

CASE 5

Brisbane, Australia

Actions on Climate Change in a Rapidly Growing City in a Subtropical Region

With 2 percent population growth in 2006–07, Brisbane, the capital of the State of Queensland, was one of the most rapidly growing capital cities in Australia (ABS 2008). The population of Brisbane in 2007 was approximately 1.01 million, making it the first local government area in Australia to exceed the milestone of 1 million people (ABS 2008). Brisbane is among the top 10 most rapidly growing cities in the countries of the Organisation for Economic Co-operation and Development and the second most rapidly growing city in the western world (Brisbane City Council 2006). Brisbane's population is expected to continue to grow over the next two decades (Brisbane City Council 2006).¹

Since 2000, Brisbane has experienced increased electricity consumption and annual growth in peak electricity loads (Brisbane City Council 2007a).² Because the city has a subtropical climate, increased domestic air-conditioning has been a major factor prompting higher demand for electricity, along with poor housing design, an energy-intensive economy, and growth in population and disposable income (Brisbane City Council 2007a). The demand for electricity is expected to rise consistently through 2030. Brisbane is also experiencing a shortage of potable water during a period of growth and climate change that is straining water resources

and highlighting the need to shift to a new form of water management.

In 2007, the Brisbane City Council issued Brisbane's Plan for Action on Climate Change and Energy, which delineates the selected actions to be achieved in the short term (about 18 months) and the long term (more than five years) (see Brisbane City Council 2007b). Brisbane has three major challenges: climate change, high peak oil demand, and greenhouse gas emissions (see Brisbane City Council 2007c). Analyses suggest that, if Brisbane responds intelligently to these challenges, the city may generate significant economic benefits by developing sustainable industries, while saving resources. Brisbane is actively introducing various approaches to sustainable development. In addition, in the city's "Our Shared Vision: Living in Brisbane 2026" policy document, authorities have committed to cutting greenhouse gas emissions in half, reusing all wastewater, and restoring 40 percent of the natural habitat by 2026 (Brisbane City Council 2006).

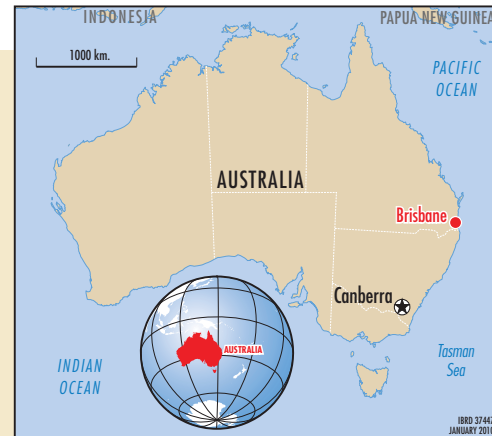
The Ecological and Economic Benefits of the CitySmart Program

To implement actions in Brisbane's Plan for Action on Climate Change and Energy, officials have initiated the Green Heart CitySmart Program (Brisbane City Council 2009a). The program introduces residents and businesses to

Profile of Brisbane

Brisbane

- Capital city of the state of Queensland, Australia
- Population (2007): 1.01 million
- Population increase (2006–07): 2.0 percent
- The largest populated local government area in Australia
- Brisbane is located on a coastal plain in southeast Queensland. The eastern suburbs line the shores of Moreton Bay, and the city's central business district is only 27 km from the mouth of the bay.
- Brisbane is a subtropical river city and has hot, humid summers and dry, mild winters.



Map 3.7 Location of Brisbane

Source: Map Design Unit, General Services Department, World Bank.

practical and affordable ways to implement actions indicated in the climate change action plan. These practical tips help residents and businesses become energy and resource efficient, thus improving the environment and saving money (box 3.2).

For instance, residents are offered tips on hot water use, heating and cooling, waste disposal, lighting and electronic appliances, bathroom and laundry facilities, house renovations, urban gardening, the installation of rainwater tanks, and so on. Moreover, Brisbane aims to reduce the annual carbon footprint of an average household from 16 tons of carbon dioxide (CO₂) in 2006 to

4.5 tons by 2026. To encourage household participation, the city offers rebates and grants supporting environmentally sustainable projects (box 3.3). The city recommends that homes reduce their greenhouse gas emissions, particularly by installing solar hot water systems (rebates available) to reduce up to 3 tons of CO₂, undertaking energy audits and monitoring (rebates available) to reduce up to 3 tons of CO₂, and connecting to GreenPower (renewable energy from government accredited sources) to save up to 9 tons of CO₂.

