the Sydney system as a whole is 2.45. According to the IWA well managed systems in very good condition would be expected to have ILI values close to 1.0, with higher values for older systems with infrastructure deficiencies.

## 5.6 Recycled Water Program

Examination of the recycling strategy identified that a number of issues affect the performance of the program. These are summarised as follows:

- **High Unit Price of Recycled Water.** Analysis by SWC (Ref 19) indicates that full cost recovery for recycled water is a major issue with their research indicating that the marginal price is mostly higher than for potable water. This is particularly the case for smaller schemes and those distant from treatment plants.

- **Location of Industry.** Sydney's industry is located a significant distance from the major treatment plants at Malabar and North Head. In addition these plants are primary level treatment and would require the construction of tertiary plants to process water for reuse.
- **Lack of Market Targets.** There is a limited market for the use of reclaimed wastewater effluent. SWC's investigations, which are confirmed by other studies in Australia, show that the major metropolitan markets related to replacement of potable water usage are the industrial sector and the irrigation of parks, golf courses etc.
- **Regulatory Environment.** The regulatory environment is such that it is expensive and daunting to gain approval for a reclaimed water scheme. This acts as a disincentive to the customer, as the benefits are outweighed by the potential liability required.
- **Availability of Technology.** Technology for the reclaimed water industry is both limited and expensive. Research and development is occurring around the globe, however at present commercial units to meet the health requirements for urban development are not available and indications are that such units will not be available for many years.

Of the above issues the cost of recycled water is identified as being the major impediment to the implementation of recycled water schemes. As with other programs the approach taken by SWC to assess costs generally compares life cycle costs against the current marginal cost of producing potable water. MWH believes that this approach is flawed, as it does not take account of the cost of the next increment of supply. The cost of providing water via an alternative source such as a desalination plant will be higher than that of the existing potable supply. All potential projects should be reviewed from an integrated resource management or water balance perspective.

SWC should adopt a "capacity buy-back" approach to water recycling similarly to that suggested for the Business Program. Incentives could be developed in line with identified savings.

## 5.7 Water Pricing

Based on various studies of water demand in the US and Australia over the past 15 years, it has been recognised that the use of water pricing as a primary tool for water conservation is not as effective as previously thought. The relationship between price and water use is complex and care must be exercised both in terms of predicting the revenue that will be generated under various pricing schemes and reviewing equity issues for ratepayers.

The reviewer generally agrees with IPART's position on water pricing, which is outlined in the recent Issues Paper (Ref 18). This position is that inclining block tariffs have been favoured in OECD and European countries, and that elasticities are likely to be between -0.1 and -0.3. At present, it is agreed that SWC should concentrate efforts on non-price initiatives, at least until a more substantial proportion of the strategy has been implemented.

In the future, however, SWC should review options to provide a more effectively communicated water bill so that informed choices can be made to use or not use the water. There are two important aspects to the communication side of this equation:

- **Shorter Billing Cycles:** Reducing the billing cycle from quarterly to say bimonthly provides a more frequent the reminder to ratepayers of the cost of water. In jurisdictions where there is a chronic shortage of water,



monthly meter reading and billing is often introduced. SWC currently bills quarterly, which achieves little communication with ratepayers. The cost of more frequent billing is often offset by the positive effect on cashflow.

- **Indication of Performance:** The water bill should clearly show the amount of water used in prior periods and the cost of water, separate from wastewater, stormwater, and other charges. There are also significant opportunities to integrate highly focussed and individually targeted water conservation messages into bills.

## 5.8 Stakeholder Involvement

A number of stakeholders have a strong interest in the success of the Demand Management Strategy. The original targets were incorporated into the Operating Licence by negotiation with environmental interest groups. Customer research and consultation about new SWC projects consistently shows the community expects SWC to take a leadership role in water conservation, and strongly supports demand management and recycling programs. Other stakeholders including Planning NSW, local government, EPA, NSW Health and the SCA are concerned with future development demand for secure water supplies and environmental flows.

SWC has periodically supplied reports on the demand management strategy to its Customer Councils and PENGOS. This has been a communication rather than participation process. However, from interviews and submissions to the mid term review, it is evident this process has been insufficient to build a level of trust or satisfaction with SWC's performance or approach. Frustrated by perceptions of lack of commitment, some stakeholders are requesting that further penalties be included in the licence as additional incentive to meet water conservation targets.

Without stakeholder trust, SWC is left exposed to political pressure forcing changes to the program, increased reporting, decreased funding support or unforeseen policy commitments that may or may not be cost effective.

## 5.9 Summary of Strategy Improvements

A list of actions that should be undertaken by SWC is summarised in Table 5.1.

