9. NON-RESIDENTIAL MEASURES

9.1 Overview

The non-residential sector typically represents up to 30 percent of the total water consumption in each pilot community. This consumption is however comprised of a small proportion of accounts, in comparison to the residential sector.

The non-residential sector includes commercial and industrial customer categories and characteristically exhibits high water usage as part of processes such as manufacturing, cleaning, or provision of customer/employee facilities. Commercial sector usage is made up by a large number of people within the one facility, for example, office buildings and shopping centres. Industrial users employ processes that may require high volumes of water to counter or supplement the processes that are used each day.

Because of the diversity of water end uses within the non-residential sector, it is difficult to evaluate any specific measures using the DSS with the available information. The water savings identified for one account could be vastly different from another account due to the wide range of end uses. For this reason, a number of generalised measures were analysed with the DSS. These are explained in the following sections.

9.2 Potential for Demand Management

Table 9.1 summarises the daily average demand in the non-residential sector in the five pilot communities, (as categorised by the authority, except Mackay, which was estimated due to the lack of available data).

Table 9.1: Summary of Non-Residential Demand

Customer Category	Daily Water Demand (ML)									
	Emerald		Ingham		Mackay		Maroochy		Toowoomba	
	Demand	% of Total	Demand	% of Total	Demand	% of Total	Demand	% of Total	Demand	% of Total
Commercial	0.8	15.3%	0.4	14.3%	3.1	12.6%	4.0	11.7%	5.8	15.9%
Industrial	0.2	3.5%	0.2	6.9%	1.4	5.6%	1.5	4.3%	0.3	0.9%
Public & Other	1.0	18.0%	0.3	8.0%	2.6	10.6%	1.5	4.4%	6.6	15.4%
Tourist							0.8	2.3%		
Total	**2.0**		**0.9**		**7.1**		**7.8**		**12.7**	

The summary shows that the industrial sector is only a small percentage of the overall demand and therefore higher efficiency in this sector will not always provide significant water savings, e.g. a 10% reduction in the industrial sector in Emerald would save only 0.02 ML/d. On the other hand the Commercial and Public sectors are significant water users and 10 – 20% reductions through water efficiency implementation in these sectors would be beneficial to most water supply schemes.

9.3 Commercial Sector

Commercial sector accounts serve as beneficial targets for water efficiency programs. Although the accounts may range from a small shop to large-scale office properties, there will inevitably be ways to reduce the account's overall water usage. Commercial properties need to be considered on an individual basis, as there are a wide range of end uses of water within any account.

Hotel/motel, resort and caravan park accounts provide an attractive starting point for water conservation within the commercial sector. Because of the scale of these accounts, especially in predominantly tourist based areas and regional centres, it is possible to reduce water consumption through the implementation of measures such as showerhead replacement and urinal upgrades in older properties. Audits undertaken by MW and WaterWise (Water Conservation in Large Hotels and Resorts, Water Conservation in Caravan Parks) indicate that the payback periods are in the range of 0.5 to 2 years when considering water, trade waste (where applicable) and energy savings.

A further issue relating to the use of water in the accommodation industry is the wasteful practices of holiday makers. Education programs may be developed specifically targeting tourists and identifying local issues such as environmental and social impacts of wasting water. Such programs would be particularly appropriate for large tourist resorts and accommodation complexes.

Landscaping in commercial properties could also be targeted, as this is a typically high end user within a commercial account. Irrigation advisory schemes could be implemented, whereby an account holder would receive advice on how to effectively irrigate. Landscape use efficiency could also be implemented to assist account holders in landscape design to enable the minimum level of water usage.

A water conservation strategy for this sector would target the higher water users (say the top 10-20%), and conservation programs would be tailored to the specific needs of the account holder, and the relevant water using processes / practices.

9.4 Industrial Sector

The diversity of water usage within the industrial sector is probably the highest in any of the sectors because of specific manufacturing processes that are employed between different accounts. The industrial sector only represents a small proportion of the overall number of accounts, and also of the total demand. The proportion of usage and number of accounts make up approximately 5% of the total in any community. In reality, this sector would only be targeted once water efficiency in other sectors, such as

residential and commercial sectors, was successfully completed. This is unless there are known high users such as sugar mills that utilise potable water for wasteful processes such as cooling without efficient recycling.

