

**NSW Climate Change Fund  
Annual Report 2009–2010**



**Cover photographs:**

1. Liddell Power Station. Courtesy Macquarie Generation
2. Checking appliances for energy efficiency
3. Rainwater storage tanks at Newtown High School of Performing Arts. Courtesy John Caley
4. Mini-hydro turbine. Courtesy Sydney Water

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# Minister's foreword

Welcome to the 2009–10 annual report for the NSW Government's Climate Change Fund.

This report shows that NSW is becoming a greener state.

Since it was established in 2007, the Fund has expended \$369.490 million to help households, businesses, schools, government and communities tackle climate change by saving water, energy and greenhouse gas emissions. This funding will deliver estimated savings of 18.7 billion litres of water, 724,000 megawatt hours of electricity, 795,000 tonnes of greenhouse gas emissions and \$141 million on water and energy bills a year.

The Fund has provided financial support for a cultural shift that is taking place, as households, businesses and communities take up water and energy efficient technologies and behaviours in unprecedented numbers.

Education campaigns, business audits, low-income home assessments and Savings Action Plans have increased knowledge about cost-effective measures that can be made to save water, energy and greenhouse gas emissions and cut utility bills.

Rebates, retrofits and individual project funding have helped with up-front costs to significantly increase the number and range of effective water and energy saving measures being put in place. This includes low-cost lighting and water upgrades through to the installation of major infrastructure to generate clean energy through wind, geothermal and solar technologies.

One in 11 households has now taken up rebates in NSW to make their home more water and energy efficient. One in three rainwater tanks are now connected to toilets and/or washing machines, saving precious drinking water.

This year the Fund has helped a record number of community groups to undertake simple, low-cost water and energy upgrades for their facilities that are not only making a difference to their bills and helping the environment, but also inspiring the wider community to take action against climate change.

The NSW Government is pleased to be increasing its investment in proven and emerging technologies and building environmental expertise within a range of vocations.

People in NSW are taking action to tackle climate change and collectively we are making significant water, energy and greenhouse gas savings and moving closer to a low-carbon future through the generation of clean energy.

**Hon. Frank Sartor MP | Minister for Climate Change and the Environment**





# NSW Climate Change Fund overview





# The NSW Climate Change Fund

The NSW Climate Change Fund was established on 1 July 2007 under the *Energy and Utilities Administration Act 1987* and is administered by the Department of Environment, Climate Change and Water NSW (DECCW). The specific functions of the Fund, as outlined in section 34F of the Act, are to provide funding:

- to reduce greenhouse gas emissions and the impacts of climate change associated with water and energy activities
- to encourage water and energy savings and the recycling of water
- to reduce the demand for water and energy, including addressing peak demand for energy
- to stimulate investment in innovative water and energy savings measures
- to increase public awareness and acceptance of the importance of climate change and water and energy savings measures
- for contributions made by the State for the purposes of national energy regulation.

Over five years, the NSW Climate Change Fund will deliver more than \$700 million of funding to achieve outcomes in two key ways:

- providing direct financial support to homes, businesses, government, schools and community organisations to implement measures which will save water and power (and related greenhouse gas emissions), and so reduce their water and energy utility bills
- stimulating investment in clean energy technologies in NSW through funding for commercialising emerging technologies and additional support for proven technologies such as wind and solar power.

## How is it funded?

The main source of funding for the NSW Climate Change Fund continues to be the annual contributions from water and electricity providers, including EnergyAustralia, Integral Energy and Country Energy and water suppliers Sydney Water, Gosford City Council and Wyong Shire Council.

Under the Act, the Minister for Climate Change and the Environment requires water utilities and network service providers to make contributions to the Fund via the annual gazettal of Contributions Orders. The Water Contributions Order requires the concurrence of the Minister for Water and the Minister for Local Government and the Energy Contributions Order requires the concurrence of the Minister for Energy and the Treasurer.

Additional monies to the Fund are interest earned on cash balances.

## The 2009–10 Annual Report

This Annual Report has been prepared in accordance with the requirements of the *Energy and Utilities Administration Act 1987* (section 34H). Activities under the NSW Climate Change Fund are reported for the third financial year of operations from 1 July 2009 to 30 June 2010.

As required by the Act, the Report provides information on fund allocations and anticipated benefits, with reference to the key performance indicators and purposes of the Fund. The performance of the Fund is reported under grouping of initiatives for power savings, water savings and clean energy.

Key performance indicators for the Fund are:

- savings in water, energy (consumption and peak demand) and greenhouse gas emissions
- savings in annual energy and water bills for households, business, government, community groups and other organisations
- clean energy generated
- cost-effectiveness (per funding dollar spent)
- funding allocated.

# Highlights for 2009–2010



To 30 June 2010, \$301 million has been allocated or paid to help households, businesses and communities save an estimated 18.7 billion litres of water, 724,000 megawatt hours of electricity, 795,000 tonnes of greenhouse gas emissions, 75,000 kilowatts peak demand and \$141 million in water and power bills a year.

On average, the funding investment is paid back in two years and two months (see Table 1).

These savings are being delivered through 763 funded projects, 278,000 residential rebates, 25,000 public housing retrofits and assistance to 5,290 businesses.

Three hundred and thirty of the 763 projects have already been completed.

## Households

\$155 million has been provided to help households save an estimated 4.5 billion litres of water, 397,000 megawatt hours of electricity, 425,000 tonnes of greenhouse gas emissions, 6,000 kilowatts peak demand and \$50.5 million in water and power bills a year. This is being delivered through 23 projects, 278,000 residential rebates and 25,000 public housing retrofits.

On average, the funding investment is paid back in three years and one month (see Table 1).

The NSW Government has committed an extra \$70 million to expand NSW Home Saver Rebates, including two new rebates for dual flush toilets and hot water circulators.

One in 11 NSW households has taken advantage of NSW Home Saver Rebates to make their home more water and energy efficient.

Twenty local councils have received up to \$5,000 for promotional activities to increase rebate uptake in their Local Government Area.

The \$63 million Home Power Savings Program is offering 220,000 vulnerable households across NSW a free home energy assessment, energy refit and tailored advice.

The average cost to the Fund to obtain CO<sub>2</sub>-e emission reductions for household programs is \$26.21 per tonne (see Table 2).

## Businesses

\$79.5 million is being provided to help businesses save an estimated 11.2 billion litres of water, 263,000 megawatt hours of electricity, 302,000 tonnes of greenhouse gas emissions, 62,000 kilowatts peak demand and \$73 million in water and power bills a year. This is being delivered through 109 projects and two key sustainability programs for businesses.

On average the funding investment is paid back in 13 months (see Table 1).

More than 5,000 businesses have received energy assessments and a tailored 'action plan' as part of the Energy Efficiency for Small Business Program, estimated to save an average of \$1,400 in energy costs and 10 tonnes of greenhouse gas emissions a year per business.

A total of 290 medium to large businesses have joined the \$20 million Sustainability Advantage Energy Saver Program to access subsidised energy audits and technical support to save energy and greenhouse gas emissions. To 30 June 2010, the program has helped businesses identify measures to save 57,450 tonnes of greenhouse gas emissions and \$7.3 million on power bills a year.

High-end users and some councils completed 298 Water Savings Action Plans and 267 Energy Savings Action Plans. Combined, these have identified savings of 8.3 billion litres of water, 458,000 megawatt hours of electricity and more than 825,000 tonnes of greenhouse gas emissions a year. This is estimated to save \$20.2 million off water bills and \$108 million off power (electricity and gas) bills a year through the implementation of cost-effective actions. Thirty nine per cent of cost-effective water measures and 32 per cent of energy measures had been implemented by 30 June 2010.

Around 600 vocational students, mainly from the utilities and construction sectors, have received energy efficiency training.

Six large-scale projects for commercialising emerging technologies are being funded to generate power or reduce grid power demand by an estimated 96,000 megawatt hours, reduce summer peak demand by 11,400 kilowatts and save around 103,000 tonnes of greenhouse gas emissions a year.

Six Wind Renewable Energy Precincts have been established in NSW.

In May 2010 the NSW Government announced it would provide \$120 million over 20 years for NSW projects under the Australian Government's \$1.5 billion Solar Flagships Program. Three NSW-based projects have been short-listed for consideration.

The average cost to the Fund to obtain CO<sub>2</sub>-e emission reductions for business programs is \$11.72 per tonne (see Table 2).

## Community

\$66 million is being provided to community organisations, government agencies and schools to make their facilities more water and energy efficient, reduce utility bills and inspire the wider community to do the same. Six hundred and thirty one projects are expected to save an estimated 3 billion litres of water, 64,000 megawatt hours of electricity and 68,000 tonnes of greenhouse gas emissions a year and 6,500 kilowatts of peak demand. This translates to estimated savings of \$8.3 million in water bills and \$8.8 million in power bills a year.

On average, the funding investment is paid back in four years (see Table 1).

A total of 51 NSW high schools have now received lighting retrofits, estimated to save 25,000 megawatt hours and 26,750 tonnes of greenhouse gas emissions in the first 10 years and \$300,000 off power bills per year.

More than 400 not-for-profit community organisations applied for up to \$40,000 funding to make their facilities more water and/or energy efficient under the Community Savers stream of the Public Facilities Program.

Fifty seven per cent of 63,413 calls to the Environment Line for 2009/10 were related to the Climate Change Fund – around 30 per cent higher than the previous financial year.

The average cost to the Fund to obtain CO<sub>2</sub>-e emission reductions for community programs is \$54.30 per tonne (see Table 2).

Table 1

### Climate Change Fund average payback period by sector

Sector	Funding approved	Average payback period on CCF funding investment
Business	79,510,921	13 mths
Households	155,367,683	3 yrs 1 mth
Community facilities	65,925,446	4 yrs
<b>Total</b>	<b>300,804,050</b>	<b>2 yrs 2 mths</b>

Payback = funding approved/estimated annual \$ savings (from Tables 2, 3, and 4)

## Tables 2, 3 and 4

### Funding and expected outcomes by sector and resource savings

Power Savings	Funding approved	Estimated MWh savings per year	Estimated tCO <sub>2</sub> -e savings per year	Estimated kW savings per year	Estimated annual \$ savings (electricity bills)*	**Cost-effectiveness \$/MWh	**Cost-effectiveness \$/tCO <sub>2</sub> -e
Business	23,965,456	167,117	199,427	50,693	30,834,571	\$14.35	\$11.72
Households	110,566,859	396,832	424,692	6,025	41,515,166	\$28.05	\$26.21
Community Facilities	26,635,142	46,491	50,220	5,936	6,698,544	\$58.57	\$54.30
<b>Total</b>	<b>161,167,458</b>	<b>610,440</b>	<b>674,339</b>	<b>62,653</b>	<b>79,048,281</b>	<b>\$26.56</b>	<b>\$23.95</b>

Water Savings	Funding approved	Estimated ML savings per year	Estimated annual \$ savings (water bills)*	**Cost-effectiveness \$/kL
Business	30,719,581	11,151	30,554,632	\$0.28
Households	44,800,824	4,504	9,007,118	\$1.02
Community Facilities	33,228,896	3,035	8,316,651	\$1.12
<b>Total</b>	<b>108,749,301</b>	<b>18,690</b>	<b>47,878,401</b>	<b>\$0.59</b>

Clean Energy	Funding approved	Estimated MWh generated per year	Estimated tCO <sub>2</sub> -e savings per year	Estimated kW savings per year	Estimated annual \$ savings (electricity bills)*	**Cost-effectiveness \$/MWh	**Cost-effectiveness \$/tCO <sub>2</sub> -e
Emerging Technologies	24,825,884	96,012	102,733	11,401	12,001,500	\$25.86	\$24.17
Proven Technologies	6,061,408	17,163	17,645	613	2,145,428	\$35.32	\$34.35
<b>Total</b>	<b>30,887,292</b>	<b>113,175</b>	<b>120,378</b>	<b>12,014</b>	<b>14,146,928</b>	<b>\$27.97</b>	<b>\$25.66</b>

These tables include information from the following:

Energy Savings Fund, Water Savings Fund, Green Business Program, Public Facilities Program (Demonstration and Community Savers), Central Coast Water Savings, Renewable Energy Development Program, Schools Energy Efficiency Program, Schools Rain Water Tank Program, Housing NSW initiatives, Home Saver Rebates Program, Sustainability Advantage Energy Savers Program and Energy Efficiency for Small Business Program.