**Table 5.1: Summary of Actions to Improve Strategy Effectiveness**

Action	Priority	Year	Comment
<b>Overall Program</b>			
Define the Water Balance	High	2002/3	Requires input from other groups
Develop Cost Effectiveness Model	High	2002/3	May use available alternatives
Develop Implementation/Marketing Plans	High	On-going	For proposed programs
Improve Resource Level and Mix	High	On-going	Relies on implementation plan
Revise Program Tracking Systems	High	2002/3	Include activities, cost and demand
<b>Residential Program</b>			
Extend Retrofit Program			Program to be continued and expanded.
<ul style="list-style-type: none"> <li>• Continue Current Program</li> </ul>	High	2002/3	
<ul style="list-style-type: none"> <li>• Complete DoH Program</li> </ul>	High	2002/3	
<ul style="list-style-type: none"> <li>• Implement MFR (Unit) Program</li> </ul>	Medium	2003/4	
<ul style="list-style-type: none"> <li>• Develop Defence Dept Program</li> </ul>	Medium	2003/4	
Expand Rebate Programs	High	2002/3	To support education process



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<b>Action</b>	<b>Priority</b>	<b>Year</b>	<b>Comment</b>
Establish End Use Baseline	High	2002/3	To provide data for programs and future performance assessment
Accelerate Regulations Implementation	Medium	2003/4	Water efficiency for res sector through mandatory conditions
Improve Community Behaviour Change Program	High	2002/3	Combine with incentives
<b>Business Program</b>			
Adopt a "Capacity Buy-Back" Approach	High	2002/3	Adopt and interim marginal cost of supply
Review the Major Water User Program	High	2002/3	Provide reduced cost audits free and increase incentives
Provide Access to Minor Water Users	Medium	2003/4	Develop program and incentives
Develop Partnerships with Government Customers	Medium	2003/4	Develop MOU and commit to activities
<b>Leakage Reduction Program</b>			
Revise Measurement Approach	High	2002/3	Improve flowmetering, review WISKEYs
Improve System Operation/Speed of Repairs	High	2002/3	Review DV status and condition
Undertake Zonal Water Balances	High	2002/3	Utilise ILI approach
Develop Leakage Targets and Prioritise Works	High	2002/3	Achieve maximum reduction in shortest time
Assess Alternative Delivery	Medium	2003/4	Eg. Pressure management
<b>Recycled Water Program</b>			
Determine Marginal Cost of Supply	High	2002/3	Preliminary prior to water balance agreement
Reassess Potential Programs	High	2002/3	Assess Georges River pipeline
<b>Pricing/Billing</b>			
Review the Billing Cycle/Bill Effectiveness	Medium	2003/4	Bimonthly with customer performance notes
Use billing information to deliver targeted demand management messages.	Medium	2003/4	Dependent on successful implementation of new billing IT system

## 6. Evaluation of Targets and Incentives

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### 6.1 Key Issues for Setting Targets

Target setting for monopoly water businesses should meet a range of criteria to be effective. These criteria include:

- Targets should be set at a reasonable level, which can be achieved through a range of appropriate actions by the authority.
- Targets should be defined by terms that are unambiguous and can be readily measured. This enables a technical audit of both performance and the underlying data to be undertaken.
- Targets should not be subject to a significant number of variables that are outside of the control of the authority.
- Incentives should be used to encourage performance, however the level of the incentive needs to be consistent with the cost of the breach and relative to other incentives under the licence.

As outlined by IPART in the *Review of Operating Licence for Hunter Water Corporation – Issues Paper* (Ref 14), the possible approaches to licence regulation and therefore to the setting of licence targets include the following:

- Prescription of specific actions.
- Prescription of systems and processes.
- Setting of performance standards.
- Requirement for performance to be reported against common performance indicators.
- Allow for self-regulation and public disclosure.

### 6.2 Existing Target Issues

As stated in previous sections the Demand Management Strategy has achieved the demand reductions that were expected when targets were set. The strategy is moving forward and may eventually achieve the targets, however progress is slow and difficult to measure.

Measurement of success using demand on either a total annual volume or a climate corrected per capita demand is subject to a large range of climate, demographic and socio-economic factors. These factors continuously cause debate regarding actual underlying trends. Such debate will continue for some time particularly as eastern Australia appears to be moving towards drought conditions.

As part of this review alternative approaches to target setting were examined. It is recognised that any change or new approach will take some time to be developed and established and there will be hurdles to overcome. The effective way to proceed is to take a *big picture* view and ask *where do we want to be five or ten years from now?* It is then necessary to determine the most cost effective way to get there and, along the way, demonstrate to all stakeholders that SWC is making good progress through its actions.

Another issue is whether the current incentives provide sufficient incentive to SWC to perform. It is noted that SWC were allowed in 1999 to include lower, conservation affected, water demand projections in the price path. The recent

Issues Paper (Ref 18) highlights that SWC stand to gain a revenue windfall of \$35 to \$72m from this situation. The issue of whether such revenue should be used as funding for accelerating the demand management strategy or whether the SCA should have stepped pricing to penalise SWC for high demand levels is also discussed.

### 6.3 Examples of Demand Management Targets

Based on a global review, three approaches were considered in reviewing options for setting targets:

1. State of Arizona's (US) regulated Per Capita target approach
2. California Urban Water Conservation Council's Memorandum of Understanding on Urban Water Conservation.
3. Environment Agency and OFWAT (UK) approach to setting leakage reduction targets in England and Wales.

