



# **A Cross-Sector and Cross-Country Review of Approaches to Transitioning to Markets**

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Final Report for the Environment Agency

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**Appendix B. Summary of Long-List of Options**

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## **Executive Summary**

The Environment Agency (EA) is working with the Department for Environment, Food and Rural Affairs, the Welsh Government, Natural Resources Wales and Ofwat to develop proposals to reform the framework for water abstraction in England & Wales. The current framework is felt to have a number of shortcomings. One concern is that trading of abstraction rights has not been easy. The reforms currently being contemplated include promoting a more market-based approach to water abstraction management. However, stakeholders have concerns about the possible consequences of reforms designed to make trading easier. One concern is a fear that larger abstractors – particularly water companies, but also power plants and other industrial users – could dominate the market. Another concern is the potential role of non-users (i.e. those that may not want to abstract themselves, but that may nonetheless wish to participate in markets for abstraction rights) and their effects on users.

Within this context, the EA commissioned NERA Economic Consulting to review the experience of transitions to market-based approaches in selected other sectors and countries. This review takes the form of case studies. The purpose of the case studies is to draw lessons from the experience of transitioning to markets in other sectors that may be relevant for water abstraction.

### **Case Studies**

A long-list of options was developed following discussions with experts in a variety of industries and geographies, as well as from suggestions by the Steering Group. Options were short-listed on the basis of their potential relevance to water abstraction in England and Wales. Features of water abstraction that influenced the selection of case studies include: dependence of water availability on environmental factors; seasonality of water availability and demand; the sharing of abstraction resources between users; significance of location for the value of abstraction rights; importance of how water is used; and the potential for a water resource to be exhausted if not managed.

A total of 17 options were included in the long-list. Following discussions with the project Steering Group, the following case studies were selected:

1. Individual transferable quotas (ITQs) in fisheries in New Zealand.
2. ITQs in fisheries in Iceland.
3. Trading of airport slots in the United States.
4. Emissions trading in the European Union (EU ETS).
5. Tradable gas transport capacity rights in the United States.
6. Measures to improve liquidity in the market for spot electricity price hedging instruments in New Zealand.

## **Lessons for Water Abstraction**

### ***Success of markets in achieving objectives***

The case studies reviewed cover a wide range of experiences of transitions to market-based approaches in sectors where either markets did not previously exist, or where reforms were introduced to improve the way markets functioned. In many instances, the introduction of markets has helped to promote the underlying objectives of the reforms introduced. Examples include the success of ITQ systems in managing stocks of fish, the contribution of tradable gas transport capacity rights to development of competition in the US natural gas industry, and improved liquidity in markets for electricity price hedging instruments contributing to competition between electricity retailers and in providing improved signals for investment. In the case of secondary trading of airport slots, some challenges have been encountered but the removal in some airports of reforms allowing secondary trading led to significant increases in delays.

Key contributors to the successful introduction of markets in other sectors include: clarity in the legislative framework, particularly with respect to recognising the ability of participants to trade; the careful definition of rights; transparency; provisions to mitigate unintended consequences; and where required, measures to facilitate and encourage trading. In some of the sectors reviewed, subsequent reforms have been required where the initial provisions overlooked some of these aspects. We discuss the experiences in more detail below, and identify potential parallels with water abstraction.

### ***Gradual transitions to markets***

Transitions in other sectors have typically occurred gradually, providing an opportunity for lessons to be learnt before more widespread reforms are enacted. For example, the introduction of emissions trading in the EU has occurred in phases, including an initial pilot phase. Over time, the scheme has been expanded to include more sectors, and the approach to allocating allowances has changed. Likewise, fishery ITQs have typically been expanded over time to cover a greater number of species, typically beginning with species of greatest economic importance or those whose stocks were most threatened. In water abstraction, a gradual transition to more market-based approaches could take the form of trialling reforms: in a limited number of catchments; to cover a sub-set of users; or trades applying only for specific time periods. Moreover, different approaches could be tried in different catchments.

However, it is important for the advantages of a gradual introduction of reforms to be offset against the uncertainty this may create. The gradual phasing in of reforms can also lead to speculative activity in anticipation of the reforms being expanded. This occurred in fisheries in Iceland where the initial exclusion of small vessels from the ITQ framework led to a dramatic increase in the number of such vessels, partly motivated by an expectation that such vessels would be granted valuable fishing quotas once they were eventually included in the framework.

### ***Defining rights that can be traded***

A key prerequisite to introducing a market-based approach in other sectors has been to establish clearly defined property rights, accompanied by a statutory framework that

recognises the ability to trade such rights. The experience of defining rights in other sectors – in particular, the challenges encountered – provides some lessons that are relevant to water abstraction, including:

- the unbundling of rights – which, in the context of water abstraction, includes the separation of long-term entitlements and short-term allocations – can help to reduce transaction costs. This has been the case in US airport slots and fishery ITQs. In airports, the distinction between a slot holder (i.e. long-term entitlement) and slot operator (short-term allocation) has meant that short-term leases occur without the need to formally change titles for the long-term right. This has been cited by users as reducing the administrative and legal costs associated with leases.
- the variability of water availability (and the difficulty of predicting it) means that a framework in which entitlements are defined as shares rather than fixed quantities reduces the risk to the government from needing to intervene to adjust the total available for use. The risks associated with defining entitlements in terms of fixed quantities are illustrated by the experience of New Zealand fisheries, where the framework meant that the government faced the prospect of buying back costly entitlements when it overestimated the available stock of fish.
- advance thought is required to capture the complexities of water abstraction when defining rights – particularly with respect to how water is used (i.e. whether it is consumptive) and the return of water (for example, where and when). The importance of the completeness of the rights definition is illustrated by the experience of US airport slots, where the definition of slots was limited only to the right to land or take-off, and did not entail access to other parts of the airport’s infrastructure. The need to negotiate access separately was felt to have acted as a barrier to entry.
- to which agents or objects should the rights be attached in water abstraction – for example, whether rights should be held by users or land owners – also requires attention. The experience of Iceland’s fishery ITQ, where rights were allocated to vessels (and therefore vessel owners) rather than to the fisherman who used such vessels, highlights the issues that can emerge with attaching rights. This led to cases where vessel owners sold their rights and required fisherman using their vessels to purchase quotas from the market.

### ***Choices about allowing non-users to trade***

The role of non-users in markets for water abstraction rights in England and Wales is a source of stakeholders’ concern, who have cited the potential for non-users to engage in “speculative activity”. In many of the case study sectors, non-users have been allowed to acquire rights. The experience of this has generally been positive. Examples of the roles of non-users in other sectors include:

- the involvement of financial institutions, which has allowed firms to use rights holdings as collateral to fund investments (for example, in US airports slots and in fisheries in both New Zealand and Iceland);
- the involvement of special interest groups such as small communities in the case of airport slots or environmental groups in the case of emissions allowances, wanting rights to meet their own objectives; and

- the role of market intermediaries in enabling markets to function more efficiently – for example, in emissions trading in the EU, and in the market for spot electricity price hedging instruments in New Zealand.

### *Concerns over market dominance*

Another concern raised with the EA by England and Wales stakeholders in the context of water abstraction reforms is that competition for licences could be “dominated by water companies and unfair to others”.<sup>1</sup> In some of the other sectors reviewed – for example, US airport slots and fishery ITQs in Iceland and New Zealand – there was an increase in the market share of the largest organisations after markets were introduced. We note, however, that the increasing share of larger firms has also been interpreted as reflecting improvements in efficiency.

In other sectors, concerns over the rights market being dominated by larger companies have led to mitigating measures being adopted. In the case of New Zealand fisheries, restrictions were placed on the maximum share of individual companies, with exemptions made on a case by case basis. In water abstraction, where it is not clear how widely each rights market would be defined, many local catchments would have large and perhaps dominant players. In both US airport slots and in US gas capacity release markets, proposed mergers have sometimes resulted in forced divestures. In water abstractions, certain types of trades – for example, those that would lead to a market share above some threshold – could be made conditional on provisions to mitigate the effects of dominance. Such provisions can include ensuring that water is made available to other users, including new entrants, by the dominant firm.

The ring-fencing of rights holdings has been suggested to the EA by stakeholders in water abstraction, with the aim of “protect[ing] economically weaker sectors”.<sup>2</sup> Ring-fenced rights holdings, or related restrictions that segment the market between different types of users, have been used in: US airports slots (where distinctions have been made between commuter and other domestic slots); Iceland fisheries (where small vessels were initially excluded from the ITQ system); and New Zealand fisheries (where Maori fisherman were ring-fenced from commercial fisherman). The experience of ring-fencing in other sectors highlights some of the challenges associated with this approach, including:

- reduced market efficiency: Ring-fencing may lead to a loss in efficiency if there are any gains possible from trading between ring-fenced groups. This has been the case in US airport slots, although this was partly a consequence of the way in which the ring-fence was imposed;
- unintended consequences: The exclusion of smaller vessels in Iceland led to an increase in their use, which in turn undermined the ITQ framework because all users – regardless of whether they were included in the ITQ – relied on the same shared resource. Water abstraction similarly involves different users share water resources (i.e. use is

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<sup>1</sup> This concern is identified in the specification for this study.

<sup>2</sup> The specification for this study.



interdependent), and it is important for any ring-fence to avoid creating incentives for agents to act in ways that undermine the overarching goal of managing water resources.

A feature of water abstraction is that different types of abstractors are likely to have different abilities to pass through any higher costs of abstraction to their customers. A similar situation was observed in the EU ETS, where firms that did not face international competition (for example, power plants) were perceived to have greater ability to pass through costs than those that operated in internationally competitive markets (for example, aluminium or paper). This led to different approaches to allocating emissions allowances, with firms that had more limited ability to pass through costs receiving a greater share of their emissions allowances for free. The use of this measure reflects the underlying rationale of the EU ETS, which is to reduce global emissions. In the absence of mitigating measures, emissions from sectors facing international competition might instead occur in other countries. In water abstraction, this seems much less of a concern, and the regulation is much more developed, so the prospect of firms that do have the ability to pass through costs acquiring a greater share of the underlying resource may well reflect an efficient outcome. Nonetheless, there may be other reasons for wanting to avoid effects on firms that face greater product market competition, which may warrant mitigating provisions in water abstraction.

Additionally, the interaction between a water company's activities in the abstraction rights market, which generally are not expected to be regulated, and its activities in downstream regulated segments will require attention, particularly in catchments where water companies have a large share of the market. One type of interaction is how abstraction costs are allocated between a water company's downstream regulated and unregulated businesses. Ofwat has published clarification on current policy, including transfer pricing principles.<sup>3</sup> A related type of interaction is how abstraction costs are reflected in downstream *prices*. A potential concern, covered by competition law but which may benefit from clarifying regulatory provisions, is of the water company using a dominant position in the abstraction market to the benefit of its regulated downstream business. For example, in US gas capacity release markets, a firm (El Paso Natural Gas) that had a significant share of gas transport capacity in California was alleged to have withheld capacity during the energy crisis in 2000. Restricting capacity raised the price of natural gas, which was supplied by an affiliate of El Paso. This led to El Paso paying compensation to the parties affected, and agreeing to a capacity release programme.

### ***Provisions to facilitate entry***

A feature of other sectors is that specific provisions are often made to facilitate new entry. Examples of such measures include:

- For the regulatory body to retain a share of entitlements for new entrants – for example, in US airport slots. In water abstraction, following the airport example, the regulatory body could retain a proportion of the long-term entitlement in a catchment, and offer preferential access to short-term allocations to smaller or new users.

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<sup>3</sup> Ofwat (2013), Regulatory Rules Affecting Water Companies in a Future Abstraction Regime, March 2013

- The provision of information to market participants, which can help to reduce transaction and search costs for smaller firms. Such measures, used in many of the sectors reviewed, include creating searchable databases of rights holdings, and setting up trading bulletin boards as well as electronic exchanges. These measures could be used in water abstraction, both with a view to facilitating entry and to ensure that market arrangements are transparent.

### *Policies to foster market liquidity*

One of the aims of the reforms being considered in England and Wales is to increase the level of trading in the abstraction rights market. The experiences of introducing trading in other sectors provide examples of how market liquidity can be improved. Measures used to improve market liquidity, and which may have a role in water abstraction, include:

- use of standardised products: These were introduced in New Zealand to improve liquidity in the market for spot electricity price hedging instruments. In water abstraction, standardised contracts for certain types of trades – for example, short-term use rights – could help to reduce the administrative and legal costs associated with such trades, particularly for smaller participants.
- provisions for flexibility in trading, so that in cases where the requirements of the buyers do not exactly match the rights available for sale, it is possible to alter the terms of the trade without a full regulatory investigation. This flexibility can be provided by a coordinating body, which plays a similar role to US pipeline owners in gas capacity release markets. More complex trades in water, involving several parties and different types of use may continue to require more substantial regulatory oversight.
- forcing transactions through the allocation mechanism: An approach that is used in other sectors, although typically not with the sole aim of improving liquidity, is to require users to purchase all or part of their allocations. Examples of such approaches include: emissions trading in the EU ETS, fisheries in Chile, and reforms contemplated for US airport slots. In water abstraction, a possible option would be an obligation for abstractors to offer a proportion of their rights for sale. Following the New Zealand experience in the market for hedging instruments, such a “market-making” obligation could be placed on the largest abstractors.

## **1. Introduction and Background**

The Environment Agency (EA) is working with the Department for Environment, Food and Rural Affairs, the Welsh Government, Natural Resources Wales and Ofwat to develop proposals to reform the current framework for water abstraction in England & Wales. The reforms include promoting a more market-based approach to water abstraction management. At present, water abstractors need a licence to abstract water. Features of the current licence regime include:

- length: newer licences have time limits and are renewed following a review. Older licences are typically permanent.
- conditions of use: licences specify the amount of water that can be abstracted, where it can be abstracted, and how the water can be used – differentiating, for example, uses that are consumptive from those that return water directly to the watershed;
- trading: licences can, in theory, be traded. However, trading is time consuming and is subject to regulatory oversight. A trade requires a seller to relinquish the licence to the EA, and for the buyer to apply to the EA for the relevant licence. During this process, the EA will reassess the conditions of the licence as if it was a new application, and may make amendments to the licence terms.
- environmental limits: in many licences the EA has the ability to restrict the amount of water that is abstracted by enforcing so-called Hands Off Flow (HOF) conditions – if the level of water available falls below a threshold, no further water can be abstracted.
- charging: a relatively small charge is imposed on licence holders (linked to the amount that they are entitled to abstract, rather than what is actually abstracted). This charge is intended to cover the EA’s administrative cost (rather than reflect the marginal cost of the water), and also contributes to a compensation fund that the EA uses when it has to revoke or amend licence for environmental reasons.
- entry: areas are divided into catchments by the EA. Catchment plans reflect the interdependence between the amounts of water available in different parts of the same area (e.g. extracting water upstream limits the amount of water available downstream). The EA assesses licence applications and if catchment plans suggest that a new licence cannot be issued without adversely affecting existing licensees, it will not issue a new licence.

The current system is felt to have a number of shortcomings. A significant concern is that licence trading has not been very easy. One impetus for reform is environmental concerns – as water becomes scarcer, the more efficient use of water rights becomes more important. However, stakeholders have concerns about possible consequences of reforms to make trading easier.

Within this context, the EA commissioned NERA Economic Consulting to review selected experiences of transitions to market-based approaches in other sectors in different countries. This review takes the form of case studies. The purpose of the case studies is to draw lessons from the experience of transitioning to markets in other sectors that may be relevant for water abstraction. We have focussed particularly on “transitions” – i.e. steps or adjustments made to help the change avoid poor outcomes or foster good outcomes - rather than the broader

experience of liberalisation itself. As part of our review, we have also considered whether there are lessons from other sectors to inform the use or development of supporting mechanisms that assist in the process of liberalisation and enhancing competition.

## 2. Selection of Case Studies

### 2.1. Nature of Envisaged Reforms and Current Concerns

We understand that details of the abstraction reforms are currently being considered by the EA DEFRA, the Welsh Government and Natural Resources Wales. One objective for the reforms is for trading to be easier. Trading in the context of water abstraction could in future include both the trading of long-term “entitlements”, as well as of shorter term “allocations” (which can be for varying times).

Some stakeholders – particularly farmers – have expressed to the EA and Defra concerns over the introduction of a market-based approach to water abstraction. One concern is a fear that larger abstractors – particularly water companies, but also power plants and other industrial users – will dominate the market. A wider concern shared by other existing license holders is the potential role of non-users. Non-users (i.e. those that may not want to abstract themselves) could see water licences as a financial investment, or conservation groups could purchase licences to reduce overall water abstraction. The concern is that such non-users will behave as “speculators”, driving up prices and / or creating undesirable volatility on which they might hope to capitalise.

We examined case studies to see how transitions had helped in introducing reforms in general, including helping with the concerns expressed.

### 2.2. Key Features of Water Abstraction

Features of water abstraction that influence the choice of case studies include:

- dependence of water available for abstraction on environmental factors;
- interdependence between abstraction sources – potentially both within catchment and across catchments;
- significance of location for the value of abstraction rights – both within a catchment area (interdependence of the value of licences may be important) and across catchment areas (differences in environmental, demographic and economic conditions are relevant);
- importance of how water is used (for example, whether it is discharged to river systems);
- potential for a water resource to be exhausted if not managed.

### 2.3. Dimensions along Which Transitions Can Occur

Some of the dimensions along which a stepped approach or transition to a more market-based system can be effected are listed in the bullet-points below. They can also be thought of as the dimensions along which a developed market could facilitate trading:

- for trading to occur *intra*-firm initially, and then be expanded over time to inter-firm;
- geographic scope: begin by focussing sub-catchment, then expanding geographically, so that over time trades might even occur across catchments if suitable safeguards can be found and infrastructure is in place to move water;

- for trading to occur among type of users: trading may initially be permitted between certain types of users – e.g. farmers can trade only with farmers, and not with water companies or power plants;
- relative riskiness: allow trading to occur for the riskiest licences, or for trades to be limited to licences that are associated with a similar level of risk. Risk in water abstraction could mean interruptability; i.e. some licences may be subject to stronger HOF conditions, which are more likely to be triggered;
- distinction between duration – for example, initially restrict trading of long-term (possibly permanent) entitlements versus allowing the trading of short-term (e.g. annual / seasonal / weekly) allocations;
- type of firm: limit trading to abstractors only, and then (later) potentially allow third parties to be involved in trading;
- time: allow trading to occur only in specific seasons, or other period of time; or
- size of licensee: for example, ring-fencing the market so that trades occur between firms of a particular size only.

## **2.4. The Selected Case Studies**

A long-list of options was developed following discussions with experts in a variety of industries and geographies. The long-list also included options that were suggested by the EA in the specification for our work. A total of 17 options were included in the long-list. Details of these options are summarised in Appendix B below. Following discussions with the project Steering Group, the following case studies were short-listed:

1. Individual transferable quotas (ITQs) in fisheries in New Zealand.
2. ITQs in fisheries in Iceland.
3. Trading of airport slots in the United States.
4. Emissions trading in the European Union.
5. Tradable gas transport capacity rights in the United States.
6. Measures to improve liquidity in the market for hedging instruments based around the spot electricity market in New Zealand.

### **3. Summary of Case Studies**

This section includes summaries of the six case studies conducted. Detailed case studies can be found in Appendix A.

#### **3.1. Individual Transferable Quotas in Fisheries in New Zealand**

New Zealand's fishing sector is currently managed through an individual transferrable quota (ITQ) framework. The ITQ system allocates fisherman with quotas of fish that they can catch themselves, or trade with others. Separate quotas are set for the different species of fish covered by the ITQ. The current ITQ framework originates in reforms that were introduced with the Fisheries Act in 1983, and the framework has been subsequently amended on several occasions. The rationales for introducing an ITQ framework differed across inshore and deep-sea fisheries. In the former, it was primarily to address overfishing and overinvestment. In deep-sea fisheries, the reforms also aimed to increase the participation of New Zealand based companies in the sector. Although ITQ frameworks were introduced separately in the two types of fisheries, these were later combined. Moreover, over time, the ITQ framework has been expanded to include more species.

The current framework consists of permanent quotas specified as proportions of the total allowable catch (TAC). The TAC is set by the government each year, and yields the quantity of fish that is entailed by each fisherman's quota share. This differs from the original ITQ, which defined the quotas in terms of fixed quantities. The rationale for the initial arrangement was that the government believed that improved management would lead to an increase in the fish stock over time. It thus expected to benefit from revenues generated from the sale of additional quotas in the future. However, defining shares in terms of fixed quantities exposed the government to potentially large liabilities from having to buy back quotas in cases where it over-estimated the fish stock.

The initial allocation of quotas was based on historic catch levels. Restrictions required that companies have a minimum level of New Zealand ownership. However, quotas could be owned by non-users, and this has allowed quota holders to finance investments on the basis of the values of their quotas. Following the move to a system of shares defined as proportions, restrictions were also placed on the maximum share of a single company.

New Zealand's ITQ includes ring-fencing provisions for Maori fisherman. The separate provisions for the Maori reflect historical treaties with the Crown, which date from Victorian times. The arrangements put in place for Maori fisherman consist of transferring quotas to holding entities that represent different Maori tribes. Decisions to transfer rights to other Maori tribes or holding groups are subject to voting rules. Thus, the rights of Maori fisherman are subject to collective decision making. Only quota exchanges are allowed between Maori fisherman and commercial fisherman, with exchanges being defined as the trading of quotas of the same market value. Hence, trading provisions do not allow for the net reduction in quotas held by Maoris.

The introduction of an ITQ system in New Zealand is considered to have been successful at generating resource rents and ensuring biological sustainability. Stocks of fish are currently at or above the levels targeted by management for approximately 70 per cent of the types of fish regulated by the ITQ, and none of the fish stocks are at dangerously low levels.

Trading activity is significant. The majority of transactions during the 1990s were quota leases (between 30 and 40 per cent of available quotas). Sales of quotas over the same period were typically below 5 per cent of available quotas. The introduction of trading platforms has reduced variations in prices. A feature of trading has been the aggregation of quotas by dominant firms. This is reflected in the rising share of quotas held by the largest fisherman. There have also been efficiency gains, reflected in reductions in the number of vessels as well as the number of people employed and an increase in the volume of catches.

### **3.2. Individual Transferable Quotas in Fisheries in Iceland**

Iceland's fishing industry represents an important part of its economy. In 2011, the total catch of fish, shellfish and crustacean catches amounted to over 1.1 million tonnes, with a value of approximately £750 million. Fishing represents an export industry with 97 per cent of the catch exported. The value of exported marine products, many of which are processed prior to sale, was over £1 billion (total GDP in 2011 amounted to £8.76 billion).

Iceland's fisheries are regulated through an ITQ framework that has its origins in reforms introduced in the early 1970s. Over time, the ITQ framework has been expanded so that a greater number of species are now managed. The current ITQ framework was comprehensively set out in the Fisheries Management Act 1990. Features of the ITQ framework include:

- quotas are permanent, and defined as percentage shares of the total allowable catch (TAC). The TAC is set annually by the Ministry of Fisheries. The resulting allocation in terms of weight of catch permitted in any given year is referred to as the annual catch entitlement (ACE);
- quotas are attached to vessels. Initially (in 1983), only vessels weighing over 10 gross register tonnes (GRT) were included in the framework. Smaller vessels were permitted to fish as much as they wanted. This size restriction was reduced in 1990 to 6 GRT, and eventually all commercial vessels were included in the ITQ system in 2006-07;
- there are no restrictions on vessel ownership, so that non-users are allowed to acquire fishing quotas. This has allowed vessel owners to finance investments on the basis of the value of their quotas;
- the initial allocation of quotas was based on historical catch levels. Quotas are fully transferable, although restrictions were imposed on trading between firms in different geographies. However, this restriction has rarely been enforced;
- only up to half of any vessel's ACE can be transferred to another vessel in each quota-year. Moreover, since 1992, a vessel that harvests less than 50 per cent of its allocated quotas for two consecutive years forfeits its quota; and
- the total combined TAC share across all fisheries attributed to a given firm cannot exceed 12 per cent of the total value of the TAC.

The exclusion of smaller vessels from the ITQ framework led to a substantial increase in their use by commercial fisherman. The motivation from leaving smaller vessels outside of the ITQ was partly political, reflecting the importance of commercial fishing to communities in Iceland. However, the size of the catch by such vessels increased substantially, which



undermined the success of the ITQ. Over time, reforms led to smaller vessels gradually being brought into the ITQ. The prospect that such vessels would ultimately be allocated valuable fishing quotas also contributed to the increase in their numbers.

The allocation of rights to vessel owners rather than fisherman has proved contentious. Vessel owners do not always fish themselves. In some instances, such vessel owners sold their allocated quotas and required fisherman that operated their vessels to lease quotas from others. More generally, the distribution of rents from the way in which quotas were allocated has been a source of resentment. The allocation of rights to vessel owners has been challenged in courts by fisherman, with cases reaching Iceland's Supreme Court and the United Nations' Human Rights Committee. This in contrast to the experience in New Zealand, where rights were granted to fisherman and such issues did not emerge.