End use reduction in this sector is often difficult due to the specific individual needs of each account. Despite this, there is a potential for saving in this sector through the use of water reuse or recycling schemes. Wastewater effluent reuse has been employed in high water using industries such as concrete and concrete product manufacture, sugar processing and petroleum refineries. Recycling of water can also be employed for cooling required for a particular manufacturing process.

The often high initial cost to retrofit industrial properties with water efficient processes should also be considered. Specific processes are designed around the technology available at the time of construction or installation, and to refit existing machinery could cause disruption in manufacturing processes or require specialist installation.

The general use of water in industrial premises may be considered as part of a water efficiency plan. Where a large number of employees are involved there is the potential to install water efficient toilets, urinals, showers and irrigation to reduce the overall consumption. However, convincing management to undertake such work is difficult due to the perceived minor nature of the costs in this area.

It is recommended that the industrial sector only be targeted where there is scope for a large water user to refine a water using process, or where there is potential for beneficial reuse. If a specific end use can be identified for improvement without audit, then it may be possible to implement changes in process, or installation of recent water efficient technologies.

9.5 Public Sector

The public sector includes schools, council buildings, hospitals and religious centres. This sector does have potential for water conservation, but usually specific approaches need to be employed for a specific property type, such as a school.

9.5.1 Schools

A joint venture group carried out a school retrofit program that identified major end uses in schools as normally being irrigation, toilets and urinals. The joint venture was undertaken by Merrimac State High School, Gold Coast Water and WaterWise Queensland in 1998, and is referred to in the *WaterWise School – How to Save Water and Money by Involving the Whole School Community*.

Leakage can also be a problem in schools as there are usually private fire and water distribution mains within the property. Irrigation water usage often accounts for up to 50% of the overall water usage in schools where ovals are to be maintained. Efficient irrigation practices should be employed by maintenance staff to help reduce irrigation water usage. Education of the relevant staff would ensure that such practices are implemented. Provision of moisture sensors by the water authority may assist in achieving efficient watering. Other measures could be employed within schools, such

as the replacement of high flush urinals or toilets with water efficient devices using infrared or manually operated flushing or even waterless urinals. Regular maintenance on taps should also be considered as a significant level of leakage can occur through this problem.

The Merrimac School concept is an excellent approach, particularly for high schools, and could be encouraged in all areas where the initial audit indicates a potentially short payback period. It was found in the Merrimac project that the payback was 1.4 years. The major disincentive to implementation of water efficiency in schools is the annual budgeting process, particularly in state schools. Even with school based management in place, most schools are not able to spend up to $20,000 on upgrading fittings and fixtures in a single year. To enable the implementation of water efficiency in schools, incentives and rebates are therefore required to encourage participation. The authority could provide such assistance in a phased manner over say a 3 year period. Close cooperation with the school maintenance personnel can also achieve significant improvement in current practices such as irrigation and leakage reduction.

Implementing measures in a staged fashion may reduce the impact of costs on schools. High impact, low cost measures may first be implemented, such as repair of wasteful fixtures or devices, or a change in irrigation frequency, i.e. irrigate ovals less frequently. Higher impact measures, such as fixture or device retrofit may be considered at a later time, when the funds for implementing such measures can be budgeted.

9.5.2 Public Buildings

Council buildings should be the first targets in any water efficiency program, as they act to demonstrate the commitment of the Local Government to the process. Through the installation of water saving devices and the improvement of maintenance practices in public toilets, parks, swimming pools, on beaches and in other facilities, the local government has the opportunity to advertise the benefits of water conservation and as a result can positively assist the changing of community attitudes. It is also possible, and beneficial, to trial and promote devices such as waterless urinals in public places.

9.5.3 Hospitals

Hospitals are high water users and as such should be targeted for auditing. Based on previous audits of hospitals there are many possibilities for increasing water efficiency. Laundry or kitchen facilities could be retrofitted with water efficient equipment to improve efficiency in these areas. Showerheads could also be replaced, along with new dual flush toilets to replace existing older style, single high flush toilets. There is often resistance to change in hospitals due to perceptions that high volumes relate directly to hygiene, but a majority of water efficient devices are specifically designed with the medical profession in mind. While most end uses in a hospital account are internal, a hospital's grounds could be targeted for water conservation through the design of landscaping, or improvement of irrigation practices currently employed by staff. Again the budgeting situation is similar to that of schools and therefore upgrade programs for public hospitals may need to be partnered through State Government departments.

