Australian Government

Productivity Commission

Stranded Irrigation Assets

Staff Working Paper

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June 2006

ISBN 1 74037 205 0

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An appropriate citation for this paper is:
Roper, H., Sayers, C. and Smith, A. 2006, *Stranded Irrigation Assets*, Productivity Commission Staff Working Paper, Melbourne, June.

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Preface

This Staff Working Paper presents the results of research on the options to address the perceived adverse financial consequences of stranded irrigations assets. It is part of a larger suite of water policy research conducted by the Commission, including modelling of regional economic impacts of changes in water trade and research into irrigation externalities.

Stranded or under-utilised assets are the inevitable consequence of any adjustment that produces a more efficient reallocation of water entitlements. Their existence is an indication that the market is working as it should.

Some of the proposed responses to manage the impact of assets potentially stranded by net outward permanent trade of entitlements will distort the efficient use of water, water entitlements and irrigation infrastructure. Related investment is also affected under current infrastructure pricing, which is predicated on less than full cost recovery.

Less distortionary response options are explored in this paper. If implemented, they would increase the benefits of the open permanent trading environment being established under the National Water Initiative. They would also address other impediments that currently detract from the efficient allocation of scarce water — to where its benefit in use is greatest, given its cost of supply.

The Productivity Commission is releasing this Staff Working Paper as a complement to the commissioned research study currently underway into *Rural Water Use and the Environment: The Role of Market Mechanisms*. This paper is intended to inform public debate on currently proposed and other alternative options to address stranded irrigation assets.

Acknowledgments

This study was overseen by Commissioner Neil Byron and reviewed within the Commission by Jonathan Pincus and others. Their useful comments and suggestions were greatly appreciated. The authors also wish to thank the Murray–Darling Basin Commission and the National Water Commission for providing comments on a draft of this paper.

The research assistance of Peter Garrick and Anthony Bell is also gratefully acknowledged.

Abbreviations

ACCC	Australian Competition and Consumer Commission
AGD	Attorney-General's Department
ANCID	Australian National Committee on Irrigation and Drainage
ATO	Australian Taxation Office
CGT	Capital Gains Tax
CICL	Coleambally Irrigation Co-operative Limited
CIT	Central Irrigation Trust
CoAG	Council of Australian Governments
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSO	Community service obligation
DIPNR	Department of Infrastructure, Planning and Natural Resources (NSW)
DNR	Department of Natural Resources (NSW)
DNRE	Department of Natural Resources and Environment (Victoria)
DSE	Department of Sustainability and Environment (Victoria)
ESC	Essential Services Commission (Victoria)
FMIT	First Mildura Irrigation Trust
GL	gigalitre (a billion (10^9) litres)
G-MW	Goulburn-Murray Water

GRP	gross regional product
IC	Industry Commission
IPART	Independent Pricing and Regulatory Tribunal
ITAA	Income Tax Assessment Act 1997
LMW	Lower Murray Water
MDBC	Murray-Darling Basin Commission
ML	megalitre (a million (10^6) litres)
NCC	National Competition Council
NCP	National Competition Policy
NPV	Net Present Value
NSWIC	New South Wales Irrigators' Council
NWC	National Water Commission
NWI	National Water Initiative
RAV	Regulatory Asset Value
SWC	State Water Corporation
TPA	Trade Practices Act 1974
WSC	Water Service Committee (Victoria)
WSP	Water Sharing Plan (NSW)

OVERVIEW

Key points

- Despite significant concern, it is not certain that proposals under the National Water Initiative (NWI) to relax restrictions on permanent water trading will necessarily result in widespread stranded (under-utilised) irrigation assets.
- Prior to the NWI, sales did not always reach restriction levels, suggesting that there are other factors influencing the volume of permanent trade;
  - two such factors could be the differential tax treatment of temporary, leased and permanent water trades and the option value of holding entitlements in the presence of uncertainty about the level and volatility of future prices.
- Stranded assets do not necessarily represent an impediment to the efficient use of infrastructure, the allocation of entitlements, or the use of water.
- Current proposals to manage the adverse financial impact of stranded assets — such as the ongoing payment of annual access fees, 'tagging' and 'exit' fees — will reduce the economic gains potentially available from entitlement trading.
- A more efficient approach would be the introduction of full cost recovery infrastructure pricing. This would involve:
  - abandoning charges for renewals annuities predicated on the *full* replacement of existing assets;
  - revaluing under-utilised assets 'appropriately' to reflect their current economic value in use;
  - charging to recover costs fully, as already agreed by governments (having regard for the demand for services); and
  - the introduction of cost-differentiated charges for individual irrigators within irrigation areas.
- Action along these lines could be expected to:
  - encourage rationalisation of stranded assets where the provision of infrastructure services can no longer be justified;
  - ensure that the financial consequences of stranded assets on remaining entitlement holders are minimised; and
  - remove current distortions to temporary and permanent water trading caused by large variations in the level of cost recovery across irrigation areas.
- Where assets are under-utilised or stranded and remaining irrigators are unable to afford the increase arising from entitlement trading, charges should be set at levels that allow irrigators to continue using the assets, as long as they are sufficient to cover the costs that would be avoided by withdrawing the service.

Overview

The over-riding rationale for water reform in Australia is to ensure that scarce water is allocated to where it is valued the most. That is, the beneficial use of scarce water resources is maximised, given the cost of its supply. To this end, governments have established tradeable water entitlements and are introducing initiatives to increase the effectiveness of water markets.

There is a concern that when restrictions on the sale of water entitlements are relaxed and net permanent outward trade takes place, some irrigation infrastructure assets will become under-utilised or 'stranded'. Specifically, remaining irrigators utilising that infrastructure would have to bear increased charges and be financially disadvantaged, unless compensated by those who sell their entitlements.

The assets likely to be affected include weirs, delivery and drainage channels, pipes, pumps and flow measurement devices. A significant proportion of the cost of the services provided by these assets is fixed — up to 90 per cent.

The matters explored in this paper are:

- whether the National Water Initiative (NWI) reforms are likely to result in widespread stranded assets in the southern Murray–Darling Basin;
- the economic and financial implications of recent proposals to manage the impact of stranded assets; and
- less distortionary policy responses to the stranded asset issue.

Why the concern over the prospect of stranded assets?

Trade in entitlements — typically referred to as 'permanent water' or 'entitlement' trading — involves the sale of all or part of the nominal volume of the water specified against an entitlement. The value of the entitlement is typically determined in a market. Theoretically, the price approximates the value of the water available under the right into the future, plus a premium for permanent access as a hedge against price volatility and uncertainty.

Infrastructure operators are concerned that net permanent outward trade of entitlements would reduce the revenue available to maintain current services. This

concern has been heightened by governments directing them to recover sufficient funds to provide for future asset replacement.

It has been argued that charges to the fewer remaining irrigators would have to be increased to cover the large capital and common operating costs of the infrastructure. Moreover, this would stimulate other irrigators to trade more water out of the system. Indeed, under this scenario, charges for those still remaining could eventually become unsustainable and leave operators with large fixed costs and no customers (Goesch 2001).

Taking this argument further suggests the need for under-utilised assets to be rationalised, or for there to be an adjustment to the level of cost recovery, or for the acceptance of lower standards of service.

Proposals to manage stranded assets

Governments have recognised irrigators' concerns and conditionally supported measures proposed by irrigators and infrastructure operators to address the adverse financial consequences of stranded assets. However, governments have stipulated that any such measures should not significantly distort trade.

The proposed measures on outward trade include:

- ongoing payment of infrastructure access fees by landowners after the sale of an entitlement;
- 'tagging' — access fees set in the source area are paid by the new owner of an entitlement (along with the access charge in the destination area); and
- 'exit' fees paid to the infrastructure operator by the seller or purchaser on the sale of an entitlement.

One option that has not been adequately considered is to write down the value of stranded assets in accordance with efficient pricing practice and so reduce the need to increase charges on remaining entitlement holders.

Will stranded assets be a 'problem'?

It is unclear whether a relaxation of permanent trade restrictions as proposed under the NWI would lead to significantly increased volumes of entitlement trading.

Previous restrictions on volumes of permanent water trading do not appear to have been a critical factor in determining the level of trade. This suggests that other factors are influencing decisions to sell and purchase entitlements.

One factor could be the differential tax treatment of temporary, leased and permanent water trades which could have discouraged permanent trading:

- The expenditure incurred in acquiring temporary water (annually) or leasing water (for a specified period) can be deducted from assessable income by the buyer, provided that it is incurred in gaining or producing that income. In contrast, the expenditure incurred in acquiring an entitlement cannot be deducted, as it is considered to be of a capital nature that secures an enduring benefit for a taxpayer.
- Receipts from temporary trading or water leasing will be assessable as income, whereas the proceeds from the sale of an entitlement are likely to be subject to capital gains tax.

Do stranded assets lead to a misallocation of economic resources?

From an economic viewpoint, stranded assets do not adversely affect efficient resource allocation. Reduced infrastructure use does not lead to a change in the allocation of resources, either on the part of irrigators or the infrastructure operator. Consequently, there are no economy-wide resource allocation implications.

The loss of economies of scale in the source area as a result of net permanent outward trade and any increase in economies in the importing area have financial but not short-run resource allocation implications. However, resource allocation would be affected through the sale of entitlements when congestion is relieved or created in the source or destination areas.

All economic activity is subject to changing market circumstances, which affects the value of assets. In some cases, assets are reduced in value to such an extent that they are abandoned, especially if they are sunk assets with no alternative use.

Changes in local demand for water delivery and drainage infrastructure are not an exception. Indeed, the existence of stranded assets can indicate that the market is working to redistribute entitlements efficiently. Further, any measures taken to mitigate adverse financial consequences for specific individuals or groups might cause economic distortions that result in inefficient resource allocation, including water.

Are the proposed measures economically sound?

Imposts (such as ongoing payment of access fees, 'tagging' and 'exit' fees) on the outward transfer of entitlements are an impediment to efficient trade. In effect, they are an economic tax shared by the purchaser and the seller — with the burden falling more heavily on one or the other, depending on the relative price sensitivity of purchases and sales.

The proposed measures, which apply only to permanent outward trade, do not directly affect temporary water trade per se. However, these measures are likely to reduce permanent trading, thereby affecting the efficient allocation of entitlements as a natural hedge against risk, and so increase temporary water trade.

Moreover, holding permanent entitlements has an 'option' value because of uncertainties about the future demand and supply of water, the level and volatility of water prices and the transaction costs of having to purchase water annually.

Consequently, fees set too high could prevent permanent trade altogether. Instead, it would be more profitable, and possibly more tax effective, for irrigators to engage in temporary water trade or water leasing arrangements in the face of high 'exit' fees.

Which of the proposed measures is best?

All three measures currently under consideration — ongoing payment of access fees, 'tagging' and 'exit' fees — have adverse economic implications. Of the three, the ongoing payment of access fees by landowners is the least undesirable from an economic perspective. It provides the greatest flexibility, the lowest administrative cost and the greatest incentive for efficient rationalisation of infrastructure.

Are there less distorting responses to stranded assets?

A number of other options are available to infrastructure operators that are preferable to currently proposed measures that distort efficient resource allocation. Other options include:

- pursuing full cost recovery pricing and revaluing assets to better reflect their economic value at the new, lower level of use;
- rationalising the infrastructure; and
- abandoning policies of providing annuities for the *full* renewal of existing assets.

The first measure would generally lead to increased charges for most irrigators, but not to the level determined by current asset values. The last two measures would reduce costs overall.

Pursuing full cost recovery

The value of scarce water depends in part on the cost of its efficient harvesting, storage and delivery. If charges for the assets used in this process are not reflective of the costs involved, water will be supplied inefficiently and markets for temporary and permanent water trading would be distorted. That is, water will not be used where it is valued the most as an input to production (at the margin and having regard to any externalities), given the cost of its supply.

Charges are not generally differentiated within irrigation areas in such a way as to reflect the greater cost of supplying irrigators furthest from the river off-take. Further, there is great disparity in the level of cost recovery across the areas serviced by the infrastructure operators examined in this study.

Governments are committed to moving to full cost recovery. That said, however, infrastructure operators receive non-repayable capital grants, although the levels differ significantly from area to area. Consequently, some infrastructure operators face lower operational and asset renewal costs than others. Despite good intentions, governments might have inadvertently introduced distortions by increasing the value of entitlements in some areas. This can allow the use of scarce water to continue when it would be more efficiently allocated elsewhere.

The opportunity cost of capital tied up in assets is recovered under full cost recovery. As in any business, the return on capital assets should be sufficient to justify their continued use — otherwise they should be sold or abandoned. However, under-utilised assets can only be valued up to the maximum of the expected present value of the benefits they generate *less* the costs of maintaining them. That is, the 'deprival value' method of asset valuation should be used (the loss that might be expected to be incurred if the operator were deprived of the service potential or future economic benefits of the asset).

For most assets, the present value of generated benefits is determined by anticipated future net revenue. In the case of irrigation assets, charges can be increased up to the market value of the delivered water without affecting the demand for the infrastructure service. However, it would not be rational to increase charges above existing levels (that might not fully recover costs) in areas where assets are under-utilised or stranded and irrigators are unable to afford the increase. In this latter situation, charges should be set at levels that allow irrigators to continue using

the assets, as long as they are sufficient to cover the costs that would be avoided by withdrawing the service.

If assets are to be run down before being abandoned, it will be important to signal the opportunity cost of water losses. If channel maintenance is reduced as a consequence, water losses can be expected to increase. These losses should therefore be reflected in reduced water allocations at the farm gate or in an additional charge to cover the market value of the water lost.

Rationalising infrastructure

The introduction of charges that fully reflect economic costs overall and within irrigation areas would assist with the rationalisation process. They would provide an incentive for those with higher infrastructure service costs, usually at the margins of irrigation areas, to trade their entitlements first. This in turn could result in reduced services from the most costly segments of the irrigation network and lower costs overall for the distribution and delivery of water.

The introduction of cost-differentiated charges could be viewed as unfair because it would affect the viability of activities that were established under the current system of average charges. On the other hand, undifferentiated charges are inequitable as well as inefficient with irrigators in low service cost areas cross-subsidising those in high cost areas. Cost-differentiated charges would also go some way to ensuring competitive neutrality with private diverters who have to meet all of their infrastructure costs. There may need to be an associated structural adjustment program during the transition phase.

Abandoning policies for mandating the full renewal of assets

The policy of requiring infrastructure charges to be at least sufficient to provide for renewals annuities was introduced with a view to autonomous funding of irrigation infrastructure. The intention was to make irrigators responsible for future infrastructure costs.

It is currently claimed that infrastructure charges are sufficient to provide for full asset renewal. However, it would be inappropriate to continue to provide for the full replacement of assets that have become stranded. If renewals annuities are to be retained, it would be sensible to adjust them to reflect the cost of the infrastructure required to meet future needs.

Pricing for full cost recovery would remove the necessity for renewals annuities. The revenue from charges covering depreciation and the opportunity cost of capital

would over time be sufficient to meet the cost of an appropriate replacement for the existing asset (if it is economically warranted). Importantly, the charges would better indicate what level of asset replacement is economically justified.

When should infrastructure operators abandon assets?

As argued above, the efficient use of infrastructure is more likely to be achieved in the longer term if infrastructure charges are set at a level to recover full economic costs, including the opportunity cost of capital on correctly valued assets (and any water losses as appropriate). Further, it is only possible to set charges up to the value of the service to irrigators.

If the value in use is less than the charge required for full cost recovery, operators receive an unambiguous signal that the asset should be rationalised or eventually abandoned. When this occurs, irrigators would normally have ample time for adjustment because of the long remaining life of most existing assets.

When charges finally become insufficient to cover avoidable costs, the asset should be replaced with more appropriate infrastructure or abandoned altogether. Continued use in these circumstances would require subsidisation to the financial detriment of other irrigators or water users.

What about community-wide effects of outward entitlement trade?

One of the reasons for introducing restrictions on permanent water trading was to avoid the cost to the community when net outward water trade occurs. However, analysis of a simulated 10 per cent reduction to the availability of water for consumptive use (a level similar to what might be expected from permanent outward trading in some areas) indicated that such a change is unlikely to have significant consequences for regional economies (Peterson et al. 2004).

Should, however, concerns about the impact on communities of outward entitlement trade require attention, they could be addressed directly and transparently, through structural adjustment programs, with a view to avoiding the erosion of potential gains from water reform through the introduction of distortionary impediments to entitlement trade.

1 Introduction

This study was prompted by concerns that net permanent outward water trading may impose costs on remaining irrigators in an irrigation area. These concerns have led to proposals for the introduction of measures, such as exit fees, to ensure that remaining irrigators do not have to each pay substantially more in order to meet all the fixed costs of maintaining services.

Recently, these concerns have been brought into sharper focus with governments deciding that the current restrictions on permanent sales of water should be relaxed. Historically, these restrictions were an interim response to the threat of stranded (under-utilised) assets and other related adjustment concerns.

Governments have agreed to the introduction of mechanisms such as exit fees to ensure that irrigation infrastructure operators (providers of water delivery and drainage services) remain viable, so that remaining irrigators are not financially disadvantaged by the decisions others make to permanently trade water outside the irrigation district. In doing so, they stipulated that these measures should not become an institutional barrier to trade.

This study is an assessment of the necessity, efficiency and efficacy of the various proposed measures.

1.1 Stranded irrigation assets

As in any activity, infrastructure operators face the risk that changes in market circumstances will reduce the demand for their services. When this occurs, their assets are typically no longer appropriate for the level of service required.

When fixed assets are significantly under-utilised they are considered to be stranded. This does not imply that they should be immediately abandoned. Indeed, from an economic perspective it is efficient for under-utilised assets to remain in operation while ever service charges cover the cost that could be avoided by closing them down.

Under-utilised assets are normally written down in value, to reflect the (reduced) benefits that they provide. However, proposed measures such as exit fees suggest

that infrastructure operators and governments are unconvinced that it is appropriate to revalue.

In the past, governments have directed infrastructure operators to set charges at a level to accumulate annuities that will provide for the eventual replacement of assets. Further, the Victorian Government gave commitments that water will continue to be delivered as long as irrigators remain.

Clearly, these past policies will have to be re-interpreted in light of the inevitability of some assets becoming under-utilised or stranded. There is no justification to replace assets to unnecessary levels of capacity. Moreover, commitments always to provide a service, no matter how uneconomic and financially unviable, would potentially involve heavy subsidisation of remaining irrigators in some areas.

Previous studies

There is an extensive literature on stranded assets in the electricity supply industry. However, this literature mainly concerns whether prices should be sufficient to provide a return on investments authorised by regulators when assets have subsequently become obsolete because of changes in technology or government regulation. Consequently, the insights provided by this literature are of limited relevance to this study.

There are many studies on water trading and its implications. Some of these studies address the issue of stranded irrigation assets to some extent, and comment on the adoption of exit fees to overcome the financial problems caused by stranded assets. Indeed in 2004, Dr Donna Brennan recognised that detailed work still needed to be done:

> Stranded assets are an issue that need detailed investigation, from a legal, economic and competition policy perspective. It has long been cited as a barrier to the broadening of water markets and is a difficult problem because of the long lived life of the infrastructure, and its declining average cost nature. However, there is little public information about the exact cost structure of water delivery infrastructure, … The MDBC advises that the analysis of stranded assets is underway. (Brennan 2004, p. 19)

Hassall et al. (2003 and 2004) have undertaken studies for the Murray–Darling Basin Commission on options and guidance for addressing stranded assets. However, the guidance material was predicated on an assumption that remaining irrigators would be compensated by those who sell their entitlements.

1.2 Scope of the study

Assets can become stranded in any irrigation area. However, this study is confined to a selection of infrastructure operators in the southern Murray–Darling Basin including:

- Murrumbidgee Irrigation Limited (hereafter referred to as Murrumbidgee Irrigation) in New South Wales;
- Murray Irrigation Limited (hereafter referred to as Murray Irrigation) in New South Wales;
- Coleambally Irrigation Co-operative Limited (hereafter referred to as CICL) in New South Wales;
- Goulburn–Murray Water (hereafter referred to as G–MW) in Victoria;
- Lower Murray Water (hereafter referred to as LMW) in Victoria;
- First Mildura Irrigation Trust (hereafter referred to as FMIT) in Victoria; and
- Central Irrigation Trust (hereafter referred to as CIT) in South Australia.

With the focus on examining proposed measures to address stranded assets, a significant part of the study involved an examination of pricing practices and current levels of cost recovery. Pricing and cost recovery policies are central to whether remaining irrigators bear increased charges when there is net outward trade in water entitlements. Indeed, a decision to introduce exit fees involves consideration of future infrastructure investment requirements, the costs to be recovered through charges and fees, and who should bear them.

Pricing policies also affect the structure of charges, including the component for access to the service. Currently the access and usage charges do not closely reflect the relationship between fixed and variable costs, with some fixed costs being recovered through usage charges. There may be a need to rebalance these charges to recover revenue shortfalls when there is net permanent outward trade from an irrigation area.

Finally, pricing policies have the potential to affect the efficiency of temporary and permanent water trades. Efficient trade occurs when water is used where it contributes the most value in production, after taking account of infrastructure costs. Consequently, differential levels of cost recovery potentially distort efficient trading outcomes, other things being equal.

1.3 Conduct of the study

This is a staff working paper. As such, the views expressed are those of the authors and are not necessarily those of the Commission.

A draft was prepared and submitted for comment by selected experts and interested parties. The authors have had regard for these comments, drawing on them to finalise the paper.

Consultation

Officers of the Commission consulted with government departments, irrigation infrastructure operators and regulatory authorities. All cooperated and responded to requests for information.

Sections of the study containing descriptive material were sent to relevant entities to check on factuality and to invite comments on any interpretation of information.

Terminology

One of the most striking features of the debate surrounding stranded assets and water reform more generally is the lack of consistent lexicon of terminology. New terminologies are evolving with differences across jurisdictions and within jurisdictions.

For example, new trading terminology has evolved with the release of the New South Wales Water Sharing Plans and the Victorian *Water (Resource Management) Act 2005*. Water trading transactions are now referred to as water dealings.

- In New South Wales, permanent water trades or sales are referred to as a transfer of ownership of the access licence or entitlements, in Victoria they are referred to as a transfer of the ownership of water shares; and
- temporary or seasonal trade is now referred to as an assignment of water allocation from the account of one access licence or water share to the account of another.

This lack of consistency does not appear to be causing significant misunderstandings. However, it creates difficulties in producing a paper that will be readily understood by all without careful reading.

For the purpose of this study, the authors have adopted the most widely understood terminology where possible. However, it was necessary to clearly distinguish

between the sale of a 'right' to access water and the water made available under that right.

A 'water right' is a formally established or legal authority to take water from a water body and to retain the benefits of its use. An 'entitlement' is the nominal amount of water available under the right — typically a share of the available water in nominated circumstances. An 'allocation' is the amount of water actually made available in any particular season against the right and varies over time with the availability of water.

The transactions in this study are referred to as temporary and permanent sales of water respectively. In the case of a temporary sale of water, the entitlement attached to the right remains with the right holder. When water is sold permanently — involving the trade of an entitlement — a right holder sells all or part of their entitlement to a new or existing right holder.

The irrigation infrastructure operators have disparate organisational and legal forms — including trusts, companies, co-operatives and statutory authorities. They have been referred to collectively as infrastructure operators. Typically, they supply infrastructure services using water harvesting, storage, distribution and drainage assets. Their assets can be comprised of dams, weirs, pumps, bridges, culverts, tanks, pipes, caissons, syphons, channels and water measuring devices.

Report structure

The report commences with a discussion of industry arrangements and water reforms to provide context to the subsequent discussion of issues (chapter 2).

The causes and effects of stranded assets, their economic characterisation and the restrictions placed on permanent water sales to address their perceived financial implications are then discussed (chapter 3). Information on current levels of permanent water trade is also presented to examine the current threat of assets becoming stranded. Finally, the possible responses to stranded assets are identified to provide a framework for the assessments reported in the remaining chapters.

Charges for under-utilised infrastructure and the eventual abandonment of stranded assets are at the heart of irrigators' concerns. Existing charges and levels of cost recovery are examined and reported (chapter 4). Efficient pricing principles are also outlined and discussed in order to assess the necessity of introducing increased access and exit fees.

An assessment of the efficiency of exit fees is presented along with a discussion of their financial, tax, legal and community implications (chapter 5). Finally, the issue

of how exit fees might be set is discussed because they have been given qualified acceptance by the Council of Australian Governments (CoAG). Further, a number of irrigation infrastructure operators have already introduced exit fees.

2 Industry arrangements and reforms

The structure and governance of the infrastructure operators in the southern Murray–Darling Basin is described in this chapter. This is followed by an overview of the key water reforms relevant to this study — unbundling and security of entitlements, pricing, water trade and stranded assets.

Finally, responses by the selected infrastructure operators to the new trading arrangements and the mechanisms used to address stranded assets are outlined.

2.1 Industry structure

A large number of government agencies and businesses are involved in progressing national water reform, improving the management of water resources and providing water related services in the southern Murray–Darling Basin. These include the National Water Commission (NWC), the Murray–Darling Basin Commission (MDBC), state government departments and ministries, regulatory authorities, catchment management authorities, and irrigation infrastructure operators.

Bulk water and irrigation services

In New South Wales, one public authority, State Water Corporation (SWC) is responsible for delivering bulk water to all rural areas in the State. Among its 6200 customers are privately-owned infrastructure operators (who operate the retail distribution systems and supply water to irrigators in their respective areas), country town water supply authorities, farms, mines and electricity generators.

SWC delivers about 5000 gigalitres (GL) per year to water users and the environment over some 7000 kilometres of regulated river systems (State Water 2005).

SWC's bulk water charges are regulated by the Independent Pricing and Regulatory Tribunal (IPART). However, retail irrigation infrastructure service charges are not subject to state government approval or examination by an independent regulator.

