

**OPPORTUNITIES FOR
RENEWABLE ENERGY AND DEMAND SIDE
MANAGEMENT TO PARTICIPATE IN THE
WHOLESALE ENERGY MARKET**

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Disclaimer

This document provides only a summary of the content of the Wholesale Electricity Market Rules.

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1. INTRODUCTION

The new Wholesale Electricity Market being implemented in Western Australia is different from most electricity markets. From the outset, the particular needs of renewable energy generation and demand side management (the planned reduction in demand by major energy users) have been fully considered. As a result;

- Key features of the market have been described as World's Best Practice.
- Substantial investment in renewable generation is proceeding.
- Significant amounts of demand side management are being put in place.

These are clear signs that the Government's objectives of encouraging renewable energy generation and demand management are beginning to be achieved.

All electricity markets are complex. In light of this, this paper has been prepared to highlight some of the positive features for renewable energy and demand management. This paper:

- Briefly describes the features of the market with specific relevance to renewable energy and demand management.
- Identifies the opportunities for renewable and demand management to participate in the market.

Some initial benefits have already been provided through the transitional market arrangement called Top Up and Spill. This arrangement allowed generators to buy additional energy from Western Power (called top up) or sell any excess energy to Western Power (called spill). This arrangement has been of particular benefit to intermittent renewable generators, such as wind, where the generator output can fluctuate from moment to moment making it difficult to match output with user load patterns.

The move to the full Wholesale Electricity Market will be a far more significant development and will bring greater benefits. The scheduled commencement date for energy trading is 21 September 2006. This market will provide further opportunities for renewable energy and demand management.

The market has been developed with substantial input from industry. Various bodies, including the Western Australian Sustainable Energy Association, nominated representatives to form the core of the various expert teams that developed the market rules and operating procedures. This ensured that renewable energy and demand management were appropriately considered and formed an integral part of the mainstream design rather than something bolted on at the end. The market arrangements and processes were all developed in ways that accommodate the specific requirements of renewables and demand management, just as they support the requirements of other generation types.

Two particular features of these technologies needed to be considered in detail throughout the market design process:

- Many renewable energy sources are intermittent and while some, such as solar, may follow a regular pattern others, such as wind, may vary in a less predictable manner.
- Energy users offering demand management generally only wish to be called on to reduce their demand for relatively few hours per year.

2. THE WHOLESALE ENERGY MARKET OBJECTIVES

The market is a set of systems and processes through which generators and customers can trade wholesale electricity. The objectives of the market are contained within legislation and are:

- To promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West interconnected system.
- To encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors.
- ***To avoid discrimination in that market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions.***
- To minimise the long-term cost of electricity supplied to customers from the South West interconnected system.
- ***To encourage the taking of measures to manage the amount of electricity used and when it is used.***

These objectives, particularly the two that have been highlighted, contain a strong emphasis on the integration of renewable energy and demand management. Copies of the Market Rules can be downloaded from the Independent Market Operator's (IMO) website (www.imowa.com.au). A much more readable document entitled "Overview of the SWIS Wholesale Electricity Market" is also available on the website which gives a good general picture of the key market features.

3. HOW CAN RENEWABLE ENERGY AND DEMAND MANAGEMENT PARTICIPATE?

The wholesale market comprises three separate, but interlinked, elements:

- ***Energy trading*** - this is the buying and selling of electricity, generally by generators and retailers, which takes place continuously. This is essentially an expansion of the wholesale electricity trading that currently occurs via power purchase contracts.
- ***Reserve Capacity Mechanism*** – this is a new process through which the IMO ensures that enough generation and demand management facilities are made available in the market to meet the overall system reliability criteria.
- ***Energy services*** – these are services required to ensure that the power system operates securely and reliably as well as providing a means to accommodate the inevitable fluctuations that occur in generator output and customer demand.

Each of these, and the ways in which renewable energy and demand management can participate in them, are described below.

3.1 Energy Trading

A number of generators, including those using renewable energy sources, already trade energy through power sales contracts with retailers or customers. These bilateral energy contracts will continue to be the major trading mechanism within the market. The cash flow certainty offered by long-term contracts, will continue to be a key mechanism through which new power developments are funded.

One of the major features of the new market arrangements is the inclusion of a Short Term Energy Market. Each day, all generators and retailers will submit offers to provide, and bids to purchase, additional electricity during each half hour trading period of the following day. The IMO accepts those bids and offers which ensure that the system demand is met with the minimum cost to customers with the trading price for each half hour set to be equal to the highest offer cleared.

This short term trading is a major feature of the market and it gives great flexibility in that it:

- Allows retailers to purchase additional electricity they need to meet their customers' demands.
- Allows low cost generators to displace more expensive generators.
- Allows generators to cover outages due to maintenance.
- Sets competitive prices at which electricity can be bought or sold.

Up until now, a power station developer has needed to also be a power retailer and has essentially had to match their output with customer demand. However, power stations are built in discrete blocks of capacity whereas customers are usually much smaller and more diverse. Many customers will only contract for relatively short periods of time and may move between suppliers. This has made it difficult for new generators to secure the financial backing needed to enter the market.

New, small renewable generators have found it very difficult to establish the firm customer base necessary to fund their projects. The Short Term Energy Market helps overcome this because:

- It will provide an outlet for any electricity that a developer has not been able to sell by contract to customers.
- It is an assured source of additional supplies if they have contracted to sell more than they can produce.

By breaking the link between generator capacity and customer demand, the Short Term Energy Market is the heart of the reformed trading arrangements. It allows a developer to secure revenue from its full generator capacity while it progressively establishes its customer base. All of these arrangements can be made between the generator and the IMO; it is not necessary for a market participant to set up a contract with any other participant.

