Chapter 2

The non-residential building sector

Introduction

2.1 This chapter looks at the energy efficiency of the non-residential building sector in Australia. It notes the division of use of electrical energy between the owner and tenant of a non-commercial building, the rate of increase in greenhouse gas emissions in the non-residential building sector and current government initiatives to rate and to improve the energy efficiency of the sector.

Base building and tenants load

2.2 Electrical energy for a building is usually metered separately for the services provided by the owner and the usage of the tenant.[1] The owner of a commercial building is usually responsible for the 'base building' which includes:

- the common area lighting;
- plug-in equipment;
- external lighting not associated with a tenancy;
- the building's main air conditioning and ventilation;
- lifts;
- fire protection;
- central domestic hot water; and
- irrigation systems.

2.3 The tenant of a building is responsible for covering bills for:

- lighting;
- supplementary air conditioning;
- supplementary ventilation systems;
- additional domestic hot water systems;
- exterior lighting; and
- central computing and other facilities.

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1 If the building owner is the only tenant or if the building is small, there may be only one electrical energy meter for both the tenant and the base building.

2.4 The bill is targeted at building owners and will therefore provide a framework to reduce emissions from the base building. Base building emissions account for roughly 50–60 per cent of a building's total emissions.[2]

2.5 The main energy use systems of the base building services are the fans, the cooling systems and the pumping systems. The emissions intensity, and the corresponding cost of using these systems, varies depending on (among other factors) the size of the building and the local climate.[3]

2.6 Energy inefficiency in base building services can be costly for building owners. Take a three level building with a total floor area of 2000m^2 and a length to width ratio of 2:1. In this type of building, a five per cent increase in the energy consumption of the cooling and pumps due to inefficiencies can result in an increase in energy costs of approximately $385 per annum in the coldest climate to $1390 per annum in the hottest climate.[4]

Split incentives

2.7 Discussions around the energy efficiency of buildings often refer to the principal/agent problem or the problem of 'split incentives'. The Garnaut Climate Change Review's Issues Paper identified that split incentives:

> …can arise when one individual makes decisions about building design and appliances, but another individual pays the ongoing cost of using the building. For example, landlords may choose which heating system to install in a building, and pay the upfront cost. However, tenants often pay the running cost of the heating system. This means that there may be insufficient incentive for the landlord to install a lower emission heating system, even if the total cost of the system is much lower over its lifetime.[5]

2.8 Lend Lease and WSP Lincolne Scott note in their submission that:

> …in almost every commercial development the entity responsible for developing the building is not the owner, let alone the tenant. So there is no financial incentive for a developer to invest in energy efficiency and little incentive for an owner. Consequently uptake of energy efficiency and greenhouse gas emissions reduction initiatives has been poor.[6]

2.9 This issue of split incentives is considered in chapter 4.

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2 Secretariat, Discussion with Ché Wall, 5 February 2010.

3 Australian Building Codes Board Office, 'Monitoring Electrical Circuits', June 2006, p. 6.

4 Australian Building Codes Board Office, 'Monitoring Electrical Circuits', June 2006, p. 8.

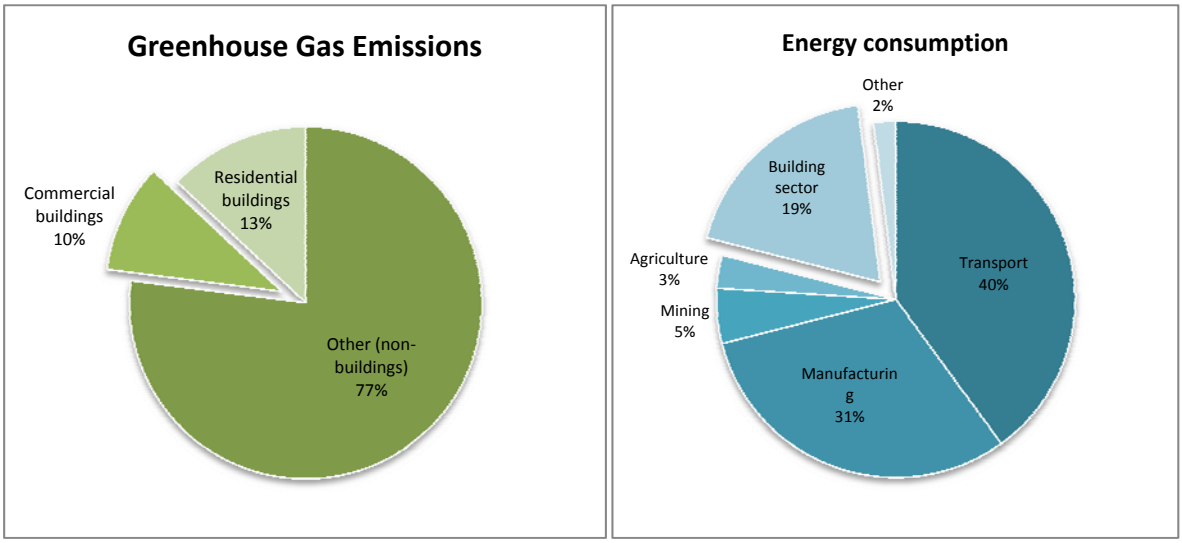
5 Garnaut Climate Change Review, Issues Paper–Forum 5, Transport, Planning and the Built Environment, p. 10.