Community projects include local government, schools and state government. Power savings table includes savings (MWh, tCO<sub>2</sub>e, kW and \$ electricity bill savings) from designated water savings projects. Water savings table includes savings (ML and \$ water bill savings) from designated power savings projects.

\* Water calculated using Tier 1 charges – \$2.00/kL for residential, \$2.74/kL (\$2.00 + 50% wastewater charges) for all other sectors (source Sydney Water usage charges 2010–2011). Electricity residential and community calculated at \$0.21/kWh (source NABERS information), and business (\$0.125/kWh) and government (\$0.119/kWh) (source DECCW data analysis average for medium to large users, Energy Australia tariffs 2008–2009, DECCW contract (777,776) data for budget dependent agencies). Electricity \$ savings for Residential Rebates calculated at \$140per HWS rebate, \$100 per INS rebate and \$210 per Fridge Buyback rebate.

\*\* Cost-effectiveness of funding – funding divided by ten years of savings. tCO<sub>2</sub>e/MWh conversion factor from NGA June 2009 = 1.07.

Cost-effectiveness is calculated using funding and savings for designated energy or water projects; i.e. cost-effectiveness does not take into account the water savings from power projects and the electricity savings from water projects.



# Power savings



\$161 million is being provided to help households, businesses and community groups save an estimated 610,000 megawatt hours of electricity, 674,000 tonnes of greenhouse gas emissions, 62,600 kilowatts peak demand and \$79 million in power bills a year.

This is being delivered through 298 projects, 159,559 residential rebates, 5,979 public housing retrofits and 5,290 assisted businesses.







# Power savings for households

**With \$110 million support from the NSW Climate Change Fund, more than 160,000 NSW households are saving an estimated 397,000 megawatt hours of electricity, 425,000 tonnes of greenhouse gas emissions, 6,000 kilowatts peak demand and \$41.5 million off their power bills a year.**

## Achievements

118,848 NSW households have now taken advantage of NSW Home Saver Rebates to switch from an electric to a solar, heat pump or gas hot water system to make their homes more energy efficient. An additional 26,080 households installed ceiling insulation to improve the comfort levels and efficiency of heating and cooling their homes. Power savings for the NSW Home Saver Rebates are shown in Table 5 below.

A total of 14,631 NSW households in Metropolitan Sydney, Central Coast, Blue Mountains, Illawarra and the Shoalhaven areas have made use of a \$35 cash back to recycle their inefficient second fridge through the Fridge Buyback Program.

The \$63 million Home Power Savings Program offers 220,000 vulnerable households across NSW a free home energy assessment, energy refit and tailored advice to help save up to 20 per cent off their power use and help the environment. Items in the Power Savings Kit include a stand-by power switch, energy-efficient light bulbs, water-saving showerhead, low flow tap aerators, and draught excluders. The program was rolled out across the state in May 2010 and is expected to cut more than \$21 million off annual household bills and reduce carbon

pollution by 160,000 tonnes a year by the time the program is completed in June 2013.

A total of 3,597 social housing residents have had electric storage hot water heaters replaced with climate-friendly systems, and 2,697 homes have been insulated. Together, these are saving an estimated 9,664 megawatt hours of power, 10,341 tonnes of greenhouse gas emissions and \$773,000 off their power bills a year.

Under the former Energy Savings Fund, 11 energy saving projects for households are being implemented with \$6.5 million funding. Types of projects include residential audits and refits with energy efficient appliances and education and awareness campaigns. These projects will help save 85,125 megawatt hours of electricity, more than 91,000 tonnes of greenhouse gas emissions and \$17.9 million in power bills a year. Nine of these projects have been completed.

The \$15 million Save Power program is increasing people's understanding of their power use and how to save power. It addresses information and knowledge deficits in relation to energy. The program uses best practice social marketing integrated with education and social research activities. It includes:

- mass-media communication (including the Save Power advertising campaign, information resources, campaign website – [savepower.nsw.gov.au](http://savepower.nsw.gov.au) and below the line advertising)
- community education (including Save Power Retail Program, Save Power at Home Library program and the CSIRO partnered Energymark NSW program)
- social research and evaluation (including campaign tracking and program evaluation).

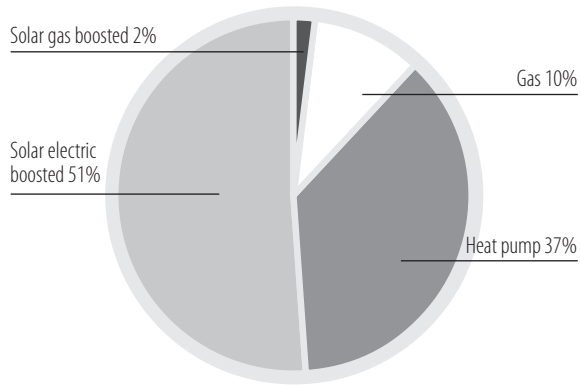
Table 5

### Energy efficient NSW Home Saver Rebates (total to 30 June 2010)

Rebate	Number	Estimated savings (MWh/yr)	Estimated savings (tCO <sub>2</sub> e/yr)	Estimated bill savings (\$/yr)
Climate-friendly hot water system	118,848	277,682	297,120	16,638,720
Fridge buyback rebate	14,631	9,572	10,242	3,072,510
Ceiling Insulation (ended on June 30 2009)	26,080	12,187	13,040	2,608,000
<b>Total</b>	<b>159,559</b>	<b>299,441</b>	<b>320,402</b>	<b>22,319,230</b>

Figure 1

## Hot water system rebates paid by system type



## Survey of rebate recipients

An email survey of some rebate recipients by DECCW in November 2009 (2,600 respondents) showed:

- 90% said that it was very important for the NSW Government to offer rebates to help people overcome the upfront costs of saving water and energy
- 80% said they are now using less energy/and or water
- 76% said that the rebate either motivated them to purchase a type of item with better environmental credentials, or that they only bought the item because the rebate was available
- 95% said they had told other family members or friends about the rebates.

The program informs and motivates changes in energy use and informs the community of other energy efficiency initiatives, including rebates, to help make their homes more water and energy efficient. It also provides the communications framework for all the other elements of the Energy Efficiency Strategy.

Since the program started, there has been a 13 per cent increase in energy efficiency activity across 10 'everyday' energy efficient behaviours that people say they do 'mostly'. Evaluations show a high level of support (81 per cent approval) for the campaign. Over the course of the campaign, knowledge and views about electricity have changed significantly:

- disagreement with the statement that 'using electricity does not contribute to environmental problems' increased by 10 per cent (from 68 per cent to 78 per cent)
- Eighty-nine per cent of people said they are mindful of electricity use, with 94 per cent of those who have seen the advertising mindful compared to 86 per cent of those who have not seen the advertising (March 2010).

## ■ CASE STUDY

### Turning good habits into bigger savings

The McCarthy family of Sydney was the first household to take part in the state-wide roll out of the Home Power Savings Program.

Pensioners Patricia and Chris will save \$116 on their power bills and the equivalent of 38,200 black balloons of carbon pollution a year following a free home power assessment as part of the program.

Patricia and Chris had considered themselves to be good power savers.

"I did not think there would be much opportunity for us to save more power as we are already pretty efficient, but the Power Savings Kit gave us new devices that made a big difference.

"We used the powerboard straight away in the lounge room. I now go to bed every night knowing that the power is off on my TV, DVD, VCR, stereo and lamp. The draught-proofing around the doorway has also made a big difference as the house is now much warmer," said Patricia.

Following the home power assessment, the McCarthys received a personal Power Savings Action Plan identifying a further \$600 of savings. Simple actions such as recycling the second fridge will save Patricia and Chris close to \$300 a year and around 30,000 black balloons of carbon pollution.

"I was really pleased with the program, and happy to learn that there are other ways that I can save," Patricia said.

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NSW HOME POWER SAVINGS PROGRAM

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# Power savings for businesses

**With \$24 million support from the NSW Climate Change Fund, more than 5,330 NSW businesses are saving an estimated 167,000 megawatt hours of electricity, 199,000 tonnes of greenhouse gas emissions and \$30.8 million off their power bills a year, through 44 projects and two key assistance programs.**

## Achievements

A total of 44 energy savings projects for businesses are being implemented with \$18.9 million allocated under the Green Business Program, Public Facilities Program and the former Energy Savings Fund. These projects will help save 85,000 megawatt hours of electricity, 92,000 tonnes of greenhouse gas emissions and \$10.7 million in power bills a year. To 30 June 2010, 25 of 44 projects have been completed.

These projects include generation (including cogeneration), energy efficiency, education and power factor correction initiatives. Technologies being employed include absorption chilling and high efficiency compressors in industrial processes, multi-level lighting systems, installation of utilities management systems and efficient speed drives. Power savings by project type are shown in Table 6.

In addition, 290 medium to large businesses have participated in Sustainability Advantage Energy Saver activities including audits, energy savings projects and sector transformation projects. To

30 June 2010, the program has helped businesses identify measures to save 35,000 megawatt hours of electricity, 294,500 GJ of gas, 57,450 tonnes of greenhouse gas emissions and \$7.3 million on power bills a year.

More than 6,000 businesses that employ up to 10 staff, or spend less than \$20,000 a year on power bills, have joined the \$15 million Energy Efficiency for Small Business Program. To 30 June 2010, more than 5,000 businesses have received energy assessments and a tailored 'action plan', which are estimated to save an average of \$1,400 in energy costs and 10 tonnes of greenhouse gas emissions a year. Rebates of up to \$5,000 are available for improvements to lighting, heating, ventilation and cooling, refrigeration, hot water systems, insulation, boilers and compressed air use.

Industry associations are promoting the Energy Efficiency for Small Business Program across their NSW membership. For example:

- a partnership with Dairy NSW will help more than 700 dairy farmers identify and implement energy saving opportunities, such as the installation of variable speed drives on milk vacuum pumps
- a partnership with EnergyAustralia targets 400 hairdressers for a complete down-light replacement resulting in an average annual saving of \$250 a year.

