

MARKET BASED INSTRUMENTS: AUSTRALIA'S EXPERIENCE WITH TRADING RENEWABLE ENERGY CERTIFICATES

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***Abstract:** Australia is the first country in the world to create a national renewable energy market using tradeable certificates. By law, purchasers of wholesale electricity in Australia are now required to ensure a percentage of electricity purchased is from renewable energy sources. This is being achieved through the creation of a renewable energy market and the trading of Renewable Energy Certificates (RECs), which are generated from accredited renewable energy power stations. 1 October 2001 marks six months since the market opened. Though still in a formative stage, initial trading has seen some interesting developments.*

Australia's Policy Framework for the Renewable Energy Market

Australia's suite of domestic programs addressing greenhouse gas reduction is broad ranging, covering emissions from the residential, commercial, agriculture, forestry, transport, energy and industry sectors. A three pronged, overlapping approach is used, comprising a mix of voluntary action, regulated mechanisms and market measures. One of these initiatives, a world first, is the creation of a renewable energy market.

In November 1997, immediately prior to the December Kyoto negotiations, the Prime Minister of Australia, in his statement *Safeguarding the Future: Australia's Response to Climate Change*, specified that targets would be set for the inclusion of renewable energy in electricity generation by the year 2010. These targets would legally require electricity retailers and other large buyers to source an additional 2 per cent of their electricity from renewable or specified waste-product energy sources by 2010, increasing the share of renewable electricity in the total electricity supply to approximately 12.5%.

The Australian Greenhouse Office (AGO) facilitated a prolonged period of stakeholder consultation and research to determine an effective implementation plan for the targets. Significant work, on defining implementation options, was conducted by a consultative group comprising Commonwealth, State, Territory and industry representatives. In the course of this work, two primary options emerged as providing potentially suitable approaches. The first was an individual liability option, where liable parties would be independently responsible for meeting their targets, through obtaining renewable energy

certificates credited to generators of new renewable energy. The second approach, was the establishment of a central renewable energy purchasing agency, tasked with meeting the national target through direct contractual obligations with generators. On the basis of issues such as coverage, eligibility, creation of markets and legislation, the group recommended the individual liability option, which would see the creation of a renewable energy market in Australia.

Legislative Framework and General Principles

The legislative framework for the renewable energy market comprises two Acts: the *Renewable Energy (Electricity) Act 2000* (the Act), which establishes the framework for meeting prescribed targets, and the *Renewable Energy (Electricity) (Charge) Act 2000*, which establishes the rate of the penalty for failing to meet the targets. These Acts were passed by the Commonwealth Parliament in December and October 2000 respectively, and have applied from 1 April 2001.

The objectives of the *Renewable Energy (Electricity) Act 2000* are to reduce greenhouse gas emissions through the additional generation of electricity from renewable energy sources, and to build capacity for energy sources which are ecologically sustainable. The Act obliges wholesale purchasers of electricity to contribute to an increase in the amount of electricity generated from eligible renewable energy sources by an additional 9500 GWh/yr by the year 2010. This is equivalent to a 60% increase above levels of renewable energy generation in 1997, or enough energy to supply the residential electricity needs of a city of four million people.

Enforceable interim targets have been set to ensure that there will be consistent progress towards achieving the 9,500GWh target by 2010 and that all of the investment does not occur in the final years of the scheme. Table 1 outlines the interim and final targets.

Table 1. Interim and Final Targets

Year	Required additional GWh
2001	300
2002	1100
2003	1800
2004	2600
2005	3400
2006	4500
2007	5600
2008	6800
2009	8100
2010-2020	9500

The legislation is supported by a set of regulations that contain more detailed rules on a number of issues, including eligible renewable energy resources, accreditation of power stations and baselines.

In addition, a Renewable Energy Regulator was appointed in February 2001. The Office of the Renewable Energy Regulator (ORER) is a statutory authority responsible for implementing provisions of the legislation. The Regulator registers parties, accredits power plants, validates certificates, audits parties, imposes penalties and reports on progress to the responsible Minister and Parliament (policy issues relating to the legislation continue to be handled by the AGO).

Development of a Market for Renewable Energy

The legislative framework and principles enable the establishment of a new market for tradeable Renewable Energy Certificates (RECs). The RECs are a new and innovative approach to supporting renewable energy technologies and they allow for a certificate market to be separated from the physical electricity market. These certificates can then be traded across the country, rather than being restricted to the State or Territory electricity grid to which a generator is attached. This overcomes any resource constraints which result from renewable energy sources being available to varying degrees across Australia.

How are Renewable Energy Certificates Created?

RECs are created by accredited power stations generating additional renewable energy over an agreed baseline. One REC is equivalent to one megawatt hour of new eligible renewable energy.