Despite these challenges, the stocks of all but one type of fish covered by the ITQ framework have been stable.<sup>4</sup> This was one of the main rationales for introducing the initial ITQ framework. Moreover, trading of quotas has been significant since the ITQ framework was introduced. Trading in annual quotas has been as high as 80 to 90 percent of the available quotas for some species. Trading of permanent quotas has also been significant, ranging between 10 and 20 percent.

### **3.3. Trading of Airport Slots in the United States**

The secondary trading of airport slots in the US was introduced through the Buy/Sell Rule (BSR) in 1985. The BSR built on earlier legislation – the High Density Rule (HDR) of 1969 – that imposed restrictions on the availability of airport slots at five congested airports. The rationale for HDR was to reduce delays. Access to airports in the US is typically unconstrained, and slots are offered to airlines on a first come first served basis. Deregulation of the aviation industry in the 1970s led to a substantial increase in the demand for airport slots, and secondary trading at high-density airports was introduced as a way to achieve a more efficient allocation of slots, and facilitate entry.

BSR put in place a clear legislative framework that allowed airlines to trade slots with others, including parties that did not themselves offer aviation services. The initial allocation of slots to airlines was based on grandfathering, with the regulator retaining 5 per cent of the available slots with a view to offering these through a lottery. A minimum share (25 per cent) of the slots allocated through lotteries was ear-marked for new entrants. Slots were subject to a “use it or lose it” rule, and relinquished slots were also offered through a lottery with a minimum share reserved for new entrants.

BSR retained the distinction between “commuter” and “air carrier” slots that was made in HDR. Commuter slots are for flights operated on smaller aircrafts, typically serving small regional airports, whereas air carrier slots are for flights operated on larger aircrafts that typically form part of the network of more established airlines. This distinction was designed to preserve operations to areas that would typically not be served by larger carriers for commercial reasons. It has, however, been regarded as inhibiting the efficient development of the market for slots, although this is partly the result of the way in which commuter and air

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<sup>4</sup> The stock of the species that suffered a collapse in 2009 has since recovered.

carrier slots were defined – the distinction was made on the basis of air craft size, and this was felt to be arbitrary. In practice, this led to the many commuter flights operating as feeder services to the network carriers, but using aircrafts that were smaller than they would have wanted.

Significant trading occurred in the year that BSR was introduced, and the number of transactions remained high in subsequent years. Trading was felt to have been facilitated by the distinction between slot holders and slot operators. This distinction simplified the legal process for temporary trades, as the exchange of operating rights did not require changes to the underlying title. US airlines have also noted the importance of a clear legislative framework in facilitating trade, contrasting it with their experience of slot trading in the EU. The lack of clarity in the EU framework is reflected in different interpretations of members, with some allowing secondary trading (UK) and others regarding secondary trading as illegal (Spain).

Allowing non-users to acquire slots led to financial institutions holding slots, and their holdings reached as high as 20 per cent of available slots in some years. The ability of financial institutions to hold slots has allowed airlines to finance investments against their value. Airlines have relied on the value of slots to overcome periods of financial strain – most notably after the events of 9/11. Other non-users who have taken advantage of the ability to own slots include small communities or regional airports to ensure that aviation services are offered to their areas.

The experience of secondary trading of airport slots has been mixed. Although a significant number of transactions have taken place, the share of slots held by dominant airlines has increased at high-density airports. Moreover, entry into the market has been felt to be limited. Reasons offered for consolidation by large airlines and lack of entry include:

- the definition of slots in the US is limited to the right to land or take-off at an airport, and does not cover the use of other parts of the airport's infrastructure. Hence, even if other airlines are able to secure slots, they still need to separately negotiate for access to other parts of the airport's infrastructure;
- entrants will typically require several slots to make services viable, and a substantial number of slots have rarely become available;
- the value of slots to larger airlines is higher because of network effects; and
- a lack of transparency in trading, with some airlines being unaware of the availability of slots.

Many studies have drawn different conclusions regarding the experience of consolidation of slots by dominant airlines and limited entry. Such studies have pointed out that there have generally been no instance of aggressive entry in the aviation industry as a whole, and thus the experience of limited entry at high-density airports is not unique. Moreover, many studies have suggested that the consolidation of slots by dominant carriers might represent an efficient outcome.

The BSR has been subsequently replaced at all but one of the high-density airports, with a mixture of different provisions to address some of its perceived weaknesses. The main reform replacing BSR was the 2000 Aviation Investment and Reform Act for the 21<sup>st</sup> Century

(AIR-21). This removed a lot of the high density restrictions, but led in many instances to significant delays. Since then, a number of reforms have been contemplated to build on the BSR framework. These reforms have included grandfathering a smaller proportion of slots to incumbents so that a greater is retained for new entrants, introducing a rolling mechanism whereby slots would need to be renewed every 10 years, and to improve transparency in trading through the advertising of potential trades on a regulator maintained bulletin board. These reforms, however, have not been enacted.

### **3.4. The European Union Emissions Trading Scheme**

The European Union Emissions Trading System (EU ETS) was established through EU legislation in October 2003 and began operation from the beginning of 2005. The market-based regulation was introduced to facilitate achieving emission reduction targets agreed under the Kyoto Protocol and to drive long term investment in both clean energy technologies and energy efficiency measures. The EU ETS applies to certain energy intensive users that have significant greenhouse gas emissions, initially covering over 12,000 installations and representing approximately 45% of carbon dioxide emissions across the EU.<sup>5</sup> The scheme places a cap on total emissions, and requires participants to obtain an EU emissions allowance (EUA) for each tonne of CO<sub>2</sub> emitted. Emissions allowances can be traded by firms.

Legislation was adopted by EU Member States in 2003 that set out three phases of the EU ETS starting with a pilot Phase I that ran from 1 January 2005 until the end of 2007. Phase II then mirrored the Kyoto first commitment period between 2008 and 2012. A third Phase was also established beyond the first Kyoto compliance period, set to run from 2013 until the end of 2020. The phased approach to designing and operating the scheme provided pre-established intervals for the regulator, the European Commission and national governments, to incorporate lessons learnt into amendments to the governing policy. However, one downside of the phasing was that it has created additional uncertainty amongst market participants regarding future features of the regulation.

In the first two phases of the EU ETS, each country was responsible for setting its own cap, which was then combined together into the total EU cap, subject to approval by the European Commission. Emissions allowances were allocated to installations covered by the scheme on the basis of grandfathering. Member States also set aside a pool of spare allowances to allocate to new entrants. Phase III of the EU ETS has replaced national caps by a single EU cap. Central allocation rules for handing out allowances are now determined also at the EU level. A feature of Phase III is a transition away from grandfathering to benchmarking and auctioning of allowances. New entrants are allocated allowances from a central reserve corresponding to 5 percent of all allowances. These are allocated according to technology benchmarks. Additionally, a portion of the reserve has been set aside to support investment in demonstration projects for innovative renewable energy technologies.

Participation in the market to trade pollution permits has increased significantly over time. The first bilateral trade of an EUA for future delivery was in February 2003, shortly before the official legislation was adopted by EU Member States. By 2004, still prior to the start of

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<sup>5</sup> The number of installations covered by the regulation has since reduced, but is still above 10,000.

the first compliance year, significant trading was carried out in the marketplace, largely via over-the-counter (OTC) transactions. In 2011 the total value of all transactions was almost \$150 billion.

The EU ETS currently covers over 10,000 emitting installations, and companies across sectors differ in their ability to pass through costs of emissions allowances – either actual costs or opportunity costs. In particular, power generators in the EU are subjected, almost solely, to competition from within the region as electricity cannot be easily transported across significant distances. As a result, the power sector has been able to pass through the majority of the allowance costs they incur from production. In contrast, firms operating in sectors facing international competition – for example, steel, cement, and aluminium – risk losing competitiveness, resulting in production shifting to regions not covered by the EU ETS, which means that the underlying goal of reducing emissions is missed. Recognising the potential threat of production relocation, the EU ETS has maintained significant proportions of free allocation in Phase III for sectors that were assessed to face international competition and that therefore struggle to pass through their increased costs successfully.

The EU ETS is also host to a wide range of third parties that are not, themselves, required to surrender EUAs, but instead offer brokerage and trading services, or participate in the market purely for arbitrage or profit making opportunities. The activity of third parties in the EU ETS market has served to increase liquidity. Brokers and banks have also offered their services to allow manufacturing companies, with limited or no trading background, to access the market and engage in risk management activities. Allowing third parties to acquire emissions allowances has also led to environmental groups purchasing such allowances to reduce the overall level of emissions. However, the value of the market has also encouraged some less positive participation. In 2009 evidence emerged that participants had been transferring EUAs between countries to commit VAT fraud.

### **3.5. Tradable Gas Transport Rights in the United States**

For many years, the US gas industry has been vertically separated into production, transportation, and distribution segments. However, until the mid-1980s all transactions were tightly regulated, resulting in an industry structure that was effectively vertically integrated. Deregulation in the gas industry was introduced through a series of reforms by the Federal Energy Regulatory Commission (FERC). These reforms aimed to introduce competition into different segments of the industry, and included decontrolling the price of gas.

To facilitate competition, FERC also introduced reforms in the gas transportation segment in 1992 through Order 636. These reforms led to the creation of a secondary market for gas transport capacity – the so-called capacity release market. The Order required the unbundling of up- and downstream activities of pipeline owners. Previously, pipeline owners carried gas belonging to themselves (among others), which was sold to customers (typically distribution companies) downstream. Unbundling required pipeline owners to sell their gas upstream so that only companies not affiliated to the owners would use the pipelines. Original customers of gas converted their right to buy gas downstream into (1) a right to buy gas upstream at pooling points; and (2) a right to use the pipeline to move the gas from the pooling point to the downstream delivery point.

Order 636 made provisions for firm shippers (“releasing shippers”) – i.e. those that own the right to move gas from the pooling point to the downstream delivery point – to sell pipeline capacity to others (“replacement shippers”) when they are not using it. Sales in the secondary market may transfer “firm” capacity, meaning that all rights transfer to the new user for some longer or shorter period. However, many sales are “interruptible”, meaning that the original holder has the option to take back the capacity when it needs it. In practice, this condition means that users who buy interruptible capacity retain it at all but peak times. Two types of transactions occur in the secondary market:

- prearranged trades, where releasing shippers enter into a bilateral transaction with the replacement shipper, possibly with the assistance of the pipeline owner; or
- open bidding, where the releasing shipper relies on an open auction for the sale of excess capacity.

Pipeline owners have a number of roles in facilitating liquidity in the capacity release market. These roles include: helping releasing shippers and replacement shippers to find each other; documenting transactions; collecting revenues from replacement shippers; and compensating the releasing shippers. To fulfil these roles, pipeline owners maintain electronic bulletin boards. For the purpose of transparency, pipeline companies also have to post the rate charged under each contract, the duration of the contract, the receipt and delivery points, the contract quantity, and any special terms or conditions. Pipeline operators must make this information available for download from their websites for 90 days and retain this information (to be made available on request) for four years. Finally, pipeline owners have the responsibility to accommodate any change in terms – for example, changes to receipt and delivery points – that the replacement shipper may require.

To address concerns over capacity owners acquiring market power following mergers, the competition authority – the Federal Trade Commission (FTC) – has often required the divestiture of capacity to competitors as a precondition for mergers. Another aspect of market dominance in the capacity release market is the operation of affiliated companies in different market segments. During the energy crisis in California in 2000, demand for natural gas increased sharply. The incumbent that controlled excess capacity in the area was alleged to have restricted capacity to increase gas prices, which would benefit its affiliate that was a major supplier of additional gas in the region. This led to compensation being made by the incumbent, and restrictions on how affiliated organisations operating in different vertical segments could interact with each other.

Since the reforms were introduced, a highly liquid capacity release market has emerged. In 2009-10, there were 30,000 releases, and released capacity in January 2013 corresponds to 1.3 annualised equivalent BCF/day (total natural gas consumption in the US in 2012 was 70 BCF/day).

### **3.6. Hedging Instrument for Spot Electricity Market Prices in New Zealand**

The electricity industry in New Zealand was liberalised in 1996. Liberalisation involved creating a wholesale market for electricity. The wholesale electricity market was compulsory, involving buyers and sellers submitting bids to determine the market clearing spot price of

electricity. Trading occurs at half hour intervals. A complimentary market for financial hedging instruments operates alongside the wholesale market. Such instruments provide long-term contracts to hedge the exposure of buyers and sellers to changes in the spot price.

When the spot market was first introduced in 1996, there was a relatively liquid market for the trading of hedge instruments. However, reforms in 1998 required the separation of electricity distributors and retailers. This led to electricity generators acquiring retailers, which provided electricity generators with a natural hedge against spot market price fluctuations: electricity sold by a generator at the spot market price could be offset against electricity purchased by that same generator's retailing business at that same price. As a result of the vertical integration of generators into retailing, the hedge market shrank substantially. Some over the counter (OTC) trading of hedge products did still occur, but the volumes traded were significantly below what they were pre-1998, and market liquidity was considered to be relatively poor.

The main rationale for improving liquidity in the market for hedging instruments was that it would facilitate more competition between electricity retailers: hedging instruments would provide retailers with the ability to mitigate exposure to spot risk and compete more effectively with others that had a generation portfolio that offset spot price risk. Moreover, a liquid market for hedging instruments would also provide pricing signals for future supply and demand conditions. These signals would help to provide an indication of where and when new generation investment may be required.

Following earlier unsuccessful attempts to improve liquidity, the government introduced a package of reforms in 2009. The main features of the reforms were:

- the provision of standardised tradable contracts. For example, contracts were for electricity traded in a three month period, and could cover periods up to three years in the future. Firms wanting more customised products could still obtain these through the OTC market;
- the creation of a clearing house. This provided a platform for the exchange of contracts, and the clearing house also acted as counterparty for trades (i.e. guaranteeing that contracts will be honoured). The clearing house role has been undertaken by the Australian Stock Exchange;
- a market maker requirement on the large generator-retailer companies. Details of how the market maker requirement would be fulfilled were left to the generator-retailer companies. The requirement was fulfilled by the companies simultaneously making bids to buy and sell futures contracts with a minimum price difference (initially 10 per cent, but later reduced to 5). The regulator had considered an approach where it would itself be involved in price setting, but this was considered to be less desirable than prices being determined through market forces; and
- the setting of targets for the level of trading, accompanied by the threat of regulatory intervention if such targets were not met.

Since the reforms have been introduced, there has been an increase in the level of trading of spot electricity price hedging instruments. Moreover, reviews by the regulator have noted that prices have been reflecting events that influence the short and long term outlooks for the supply and demand – for example, low levels of water storage in hydroelectric generation, or

developments in planning approval. Non-users (i.e. those that do not themselves participate in the generation or retail markets) have also been active in the market, with the regulator noting that “having speculators operating in a futures market is beneficial for all concerned”, because of the improvement in liquidity that results (particularly due to improvements in the process of price discovery).

One of the main objectives of the reforms was to improve retail competition. The introduction of the reforms has coincided with one new entrant in the retail market. The extent to which improved liquidity in the market for hedging instruments has contributed to this is unclear, but the new entrant has highlighted the importance of risk management tools. Competition between existing retailers has also improved, with reductions in incumbent market share in a number of regions. However, it is difficult to establish how much of this is due to the reforms.

## **4. Lessons for Water Abstraction**

The case studies reviewed cover a wide range of experiences of transitions to market-based approaches in sectors where either markets did not previously exist, or where reforms were introduced to improve the way markets functioned. The case studies offer several insights that are relevant to the reforms of the abstraction framework that are currently being contemplated by the EA. These insights provide examples of:

- key features of reforms that contributed to the successful development of markets, as well as challenges that were encountered and reforms undertaken to address these;
- the ways in which transitions to market-based approaches were gradually introduced;
- the experience in other sectors of some of the concerns raised by stakeholders in the context of water abstraction reform, along with steps taken to address such concerns; and
- the type of reforms introduced specifically to improve market liquidity.

### **4.1. Success of Markets in Achieving Objectives**

In many instances, the introduction of markets has helped to promote the underlying objectives of the reforms introduced. Examples include the success of ITQ systems in managing stocks of fish, the contribution of tradable gas transport capacity rights to development of competition in the US natural gas industry, and improved liquidity in markets for hedging instruments contributing to competition between electricity retailers and in providing improved signals for investment. In the case of secondary trading of airport slots, some challenges have been encountered but the removal in some airports of reforms allowing secondary trading led to significant increases in delays.

Key contributors to the successful introduction of markets in other sectors include: clarity in the legislative framework, particularly with respect to recognising the ability of participants to trade; the careful definition of rights; transparency; provisions to mitigate unintended consequences; and where required, measures to facilitate and encourage trading. In some of the sectors reviewed, subsequent reforms have been required where the initial provisions overlooked some of these aspects. We discuss the experiences in more detail below, and identify potential parallels with water abstraction.

### **4.2. Gradual Transitions to Markets**

In many of the case studies reviewed, transitions to market based approaches were undertaken gradually. Examples include:

- emissions trading in the EU ETS, which has been introduced in phases, including an initial pilot phase.<sup>6</sup> The different phases have seen the scheme expanded to cover a greater number of sectors, and changes to how emissions allowances are allocated; and

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<sup>6</sup> The wider history of emissions trading also provides an example of this kind of gradual transition, with the United States Environmental Protection Agency's local and company-specific netting and offsetting policies subsequently being expanded into much more comprehensive national emissions trading systems.



- ITQ frameworks in fisheries which have been expanded over time to include a greater number of species. Moreover, in the case of New Zealand, the arrangements for inshore and deep-sea fisheries were initially separate, reflecting different motivations, but were ultimately brought together in a unified framework.

The gradual introduction of reforms can provide an opportunity for lessons to be learnt before more widespread reforms are enacted – for example, by allowing unforeseen challenges to be identified or approaches to be refined. However, it is important for the advantages of a gradual introduction of reforms to be offset against the uncertainty that this may create. Uncertainty about the direction of future policy changes may limit the incentives of participants to undertake activities such as investments. The gradual phasing in of reforms can also lead to speculative activity in anticipation of the reforms being expanded. An example of this is fisheries in Iceland, where the exclusion of smaller vessels from the ITQ framework led to their proliferation. Smaller vessels were initially not intended to be regulated even at a later stage, but the substantial increase in their use led to increased pressure for these to be included. This is felt to have fuelled speculative ownership by fisherman as smaller vessels would be allocated valuable fishing rights at no cost.

In water abstraction, the gradual introduction of reforms could take several forms, among them:

- trialling reforms in a limited number of catchments;
- limiting reforms to cover a sub-set of users – for example, types of firms; or
- limiting reforms to specific time periods.

Moreover, where there are alternative design options available, different approaches can be trialled in different catchments or sub-sets of catchments. Such an approach has been adopted in China in the context of emissions trading policies to reduce greenhouse gas emissions.

### **4.3. Defining Rights That Can Be Traded**

A key prerequisite to introducing a market-based approach in other sectors has been to establish clearly defined property rights, accompanied by a statutory framework that recognises the trading of such rights. For example, the EU directive on airport slots is regarded as unclear on the provisions for trading. This is reflected in the different interpretations of the directive by member states, ranging from those that have made explicit provisions for secondary slot trading (for example, the UK) to those that regard it as illegal (for example, Spain). US airlines, who have experience of operating in the more well-defined framework for domestic US slots, regard the lack of clarity in the EU as a significant source of higher legal and transaction costs.

The experiences of defining rights in other sectors that have relevance to water abstraction include:

- *Defining rights over fixed quantities versus a system of shares with periodic allocations.* The risk associated with setting entitlements over fixed quantities is highlighted by the experience of New Zealand fisheries. The government initially set entitlements over

fixed quantities. Like water stocks, fish stocks can vary naturally over time (although possibly to a lesser extent than water). By setting rights over absolute quantities of fish, the government left itself with the responsibility of buying or selling rights if it needed to change the overall size of fishing allocations. This policy left the government exposed to potentially large costs (although it could also make profits) if it underestimated the available catch. In water, such risks may be even more significant, as allocations are likely to be defined over shorter periods and may be less predictable than fisheries. In New Zealand fisheries, the framework was later revised so that permanent entitlements were defined as proportions of the total allowable catch (TAC), and the quantity associated with the TAC was set each year. This framework was adopted from the outset in Iceland, and is similar to the approach used in water abstraction in Australia.

- ***Unbundling of rights.*** Related to the above, unbundling includes a distinction between long-term rights or entitlements (in some cases, permanent) and short-term allocations. Such a distinction applies in US airport slots and in fisheries. In airports, the distinction between a slot holder (i.e. long-term entitlement) and slot operator (short-term allocation) has meant that short-term leases occur without the need to formally change titles for the long-term right. This has been cited by users as reducing the administrative and legal costs associated with leases. Such a distinction can be applied in water in a similar way to fisheries, and is already used in water abstraction in Australia.
- ***Completeness of the definition of rights.*** An important aspect of defining rights is to specify what the right entails. US airport slots were defined solely as the right to land or take-off from an airport, but entailed no rights over the use of other parts of the airport infrastructure. This was felt to limit entry because it required those acquiring slots to separately negotiate rights to use other parts of the airport's infrastructure. Complexities in water abstraction which need advance thought include how water is used (i.e. whether the use is consumptive) and characteristics of the return of water (for example, where and when).
- ***To what / to whom rights are attached.*** Exactly what the right is attached to can be a source of complication that requires attention. An example of the issues that may emerge is Iceland's experience of attaching fishing rights to vessels. Vessel owners were not necessarily the people who fished. In some cases, vessel owners simply sold their rights to others, which meant the fisherman who used their boats needed to lease quotas from elsewhere. Fisherman, as well as others, particularly resented the distributional implications of the free allocation of rights, which led to significant financial gains for some whereas others were left to pay to lease rights to carry on fishing. Attaching rights to vessels also posed complications in areas such as inheritance. A parallel in water abstraction is that abstractors in an area may not own the land where they operate and so explicit attention needs to be given to whether the rights should be given to landowners, or to those that actually make use of the water. In Australia, water abstraction rights have been attached to land. Moreover, water rights have historically been legally linked to land holdings adjacent to water courses.

#### 4.4. Non-Users in Trade

The role of non-users in the water abstraction market is a source of stakeholder concern. In many of the sectors reviewed, however, there are positive experiences of allowing non-users to participate. Examples include:

- the framework for secondary trading of airport slots allowed any party to own slots. This has helped airlines to overcome financial difficulties, and to finance investments on the basis of slots;
- allowing non-users the right to ownership in both Iceland and New Zealand fisheries has allowed rights-holders to finance investments;
- the purchasing of rights by special interest groups – examples include communities buying airport slots so that flights would serve them, or environmental groups buying emissions allowances. In water abstraction, conservation groups may have an interest in purchasing water abstraction rights; and
- non-users enabling markets to function more efficiently. This aspect of the role of non-users is recognised in the report of the New Zealand electricity regulator in the case of markets for hedging instruments. Non-users play a similar role in emissions trading.

#### **4.5. Concerns over Market Dominance**

One of the concerns raised by stakeholders in the context of water abstraction reforms is that competition for licences could be “dominated by water companies and unfair to others”.<sup>7</sup> In some of the other sectors reviewed, there was an increase in the market share of the largest organisations following the introduction of markets. Examples include the increase in the share of slots held by dominant carriers at high-density airports in the US, and the accumulation of ITQs by larger fishing companies in both Iceland and New Zealand. However, the increasing share of larger firms in other sectors has also been interpreted as reflecting improvements in efficiency. Indeed, in the case of New Zealand fisheries, one of the aims of introducing ITQs was to reduce overinvestment (i.e. reduce the number of vessels). In both Iceland and New Zealand, the average catch per fisherman – a measure of efficiency – has increased. In the case of airports, several studies suggest that the consolidation of slots by dominant carriers may well reflect the most efficient allocation of such slots. More generally, one of the aims of introducing market-based approaches is often to achieve an allocation that reflects the valuations different market participants place on a product. If there are economies of scale available to market participants, then larger firms are likely to have higher valuations, and therefore accumulate a greater share.

In other sectors, concerns over the rights market being dominated by larger companies have led to mitigating measures being adopted. For example, in both New Zealand and Iceland fisheries, a limit is placed on the quotas that can be held by a single firm to prevent dominance. The ownership limit in New Zealand is subject to exceptions. In water abstraction, where it is not clear how widely each rights market would be defined, many local catchments would have large and perhaps dominant players. More generally, competition law provisions are used in various contexts to regulate transactions that have the potential to undermine competition. In both US airport slots and in gas capacity release markets, proposed mergers have sometimes resulted in forced divestitures. In water abstractions, certain types of trades – for example, those that lead to a higher than specified market share – could be made conditional on provisions to mitigate the potential effects of dominance. Such

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<sup>7</sup> Highlighted in the specification for this study.

provisions could include ensuring that water is made available to other users, include new entrants, by the dominant firm.

Ring-fencing of rights holdings has also been used to address concerns over market dominance in other sectors. We discuss this experience in the next section.