Energy Savings Action Plans have been prepared by 206 business sites that use more than 10 gigawatt hours of electricity a year. Of the cost-effective annual savings of 729,000 tonnes of greenhouse gas emissions (identified in these Plans), 35 per cent have already been implemented, with estimated savings of \$35.3 million on electricity and gas bills a year. Measures commonly implemented

Table 6

## Business energy projects estimated savings and cost-effectiveness by project type

Project type	No. of projects	Funding allocated \$	Estimated savings (MWh/yr)	Estimated savings (tCO <sub>2</sub> e/yr)	Estimated peak savings (kW)	Estimated bill savings (\$/yr)	Return on CCF funding /MWh
Efficiency measures	32	10,898,658	42,678	46,277	33,675	5,334,688	\$25.54
Education	2	580,000	12,921	13,825	0	1,615,125	\$4.49
Generation	5	6,780,000	29,731	31,812	6,955	3,716,400	\$22.80
Power factor correction	5	602,804	-	-	9,717	-	-
<b>Total</b>	<b>44</b>	<b>18,861,462</b>	<b>85,330</b>	<b>91,915</b>	<b>50,347</b>	<b>10,666,213</b>	<b>\$22.10</b>

[Table note: Does not include water savings projects with some energy savings]

are installation, upgrade or optimisation of industry equipment, modifying industrial processes and improvement of HVAC through sensor controls or replacement of systems.

NSW tradespeople and professionals are getting a boost to their energy efficiency knowledge and skills under the \$20 million Energy Efficiency Training Program, managed by DECCW NSW and NSW Department of Education and Training (DET). The program targets key trades and professions, such as electricians,

plumbers, building managers, engineers, planners and service professionals, to improve the design, installation and maintenance of energy-efficient products and services. In the first year of the program, 589 vocational students, mainly from the utilities and construction sectors, have received energy efficiency training. A total of 18 Industry Partnerships have been established to deliver innovative training in services such as property, business, construction, sales and IT.

#### ■ CASE STUDY

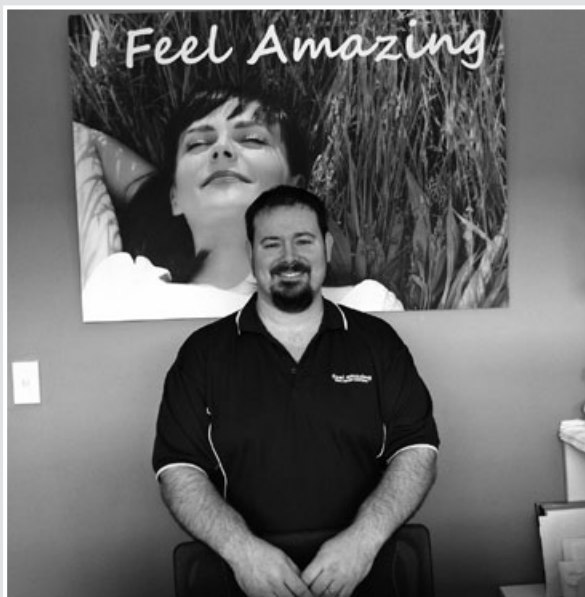
### Small business lowers power bills

The Feel Amazing Wellness Centre is owned and managed by a husband and wife team, offering natural therapies such as massage, naturopathy and chiropractic treatments. The centre employs three full-time staff and eight part-time staff.

The Centre viewed the Energy Efficiency for Small Business Program as an opportunity to better understand its use of power and make changes to reduce greenhouse gas emissions and to save money. Following an energy assessment the business:

- replaced halogen down-lights in the reception area with compact fluorescent and high-efficiency halogen lights
- installed a timer on the hot water system
- installed zone dampers to air-conditioning ducts
- encouraged staff to turn off lights and equipment when not in use.

These simple actions are estimated to save 3,916 kilowatt hours of electricity, four tonnes of greenhouse gas emissions and \$413 off power bills a year.



#### ■ CASE STUDY

### The power of integrated energy management

Kellogg (Aust.) Pty Ltd (Kellogg's) is one of the top energy users in NSW. The company has put its Energy Savings Action Plan to work with the help of \$444,000 funding from the Climate Change Fund's Green Business Program.

Kellogg's has installed a utility management system (including boiler combustion control and chilled water management), a large number of variable speed drives, power sub-metering and a demand management and control system to reduce power demand.

Compared to 2009, there has been a six per cent reduction in both gas and electricity use and consumption is continuing to trend downwards.

Helena Cooke-Yarborough, Environmental Sustainability Manager, Asia Pacific, believes that the energy management project is an important part of the Kellogg's commitment to making quality food while maximising environmental sustainability.

"Kellogg's has set a goal of 15-20 per cent reductions in energy use, greenhouse gas emissions, water use and waste per metric tonne of food produced by 2015 against a 2005 baseline," said Helena.

"Similar systems are also being adopted in other parts of our business and we believe the integrated energy management system can also be adopted by other similar food manufacturing and processing businesses."

Kellogg's is also a participant in DECCW's Sustainability Advantage Program.



#### ■ CASE STUDY

### Energy-wise bowling clubs

Bowling Clubs provide a valuable recreational and social hub for regional and city communities. Club members and visitors can enjoy a range of facilities such as bowling greens, gyms, function rooms, restaurants and bars. Some clubs attract more than 100,000 people through their doors each year.

Thirteen NSW Bowling Clubs have been provided with a total of \$286,390 funding under the Climate Change Fund's Community Savers stream to help reduce their energy use.

Clubs have installed a range of measures to increase energy efficiency, save money on power bills and improve club facilities. Clubs have undertaken one or more of the following actions:

- roofs painted with a heat reflective coating
- cooling towers upgraded and installed air curtains across all cool and freezer rooms
- roof ventilators, ceiling insulation, ceiling fans, automatic timers, movement and daylight sensors installed
- lighting upgraded
- electric hot water systems replaced with solar and heat pump units.

Savings by individual clubs are expected to be as high as 2,150 megawatt hours of electricity and 2,300 tonnes of greenhouse gas emissions in the first 10 years. One Club is expected to save a massive \$45,000 off its annual electricity bill.

#### ■ CASE STUDY

### Energy Saver Program

Thales Australia Limited, a high-tech defence technology company, marginally increased the air conditioning set-point of its workplaces in summer and reduced the temperature set-point in winter. The estimated savings for the company are \$13,000 and 120 tonnes of greenhouse gas emissions a year, for zero capital outlay.

Rheem Australia Pty Ltd, a hot water system manufacturer, found that air compressor power consumption was logged at 43 kW when the factory was not operating, due to air leaks. By implementing a leak reduction program, Rheem is saving \$11,900 each year, with a net saving (after labour and material costs) of \$3,900. The project is saving 140 tonnes of greenhouse gas emissions a year.

Another manufacturer undertook lighting and refrigeration improvements, such as sealing doors and replacing fluorescent tubes. The company will accumulate \$70,350 in cost savings over 5 years (\$14,070 per annum), while saving 113 megawatt hours of electricity and 120 tonnes of greenhouse gas emissions a year. With maintenance savings, this investment has a payback period of 2.4 to 3.75 years.



# Power savings for community facilities



**\$26.6 million is being provided to 243 projects to help community groups and government save an estimated 465,000 megawatt hours of electricity, 500,000 tonnes of greenhouse gas emissions in the first ten years in their public and community facilities, and \$6.7 million in annual power bills.**

## Achievements

A total of 243 energy savings projects for community groups and government are being implemented with \$26.6 million allocated under the Public Facilities and Schools Energy Efficiency programs and the former Energy Savings Fund. These projects are estimated to save 465,000 megawatt hours of electricity and 500,000 tonnes of greenhouse gas emissions in the first 10 years as well as \$6.7 million in power bills a year. To 30 June 2010, 129 of these projects have been completed. Power savings by project type are shown in Table 7 below.

Up to \$40,000 is available for community organisations to implement simple, low-cost energy and water upgrades in their facilities. Types of projects being funded to reduce energy consumption and power bills include lighting upgrades and the installation of climate-friendly hot water systems, ceiling insulation and skylights. Examples of organisations being supported are not-for-profit pre-schools, aged care groups, sport and recreation clubs, religious facilities and disability and support services.

Demonstration projects are being implemented in larger public facilities such as local council buildings, schools, TAFEs, scout halls and hospitals. Types of projects being funded include lighting

upgrades, optimisation of HVAC and chillers and insulation. The demonstration projects will implement education initiatives such as practical workshops and events, educational brochures, signage and websites.

Around \$8 million in lighting upgrades has been funded in 51 NSW high schools under the \$20 million Schools Energy Efficiency Program, being jointly managed by DECCW and NSW Department of Education and Training. Savings are estimated at 25,000 megawatt hours of electricity and 26,750 tonnes of greenhouse gas emissions in the first 10 years as well as saving \$300,000 in annual power bills.

Energy Savings Action Plans have been prepared by 46 local councils that have populations of more than 50,000 people and 15 government sites that use more than 10 gigawatt hours of electricity a year. Of the cost-effective annual savings of 96,500 tonnes of greenhouse emissions identified in these Plans, eight per cent have been implemented, with estimated savings of \$1 million on electricity and gas bills a year. Measures commonly implemented are lighting upgrades, improvements to HVAC and installing energy efficient appliances.

Earth Hour 2010, coordinated by the World Wildlife Fund, received \$100,000 from the Climate Change Fund to encourage communities to save power and to encourage sustainability. Of the 42,908 Australians who signed up to the event on Saturday 27 March, around 36,000 individuals and more than 2,000 businesses were from NSW. During Earth Hour 2010, Energy Australia estimated a six per cent drop in energy use in the Sydney CBD area.

Visit [www.environment.nsw.gov.au/grants/ccfund.htm](http://www.environment.nsw.gov.au/grants/ccfund.htm) for details of power savings projects funded under the Climate Change Fund.

Table 7

## Community energy projects estimated savings and cost-effectiveness by project type

Project type	No. of projects	Funding allocated \$	Estimated savings (MWh/yr)	Estimated savings (tCO <sub>2</sub> e/yr)	Estimated peak savings (kW)	Estimated bill savings (\$/yr)	Return on CCF funding /MWh
Demonstration	89	23,087,282	41,981	45,394	5,936	5,751,368	\$54.99
Community Savers	154	3,547,860	4,510	4,826	0	947,176	\$78.66
<b>Total</b>	<b>243</b>	<b>26,635,142</b>	<b>46,491</b>	<b>50,220</b>	<b>5,936</b>	<b>6,698,544</b>	<b>\$57.29</b>

## ■ CASE STUDY

### Tamworth TAFE cuts its power use

Tamworth TAFE has reduced its energy use by around eight per cent following lighting and air conditioning upgrades that were supported with \$59,300 from the Climate Change Fund. These energy saving measures are saving the TAFE 256 megawatt hours of electricity and 274 tonnes of greenhouse gas emissions a year.

The library, which includes classrooms and a seminar room, is the TAFE's largest energy consumer and is air conditioned with a chilled water system plus split units for the classrooms. A Master Controller now optimises the air conditioning plant's operation by matching the chilled water temperature to the outside air.

In winter, the temperature will float upwards and reduce the running time of the main compressor. The cooling tower fan now has a variable speed drive which slows the fan at low loads, saving more energy. In warm weather, when the outside air temperature is cooler than inside, fresh air will be drawn inside by controlling the fresh air damper which enables "free cooling".

