



WIND FARM LICENSING DRAFT STATEMENT OF PRINCIPLES

June 2005

ELECTRICITY

REQUEST FOR SUBMISSIONS

The Essential Services Commission of SA (the Commission) invites written submissions from interested parties in relation to the issues raised in this paper. Written comments should be provided by **1 August 2005**. It is highly desirable for an electronic copy of the submission to accompany any written submission.

It is Commission policy to make all submissions publicly available via its website (www.escosa.sa.gov.au), except where a submission either wholly or partly contains confidential or commercially sensitive information provided on a confidential basis and appropriate prior notice has been given.

The Commission may also exercise its discretion not to exhibit any submission based on their length or content (for example containing material that is defamatory, offensive or in breach of any law).

Responses to this paper should be directed to:

Wind Farm Licensing: Statement of Principles

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Public Information about ESCOSA's activities

Information about the role and activities of the Commission, including copies of latest reports and submissions, can be found on the ESCOSA website at www.escosa.sa.gov.au.

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GLOSSARY OF TERMS

COMMISSION	Essential Services Commission of South Australia
AGC	Automatic Generator Controls
AGO	Australian Greenhouse Office
ELECTRICITY ACT	<i>Electricity Act 1996 (SA)</i>
ESC ACT	<i>Essential Services Commission Act 2002 (SA)</i>
ESIPC	Electricity Supply Industry Planning Council
FCAS	Frequency Control Ancillary Services
kVA	Kilovolt ampere
MCE	Ministerial Council on Energy
MRET	Mandatory Renewable Energy Target
NCA	Network Connection Agreement
NEC	National Electricity Code
NECA	National Electricity Code Administrator
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NSP	Network Service Provider
PASA	Projected Assessment of System Adequacy
PoE	Probability of Exceedence
TCA	Transmission Connection Agreement
WETAG	Wind Energy Technical Advisory Group

1 INTRODUCTION

One of the functions of the Commission, under section 5(1)(a) of the *Essential Services Commission Act 2002* (the ESC Act), is the licensing of entities carrying on operations within the South Australian electricity supply industry.

As at 30 June 2004, 16 electricity generators had been issued with generation licences by the Commission, authorising operations in South Australia.¹ The total installed name-plate capacity of those generators was 3,454 MW (noting, however, that the capacity does not include the capacity of non-dispatched generators, such as wind farms, as those generators are regarded as reductions in demand for the purposes of the National Electricity Market).²

In its 2003-04 Annual Performance Report, the Commission identified that one of the emerging licensing issues for 2004-05 was an expected increase in applications for generation licences authorising the operating of wind farms in South Australia. That increase was attributed, in part, to the Federal Government's Mandatory Renewable Energy Target (MRET) scheme, which requires electricity retailers to source specified amounts of their electricity purchases from renewable energy sources.

As anticipated, since November 2004 the Commission has received a significant number of generation licence applications pursuant to Part 3 of the *Electricity Act 1996* ("Electricity Act") from wind farm proponents in South Australia.³

As at 30 November 2004, the Commission had approved the licensing of seven wind farms, with a total capacity of about 450 MW. Therefore, adding the wind farm capacity to the total installed name-plate capacity for dispatched generators, there was approximately 3,900 MW of licensed generation capacity in South Australia by the end of November 2004. That is to say, approximately one eighth of South Australia's licensed generation capacity at that time came from non-conventional sources.

In addition to the currently licensed wind generators however, an additional eleven licence applications have been received for generation licences for wind farms since November 2004, with a total installed capacity of an additional 1,260 MW.⁴ Table 1 and Figure 1 provide summary details of the wind farms already licensed and those for which licence applications are pending. Detailed information about each application is available from the Commission website, www.escosa.sa.gov.au.

¹ Essential Services Commission, 2003-04 Annual Performance Report, November 2004, Table 1, page 14.

² Electricity Supply Industry Planning Council, Annual Planning Report, June 2004, page 38.

³ An application for licence is considered to have been formally made once the requirements under s.16(1), (2) of the Electricity Act are satisfied.

⁴ One of these relates to an application to vary an existing licence (i.e. that for Lake Bonney WindPower) to increase the capacity for which the wind farm has already been licensed from 80 MW to 240MW.



Were those wind farms all to be issued with licences, the total installed generation capacity in South Australia would rise to approximately 5,100 MW, with approximately 1,700MW of that total amount (or roughly one-third) being attributable to wind farms.

Ordinarily, the introduction of new generation capacity into South Australia would not present any issues, from a licensing perspective, for the Commission. However, the nature of wind generators, as compared with conventional coal or gas-fired generators, does present particular licensing issues for the Commission.

To better understand the issues facing the Commission in respect of the licensing of wind generators, it is appropriate to briefly outline the manner in which wind generators currently operate within the National Electricity Market (NEM).

1.1 Operation of Wind Generators in the NEM – Current Rules

While it is the Commission's role to authorise a generator to carry on generation operations in this State, the actual operations of the generator must generally be carried out in accordance with the requirements of the National Electricity Code (NEC). Those requirements were established in the late 1990's, following the commencement of the NEM, and while generally regarded to be "technology neutral", were not conceived with regard to a large amount of wind generation capacity being installed.

Clause 2.2.1 of the NEC establishes a requirement for a person operating a generating system that supplies electricity to a transmission or distribution network to register with NEMMCO as a generator. This requirement applies regardless of the energy source being used by the generating system. Significant penalties apply if such operations are carried on without the operator being registered.⁵ In registering with NEMMCO as a generator, a person must classify each generating unit as a *scheduled* (clause 2.2.2) or *non-scheduled* (clause 2.2.3) generator, and as a *market* (clause 2.2.4) or *non-market* (clause 2.2.5) generator. NEMMCO regularly publishes a list of registered generators in the NEM, including the classification of each into the above categories⁶.

In general, a generating unit with nameplate rating of 30 MW or greater is to be classified as a scheduled market generator and hence is required to be operated in accordance with the co-ordinated central dispatch process operated by NEMMCO under the provisions of Chapter 3 of the NEC. This means that the generating unit must bid its generation capacity for each trading period into the National Electricity Market, and is subsequently dispatched by NEMMCO in order to match the demand on the system. This process requires an ability to control the output of the generator in response to NEMMCO's dispatch orders.

At present, however, wind generators are not classified as scheduled generating units within the NEM. Instead, wind generators operate as non-scheduled generating units.

⁵ Refer Part 3 of Schedule 1 (The National Electricity Law) of the *National Electricity (South Australia) Act 1996*.

⁶ Refer http://www.nemmco.com.au/registration/mo_rg044v215.pdf

Non-scheduled generating units are generators typically with nameplate rating less than 30 MW, and those generators do not participate in NEMMCO's central dispatch process; non-scheduled generating units simply generate electricity as they determine.

While it is generally the case that the criteria for classification as a non-scheduled generator is a nameplate rating of less than 30 MW, a person may apply to NEMMCO to approve classification of a generating unit with nameplate rating greater than 30 MW as non-scheduled if, for example, the physical and technical attributes of the relevant generating unit are such that it is not practicable for it to participate in central dispatch, or if the output of the generating unit is intermittent. At present, all operating wind farms have a non-scheduled classification on that basis.

A market generating unit is one for which the generation output is not purchased in its entirety by the "local retailer" as defined in the NEC (the local retailer for SA is AGL SA Pty Ltd) or by a market customer located at the same connection point.⁷ A market generator must sell its generation output through the wholesale (spot) market operated by NEMMCO under the provisions of Chapter 3 of the NEC. A non-market generator, for which generation output is purchased in its entirety by the local retailer or by a market customer, does not participate in market settlements. Operating wind farms have adopted market (e.g. Starfish Hill, Cathedral Rocks, Wattle Point) and non-market (e.g. Canunda) classifications.

It is also to be noted that electricity generators are either synchronous or asynchronous in nature. Large conventional generators are normally synchronous machines which lock themselves to the frequency of the power system when generating. Many wind turbine generators are asynchronous, or induction, generators whose characteristics are not as supportive of the power system. In recognition of the difficulties in integration of larger amounts of simple induction generators into power grids worldwide, wind turbine manufacturers have developed more sophisticated generators (doubly fed induction generators and synchronous-synchronous designs) incorporating power electronics. The technical standards in the NEC do not deal properly with asynchronous generators or these newer variants.

The effect of the intermittent nature of wind generators (that is, they generate electricity only when the wind blows rather than in response to market needs), and the classification of wind generators connected to the NEM as non-scheduled, is that the output of such generators is not treated by the NEM as generation capacity per se, but rather as "negative demand". That is to say, for the purposes of establishing system security and settling the market, NEMMCO regards the output of wind generators as being reductions in demand on the system.

In overall terms, therefore, while there are acknowledged environmental benefits arising from the installation of wind generators, the nature of the output of those generators

⁷ There are no South Australian market customers operating in the NEM.



(asynchronous, non-dispatched) as compared with the requirements of the entire electricity network is such that when the proportion of wind generation within the network rises, questions arise as to the impacts of that wind generation.

This is particularly so in light of the current rules of the NEM, as established through the NEC. As discussed above, the present NEC was conceived on a basis that did not envisage significant amounts of wind generation within the NEM, and therefore does not cater for that circumstance.

The Commission understands that NEMMCO is presently investigating the impacts of wind generation, and exploring possible changes necessary to the NEC to respond to wind generation capacity increases.

1.2 Commission response to increase in Wind Generation Licence Applications

The nature of wind generator output, combined with the lack of definitive regulatory controls at the NEM level, and the dramatic increase in the number of wind generation licence applications means that the Commission, acting in accordance with the imperatives of the statutory licensing regime, is not in a position to treat wind generation licence applications in the same way as other, more conventional, generation licence applications which are not attended by the same concerns in relation to network impacts. That is to say, within the legislative framework established under the Electricity Act, there are grounds to regard wind as different to other generation licence applications: at present the Commission cannot apply the same “rules” and still meet its statutory obligations.

Therefore, in November 2004, the Commission issued a public statement expressing concern about the potential network, power system and market impacts associated with a large level of wind generation capacity in the SA power system.

It indicated that any new generation licence applications associated with wind farms would be referred to the Electricity Supply Industry Planning Council (“ESIPC”) for advice about such impacts. All subsequent wind farm generation licence applications have been referred to ESIPC.

The Commission sought general advice from ESIPC on:

- ▲ the impacts that the proposed wind farm developments might have on the achievement of the Commission’s principal objective under the ESC Act, i.e. on the long term interests of SA consumers with respect to the price, quality and reliability of electricity;
- ▲ the impacts that the proposed developments might have on the electricity market, market prices, network operations and system security; and
- ▲ whether there were any limits to the amount of wind generation capacity that could be developed in particular regions, having regard to transmission line capacity and diversity.

The Commission received a report from ESIPC on this matter on 6 April 2005.

This paper, which is being released for a period of public consultation, summarises the findings of the ESIPC report. In broad terms, the report concluded that there are significant risks associated with the introduction of large amounts of wind generation at present, but also noted that there may be ways in which system operations could be changed in the future which would accommodate wind generation.

Having considered that report, the Commission has now prepared a draft set of principles that it considers could provide an interim solution to the difficulties identified by ESIPC, and which it proposes to apply in the granting of additional generation licences for wind farms in South Australia. Importantly, the Commission does not consider that the draft set of principles can, or should, provide a final solution to those problems; such solutions are necessarily of a nature such that they must be implemented on a market-wide basis. Nevertheless, the draft principles developed by the Commission should allow the introduction of wind farms in South Australia while preserving system and market integrity until such time as market-wide solutions are established.

This draft statement of principles does not provide the Commission's final decisions concerning each licence application. Public comment is being sought on the draft principles outlined here, before the Commission then moves to finalise its licensing decisions.