#### **4.5.1. Ring-fenced rights holdings as a measure to address dominance**

Stakeholders in water abstraction have suggested the ring-fencing of rights holdings to “protect economically weaker sectors” as a measure to address concerns of market dominance. As noted above, this approach has also been used in other sectors. In all cases, ring-fencing or special provisions reflected a desire to protect the interest of a particular group. Examples of ring-fencing, or similar exclusions restrictions, include:

- US airport slots with separation between so called “commuter” and “air carrier slots”;
- Iceland fisheries, where small vessels initially operated out of the ITQ system; and
- New Zealand fisheries, where Maori fisherman were ring-fenced.

In the case of US airport slots, studies suggest that the ring-fencing of rights holdings had an adverse impact on the efficiency of markets. This is partly because of the way in which the ring-fence was imposed. The distinction between commuter and air carrier slots was made on the basis of aircraft size. This was felt to be arbitrary and resulted in imposing restrictions on how airlines could operate. In practice, ring-fencing resulted in commuter slots being used to feed traffic into the networks of larger carriers, with many large carriers using subsidiaries to operate aircrafts using commuter slots – effectively, airlines sought to bypass the restrictions to achieve efficiency gains from network effects to the extent possible.

In the case of water abstraction, the distinction between larger users (on any stretch of river or geographic rights market) that may dominate the rights market (such as water or energy companies), and other users is likely to be clearer, as they are likely to operate in different sectors altogether. Hence, the risk associated with appropriately defining the boundaries of the ring-fence may be lower than that of US airport slots. However, in the case of airport slots, airlines were still able to realise network efficiencies despite the ring-fence, although these may have been reduced. This reflects the nature of the aviation industry, where the ability to trade slots across the ring-fence is not necessary to realise the efficiencies associated with the hub and spoke model. In water abstraction, if there are any efficiencies associated with trades between large and small users, such efficiencies will be more difficult to realise if the abstraction market is ring-fenced.

The experience of excluding smaller vessels in Iceland’s fisheries highlights the potential for unintended consequences when separating the framework for managing resources across users. The exclusion of smaller vessels led to large increases in their use. This undermined the overall effectiveness of the ITQ system because of the interdependence between those that operated within the ITQ framework and those that didn’t. Water abstraction is also characterised by interdependence – potentially both within and across catchments. Moreover, the current licence regime already excludes water users that abstract less than a set maximum. The experience of Iceland suggests that if a ring-fence was introduced, it will need to account for the interdependence between water abstractors to ensure that it does not provide incentives for users to structure their operations with a view to taking advantage of the

different frameworks. Moreover, as noted above, the Iceland experience also had a second unintended consequence: it is alleged to have attracted speculative activities from fisherman who invested in vessels with the expectation that they would benefit from the free allocation of valuable fishing quotas once smaller vessels were brought into the ITQ framework.

Finally, although the ring-fencing of Maori fishermen in New Zealand reflected historical treaties, it nonetheless offers some examples of the type of ring-fencing arrangements which could be applied in water abstraction. One feature of the Maori framework is that the rights of smaller groups were collectivised through holding companies, with decisions regarding the trading of quotas or allocations subject to specified voting rules. Such a framework could be applied in water abstraction to allow smaller users to be represented collectively. This arrangement can be useful in instances where smaller abstractors jointly undertake investments, although we understand that there are few cases of such investments in England and Wales. Moreover, such arrangements need not be mandated by policy makers, and can instead emerge voluntarily if there is a sound rationale for them.

The case of Maori fishermen also highlights the possibility of allowing some trading to occur between groups even when they are ring-fenced. In the case of the Maori, the framework only allowed exchanges of ITQs to occur between Maori and other commercial fishermen, so that there would no net reduction in the quotas held by the Maori. A similar approach of allowing certain types of transactions between ring-fenced groups in water abstraction could be used to ensure that at least some of the benefits associated with trading across groups are realised. Such trades – for example, exchanges or trades smaller than a certain threshold – could be specified in advance as requiring little or no regulatory oversight to ensure that transaction costs and regulatory uncertainty are reduced.

#### **4.5.2. Different abilities of market participants to pass through costs**

A feature of water abstraction is that different types of abstractors are likely to have different abilities to pass through abstraction costs to final consumers. Differences between the abilities of different types of market participants to pass through costs have also been an important issue under EU emissions trading. As noted above, the EU ETS covers more than 10,000 emitting installations across a wide range of sectors. Companies differ across sectors in their ability to pass through costs of emissions allowances – either actual costs or opportunity costs. In particular, power generators are typically regarded as having a greater ability to pass through costs than firms facing direct international competition in sectors such as aluminium or paper. The main policy tool that has been used in the EU ETS to avoid disadvantaging EU firms facing international competition is to allocate emissions allowances to these companies for free.

The perceived need to protect such firms reflects the underlying rationale of the EU ETS, which is to reduce emissions of a global pollutant. In the absence of mitigating measures, emissions from companies facing international competition might simply be displaced to other countries outside the EU. In water abstraction, this seems much less of a concern, and regulation is much more developed, so the prospect of firms that do have the ability to pass through costs acquiring a greater share of the underlying resource may well reflect an efficient outcome. Nonetheless, there may be other reasons for wanting to avoid effects on firms that face greater product market competition, which may warrant mitigating provisions in water abstraction.

Additionally, the interaction between a water company's activities in the abstraction rights market, which generally are not expected to be regulated, and its activities in downstream regulated segments will require attention, particularly in catchments where water companies have a large share of the market. One type of interaction is how abstraction costs are allocated between a water company's downstream regulated and unregulated businesses. Ofwat has published clarification on current policy, including transfer pricing principles.<sup>8</sup> A related type of interaction is how abstraction costs are reflected in downstream *prices*. A potential concern, covered by competition law but which may benefit from clarifying regulatory provisions, is of the water company using a dominant position in the abstraction market to the benefit of its regulated downstream business. For example, in US gas capacity release markets, a firm (El Paso Natural Gas) that had a significant share of gas transport capacity in California was alleged to have withheld capacity during the energy crisis in 2000. Restricting capacity raised the price of natural gas, which was supplied by an affiliate of El Paso. The determination of market manipulation ultimately led to El Paso paying compensation to the parties affected, and agreeing to a capacity release programme.

#### **4.6. Provisions to Facilitate Entry**

A feature of other sectors is that specific provisions are often made to facilitate new entry. Such provisions can be important in sectors where the availability of the underlying resource is constrained – for example, because of physical factors (airport slots) or environmental / biological factors (fisheries). In US airport slots, one provision for new entry is the earmarking of a proportion of newly available slots for entrants. This was implemented via retention by the regulator of a proportion of the available slots when slots were initially grandfathered to incumbents.<sup>9</sup> In water abstraction, similar provisions could also be made to provide access to smaller users or new entrants. Following the airport example, the regulatory body could retain a proportion of the long-term entitlement in a catchment, and offer preferential access to the water resource smaller users.

Another approach used to facilitate entry is the provision of information to reduce transaction costs associated with trading. Lack of information about trading opportunities prevented smaller and/or new participants from trading airport slots, and subsequent reforms contemplated by the regulator included measures to enhance the provision of information through bulletin-boards. Similarly, in New Zealand fisheries, markets for hedging instruments are used to facilitate trade, and bulletin boards or formal exchanges serve such functions in US gas capacity release markets. Measures to provide information to all participants could help to lower transaction costs in water abstraction, which may be particularly important for new entrants or smaller participants.

#### **4.7. Policies to Foster Market Liquidity**

One of the aims of the reforms being considered is to increase the ease of trading in the abstraction market. The experiences of introducing trading in other sectors provide examples how market liquidity can be improved. Measures used to improve market liquidity range from policies to reduce transaction costs to those that mandate some form of trading.

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<sup>8</sup> Ofwat (2013), "Regulatory Rules Affecting Water Companies in a Future Abstraction Regime", March 2013

<sup>9</sup> However, the proportion retained was regarded by some stakeholders as being too low to facilitate new entry.

One measure is to provide trading platforms for market participants. Such measures typically do not place restrictions on trading so that it can only occur through a specific medium. For example, although exchanges exist to facilitate trading in New Zealand fisheries, markets for spot electricity price hedging instruments, US gas capacity release markets, and the EU ETS, the frameworks also allow participants to trade bilaterally outside of the exchanges. In contrast, the experience of compulsory anonymous trading in Iceland proved to be unpopular and was repealed shortly after being introduced.

Another measure to improve market liquidity is the development of standardised products. These were introduced in New Zealand to improve liquidity in the market for spot electricity price hedging instruments. Likewise, US airlines have noted that legal costs are significantly reduced by the ability to use shorter standardised contracts for slot trades compared to the more cumbersome legal framework in EU countries. In water abstraction, standardised contracts for certain types of trades – for example, short-term use rights – could help to reduce the administrative and legal costs associated with such trades, particularly for smaller participants.

In US gas capacity release markets, trading is facilitated by replacement shippers having the flexibility to change the terms of the capacity released. For example, a replacement shipper can, in some instances, request delivery points suiting its needs even if the releasing shipper offers capacity with different characteristics. This flexibility is provided by the pipeline owner, with which the replacement shipper is able to renegotiate terms. Such provisions may also be used in water abstraction in situations where the requirements of the buyer do not exactly match the rights available for sale. Such transactions could be facilitated by a coordinating body without the need for a significant regulatory investigation. More complex trades, involving several parties and different types of use may continue to require more substantial regulatory oversight.

A broad category of options for facilitating trade is the use of the allocation mechanism. We discuss this in the sub-section below.

#### **4.7.1. Using the allocation mechanism to force transactions**

The way in which either long-term rights or short-term allocations are made available to users can potentially be used to force transactions in the abstraction market. An approach that is used in other sectors, although typically not with the sole aim of improving liquidity, is to require users to purchase all or part of their allocations. Examples of such approaches include:

- the EU ETS, where (absent mitigating factors) the amount of freely allocated allowances is reduced each year, requiring companies to purchase emission rights;
- fisheries in Chile, where long-term entitlements to shares of the overall quota are reduced by a specified percentage each year, requiring commercial fisherman to purchase entitlements to maintain their shares; and
- reforms contemplated for US airport slots, whereby the slots allocated to an airline would initially be of different lifetimes. The intention of the reforms was to have a rolling allocation of slots ten years after they were introduced, so that slots would have a term of

ten years and a specified proportion of the slots held by an airline would need to be purchased each year.

These approaches had different motivations. The approach used in Chilean fisheries was intended to raise revenue for the government. In contrast, the motivation behind the reforms contemplated for airport slots was to encourage entry. However, a feature of these approaches is that they require rights holders to participate in the market for allocations.

In water abstraction, one possibility would be to require that abstractors offer a proportion of their allocations for sale. Abstractors could still retain the right to the *value* of the entitlements,<sup>10</sup> and thus receive revenues from the sale of such allocations. Following the New Zealand experience of the market for hedging instruments, such a “market-making” obligation can be placed on the largest abstractors.

#### **4.8. Summary of Implications for Water Abstraction**

- The gradual phasing in of reforms provides an opportunity for lessons to be learnt. In water abstraction, a gradual transition to more market-based approaches could take the form of trialling reforms: in a limited number of catchments; to cover a sub-set of users; or trades applying only for specific time periods. However, it is important for the advantages of a gradual introduction of reforms to be offset against the uncertainty this may create.
- Prerequisites for the successful transition to a more market-based approach include the clear definitions of different types of rights and a statutory framework that recognises the ability of rights holders to trade. Areas to consider when defining rights include:
  - adopting a flexible approach to defining entitlements as proportions of the water available in a catchment, and setting quantity allowances periodically so that these can be revised to reflect changing circumstances,
  - ensuring that the definition of rights adequately captures the complexity of water abstraction – for example, how it is used and if and how it is returned.
  - deciding whether rights should be attached to users or land-owners so that potential conflicts can be avoided.
- The experience of allowing non-users to participate in trade is generally positive in other sectors, and there is the potential for non-users to improve the way the abstraction market functions. This includes allowing users to finance investments on the basis of abstraction rights, allowing organisations to hold rights for other non-abstraction purposes (e.g. recreation or conservation), and benefitting from the activities of market intermediaries.
- The potential for large users dominating individual abstraction markets may require mitigating provisions. We note, however, that the increasing share of larger firms in other sectors has also been interpreted as reflecting improvements in efficiency.
- Ring-fencing has been used in other industries to mitigate concerns about potentially vulnerable market participants. The rationale for ring-fencing is typically not economic

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<sup>10</sup> This is done, for example, in the US EPA’s Acid Rain Trading Program for sulphur dioxide.



efficiency, and ring-fencing has adversely affected efficiency in other industries. Other mitigating measures that have been used are restrictions on market share, or reliance on existing competition law provisions.

- A feature of water abstraction is that, reflecting the extent of the product competition they face, different types of abstractors are likely to have different abilities to pass through abstraction costs to final consumers. Mitigating provisions may be required to avoid effects on firms that face greater product competition. For water companies, the current approach to allocating abstraction costs to regulated and unregulated activities has been recently clarified by Ofwat. A potential concern, covered by competition law but which may benefit from clarifying regulatory provisions, is of the water company using a dominant position in the abstraction market to the benefit of its regulated downstream business.
- Provisions similar to those used in other sectors to facilitate entry can also be adopted in water abstraction. For example, the regulatory body can retain a proportion of the long-term entitlement in a catchment to provide preferential access to the water resource for entrants (or small users). Measures to provide information to all market participants – for example, bulletin boards – can also help to reduce transaction costs for new entrants.
- Various measures can be used in water abstraction to improve market liquidity. Measures that may have relevance include: standardising products; providing flexibility to buyers that may want to change terms – for example, through establishing a coordinating body; and setting up trading platforms to compliment other means of trading. An additional type of measure is the use of the allocation mechanism. For example, obligations can be placed on large abstractions to offer a proportion of their allocations for sale, or entitlements can be time-limited and require periodic renewal.

## Appendix A. Case Studies

### A.1. Individual Transferable Quotas in Fisheries in New Zealand

#### A.1.1. Background and rationale for reforms

New Zealand has a large and prosperous fishing sector. The country's marine fisheries waters span 4.4 million square kilometres, 31 per cent of which belongs to New Zealand's exclusive economic zone (EEZ).<sup>11 12</sup> The EEZ is the fourth largest in the world, but 65 per cent of it is too deep to be fished or is closed to commercial fishing.<sup>13</sup> These waters are home to 16,000 species, of which 130 are commercially fished. The country's commercial fisherman harvest over 400,000 tonnes of fish per year in the open seas, and over 530,000 tonnes when aquaculture enclosures are included.<sup>14 15</sup> In 2009 the catch equated to a total seafood export value of £570 million.<sup>16 17</sup>

New Zealand's fishing industry can be divided into distinct offshore and inshore fisheries. The offshore or "deepwater" sector has traditionally been dominated by large vertically integrated harvesting and processing companies. Many of these are foreign owned. The inshore harvesting is done by small-scale owner-operators fisherman and by hired fisherman who operate boats that are owned by the large integrated companies. Both groups typically sell their catch to the integrated companies for processing.<sup>18</sup>

In the deepwater sector, the primary targets are pelagic species such as the orange roughy, squid, hake, and hoki. The main target species for the inshore demersal fisheries are snapper, tilapia, flounder, rock lobster and gurnard. The two sectors are currently managed jointly under a single framework.

New Zealand's fishing sector is currently managed through an individual transferrable quota (ITQ) framework, which has evolved over time. The New Zealand quota management system (QMS) is divided into ten Fisheries Management Areas (FMAs).<sup>19</sup> Each fish stock under management is monitored within a quota management area (QMA), which spans one or

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<sup>11</sup> New Zealand Government Website, "Fisheries at a Glance", last updated in 2010, accessible at: <http://www.fish.govt.nz/en-nz/Fisheries+at+a+glance/default.htm>

<sup>12</sup> An exclusive economic zone gives a nation exclusive rights for exploring, exploiting, conserving and managing any natural resources contained within it. EEZs were prescribed by the UN Convention on the Law of the Sea, the legislation is accessible at: [https://www.un.org/depts/los/convention\\_agreements/texts/unclos/part5.htm](https://www.un.org/depts/los/convention_agreements/texts/unclos/part5.htm)

<sup>13</sup> Sealord Fishing Quota Webpage, accessible at: <http://www.sealord.com/nz/environment/fishing-quota>

<sup>14</sup> OECD 2011 Review of Fisheries, page 357.

<sup>15</sup> Aquaculture refers to the breeding, rearing and harvesting of plants and animals in water. Lots of it is done in ocean enclosures. The Ministry for Primary Industries states that the marine-based aquaculture industry in New Zealand comprises 23,000 hectares, of which 56% is near shore, 38% of it is considered open ocean, and 6% is undeveloped.

<sup>16</sup> In local currency the figure is NZ\$1.42 billion in 2009. The exchange rate used is the average value for 2009 £0.40209 = NZ\$1. The exchange rate can be accessed at: <http://www.hmrc.gov.uk/exrate/exchangerates-0910.pdf>

<sup>17</sup> Ministry of Fisheries Statement of Intent 2010. Export value is FOB

<sup>18</sup> Yandle, Tracy, and Christopher Dewees, "Consolidation in an ITQ Regime: Lessons from New Zealand, 1986-1999", Environmental Management, 2008, page 917.

<sup>19</sup> A map of the FMAs can be viewed at: <http://www.fishinfo.co.nz/clement/atlas/nzfma.html>

more of the FMAs depending on the movement of each particular species of fish. New Zealand's QMS now covers 633 stocks of fish from 97 different species.<sup>20</sup>

The motivations for introducing an ITQ framework to manage fisheries differed somewhat for inshore and deepwater fisheries. Prior to the introduction of the ITQs, it was becoming clear that New Zealand's inshore fisheries were overfished and characterised by overinvestment. For example, between 1978 and 1983, the catch of tilapia had fallen by 43 per cent.<sup>21</sup> In addition, there were large differences in vessels' rates of success, with approximately two thirds of the catch being taken in by five percent of the fleet. Attempts to reduce overinvestment in fishing capacity through license restrictions and other input controls had proven to be ineffective.<sup>22 23</sup>

Although the management of fish stocks also motivated the introduction of ITQs for deepwater fisheries, an additional rationale for regulation was to increase the participation of New Zealand based companies in the sector. Throughout the 1970s, the deep sea fishery had primarily been fished by Japanese, Korean, and Soviet fleets and was therefore largely outside of New Zealand's control. In 1978, as the economic importance of the sector grew, New Zealand expanded its exclusive economic zone from 12 to 200 miles out to sea to encapsulate it.

Finally, when the ITQ regimes were initially introduced, an additional objective of the New Zealand government was to extract economic rents from the sector. However, as described below, this objective was abandoned in subsequent reforms.

### **A.1.2. Main features of the ITQs**

#### **A.1.2.1. Introduction of ITQs**

The current ITQ framework in operation in New Zealand originates in reforms that were introduced with the Fisheries Act in 1983. The Act introduced ITQs for nine different commercially important species.<sup>24</sup> The ITQ system initially applied separate frameworks for inshore and deepwater fisheries, but an amendment to the Act in 1986 (Fisheries Amendment Act) introduced a uniform framework that applied to all fisheries. The amendment Act also extended the system to cover 26 species,<sup>25</sup> which were composed of 156 separate fish stocks.<sup>26</sup>

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<sup>20</sup> New Zealand Government Website, "Fisheries at a Glance", last updated in 2010, accessible at: <http://www.fish.govt.nz/en-nz/Fisheries+at+a+glance/default.htm>

<sup>21</sup> Newell et al. "Fishing Quota Markets", RFF Discussion Paper, 2002, page 11.

<sup>22</sup> Typical license restrictions are things like limited fishing seasons, limits to the number of people who can be licensed, days of the week where fishing is prohibited, etc. Input controls relate to the size of fishing vessels, types of equipment that can be used, a maximum power for the boat engine, minimum net mesh size, etc.

<sup>23</sup> Arnason, R, "A Review of International Experiences with ITQs", CEMARE, 2002, page 45.

<sup>24</sup> Arnason, R, "A Review of International Experiences with ITQs", CEMARE, 2002, pages 45-46.

<sup>25</sup> Newell et al. "Fishing Quota Markets", RFF Discussion Paper, 2002, page 39.

<sup>26</sup> Peacey, Jonathan, "New Zealand Fisheries; How Research Underpins Existing Management and Priorities for the Future", Ministry of Fisheries, 2007, slide 5.

Features of the ITQ framework included:

- Restricting quotas to those who were dependant on the fishery and committed to its future. This was a principle sought by the commercial fisherman who were unwilling to reduce their fishing efforts if it would simply increase the number of part-time fisherman.<sup>27</sup>
- Establishing ITQs that enabled fisherman to land a fixed tonnage of a given species of fish. To reduce the total amount that could be landed in each fishery the government had to buy back existing quotas (or sell additional quotas to increase the landed amount). The motivation for defining ITQs as fixed tonnage quotas was that the government aimed to extract all of the economic rent from the fishery.<sup>28</sup> The government had anticipated that the management of the fishery would on average lead to a higher eventual total annual catch (TAC), which would provide the government with future revenue from additional quota sales.
- The ITQs provided to fisherman were based on historical catch levels. An alternative framework for assigning quotas is used in Chile, and discussed in Box A.1 below.
- Providing quotas only to firms with at least 75 per cent New Zealand ownership and which processed 35 per cent of all catches in New Zealand. As a result of these ownership restrictions and of catch limits and licence controls that were imposed in 1978 New Zealand-owned companies took in two thirds of the catch in 1983, either directly or through joint ventures.<sup>29</sup>
- Quotas lasting 10 years and covering seven species were initially allocated to nine firms in 1983. Allocations were made based on prior investment.<sup>30</sup> In the much more comprehensive ITQ system of 1986, quotas were allocated based on the best two of the past three years of harvests. Fishers had the right to object in case of errors or special circumstances that reduced their harvests.<sup>31</sup>
- Under the Fisheries Amendment Act 1986, any New Zealand resident or firm with less than 25% foreign ownership is entitled to own quota.<sup>32</sup>

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<sup>27</sup> Connor, R, "Initial Allocation of Individual Transferable Rights in New Zealand Fisheries", published in Case Studies on the Allocation of Transferable Quota Rights in Fisheries, FAO Fisheries Technical Paper, 2001, page 225.

<sup>28</sup> Clarke et al, "*Development and Implementation of New Zealand's ITQ Management System*", Marine Resource Economics, 1988, pages 337, 347-348.

<sup>29</sup> Arnason, R, "*A Review of International Experiences with ITQs*", CEMARE, 2002, pages 45-46.

<sup>30</sup> Clarke et al, "*Development and Implementation of New Zealand's ITQ Management System*", Marine Resource Economics, 1988, page 327.

<sup>31</sup> In the deepwater fisheries 1,800 individuals were notified of their catch histories, and 1,400 objected. (Clarke, 1988)

<sup>32</sup> Arnason, R, "*A Review of International Experiences with ITQs*", CEMARE, 2002, page 47.

### Box A.1 Dynamic Entitlement Shares in Chilean Fisheries

In order to introduce more dynamism to its four fisheries entitlement markets as well as to extract some of the economic rents from them, the Chilean government annually reclaims a fraction of entitlement shares and reissues them by auction.<sup>33</sup> This is achieved through a 10% reduction of all ITSQ holdings annually, which reverts to the government to be subsequently re-auctioned.<sup>34</sup> There is a restriction that no firm bids for more than 50% of the quota that is offered in any given year. This has the effect of making it considerably more difficult for any firm to accumulate a very large position in the fishery.<sup>35</sup>

The initial allocations for these fisheries were done by auction, and the share sales fetched relatively high prices. However, over the years the auction prices gradually declined toward the minimum possible bid, possibly due to collusion by the fishery's few major players. Another possibility for the decline in prices is that there was an excessive amount of optimism in the fishery when the ITQ system was introduced, or perhaps that firms perceived an interest in establishing a dominant presence in the market.<sup>36</sup>

According to Prospect Theory, a divestment and re-auction system such as the Chilean one has the potential to increase the functionality of markets by affecting the status quo option and correspondingly changing the reference point from which behavioural decisions are made.<sup>37</sup>

#### A.1.2.2. Reforming the ITQ – moving from fixed tonnage quotas to shares

In 1990, the Fisheries Act was amended to convert fixed tonnage quotas into individual transferable fixed share quotas (ITSQs) with shares corresponding to a proportion of the TAC that the government annually chooses to set for the year.<sup>38</sup> This transition marked the end of the government's aim to extract economic rent from fisheries. It also transferred the financial risk from the government to fishery stakeholders, since the government would henceforth set a lower TAC in the event of overfishing, and would no longer be expected to buy back quota. The reforms were precipitated by the need for the government to repeatedly purchase (or sell) quotas to revise the level of the total annual catch. For example:

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<sup>33</sup> Another dilution system for water abstraction entitlements was proposed in New South Wales with the hope of enabling rights-holders to prevent abuses during periodic review processes. See: Young, M.D, "The Design of Fishing-Rights Systems – the NSW Experience", Ecological Economics, 1999, pages 309-311.