Classroom units are now controlled by push-button timers so that the units only run when required and the seminar room now has its own split systems, which will run only when the room is occupied. Old inefficient fluorescent lighting was either upgraded with electronic ballasts and efficient lamps or replaced with efficient T5 types.

Classroom lights that were previously left on are now switched off in unoccupied rooms, thanks to the installation of 124 occupancy sensors. On top of the energy savings, TAFE students and staff are now enjoying better quality lighting because of higher lighting levels and improved colours.

Assistant Director Bernie Ingle said that demonstrating the benefits of the upgrades and educating the community about energy efficiency was an important part of the project.



"Tamworth TAFE is providing local teachers, high school students, contractors and the wider community with opportunities to learn more about its energy saving technology and results through presentations, trade nights, a video and local media," said Bernie.

## ■ CASE STUDY

### Arts precinct goes green

Sydney Theatre Company (STC) has partnered with Arts NSW to turn Pier 4/5, The Wharf at Walsh Bay, a 20th century industrial building on Sydney Harbour, into an example of 21st century best environmental practice.

The Climate Change Fund has contributed \$1.1 million towards the \$5.6 million Greening the Wharf project. The project will provide water and energy upgrades to the heritage listed home of arts organisations such as Sydney Theatre Company, Sydney Dance Company, Australian Theatre for Young People, Accessible Arts, Regional Arts NSW, Australian Dance Council, Sydney Philharmonia, Song Company, Gondwana Voices and the Bangarra Dance Theatre.

A major feature of the project is the roof-mounted 378 kW photovoltaic (PV) array that will generate over 400 megawatt hours of clean energy a year. The PV array is composed of new Suntech Pluto photovoltaic technology co-developed with the University of New South Wales. This installation is the second largest building mounted array in Australia and the first large scale Pluto array.

Lighting upgrades will also save energy drawn from the power grid, occupancy sensors will switch lights off in unoccupied areas, halogen downlights will be re-lamped with more efficient types and all fluorescent lamps using old technology will be converted to high efficiency T5 lamps with electronic ballasts.

Cate Blanchett, co-artistic director of STC, said that as a cultural institution the theatre company wanted to be engaged in the most important issue facing us as a species, that is, climate change.

"We all know theatre happens under electric lights. We're a huge consumer of energy, so this is a really positive thing," said Ms Blanchett.



Collectively, the upgrades are expected to reduce electricity drawn from the grid by 600 megawatt hours and save 634 tonnes of greenhouse gas emissions a year.

Through rainwater harvesting, the project is also expected to save 8.8 million litres of water a year which, is equivalent to four Olympic sized pools. The rainwater harvesting system will supply 100 per cent of The Wharf's non-potable water needs.

With 300,000 attendances at the Wharf each year, the project is expected to provide an excellent starting point to promote the sustainability initiatives through hosting lectures, forums and art exhibitions. The PV array is also highly visible from the Harbour Bridge.





# Water savings



\$109 million is being provided to help households, businesses and community groups save an estimated 18.7 billion litres of water and \$47.9 million in water bills a year, through 452 projects, 118,591 residential rebates and 18,855 public housing retrofits.







# Water savings for households

**With \$44.8 million support from the NSW Climate Change Fund, more than 130,000 NSW households are saving an estimated 4.5 billion litres of water and \$9 million off their water bills a year.**

## Achievements

To make their homes more water efficient, 118,591 households have now taken advantage of NSW Home Saver Rebates for rainwater tanks and water efficient washing machines, as well as new rebates for dual flush toilets and hot water circulators.

Two new rebates were introduced in January 2010:

- \$200 for replacing a single flush toilet with a 4 star dual flush toilet suite
- \$150 for installing a hot water circulator
- One in three rainwater tanks installed in NSW are now connected to toilets and/or washing machines, compared to almost one in six in 2007.

Water savings for NSW Home Saver Rebates are shown in Table 8 below.

A total of 12 water savings projects for households are being implemented with \$4.3 million funding under the Central Coast Water Savings Fund and the former Water Savings Fund (within Sydney). The projects include measures such as installation of water efficient fixtures, harvesting of rainwater via rainwater tanks and use of alternate water sources for laundries, gardens and toilets. These projects will help save 328 million litres of water and more than \$650,000 in water bills a year. Eight of these projects have already been completed (to 30 June 2010).

More than 18,000 social housing residents have had their homes fitted with water saving tap valves and showerheads to save an estimated 394 million litres of water and \$788,139 in water bills each year.

Sydney Water's demand management initiatives for households are delivering additional savings funded from the Climate Change Fund, including WaterFix Residential Retrofits, DIY Water Saving Kits, Love Your Garden and other education campaigns (visit [www.sydneywater.com.au](http://www.sydneywater.com.au) for more details).

Table 8

### Water efficient NSW Home Saver Rebates (total to 30 June 2010)

Rebate	Number	Estimated savings (ML/yr)	Estimated bill savings (\$/yr)
Rainwater tanks	40,154	1,807	3,613,860
Washing machines	76,223	1,829	3,658,704
Dual flush toilets	2,214	55	110,700
Total	118,591	3,692	7,383,264

■ CASE STUDY

### Washing machine rebates help homes save water

Washing machines are typically the third-highest user of water in the home. By using a water efficient washing machine, households can save up to 24,000 litres of water a year.

The NSW Climate Change Fund's \$150 rebate began on 1 August 2008 with the rebate available for households purchasing a washing machine with at least a 4.5 star Water Efficiency Labelling and Standards (WELS) rating. By installing a 4.5 star washing machine, up to 100 litres per wash can be saved compared to an old top loader. To encourage greater water savings, the washing machine rebate changed to a 5 star WELS rating machine on 15 January 2010.

More than 76,000 washing machine rebates have been paid to NSW householders from 1 August 2008 to 30 June 2010, totalling \$11.4 million and saving an estimated 1.8 billion litres of water a year.

The rebate program also encouraged manufacturers to make water efficient washing machines widely available. Water efficient models (4 star or greater) now account for more than 60 per cent of the market. The rebate ended as scheduled on 30 June 2010.

Visit [www.environment.nsw.gov.au/rebates](http://www.environment.nsw.gov.au/rebates) for more information.





# Water savings for businesses

**NSW businesses are being assisted with \$30.7 million through 59 projects to save an estimated 11.2 billion litres of water and \$30.5 million off their water bills a year.**

## Achievements

A total of 59 water savings projects for businesses are being implemented with \$30.7 million allocated under the Green Business Program, Central Coast Water Savings Fund and the former Water Savings Fund (within Sydney). These projects will help save 11.2 billion litres of water and \$30.5 million in water bills a year. To 30 June 2010, 42 of these projects have already been completed.

A range of stormwater and rainwater harvesting, recycling, groundwater and water efficiency projects are being funded, including water recovery and re-use from industrial processes and equipment, and water efficient devices and equipment.

Water savings by project type are shown in Table 9 below.

Water Savings Action Plans have been prepared by 220 business sites in the Sydney Water area that use more than 50 million litres of water a year. Of the cost-effective savings of 6.5 billion litres of water identified in these plans, 44 per cent have already been implemented with estimated savings of \$7.8 million on water bills a year. Measures commonly implemented are alternate water supplies (waste and industrial process recovery, harvesting, recycling and bore water) and optimisation of industrial processes.

Sydney Water's Every Drop Counts Business Program, funded from the Climate Change Fund, is delivering additional water savings (visit [www.sydneywater.com.au](http://www.sydneywater.com.au) for more details).

The Recycling and Stormwater Harvesting Program provides \$13 million to support potential recycled water suppliers, distributors and customers in the development of localised recycling and stormwater harvesting schemes. The Office of Water is reviewing cost and water saving estimates of a prioritised list of recycling schemes to establish their feasibility.

Table 9

## Business water projects estimated savings and cost-effectiveness by project type

Project type	No. of projects	Funding allocated \$	Estimated savings (ML/yr)	Estimated bill savings (\$/yr)	Return on CCF funding /kL
Recycling	31	20,807,808	8,847	24,240,069	\$0.24
Harvesting	9	1,444,168	158	433,679	\$0.91
Efficiency	18	6,806,098	1,972	5,403,564	\$0.35
Groundwater	1	1,661,507	160	438,400	\$1.04
Total*	59	30,719,581	11,137	30,515,713	\$0.28

\*does not include power savings projects with associated water savings

■ CASE STUDY

## Millions of litres of water saved at Sydney airport

As one of NSW's largest water users, Sydney Airport has undertaken an innovative water recycling project that is expected to save one million litres of drinking water each day over the next 20 years.

The project was identified as a key water saving opportunity in Sydney Airport's Environment Strategy and Water Savings Action Plan.

With three million dollars from the NSW Climate Change Fund, a dual-pipe system was retrofitted throughout the International Terminal. Sydney Airport then invested a further seven million dollars to build a water treatment and recycling plant to treat and clean waste water using mechanical, chemical and biological processes. The water is then reused throughout the airport for toilet flushing, air conditioning cooling towers and irrigation.

This project is achieving sustainable environmental and commercial outcomes for Sydney Airport. By treating and reusing water that is fit-for-purpose throughout the International Terminal, the airport is reducing the amount of drinking water it purchases and therefore saving on water bills.

This long-term investment in water management will offset the increase in water demand into the future as passenger movements through the International Terminal are set to double to over 68 million by 2024.



Julia Phillips, Sydney Airport Manager Environment, said that the economic benefits are already being seen and that feedback has been positive.

"We are already realising the cost savings, and we will be able to quantify exact figures in the near future," said Phillips.

Already the treatment plant is saving an average of 550,000 litres of water every day and is set to increase to a maximum of one million litres a day over the coming years.

"We are receiving positive feedback from airport stakeholders," said Phillips, "no one is frightened by recycled water and we haven't received any negative feedback."



# Water savings for community facilities

**\$33.5 million is being provided through 381 projects to help community groups and government save an estimated 30 billion litres of water in the first 10 years in their public and community facilities and \$8.3 million savings in annual water bills.**

## Achievements

A total of 381 water savings projects for community groups and government are being implemented with \$33.5 million allocated under the Public Facilities Program, Central Coast Water Savings Fund and the former Water Savings Fund (within Sydney). These projects will help save 30 billion litres of water in the first 10 years and \$8.3 million in water bills a year. To 30 June 2010, 117 of these projects have already been completed.

Up to \$40,000 is available for community organisations to implement simple, low-cost energy and water upgrades in their facilities. Types of water measures being funded include upgrade and retrofit of bathroom amenities, installation of rainwater tanks and harvesting of rainwater for irrigation. Examples of organisations being supported are pre-schools, aged care groups, sport and recreation clubs and disability and support services.

Demonstration projects are being implemented in larger public facilities such as local council buildings, schools, TAFEs, scout halls and hospitals. Types of projects being funded include upgrade of taps and toilets, alternate water use (harvested or recycled) for irrigation and installation of rainwater tanks. Demonstration initiatives include practical workshops and events, educational brochures, signage and websites.

Water savings by project type are shown in Table 10 below.