In contrast, there are five Victorian rural water businesses, of which three provide bulk water services to a number of rural and urban water businesses.[1] Goulburn-Murray Water (G–MW) provides bulk water to seven other businesses including the First Mildura Irrigation Trust (FMIT) and Lower Murray Water (LMW). G–MW is also responsible for providing bulk water to each of its irrigation districts as well as maintaining the irrigation infrastructure within its districts.

The Essential Services Commission (ESC) will determine service charges for each of the five rural water businesses in the future. The first price review to be undertaken by the ESC will consider charges to apply for a two-year period from 1 July 2006.

In South Australia, the Department of Water, Land and Biodiversity Conservation controls bulk supplies in the River Murray. The infrastructure operators pump directly from the River Murray and supply water directly to individual irrigators. The operators recommend prices for approval by their members (privatised irrigation districts) or the Minister (government irrigation districts). The Minister also approves prices in private irrigation districts if they are indebted to the government.

Some bulk water is provided to users under the 'umbrella' of the MDBC (River Murray Water). Although the assets involved in providing these services are owned and operated by individual state authorities they are managed by the MDBC.[2]

The costs of managing and maintaining assets under joint arrangements are paid for by the signatory states (New South Wales, Victoria and South Australia). The costs are then allocated to each state in proportions defined under the terms of the MDBC agreement (IPART 2004).

Southern Murray–Darling Basin suppliers and users of irrigation water

Each of the infrastructure operators in the southern Murray–Darling Basin — Murray Irrigation, Murrumbidgee Irrigation and Coleambally Irrigation Co-operative Limited (CICL) in New South Wales, G–MW, LMW and FMIT in Victoria and Central Irrigation Trust (CIT) in South Australia — operate independently of each other.

1 The five rural water businesses are Goulburn–Murray Water, Southern Rural Water, Grampians Wimmera–Mallee Water, Lower Murray Water and the First Mildura Irrigation Trust. Only Goulburn–Murray Water, Southern Rural Water and Grampians Wimmera–Mallee Water provide bulk water services.

2 The main assets falling under the management of the MDBC include the Hume Dam, Dartmouth Dam and the Menindee Lakes storage scheme, as well as a range of diversion weirs.

All infrastructure operators in New South Wales have been privatised (see table 2.1). In South Australia, some irrigation districts have been, and others are still in the process of being, privatised. Infrastructure operators in Victoria are being retained in public ownership (DSE 2004).

Table 2.1 **Characteristics of selected irrigation infrastructure operators, 2003-04**

Infrastructure operator	*Management structure*	*Irrigation entitlement*	*Area irrigated*	*Irrigated farms*
		ML	ha	no.
New South Wales				
Coleambally Irrigation	Private cooperative — each irrigator is a shareholder in the cooperative	630 000	73 100	350
Murray Irrigation	Private non-listed company — each irrigator is a shareholder in the company	1 479 000	112 600	2 400
Murrumbidgee Irrigation	Private non-listed company — each irrigator is a shareholder in the company	1 456 000	107 700	2 700
Victoria				
Goulburn–Murray Water	Statutory authority	1 606 000	390 000	10 900
Lower Murray Water (Rural)	Statutory authority	99 200	11 100	1 400
First Mildura Irrigation Trust	Public Trust	83 000	6 400	1 600
South Australia				
Central Irrigation Trust	Private Trust	155 000	13 500	1 500

Note River and groundwater diverters not included in G–MW and LMW data. Western Murray and Jemalong Irrigation Limited and the private irrigation districts of West Corurgan and Moira in New South Wales are not included. Their combined irrigation entitlement accounts for around 279 000 ML.

Source: ANCID 2005; CIT 2005; G–MW 2004a; LMW 2005b; Murrumbidgee 2004a; CICL, NSW, pers. comm., May 2005.

The selected operators receive water under a bulk entitlement licence issued by their respective state government departments. Individual irrigators contract with the infrastructure operator for the supply of water.[3]

In New South Wales, the privatised infrastructure operators hold the bulk entitlement (access) licence that specifies rights to a share of the available water in the regulated river systems.

3 Infrastructure operators may also transport some water for towns or for environmental or other purposes.

As part of the privatisation process in New South Wales, each landholder, as a shareholder in the company, rescinded their statutory rights to water in exchange for a number of shares equivalent to the number of megalitres (ML) in their prior volumetric entitlements held with the relevant state government department (Taylor et al. 2001).[4]

In contrast, Victorian irrigators have retained their statutory right to water. The operator holds a bulk water entitlement licence that specifies the nominal volumetric and reliability components of the primary entitlements that they must supply.

These primary entitlements include:

- water rights that are specific to irrigation districts and depend on ownership of land within the district; and
- 'take and use' licences which are held by private diverters who pump directly from a waterway. They are generally not held within an irrigation district.

Most water used for irrigated agriculture is supplied to farmers (irrigators) by the selected infrastructure operators. However, private diverters (including river and groundwater pumpers) are also important users of water for irrigation.

Private diversion licences for the regulated rivers in the southern Murray–Darling Basin accounted for around:

- 250 000 ML (72 per cent) in the area serviced by LMW and 213 000 ML (12 per cent) in the area serviced by G–MW in Victoria in 2004-05 (LMW 2005b; G–MW 2005);
- 650 000 ML (30 per cent) of general security entitlements in the Murrumbidgee regulated catchment of New South Wales (excluding irrigators serviced by CICL and Murrumbidgee Irrigation) (DNR, NSW, pers. comm., 16 May 2006); and
- 518 000 ML (27 per cent) of general and high security entitlements in the Murray and Lower Darling regulated catchment of New South Wales (excluding irrigators serviced by Murray Irrigation, Western Murray, West Corurgan and Moira Private Irrigation Districts) (DNR, NSW, pers. comm., 16 May 2006).

Although private diverters are licensed to operate privately-owned pumps or diversion channels to source water, the study is confined to the selected infrastructure operators. Consequently, there are only limited references to private diverters in this report.

4 Each landholder entitlement equates to one megalitre of water and represents a share of the infrastructure operator's bulk water access licence.

2.2 Governance

Ownership and governance arrangements for infrastructure operators vary across jurisdictions. These different governance arrangements also have an influence on pricing policies and the responses to the financial and community consequences of stranded assets.

Historically, the prices charged by operators did not cover the cost of providing the service. They typically had a number of unclear and conflicting objectives, and were therefore not accountable for poor financial performance. Operators were often expected to meet community service obligations (CSOs) without compensation from governments for meeting these obligations.

In 1992, the Industry Commission (IC) raised concerned about taxpayers' money funding 'unproductive and unsustainable' water infrastructure investments. Acceptance of cost under-recovery rendered price signals ineffective, leading to higher demand for water than would have otherwise been the case. To put the problem in perspective, Victoria's Rural Water Commission stated in 1992 that water charges recovered less than 50 per cent of associated costs (excluding superannuation and overdraft costs) (IC 1992).

The IC argued for greater devolution of decision making over irrigation assets to local areas, and ultimately saw privatisation as the best way of imposing commercial disciplines on infrastructure operators. Governments were typically moving in this direction already, consistent with trends in the reform of government trading enterprises more generally.

Concerns about inefficient resource use in the water sector led the Council of Australian Governments (CoAG) to make a number of commitments in 1994 relating to water resources. These included movement toward full cost recovery for water services, separation of water entitlements from the ownership of land, promotion of intra and interstate water trading, and the introduction of environmental water allocations. Further, they agreed to perform more thorough economic and environmental assessments of water investments and to transfer to constituents greater responsibility in the management of irrigation areas.

To further the water reform process, the Australian Government and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory agreed in 2004 to the National Water Initiative (NWI). The NWI was designed to, among other things, promote further reform in the areas of water access entitlements, water trading and best practice water pricing.

New South Wales

New South Wales began the reform process in the late 1980s by establishing Irrigation Management Boards made up of irrigator representatives. Although these boards had *de facto* control of irrigation schemes, the government continued to employ staff, sign contracts and be liable for legal action against the schemes. Consequently, many in government wished to transfer risk more appropriately to the irrigators by handing them control of the schemes (Taylor et al. 2001).

The *Irrigation Corporations Act 1994* enabled irrigation areas and districts to convert to corporations and then companies. These companies were to be effectively cooperatives in which all customers were to have shares. The articles of association for each corporation set out the rights of irrigator shareholders.

Murray, Western Murray and Jemalong were privatised in 1995, Murrumbidgee in 1999 and Coleambally in 2000. It was determined that bulk water would be provided to these entities to the amount equal to the total individual entitlements of shareholders, with some additional water provided for other users and to allow for water losses where applicable.

The entities are relatively free to set terms and conditions of contracts with irrigators, determine operational practices for distributing water to individual irrigators (including the order of distribution), set charges in accordance with costs and determine rules for water transfers within and between schemes.

CICL has become a cooperative, with its constitution included in its cooperative rules. The other New South Wales irrigation companies remain private corporations, with constitutions set out in their memoranda, articles of association or operating plans.

The governance arrangements for these entities are similar. For example, Murray Irrigation has ten elected directors. Eight of these are irrigator members, elected based on geographic representation, and two have specialist skills. The interests of landholders are therefore centrally represented (MJA 2003).

An advantage of privatisation is greater assurance that boards are responsive to the needs of their irrigator customers. However, they may be less responsive to 'national interest' concerns than would be government-owned enterprises that can be directed by ministers.

One issue stemming from the privatisation in New South Wales relates to the State's commitments to CoAG and the NWI. In 2004, the New South Wales Government initially held the position that the ability to vary trading rules

constraining trade out of irrigation districts rests with the companies and their shareholder customers (NCC 2004). However, in recognition of the potential gains from water trading, the New South Wales Government has subsequently passed legislation designed to facilitate trade.

Victoria

Unlike New South Wales (and South Australia), Victoria has maintained assets in public ownership. The rural water businesses are constituted under the *Water Act 1989*. Board members are appointed by, and accountable to, the portfolio minister and objectives are determined, at least in theory, by the government.

The sector is dominated by G–MW, which manages 70 per cent of Victoria's stored water each year. G–MW has a skills-based board appointed by, and reporting to, the Minister for Sustainability and Environment (G–MW 2004a).

In July 1994, the government assumed the debts of G–MW's predecessor organisations — the Rural Water Commission and the Rural Water Corporation. In return, the government required G–MW to move toward full cost recovery without the need for ongoing government funding (MJA 2003).[5]

G–MW's most recent corporate plan lists seven business objectives, relating to service (deliver to agreed standards), water resource management, the environment, asset management, its workforce, finance and relationships with stakeholders (G-MW 2004b). The priorities placed on these objectives have not been published.

The finance objective is 'to set prices to reflect the cost of efficient service provision and to ensure long-term business viability'. Beyond the objective of long-term viability, there does not seem to be a commercial focus to G–MW's activities.

G–MW has established water service committees (WSCs) for each region to achieve some level of devolution of management to local irrigators. These committees provide input on pricing, maintenance and investment decisions. The WSCs are advisory however, and decision making in these areas still rests with G-MW's management and the board.

One characteristic of public ownership is that it has been much easier for the Victorian Government to instruct the Victorian rural water businesses to meet the State's obligations under CoAG and NWI pricing and trading principles. Victoria

[5] Victorian rural water businesses are required to set prices based on lower bound cost recovery under the CoAG pricing principles.

has the capacity through ownership to instruct rural water businesses to adopt these policies.

One major change to governance arrangements in Victoria has been the decision to make the ESC the regulator of the entire water sector. This regulatory arrangement will require each business to develop a plan setting out:

- what it proposes to achieve over the period with respect to meeting future demands and complying with regulatory requirements;
- the services to be provided and the programs to be undertaken to meet future demands and regulatory requirements;
- its revenue requirements; and
- its proposed prices, or the manner in which prices will be determined, for each of its services (DSE 2004).

The ESC will assess the proposals against criteria, stakeholder views and government pricing principles.

South Australia

South Australia has transferred ownership of all but nine irrigation districts to irrigators. It has advised the National Competition Council (NCC) that it does not provide the privately-owned irrigation trusts with irrigation or drainage infrastructure services and none receive government funding (NCC 2004).

More than half of South Australia's total irrigation diversion is represented by CIT, an organisation providing services on contract to nine irrigation trusts in the Riverland district. CIT's governance arrangements are typical of those in South Australia.

The trusts are statutory bodies set up under the *Irrigation Act 1994*, and are exempt from the provisions of Corporations Law. Irrigators vote in proportion to their water holdings to elect office holders and on key decisions. There is a board of management, made up of representatives from each local area trust, to whom day-to-day decisions are delegated (MJA 2003).

Although the day-to-day operation of the trust is delegated to local management, the government retains the power to abolish the trust, dispose of its property or reallocate its assets.

The NCC has questioned whether the restrictions placed by trusts such as CIT on trade out of districts are consistent with South Australia's obligations under the

1994 CoAG agreement. The South Australian Government has expressed the view that the trading limits are not an issue for government as they are imposed by private trusts under their articles of association.

The NCC, on the other hand, maintains the government has responsibility under the CoAG agreement to facilitate trade in water even though the ability to vary trading rules rests with the trusts. Following the NWI, South Australia has committed to take all necessary steps to achieve higher levels of permanent trade out of irrigation areas by June 2005 (NCC 2004).

Implications of ownership

There are significant differences in the way privately- and publicly-owned infrastructure operators are likely to behave based on the differing incentives they face.

Privately-owned infrastructure operators are likely to behave as 'pure' cooperatives, seeking to maximise the welfare of those irrigators that are both their customers and shareholders. They are likely therefore to be maximising the welfare of irrigators as their dominant primary objective (although there could be internal conflicts between individual irrigators within the group).

Publicly-owned infrastructure operators tend to exhibit many conflicting objectives that have to be resolved. Some of these (such as maintaining financial viability or some environmental objectives) may conflict with the objective of increasing trade out of regions.

For publicly-owned infrastructure operators, governments need to be very clear about the priorities to be placed on these various objectives, particularly clashes between the commercial interests of the business and broader economic efficiency objectives of the government. Decisions to allow or set exit fees should be fully evaluated and exposed to public scrutiny.

2.3 Water supply reliability and technology

The reliability of water supply and the technology used in providing infrastructure services for the supply, delivery and drainage of water affect the ability of operators to respond when their assets are at risk of becoming stranded.

Irrigator entitlements and reliability of supply

All irrigators have a conditional entitlement to a specified volume of water. The extent to which they receive their full entitlement in each season depends on the category or class of entitlement they hold and its associated supply reliability.

In Victoria and South Australia, all irrigator entitlements are classified as high security. In contrast, New South Wales irrigator entitlements are classified as 'high' and 'general' — with the majority being 'general security' (see table 2.2).

Table 2.2 **Security of entitlement for selected infrastructure operators, 2003-04**

Infrastructure operator	*Entitlement classified as general security*	*Entitlement classified as high security*
	%	%
New South Wales		
Coleambally Irrigation	98	2
Murray Irrigation	99	1
Murrumbidgee Irrigation	80	20
Victoria		
Goulburn–Murray Water	nil	100
Lower Murray Water (Rural)	nil	100
First Mildura Irrigation Trust	nil	100
South Australia		
Central Irrigation Trust	nil	100

Source: ANCID 2005.

The reliability of supply also varies across jurisdictions:

- In South Australia, high security entitlements have almost 100 per cent reliability of supply. Under the Murray–Darling Basin Agreement, South Australia is guaranteed a fixed volumetric cap on diversions from the River Murray, which effectively provides irrigators with a high reliability of supply every year.
- In New South Wales, high security water has a 97 per cent reliability of full allocation, but general security allocation varies widely depending on the resource supply. For example, in seven out of ten years Murray Irrigation shareholders can expect to receive 80 per cent of their allocation by the end of the season (Murray Irrigation 2005a). General security licence holders can mitigate some of the risk of low allocations through a carryover system from one season to the next.

- In Victoria, high security entitlements can expect to be met in 96 years in 100. However, carryover of unused water is not available for high security irrigators.

High security entitlements and high levels of supply reliability attract industries with higher initial investment such as wine grapes, citrus, almonds and dairy which are concentrated in Victoria and South Australia (BTRE 2003).

In contrast, general security entitlements combined with lower levels of supply reliability encourage a more opportunistic response to water management and lower levels of investment. In New South Wales, where the majority of irrigators have general security entitlements, a higher proportion of annual crops (rice and other cereals) are grown *viz a viz* permanent plantings in Victoria and South Australia (BTRE 2003).[6]

It has been suggested that general security water was originally chosen for New South Wales because, together with the prevailing soil types, it suited annual cropping. In contrast, high security water was required in Victoria for perennial or permanent plantings (Alvarez 2005).

Infrastructure capacity can also affect the reliability of supply. Irrigators in some areas experience problems in obtaining the water they are entitled to when they need it because of delivery constraints.

Technology and operations

The distribution of irrigation water and the on-farm use of water have an important effect on the costs of irrigated crops.

The irrigation infrastructure is usually comprised of:

- distribution channels (gravity irrigation) or pipes (pumped irrigation);
- drainage channels; and
- weirs for supplying the network.

Water supplied in pipes is typically pumped under pressure. Channels may be earthen or lined with concrete.

Pumping through pipes reduces losses but incurs significant power costs. Initial capital costs of pumped irrigation are also high on a per ML basis. In pumped

6 Annual cropping tends to be more opportunistic because rice farmers, for example, can adapt more easily to changing conditions such as water shortages and price changes (they can choose not to plant and sell their temporary water allocation or plant an alternative crop).

irrigation areas, the total crop area and volume of water consumed are relatively small, typically comprising of high valued crops such as vines, fruit trees and other horticulture crops rather than broadacre crops and pastures (see table 2.3).

Table 2.3 **Summary of technology and operations of selected infrastructure operators**

Infrastructure operator	*Type of irrigation*	*Security of supply*	*Main irrigated crops*
New South Wales			
Coleambally Irrigation	gravity	general	wheat, rice, maize
	gravity	high	horticulture
Murray Irrigation	gravity	general	rice, annual and perennial pasture, cereals
Murrumbidgee Irrigation	gravity	general	wheat, rice
	gravity	high	vines, citrus
	pumped	high	vines, citrus
Victoria			
Goulburn–Murray Water	gravity	high	annual and perennial pasture
	pumped	high	stone fruit, vines
Lower Murray Water (Rural)	pumped	high	vines, citrus, fruit
First Mildura Irrigation Trust	pumped	high	vines, citrus
South Australia			
Central Irrigation Trust	pumped	high	vines, citrus

Source: ANCID 2005; Murrumbidgee Irrigation, NSW, pers. comm., 20 December 2005; Murray Irrigation, NSW, pers. comm., 5 May 2006.

The flow of water is metered and controlled by the use of measuring devices. The Dethridge wheel is the traditional device used to measure on-farm water use. Its accuracy is influenced by the channel operating level, the revolutions it is operated at and the height of the channel compared to the wheel. It tends to underestimate actual flows by around 8 per cent (Murray Irrigation, NSW, pers. comm., 5 May 2006).[7] The underestimation of actual flows tends to increase with the size of the channel (Murrumbidgee Irrigation, NSW, pers. comm., 10 May 2005). In some irrigation areas, new metering technology is being implemented, such as solar-powered, magflow and doplar meters.

Historically, the pace at which new technology is being introduced has been influenced by the amount of funding received from governments for refurbishing and upgrading the infrastructure assets. For example, CIT has the newest

[7] In low-flow periods water goes under the wheel without registering. In high-flow periods water can go over the wheel without registering.

infrastructure of all the irrigation systems studied as a result of the relatively large government funds received before and after its privatisation in 1997.

The irrigation seasons vary partly because of different distribution technologies used. For example, CIT's automated pumped system is able to provide water on-demand all year round, while for Coleambally's gravity system the season is limited from mid-September to mid-May.

2.4 The 1994 reforms

In 1994, CoAG endorsed a national water reform framework to achieve an efficient and sustainable water industry. The strategic framework contained a suite of principles. Of particular relevance to this study are those principles relating to irrigation services including setting infrastructure charges and trading water entitlements.

In relation to charges:

- charges and costs had to comply with the principle of full cost recovery with any subsidy made transparent by 2001;
- positive real rates of return on the written down replacement cost of assets had to be achieved by 2001;
- where trading in water could occur across state borders, the basis of charges and asset valuation arrangements had to be consistent;
- where it was not currently the case, the infrastructure operator had to set aside funds for future asset refurbishment or upgrading of government supplied water infrastructure.

In relation to water allocations and entitlements:

- state governments had to implement comprehensive systems of water allocations or entitlements backed by separation of water property rights from land title and clear specification of entitlement in terms of ownership;
- where they have not already done so, states agreed to give priority to formally determining allocations or entitlements to water, including allocations for the environment as a legitimate user of water.

In relation to temporary and permanent water trading:

- water had to be used to maximise its contribution to national income and welfare, within the social, physical and ecological constraints of catchments;

- where it was not already the case, the trading arrangements in water allocations or entitlements were to be instituted once the entitlement arrangements had been settled. This should occur no later than 1998;
- where cross-border trading was possible, trading arrangements had to be consistent and facilitate cross-border sales where this was socially, physically and ecologically sustainable; and
- individual jurisdictions agreed to develop, where they did not already exist, the necessary institutional arrangements from a natural resource management perspective, to facilitate trade in water, with the proviso that the MDBC be satisfied as to the sustainability of proposed trading transactions within the Basin.

Regulatory arrangements

In 1995, the Murray–Darling Basin Ministerial Council introduced a limit (Cap) on diversions from the rivers in the Basin in response to concerns about the deteriorating environmental health of the river system.

The Cap affects all the selected irrigation infrastructure operators in this study and effectively limits the amount of water available for consumptive use such that demand for more water has to be met through trades. Prior to the introduction of the Cap there was little incentive to trade since increased demand for water was largely met administratively through increased allocations to irrigators (Goesch 2001).

For New South Wales and Victoria, the Cap in any year is the volume of water that would have been used with the infrastructure (pumps, dams, and channels), the area developed for irrigation, and the management rules that existed in 1993-94, assuming similar climatic and hydrologic conditions to those experienced in the year in question (MDBC 2005a).

For South Australia, diversions were capped at the level that enabled its existing high security entitlements to be maintained. In effect, this represented a small increase in allowable diversions from the 1993-94 levels equivalent to the long-term average of 90 per cent of the amount of entitlement on high security licences that existed in 1993-94 (MDBC 2005a).

Each year an audit of Cap compliance is conducted by the MDBC's Independent Audit Group. A Water Audit Monitoring Report is issued that provides the detailed accounting under the Cap, covering water use, accuracy of water use figures, climatic overview of the water year, water availability through allocations, off-allocations and water trading, storage losses and groundwater use.

2.5 The National Water Initiative

In August 2003, CoAG agreed that:

> … there was a pressing need to refresh its 1994 water reform agenda to increase productivity and efficiency of water use, sustain rural and urban communities, and to ensure the health of river and groundwater systems. (2003, p. 1)

Out of this agreement emerged the NWI in June 2004. The NWI builds on the achievements of the 1994 CoAG strategic framework and is designed to:

- ensure water is put to best use by encouraging the expansion of water markets and trading across and between districts and states (where water systems are physically shared), involving clear rules for trading, robust water accounting arrangements and charges based on full cost recovery principles;
- improve the security of water access entitlements, by clear assignment of risks of reductions in future water availability and by returning over-allocated systems to sustainable allocation levels;
- ensure ecosystem health by implementing regimes to protect environmental assets at a whole of basin, aquifer or catchment scale; and
- encourage water conservation in our cities, including better use of stormwater and recycled water.

The Governments of New South Wales, Victoria and South Australia (among others) are signatories to the NWI. The intergovernmental agreement on the NWI sets out objectives, outcomes and actions for the ongoing process of national water reform, and timelines to achieve this reform.

The NWC is responsible for overseeing the implementation of the NWI and, in doing so, requires each of the signatories to prepare an implementation plan that will be accredited by the NWC.[8] The implementation plans are intended to:

- describe how the actions and timelines agreed in the intergovernmental agreement are to be achieved, including milestones for each key element of the agreement;
- describe the timing and process for making any consequential changes to water plans and the water access entitlement frameworks;
- be developed cooperatively between the states and territories that share water resources to ensure appropriate co-development of those actions that are of a cross-jurisdictional nature, including registries, trading rules, water products and environmental outcomes; and

8 The NWC is an independent statutory body in the Prime Minister's portfolio.

- be made publicly available.

Prior to the requirement to develop these implementation plans, New South Wales and Victoria had been pursuing their own water reforms in support of the key strategies and principles underpinning the NWI. For example:

- In June 2004, the Victorian Government released the White Paper — *Securing Our Water Future Together* — an action plan to secure sustainable water supplies for the future.
- In 2004, the New South Wales Government enacted the *Water Management Amendment Bill 2004*, which establishes a new water management framework, including the implementation of water sharing plans (WSPs) that define water sharing rules for the environment, provide for perpetual water rights and establish the rules for water dealings (trading).

A State Natural Resources Management Plan has been developed in South Australia, which among other things, adopts the broad policy objectives and principles of the NWI (DWLBC 2006).

NWI objectives affecting water access entitlements

Under the NWI, water access will be via an entitlement, separate from land. The associated right will be a perpetual or open ended share of the consumptive pool of a specified water resource, as determined by the relevant water plan (CoAG 2004, para. 28). In addition, water use at a particular site for a particular purpose and works (pumps, bores, and dams) used to take water will be specified separately to the water access entitlement (CoAG 2004, para. 30).

The separation of access entitlements from works and use licences is designed to:

- streamline the process for water trading as it is water and the access entitlement that are the tradeable commodity; and
- control land-based activities that impact on the environment and other water users with works and use licences remaining tied to the land.

NWI objectives affecting over-allocated systems

The Cap on water diversions in the Murray–Darling Basin, the development of WSPs (New South Wales), Water Allocation Plans (South Australia), and the Living Murray Initiative are all predicated on sustaining water resources into the future.