<sup>34</sup> Arnason, R, "A Review of International Experiences with ITQs", CEMARE 2002, page 20.

<sup>35</sup> Bernal et al. "New Regulation in Chilean Fisheries and Aquaculture: ITQ's and Territorial Users Rights", Ocean & Coastal Management, 1999, page 135.

<sup>36</sup> Bernal et al. "New Regulation in Chilean Fisheries and Aquaculture: ITQ's and Territorial Users Rights", Ocean & Coastal Management, 1999, page 135.

<sup>37</sup> Kahneman, D, and Amos Tversky, "Prospect Theory: An Analysis of Decision under Risk", Econometrica, 1979.

<sup>38</sup> Arnason, R, "A Review of International Experiences with ITQs", CEMARE 2002, page 47.

- during the implementation of the ITQ regime, the government initiated a voluntary quota buy back program in order to reduce fishing pressure on 20 stressed species.<sup>39</sup> This programme cost the government NZ\$42.4 million,<sup>40</sup> an amount that is roughly equivalent to 10% of the total 1986 catch value.<sup>41</sup>
- the government also sold additional quotas in fisheries where it was believed that stocks were at healthy levels. This generated revenues of NZ\$84.2 million over the first three years of the programme, and the vast majority of these sales occurred during the first year;<sup>42</sup>
- following declines in the stock of the orange roughy fishery, the government was going to be required to spend between NZ\$60 million and NZ\$150 million on buying back quotas over the following few years.<sup>43</sup>

Features of the transition to an ITSQ system included:

- establishing permanent property rights, which are protected by the New Zealand constitution;
- maintaining domestic ownership restrictions so that firms with ITSQs needed to be at least 75 per cent New Zealand owned;
- to prevent anti-competitive behaviour, restricting the maximum share of a single firm to 35 per cent in deepwater fisheries and between 10 and 45 per cent in different inshore fisheries;
- imposing charges on quota holders to cover the cost of managing the ITSQs;
- requiring all fisherman to also hold a fishing permit which subjects them to certain conditions under which they are permitted to fish.<sup>44</sup>

Following the move to establishing quotas as shares, further reforms were undertaken in 1996 to unbundle long-term entitlements from allocations (known as annual catch entitlements

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<sup>39</sup> The programme requested that fisherman submit their valuations for the right to fish, and paid those with the lowest valuations to leave the fisheries at an agreeable level. Due to insufficient participation, a further offer which was approximately 20% lower was made, before the remaining quotas were reduced proportionally. Several more fisherman accepted the second offer and the remainder received a pro rata quota reduction. No compensation payments were made for the pro rata quota reductions, but the government made assurances that if TACs recovered, the original quota amounts would be reinstated.

<sup>40</sup> Sissenwine, Michael, and Pamela Mace, "ITQs in New Zealand: The Era of Fixed Quota in Perpetuity", Fishery Bulletin, 1992, page 150.

<sup>41</sup> Clarke et al, "*Development and Implementation of New Zealand's ITQ Management System*", Marine Resource Economics, 1988, page 339.

<sup>42</sup> Sissenwine, Michael, and Pamela Mace, "ITQs in New Zealand: The Era of Fixed Quota in Perpetuity", Fishery Bulletin, 1992, page 151.

<sup>43</sup> The Orange Roughy stock was very difficult to estimate. The range of expenditure on quota reflects the uncertainty of the actual level of the fish stock at the time. Sissenwine, Michael, and Pamela Mace, "ITQs in New Zealand: The Era of Fixed Quota in Perpetuity", Fishery Bulletin, 1992, page 154.

<sup>44</sup> These permits must be held by all commercial fisherman. They are also granted to any person or firm which holds a quota. The permits impose conditions pertaining to which are acceptable fishing methods, areas, species, levels of provision of information to authorities, etc. Arnason, R, "A Review of International Experiences with ITQs", CEMARE 2002, page 48.

(ACE)). The ACE are allocated to the holders of the quotas at the start of every fishing year after the TAC is determined, and are expressed in terms of tonnage of catch permitted. The implementation of the ACE ended the practice of quota-holders' leasing their quota for a fixed period. However, the system could not be implemented until 2001 due to technical limitations in the trading market.<sup>45</sup>

#### A.1.2.3. Ring-fencing: Maori population

Following widespread agreement that the Fisheries Act of 1986 had been unjust to the Maori, who held rights to fisheries under a treaty with the Crown dating from Victorian times, the Maori Fisheries Act of 1989 was signed as an interim settlement as a step toward redressing the situation. The government was to transfer NZ\$10 million to the Maori Fisheries Commission as well as to allocate 10% of each of the ITSQs from the original allocations to the Maori by purchasing them from existing owners. Furthermore, any new species of fish that was introduced to the quota management system (QMS) would be required to have 20% of quotas allocated to the Maori prior to distributing the remaining quotas according to historical catches.<sup>46</sup>

The purchase of the 10% of quota that were to be reallocated to the Maori were expected to be carried out in four separate transfers over four consecutive years, each for 2.5% of the quota. However, the government was unable to acquire all of the quota at the times stipulated by the agreement due to the "thinness" of some of the markets, so it transferred the equivalent cash value of the missing quota to the Commission, where it was retained until the additional quota became available.

The arrangements put in place for Maori fisherman consist of transferring quotas to holding entities that represent different Maori tribes. Decisions to transfer rights to other Maori tribes or holding groups are subject to voting rules. Thus, the rights of Maori fisherman are subject to collective decision making. Only quota exchanges are allowed between Maori fisherman and commercial fisherman, with exchanges being defined as the trading of quotas of the same market value. Hence, trading provisions do not allow for the net reduction in quotas held by Maoris.

#### A.1.2.4. Arrangements for trading

Following the unbundling of quotas and ACE, FishServe was created in 2001 to facilitate trading and management of ACE, quota, and improve access to registration and information databases.<sup>47 48</sup> FishServe also set up an auction and reverse auction website called FishStock in 2004. A prospective seller could go to the site and list the auction close date, start price, buyout price, and optionally also stipulate a reserve price.

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<sup>45</sup> Lock, Kelley, and Stefan Leslie, "New Zealand's Quota Management System: A History of the First Twenty Years", Ministry of Fisheries Working Paper, 2007, page 18.

<sup>46</sup> Lock, Kelley, and Stefan Leslie, "New Zealand's Quota Management System: A History of the First Twenty Years", Ministry of Fisheries Working Paper, 2007, page 18.

<sup>47</sup> Lock, Kelley, and Stefan Leslie, "New Zealand's Quota Management System: A History of the First Twenty Years", Ministry of Fisheries Working Paper, 2007, page 18.

<sup>48</sup> In 2003, ACETrader, the first online trading platform, was set up by the Maori Fishery Trust. Although the system was designed to facilitate trade for all users, it was not successful and shut down.

For a regular auction, prospective buyers bid up the prices and the highest bidder on the end date gets the ACE. A reverse auction works in a similar way but is set up by a buyer. In that case, prospective sellers bid down the price that they are willing to receive for their ACE. The lowest bidder receives the amount of their bid in exchange for providing their ACE to the buyer.<sup>49</sup>

#### A.1.2.5. Framework for regulation

The fisheries are governed under the authority of the Ministry of Primary Industries, which was created through a merger of the Ministry of Fisheries and the Ministry of Forestry and Agriculture in 2011. Government agencies such as the National Institute of Water and Atmospheric Research work with the fishing industry to assess stock levels after which the Minister of Primary Industry sets the total annual commercial catch (TAC) for each species. After considering how much fish will be harvested for recreational and non-commercial interests the total annual commercial catch (TACC) is then determined. This is the amount that is used to allocate ACE to the quota holders. The Ministry of Primary Industry manages compliance and enforcement.<sup>50</sup>

The enforcement model prior to the ITQ regime was similar to that of wardens who apprehend lawbreakers and maintain a presence to discourage illegal behaviour. With the implementation of the ITQ regime, there was a shift toward a paper trail enforcement system that monitors catch landings and product flow along the supply chain. Quota holders must sell their catch to licensed fish receivers, who then must provide monthly reports on the amount of fish they purchased from each permit holder. It was expected that enforcement would become easier as the number of fisherman declined and the size of their respective operations increased.<sup>51</sup>

#### A.1.3. Outcomes

New Zealand's QMS has been extremely successful at generating resource rents and ensuring biological sustainability. Approximately 70% of the stocks are currently at or above the levels targeted by management and none of its fish stocks are at dangerously low levels.<sup>52</sup> In the sections below, we comment on some of the most important experiences of introducing ITQs to fisheries, including:

- the impact of ITQs on investment;
- the experience of trading; and
- changes in the structure of the fisheries sector

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<sup>49</sup> Lock, Kelley, and Stefan Leslie, "New Zealand's Quota Management System: A History of the First Twenty Years", Ministry of Fisheries Working Paper, 2007, page 22.

<sup>50</sup> Previous to 2011, compliance and enforcement, and the setting of the TAC were performed by the Minister of Fisheries.

<sup>51</sup> Clarke et al, "Development and Implementation of New Zealand's ITQ Management System", Marine Resource Economics, 1988, page 334.

<sup>52</sup> For the stocks of known size the range over the past five years has been between 67.5% and 71.3%. New Zealand Ministry of Primary Industries, "The Status of New Zealand's Fisheries", November 2012.



## A.1.3.1. Level of investment

As a result of the exclusion of all but the officially-defined “commercial fisherman”, part-time fisherman and non-owners of boats were excluded from the fishery and their licences were retired. From 1983 to 1985 the number of licensed fishing vessels was reduced from 4,320 to 2,744, a 37% reduction in the size of the fleet.<sup>53</sup> This change created a setting where problems such as overcapitalization could be more effectively addressed. The exclusion of these groups was intended to reduce the administrative burden for the regulation of the fishery. An Auckland-based survey participant commented “I don’t think they [the government] want us, the little guys, in the system, we’re a pain... They want big companies they can control”.<sup>54</sup>

The exclusion of part-time fisherman had a negligible effect on actual landings since the change did not directly address overcapitalization in any significant way. This was because the majority of capital was held by commercial licensees. Furthermore, many of the excluded part-time fisherman were Maori, New Zealand’s indigenous people, which the Ministry later acknowledged had been an inequitable outcome and was forced to redress.<sup>55</sup>

## A.1.3.2. Experience of trading

The ITQ sales markets were most active in 1986 - the year of their full implementation. See Figure A.1. There were almost 3,250 trades that year.<sup>56</sup> A similar but lower peak occurred in 1990 when rock lobster was incorporated into the ITQ system. The level of sales then gradually declined until 1993, when it stabilized at approximately 4% of total outstanding quotas per year. This pattern of market activity is consistent with a period of rationalization in which less efficient operators sell their quota to more efficient ones in the early years, after which a lower “natural” level of turnover occurs.<sup>57</sup>

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<sup>53</sup> Yandle, Tracy, and Christopher Dewees, “Consolidation in an ITQ Regime: Lessons from New Zealand, 1986-1999”, Environmental Management, 2008, page 918.

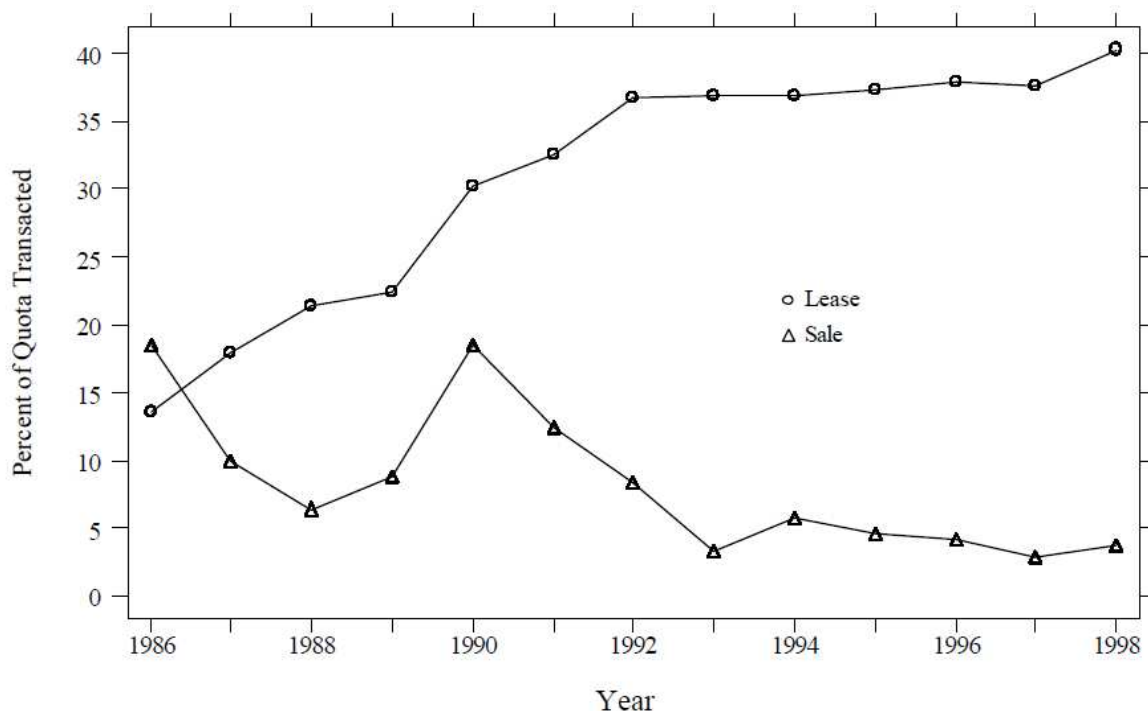
<sup>54</sup> Yandle, Tracy, and Christopher Dewees, “Consolidation in an ITQ Regime: Lessons from New Zealand, 1986-1999”, Environmental Management, 2008, page 918.

<sup>55</sup> Bess, Randall, “New Zealand Maori Claims to Fisheries Resources”, 2001.

<sup>56</sup> Kerr et al. “Evaluating the New Zealand ITQ Market for Fisheries Management”, Motu Working Paper, 2003, page 10.

<sup>57</sup> Newell et al. “Fishing Quota Markets”, RFF Discussion Paper, 2002, page 15.

**Figure A.1**  
**Annual Median Proportion of Quota that is Leased and Sold**



Source: Newell et al. (2002)

Figure A.1 provides an indication of the pattern of sales and leases in the markets for the different species covered by the ITQ.<sup>58</sup> Quota leases rose steadily from 14% in 1987 to 40% in 1998. The levels of trading varied across markets for individual species, with the most economically important species generally seeing the largest level of trading.<sup>59</sup> In addition, the introduction of electronic trading platforms has also reduced the variation in prices for the same types of quotas.

#### A.1.3.3. Aggregation of quota by dominant firms

While there are some entirely new quota owners and others who leave the market altogether, some trades result from owners divesting in some stocks while investing in others. Over time the median number of owners per stock was gradually declining, from 51 in 1986 to 42 in 1998.<sup>60</sup> An early report commissioned by the Fishing Industry Association to analyse changes

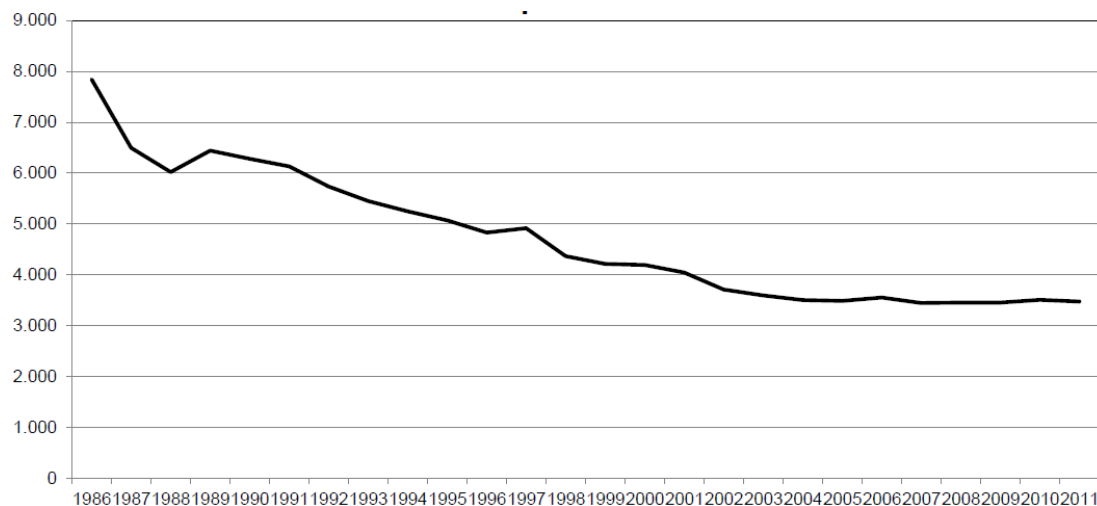
<sup>58</sup> The ITQ system covers several species and there are effectively separate markets for each species. The figures reported represent the median across all of the species covered by the ITQ framework, and therefore reflect average market activity.

<sup>59</sup> Although the median levels suggest that most markets are quite active, some of them are very thin. Thinner markets tend to be those with lower economic importance according to catch size and value. From 1986 to 1998 the number of leases in the individual markets ranged from 30 to 3,500 with a median of 645 leases. The number of quota sales ranges from 0 to 1,500 with a median of 138 sales. Source: Newell et al. "Fishing Quota Markets", RFF Discussion Paper, 2002, page 16.

<sup>60</sup> Newell et al. "Fishing Quota Markets", RFF Discussion Paper, 2002, pages 12-13.

in quota ownership found that aggregation was occurring due to larger companies purchasing quotas from smaller ones or from small-scale owner-operators. At the same time, smaller vessels were being retired and there was a shift to a larger and more industrialised fishery sector.<sup>61</sup> This outcome is consistent with the transfer of property rights with compensation from the least efficient agents to the most efficient ones. An Auckland region survey showed that small fisherman had become less financially committed to the industry.<sup>62</sup>

**Figure A.2  
Combined Quota Owners for 16 Inshore Species**



Source: New Zealand Ministry of Fisheries Presentation to European Parliament 2012

In 1996, the law limited quota ownership at 35% for any fish stock with only a few exceptions for limits of 10% or 20% for certain species. However, there were 38 exemptions to this law between 1988 and 1999. Exemptions allowed owners to hold more than the legal limit (for example, a 50% exemption would allow a quota holder to own up to 50% of the quota). One of these exemptions covered as many as 26 different species. Exemptions for 35% or 45% were commonplace, and in some markets two companies held exemptions for 45% each.

Although many of the markets are dominated by large players, efficiency gains continue to be realised in the form of reduced demand for labour, higher catches, and the need for fewer vessels. See Table A.1.

<sup>61</sup> Yandle, Tracy, and Christopher Dewees, “Consolidation in an ITQ Regime: Lessons from New Zealand, 1986-1999”, Environmental Management, 2008, page 921.

<sup>62</sup> Yandle, Tracy, and Christopher Dewees, “Consolidation in an ITQ Regime: Lessons from New Zealand, 1986-1999”, Environmental Management, 2008, page 921.

**Table A.1  
Ongoing Efficiency Gains**

	2000	2008	% change
Number of People Employed	10,000	8,090	-19.1
Number of Vessels	1,988	1,435	-27.8
Total Tonnage of Vessels	85,595	130,785	52.8

*Source: OECD Review of Fisheries 2011*

## A.2. Individual Transferable Quotas in Fisheries in Iceland

### A.2.1. Background and rationale for reforms

Iceland's fishing industry represents an important part of its economy. In 2011, the total catch of fish, shellfish and crustacean catches amounted to over 1.1 million tonnes, with a value of approximately £750 million.<sup>63</sup> Fishing represents an export industry with 97 per cent of the catch exported. The value of exported marine products, many of which are processed prior to sale, was over £1 billion<sup>64</sup> (total GDP in 2011 amounted to £8.76 billion).

Iceland's fisheries can be separated into two regions; the deep sea pelagic fisheries and the inshore demersal fisheries. The most important pelagic species have traditionally been herring and capelin, but stocks of both have been highly volatile and have at times been so depleted that moratoriums had to be declared to avoid their collapse. The pelagic species are generally used for fish meal or oil production. The most important demersals are cod, haddock, redfish, Greenland halibut and saithe. The demersal species are of higher value than the pelagic types because they are processed and consumed by people.

Iceland extended its exclusive economic zone (EEZ) to four miles in 1952 and 12 miles in 1958. These extensions were met with resistance, particularly from English and other European governments. By 1975, the foreign fleet were taking over 100,000 tonnes of cod from the Icelandic stock every year; about a third of the total cod catch. They were also taking about a quarter of the haddock catch and half of the total catches of saithe and redfish.<sup>65</sup> In order to manage the region, the EEZ was extended to 200 miles in 1975, which heralded the end of foreign fishing in Icelandic waters.<sup>66</sup> As the foreign fleet left for other waters, the domestic fleet expanded its harvest.

The exclusion of other nations did little to end the overfishing that was occurring throughout the 1960s and 1970s, since the Icelandic fleet expanded to fill in the gap that the foreign ships left behind. Iceland's authority over its EEZ did, however, provide the regional control from which reforms could successfully be implemented when needed.

### A.2.2. Main features of the ITQs

The earliest quotas were issues in 1973 in the lobster, shrimp and scallop fisheries and in the then-depleted herring fishery in 1975,<sup>67</sup> while effort and volume restrictions were used to

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<sup>63</sup> Statistics Iceland Data, accessible at: <http://www.statice.is/Statistics/Fisheries-and-agriculture/Catch-and-value-of-catch>  
The currency exchange rate used is £0.0054= ISK1- the HMRC average for 2011, accessible at:  
<http://www.hmrc.gov.uk/exrate/exchangerates-1112.pdf>

<sup>64</sup> OECD 2011 Review of Fisheries, page 274-276. The figure is based on 2009 data, when the harvest was marginally smaller than in 2011. The exchange rate used is £0.0051673= ISK1, the average rate for 2009. The exchange rate can be accessed at: <http://www.hmrc.gov.uk/exrate/exchangerates-0910.pdf>

<sup>65</sup> Icelandic Fisheries Government Website, accessible at <http://www.fisheries.is/management/>

<sup>66</sup> European Parliament Fisheries Note 2012, "*Rights Based Fisheries Management in Iceland and Economic and Financial Crisis*", pages 11-12.

<sup>67</sup> Icelandic Fisheries Government Website, accessible at: <http://www.fisheries.is/management/fisheries-management/system-development/>

manage the stocks of cod.<sup>68</sup> More significant implementations occurred in an amendment to the Fisheries Act in 1983, but it was not until the Fisheries Management Act 1990 that the Quota Management System (QMS) was comprehensively set out.

Key features of the implementation:

- Vessels weighing over 10 Gross Register Tonnes (GRT) were covered under the system from 1983, and this was reduced to 6 GRT in 1990. Those below the threshold were subject to effort and catch restrictions, but these were generally unsuccessful at reducing harvest rates.<sup>69</sup> Furthermore, the small vessel exemption fuelled a dramatic increase in the size of the small vessel fleet and their share of the catch.<sup>70</sup>
- The 1983 implementation was limited to seven species, while the others species remained under effort restrictions. This lack of completeness was likely to be due to political factors.<sup>71</sup>
- The annual quotas were renewed every year prior to 1990, when they were finally made permanent by the Fisheries Management Act.
- In the demersal fisheries the initial allocations were based on historical catches. For the capelin and herring fisheries, between 50 and 100 per cent of the quota rights were issued in equal share to each vessel, while the remainder was issued according to cargo capacity.<sup>72</sup>
- Further reforms were implemented in later years in an attempt to bring the small ships into the system. A small vessel ITQ was developed in 1995, but those that did not choose to join it continued to cause problems.<sup>73</sup> It was not until 2005-06 that all of the small ships were covered under the QMS.

#### A.2.2.1. The ITQ framework

Features of the framework for managing the QMS:

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<sup>68</sup> European Parliament Fisheries Note 2012, “*Rights Based Fisheries Management in Iceland and Economic and Financial Crisis*”, page 11.

<sup>69</sup> The small vessel fleet harvested 15,500 tonnes in 1983 – almost double the designated amount. See European Parliament Fisheries Note 2012, “*Rights Based Fisheries Management in Iceland and Economic and Financial Crisis*”, page 17.

<sup>70</sup> The small fleet consisted of 1,600 vessels harvesting 14.4% of the cod catch in 1990, up from 828 vessels taking in 5.9% of the cod catch in 1983. See Runolfsson, Birgir, 1999 Report to the Ministry of Fisheries, “On the Management Measures to Reduce Overcapacity in Icelandic Fisheries”, page 8.

<sup>71</sup> This is evidenced by the fact that the Fisheries Act only garnered the support of 11 out of 21 members of Parliament, the smallest possible majority, despite the obvious need for fisheries management reforms. See Runolfsson, Birgir, 1999 Report to the Ministry of Fisheries, “On the Management Measures to Reduce Overcapacity in Icelandic Fisheries”, page 4.

