"Achieving Outcomes by Building Capability"

The AgriBusiness Group™

Options for efficiency gains through trading within a community irrigation scheme

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Executive Summary

Background

The Ritso Society represents irrigation interests in the Central Plains of Canterbury with its prime focus on the development of the proposed Central Plains Water Ltd (CPWL) community irrigation scheme. As part of that initiative Ritso are developing an Irrigation Scheme Sustainability Code.

In the project description one of the key outputs from the project is stated as;

"A workable example of water and emissions trading in NZ at a scheme level".

This report addresses the issue of information gaps in this area and provides a background report to the project that examines the theory and practice around water and emissions trading and transfer and evaluates the ability and requirements for CPWL to instigate trading regimes in order to encourage efficiency gains.

The report methodology was to initially carry out a literature review of the theory and practice and then test the feasibility of establishing water and emissions trading within the scheme through workshoping the concepts with experienced farm consultants and potential irrigators in the scheme. These exercises indicated that scheme development was at an early stage in terms of design and specification of water delivery infrastructure and was therefore not at a state where detailed market design was possible.

However, the report has been able to identify the necessary pre requisites for trading regimes to be implemented and the transition issues that CPWL should consider in designing the Sustainability Code of Practice in order to provide for a stepped transition towards market design.

Theory and Practice

Market based instruments (MBI) are seen as a tool to achieve sustainable resource use goals through the use of market signals rather than through explicit directives (command and control regulatory mechanisms). The international experience is that MBI are a next step tool when Best Management Practices are unable or inadequate to achieve the desired efficiency outcomes from resource use. Basically they work on the concept that they are able to efficiently encourage behaviour towards total efficiency goals through operation of a market. Markets work best when access to the resource is constrained or emissions are capped or restricted therefore there is a degree of scarcity of the resource. They also work best where there are significant differences in the individual's opportunity costs of resource use or emission reduction (significantly different values).

Evaluation of the range of instruments available to a community irrigation scheme would indicate that establishment of a tradable / transfer regime for permits or credits is the most appropriate. All other mechanisms available require some form of institutional or legislative control over the resource use needs of the scheme. It is difficult to envisage a community scheme being able to impose resource use charges over and above the water supply costs or pollution charges on emissions.

The theoretical constructs of the value of MBI's are well proven, however the key issue in making them work revolves around the practical issues related to **mechanism and or market design**. There are many examples of the use of MBI that have failed to achieve the expected efficiency outcomes as a result of flawed instrument design.

Options for Cental Plains Water

The following table gives an overview of the state of the important issues to be considered by CPWL in relation to issues in relation to **water transfer** for mechanism or market design.

Issue	State
Pre requisites for a successful market.	
Scarcity of the resource.	✓
Adequate participant knowledge	X
Range of opportunity costs	?
Simple trading and transfer implementation.	?
Number of market participants.	?
Opportunity to increase economic activity.	✓
Issues for Market Design	
Enforceable volume restrictions.	✓
Understanding of market potential.	X
Start from scratch.	✓
Simple rules and low transaction costs.	X
Rights underpinned to science.	✓
Education and training programmes	X

Assessment of the issues to be considered would indicate that if CPWL do wish to establish the ability to transfer and trade water then there is a significant amount of preparatory work that could be done to facilitate participant knowledge and understanding the potential of the market through education and training programmes. Consideration of the future ability to transfer water within the scheme command area should be part of distribution scheme design.

There are a number of mechanisms and tools that the scheme could encourage the use of amongst water users to establish "value thinking" amongst water users. Value thinking can be achieved through encouraging water budgeting and economic efficiency measuring and monitoring.

The following table gives an overview of the state of the important issues to be considered by CPWL in relation to issues in relation to **emissions transfer** for mechanism or market design.

Issue	State
Pre requisites for a successful market.	
Scarcity of the resource.	X
Adequate participant knowledge	X
Range of opportunity costs	?
Simple trading and transfer implementation.	?
Number of market participants.	?
Opportunity to increase economic activity.	✓
Issues for Market Design	
Enforceable volume restrictions.	X
Understanding of market potential.	X
Start from scratch.	✓
Simple rules and low transaction costs.	X
Rights underpinned to science.	X
Education and training programmes	X

Other than the theoretical assumption that there would be the opportunity to increase economic activity if emissions were able to be transferred we do not have any of the pre conditions for market establishment in place. Fundamentally there is no property right to emit that could be transferred.