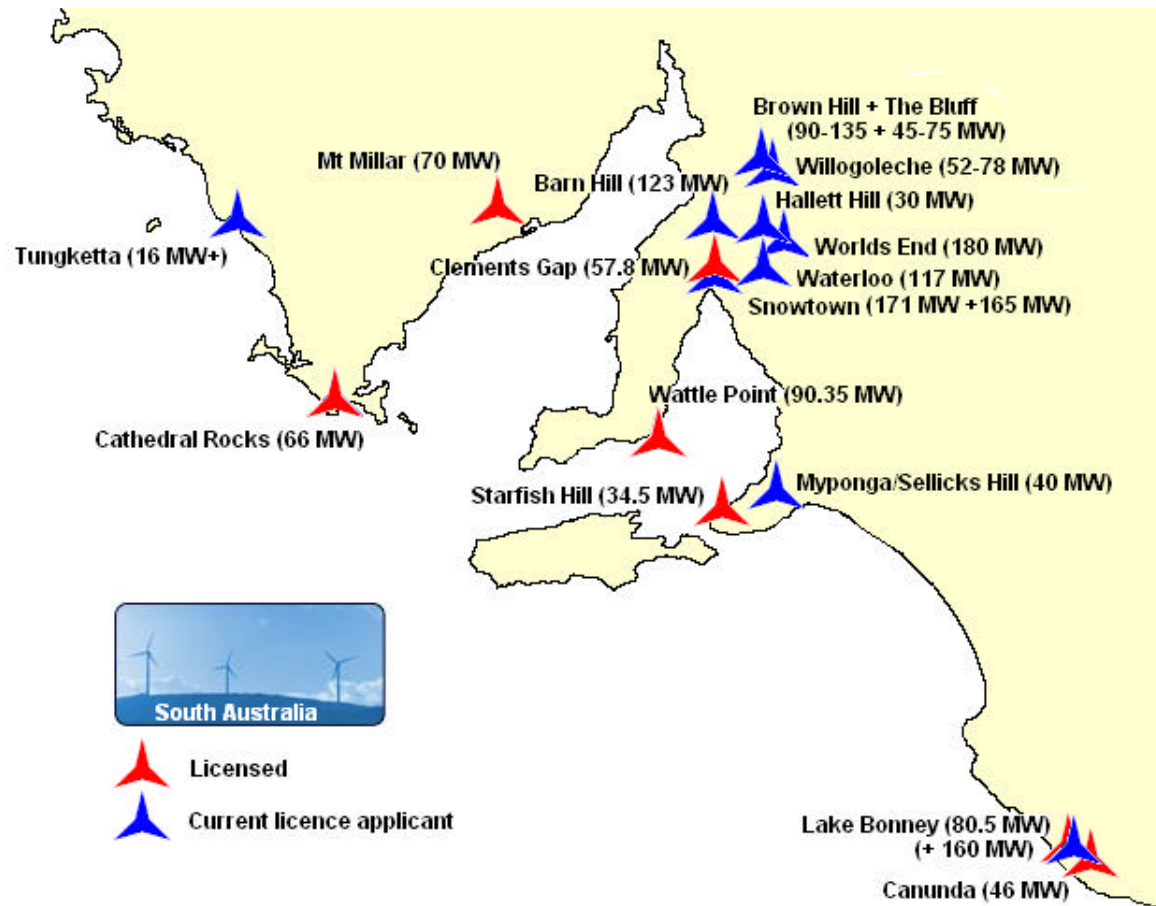


Table 1: Wind farm developments as at 15 June 2005

WIND FARM NAME, PROPONENT	ULTIMATE HOLDING COMPANIES	LOCATION IN SA	OUTPUT CAPACITY (MW)	NETWORK SERVICES PROVIDER	LICENSING STATUS
Starfish Hill, Tarong Energy Corporation Ltd	Tarong Energy Corporation Limited	Fleurieu Peninsula	34.5	ETSA Utilities	Licensed (Jan. '02)
Lake Bonney, Lake Bonney WindPower Pty Ltd	Babcock & Brown; National Power Partners	South-east	80.5 (Stage 1)	ElectraNet	Licensed (Jul. '02)
Wattle Point, Wattle Point Wind Farm Pty Ltd	Southern Hydro Pty Ltd	Yorke Peninsula	97.35	ElectraNet	Licensed (Apr. '04)
Mt Millar, Mt Millar Wind Farm Pty Ltd	Tarong Energy Corporation Limited	Eyre Peninsula	70	ElectraNet	Licensed (Sep. '04)
Cathedral Rocks, Cathedral Rocks Wind Farm Pty Ltd	Hydro Tasmania; Corporacion Energja Hidroelectrica de Navarra SA	Eyre Peninsula	66	ElectraNet	Licensed (Nov. '04)
Canunda, Canunda Power Pty Ltd	International Power plc	South-east SA	46	ETSA Utilities	Licensed (Oct. '04)
Clements Gap, Pacific Hydro Clements Gap Pty Ltd	Pacific Hydro Limited	Mid-north	57.8	ElectraNet	Licence to be issued (approved Oct. '04)
Snowtown, Snowtown Wind Farm Pty Ltd	TrustPower Limited	Mid-north	171 (Stage 1) 165 (Stage 2)	ElectraNet	Application made (Dec. '04)
Lake Bonney, Lake Bonney WindPower Pty Ltd	Babcock & Brown; National Power Partners	South-east	159.5 (Stage 2)	ElectraNet	Application made (Dec. '04)
Myponga/Sellicks Hill, Sellicks Hill Wind Farm Pty Ltd	TrustPower Ltd	Fleurieu Peninsula	40	ETSA Utilities	Application made (Dec. '04)
Willogoleche, Willogoleche Power Pty Ltd	International Power plc	Mid-north	52 - 78	ElectraNet	Application made (Dec. '04)
Brown Hill, AGL Power Generation (Brown Hill) Pty Ltd	The Australian Gas Light Company (AGL)	Mid-north	90 - 135	ElectraNet	Application made (Jan. '05)
Tungketta Hill, Ausker Energies Pty Ltd	Ausker Pacific Co. Pty Ltd; Tacit Pty Ltd; ABAN Lloyd Chiles Offshore Ltd (trustee)	Eyre Peninsula	16	ETSA Utilities	Application varied (Mar. '05)
The Bluff, AGL Power Generation (Brown Hill) Pty Ltd	The Australian Gas Light Company (AGL)	Mid-north	45 - 75	ElectraNet	Application made (Mar. '05)
Waterloo, Waterloo Wind Farm Pty Ltd	Hydro Tasmania	Mid-north	117	ElectraNet	Application made (Mar. '05)
Barn Hill, Stanwell Corporation Limited	Stanwell Corporation Limited	Mid-north	123	ElectraNet	Application made (Mar. '05)
Worlds End, Worlds End Wind Farm Pty Ltd	Energreen Wind Pty Ltd	Mid-north	180	ElectraNet	Application made (Mar. '05)
Hallett Hill, Wind Prospect Pty Ltd	Wind Prospect Group Limited	Mid-North SA	30MW	ETSA Utilities	Application made (Jun. '05) ⁸

⁸ This application was referred to the Electricity Supply Industry Planning Council in June 2005 and has therefore not been considered as part of the ESIPC Wind Study of April 2005.

Figure 1: Wind Farm location map



Map adapted from ElectraNet sources

2 CRITERIA FOR ISSUE OF A GENERATION LICENCE

The obligations on operators of electricity generation plant to be licensed, as well as the Commission's licensing powers in relation to the electricity supply industry, are established under the Electricity Act.

A person carrying on the generation of electricity is required to hold a licence under the Electricity Act if the generating plant has a rated nameplate output of > 100 kVA (or about 0.1 MW). The Electricity Act makes no distinction between generating plant using renewable or non-renewable energy – all are subject to the same licensing requirements.⁹

The Commission is required to determine the outcome of a licence application in accordance with specified criteria¹⁰. It is these criteria that must be used in determining the outcome of the current wind farm generation licence applications.

The Electricity Act specifies that the Commission may only issue a *generation* licence if satisfied that:

- ▲ the applicant is a “suitable person” to hold the licence (s. 17(2)(a));
- ▲ the proposed generating plant will generate electricity of the appropriate quality for the relevant transmission or distribution network (s. 17(2)(b)).

In deciding whether the applicant is a suitable person, the Commission may consider the previous commercial dealings of the applicant (and of the officers and major shareholders of the applicant) and the standard of honesty and integrity shown in those dealings; and the financial, technical and human resources available to the applicant (s. 17(3)).

In addition, the Electricity Act requires that, in considering a licence application, the Commission must have regard to the general factors specified in Part 2 of the ESC Act (s. 17(2)). These general factors are specified at s. 6(1) of the ESC Act, which provides that the Commission, in performing its functions, must:

- (a) *have as its primary objective protection of the long term interests of South Australian consumers with respect to the price, quality and reliability of electricity services; and*
- (b) *at the same time, have regard to the need to –*
 - (i) *promote competitive and fair market conduct; and*
 - (ii) *prevent misuse of monopoly or market power; and*
 - (iii) *facilitate entry into relevant markets; and*
 - (iv) *promote economic efficiency; and*
 - (v) *ensure consumers benefit from competition and efficiency; and*

⁹ It is noted that many domestic (roof-top) photovoltaic electricity generation systems have capacity < 100 kVA and hence are not required to be licensed.

¹⁰ A detailed description of the Commission's licensing powers and the process followed in considering a licence application is available from Advisory Bulletin No. 4, *Licensing Arrangements for the Electricity and Gas Supply Industries*, available from the Commission website, www.escosa.sa.gov.au



- (vi) *facilitate maintenance of the financial viability of regulated industries and the incentive for long term investment; and*
- (vii) *promote consistency in regulation with other jurisdictions.*

Several general comments can be made about these criteria in the context of the current wind farm generation licence applications.

The criteria specified at s. 17(2)(a) and (b) of the Electricity Act are matters about which the Commission *must* be satisfied before it may issue a licence, whereas the criteria specified at s. 6(1) of the ESC Act are general factors to which the Commission *must have regard* (i.e. to which it must give serious consideration) in making its decision. This suggests that the Commission might issue a generation licence even if it were uncertain about the impacts of the proposed operations on certain of the s. 6(1) objectives. However, identification of significant risks to the achievement of the principal objective as specified at s. 6(1) of the ESC Act might provide grounds for the Commission to reject such a licence application. It is noted that the general advice sought from ESIPC in relation to the expansion of wind farms in South Australia relates directly to the principal objective. Section 4 of this paper provides further discussion about the application of the ESC Act criteria to the Commission's consideration of the current set of generation licence applications.

None of the criteria in either the Electricity Act or the ESC Act suggest that the Commission should give weight to the renewable energy aspect of wind farms (e.g. in terms of reducing greenhouse gas emissions in comparison with non-renewable generation sources) in reaching its decision on the generation licence applications currently before it. As a consequence, the Commission has not done so.

Equally, the criteria do not provide for the Commission to consider planning issues (e.g. landscape impacts of wind farms) in arriving at a decision on whether or not to issue a licence. Such matters are dealt with through the development approval process under the *Development Act 1993*, which operates independently of the licensing process established under the Electricity Act. Clearly a proposed wind farm will require approval under both processes before the electricity generation operations can be commenced.

Finally, while the advice sought from ESIPC concerned the impact of the *group* of wind farms, and this advice is relevant to the Commission's licensing decision, ultimately the Commission must make a decision based on its consideration of *individual* applications. For this purpose, the Commission has, where appropriate, sought additional advice from ESIPC on specific wind farm proposals.

3 THE ELECTRICITY SUPPLY INDUSTRY PLANNING COUNCIL REPORT

This section of the paper summarises the findings of the report from ESIPC on the impacts of wind farm developments.¹¹ The Commission has sought the views of wind farm developers, non-wind generators, NEMMCO and other relevant stakeholders on the conclusions and recommendations of the report. ESIPC itself has initiated a process of consultation on the report. Stakeholder comment is discussed in section 4 of the paper in the context of the Commission's response to the ESIPC report.

The findings of ESIPC were developed from two perspectives, viz a detailed South Australian specific analysis using local data, actual projects and real market conditions; and a review of the international experience with wind generation. The local analysis considered situations in which 400 MW, 500 MW, 800 MW and 1,000 MW of wind farm capacity were installed across the State, based upon the currently licensed developments, as well as additions of certain of the other proposed developments¹² as detailed in section 1 of this paper.

3.1 *General Character and Variability of Wind Energy*

ESIPC concluded that South Australia has an excellent wind resource. Based on modelling of wind farms outputs, annual capacity factors between 32% and 40% are achievable, which is considered high by international standards. The wind resource shows, on average, a consistent diurnal variation, with wind energy outputs peaking in late afternoon.

Nevertheless, the variability of the wind resource complicates the prediction of wind farm outputs within short time frames.

Variability would appear to be the single largest challenge to the integration of wind energy into the National Electricity Market as it affects a broad range of market mechanisms from the security of dispatch to the management of contractual risk instruments. (ESIPC report, p. 8)

The impact of variability is most significant where it is large in relation to system demand, and this is most likely to be the case for the 800 MW and 1,000 MW cases at times of low demand. ESIPC concluded that diversity in locations of wind farms across the State would assist in managing the effects of variability. In addition, adequate forecasting of wind variability is an important pre-requisite to effective management of the wind resource.

The ESIPC analysis considered variability at several levels, including:

¹¹ Refer http://www.esipc.sa.gov.au/downloads/Planning_Council_Wind_Report_to_ESCOSA.pdf.

¹² These were Myponga/Sellicks Hill, Lake Bonney (Stage 2), and Snowtown (Stages 1 and 2).



> 30 min variability

Modelling was used to determine the probability of wind farm output varying by certain amounts in specified timeframes. In the 400 MW and 500 MW cases, the hourly variability achieved on a “once per annum” basis was less than one contingency for South Australia (260 MW). However, for the 800 MW and 1,000 MW cases, the hourly variability was significantly greater than two contingencies in the State.

Without comprehensive forecasting of these events or additional constraints in the National Electricity Market to instruct other generators to be operating, it may be difficult to ensure that sufficient generating capacity would be available. (ESIPC report, p. 14)

< 30 min variability

A statistical approach was used to assess variability of wind generation at time scales less than 30 min¹³. Different timeframes within this category are important in terms of control mechanisms available in the NEM.