The NWI reiterates the need to return previously over-allocated systems (that is, where entitlements have been issued for more than the sustainable level of water use and where the consumption of water is more than the sustainable level of use) to environmentally sustainable levels of extraction.

Under the NWI, the property rights of irrigators will be amended to give greater certainty should there be future reductions in water availability for consumptive use. A framework to assign the risks has been devised which specifies that:

- Reductions arising from natural events such as climate change, drought or bushfire will be borne by water users (CoAG 2004, para. 48).
- Reductions arising from *bona fide* improvements in knowledge of water systems' capacity to sustain particular extraction levels are to borne by users up to 2014 (CoAG 2004, para. 49).
- Risks arising under comprehensive water plans commencing or renewed after 2014 are to be shared over each ten-year period in the following way:
  - water access entitlement holders will bear the first 3 per cent reduction in water allocation (CoAG 2004, para. 49(i));
  - state and territory governments, and the Australian Government will share (one third and two thirds, respectively) the risk of reductions of between 3 per cent and 6 per cent (CoAG 2004, para. 49(ii)); and
  - state and territory governments and the Australian Government will share equally the risk of reductions above 6 per cent (CoAG 2004, para. 49(iii)).

The potential for reduced water entitlements in the event of new scientific information and climate change creates uncertainty about future water availability, entitlements and allocations. If less water is available in the future, its scarcity value and price in temporary markets will increase. This expectation may encourage demand for water entitlements and long-term lease agreements now, rather than relying on the temporary market in the future.

NWI objectives affecting trade

One of the key objectives of the NWI is to remove barriers to trade progressively, to facilitate the 'deepening of water markets' (CoAG 2004). To achieve this objective, the Parties[9] agreed that:

9 The Parties to the Agreement include the Commonwealth of Australia and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory. Tasmania and Western Australia signed up to the NWI on 2 June 2005 and 7 April 2006, respectively.

- Compatible institutional and regulatory arrangements be established by 2007 that facilitate intra and interstate trade (all parties have agreed to establish trading rules consistent with a set of principles outlined in Schedule G of the intergovernmental agreement) (CoAG 2004, para. 60(i)).
- There should be immediate removal of barriers to temporary trade (CoAG 2004, para. 60(iv)(a)).
- There should be immediate removal of barriers to permanent trade out of water irrigation areas up to an annual threshold limit of 4 per cent of the total water entitlement of that area, subject to a review by 2009, with a move to full open trade by 2014 (CoAG 2004, para. 60(iv)(b)).
- Barriers to trade in the southern Murray–Darling Basin should be reduced by taking the necessary legislative and other actions to permit open trade and ensure competitive neutrality, and to establish an interim threshold level of permanent trade out of all water irrigation areas of 4 per cent per annum of the total water access entitlement for the water irrigation area by June 2005, including:
  - in the case of New South Wales, making necessary legislative change (CoAG 2004, para. 63(ii)(a));
  - in the case of Victoria and South Australia bringing into effect change to permit increased trade ... at the same time that New South Wales amends its legislation (CoAG 2004, para. 63(ii)(b)).

In recognition of the need to manage the impact of assets potentially stranded by trades out of serviced areas, the Parties agreed to ensure that support mechanisms used for this purpose, including access and exit fees and retail tagging, should not become an institutional barrier to trade (CoAG 2004, para. 62).

NWI objectives affecting pricing principles

The 1994 CoAG pricing principles were generally re-iterated in the NWI. In accordance with National Competition Policy (NCP) commitments, the parties to the NWI agreed to bring into effect pricing policies for water storage and delivery in rural and urban systems that facilitate efficient water use and trade in water entitlements, including through the use of:

- consumption-based pricing (CoAG 2004, para. 65(i));
- full cost recovery for water services to ensure business viability and avoid monopoly rents, including recovery of environmental externalities, where feasible and practical (CoAG 2004, para. 65(ii); and

- consistency in pricing policies across sectors and jurisdictions where entitlements are able to be traded (CoAG 2004, para. 65(iii)).

In relation to pricing in rural and regional areas, the parties agreed in principle to full cost recovery for all rural surface and groundwater based systems. However, recognising that there will be some small community services that will never be economically viable but need to be maintained to meet social and public health obligations, they specifically agreed:

- to the achievement of *lower bound pricing* for all rural systems in line with existing NCP commitments (CoAG 2004, para. 66(v)(a));
- the continued movement towards *upper bound pricing* for all rural systems, where practicable (CoAG 2004, para. 66(v)(b)); and
- that where full cost recovery is unlikely to be achieved in the long term and a CSO is deemed necessary, the size of the subsidy is to be reported publicly and, where practicable, jurisdictions to consider alternative management arrangements aimed at removing the need for an ongoing CSO (CoAG 2004, para. 66(v)(c)).

The main difference between lower and upper bound pricing is that the former recovers interest on debt and provides for the payment of dividends, while the latter recovers the opportunity cost of capital (a return on the financing capital including an appropriate risk premium).

Efficient pricing of irrigation services would produce more efficient use of and investment of irrigation assets. Appropriate pricing of services, along with cost savings from infrastructure rationalisation, can also provide the basis for a more efficient response to a loss of patronage in an open trading environment (see chapter 4).

2.6 Responses to the National Water Initiative

The MDBC, the New South Wales, Victorian and South Australian Governments and infrastructure operators are at various stages of implementing the NWI principles that impact on addressing stranded irrigation assets.

Unbundling of entitlements

In New South Wales, the unbundling of water entitlements commenced in July 2004 (Hamstead and Gill 2004). The access licence entitles its holder to specified shares in the available water within a management area or from a specified water source

(share component) and to take water at specified times, at specified rates or in specified circumstances and in specified locations or areas (extraction component). In a regulated river system, the extraction component relates to a share of the delivery capacity in a channel.

In New South Wales, an access licence gives the holder of the licence the right to take water. It does not give the right to use water or to build any of the works such as pipes, pumps, or dams that may be physically required to extract the water. These works require a 'water use' approval and a 'water supply work' approval.

The Victorian Government is proposing to unbundle water entitlements into three separate components:

- A water share that specifies the irrigator's ongoing share of the water available for consumption. The water share is held independently of land and is to be tradeable.
- A delivery share that is the entitlement to have water delivered to a property. It would be linked to land or a channel and has the potential to be traded.
- A water use licence that recognises and defines an irrigator's right to use water for irrigation on a property. This licence remains tied to the land.

As outlined in the Victorian White Paper, the benefit of creating a delivery share is that it will provide infrastructure operators with the option to manage channel congestion and address the potential for stranded assets (DSE 2004). Specifically, it is stated in the Paper that:

- The ability to trade delivery shares is identified as the preferred option to alleviate channel congestion. It also allows delivery capacity to be purchased by those who value it more highly.
- Applying a charge to the delivery share, irrespective of whether irrigators use the delivery infrastructure or not, is considered an appropriate way of stopping excessive costs falling on the remaining irrigators when water leaves an irrigation area.

As noted by the MDBC, the unbundling of the entitlement allows tariffs to be separated for each service. This has the added advantage that the charge assigned to the delivery share can be used to provide a transparent basis for the calculation of access and exit fees (Hassall et al. 2004).

Permanent water trading

The bodies responsible for facilitating permanent water trades include the MDBC, state governments and infrastructure operators.

The Murray–Darling Basin Commission

The MDBC, in its role as administrator of the pilot project for permanent interstate water trading, is preparing a package of measures to enable the extension of permanent interstate water trades beyond the pilot project in the southern interconnected Basin (MDBMC 2005).[10] This is consistent with the NWI (CoAG 2004, para. 63(iv)).

The Murray–Darling Basin Ministerial Council placed a high priority on the expansion of permanent interstate trade where it is hydrologically feasible — that is, across the Murray, Goulburn and Murrumbidgee systems. It also acknowledged that an expansion in permanent interstate water trades has the potential to achieve the outcomes of the Living Murray Initiative, by leading to more cost effective and flexible recovery of water to achieve environmental outcomes (MDBC 2005b).

In supporting the removal of barriers to interstate trade, the MDBC has developed mechanisms to deal with financial and asset management impacts of net permanent outward trade. These mechanisms include:

- the establishment of principles for the development of access and exit fees; and
- the publication of *'A Guide to Dealing with Stranded Assets'* to support the establishment of robust pricing reforms (Hassall et al. 2004).

New South Wales

In August 2004, the New South Wales Government made a commitment to facilitate water trading into and out of irrigation corporations and cooperatives. In its Ministerial Statement the Government stated that:

> It will work closely with the corporations and cooperatives to assist them in removing unjustified barriers to trade and in implementing mechanisms, such as "retail tagging", to mitigate any potential adverse consequences flowing from the removal of trading restrictions, including the residual costs of managing water supply infrastructure. (DIPNR 2004a, p. 16)

[10] The southern interconnected Basin includes the Murrumbidgee, Murray, Goulburn and some tributaries, and lower Darling river systems where trade is possible without too much transmission loss.

A number of WSPs have been developed under the *Water Management Act 2000*. These statutory ten-year plans define how water resources are to be shared between the environment and water users within a defined area. Among other things, they set the overarching rules that affect the trading of or dealings in access licences and water allocations.

The WSPs for the Murray and Lower Darling, and Murrumbidgee include some similar trading rules but also some specific rules for their respective regulated river sources (DIPNR 2004b, DIPNR 2004c). Both WSPs permit:

- trades of access licences or water allocations to other states, but such trades are subject to interstate agreements;
- conversion of domestic and stock access licences to domestic only and stock only, stock only access licences to high security, high security to general security, general to high security, and conveyance to either high security or general security; and
- conversions of licence category and trade between water sources are subject to conversion factors and other rules designed to ensure that environmental water and other water extractors are not affected as a result of the dealing.

The WSP for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources prohibits:

- the movement of New South Wales Murray access licences from upstream of the Barmah Choke (taken as the Murray River downstream of the Gulpa Creek off-take at Picnic Point) to downstream of the Barmah Choke; and
- movement of access licences or assignment of water allocations between the water sources and any water source in New South Wales other than the Murrumbidgee or an unregulated catchment in the Murray (trading and assignment between the New South Wales Murray and the Lower Darling is permitted) (DIPNR 2004b).

The WSP for the Murrumbidgee regulated river water source (covering Murrumbidgee Irrigation and CICL) prohibits the transfer of access licences between the Murrumbidgee and any other water source in New South Wales, other than the New South Wales Murray, Lower Darling or an unregulated river in the Murrumbidgee catchment (DIPNR 2004c).

Other trading rules are described in Murray Irrigation's annual operating plan, and within Murrumbidgee Irrigation and CICL's articles of association.[11] These documents are not publicly available.

Murray Irrigation, Murrumbidgee Irrigation and CICL have all implemented the 4 per cent interim trade threshold level and made the necessary changes to their respective constitutions. The 2005 amendments to the New South Wales *Water Management Act 2000* allow for civil penalties if the constitution of an irrigation corporation prevents trade up to the threshold level.

Amendments to the *Water Management Act 2000* enable irrigators serviced by Murray Irrigation, Murrumbidgee Irrigation and CICL to buy and sell water, while allowing these infrastructure operators to charge an exit fee (DNR 2005).

The introduction of a 4 per cent interim limit in New South Wales implies a major easing of permanent trade restrictions (see chapter 3). Potentially net permanent outward water trades could occur. However, Murray Irrigation and CICL have indicated that more water could move into their areas:

- CICL noted that they are cost competitive, have implemented innovative systems that deliver improved customer service, have spare system capacity and could encourage new entrants (CICL, NSW, pers. comm., 10 May 2005).
- Murray Irrigation indicated that they have a significant amount of land that could be developed for irrigated agriculture that could encourage new entrants (Murray Irrigation, NSW, pers. comm., 9 May 2005).

Murrumbidgee Irrigation is concerned about managing Cap compliance under trading arrangements. The Cap limit in the WSP for the Murrumbidgee Valley is an average of 76 per cent of entitlement.

The method proposed to ensure that trade remains within the Cap limit is to tag the entitlement so the traded entitlement retains all existing rights, charges and responsibilities, including rules governing carryover, use and trade. That is, the entitlement is unchanged by the trade process and remains the same product for both the seller and buyer (Murrumbidgee Irrigation, NSW, pers. comm., 26 April 2006).

[11] In January 2006, Murray Irrigation introduced a new company constitution that replaced their previous Memorandum and Articles of Association. The constitution contains the principles for ownership and sale of entitlements. Their annual operating plan contains their allocation policy and annual trading rules.

In response to the perceived need to eliminate third-party financial impacts arising from net permanent outward trades:

- CICL have introduced a lump sum exit fee on permanent outward water trades (CICL, NSW, pers. comm., 25 November 2005).
- Murray Irrigation has introduced an exit fee on water entitlements permanently transferred from the company's licence. Under the proposal, the exit fee will be a one-off contribution to the company's fixed operating and capital costs and will include the company tax payable on the contribution. The exit fee will be reviewed regularly and will be paid by the owner of the entitlements when they are transferred from Murray Irrigation's general security water access licence (Murray Irrigation 2005b, Murray Irrigation 2005c, Murray Irrigation 2006a).
- Murray Irrigation envisages that sale of entitlements from the company's water access licence is likely to be a two stage process, with the external buyer owning Murray Irrigation entitlements, without owning land or shares (Murray Irrigation, NSW, pers. comm., 5 May 2006).
- Murray Irrigation has introduced retail tagging on permanent trades that occur between landowners and non-landowners. The non-landowner or buyer will be required to pay Murray Irrigation's fixed charges each year. Alternatively, the non-landowner or buyer can transfer the entitlement to a water access licence (New South Wales general security) and pay an exit fee (Murray Irrigation 2006a).

In considering alternatives to an exit fee and retail tagging such as a land-based access fee, Murray Irrigation noted that:

> [it] … would penalise existing landholders who will not benefit from the ownership or use of the water once they have sold their entitlements. … access fees will cause demand for channels to be decommissioned which is not in the interests of Murray Irrigation shareholders, or the region. (Murray Irrigation 2005c, p. 10)

Murray Irrigation has also removed what was referred to as the 60:40 rule, which limited the sale of entitlements from a landholding to 40 per cent of the entitlement on the landholding at privatisation in 1995. Murray Irrigation now only requires five water entitlements and five shares to remain on a landholding, the five water entitlements are effectively a stock and domestic water supply entitlement.

- Murrumbidgee Irrigation is proposing to introduce an exit fee on all permanent outward water trades, which will be paid by the seller and determined annually, based on the fixed access costs per ML. However, Murrumbidgee Irrigation is concerned that any exit fees should be set at levels and in ways that ensure that the impacts are limited to eliminating third-party financial impacts and do not result in windfall gains to infrastructure operators at the expense of farmers.

Victoria

The Victorian Government is proposing to replace the 2 per cent limit on permanent outward water trade with the 4 per cent interim trade threshold level in 2006-07.[12]

The unbundling of water entitlements is expected to take effect from 1 July 2007 for Lower Murray, Goulburn–Murray and First Mildura irrigators (LMW 2005a, Thwaites 2005, FMIT 2005a).

The Victorian Government supports the introduction of an annual access or a lump sum exit fee based on delivery shares to address the financial consequences of stranded infrastructure when there is net permanent outward water trade. However, it is stipulated that delivery access charges must be based on a reasonable estimate of the costs to the infrastructure operator in having the service available. Further the charge must be waived if:

- a farmer has stopped irrigating and has no wish to keep a right to be supplied, in a place where it has been formally decided to phase out irrigation;
- a landowner or the infrastructure operator finds a new customer to take over the delivery capacity share, or if terminating the delivery capacity share would relieve over-commitment; or
- a landowner has no wish to retain the right to be supplied (if charges have been applied to unirrigated properties for ten years). Where this is the case, the infrastructure operator should decide whether the existing situation should continue, or consider closing the service via a reconfiguration plan, or the remaining irrigators should take on the responsibility for paying for the service (DSE 2004).

The Victorian Government stipulates that such fees must not act as a barrier to trade and that both annual access fees and exit fees will be subject to scrutiny by the ESC. The extent to which these fees are a barrier to trade is discussed in chapter 5.

South Australia

The South Australian Government stated that it supports water trading and is proposing to implement the NWI water trading principles (NRMC 2005). As noted:

> At the broadest level the *Initiative's* water trading principles are consistent with the current approach in South Australia, which is that water can only be traded within

[12] From 1 July 2006, the 4 per cent interim trade threshold level will also apply to *interstate* water trading (Victoria Government 2006).

> physical, social and environmental constraints as set out in water allocation plans. (NRMC 2005, p. 65)

There is also an expectation that irrigated areas using River Murray water will expand over the next 10 to 20 years, predominantly in vines, citrus, tree crops and vegetables using water traded into South Australia (RMCWMB 2002).

CIT is totally compliant with the 4 per cent interim trade threshold. Their previous trade restrictions have been discontinued. As at 12 April 2006, a total of 295 ML had been traded under the new interim trade threshold level. Further, an exit fee of $360 per ML on all permanent outward trade has been introduced. CIT claim that trade has not been impeded by the fee (CIT, SA, pers. comm., 12 April 2006).

3 Stranded assets and trade

An objective of the National Water Initiative (NWI) is to remove unwarranted barriers to trade in entitlements. This can be expected to reduce the utilisation of irrigation infrastructure where net outward trade occurs and possibly lead to stranded assets in some irrigation areas. Conversely, increased utilisation of irrigation infrastructure would occur when there is net inward trade.

The causes and effects of stranded assets, their economic implications and the restrictions placed on permanent water sales to address the potential for stranded assets are discussed. Information on current and past levels of permanent water trades is also presented to examine the likelihood of assets becoming stranded.

Strategies for addressing the perceived financial consequences of stranded assets are introduced towards the end of this chapter and are considered in more detail in chapters 4 and 5.

3.1 Stranded assets

The potential for stranded assets became an issue in the mid-1990s when irrigators were allowed to permanently trade their water entitlements outside their irrigation area (that is, irrigators were able to engage in intra and interstate trades).

Causes and effects of stranded assets

In the context of this study, any of the assets controlled by infrastructure operators to deliver and dispose of water could potentially become stranded in some areas. These assets include weirs that store and control the flow of water, the channels and pipes that divert the water from rivers to irrigators, and the channels and pipes that convey excess water away.

Irrigation assets are commonly ‘sunk’. That is, their specialised nature generally precludes them from being utilised elsewhere in the economy. Consequently, in the absence of alternative uses they become under-utilised when one or more irrigators permanently trade their water entitlements out of an irrigation area and a net loss of entitlement occurs. Indeed, the level of demand for the services provided by the

assets can reach levels where it is not economically viable to replace the asset when it has reached the end of its useful life, or in the extreme, not financially viable to operate the asset at all.

The assets can also become under-utilised with the net export of temporary or leased water. However, the sellers of temporary or leased water are required to continue paying the annual fixed infrastructure access charge.

With net permanent outward trade, infrastructure operators are faced with a declining revenue base with fewer irrigators remaining to meet the fixed costs of maintaining and replacing the water delivery infrastructure. Further, irrigators are fearful that charges paid by those who remain will have to be increased to offset the loss of operator revenue (NCC 2004).

Irrigation infrastructure assets are dominated by high fixed costs (both capital and maintenance). Even if parts of the system are stranded, the cost to run the system remains relatively unchanged in the absence of rationalising (closing down infrastructure that is no longer required).

Consequently, irrigators have argued that if these higher charges lead to other irrigators trading water out of the system, it will lead to unsustainable delivery charges for those remaining, and leave the infrastructure operators with large fixed costs and no customers (Goesch 2001).

Economic implications

Others would consider stranded assets to be an indicator that a market is working properly and producing efficient outcomes. As noted by Dr Alistair Watson:

> Generation of some stranded assets is just what advocates of water trading were looking for. Irrigation was often located in the wrong places because of initial carelessness in testing for soil types and so on, causing environmental damage through water logging and salinization. Shifting water to a safer location is a plus not a minus. Stranded assets are more like a success indicator than a valid reason for slowing down the transfer of water through voluntary exchanges. Plenty of other assets are left 'stranded' by social and economic changes. Stranded assets in irrigation reflect the fact that water is being used more profitably elsewhere. (Watson 2005, p. 16)

Reinforcing these views, Holcombe et al. (2001) and Heaney et al. (2005) argue that net permanent outward trade creates a *pecuniary externality*. That is, in a competitive market system, the activities of individual irrigators (selling their permanent entitlement) can change the relative prices or affect the value of assets, which create financial benefits or costs on third parties. Holcombe (2005) goes on

to point out that a pecuniary externality is not an indication of an inefficiency or deadweight loss because all benefits and costs are reflected in market prices.

In contrast, true externalities occur when the utility and production functions of individuals and producers are changed (see box 3.1). Such changes impose economic costs or generate benefits that are not accounted for by the creators. In the absence of a market for the externality, the producer of the externality does not consider the benefits or costs the externality imposes on others.

Box 3.1 **Pecuniary externalities**

Pecuniary externalities manifest themselves through a change in input or output prices in an economy. They arise when one individual's activity levels affect the financial circumstances of another.

Unlike true externalities, pecuniary externalities are not associated with a change in production functions. In essence, they are not indicative of a change in the relationships between quantities of resources as independent variables and output quantities or utility as dependent variables. An event resulting in a pecuniary externality permits all members of the economy to remain at their initial utility levels if there is an appropriate redistribution of income to compensate for income effects of the price changes that are the instrument of the externality.

The price effects that constitute pecuniary externalities are just the normal competitive mechanism for reallocating resources in response to changes in demands or factor supplies. Pecuniary externalities are not an indication of a misallocation of resources in a world of pure competition. There is no change to the real efficiency of productive processes viewed as a means of transforming inputs into utility levels within the community.

Source: Baumol and Oates 1975.

One way of testing whether permanent water sales create pecuniary rather than true externalities is to ask whether an owner of a water entitlement with the financial obligations of the infrastructure operator would still sell water permanently — that is, whether their allocation of resources would be different from those made by some irrigators in an area. The reduction to demand for infrastructure services caused by the permanent sale of water would not affect infrastructure service costs and the proceeds of the sale of water would more than compensate for the loss of infrastructure service revenue (assuming water has a scarcity value in excess of its efficient supply cost).

That said, a true externality can arise with the sale of water entitlements if the water delivery infrastructure is congested. In these circumstances, a permanent sale of

water has a positive impact on the remaining irrigators because reduced congestion improves irrigation service provision using the existing infrastructure.

So called 'inefficient migration' can also result from temporary and permanent sale of water to the detriment of efficient resource use in other ways. Inefficient migration arises where differences in taxes or subsidies between areas distorts the migration of factors of production. The possibility that irrigation infrastructure charges are causing such distortions is examined in chapter 4. However, it was beyond the scope of the study to look at the effects of other possible distortions.

Holcombe et al. (2001) indicate that a first best policy response would be to take no account of pecuniary externalities, as any policy intervention would result in resource misallocation. However, they note that in reality policy makers and politicians do not always differentiate between true and pecuniary externalities, and sometimes intervene in the market to prevent pecuniary externalities from occurring or to mitigate perceived adverse distributional effects.

In Australia, the signatories to the NWI have agreed that access and exit fees and retail tagging can be used to address the potential for stranded assets.[1] Consequently, the Australian and state governments have agreed to measures intended to protect infrastructure operators from a pecuniary externality.

Dr Alistair Watson would argue that:

> Proposals for 'exit fees' to be paid when water is shifted from one area to another have no counterpart in other areas of commerce. (Watson 2005, p. 16)

Further, he advocates a Coasian negotiated solution,[2] namely:

> Negotiation between water authorities and irrigators is the best way of solving problems of stranded assets. (Watson 2005, p. 16)

The loss of revenue that arises with the net outward sale of an entitlement is not an indication of a change in the efficiency of agriculture production or the provision of water delivery infrastructure. The use of an exit fee to financially compensate remaining irrigators through the infrastructure operator is a means of redistributing income, but it could come at an economic cost if it impedes trade in entitlements.

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1 When irrigators sell their permanent water entitlement, they may be given the option of continuing to pay an annual access fee or a lump sum exit fee. Alternatively, the purchaser of the entitlement, under retail tagging arrangements, would be required to pay an annual access fee to the infrastructure operator in the area from which the entitlement was exported.

2 The Coase theorem states that if property rights are well defined and there are no transaction costs, interested parties will negotiate an efficient solution to any externality (Coase 1960).

3.2 Historical response to stranded assets

Irrigators potentially have a number of trading options. They can permanently trade some or all of their water entitlement, lease some or all of their annual water allocation through long-term contracts, or trade some or all of their annual allocation on the temporary market.

There has been a general reluctance by infrastructure operators to encourage permanent water trades (intra and interstate trade). In its review of interstate water trading the Commonwealth Scientific and Industrial Research Organisation (CSIRO) noted that:

> Some councils are concerned that water trading could cause land values to plummet; some water supply authorities are concerned that water trading could leave them with unserviceable infrastructure debts; some communities fear that the result could be a decline in economic activity. (2000, p. 40)

Despite these concerns, however, CSIRO found no evidence that interstate trading was contributing to these perceived problems (CSIRO 2000).

Historically, restrictions on permanent trades have been imposed to protect an irrigation area against the potential for stranded assets, and to maintain the economic viability of the area.

Trade restrictions protect the irrigation areas from stranded assets or at least delay the rate at which assets become stranded. However, they have the potential to inhibit gains from trade in entitlements and can lead to an inefficient distribution of entitlements. Conversely, the removal of trade restrictions may expose irrigation areas to stranded assets but generate trade gains.

Prior to implementing the NWI principles relating to permanent trades, New South Wales, Victoria and South Australia placed restrictions on the total volume of trade or on the annual volume of trade out of an area. Further, trade in entitlements and seasonal allocations could only occur between those who owned land that could be irrigated.