Development of the Sustainability Code component of this project will be an opportunity to establish activity based methods of addressing important emissions issues. It is expected that over time the barriers to the setting of emissions caps or targets and establishment of emissions transfer capability will be addressed through these channels. This will occur through improved understanding of the underlying science, measuring and monitoring capability through the education programmes and engagement of land users in consideration of how land management and system practices impact on emissions from their systems.

This activity could be considered as taking the baby steps necessary to move towards the ability to establish emissions rights and emissions transfer capability.

1 Background

1.1 Project Background

The Ritso Society represents irrigation interests in the Central Plains of Canterbury with its prime focus on the development of the proposed Central Plains Water community irrigation scheme. As part of that initiative Ritso are developing an Irrigation Scheme Sustainability Code. This project is funded in conjunction with the Ministry of Agriculture and Forestry Sustainable Farming Fund (SFF) and Central Plains Water Ltd (CPWL).

The project description states that;

"This project takes a pro-active and preventative approach, to show that irrigation and intensification of land use can be developed using innovative solutions that both increase economic wealth and maintain high environmental standards. Social challenges, opportunities and benefits are a component of the project. The project brings together the wide range of information on irrigation already available and being developed in current projects. Where gaps in this information have been identified further work has been commissioned to cover these issues.

*From this information a generic **Irrigation Scheme Sustainability Code** will be developed. The generic code will then be tailored to the Canterbury Central Plains Scheme. In this way the project is relevant to existing irrigation schemes and proposed schemes throughout New Zealand."*

In the project description key outputs from the project are stated as:

- A generic best practice sustainability code that
  - Enables the users to achieve the 'top end' of best practice – environmentally, socially and economically (i.e. maximise return from minimum inputs)
  - Is practical and economically viable for water users
  - Is dynamic and can "adapt over time" to incorporate new technologies, deal with new issues etc
- A best practice sustainability code specific to Central Plains Water, that ensures that adverse effects on those affected by the scheme can be avoided or managed, not only in the design and build phases but also as part of the scheme operation.

- **A workable example of water and emissions trading in NZ at a scheme level.**

- Development of a process that enables intensification following irrigation to be achieved and monitored to avoid or remedy adverse environmental effects.
- Full reporting on process, outputs, outcomes and lessons learned would be available to others.

This report adresses the key output highlighted at bullet point three.

1.2 Report Background

Irrigation Water

Most community irrigation schemes in New Zealand are effectively "take and pay schemes" where the water is abstracted from a river and delivered on a fixed roster to water users who are required to use the water when it is made available and to pay for it. These schemes do not encourage efficient use and matching of water use to demand. Most schemes deliver a standard amount of water to each property regardless of their actual use requirements. Community irrigation schemes of the future are more likely to incorporate both run of river and storage elements. This means that different volumes of water at different times of the year have quite different costs. The traditional practice of one price fits all does not indicate the true value of the different types of water. In the future fixed and variable pricing schemes are more likely to be used to discourage inefficient use of the more expensive stored water and to properly reflect the true cost of water provision. Water pricing alternatives along with establishment of a market, both short term and long term, are important economic instruments that can contribute to achieving greater efficiency of use.

This project investigates the range of water pricing options available and suggests an appropriate formula for the Central Plains Scheme. Water trading theory needs to be adapted to form the framework for an appropriate water market that suits the unique features of the Central Plains Scheme.

Emissions

The best way to achieve the greatest efficiency of output under a restrained emissions regime is to allow emissions trading. To achieve this agreement must be reached on an appropriate level of emissions for the total scheme area and allocate emissions credits on a pro rata basis across the area. Then a market can be set up which enables low emission operations to trade or transfer their unused credits to high emissions operations. In that way total emissions are capped but no one is necessarily restricted from carrying out high value land use options because of relatively high associated emissions levels.

This report investigates the options available in the area of emissions trading as best practice and determines the practicality of setting up an emissions trading/transfer regime connected to the water use agreement.

SFF Project Application

The SFF project application proposed that one of the key outputs would be;

"A workable example of water and emissions trading in NZ at a scheme level."

Milestone two of the project identified that water and emissions trading is an area where there is a gap in existing information.