In the 5 min timeframe, the NEM dispatch process would be issuing instructions to the available generators to change their output to accommodate variations in wind and demand (the “Ramp Rate” controls in the NEM). Variability at the 3 sec level cannot be compensated for in the existing NEM dispatch instruction arrangements, relying instead on the automatic generator controls (AGC) in the NEM. This service is currently part of the existing Frequency Control Ancillary Service (FCAS) market arrangements. Variations with a timeframe between 0 and 3 sec, which impact on system frequency, are not able to be managed through the regulation FCAS, and can only be offset by power system inertia. The ESIPC report suggests that latest technology wind turbines have control systems that should smooth out fluctuations in the 0 – 3 sec timeframe.

Table 2 shows the 1% Probability of Exceedance (PoE) variations in wind farm output for the 400 MW and 1,000 MW wind farm cases over and above any diurnal patterns for the studied timeframes – for 30 minute timeframes and below.

Table 2: 1% PoE variations (MW)

TIMEFRAME	400 MW CASE	1,000 MW CASE
3 hour	208	647
1 hour	117	390
30 min	77	252
30 min*	70	221
5 min*	20	37
3 sec*	4.9	8.3

* exclude diurnal variability

¹³ This approach involved correlating wind generation output data obtained from the Starfish Hill wind farm with Bureau of Meteorology wind data to provide representative information for other wind farm sites.

3.2 Potential Impacts on Power Quality

The National Electricity Code (NEC) sets out system standards for power quality (voltage, voltage fluctuations, harmonic distortion and voltage imbalance). These are very location specific, and are dealt with as part of the process for negotiation of a connection agreement between the wind farm proponent and the network service provider (either ElectraNet for connection to the transmission network, or ETSA Utilities for connection to the distribution network).

ESIPC concluded that power quality issues arising from wind farms were being managed effectively under present arrangements.

Appropriate standards are in place and the utility is monitored to ensure these standards are met. The technical capabilities of today's wind turbines and the approaches available through the connection arrangements and supplementary plant ensure that any potential power quality issues can be managed. The Planning Council is satisfied that the combination of improving machine types and the commendably high quality of network agreements delivers adequate assurances that power quality will not be adversely affected by increased levels of wind generation. (ESIPC report, pp18-19)

3.3 Potential Impacts on System Security and Reliability

ESIPC concluded that variability of wind output raises potential issues concerning security and reliability of the power system. It notes that management of system security in the NEM relies on:

- ▲ Setting appropriate requirements on generation plant prior to permitting connection of that plant to the grid; and
- ▲ Ongoing operation and management of the power system through market incentives, market mechanisms, and NEMMCO's powers.

The ESIPC report deals with each of these areas in relation to the connection and operation of wind farms in the South Australian power system.

3.3.1 Connection Arrangements and Technical Standards

The NEC outlines the range of technical requirements that may be imposed on generators seeking to connect to a transmission or distribution network. The detailed technical standards to be applied in a particular case are negotiated as part of the connection process with the network service provider, with an overriding objective of such negotiations being maintenance of the power system's stability and security. The ESIPC report noted that the NEC technical standards are not well adapted to be applied to unscheduled and asynchronous generators such as wind turbines.

The technical standards are not rigid and the connection process involves the setting of a number of "negotiated access standards". Negotiated standards are normally applied to wind generators' ability to ride through low voltage disturbances and to their ability to generate and absorb reactive power. (ESIPC report, p. 20)



ESIPC noted that the performance assessment of a proposed wind generator is based on a dynamic model of the relevant type of wind turbine, and that there are doubts about the accuracy of such models and their wider applicability in studying system stability. It suggests that the “automatic access standard” of the NEC, while more onerous than typically negotiated standards, will contribute to providing a secure power system with higher levels of wind generation.

The automatic access standard requires synchronous generators to have the ability to generate and absorb considerable quantities of reactive power. This could be applied to wind farms and achieved either through the use of state of the art turbine equipment or through the use of appropriate network support equipment (e.g. static VAR compensators).

Generators are also required to remain connected and operational or “ride through” through a severe disturbance. Wind farms usually negotiate a standard based on their ability to ride through a severe but single credible transmission fault modelled with given loads and other generation on-line and assuming primary protection clears all faults. With a large and growing amount of wind energy on the system, the ability to predict power system configuration is difficult and ESIPC recommends a more prescriptive ride through capability.

The short-term variability of wind generator output may also require the imposition of new standards, e.g. requiring wind generators to smooth output over time scales from a few seconds up to 5 minutes. Remote control of wind output through market security systems will also be necessary to maintain system security.

ESIPC concluded that higher technical standards will need to be imposed on future wind farms, and in particular that they have the ability:

- ▲ to ride through a prescriptive and more severe low voltage event;
- ▲ to generate and absorb reactive power and to control voltage;
- ▲ to smooth short term fluctuations in output; and
- ▲ to be remotely controlled and to curtail output where necessary.

It suggested that new standards consistent with these requirements should be developed, but that the NEC automatic access standards combined with NEMMCO’s remote data and control requirements provide a reasonable interim step.

3.3.2 Operation and Management of the Power System

The ESIPC report noted that the ongoing management of system security is delivered through NEMMCO’s market systems, which are designed to deliver “security constrained, optimised dispatch”. Security and reliability also depend on appropriate market incentives placed on generators participating in the NEM, including FCAS markets. In reviewing the impacts of wind farms on reliability and

security of the South Australian power system, ESIPC was therefore required to analyse the market impacts, particularly to examine likely dispatch patterns, examine ramp rate adequacy, and consider the effects on conventional generators.

The addition of wind energy increases the variability and uncertainty already inherent in the operation of the power system (e.g. through demand fluctuations). ESIPC modelling shows that, in the 400 MW and 500 MW wind farm cases, wind energy increases overall variability by 20 – 30%, with a similar deterioration in average forecasting accuracy. Indeed, market data suggests that this effect is already being observed. ESIPC suggested that this impact is undesirable, but nevertheless is manageable. In the 800 MW and 1,000 MW cases, however, the average variability in wind output exceeds the average variability in demand and demand forecast accuracy. In these cases, variability in wind output is the dominant cause of variability and uncertainty in market operations. The ESIPC analysis suggests that concentration of wind farms in one location exacerbates the effects of such variability.

It is therefore essential that high quality wind generation forecasts be available to the market.

Without excellent wind generation forecasting we should expect a significant deterioration on the forward demand forecasts which are vital for other generators trying to make efficient plant commitment decisions. (ESIPC report, p. 25)

The ESIPC modelling also showed that the potential for rapid changes in wind output would place pressure on the effective management of ramp rates. In particular, for the 800 MW and 1,000 MW cases, the ramp rate of generation already in operation was insufficient to manage ramp rates associated with wind generation variations, requiring the commitment of additional generation. Again, high quality wind generation forecasting is essential to address this impact.

With accurate forecasts of these types of rapid rate of change events and appropriate dispatch optimisation mechanisms the generators and the market operator could more effectively optimise the dispatch of all of the generators in the network. (ESIPC report, p. 26)

The ESIPC analysis considered the possibility that the South Australian power system might become insecure due to high levels of wind generation, particularly at times of low demand. Modelling results suggested that high levels of wind generation occur less frequently at times of low State demand. However, where the two coincide, the system security implications need to be managed. In particular, a credible contingency could lead to system instability. This is a particular issue in the 800 MW and 1,000 MW cases.

In most circumstances where the output from the wind-farms is significant with respect to demand, South Australia will be exporting power mitigating, to some degree, the risk of a credible contingency causing significant instability. The issue remains that under these circumstances the technical requirements for operating the network within its safe working envelope may require



additional capacity from conventional generation beyond that which would be available on the basis of market offers to maintain system integrity during a forced outage. (ESIPC report, p. 29)

The ESIPC report suggested that the system security pressures could be relieved if wind farms were integrated into the economic optimisation of the NEM, since this provides NEMMCO with the power to ensure that system security will be maintained in the most efficient way.

NEMMCO has been supplied with data and analysis by the ESIPC and is undertaking its own detailed analysis of the potential impacts of larger amounts of wind generation on the security of the power system. NEMMCO has retained international consultants DlgSILENT to assist in this work, which should be completed in the coming months.

Finally, the market analysis conducted by ESIPC showed that increased use of wind generation in South Australia would reduce average gas consumption for electricity generation purposes, and also increase the volatility of gas usage. This could have implications for gas supply and price, particularly in respect of the allocation of demand charges between gas customer classes.

In summary, the ESIPC report noted that classification of wind generators as non-scheduled has the potential to lead to unacceptable market distortions at higher levels of wind generation. Key market participation issues for wind generation are:

- ▲ Non-participation in the normal market bidding process to determine which generators operate to satisfy market demand;
- ▲ NEMMCO is unable to manage market stability and security through its normal market optimization techniques;
- ▲ Currently wind generation is treated as a negative demand rather than a source of supply, so that neither the forecast nor the actual quantity of wind energy are visible to the market, making it difficult for participants to manage their market involvement; and
- ▲ Wind generators do not participate in the markets for ancillary services, which are an important part of the market design, operating on a causer-pays basis and allowing NEMMCO to manage the market within secure limits.

3.4 Potential Impacts on Price

The ESIPC report has drawn some general conclusions regarding market outcomes and price impacts from the system modelling. Such conclusions are highly dependent on the assumed bidding strategies adopted by conventional generators.

The modelling showed that, as the level of wind generation increases, there is an increase in the level of exports and a decrease in the level of imports. However, in general South Australia remains a net importer from the Eastern States grid. In addition, about half of

wind generator output displaced South Australian conventional generation, particularly gas-fired generation.

The modelling also showed that the energy output from wind farms is significant with respect to energy growth in South Australia. Even at 400 MW of wind generation capacity, the energy generated covers 5 years of demand growth. ESIPC suggested that this would have significant impacts on investment from conventional generation.

Increased wind generation increases competition in the generation sector and, in the case of simpler bidding strategies (e.g. Short Run Marginal Cost cases) causes spot (wholesale market) prices to fall. More complex bidding strategies (e.g. Long Run Marginal Cost cases) are more reflective of commercial reality, and the ESIPC analysis suggested that, for such cases, the spot price becomes more volatile with high levels of wind generation (i.e. increased occurrence of both lower and higher spot prices). Volatility in the wholesale price would in all probability flow through to a higher price to consumers in the retail market in the longer term (noting that in respect of small customers, the Commission's three and a half year retail price path will provide medium term stability).

The ESIPC report also noted that wind variability will impose additional costs on other market participants (and hence upward pressure on price) associated with the need to recover fixed costs over shorter operation times and with increased costs of market ancillary services. In addition, there may be a need for increased flexibility in gas supply arrangements, since the modelling suggested that wind generation largely displaces gas-fired generation.

The ESIPC report suggested that there is no clear outcome in relation to the impact of increased amounts of wind generation on prices. It concluded that the market should be adapted to ensure efficient operation, pricing and cost allocation through applying the causer pays principle to ancillary services, applying optimal market dispatch to wind generators, and increasing the transparency and accuracy of information to the market (e.g. through improved forecasting).

3.5 Summary of Conclusions from the ESIPC Report

ESIPC has concluded that 500 MW of wind generation capacity in the SA power system has only "modest" network, power system, and market impacts. Beyond that level, the risk of such impacts increases significantly. ESIPC suggested that there is no absolute "limit" on the amount of wind generation capacity that could be installed in South Australia, provided that appropriate market-based measures are put in place. Such measures would impose additional economic constraints on wind farm developments, ensuring that market forces determine an appropriate level of wind generation in South Australia. These measures are incorporated into four key recommendations as follows:



Recommendation 1: Appropriate technical standards

New wind generators should be required to conform to the automatic access standards under the NEC. In the medium term the technical standards should be aligned with emerging world's best practice. Most modern wind turbines are already capable of meeting these standards

Recommendation 2: State of the art wind energy forecasting

The market needs to be informed to allow participants to make efficient decisions on the commitment of plant and scheduling of fuel. Otherwise, costs could rise and security be put at risk.

Recommendation 3: Optimised dispatch of non-scheduled generation

NEMMCO must be able to automatically optimise non-scheduled generators (as is currently done for scheduled generators) to ensure that the market continues to operate efficiently and securely.

Recommendation 4: Proper cost allocation and market design measures

Market changes should be made to require non-scheduled generators to participate in ancillary service markets, both to pay for effects they cause and earn revenue for services they provide. This will drive appropriate investment and operational decisions.

3.6 Wind Energy Technical Advisory Group

In mid 2004, the Commonwealth and State and Territory Governments, through the Ministerial Council on Energy (MCE) established an inter-jurisdictional working group to review the range of policy level issues associated with large amounts of wind generation in the NEM. The Working Group in turn requested NEMMCO to establish a Wind Energy Technical Advisory Group (WETAG) to report on the technical matters associated with the policy review. A report from WETAG was released by the Working Group for comment in April 2005.¹⁴

Among the measures recommended by the WETAG report were the following:

- ▲ The application to wind generators of the technical standards contained in the NEC should be reviewed in accordance with a set of guiding principles as outlined in the WETAG report. In addition, future such reviews should be undertaken at intervals of 3-5 years.
- ▲ Large amounts of non-scheduled generation are incompatible with the optimised central dispatch process in the NEM, in part because the operational security limits

¹⁴ Refer <http://www.mce.gov.au/assets/documents/mceinternet/WEPWGDiscussionPaperMarch0520050322094836.pdf>

of the network may be infringed. Some form of dispatch control should therefore be applied to wind generators (e.g. a “semi dispatch” model as described in the WETAG report).