Discussion of the approaches adopted by these organisations is provided below, as well as the success of the Singapore strategy is given in Appendix 4. Approaches to target setting are not usually regulated particularly in Europe, however this is changing with recent European research taking steps to consolidate initiatives and develop best practices.

### 6.4 Options for Target Setting

#### 6.4.1 Overview

From a review of the above approaches it is apparent that there are four options including the present system. These are outlined as follows:

- **Option 1: Maintain Current Demand Target Approach**

A key question for this mid-term licence review is - why change the system now? From the material presented in Section 4 the system should be changed because it is apparent that it is not working. Moreover other jurisdictions, such as Arizona, where conservation programs have been pursued vigorously have found that per capita water use targets are not effective. Therefore change is necessary to identify a better system. The question then becomes - what is the most appropriate system for Sydney?

- **Option 2: Sector Target Approach**

One method that could be pursued would be to set individual targets for each type of water user or customer sector. This could take the form of:

- A per capita water use target for residential use.
- A per account target for non-residential use.
- A volumetric or Infrastructure Leakage Index (ILI) target for leakage reduction.
- A volumetric target for recycled water.

- **Option 3: Best Practices Program Approach**

Two sub-options are proposed based on either alternative ways of implementing the Californian Best Management Practices (BMPs), or the Arizona Reasonable Conservation Measures (RCMs) approach. These approaches would specify the activities that would be undertaken over the

licence period and performance would be audited through a simple framework of tables. Such a reporting system would be transparent and could be public through SWC's EDC website. The two options include different methods of agreeing activities and are described as follows:

- *Option 3A:* Develop an MOU comprising a range of activities (BMPs or RCMs), through a stakeholder consensus process, similar to the Californian approach. Penalties for non-compliance would be sufficiently harsh to ensure performance.
- *Option 3B:* Mandate, using the current regulatory framework, a requirement to develop and implement specific activities (BMPs or RCMs). This would be similar to the current Arizona Non-Per Capita Program.

Although both California and Arizona use this approach for control of unaccounted for water, the alternatives above are intended to manage customer water use efficiency ie. the Residential and Business programs.

- **Option 4: Leakage Targets Approach**

The England and Wales approach only applies to control of Unaccounted For Water (UFW). Targets would be expressed as a ML/day reduction, and/or as an Infrastructure Leakage Index, which is capable of being benchmarked with other cities, both nationally and internationally. Targets may be set at a zonal or an overall system basis.

#### **6.4.2 Discussion of Options**

As discussed, the current approach (Option 1), required under the current Operating Licence, has not been successful for various reasons and is not considered a viable or sustainable option for the future success of the program. There are better methods to monitor and review performance. For such a significant program, Sydney should rely on proven methods or further delays will occur.

Option 2, the sector target approach is an improvement on the existing system, however there are better methods. Sector targets will be difficult to use to regulate performance. While this approach provides a useful guide to improvements in water use efficiency results suffer from similar problems as the overall per capita approach. It is difficult to decipher exact cause/effect to analyse results or to assign credit/blame for good or poor performance.

Some of the weaknesses in the sector target approach to evaluating success in a demand management project include:

- Residential water use will change with the mix of future housing types. If, for example, there is a trend towards larger houses on smaller lots and more people living in apartments, per capita water use will reduce. On the other hand if household sizes decrease more houses are needed to house the population so per capita water use will increase. Such variation makes it difficult to differentiate between changes due to SWC's efforts and naturally occurring change. Furthermore, if AAA ratings become mandatory regulations then some of the reductions will occur naturally, further clouding the issue of how much is due to SWC's efforts.
- Non-residential use will vary with business activity. When the economy is buoyant water use will increase and vice versa. Furthermore, trends in per account water use, while useful to track will not provide the proof that

SWC's Business Program is working. Decreased water use per account could be due to a multitude of factors.

Adoption of a best practices approach to the development of targets may be undertaken in two ways. As discussed above the two options relate the approach used to initially agree activities with the stakeholders. The issues relating to the two approaches are as follows:

- Option 3A, the Californian BMP approach, has been refined over a ten year period. Recently agencies a regulatory framework was included to introduce compliance auditing of the provisions in the MOU. The one disadvantage is that if the incentives or disincentives are poorly formulated, SWC may not be motivated to ramp up its programs. The fact that the process cannot proceed without an MOU signed by stakeholders would ensure that the mix of planned actions and incentives would need to be set at a level to achieve consensus. Anything less would mean that the signatories to an MOU would not represent consensus among all interested parties. The parties would need assurances that SWC would take the commitment seriously and perform. A BMP reporting system would be needed so that compliance or lack thereof, will be readily apparent. The motivation on SWC's part would be the need to achieve consensus that all reasonable and cost effective steps to reduce demand have been taken before discussions of a new source of supply will have any chance of moving forward.
- Option 3B, the Arizona Non-Per Capita Program approach has merit, however is a regulated approach that is not stakeholder driven or consensus based. The RCM reporting requirements and process are onerous and require almost a person-month of time to complete the reports every year. These reports may be simplified as per the Californian BMP reporting, however there will be suspicion regarding figures as the process is not as open and transparent as the BMP approach. Additional information will be necessary to justify unit water savings and the estimated overall program savings as well as methods of measurement. As an alternative the use of Demand Management Forums, similar to that undertaken in 1995, could be used to explain the mechanics behind the assumptions that are made to both formulate the program and estimate the long term savings.