In New South Wales, the rules varied for each of the selected infrastructure operators (see box 3.2).

Box 3.2 **Permanent trading rules of selected infrastructure operators in New South Wales, 2004-05**

Murray Irrigation Limited

- Permanent transfers out of the area must not exceed the sum of transfers into the area.
- A minimum 60 per cent of an irrigator's 1995 entitlement must remain on the property.

Murrumbidgee Irrigation Limited

- A minimum 25 per cent of an irrigator's entitlement must remain on the property.

Coleambally Irrigation Co-operative Limited

- Permanent transfers out of the area must not exceed the sum of transfers into the area.
- A minimum of 4 ML per hectare must be retained on each property.

Sources: Murray Irrigation, Murrumbidgee Irrigation, CICL, NSW, pers. comm., May 2005.

In Victoria, the *Water Act 1989* contains provisions for the permanent transfer of water rights. The Act also provides for the power to make regulations with respect to the permanent transfer of water rights.[3]

In December 1994, the *Water (Permanent Transfer of Water Rights) Regulations 1991* were amended to include a 2 per cent limit on all permanent trades leaving specified areas, including Goulburn–Murray and Sunraysia.[4] In 2001, the regulations were again amended to allow First Mildura Irrigation Trust (FMIT) to participate in permanent water trading for the first time subject to the 2 per cent limit.

The regulations permit permanent trade that does not exceed 2 per cent (net) of the total water entitlement being transferred out of selected irrigation districts in any given year. The 2 per cent rule does not apply to trades within a district.

In part, this rule was designed to prevent a district's infrastructure from being stranded without enough customers to afford its upkeep (DNRE 2001). This rule has

3 In December 2005, the *Water (Resource Management) Act 2005* amended the *Water Act 1989* to make further provision for the management of water resources. As a result, the permanent transfer of water rights is now referred to as dealings in water shares.

4 On 1 July 2004, Sunraysia Rural Water Authority and Lower Murray Region Water Authority merged to form Lower Murray Urban and Rural Water Authority, referred to as Lower Murray Water (LMW).

also been justified on the basis that it is used to minimise the impact on those remaining irrigators and allow enough time for structural adjustment to occur in the community.

In South Australia, Central Irrigation Trust (CIT) (the largest of the irrigation trusts) imposed an absolute cap, not an annual limit like Victoria, of 2 per cent that could be permanently traded out of each of their nine districts. Further, CIT imposed a limit on transfers from any individual property of 25 per cent of the landholder's original entitlement.

3.3 Trade in the southern Murray–Darling Basin

Trade in water entitlements was introduced in South Australia in 1983, New South Wales in 1989 and Victoria in 1991, albeit on a limited scale (confined within irrigation areas). However, it was not until 1994, when CoAG adopted the strategic framework for the reform of the Australian water industry that subsequent intra and interstate trade in entitlements occurred (see chapter 2).

Although water entitlements have been bought and sold within state boundaries, it was not until September 1998 that interstate trade occurred as part of a restricted MDBC pilot project on the lower Murray River. The first permanent interstate transfer occurred from Wentworth in New South Wales to Nangiloc in Victoria (DNRE 2001).[5]

Between 1998-99 and 2004-05, almost 28 GL has been traded under the MDBC pilot project. Although permanent trades have occurred in several directions (for example, from New South Wales to Victoria and from South Australia to New South Wales), around 77 per cent of the water traded has been from New South Wales and Victoria to South Australia (MDBC, pers. comm., 10 February 2006).

Current trade patterns

Despite the ability to trade more widely, the volume of permanent water trading has remained relatively insignificant compared with the volume of temporary water trading (see table 3.1).

5 The Pilot Scheme is limited to the permanent transfer of high security water entitlements held by private diverters in the Mallee region of South Australia, Victoria and New South Wales. It covers the River Murray between Nyah (downstream of Swan Hill, and the Barrages at the mouth of the Murray).

Table 3.1 **Water trades, selected infrastructure operators, 2004-05**

	Temporary			*Permanent*		
Infrastructure operator	*In*	*Out*	*Balance*	*In*	*Out*	*Balance*
	ML	ML	ML	ML	ML	ML
New South Wales						
Coleambally Irrigation	5 812	4 457	1 355	nil	nil	nil
Murray Irrigation	181 538	22 399	159 139	nil	nil	nil
Murrumbidgee Irrigation	22 257	19 803	2 454	472	1 698	- 1 226
Victoria						
Goulburn–Murray Water	328 047	283 792	44 255	200	27 995	- 27 795
Lower Murray Water (Rural)	12 097	40 859	- 28 762	25 535	4 687	20 848
First Mildura Irrigation Trust	2 215	7 658	- 5 443	68	1 241	- 1 173
South Australia						
Central Irrigation Trust	767	7 968	- 7 201	648	228	420

Note The data do not include internal trades within districts or areas. For G–MW and LMW the data include both the transfer of water rights and private diversion licences. Balance of trade equals trade out less trade in. (-) indicates that an infrastructure operator is a net exporter of water.

Sources: DIPNR, NSW, pers. comm., June 2005; Murrumbidgee Irrigation 2004b; Murrumbidgee Irrigation 2005; G–MW 2005; FMIT 2005b; LMW 2005b; CIT 2005.

In 2004-05, gross trade in entitlements between the selected infrastructure operators accounted for around 1 per cent (34 GL) of total water allocations. Over the same period, gross trade in seasonal or temporary allocations accounted for around 10 per cent (386 GL).

It has been suggested that the low volumes of permanent water trading reflect other factors as well as the restrictions imposed by infrastructure operators. These factors include a general reluctance by irrigators to trade their entitlement because of uncertainty about the future availability of water, high transaction costs, an under developed 'thin' market for permanent water, and inadequate information. Other possible factors include peer pressure and the threat of social ostracism on those who sell.

Another possibility is that those who do not already have access to sufficient quantities of water might be reluctant to 'lock-up' large amounts of capital in water entitlements. It could be more rational to buy water (seasonal allocations) through the temporary market as and when it is required.

Bjornlund (2003) also suggests that temporary water sales have been much higher than permanent water sales because of the differential tax treatment of the proceeds. He noted that:

> A temporary trade is fully tax deductible in the year of purchase, while a permanent purchase cannot be deducted in tax or depreciated. The proceeds from a temporary trade are treated as income, which can be offset against costs or losses, while permanent sales might be subject to capital gains tax. This has increased buyer's willingness to pay for temporary water relative to permanent water. (p. 65)

Trade trends

Irrigators serviced by Goulburn–Murray Water (G–MW) and FMIT have been net exporters of permanent entitlements (see tables 3.2 and 3.3). In contrast, irrigators serviced by Lower Murray Water (LMW) (Rural) have been net importers of permanent entitlements (see table 3.4).

Table 3.2 **Water trades, Goulburn–Murray Water, 1997-98 to 2004-05**

	Temporary			*Permanent*		
Year	*In*	*Out*	*Balance*	*In*	*Out*	*Balance*
	ML	ML	ML	ML	ML	ML
1997-98	93 166	74 504	18 662	6 247	7 342	- 1 095
1998-99	197 922	182 036	15 886	13 286	23 179	- 9 893
1999-00	205 944	205 149	795	10 174	18 172	- 7 998
2000-01	189 475	175 576	13 899	11 057	16 851	- 5 794
2001-02	254 702	222 625	32 077	12 120	23 834	- 11 713
2002-03	270 195	243 165	27 030	16 690	20 431	- 3 740
2003-04	325 702	286 738	38 964	24 121	51 333	- 27 212
2004-05	328 047	283 792	44 255	200	27 995	- 27 795

Note The data include both the transfer of water rights and private diversion licences. From 1998-99 to 2003-04, the 'in' and 'out' figures include both internal and external water trades. In 2004-05 and 1997-98, the 'in' and 'out' figures do not include internal trades within districts or areas. The inclusion of internal trades has no effect on the 'balance' figure. Balance of trade equals trade out less trade in. (-) indicates that G–MW is a net exporter of water.

Sources: G–MW (2005 and previous issues).

Between 1997-98 and 2004-05, irrigators serviced by G–MW exported a net total of 95 GL, with most water traded downstream to private diverters in the Lower Murray region. Although G–MW recognises the benefits of trade (from low to higher value use and its potential to alleviate channel congestion), it has experienced first hand the negative consequences of water leaving irrigation districts. For example, where 12 per cent of water rights have been traded out of the Pyramid-Boort irrigation district since 1991, the stranded asset 'problem' has led to

a declining revenue base and price increases for the remaining irrigators (G–MW, Victoria, pers. comm., 9 March 2005).

G–MW indicated that high debt levels, combined with a prolonged period of drought, depressed dairy prices and environmental degradation in some areas, have contributed to the sale of permanent water entitlements to downstream horticulturists (G–MW, Victoria, pers. comm., 9 March 2005).

Table 3.3 **Water trades, First Mildura Irrigation Trust, 2001-02 to 2004-05**

	Temporary			*Permanent*		
Year	*In*	*Out*	*Balance*	*In*	*Out*	*Balance*
	ML	ML	ML	ML	ML	ML
2001-02	265	764	- 499	162	8	154
2002-03	554	8 068	- 7 514	252	1 425	- 1 173
2003-04	1 247	12 182	- 10 935	313	1 283	- 969
2004-05	2 215	7 658	- 5 443	68	1 241	- 1 173

Note The data do not include internal trades within districts or areas. Balance of trade equals trade out less trade in. (-) indicates that FMIT is a net exporter of water. FMIT was unable to trade in water rights until December 2001 (DNRE 2001).

Sources: FMIT (2005b and previous issues); FMIT, Victoria, pers. comm., July 2005.

Some FMIT irrigators have sold their land and water entitlements for residential development. However, FMIT management believe they can plan around this and that they have the potential to develop more land for irrigation use (FMIT, Victoria, pers. comm., 3 May 2005).

In contrast, between 1997-98 and 2004-05 irrigators serviced by LMW have imported a net total of 73 GL. Over this period there has been a 44 per cent increase in private diverter entitlements with a corresponding 4 per cent increase in irrigator entitlements (see attachment 3A, table 3A.1).[6]

In the districts covered by G–MW, LMW and FMIT, the impact of the 2 per cent limit has rarely acted as a constraint on permanent outward trade, albeit that it has been invoked by G–MW in some of its irrigation districts in recent years (see attachment 3A, tables 3A.2 to 3A.7).[7] For FMIT, net permanent outward trade

6 Private diverters (particularly large corporations) are purchasing water entitlements with the view to developing plantations in due course. In the meantime, they are selling the water on the temporary market until they establish their own operations (FMIT and LMW, Victoria, pers. comm., 3 May 2005).

7 G–MW is the largest rural water business in Victoria, accounting for around 90 per cent of all entitlements used for irrigation.

has been within the 2 per cent limit since trade was permitted (see attachment 3A, table 3A.8).

Table 3.4 **Water trades, Lower Murray Water, 1997-98 to 2004-05**

	Temporary			*Permanent*		
Year	*In*	*Out*	*Balance*	*In*	*Out*	*Balance*
	ML	ML	ML	ML	ML	ML
1997-98	2 470	5 197	- 2 727	4 547	104	4 443
1998-99	4 445	4 441	4	7 427	681	6 746
1999-00	6 850	9 018	- 2 168	8 007	2 249	5 758
2000-01	2 478	10 294	- 7 816	3 746	2 928	818
2001-02	7 585	12 159	- 4 574	11 218	4 020	7 198
2002-03	9 330	25 504	- 16 173	4 524	1 395	3 129
2003-04	12 099	31 134	- 19 034	26 456	1 970	24 485
2004-05	12 097	40 859	- 28 762	25 535	4 687	20 848

Note The data include both the transfer of water rights and private diversion licences. The data do not include internal trades within districts or areas. Balance of trade equals trade out less trade in. (-) indicates that LMW is a net exporter of water.

Sources: LMW (2005b and previous issues).

There has been some permanent outward trade from Murrumbidgee Irrigation and Murray Irrigation districts (see tables 3.5 and 3.6). There were no permanent water trades into and out of the Coleambally Irrigation Co-operative Limited (CICL) districts between 1997-98 and 2004-05 (see table 3.7).

Murrumbidgee Irrigation indicated that low volumes of permanent outward trade are not a reflection of trade restrictions. Rather, the low volumes represent a combination of factors such as a preference by farmers to retain an entitlement as insurance against dry conditions. Moreover, when a sale of entitlement occurs it is more common for the entitlement to be purchased by others within the Murrumbidgee area and its districts (Murrumbidgee Irrigation, NSW, pers. comm., 4 May 2006).

CICL also noted that while there have been no permanent outward trades from the Coleambally irrigation district, internal transfers of entitlements are common, particularly succession transfers (from father to son), farm build up (properties purchased by other Coleambally farmers seeking to obtain economies of scale) and transfers to new owners within CICL (CICL, NSW, pers. comm., 18 April 2006).

Prior to the NWI, irrigators serviced by Murray Irrigation, Murrumbidgee Irrigation and CICL were not involved in permanent interstate trades. Such trading required

ministerial approval by the seller's and buyer's respective state government ministers.[8]

Table 3.5 **Water trades, Murrumbidgee Irrigation Limited, 1997-98 to 2004-05**

	Temporary			*Permanent*		
Year	*In*	*Out*	*Balance*	*In*	*Out*	*Balance*
	ML	ML	ML	ML	ML	ML
1997-98	77 937	167 516	- 89 579	1 551	2 679	- 1 128
1998-99	29 205	112 327	- 83 122	3 617	4 074	- 457
1999-00	13 045	133 392	- 120 347	nil	nil	nil
2000-01	10 263	88 033	- 77 770	nil	nil	nil
2001-02	35 574	97 787	- 62 213	nil	nil	nil
2002-03	47 091	70 766	- 23 675	nil	nil	nil
2003-04	39 333	45 733	- 6 400	351	2 458	- 2 107
2004-05	68 410	77 010	- 8 600	472	1 698	- 1 226

Note The data do not include internal trades within districts or areas. Balance of trade equals trade out less trade in. (-) indicates that Murrumbidgee Irrigation is a net exporter of water.

Sources: Murrumbidgee Irrigation 2004b; Murrumbidgee Irrigation 2005; Murrumbidgee Irrigation, NSW, pers. comm., December 2005.

Table 3.6 **Water trades, Murray Irrigation Limited, 1997-98 to 2004-05**

	Temporary			*Permanent*		
Year	*In*	*Out*	*Balance*	*In*	*Out*	*Balance*
	ML	ML	ML	ML	ML	ML
1997-98	106 027	7 548	98 479	nil	nil	nil
1998-99	98 864	9 451	89 413	nil	nil	nil
1999-00	291 119	115 328	175 791	nil	1 342	- 1 342
2000-01	92 303	7 783	84 520	nil	73	- 73
2001-02	106 345	20 526	85 819	nil	nil	nil
2002-03	239 588	18 325	221 263	nil	393	- 393
2003-04	126 753	135 971	- 9 218	350	nil	350
2004-05	181 538	22 399	159 139	nil	nil	nil

Note The data do not include internal trades within districts or areas. Balance of trade equals trade out less trade in. (-) indicates that Murray Irrigation is a net exporter of water. In 2002-03, Murray Irrigation borrowed 124 000 ML of water from Snowy Hydro. This is included in the 'temporary trade in' figure. In 2003-04,124 000 ML of water was returned to Snowy Hydro and is included in the 'temporary trade out' figure. The 2004-05 'temporary trade in' figure also included an advance of 104 142 ML from Snowy Hydro.

Sources: DIPNR, NSW, pers. comm., June 2005; Murray Irrigation, NSW, pers. comm., 5 May 2006.

8 Documents produced by the Department of Natural Resources indicated that interstate trades were not permitted (Murray Irrigation, NSW, pers. comm., 5 May 2006).

Table 3.7 **Water trades, Coleambally Irrigation Co-operative Limited, 1997-98 to 2004-05**

	Temporary			*Permanent*		
Year	*In*	*Out*	*Balance*	*In*	*Out*	*Balance*
	ML	ML	ML	ML	ML	ML
1997-98	16 204	4 985	11 219	nil	nil	nil
1998-99	15 452	8 163	7 289	nil	nil	nil
1999-00	14 541	10 062	4 479	nil	nil	nil
2000-01	18 475	3 379	15 096	nil	nil	nil
2001-02	20 133	7 219	12 914	nil	nil	nil
2002-03	53 438	33 675	19 763	nil	nil	nil
2003-04	5 178	11 921	- 6 743	nil	nil	nil
2004-05	5 812	4 457	1 355	nil	nil	nil

Note The data do not include internal trades within districts or areas. Balance of trade equal trade out less trade in. (-) indicates that CICL is a net exporter of water.

Source: DIPNR, NSW, pers. comm., June 2005.

Despite imposing limitations on permanent outward trade, there has been a net export of permanent entitlements in most years from CIT districts (see table 3.8). Irrigators serviced by CIT were able to participate in the MDBC interstate trade pilot project.

Table 3.8 **Water trades, Central Irrigation Trust, 1997-98 to 2004-05**

	Temporary			*Permanent*		
Year	*In*	*Out*	*Balance*	*In*	*Out*	*Balance*
	ML	ML	ML	ML	ML	ML
1997-98	35	3 833	- 3 738	207	644	- 437
1998-99	270	2 196	- 1 926	501	654	- 153
1999-00	285	1 693	- 1 408	472	501	- 29
2000-01	315	1 694	- 1 379	230	493	- 263
2001-02	191	5 001	- 4 810	184	277	- 93
2002-03	685	8 976	- 8 281	281	549	- 268
2003-04	2 519	7 079	- 560	348	344	4
2004-05	767	7 968	- 201	648	228	420

Note The data do not include internal trades within districts or areas. Balance of trade equals trade out less trade in. (-) indicates that CIT is a net exporter of water.

Sources: CIT, SA, pers. comm., 15 August 2005; CIT (2005 and previous issues).

Have the restrictions been effective?

Prior to the NWI, stranded assets were for the most part not an issue for the selected infrastructure operators covered in this study. The net loss of entitlements out of

each of the operators' districts was constrained by trade restrictions, and net outward trade remained at volumes low enough to avoid stranded assets. That said, the 2 per cent limit on all permanent water trades leaving specified areas in Victoria has been invoked by G–MW in some of its districts in recent years and this is beginning to cause concern.

The past restrictions on volumes of permanent water trading do not appear to have been a critical factor in determining the level of trade. This suggests that other factors are also influencing decisions to sell and purchase entitlements.

This, in turn, raises questions about whether a relaxation of permanent trade restrictions as proposed under the NWI will lead to increased trade in entitlements. Consequently, the future significance of stranded assets in all the selected irrigation areas is unclear.

3.4 Strategies to address stranded assets

With the progressive removal of restrictions on trade in entitlements and the possibility of a more open trading environment under the NWI, there are a number of strategies available to infrastructure operators wishing to respond to net outward trade:

Strategy 1: Reconfigure irrigation assets to reflect reduced demand (as recommended by NWI and the Victorian Government).

Strategy 2: Reduce costs and revalue the asset base downwards to reflect reduced demand and minimise the impact on infrastructure charges for remaining customers.

Strategy 3: Increase access charges for remaining customers.

Strategy 4: Fund future investment by borrowing or share issues.

Strategy 5: Impose fees on the seller or purchaser when a water entitlement is sold out of an irrigation area.

The strategies are not all being actively considered. Further, not all are necessarily mutually exclusive. In particular, strategy 1 could be implemented along with, and would support, strategy 2.

Although they appear to be unwarranted, strategies 3, 4 and 5 could be regarded as alternative ways of maintaining the physical infrastructure and financial viability of the irrigation operation. The strategies are discussed further below.

Adjustment of infrastructure

The most important adjustment to substantial long-term net permanent outward trade and a fall in demand for irrigation infrastructure services is the reconfiguration (upgrading or rationalising) of the related physical assets. The purpose of this would be to reduce costs and improve the match between supply and the changed demand for services in the irrigation area.

The NWI states that that there should be measures to facilitate rationalisation of inefficient infrastructure or unsustainable irrigation supply schemes, including consideration of the need for any structural assistance (CoAG 2004, para. 60(vi), para. 97).

There is recognition, at least in Victoria, that reconfiguring some distribution systems is necessary to maintain an efficient and viable system.[9] To enable infrastructure operators to do so, the Victorian Government has amended its water legislation to relieve them of their previous supply obligations (*Water (Resource Management) Act 2005*). This legislative change will provide operators with the flexibility to address the potential for stranded irrigation assets.

Specifically, operators will be able to stop providing a service either:

- by agreement with all the customers directly affected; or
- through an infrastructure reconfiguration plan prepared consultatively by the operator and endorsed by the Minister.

If a plan is not prepared within a certain timeframe, the Minister will appoint an expert panel to recommend a plan (DSE 2004).

A reconfiguration plan would set out what is to happen in each channel or service, including timeframes for upgrade or closure. If the service is to be closed:

- properties that do not have and do not pay for an ongoing share of delivery capacity (either for current irrigation, or to keep open the option of irrigation recommencing), will be recorded as no longer having a right to be supplied;
- the service can be kept going for a set number of years on a minimum maintenance basis;

9 Rationalisation involves minimising the assets currently owned by reducing the length of channels and drains, and the number of structures, without reducing the standard of service for remaining customers.

- the infrastructure operator can offer a rebate or other inducements in seeking the agreement of owners of properties still being irrigated to give up their rights to delivery and forgo other compensation; and
- where agreement is not reached, the operator must pay an irrigator compensation under s.59 of the *Water (Resource Management) Act 2005* and in accordance with other relevant laws for any loss of value as a result of supply being ended (DSE 2004).

In reconfiguring irrigation distribution systems, the Victorian Government will require infrastructure operators to:

- share information with its customers and consult with the broader community;
- be commercial in providing infrastructure services to customers. Where the customer base is declining and the cost of keeping up a particular service is becoming unaffordable, the operator will need to consider phasing out that service;
- identify feasible water supply options for remaining viable customers;
- discuss the possibility with customers that they meet more of the costs of their local service rather than those costs being spread over a wide customer base, and discuss the possibility that they take over the service;[10] and
- when an operator agrees to upgrade a service or install a new service, it will look at a range of potential pricing and delivery arrangements, including more contractual ones, to allocate the costs and risks (DSE 2004).

Cost reductions and revaluation of the asset base

Net permanent outward trade implies less demand by farmers for irrigation water and hence a lower utilisation of infrastructure assets. As indicated above, there could be some consolidation of the physical infrastructure. There may also be other opportunities to reduce cash expenses.

These considerations imply that, as a result of the market developments, a lower financial value should be attributed to the asset base. This means that depreciation expenses are reduced with corresponding consequences for revenue requirements.

This approach is elaborated in chapter 4.

[10] Charging proposals will be subject to scrutiny by the ESC.

Higher access charges for remaining irrigators

Rationalisation of the infrastructure might be avoided by raising infrastructure assess charges for the remaining customers. This would allow a continuation of the accumulation of funds for future asset replacement and refurbishment.

The capacity to raise charges to irrigators selling into competitive produce markets depends on the existence of scarcity rents associated with the entitlements held by the irrigators (see chapter 4, section 4.5).[11] Further, increasing charges is not a typical response to a decline in demand. A more common market response is price reduction in order to compete with other operators and recapture market share.

This strategy is really an alternative to a combination of strategies 1 and 2 (above) and is considered further in chapter 4, where it is assessed in a context of efficient pricing of irrigation services.

Funding of future investment by borrowing or share issues

If accumulated depreciation allowances are insufficient to fund future replacement investment, external funding (borrowing or share issues) should be available if the return on the investment is sufficient (chapter 4).

Imposition of fees on seller or purchaser of a water entitlement

Fees paid to the infrastructure operator in the area from which the entitlement is exported could be in the form of:

- a continuation of access fees paid by the seller of an entitlement for a specific period or indefinitely;
- tagging arrangements, whereby the new owner of an entitlement pays an annual access fee set in the source area for a specific period or indefinitely; or
- a once-off lump sum exit fee paid by the seller or purchaser on the sale of an entitlement.

The fees could be used to sustain the flow of funds needed to maintain the irrigation network at its current or some reduced capacity.

The economic consequences of such fees, and the pros and cons of the various forms of implementation, are examined in chapter 5 of the study.

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11 Scarcity rent is the difference between the market value of water less the cost of its supply.

Attachment 3A — Data tables

Table 3A.1 **Entitlements and permanent water trades, Lower Murray Water**

Year	*Private diverter water entitlements*	*Irrigator water entitlements*	*Net change for area*
	ML	ML	ML
1997-98	173 075	94 565	+ 4 443
1998-99	176 916	94 938	+ 6 746
1999-00	187 260	114 157	+ 5 758
2000-01	203 327	115 946	+ 818
2001-02	200 286	99 565	+ 7 198
2002-03	203 270	99 325	+ 3 129
2003-04	227 925	99 186	+ 24 485
2004-05	249 077	98 260	+ 20 848

Sources: Productivity Commission calculations based on LMW (2005b and previous issues).

Table 3A.2 **Permanent water trades, Central Goulburn**

Year	*Entitlement*	*2 per cent of water entitlement*	*Net change for district*	*Net permanent trade as a percentage of water entitlement*
	ML	ML	ML	%
1994-95	393 198	7 864	+ 1 446	+ 0.36
1995-96	393 820	7 876	+ 804	+ 0.20
1996-97	389 247	7 785	+ 1 565	+ 0.40
1997-98	382 555	7 651	+ 349	+ 0.09
1998-99	391 589	7 832	+ 694	+ 0.18
1999-00	385 180	7 704	- 544	- 0.14
2000-01	391 751	7 835	- 1 409	- 0.40
2001-02	391 008	7 820	- 1 749	- 0.45
2002-03	389 121	7 782	- 740	- 0.20
2003-04	390 178	7 803	- 7 970	- 2.00
2004-05	380 649	7 612	- 7 681	- 2.00

Sources: Productivity Commission calculations based on G–MW (2005 and previous issues).