Electricity generated from a wide range of renewable sources is eligible for RECs, for example: hydro, solar, wind, geothermal, photovoltaic, bagasse co-generation, wood waste, landfill or sewage gas, wave, tidal. While RECs are mostly created for making electricity, certificates may also be created for certain solar water heaters installed after 1 April 2001, based on the amount of electricity that they displace.

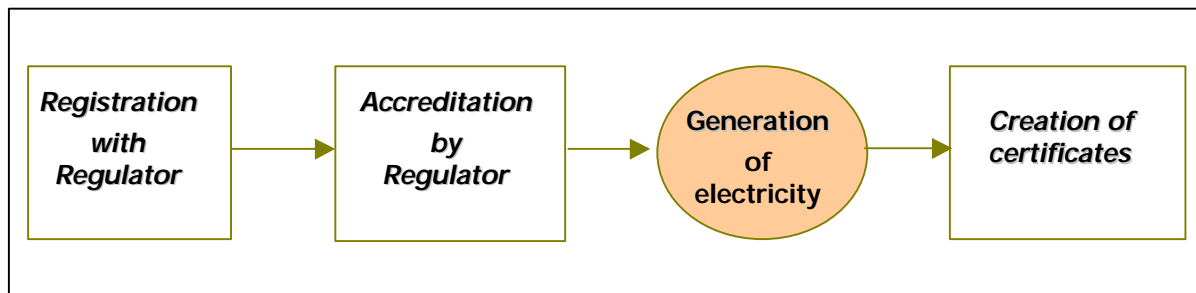
The legislation specifies that for a REC to be created, the renewable energy generated must be additional to a 1997 baseline. Baselines for individual power stations are set as part of the accreditation process, with special baselines used where they are more statistically representative, such as energy sources dependent on hydrological cycles.

Becoming an Accredited Power Station

To become an accredited power station, stations must register with ORER, which verifies that an eligible renewable energy source is being used. The accreditation process involves the establishment of a baseline described above, estimation of the amount of additional energy that will be generated and confirmation that the energy generated is actually being used. Accredited power stations are then eligible to create

RECs (*Figure 1*).

Figure 1. Creation of Renewable Energy Certificates



The ORER conducts physical audits of power stations to establish whether RECs have been legally created, and the Act sets out penalties to be applied to parties that accidentally or deliberately create invalid certificates.

Who is Liable?

Purchasers of wholesale electricity are liable to meet a share of the renewable energy target in proportion to their share of the national wholesale electricity market. This applies to all wholesale purchases of electricity on grids greater than 100MW of installed capacity (a wholesale purchase of electricity is a purchase directly from the electricity pool or from a generator).

The renewable power percentage (RPP), as determined each year under the Act, is used to determine liability for renewable energy certificates. The purchased amount of liable electricity is multiplied by the RPP to establish the number of RECs required to discharge liability. The RPP will increase each year up to 2010, to take account of the growing target.

How can the Liability be Discharged?

On 14 February each year, liable parties are required to surrender a number of RECs, equal to their liability for the previous year, to the Renewable Energy Regulator. Liable parties can either develop their own contracts with renewable energy generators to acquire renewable energy certificates or trade in renewable energy certificates at a price negotiated by individual parties.

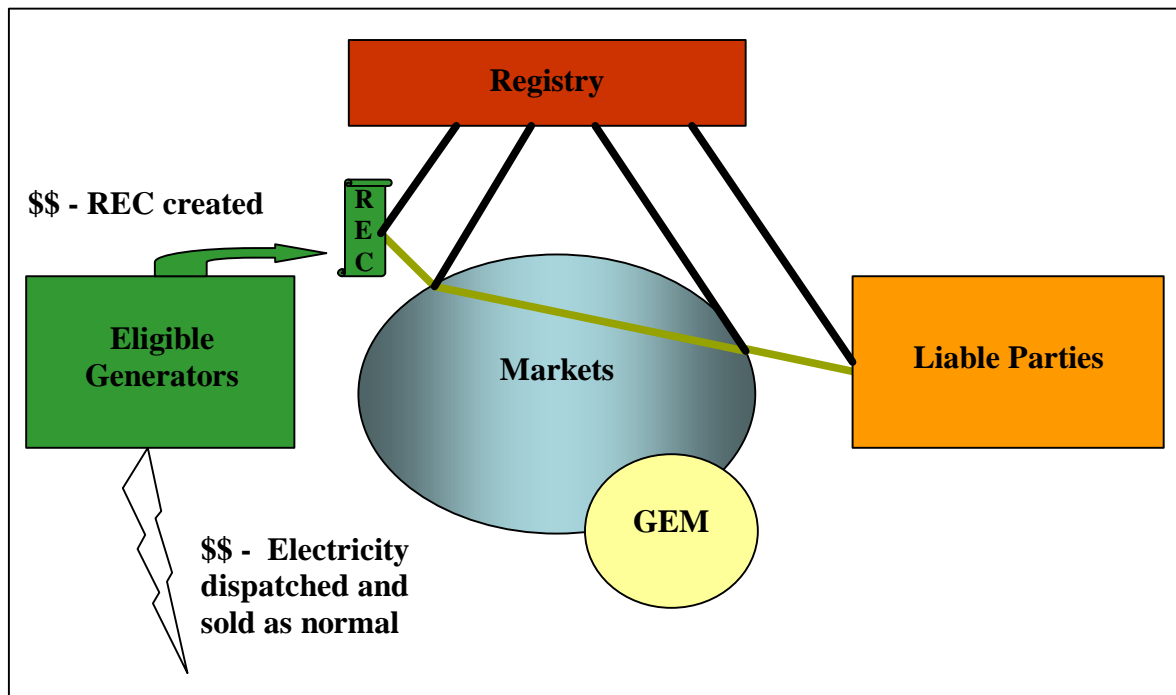
A significant degree of flexibility is built into the liability system. If a liable party is unable to discharge its liability for a particular year, but the shortfall is less than 10% of the party's total liability, the shortfall will be carried forward into next year's liability. If the shortfall is greater than 10% of the total liability, a penalty payment of AUD\$40 per MWh, called the renewable energy shortfall charge, will be imposed by the

