

# Water Forever

Whatever the Weather

Water recycling and water efficiency

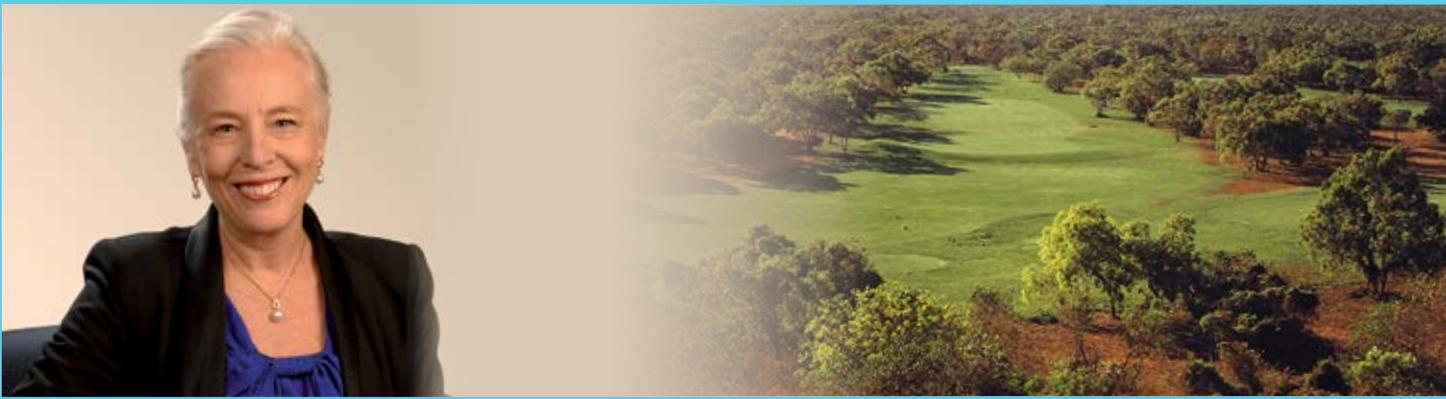
| May 2013



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# Foreword

The responsibility of providing safe, reliable drinking water in a sustainable way is not taken lightly by the Water Corporation. We run a 'forever' business – planning and developing sources and working with the community to ensure that our water resources indeed last forever.



This is why we are committed to achieving our long term goal of helping make Western Australia become more climate resilient – able to adapt to whatever the climate throws at us.

We will continue to work with the community to reduce water use, increase water recycling and develop new, climate independent sources to deliver on this promise.

Our new report, *Water Forever – Whatever the Weather: Water recycling and water efficiency* provides a snapshot of how we are progressing towards the goals set in the 2009 *Water Forever – Towards Climate Resilience* 50-year plan. It supports the more detailed 10-year plans for Perth and regional areas.

From leading the nation in trialling groundwater replenishment for large-scale implementation, to running innovative programs across the State to help the community use water more efficiently, considerable progress has been made.

This has been a collaborative effort with the State Government, communities and industries which have all played their part.

I trust this collaboration will continue as we work together on the journey towards climate resilience.

Handwritten signature of Sue Murphy.

Sue Murphy  
Chief Executive Officer

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# An extraordinary turn-around

Perth and the south west region of Western Australia are in the grip of a relentlessly drying climate that has brought dwindling rainfall and seriously depleted traditional water sources - dams and groundwater.



Rainfall has declined by 12 per cent since 1990, and run-off into Perth's main supply dams has fallen by more than half. At the same time, Western Australia experienced unprecedented economic and population growth.

Rising to these challenges, the Water Corporation revolutionised its planning and ushered in a new era of urban water supply management to achieve climate resilience.

This remarkable period has spawned a portfolio approach to planning for our future water needs comprising an array of initiatives that are independent of climate.

The release of the *Water Forever – Towards Climate Resilience* 50 year plan in 2009 was the catalyst for a radical change in the way water supply and demand was planned for. In a multifaceted approach which includes water efficiency, water recycling and developing new sources, the way people regard and use water is changing. They no longer see it as an endless supply, but rather as a critical resource that must be accorded much greater value.