6 Lend Lease, WSP Lincolne Scott, Advanced Environmental, *Submission* 8, p. 4.

Energy Efficiency in the Australian building sector

2.10 Based on 2005–06 data, energy consumption in the building sector accounted for 19 per cent of total energy consumption in Australia. Greenhouse gas emissions from buildings account for 23 per cent of all emissions, of which roughly ten per cent come from commercial buildings (Chart 1). In other words, 'energy use from activities within buildings is the source of demand which when met produces nearly a quarter of national greenhouse gas emissions'.[7]

Chart 1



2.11 The rate of increase in greenhouse gas emissions from the commercial building sector in Australia has been rapid. In 1990, the sector generated 32 megatonnes of CO_2 equivalent gases; by 2006, this figure had increased to 60 megatonnes. The largest emitters within the commercial building sector are office buildings followed by hospitals.[8]

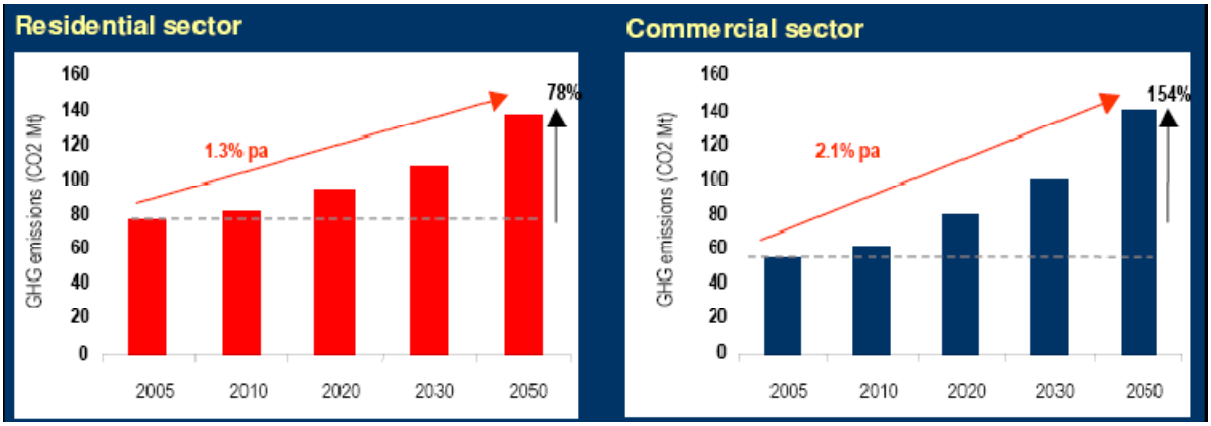
2.12 The emissions generated in the construction and refurbishment of buildings and appliances is also significant. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) estimate that '[T]he energy embodied in existing building stock in Australia is equivalent to ten years of the total energy consumption

7 Australian Sustainable Built Environment Council, 'The Second Plank, Building a low carbon economy with energy efficient buildings', September 2008, p. 8. http://www.asbec.asn.au/files/ASBEC%20CCTG%20Second%20Plank%20Report%202.0_0.pdf (accessed 4 February 2010)

8 Department of Environment, Water, Heritage and the Arts, 'Mandatory disclosure of Commercial Office Building Energy Efficiency', Regulation Document, November 2009.

for the entire nation'.[9] The bill does not address embodied energy in commercial buildings.

Chart 2



Source: Centre for International Economics, Based on energy consumption data from ABARE (2006) and Australia's National Greenhouse Accounts: National Inventory Economic Sector (2005). AGO (2007).

2.13 Chart 2 is reproduced from a 2008 publication from the Centre for International Economics.[10] It shows that, from the 2005 baseline to 2050, both the [average] annual rate and the overall percentage increase in CO_{2e} emissions is projected to be significantly higher for commercial buildings than for residential buildings.

2.14 In September 2008, the Australian Sustainable Built Environment Council published a commissioned analysis from the Centre for International Economics. The key findings of the report were that:

- without complementary measures the building sector is expected to reduce emissions by around 8 megatonnes a year from higher electricity prices through the CPRS. This is 3–4 per cent of the sector's total emissions each year from the 'business as usual' projection;
- with complementary measures, greenhouse gas abatement of around 60 megatonnes per annum is achievable by 2030. This is an abatement of around 27–31 per cent against the baseline emission projections (without change) for the building sector; and

9 http://www.garnautreview.org.au/CA25734E0016A131/WebObj/IssuesPaper5-Transport,planningandbuiltenvironment/$File/Issues%20Paper%205%20-%20Transport,%20planning%20and%20built%20environment.pdf

10 Centre for International Economics, Building energy efficiency and greenhouse gas emission abatement: potential and implications. Presentation at the Garnaut Climate Change Review Public Forum on Transport, Planning and the Built Environment, 19 February 2008, Perth.