Brisbane's trees are vital in protecting and improving the urban environment. Trees pro-

BOX 3.2

The Measures in the CitySmart Program in Brisbane

- Shifting to energy-efficient light fittings
- Installing rainwater tanks in homes
- Using more efficient air-conditioners
- Continuing to recycle and preserve water
- Installing solar panels and solar hot water systems
- Signing up for green energy
- Thinking about alternative public transportation solutions
- Reducing vehicle emissions
- Implementing the 2 Million Trees Project

Source: Brisbane City Council (2009b).

BOX 3.3

Examples of Grants and Rebates for Environmentally Sustainable Home Projects in Brisbane

- \$A 50 rebate on the installation of home energy monitors
- \$A 400 rebate on solar hot water systems
- Rebates for installing rainwater tanks with internal connections to toilets and cold water washing machine taps
- Funding up to \$A 50,000 to local nonprofit community groups for the installation of devices to save energy and water

Source: Brisbane City Council (2009c).

Note: The information is current as of May 2009.

vide shade and transpire water to cool the air and surface temperatures. In subtropical cities, it is important to identify ways to become less dependent on air-conditioners to reduce energy use and carbon emissions. Shade allows more people to enjoy outdoor activities. Trees absorb greenhouse gases, including CO₂, and remove pollutants from the air. In addition, trees reduce storm water runoff and evaporation, an important outcome in cities in which water resources need protection. Brisbane city officials have provided 133,000 free plants to residents to maintain the city's unique subtropical landscape. Furthermore, the city is committed to planting two million trees between 2008 and 2012. People involved in this effort will restore bushland on a large scale, cultivate new trees along streets, and support the greening of landfill and infrastructure sites (Brisbane City Council 2009d).

The Brisbane City Council aims to be carbon neutral in its daily operations by 2026 by adhering to sustainability principles in its offices and facilities. As a result, public sector electricity use and greenhouse gas emissions have already decreased (table 3.7). The city council also actively engages residents and businesses to promote actions that reduce negative environmental impacts.

Urban Development in Brisbane

As in many other cities in Australia, most of Brisbane's citizens reside in detached homes built in low-density suburbs outside the city boundaries (Dingle 1999). The suburban lifestyle in Australia is highly dependent on private motor vehicles because, for the past 50 years, suburbs have been built on the assumption that most people will not need public transportation services (Newman 1999). The shape of Brisbane demonstrates this dependence. Peak oil prices have multiple implications for Brisbane's economy and society and increase the need for fuel-efficient vehicles and public transportation options. For many years, the problem of urban sprawl has been addressed for reasons other than peak oil prices. Local and regional planning has incorporated the principles of transport-oriented development, which aims to promote the development of mixed residential and employment zones to maximize the efficient use of land through a high level of access to public transportation (Brisbane City Council 2009f). However, the results are still mixed; economic structures and traditional housing preferences do not always coincide with these planning initiatives (Brisbane City Council 2009b).

Table 3.7 Greenhouse Gas Emissions and Electricity Use by the Brisbane City Council, Fiscal Years 2005–2008

INDICATOR	2005	2006	2007	2008
Net greenhouse gas emissions (tons of equivalent carbon dioxide)	—	441,850	376,471	—
Direct emissions ^a	—	199,284	180,255	—
Indirect emissions arising from the consumption of electricity, heat, and steam	—	218,988	205,669	—
Other indirect emissions	—	30,148	40,864	—
GreenPower ^b	—	(6,570)	(53,317)	—
Offsets	—	—	(95,000)	—
Electricity use (megawatt hours)	224,603	209,357	200,719	—
GreenPower purchased (percent)	6	6	25	50

Source: Brisbane City Council 2009e.

Note: — = not available; FY = fiscal year.

a. Direct emissions are from transport (trucks, buses, ferries); manufacturing (for example, asphalt production); and the on-site generation of energy, heat, steam, electricity, and fugitive emissions from landfill and wastewater treatment.

b. GreenPower is renewable energy that comes from the sun, wind, and waste. GreenPower produces no greenhouse gas emissions; the energy must be supplied by government-accredited sources.