This new approach places Western Australia at the forefront of global responses to climate change through water security.

In an extraordinary turn-around, water consumption in the state has fallen by 8 per cent per person over the past five years. Substantial and increasing volumes of water have been saved

through various water efficiency programs, culminating in an estimated saving of 100 billion litres of scheme water in Perth in 2011/12.

This is a huge achievement, equalling the annual capacity of the expanded Southern Seawater Desalination plant which will provide one third of Perth's water.

Even though these savings are expected to continue in the future, Perth remains one of the highest water using cities in Australia, due in part to its prolonged dry periods and sandy soils that result in high garden watering needs.

Recycling our water is an important part of the drive for climate resilience and will be greatly expanded in Perth to take the 'waste' out of wastewater.

Treated wastewater has long been recycled in regional centres, mainly to irrigate parks, golf courses and sporting grounds close to treatment plants, and opportunities are being explored to grow this practice.

Following is the story of Western Australia's response to secure its drinking water supplies in the face of climate change. It explains the new way of thinking about water and the efforts to maintain reliable and sustainable water supplies well into a future that is certain to bring more of the same: hot, dry weather.

# Key achievements and targets



## Water Recycling Target

30 per cent recycling of all wastewater in Western Australia by 2030

### Achievements

75 per cent increase in water recycled in WA over the last 10 years

80 recycling schemes operating across the State

Recycling 13.6 per cent of wastewater inflows in WA and providing 21 billion litres of recycled water each year

Successful completion of the Groundwater Replenishment trial in Perth

Providing nearly 5 billion litres of recycled water a year to industry in Kwinana through the Kwinana Water Recycling Plant



## Water Efficiency Target

Reduce per person scheme water use in Perth to 125 kilolitres per person by 2030

### Achievements

Saving around 100 billion litres of water in Perth in 2011/12 through various water efficiency initiatives introduced over the last decade

Reducing the amount of per person water use in Perth from 191 kilolitres to 135 kilolitres since 2001 – a 29% reduction

Building partnerships with a wide range of industry groups to facilitate water efficiency while supporting economic and social investment

# Climate change hits hard

The south west corner of Western Australia has been hit hard by the effects of climate change over the past few decades, making it one of the world's most affected regions to date.

The most severe effects have been felt since 2000. The tinder dry winter of 2001 was dubbed by the Water Corporation as the 'winter from hell'. Records for dry winters have tumbled, leaving dam storages and shallow groundwater resources struggling. In 2010 Perth's major supply dams, which have a total capacity of 605 billion litres, received their lowest ever inflows – just 13 billion litres. This is a mere 5 per cent of Perth's annual scheme water demand.

There is substantial and compelling scientific evidence that the drying and warming shift will continue to worsen. Climate models indicate a possible further 8 per cent reduction in surface water yields by 2030 in a median scenario.



## Catalyst for change

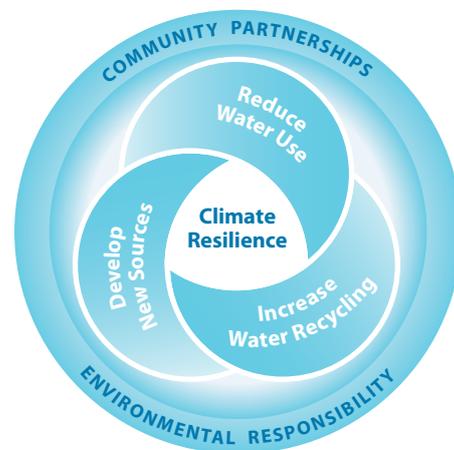
The landmark planning report by the Water Corporation: 'Water Forever – Towards Climate Resilience,' was released in 2009 and provided a portfolio of options to manage the State's demand and supply balance to 2060 by developing new sources, reducing water use and increasing wastewater recycling.

The plan has been a catalyst for change in the provision of sustainable water services across Western Australia. It focuses on helping all community sectors to join the drive to become more climate resilient.