<sup>72</sup> The pelagic allocations were intended to be temporary. European Parliament Fisheries Note 2012, “*Rights Based Fisheries Management in Iceland and Economic and Financial Crisis*”, page 16.

<sup>73</sup> OECD, “*Country Note on National Fishery Management Systems – Iceland*”, 1997, page 17.

- The Minister of Fisheries determines the total annual catch (TAC) for each fishing year. The Minister receives scientific advice from the Icelandic Marine Research Institute (MRI) to inform the level at which to set the TAC.
- The Directorate of Fisheries, a government body under the Ministry of Fisheries, monitors the sector to ensure compliance. Much of the monitoring is performed through port controls and paper trails.<sup>74</sup>
- The Icelandic Coast Guard patrols the water in areas that are closed for fishing and performs checks to ensure that acceptable mesh sizes and other gear requirements are being followed.<sup>75</sup>

#### A.2.2.2. Features of the system

The main features of the QMS are:

- Quotas can only be allocated to vessels. They are fully transferrable with the exception of being traded to firms from different communities, but this restriction has never been enforced.
- The quotas are permanent shares of the annual TAC. Owners of quota are issued annual catch entitlements (ACE) which are granted in terms of the weight of catch permitted.
- Only up to half of any given vessel's ACE can be transferred to another vessel in each quota-year. This means owners are forced to harvest at least half of their quota share themselves.
- There is a restriction that the total combined TAC share across all fisheries attributed to any given firm cannot exceed 12% of the total value of the TAC.<sup>76</sup>

#### A.2.3. Outcomes

The current ITQ system applies to 25 different fisheries, which account for 98% of the landed value of all catches.<sup>77</sup> In terms of fish stocks, the demersal catch has been fairly stable at around 500 million tonnes. Cod is the most important inshore species, and constitutes roughly 40% of the demersal catch.<sup>78</sup> Only one of Iceland's major fish stocks has collapsed since the

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<sup>74</sup> Icelandic Fisheries Government Website, accessible at <http://www.fisheries.is/management/fisheries-management/enforcement/>

<sup>75</sup> Icelandic Fisheries Government Website, accessible at <http://www.fisheries.is/management/fisheries-management/enforcement/>

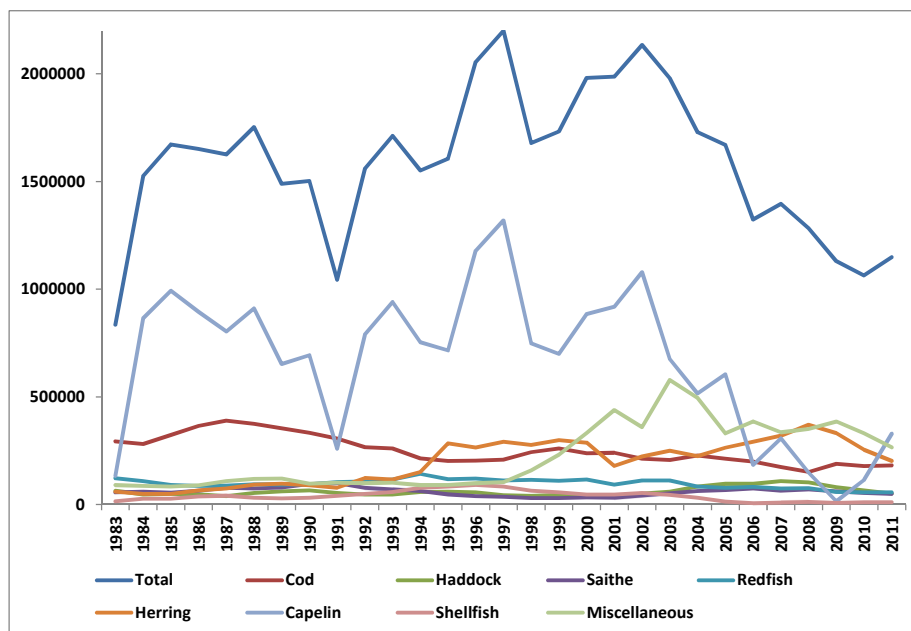
<sup>76</sup> European Parliament Fisheries Note 2012, "Rights Based Fisheries Management in Iceland and Economic and Financial Crisis", page 16.

<sup>77</sup> European Parliament Fisheries Note 2012, "Rights Based Fisheries Management in Iceland and Economic and Financial Crisis", page 15.

<sup>78</sup> OECD 2011 Review of Fisheries, page 276.

ITQ system began. This collapse occurred for the pelagic capelin stock in 2009, which has since recovered to a non-collapsed state.<sup>79</sup>

**Figure A.3**  
**Catch Harvests by Species in Tonnes under the ITQ Regime**



Source: Statistics Iceland

The other important demersal species are haddock, redfish, Greenland halibut and saithe. In 2011 the demersal species accounted for approximately 63% of the total catch value, while the pelagic harvest made up about 28% of the total catch value despite its much larger catch volume.<sup>80</sup> See Figure A.4. The value of the demersal species is far greater than the more voluminous pelagic catch since the latter is commonly used for low-value purposes such as fish meal or oil processing.<sup>81</sup>

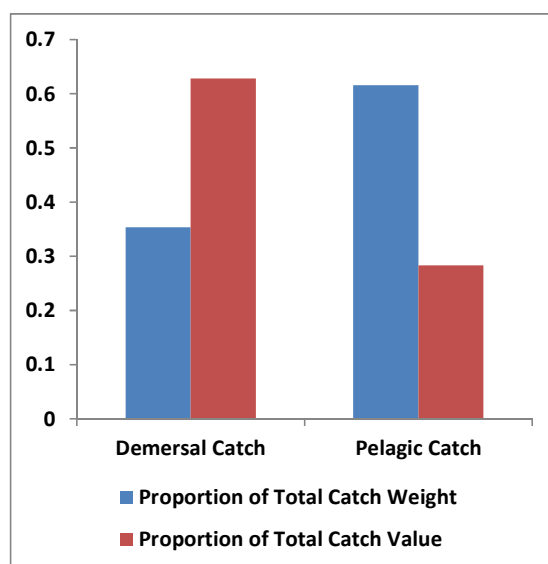
<sup>79</sup> We adopt the definition of collapse occurring if its harvest is less than one tenth of its highest historical level. The definition was employed in the widely cited Worm et al. “Impacts of Biodiversity Loss on Ocean Ecosystem Services”, Science, 2006, page 788. Other respected authors such as Costello et al. “Can Catch Shares Prevent Fisheries Collapse”, Science, 2008, page 1679, adopt the Worm definition of collapse in the absence of a measure that is based on widely available stock data.

<sup>80</sup> Statistics Iceland Data, accessible at: <http://www.statice.is/Statistics/Fisheries-and-agriculture/Catch-and-value-of-catch>

<sup>81</sup> OECD 2011 Review of Fisheries, page 277.



**Figure A.4**  
**Relative Catch Volumes and Values in 2011**



Source: Statistics Iceland

#### A.2.3.1. Ring fencing – issues related to the exemption of small vessels

As part of the 1983 reforms, quotas were issued to vessels above a threshold size of 10 Gross Register Tonnes (GRT). These quotas were allocated to fisherman operating in seven demersal fisheries based on historical catches over the previous three years. The system was implemented on a year-by-year basis beginning in 1984.<sup>82</sup> New entrants could accept quotas or abide by effort restrictions. However, catches of other species such as haddock, saith, and catfish remained unrestricted.<sup>83</sup> The effort option and the existence of major species and significant numbers of ships that were not covered by the system would prove to be highly problematic.

In 1983, there were 828 vessels of less than 10 GRT in the fishing fleet. These vessels were allocated a quota of 8,300 tonnes for the following season which was to be enforced through effort restrictions. They were largely unsuccessful; the small vessel fleet harvested 15,500 tonnes – almost double the designated amount. This represented 5.9% of the share of the total cod catch.<sup>84</sup> Their success at working around the effort restrictions beckoned an increasing number of small boats to enter the fishery.

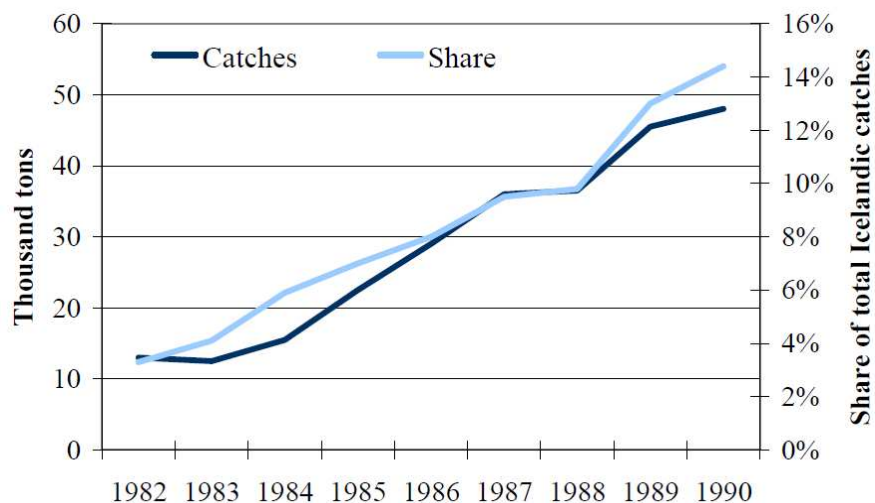
<sup>82</sup> European Parliament Fisheries Note 2012, “Rights Based Fisheries Management in Iceland and Economic and Financial Crisis”, page 14.

<sup>83</sup> European Parliament Fisheries Note 2012, “Rights Based Fisheries Management in Iceland and Economic and Financial Crisis”, page 17.

<sup>84</sup> European Parliament Fisheries Note 2012, “Rights Based Fisheries Management in Iceland and Economic and Financial Crisis”, page 17.

A new restriction was implemented in January of 1988 to attempt to curb the small boat expansion.<sup>85</sup> No new small boat larger than 6 GRT was permitted to enter the fisheries unless another boat of that size was taken out of operation or sold abroad. The restriction was ignored, however, and over 100 new boats of between 6 GRT and 10 GRT were added to the fleet between 1988 and 1990.<sup>86</sup> The number of small ships had increased to 1,600 by 1990. Their catches had risen to 48,000 tonnes by that time, which constituted 14.4% of the total.<sup>87</sup> See Figure A.5.

**Figure A.5**  
**Cod Catch Share of Small Boats (6 GRT to 10 GRT)**



Source: Runolfsson 1999

Following the 1990 reforms, boats of under 6 GRT were given the choice between entering the quota system that applied to the larger vessels or remaining outside the system and obtaining a hook license. Virtually all of them opted for the hook license. As a result, the system lacked comprehensive coverage of all agents yet again. The justification for the exemption option may have been based on reasons related to political economy – including all vessels in the quota system may not have garnered enough political support.<sup>88</sup>

In spite of the restrictions and a cap on harvests, the size of the small vessel fleet and its harvest increased significantly in the following years. In 1995, a special small boat ITQ system was implemented for the cod fishery which offered more fishing days than under the effort restriction option. Many small boat owners chose this option. However, the small

<sup>85</sup> Prior to 1988, entry into the small boat fisheries had been completely unrestricted.

<sup>86</sup> European Parliament Fisheries Note 2012, “Rights Based Fisheries Management in Iceland and Economic and Financial Crisis”, page 17.

<sup>87</sup> Runolfsson, Birgir, 1999 Report to the Ministry of Fisheries, “On the Management Measures to Reduce Overcapacity in Icelandic Fisheries”, page 8.

<sup>88</sup> European Parliament Fisheries Note 2012, “Rights Based Fisheries Management in Iceland and Economic and Financial Crisis”, page 18.

vessels that did not wish to join the ITQ system continued to cause problems with higher than expected catches.<sup>89</sup>

Numerous further reforms and experiments with additional restrictions were implemented over the years until eventually all small vessels were finally incorporated into the ITQ system in 2006-07.<sup>90</sup>

#### A.2.3.2. Challenges resulting from ITQ allocations and reforms to address discontent

The Icelandic ITQ system has been successful in ensuring the biological and economic sustainability of the fisheries resource. When the ITQ system was implemented, few parties believed that resource rents would be generated and little attention was paid to how these rents would be distributed.<sup>91</sup> The distribution of this newly created wealth has been a source of resentment from those that did not benefit from the allocations. There are many anecdotes of fishing vessel owners who received quotas in Iceland in 1984 and immediately sold them off and either began operating in fisheries that were not covered under the quota system or they changed ships to be able to operate under the small vessel exemption. These agents made a substantial windfall gain and also positioned themselves for the possibility for similar future gains when the system was expanded to include new fisheries in which they began operating.

In addition, attaching rights to vessels (and therefore vessel owners) rather than fisherman has been a particular source of controversy. Vessel owners do not always fish themselves. In some instances, such vessel owners sold their allocated quotas, requiring fisherman that operated their vessels to lease quotas from others. Hence, not only did fisherman benefit from the rents associated with the initial allocations of quotas, but they then went on to bear the cost of acquiring quotas to continue fishing.

The ITQ regime has been reformed in a number of ways to address some of these concerns. Reforms included:

- a new sentence was added to the opening paragraph of the Fisheries Management Act 1988. It states “[T]he fish stocks around Iceland are the property of the Icelandic People.” This sentence has been preserved in all subsequent revisions of the Act, thereby creating uncertainty about whether the ITQ system will eventually be undermined.<sup>92</sup> This has the effect of weakening the property rights and correspondingly making them less valuable.<sup>93</sup>

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<sup>89</sup> OECD, “*Country Note on National Fishery Management Systems – Iceland*”, 1997, page 17.

<sup>90</sup> European Parliament Fisheries Note 2012, “*Rights Based Fisheries Management in Iceland and Economic and Financial Crisis*”, page 17.

<sup>91</sup> European Parliament Fisheries Note 2012, “*Rights Based Fisheries Management in Iceland and Economic and Financial Crisis*”, page 9.

<sup>92</sup> European Parliament Fisheries Note 2012, “*Rights Based Fisheries Management in Iceland and Economic and Financial Crisis*”, page 16.

<sup>93</sup> An analysis of the level of security attributed to property rights and how this affects their value is performed in: Grainger, Corbett, and Christopher Costello, “*The Value of Secure property Rights: Evidence from Global Fisheries*”, April 2012 NBER working paper.

- in 1992, a restriction that if utilization of TAC is below 50% for two consecutive years then the vessel must forfeit its quota share.<sup>94</sup>
- in 2002, the Icelandic Parliament implemented a catch fee to reduce the tension caused by the free initial allocation of quotas. The fee is levied annually with the aim of recovering 9.5% of the estimated resource rent.<sup>95</sup>

Nonetheless, resentment over the allocation of rights has resulted in court challenges. In 1998, the Supreme Court of Iceland ruled that it was unconstitutional to restrict the right to fish to only those who held a title to a vessel during a specific period of time. However, another separate ruling concluded that the Ministry of Fisheries could allocate ITQs to a restricted group of people (i.e. vessel owners). These rulings are generally perceived to be contradictory.

After the second ruling, two fisherman that were not eligible for initial quota allotments deliberately disobeyed the law after having been refused their request for quotas. The Icelandic courts did not accept their arguments, so they brought their case to the UN Human Rights Committee. In October 2007 The UN Committee ruled that the initial allocation of quota had been a violation of the equality principle embedded in the International Covenant on Civil and Political Rights. It stated that the fisherman should be compensated for their losses and that the Fisheries Management Act be reformed to align itself with the spirit of the Covenant on Civil and Political Rights.

In response, the Icelandic Government announced that it did not accept to pay compensation to the fisherman but that it would be willing to consider a long term plan for directing the Icelandic Fishery Management System according to the Committee's suggestion. However, no action was taken – making revisions to the Fishery Management Act proved to be harder and more tedious than had been assumed.<sup>96</sup>

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<sup>94</sup> Arnason, R, "A Review of International Experiences with ITQs", CEMARE, 2002, page 27.

<sup>95</sup> European Parliament Fisheries Note 2012, "Rights Based Fisheries Management in Iceland and Economic and Financial Crisis", page 16-17.

<sup>96</sup> European Parliament Fisheries Note 2012, "Rights Based Fisheries Management in Iceland and Economic and Financial Crisis", page 21.

### A.3. Trading of Airport Slots in the United States

#### A.3.1. Background and rationale for reforms

In the United States, access to most airports is unconstrained. Airlines’ demand for slots at airports is accommodated according to the “first come first served” principle and airlines schedule their flights taking expected delays into account. In some congested airports, however, slot-control restrictions are in place to limit access to slots.

Slot-control restrictions were introduced as a result of excess demand and noise problems at congested airports. The starting point for slot-control restrictions was the High Density Rule (HDR) introduced in 1969. The reform categorised four airports as high-density airports,<sup>97</sup> and formally placed restrictions on the number of slots that could be used. Restrictions were imposed during specific hours of the day. Moreover, HDR specified the maximum numbers of permitted slots separately for “commuter” and “air carrier” slots. Commuter slots are for flights operated on smaller aircrafts, typically serving areas with commuter traffic, whereas air carrier slots are for flights operated on larger aircrafts that typically form part of the network of more established airlines.<sup>98</sup> The rationale for this distinction was to protect regional services to smaller airports. A summary of the restrictions imposed by HDR is presented in Table A.2 below.

**Table A.2**  
**Slot Restrictions under the High Density Rule**

	<b>JFK International Airport, New York</b>	<b>Washington National Airport</b>	<b>LaGuardia Airport, New York</b>	<b>O’Hare International Airport, Chicago</b>
Restricted hours	15:00 to 19:59	06:00 to 23:59	06:00 to 23:59	06:45 to 24:14
Air carrier slots (hourly limits)	63 to 80	37	48	105 to 120
Air carrier slots (per day)	361	670	864	1670
Commuter slots (hourly limits)	10 to 15	11	14	25 to 40
Commuter slots (per day)	62	234	252	435

*Source: based on Starkie (1991)*

Under HDR, airlines were granted antitrust immunity to discuss the allocation of slots. Airlines formed scheduling committees to coordinate the use of slots and schedule services. This system worked well initially. However, deregulation of the aviation industry in the late

<sup>97</sup> Initially, Newark Airport was also designated as a high-density airport, but slot-control restrictions were removed at Newark in 1970 and not reintroduced until 2008.

<sup>98</sup> The size threshold used for commuter slots was: (i) aircrafts with less than 75 passenger seats in the case of turbo-prop powered aircraft; and (ii) aircrafts with less than 56 passenger seats in the case of jet aircrafts.

1970s led to rapid growth in the sector. This growth resulted in increased demand for airport slots, but under the High Density Rule, new entry was “virtually non-existent”.<sup>99</sup>

To allocate scarce capacity in the face of excess demand, and particularly to facilitate new entry, secondary trading of slots at airports was introduced in 1985 through the Buy/Sell Rule (BSR). The BSR is the formal focus of this case study. Although BSR is now only in operation at Washington National Airport, it marks the point at which secondary trading was first introduced. Secondary trading has continued at high-density airports even where BSR no longer applies.

### **A.3.2. Features of the reform**

Under BSR, from 1 April 1986:

- airlines were allocated slots on the basis of grandfathering (with no fees charged);
- five per cent of existing slots were retained by the regulator, the Federal Aviation Authority (FAA). Unused slots were made available through a lottery in which 25 per cent were initially offered to new entrants;
- a “use it or lose it” rule was put in place, whereby slots needed to be used 80 per cent of the time over a two month period. Such slots were also reallocated by the FAA through a lottery, with a 25 per cent provision for new entrants;<sup>100</sup>
- the Rule maintained the distinction between commuter and air carrier slots, using the same proportions as HDR. Commuter and air carrier slots were ring-fenced, resulting in separate secondary markets for the two types of slots;
- international slots were also ring-fenced from the trading system, although they could be exchanged on a one-for-one basis for other international slots.<sup>101</sup> The rationale for ring-fencing international slots was that these were governed by separate, international, regulations;
- no restrictions were placed on who could trade the slots – i.e. third parties were allowed to participate in secondary trading.

A feature of the Rule was that it did not formally transfer ownership of slots to airlines. Instead, airlines were granted “operating privileges” over the slots, with the FAA retaining ownership. Moreover, under the 1958 Air Transport Act, the FAA continued to have the legal power to withdraw slots from airlines. This power has been used by the FAA in negotiations with airlines to voluntarily reduce the number of slots to reduce delays.<sup>102</sup> In addition to formally owning the slots and reallocating returned slots, other roles of the FAA include: recording all trades; having ultimate authority to approve trades, although in practice the FAA did not approve all trades individually; and enforcing the “use it or lose it”

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<sup>99</sup> Starkie, D (1994) “The US market in airport slots” *Journal of Transport Economics and Policy*, Vol 28, No 3, p325-329.

<sup>100</sup> The 80 per cent requirement was introduced in 1994, and the original requirement was for slots to be used at least 65 per cent of the time in a two month period.

<sup>101</sup> Domestic slots could also be used for international flights.

<sup>102</sup> Mott McDonald (2006) “Study on the Impact of the Introduction of Secondary Trading at Community Airports”, p42

provisions of the rule, although the FAA relies on airlines to report usage. As with many other sectors in the US, the Department of Justice is responsible for enforcing antitrust laws. A feature of the application of anti-trust laws to airport slots is that carriers have sometimes been asked to release slots as a condition for approving proposed mergers.

Trading in the secondary market for slots is predominantly through bilateral negotiations between airlines. Bilateral negotiations are sometimes facilitated by meetings organised by the trade association for airlines (the Air Transport Association at the time of the reforms). Airlines, however, also negotiate slot trades outside of such meetings. The bilateral nature of trades means that value of trades is typically not reported.

Different types of trades are allowed under the Rule, including: sales; leases; and swaps. Trading is facilitated by a simplified regulatory framework, compared to, for example, arrangements in the European Union. In particular:

- the US framework explicitly recognises the ability of slot holders to trade, whereas the EU framework requires a complex legal process to trade slots;<sup>103</sup> and
- the US framework distinguishes between slot holders and slot operators. This simplifies the legal process for temporary trades, as the exchange of operating rights does not require changes to the underlying title.<sup>104</sup>

### **A.3.3. Outcomes**

In the section below, we review the outcomes associated with the introduction of BSR, focussing in particular on those issues with greatest relevance to water abstraction. We review:

- the experience of ring-fencing commuter slots;
- the role of third parties in slot trading;
- the experience of trading and market entry; and
- reforms that were subsequently introduced to address perceived shortcomings of BSR.

#### **A.3.3.1. The experience of ring-fencing commuter slots**

Commuter slots were ring-fenced by the BSR so that these could be traded only with other commuter slots. The rationale for this provision was to protect aviation services to and from smaller communities. However, ring-fencing of commuter slots has been felt to undermine the efficient allocation of airport slots. In part, this is because of the way in which commuter

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<sup>103</sup> The EU directive on airport slots is considered to be unclear on the provisions for secondary trading. This is evident from the different ways in which regulations have been interpreted by member states. For example, the UK has allowed secondary trading at congested airports, whereas Spain has made secondary trading illegal.

<sup>104</sup> SDG (2011) “Impact Assessment of Revisions to Regulation 95/93”, European Commission

slots have been defined, which is on the basis of aircraft size. For example, a report by the Transportation Research Board in 1999<sup>105</sup> noted that:

*“Perhaps the most enduring criticism is that they allocate access to key airports on arbitrary distinctions among operators of large jet, commuter, and general aviation aircraft rather than on the most efficient use of the slots. About 20 percent of the operations at LaGuardia and one-third at Reagan National are by nonjet aircraft (DOT 1995). This is because the class-based assignments of slots were left unchanged by the 1985 buy/sell reforms, even though the majority of air travellers fly in larger commercial jets and would benefit from the shifting of an increased share of slots to larger aircraft.”*

The separation of commuter and air carrier slots has led to the development of the commuter segment in a way that complements the operations of major carriers. In particular, the majority of commuter carriers entered into codesharing agreements<sup>106</sup> with major carriers to take advantage of network externalities. Analysis of commuter carriers by TRB (1999) concluded that “many commuter airlines have become – or act as – subsidiaries of their larger codeshare partners.” Once BSR was replaced at some airports in 2000 and the slot-controls of HDR were phased out, there were significant changes in the number of commuter slots – for example, between 2001 and 2000, the removal of slot-controls at Chicago O’Hare led to the number of commuter slots being reduced from 540 to 224.

#### A.3.3.2. Role of third parties

A feature of the reforms introduced by BSR was that any party was allowed to acquire operating privileges over airport slots. This has led to third parties, particularly financial institutions, assuming “ownership” of slots. Table A.3 below shows how the share of slots owned by financial institutions at the high-density airports changed between 1986 and 1999.

**Table A.3  
Percentage of Domestic Air Carrier Slots held by Financial Institutions**

<b>Airport</b>	<b>1986</b>	<b>1991</b>	<b>1996</b>	<b>1999</b>
Chicago O’Hare	0	3	2	3
New York JFK	0	19	6	1
La Guardia	0	7	20	10
Washington National	0	7	19	14

Source: GAO (1999)

The US experience suggests that third parties have not acquired airport slots for speculative purposes, with Mott McDonald (2006) concluding “there is no observable trend suggesting

<sup>105</sup> TRB (1999) “Entry and Competition in the US Airline Industry: Issues and Opportunities” Transportation Research Board: Special Report 255.