Specification of the sustainability code of practice under milestone three suggested inclusion of (amongst others):

Water Efficiency Measures

- Consideration of water sharing / trading for both scheme design and operation needs.
- Evaluation of “saved water credits”.
- Consideration of incentives for efficient use eg: pricing / allocation.

Use of economic instruments to achieve efficiency of use.

- Water trading.
- Emissions trading.

This report addresses the issue of information gaps in this area and provides a background report to the project that;

1 Reports the range of market based instruments that can be used to encourage resource use and emissions efficiency.

2 Suggests the options for establishing markets to facilitate transfer that are adapted to the nature of the proposed Central Plains Water scheme.

3 Defines the possible range of efficiency benefits and costs that could be achieved under each option.

2 Market Based Instruments – Theory and Practice

Market based instruments (MBI) are seen as a tool to achieve sustainable resource use goals through the use of market signals rather than through explicit directives (command and control regulatory mechanisms). The international experience is that MBI are a next step tool when Best Management Practices are unable or inadequate to achieve the desired efficiency outcomes from resource use. Basically they work on the concept that they are able to efficiently encourage behaviour towards total efficiency goals through operation of a market. Markets work best when access to the resource is constrained or emissions are capped or restricted therefore there is a degree of scarcity of the resource. They also work best where there are significant differences in the individual's opportunity costs of resource use or emission reduction (significantly different values).

The following section briefly traverses the theory and practice behind the use of market based instruments and concludes that the use of tradable permits and the establishment of an efficient market are the most important issues in the context of a community based irrigation scheme.

It is important to distinguish between markets as allocation mechanisms and markets as efficiency tools. In the context of this report the discussion focuses on markets, trading and transfer as efficiency tools.

2.1 Theory

There are a number of market based (or economic) instruments that can be used to encourage behaviour towards the desired outcome of maximising resource use efficiency.

They include;

- **Pollution charges** which cover a range of taxes and user fees that have the impact of placing a cost on resource use. The aim is to discourage inefficient behaviour and provide an incentive to reduce waste and pollution. They can also have the purpose of raising revenue that can then be used for public good environmental protection.

- **Tradable / transferable permits or credits** can achieve allocation and movement of resource use rights by transfer between individuals who have different volume requirements and value the rights differently. In the case of water use some people may have a higher value use or a higher consumption requirement than others and are therefore prepared to pay to gain access to extra water. Similarly with emissions credits, some people may have operations that have either lower abatement costs or higher financial returns per unit of emission and are therefore prepared to pay others who have unused credits as a result of having low emission operations.

- **Market barrier reductions** are seen as a form of market based instrument as they involve the removal of barriers; be they legal, regularity or others to the market working efficiently. The most significant example of this is the establishment of a regulatory framework which strengthens the nature of the property right to water to enable trading to occur. The nature of the right that is to be traded has a large influence on the relative gains to be made through market trading.

- **Government subsidy reform** is another form of market based instrument as a number of subsidy programmes have the form of encouraging output or maintaining current management behaviour which may indirectly work against achievement of efficiency of resource use goals.

Overall the objective of each option is to incorporate resource use values and resource use efficiency thinking into the individual business decision making process at the individual enterprise level as well as at the total resource use level.

The **Advantages** of market based instruments are seen as:

- They have the potential to reduce the overall cost of achieving a certain level of environmental outcomes because they drive resource use to the most efficient outcome economically by allowing individuals flexibility to strive for efficiency.

- They stimulate the rapid development of innovation in resource use technologies or management practices that reduce use below regulatory standards. This advantage is driven by the response of resource users to understanding the value of the resource that they are using and therefore having an economic imperative to maximise the return from the resource. In command and control systems the achievement of the regulatory standard is seen as a satisfactory end point and when it is reached there is no incentive provided to continue development of innovation or achieving further levels of resource use efficiency. .

- Some of the market based instruments are able to raise revenues which can then be used to achieve environmental outcomes through investment in mechanisms outside the market.

The most significant potential advantage for MBI is their ability to drive efficiency gains on an ongoing basis. As one level of output or emission reduction is achieved there is always incentive to continue to improve therefore the gains can be dynamic or ongoing.