Our overarching challenge is to provide water for a rapidly expanding population in a drier climate while reducing impacts on the environment.

The portfolio approach provides a framework to optimise investment decisions and focus on innovations in water recycling, water efficiency and new sources that would provide the most sustainable option.

As a result, new supply sources led by seawater desalination, and programs to boost water recycling and water use efficiency have been introduced across Western Australia since the early 2000s.



**Figure 1: Towards climate resilience**

The Corporation is pushing ahead with a suite of initiatives, including completing in 2012 a trial of groundwater replenishment with highly treated wastewater.

The Corporation's efficiency programs have reached right across the community including business and industry, homes, governments and schools.

Extensions of the *Water Forever* plan under the sub-title: 'Whatever the Weather' were released in 2011 and 2012 presenting more detailed 10-year water and wastewater plans for Perth and Western Australia.

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# Recycling to achieve water forever

**Water recycling is essential to maintaining a reliable, sustainable water supply for Western Australia and is a key part of the Water Corporation's climate resilience strategy.**

An integral part of our plan is to increase wastewater recycling in Western Australia to 30 per cent by 2030. In the longer term, it is envisaged that most wastewater can be 'saved' through recycling.

This relies on collaboration between the Water Corporation, State and local government, business, industry and the community.

Most of the increases will be made through large scale schemes such as groundwater replenishment, use by industry and irrigation of public parks and sports fields.

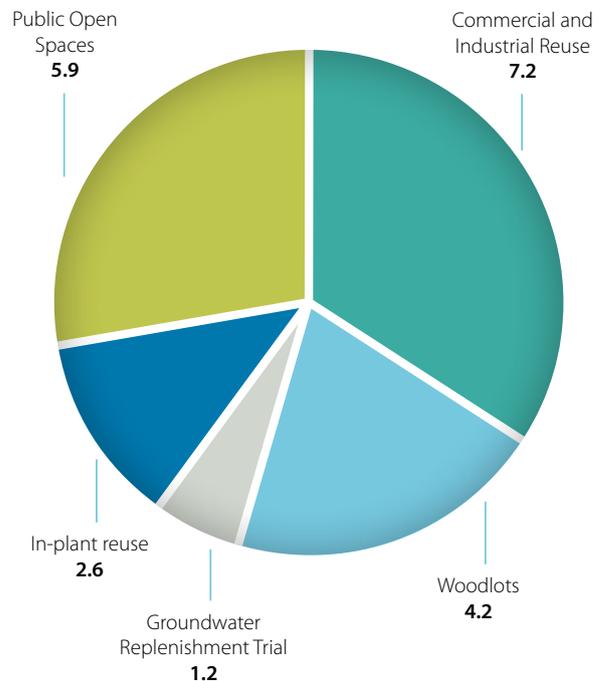
The Water Corporation is involved in 80 water recycling schemes in Western Australia. Most of these have been developed over many years in regional areas where more than 40 per cent of treated wastewater is recycled. The Corporation manages the quality of recycled water throughout the State through the implementation of a 12-element Wastewater Quality Framework, based on the Australian Guidelines for Water Recycling (2006).

Approximately 9.8 billion litres of recycled water was used by industry in 2011/12 (including use in wastewater treatment plants) and 10.2 billion litres was used to irrigate public open space and woodlots.

About 1.2 billion litres of recycled water was delivered as part of the Groundwater Replenishment Trial in 2011/12. The Advanced Water Recycling Plant, which was built for the trial, further treats wastewater to drinking water standards and recharges it to groundwater supplies for potential future use.

The total volume of water recycled in WA has increased by almost 75 per cent over the past ten years, exceeding 21 billion litres in 2011/12 (Figure 2).

**Figure 2: Total wastewater recycled in 2011/12 (billion litres)**





*Kwinana Water Recycling Plant*

## Looking for opportunities

A major challenge for water recycling in Perth has been relatively abundant supplies of groundwater. However, this scenario is changing as groundwater resources are becoming more scarce.