<sup>106</sup> Codesharing agreements allow two or more airlines to share a flight, even though the flight is operated by only one of the airlines. Codesharing means that all of the airlines party to the agreement can sell seats on the flight, and advertise the flight using their own flight numbers.



that financial institutions, such as hedge funds, have sought to invest in slots as investment assets”. Instead, financial institutions have typically acquired airport slots as collateral for financial transactions by airlines. Moreover, airlines have also used the value of slots to overcome financial difficulties – for example, Northwest Airlines sold many of its slots in 2000 to financial institutions, but continued operations by leasing slots through the secondary market.

Although financial institutions have not acquired slots to draw incomes, airlines have in some cases set up entities with the specific intention of holding slots – for example, CalAir is a subsidiary of Continental Airlines, which does not operate any services, but holds slots at Washington National Airport. This has allowed Continental Airlines to retain its valuable slots, and draw income from leases. In addition to financial institutions, other third parties that have acquired slots include local communities to enhance services to their region’s airports or local regional airports.<sup>107</sup>

**A.3.3.3. Experience of trading, consolidation by dominant airlines, and entry**

Trading volumes were substantial immediately after the introduction of the Rule, reflecting an initial sorting of the market. In particular, sales accounted for a larger proportion of transactions than leases. The volume of sales declined somewhat in 1987 and 1988, but then steadily rose to levels higher than the year in which the reforms were introduced. The volume of leases generally increased in the years after the introduction of the Rule. By 1989, the overall volume of trade was estimated to be, on annual basis, higher than 50 per cent. The volumes of transactions between 1986 and 1992 are shown in Table A.4.

**Table A.4  
Summary of Transactions for Slots at US High-Density Airports**

<b>Year</b>	<b>Leases</b>	<b>Sales</b>	<b>Transactions</b>
1986	242	375	617
1987	622	152	774
1988	670	64	734
1989	1,259	290	1,549
1990	1,294	403	1,697
1991	1,468	477	1,945
1992	1,178	310	1,488

*Source: IEA (2003)*

One feature of the experience of slot sales was the consolidation of slots by dominant carriers. Table A.5 shows the share of dominant carriers between 1986 and 1999, the last year before

<sup>107</sup> For example, Greenville Spartanburg Airport (South Carolina) and Savannah Airport Commission (Georgia) held slots at Chicago O’Hare airport, although these slots were not purchased by provided by the FAA as part of exemption slots following the AIR-21 reform (see below).

the AIR-21 reforms (see below) were introduced. The table shows that the share of dominant carriers increased over time after the introduction of the BSR.

**Table A.5  
Percentage of Domestic Air Carrier Slots held by Major Airlines at US High Density Airports**

<b>Airport</b>	<b>Holding Entities</b>	<b>1986</b>	<b>1991</b>	<b>1996</b>	<b>1999</b>
Chicago O'Hare	American and United	63	83	87	84
New York JFK	Shawmut Bank, American and Delta	43	60	75	84
La Guardia	American, Delta and US Airways	27	43	64	70
Washington National	American, Delta and US Airways	25	43	59	65

*Source: GAO (1999)*

In addition to the consolidation of slots by dominant carriers, entry following the introduction of the Rule remained limited. Indeed, a report by the General Accounting Office (GAO) concluded that the number of new entrants had been “negligible”. The different explanations that have been offered for why this has occurred are given below. As discussed below, some of these concerns are reflected in the reforms that have replaced the Rule, as well as other reforms that have been contemplated but not implemented:

- slots in the US are defined only as rights to land or take-off at an airport, and do not entail access to other parts of the airport’s infrastructure (for example, gates).<sup>108</sup> Such infrastructure is often leased by dominant airlines for long periods, and thus entrants must, in addition to acquiring slots, separately negotiate access terms for using other infrastructure;
- entrants typically require several slots to make a service viable. In practice, a substantial number of slots have typically only been available when airlines have exited an airport or filed for bankruptcy;<sup>109</sup>
- the value of slots to large carriers was substantially higher because of network effects;
- the bilateral nature of trading meant that trading is not transparent. This may have resulted in interested carriers not being aware of opportunities to acquire slots.<sup>110</sup> However, OECD (2006) suggests that transparency may have hindered trading – sellers would know the identity of potential buyers, and would not be willing to sell or lease slots to competitors; and

<sup>108</sup> This is unlike the EU, where slots entail the full use of airport infrastructure.

<sup>109</sup> OECD (2006) “Roundtable on Ensuring Access to Key Capacity for New Entrants”, p11

<sup>110</sup> SDG (2011) “Impact Assessment of Revisions to Regulation 95/93”, European Commission

- the initial allocation of 95 per cent of slots to incumbents left only a limited number of slots for reallocation.

Despite reforms to replace the Rule in many of the high-density airports, many studies have drawn different conclusions regarding the experience of the Rule. Such studies have pointed out that there have generally been no instance of aggressive entry in the aviation industry as a whole, and thus the experience of limited entry at high-density airports is not unique.<sup>111</sup> Moreover, many studies have suggested that the consolidation of slots by dominant carriers might represent an efficient outcome. Examples of such studies include:

- Kleit and Kobayashi (1996), which analysed slot usage at the US's most concentrated airport, Chicago O'Hare, and concluded that the evidence was more consistent with the observed concentration being the result of efficiency considerations rather than with anti-competitive behaviour;
- Morrison and Winston (1997), which reports that there is in fact no evidence that new entrants have fewer slots at controlled airports than at other airports once the impact of Southwest Airlines (which had a strategy of avoiding congested airports) is corrected for. Their calculations show that new entrants airlines provide 8 per cent of passenger miles at slot-constrained airports and 20 per cent at airports that were not subject to slot coordination. When excluding Southwest Airlines, the share of new entrants at non-slot constrained airports falls to 10 per cent, roughly comparable with their share at slot-controlled airports; and
- Czerny and Tegner (2002), which suggests that consolidation of slot by dominant carriers may not be a result of market failure but of market efficiency – hub networks create positive network effects and the high prices at constrained airports may be an efficient way of allocating scarce capacity.

#### A.3.3.4. Subsequent reforms

Concerns about the competitiveness of the US airline industry resulted in the Aviation Investment and Reform Act for the 21st Century (AIR-21). The Act was enacted in April 2000 and has, over time, replaced the Buy/Sell Rule at all of the high-density airports except for Washington National. To stimulate airline competition, the Act allowed the FAA to grant so-called exemption slots to applicants. Such slots were provided at no cost, but could not be traded or transferred to other carriers. This system effectively removed the cap on slots available at airports, and allowed the FAA to add more slots to serve new requests. Following the Act, a large number of requests were made for exemption slots, which resulted in severe delays. For example, in 2000, over 600 exemption requests were submitted and approved for new flights to LaGuardia airport (where prior to the implementation of the AIR-21 exemptions, just over 1,000 daily operations had been scheduled). By November 2000, around 300 new flights had started operating and average daily delays increased by over 230 per cent. Moreover, the availability of exemption slots has also undermined secondary trading of slots.

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<sup>111</sup> IEA (2003) "A Market for Airport Slots", Institute of Economic Affairs

In response to the delays that followed the enactment of AIR-21, several reforms have been considered for the efficient allocation of airport slots. Such proposals have typically aimed to address some of the perceived shortcomings of the Buy/Sell Rule. For example, in 2007, proposed reforms for LaGuardia airport included:

- grandfathering only 85 per cent of slots (compared to the 95 per cent under Buy/Sell Rule). Airline would be given “operating authorisation” over such slots, which would have a lifespan of between 3 and 13 years. The intention was for 10 per cent of slots to be withdrawn each year from 2010, and then redistributed;
- of the 15 per cent of slots retained, 5 per cent would be retired and 10 per cent would be allocated through an auction;
- increased transparency through the advertising of all available sub-leases on an FAA bulletin board.

Such reforms, however, have not been implemented because they have conflicted with other Federal rules or have been opposed by the industry. This has meant that temporary restrictions to address delays at airports where the Buy/Sell Rule no longer operates have been repeatedly renewed.

## A.4. The European Union Emissions Trading Scheme

### A.4.1. Background and rationale for reforms

The European Union Emissions Trading System (EU ETS) was established through EU legislation in October 2003 and began operation from the beginning of 2005. It was the first international emissions trading scheme to be introduced and still remains the largest such scheme in terms of the volume and value of trades. The EU ETS is the cornerstone of the EU policy to tackle climate change, regulating greenhouse gas emissions from the most energy intensive installations across the region.<sup>112</sup> The market-based regulation was introduced to facilitate achieving emission reduction targets agreed under the Kyoto Protocol and to drive long term investment in both clean energy technologies and energy efficiency measures.<sup>113</sup> The policy has forced regulated companies to consider the level of emissions as an additional cost when making production decisions.

The EU ETS applies to certain energy intensive users that have significant greenhouse gas emissions, initially covering over 12,000 installations and representing approximately 45% of carbon dioxide emissions across the EU.<sup>114</sup> Sectors covered by the scheme include the power sector, refining processes and industrial producers of materials such as iron and steel, aluminium, cement and paper. Participation in the market to trade pollution permits has increased significantly over time. In 2011 the total value of all transactions was almost \$150 billion.<sup>115</sup>

Initially, each country within the EU defined annual national emissions caps and laid out plans to allocate allowances to pollute to installations based within their country. Combined together, these national caps defined an EU-wide cap on emissions. Permits to pollute, or allowances, could then be traded with other installations or intermediaries at an agreed price. The allowances (known as EUAs) were designed to be homogenous so that they could be used anywhere across the EU, regardless of their origin.

In theory, through adopting a market-based approach, as the EU ETS is, the environmental objective – established through the cap on emissions – can be achieved at a lower cost than ‘command and control’ regulation where the regulator does not have full information on the abatement costs of different polluters in the market. The trading of allowances and the creation of a market has established a carbon price that broadly reflects the constraints of the cap as well as supply and demand fundamentals. Furthermore, the monitoring and reporting of emissions in the EU ETS has greatly improved the extent to which data has been made publicly available.

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<sup>112</sup> Initially the EU ETS just covered CO<sub>2</sub> emissions. Subsequently additional greenhouse gases have been incorporated into the scheme, represented in terms of equivalent units of CO<sub>2</sub> in order to ensure that all permits are identical.

<sup>113</sup> The Kyoto Protocol is a United Nations lead legally binding international emissions cap and trade scheme, requiring signatories in developed countries (the European Union make up a significant proportion of these), to reduce their emissions of certain greenhouse gases. The first commitment period of the Kyoto Protocol covered the years 2008 to 2012.

<sup>114</sup> The number of installations covered by the regulation has since reduced, but is still above 10,000.

<sup>115</sup> World Bank, State and Trends of the Carbon Market 2012, May 2012.

## **A.4.2. Features of the reform**

The EU ETS was ambitious in the range of industries as well as the number of countries included within its coverage. The design and implementation of the scheme had to follow a relatively fast timetable in order to prepare the EU to meet its obligations under the Kyoto protocol and allow for a trial phase prior to the beginning of the first Kyoto commitment period.

Legislation was adopted by EU Member States in 2003 that set out three phases of the EU ETS starting with a pilot Phase I that ran from 1 January 2005 until the end of 2007. Phase II then mirrored the Kyoto first commitment period between 2008 and 2012. A third Phase was also established beyond the first Kyoto compliance period, set to run from 2013 until the end of 2020. The phased approach to designing and operating the scheme provided pre-established intervals for the regulator, the European Commission and national governments, to incorporate lessons learnt into amendments to the governing policy. However, one downside of the phasing was that it has created additional uncertainty amongst market participants regarding future features of the regulation.

### **A.4.2.1. Phases I and II**

- For Phase I and Phase II of the EU ETS, each country was responsible for setting its own cap, which was then combined together into the total EU cap, subject to approval by the European Commission.
- The cap in Phase I was based on estimated emissions of the regulated installations due to the lack of credible data available at the time. For subsequent phases, governments were able to draw on actual production and emissions data that had been monitored, verified and reported during the initial years of the regulation.
- In the first two phases of the EU ETS, allowances were predominantly allocated out for free via grandfathering, based on historic emissions data. Only limited provisions for auctioning were included.
- In addition to allocating allowances to existing installations, Member States also set aside a pool of spare allowances to allocate to new entrants. New entrant allocation featured in the plans of most countries for Phases I and II of the EU ETS, although to differing degrees of detail. A pre-specified reserve was commonly maintained and allocated on the bases of technology benchmarks.
- Each compliance period runs for one year, after which regulated installations are required to submit a number of EUAs directly corresponding to the number of tonnes of CO<sub>2</sub> emitted over the year.
- Installations must engage in ongoing monitoring and reporting of emissions, which are then verified. The required number of allowances must be surrendered within three months of the end of the compliance period. Should there be a deficit of allowances, the

offending installation is required to pay a fine directly proportional to the size of its deficit.<sup>116</sup>

- Banking<sup>117</sup> of allowances between years belonging to the same phase has always been permitted. Banking of allowances between phases was not permitted in Phase I. This was amended so that from Phase II allowances could be banked for use in subsequent phases.
- The EU ETS initially covered the 25 members of the EU when it started in 2005. Additional countries have been added to the EU ETS since its inception, widening the geographical scope of the scheme. Norway, Liechtenstein and Iceland joined for Phase II.<sup>118</sup> Furthermore the European Commission is keen to join the scheme with other countries operating emissions cap and trade mechanisms with current plans in place to link in with Australia from 2015.

#### A.4.2.2. Phase III amendments

In preparation for the third phase, set to run from 2013 until 2020, in 2008 the EU adopted the Energy and Climate Package of reforms, incorporating much deeper harmonisation of the EU ETS across the participating countries.

- National caps have been replaced by a single EU cap and central allocation rules for handing out allowances are now determined also at the EU level.
- From allocating allowances primarily through grandfathering, Phase III has seen a transition towards benchmarking and increased auctioning of allowances.
- New entrants are allocated allowances from a central reserve corresponding to 5 percent of all allowances. These are allocated according to technology benchmarks. Additionally, a portion of the reserve has been set aside to support investment in demonstration projects for innovative renewable energy technologies.

#### A.4.3. Outcomes

##### A.4.3.1. Creation of a marketplace

The creation of the market revealed useful information about the abatement costs and production activities of regulated companies through both the market price signal and the required monitoring, reporting and verification procedures. In Phase I, allocations of permits to pollute were based on estimates of historic emissions for the installations that were covered by the regulation. This turned out to significantly overestimate emissions levels, causing a price collapse once compliance data was made public after the first year. However, it meant

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<sup>116</sup> The fine per allowance not surrendered was set at €40 per EUA that was not surrendered in Phase I, prior to a market price being established. The fine was not too high in the pilot phase, given uncertainties regarding how the market would work and in order not to over-penalise installations as they adapted to the regulation. From Phase II, the fine was raised to €100 per EUA, significantly above the expected EUA market price, in order to ensure the effectiveness of the cap.

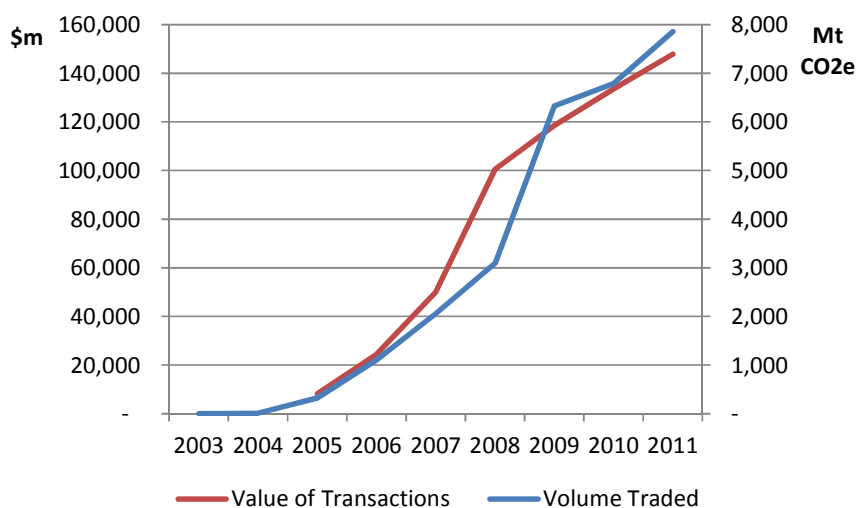
<sup>117</sup> Banking refers to the process of holding on to allowances issued during a given period to then use them for compliance in a subsequent period.

<sup>118</sup> Bulgaria and Romania joined in 2007 for the last year of Phase I as part of their entry into the EU.

that the governments responsible for setting the caps for Phase II had significantly improved emissions data at an installation level on which to base their revised caps. The pilot phase was therefore successful at initiating a price signal as well as providing data on the extent and variability of emissions across countries, sectors and production activities.

Figure A.6 shows how the market for permits has evolved over time. In the first year of the scheme, in 2005, just over 300 million permits were transacted with a total transaction value of approximately €8bn. By 2010 almost 7 billion permits were transacted, representing a market of close to €140bn.

**Figure A.6**  
**Volume and Value of EU ETS transactions**



Source: World Bank State and Trends of the Carbon Market, editions 2004 – 2012

The trading of allowances got underway early and experienced very significant year-on-year growth. The first bilateral trade of an EUA for future delivery was in February 2003, shortly before the official legislation was adopted by EU Member States. By 2004, still prior to the start of the first compliance year, significant trading was carried out in the marketplace, largely via over-the-counter (OTC) transactions. As shown above in Figure A.6, following the start of the scheme in 2005 the size of the market in terms of both the volume of transactions and their value increased steeply, establishing clear, publicly available price signals to emitting installations covered by the regulation.

#### A.4.3.2. Allowance allocation

The initial allocation of allowances to pollute is one of the key decisions faced by the regulator in the EU ETS as allowances can hold significant value. According to economic theory the allocation of allowances should not affect the efficiency of the trading scheme. However, the choice of allocation procedure has distributional effects that influence the competitiveness of industries, dependent upon their ability to pass through costs. Even if the allowances do not represent a *direct cost* to regulated companies – if they are issued for free – they do represent an *opportunity cost* as the recipient of any free allocation is still able to sell



the allowances on at a price. This has been an important consideration in the EU ETS and the evolution of its allocation mechanisms.

There are three principle ways to allocate allowances that have been used in the EU ETS; grandfathering, benchmarking and auctioning. The first two involve handing out allocations free of charge to regulated companies. Grandfathering distributes allowances to installations for free based on historic emissions levels. Benchmarking segments regulated companies into sectors and subsectors and distributes allowances based on performance standards for a particular production activity, commonly allocating a number of allowances corresponding to the amount required by the more efficient installations. The third mechanism, auctioning, distributes allowances for a price to bidders under a competitive auction.

In Phase I and II of the EU ETS the allocation of allowances was defined by individual Member States with the condition that only 5% of a country's allowances could be auctioned in Phase I, rising to 10% in Phase II.<sup>119</sup> This central ruling was intended to ease the immediate burden on regulated installations as they adapted to the scheme and to mitigate competitiveness issues for those companies that relied on demand for their goods from outside the EU. In the first two phases allocation was predominately carried out via the grandfathering mechanism, based on historic emissions data.

As mentioned above, the lack of data prior to the scheme's beginning lead to overestimates of the allowance requirements for most installations and caused a price collapse, once this was understood in the market. However, in Phase II the available data allowed for more informed allocation decisions to be made by each country, thus tightening the cap.

Different approaches taken by the individual Member States caused distortions in intra-EU competitiveness. Allocating allowances to companies that could pass through all their costs (discussed in section 1.3.3 below) also lead to windfall profits, most notably in the power sector.<sup>120</sup> Therefore, significant changes were made to the EU ETS for Phase III that centralised the allocation procedures and moved away from grandfathering towards benchmarking and auctioning of allowances. The EU Climate and Energy Package of reforms, adopted in Dec 2008, set out that free allocation would be stopped from 2013 for the power sector, with a few exceptions<sup>121</sup>, and gradually phased out for other sectors between 2013 and 2020, dividing approaches between sectors subject to global competition and those that are not. Instead of grandfathering allowances to installations, a benchmark approach has been taken from 2013, reflecting the average performance of the top 10% of a sector or subsector in terms of energy efficiency.

The EU ETS policy has therefore transitioned over time from one which allocated most allowances for free to one which is gradually moving towards auctioning, imposing a direct cost to polluters. Auctioning allowances, rather than allocating them for free also provides a

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<sup>119</sup> In practice, significantly less auctioning was carried out than this upper limit. In Phase I only a handful of countries carried out any auctioning. These were Denmark, Hungary, Ireland and Lithuania.

<sup>120</sup> In order to address the concerns of windfall profits more allocations were withdrawn from the power sector for auctioning in Phase II in countries such as Germany and the UK, two of the largest emitters. However, this remained within the cap of 10% of all allowances, but paved the transition towards full auctioning for the power sector in Phase III.

<sup>121</sup> A limited number of exceptions have been granted to countries with under-developed power sector infrastructure.

transfer of funds from the private sector to government. The original EU ETS Directive of 2003 specifies that at least 50% of auctioning proceeds are to be re-invested in low carbon growth. Auctioning therefore has provided significant funds for governments to stimulate the green economy as well as generating additional revenue for general use. This will be even more significant in Phase III as auctioning becomes the standard allocation procedure.

#### A.4.3.3. Cost pass through

Power generators in the EU are subjected, almost solely, to competition from within the region as electricity cannot be easily transported across significant distances. As a result, the power sector has been able to pass through the majority of the allowance costs they incur from production.<sup>122</sup> Empirical studies carried out in Germany and the Netherlands over the first year of the EU ETS showed opportunity cost pass-through rates varying between 60% and 100% for the wholesale electricity market.<sup>123</sup> Regulated manufacturing plants faced higher electricity costs as a result. The EU ETS therefore introduced both *direct costs* to regulated installations, in terms of the requirement to surrender allowances, and *indirect costs* to manufacturers, in terms of higher electricity prices.

The ability to pass through costs varies across regulated companies. Power generators were the main cause for concern in the EU ETS as their ability to pass through costs effectively offered them windfall profits from the allowances they were allocated for free. Manufacturing industries facing strict international competition were less able to pass through their additional costs. At the end of 2006, following two years of the EU ETS, McKinsey and Ecofys carried out a review on international competitiveness for companies regulated by the scheme in order to inform policy decisions going forward. The review found that there was a threat that some production activities in the steel, cement, aluminium and pulp and paper sectors could be relocated to outside the EU ETS region as a result of the regulation.

In the case of steel and cement production the largest burdens of the regulation were from direct costs, whereas for aluminium and certain energy intensive pulping the indirect costs from electricity consumption were found to be most significant. However, through offsetting these costs with free allocation of allowances, the net costs of the scheme were found to range between zero and 6 percent of the total production costs for the industries reviewed. For most installation types the figure was below 2 percent. Recognising the potential threat of production relocation, the EU ETS has maintained significant proportions of free allocation in Phase III for sectors that were assessed to face international competition and that therefore struggle to pass through their increased costs successfully.<sup>124</sup>

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<sup>122</sup> The most efficient generation plants are able to fully pass through their additional costs. Less efficient plants are able to pass through only a portion of their allowance costs.

<sup>123</sup> Sijm, J, K.Neuhoff and Y. Chen, CO2 Cost Pass Through and Windfall Profits in the Power Sector, CWPE and EPRG working paper series, May2006.

<sup>124</sup> The threat of production relocation for individual sectors was assessed on the basis of two measures: carbon intensity of production and trade intensity. Sectors with either particularly high carbon intensity, high trade intensity or a relatively high level of both measures were granted free allowances according to the benchmarking principal.

#### A.4.3.4. Market participants

Trading of allowances within the EU ETS takes place for a variety of different purposes. Central to the scheme are compliance buyers that are required, via the legislation, to surrender sufficient allowances to cover their emissions. There are over 5,000 compliance buying companies in the EU ETS that operate the regulated installations. Many of these companies have been allocated allowances based on their historic emissions levels. However, they may still need to enter the market should they require additional allowances, where emissions are projected to be above their allocation, or if they have surplus allowances that they wish to monetise. Regulated companies therefore participate in the market in order to satisfy their eventual compliance needs and to perform risk management operations.

The EU ETS is also host to a wide range of third parties that are not, themselves, required to surrender EUAs, but instead offer brokerage and trading services, or participate in the market purely for arbitrage or profit making opportunities. The World Bank's review of market participants in the first year of the EU ETS noted that trading was initially carried out by energy companies as they already had existing trading arms with expertise in the power, gas and fuel markets. Other sectors were relatively new to trading, or were too small to dedicate significant resources to it, and thus were slower to enter the market.<sup>125</sup> Investment banks and brokers sought out these companies in order to facilitate transactions on their behalf. Consequently, investment banks, hedge funds and other financial institutions represented a large share of traded volumes in the first years of the EU ETS, in addition to the energy companies' trading arms.