Funding is also being provided to implement the Government's commitment that every government school in NSW will have a rainwater tank. In 2009–10, 134 schools were given grants to install a rainwater tank. The remaining schools that do not have a rainwater tank will receive a grant by early 2011. Sydney Water's Every Drop Counts Schools Program, funded from the Climate Change Fund, is delivering additional water savings (visit [www.sydneywater.com.au](http://www.sydneywater.com.au) for more details).

Water Savings Action Plans have been prepared in the Sydney Water area by all 44 local councils and 34 government sites that use more than 50 million litres of water a year. Of the cost-effective annual savings of 1.8 billion litres of water identified in these Plans, 22 per cent have already been implemented with estimated savings of \$1.1 million a year on water bills. Measures commonly implemented are upgrades and retrofit of amenities, monitoring of leakage, rainwater harvesting and improved efficiency of irrigation systems.

The NSW Government's Water for Life Education Program, coordinated by the NSW Office of Water, receives \$2 million a year from the Climate Change Fund. This program delivers and coordinates social marketing campaigns, on-the-ground water education projects, community consultation and provides training and resources for councils and non-government organisations. In 2009–10 almost \$300,000 in grants were allocated to eight council and non-government organisations to deliver practical water education projects. Visit [www.waterforlife.nsw.gov.au](http://www.waterforlife.nsw.gov.au) for more information on this program.

Visit [www.environment.nsw.gov.au/grants/ccfund.htm](http://www.environment.nsw.gov.au/grants/ccfund.htm) for details of water savings projects funded under the Climate Change Fund.

Table 10

## Community water projects estimated savings and cost-effectiveness by project type

Project type	No. of projects	Funding allocated \$	Estimated savings (ML/yr)	Estimated bill savings (\$/yr)	Return on CCF funding \$/kL
Recycling	29	13,447,430	1,705	4,670,708	\$0.79
Harvesting	292	15,329,398	916	2,510,901	\$1.67
Efficiency	56	4,098,449	290	794,846	\$1.41
Groundwater	4	618,620	59	160,564	\$1.06
<b>Total</b>	<b>381</b>	<b>33,493,896</b>	<b>2,970</b>	<b>8,137,019</b>	<b>\$1.13</b>

Table note: Does not include power savings projects with associated water and \$ savings





#### ■ CASE STUDY

### Local council takes the lead on rainwater harvesting

Woollahra Municipal Council has used \$79,427 from the Climate Change Fund to establish a rainwater harvesting project at the heart of the local community – the Holdsworth Community Centre.

The Council has installed four rainwater tanks (with a combined capacity of 28,000 litres), water savings fixtures, waterless urinals and dual flush toilets at the community centre.

The rainwater harvesting project is expected to save 591,000 litres of water a year and slash the community centre's water bills. Importantly, the funding has also enabled the centre to showcase water efficient technologies to local residents.

The Council and community centre have developed educational resources to explain to residents the various water conservation measures in use at the centre. They also host a series of workshops and community events to encourage water-wise behaviour.

Woollahra Municipal Council is committed to promoting the benefits of rainwater harvesting within the community.

Woollahra residents have one of the highest consumption rates of water in Sydney. The Council applied for Climate Change Funding to improve the water efficiency of the Centre and to also showcase rainwater harvesting at work.

By doing so the Council hopes to inspire residents to adopt water efficient practices at home and in their gardens.



#### ■ CASE STUDY

### Swimming in water and bill savings

Ryde Aquatic Leisure Centre has a range of water slides and swimming pools and is one of Ryde's major energy and water users. More than 760,000 people use the centre each year.

In 2004 the Centre commissioned a study to look at ways to reduce its environmental footprint. Three projects were identified that would save the Centre more than 32 million litres of water a year through roof water harvesting, backwash water recovery and UV disinfection.

With \$431,841 in funding from the NSW Climate Change Fund, the projects were able to proceed.

A 220,000 litre rainwater tank has been installed to harvest water from the centre's large roof. A water recycling treatment system (membrane, reverse osmosis and UV) was also installed to purify backwash water from the swimming pool filter. This purified water is used instead of drinking water to top up the swimming pools.

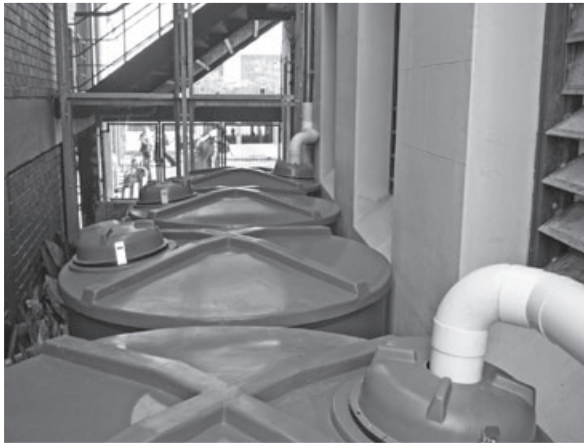
Paul Hartmann, Centre Manager, said that through careful planning and good project management the system is now completely up and running and working beautifully.

"These water saving measures have exceeded original predictions and are saving around 32 million litres of drinking water a year, which is a 60 per cent reduction in the centre's water use compared to the total use in 2003/2004," Hartmann said.

"We have already been able to save around \$53,000 off our water bills since the water recycling plant and rainwater harvesting system were put in place."

The centre has also reduced the need for gas heating of the pool, as recycling the pool water means that some heat is now retained.

Both the harvested and recycled water are treated to drinking water quality, to meet health department guidelines.



#### ■ CASE STUDY

### Real-time sustainability education

Funds of \$76,727 from the Climate Change Fund have helped Newtown High School for the Performing Arts save water, generate electricity and bring sustainability education to life by installing water monitoring, saving and harvesting initiatives, and a photo voltaic (PV) system.

The school, which has more than 860 students, has installed four unique rainwater harvesting systems to supply water to toilets, the theatre and gymnasium. Wash basin taps have been replaced with spring loaded taps to reduce waste from left-on taps. Original single flush toilets have been replaced with WELS 4 star toilet suites to make more water savings.

A water monitoring system is now in place to detect leaks as well as evaluate the effectiveness of the water efficiency and rainwater harvesting initiatives.

The five kilowatt PV system has been generating an average of 18 kilowatt hours a day. An installed online energy meter is able to measure the amount of clean energy generated in real-time.

These water and energy saving measures are expected to save around 1.5 million litres of water and around 7 tonnes of greenhouse gas emissions a year.

The school's Science, Maths and Geography Departments are now integrating the school's water and energy saving systems into their study units.

Students and staff can monitor the effectiveness of the technologies by logging onto the school's water and energy monitoring website. Through this project the school is able to show students the role that these technologies play in directly reducing water and energy use and addressing climate change.



#### ■ CASE STUDY

### Aged care services slash their water use

Australia's population is ageing and this presents the challenge of an increasing demand for high quality and affordable aged care services. Aged care organisations provide a range of facilities for their clients including hostels, day centres, palliative care and independent living villages.

Larger facilities provide care for more than 250 residents and employ more than 120 carers and staff. High volumes of water are often needed through the use of commercial kitchens and laundries and numerous bathroom areas.

\$265,892 has been provided to nine aged care facilities under the Climate Change Fund's Community Savers stream to help reduce their water use.

These organisations have installed a range of measures to improve water efficiency, cut water bills and enhance their facilities by installing one or more of the following measures: overhead garden drip irrigation, dual flush toilets, rainwater tanks, low-flow showerheads, flow restrictors and pool covers.

Savings by individual aged care facilities are expected to be as high as 5.4 million litres of water and around \$15,000 a year in water bills.

Installing drip line irrigation in gardens has resulted in flourishing plant and lawn growth which has made the landscape more pleasant for patients, staff and visitors.

# Clean energy

The Climate Change Fund is stimulating investment in clean energy technologies in NSW through \$31 million in funding for commercialising emerging technologies and additional support for proven technologies such as wind and solar power.





# Emerging technologies

## Achievements

Six large-scale projects for commercialising emerging technologies are being funded \$24.8 million to generate power or reduce grid power use by an estimated 96,000 megawatt hours and reduce summer peak demand by 11,400 kilowatts. This will save around 103,000 tonnes of greenhouse gas emissions a year.

These projects include applications of geothermal, solar thermal and biogas (energy from animal waste methane) technologies to generate electricity, the application of enabling technologies to store wind-generated energy and the testing of the potential for small-scale urban wind farms.

These projects are funded under the Renewable Energy Development program with support for technologies that are not yet market-ready. In the case of new technologies, early movers are often deterred or delayed by having to bear all the costs of trail-blazing without the ability to prevent subsequent competitors from free-riding.

The NSW Government has also committed \$100 million over four years to the Clean Coal Fund, which provides funding (under the Climate Change Fund):

- to undertake research into and development of clean coal technologies
- to demonstrate clean coal technologies
- to increase public awareness and acceptance of the importance of reducing greenhouse gas emissions through the use of clean coal technologies
- for the commercialisation of clean coal technologies.

A call for Expressions of Interest under the NSW Clean Coal Fund closed on 4 December 2009, with 29 project applications received and assessed. In May 2010, 10 projects were successful with an allocated funding of \$13 million. Funding agreements are currently being finalised for these projects. Project details are outlined in Appendix D.

# Supporting proven technologies



## Achievements

Seven clean energy projects with proven technologies are being implemented, with \$6 million allocated under the Public Facilities Program and the former Energy Savings Fund. These projects will help generate 17,000 megawatt hours of electricity a year and save 17,645 tonnes of greenhouse gas emissions and \$2.1 million on electricity bills annually. One of these projects has been completed.

These projects include harnessing methane gas from animal effluent and sewage and installing mini-hydro generators and photovoltaic panels. These are proven technologies that are not yet cost-effective. The Fund is helping to overcome the major barrier to investment by bridging the gap between the upfront cost of investment in this generation and the savings on energy bills.

Funds of \$3.2 million have also been allocated to eight projects that are installing photovoltaic panels, as well as power and water savings. These include greening of community centres, schools and public buildings. For example, the NSW Government has installed photovoltaic panels at Parliament House, which are now producing 29 megawatt hours of renewable energy each year.

NSW is positioning itself to attract substantial new wind farm investment with the creation of six Wind Renewable Energy Precincts. These precincts have been established in areas of the

state with the best known wind resources – in the New England Tablelands, Upper Hunter, Central Tablelands, NSW/ACT Border Region, South Coast and Cooma-Monaro. Precinct Advisory Committees are being formed in each of the six regions to provide enhanced consultation and engagement with local communities regarding renewable energy development within their region. The Climate Change Fund provided \$800,000 in 2009–10 to support the Precincts.

In May 2010, the NSW Government announced it would provide up to \$120 million over 20 years for NSW projects under the Australian Government's Solar Flagships Program. The \$1.5 billion national program aims to build four significant solar energy facilities in the coming years. The NSW package is the largest amount of financial support being offered by any state or territory for large-scale solar power. Three NSW based solar photovoltaic proposals have been short-listed for consideration. Proponents will now undertake further feasibility studies and submit full applications. The winners are expected to be announced in early 2011.

Visit [www.environment.nsw.gov.au/grants/ccfund.htm](http://www.environment.nsw.gov.au/grants/ccfund.htm) for details of clean energy projects funded under the Climate Change Fund.