The Corporation is looking for opportunities to increase the volume of recycled water used to irrigate public parks and gardens and for use in industry. We provide recycled water free for community uses such as the irrigation of sporting grounds.

One success story is an irrigation scheme that has been operating at the University of WA's McGillivray sports park in Shenton Park, near the Subiaco Wastewater Treatment Plant, since 2004.

**A big contribution came from the Kwinana Water Recycling Plant that supplies recycled wastewater to local industry. Since 2004, it has supplied up to 6 billion litres per year of high grade water, which represents about 2 per cent of Perth's scheme water use and a major part of Perth's recycling effort.**

In Mandurah, the Halls Head treatment plant provides water for an aquifer recharge and reuse scheme.

Some recycled water is used for process water at the Water Corporation's four biggest wastewater treatment plants in Perth. Further recycling opportunities are being investigated for these plants, including for open space irrigation, wetlands support and recycling for industry.

Dual reticulation, where two separate pipes deliver drinking and non-drinking water into homes and commercial/industrial sites, also has potential in Perth and the regions to use recycled water, greywater, groundwater or stormwater.



## Regional initiatives

**While recycled water has been used in regional WA for about 60 years new opportunities are continually being investigated.**

In some growth areas such as Port Hedland and Karratha in the Pilbara, the Water Corporation is investing substantially in technology and new or upgraded wastewater treatment plants to improve the quality of treated wastewater to allow greater recycling including for industry.

An upgrade of the South Hedland plant will include a new purpose built recycling facility providing 'fit for purpose' water for business, thus conserving the town's water resources.

A dual reticulated scheme is being considered for Karratha to irrigate residential gardens as well as public open spaces. Treated wastewater is also used for tankering and is being investigated for dust suppression in the North West region.

Further south, 375 million litres of recycled water is used in Geraldton, Kalbarri and Dongara. Water Corporation has undertaken a project in partnership with the Federal Government to upgrade the Kalbarri Wastewater Treatment Plant which will increase its water recycling capacity to about 1.2 million litres per day by 2015 and 2.2 million litres per day by 2018. Currently, all wastewater from Kalbarri is reused to irrigate a golf course.

In the Great Southern region, where 94 per cent of wastewater is recycled, a 560-hectare commercial wood lot at Albany receives about 2 billion litres of treated wastewater annually for irrigation.

In the South West, the wastewater treatment plant at Boddington provides up to 500,000 litres per day of treated wastewater to Boddington gold mine for process water. The Swamphen Island and Peninsula wetlands are enhanced with 30 million litres of recycled water each year from the Capel Wastewater Treatment Plant.

In the Goldfields, an industrial recycling scheme in Kambalda provides miner BHP with recycled water for processing. Recycled water is also supplied for irrigation of public open space and golf courses in Merredin.

The Corporation is exploring further water recycling opportunities for the agricultural industry which is also feeling the effects of the drying climate. Current schemes include irrigation of vineyards, and may extend to other horticulture.



## The drive for water efficiency

Western Australia's drive for greater water efficiency to help it meet the huge challenge of climate change has gathered pace over the past decade, producing a suite of programs that interact with all community sectors.

*Water Forever – Towards Climate Resilience* set a target to reduce water use by 15 per cent by 2030 across all Perth households and businesses. Currently we are ahead of schedule with water use falling from 191 kilolitres per person in 2001 to just 135 kilolitres in 2012.

**These initiatives help us to become more efficient in the way we use water in our everyday lives without compromising our lifestyle.**

A range of new water efficiency initiatives have had a big impact on water use since their launch in 2001.