Given the expansion in the size of the market and the commoditised nature of allowances, exchanges included EUA transactions within their product offerings from 2005. Initially the vast majority of transactions were carried out OTC, either bilaterally or via a broker.<sup>126</sup> However, over time trading via exchange platforms has increased as a share of the market.<sup>127</sup> Additionally, as the market has matured and become more established the products, and derivatives of them, have increased in complexity.

The activity of third parties in the EU ETS market has served to increase liquidity. Brokers and banks have also offered their services to allow manufacturing companies, with limited or no trading background, to access the market and engage in risk management activities. However, the value of the market has also encouraged some less positive participation. In 2009 evidence emerged that participants had been transferring EUAs between countries to commit VAT fraud. Also, in the same year, an attempt was made to hack the German registry account in order to transfer out allowances. These instances highlighted the significant value of allowances and size to which the market had grown, which has both contributed to the effectiveness of the scheme as well as posed additional threats to the security of transactions.

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<sup>125</sup> World Bank, State and Trends of the Carbon Market 2006, May 2006.

<sup>126</sup> In 2007 approximately 80 percent of the market for EUA transactions were carried out OTC. (Source: World Bank, State and Trends of the Carbon Market 2008, May 2008)

<sup>127</sup> The five main exchanges for EUAs include ECX, EEX, Nord Pool and Bluenext. Bluenext announced its closure in late 2012.

Finally, allowing third parties to acquire emissions allowances has also led to environmental groups purchasing such allowances to reduce the overall level of emissions.

## A.5. Tradable Gas Transport Capacity Rights in the United States

### A.5.1. Background and Rationale for Reforms

The US interstate natural gas pipeline network is an expansive and integrated transmission system that can transport gas to and from nearly any location in the lower 48 States. The interstate pipeline grid comprises more than 220,000 miles of pipelines. When building new pipeline transport capacity, US gas pipelines use a “contract carriage” approach to contract with gas shippers for the new gas transport capacity so that the pipeline can fund the project at a reasonable capital cost. With contract carriage, gas local distributors sign “arm’s-length” contracts with gas pipelines for firm transportation service, with “just and reasonable” and “non-discriminatory” tariffed rates set by the Federal Energy Regulatory Commission (FERC). In the US, this approach has been used since the 1930s.

Until the mid-1980s, the contract carriage approach meant that gas pipelines provided a “bundled” gas sales and transportation service.<sup>128</sup> Pipelines would buy natural gas from producers and ship that gas to distributors on their pipeline system. In the late 1970s, the price of gas was set “administratively” rather than by the market. By the early-1990s, the price of natural gas was completely decontrolled, with the price of gas set by the market rather than administratively.

Once the price of natural gas was decontrolled, FERC recognized that the regulation of natural gas pipeline transportation needed to be reformed in order to promote “gas-on-gas” competition. In particular, to support competition in the gas commodity itself, first of all, the transportation of gas would need to be rationalised in ways that support competition in gas. Second, gas customers would need to be willing to switch. Finally, market liquidity was needed.

### A.5.2. Features of reforms

To facilitate competition in the gas industry, FERC introduced reforms in 1992 that led to the creation of a “capacity release” market. The capacity release market provides a secondary market for pipeline capacity rights held by shippers of natural gas on gas pipeline carriers.”<sup>129</sup> Shippers are typically local gas distributors, gas-fired electric generators, and natural gas marketers.

FERC’s capacity trading rules were promulgated in 1992 through FERC Order No. 636. The Order led to the unbundling of up- and downstream activities of pipelines. Rather than just obliging pipeline companies to provide transportation service without favouring their own source of supply, this Order required interstate pipeline companies to separate their sales and

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<sup>128</sup> FERC did not deal with stranded costs directly when reforming natural gas pipeline regulation, but FERC did eventually craft a “grand bargain” where pipelines would be able to recover roughly 50 percent of their take-or-pay costs if they voluntarily agreed to provide open and nondiscriminatory service to customers.

<sup>129</sup> The U.S. experience with natural gas restructuring is relevant to the development of a secondary market in water abstraction—the U.K. natural gas market does not have similar experience. The U.K. lacks the necessary gas market institutional and regulatory arrangements, which make it possible for a robust secondary market in tradable capacity rights to develop. In the U.K., a National Balancing Point is used that is “virtual” in nature rather than a physical spot, such as Henry Hub in the U.S. Thus, while, in the U.S., it is easy to determine basis differentials relative to Henry Hub, this is only “notionally” possible in the U.K.

transportation services and to offer a common service and tariff to all users. Order 636 required that all users have access to the same standards of service, and a common tariff structure. Furthermore, the mechanism through which Order 636 enforced the unbundling was to require the transfer title to gas from supplier to customer “as far upstream as possible”, thus removing any chance of pipeline operators favouring the transit of its own gas across its pipeline. Hence, although the pipeline companies originally carried gas belonging to themselves (among others) for sale at the downstream end of the pipeline, Order 636 obliged them to sell the gas upstream, so that only non-affiliated companies would use the pipelines. In practice, a number of “pooling points” emerged at upstream locations, at which pipeline operators were able to sell their gas to others. The original customers of the gas (often gas distribution companies) therefore simply converted their rights to buy gas downstream into (1) a right to buy gas upstream at a pooling point and (2) a right to use the pipeline to move the gas from the pooling point to the downstream delivery point.

Alongside unbundling, the Order also created provisions for the secondary trading of the right to use the pipeline to move gas which has been acquired by shippers: Order No. 636 required that all FERC-regulated gas pipelines “provide a capacity releasing mechanism through which shippers can voluntarily reallocate all or a part of their firm capacity rights to any person who wants to obtain that capacity by contracting with the pipeline.”<sup>130</sup> Thus, one of the cornerstones of FERC’s interstate gas transportation policy is that pipeline customers with firm contracts can resell their right to use pipeline capacity in a secondary market.

Prior to Order 636, FERC had allowed some pipelines to permit their shippers to “broker” their surplus capacity to others, but FERC found, in Order 636, that “there [were] too many potential assignors of capacity and too many different programs for the Commission to oversee capacity brokering.”<sup>131</sup> Moreover, FERC was concerned about the “discriminatory allocation of pipeline capacity.”<sup>132</sup> The Natural Gas Act of 1938 requires that FERC prevent undue discrimination in rates, charges and practices. Because FERC no longer believed that it “could adequately monitor capacity broker under existing certificates to ensure that all allocations are nondiscriminatory,”<sup>133</sup> FERC adopted a comprehensive capacity release program that facilitates the development of the secondary market and provides transparency. FERC’s authority to respond to the exercise of market power *after* it occurs is extremely limited so FERC has focused on preventing problems from happening in the first place—transparency can prevent competitors’ from exercising market power in ways that adversely affect the price/service quality that consumers receive.<sup>134</sup>

FERC’s “capacity release” program allows firm shippers (“releasing shippers”) to release pipeline capacity to others (“replacement shippers”) when they are not using it:

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<sup>130</sup> *FERC Stats. and Regs., Regulations Preambles 1991-1996* ¶30,939 at 30,418 (1992).

<sup>131</sup> Order No. 636 at 30,416.

<sup>132</sup> Order No. 636 at 10.

<sup>133</sup> “Simply put, there are too many potential assignors of capacity and too many different programs for the Commission to oversee capacity brokering as it now exists.” Order No. 636 at 73.

<sup>134</sup> During the “California energy crisis” in 2000-2001, FERC became aware of its limited authority to deal with the exercise of market power after the fact. Many of the trading strategies that market participants used were highly complex, making detection, proof, and enforcement extremely difficult.

*In brief, under the Commission's current capacity release program, a firm shipper (releasing shipper) sells its capacity by returning its capacity to the pipeline for reassignment to the buyer (replacement shipper). The pipeline contracts with, and receives payment from, the replacement shipper and then issues a credit to the releasing shipper. ... The results of all releases are posted by the pipeline on its Internet web site and made available through standardized, downloadable files.<sup>135</sup>*

There are two types of transactions that occur in the secondary market:

- prearranged trades: releasing shippers enter into a bilateral transaction with the replacement shipper, possibly facilitated by the pipeline; or
- open bidding: the releasing shipper has no prearranged deal with another shipper, instead relying on an open auction for the sale of excess capacity.

Sales in the secondary market may transfer “firm” capacity, meaning that all rights transfer to the new user for some longer or shorter period. However, many sales are “interruptible”, meaning that the original holder has the option to take back the capacity when it needs it. In practice, this condition means that users who buy interruptible capacity retain it at all but peak times.<sup>136</sup>

One concern expressed by stakeholders at the time Order 636 was being considered was how the fixed costs of pipelines were recovered in tariffed rates. Prior to Order 636, FERC used a modified fixed-variable method, which meant that most, but not all, fixed costs were recovered in a fixed charge, with the balance of fixed and variable costs recovered in a usage charge, which meant that if demand was lower than expected, the pipeline might not be able to recover its costs in rates. In Order 636, FERC decided that it needed to reform its tariff design to a straight fixed-variable (SFV) rate design that recovered all fixed costs in a fixed charge with variable costs recovered based on a usage charge in order to promote the development of a competitive market for natural gas at the wellhead by eliminating transportation rate differentials. The SFV provided a uniform basis for shippers to decide how to transport gas from the producer to the user.

### **A.5.3. Outcomes**

#### **A.5.3.1. Experience of reforms**

The creation of a capacity release market has been considered to be a highly successful example of the operation of markets to achieve the efficient allocation of a scarce resource. The “capacity release” secondary market is beneficial to:

1. *Shippers*, who can sell their excess reserved capacity.
2. *End-use customers*, who receive reliable gas pipeline delivery service.

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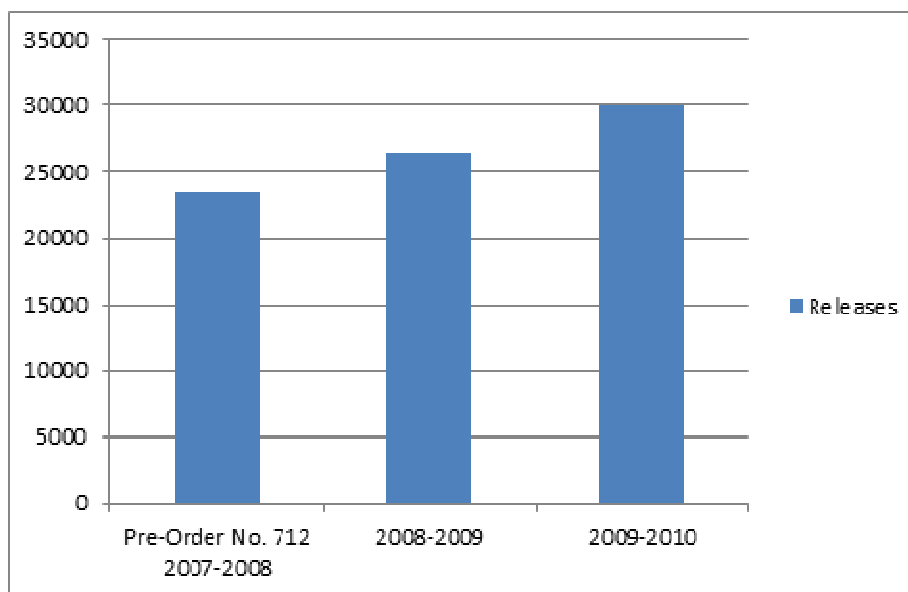
<sup>135</sup> 123 FERC ¶ 61,286 at 3.

<sup>136</sup> For a gas pipeline, the “system peak” is typically the coldest day of the year. Gas pipelines typically have their system peak in the winter, with less demand the rest of the year.

3. *Builders of new pipelines*, who can look to the capacity release market to provide a signal to where new pipeline capacity is needed.
4. *Society generally*, which benefits because the use of pipeline capacity is optimized to a greater extent because a secondary capacity release market allows reserved capacity to be allocated to the shippers that value that capacity market more highly.

The capacity release market is active. As shown in Figure A.7, in 2007-2008 there were about 23,500 exchanges of capacity between gas shippers, which increased to about 30,000 releases in 2009-2010.<sup>137</sup> About 69 percent of releases are for a one-month term, seven percent for less than a month, and eight percent for a year.<sup>138</sup> In January 2013, awarded capacity was about 1.3 annualized equivalent bcf/d total<sup>139</sup> (total natural gas consumption in the US in 2012 was 70 bcf/day).

**Figure A.7**  
**Number of Capacity Releases**



Overall, there are 165 FERC-regulated interstate gas pipeline companies. Table A.6 provides a listing of the 20 largest acquiring shippers. For the “top 20” acquiring shippers, total traded capacity in 2012 was about 28 billion cubic feet per day (bcf/d). About 500 entities participated in buying this released capacity, which is almost three times the number of participants in 2011.

<sup>137</sup> FERC Staff Report, January 31, 2011, p. 4.

<sup>138</sup> FERC Staff Report, January 31, 2011, p. 4.

<sup>139</sup> Capacity Center.com newsletter, January 2013. Accessible at: [http://www.capacitycenter.com/CCI\\_Newsltr%20for%20Feb%202013.pdf](http://www.capacitycenter.com/CCI_Newsltr%20for%20Feb%202013.pdf) (accessed on March 7, 2013).



**Table A.6**  
**2012 Top 20 Capacity Traders**

2012 Rank	Acquiring Shipper	Daily Equiv	2012 Deal Count
1	Tenaska	3,495,252	755
2	Sequent Energy Mngmnt	2,803,447	1,019
3	BP	1,288,434	991
4	Amerada Hess	1,113,892	1,399
5	Atmos Energy Reg	601,698	74
6	Direct Energy	587,231	1,741
7	Macquarie Energy	532,047	474
8	Dominion Non Reg	453,888	398
9	NextEra Energy	412,012	123
10	GenOn	384,180	22
11	Centerpoint Non Reg	369,426	293
12	DTE Non Reg	362,229	230
13	Iberdrola Non Reg	353,177	42
14	Interstate Gas Supply	334,463	404
15	Scana Energy Non Reg	328,031	256
16	Texia	322,674	237
17	Gavilon LLC	286,525	216
18	BG Energy	279,188	89
19	Conoco Phillips	278,046	104
20	Shell	268,490	160

Source: CapacityCenter.com, 2012 Capacity Rankings, November 26, 2012

**A.5.3.2. Role of the pipeline owners in facilitating trades and providing transparency**

A pipeline owner acts as the “facilitator” of the capacity release market, helping releasing shippers and replacement shippers to find each other, document the transactions, collect from the replacement shippers and compensate the releasing shippers. A gas pipeline is largely indifferent from a cost-recovery standpoint as to whether firm shippers actually ship gas or not—the carrier recovers its fixed costs and its variable costs of doing business even if reserved capacity is not fully utilized—and therefore has the correct economic incentives to act as a neutral facilitator. Moreover, the pipeline knows its own system and is therefore well placed to act as facilitator and ensure that activity in the capacity release market is transparent.

For the purpose of transparency, pipeline companies also have to post the rate charged under each contract, the duration of the contract, the receipt and delivery points, the contract quantity, and any special terms or conditions. Pipeline operators must make this information

available for download from their websites for 90 days and retain this information (to be made available on request) for four years.<sup>140</sup>

Pipeline owners also help to facilitate trades where the released capacity may not match the requirements of an acquiring shipper. Replacement shippers can sometime arrange terms – for example, receipt and delivery points – that are different from those used by the releasing shippers, subject to whether or not the pipeline has sufficient firm capacity available to accommodate these changed terms. U.S. gas pipelines provide point-to-point pipeline service, which is different from the “national balancing point” approach used in the UK. Thus, a replacement shipper may need to negotiate with the pipeline to adjust the releasing shippers’ receipt and delivery points to meet its demand requirements.

#### A.5.3.3. Market dominance and competition policy

To address the potential for dominant firms using their market power following mergers, the Federal Trade Commission (FTC) – the relevant competition authority – has required merging firms to make their capacity available to others to maintain competition. Such divestures have been required by the FTC in 16 natural gas mergers since 1980. For example, in the 2001 merger between a local electricity company (MCN Energy Group) and a local gas distribution company (DTE Energy), the FTC required the merged company to provide access to its capacity for period of 20 years.

During the California energy crisis in 2000, the vertically linked nature of the natural gas industry (i.e. production, transmission, and distribution) led to a situation where a gas company (El Paso Natural Gas) was alleged to have exploited its dominant position in the capacity release market to benefit its upstream affiliate. The energy crisis led to an increase in the demand for gas, and El Paso was alleged to have restricted the supply of transport capacity. The subsequent increase in price for gas would then benefit its affiliate, which was the main supplier of additional gas in the region. The allegations were settled by El Paso by paying compensation of \$1.69 billion, as well as commitments to increase the availability of capacity.

#### A.5.3.4. Subsequent reforms

For short term releases of less than one year, FERC Order 712 changed its policy of “capping” capacity release prices at the pipeline’s maximum tariff rate.<sup>141</sup> Removing the price cap for released capacity allows the market to provide a clearer signal of the demand for that capacity. This provides an indication of whether it would be worthwhile to invest in new pipeline capacity. A subsequent FERC Staff report on capacity release explains that “removal of the price cap has not had a significant impact on pricing. In fact above-cap premium

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<sup>140</sup> Code of Federal Regulations - Title 18: Conservation of Power and Water Resources (December 2005), 284.13 (Reporting requirements for interstate pipelines.) and 225.3 (Schedule of records and periods of retention.): Viewable at:

(1) <http://cfr.vlex.com/vid/284-13-reporting-interstate-pipelines-19645881>

(2) <http://cfr.vlex.com/vid/225-3-schedule-records-periods-retention-19645790>

<sup>141</sup> 123 FERC ¶ 61,286 at 3

releases make up less than 3 percent of the overall market.”<sup>142</sup> This may reflect economic conditions in the U.S. economy in recent years.

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<sup>142</sup> FERC, “Staff Report on Capacity Release,” January 31, 2011, p. 4. Accessed at: [http://www.energymarketers.com/documents/ferc\\_staff\\_report\\_on\\_cap\\_release\\_2011.pdf](http://www.energymarketers.com/documents/ferc_staff_report_on_cap_release_2011.pdf) (accessed on March 7, 2013).

## A.6. Hedging Instruments based around the Spot Electricity Market in New Zealand

### A.6.1. Background and Context

Since 1996, when the previously centralised electricity industry was liberalised, electricity in New Zealand has been traded at the wholesale level using a (compulsory) spot market. Electricity generators offer to supply electricity into the spot market at a certain price, and buyers of electricity (electricity retailers and major industrial and commercial users) submit bids to purchase electricity. Supply is matched to demand, and a market-clearing price is determined at each of the 244 different nodes (electricity entry and exit points) on the national transmission grid. This process of matching bids and offers and determining the market-clearing price is repeated continuously at half-hourly intervals throughout the day.

All electricity is traded on the spot market, but this is complemented by trading of financial hedge contracts, which are a longer-term form of contract that seek to hedge a buyer's and seller's exposure to changes in the spot price. Electricity hedge contracts in New Zealand can take various forms, including fixed-price variable volume (FPVV) contracts,<sup>143</sup> contracts-for-differences (CFDs),<sup>144</sup> options<sup>145</sup> and futures<sup>146</sup>. Electricity hedge contracts can be traded "over-the-counter" (OTC), where a customised contract is determined through bilateral negotiation between the electricity buyer and seller, or through a centralised platform operated by the Australian Stock Exchange (ASX), although this has not always been the framework for the trading of hedge contracts, as will be discussed.

When the spot market was first introduced in 1996, there was a relatively liquid market for the trading of hedge contracts.<sup>147 148</sup> Electricity retailers, known at the time as Electricity Supply Authorities (ESAs), would enter into hedge contracts with electricity generators to hedge their exposure to changes in spot market prices. ESAs both owned the electricity distribution lines in different regions, and sold electricity to retail customers in those same regions. However, in 1998, new legislation required that ESAs could not be both distribution lines owners and retail electricity providers. Accordingly, most of the ESAs sold their retail customers to the electricity generators. This provided electricity generators with a natural hedge against spot market price fluctuations: electricity sold by a generator at the spot market price could be offset against electricity purchased by that same generator's retailing business at that same price.

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<sup>143</sup> Fixed-price variable volume contracts specify in advance the price that is paid for electricity over the life of the contract.

<sup>144</sup> Contracts-for-differences require a payment of the difference between a strike price specified in advance, and the spot price, on a nominate volume of electricity (with the payment being made by either the electricity seller or buyer, depending on whether the spot price is higher or lower than the strike price).

<sup>145</sup> An electricity options contract provides the right, but not necessarily the obligation, for the buyer to purchase electricity at a pre-specified strike price.

<sup>146</sup> Electricity futures contracts specify in advance the price and quantity of electricity that will be physically traded at some specified date in the future.

<sup>147</sup> In part, the liquidity of the hedge market came from a government requirement for the largest (of two) generators at the time, ECNZ, to hold hedge contracts to mitigate its market power.

<sup>148</sup> The following brief history of the hedge market is based on Energy Link (2011), "Evaluation of Hedge Market Liquidity", paper prepared for The Electricity Authority, June.

As a result of the vertical integration of generators into retailing, the hedge market shrank substantially. Some OTC trading of hedge products did still occur, but the volumes traded were significantly below what they were pre-1998, and the market liquidity was considered to be relatively poor. In the early 2000s, the government identified improving the liquidity of the hedge market as a priority for electricity market reform. However, there was little in the way of policy measures that were actually introduced to allow a more liquid hedge market to develop. It was not until December 2004 that improvements were made, when the five major generator-retailers set up a market to facilitate the bilateral trading of CFDs (known as the “EnergyHedge” market), which was complementary to OTC trading of other forms of hedge contracts.

The EnergyHedge market was owned by the five generator-retailers, and involved the operation of a web-based platform for the trading of standardised CFDs at a single node (the Haywards node in the North Island – although towards the end of its life (in December 2010) contracts were also traded at the Otahuhu node, also in the North Island, and the Benmore node in the South Island). Contracts were quarterly contracts for a fixed amount of electricity (0.25MW per hour) over the quarter, and could be for electricity delivered up to two years in advance. All participants in the EnergyHedge market were required to be market-makers, offering prices at which to buy and sell hedge contracts. Participants were also required to meet certain credit requirements, with credit risk (i.e., the risk that the other party reneges on its payment obligations) allocated to the two parties engaging in the hedge transaction.<sup>149</sup> This effectively limited the market participants to the major generator-retailers.

However, by 2009, both the EnergyHedge market and OTC trading of hedge contracts were still considered to be relatively illiquid. An Electricity Technical Advisory Group (ETAG) was set up in April 2009 to conduct a “Ministerial Review” of the performance and governance arrangements of the electricity market, and as part of this review ETAG assessed the market for hedge contracts as being “less transparent and liquid than desirable”.<sup>150</sup> ETAG made a number of recommendations of measures that could be put in place to facilitate a more liquid hedge market, and these recommendations were ultimately implemented by the Minister of Energy and Resources in December 2009. It is these measures that are the subject of this case study, and are discussed in more detail below.

## A.6.2. Rationale for Reforms

As discussed above, despite numerous calls to improve liquidity in electricity hedge markets, and the specific introduction of the EnergyHedge platform for trading hedge contracts, prior to the 2009 hedge market reforms the hedge markets were still considered to be relatively illiquid. For example, in the year ended April 2010, the volume of electricity traded in hedge contracts amounted to approximately 50% of the total volume of electricity sold on the spot market.<sup>151</sup> While this seems like a reasonably substantial proportion, it can be compared to,

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<sup>149</sup> See Carl Hansen (2011), “Competition, Reliability and Hedge Market Developments in NZ”, Singapore Electricity Roundtable presentation, available at: <http://www.ea.govt.nz/dmsdocument/12003>

<sup>150</sup> ETAG and Ministry of Economic Development (2009), “Improving Electricity Market Performance: Volume One: Discussion Paper”, A preliminary report to the Ministerial Review of Electricity Market Performance, August.

<sup>151</sup> Annual electricity generation in New Zealand is approximately 40,000GWh. In the year to April 2010 approximately 20,000GWh of electricity was traded via hedge contracts (Energy Link (2011), *op cit.*).

for example, the volume of trades on the Australian electricity futures market, which in 2010 amounted to 252% of the total spot market.<sup>152</sup>

One of the main rationales for improving liquidity on the hedge markets was that it would facilitate more competition on the retail side of the market. In the Ministerial Review, ETAG identified some problems with the current state of retail electricity competition, noting in particular that “[t]he rate at which retail prices have risen, especially for residential consumers, appears excessive when compared to the increase in the cost of new supply” and that there is “[i]nsufficient competition in the retail market, especially outside the main centres...”<sup>153</sup>

The retail market was dominated by five vertically integrated generator-retailers, whose collective market share at the time of the ETAG report (August 2009) was 97%, with the remaining 3% held by only one other small (but still vertically integrated) retailer.<sup>154</sup> Each of the five major generator-retailers was also focused on particular regions: across 33 regions in New Zealand defined by ownership of the electricity distribution networks, the (August 2009) market share held by the largest retailer in each region ranged from 33% to 91%, with an average market share of 67% across these regions.<sup>155</sup>

ETAG noted that improving the liquidity of the hedge market would facilitate the entry of new retailers, and allow existing retailers to expand, particularly those that do not have an offsetting generation portfolio to hedge against spot price risk. In turn, retailer entry and expansion would enhance competition in the retail market, and improve outcomes for final electricity consumers.