■ **CASE STUDY**

**Sydney Water set to increase clean energy use**

With more than \$3.6 million from the Climate Change Fund, Sydney Water will harness treated water and biogas to increase renewable energy used by the company over the next 20 years.

The renewable energy project will install a 160 kilowatt mini-hydro turbine at Woronora, expanding the capacity of the mini-hydro at North Head sewage treatment plant from one megawatt to two megawatts and installing a 250 kilowatt biogas cogeneration unit at Warriewood wastewater treatment plant.

Once fully commissioned, these three projects are expected to generate around 13,000 megawatt hours of clean energy and save 13,910 tonnes of greenhouse gas emissions a year.

Using the company's access to water and wastewater resources had enabled Sydney Water to pursue cogeneration and hydropower projects.

The cogeneration facility converts biogas, which is a product of the wastewater treatment process, into electricity and heat that is used for the on-site digesters. The hydropower projects capture energy from the flow of water and wastewater travelling through Sydney Water's pipeline network.

Sydney Water's initiatives showcase environmental innovation. The mini-hydro at North Head is a first in Australia for capturing potential energy from sewage treatment effluent. The mini-hydro at Woronora demonstrates the integration of small scale hydroelectric plant into an existing facility.

The cogeneration plant at Warriewood is a small scale cogeneration plant installed at Sydney Water and provides a valuable model for the installation of small scale biogas cogeneration plants at other sewage treatment plants.



■ **CASE STUDY**

**Community centre showcases green technologies**

Comboyne Community Centre has used \$60,953 from the Climate Change Fund to showcase environmental sustainability on the Mid North Coast of NSW.

The centre has installed a 5 kilowatt photovoltaic system on the roof and replaced the electric hot water system with a climate-friendly solar system. Skylights now let more natural light into the building, reducing the need for artificial lighting.

External floodlights have been replaced with compact fluorescent equivalent fittings, cutting overnight power use. Ceiling fans have been installed to keep the centre comfortable without the need for air conditioning.

These energy saving measures have slashed the centre's annual energy use by around 60 per cent and will save 107 tonnes of greenhouse gas emissions in the first 10 years. Excess power generated by the rooftop solar panels is being fed back to the grid for other customers to use and is providing the centre with welcome income.

Through the installation of an online energy meter, the centre can measure clean energy as it is being generated by the solar panels.

The centre has also increased their sustainability by installing a 10,000 litre rainwater tank which has slashed the amount of drinking water used to flush toilets.

Now that the energy and water saving initiatives are in place, the centre's 2,500 annual visitors are keen to see how they can also save water, energy and money.

The project has had a lot of support from the community and local tradespeople have generously donated their time. Students, councils, local businesses and not-for-profit organisations will be shown through the refitted facility.

# Administration and AEMC



## Governance arrangements

Under the Act, the Minister approves payments out of the NSW Climate Change Fund if satisfied projects promote a purpose referred to in the legislation. The NSW Climate Change Fund is administered by DECCW.

Contestable grants under the Fund are assessed by an evaluation panel with an independent chair and members with relevant industry and technical expertise. DECCW conducts technical assessments of all applications received to assist the evaluation panel in their assessments. Applications are assessed according to set selection criteria given in the relevant publicly available Guide for Applicants. The evaluation panel makes recommendations on funding to the Minister for Climate Change and the Environment.

Under the legislation, the Minister has the power to establish Advisory Committees to provide advice on strategy and priority areas for the Fund. The Climate Change Fund Advisory Committee was established in August 2007 and met twice in 2009–10. The members of the Committee for 2009–10 and its terms of reference are listed in Appendix B.

## Principles for administering the Fund

DECCW applies the following key principles in administering the Fund:

- funding allocations and expenditures will ensure responsible financial management
- a strategic approach will be used in setting priorities for expenditure
- the detailed priority setting process and fund allocation will closely follow strategic Government policy (including the election commitment of the NSW Climate Change Fund, the NSW State Plan and the NSW Energy Efficiency Strategy).

DECCW will:

- regularly assess and review outcomes achieved through expenditure
- provide a program of regular reporting to provide oversight of the Fund
- establish strong accountability and adhere to clear corporate governance principles.

## Funding streams

There are four types of funding available under the NSW Climate Change Fund:

1. Competitive grants – providing funding on a contestable basis for projects that meet specific selection criteria. These include the Public Facilities Program, Renewable Energy Development Program, Green Business Program, Central Coast Water Savings Fund and projects previously funded through the Water and Energy Savings Funds.
2. Rebate programs – funding provided in the form of rebates for specified water or energy savings measures under certain terms and conditions. These include the current commitment for the Home Saver Rebates.
3. External programs – funding from the NSW Climate Change Fund for programs implemented by an organisation other than DECCW to meet government commitments or policies. These currently include the Sydney Water Demand Management Program.
4. Other programs or projects – funding for programs or projects which are not competitive grants or external programs. These include programs that are jointly delivered by DECCW and other agencies and potential new programs, which may include:
  - funding the demonstration of new technologies or practices (not yet able to compete for grants because they cannot clearly demonstrate cost-effective water/energy savings)
  - extension of successful competitive grants
  - studies/research projects needed to effectively target Fund programs
  - community awareness raising efforts
  - projects or programs to fill gaps in Fund programs (e.g. sectors or approaches not yet covered).

All contestable funding rounds are advertised via the NSW Climate Change Fund subscriber e-newsletter, the NSW Climate Change Fund News, DECCW's website ([www.environment.nsw.gov.au/grants/ccfund](http://www.environment.nsw.gov.au/grants/ccfund)) and in metropolitan, regional and ethnic newspapers.

## Reporting

Funding recipients must report on the progress of projects and their success in achieving the anticipated outcomes (e.g. water and/or energy and greenhouse gas savings). In the case of residential rebates, recipients must provide receipts to validate purchase and installation details.

The Fund is committed to keeping the NSW community fully informed about progress in achieving its climate change goals and expenditure and achievements under the Fund. DECCW reports regularly on its progress in meeting its NSW State Plan emissions target and publishes information on the range of funding available and projects awarded funding under the NSW Climate Change Fund.

## Australian Energy Market Commission

The NSW Climate Change Fund provides the funding for NSW's contribution to national energy regulation initiatives, as provided for under section 34H of the Act. In the 2009–10 financial year, NSW paid \$5.516 million to the Commonwealth as NSW's share of the Australian Energy Market Commission's (AEMC) annual operating budget. Under established funding arrangements agreed between relevant jurisdictions, NSW is responsible for 37.5 per cent of the AEMC's budget.

The AEMC was established in July 2005 by the Council of Australian Governments, through its Ministerial Council on Energy. The AEMC is the national body responsible for rule-making, market development and policy advice with regard to the National Electricity Market and, from 1 July 2008, with regard to access to natural gas pipeline services and elements of the broader natural gas markets. The Ministerial Council on Energy (on which the NSW Minister for Energy sits) approves the annual budget for the AEMC.

# Budget and spending status



## Revenue

Electricity distributors and water utilities were required to make contributions to the Fund through annual contribution orders gazetted on 1 May 2009 for energy and on 19 June 2009 for water. A breakdown of revenue to the NSW Climate Change Fund in 2009–10 is shown in Table 11.

## Expenditure

Expenditure was \$213 million in 2009–2010. The proportion of program administration expenditure was 3.3 per cent. Expenditure for each of the components of the Fund is presented in Table 12.

Table 11

### NSW Climate Change Fund 2009–10 revenue

Source	Amount (\$)
EnergyAustralia	67,353,873
Integral Energy	42,385,378
Country Energy	32,989,294
Sydney Water	33,592,470
Gosford City Council	1,050,000
Wyong Shire Council	950,000
Environmental Trust	1,000,000
Interest	4,732,252
Miscellaneous revenue	75,920
<b>Total</b>	<b>184,129,187</b>

Table 12

### NSW Climate Change Fund 2009–10 expenditure

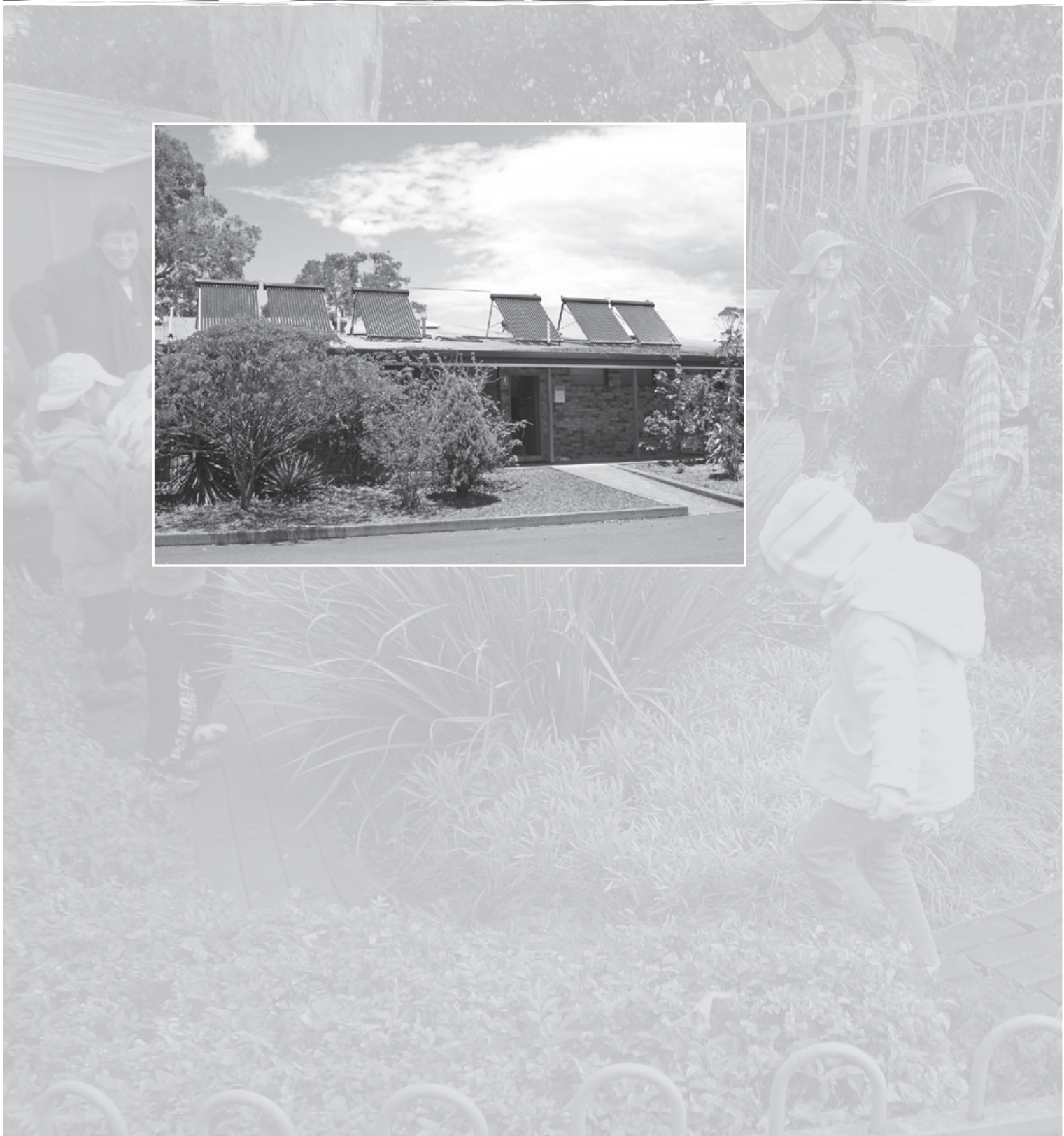
Program/component	Recipient	Expenditure (\$, GST excluded)
Home Saver Rebates Program	Residents	90,439,473
Green Business Program	Business	4,628,557
Public Facilities Program	Various	13,099,432
Renewable Energy Development Program	Business	3,832,383
Recycling and Stormwater Harvesting Program	NOW	530,000
Schools Energy Efficiency Program	Schools	5,205,909
Central Coast Water Savings Fund	Various	1,476,622
<b>Water and Energy Savings Funds (funding allocated prior to the establishment of CCF)</b>		
• contestable	Various	10,323,901
• non-contestable	Various	2,189,362