Option 4 is essentially a target for leakage reduction and is preferred since it is not dependent on customer water use trends, rather it is related to actions taken and changes in the system managed by SWC. The England and Wales approach has been successful in achieving leakage targets and this system could be implemented in Sydney for managing and monitoring water losses.

## **6.5 Options for Licence Incentives**

### **6.5.1 Overview**

For any program to operate effectively the incentives need to be carefully and justifiably formulated. When the original targets were set SWC felt comfortable that water use would be well below the safe yield of the reservoir system. Two changes have occurred since the 1995 Operating Licence was negotiated to change this perception:

- Safe yield of the system has been down rated due to the drought of the mid-1990's.

- Requirements for environmental flows are expected to cause a further lowering of the safe yield.

As discussed in Section 2 of this report the safe yield may be reduced by about 25 percent from 720 to 540 GL/a. This may cause water planners to realise that the targets are logical. On the other hand, there are alternatives to reduce the demand on reservoirs by pursuing local water supplies in the Sydney area. Logically the selection of future options should be based on a cost effective strategy. This is likely to include significant demand management but also other ways to reduce demand or increase supply. The fact that demand appears to be close to the existing yield, will provide a greater incentive to pursue demand management than existed originally or than currently exists in the Operating Licence.

Other incentive models have been suggested and are discussed as follows:

- **Option 1 - Raw Water Rate (Step Pricing) Approach**

This option allows for SWC to be penalised by increasing the unit price of raw water, which is in excess of the targeted annual volume. As outlined in IPART's recent Issues Paper (Ref 18) the approach would be to significantly increase the price of water that is drawn from storages in excess of a predefined target. This cost could not be passed on to SWC customers and would be a significant financial incentive.

- **Option 2 – Excess Revenue Approach**

The price path for water is determined based on a water demand projection which may take into account an element of demand reduction resulting from successful demand management. This approach was adopted in the 1999 determination and as the water conservation targets have not been met a revenue windfall may result. This option would require SWC to utilise this windfall for water demand management programs.

- **Option 3 – Water Pricing Approach**

This approach would link the price path determination to the success of the strategy over the period leading up to the determination. If SWC failed to meet the targets, then the price path would take into account a lower than calculated demand reduction for the next period than calculated for the program. Such a system would not reduce SWC's performance requirements in relation to the demand management strategy.

## **6.5.2 Discussion of Options**

Options 1 and 2 suffer from the same measurement difficulties as the current water conservation (per capita demand) targets and will inevitably result in endless argument regarding climate and other effects on demand, without providing a real incentive to achieve lower water use. Price paths are set for average climate and background conditions. In a dry year, demand and revenue will be high. On the other hand, demand and revenue will fall for wet years. Use of incentives based on such an approach would need to have complex adjustments for climate as well as for other factors that affect demand. Such a system would be unworkable.

Option 3 may be workable although the major issue will be whether IPART will allow conservation based demand reductions to be considered in the next determination.

If the current incentives are maintained, revisions need to be included to ensure consistency with the proposed method of performance measurement. The advantage of maintaining the current incentives, at least in the short term, is that



they enable IPART to take action at the end of this licence if SWC fail to meet targets.

As discussed above the major incentive for SWC has become the fact that the available supply will soon be exceeded and future supply alternatives may be expensive. In addition the SCA will need to be assured by SWC that all cost effective demand management initiatives have been undertaken prior to considering capacity augmentation.