Table 3A.3 **Permanent water trades, Shepparton**

Year	*Entitlement*	*2 per cent of water entitlement*	*Net change for district*	*Net permanent trade as a percentage of water entitlement*
	ML	ML	ML	%
1994-95	182 038	3 640	+ 58	+ 0.03
1995-96	180 629	3 612	+ 89	+ 0.05
1996-97	181 974	3 639	- 410	- 0.20
1997-98	187 129	3 743	+ 325	+ 0.17
1998-99	182 695	3 654	- 277	- 0.15
1999-00	181 743	3 635	- 127	- 0.07
2000-01	181 330	3 627	- 79	- 0.04
2001-02	181 406	3 628	- 1 960	- 1.08
2002-03	179 301	3 586	+ 90	+ 0.05
2003-04	179 247	3 585	- 2 114	- 1.20
2004-05	176 911	3 538	- 2 638	- 1.50

Sources: Productivity Commission calculations based on G–MW (2005 and previous issues).

Table 3A.4 **Permanent water trades, Rochester**

Year	*Entitlement*	*2 per cent of water entitlement*	*Net change for district*	*Net permanent trade as a percentage of water entitlement*
	ML	ML	ML	%
1994-95	176 154	3 523	+ 839	+ 0.50
1995-96	176 648	3 533	+ 1 175	+ 0.70
1996-97	181 709	3 634	+ 1 066	+ 0.60
1997-98	183 270	3 665	+ 1 151	+ 0.60
1998-99	184 728	3 695	+ 1 953	+ 1.00
1999-00	186 673	3 733	+ 648	+ 0.35
2000-01	187 373	3 747	- 883	- 0.50
2001-02	187 766	3 755	+ 91	- 0.05
2002-03	187 946	3 758	+ 1 484	+ 0.80
2003-04	189 424	3 788	- 4 038	- 2.10
2004-05	185 377	3 707	- 3 690	- 2.00

Sources: Productivity Commission calculations based on G–MW (2005 and previous issues).

Table 3A.5 **Permanent water trades, Murray Valley**

Year	*Entitlement*	*2 per cent of water entitlement*	*Net change for district*	*Net permanent trade as a percentage of water entitlement*
	ML	ML	ML	%
1994-95	263 281	5 266	- 381	- 0.15
1995-96	260 614	5 212	- 121	- 0.05
1996-97	270 846	5 417	+ 172	+0.06
1997-98	255 821	5 116	+ 216	+ 0.08
1998-99	257 561	5 151	+ 399	+ 0.15
1999-00	256 455	5 129	- 327	- 0.13
2000-01	258 319	5 166	+ 152	+ 0.06
2001-02	259 103	5 182	- 191	- 0.07
2002-03	259 063	5 181	+ 533	+ 0.20
2003-04	259 915	5 198	- 371	- 0.14
2004-05	259 348	5 186	- 565	- 0.20

Sources: Productivity Commission calculations based on G–MW (2005 and previous issues).

Table 3A.6 **Permanent water trades, Pyramid-Boort**

Year	*Entitlement*	*2 per cent of water entitlement*	*Net change for district*	*Net permanent trade as a percentage of water entitlement*
	ML	ML	ML	%
1994-95	235 392	4 708	- 1 962	- 0.80
1995-96	233 903	4 678	- 1 599	- 0.70
1996-97	234 226	4 684	- 1 166	- 0.50
1997-98	236 849	4 737	- 1 448	- 0.60
1998-99	233 526	4 670	- 3 998	- 1.70
1999-00	232 745	4 655	- 1 583	- 0.70
2000-01	227 606	4 552	+ 1 433	+ 0.60
2001-02	229 835	4 597	- 2 602	- 1.10
2002-03	227 653	4 553	- 1 089	- 0.50
2003-04	227 027	4 540	- 6 187	- 2.70
2004-05	219 963	4 399	- 4 016	- 1.80

Sources: Productivity Commission calculations based on G–MW (2005 and previous issues).

Table 3A.7 **Permanent water trades, Torrumbarry**

Year	*Entitlement*	*2 per cent of water entitlement*	*Net change for district*	*Net permanent trade as a percentage of water entitlement*
	ML	ML	ML	%
1994-95	371 438	7 429	nil	nil
1995-96	368 632	7 372	- 120	- 0.03
1996-97	375 589	7 511	- 318	- 0.08
1997-98	374 727	7 494	- 1 870	- 0.50
1998-99	363 885	7 277	- 7 279	- 2.00
1999-00	347 939	6 958	- 4 733	- 1.40
2000-01	350 219	7 004	- 3 719	- 1.06
2001-02	347 577	6 951	- 4 673	- 1.30
2002-03	342 937	6 858	- 2 902	- 0.85
2003-04	341 221	6 824	- 6 479	- 1.90
2004-05	333 551	6 671	- 6 164	- 1.80

Sources: Productivity Commission calculations based on G–MW (2005 and previous issues).

Table 3A.8 **Permanent water trades, First Mildura Irrigation Trust**

Year	*Entitlement*	*2 per cent of water entitlement*	*Net change for district*	*Net permanent trade as a percentage of water entitlement*
	ML	ML	ML	%
2001-02	85 055	1 701	+154	+ 0.18
2002-03	85 209	1 704	- 1 173	- 1.40
2003-04	83 270	1 665	- 967	- 1.16
2004-05	82 097	1 641	- 1 173	- 1.43

Sources: Productivity Commission calculations based on FMIT (2005b and previous issues).

4 Pricing

Many factors affect the cost of irrigation infrastructure services. These include the technology of the infrastructure network, the efficiency of the operators and the extent of government involvement and support.

Charges and their relationship to the cost of infrastructure provision have an important bearing on efficient use of services and responses to changing trade patterns. Therefore a particular focus of this chapter is cost recovery along with the extent of government support to operators.

Illustrative estimates of *charges* imposed by the selected infrastructure operators (which affect *actual trade* flows), and estimates of the degree of *cost recovery* by the infrastructure operators (which affect the *efficiency of trade*) are presented in this chapter.

4.1 Pricing of water, entitlements and infrastructure services

The price of temporary water and permanent water entitlements is briefly discussed, followed by a description of the components of infrastructure service charges.

Trade prices

Prices of traded water (both temporary and permanent water entitlements) are market determined. Trading mostly occurs between irrigators. The price of temporary water, expressed in dollars per ML of water delivered and used, reflects seasonal fluctuations in supply and demand.

A water entitlement is an asset giving access to water each year. The price of water entitlements, expressed in dollars per ML, is determined in the permanent trade market and is affected by perceptions of the scarcity of water over the long term.

There are significant differences in the prices paid for temporary water and permanent entitlements. The price of a ML of water entitlement commands a higher price than the price of a ML of temporary or seasonal water because entitlements

provide a stream of future allocations, as well as the current allocation (Peterson et al. 2004). Also, the price paid for high security water entitlements is somewhat higher than that paid for general security entitlements reflecting the differences in supply reliability.

Theoretically, any price difference between a permanent entitlement and the net present value of selling the future expected allocations available under the entitlement, is the value of having access to water irrespective of unforeseeable fluctuations in water prices. Permanent entitlements can be expected to have an 'option' value because of uncertainties about the future availability of water for consumptive use.

Infrastructure charges

The overall cost of supplying water to irrigators includes the cost of services supplied by headworks such as dams (bulk water charges), River Murray costs (where applicable), and irrigation infrastructure, including delivery channels, drainage systems, pipes and pumping equipment.

The following analysis primarily concerns the efficiency of pricing in recovering the costs of irrigation delivery and drainage services provided by the systems of channels or pipes that transport water to and from irrigators.

Infrastructure operators usually employ a two-part pricing structure for most of their services. The first part (the 'fixed' or access charge) is a charge per annum per ML of entitlement. The second part (the 'variable' or usage charge) is a charge per annum per ML of water used which varies from year to year.

Fixed access charges

Infrastructure operators generally have a bulk water entitlement which is potentially available in any given year. Typically they also have a loss allowance for seepage and evaporation when the transport of the water from the off-take (from the source river or dam) to properties within the relevant irrigation area results in significant losses. This leaves a smaller bulk entitlement for irrigation purposes (as well as for town supplies and stock and domestic uses).

The 'fixed' component of the service charge is sometimes based on the individual irrigator's share of the bulk water entitlement at the operator's off-take and sometimes on the entitlement at the farm gate. The fixed charge per ML of entitlement should be stable over time for an irrigator, assuming there has been no

change in the operator's pricing policy. It does not depend on the irrigator's actual usage of water which can differ from their entitlement.

Variable usage charges

The amount of water available for irrigation purposes can be below the entitlement in a given year because of limited supplies in the storage dams. Also, irrigators sometimes do not use all of their entitlement in a given year or they buy additional water. Their decisions depend on circumstances such as climatic conditions and expected commodity prices which vary from year to year. These decisions affect the amount paid by irrigators in variable usage charges.

Other charges

Most infrastructure operators impose levies to recover costs of land and water management planning. In some areas, salinity and water quality levies are also collected. Planning and environmental levies are typically based on entitlement or on the volume of water used. They are small compared with fixed access and variable usage charges.

Stock and domestic services supplied to so-called waterworks districts are usually priced on a dollar per hectare basis. Stock and domestic water supplies are relatively small compared to water volumes supplied to irrigation areas, and are not included in this analysis.

4.2 Infrastructure price comparisons

Price data for 2004-05 were collected from infrastructure operators and put into a form suitable for presenting comparisons of average charges across irrigation areas. The fixed and variable components of irrigation infrastructure charges (excluding those for bulk water) are also compared.

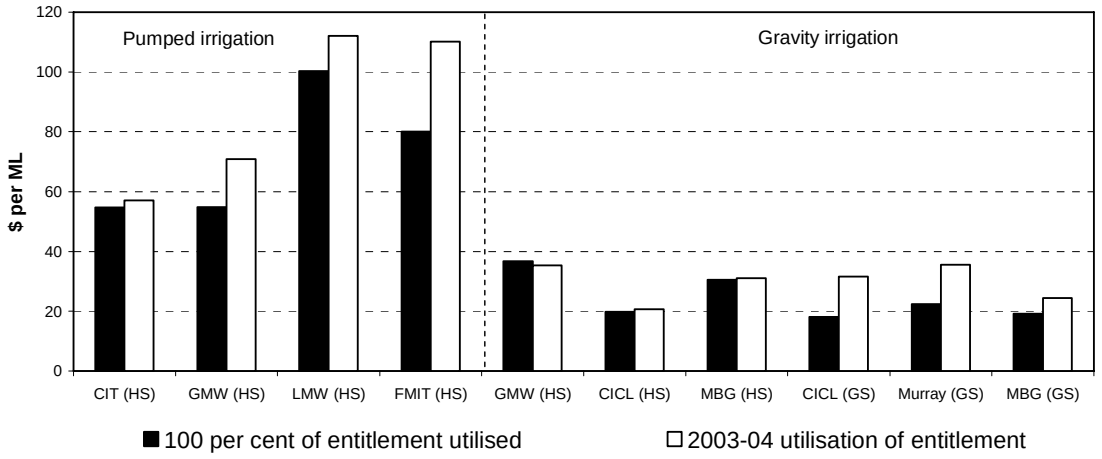
Factors such as technology and productivity, that cause differences in costs and charges, are discussed.

Average charges

Charges vary considerably among the selected infrastructure operators in the Murray–Darling Basin (see figure 4.1). The differences would appear to be significant enough alone to provide an incentive for trade, other things being equal,

although this could be offset or overridden by other economic factors and environmental constraints.

Figure 4.1 **Comparisons of total charges for delivery and drainage — selected infrastructure operators, 2004-05**



Note Includes bulk water and irrigation infrastructure service charges, but not environmental or planning levies. HS refers to high security entitlements. GS refers to general security entitlements. MBG refers to Murrumbidgee Irrigation.

Data source: Productivity Commission estimates based on data supplied by infrastructure operators.

The charges presented are typically averages for services in different sub-areas of the total area supplied by each operator. Variations within the irrigation areas of New South Wales tend to be small. However, there are large differences in the fixed access charge between some of the sub-areas within Goulburn–Murray Water (G-MW) and Lower Murray Water (LMW) in Victoria. There are significant differences in the variable usage charge among sub-areas serviced by Central Irrigation Trust (CIT) in South Australia.

The sum of the fixed charge per ML of entitlement and the variable charge per ML of delivered water is represented by the black bars in figure 4.1, assuming 100 per cent utilisation of entitlements. These estimates do not reflect the utilisation of the entitlement that can raise or lower the average fixed cost per ML of water actually delivered to the irrigator over a whole year. Price comparisons based on actual (or estimated) utilisation of entitlement in 2003-04 (the previous year) are represented by the clear bars in figure 4.1.

CIT's pumped service has a significant price advantage over the pumped irrigation services of LMW and First Mildura Irrigation Trust (FMIT). The gravity service for high security water supplied by Coleambally Irrigation Co-operative Limited

(CICL) to relatively few irrigators appears to have a price advantage over the G-MW gravity service.

Impact of the level of utilisation of entitlement

Capacity utilisation of infrastructure and equipment used in providing irrigation services affects the average per ML cost of the service in the short term. Capacity utilisation will be affected in the longer term by changes in the demand for infrastructure services in an area and any adjustment of infrastructure capacity in response to demand changes related to the trading of entitlements and responses to stranded assets.

Generally, the water volumes delivered in 2003-04 were significantly less than entitlements. This had the effect of increasing the fixed cost per ML of water used and hence, also the overall cost per ML (as seen from a comparison of the usage (delivered) and entitlement numbers in table 4.1 and the charges in figure 4.1).[1] On the other hand, deliveries exceeded entitlements in aggregate across all G–MW gravity districts.

The utilisation of entitlements can be affected by government and Murray–Darling Basin Commission (MDBC) decisions about water allocations available in a particular year and by irrigator decisions about their requirements in that year. Reductions of allocations below entitlements because of government decisions pushed up costs per ML delivered for general security water in New South Wales. On the other hand, water deliveries below entitlements because of irrigator decisions pushed up costs per ML delivered in 2004-05 in the pumped regions of South Australia and Victoria.

CICL's price structures discriminate between the delivery of high and general security water. There are small differences in fixed (bulk and irrigation infrastructure) access charges. For example, the per ML cost to irrigators is slightly higher for high security water as indicated by a comparison of the black bars for CICL in figure 4.1. However, the lower utilisation of a general security entitlement can have a much bigger effect, pushing the effective cost of services substantially higher.

1 The term 'cost' is used here to refer to the cost to irrigators of the services received from the infrastructure operator, that is the charge for these services.

Table 4.1 **Water entitlements and deliveries — selected infrastructure operators, 2003-04**

Infrastructure operator	*Type of service*	*Entitlement*	*Delivered*	*Proportion of entitlement delivered*
		'000 ML	'000 ML	Ratio
New South Wales				
Coleambally Irrigation	Gravity, high security	9	8	0.95
	Gravity, general security	489	231	0.47
Murray Irrigation	Gravity, general security	1 479	659	0.45
Murrumbidgee Irrigation	Gravity, high security	250	237	0.95
	Gravity, general security	930	422	0.45
Victoria				
Goulburn–Murray Water	Pumped, high security	31	22	0.71
	Gravity, high security	1 606	1 687	1.05
Lower Murray Water (Rural)	Pumped, high security	99	80	0.81
First Mildura Irrigation Trust	Pumped, high security	83	46	0.56
South Australia				
Central Irrigation Trust	Pumped, high security	155	108	0.69

Sources: ANCID 2005; CICL 2004; CIT 2005; FMIT 2005b; G–MW 2004a; Murray Irrigation 2004; Murrumbidgee Irrigation 2004a; Sunraysia Rural Water Authority 2004; CICL, CIT, FMIT, Murray Irrigation, pers. comm., May 2005.

Impact of technology and productivity on irrigation prices

Pumped delivery is more expensive than gravity delivery using open channels, and this is reflected in the cost to irrigators presented in figure 4.1. Improvements in metering and irrigator control are being implemented in some of the pumped areas. Although these technological advances involve capital expenditure and ongoing energy costs, there are claimed productivity benefits from water and labour savings.[2]

2 Net benefits depend also on many other factors such as the crops grown, local soil and climatic conditions.

Productivity depends on the asset management practices and labour productivity of the infrastructure operators. Consequently, governance arrangements and efficiency incentives can also affect the productivity of infrastructure services.

The private trusts in South Australia or companies and cooperatives in New South Wales, which are owned by the irrigators, have built-in incentives to improve the productivity of both infrastructure services and on-farm water use (assuming farm products are sold in competitive markets). In Victoria, the incentives of the government-owned entities to maximize the productivity of service provision might be in conflict with other government objectives (see chapter 2).

Bulk water charges

Delivery and drainage infrastructure services generally account for between 78 per cent and 100 per cent of the total charge of supplying water, the difference being bulk water and River Murray charges (where applicable). Bulk water is charged mainly on a per ML of entitlement basis. Bulk water charges are higher in Victoria than in New South Wales, in line with the higher security of water entitlements. Bulk water charges are not imposed on irrigators in South Australia served by CIT.

The provision of high security or general security water affects the cost of bulk water supplied from storages more than the cost of delivery and drainage. In a given climatic environment, the amount of high security water that could be supplied from storage is smaller than the amount of general security water from the same storage capacity. It has been noted by Alvarez (2005) that:

> … either a small volume could be issued that would be available in all years, or a larger volume could be issued that would have to be restricted in years of shortage. (p. 34)

Irrigation infrastructure fixed access and variable usage charges

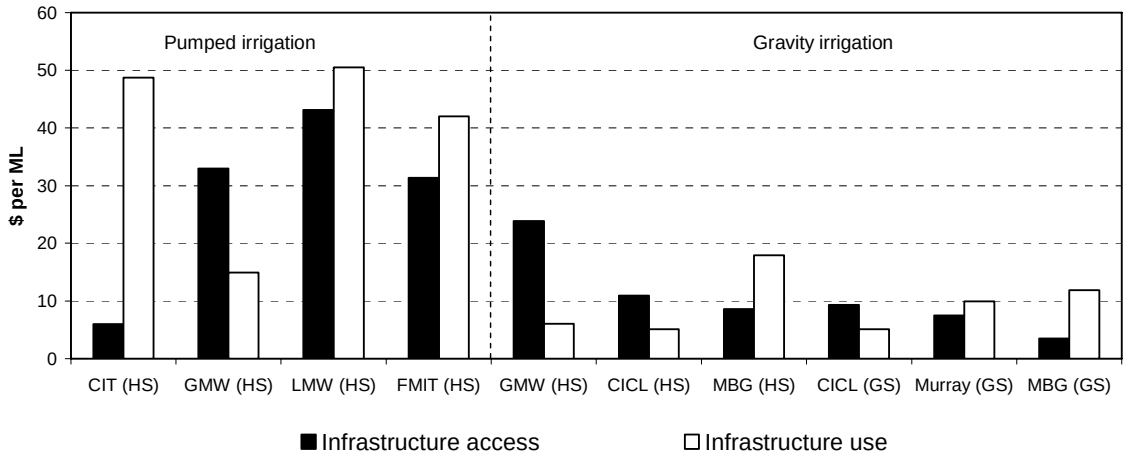
Infrastructure fixed access and variable usage charges vary greatly among the selected infrastructure operators. There is limited correlation between the relative levels of access and usage charges across the infrastructure operators (see figure 4.2).

Currently, fixed access and variable usage charges do not closely reflect the relationship between fixed and variable costs. Fixed costs can represent a very high share of total costs of irrigation infrastructure services — for example, between 80 per cent and 90 per cent for Murray Irrigation's gravity system. For some

irrigation systems, the share of revenue provided by fixed charges is significantly lower than the share of total costs accounted for by fixed costs.

A relatively high usage charge could discourage optimal throughput and utilisation of the existing irrigation infrastructure. On the other hand, in an era of scarce water and restrictions on water trading, relatively high variable usage charges are sometimes justified on the basis of encouraging water savings.

Figure 4.2 **Comparisons of access and usage charges — selected infrastructure operators, 2004-05**



Note Excludes environmental or planning levies. HS refers to high security entitlements. GS refers to general security entitlements. MBG refers to Murrumbidgee Irrigation.

Data source: Productivity Commission estimates based on data supplied by infrastructure operators.

G–MW has the highest ratio of fixed access charge to variable usage charge among the selected infrastructure operators — above 80 per cent fixed share for gravity and below 80 per cent for pumped services.

The pumped services of LMW and FMIT have price structures with relatively high variable usage charges. The gravity services of CICL have very low variable usage charges. The high usage charges (to some degree) reflect higher variable costs relative to gravity irrigation because of high levels of energy consumption of pumped services.

CIT's access charge was very low compared with its usage charge in 2004-05. A relatively high variable usage charge is justified by CIT on the grounds that it provides a desirable incentive for irrigators to save water by investing in on-farm technologies which complemented CIT's investment in new water-saving technologies.

4.3 Pricing issues

The *Trade Practices Act 1974* (TPA), various intergovernmental agreements, and state legislation empower regulators to decide whether particular infrastructure should be subject to regulation and, if so, to determine what restraints should be imposed on the prices charged.

The prices of many infrastructure services require regulatory oversight because of their natural monopoly characteristics. The arrangements for infrastructure in general, and their applicability to irrigation infrastructure, are discussed below.

Irrigation infrastructure assets have some natural monopoly characteristics and, therefore, operators might be able to exercise market power. Farmers, however, sell their produce into competitive markets. Consequently, irrigators reliant on a particular irrigation network are competing with irrigators producing similar products in other irrigation areas in Australia (within and outside the Murray-Darling Basin), and with producers in other countries.

The supply of bulk water to infrastructure operators can have stronger monopoly characteristics than the supply of irrigation infrastructure services. Monopoly conditions in the supply of bulk water in the Murray–Darling Basin are more likely to be an issue because of the natural advantages of a single supplier of bulk water to a number of different irrigation areas.

It might be possible in some circumstances for infrastructure operators to increase their prices above their costs without causing a significant reduction in the quantity of water transported. This could happen when operators face inelastic demand because irrigators are receiving water scarcity rents.

Excessive charging for water delivery and drainage services has not generally been a concern. On the contrary, prices have not fully recovered costs and under the National Water Initiative (NWI) it is proposed to move 'towards *upper bound pricing* for all rural systems, where practicable' (see chapter 2). Upper bound pricing refers to full cost recovery including the opportunity cost of capital — a return on the financing capital including an appropriate risk premium (see box 4.1).

Although the pricing policy embodied in the NWI and in previous intergovernmental communiqués is full cost recovery, a less demanding short-term objective is recognised. Charges can be set to recover interest and dividend payments, but not provide a full return to investors including an appropriate risk premium. As such, there is little risk of monopoly pricing.

Box 4.1 **Full cost recovery and the components of the cost of capital**

Upper bound full cost recovery would require irrigation infrastructure charges to be sufficient to cover, in addition to cash operating expenses, the following components of the gross cost of capital:

- the depreciation expense which is a *return of the capital* used to provide the infrastructure service; and
- the financing cost which is a *return on the capital* invested in the infrastructure.

The return on the capital can be either paid out as interest on debt — an expense of the business — or accrued by the owners of the irrigation business, and either distributed as dividends or kept as retained earnings. The return on capital is related to the return that would be obtained from alternative investment opportunities having a similar risk.

Historically, fixed access charges for irrigation infrastructure services have not generally been sufficient to meet the financing cost of capital (return on capital). Low prices are related to the role of government in the development and ongoing contribution of irrigation assets. However, at least in recent years, fixed access charges have generally been sufficient to provide funds for the refurbishment or replacement of the infrastructure.

Source: Productivity Commission.

Short-run marginal cost pricing

In order to ensure that prices lead to efficient resource allocation, they must reflect the opportunity cost of resources, not accounting costs. Further, the cost estimates should be 'forward looking', based on current technology and not historical costs.

Differences in the prices of irrigation services (along with many other factors) give incentives to permanently trade water between irrigation areas. If the prices reflect economic costs, efficiency will be increased as a result of trade promoted by price differences. However, the promoted trade could be inefficient to the extent that the differences in charges are created by different levels of cost recovery linked to differences in operator objectives and government financial support.

Pricing for full cost recovery, as agreed to by governments, would indicate the level of asset replacement that is economically justified. The revenue over time from charges covering depreciation and the opportunity cost of capital would be sufficient to meet the cost of an appropriate replacement for the existing asset (if it is economically warranted).

Short-run marginal cost pricing theoretically maximises the utilisation of existing assets. However, in cases where marginal costs are below average costs, charge revenue would be below that required to provide a return on capital. However, there is a broader concern that short-run marginal cost pricing of irrigation infrastructure would introduce economic distortions because this pricing approach is rarely used in other sectors of the economy where there are fixed costs and sunk assets.

Short-run marginal costs are difficult to estimate and apply in a way that reflect economic costs. When infrastructure has been built without close regard to economic criteria, the structure and level of costs, including the short-run marginal cost, might not reflect minimum necessary costs. Further, short-run marginal cost pricing in a context of growing demand could result in significant price variations over time — rising prices as demand runs up against capacity and a fall in prices after investment in new capacity.

In the case of stranded irrigation assets, short-run marginal cost pricing could exceed the avoidable cost of keeping irrigation channels open at a reduced level of service when a decision has been made to abandon them. For example, the cost of continuing to operate unlined channels and the cost avoided by closing them off would be small. However, with reduced levels of maintenance, water losses would increase and flow capacity would be reduced over time with weed growth and erosion.

Cost-reflective pricing within an irrigation area

Cost-reflective pricing can be used to differentiate between the more expensive irrigation operations at the fringe of a network compared with operations nearer to main channels and the river off-take.