There is a significant scope for water efficiency within this sector, however as for the other non-residential sectors, it is necessary to assess each account on an individual

basis. These properties would be audited to ascertain water usage figures, and applicable measures can be suggested for implementation.

9.6 Tourist Sector

Tourism in Queensland is a dynamic component of the commercial sector. The level of activity within this sector leads to high water usage, usually associated with the number of guests hosted at attractions at various locations.

Large tourist attractions are usually among the highest users of water. Generally, large attractions, such as theme parks are specifically categorised as *tourist* within an authority's billing system. Other tourist based operations, such as resorts, or smaller attractions, are generally categorised as commercial users.

Attractions such as the Ginger Factory or the Big Pineapple on the Sunshine Coast may be able to reduce overall water consumption by employing more water efficient practices. This is not to say that these attractions do not already practice efficient use of water, however, from previous experience it is evident that these enterprises can improve water efficiency by being audited on a voluntary, 4 to 5 year cycle. New technologies may become available during the cycle, which offer further water savings.

The use of water for landscaping in the tourist sector could be targeted, as this end use is often a major user. The appearance of any tourist attraction is a key factor to its identity, and to maintain the appearance, landscaping can be quite detailed and abundant, requiring a large volume of water for maintenance.

The tourist sector may also include tourist accommodation such as resorts, hotels, motels, caravan parks. In this report these accommodation accounts were considered to be commercial accounts and are discussed in Section 9.3.

9.7 Non-Residential Measures

The following measures were analysed using the DSS, specifically targeting a particular sector or as a combination of non-residential sectors:

- Water Audits (sector specific)
- Water Efficient Urinal installations - infrared or waterless (commercial, industrial and public sectors)

9.7.1 Water Audit

An audit of a commercial account is critical to define the water usage of all the end uses of water. Based on data collected during the audit, recommendations can be made outlining efficiency initiatives. An audit program was evaluated in the DSS that would specifically target the top 5% of accounts each year in this sector. The average cost of this measure would be $500 to both the utility and the customer. This cost is for the involvement of a staff member from the account, and a council employee to carry out the actual audit. These costs form the basis of the other audits in the non-residential

sector. The estimated savings for a commercial audit only, with no rebates or other assistance from the authority, are summarised in **Table 9.2**.

Table 9.2: Commercial Audit – Summary of Assumptions

End Use Identifier	Type of Use (Internal or External)	% of Savings Per Account	Costs/Participation Rates
COM Urinals	Internal	15%	• $500 per account cost to Utility • $500 per account cost to Customer • 5% Participation Rate with 10-year Measure Life
COM Showers	Internal	15%	
COM Taps/Sinks	Internal	10%	
COM Laundry	Internal	15%	
COM Dishwashers	Internal	15%	
COM Process	Internal	10%	
COM Int. Leakage	Internal	10%	
COM Irrigation	External	10%	
COM Pools/Fountains	External	10%	
COM Wash-Down	External	10%	
COM Car-Washing	External	10%	
COM Ext. Leakage	External	10%	

The results of the analysis of commercial audits are summarised in **Table 9.3**.

Table 9.3: Summary of Commercial Audit B/C Ratios

Pilot Area	Water Utility B/C	Total Community B/C	Annual Water Savings (ML/d)	Cost of Savings ($/ML)
Toowoomba	1.27	1.51	0.21	$275
Maroochy	0.44	0.81	0.33	$403
Mackay	1.05	1.80	0.19	$156
Ingham	0.07	0.26	0.02	$904
Emerald	1.05	1.69	0.05	$171

These results show that it is cost-effective to conduct commercial property audits in Toowoomba, Mackay and Emerald. Even though the benefit/cost ratios for the other pilot communities are less than 1.0, the results illustrate specific circumstances and participation rates. On this basis, it is recommended that commercial property audits be considered, as the benefit/cost ratios resulting from this analysis are not necessarily indicative of all commercial properties within each of the areas. The high level of growth in this sector in Maroochy is the reason for commercial property audits not being beneficial. Deferral of capital investment in Maroochy is limited due to the high growth rate. Most of the commercial sector will comprise newer properties, because of the growth in the area. For the commercial sector in Maroochy, a code or regulation could be set in place for new properties to regulate the usage of water efficient fixtures and devices.

Assumptions used in the audit of the public sector are listed in **Table 9.4**.