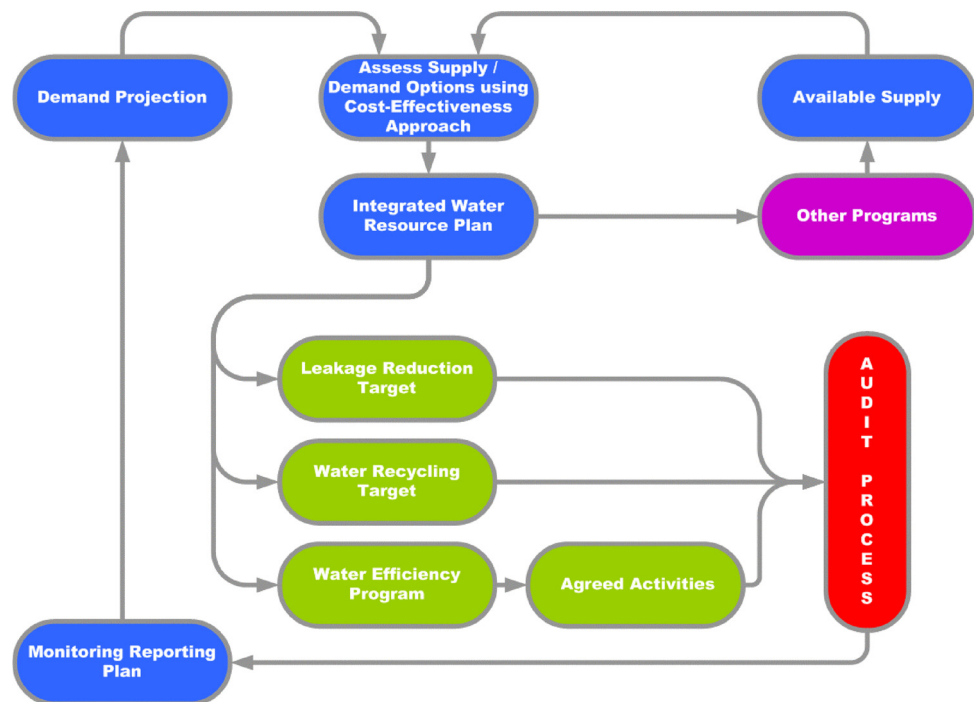
## 6.6 Preferred Approach

### 6.6.1 Strategy Targets

The reviewer's preference is a hybrid approach based on the BMP and MOU consensus model which has been successfully implemented on a large scale in California. It is believed that SWC would benefit from a more direct involvement of stakeholders in the process of developing the Demand Management Strategy. Under the current licence arrangements such an approach is not ideal as a process for public review exists in the regulatory framework. It is therefore proposed to adopt a hybrid approach to the setting of performance targets which will include a range of targets (refer to Figure 6.1):

- *Water Efficiency Program*: Includes for targets involving specified actions to be termed **Water Efficiency Activities** or **WEAs** for the residential and business sectors.
- *Leakage Reduction Program*: Includes targets for reduction of leakage and possibly for reduction of Unbilled Authorised Consumption through increased metering.
- *Recycled Water Target*: Includes a volumetric target for recycled water projects.

**Figure 6.1: Proposed Approach to Demand Management**





#### 6.6.1.1 Definition of Required Program Savings

The key to the program development and implementation is the assessment of supply/demand options taking into account the water balance in the Sydney region. It is critical to the long term success of this project to ensure that the initial strategic planning is comprehensively analysed. Following this work the required level of demand management can be determined on a cost effectiveness basis.

Targets may then be set for three components of the Demand Management Strategy including activity based targets for the water efficiency component of the program. These targets and activities would be audited through a technical audit process defined by measurement clauses.

#### 6.6.1.2 Water Efficiency Programs

Customer water use will be managed by SWC implementing a defined set of Water Efficiency Activities (WEAs). The WEAs will be developed by SWC and discussed with the stakeholders in an agreed Forum process.

A WEA Framework will be developed containing the list of WEAs and description and implementation requirements for each WEA. The method, scope and annual reporting process will be generally included licence and detailed in the WEA Framework. Reporting will be combined with reporting on the leakage and recycling targets. Opportunities and procedures to change the WEAs will be defined.

#### 6.6.1.3 Leakage Target

SWC should propose a leakage target after doing sufficient fieldwork to ensure that this target represents reducing leakage down to a cost effective level. The target will be expressed through a target Infrastructure Leakage Index for performance benchmarking and as a volume saved in ML/day by a specified date.

#### 6.6.1.4 Recycled Water Target

The recycled water target will be similar to the leakage target but developed based on studies of the market for recycled water and the cost effectiveness of alternatives. This target would be expressed as a volume saved in ML/day by a specified date.

### **6.6.2 Incentives**

At this stage amendments to the existing incentives are not recommended. It is the belief of the reviewer that the major incentive will become the lack of available supply and therefore demand management activities will become a major focus of SWC. For the 2004/5 licence consideration may be given to providing more defined financial incentives for the programs Water Efficiency and Leakage Reduction Programs. Financial incentives for the Recycled Water Program must take into account the uncertainty of the market for this product.

## 6.7 Implementation of Preferred Approach

### 6.7.1 Role of Sydney Water

SWC is the recognised expert in demand management in this region. SWC would be responsible for the following tasks:

- Defining the overall savings required from the Strategy based on the water balance outcomes.
- Selection of Water Efficiency Activities (WEAs)
- Determination of recycled water and leakage reduction program targets
- Determination of an implementation timetable for WEAs and other programs
- Estimation of expected water savings from each WEA.

Determination of where to place the emphasis and the savings from each program should be undertaken using cost effectiveness assessment. SWC should be expected to pursue all avenues of cost effective conservation, nothing less, nothing more. It will be up to SWC to take a leadership role and define what activities are cost effective.