The major **Disadvantages** of market based instruments are seen as:

- There is potential for establishment of monopoly power over a resource if a single person or group of people are able to gain market dominance and influence the conduct of the market through volume or price control. There are however mechanisms available in market establishment that are able to reduce or minimise any potential for this.
- Some MBI can create uncertainty over costs and force a level of costs on some users that they cannot afford.
- There is a danger that extra transaction costs at the individual and market level can be greater than the costs of the efficiency gains they are designed to achieve. These can occur if instruments are designed so that administration and compliance costs of the scheme are high.
- The degree of uncertainty around the outcomes achieved through the use of MBI and the concern that they may not guarantee attainment of the objective is a significant reason for some regulators to be unsure of the effectiveness of the use of MBI. Markets are not perfect in their operation at all times and therefore are not deemed to

be appropriate in situations where there is little latitude for variable performance over time or when dealing with intractable or difficult environmental issues.

There are a number of evaluation criteria that can be used to test the performance of MBI or their potential to be used in specific situations. They involve assessment of:

- **Environmental effectiveness**; which has elements of assessing the relative costs and benefits of measures in terms of the environmental outcomes to be gained. Where the instrument relies on resource user's engagement and responses to the market signals there is a need to incorporate parallel programmes such as technology use, regulations and / or education. It is difficult to separate the effectiveness of those aspects alone from those that can be attributed to the MBI itself.
- **Economic efficiency**; the concept of the use of MBI as opposed to command and control mechanisms is that they achieve the same results at a lower overall cost.
- **Administrative and compliance costs**; the lowest level of acceptable administrative and compliance costs and their equitable distribution are an important consideration.
- **Revenue use**; as to whether any revenue raised is applied to furthering the environmental issue addressed by the mechanism or applied to other purposes.
- **Wider economic effects**; which include product prices, competitiveness, trade impacts, employment, income distribution, economic growth and the rate of innovation which all look at possible flow on impacts past the farm gate or area of interest.
- **"Soft" effects**: which report changes in attitudes, awareness and acceptability of resource use practices.
- **Dynamic innovation effects**; or the rate that instruments encourage the search and adoption of innovative responses to resource use issues are an important consideration.
- **Compatibility with existing institutions**; or how well the mechanism fits with existing legislation, institutional responsibilities and community expectations.
- **Community acceptance**; particularly where there are conflicting opinions on resource use in the community. Many MBI need to have public consultation, information and reporting elements to establish and maintain the public acceptance of the mechanism and its relative effectiveness.

2.2 Practice

Evaluation of the range of instruments available to a community irrigation scheme would indicate that establishment of a tradable / transfer regime for permits or credits is the most appropriate. All other mechanisms available require some form of institutional or legislative control over the resource use needs of the scheme. It is difficult to envisage a community scheme being able to impose resource use charges over and above the water supply costs or pollution charges on emissions. There may be a need for a community scheme to advocate for market barrier reductions if there was a need to do so to strengthen the property right to water. In most instances the right to water is held by the scheme parent body and not individual water users therefore the parent body only need the ability to establish property right frameworks within their supply and use agreements with users.

Case Studies

Water Trading – Murray Irrigation Limited.
Murray Irrigation Limited is a community irrigation company which holds a number of Water Access Licences which are share components of the available water resources in the Murray River. Land owners in the scheme area hold shares in the company which reflect their investment in the assets of the company and Murray Irrigation Water Entitlements which determine the proportion of the companies' access licence that is held. The water entitlement determines the annual volume of water that they are able to access as the water is available as a proportion of the total resource available in any one year not a fixed volume.

Water entitlements can be traded through a company managed Water Exchange which operates buyer and seller offer boards. Trades can be permanent transfers or for annual use of known volumes of water. Non landowners can own water entitlements. Shares can also be traded but must be connected to land within the area. A minimum amount of shares and entitlements (5 of each) is required to be retained by landowners selling shares or entitlements.

Although the majority of early trades went with land holdings the market is now seeing the movement of water entitlements separate to the transfer of land.

A study in 2000 identified that the majority of trades were temporary or annual trades. However analysis of permanent trades at that time indicated that trades were moving water to more efficient users. A much higher proportion of buyers were adopting high technology water management and application techniques on their farms than were sellers. This resulted in buyers having much higher irrigation efficiency ratios than sellers.