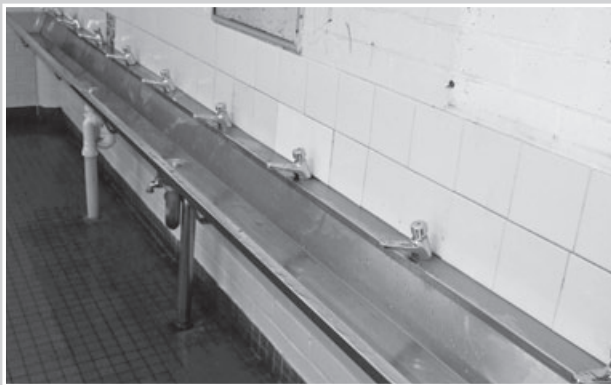
## NSW Climate Change Fund 2009–10 expenditure (cont.)

Program/component	Recipient	Expenditure (\$, GST excluded)
<b>Energy Efficiency Strategy</b>		
• Energy Efficiency for Small Business Program	Business	3,363,149
• Sustainability Advantage Energy Saver	Business	1,740,845
• Green Skills	Various	3,096,592
• Energy Efficiency Community Awareness Program	Various	6,618,979
• Home Power Savings Program	Residents	2,358,641
• Government Energy Efficiency Team Program	DECCW	225,843
• Energy Efficiency Data Collection Program	DECCW	176,806
Metropolitan Water Education Program	Office of Water	2,000,000
Sydney Water Demand Management Program	Sydney Water	16,196,109
Australian Energy Market Commission (for national energy regulation purposes)	AEMC	5,516,420
Greenhouse Innovation Fund projects	Various	334,078
Public Housing retrofits	Housing NSW	6,484,648
Rainwater Tanks in Schools	DET	1,968,000
Carbon Neutral Government – carbon offset for NSW Cabinet to become Carbon Neutral by 2008/09	Carbon Planet Australia	41,149
Clean Coal Fund	I&I NSW	25,000,000
NSW Climate Change Fund administration (includes Home Saver Rebates Program administration and administration of Savings Action Plans)	DECCW	6,998,198
<b>Total</b>		<b>213,845,096</b>



# Appendices





# Appendix A Legislative requirements



The *Energy and Utilities Administration Act 1987* establishes the NSW Climate Change Fund and describes the purposes of the Fund and a number of other requirements.

Relevant provisions in the legislation are provided below.

## Division 2 – Climate Change Fund

### 34F Purposes of Climate Change Fund

The purposes of the Fund are as follows:

- (a) to provide funding to reduce greenhouse gas emissions and the impacts of climate change associated with water and energy activities
- (b) to provide funding to encourage water and energy savings and the recycling of water
- (c) to provide funding to reduce the demand for water and energy, including addressing peak demand for energy
- (d) to provide funding to stimulate investment in innovative water and energy savings measures
- (e) to provide funding to increase public awareness and acceptance of the importance of climate change and water and energy savings measures
- (f) to provide funding for contributions made by the State for the purposes of national energy regulation.

### 34G Payments into Climate Change Fund

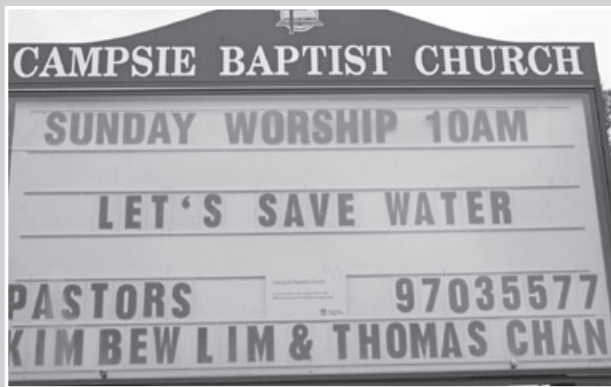
- (1) There is payable into the Fund:
  - (a) all money received from contributions required to be made to the Fund under Division 3 and
  - (b) all money advanced by the Treasurer for the Fund and
  - (c) all money appropriated by Parliament for the purposes of the Fund and
  - (d) the proceeds of the investment of money in the Fund and
  - (e) all money directed or authorised to be paid into the Fund by or under this or any other Act or law.

- (2) Without limiting subsection (1) (f), State agencies are authorised by this section to make voluntary contributions to the Fund.
- (3) Subsection (2) does not authorise a State water agency or a distribution network service provider to refuse to pay a contribution to the Fund that is payable under Division 3.

### 34H Payments out of Climate Change Fund

- (1) There is payable from the Fund:
  - (a) any money approved by the Minister to fund all or any part of the cost of any measure that the Minister is satisfied promotes a purpose referred to in section 34F, and
  - (b) any money approved by the Minister to fund all or any part of the contributions that the State is required to make for the purposes of national energy regulation and
  - (c) any money required to meet administrative expenses related to the Fund and
  - (d) any money required to meet administrative expenses of the Minister in connection with the Minister's functions under this Act in relation to savings action plans and
  - (e) any money directed or authorised to be paid from the Fund by or under this or any other Act or law.
- (2) In exercising the Minister's functions under subsection (1) (a) (but without limiting the generality of that paragraph), the Minister may:
  - (a) approve selection criteria from time to time to be applied to determine the kinds of water or energy savings measures that will be eligible for funding and
  - (b) approve the funding of community grants from the Fund, being grants awarded on the basis of their merit in advancing one or more of the purposes referred to in section 34F, established through a competitive selection process and
  - (c) require a person or body seeking funding for a water or energy savings measure to do either or both of the following as a precondition to applying for or obtaining funding:

- (i) to submit a water savings action plan or energy savings action plan (as the case requires) that includes details about the measure
  - (ii) to provide any other information requested by the Minister about the measure
- and
- (d) obtain and have regard to any advice, recommendations or other information provided to the Minister by a committee established by the Minister under Division 5, or by any other person or body, that the Minister considers relevant.
- (3) The Minister is to produce an annual report detailing fund allocations and programs and anticipated benefits, by reference to key performance indicators, to be achieved in
- advancing any one or more of the purposes referred to in section 34F
- (4) The annual report is to include an evaluation of the effectiveness of each program as it is completed under the Fund
  - (5) The annual report is to be tabled in each House of Parliament within six months after the end of the financial year to which it relates
  - (6) The Minister is to publish each annual report so as to promote, to the NSW public, schemes, technologies and processes that address climate change and to inform the NSW public about consumer choices and procurement decisions.



# Appendix B Climate Change Fund Advisory Committee

Table B1

## Members of Climate Change Fund Advisory Committee as at 30 June 2010

Organisation	Name	Title
Department of Environment, Climate Change and Water	Simon Smith	Deputy Director General – Climate Change, Policy and Programs
NSW Treasury	Lindsey Williams	Director, Natural Resources and Environment
EnergyAustralia	Peter Birk	Executive Manager, Development & Innovation
Country Energy	Ben Hamilton	General Manager, Corporate Strategy
Integral Energy	Helen Stewart	EE Program Manager
Sydney Water	Andrew Kirkwood	Manager, Customer Resource Management
Clean Energy Council	Peter Szental #	Deputy Chair of Clean Energy Council
Local Government and Shires Associations	Genia McCaffery	President of Local Government Association
Energy Users Association of Australia	Roman Domanski	Executive Director
Energy Retailers Association of Australia	Tim Nelson	Manager Carbon Analysis, AGL
Total Environment Centre	Jeff Angel	Executive Director
CSIRO Energy Technology	Dr Stephen White	Distributed Energy Manager
NSW Business Chamber	Paul Orton	General Manager – Policy and Membership
Property Council of Australia	Glenn Byres	NSW Policy Manager
Australian Water Association	Paul Hackney	Senior Project Officer – Waterways Strategy, City Strategy Unit Parramatta City Council
Public Advocacy Interest Centre	Mark Ludbrooke	Chief Executive Officer
Beletich Associates	Steve Beletich	Principal, Beletich Associates

# Peter Szental sadly passed away on 14 July 2010. Peter was widely respected for his pioneering work over three decades to improve Australia's sustainability.

## Terms of Reference of Climate Change Fund Advisory Committee

The Climate Change Fund has been established to provide funding:

- to reduce greenhouse gas emissions and the impacts of climate change associated with water and energy activities
- to encourage water and energy savings and the recycling of water
- to reduce the demand for water and energy, including addressing peak demand for energy
- to stimulate investment in innovative water and energy savings measures
- to increase public awareness and acceptance of the importance of climate change and water and energy savings measures
- for contributions made by the State for the purposes of national energy regulation.

Under the *Energy and Utilities Administration Act 1987*, the Minister for Climate Change and the Environment may appoint Advisory Committees for the purpose of advising the Minister in the exercise of his functions.

## Purpose of Advisory Committee

The Advisory Committee will have the following functions:

- advise the Minister and the Department of Environment, Climate Change and Water on strategy and priority areas for the fund
- review these priorities to take account of changing conditions and the success of various climate change activities
- monitor, review and report to the Minister on the overall performance of the fund against the established objectives.

## Membership

The Advisory Committee consists of representatives from:

- Department of Environment, Climate Change and Water NSW
- NSW Treasury
- local government
- water and electricity businesses
- water and energy services industry
- NSW water and electricity customers (including large business users and property industry) or representative groups
- environment groups
- individuals with expertise in water or energy savings measures.

## Operation

The Advisory Committee is chaired by the Deputy Director General (Climate Change, Policy and Programs) of DECCW and meets one or two times per year or as required. It is serviced by DECCW.