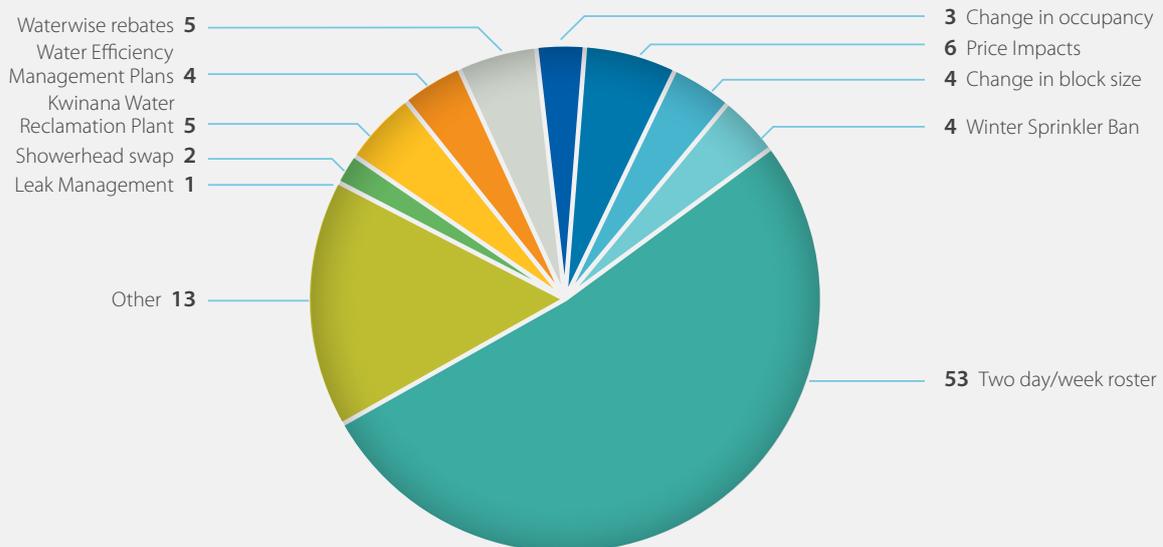
By far the biggest change came with the introduction in 2001 of a two-days-per-week roster of sprinkler use for gardens in Perth. Sprinkler rosters were extended statewide in 2007. By 2011/12, these measures achieved an annual saving of an estimated 53 billion litres. Other measures, including a winter sprinkler ban (which reduced annual water use by about 4 billion litres), recycling initiatives, a State Government rebate program, leak management, showerhead retrofits and waterwise programs combine to save about 34 billion litres each year.

The remainder has been achieved through a range of factors including reduced house block sizes, higher density living and rebalancing residential water pricing, to provide an incentive to use less.

Estimated annual water savings of around 100 billion litres have now been achieved in Perth, which is equivalent to output from the Southern Seawater Desalination plant (Figure 3).

This trend continues in regional areas where average water use has reduced significantly over the past five years.

**Figure 3: Water savings through water efficiency programs 2011/12 (billion litres)**





## Gardens still big guzzlers

The Perth Residential Water Use study, conducted by the Water Corporation in 2008/09, showed that households still used most (71 per cent) water from the Integrated Water Supply Scheme, and therefore had the greatest potential to save scheme water.

A significant finding was that garden watering is now less than indoor use, reversing a long standing trend, highlighting the effectiveness of the two-day per-week sprinkler roster introduced in 2001.

Permanent water efficiency measures introduced in 2007 embedded sprinkler rosters throughout the state. These measures also included working more closely with industry to reduce their water use through Water Efficiency Management Plans (WEMPs).

**Over the past decade householders have become much more aware of the need to save water. This is reflected in an increase in use of water efficient appliances such as front loading washing machines, low flow showerheads and dual flush toilets that provide substantial long term savings.**

## Working closely with industry

**Partnerships formed with peak industry groups and retailers have been the cornerstone of the success of delivering the water efficiency message to the community and industry.**

In July 2007, the Western Australian Government made it mandatory for all businesses and Government agencies using more than 20,000 kilolitres of scheme water a year to conduct a water management assessment and submit annual WEMPs to the Water Corporation. This program has helped high water using businesses to understand and evaluate their water management practices and develop efficiency strategies.

In conjunction with the Department of Water, the Waterwise Councils Program was launched in 2009 to encourage local government councils to become endorsed as waterwise.

A Waterwise Specialist Program involves hundreds of specialists trained to help achieve water savings inside and outside homes and businesses, ranging from plumbing and landscaping services to garden centres and irrigation design shops.