For gravity irrigation, the main difference in irrigation costs within an irrigation area lies in the fixed capital costs of the channel capacity. Under cost-reflective pricing a remote irrigator would be allocated a share of the costs of a relatively lengthy feeder network, as well as the full cost of any infrastructure that exclusively services the irrigator.

In the case of pumped irrigation, to service a remote irrigator probably involves relatively large energy costs as well as higher fixed costs.

Prices that reflect cost differences such as those discussed above promote efficient resource allocation decisions, including decisions to trade temporarily or permanently. Thus, higher charges for higher cost services supplied to a property

increase the incentive to trade water out of the property, as compared with properties that can be serviced at lower cost.

Irrigators in a fringe district of an irrigation network are likely to have higher distribution costs. With cost-reflective pricing they would face greater pressures to trade out of the network, compared with irrigators closer to the off-take. These pressures could be expected to facilitate a more orderly and cost-effective adjustment of the network in response to a decline in demand for irrigation services and net trade out of the whole area.

Moreover, it is important to have regard for the opportunity cost of water losses if assets are to be run down before being abandoned. If channel maintenance is reduced as a consequence, water losses can be expected to increase. These losses should therefore be reflected in reduced water allocations at the farm gate or in an additional charge to cover the market value of the water lost.

Some might regard the introduction of cost-differentiated charges as unfair because it would affect the viability of current activities that were established under the current system of average charges. On the other hand, undifferentiated charges are inequitable with irrigators in low service cost areas cross-subsidising those in high cost areas. Cost-differentiated charges would go some way to ensuring competitive neutrality with private diverters who have to meet all of their infrastructure costs. There may need to be an associated structural adjustment program during the transition phase.

Price discrimination based on willingness to pay

Prices that discriminate between irrigators according to elasticity of demand or ability to pay are an option for recovering costs in a way that minimises any distortion to efficient resource allocation. For this purpose, the market could be segmented on characteristics of the service, such as time of year, or on type of use, such as viticulture or annual crops.

Care is required in setting charges above short-run marginal cost in recovering fixed costs. Further, the extent to which charges include a contribution to fixed overheads should depend on what the irrigator can bear. When irrigators leave the market because charges are set too high, there is an efficiency cost and possible contributions to overheads are lost to the infrastructure operator.

High prices for congested capacity in peak periods might be willingly paid by some irrigators, and result in a more efficient allocation of the capacity. However, the industry could prefer congestion to be handled by trading peak capacity among

irrigators rather than by surcharges imposed by the infrastructure operators (DSE 2004). If so, revenue will be lost, which would otherwise be available to cover costs.

Renewals annuities

Renewals annuities are used to set aside funds out of each year's revenue for the purpose of periodic refurbishment and replacement of the physical assets owned by the infrastructure operator, and possibly for additional capital expenditure in the future. Estimates of the future profile of capital expenditure are made, and an annuity is calculated to provide the funds in advance. The calculated annuity is then raised through fixed access charges.

With infrastructure typically provided debt-free by the government, there is no ongoing financing costs in addition to the renewals annuity payments imposed to finance the maintenance of assets over the long term. There will, of course, be operating expenses to be covered by variable usage charges.

A reason for the adoption of renewals annuities by infrastructure operators was to ensure that the funding of renewal of the infrastructure in the future would be provided by irrigators through charges and not by further government funding.

If the government no longer provides new capital infrastructure debt-free, capital funds required to expand the capacity or improve the productivity of the infrastructure (either by adding channels or converting to a new technology) can be sourced from either:

- retained earnings, which can be accumulated by raising fixed access charges well before the additional expenditure is undertaken; or
- the issue of new debt or equity contributions.

A mixture of the two is common commercial practice. The first element is akin to the renewals annuity approach (even though applied to additional or upgraded infrastructure).

A feature of the renewals annuity approach is the requirement to forecast capital expenditure many years into the future. Underlying this investment profile is an implicit assessment of the viability of investments years before they are undertaken. Although adjustments to the capital program can be made as events unfold, the very long lives of most major irrigation assets mean that prices can be influenced by expectations of developments a long way off.

Also, as noted in a review of pricing policies for G–MW:

> … the accumulation of funds may lead to investments taking place even if the economic case for the investment is weak. (Frontier Economics 2005, p. 8)

4.4 Cost recovery comparisons

Charges for irrigation services are influenced by the degree of cost recovery practised by infrastructure operators. The possible impact of policy differences across areas in this study is discussed below.

So-called upper bound cost recovery implies that the operators should meet the opportunity cost of capital (financing cost) for the *entire capital infrastructure*, including both the existing assets and new capital expenditure and in doing so provide the funds for subsequent refurbishment and infrastructure replacement. This is consistent with the normal business imperative of raising the capital required to establish the asset base — that is, the annual financing and depreciation costs of the infrastructure are reflected in the price.

Generally, the infrastructure operators have no or very small levels of debt. The financing cost of their capital assets is effectively zero — the assets having been for the most part provided free of charge by governments.

The assets of the infrastructure operators located in New South Wales and South Australia were transferred to private ownership unencumbered, with no requirement to pay the governments for the assets. The economic value of the transferred assets depends on their age and condition. The value will be greater if the assets are new or recently refurbished. In Victoria, the government does not require a return on any assets built prior to 1 July 2004.

Order-of-magnitude estimates of the levels of cost recovery, against a benchmark of upper bound cost recovery for the entire capital base, are presented in table 4.2. These estimates indicate the extent to which charges would have to increase to achieve full cost recovery given that existing prices do not recover the opportunity cost of capital.

The significance of the provision of government funding for the financial performance of the infrastructure operators can be gauged by the relative sizes of the annual returns, per ML of delivered water, that private investors would normally expect. Illustrative estimates of these expected returns on the non-current asset base have been made assuming a 5 per cent per annum rate of return in real terms (see table 4.2).

Table 4.2 **Reported asset values, calculated annual returns and charges — selected infrastructure operators, 2004-05**

Infrastructure operator	*Value of property, plant and equipment*	*Opportunity cost of capital per annum*[a]	*Water delivered*[b]	*Opportunity cost of capital per annum per ML of water delivered*[a]	*Current price*	*Cost recovery*
	$ '000	$ '000	'000 ML	$ per ML delivered	$ per ML delivered	per cent
South Australia						
Central Irrigation	87 893	4 395	108	41	57	58
Victoria						
Goulburn–Murray	1 015 208	50 760	1 687	30	35	54
Lower Murray	108 124	5 406	80	67	112	62
First Mildura	61 395	3 070	46	66	110	62
New South Wales						
Coleambally	36 332	1 817	239	8	32	81
Murray Irrigation	238 310	11 916	659	18	36	66
Murrumbidgee Irrigation	137 598	6 880	659	10	27	72

Note The estimates were derived by assuming assets are valued in a consistent way and current revenue approximately covers operating expenses including depreciation but not the opportunity cost of capital. [a] Estimated as the annual return on capital normally required by investors using a rate of 5 per cent (opportunity cost of capital). [b] In 2003-04.

Sources: ANCID 2005; CICL 2004; CIT 2005; FMIT 2005b; G–MW 2004a; Murray Irrigation 2004; Murrumbidgee Irrigation 2004a; Sunraysia Rural Water Authority 2004.

These estimates were derived by assuming that the risk premium is similar across irrigation areas (and embodied in the 5 per cent rate of return) and current revenue approximately covers operating expenses including depreciation.

The value of the irrigation infrastructure that is recorded in the financial accounts of each infrastructure operator depends on the valuation methodology, the physical characteristics of the assets and the way the assets are used. Infrastructure operators use different methods of valuing their assets, including the written down historic cost, deprival value, depreciated optimal replacement cost and the net present value (NPV) of future earnings forgone (without the asset). Assumptions, such as asset lives, also affect valuations.

Most of the infrastructure operators in this study (including all of those in New South Wales and South Australia) report infrastructure capital values at written down net current cost (carrying values). Depreciation is calculated on a straight line basis. The assumptions for expected useful lives of property, plant and equipment assets are broadly similar across the infrastructure operators.

Where the carrying value of a non-current asset is greater than its recoverable amount, infrastructure operators write down the value of the asset. The recoverable amount of an asset is the net amount expected to be recovered through the net cash inflows arising from its continued use and subsequent disposal, given that realisable value from the sale of the asset is typically zero. In most years and for most of the infrastructure operators, the carrying value of their assets is assumed to be less than their recoverable values. Asset revaluations are undertaken from time to time to take account of changed market conditions.

The estimated financing cost of capital required by an investor, in terms of the annual return per ML of water delivered, varies among the infrastructure operators from $8 per ML to $67 per ML (fifth column of table 4.2). Some of this variation can be attributable to the physical characteristics and dimensions, average age of the distribution network and its distance from the river source. For example, the piped networks tend to have relatively high capital costs. G–MW infrastructure includes more weirs than some other operators. Coleambally is more recently established, with an ideal landscape for gravity irrigation.

The information on the cost of capital is combined with current charges to provide a rough estimate of the extent of cost recovery (as a per cent of the charge necessary to fully recover costs, including a return on all the capital assets deployed).

If as assumed in table 4.2, existing charges contribute nothing towards the cost of capital, the opportunity cost of capital is a major part of the full cost of providing irrigation infrastructure services. Further, the extent to which existing charges fall short of the cost varies greatly across the irrigation areas examined.

Water trading would be efficient if differences in charges across irrigation areas are attributable to factors such as productivity and input prices. However, trade deterred or promoted by differences in infrastructure charges that do not reflect differences in cost could result in an inefficient allocation of resources.

Decisions to use water in different locations should be based on the overall net benefits associated with the locations, with these net benefits reflecting differences in costs, as well as productivity differences. If charges do not adequately reflect infrastructure service cost differences, the competitive process would be affected and water trading distorted.

The benefits of water use will be maximised if the marginal benefits from irrigation are equal to the marginal cost of infrastructure services (collection, storage, delivery and drainage) plus the opportunity cost of water (its value in exchange in an efficient market). However, governments have decided, appropriately, that

efficiency is best served in the long-run economy-wide sense by charging to fully recover costs — that is, setting charges at average costs, not marginal costs.

The market price of water is determined by its value in use less the cost of its supply. That is, infrastructure charging policies can affect the market price of water. If charges are below the cost of supply to the marginal user, the market price of water will be higher than it would be if charges fully reflected costs, and vice versa.[3]

Moreover, differences in charges unrelated to costs are likely to be an impediment to efficient trade in water (see box 4.2). For example, disincentives to trade will result if charges do not fully reflect the cost of supply and the benefits of water use will not be maximised (given government pricing policies). For some irrigators, water will continue to be used because its value in use is greater than the market price of water and the charge for its supply (but not necessarily its true cost). Further, benefits of water use will be foregone where the value of water in use is greater and the cost of supply is lower.

This highlights the importance of setting charges within irrigation areas to reflect infrastructure cost differences to promote efficient water use.

4.5 Consequences of increasing charges

Implementation of full cost recovery on all assets from now on (or from a specified date) would require a significant increase in charges because of the inclusion of the cost of capital of the existing infrastructure in the expenses to be recovered. Prices would be higher than under the renewals annuity approach to maintain the existing irrigation network because under the latter, the opportunity cost of capital is ignored.

That said, the market price of water entitlements has increased considerably in the past decade, during which there has been a restricted trading environment. For example, the price per ML has doubled in the area serviced by Murray Irrigation from around $270 in 1996-97 to about $550 in 2004-05 (Murray Irrigation 2006b). This means that the scarcity rents have increased as a result of constraints on the allocation of water for consumptive use, and increasing demand for entitlements by new irrigation developments, new crops, or expansion by existing irrigators.

3 Differences between the short-run marginal cost of supply and the charge would not distort efficient resource use if they are less than the market price of water with charges set at short-run marginal cost.

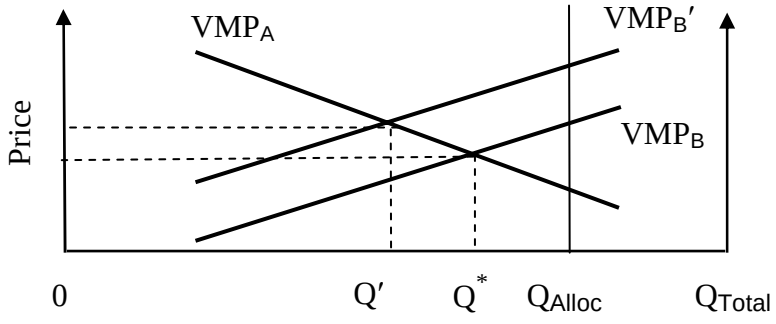
Box 4.2 **Impact of differences in infrastructure cost recovery on trade**

The distortionary impact of differences in the level of infrastructure cost recovery on permanent trade between two irrigation areas is discussed and illustrated in the figure below. This is followed by a discussion of the implications for temporary trade.

For ease of exposition, two regions A and B with the same infrastructure costs are considered. The total quantity of entitlements in the two regions is Q_{Total}. Before trade takes place the initial allocation in region A is Q_{Alloc} and in region B it is $Q_{Total} - Q_{Alloc}$.

With *permanent trade* and no difference in the level of cost recovery, the allocation in region A adjusts to Q^* where the marginal benefits of trade VMP_A and VMP_B are equalised, and all the gains from trade are exhausted.

If region B pays less in infrastructure charges (but has the same cost), the value of the marginal product of water increases from VMP_B to VMP_B' by the difference in the relative level of the infrastructure charge. The increase is invariant with quantity because on an annualised basis the total charge is directly related to the quantity of entitlement held. The new equilibrium allocation is Q', with a lower volume of entitlements retained in region A relative to the case of no difference in the level of cost recovery. The market price of entitlements is also higher because of the lower relative infrastructure charges in region B.



With *temporary trade* and a lower level of cost recovery in region B, the value of the marginal product of water in region B would increase relative to that in region A. The size of the increase would depend on how the charges in region B are structured relative to the charges in region A. Nevertheless, less water will be retained in region A and water prices would be higher as a result of the lower relative level of infrastructure cost recovery in region B, as in the case of permanent trade.

Consequently, increasing infrastructure charges to achieve full cost recovery is unlikely to have adverse implications for irrigators if managed appropriately. With increasing rents, a general increase across the Basin can be expected to reallocate some of the scarcity rents from entitlement holders to infrastructure operators without significantly affecting the total use of entitlements.

4.6 Transition to higher cost recovery

The implementation of government policy to move to higher levels of cost recovery is affected by interpretations of cost recovery and the rate of progress that would be feasible. Different institutional arrangements across states also affect implementation.

Infrastructure operators deciding to undertake additional investment expenditure to expand capacity would have to raise the finance from capital markets. The *additional services* provided by the new infrastructure would have to be priced to meet the associated financing and depreciation expenses.

If the investment improves the quality of the existing service (for example, introducing automated flow control), the price of the new *higher quality service* would be increased (compared with the existing service it replaces) to cover the additional cost of capital.

Assessments and decisions about capital expenditure programs are made shortly before expenditure is incurred. Unlike the renewals annuity approach, there is no requirement to forecast capital expenditure many years into the future. Also, the beneficiaries pay the full cost of the services flowing from the new investment.

In practice, it appears that governments are not expecting a return on capital invested in the past and embodied in the existing irrigation infrastructure. However, they expect a return on any further funding that they supply for new capital projects or for projects commencing after a specified date — the so-called 'line in the sand':

> Government … will not require rural water authorities to generate a return on past investments, in recognition of the fact that the costs associated with constructing the existing rural infrastructure many years ago are largely sunk. (DSE 2004, p. 131)

The transition towards full cost recovery is being implemented in a transparent way. An accounting asset base for new investments (for which full cost recovery is required) is kept separate from the accounting asset base for existing assets (on which depreciation is charged but a net return not required).

Accounting separation accommodates contributed irrigation assets by governments where there is no requirement for the donor government to receive a return. Nevertheless, the approach is inconsistent with the principle of fully recovering costs, including the opportunity cost of capital, to provide price signals that ensure that related investments are not distorted in the long run. It will take many years to reach full cost recovery with assets potentially having lives of over 50 years.

Policy implementation in the states

It is difficult to associate consistent dates with the 'line in the sand' approach for implementing a commercial return on recently established assets and future investment. Further, there are continuing agreements for government contributions.

Approaches differ among the states. For example, in New South Wales the 'line in the sand' is used only in relation to bulk water services provided by State Water Corporation. However, it may apply to irrigation infrastructure services in the future. In Victoria, a 'line in the sand' concept is embodied in the Regulatory Asset Value (RAV) used to determine infrastructure service charges.

New South Wales

The ownership of the selected infrastructure operators in New South Wales was transferred from the government to the customers of the operators (that is, the irrigators). This means that an increase in the fixed access charge in pursuit of improved cost recovery is effectively an increase in the charge irrigators pay themselves.

Nevertheless, the new charge would give a more reliable signal to irrigators of the true costs of providing the service, and the costs to be met in the event of investment to expand or upgrade the network.

There is no regulatory oversight of the privatised irrigation infrastructure charges in New South Wales (or in South Australia under existing circumstances), as noted in chapter 2.

As part of the transfer of irrigation assets to private ownership, the New South Wales Government agreed to provide funding for refurbishment and upgrading of irrigation infrastructure. The extent and timing of this funding differs across irrigation areas and businesses.

For example, the government provided and is providing:

- A one-off upfront payment of $10.3 million in 2000 to CICL, which has a bulk water entitlement of 630 GL. The funds were to be expended on a wide range of assets including among other things, fencing and replacement and refurbishment of selected road bridges and culverts.
- $82.5 million over a 15-year period from 1995 to Murray Irrigation, which has a bulk water entitlement of 1479 GL.
- $100 million over a 15-year period from 1999 (with a CPI adjustment) to Murrumbidgee Irrigation, which has a bulk water entitlement of 1456 GL. These funds are for specifically agreed purposes (like-for-like asset replacements), with the New South Wales Government retaining tight control over approval and disbursement.

With the provision of these funds, infrastructure operators will avoid the financing costs of upgrading some existing assets. These decisions to contribute some assets were taken prior to the current intergovernmental commitment to move to full cost recovery.

South Australia

As in New South Wales, the ownership of most infrastructure assets in South Australia was transferred to irrigators, with similar implications.

The South Australian and Australian Governments spent around $80 million in addition to a contribution of up to 20 per cent from the irrigators to upgrade the infrastructure of CIT prior to privatisation in 1997. These governments provided a further $32 million, together with $8 million from the irrigators, to complete the upgrade after privatisation. CIT now has a modern, fully metered, piped distribution system. Irrigators can place water orders via the internet and have them immediately confirmed. They can then commence irrigating with CIT's pumps automatically responding to the irrigators' water use.

Victoria

The Victorian infrastructure operators have remained in government ownership, and their charges are to be regulated by the Essential Services Commission (ESC), with the purpose of progressing towards full cost recovery and preventing monopoly pricing.

Prices are to be regulated over a two-year period on the basis of recovery of operating expenditure, a rate of return *of* the RAV (regulatory depreciation), a rate

of return *on* the RAV (cost of capital), and possibly a renewals annuity and interest on debt relating to assets existing prior to 1 July 2004. The principle underlying the approach is that recovery of the opportunity cost of capital is required on new investments but not on assets existing before 1 July 2004.

The initial RAV is determined by the Victorian Government to ensure that the average price increase in the first year is kept to an acceptable limit. The RAV for regulatory purposes will be much less than the accounting and economic asset values because of the decision to set prices that provide zero return on the existing assets and a commercial rate of return on future investment. According to the ESC:

> … deciding the level of the initial RAV essentially involves a trade-off between prices to customers and the value to the owner. That is, a higher RAV yields a higher value of returns on past investments and hence will result in higher prices to customers. (2005, p. 5)

The initial valuation of past investment embodied in the initial RAV will not be revised in subsequent price reviews by the ESC. However, the RAV will be updated in these subsequent reviews to reflect new capital expenditure, depreciation and asset disposals.

The regulatory process is intended to safeguard against the abuse of monopoly power as well as promote a commercial return on future investment and therefore a higher level of cost recovery on the total asset base.

Although the intention was for the infrastructure operators to begin moving in the direction of full cost recovery after 1 July 2004, the Victorian Government (like the New South Wales Government) has new investment programs providing funding for infrastructure. These include:

- $9 million to upgrade the Woorinen irrigation system near Swan Hill;
- $48 million (of which $26 million was provided by the Victorian Government with the balance provided by G–MW) for the Eildon Dam Improvement Project;
- $40 million to assist in upgrading the irrigation system for the Goulburn and Broken region;
- $20 million to upgrade irrigation assets in the Sunraysia region; and
- $8.3 million (of which $4.2 million was provided by the Victorian Government with the balance provided by Lodden Shire Council, Timbercorp, G–MW and Powercor Australia), to upgrade the Waranga Western Channel in the Pyramid-Boort area.

These are ‘contributed’ assets which are not to be included in the RAV for the purpose of price regulation.

4.7 Net outward trade and price adjustment

Efficient prices for irrigation services and appropriate asset valuation processes, such as those based on the deprival method (see box 4.3), are a good basis for an effective response to the impact of new or increased trade in entitlements.

Box 4.3 **Deprival method of asset valuation**

In applying the deprival value method the basic principles are:

- where the asset would be replaced or reproduced if the operator were deprived of its service potential, the value of the asset is measured using current cost — the lowest cost at which the gross service potential of the asset could currently be obtained in the normal course of business.
- where an asset would not be replaced or reproduced if the operator were deprived of its service potential, value should be measured at the greater of its market value and the present value of any future incomes that it may generate.
- where the asset is surplus to requirements it should be measured at its market value (selling price).

In the case of a specialised non-current asset that would be replaced if the operator were deprived of it, the optimised deprival value would be equal to:

ODV = minimum{DORC, maximum [NPV, NRV]}

where,

ODV = optimal deprival value;

DORC = depreciated optimal replacement (or reproduction) cost — that is, the depreciated cost of replacing (or reproducing) the asset using the optimum technology (usually the most modern) to achieve current demand plus expected growth over a specified period;

NPV = net present value of future earnings forgone; and

NRV = net realisable value from the sale of the asset.

Source: PC 2002.

As discussed in chapter 3, those areas exposed to net outward trade could be left with under-utilised or stranded assets. Further, irrigators and infrastructure operators have indicated their intentions to address the potentially adverse financial effects of stranded assets by introducing measures such as fees on exit.

The challenge is to address local financial problems without compromising overall economic efficiency.

Financial implications and future funding options

Net outward trade of water entitlements from an irrigation area can be addressed by adjusting the physical irrigation network and the financial value of the network to reflect the reduced expectation of future demand for services.

If net outward trade occurs, the infrastructure operator will be delivering less water. The initial financial consequences of this would be lower sales revenue and some lowering of the costs of operating the irrigation system — see box 4.4 for simplified algebraic relationships between output, cash flows, profits and asset value.

Cash expenses

If total expenses (both cash expenses and depreciation) could be reduced in proportion to the reduction in demand, along with the same proportional reduction in revenue, profitability of the operation would remain the same — net cash receipts, profit and asset value per ML of output would all be unchanged. This would be achieved without needing to adjust prevailing infrastructure charges.

Some cash expenses vary directly with the volume of services. An example might be the cost of electricity in a pumped distribution system. However, other cash expenses would be fixed, at least in the short or medium term. This would include some labour costs incurred in the management and administration of the irrigation network.[4]

The effect of net outward trade when some cash expenses are fixed would be to reduce net cash receipts and profits more than in proportion to the output reduction, and may produce a loss that would erode non-cash expenses (current depreciation) and even accumulated depreciation allowances. In this circumstance, an increase in infrastructure charges could be needed for a period.

4 The introduction of new technology may reduce unit operating costs in the future, and ease the transition to a new market environment. An example might be CICL's new total channel control system which 'involves the installation of automatic control gates, communications networks and advanced control and management software' (CICL 2006a).

Box 4.4 **Relationships between output, cash flows and asset value**

Annual net cash inflow is the difference between sales revenue and cash expenses, and provides for an annual profit and an allowance for depreciation.

If revenue and expenses (including both cash and depreciation) are all proportional to the quantity of output, profit per unit of output, depreciation per unit of output and asset value per unit of output would remain constant if output fell.

However, some cash expenses and depreciation may change less than in proportion in response to a change in output — a symptom of increasing returns to scale (declining average costs). This would adversely affect net cash receipts, profit and asset value.

Annual net cash receipts (NCR) of the infrastructure operator are given by:

$NCR = R – VCE – FCE = p.q – v.q – FCE = P + D$

where:

- R = annual revenue
- VCE = annual variable cash expenses
- FCE = annualised fixed cash expenses
- p = infrastructure charge
- q = quantity of output in ML
- v = unit variable expense per unit of output
- P = annual profit
- D = annual depreciation

The value of the asset base (AV) of the operator is given by:

$AV = \Sigma_n [NCR_i/(1 – r)^i]$

where:

- r = discount rate
- Σ_n is the sum over n years of the discounted future net cash receipts in each year i

If q (output) declines, R and VCE decline in the same proportion. However, NCR and AV would decline more than in proportion unless FCE (fixed expenses) is zero.

Source: Productivity Commission.

Depreciation

Rigid application of renewals annuity to provide for the accumulation of funds for the *full* replacement of the existing infrastructure in the future would be inappropriate when there is significant net outward trade. Nevertheless, reduced depreciation could be justified, provided the lower demand for irrigation services is indicative of the longer-term outlook for the area.

Any lower rate of depreciation should be consistent with progressively rationalising the physical infrastructure in line with the new demand outlook (see chapter 3). It should also be related to the reduced value of total assets reflecting the changed outlook for net cash receipts.