- ▲ Evaluation of the power system security implications of increasing amounts of wind generation is urgently required. In addition, the NEC should be amended to require the provision of appropriate dynamic generating plant models for all significant generators.
- ▲ Information regarding wind generation forecasts should be made available to market participants to facilitate transparency and efficient plant commitment. The NEC could be amended to require appropriate information disclosure.
- ▲ The NEC should be amended to require that all market generators participate in “causer pays” arrangements for regulation FCAS services.

The Commission notes that ESIPC was closely involved in the WETAG discussions and that there is broad consistency between the ESIPC and WETAG reports. While consultation on the WETAG report is still underway, some of the recommended measures are being progressed. For example, NEMMCO has already commenced the immediate review of the technical standards of the NEC as applied to wind generators. Furthermore, NEMMCO has recently submitted to National Electricity Code Administrator (NECA) a series of proposed amendments to the NEC to provide for appropriate information disclosure arrangements for non-scheduled generation in the NEM.¹⁵ The Commission will closely monitor the outcomes of these developments.

¹⁵ Refer <http://www.neca.com.au/TheCode.asp>

4 LICENSING PRINCIPLES

This section discusses the implications of the conclusions and recommendations of the ESIPC report for the Commission's consideration of the applications currently before it, as outlined in section 1, for the issue of generation licences associated with additional wind farms in South Australia. Where relevant, the findings of the WETAG report are also considered. The discussion occurs within the framework of the legislative criteria for issue of generation licences as outlined in section 2. A draft set of principles, intended to guide the Commission in this task and to inform wind farm proponents of the Commission's approach on this matter, is outlined.

4.1 Implications of the ESIPC report

The Commission has sought comments on the ESIPC report through a notice placed on its website¹⁶. It has also discussed the findings of the report with various parties, including NEMMCO, and several wind farm developers. Several written submissions were received in response to this consultative process.

In general, the Commission has noted broad support for both the method used by ESIPC in conducting its analysis of the impact of additional wind generation in South Australia, and for the findings contained in the ESIPC report.

NEMMCO has noted the consistency between the findings of the ESIPC and WETAG reports, and provided the Commission with a detailed statement of the work it is doing to progress the WETAG recommendations.

Amongst wind farm proponents:

- ▲ AGL indicated its agreement with the recommendations of the ESIPC report, and expressed particular support for the conclusion that market forces should determine an appropriate level of wind generation in South Australia.
- ▲ TrustPower expressed its desire to work closely with the Commission, ESIPC and other relevant parties to progress the development of solutions to the issues raised in the ESIPC report.
- ▲ International Power Australia welcomed the study undertaken by ESIPC, and indicated in-principle support for market based mechanisms rather than additional regulation as the way forward.
- ▲ Wind Prospect welcomed the opportunity it had been afforded to participate in discussions with ESIPC during the development of the report.
- ▲ Stanwell indicated its support for the conclusions and recommendations of the ESIPC report.

¹⁶ Refer the *What's New* page of 15 April 2005.



- ▲ Babcock & Brown and National Power commented that the ESIPC report can be relied on as a basis for developing recommendations that will enhance competition in the NEM, ensure a level playing field for market participants, and ensure system security.

In commenting on the nature of the modelling undertaken by ESIPC, TrustPower noted that marginal loss factors recently released by NEMMCO for the year ending March 2006 have resulted in a significant reduction in these factors for connection points on the Yorke and Eyre Peninsulas, where several large wind farms are located. After allowing for local line losses and turbine maintenance outages, the net wind output available to supply load in South Australia is well below the name-plate capacity of the wind generators. In addition, TrustPower suggested that inclusion of significant geographical concentrations of wind generation from the mid North and South East of the State in the 800 MW and 1,000 MW cases considered by ESIPC had reduced the diversity benefits of various projects across the State. As a consequence, TrustPower suggested that any short-term limit to the level of wind farm capacity in South Australia could be comfortably higher than the 500 MW amount suggested by ESIPC.

International Power Australia commented that

...we recognise the inherent challenges of modelling wind farm impacts on the South Australian electricity market and as such we would urge caution on an over reliance on the modelling outcomes. We are happy to work with ESCOSA to refine these models in the future so wind's impact on the South Australian electricity market can be better understood.

In all cases, the wind farm proponents provided detailed comments on the means by which the concerns raised in the ESIPC report could be addressed in the short term, given their concern at the delay which might otherwise occur if the Commission was to await the ultimate national resolution of those concerns. Addressing the concerns of the ESIPC Report would allow the Commission to issue at least some generation licences in the short term. These detailed comments are discussed later in this section.

Operators of conventional generation plant (with no interests in wind farms) also supported the findings of the ESIPC report and suggested that the Commission should issue no further generation licences for wind farms until the matters raised in the report has been addressed fully. In particular:

- ▲ NRG Flinders suggested that, while a cap on the permissible wind generation in South Australia is not necessarily required, a range of market improvements are needed urgently to ensure that wind generation operates in an efficient manner within the current framework, and faces the correct cost drivers and incentives.
- ▲ TXU suggested that the ESIPC report has raised significant concerns that warrant action from the Commission to limit wind generation investment in South Australia to 500 MW until the ESIPC recommendations are implemented.

The Commission also received submissions from a small number of consumers urging the Commission to impose a moratorium on further generation licences for wind farms until the matters raised in the ESIPC report had been addressed.

For example, a submission from the True Friends of the Southern Mt Lofty Ranges argues that the current level of licensed wind generation in South Australia is an already high proportion in the grid and that, based on the ESIPC report, the issuing of further licences is not warranted. It suggests that further licences would make the State's power system vulnerable to significant cost increases, instability and unreliability consequences.

ElectraNet provided comments on the nature of the analysis being undertaken by ESIPC prior to completion of the ESIPC report.¹⁷ It noted that the statistical approach used to assess the impact of short-term (< 30 min) variability was based on wind generation data from the Starfish Hill wind farm, which uses what might now be regarded as "old technology", and urged caution in drawing conclusions based on one site that may not be representative of wind generation as a whole. The Commission acknowledges such shortcomings, and notes that additional modelling and other work needs to be undertaken as more operational wind generation data become available. NEMMCO in particular is now embarking on a broader and more detailed analysis, using the ESIPC work as a starting point. However, it is necessary for the Commission to draw conclusions based on the work that has been done to date.

COMMISSION'S CONCLUSIONS IN RELATION TO THE ESIPC REPORT

It is the view of the Commission that:

- ▲ the ESIPC Report raises matters of significant risk for the ongoing security and reliability of the South Australian power system if the level of wind generation capacity were to increase beyond the current level.
- ▲ the fundamental conclusions of the ESIPC Report are appropriately conservative;
- ▲ the ESIPC findings are consistent with and complement those of the WETAG report.
- ▲ the ESIPC findings have received broad support from a range of stakeholders.

The Commission's conclusions are that:

- ▲ *the ESIPC Report proposes means of managing the risks it identified associated with an increase in the level of wind generation capacity, by the establishment of a regulatory environment in which the further expansion of wind generation in this State can safely occur;*
- ▲ *the ESIPC Report provides a sound basis for use in consideration of the current wind farm applications.*

¹⁷ http://www.esipc.sa.gov.au/downloads/Comments_from_ElectraNet_re_Wind_Energy_work_Mar_05.pdf



4.2 ESPIC recommendations and licensing framework

Having concluded that the ESIPC Report provides a sound basis for the Commission to consider the current wind farm applications, the Commission has considered the legislative framework within which it is required to make licensing decisions.

In the remainder of this section, the ESIPC report is used, together with other information as appropriate, to consider the extent to which the licensing of further wind farm developments as outlined in Table 1, would satisfy the legislative criteria as summarised in section 2 of this paper. It is noted that, ultimately, the Commission must consider each application against these criteria. Here, however, the discussion is confined to the general consideration as to whether or not the issuing of further licences would impact negatively on the requirement to satisfy each criterion in turn.

4.2.1 Electricity Act Criteria

The Commission is required to be satisfied that:

- ▲ the applicant for a generation licence is a “suitable person” to hold the licence; and
- ▲ the proposed generating plant will generate electricity of the appropriate quality for the relevant transmission or distribution network.

This paper does not consider the “suitable person” requirement. The Commission is reviewing this matter separately in relation to each applicant, and will outline its findings in its final licensing decision.

The “appropriate quality” criterion is discussed in section 4.4.1 of this paper.

4.2.2 ESC Act Criteria

As noted in section 2 of this paper, when considering a licence application, the Commission is also required to have regard to the general factors or Commission objectives specified at s. 6(1) of the ESC Act. These include a principal objective (protection of the long-term interests of consumers with respect to price, quality and reliability of electricity services) as well as a set of subsidiary objectives (e.g. enhancing competition).

The Commission must thus consider whether or not the proposed electricity operations might compromise the achievement of these objectives. It is noted that the objectives may, in some situations, conflict, so that the Commission would need to consider whether a negative impact on the achievement of one objective was being offset by a positive impact on the achievement of another objective. The fact that one objective is expressed as being the *principal* objective, provides clear direction that stronger weight should be given to that objective in the Commission’s deliberations than to the subsidiary objectives.

Ultimately, the Commission might form the view that the achievement of the set of objectives was being sufficiently compromised by the proposed operations as to require that it not approve the issue of the licence. This would be particularly the case if the principal objective were being seriously compromised.

This subsection reviews the current set of proposed wind farm developments (for which the Commission has received generation licence applications) against the general objectives specified in s. 6(1) of the ESC Act. The review takes into account the findings outlined in the ESIPC and WETAG reports, submissions received on those reports, and other relevant information.

Principal Objective

How will the proposed wind farm developments impact on the long-term interests of consumers with respect to price, quality and reliability of electricity services?

(i) Price

The ESIPC report draws some general conclusions about market and associated price impacts of wind farm developments for 400 MW, 500 MW, 800 MW and 1,000 MW cases (refer section 3.4 of this paper). Its modelling showed that under simple bidding strategies, wholesale prices fall due to the competitive pressures associated with new sources of generation. More complex bidding strategies lead to more volatile wholesale prices, and such volatility could be reflected in higher contract prices in the retail market. In addition, high variability of wind can impose additional costs on conventional generators. Thus, under certain circumstances, prices experienced by customers could increase.

In its submission on the ESIPC report, TXU indicated its broad agreement with the ESIPC assessment of significant wind generation on wholesale prices, and:

...in particular, that this is likely to result in lower base-load energy prices, and that scheduled plants will become even more reliant on short-term spikes to recover their costs.

However, in commenting on the ESIPC suggestion that plants may alter their bidding strategies to increase market volatility following large scale wind penetration, TXU noted that:

...while we concur that bidding strategies may change as a result of changes in competitive dynamics, we are sceptical that sufficient supply scarcity will occur to substantially increase the incidence of price spikes.

TXU suggested that if the incidence of price spikes does increase, this would be more likely due to increased occurrences of ramp rate constrained dispatch intervals.



The ESIPC report noted that increasing wind generation changes the utilization of the Heywood interconnector, reducing imports and increasing exports, thereby bringing prices in South Australia and Victoria closer together. Stanwell commented that reduction of this price differential:

...has NEM wide benefits that should not be underestimated and is limited only by the current interconnector transfer capacity. While there is also an increase in the volatility in the NEM as a result of increased wind penetration, this should be seen as an opportunity for market innovations to emerge from participants in terms of contracting, demand management and integration of various generation technologies.

In summary, the conclusions of the ESIPC report on price impacts are equivocal:

There is no clear outcome on the impact of wind on price. Instead the Planning Council observed a number of balancing pressures on price. (ESIPC report, p iv).

The Commission therefore does not believe that there is clear evidence that the long-term interests of consumers would be adversely affected by price impacts associated with significant amounts of additional wind generation.

In addition, the Commission notes that any long-term upward pressures on price are likely to be ameliorated through the market-based measures recommended by ESIPC to address the reliability and system security impacts associated with wind generation.

(ii) Quality

In contrast, the conclusions of the ESIPC report on quality impacts are unequivocal. As outlined in section 3.2 of this paper, ESIPC concluded that the combination of improving wind turbines and the high standard of connection agreements provides adequate assurance that power quality levels will not be adversely impacted by wind generation. The Commission is therefore satisfied that the long-term interests of consumers would not be adversely affected by the power quality impacts associated with significant amounts of additional wind generation.

(iii) Reliability

The Commission interprets the term “reliability” as contained in s. 6(1) of the ESC Act as incorporating the reliability and system security impacts examined in the ESIPC report. The findings of ESIPC concerning these impacts have been summarised in section 3.3 of this paper.