- investment in energy efficiency in the building sector has the potential to reduce the sector's greenhouse gas emissions between 30–35 per cent by 2030.[11]

2.15 The Garnaut Review's issues paper on transport and the built environment noted that many authors have identified significant opportunities for mitigation in the building sector using current technologies which 'would appear to be cost-effective'.[12] It is not clear whether this assumes that there will a CPRS and a price on carbon.

2.16 A recent McKinsey report (2008) estimates that 60 megatonnes of carbon dioxide emissions reduction opportunities could be found in buildings by 2030 at low or negative cost. The report noted that:

> Most of these opportunities (-50 Mt) will be available by 2020 and many can be implemented today. Significant opportunities include improving commercial air handling, air conditioning and residential water heating systems. Australia's relatively low level of insulation creates significant opportunities for increased energy efficiency in residential and commercial buildings. Other major areas of opportunities include reducing energy consumption through improvements in lighting and mandating that appliances have energy-efficient standby features. Many of these efficiency measures are 'perishable' once a building is complete, it is generally much more expensive to retrofit. Two of the key levers here are better aligning tenants' and developers' incentives to improve energy efficiency, and using direct regulation to establish appropriate building codes and standards.[13]

Current Australian Government initiatives

2.17 The Australian Government is currently developing initiatives to improve the energy efficiency of commercial buildings. Prime among these initiatives are the National Strategy on Energy Efficiency and the Mandatory Disclosure of Commercial Office Building Energy Efficiency.

The National Strategy on Energy Efficiency

2.18 In July 2009, the Council of Australian Governments' (COAG) National Strategy on Energy Efficiency identified as a key objective to make 'buildings more energy efficient'. Part of meeting this objective is 'to drive significant improvement in minimum energy efficiency standards to deliver substantial growth in the number of

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11 Australian Sustainable Build Environment Council, The Second Plank-Building a Low Carbon Economy with Energy Efficient Buildings', p. viii. See Table 3.1.

12 Garnaut Climate Change Review, Issues Paper–Forum 5, Transport, Planning and the Built Environment, p. 9.

13 McKinsey & Company, 'An Australian Cost Curve for Greenhouse Gas Reduction', 15 February 2008, http://tasmaniantimes.com/images/uploads/EMBARGOEDAustralianCostCurveforGHGReduction.pdf

highly energy efficient homes and commercial buildings'. COAG noted that governments will set out a clear process and timetable for periodic review of energy efficiency standards.[14]

2.19 The Strategy will include various measures to improve the energy efficiency of non-residential buildings including:

- improving the efficiency of new buildings and major renovations by increasing the energy efficiency requirements in the 2010 update of the Building Code of Australia;
- requiring owners of commercial office buildings and government buildings to provide energy efficiency information to interested buyers and tenants, starting in the second half of 2010;
- collecting information on how energy efficient Australian homes and commercial buildings are now to help inform future policy;
- developing a national building framework to deliver consistency in how building energy efficiency is assessed and rated throughout Australia and for reviewing and setting stronger minimum energy efficiency standards for new and existing homes and commercial buildings over time; and
- offering financial support and information resources to homes and commercial buildings.[15]

2.20 The Strategy also announced that there will be measures 'to help raise the energy efficiency of existing building stock through cost-effective voluntary action in response to better information about building energy use'. In particular:

> ...people seeking to buy or lease properties will be provided with information about the energy efficiency of the buildings through proposed new mandatory disclosure provisions. Armed with this information, consumers and businesses will be able to make informed choices about the energy efficiency of the buildings they buy and lease - and builders and building owners will respond to those market signals by investing in energy efficiency.[16]

Mandatory Disclosure of Commercial Office Building Energy Efficiency

2.21 In November 2009, the Government released a regulation document outlining a national scheme for the mandatory disclosure of commercial office building energy efficiency. Starting in the second half of this year, building owners will need to provide up-to-date energy efficiency information when they sell or lease office space

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14 National Strategy on Energy Efficiency, Council of Australian Governments, July 2009, p. 22.

15 Department of Environment, Water, Heritage and the Arts, 'National Strategy on Energy Efficiency', http://www.environment.gov.au/sustainability/energyefficiency/buildings/ (accessed 2 March 2010).

16 National Strategy on Energy Efficiency, Council of Australian Governments, July 2009, p. 22.

covering more than 2000 square metres. Under the scheme, building owners will need to disclose a valid Building Energy Certificate which will include a National Australian Built Environment Rating System (NABERS) Energy base building star rating.[17] The NABERS scheme is discussed in more detail in chapter 4.

17 Department of the Environment, Water, Heritage and the Arts, 'Mandatory Disclosure of Commercial Office Building Energy Efficiency', Regulation Document, November 2009, p. i. The Hon. Peter Garrett, 'Improving the energy efficiency of Australia's office buildings', *Media Release*, 12 November 2009.