Table 9.4: Public Audit - Summary of Assumptions

End Use Identifier	Type of Use (Internal or External)	% of Savings Per Account	Costs/Participation Rates
PUB-OTH Toilets	Internal	15%	• $500 per account cost to Utility • $500 per account cost to Customer • 5% Participation Rate with 10-year Measure Life
PUB-OTH Int. Leakage	Internal	15%	
PUB-OTH Showers	Internal	10%	
PUB-OTH Taps/Sinks	Internal	15%	
PUB-OTH Wash-Down	Internal	15%	
PUB-OTH Car Washing	Internal	10%	
PUB-OTH Ext. Leakage	Internal	10%	
PUB-OTH Irrigation	External	10%	
PUB-OTH Pools/Fountains	External	10%	
PUB-OTH Urinals	External	10%	

The results of the analysis of public audits are summarised in **Table 9.5**.

Table 9.5: Summary of Public Audit B/C Ratios

Pilot Area	Water Utility B/C	Total Community B/C	Annual Water Savings (ML/d)	Cost of Savings ($/ML)
Emerald	0.74	1.05	0.06	$243
Ingham	0.07	0.22	0.01	$915
Mackay	1.00	1.56	0.16	$157
Maroochy	0.12	0.18	0.12	$1594
Toowoomba	1.06	1.10	0.20	$360

Public audits proved to be beneficial in Toowoomba and Mackay with a positive community benefit in Emerald. Again this measure was found to be inappropriate for Maroochy which exhibited a low B/C ratio due mainly to the low level of deferrals of capital works resulting from a very high growth rate.

Tourist facility audits were assessed using the DSS for the Maroochy area. The audit presents the opportunity for the operator to act on suggestions made as a result of the independent review of water usage. However, implementing measures is at the discretion of the account holder, and often little action is taken without incentives or rebates being offered. The results of the analysis showed a B/C for the utility of 1.90 and overall savings of 0.02ML/d. The positive result for this measure is due to the fact that the facility can realise an initial benefit from implementing measures with little expenditure. However, greater savings could be realised if the audit and retrofit was enforced by the authority. The results of this measure are detailed in **Table 9.6**.

Table 9.6: Summary of Tourist Audit Results

Water Utility Benefit Cost Ratio	Total Community Benefit Cost Ratio	Average Water Savings (ML/d)
1.90	4.80	0.02

Industrial audits were not assessed within the DSS, due to the diverse nature of industrial accounts. Each industrial account needs to be assessed individually, to ascertain the requirements of an audit, and audits are usually targeted at the entire operation or at specific processes. For example, for industrial laundry, there may be a potential to increase the efficiency of the existing process or an existing device using water efficient technology.

9.7.2 Waterless Urinals

This is the first of two urinal measures that, when implemented could significantly reduce water usage. Both of these measures achieve water savings in commercial properties, especially in restaurants, hotels or other high traffic areas. This measure virtually eliminates urinal water use, as it uses chemicals to assist in the disposal of waste. The chemical cartridge used in the toilet is replaced on a regular cycle, typically every three months at a cost of $50. This measure was designed with the intention of installation in the majority of existing accounts in the first year, and subsequently in any new accounts.

Despite the saving that can be realised from implementing this measure, the cost to implement the measure is quite high to the community. The initial setup cost is substantial, as an inspector would have to be trained to carry out inspections once the waterless urinal device was installed. These inspections would verify the correct installation of the unit, and that it is operating correctly, to local standards. The setup cost would also include media advertising and material for distribution to any qualifying accounts. The assumptions used in this analysis are listed in **Table 9.7**. Initially, the measure will cost the utility $10,000 to implement. The cost of each unit in the assumptions includes the cost of a unit, which is $600. The installation cost is $200 per unit. This would include the disabling of plumbing connected to existing urinals, and the installation of the actual units. A high initial participation rate is assumed, as the measure would need to be enforced as a compulsory measure to realise the maximum benefit.

Table 9.7: Waterless Urinals – Summary of Assumptions

End Use Identifier	Type of Use (Internal or External)	% of Savings Per Account	Costs/Participation Rates
COM Urinals	Internal	95%	• $10,000 cost to utility to initiate measure • $50 per account cost to Utility for inspection of installation • $1,200 per account cost to Community (1.5 units at $800 each) • 97% participation in the first year, then participation rate is linked to local population growth rate for each year thereafter.
PUB-OTH Urinals	Internal	95%	
IND Urinals	Internal	95%	

The results of this analysis are listed in **Table 9.8**.