In brief, ESIPC found that, in the absence of upgraded technical standards for network connections, high quality wind energy forecasting, and market arrangements that would integrate wind generators more fully into the NEM, wind developments in SA at the 800 MW and 1,000 MW cases posed significant

risks to reliability and security of the South Australian power system. Such risks arise chiefly from the inherent variability associated with the output of wind generators, and include:

- ▲ reduced ability of the system to remain operational through low voltage events or through disturbances to system frequency;
- ▲ insufficient capacity of the system to generate and absorb reactive power;
- ▲ greater variability and uncertainty in market operations;
- ▲ ineffective management of ramp rates, requiring the commitment of additional generation; and
- ▲ system instability arising from a credible contingency (particularly at times when high level of wind generation coincide with low State demand).

As noted in section 4.1, the Commission has not received any submissions that disagree in any substantive way with the ESIPC conclusions regarding such risks. The WETAG report has noted the urgent need to progress the development of measures to manage these risks. NEMMCO, in its comments to the Commission, has reinforced the need for such action, noting in particular that it:

sees management of network flows (where flows are close to network limits) as an area for urgent investigation.

The Commission therefore believes that a further significant increase in the level of wind generation in the State, in the absence of measures to ameliorate the risks identified in the ESIPC report, could significantly impact on the long term interests of South Australian consumers with respect to the reliability of the power system.

Subsidiary Objectives

The subsidiary objectives of s. 6(1) of the ESC Act have been outlined in section 2 of this paper. They relate to matters associated with competition and efficiency, and the financial viability of, and long term investment in, the electricity supply industry in South Australia.

The influx of a significant amount of additional generation (whether powered by wind or other sources) enhances competition in the generation sector of the NEM. As noted previously, the ESIPC modelling suggests that, under certain circumstances, this competitive pressure will act to drive wholesale market prices lower. However, since wind generators do not at present participate fully in the market in the manner of conventional generators (in particular because they are not currently part of the scheduled dispatch processes of NEMMCO), the notion of competition being enhanced in this manner has a degree of artificiality about it. Furthermore, the extent to which customers benefit from such competitive



pressures is questionable if it is accompanied by reduced power system security and reliability.

TXU, in its submission on the ESIPC report, commented on the impact of wind generation on the financial position of conventional generators. It noted the possible increased incidence of wholesale price spikes, which it suggested are difficult for gas-fired scheduled generation plant to manage, and may not be fully recoverable through the NEM pool.

These factors could impact on the financial sustainability of scheduled plant in SA in the face of the subsidised entry of wind farms, which are generally not reliant on market price outcomes for their revenue. Needless to say the ongoing viability of scheduled plant will be essential to support energy supply security in SA.

As outlined in section 3.4, the ESIPC report noted that the advent of large amounts of wind generation capacity, even at the 400 MW level, would have a significant impact on future investment from conventional generation. Nevertheless, the Commission notes that the overall level of generation investment would not diminish as a result of significant levels of wind generation investment.

Other issues

Of course, the consideration of the ESC Act objectives must ultimately focus on each individual wind farm that is the subject of a generation licence application.

The Commission has sought further advice from ESIPC on whether it was possible, based upon the ESIPC analysis of the aggregated impact of proposed wind farm developments, to draw any conclusions about the impact of individual developments on the achievement of the ESC Act objectives?

Key additional issues are as follows:

Distribution vs transmission connected wind farms

As noted in Table 1, two of the wind farms that are currently the subject of generation licence applications before the Commission are proposed to be connected to the distribution network, with the remainder to be connected to the transmission network. The distribution-connected (embedded) wind farms are smaller (< 50 MW) than transmission-connected developments, and hence, perhaps, less likely to contribute significantly to the reliability and system security risks identified in the ESIPC report as arising from the output variability of wind generators.

The ESIPC report suggests that distribution-connected wind farms are more likely to give rise to power quality issues, being electrically closer to customers, and, as a consequence, higher power quality standards might be expected of

such wind farms. In addition, they may introduce issues of network loading and control that are beyond NEMMCO's capacity to influence. Nevertheless, ESIPC concluded that local power quality and network control issues were being managed satisfactorily by ETSA Utilities through the connection agreement process for distribution-connected wind farms.

Geographical Location

Some wind farm locations may be more suited to the management of risks identified in the ESIPC report than other locations. Geographical location is, of course, a critical determinant in the success of a wind farm proposal, as it influences the amount of the wind resource, the costs of connection, the extent of line losses, and local network management issues.

With the exception of the two embedded wind farm proposals and the Lake Bonney proposal, the wind farms that are currently the subject of generation licence applications are all grouped in the mid-north area of the State. This location is favourable from a connection cost perspective. However, such a large amount of wind generation in a relatively small area (up to 1,000 MW based upon the plant capacities of Table 1) may exacerbate the reliability and system security issues associated with variability of wind generation output.

A similar problem could arise in relation to the wind farms located in the south east area of the State. This could suggest the need to limit the amount of generation located in such areas.

Conclusions

Based on the findings of the ESIPC report, the Commission has identified an adverse impact on the achievement of the principal objective of s. 6(1) of the ESC Act, in particular on reliability of electricity services to South Australian consumers, as a result of further increases in the level of wind generation in South Australia. There are also some positive impacts on the secondary objectives, in particular through enhancement of competition in the generation sector. However, it would be difficult to conclude that those benefits were sufficient to offset the adverse impacts on the achievement of the principal objective.

The Commission has concluded that the findings of the ESIPC Report must be considered to apply to each individual wind farm that is currently the subject of a generation licence application.



THE COMMISSION'S PRELIMINARY ASSESSMENT OF THE IMPACT OF THE ESIPC REPORT ON LICENSING CRITERIA

The preliminary view of the Commission, based on consideration of the impact of additional wind generation in South Australia on the achievement of the general objectives specified at s. 6(1) of the ESC Act and the findings of the ESIPC report, is that:

- ▲ the long-term interests of South Australian consumers would be adversely affected in relation to reliability of electricity services by such a development, and that any offsetting benefits (e.g. those associated with enhanced competition in the generation sector) are minor and accordingly there would be grounds for the Commission to reject each of the wind generation licence applications,

unless

- ▲ the main findings of the ESIPC Report can be given effect in such a way as to bind the proponents of additional wind generation capacity in South Australia.

4.3 Manner in which ESIPC recommendations could be implemented

Having determined that the main findings of the ESIPC Report must be given effect if the Commission is to issue further licences for wind generators in South Australia, the Commission has considered what options it has for implementing the regulatory framework recommended by ESIPC Report. The Commission has determined there are two options, these are:

- ▲ it could await the completion of work at the national level before licensing any further wind generation developments. As is evident from the discussion contained later in this paper, if the Commission were to adopt this approach, a period of at least two years might elapse before such licences were issued; or
- ▲ it could issue licences subject to a set of conditions that seek to ensure that, for the transitional period between the commencement of the generation operations and the implementation of appropriate measures at the national level, the risks identified in the ESIPC report can be managed effectively.

A further option would be for the Commission to issue licences to current wind farm applicants in the same form as current generation licences in the expectation that the necessary work at the national level will be completed and that the licensees would then be bound by the outcomes of that work (e.g. NEC changes). The Commission does not consider this option addresses the risks identified by ESIPC.

The Commission considers that ultimately, changes to the NEC are the preferred method for establishing the technical and market operation rules under which an expansion of wind generation in South Australia can safely occur. However, the Commission is aware that such changes, while being actively considered, are still some way from being implemented,

While it would be open to the Commission, based on the ESIPC Report to decline to issue further wind generation licences until the NEC changes have been made, the Commission considers it is appropriate for it to develop a range of licence conditions which would allow for the expansion of wind generation capacity in South Australia in the interim period before the NEM changes are implemented

**THE COMMISSION'S PROPOSED APPROACH TO IMPLEMENTATION OF
ESIPC REPORT**

On the basis of the ESIPC Report it would be open to the Commission to:

- ▲ decline to issue further licences to wind generators until changes are made in the NEM to address the market integration of a higher penetration of wind generation (this would mean that there would potentially be no further wind generation licences issues in South Australia for up to two years);

or

- ▲ develop local licence conditions which address the risks identified. This would mean that the Commission could issue new wind generation licences in the transitional period prior to NEM changes.

The Commission's proposed approach is:

- ▲ to pursue the option of developing licence conditions which will establish a regulatory framework in South Australia in which the risks raised in the ESIPC Report are addressed; and
- ▲ to issue new wind generation licences incorporating such conditions prior to changes in the NEM.

ISSUES FOR CONSIDERATION

Is the Commission's proposed approach to the implementation of the ESIPC Report appropriate?

Are there any other alternatives which the Commission should consider?



4.4 Proposed Licence Conditions

As outlined in section 3.5, the ESIPC report included four key recommendations. ESIPC suggested that, if implemented, these recommendations would impose additional economic constraints on wind farm developments and ensure that market forces determined an appropriate level of wind generation in South Australia. The Commission notes that these recommendations are consistent with emerging international practice, as outlined in the ESIPC report, and also with the findings of the WETAG report.

This section examines each recommendation in turn, essentially addressing three basic questions in relation to each recommendation:

- ▲ Is work underway (e.g. development of changes to the NEC by NEMMCO) to address the recommendation, and what is the status, and timeframe for completion, of that work?
- ▲ What changes would be required to the proposed wind generation developments for South Australia in order that they are able to accommodate the technical or operational requirements imposed by the recommendation?
- ▲ Taking into account the answers to the first two questions, how should the Commission respond, in terms of its licensing decision, to the recommendation?

The Commission notes that the conditions contained in wind farm licences issued by the Commission since 2002 do not differ from those contained in generation licences issued over the same period to operators of conventional generation plant. The Electricity Act mandates many of the conditions contained in current generation licences¹⁸. What is therefore proposed in this section of the paper is a set of additional conditions that would apply only to wind generators¹⁹. Section 4.5 discusses the question of whether or not such conditions should also apply to current wind farm licensees.

4.4.1 Technical Standards

In order to issue a generation licence the Commission must be satisfied that the proposed generating plant will generate electricity of the appropriate quality for the relevant transmission or distribution network (Electricity Act) and the Commission must also consider the quality and reliability of electricity services (ESC Act). A consideration of these matters requires a consideration of the technical standards to be applied to wind generators.

Requirement for connection agreement

The Commission's interpretation of the "appropriate quality" requirement is that it encompasses quality of supply (i.e. voltage levels and fluctuations) as well as

¹⁸ Refer ss. 21 and 22 of the Electricity Act.

¹⁹ The Commission has significant discretionary licensing powers (refer, e.g., s. 22(2) of the Electricity Act).

other matters required to ensure that the generation plant is appropriately connected to the relevant network so as to meet relevant technical requirements (e.g. those imposed by the NEC).

The Commission has historically taken this requirement to be satisfied in full if a connection agreement has been negotiated between the proposed generator and the relevant network service provider,²⁰ and there are no remaining impediments to the signing of such an agreement.

The Commission determined in October 2004 that it would not issue a generation licence for the Clements Gap wind farm until the transmission connection agreement between the proposed wind farm operator and ElectraNet had been signed. This is the position that the Commission will adopt in relation to other wind farm generation licence applicants²¹.

In adopting this position, the Commission is heartened by the conclusions of the ESIPC report that the connection agreements being negotiated between wind farm proponents and ElectraNet or ETSA Utilities are of a “commendably high” standard (refer p. 19 of the ESIPC report).

ElectraNet has supplied the Commission with confidential information concerning the status of negotiations of connection agreements with each of the non-licensed wind farms, listed in Table 1 of this paper, proposed to be connected to the transmission network. ETSA Utilities has supplied similar information concerning wind farms proposed to be connected to the distribution network. In some cases, such negotiations are well advanced; while in other cases, the negotiations and necessary technical studies are at an early stage.

Conclusion

The Commission will continue to require a signed connection agreement to be in place prior to the issue of a licence for wind generation.

However, the Commission notes the ESIPC Report identified some matters relating to technical standards and the Commission is aware that NEMMCO has an emerging concern with respect to voltage control with a large penetration of wind energy in South Australia, both of which are discussed more fully in relation to Proposed Licensing Principle 2.

²⁰ Network service providers are required to assess connection applications in accordance with the provisions of Chapter 5 of the NEC. Clause 5.1.3 of the NEC requires that technical standards of performance be established at levels at or above the minimum access standards set out in schedules 5.1, 5.2, 5.3 and 5.3a, with the objective of ensuring that the power system operates securely and reliably and in accordance with the system standards set out in schedule 5.1a.

²¹ It is noted that connection agreements are typically made conditional on the receipt of final approvals, including securing a generation licence. The Commission would be satisfied with the signing of such a conditional connection agreement for the purposes of satisfying the “appropriate quality” requirement.



Proposed Licensing Principle 1.