### 6.7.2 Stakeholder Involvement

Stakeholder involvement will be provided in two ways:

- Via the normal regulatory channels through submissions to IPART as part of Operating Licence audits and issues paper.
- As part of Demand Management Forums that would be held during the mid-term and end of licence reviews. SWC to provide details, including technical reasons for decisions relating to demand management actions and gain input and views from stakeholders.

SWC will need to be proactive and provide concrete proposals and reasons for decisions. Other stakeholders have a right to have a healthy scepticism and should encourage SWC to support and defend their position.

### 6.7.3 Implementation Schedule

**Table 6.1** outlines the implementation schedule for the preferred approach and provides target dates for actions where appropriate. This schedule should be included in the revised conditions for the balance of the 2000/05 licence.

**Table 6.1: Proposed Implementation Schedule**

Proposed Action	Responsibility	Target Date
<b>2000 Licence</b>		
Define 2002/3 Program Activities and Estimated Related Savings	SWC	September 2002
Review/Approval of 2002/3 Activities	IPART	October 2002

<b>Proposed Action</b>	<b>Responsibility</b>	<b>Target Date</b>
Develop Reporting Framework	SWC	October 2002
Approve Reporting Framework	IPART	November 2002
Define 2003/4/5 Program Activities	SWC	April each year
Review/Approval of 2003/4/5 Activities	IPART	June each year
<b>2005 Licence</b>		
Water Demand Management Forum	SWC	October 2003
Improve LCP approach by including a cost benefit analysis approach	SWC	June 2003
Finalise water balance and assess demand/supply side options using a cost benefit approach.	SWC/Task Force	December 2003
Define goals and objectives for the Demand Management Strategy over the period 2005 to 2015.	SWC	March 2004
Define WEAs and other targets for the Demand Management Strategy for period 2005/10 for inclusion in licence	SWC	June 2004
Define monitoring and reporting procedures	SWC	June 2004
Water Demand Management Forum	SWC	August 2004

#### **6.7.4 Performance Reporting by Sydney Water**

The overall reporting system will be a tailored version of the California BMP reporting system; an example is shown in Appendix 8. The approach to reporting is *very specific* and includes methods of measuring success as well as activity.

##### **6.7.4.1 Leakage Reduction and Recycled Water Programs**

Reports for leakage reduction and recycled water use will be on a volumetric basis. The Infrastructure Leakage Index will also be reported for leakage.

##### **6.7.4.2 Water Efficiency Programs**

SWC will determine the scope of the WEAs. Reporting should include:

- Planned versus actual activities
- Planned versus actual expenditures
- Estimated water saved (measured against the standard measurement clauses in the Framework document)
- Progress towards threshold to gauge when implementation can be considered complete
- Any variations made (if allowed) to implement the program in an as least as effective manner as originally planned. Reasons for variations should be justified.

As can be seen by the example from the Californian system in Appendix 8 this reporting system is very simple yet very precise. It should not take very long to prepare reports or inspect the data provided and quickly identify whether performance is as planned.

#### 6.7.4.3 Demand Tracking Requirements

In addition to the program activities, demand tracking should continue and be included in SWC's reporting under the licence. Reporting should include the performance of the overall total annual demand, the per capita demand and sector demands (per capita for residential sector).

#### 6.7.4.4 Opportunities for SWC to Modify Demand Management Strategies

As SWC is on a learning curve with respect to demand management, it is unreasonable to presume that they will be able to set a long term course and rarely want to change it. Change should be possible but subject to IPART review. At the time of the mid-licence and end of licence reviews the Demand Management Forum would be reconvened to review progress and discuss program changes. SWC would have the responsibility for proposing any changes they deem necessary and provide justification to IPART. Minor annual changes would be possible, however major changes should only be allowed twice each five years.

#### 6.7.4.5 Transition Period to 2005

During the remainder of the 2000 licence, the development of the new approach could become a distraction to SWC to the detriment of the current program. To avoid this scenario, it is proposed that SWC would provide activity based targets and the level of expenditure required to meet the 2004/5 target. This list of activities would be audited on an annual basis and SWC would submit minor changes to the program prior to the end of May each year. This new program would become the next targeted activity statement, against which the organisation would be audited.

In this way, the program momentum will be maintained and SWC will be required to meet the 2004/5 target. If SWC fail to meet the target, IPART may impose penalties as outlined in the Operating Licence.

## 6.8 Sydney Catchment Authority Role

The Sydney Catchment Authority (SCA) is a key stakeholder in the development of new targets. Provisions of the SCA Operating Licence prevent the development of additional works if SWC has any additional scope for cost effective demand management strategies. As the targets will be more easily audited under the proposed system, this provision can be practically implemented. If SWC does not show progress through the annual audits, the SCA can and should use its influence to exert pressure on SWC to improve performance. If SWC performance is still below goal then additional measures, such as penalty pricing may be considered by SCA and IPART. Resolution on this issue can be deferred until the end of the current licence period when SWC can be judged on performance over the next two years.