# Appendix C

## Projects discontinued during 2009–2010

### Notes to Appendix C table

- the table displays funding approved by the Minister not actual expenditure
- numbers after program type relate to the funding round number
- fund round abbreviations: WSF = Water Savings Fund PFC = Community Savers Program GBP = Green Business Program CCWSF = Central Coast Water Savings Fund PFP1= Public Facilities Program Round1 RED = Renewable Energy Development Program

Table C1

### Discontinued projects 2009–2010

Fund Round	Applicant Name	Funding allocated
GBPR1w	University of Technology, Sydney	\$1,471,000
WSF1	Energy Conservation Systems Pty Ltd	\$1,000,000
WSF2	Rainsaver Pty Ltd	\$800,000
WSF2	Bonds Industries Limited	\$240,000
WSF2	Mowlemsodexho	\$125,725
WSF3	Irrigation & Water Technology Pty Ltd	\$1,567,849
CCWSF1	Rainsaver Pty Ltd	\$74,000
CCWSF2	Northern Lakes Power Junior AFC	\$70,000
RED	Biogen Limited	\$2,500,000
PFCw	The Disability Trust North Wollongong	\$17,400
PFCe	Kentucky Memorial Hall Committee	\$13,652
PFCw	Redhead Bowling Club Coop Ltd	\$40,000
PFP1e	University of New England	\$250,000
WSF3	Fieldforce Services Pty Ltd	\$400,000
CCWSF3	Wyong Shire Council	\$42,000
PFCw	Woonona Bulli R S L Memorial Club Ltd.	\$40,000
WSF3	Pittwater Council	\$47,280
PFCe	Illawarra Retirement Trust – Batemans Bay	\$39,600
<b>Total</b>		<b>\$8,738,506</b>

# Appendix D

## Projects under Clean Coal Fund



Table D1

### Approved Projects – Clean Coal Fund – May 2010

Applicant	Project title	Funding, up to (\$)	Duration
University of Newcastle & GreenMag Group	Mineral Carbonation	3,040,000	3.5 yrs
UCC Energy P/L	UCC Burning Efficiency	2,581,000	4 yrs
Centennial Coal (Mandalong) P/L	Fugitive Emissions (ventilation)	2,200,000	2 yrs
CSIRO	Capture Testing Solvents	1,300,000	3 yrs
CSIRO	Fugitive Emissions (open cut)	1,000,000	2 yrs
University of Newcastle	Chemical Looping – oxyfuel	886,618	3 yrs
University of Newcastle	Social Research/Public Awareness	618,930	2 yrs
CSIRO	Novel Capture & Energy Efficiency	613,711	1.5 yrs
University of Newcastle	Direct Carbon Fuel Cell	608,719	5.5 yrs
ourSun P/L	Combined Brayton Rankine Cycle.	159,200	7 mths.
<b>Total</b>		<b>13,008,178</b>	



# Glossary





# Glossary

<b>The Act</b>	<i>Energy and Utilities Administration Act 1987</i> , under which the Climate Change Fund is established	<b>Heat pump</b>	A device that pumps heat energy used in both heating and cooling systems. As heating units, heat pumps are able to extract heat energy from even the coldest outdoor air to heat the inside of a structure. When used as cooling units, they can extract heat from indoor air even if the outdoor air is much hotter.
<b>AEMC</b>	Australian Energy Market Commission	<b>HVAC</b>	Heating, ventilation and air-conditioning
<b>Biogas</b>	A by-product of anaerobic digestion, which is a decomposition process by micro-organisms. This gas by-product can be harvested to convert to energy	<b>IPART</b>	The Independent Pricing and Regulatory Tribunal is the independent economic regulator NSW.
<b>CCF</b>	Climate Change Fund	<b>Kilolitre (kL)</b>	A volumetric measurement equivalent to one thousand litres, or one cubic metre.
<b>tCO<sub>2</sub>-e</b>	An abbreviation of 'tonnes of carbon dioxide equivalent' and is the internationally recognised measure of greenhouse gas emissions	<b>Kilowatt hour (kWh)</b>	A quantitative measure of electric current flow equivalent to one thousand watts being used continuously for a period of one hour; the unit most commonly used to measure electrical energy. A kilowatt is one thousand watts (see definition under watt).
<b>Cogeneration</b>	The simultaneous generation of electrical and thermal energy where both forms of energy are put to productive use. Cogeneration is typically possible when facilities that produce large amounts of waste heat (usually in the form of steam or hot water) is used efficiently for space or water heating, cooling, industrial use, agriculture or conversion into electricity.	<b>Luminaires</b>	A complete lighting unit consisting of a lamp or lamps, lampholders, optical elements to distribute the light, and the means for connection to a power source.
<b>DECCW</b>	Department of Environment, Climate Change and Water NSW	<b>Megalitres (ML)</b>	A volumetric measurement equivalent to one million litres.
<b>DET</b>	Department of Education and Training NSW	<b>Megawatt hour (MWh)</b>	A unit of electricity equivalent to 1,000 kilowatt hours or one million watts.
<b>Efficiency (energy and water)</b>	Reducing the amount of energy or water required to provide a given level of service (e.g. for lighting, air conditioning, toilet flushing)	<b>National Australian Built Environment Rating System (NABERS)</b>	NABERS is a performance-based rating system for existing buildings. NABERS rates a building on the basis of its measured operational impacts on the environment, and provides a simple indication of how well you are managing these environmental impacts compared with your peers and neighbours.
<b>ESAP</b>	Energy Savings Action Plan	<b>Payback period</b>	The time taken for the savings or profit of investment to pay for the initial capital expenditure. Payback period = Capital cost/Total annual savings.  For example, a new lighting system costing \$400 with \$200 savings per year has a payback period of $\$400/\$200 = 2$ years.
<b>ESF</b>	Energy Savings Fund	<b>Peak demand</b>	The maximum power demand of a system at a given time, or the maximum power required to supply customers at any time. This may be at a particular time of the day or a specific hour of the day.
<b>Flow restrictor</b>	A device used to restrict the amount of water flow for a given use. For example, flow restrictors are often installed on taps to inhibit the amount of water people can use to wash their hands.	<b>PFP</b>	Public Facilities Program
<b>Fluorescent lamp</b>	A low pressure mercury discharge lamp that emits light via a phosphor coating. Tubular and compact types are available. The main types of general office luminaires use tubular fluorescent lamps.	<b>Photovoltaic (PV)</b>	A form of solar energy that directly converts light into energy.
<b>GBP</b>	Green Business Program	<b>Potable water</b>	Water that is suitable for drinking.
<b>Gigajoule</b>	A joule is a unit of energy, equivalent to a power of one watt for one second. A gigajoule is one thousand million joules.		
<b>Greywater</b>	Wastewater from a variety of sources within households or businesses, typically sourced from baths, showers, laundries or basins. Greywater is not sourced from toilets or bidets.		
<b>Groundwater</b>	Water that has been collected in an aquifer or the water table that is below ground level.		
<b>Harvesting</b>	To collect rain or stormwater for reuse.		

<b>Power factor correction (PFC)</b>	The demand for electricity a site places on the electricity network is expressed in kVA (1,000s of volt amps) and is a measure of the customer's load on the power supply network. Power factor is the ratio of the actual power in kW divided by the kVA. The ratio is between 0 and 1, where 1 means that you are making the most effective use of your electricity supply. Power factor correction reduces your peak demand on the electricity supply network by bringing the ratio closer to 1.
<b>Recycled water</b>	Water taken from a non-potable source and treated to a level suitable for its intended use.
<b>Renewable energy</b>	Energy which is generated from renewable sources, including the sun, wind, waves, water (hydroelectricity) and waste, as opposed to fossil fuels that emit greenhouse gases.
<b>Renewable Energy Certificates (RECs)</b>	A form of 'currency' that can be earned when you install renewable energy equipment. One REC represents one megawatt hour of renewable energy generated.
<b>Retrofit</b>	Upgrading an existing system or building, typically to make it more energy or water efficient.
<b>Sewer mining</b>	Sewer mining involves tapping directly into a sewer main either before or after a treatment plant and extracting the wastewater. The wastewater can be treated and reused as recycled water.
<b>Smart meter</b>	An advanced water or energy meter that can provide more information about consumption patterns than a conventional meter.

<b>Solar energy</b>	Solar power refers to the potential of the sun to produce energy. Solar energy can be generated using a wide variety of methods, ranging from simple water recirculating systems used to heat homes and commercial offices to sophisticated networks of solar cells that produce enough energy to supply small cities.
<b>Stormwater harvesting</b>	The collection and reuse of rainwater that would otherwise end up in the stormwater channels that lead to a river or the ocean. Harvesting stormwater generally involves two stages: storage and treatment. Stormwater usually comes in large volumes during a rainfall event, and as such, must be stored to allow for reuse. Also as stormwater is typically of low quality with a high level of pollutants it must be sufficiently treated. The most common reuse of stormwater is for irrigation.
<b>Variable speed drives (VSDs)</b>	Mechanisms that control motor speed. They can be installed on motors driving fans and pumps to adjust to speed at which they are running. This means that the amount of energy being consumed can be adjusted to match the demand and so does not waste energy.
<b>Wastewater (&amp; wastewater recycling)</b>	Water that has been contaminated by some activity; includes greywater and sewage. It can be collected from a variety of sources, stored and treated so that it can be used as an alternative to the potable supply.
<b>Watt (W)</b>	The unit for measuring electrical power. The rate of energy consumption by an electrical device when it is in use is measured in watts.
<b>WSAP</b>	Water Savings Action Plan
<b>WSF</b>	Water Savings Fund

## Photographs:

Page	Title and source
i	Fridge BuyBack Program
ii	Hon. Frank Sartor MP, Minister for Climate Change and the Environment
1	Liddell Power Station. Courtesy Macquarie Generation
2	Carwell Station. Courtesy Stuart Cohen
3	The Hills Kindergarten received funding to install rainwater tanks and a solar hot water system. Courtesy The Hills Community Kindergarten
5	Solar hot water system
6	Checking appliances for energy efficiency
7	Home Power Savings Program promotional material
8	Tri-gen engine at Tooheys Brewery. Courtesy Lion Nathan
9	The Feel Amazing Wellness Centre
10	Oberon RSL Bowling Club
11	Outdoor lighting upgrade. Courtesy Illawarra Montessori Preschool
12	Luminaire being refurbished. Courtesy Tamworth TAFE
13	Greening The Wharf project. Courtesy Grant Sparkes-Carroll
15	Hybrid cooling tower. Courtesy SULO MGB Australia Pty Ltd
16	Water use around the home
17	Choosing a water efficient washing machine
18	Reverse osmosis plant at EFFEM Foods Pty Ltd
19	Contact tanks at Sydney Airport. Courtesy Sydney Airport Corporation Limited
20	Rainwater tanks at Port Macquarie Historic Cemetery. Courtesy Lake Macquarie City Council
21	Rainwater tanks at Woollahra Council
21	Ryde Aquatic Centre. Courtesy Ryde Aquatic Centre
22	Rainwater storage tanks at Newtown High School of Performing Arts. Courtesy John Caley
22	Low flow showerhead
23	5 kW wind turbine. Courtesy Aerogenesis Australia
24	Dawn drilling. Courtesy Geodynamics Ltd
25	Rigby House photo voltaic array. Courtesy Coffs Harbour City Council
26	Mini-hydro turbine. Courtesy Sydney Water
26	Solar panels. Courtesy Comboyne Community Centre
27	Water pump and controller. Courtesy Robertson Community Technology Centre
29	Water harvesting project. Courtesy Lowes TC Pty Ltd
31	Solar hot water system at Swansea Gardens Lakeside Holiday Park. Courtesy Lake Macquarie City Council
32	Water efficient taps. Courtesy John Caley
34	Water saving signage. Courtesy Campsie Baptist Church
36	Setting an energy efficient cooling temperature
37	Kosciuszko National Park. Courtesy Stuart Cohen
39	Rainwater tank pipes. Courtesy Illawarra Montessori Preschool