The Commission will be satisfied that the “appropriate quality” requirement (s. 17(2)(b) of the Electricity Act) and quality and reliability requirement (section 6(1) of the Essential Services Commission Act) have been met in relation to any wind farm generation licence applicant if:

- ▲ a connection agreement between the proposed wind farm operator and the relevant network service provider has been signed. Since this legislative requirement is one about which the Commission must be satisfied before it can issue a generation licence, the requirement to have signed a connection agreement thus becomes a condition precedent to the issue of such a licence

and

- ▲ the licensee can demonstrate that its proposed generating plant and associated equipment has the technical capacity to meet the further technical standards set out in Principle 2.

The Commission notes that meeting the connection agreement requirement and demonstrating capacity to meet technical standards is not in itself sufficient to ensure the issue of a generation licence for a wind farm. These requirements are necessary in order to satisfy the Commission that the legislative criterion specified at s. 17(2)(b) of the Electricity Act and section 6(1) of the ESC Act have been met.

It has been suggested to the Commission that the requirement for a wind generator to register with NEMMCO under the NEC should also be made a condition precedent to the issue of a generation licence, or indeed that such a requirement might replace the requirement to have entered into a connection agreement. For example, in its submission on the ESIPC report, NRG Flinders commented that:

...it would also appear prudent to require licence applicants to provide evidence of registration with NEMMCO under the Code prior to the issue of any further generation licences, noting that this is a standard generation licence requirement in any event.

In response, the Commission notes that it has only limited powers to set conditions precedent to the issue of a licence. Such conditions must relate to the legislative criteria in the Electricity Act or ESC Act. It is not clear that a requirement to have registered with NEMMCO prior to the issue of a generation licence can be related to these criteria. The connection agreement requirement, however, is directly related to the criterion at s. 17(2)(b) of the Electricity Act.

In any event, NEMMCO must be involved in the negotiation of technical standards in a connection agreement, particularly in areas which may impact on system security.

As noted by NRG Flinders, the requirement to hold appropriate NEMMCO registration is a standard condition of a generation licence issued by the Commission. Thus, once the generation operations commence, the generator is required to hold such registration. Operating the generation plant without NEMMCO registration gives rise to a breach of both the NEC and the generation licence. The licence breach is a compliance matter for the Commission²².

Wind Prospect, in its submission on the ESIPC report, suggested that conditions precedent to the issue of a generation licence should include receipt from the relevant authority of the appropriate development approval for the wind farm and associated power line; and that long-term power purchase agreement(s) or options are in place for the output of the wind farm. Again, the Commission stresses that it does not have the legislative power to arbitrarily select conditions precedent to the issue of a generation licence. While it is acknowledged that the two conditions suggested by Wind Prospect are appropriate barometers of a viable and advanced project, the connection agreement requirement performs the same function and has a stronger legislative basis.

Other Technical Standards

The ESIPC report concluded that higher technical standards would need to be imposed on future wind farms, and in particular that they have the ability:

- ▲ to ride through a prescriptive and more severe low voltage event than is usually negotiated in connection agreements;
- ▲ to generate and absorb reactive power and to control voltage;
- ▲ to smooth short term fluctuations in output; and
- ▲ to be remotely controlled and to curtail output where necessary.

It suggested that new standards consistent with these requirements should be developed, but that the NEC automatic access standards combined with NEMMCO's remote data and control requirements provided a reasonable interim step.

The Commission notes advice from NEMMCO that the development of new standards consistent with these requirements is well advanced. Draft proposals for NEC changes for such technical standards are being reviewed by a technical reference group chaired by NEMMCO, with the aim of submitting such changes to the Australian Energy Market Commission (AEMC) by August 2005.

²² Division 4, Part 3 and Divisions A1 and A2, Part 7 of the Electricity Act provide the Commission with certain powers in respect of the breach of licence conditions, including the suspension or cancellation of a licence (s.37), issue of warning notices (s.63A) and injunctions (s.63C).



In general, wind farm developers expressed confidence about the capacity of proposed wind farm developments to meet the emerging technical standards. Comments made by wind developers on the technical standards issue included the following:

- ▲ Babcock & Brown and National Power Partners commented that the transmission connection arrangements with ElectraNet:

...already provide for comprehensive and rigorous technical standards (in fact among the most rigorous in the world) and also place significant power stability obligations on wind farm developers through run-back systems and compliance with the NEC and NEMMCO's powers to manage system stability.

- ▲ International Power Australia suggested that automatic access standards should be set as low as practically possible and be based on the market-based principle. International best practice technical benchmarks referred to in the ESIPC report should not be adopted as the automatic access standard as these were developed as a non-market based solution. Instead the automatic access standard should be kept as low as possible so that an efficient market-based response for ancillary service provision is facilitated. A proponent of a wind generator should be able to seek a lowest cost solution to meeting the entry requirements. These may be technical, market based, or purchased from an external service provider (i.e. off-loading service, load following, energy support, etc). It should be possible to enter into commercial arrangements with network service providers, NEMMCO or other participants, to meet the connection and market requirement.

The ESIPC report noted the importance of wind farms being able to be remotely controlled and to be able to limit output where necessary. The WETAG report also noted that the technical ability to provide continuous control should be included in each wind farm design so that wind farms could reduce their output or limit the rate of increase or decrease of output to control network flows. ElectraNet has confirmed that a wind farm connecting to its network is required to have the capability to limit its output in order to manage local network flows.

In addition to these matters, the Commission has been made aware of emerging concerns of ESIPC and NEMMCO with respect to voltage control with a larger penetration of wind energy in South Australia. As outlined earlier in this paper, NEMMCO has retained the services of DlgSILENT, one of the world's leading power system consultants with extensive expertise in wind generation. The Commission is advised that that the analysis being conducted for NEMMCO has identified concerns with the control of transmission system voltages in South Australia if wind generation displaces significant amounts of conventional generation. The preliminary results indicate such concerns may become apparent with 400 – 500 MW of installed wind generation capacity. This is the

amount currently licensed in South Australia (refer Table 1). The preliminary results are of concern to NEMMCO and ESIPC and are being actively pursued.

ESIPC had already advised the Commission that voltage control was likely to be a significant issue with a greater penetration of wind energy in the power system and had recommended tougher standards based on the automatic access standards applying to conventional synchronous generators. The NEMMCO consultancy reinforces the need for wind generators to provide reactive power support to the network, but raises the further and particular issue of voltage control on the 275kV transmission system backbone.

Conclusion

In summary, the Commission considers that proposed wind farm developments in South Australia should be capable of meeting emerging technical standards as proposed by the ESIPC report. Amendments to the NEC to give effect to such standards are likely to be in place within 12 – 18 months.

In advance of such standards being in place, the Commission concludes that a licence condition should be established that specifies interim technical standards to be met by future wind generators, and that explicitly obliges the licensee to comply with ongoing technical standards established under the NEC.

The Commission is of the view that wind generators should be required to comply with the automatic access standards which apply to conventional synchronous generators, and that specific licence conditions should be established requiring wind generators to contribute to reactive power support and voltage control to the extent required by either ETSA Utilities or ElectraNet or both. It should be noted that the Commission is advised that the issue of voltage control on the 275kV system may arise with a distributor connected wind generator, and the proposed licence condition has the effect of requiring such generators to contribute to voltage control or the cost of voltage control equipment on the transmission system if required to do so by ElectraNet.

The licence condition outlined below has been developed in consultation with ESIPC.



Proposed Licensing Principle 2.

Based on advice from ESIPC, the Commission considers it appropriate for a condition in the following form to be included in future generation licences issued for wind farms in South Australia:

COMPLIANCE WITH TECHNICAL STANDARDS

1. *The Licensee must ensure its generating plant is capable of meeting the automatic access standard for connection to the relevant network as specified in S5.2.5.3 of the National Electricity Code.*
2. *The Licensee must ensure that its generating plant is capable of delivering voltage support to the 275 kV system equivalent such that:*
 - (a) *where the generating plant has a dedicated connection to the 275 kV system it must:*
 - (i) *contribute to voltage control at its connection point to the extent determined necessary by the relevant network service provider; and*
 - (ii) *have the ability to generate or absorb reactive power to the levels set out in the automatic access standards in s.5.2.5.1 of the Code whether the generator is synchronous or not.*
 - (b) *Where the generating plant does not have a dedicated connection to the 275 kV system it must, to the extent and in the manner determined necessary by the distribution network service provider, the transmission network service provider or both:*
 - (i) *contribute to voltage control at its connection point; and*
 - (ii) *contribute to the provision of suitable voltage control equipment on the 275 kV system which can supply or absorb an amount of reactive power such that the total amount supplied and absorbed at the connection point and other agreed point is equal to the product of the rated active power output of the proposed generating plant at nominal voltage and 0.395.*
3. *The Licensee must ensure its generating plant is able to meet requirements as specified by NEMMCO for real time supply of data on active and reactive power, wind speed and wind direction, and be capable of remote control by NEMMCO.*
4. *The Licensee must ensure that the control equipment is capable of operating for at least three hours following total loss of supply at the connection point.*

In the event that appropriate amendments are made to the National Electricity Code in the future, Commission believes it appropriate that the above conditions should be replaced by a condition of the following form:

COMPLIANCE WITH TECHNICAL STANDARDS

1. *The Licensee must ensure its generating plant at all times complies with technical standards imposed under the National Electricity Code from time to time applicable to electricity generating plant of the kind which this licence authorises the licensee to use to generate electricity.*

ISSUE FOR CONSIDERATION

Is the Commission's proposed approach to the implementation of the ESIPC Report in relation to technical standards, appropriate?

Are there any other alternatives which the Commission should consider?

4.4.2 Optimised Dispatch

The ESIPC report has highlighted the difficulties caused by the classification of wind generators as non-scheduled under the NEC. Wind generation is treated as a negative demand rather than a source of supply, and, as a consequence, neither the forecast nor the actual quantity of wind energy is visible to the market. In particular, wind generators do not participate in the normal market bidding process to determine which generators operate to satisfy market demand. NEMMCO is unable to manage market stability and security through its normal market optimization techniques, leading to unacceptable market distortions at higher levels of wind generation. ESIPC concluded that wind generators must be integrated into the security constrained, optimised dispatch system operated by NEMMCO.

The WETAG report concurred that some form of dispatch control should be applied to wind generators, suggesting that it is:

...inevitable that significant non-scheduled generation plant will need to be controlled to reduced outputs in cases where network loading constraints become binding. There is merit in determining the acceptable loading level limits of non-scheduled generating plant using the central dispatch engine, particularly for any plant that is greater than 30 MW in size (WETAG report, p 15)

WETAG suggested that one option to meet this requirement for wind generators would be through a form of what it termed "semi-dispatch": the maximum output of the relevant non-scheduled generation would be determined for the next dispatch interval through the central dispatch process, using constraint equations to keep network flows within limits. Dispatch targets of maximum generation would be sent to wind farms where network constraints are binding. Communication and control facilities would need to be installed and operated to ensure that the dispatch instructions could be implemented.

NEMMCO has indicated to the Working Group oversighting consideration of the WETAG report that it is willing to take a lead role in the further development of the semi-dispatch or similar mechanism for application to non-scheduled generators. The Commission understands that NEMMCO may be requested to provide further advice on this matter shortly, and that the provision of such advice could take up to six months. The subsequent process of amending the NEC to accommodate the appropriate dispatch mechanism and implementing required system changes in the NEM could take a further eighteen months. Thus, on the assumption that there is



policy level commitment to implement such a mechanism (and the Commission believes there are grounds for optimism on this matter), it could be mid-2007 before the mechanism is in place.

In general, wind farm developers supported the incorporation of non-scheduled generators into the NEMMCO optimised dispatch process (e.g. through semi-dispatch rules), together with the installation of the associated control equipment.

However, Stanwell suggested that, from a trading perspective, it did not consider that the WETAG semi-dispatch model was the most appropriate and cost effective method to apply to wind farms.

Given the financial arrangements associated with wind farm developments (e.g. metered-volume power purchase agreements), the owner/operator has an incentive to maximise output at all times. As a result, under the proposed semi-dispatch arrangements, all wind farm participants are expected to bid at the price floor. In the event of network constraints, bids submitted by wind farm participants are of second order importance and dispatch will need to be prorated based on system requirements. Accordingly, the costs (e.g. IT start-up and monitoring) incurred by wind farm participants under the proposed semi-dispatch model will exceed the potential market benefits and these costs may be passed onto end users. Consequently, Stanwell considers there is merit in developing an alternative methodology to apply to the dispatch arrangements for wind farms in the event of network constraints.

International Power Australia indicated its agreement with the need to automatically optimise non-scheduled plant operation within the electrical system security envelope.

This in turn requires the wind generator to have the necessary facilities installed to achieve ramp rate limiting, remote offloading and to allow for communication with NEMMCO. The offloading requirements may be met by using either proportional control or by a unit trip. However, it should be possible for wind generators to enter into commercial arrangements with existing generators to either firm up the wind output for system security purposes, or to provide offloading services (runback) where it is not a local network issue. To manage system security, non-scheduled generators can be dispatched according to a standing off-loading offer without the need to offer the plant into the NEM market on daily basis (i.e. "semi-dispatch"). The dispatch engine would use the offloading price to optimally reduce output of a wind generator where necessary to manage system constraints. This would be done consistently between different plant technologies whilst maintaining the overall efficiency of economic dispatch.