SCA should develop and implement a separate program to minimise system losses in reservoirs, canals and pipelines. As a major stakeholder the SCA should be involved in Demand Management Forums. To comply with their licence requirements the SCA need to develop a close relationship with the Water

Conservation and Recycling Strategy Unit, including reporting on SWC's performance annually.

## 6.9 Relevance of a 2014/15 Target

The project brief required consideration to be given to the setting of a 2014/15 per capita demand target. At this stage it is the reviewer's opinion that although the current targets should remain unchanged, additional per capita targets should not be set for 2014/15. The preferred approach is to develop activity targets based on least cost planning to evaluate program cost effectiveness. The resulting Water Efficiency Activities list will form part of the target for the licence period. It should be remembered that the activities are to be based on a supply/demand balance and therefore an overall total demand will be used to determine the required program savings.

At this stage, the implementation cycle is recommended to be 10 years. So if a new program is in place by 2005 then, in effect, there will be a 2014/15 target and that would be to complete implementation of programs by that time or before.

## 6.10 Summary of Findings

A summary of findings relating to the review of targets and incentives for the Sydney Demand Management Strategy is as follows:

- 1. Current Targets:** The use of per capita demand as the target performance criteria is not appropriate due to the significant number of variables that impact demand for water.
- 2. Options for Customer Programs:** Three options were considered:
  - Sectoral targets for various customer categories
  - An MOU comprising a range of Water Efficiency (WEAs) developed through a stakeholder consensus process
  - A mandatory activity list, comprising WEAs determined through cost effectiveness analysis by SWC and controlled through the existing regulatory framework.
- 3. Preferred Option for Customer Programs:** The mandatory WEA approach was preferred in the current regulatory context. However, the reviewer believes that SWC could benefit through a more direct involvement with stakeholders as proposed by the MOU approach.
- 4. Preferred Option for Leakage Reduction Program:** A separate target, expressed in terms of an Infrastructure Leakage Index as well as ML saved/d, is preferred.
- 5. Preferred Option for Recycled Water Program:** A separate volumetric target, expressed in terms of ML saved/d is preferred.
- 6. Stakeholder Involvement:** Participation should be encouraged through the regulatory process and through Demand Management Forums.
- 7. Reporting System:** Develop a system for each WEA incorporating a standard method of water savings measurement. This would be undertaken by IPART as part of the regulatory process.
- 8. Future WEAs:** Following the determination of the water balance for Sydney, least cost planning should be used set goals for the various programs on a cost effectiveness basis. WEAs can then be developed for the next licence period.
- 9. 2014/15 Target:** A target was not set for 2014/15 as this will be undertaken as part of the water balance and cost effectiveness tasks.

- 10.Incentives:** Current licence incentives should remain unchanged to 2005, as an equitable alternative is not apparent at present. The current supply/demand water balance reinforces existing incentives.
- 11.SCA's Role:** The role of the SCA in demand management should remain as prescribed by the operating licence. As part of their licence SCA should report annually on SWC performance in the context of the requirement to understand whether SWC has any further scope for cost effective demand management.

## 7. Recommendations

Based on the review of Sydney Water's Demand Management Strategy and the related regulatory framework, a range of short term (2000 Licence) and medium term (2005 Licence) recommendations have been developed. Recommendations are grouped into those relating to the regulatory framework and high priority actions that should be implemented or considered to improve the effectiveness of the current SWC programs. Recommended implementation target dates are provided, however the timing of these actions will depend on the completion of tasks which are outside of SWC's control, such as the finalisation of environmental flows and security of supply issues.

### 7.1 Preferred Regulatory Model

#### 7.1.1 Recommendations relating to the Mid Term Licence Review

The following recommendations are made in relation to changes to the 2000 Operating Licence:

- 1. Per Capita Targets:** Current per capita targets should be retained pending development of a revised approach for the 2005 licence.
- 2. Water Efficiency Activities:** SWC should be required to commit to, and report on, activities that are designed to meet the demand reductions implicit in the water conservation targets. At present these activities will be limited to the Residential and Business Programs. This approach will provide effective performance monitoring and auditing.
- 3. Leakage Reduction Program:** Annual reporting should include activities, estimated water savings and the basis on which the savings were calculated including a confidence grading.
- 4. Water Recycling Program:** Annual reporting based on metered consumption for all activities. A distinction needs to be made between general reuse and reuse relevant to the demand management program.
- 5. Overall Program Monitoring and Reporting:** In addition to the above, SWC should be required to report on the performance of the overall program and Sydney's water demand as follows:
  - Per Capita reporting (without climate correction) since 1990
  - Customer sector performance since 1990
  - Total annual production performance since 1975
- 6. Implementation Plan:** The following program should be implemented:

Proposed Action	Responsibility	Target Date
Define 2002/3 Program Activities and Estimated Related Savings	SWC	September 2002
Review/Approval of 2002/3 Activities	IPART	October 2002
Develop Reporting Framework	SWC	October 2002



<b>Proposed Action</b>	<b>Responsibility</b>	<b>Target Date</b>
Approve Reporting Framework	IPART	November 2002
Define 2003/4/5 Program Activities	SWC	April each year
Review/Approval of 2003/4/5 Activities	IPART	June each year

### 7.1.2 Recommendations Relating to the 2005 Licence

The following recommendations relate to the development of the 2005 Operating Licence and include actions required to develop the licence conditions:

**1. Water Conservation Targets:** The preferred approach for the Sydney program is the use of the following targets:

- *Leakage Reduction Program* – targets based on both an Infrastructure Leakage Index (ILI) and the volume of water saved (ML/d)
- *Recycled Water Program* – target based on volume of water saved (ML/d)
- *Water Efficiency Program* – Water Efficiency Activity (WEA) targets for prioritised initiatives.