Table 9.8: Summary of Waterless Urinals B/C Ratios

Pilot Area	Water Utility B/C	Total Community B/C	Annual Water Savings (ML/d)	Cost of Savings ($/ML)
Emerald	27.09	0.56	0.28	$7
Ingham	6.55	0.05	0.08	$23
Mackay	49.62	0.84	0.89	$4
Maroochy	8.46	0.17	1.21	$15
Toowoomba	87.37	0.62	0.95	$6

The B/C ratios achieved in all communities indicate that there is substantial benefit to the utility if this measure is implemented. This can be attributed to the complete elimination of water usage for urinal end use, which is estimated to account for approximately 15% of internal commercial water use. However, the B/C ratio for the community indicates that the measure would not be cost effective due to the high installation and recurrent costs. To encourage implementation of this measure, it may be necessary for the local authority to provide extra incentive to participate. Recognition in media releases of the accounts that take up this measure may provide the incentive to participate.

9.7.3 Infrared Urinal

To assist in the reduction of water usage in high traffic facilities (such as restaurants or hotels), the installation of infrared flush units for urinals could be considered. These units can be set to activate at particular time intervals as well as after a certain number of uses. The operator can also set the flush volume. These units integrate into existing plumbing, and have the potential to reduce water usage in urinals significantly.

This measure was designed to incorporate a rebate to encourage businesses to retrofit or upgrade existing inefficient urinals. The measure would initially be targeted at the majority of existing accounts, then any new accounts after the first year. The cost of the infrared unit is approximately $700, with a $100 installation cost per unit. The assumptions used in the analysis of this measure are listed in **Table 9.9**. A high initial participation rate is assumed, as the measure would need to be enforced as a compulsory measure to realise the maximum benefit.

Table 9.9: Infrared Urinals – Summary of Assumptions

End Use Identifier	Type of Use (Internal or External)	% of Savings Per Account	Costs/Participation Rates
COM Urinals	Internal	30%	• $300 per account cost to Utility for rebate (1.5 units at $200 each) • $1,200 per account cost to Community (average of 1.5 units at $800 each) • 97% participation in the first year, then participation rate is linked to local population growth rate for each year after.
PUB-OTH Urinals	Internal	30%	
IND Urinals	Internal	30%	

The results obtained from this analysis are listed in **Table 9.10**.

Table 9.10: Summary of Infrared Urinals B/C Ratios

Pilot Area	Water Utility B/C	Total Community B/C	Annual Water Savings (ML/d)	Cost of Savings ($/ML)
Emerald	0.59	0.14	0.09	$337
Ingham	0.05	0.01	0.03	$1441
Mackay	0.87	0.21	0.28	$220
Maroochy	0.18	0.04	0.38	$944
Toowoomba	0.70	0.17	0.30	$424

The results from this analysis suggest that the measure is not beneficial to either the utility or the community in any of the communities studied.

The water savings that can be achieved for each of the urinal based measures do not relate to the savings that may be achieved by replacing or upgrading the "dump and flush" units or continuously running urinals. In these cases the B/C ratio may be greater than 1.0 for the utility and community.

The analysis of urinals would normally be undertaken through the audit process which may indicate a higher B/C and a short pay back period. Such results would be expected when the cost of water to the customer is considered.

9.8 Approaches to Non-Residential Sector Water Efficiency

Water use by the commercial, industrial and public / institutional sectors are markedly different from residential water use in that non-residential customers consume a larger volume of water for more diverse purposes. The complexity of non-residential water use has inhibited authorities from developing water efficiency programs for this sector. It is crucial to understand how this sector uses water before designing water efficiency programs for its consumers. Such an understanding is slowly developing from research, water audits, reports of successful water efficiency programs and the like.

The receptiveness of non-residential customers to water conservation generally depends on three issues – the cost of water and water related charges (energy to heat water, and wastewater charges), environmental issues, and the authority's marketing strategy. Successful conservation efforts will generally have two parts:

1. Sound economic and technical information
2. An implementation strategy that fits the company's decision making process.

The marketing program for non-residential programs should embody the following concepts:[9]

[9] Plosser, Jane H. "Conservation and the Industrial Customer", Journal American Water Works Association, January 1996.