The study also showed that water was moved to higher value use. A high proportion of the water was used by the buyers to expand the area of high value use which would indicate that the buyers had sufficient water for their existing use. The movement was generally from pastoral and mixed cropping land to dairy farms and horticultural and process cropping uses. All of which produce a higher value of output per unit of water used.

It was also noted that some of the traded water was not previously used or underused by the sellers. This provided significant efficiency gains in total water use in that allocable water is being used or its designated purpose.

Overall the tradable water regime operated within Murray Irrigation Limited is a good example of a water market operating successfully and achieving the theoretical efficiency gains possible.

Further information on Murray Irrigation Limited and its constitution, water trading rules and water market can be viewed at: www.murrayirrigation.com.au

Emissions Trading - California

The Grassland Drainage Area is an agricultural region on the west side of California's San Joaquin Valley. The agricultural land there is productive, but the soil contains a high level of selenium, a naturally occurring trace element. Selenium accumulates in the agricultural drainage water that collects in the tiles installed to drain excess water from the fields.

In 1996 several irrigation and drainage districts formed the "Grassland Area Farmers," a regional drainage entity that includes some 97,000 acres of irrigated farmland.

The group **voluntarily** entered into a Use Agreement with Reclamation, incorporating monthly and annual selenium load limits. A procedure was included in the Use Agreement to assess incentive fees if the monthly or annual load limits were exceeded. In addition, a maximum cap was established on the total amount of selenium that the Grassland Area Farmers could discharge.

To meet the selenium load limits, the Grassland Area Farmers have implemented a wide variety of practices, including formation of a regional drainage entity, newsletters and other communications with the farmers, a monitoring program, an active land management program and tiered water pricing.

The Grassland Area Farmers developed and adopted a "tradable loads" program to help achieve regional water quality targets. To date, pollution trading policies have been designed for trades between point sources, such as factories, and trades between point sources and non point sources, such as farms. This project is unique in that it also establishes a trading program between non point sources.

Under the tradable loads program, the total allowable regional selenium load is allocated among the member irrigation and drainage districts. The districts can then either meet their load allocation or buy/trade selenium load allocation from other districts. The theory is that the region will meet its selenium load target at the lowest possible cost because reduction measures will be taken where they are cheapest to achieve. In addition, the program encourages innovation by bringing selenium reduction decisions to a more localized level. Finally, the tradable loads program aims to distribute the costs of selenium discharge reduction equitably among the districts.

Environmental benefits

The environmental benefits of the project to wetland areas, including state and federal refuges, are significant. Drainage water has been removed from more than 93 miles of conveyance channels, allowing for delivery of fresh water to the wetland areas. Good-quality water from areas upslope of the Grassland Drainage is now separate from selenium-contaminated drainage water and can be put to use in the Grassland Water District and in the state and federal refuges.

Compared to data on pre project conditions observed in 1996, year 2000 data reflect that drainage volume has been reduced 41 percent; selenium load, 54 percent; salt load, 29 percent; and boron load, 14 percent. With the exception of the very wet year 1998, data

show a continuous reduction in selenium discharge since 1995. Selenium loads in 1999 and 2000 were the lowest ever discharged from the drainage in the past 15 years.

Other related efforts

In addition to providing local water quality benefits, this project provides valuable insight for controlling agricultural non point source discharges elsewhere. Through a combination of quantitative discharge limits and economic incentives, a model that provides for direct accountability within a system that is locally controlled is emerging. In the long term, the use of economic incentives might enhance implementation by promoting cost-effectiveness and preserving farmers' flexibility to choose the most appropriate pollution reduction practices.

The theoretical constructs of the value of MBI's are well proven, however the key issue in making them work revolves around the practical issues related to **mechanism and or market design**. There are many examples of the use of MBI that have failed to achieve the expected efficiency outcomes as a result of flawed instrument design.

Therefore from a practical perspective there are a number of trading scheme design issues to be considered.

Experience shows that markets work best where;

- Scarcity of the resource to be used or limits to emissions.
- There is adequate knowledge within the market participants about issues relevant to the market, scientific cause and effect and the range of individual values around the resource use.
- There is a wide variety or range of opportunity costs related to resource use with clear economic benefits from movement or transfer within the market.
- The rules of trading are simple and transactions are easy to implement.
- There are a number of potential market participants. There is much discussion from overseas experience about "thin markets" and lack of trades or transfers in markets as a result of there being a small pool of potential players in the market.
- There is opportunity to increase total economic activity through trading as a result of purchasers being able to achieve a higher level of output or profit as a result of the trade than the seller.