It is recognised that adjustment of total expenses in response to lower throughput of irrigation water might be difficult because of the high level of fixed costs, although the scope to make adjustments should increase over time. In the context of a discussion of stranded asset costs, CICL notes:

> Joint distribution assets are not readily decommissioned, mothballed or rationalised especially when only a handful of users exit the system or when exit is geographically randomly distributed … Costs or expenditure requirements are fixed in relation to the volume of entitlement up to the point where it becomes possible to restructure part of the system and reduce costs. Restructuring opportunities such as the closing down of part of the irrigation network can only proceed if all users on the part of the network to be closed down agree to relinquish their rights to the irrigation service. Accordingly costs respond to changes in entitlement volumes in discrete steps. (2006b, p. 4)

Future funding by borrowing or share issues

If charges are not increased following a net outward trade of entitlements, accumulated depreciation allowances could be insufficient to fund *future* investments for replacement or upgrading of infrastructure. However, the operators may obtain funds from other sources by borrowing or share issues. This would ensure:

- careful evaluation prior to the investment decision; and
- inclusion of the financing cost of the new funds in the price of the service provided by the new investment — cost recovery from the beneficiaries of the service.

Impact of debt

The returns to the infrastructure operators' shareholders would be adversely affected if the assets of the operation are partly supported by debt. The asset revaluation would not affect the interest payable on the debt. This interest would have to come out of the lower total returns on the asset base leaving less for shareholders.

In practice, most operators do not have debt. This means that they do not have the burden that debt can place on organisations when they need to adjust to deteriorating circumstances.

Impact of rate of return on equity

Infrastructure operators generally earn very low or negative profits (return on equity). Therefore there is very little, if any, cushion between revenue net of cash expenses on the one hand and non-cash depreciation on the other.

Implementing full cost recovery prior to an open entitlement trading environment would have significant cash flow advantages. By providing a return on assets in line with the cost of capital set by financial markets (or a reasonable level of cost recovery), the repercussions on net cash receipts from a loss of entitlement could be absorbed to a degree by reduced profit rather than reduced depreciation — with more funds retained for the maintenance of the physical assets.

The level of equity would reduce if asset values have to be written down because they are being under-utilised. Losses would have to be recorded, but profitability would be restored.

5 Fees on exit

Net permanent outward water trade from some irrigation areas, the re-allocation of water resources and changes in the utilisation of irrigation assets are a normal outcome of market forces (chapter 3). They would denote a successful re-allocation of scarce water to where the resource has greatest value — to where its value in use *less* the cost of its collection, storage and delivery is greatest.

Nevertheless, irrigation communities are collectively concerned about the local consequences of net outward trade that could occur from some irrigation areas. Consequently, fees associated with permanent outward water trade have been promoted as a means of preserving irrigation assets and protecting the financial interests of remaining irrigators.

Efficient entitlement trading markets and infrastructure pricing would encourage and facilitate adjustment of the irrigation infrastructure in response to net outward trade from an irrigation area (chapter 4). Interference with the market could have adverse efficiency consequences by impeding trade and reducing the benefits of efficient access to water and cost-efficient infrastructure services.

The economic implications of exit fees are considered in this chapter, together with their financial consequences, tax and community effects, and legal issues. As there is a possibility that exit fees will be introduced more widely irrespective of their adverse economic consequences, comments are also offered on the ways in which they could be implemented to minimise their adverse effects.

5.1 Options for fees on outward trade

Under arrangements in place prior to the National Water Initiative (NWI), infrastructure operators would cease charging for access because the service was no longer required when an entitlement was traded out of an irrigation area.

With the prospect of more open trade in entitlements (increased permanent water trade), several options have been proposed for imposing additional fees on outward trade.

These options include the following:

- ongoing payment of infrastructure access fees by landowners after the sale of an entitlement;
- tagging — access fees set in source area are paid by the new owner of a water entitlement (along with the access charge in the destination area); and
- lump sum exit fees paid to the infrastructure operator by the seller or purchaser on the sale of an entitlement.

Concerns about net outward trade relate, among other things, to the loss of revenue for the infrastructure operator in the source area. The reason for the support for these fees is that they would prevent or reduce this loss of revenue.

From the perspective of the irrigation community in the area from which entitlements are sold, the revenue from the exit fee (in any of its forms) would be a contribution to funds required for future asset refurbishment and replacement.

Annual access fees paid after the sale of an entitlement

One suggested option is to require landowners to continue to pay an annual fixed access fee after the sale of their entitlement to purchasers in different irrigation areas. This general approach is consistent with the unbundling of water entitlements and delivery capacity and associated charges that has been recommended by the Murray–Darling Basin Commission (MDBC) (Hassall et al. 2004).

This approach has been adopted by the Victorian Government (DSE 2004). The entitlement owner, the water user and the landowner are each levied charges for specific services, with the landowner responsible for paying the cost of infrastructure services, even if the service is not used (see chapter 2).

Tagging

Tagging enables an entitlement to be traded in its original form, retaining in the destination irrigation area the features that were attached to it in the source area, such as the level of security and the specification of its tenure. These retained features could also include the annual payment of the fixed access fee by the purchaser of the entitlement to the infrastructure operator in the source area.

Operators in New South Wales are interested in tagging. As noted in Chapter 2 Murray Irrigation has introduced retail tagging on permanent trades that occur between landowners and non-landowners. Murrumbidgee Irrigation is planning to

introduce tagging to remain Cap compliant. Coleambally Irrigation Co-operative Limited (CICL) does not intend to implement tagging but noted the following:

> [Tagging] allows a traded access entitlement to retain its characteristics including deliverability, reliability, priority of access, and its share in the consumptive pool when traded to a new jurisdiction and or trading zone. Under this arrangement the party to whom the water is traded would become a member of CICL and become liable for the fixed charge component consistent with the entitlement traded. (CICL 2004, p. 23)

Lump sum exit fees

Lump sum exit fees are a one-off contribution paid on the sale of an entitlement outside the area of the infrastructure operators.

As described in chapter 2, Central Irrigation Trust (CIT) has already applied an exit fee in several recent trades. Murray Irrigation has introduced an exit fee on water entitlements permanently transferred from the company's licence (Murray Irrigation 2005c).

5.2 Economic impact

The economic impact of imposts on outward permanent trade is discussed in terms of the impact of a lump sum exit fee on the supply of and demand for water entitlements. Similar principles would apply in the context of the imposition of an ongoing access fee. However, there are also some differences in the effects of lump sum exit fees, ongoing access fees and retail tagging as discussed later.

The likely effect of an exit fee on entitlements is to divert some trade to the temporary or leasing markets or to retain and possibly continue to use some of the entitlement in the same irrigation area.

Further, the imposition of an exit fee on irrigators serviced by infrastructure operators is likely to have an indirect effect on the value of private diverter entitlements. Private diverters (river and groundwater pumpers) are exempt from paying an exit fee on transfer of their entitlement. Consequently, they are likely to benefit if exit fees are introduced because the value of their entitlement will increase. This has the potential to distort trade of entitlements held by irrigators serviced by infrastructure operators and private diverters.

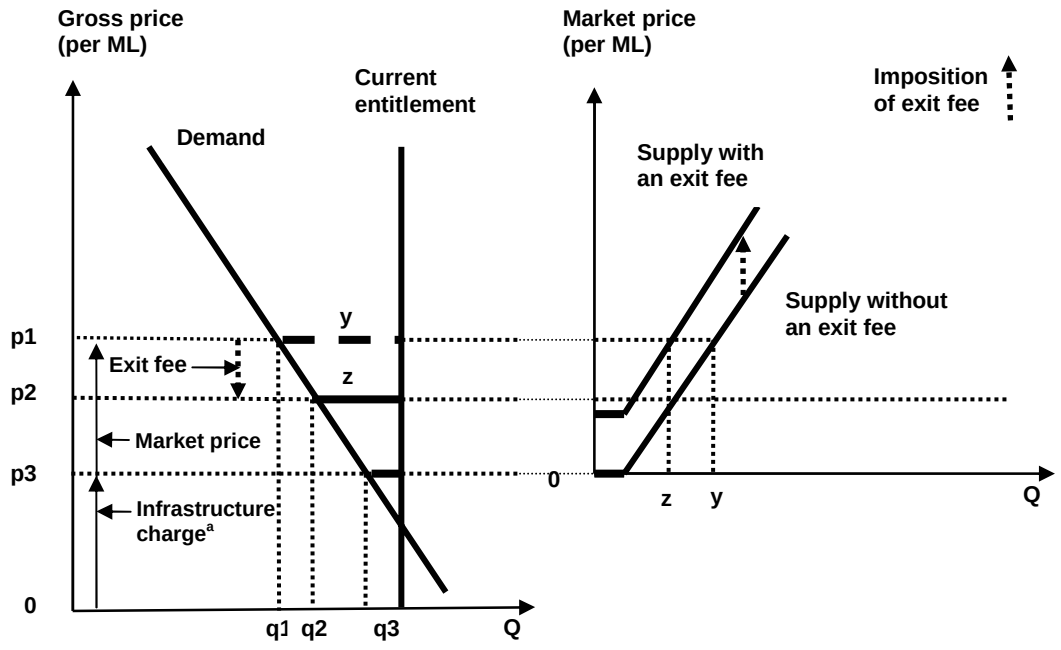
Demand and supply for an individual with a large water entitlement

The demand by individual irrigators for water entitlements given their value in the market and the volume sold by them is a function of the gross price. This price, as shown in the left-hand graph of figure 5.1, includes the infrastructure charge per ML and the market price per ML of entitlement (assumed to remain unaltered by an individual irrigator's decision to sell).

For the entitlement market price shown (equal to 'p1 to p3'), 'q1' ML of entitlement would be retained by the irrigator. Assuming there was no exit fee, the irrigator would offer 'y' ML for sale.

An irrigator's entitlement supply curve is shown on the right-hand graph. Note that supply is the schedule of quantity supplied to the market against net market price (excluding the infrastructure charge).

Figure 5.1 **Effect of an exit fee on an individual irrigator**
Individual irrigator for whom current entitlement exceeds demand



Note It is assumed that the infrastructure charge is the capitalised value or NPV of the stream of annual future charges incurred as a result of using the flow of water associated with the entitlement owned by the irrigator. This expresses the infrastructure charge in the same terms as the market price and exit fee (that is, in capitalised terms).

The requirement for the irrigator to pay an exit fee for each ML of entitlement sold would reduce the proceeds from the sale, as indicated in the left-hand graph of figure 5.1 (the exit fee being 'p1 to p2'). At the market price shown, the irrigator

would offer ‘z’ ML for sale which is less than the ‘y’ ML offered without the exit fee. The effect of the exit fee is to shift the irrigator’s entitlement supply curve to the left in the right-hand graph.

The size of the impact of the exit fee on the supply of entitlement will be influenced by other options for using the entitlement, which include selling the water annually on the temporary market, leasing the water to another irrigator for a specified period, or retaining the water and continuing to use it. The value of these options affect the elasticity of supply of entitlement to the market.[1]

Efficiency loss from less trade in entitlements

From the perspective of an irrigation area where there is a potential supply of entitlement to other irrigation areas, the effect of an exit fee is to shift the supply schedule to the left, as shown in figure 5.2. The upward shift is equal to the exit fee. The volume of entitlement that would be sold is reduced accordingly.

Exit fees will affect the level of permanent trade. The extent of the impact of an exit fee on the volume of permanent trade out of a region increases as the size of the exit fee increases relative to the traded price of entitlements.

The sensitivity of trade in water entitlements to the market price and to the size of an exit fee is also affected by the attractiveness of participating in the temporary market or leasing water for specific periods. For example, a high degree of substitutability between the supply of entitlements and the supply of annual allocations would tend to increase the responsiveness of market participants to price.

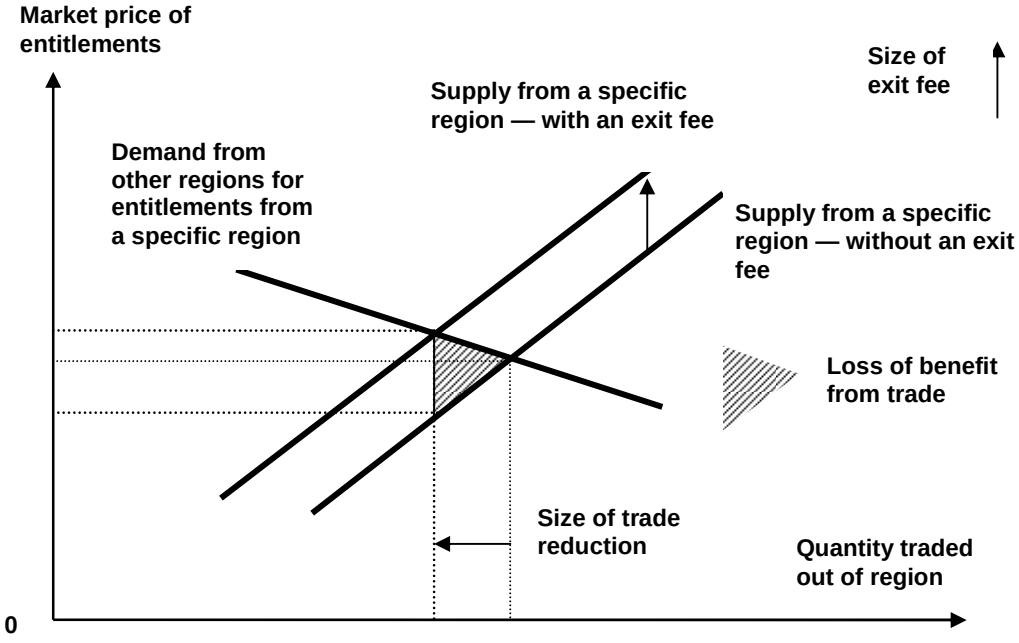
The responsiveness of demand for entitlements would also be affected by opportunities to obtain water in the temporary or leasing markets — particularly if they are complemented by option contract facilities. The existence of these markets would tend to increase the impact of an exit fee on the amount of trade in entitlements. For example, it could encourage the purchase of an entitlement in another district, to leave it in that district but redirect the water allocated to it each year to wherever it is required as a temporary trade.

The seller will tend to bear most of the cost of an exit fee if supply is less price sensitive than demand — that is, the elasticity of supply from the source region is less than the elasticity of demand from outside the region.

1 Elasticity of supply or demand is the proportional change in the quantity supplied or demanded per unit proportional change in price.

Figure 5.2 **Effect of an exit fee on the permanent trade market**

Demand for and supply from a specific region



The efficiency loss of reduced trade from an area where there is a potential supply of entitlement to other irrigation areas has two components:

- loss of benefits that would have been available to purchasers of traded entitlements; and
- loss of benefits for sellers who would have obtained more from selling entitlements than from utilising them on their properties.

The value of these benefits can be understood by recognising that there is a price difference between purchasing water entitlements in the permanent market or purchasing water annually or periodically in the temporary market, or leasing water.

Relationship between permanent and temporary water trades

A water entitlement is an asset which ensures an annual flow of water in future years without the need to purchase the water in the market place. However, the quantity of water available to an entitlement holder in a given season may fluctuate according to climatic conditions and sovereign risk associated with allocation decisions by the MDBC and state authorities. The risk of a reduction in the available water below the entitlement depends on the security specification of the entitlement (see chapter 2).

The value of a water entitlement is related to the discounted stream of the expected costs of annual purchases in the temporary market equivalent to the entitlement. However, there is likely to be a premium paid for entitlements because the price of water is volatile and expected to increase at an uncertain rate as it becomes scarcer.

For irrigators, selling some or all of their entitlement provides an additional avenue for liquidating their assets. For potential buyers in the permanent market, a water entitlement would be part of their investment required to expand irrigation activities — the water asset could provide greater certainty than having to purchase the water each year in an uncertain temporary market.

If the permanent market were inhibited by exit fees some of these benefits would be lost.

Relationship between permanent trading and leasing water

The losses resulting from inhibiting permanent trade discussed above may be lessened by the availability of leased water products that do not incur exit fees. Leased water, or forward contracts, could be expected to be a closer substitute for water entitlements than for water obtained in the temporary market.

A long-term lease agreement between an entitlement owner (lessor) and water user (lessee) where the lease price is established at the beginning of the lease period would appear to have similar characteristics to a permanent trade, although the taxation and infrastructure pricing arrangements are currently different. Leasing potentially has more financial flexibility than permanent trading. At an MDBC workshop, it was noted that:

> For many buyers, leasing provides greater financial management and taxation benefits than permanent trade. Leasing is therefore likely to become a more common feature of water trade … . (Tim Cummins & Associates 2000, p. 7)

Leasing is a common practice for CIT irrigators, both within CIT and externally. Leasing has recently been permitted in Victoria but with an upper lease duration of 20 years. There is some leasing within irrigation areas in New South Wales.

Infrastructure charges for temporary, permanent or leased water

The normal arrangements for payment of infrastructure charges, when entitlements or seasonal water is traded from one irrigation area to another or water is leased by an entitlement owner in one area to a user in another area, are shown in table 5.1. These arrangements were in place prior to the NWI.

Table 5.1 **Payment responsibility for infrastructure charges when water is traded between irrigation areas**

	Responsibility of seller or lessor in source area	*Responsibility of purchaser or lessee in destination area*
Temporary trade	Pays fixed charge	Pays variable charge
Water lease	Pays fixed charge	Pays variable charge
Permanent trade	No charges paid	Pays fixed and variable charge

A seller of water in the temporary market, or the lessor of water, must keep paying the annual access charge (fixed component of the infrastructure charge). This ongoing expense can be avoided by sale of entitlement, provided that there is no exit fee. The purchaser of an entitlement would have to pay the annual access charge to the infrastructure operator in the destination area because access charges are related to the size of the entitlement under current arrangements.

A possible justification for the entitlement holder continuing to be responsible for the annual access charge after selling water in the temporary market is that most sales are excess to requirements at particular times in a season. Even if relatively large quantities of water are sold temporarily, there is usually the expectation that the entitlement holder will use water in subsequent periods, and the distribution network must be maintained to provide for this.

In the case of permanent trade, the expectation is that the associated flow of water will be transferred to another irrigation area for the foreseeable future and the irrigation capacity in the source area will no longer be required for its delivery.

The imposition of an exit fee on the outward sale of an entitlement distorts the long-term demand for infrastructure services in the source and destination areas. In particular, an exit fee would encourage ongoing maintenance of the existing scale of irrigation infrastructure that supported the delivery of water prior to the sale of entitlements, rather than adjustment of the network in response to changes in demand.

Where a long-term lease agreement is used to transfer water from one area to another, the continued payment of a fixed access charge to the infrastructure operator in the source area is somewhat similar to an exit fee on a permanent trade. However, there is one notable difference between a lease agreement and the purchase of an entitlement. Under a lease agreement there is currently no requirement for a fixed access charge to be paid to the infrastructure operator in the destination area (see table 5.1) — however, this could change in the future.

It could be argued that this arrangement for infrastructure pricing gives the wrong signal regarding the location of irrigation infrastructure capacity — maintenance of

the infrastructure is encouraged in the source area at the expense of infrastructure development in the destination area.

It would be preferable for the access fee to be paid to the infrastructure operator in the destination area by lessees of long-term leases where there were strict penalties for breaking the lease. The definition of 'long-term' would need to be determined — perhaps it should be five years or more.

For the reasons cited in chapter 4, economically efficient decisions about whether to lease or trade permanently are more likely to be achieved with a consistent approach to pricing the irrigation infrastructure in the source and destination areas. The efficiency objective would be served if lessees (not lessors) or purchasers (not sellers) paid the access charges and if these access charges were paid only to the infrastructure operator in the destination area (not the operator in the source area from which the water is transferred). No exit fees would accompany the water transfer.

5.3 Financial effects

The seller of the entitlement will bear some of the cost of an exit fee with the balance being borne by the purchaser as discussed above. The overall financial effect, however, depends on taxation arrangements.

Exit fees financially benefit infrastructure operators and possibly the irrigators remaining in the district.

Infrastructure operator

Exit fees that cover the present value of the future access charges would offset the financial impact of the loss of revenue for the infrastructure operator associated with net outward trade in entitlements. Fees set at this level would provide funds for future refurbishment and replacement, whether warranted or not.

Irrigators

In the case of privatised infrastructure operators, exit fees are a transfer from the irrigators who sell their entitlement out of the area to the irrigators who retain their entitlement and their shareholding with the infrastructure operator.

In the case of the government-owned infrastructure operators, exit fees are a transfer from the irrigators who sell their entitlement out of the area to the operator. The

funds could be used for the benefit of the irrigators who continue to use the services, but not necessarily so.

As noted earlier, exit fees can be avoided under current pricing arrangements by transferring water using long-term leasing rather than permanent trading. From the perspective of irrigators, an obvious benefit of long-term leases without exit fees over the outward sale of entitlement with exit fees is that access fees under leasing would be paid only once (currently by the lessor). In contrast, with the outward sale of an entitlement the access fees are effectively paid twice — to the infrastructure operators at both the source area (because of exit fees) and destination area.

Leasing can also have tax advantages over permanent trades. From the perspective of the irrigator acquiring water, lease payments (like temporary purchases) are tax deductible, whereas a deduction for the purchase of an entitlement (a capital item) is not available (as discussed in more detail below).

5.4 Tax implications

All states and territories have enacted legislation to enable the trading of water allocations (temporary or seasonal) and permanent water entitlements. Generally, there are capital gains tax (CGT) and or general taxation consequences from the sale, transfer or ending of water licences, allocations, quotas and entitlements.

Water trading

The Australian Taxation Office (ATO) is not in a position to provide definitive advice on the taxation treatment of all the revenue and expenses that are relevant to this study. The tax treatment of any particular transaction depends on the specific details of the transaction such as the regulatory framework and the terms of any contracts between the relevant parties (ATO, pers. comm., September 2005).

Nevertheless, the ATO provided the following general advice in relation to the sale and purchase of water entitlements, temporary and leased water, and the tax treatment of annual access and exit fees.

Sale and purchase of a water entitlement

A water entitlement is a CGT asset under section 108-5 of the *Income Tax Assessment Act (ITAA) 1997*. A capital gain or a capital loss occurs when a CGT

event happens to a CGT asset.[2] If the sale of the entitlement is a permanent disposal of that entitlement (that is, a change in ownership of that asset occurs after its sale), it would be classified as a CGT event A1 under 104-10 of the *ITAA 1997*.[3] The timing of the CGT event is when the sale contract is entered into or, if none, when the irrigator stops being the owner of the entitlement.

If the water entitlement was acquired before 20 September 1985 (pre-CGT) the capital gain or capital loss is disregarded (ATO 2004).

Although CGT applies to water entitlements purchased after 20 September 1985, irrigators might be able to obtain a CGT concession to reduce a capital gain made on a CGT event on a water entitlement; namely,

- An owner can reduce a capital gain by a CGT discount when a CGT event happens to their water entitlements and those entitlements were acquired at least 12 months before the CGT event — the discount is 50 per cent if the owner is an individual or trustee.
- If the water entitlement was acquired before 21 September 1999, the owner can use either the indexation method or the discount method to calculate the capital gain. If the indexation method is chosen, the CGT discount does not apply (ATO 2004).

Additionally, there are four small-business CGT concessions available that could disregard, reduce or defer a capital gain made by an owner of a water entitlement on a CGT event that happens to those entitlements, including small business:

- 15-year exemption;[4]
- 50 per cent active asset reduction;
- retirement exemption; and
- rollover (ATO 2004).

These concessions are available for businesses with net assets of not more than $5 million.[5] One of the basic requirements that must be satisfied for the concessions to apply is that a water entitlement must be an active asset.

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2 CGT events are transactions that result in a capital gain or a capital loss.

3 The sale of an entitlement can occur without a change of ownership if a person stops being the legal owner but continues to be its beneficial owner and if there is a change of trustee.

4 The entire gain from the sale of a water entitlement will be exempt from CGT if the entitlement has been held for at least 15 years, and the taxpayer is at least 55 years of age and intends to retire or has become incapacitated.

5 These assets do not include the family home, superannuation and life insurance policies.

To be an active asset it must be:

- used or held ready for use by the owner, the owner's affiliate or an entity connected with the owner, in the course of carrying on a business (for example, an extraction component available to a rice grower in an irrigation area); or
- an intangible asset, that is inherently connected with a business carried on by the owner or that is used or held ready for use, in a business carried on by the owner's CGT affiliate or entity connected with the owner (ATO 2004).

From the perspective of the buyer, a deduction is not available under section 8-1 of the *ITAA 1997* for expenditure incurred in acquiring a water entitlement to irrigate primary production property. This expenditure is considered to be of a capital nature that secures an enduring benefit for a taxpayer.

Sale and purchase of temporary and leased water

Generally, receipts from temporary trading or the leasing of water will be assessable as income. Under section 8-1 of the *ITAA 1997*, a deduction can be made for the expenditure incurred by the buyer provided that it is incurred in gaining or producing a taxpayer's assessable income or is necessarily incurred in carrying on a business for the purpose of gaining or producing assessable income.

Annual access and exit fee payments

Currently there are no public rulings regarding the way in which 'a tax law' applies to an infrastructure operator that imposes ongoing annual access or exit fees to account for stranded assets when water entitlements are traded out of an irrigation area (ATO, pers. comm., September 2005). This led the New South Wales Irrigators' Council to make the following comment in their recent submission to the NWC:

> … the taxation treatment of exit fees is one of a number of issues that must be resolved to provide certainty to the ongoing business operations of the water corporations. (NSWIC 2005, p. 14)

However, the ATO has made the following general comments with respect to how an annual access and an exit fee will be treated for income tax purposes (ATO, pers. comm., September 2005).

Payments while holding the water entitlement

In determining if an annual access fee (while holding the water access entitlement) is deductible under section 8-1 of the *ITAA 1997*, the connection between the expenditure and the production of income must be examined. In doing so, emphasis would be placed on the scope of the operations and the relation of the expenditure to them. This would require an examination of the significant features of the transaction in the context of the business or income producing operations.