Urban Renewal Brisbane is a US\$4 billion program to revitalize specific areas of the inner city (Brisbane City Council 2009g). The program has been implemented in several urban areas, including Brisbane City Center (the central business district). It has incorporated innovative principles and practices, such as high-quality urban designs, modern construction, mixed land use, higher-density development, diverse transit options, and enhanced accessibility.

The Brisbane City Council is working with the development industry to promote sustainable living and working environments. The city council has developed guidelines to help architects, engineers, planners, developers, and builders incorporate principles that promote sustainability in development applications. While such principles offer broad markers for sustainable development, the guidelines explain ways to apply them practically. For example, the buildings in Brisbane used to be designed to be open to breezes, with overhead ceiling fans, shaded areas, and good circulation. However, recent designs depend on air-conditioners that are energy dependent. Today, Brisbane is promoting new approaches to urban construction and spatial designs that create attractive living environments and walkable areas in this subtropical city.

The Water Cycle and Water Catchment Management

Brisbane's growing population is increasing pressure on the city's supply of potable water. The average annual rainfall in southeast Queensland is about 1,200 millimeters (compared with 2,400 millimeters in Singapore). Although higher than in other Australian cities, Brisbane's rainfall is less predictable, and careful water resource management is required. In recent years, drought has become a serious national problem. States with authority in water management may undertake measures to conserve water, including by applying water use restrictions (with

penalties for overuse) and subsidizing rainwater tanks. Brisbane has also pursued integrated water cycle management encompassing water provision, wastewater treatment, storm water management, and strategic land management. Poor land management in water catchments results in lower-quality water and higher water treatment costs. As a subtropical city, Brisbane is endowed with creeks, waterways, and rich biodiversity. The city is working to restore the health of its waterways and creeks through various means, including removing weeds, encouraging communities to plant native seedlings, and reducing illegal dumping by sponsoring community campaigns (for example, see Brisbane City Council 2007d).

Public Transportation: Bus Rapid Transit Systems

Brisbane has two bus rapid transit systems: the Brisbane South East Busway, which opened in 2001, and the Brisbane Inner-Northern Busway, which opened in 2004. These systems fall under the jurisdiction of the Queensland government and Queensland Transport, which is committed to public transportation provision to support growth and connectivity in greater Brisbane. They are designed to provide public transportation services to areas that existing rail lines (Queensland Rail) do not cover. The Brisbane South East Busway connects Brisbane's central business district to the city's sprawling southeastern suburbs. The busways are two-lane, bidirectional roads used exclusively by buses and emergency vehicles. This permits buses to bypass congestion. The system also provides high-quality, well-designed bus stations with good pedestrian access (Queensland Transport 2008).

Busways reduce the growth of car traffic on roadways mainly because of their greater carrying capacity. One motorway lane may accommodate 2,000 passengers per hour, but one busway

lane is able to carry 15,000 passengers per hour. In addition, busways significantly reduce travel time. For example, a typical route that takes 60 minutes on a Brisbane motorway is reduced to 18 minutes by riding a bus on the South East Busway. Fewer cars and less travel time decrease vehicular emissions, which helps mitigate climate change and improve air quality. In general, less time commuting translates into greater urban productivity and economic activity. The bus rapid transit systems also affect land development. Along the South East Busway, property values within six miles of bus stations have risen as much as 20 percent; moreover, the rates of growth in property values have been two to three times higher in these areas than in areas farther from stations (Currie 2006).

Lesson Learned in the Brisbane Case

Brisbane has responded to its unique local situation as a subtropical city under growth pressures. Climate change has already started to affect the city. Water is scarce, and temperatures are higher. Responding to its natural conditions, Brisbane protects water resources, plants trees to improve its urban ecology, and promotes a sustainable built environment. These actions save money for the city and its residents. Many developing-country cities are in tropical and hot climates and may be vulnerable to climatic change. Some cities may be highly dependent on air-conditioning, which is relatively energy consuming compared with other viable strategies. In this context, Brisbane's measures and actions may provide good examples for how cities might respond to such challenges, while remaining ecologically and economically vibrant.

Notes

1. The State of Queensland will have to accommodate 1 million new residents over the next two decades, 25 percent of whom will arrive in Brisbane.

2. The State of Queensland experienced a 53 percent increase in electricity consumption and an 8 percent annual increase in peak load growth over the 10 years between 1997 and 2007.

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