The most significant impact on the success of an operating market is the degree of scarcity or exclusivity of access that is created around the resource that is available for trade.

Six main messages for market design.

- In the case of emissions trading enforceable emissions targets are essential for market development as is a clearly defined right to a volume or proportion of the available water resource to enable water transfer.
- A clear understanding of the market potential is necessary before commencing design.

- It is best to start from scratch and design the market from the bottom up. Although there is now a considerable amount of information around the operation of water markets from overseas it is best to learn from those examples but still start from scratch rather than try to transplant another system into a new area.
- The trading rules must be simple and unambiguous and the costs of trading transactions must be minimal.
- The rights to the resource must be underpinned with science which is fully understood through involvement of the participants in the market in education and training programmes.

The issue of enforceable emissions targets being essential is problematic for emissions trading schemes in New Zealand. Emissions' trading requires a cap or limit to be placed on total emissions and then some form of allocation process to equitably allocate rights to emit.

At present we do not have emissions targets that could be used as a cap for Nitrogen, Phosphorous, greenhouse gases or other water quality contaminants on an individual property or scheme wide basis (other than around the Central North Island Lakes). The caps can either be set by an external agency through a legislative process or by land owners through a voluntary agreement. For an irrigation scheme to adopt a voluntary agreement there would be the need to establish some form of "group performance contract" around emissions levels.

As we do not have the ability to measure or monitor emissions on an individual property basis any targets that were set are unable to be enforced. Therefore we cannot meet the two vital requirements; volumetric target setting and enforceability.

At present the concentration in activity in this area is a continuance of our scientific understanding of the cause and effects of emissions and development of our ability to model theoretical emissions profiles on an individual and catchment basis. Measurement capability is being concentrated at the catchment or sub catchment level. Once these objectives have been met then the possibility of market design to facilitate emissions trading becomes possible.

Consequently the majority of legislative responses to the issue of controlling emissions are to impose arbitrary levels of activity controls where there is a known link between the activity and the emission. Standard levels of activity controls are considered as second best methods of controlling emission therefore it is in land user's interests to move towards the state of knowledge and capability where the requirements of an emissions market can be met whether or not the market itself operates.

Some overseas experience suggests that markets should be designed and implemented in "baby steps". In some instances quite prolonged programmes designed to get all of the necessary ingredients in place before the market is operational are proving valuable in successfully encouraging market success. It may take some time for new entrants into a resource use scheme to become fully knowledgeable about the science behind and value of the resource along with how scheme operational aspects work and impact on them. In the interim period market activity or transfer will most likely be limited. Therefore there are some

important issues around the speed and nature of transition into a market regime that need to be considered as an integral part of market design and implementation.

This aspect points to necessary consideration of the role of the community scheme entity in market design and transition.

3 Options for Cental Plains Water

A community irrigation scheme such as CPWL, as a community with common interests, is an ideal environment to establish trading markets however there are a number of issues to consider in relation to both **establishment** of a market and **successful transition** into an effective market.

This section of the report is based on information and understanding gained from workshoping the issues outlined in the previous section with a group of consultants with knowledge of the CPWL scheme and with a group of Ritso members who are also shareholders in the scheme. As part of that exercise the practical issues related to transfer and shareholder view of the value of establishing a market trading regime were established.

It is difficult to resolve a number of the issues that should be resolved or make much progress in discussion of specific market design issues because of the stage of design and understanding of the CPWL scheme. Much of the scheme detail is still at the conceptual design phase or is not sufficiently detailed to be able to progress to the detailed design stage. However there is much to be learned in terms of issues to be considered as part of choice issues in relation to establishing markets in the future.

3.1 Water Trading

The following table gives an overview of the state of the important issues to be considered and is followed by discussion around the state of play of the issues where appropriate.

Issue	State
Pre requisites for a successful market.	
Scarcity of the resource.	✓
Adequate participant knowledge	**X**
Range of opportunity costs	**?**
Simple trading and transfer implementation.	**?**
Number of market participants.	**?**
Opportunity to increase economic activity.	✓
Issues for Market Design	
Enforceable volume restrictions.	✓
Understanding of market potential.	**X**
Start from scratch.	✓
Simple rules and low transaction costs.	**X**
Rights underpinned to science.	✓
Education and training programmes	**X**

Market pre requisites.