As noted in section 4.4.1, ElectraNet requires that a wind farm connecting to its network have the capability to limit its output in order to manage local network flows. Such a capability would be used by ElectraNet to manage system security issues in instances where network constraints became binding. As noted in the WETAG report:

...such arrangements are not required by the Code, nor co-ordinated with the central dispatch process and will therefore not be reflected in market forecast processes managed by NEMMCO. ... These arrangements deliver an ability to manage network flows for the NSPs but introduce

complexity for wind developers through potentially different approaches being adopted by each NSP. ... It is desirable to have NEM wide common arrangements for the dispatch of plant rather than different arrangements being possible at different locations in the NEM. (WETAG report p 14)

The Commission concurs with the sentiments of the WETAG report on this matter. However, it notes that, due to the ElectraNet requirements, wind farms in South Australia appear to already have the necessary control equipment to support a centralised dispatch process operated by NEMMCO. Furthermore, the emerging technical standards to be applied to future wind generation plant, as discussed in section 4.4.1 above, will also impose such requirements. In addition, the proposed licence condition for technical standards addresses this requirement.

As noted in section 1.1 of this paper, any generator over 30 MW in size will be classified as a scheduled generator unless it seeks NEMMCO's approval to be non-scheduled. It is thus an option, albeit one that would introduce operational complexities and hence presumably additional costs, for a wind generator to operate as a scheduled generator in the market. ESIPC has advised that a scheduled wind generator:

- ▲ would be required to submit PASA and pre-dispatch data, hence providing an avenue for the wind generator to supply forecast information;
- ▲ would be expected to automatically rebid its availability every five minutes with a statistical five minute forecast that would aid market operation and would result in the generator being charged for ancillary services on a causer pays basis relative to its forecast;
- ▲ is by definition part of the NEMMCO optimised dispatch process.

It may be possible as an interim step, i.e. prior to finalization of a semi-dispatch or other appropriate form of dispatch for non-scheduled wind generators, that new wind generators would be required as a condition of licence to operate as a scheduled generator. As an alternative, NEMMCO might be able to use its powers under clause 2.2.3(c) of the NEC (in approving a non-scheduled classification) to specify certain interim conditions that would have the same effect.

In summary, there appears to be commitment to the development of appropriate changes to the NEC to support the imposition of some form of optimised dispatch (e.g. semi-dispatch) requirements on future wind generation operators. However, such measures will not be in place for at least two years.

As an interim position, the Commission concludes that a licence condition should be established that requires the wind generator to operate as a scheduled generator during the transitional period. The condition would allow a change in classification when new national arrangements are in place and then bind the licensee to comply with the optimised dispatch measures for non-scheduled generators once established under the NEC.



Proposed Licensing Principle 3.

Based on advice from ESIPC, the Commission considers it appropriate for a condition in the following form to be included in future generation licences issued for wind farms in South Australia:

OPTIMISED DISPATCH

1. *The Licensee must, until a date notified by the Commission, be classified as a scheduled generator under the National Electricity Code.*
2. *After a date notified by the Commission the licensee may apply to NEMMCO for a change in classification.*

In the event that appropriate amendments are made to the NEC in the future, Commission believes it appropriate that the above conditions should be replaced by condition of the following form:

OPTIMISED DISPATCH

1. *The Licensee must comply with dispatch processes established under the National Electricity Code from time to time for generating plant of the kind which this licence authorises the licensee to operate to generate electricity.*

ISSUES FOR CONSIDERATION

Is the Commission's proposed approach to the implementation of the ESIPC Report in relation to optimised dispatch, appropriate?

Are there any other alternatives which the Commission should consider?

4.4.3 Wind Energy Forecasting

The ESIPC report noted that a fundamental strategy to deal with the variability of wind energy available to the market was to have techniques to ensure accurate wind forecasting. The need to have such forecasting techniques arises because the output of wind generators varies significantly over time and affects the efficiency of the market and the security of the power system.

The Commission notes that significant work is now underway to develop such techniques. For example, the Australian Greenhouse Office (AGO) has received funding from the Federal Government to develop a comprehensive forecasting tool.

NEMMCO has advised that it currently has a rudimentary model to forecast output from wind farms for pre-dispatch timeframes in South Australia, developed with assistance from ESIPC. It is seeking additional SCADA data from wind farms to improve the model and is seeking to establish the availability of forecast information from the Bureau of Meteorology about major changes in wind speed.

NEMMCO suggests that, in the longer term, the AGO project will deliver a forecasting system for the NEM that covers all relevant timeframes from dispatch to medium term PASA (2 years)²³. However, it is understood that initial deliverables from the AGO project will not be available until late 2006.

In its submission to the Commission on the ESIPC report, TXU suggested that the approval of wind generation above 500 MW in advance of appropriate forecasting systems being available was likely to artificially force additional unit commitment through the use either of additional dispatch constraints, or through direction or instructions issued by NEMMCO, resulting in market uncertainty and disputes between participants. It proposed an alternative approach to managing unit commitment risk.

Specifically, we suggest that a "unit commitment" ancillary service payment be made to units in SA which may be required to commit at short notice in the event of large wind variations. This would compensate generators for the costs of maintaining their units in a state of rapid availability, and ensure that sufficient scheduled plant is available for rapid commitment in the event of significant wind variations. Such a service could be contracted with NEMMCO over several years, thereby providing a stable low-cost transition to a time when wind-forecasting technology has reached standards that will allow the NEM decentralised commitment process to appropriately manage system security.

The approach outlined above is one which would be difficult to implement from an ESCOSA viewpoint, but may be a valuable suggestion in the context of NEM changes, particularly if wind farm construction outstrips forecasting system development.

Wind farm developers were in general agreement about the need to provide both forecast and real time wind farm output data to relevant parties (e.g. NEMMCO, ESIPC, and network service providers) as required.

- ▲ International Power Australia commented that to assist market participants in managing their risks and opportunities in the market, wind forecasts must be provided to all market participants in a manner analogous to demand forecasts. The forecasting process should be facilitated by NEMMCO, either in-house or outsourced to an external service provider on a competitive basis.
- ▲ Stanwell indicated that it is imperative that all (existing licensed and future licensed) wind generation participants provide comprehensive forecasting information and are involved in the development of NEM forecasting systems. The ability to manage system stability and concurrently maximise the amount of wind generation will be enhanced by all participants being required to provide forecasting information. The submission from Babcock & Brown and National Power Partners also emphasised the need for forecasting requirements to be imposed equitably on both current and future wind farms.

²³ PASA is the Projected Assessment of System Adequacy, undertaken by NEMMCO in accordance with clause 3.7 of the NEC.



As noted previously (refer Footnote 8), NEC changes have recently been proposed by NEMMCO providing for appropriate information disclosure arrangements for non-scheduled generators. These changes would enable NEMMCO to publish details of allowances made for non-scheduled generation in forecasts of short and medium term PASA and in pre-dispatch forecasts, and have been developed as a result of a recommendation of the WETAG report. This is a necessary step in making wind generation load forecasts available to the market, but nevertheless is ineffective without adequate forecasts being developed.

The issue for the Commission is whether it could issue generation licences for wind farms ahead of an appropriate wind forecasting system being in place. It may be at least 2 years before such a system is in place, although NEMMCO is developing and refining a system that should provide useful information in an earlier timeframe.

The Commission concludes that it is possible to develop a suitable licence condition that would bind a future wind generator both to implement any interim forecasting system that might be established prior to a more comprehensive system being available as well to participate in a longer-term approach. Such a condition is outlined below.

Proposed Licensing Principle 4.

Based on advice from ESIPC, the Commission considers it appropriate for a condition in the following form to be included in future generation licences issued for wind farms in South Australia:

WIND FORECASTING

- 1. Licensee must, on request, provide to the Planning Council, the Commission and NEMMCO accurate and verifiable wind energy forecasting data and temperature data, appropriately constructed models, documents and other information concerning the operation of the generating plant the licensee is authorised by this licence to operate.*
- 2. Any data, models, documents and information requested under this clause must be provided in the manner and form and within the time frame specified by the Planning Council, the Commission or NEMMCO.*
- 3. The Licensee must cooperate with the development and implementation of wind energy forecasting systems for use in the National Electricity Market and must provide timely, accurate, and verifiable information for this purpose.*
- 4. The Licensee, as a scheduled generator, must ensure that forecasts of expected generation output are incorporated into pre-dispatch, medium term and long term PASA data*

In the event that appropriate amendments are made to the NEC in the future, Commission believes it appropriate that the above conditions should be replaced by condition of the following form:

WIND FORECASTING

1. *The Licensee must:*

- (a) *install and maintain wind forecasting systems which meet requirements imposed under the National Electricity Code from time to time*
- (b) *comply with any other requirements imposed under the Code from time-to-time relating to wind energy forecasting data, temperature data, models, documents and information including the provision of forecasts of expected generation output for incorporation into pre-dispatch, medium term and long term PASA data, and the provision of appropriately constructed and verified models.*

ISSUE FOR CONSIDERATION

Is the Commission's proposed approach to the implementation of the ESIPC Report in relation to wind forecasting, appropriate?

Are there any other alternatives which the Commission should consider?

4.4.4 Cost Allocation

The ESIPC report has highlighted the importance of the role played by the FCAS markets within the NEM. The regulatory markets in particular, operate on a causer pays basis and allow NEMMCO to maintain the power system frequency within secure limits. The ESIPC report recommended that market changes be introduced to require participation by wind generators in such markets; this would require that wind generators pay for the effects they cause and earn revenue for services they provide. This would drive appropriate investment and operational decisions on the part of wind generators.

The WETAG report notes that NEMMCO procures *contingency* FCAS to ensure that power system frequency meets the operating standards set by the Reliability Panel. At present, the amount of contingency raise service procured by NEMMCO is mainly determined by the largest generating unit present on the power system; contingency lower service is determined by the largest load. WETAG suggests that wind farms would be unlikely to impact these requirements directly, and that hence no compelling reason has emerged as to the need for changes to the current arrangements for the procurement and funding of contingency FCAS.

The WETAG report further notes that variations in the output of generating units and loads disturb the supply/demand balance and routinely cause power system frequency to move away from the nominal 50 Hz. NEMMCO procures *regulation* FCAS through a spot market to ensure that power system frequency stays within the operating limits set by the Reliability Panel. WETAG notes that NEMMCO has



made no special arrangements to purchase additional regulation FCAS due to an increase in wind generation, but that, if the issue increased in materiality, NEMMCO's current powers under the NEC were considered sufficient for the purpose.

In relation to cost recovery of regulation FCAS, the WETAG report notes that the "causer pays" mechanism is defined at clause 3.15.6A of the NEC for market generating units that have real time operational metering that records short-term variations in plant output.

The causer-pays mechanism identifies relevant generators that are causers of frequency variations and allocates a causer pays factor to each. The remaining cause of frequency deviations is allocated to market customers, shared on a pro-rated basis. The causer pays factors are then used in market settlements to recover the procurement costs for regulation FCAS. (WETAG report, p 32)

Thus, wind generators that are registered as market generators under the NEC will participate in the current causer pays arrangements for regulation FCAS only if appropriate operational metering is installed. If such metering is not installed, that generator's contribution to regulation FCAS will be picked up by customers. Non-market generators will not participate in such arrangements. In this case, the generator's contribution will default to market customers as a group. The WETAG report expresses particular concern about the cross subsidy caused by wind farms that are registered as market generators but do not have appropriate operational metering. It suggested that a preferred option for addressing this issue was to amend the NEC to require that all significant market generating systems (> 30 MW) be included in the causer pays arrangements under the NEC²⁴.

The Commission notes that, in the absence of such a change to the NEC, the current causer pays arrangements would continue to operate, such that only wind farms registered as market generators and with appropriate operational metering would participate in those arrangements. The Commission is of the view that, in the interim, it would be appropriate to require, as a condition of a generation licence issued to a wind generator, the installation of metering appropriate for participation in the causer pays arrangements as established under clause 3.15.6A of the NEC.

In general, wind farm developers supported the inclusion of wind generators in the markets for ancillary services within the NEM.

Stanwell sounded a note of caution, commenting that:

²⁴ WETAG noted that it did not consider the cross subsidies associated with the exclusion of non market generators from the causer pays arrangements to be material, and that, as a consequence, no compelling case existed to address this matter. It noted that, as wind farms become larger, many will be registered as market generators, either because the generator will not have a Power Purchase Agreement or because their Agreement will be with a retailer other than the first tier retailer (AGL SA in South Australia).

...the participation of wind generation as a full participant in the NEM with efficient allocation of costs should be seen as a long-term goal that will have issues of practicality in its implementation and will be reliant on achieving quality forecasting as a precursor, but Stanwell agrees with the need for clarification with regards to wind farms over 30 MW.

International Power Australia supported the extension of ancillary services market-based approaches to wind generators, and suggested that:

...the Code already provides for this without policy changes, although clarification in the Code would be helpful.