The other key rationale for the measures to improve hedge market liquidity was that doing so would yield security of supply benefits. The logic here is that a more liquid hedge market provides a better price signal about future supply and demand conditions, thereby providing a clearer indication of where and when new generation investment is required to ensure on-going security of supply.

Finally, another rationale that was noted was to provide greater access to risk management instruments for market participants.

### **A.6.3. Key features of the hedge market reforms**

The main aspect of the reform programme, announced by the Minister of Energy and Resources on 9 December 2009, was a request for the large generator-retailers to put in place an arrangement for exchange-traded hedge contracts with the following features:

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<sup>152</sup> Annual electricity generation in Australia is approximately Energy Link (2011), *op cit*.

<sup>153</sup> ETAG and Ministry of Economic Development (2009), “Improving Electricity Market Performance: Volume One: Discussion Paper”, A preliminary report to the Ministerial Review of Electricity Market Performance, August.

<sup>154</sup> Source: Electricity Authority Retail Market Share by energised ICP for August 2009, available at: <http://www.ea.govt.nz/industry/market/statistics-reports/percentage-of-icps-per-retailer-graphs/>

<sup>155</sup> Source: Electricity Authority Majority Retailer Market Share data for August 2009, available at: <http://www.ea.govt.nz/industry/market/statistics-reports/majority-retailer-market-share/>

- Standardised, tradable contracts;
- A clearing house to act as a counterparty for all trades (which makes trades anonymous and means the counterparty takes on credit risk);
- Low barriers to participation and low transaction costs; and
- The generator-retailers acting as market-makers (offering buy and sell prices with a maximum spread) to provide market liquidity.

The Minister set a deadline for the implementation of this exchange of 1 June 2010, with legislation providing the Minister with powers to implement these arrangements if it was not satisfied that an active hedge market had been established.

To implement these measures, the five major generator-retailers selected the ASX to operate a platform for the trading of hedge contracts.<sup>156</sup> The contracts traded are standardised futures contracts with the following features:<sup>157</sup>

- Contracts are for a fixed amount of electricity, being 1MW of electrical energy per hour;
- Contracts are quarterly, such that they relate to electricity traded over a three-month period;
- Contracts are for electricity traded at one of two nodes, Otahuhu (in the North Island) or Benmore (in the South Island);
- Contracts can be up to three years in advance; and
- Contracts are cash settled, with no physical delivery. That is, the parties to the contract will still make the physical trade of electricity using the spot market, but they undertake a cash transaction as a means of settling the futures contract (and which provides the effective hedge against spot market prices).

So, for example, if an electricity generator and electricity retailer wanted to hedge their exposure to spot prices for a three-month period three years into the future, they could trade the relevant electricity futures contract on the ASX platform. In three years' time the parties would use the spot market for the physical exchange of electricity, and the futures contract would be cash settled. With the ASX acting as the clearing house for the trading of standardised futures contracts, the first two requirements of the government's reform programme were put in place. ASX's role of the clearing house means that it guarantees that futures contracts will be honoured, thereby eliminating any credit risk for those actually trading the futures contract (in contrast to the EnergyHedge market, where the traders took on the credit risk). In addition, because contracts are standardised and cash settlement systems are automated, it is considered that transaction costs are relatively low.<sup>158</sup>

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<sup>156</sup> Note that the generator-retailers could not use the EnergyHedge market to meet the requirements, because it did not involve the use of a clearing house to act as a counterparty on trades.

<sup>157</sup> See <http://www.asx.com.au/products/about-asx-new-zealand-electricity-futures-and-options.htm>

<sup>158</sup> Office of the Minister of Energy and Resources (2009), "Ministerial Review of the Electricity Market", Cabinet Paper.

To provide for the “market-maker” requirement, four (of the five) major electricity generator-retailers signed market-making agreements with the ASX. The market-maker requirement did not specify what form this market-making needed to take, so the exact details of the agreements were determined by the generator-retailers and the ASX. These agreements required the generator-retailers to simultaneously make bids to buy futures contracts (at a “bid” price) and offers to sell futures contracts (at an “ask” price) on the ASX platform, with this market-making taking place in the last 30 minutes of every trading day. The agreements initially required a maximum bid-ask spread (the difference between the bid and ask prices) of 10%, but the four generator-retailers later entered into updated agreements which reduced the maximum spread to 5%. The agreements also require bid-ask quotes to be provided for all New Zealand electricity futures contracts traded on the ASX platform i.e., all quarterly contracts at both the Otahuhu and Benmore nodes.<sup>159</sup>

The requirement for generator-retailers to act as market-makers was one of the key recommendations of ETAG to improve the liquidity of the hedge market. Note that, in contrast to the EnergyHedge market, other participants are able to trade futures contracts without a requirement to also be market-makers. ETAG also considered an alternative way of improving liquidity, by requiring the major generator-retailers to offer a minimum level of hedge contracts via an auction mechanism, with reserve prices set by a regulatory body. However, this approach was rejected, mainly because the administrative price setting approach carried the risk of chilling investment incentives, relative to mandatory market-making where prices are set more by market mechanisms.<sup>160</sup>

There were two further important aspects of the reforms. One was that the government required an assessment be made for “satisfactory market depth” at 1 June 2011. The test for this market depth was specified as being the level of “unmatched open interest” (UOI). UOI refers to the volume of hedge contracts that are held by market participants at the end of a trading day, but that are not offset by a matching transaction. For example, a hedge contract that is both sold by a generator and bought by that same generator’s retail business would not be considered part of UOI. The required level of UOI to be achieved by 1 June 2011 was 3,000GWh of electricity traded.

If this level of market depth could not be achieved by the measures to be introduced by the generator-retailers, then there was a requirement for the industry regulator, the Electricity Authority, to amend the industry rules (the Electricity Industry Participation Code) so that they “facilitate, or provide for, an active market for trading financial hedges for electricity”.<sup>161</sup> That is, if the generator-retailers could not achieve a more liquid hedge market by implementing the various measures noted above, then the Electricity Authority could impose measures for a more liquid market by regulatory fiat via the Code. The legislation also specified that, if the Electricity Authority did not amend the Code in a manner necessary to achieve a more active hedge market, then it can report back to the Minister on

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<sup>159</sup> While the contracts themselves are confidential, this has been inferred from the Electricity Authority’s discussion of the market-maker agreements in Electricity Authority (2011), “Cost-Benefit Analysis – Market-Maker Obligations”, Information Paper, 21 November.

<sup>160</sup> See ETAG and Ministry of Economic Development (2009), “Improving Electricity Market Performance: Summary note on recommendations taking account of submissions”, October.

<sup>161</sup> Section 42, Electricity Industry Act 2010.



why it has not done so. The legislation also gave powers to the Minister to step in and amend the Code itself, if the Minister considered that the Authority's amendments were not satisfactory. then the Minister is able to make the necessary amendments.

#### **A.6.4. Outcomes**

##### **A.6.4.1. Improvement in market liquidity**

The hedge market reforms led to the development and growth of trading of electricity futures on the ASX. As a result of this, the previous centralised platform, EnergyHedge, ceased trading in December 2010. Trading of OTC hedge contracts still exists, and it is expected that OTC trading will continue to occur as electricity industry participants seek more customised hedge contracts relative to the standardised contracts available on the ASX.

Trading on the futures market is mostly undertaken by the five large generator-retailers, but some non-generator/retailers also trade (specifically, Deutsche Bank and ANZ). It is not clear whether the presence of Deutsche Bank and ANZ has improved the liquidity of the market, although there is some limited anecdotal evidence to suggest this might be the case.<sup>162</sup> Trading of OTC hedge contracts is also dominated by the generator-retailers as sellers, but there are at least 100 buyers of OTC hedge contracts.<sup>163</sup> Brokerage firms (e.g., OMF, an Auckland-based brokerage firm) have also entered both the futures and OTC markets to provide brokerage services.

When the reforms were initially introduced, trading of futures contracts increased steadily, such that by June 2011 the level of UOI was at 600GWh. However, this was still well short of the target UOI of 3,000GWh by 1 June 2011. Coupled with relatively high bid-ask spreads (averaging around 7-8%), it was considered at that time that liquidity in the hedge market was still "less than desirable".<sup>164</sup>

While the target was not met, the Electricity Authority decided not to make any changes to the Code to provide for more liquidity in the hedge market. Indeed, the Authority has stated that:<sup>165</sup>

*As a matter of principle, the Authority prefers not to regulate when it is feasible for market participants to voluntarily develop market arrangements and achieve long-term benefits to consumers.*

Part of the Authority's reasoning was that, at the time that the hedge market reforms were implemented, three of the large electricity generator-retailers were also required to engage in "virtual asset swaps". The swaps were a one-off exchange of (15 year) hedge contracts between the generator-retailers, with the intention of adjusting the configuration of generation

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<sup>162</sup> A 2012 survey of hedge market participants records views such as there being more competitive tension from independent traders like ANZ and Deutsche Bank, and that ANZ seem to have increased activity in the market. UMR Research (2012), "Hedge Market Review: A Quantitative and Qualitative Survey", April.

<sup>163</sup> Energy Link (2011), *op cit*.

<sup>164</sup> Energy Link (2011)

<sup>165</sup> Electricity Authority (2011), "Improving the Opportunities to Hedge New Zealand Electricity Prices", Information Paper, 20 October, paragraph 3.6.1

and retail customers of the three firms. The prices in the swaps were indexed to ASX futures prices, and because the electricity volumes involved greatly exceeded the 3,000GWh UOI target, the Authority concluded that the target had “in effect been achieved” by 1 June 2011.<sup>166</sup>

The Authority introduced new UOI targets, of 1,000GWh by 1 December 2011, 2,000GWh by 1 March 2012 and 3,000GWh by 1 June 2012. The first two of these targets were met, and while UOI has yet to reach 3,000GWh, it has grown steadily to approximately 2,500GWh by the end of February 2013.<sup>167</sup> Bid-ask spreads have also fallen recently, and have consistently averaged around 4% since November 2011.<sup>168</sup>

In the year ended February 2013 the total volume of electricity traded on the ASX market was (approximately) 15,600 GWh.<sup>169</sup> This is equivalent to around 40% of the total annual volume sold on the electricity spot market. When OTC contracts are included, we estimate that all hedge contracts (i.e., both OTC and ASX contracts) account for approximately 95% of the annual volume of electricity sold on the spot market.<sup>170</sup> This compares with the figure quoted earlier of 50% of the electricity spot market for the volume of hedge contracts sold in the year ended April 2010.

It therefore appears that there has been some improvement in hedge market liquidity, as indicated by the falling bid-ask spreads, increasing UOI, and increasing volume of hedge contracts traded more generally. There is also some evidence to suggest that this has promoted one objective of the reforms, to provide a good price signal for new generation investment. The Electricity Authority reports that ASX futures prices are appropriately responding to events that influence both the short-term and long-term outlook for supply and demand.<sup>171</sup> These events include low levels of water storage for hydro-electric generators, generation and transmission outages, announcements by major electricity users to shut down production, and planning approval of new generation investments. The Authority concludes that “[t]his suggests that futures prices are being determined robustly and are being influenced by the market fundamentals”.

#### A.6.4.2. Effect on retail competition

It is less clear whether the hedge market reforms have promoted the other main objective, which was to improve retail market competition. There has been one recent entrant into the retail market, the (non-vertically integrated) retailer Pulse Utilities, which entered in

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<sup>166</sup> Electricity Authority (2011), “Improving the Opportunities to Hedge New Zealand Electricity Prices”, Information Paper, 20 October

<sup>167</sup> Electricity Authority (2013), “New Zealand Electricity Hedge Contracts”, Weekly hedge market report, 1 March.

<sup>168</sup> Electricity Authority (2012), “Hedge Market Performance Update”, Information Paper, 26 November.

<sup>169</sup> Based on graphical data in Electricity Authority (2013), “New Zealand Electricity Hedge Contracts”, Weekly hedge market report, 15 March.

<sup>170</sup> While we have not been able to source data on the volume of OTC contracts sold, if we use the figure noted above of ASX trades making up 42% of all hedge contracts traded, then the total volume of hedge contracts traded is approximately 37,000GWh per annum. This equates to around 95% of the 40,000GWh of electricity traded annually on the spot market.

<sup>171</sup> Electricity Authority (2012), “Hedge Market Performance Update”, Information Paper, 26 November.

December 2009 and has grown its market share to 1.6% by January 2013.<sup>172</sup> It is possible that Pulse’s entry and expansion has been facilitated, in part, by the hedge market reforms. For example, Pulse notes in a media release associated with its most recent financial accounts that it “now has a proven set of prudent risk management tools including longer term electricity hedge contracts to enable it to focus on sustainable growth”.<sup>173</sup>

There have also been reported improvements in retail competition between existing retailers, with some large reductions in retailer concentration and reductions in incumbent market share in a number of regions.<sup>174</sup> This has predominately been the result of a consumer awareness campaign to encourage switching between retailers, but it has also been attributed to the “virtual asset swaps” discussed above<sup>175</sup> and it is possible that the more general improvement in hedge market liquidity has also had an effect.

It is difficult to establish if any one particular measure of the hedge market reforms has been more effective in driving the positive outcomes above. It is interesting to note that one of the key differences between EnergyHedge, which remained relatively illiquid, and the ASX futures market is the presence in the latter of a clearing house to act as a counterparty for credit risk. However, without further evidence it would be speculative to suggest that the requirement for a clearing house has been more effective than the other requirements, and indeed there are a range of other features in the current arrangements (such as the UOI targets and the increased involvement of the Electricity Authority) that also differ from EnergyHedge. The only evidence that partly addresses this issue is a 2012 survey of hedge market participants, which asked participants to rate how highly they think certain initiatives would contribute to hedge market liquidity (covering both the ASX futures market and OTC hedge market).<sup>176</sup> The most highly rated initiatives were market-making for ASX futures products and improved publication of information on outages and fuel data.

#### A.6.4.3. Further reforms

While there have been no further government-imposed reforms of the hedge market since the 2009 reforms, the Electricity Authority has implemented a number of measures to improve the liquidity of the hedge market. These have included:

- Encouraging market-makers to update their market-maker agreements with tighter bid-ask spreads and increased volumes;
- Requesting that the ASX consider the potential for new products to be implemented;

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<sup>172</sup> Source: Electricity Authority Retail Market Share by energised ICP for January 2013, available at: <http://www.ea.govt.nz/industry/market/statistics-reports/percentage-of-icps-per-retailer-graphs/>

<sup>173</sup> Pulse Utilities Media Release (2012), “Pulse Utilities New Zealand Limited Unaudited Financial Results for the Six-Months Ended 30 September 2012”, 26 November.

<sup>174</sup> Electricity Authority (2011), “Electricity market performance: 2010-2011 in review”, December.

<sup>175</sup> Electricity Authority (2011), “Electricity market performance: 2010-2011 in review”, December.

<sup>176</sup> UMR Research (2012), “Hedge Market Review: A Quantitative and Qualitative Survey”, April.

- Producing education resources on the nature of hedge markets and the need to manage exposure to spot price risk;
- Publishing weekly statistical information on the hedge market, including volumes, bid-ask spreads and price movements; and
- Improving the operation of a website providing for the disclosure of details associated with all futures and OTC hedge contracts entered into.

#### A.6.4.4. Role of non-users

The hedge market specifically allows speculators to operate, and indeed some parties (e.g., Deutsche Bank and ANZ) are not electricity generators or retailers. ETAG noted in its recommendations as part of the Ministerial Review that “having speculators operating in a futures market is beneficial for all concerned”, because of the improvements in liquidity that result (particularly due to improvements in the process of price discovery).<sup>177</sup>

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<sup>177</sup> ETAG and Ministry of Economic Development (2009), “Improving Electricity Market Performance: Summary note on recommendations taking account of submissions”, October.

## **Appendix B. Summary of Long-List of Options**

**Table B.1  
Long-list of Options for Case Studies**

No.	Industry and Market	Country	Brief Description	Comments
1	Air transport: airport slots	United Kingdom	<ul style="list-style-type: none"> <li>▪ Secondary trading of airport slots.</li> <li>▪ Initial entitlements are grandfathered.</li> <li>▪ Bilateral trading, facilitated by a slot coordinator.</li> <li>▪ Types of trades include: sales, leases and swaps.</li> <li>▪ Provisions for making slots available to new entrants.</li> <li>▪ Application of use it or lose it rules.</li> </ul>	Not included in initial short-list. Shares many similarities with the US experience (see next topic). However, the US offers a richer example.
2	Air transport: airport slots	United States	<p>Similar to UK example. Some differences:</p> <ul style="list-style-type: none"> <li>▪ ring-fencing provisions - slots set aside for commuter routes, and international traffic slots excluded.</li> <li>▪ lots of changes over time, with non-users only allowed in some airports (although have been active in the past).</li> <li>▪ FAA retained slots for auction. 25% of such slots reserved for new entrants.</li> </ul>	Included in final short-list. An example of a framework that relies on trading for the efficient allocation of a scarce resource. Includes ring-fencing provisions that restrict scope to trade commuter slots. The regulator also retained some slots, which were used to support entry. Use it or lose it provisions focus on strategic behaviour. Provides insights into the potential role of non-users.
3	Fisheries: Individual Transferable	New Zealand	<ul style="list-style-type: none"> <li>▪ Creation of tradable fishing rights.</li> <li>▪ Transition from rights defined as fixed quantities to</li> </ul>	Included in final short-list. Tradable quotas used to manage and efficiently allocate a scarce resource. Move from quotas defined

No.	Industry and Market	Country	Brief Description	Comments
	Quotas		<p>shares.</p> <ul style="list-style-type: none"> <li>▪ Setting of total available catch by regulatory body.</li> <li>▪ Ring-fencing provision for Maori population.</li> </ul>	in terms of quantities to quotas expressed as shares. An example of ring-fencing in the system.
4	Fisheries: Individual Transferable Quotas	Iceland	<p>Important differences from New Zealand:</p> <ul style="list-style-type: none"> <li>▪ Attachment of quotas to vessels.</li> <li>▪ Exclusion of smaller vessels.</li> <li>▪ Some restrictions on transferability of rights across regions.</li> <li>▪ Loss of unused rights.</li> </ul>	Included in final short-list. Some important transitions that warrant separate consideration from New Zealand – in particular, the exclusion of smaller vessels and the attachment of rights to vessels.
5	Electricity: wholesale electricity generation	United Kingdom	<ul style="list-style-type: none"> <li>▪ Creation of wholesale electricity market.</li> <li>▪ All electricity must be traded in exchange (gross pool).</li> <li>▪ Seller and buyer bids matched to determine pool price.</li> <li>▪ Financial contracts outside of the pool possible, but trading of electricity to occur only through the pool.</li> <li>▪ Separation of generators and retailers.</li> </ul>	Included in initial short-list as part of a broader electricity wholesale markets case study. Provides a useful example of compulsory trading – i.e. all allocations have to be traded in a pool. Subsequent reforms (see example 8 below) in the UK to allow trading to occur outside the pool but retain the pool for balancing. However, not included in final short-list.
6	Electricity: wholesale	United States	<ul style="list-style-type: none"> <li>▪ Similar to UK wholesale model.</li> </ul>	Included in initial short-list as part of a broader electricity wholesale markets case

No.	Industry and Market	Country	Brief Description	Comments
	electricity generation			study. However, not included in final short-list.
7	Electricity: wholesale electricity generation	New Zealand	<ul style="list-style-type: none"> <li>Similar to UK. Some contracting allowed outside of the pool.</li> </ul>	Included in initial short-list as part of a broader electricity wholesale markets case study. However, not included in final short-list.
8	Electricity: wholesale electricity generation	United Kingdom	<ul style="list-style-type: none"> <li>Move from a gross to net pool: electricity can be traded outside the pool through bilateral contracting. Share of electricity traded through pool is small.</li> </ul>	Included in initial short-list as part of a broader electricity wholesale markets case study. However, not included in final short-list.
9	Electricity: market for hedging instruments	New Zealand	<ul style="list-style-type: none"> <li>Measures to improve liquidity in the market for hedging instruments based around the spot electricity price.</li> <li>Creation of new exchanges, but hedging not mandatory.</li> <li>Contracts of standardised products.</li> </ul>	Included in final short-list. Example of reforms to improve liquidity in a market that existed for many years.
10	Air Quality: emissions trading	United States (East Coast)	<ul style="list-style-type: none"> <li>Creation of market for the right to emit.</li> <li>Focus of market on power producers.</li> <li>Impose a cap on emissions, and allow firms to trade allowances.</li> <li>Gradual introduction - use of bubbles for intra-plant, then intra-firm trading.</li> </ul>	Included in initial short-list. An example of a framework that relies on trading for the efficient allocation of a scarce resource (i.e. the right to pollute). Provides insights into the gradual extension of a scheme to broaden scope and flexibility over time. Insights from the gradual replacement of grandfathered allocations by auctioning. However, not included in final short-list.



No.	Industry and Market	Country	Brief Description	Comments
11	Air Quality: emission trading	United States (West Coast)	<ul style="list-style-type: none"> <li>▪ Creation of market for the right to emit.</li> <li>▪ Emissions trading covers a broader set of industries.</li> </ul>	<p>Included in initial short-list. An example of a framework that relies on trading for the efficient allocation of a scarce resource (i.e. the right to pollute). Useful in highlighting how emissions trading affects different types of industries – particularly those that might have greater scope to pass through costs (e.g. power utilities) against those where the scope may be more limited. Not included in final short-list.</p>
12	Air Quality: emissions trading	European Union	<ul style="list-style-type: none"> <li>▪ Creation of market for the right to emit.</li> <li>▪ Emissions trading covers a broader set of industries.</li> </ul>	<p>Included in final short-list. An example of a framework that relies on trading for the efficient allocation of a scarce resource (i.e. the right to pollute). Useful in highlighting how emissions trading affects different types of industries – particularly those that might have greater scope to pass through costs (e.g. power utilities) against those where the scope may be more limited.</p>
13	Rail: access rights (freight)	United States	<ul style="list-style-type: none"> <li>▪ Trading of access rights between privately owned and vertically integrated freight companies.</li> <li>▪ Trading of access rights and prices negotiated bilaterally. Trading is often reciprocal.</li> <li>▪ Recourse to regulator (Surface Transportation Board) on disputes over access terms (including prices).</li> <li>▪ Access rights sometimes transferred to others during mergers.</li> </ul>	<p>Not included in short-list. The framework relies mostly on the reciprocal nature of trading, and the ability to refer matters to a regulator. Industry consists of a handful of operators, and is more similar to a traditionally regulated utility.</p>

No.	Industry and Market	Country	Brief Description	Comments
14	Rail: access rights (freight)	Australia	<ul style="list-style-type: none"> <li>▪ Trading of access rights between different types of freight companies.</li> <li>▪ Trading is bilateral - with provisions in negotiations for arbitration.</li> <li>▪ Pricing and access principles have to be consistent with frameworks specified by regulators in different states.</li> </ul>	Not included in initial short-list. The framework is similar to access rights in traditionally regulated industries, with fewer parallels with water abstraction.
15	Gas: tradable capacity rights for gas transport	United States	<ul style="list-style-type: none"> <li>▪ Separation of pipeline ownership and shippers of gas.</li> <li>▪ Pipeline charges are regulated.</li> <li>▪ Secondary market for entitlements to ship gas.</li> <li>▪ Electronic platform to facilitate trading.</li> </ul>	Included in final short-list. Provides a useful example of incremental reforms leading to the creation of a liquid market for secondary trading.
16	Telecoms: secondary trading of spectrum	United Kingdom	<ul style="list-style-type: none"> <li>▪ Simplification of arrangements for spectrum trading.</li> <li>▪ Allow both trading and leasing of spectrum. Also allow certain types of sub-leasing.</li> <li>▪ Reforms designed to reduce regulatory burden (e.g. approvals from Ofcom).</li> <li>▪ In practice, limited by significant under-supply of spectrum. No notable examples of trades occurring.</li> </ul>	Not included in initial short-list. The significant under-supply of spectrums has meant that a secondary market has struggled to develop.
17	Water: retailing (Business Consumers)	Scotland	<ul style="list-style-type: none"> <li>▪ Transition that separated business retailing of water and sewerage services.</li> <li>▪ Three licensed suppliers at the time of the transition (2008).</li> <li>▪ In 2011, there were five companies in total and one of</li> </ul>	Not included in initial short-list. Other short-listed options are likely to provide more relevant lessons.

No.	Industry and Market	Country	Brief Description	Comments
			<p>the original three had captured 97% of the market.</p> <ul style="list-style-type: none"><li>▪ Market codes specify terms of competition.</li><li>▪ Central Market Agency (CMA) was established to administer the new market. It is owned by the retailers.</li></ul>	



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