Renewable Energy Regulator. However, if the shortfall is made up within the following three years, the penalty can be refunded. Shortfalls occurring within the final three years of the scheme (2018-2020) will need to be made up prior to the measure ceasing for the penalty to be redeemed.

Utilisation of Technology in the Operation of the Market

To facilitate least-cost implementation of the market, a number of Internet based tools are being utilised. ORER has contracted the development and support of an Internet-based central registry where RECs can be created, transferred and surrendered. In addition, consultation with industry, regulators and the Government resulted in the establishment of an Internet-based trading market called the Green Electricity Market (GEM). This industry-governed market is required to inform the Regulator each time a certificate has been traded within their market, facilitating the transparent exchange of RECs. The GEM offers a mechanism to trade RECs and allows companies to track their positions against the renewable energy target. Figure 2 demonstrates the relationship of the GEM to the REC framework. Other less formal markets have also been established for trading RECs.

Figure 2. Market Form



What are we Learning from the Trading of RECs?

The Act came into effect on 1 April 2001 and the trading of certificates is still in a formative stage. The market is small, with limited trading occurring at present as many RECs are being transferred directly as forward trades between eligible generators and liable parties, bypassing the market. However we anticipate that as more RECs are created, the target increases and the markets become well established, more trades will occur.

Price of Renewable Energy Certificates

Projections predicted prices to be low earlier on. Independent reports projected a wide range of certificate prices from AUD\$12/MWh to \$30/MWh in the early years of the market (*MMA, 2001; MMA, 1999*). Current data, though limited, matches fairly well with these predictions, with one power company setting an early benchmark through an agreement with a solar water heater sales agent to buy all the RECs created by new solar water heater installations at a price of \$24.43 each (*Australian Energy News, 2001*). There is also anecdotal evidence that RECs from some eligible renewable energy sources are receiving higher prices than from other sources.

One independent model has predicted that prices will increase gradually over the first 10 years of the measure, after which, the model predicts REC prices will reach the quasi price cap imposed by the penalty rate (*MMA, 2001*). It is also envisaged that banking will aid in keeping the market robust through the earlier stages.

REC Generators

As with pricing of certificates, it is predicted that the technologies contributing to the proportion of the target will change over the life of the measure. Simulations commissioned prior to implementation indicated that a large proportion of the 9500GWh target would be supplied by bagasse created by the sugar cane industry. However, with significant capital stock required, it may take some time before the potential capacity is realised. As of late September, no bagasse co-generation power stations had been accredited, though 16 applications were pending accreditation. This is mostly because of poor data collection to set baselines for these plants.

To date, the market has been dominated by RECs generated through solar water heaters, hydro and wind plants. Almost half of all applications for accreditation are from hydro power plants. Wind power has proven to be more dominant than was first expected because the cost of it has come down and the technology is proven and quick to install. Landfill gas powered generators are also contributing to the target.

Conclusion

The tradeable certificate approach appears, at this early stage, to be working successfully. The mandated target will significantly boost renewable energy in Australia, and will help to ensure that renewables are an important part of electricity supply in the market. It will also help overcome price barriers to renewable energy

technologies.

The target is expected to drive over AUD\$2 billion of additional investment in renewable energy over the next decade and reduce Australia's greenhouse gas emissions by up to seven million tonnes in 2010. With economies of scale resulting from larger scale, more secure development, we expect that renewables will become a far more cost-effective option to users than they currently are today.

References

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