Revised targets would be based on the evaluation of the supply/demand balance using a least cost planning assessment of supply and demand options. The Water Demand Management Strategy would set out a 10 year conservation plan.

- 2. Licence Incentives:** Individual financial incentives should be considered as part of the development of the 10 year water conservation plan.
- 3. Monitoring and Reporting:** The licence should define the monitoring and reporting requirements as well as methods of measurement and data accuracy required.
- 4. Consultation:** In addition to the existing regulatory review process, the Operating Licence should require SWC to convene regular Demand Management Forums (minimum twice per licence period) to achieve stakeholder support and input to the development and improvement of the program.
- 5. Implementation Plan:** To prepare for the drafting of the 2005 licence the following actions are required:

<b>Proposed Action</b>	<b>Responsibility</b>	<b>Target Date</b>
Water Demand Management Forum	SWC	October 2003
Improve LCP approach by including a cost benefit analysis approach	SWC	June 2003
Finalise water balance and assess demand/supply side options using a cost benefit approach.	SWC/Task Force	December 2003
Define goals and objectives for the Demand Management Strategy over the period 2005 to 2015.	SWC	March 2004

<b>Proposed Action</b>	<b>Responsibility</b>	<b>Target Date</b>
Define WEAs and other targets for the Demand Management Strategy for period 2005/10 for inclusion in licence	SWC	June 2004
Define monitoring and reporting procedures	SWC	June 2004
Water Demand Management Forum	SWC	August 2004

## 7.2 SWC's Demand Management Strategy

It is evident from the review of SWC's performance that a significant expansion of the strategy is required to meet the water conservation targets and to overcome the imbalance in the supply/demand equation. To achieve the reductions in the short term SWC need to implement initiatives that will cost effectively achieve major water reductions. The reviewer identified a range of actions that should be considered to improve the effectiveness of the programs up to 2005.

### 7.2.1 Overall Program – High Priority Actions

Actions that should be considered to improve the effectiveness of the overall demand management strategy up to 2005 are:

- 1. Implementation:** Develop implementation and marketing plans for demand management initiatives.
- 2. Resources:** Increase resource levels and provide full time marketing resources in the Water Conservation and Recycling Unit.
- 3. Expenditure Tracking:** Improve individual program expenditure reporting.
- 4. Performance Monitoring:** Improve monitoring of program initiatives in accordance with the revised licence requirements.

These actions are essential to the cost effective implementation and success of all programs and should be implemented immediately.

### 7.2.2 Specific Programs – High Priority Actions

High priority actions that need to be considered to improve the effectiveness of individual programs over the period 2002/3 are:

#### 1. Water Efficiency Programs - Residential

- a) Continue the successful retrofit program
- b) Accelerate the Department of Housing retrofit to be completed in 1 to 2 years.
- c) Expand rebate incentives program to support the communication program.
- d) Expand and improve the communication program.

#### 2. Water Efficiency Programs - Business

- a) Adopt a "capacity buy-back" approach as an alternative to the current program, providing flexibility to meet business customer needs.
- b) Streamline the major user program and audits and review the use of incentives including free audits

**3. Leakage Reduction Program**

- a) Develop a best practice approach to measurement of savings, through improved dividing valve management and flow measurement.
- b) Improve speed of repairs to maximise water savings.
- c) Adopt a zonal approach to water balance using the Infrastructure Leakage Index (ILI) and implement leakage targets on this basis.

**4. Water Recycling Program**

- a) Reassess opportunities using a cost effectiveness approach taking into account the cost of the next increment of supply.

**7.2.3 Specific Programs – Medium Priority Actions**

Actions, which should be considered for implementation in the medium term (2003 to 2005), are as follows:

**1. Water Efficiency Programs - Residential**

- a) Establish a customer end use baseline.
- b) Develop and implement a program targeting multi unit dwelling efficiency
- c) Develop a Department of Defence housing retrofit program
- d) Implement, in conjunction with Planning NSW, a policy for the regulation of water efficiency in new development.

**2. Water Efficiency Programs - Business**

- a) Improve access for lower water using customers through the *WaterCheck* program, including audits and incentives.
- b) Develop partnerships with government agencies such as the departments of Health and Education.

**3. Leakage Reduction Program**

- a) SWC should assess alternative approaches to leakage management, particularly pressure management

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