In summary, the Commission supports the approach advocated by the WETAG report on cost allocation of ancillary services. Clarification of current NEC requirements is necessary to ensure that wind generators registered as market generators participate fully in the causer pays arrangements for regulation FCAS. As an interim measure, the Commission concludes that a licence condition that binds a future wind generator to install metering suitable for the purposes of clause 3.15.6A(h) of the NEC would be appropriate. In addition, the clause would require compliance with any future ancillary service arrangements established under the NEC for wind generators.

Proposed Licensing Principle 5.

Based on advice from ESIPC, the Commission considers it appropriate for a condition in the following form to be included in future generation licences issued for wind farms in South Australia:

COST ALLOCATION OF ANCILLARY SERVICES

- 1. The Licensee must ensure that it has installed, and keeps operational, metering suitable for the purposes of clause 3.15.6A(h) of the National Electricity Code to allow the individual contribution of the generating plant to the aggregate deviation in frequency of the power system to be assessed within each trading interval of the National Electricity Market.*
- 2. The Licensee must comply with requirements imposed under the National Electricity Code from time to time in relation to ancillary services arrangements.*
- 3. The Licensee must be registered under the National Electricity Code as a "Market" generator.*

ISSUES FOR CONSIDERATION

Is the Commission's proposed approach to the implementation of the ESIPC Report in relation to cost allocation of ancillary services appropriate?

Are there any other alternatives which the Commission should consider?



4.5 Existing Wind Generation Licensees

As noted in section 1 of this paper, the Commission has already licensed seven wind farms with a total capacity of about 450 MW. The question arises as to whether or not any of the licence conditions outlined in section 4.4 for application to *future* wind farms should also be made applicable to those that have already been licensed.

The Commission is empowered to vary existing licences by s. 27 of the Electricity Act. A licence variation may be made on application by the licensee or with the licensee's agreement. Alternatively, the Commission may vary a licence after giving the licensee reasonable notice of the proposed variation and allowing the licensee a reasonable opportunity to make representations about the proposed variation²⁵. It is thus open to the Commission to vary the existing generation licences issued to wind farms to incorporate new conditions such as those discussed in section 4.4.

In deciding on such a matter, the Commission would need to consider carefully the costs and benefits of imposing such conditions on existing licensees. Significantly greater costs would potentially be imposed on the currently licensed wind generators (five of which have already commenced the generation operations) than on new licensees through such conditions. Furthermore, the impacts of additional wind generation as detailed in the ESIPC report have been assessed based on an assumption that none of the recommended measures are applied to the existing licensees. The ESIPC report concludes that the current level of wind generation in South Australia is manageable. It might therefore be concluded that the additional licence conditions as detailed in section 4.4 for application to new wind generation developments should not be imposed on existing licensees.

Section 4.4.3 of this paper noted a comment from certain wind farm developers that both current and future wind generators should be required to provide comprehensive forecasting information about wind energy output and to be involved in the development and implementation of NEM wind forecasting systems. The Commission endorses the view that there may be a particular need for existing as well as future wind generators to provide appropriate forecasting information to the market.

Furthermore, as noted earlier, ElectraNet requires wind farms connecting to its network to install control equipment to enable output to be limited as necessary to manage local network flows. It is understood that this applies equally to the current set of wind farms that have already been licensed as well as to proposed new wind farms. This would facilitate the participation of the current wind farms in any future centralised dispatch process developed by NEMMCO.

²⁵ S. 75 of the Electricity Act provides for a system of review by the Commission and appeal by the licensee to the District Court where the licensee is dissatisfied with a decision of the Commission to vary an existing licence.

Proposed Licensing Principle 6.

It is the Commission's preliminary view that:

- ▲ current generation licences issued to wind generators should not be varied to impose the requirements described in Proposed Licensing Principles 2, 3 and 5.

but

- ▲ current licences issued to wind generators should nevertheless be varied to impose the requirements described in Proposed Licensing Principle 4, parts 1, 2 & 3 in relation to wind forecasting.

ISSUE FOR CONSIDERATION

Is the Commission's proposed approach to the application of licensing principles to existing licensees appropriate?

Are there any other alternatives which the Commission should consider?

In addition, the Commission will await the outcome of the processes currently underway through NEMMCO and other bodies, as outlined in section 4.4, to address the key issues raised in the ESIPC and WETAG reports. At that time, the Commission will consider further the implications of those outcomes for existing licensees.

It is noted, however, that this preliminary view does not apply to the proposed variation of the current generation licence held by Lake Bonney wind farm to accommodate an additional 160 MW of wind generation capacity (refer Table 1). It is the Commission's position that the licence conditions enunciated in section 4.4 above would apply in relation to the additional capacity proposed for that wind farm.

4.6 Other issues

One important consideration of the Commission in respect of the subsidiary objectives of the ESC Act is the potential for wind farm proponents, once licensed, to fail to operationalise its wind farm. For example, it might be the case that, even after a connection agreement has been signed and a licence issued, a wind farm proponent might not gain development approval or might not finalise the necessary commercial arrangements that underpin the viability of the project. Hence the wind farm operations might never commence.

Such outcomes would serve to inhibit competition in South Australia, as well as hindering the entry of new entrants to the market. Further, those outcomes would necessarily be economically inefficient. The Commission is therefore of the view that, as permitted under



section 19 of the Electricity Act, any licences which it issues will include a provision that the licence will expire if the operations authorised by the licence have not commenced within a specified time (e.g. 1-2 years) following issue of the licence.

Proposed Licensing Principle 7.

To guard against the situation in which a licensee gains a licence but does not proceed with the project, the Commission intends to include a condition in each new generation licence issued for a wind farm to provide that the licence will expire if the operations authorised by the licence have not commenced within a specified time (e.g. 1-2 years) following issue of the licence.

ISSUES FOR CONSIDERATION

Is the Commission's proposed approach to ensuring licensees proceed to develop and operationalise the generation plant the licence authorises them to operate, appropriate

Are there any other alternatives which the Commission should consider?

4.7 Summary of Principles

This section briefly restates the licensing principles for future wind generators as established in sections 4.1 – 4.3 of the paper. The Commission seeks comment on the suitability of these principles as a framework for guiding the Commission's future decisions on licensing of wind generators in South Australia.

▲ *Condition precedent for issue of a generation licence*

The Commission will require a connection agreement between the proposed wind farm operator and the relevant network service provider to be signed prior to the issue of a licence. Since there is a legislative requirement that the Commission *must* be satisfied that the generation plant will generate electricity of an appropriate quality before it can issue a generation licence, the requirement to have signed a connection agreement thus becomes a condition precedent to the issue of such a licence. Further assurance in relation to this matter comes from the proposed new licence condition described in Principle 2 – Technical Standards. In effect, a further condition precedent to the issue of a licence will be a requirement that the proposed licensee demonstrate ability to comply with this principle.

▲ *Expiry of licence*

To guard against the situation in which a licensee gains a licence but does not proceed with the project, the Commission intends to include a condition in each new generation licence issued for a wind farm to provide that the licence will expire if the

operations authorised by the licence have not commenced within a specified time (e.g. 1-2 years) following issue of the licence.

▲ *Additional Licence Conditions*

The Commission is aware that significant work is underway at the national level (e.g. through development of changes to the NEC by NEMMCO) to provide long term solutions to the risks, as identified in the ESIPC and WETAG reports, attached to further significant wind generation in the NEM, and in particular in the South Australian region of the NEM.

To facilitate the issuing of generation licences for wind farms in the short-term, the Commission has developed proposals for a set of additional licence conditions that seek to ensure that, for the transitional period between the commencement of the generation operations and the implementation of appropriate measures at the national level, the risks identified in the ESIPC report can be managed effectively.

The Commission notes that applicants will need to demonstrate to the Commission the capacity to comply with the licence conditions. Further, in the event that an applicant gaining a licence subsequently breaches the relevant licence conditions, the Commission would regard that breach as serious and as providing grounds for enforcement action (including suspension of the licence).

The conditions are as follows:

▲ The first licence condition relates to technical standards.

COMPLIANCE WITH TECHNICAL STANDARDS

1. *The Licensee must ensure its generating plant is capable of meeting the automatic access standard for connection to the relevant network as specified in S5.2.5.3 of the National Electricity Code.*
2. *The Licensee must ensure that its generating plant is capable of delivering voltage support to the 275 kV system equivalent such that:*
 - a. *where the generating plant has a dedicated connection to the 275 kV system it must:*
 - i. *contribute to voltage control at its connection point to the extent determined necessary by the relevant network service provider; and*
 - ii. *have the ability to generate or absorb reactive power to the levels set out in the automatic access standards in s.5.2.5.1 of the Code whether the generator is synchronous or not.*
 - b. *Where the generating plant does not have a dedicated connection to the 275 kV system it must, to the extent and in the manner determined necessary by the distribution network service provider, the transmission network service provider or both:*
 - i. *contribute to voltage control at its connection point; and*
 - ii. *contribute to the provision of suitable voltage control equipment on the 275 kV system which can supply or absorb an amount of reactive power such that the total amount supplied and absorbed at the connection point and other agreed*



point is equal to the product of the rated active power output of the proposed generating plant at nominal voltage and 0.395.

3. *The Licensee must ensure its generating plant is able to meet requirements as specified by NEMMCO for real time supply of data on active and reactive power, wind speed and wind direction, and be capable of remote control by NEMMCO.*
4. *The Licensee must ensure that the control equipment is capable of operating for at least three hours following total loss of supply at the connection point.*

In the event that appropriate amendments are made to the NEC in the future, Commission believes it appropriate that the above conditions should be replaced by condition of the following form:

COMPLIANCE WITH TECHNICAL STANDARDS

1. *The Licensee must ensure its generating plant at all times complies with technical standards imposed under the National Electricity Code from time to time applicable to electricity generating plant of the kind which this licence authorises the licensee to use to generate electricity.*

▲ **The second condition relates to optimised dispatch.**

OPTIMISED DISPATCH

1. *The Licensee must, until a date notified by the Commission, be classified as a scheduled generator under the National Electricity Code.*
2. *After a date notified by the Commission the licensee may apply to NEMMCO for a change in classification.*

In the event that appropriate amendments are made to the NEC in the future, Commission believes it appropriate that the above conditions should be replaced by condition of the following form:

OPTIMISED DISPATCH

1. *The Licensee must comply with dispatch processes established under the National Electricity Code from time to time for generating plant of the kind which this licence authorises the licensee to operate to generate electricity.*

▲ **The third condition relates to wind forecasting.**

WIND FORECASTING

1. *Licensee must, on request, provide to the Planning Council, the Commission and NEMMCO accurate and verifiable wind energy forecasting data and temperature data, appropriately constructed models, documents and other information concerning the operation of the generating plant the licensee is authorised by this licence to operate.*
2. *Any data, models, documents and information requested under this clause must be provided in the manner and form and within the time frame specified by the Planning Council, the Commission or NEMMCO.*
3. *The Licensee must cooperate with the development and implementation of wind energy forecasting systems for use in the National Electricity Market and must provide timely, accurate, and verifiable information for this purpose.*

4. *The Licensee, as a scheduled generator, must provide forecasts of expected generation output to NEMMCO to be incorporated into pre-dispatch, medium term and long term PASA data*

In the event that appropriate amendments are made to the NEC in the future, Commission believes it appropriate that the above conditions should be replaced by condition of the following form:

WIND FORECASTING

1. *The Licensee must:*
 - a. *install and maintain wind forecasting systems which meet requirements imposed under the National Electricity Code from time to time*
 - b. *comply with any other requirements imposed under the Code from time-to-time relating to wind energy forecasting data temperature data, models, documents and information including the provision of forecasts of expected generation output for incorporation into pre-dispatch, medium term and long term PASA data, and the provision of appropriately constructed and verified models.*

▲ **The fourth condition relates to ancillary services.**

COST ALLOCATION OF ANCILLARY SERVICES

1. *The Licensee must ensure that it has installed, and keeps operational, metering suitable for the purposes of clause 3.15.6A(h) of the National Electricity Code to allow the individual contribution of the generating plant to the aggregate deviation in frequency of the power system to be assessed within each trading interval of the National Electricity Market.*
2. *The Licensee must comply with requirements imposed under the National Electricity Code from time to time in relation to ancillary services arrangements.*
3. *The Licensee must be registered under the National Electricity Code as a "Market" generator.*

5 NEXT STEPS

This paper, regarding the issuing of generation licences to wind farms in South Australia pursuant to the Electricity Act, will be open for public consultation until 1 August 2005.

The Commission particularly seeks comment on the draft set of principles enunciated in section 4 of the paper. Details for forwarding of submissions are contained in the *Request for Submissions* section of this paper.

The Commission will convene a forum with the ESIPC at which the proposals outlined in this paper will be discussed. The forum will take place on 14 July 2005. Invitations to the forum will be issued to current wind generation licence applicants, existing generation licence holders, and electricity retailers, ETSA Utilities, ElectraNet and NEMMCO.

Following this period of public consultation, and after consideration of any comments received, the Commission will finalise its position on the principles to be applied. It will then deal with individual licence applications in accordance with these principles.