The strong economic drivers for a successful market are in place with scarcity of the water resource and an opportunity to increase economic activity. However there is uncertainty around the potential range of opportunity costs, the degree of implementation possible and the potential number of participants in the market.

The feedback from the workshops indicated that the level of participant knowledge or interest in a transfer market was very low and has therefore been rated as inadequate at present.

The prospectus issued to attract initial shareholding by water users in the scheme lays the basis for the essential institutional framework for water trading in the scheme by establishing conditions and rules around specification of the volume of water entitlement, transferability of shares, licensing the rights to water and the condition that no rights to water can be exercised unless the shareholder has entered in to a water use agreement with CPWL.

Although some of the elements in the water use agreement are specified as to registration of securities etc there is no detail as to other elements of the agreement that will set the Best Management Practices required of water users in order to meet the sustainability and efficiency requirements of water use within the scheme.

Other parts of this project are establishing the range of possible Best Management Practices that may be included as part of the water use agreement.

At this point it is expected that water use charges will be equalised across water users with the majority of water having a high fixed cost component in the water charge related to the capital costs of scheme development. The variable costs related to actual water storage and delivery on a volume basis are expected to be a very small component of annual water charges and are expected to be equalised over the total scheme. Therefore the lack of variable water costs limits the ability of “saved water” or “trade back to the scheme” initiatives achieving efficiency gains at the scheme level. Once the capital component of scheme development has been paid back then water charges are expected to reduce to a level where variable delivery costs may be a more significant component of water charges.

The high degree of reliability of water within the scheme may have the impact of lessening the demand for or likelihood of short term water transfer in most seasons. However in the seasons where water reliability is compromised there would be demand from high value users for partial trading of water in order to ensure water reliability. The likelihood of demand for medium term transfers will occur as enterprise mixes change on farm as a response to market fluctuations or farming practice. For example a high value, high water dependant arable crop such as potatoes requires a long land retirement period between crops to avoid disease build up problems. This means that potatoes are grown on leased land on an annual basis in order to expand the available pool of land for the crop so the location of this crop within the scheme area will change over time.

The other driver of temporary or partial trades would be the introduction in the future of land uses that have different annual water volume or seasonal water use profiles than those envisioned at the time of scheme design which has a “one size fits all” volume entitlement.

Another potential future source of water transfer demand would be integration or substitution of scheme water with other sources in the catchment. It could be feasible that demand for scheme water could come from groundwater irrigators who are experiencing higher water access costs or unreliability of supply from their existing source.

Market Design Issues

The only market design issues in place at present are in relation to definition of the right to be traded. Trading rules, understanding of the market potential and education programmes are not sufficiently detailed for successful design to be carried out at present.

The prospectus allows for and establishes the rules and procedures for permanent trades of water through the transfer of shares. It is generally thought that permanent transfer of water is unlikely once land owners have invested in the capital cost of irrigation infrastructure on farm as this creates an imperative to recover those costs through irrigation over a long period of time. However it is feasible that there may be demand for permanent water trades in the future once the capital investment in development has been recovered and / or when there is a sufficiently large differential in water values between users to encourage the trade.

The shareholder has the ability to licence the rights to water to a third party subject to Board approval as to desirability and feasibility of the licence. This opens the opportunity for temporary (short or medium term) or partial trading and transfer of water. Uncertainty as to the capability of the water distribution system to allow temporary and partial transfers means that at this point the practical aspects of this occurring is unknown. However consideration of the future ability to transfer water within the scheme command area should be part of distribution scheme design.

One issue that will need to be resolved is whether CPWL will wish to operate the market or whether it will be left to a third party. If the institutional framework allows for trading and transfer to occur then theoretically trading can occur privately with buyers and sellers advertising their wishes either formally or informally.

Experience from the Australian trading experience indicates that in order to achieve a high degree of transparency and knowledge about the degree of activity in the market and the values that water is being traded at that a web based on line register listing parcels offered for trade (sometimes specifying the asking price) and recent sale volumes and prices has a large effect in facilitating trading interest. In some instances the company itself manages the market in others third parties manage the water market with commissions on transactions.