The Waterwise Approved Program showcases water efficiency through numerous projects with our Waterwise Partners and business and industry, including the promotion of water efficient products and waterwise plants for the garden.



In a bid to promote water efficiency to future generations, the Corporation's Waterwise Schools Program was expanded to facilitate learning about water issues, including conservation. Over 530 schools now participate in the program across the State.

### Major programs for Perth and regions

In recent years, two major efficiency programs jointly funded by the Water Corporation and the Federal Government have operated in the Perth metropolitan and regional areas.

The **Perth Residential Water Efficiency** project operated from 2010 to 2012. Costing \$4.8 million and jointly funded by the Water Corporation and the federal *Water for the Future* initiative it achieved the target of saving 1.2 billion litres of drinking water per year.

This project involved a showerhead exchange, encouraging households to fit more water efficient models; social marketing to achieve water efficiencies in 10,000 households, and an audit and retrofit program for 4,000 pensioner households, including water efficient showerheads, tap aerators and leak repairs.

**The highly successful showerhead replacement project was completed with around 124,000 showerheads swapped. As a spin-off, similar projects are now being delivered in a number of regional centres.**

The \$27 million **Regional Integrated Water Efficiency Program**, jointly funded by the Water Corporation and the federal *National Water Security for Cities and Towns Program* ran from 2010 to 2013.

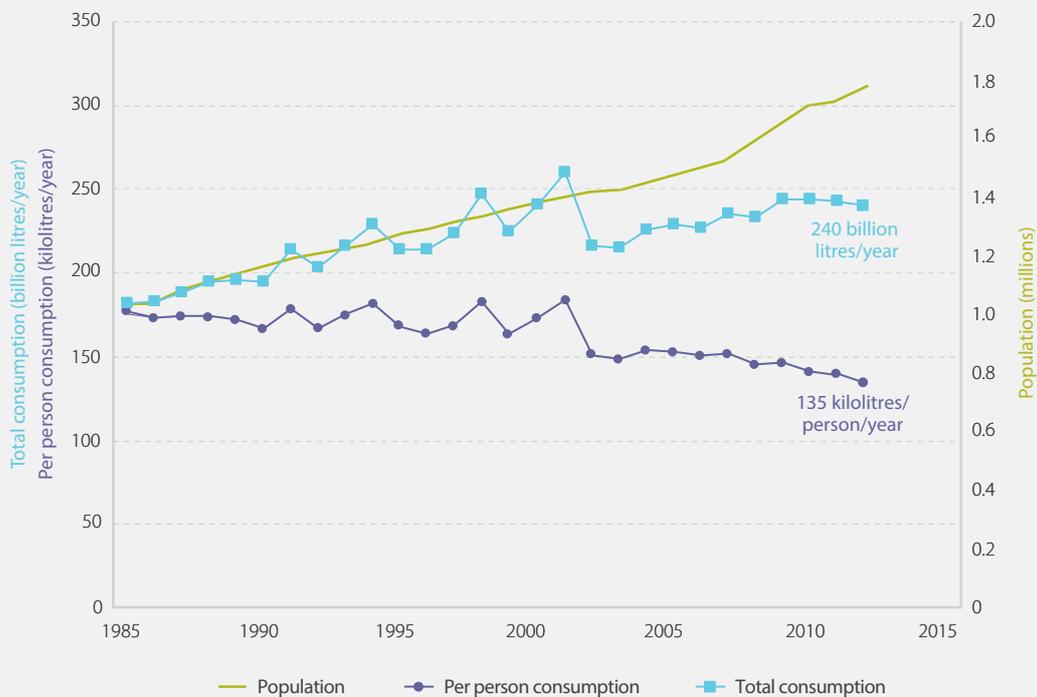
It involved more than 25,000 households and 800 non-residential customers in the Kimberley, Pilbara, Great Southern and Goldfields regions. It included retrofits of water efficiency appliances and fittings, installation of smart meters, leak detection and repair and community based social marketing.

It is estimated that this award-winning program saved almost 4.5 billion litres of water in its first full year.