- Make cost savings the primary focus bearing in mind that water costs have been a low priority to most businesses
- The efficiency and sustainability message must reach several management levels
- Recognise that water efficiency technology is complex and expensive
- Understand that employees control many end uses and must be brought into the process of improving water use efficiency through education
- Specific facility uses of water will dictate the appropriate conservation actions

Council staff must embrace three basic tenets in promoting non-residential conservation programs:

1. *Credibility* of the council representative (some degree of technical expertise required)
2. *Reliability* of the result, which means that what is promised must be delivered.
3. *Confidentiality* of water use and proprietary information must be respected.

Progress is often only possible once the customer's site manager trusts and respects the Council's water efficiency representative.

The most successful programs have identified and targeted the highest users, adjusting their approach as needed. The objective is to identify water conservation projects that have attractive paybacks for the site. Normally businesses are only interested if the payback is less than three years. In Queensland the priority land uses for initial investigation would include (in order of priority):

- Public buildings
- Hotels/motels
- Caravan Parks/Tourist parks
- Resorts
- Schools
- Hospitals
- Industry
- Large office buildings
- Landscaping

Preparing a list of the top 20 – 100 users in the community is a good starting point. A table should be prepared showing annual water use, annual water bill, low month use, and high month use. This will help establish any seasonal pattern. Additional information can be obtained through simple telephone surveys. Once the water use characteristics of the top customers is understood the water efficiency program can be designed.

Various approaches to non-residential water efficiency program promotion have been tried, and some of these are reported in the literature. A number of approaches that have been trialled are given in the following list.[10] Certainly other approaches are possible, but the list gives an indication of the variety of marketing techniques used.

- Site visits/audits
- Guidebooks
- Workshops/seminars
- Employee education
- Advisory committee
- Trade shows, organisations
- Awards
- Financial incentives
- Technical assistance
- Regulations
- Water use research studies
- Industrial reuse projects

The concept of co-sponsoring has considerable application in the non-residential sector. Focussing on water use alone is a narrow approach as often the cost of water is a small component of the overall cost structure for any business. Normally the costs of energy, gas and sewerage are significantly higher and using a holistic approach will be more attractive to the owner.

9.9 Summary of Findings

The review of non-residential water efficiency in the non-residential sector indicates that:

- The potential for water efficiency improvements in the Commercial and Public sectors is significant as these sectors represent the majority of the non-residential demand in Queensland's urban communities.
- There is minor potential for demand reduction in the industrial sector as water usage by this sector represents a small proportion of the overall demand. Known high users in this sector should however be targeted.
- Auditing of the non-residential users based on ranking of water demand is essential to understanding the end uses and potential water saving opportunities. Auditing as a stand alone measure is not highly cost effective and should be considered as part of an overall program.

[10] Plosser, J, Pike, C, Kobrick, D "Nonresidential Water Conservation: A Good Investment", Journal American Water Works Association, October 1992.

- Priority targets for the Commercial sector are hotels/motels, caravan parks and resorts.
- Priorities for the Public Sector are council and community buildings and facilities and schools.
- Analysis indicated that on a sector basis, the installation of waterless urinals and infrared flush controllers was not cost effective to the community. On the other hand, experience shows that such upgrading is beneficial to the customer as the water savings are significant and short pay backs can result from retrofitting these devices.

Based on the analysis, the following recommendations are made:

- Water efficiency in the non-residential sector should focus on high water users particularly in the commercial and public/industrial categories.
- The recommended priorities for non-residential water efficiency are
    - Public Buildings
    - Hotels/Motels
    - Caravan Parks
    - Resorts
    - Schools
    - Hospitals
    - Other high water users such as individual industries, office buildings
- The implementation of non-residential sector programs is generally resource and funding intensive, and therefore any measures need to be reviewed for their effectiveness versus resourcing prior to commencement.
- Water audits need to be undertaken as an integral component of any non-residential sector program.
- Programs need to be designed based on sound economic evaluation and must meet the customers decision making and budgeting process.
- School retrofit programs similar to the Merrimac School program are beneficial, however a staged process is recommended to overcome budgeting difficulties experienced by these organisations. Alternatively rebates or low interest loans may be considered.
- Co-sponsoring of programs in the non-residential sector has significant application and should be adopted whenever possible.
- A holistic approach to efficiency and sustainability is required in this sector. Therefore programs need to include consideration of efficiencies in all areas including water, sewerage, waste and electricity.