The Market Rules have special provisions for intermittent generators, which are generators that cannot accurately predict their output level in advance. While these provisions do not apply exclusively to renewable generators, the only intermittent generators on the system at present rely on renewable energy sources such as wind or landfill gas.

Generators are required to submit operating plans to the IMO specifying the output of their generators throughout the coming day. Strong financial incentives are in place to ensure that generators do not deviate from these plans. Intermittent generators, such as a wind farm, obviously cannot schedule their output a day in advance. The market acknowledges this and allows intermittent generators to just produce at whatever level they can. In fact, an intermittent generator may just put all of its energy into the market, without having any customers at all, and the market will pay it the appropriate market trading price for its production.

3.2 Reserve Capacity Mechanism

Another key feature of the new wholesale market is called the Reserve Capacity Mechanism. In summary, this comprises a set of processes through which the IMO:

- Determines the amount of generation and demand management capacity required to meet the total system reliability targets.
- Takes steps to ensure that this capacity is provided on time.

Unlike many other markets, such as the National Electricity Market, the new wholesale market in Western Australia puts a specific value on capacity being made available to the market. Generators and demand management providers who commit to have their facilities ready to operate when called upon will receive payment (from either the IMO or under bilateral contract).

This process has been designed to ensure that customers can offer load reductions on the same basis as generators offering capacity. The IMO places the same value on capacity provided by demand management as is placed on that provided by generating plant. The process also gives demand management providers the flexibility to offer more than one block of capacity.

Each year, the IMO identifies and publishes information on how much reserve capacity is required and how much of this can be provided by demand management to assist developers estimate how much capacity they may be able to offer. For the 2007/08 capacity year, for example, the IMO determined that up to 380 MW of capacity could be provided through demand reductions by customers.

This approach has been very effective. In the first round of the reserve capacity mechanism, which sought capacity for the 2007/08 capacity year, around 130 MW of demand management was offered, and accepted, into the market. There appears to be substantial opportunity for further demand management to be offered in the future.

As with the energy market, the reserve capacity mechanism has been designed with the specific features of renewable generators in mind. In particular, the method of calculating the level of payments takes account of the intermittent nature of most renewable energy generators within the SWIS. These generators receive a level of payment that fairly reflects their contribution to system reliability.

This Reserve Capacity Mechanism has been very well received. The consulting firm Econnect, in its report entitled “Maximising the Penetration of Intermittent Generation in the SWIS” which was recently prepared for the Office of Energy stated it “exemplifies world’s best practice in its recognition that intermittent generators contribute to the provision of reliable system capacity, even if this contribution is substantially less than the installed capacity.” This report is available on the Office of Energy website at www.energy.wa.gov.au.

3.3 The Energy Services Market

There are two significant issues in respect to energy services for renewable energy and demand management providers and these are balancing and the provision of spinning reserve.

Balancing

Although independent power producers have been able to supply customers by using the Western Power transmission and distribution grid for some years, they have been required to make sure that the electricity produced by their generators exactly matched the demand from their customers. This requirement, called balancing, imposed both practical and financial imposts on generators. It was virtually impossible for a wind farm, or other intermittent renewable generator, to sell its output to a customer other than Western Power.

Significant improvements were made in this regard with the implementation of the transitional Top Up and Spill arrangements. The new market does not require generators to balance their output to the demand of their customers at all. An intermittent generator can run at whatever output can be achieved with any fluctuations, due to changes in wind speed at a wind farm for example, being absorbed by the balancing service provided by the market.

Removing this obligation to balance output with customer demand (follow the customers load) substantially reduces the potential costs for intermittent renewable generators to participate in the market. As a result, it is much easier for new developers to build renewable generators and for existing generation operators to add renewables to their portfolio.

Provision of spinning reserve

All power systems maintain a certain amount of reserve capacity in place to cover the sudden, unexpected failure of a large generator. Some of this is provided by generating plant that is in operation but which is only running at part load, hence the term “spinning reserve”. If another generator trips, the reserve unit can take up the load.

Running plant at part load is inefficient and an alternative is to use interruptible loads to provide some of this reserve. If a generator trips, specific customer loads can be instantaneously cut thereby reducing the system demand so that the remaining generators can meet the demand.

About half of the spinning reserve requirement on the South West Interconnected System is met by having a number of customers whose demand can be interrupted. These customers receive appropriate payment for providing this service.

4. SUMMARY

The new Wholesale Electricity Market has a number of features that directly assist renewable energy generators and providers (used developers earlier) of demand management. The market was designed from the start to accommodate these facilities, as a consequence many of these features are “embedded” in the market rules, and the benefits are not always immediately obvious.

The Wholesale Electricity Market features which are of most significance in assisting renewable generation and demand management to establish themselves within the market are:

- The Balancing Service, which:
 - Frees intermittent generators from the need to match their moment by moment output to the demands from their customers.
 - Allows intermittent generators can sell all of their output into the Balancing Service thereby avoiding the need to become a retailer.
- The Short Term Energy Market, which allows renewable generators to:
 - Sell their output to the market while they build up their customer base.
 - Purchase additional energy as their customer demand increases.
 - Cover any temporary supply shortages.
- The Reserve Capacity Mechanism, which
 - Places significant value on the capacity provided by both demand management and generators.
 - Recognises the contribution towards overall system reliability that is made by intermittent renewable generators.
 - Allows demand side management to make a substantial contribution to the spinning reserve requirement.

In summary, the new Wholesale Energy Market is a market that was designed from the outset to accommodate the specific requirements of renewable generation and demand side management.