Programs included:

- H<sub>2</sub>ome Smart - helped householders to save water in a variety of ways including free advice and installation of water efficient fittings in areas where the water supply was under stress.
- H<sub>2</sub>O Smart – provides a free retrofit plumbing service for businesses including repair of leaking taps and toilet cisterns and replacement of inefficient showerheads.
- Data logging – a trial in the North West region monitored customers' water usage over short intervals, allowing for better identification of water saving opportunities, including leaks.
- Smart water metering - more than 26,000 smart meters were installed in Kalgoorlie and throughout the Pilbara region.
- The Water Corporation undertook leak detection and repairs in its water supply pipelines.

**Figure 4: Perth water statistics**



## Progress towards targets

Perth's population increased from 1.4 million in 2001 to just under 1.8 million in 2012. Despite this 27 per cent increase in population, per person water use on average reduced by 1.2 per cent per year over this period (Figure 4).

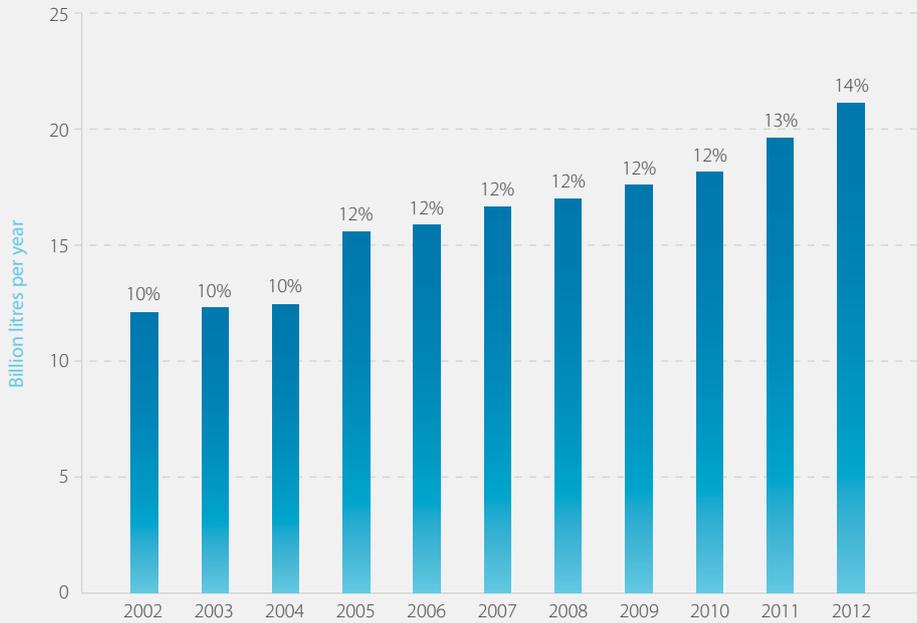
In order to track our progress towards our long term goals, the *Water Forever* 50 year plan set the targets of achieving the following by 2030:

- Reducing water use by 15 per cent;
- Increasing the amount of water that is recycled to 30 per cent; and
- Developing up to 100 gigalitres of new water sources.

**We are well on our way to meeting the targets for lower per-person consumption, reducing by around 8 per cent in Perth.**



**Figure 5: Statewide water recycling**



We are on track to increasing wastewater recycling in Western Australia from the current level of 13.6 per cent to 30 per cent by 2030. Last year, our customers helped us to recycle about 21 billion litres of water.

Over the last 10 years, the volume of recycled wastewater increased by almost 75 per cent across the State (Figure 5). Perth and regional areas each account for about half of water recycled. Generally, there is a much higher percentage of recycling in regional areas, with some towns recycling 100 per cent of their wastewater.



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## Looking ahead

Looking after our precious water is a community business. It takes cooperation and contributions from all sectors: households, business, industry, governments and schools to achieve the efficiencies that we must have to secure sustainable supplies.



The Water Corporation is taking a lead in planning and will continue to work closely with the community in all water projects throughout Western Australia.



For more information visit [watercorporation.com.au](http://watercorporation.com.au)

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