Transition Issues

Assessment of the issues to be considered would indicate that if CPWL do wish to establish the ability to transfer and trade water then there is a significant amount of preparatory work that could be done to facilitate participant knowledge and understanding the potential of the market through education and training programmes.

For the market to work well in terms of achieving efficiency there is a need to address the issues of having all water users informed as to the value of water to be traded. There are a number of mechanisms and tools that the scheme could encourage the use of amongst water users to establish “value thinking” amongst water users. Value thinking can be achieved through encouraging water budgeting and economic efficiency measuring and monitoring.

Annual water budgeting allows water users to calculate their expected annual water use profile on a monthly basis and then regularly update their budget through water use measurement data to compare their actual use against the budget. In this way water users can determine during the season whether they are likely to exceed or under use their annual volume entitlement. This will indicate whether they are likely to be in a position of being potential sellers or buyers of water and at what stage of the season any deficit or surplus is likely to occur. This information could also be of use to scheme management.

Economic efficiency measuring and benchmarking encourages water users to calculate the value of water in their production system through calculating performance on a volume of water used basis. Economic efficiency measures can be at the production or output level (Kg Milksolids / m^3 Water) as well as at the financial level (Gross Farm Revenue / m^3 Water).

If water use information is recorded on a paddock scale then comparisons of water value can be done on an enterprise scale. If there is no difference in enterprises on the farm then simple whole farm water use data can be used to calculate water value for the total system.

In order for farmers to fully understand the value of water in a trading system they should have the capacity to calculate the marginal value of profit made per unit of water used. In this way they can compare whether the extra profit that they can make from the use of a unit of water in their system is greater or less than the value of that water in the market. In that way they can determine the opportunity to them of increasing financial performance by entering into a trade either as a buyer or seller.

Farmers can be encouraged to improve efficiency of water use through the use of this information without having to enter into a trading position. Benchmarking efficiency measures across farms can encourage farmers to seek higher efficiency of use through comparison of their performance against other water users.

If CPWL seek to achieve efficiency gains in water use, either with or without a water market, they should consider facilitating the establishment of an economic efficiency measuring and monitoring system with capability for water users to compare or benchmark their results across as wide a cross section of scheme water users as possible.

3.2 Emissions Trading

The following table gives an overview of the state of the important issues to be considered and is followed by discussion around the state of play of the issues where appropriate.

Issue	State
Pre requisites for a successful market.	
Scarcity of the resource.	X
Adequate participant knowledge	X
Range of opportunity costs	?
Simple trading and transfer implementation.	?
Number of market participants.	?
Opportunity to increase economic activity.	✓
Issues for Market Design	
Enforceable volume restrictions.	X
Understanding of market potential.	X
Start from scratch.	✓
Simple rules and low transaction costs.	X
Rights underpinned to science.	X
Education and training programmes	X

Market pre requisites

Other than the theoretical assumption that there would be the opportunity to increase economic activity if emissions were able to be transferred we do not have any of the pre conditions for market establishment. Fundamentally there is no property right to emit that could be transferred.

This lack of a property right could be overcome if the scheme was willing or able to enter into a voluntary group performance contract and then allocate theoretical rights or performance standards within the group scheme. It is most likely that because of the complication that scheme member's properties are interspersed throughout the catchment with non scheme members who are also emitters, there would need to be a catchment wide agreement rather than a scheme wide agreement.

Despite the theoretical ability of the scheme to create an emissions right there are significant barriers and uncertainty around the level of participant's knowledge, and the other pre requisites for a successful market that it would be unlikely to be able to attract sufficient participant activity to operate successfully.

Market Design Issues

Apart from having a clean slate to work from, none of the issues are in place for market design to proceed or be successful.

Transition Issues

Development of the best practice component of this project will be establishing activity based methods of addressing important emissions issues. It is expected that over time the barriers to the setting of emissions caps or targets and establishment of emissions transfer capability

will be addressed through these channels. This will occur through improved understanding of the underlying science, measuring and monitoring capability through the education programmes and engagement of land users in consideration of how land management and system practices impact on emissions from their systems.

This activity could be considered as taking the baby steps necessary to move towards the ability to establish emissions rights and emissions transfer capability.

Bibliography

The references listed in this bibliography are the major references that assisted in informing this report. The full literature review identified a large body of work in this area, much of which concentrates on adopting the use of market based instruments to natural resources policy goals and the provision of ecosystem services.

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