The following tests established in *Sun Newspapers Ltd And Associated Newspapers Ltd v Federal Commissioner of Taxation* 61 CLR 337 at 363 would be considered in order to determine whether expenditure is revenue or capital in nature:

- the character of the advantage sought, and in this, its lasting qualities;
- the manner in which it is to be used, relied upon or enjoyed, and its expected recurrence; and
- the means adopted to obtain it, that is, by providing a periodical reward or outlay to cover its use or enjoyment for periods commensurate with the payment or by making a final provision or payment to secure future use or enjoyment.

The annual access fees paid by irrigators to meet the continuous demand of their business operations would generally be expenditure of a revenue nature. If all other conditions in section 8-1 of the *ITAA 1997* are satisfied, the irrigator can generally deduct the annual access fees in the year they are incurred.

The character and nature of the expenditure ultimately depends upon the circumstances and facts of each case. For example, a payment made under a long-term contract for the supply of reclaimed water that requires payment of amounts for 'access fees' for the first few years of the contract, and secures a certain amount of water for the buyer for the life of the contract, will be capital in nature because they secure an enduring benefit for the taxpayer — that is, access to a set amount of water for the life of the contract.

Payments after a water entitlement has been sold out of an irrigation area

After the sale of part or all of a water entitlement, an irrigator might continue to carry on the same business, conduct a different business, or cease carrying on a business. The tax treatment of the expense of continuing payment of annual access fees in these circumstances will depend upon the connection of the payment with the business or income producing activities.

A number of judicial decisions have indicated a deduction under section 8-1 of the *ITAA 1997* for such expenditure depends upon whether '… the occasion for the loss or outgoing is to be found in the business operations directed to gaining or producing assessable income … unless it is capital or of a capital nature' (*Placer Pacific Management Pty Ltd v Federal Commissioner of Taxation* 95 ATC 4459; (1995) 31 ATR 253).

Whether a payment of annual access fees arises out of the business operations directed at gaining or producing the assessable income is a question of fact and degree. Consequently, the tax treatment can only be determined in light of all of the circumstances.

An example of circumstances where a deduction would generally be available is where substantively the same business is carried on and the payment is only for access to water for that year. In contrast, if business activity has ceased (and an exit fee does not have to be paid), the expenditure for ongoing annual access fees could not be included in the business operations to produce assessable income.

Lump sum exit fee payments

Exit fees will generally be capital in nature as they are once and for all payments that secure the enduring benefit of being released from an obligation to pay future annual access fees. Therefore, it is unlikely that exit fees are deductible under section 8-1 of the *ITAA 1997*.

Cost to stop carrying on a business

If the capital expenditure incurred for the payment of exit fees is deemed to be a 'cost to stop carrying on a taxpayer's business', the expenditure would be deductible over five years under paragraph 40-880(1)(g) of the *ITAA 1997*. Whether exit fees incurred are 'costs to stop carrying on a taxpayer's business' have to be determined on a case-by-case basis having regard to factors such as:

- whether the sale of the water entitlement is an activity integral to the process of the taxpayer stopping carrying on their business;
- whether it can be objectively determined through activities carried out by the taxpayer that the expenditure is incurred directly for the purpose of the taxpayer to stop carrying on their business; and
- whether there is a direct causal relationship between the expenditure incurred and the taxpayer stopping carrying on their business.

Offsets against capital gains from the sale of a water entitlement

As described above, expenditure on annual access fees will generally be regarded as annual revenue or an expense in nature, and exit fees will generally be capital in nature. Consequently, the extent to which exit fees can be offset against any capital gain depends on whether they fit within the cost base of the entitlement.

A capital gain is made if the capital proceeds from the sale of the entitlement are more than the cost base of the entitlement, and vice versa. The cost base of the entitlement is worked out under Division 110 of *ITAA 1997*. Generally the base is the cost of the entitlement when it is purchased. However, it includes other costs associated with acquiring, holding and disposing of the asset.

The cost base of the entitlement is made up of five elements (see box 5.1). If the exit fee fits within any of these five elements it can be included in the cost base of the CGT asset.

Box 5.1 **Elements of the cost base**

The five elements which can be included in the cost base of the water entitlement include:

1. The cost of acquiring the entitlement.
2. The incidental costs of acquiring the entitlement or that relate to the CGT event that happens to the entitlement, including its disposal. For example, brokerage or stamp duty.
3. Non-capital costs associated with owning the entitlement include rates, land taxes, repairs and insurance premiums. Non-capital costs of ownership can only be included in the cost base if they cannot be claimed as a tax deduction and if the entitlement was acquired on or after 21 August 1991.
4. Capital costs incurred in increasing the value of the entitlement that are reflected in the state or nature of the entitlement.
5. Capital costs of defending your legal title to the entitlement.

Source: ATO 2005.

The exit fee does not satisfy any of the descriptions of the five elements of the cost base and cannot be offset against any capital gain from the sale of a water entitlement.

With access fees, this expense might be a non-capital cost of owning the entitlement. However, to the extent that a deduction for the access fee is allowed under section 8-1 of the *ITAA 1997*, the access fee is excluded from the cost base

under the otherwise deductible rule (for example, subsection 110-45(1B) of the *ITAA 1997*).

Assuming that there are no other costs that can be included in the cost base of the entitlement, the irrigator can be expected to make a capital gain. Subject to the eligibility requirements being met, the capital gain can be reduced by the CGT discount (Division 115 of the *ITAA 1997*) or disregarded under the small business CGT concessions (Division 152 of the *ITAA 1997*).

As the exit fee is not included in the cost base of the entitlement, paragraph 40-880(3)(f) of the *ITAA 1997* would not preclude the exit fee from being deductible under paragraph 40-880(1)(g) of the *ITAA 1997*.

Revenue from annual ongoing access and lump sum exit fees

Subsection 6-5(1) of the *ITAA 1997* defines that assessable income includes income according to ordinary concepts, which is called ordinary income. Ordinary income has generally been held to include income from rendering personal services, income from property and income from carrying on a business.

It was said in *Federal Commissioner of Tax v Montgomery* (1999) 198 CLR 639; [1999] HCA 34 at paragraph 98 that:

> Whether or not a particular receipt is income depends upon its quality in the hands of the recipient … And it is well established that a receipt may be income in the hands of the payee whether or not it is an expenditure of a capital nature by the payer.

Charging an irrigator for infrastructure services is the ordinary business of an infrastructure operator. Therefore, levying exit fees could also be considered to be consistent with the ordinary conduct of the operator's business.

Consequently, the revenue from annual access and lump sum exit fees is likely to be considered to be ordinary income of the operator. This would generally be the case whether the operator is a trust, co-operative, a private unlisted company or a public corporation.

Potentially, the infrastructure operator would pay tax on the income received from the annual access or lump sum exit fee. This would erode to some extent the finances available to the infrastructure operator.

In summary

The differential tax treatment of temporary, leased and permanent water trades can be expected to influence an irrigator's decision to sell or purchase water entitlements. However, decisions to hold entitlements relative to other business assets are unaffected.[6]

The expenditure incurred in acquiring temporary water (annually) or leasing water (for a specified period) would be deductible by the buyer if it is incurred in gaining or producing a taxpayer's assessable income. In contrast, the expenditure incurred in acquiring an entitlement cannot be deducted as it is considered to be of a capital nature that secures an enduring benefit for a taxpayer.

Generally, receipts from temporary trading or water leasing will be assessable as income. However, as noted by Bjornlund:

> … sellers of temporary water generally have very low farm incomes, and therefore pay a low marginal tax rate [which] increases the comparative benefits to the seller of using the market for temporary water. (2003, p. 65)

In contrast, the proceeds from the sale of an entitlement are likely to be subject to CGT. The proceeds could be sizeable and subject to a higher marginal tax rate.

In the case of permanent outward sales, the imposition of an annual access or lump sum exit fee is unlikely to be an allowable deduction for the seller or buyer under the *ITAA 1997*. The revenue received from an annual access or lump sum exit fee will generally be treated as ordinary income of the infrastructure operator and subject to the relevant rate of tax.

5.5 Community effects

An underlying concern about the potential for significant permanent outward trade is possibly the flow-on effect of reduced irrigation activity to the local community. Motivation for the introduction of exit fees might not only be to protect remaining irrigators but also to protect the wider community in which they live.

Whether deliberate or coincidental, the introduction of exit fees will reduce and slow the amount of permanent outward trade. Consequently, exit fees will assuage concerns about the possible negative effects of outward trade in entitlements.

6 Entitlements are treated like any other assets for taxation purposes. If there are impediments in the tax arrangements, they will not be specific to entitlements.

However, net temporary water trades or leasing could have similar effects on irrigation activity.

Reductions in agricultural output associated with decisions to export water entitlements out of a region reduce demand for other inputs used by the farming and irrigation industry and also reduce consumption by irrigators and others employed in the industry. These factors affect gross regional product (GRP) of the local community. Of course, there would be increased economic activity in the net importing regions.

The negative effects of the above reductions in expenditures are offset to some extent by the potential gains from the creation of value in the water entitlements which a more open trading environment brings.

Studies by the Productivity Commission suggest that the net impact of reductions in water availability on the GRP of regions within the southern Murray–Darling Basin would be relatively small. Unrestricted intra and interregional trade in water would reduce the negative effects of the reduction in water availability on total production in the Basin, but would increase the reduction of GRP in some exporting regions. In the worst affected region, the fall in GRP over the long term of a simulated 10 per cent reduction to the availability of water would be around 1 per cent (Peterson et al. 2004).

Concerns about adverse community effects of open trade in entitlements could be addressed more directly by targeted forms of structural adjustment assistance, instead of the rather blunt instrument of exit fees or taxes on traded entitlements:

> Where adjustment pressures develop rapidly and are regionally concentrated, governments may need to consider whether, in addition to generally available assistance measures, specific forms of adjustment assistance are warranted for some people in adversely affected regions. (PC 1999, p. xxii)

5.6 Legal issues

The imposition of an exit fee on permanent outward water trade is likely to result in the total volume of entitlements traded being less than it would otherwise be if no exit fee were imposed. If the exit fee is set too high, it could potentially act as a complete barrier to permanent outward trade.

Some of the possible legal issues surrounding the imposition of exit fees is whether their introduction is a restrictive trade practice under the *Trade Practices Act 1974* (TPA), or if it contravenes section 92 of the Australian Constitution. It is beyond the

scope of this study to resolve these legal and constitutional issues. Instead, they are discussed generally to raise awareness of their existence.

Restrictive trade practices

An exit fee introduced by an infrastructure operator would need to be assessed against the competitive conduct rules in Part IV of the TPA to determine if it constitutes a restrictive trade practice. These rules apply to all businesses, including rural producers in their business dealings with competitors, suppliers and customers. They prohibit persons from engaging in a range of anti-competitive behaviour, not all of which apply to the imposition of an exit fee (see table 5.2).

The legality of fees on the withdrawal of equity from cooperatives could be relevant to the imposition of exit fees by infrastructure operators that operate under other business forms.

As noted by the Australian Competition and Consumer Commission (ACCC), certain conduct of co-operatives may give rise to trade practice concerns. For example:

> A common practice in Australian cooperatives is the imposition of a monetary penalty when members attempt to withdraw their shareholding — a type of exit barrier. If a cooperative with significant market power does this, it may amount to a misuse of market power. (ACCC 2002, p. 14)

When trade practice issues arise, cooperatives might be able to alter their conduct or arrangements so that no breach occurs. However, if this cannot be done it may be possible to obtain an authorisation from the ACCC, which results in immunity from certain parts of the Act, providing that a public benefit can be demonstrated. However, an authorisation is not available for misuse of market power (s.46) (ACCC 2002).

As a last resort, the TPA provides statutory exemption from certain prohibitions in limited circumstances. For example, if a Commonwealth, State or Territory Act, or any regulation under such an Act, specifies or authorises particular conduct, it is exempt if that legislation expressly refers to the TPA (ACCC 2002).

Table 5.2 **Restrictive trade practices**

Part IV of the TPA prohibits:	*Which means that under the TPA:*
Anti-competitive agreements, such as price fixing, market sharing and primary and secondary boycotts (ss. 45-45D)	It is illegal for: • competitors to control prices and to divide the market in a way that substantially lessens competition; and • competitors to agree not to acquire goods or services from a particular supplier.
Misuse of market power (s. 46)	A person with a substantial degree of power in a market is prohibited from taking advantage of that power for the purpose of: • eliminating or substantially damaging a competitor; • preventing the entry of a person into any market; and • deterring or preventing a person from engaging in competitive conduct in any market.
Exclusive dealings (s. 47)	It is a breach to supply goods or services on condition that the purchaser: • will not acquire, or will limit the acquisition of, goods or services from a competitor of the supplier; and • will not resupply, or will resupply only to a limited extent, goods or services to a particular person, class of person or particular place(s).
Resale price maintenance (ss. 48, 96-100)	Suppliers, manufacturers and wholesalers are prohibited from specifying a minimum price below which goods or services may not be resold or advertised for resale.
Mergers which are likely to substantially lessen competition in a substantial market (s. 50)	Mergers or acquisitions are prohibited if they have the effect or likely effect of substantially lessening competition in a substantial market, or a substantial regional market, for goods and services.

Source: ACCC 2002.

Contravention of Section 92 of the Australian Constitution

Section 92 of the Australian Constitution states that 'on the imposition of uniform duties of customs, trade, commerce, and intercourse among the States, whether by means of internal carriage or ocean navigation, shall be absolutely free'.

Section 92 is only one section of many constitutional provisions designed to foster a common market and promote national economic unity (Coper 1989). Following a landmark decision in 1988 in the case of the undersized crayfish in *Cole v. Whitfield,* the interpretation of section 92 has been confined to laws that are

discriminatory in a protectionist sense. Hence, only discriminatory measures of a protectionist kind will infringe section 92.

Guidance on the meaning and content of discriminatory protectionism is fairly limited in the *Cole v. Whitfield* case (Coper 1992). However, as noted by Coper:

> The essence of the idea is the conferring of a local economic advantage through discriminatory treatment of interstate trade. The discriminatory protectionism will more likely come about through the disparate impact of a law upon interstate trade than be evident from the terms of the law. (Coper 1992, pp. 138-139)
>
> Difficulties may be expected in areas such as price fixing and product standards (Coper 1992, pp. 138-139).
>
> [For example] A State may set a maximum price for, say milk, as a consumer protection measure, with the consequence that out-of-State producers cannot sell at a viable price. Or a State may set a minimum price, in an attempt to guarantee its producers a reasonable return, yet this may have the consequence of preventing out-of-State producers from competing by undercutting the minimum price. In each case, although the law would be non-discriminatory on its face, factual enquiry would be necessary to ascertain whether the law was discriminatory in a protectionist sense, either in its purpose or in its effect. (Coper 1989, p. 20)

In effect, section 92 prohibits action by either the Commonwealth or a State that discriminates against interstate trade or commerce and which has the purpose or effect of protecting intrastate trade or commerce of a State against competition from other States (AGD 2005).

In New South Wales and South Australia, lump sum exit fees and in some cases retail tagging have been or are in the process of being introduced by the selected infrastructure operators in this study. These support mechanisms are being enacted through each operator's annual operating plan or articles of association (see chapter 2).

In New South Wales, Murray Irrigation has introduced an exit fee of $447 per ML on permanent outward trades (Murray Irrigation 2006a). In 2004-05, general security water entitlements were selling for around $550 per ML. As noted by Murray Irrigation:

> … an exit fee on external trades of entitlements makes Murray Irrigation water less attractive, but primarily, only to external buyers. (Murray Irrigation 2005c, p. 11)

The exit fee of $447 per ML so far proposed by Murray Irrigation will apply to both intra and interstate and will be paid by the owner of the entitlements when they are transferred from Murray Irrigation's access licence. On the face of it, there would appear to be no discrimination against interstate trade in a protectionist sense.

The Victorian Government in its White Paper recommends the use of an annual access and or a lump sum exit fee to address the potential for stranded irrigation infrastructure. Although there is no explicit reference to either an access or exit fee within the Victorian *Water (Resources Management) Act 2005*, each infrastructure operator has the power under s.33AJ to determine service provision fees to be paid by irrigators (owners of water shares) for the provision of infrastructure services.

The imposition of an exit fee on permanent outward trade from an irrigation area does not appear to contravene section 92 unless exit fees within a state are treated differently to exit fees between states. However, that is not to say that the impact of exit fees on interstate trade could be judged to contravene section 92.

5.7 Implementing fees on exit

Although the imposition of exit fees following the sale of entitlement out of an irrigation area would have economic costs, and may not be efficient from the perspective of the whole economy, they are currently sanctioned in a qualified way under the NWI. Moreover, they are already being implemented by some infrastructure operators in order to preserve an infrastructure operator's financial position.

Alternative ways of implementing these fees — ongoing access fees and tagging as well as lump sum exit fees — are therefore discussed and compared in this section.

Annual access fee paid after sale of an entitlement

Irrigators would, of course, continue to pay access fees per ML for that part of their entitlement that is retained for use on their property under current pricing regimes. However, it is proposed that they also continue to pay a per ML access fee on the entitlements sold out of the irrigation area.

The irrigator could have an interest in maintaining the same level of capacity for water to be delivered and therefore accept an ongoing access fee at the same level after a sale of part of their entitlement. Even if the entire entitlement is sold, the irrigator could nevertheless value the option of being able to resume irrigation activities at some future time, or be able to trade some of their delivery capacity right to other irrigators in the area.[7]

[7] The value of the option to reconnect in the future would be incorporated in the value of the property, except in the case where access rights have been unbundled from land.

The possibility of trading delivery capacity shares is raised in the Victorian White Paper, particularly in relation to congestion in the delivery network (DSE 2004). The Paper recognises that congestion may be addressed by charging higher prices for delivery in the peak, but suggests that 'the preferred method of managing congestion is making delivery rights tradeable' (DSE 2004).

An ongoing access fee could be an incentive for landowners to co-operate in rationalising irrigation systems where appropriate (see chapter 4). One possibility might be for neighbouring farms to amalgamate local systems and become responsible for providing their own local system, with a consequent reduction in charges paid to the infrastructure operator.

In areas relatively less suited to irrigation (perhaps having been over-developed in the past), agreement could be reached to close down sections of a network and avoid further access charges, perhaps in the context of converting to dryland farming.

Both improved allocation of peak or congested capacity through capacity trading, and cost-saving restructuring and reductions in capacity would bring economic efficiency benefits. However, they are less likely to materialise if a lump sum exit fee had been paid at the time of sale of an entitlement (presumably prior to any congestion problems). Unlike the adoption of access fees, there is likely to be less incentive for the operator to rationalise the network.

Tagging – access fee paid by new owner of water entitlement

Entitlements that are sold out of an irrigation area can be sold either to landowners in another area supplied by a different infrastructure operator or to an organisation or person, such as a broker, that does not own land but trades in entitlements and benefits from arbitrage opportunities. The effects of tagging (as an approach for offsetting the financial effects of outward trade) are discussed below in relation to both of these situations.

Landowners who purchase entitlements from other irrigation areas would normally be expected to pay access charges in their own area. A requirement to also pay access charges in the source area would be a liability over which they would have little control. They would not be in a position to promote rationalisation of the infrastructure in the source area, unlike the landowner (and previous entitlement owner) in that area. They would also be less well placed to engage in the beneficial trading of peak capacity in the source area than the former entitlement owner.

Similarly, if the new entitlement owners are traders of entitlements rather than users of water, they would have less control over a liability to pay access charges in source areas than would the former entitlement owners (and continuing landowners). Moreover, when a broker re-sells the entitlement, possibly to several new owners, the process of continuing the access payments to the infrastructure operator in the source area would become more complicated. The administrative task of keeping track of the ownership of entitlement would become increasingly complex with the re-selling of entitlements.

Lump sum exit fee

A lump sum exit fee could be paid to the infrastructure operator — possibly at an amount equivalent to the net present value (NPV) of a future stream of annual fixed access charges or costs expected to be incurred by the operator for a specified period.

The NPV calculations embody assumptions about the expected future annual fixed charges or costs to be met (amounts and time period) and the discount rate to be used. The size of the fee would be sensitive to these assumptions.

The exit fee could be paid by the seller or buyer of the entitlement. Who bears most of the cost of the fee is determined, not by who makes the payment, but by the degree of responsiveness to price of supply by the seller and of demand by the purchaser (as discussed in section 5.2).

Since the lump sum exit fee is regarded as a contribution to the maintenance of the existing infrastructure, it could blunt the signal from the sale of an entitlement that a smaller or different configuration could be a better match to demand. Consequently, there might be less incentive for the infrastructure operator to rationalise and restructure the irrigation infrastructure.

After paying the fee, the landowner would have little incentive to seek an adjustment to the delivery capacity formerly required to service the property from which the entitlement was traded (unless the landowner were to receive a rebate after a successful agreement to adjust capacity).

5.8 Setting fees

Setting the size of a lump sum exit fee or its annualised equivalent (access) fee is an important issue affecting the efficiency of trade in permanent entitlements.

The size of fees on exit could be based on:

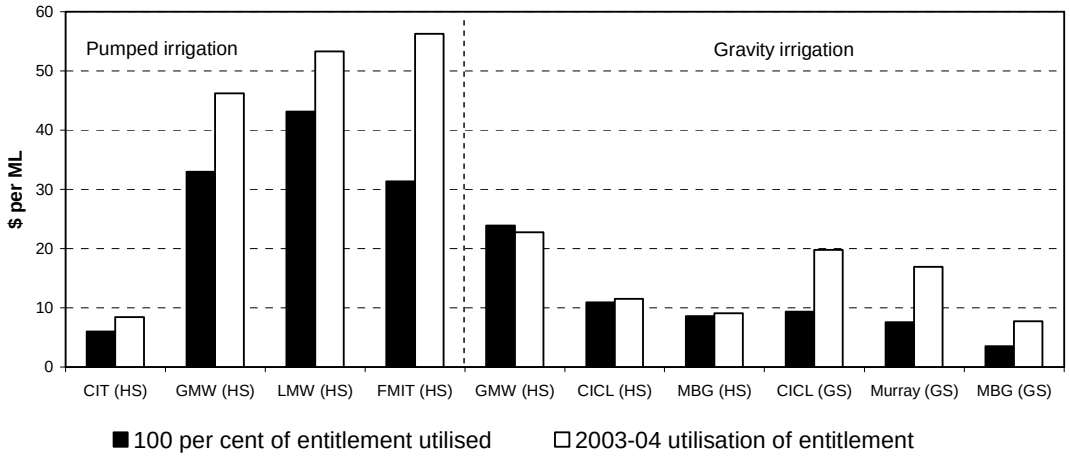
- the current fixed access charge paid by irrigators; or
- specified categories of infrastructure service fixed costs.

A more important consideration is the economic benefit that may be achieved from having the same fee for all irrigation areas between which trade could occur, or an upper limit on the fee.

Exit and access fees based on current fixed access charges paid by irrigators

Fixed charges paid for access to the irrigation network vary greatly across infrastructure operators, as illustrated in figure 5.3. Exit fees based on the access charge that the seller of the entitlement had previously paid would vary in a similar way.

Figure 5.3 **Comparisons of fixed irrigation access charges**
Selected infrastructure operators in the southern Murray–Darling Basin



Note HS refers to high security entitlements. GS refers to general security entitlements. MBG refers to Murrumbidgee Irrigation.

Data source: Productivity Commission estimates based on data supplied by infrastructure operators.

The variation in access fees occurs because of differences in the relationship of fixed charges to fixed costs and differences in the levels of fixed costs. Differences in the relationship of fixed charges to fixed costs could be due to differences in cost recovery levels and pricing structures, which in turn reflect a variety of policies and objectives.

One purpose of exit fees is to assist the remaining irrigation community sustain the network over the long term without increasing charges. However, this purpose would not be achieved in a consistent way across the irrigation networks of the southern Murray–Darling Basin if the exit fees were based on current fixed access charges for irrigation services.

As noted in chapter 4, there are a variety of pricing practices across the Basin. Further, it is highly likely that current access charges are insufficient to cover fixed costs.

Exit and access fees based on fixed costs of delivery

The MDBC has proposed that the following cost components could be included in the price of delivery capacity (access charges) for irrigation services (Hassall et al. 2004):

- maintenance associated with retail infrastructure costs;
- renewals or depreciation associated with retail infrastructure costs;
- overheads associated with retail infrastructure;
- interest on borrowings used to fund retail infrastructure; and
- bulk water losses from district off-take point to farm off-take.

These cost components do not cover the opportunity cost of capital in appropriately valued assets. The item 'interest on borrowings used to fund retail infrastructure' used instead, generally represents a relatively small part of the opportunity cost of capital. Borrowings are zero or very small in the studied irrigation areas.

The MDBC has proposed that the basis for determining access fees should also be used for exit fees. That is, exit fees are related to the revenue forgone from ongoing access charges.

The financial purpose of assisting the infrastructure operator to sustain the network should be satisfied if exit fees made a contribution, on a per ML basis, to the maintenance, depreciation and overheads associated with the retail infrastructure (the first three of the above items). However, this approach would reduce the incentive to improve productivity of the labour and capital underlying the fixed costs.

The exit fee would reduce economic efficiency by adversely affecting the pattern of permanent trade. If the exit fee is related to the first three items of the MDBC's list of fixed infrastructure costs in the source area, then permanent trade out of an area which has high fixed costs is inhibited more than trade out of an area with low fixed

costs (other things being equal). This undermines an important objective of permanent trade which is to encourage entitlements to move to areas where total infrastructure service costs are lower (as well as to areas where its use is most productive).

Upper limit on the exit fee

An exit or access fee after sale of entitlement could be designed to minimise the economic costs of distorting trade and provide an incentive for infrastructure operators to increase productivity. Principles to consider in establishing the fee could be to:

- have an upper limit; and
- base the limit on the costs of maintaining the distribution network of the most cost efficient systems in the southern Murray–Darling Basin.

National oversight of exit and access fees could be needed to implement and manage a regime of exit fees that minimise the economic efficiency distortions they pose.

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