FINAL

Codes of Practice for Embedded Generation

Submitted to

Ministerial Council on Energy
Standing Committee of Officials
C/- The South Australian Department of Treasury & Finance
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1. EXECUTIVE SUMMARY

Charles River Associates (Asia Pacific) Pty Ltd (CRA) has been commissioned by the Ministerial Council on Energy Standing Committee of Officials to provide:

- a summary and high-level comparison of the overall environment for embedded generation in all jurisdictions; and
- an assessment of the role played or intended for a Code of Practice within each jurisdictional arrangement and possible enhancements over and above that envisaged currently.

Across the NEM 3 - 5 % of installed generation is embedded except in Tasmania, which has around 1.5%. The participation of embedded generation is affected by regulatory arrangements and bilateral contract undertakings with distributors, retailers and market institutions these include:

Formal regulatory instruments: As participating jurisdictions in the NEM NSW, Victoria, Queensland, South Australia and the ACT share some common regulatory arrangements concerning embedded generation including the National Electricity Code (NEC) and the ACCC's Regulatory test for new interconnectors and network augmentation. These are supplemented by local requirements which interact with and compliment the national arrangements. WA, NT and until its full integration to the NEM, Tasmania, employ local instruments in place of the NEC. The local jurisdictional instruments include:

- Retail licences;
- Distribution licences;
- Distribution codes;
- Metering Codes;
- Regulatory guidelines; and
- Code of Practice.

Bilateral (access) contracts: for example for physical connection of embedded generators are also key parts of the overall arrangement.

Headline issues including pricing and performance obligations are generally addressed under the auspices of the NEC (where relevant), ACCC determinations, and high level licences and codes.

A Code of Practice is very much a procedural document designed to facilitate implementation, in particular interactions between the different stakeholders, for example an embedded generator proponent and a distributor. As result a Code of Practice is potentially more valuable to small players and new entrants dealing with large incumbent or monopoly entities and is often focussed on distributors.

It is important to note that many of the procedural matters that might be dealt with in a Code of Practice could also be part of one of the higher level instruments. However, it can be advantageous to address procedural issues in a single document that may be amended more readily to suit evolving circumstances, compared with the higher-level instruments. Accordingly this report reviews, at a relatively high level, the treatment of major issues with the intention of identifying any gaps in coverage and in particular possible additions to a Code of Practice.

It is also important to note that such an examination will not address genuine high-level concerns, for example the principles underpinning pricing decisions, as these are clearly matters for the higher-level instruments.

The overall status of development of Codes of Practice across the states is:

- NSW, Victoria and SA are well on their way to addressing many of the issues that we envisage a code of practice for embedded generation would address. All three jurisdictions either have or are in the process of developing guidelines or a code a practice that will provide a single point of reference for many of the issues relating to embedded generation;

- Queensland and the ACT have a number of issues of interest to embedded generation which do not appear to be addressed in their existing equivalents to a code of practice;

- Tasmania's Electricity Code covers many issues that other jurisdictions include in embedded generator guidelines or codes of practice;

- Western Australia's existing regulations and guidelines concerning network access, technical codes, and pricing address many of the issues we envisage in a code of practice for embedded generation. However the higher level principles for pricing, eg for recognising possible cost offsets resulting from installation of embedded generation and are elements for a Code of Practice are not included in overall arrangements. The term 'embedded generation' has a different meaning in WA to that in the rest of the country, because there are several private networks, in addition to those of Western Power. "Embedded generation" in Western Australia means any plant ***not*** connected directly to Western Power's wires (transmission or distribution). Hence, in WA, even a small generator directly connected to the distribution network of Western Power would ***not*** be called 'embedded'.

In this report, to avoid confusion when referring to WA, we use the term 'embedded generation' in the same manner as it is used in other states operating under the NEM, viz for plant that ***is*** connected to Western Power's *distribution* network, and hence assess the regulations in WA for such plant against that which would be covered by a code of practice; and

- Northern Territory's Utilities Commission recently recommended reviewing aspects of the NT Access Code, which have the potential to improve, among other things, the guidance given to embedded generators, information disclosure, and planning procedures.

Jurisdictional regulators and market participants in NSW, Victoria and South Australia are actively working to develop either a Code of Practice or Guidelines for embedded generation. Arrangements in WA are also being reviewed in conjunction with major reform of the electricity sector. In addition, regulators are reviewing their regulatory methodologies prior to the next regulatory period for distribution networks. Both of these measures are likely to increase transparency concerning the regulatory and commercial treatment of embedded generation.

Next Steps

Our review suggests that a Code of Practice can fill a valuable role within the suite of regulatory instruments and should:

- Focus on implementation and procedural detail and approach;
- At the discretion of the relevant regulatory authority, provide procedural detail about how regulators, distributors and participants should fulfil the requirements laid out in other regulatory documents;
- Provide a directory of key regulatory matters within each jurisdiction. This could comprise a standard list agreed between the regulators that would direct interested parties to where each matter is addressed in that jurisdiction; and
- As far as practicable have a common "look and feel" across the jurisdictions. This would in part address criticism about unnecessary duplication and complexity, simply due to different approach.

These objectives for a Code of Practice are being met in part, but not consistently across the jurisdictions. We see benefit in providing a more standardised approach that would also facilitate progressive alignment of arrangements where there is no basis for difference.

A summary assessment of work underway — and what potentially remains to be done — in each jurisdiction is provided in Chapter 5.

Due to the differing jurisdictional arrangements and stated development of guidelines for embedded generation, the scope for enhancement varies. Consequently, the future development work on Codes of Practice for embedded generation will necessarily develop differently. Recognising that there is considerable work in progress in a number of jurisdictions, Tables 3 through 10 identifies, as far as we are able within a desktop study, the potential for further coverage of the items we believe could be included in a Code of Practice in each jurisdiction.

2. INTRODUCTION

2.1. OBJECTIVE AND SCOPE OF WORK

The Ministerial Council on Energy Standing Committee of Officials (SCO) is currently considering initiatives to facilitate the further involvement of embedded generation within Australian electricity networks. A number of reports including to jurisdictional regulators and the COAG Review of Energy Markets (Parer 2002) have previously assessed barriers to entry and operation of embedded generation. In particular, a report by Charles River Associates (Asia Pacific) (CRA) for the Parer review concluded that many of the allegations about barriers were at one time or another valid but that there has been, and continues to be, work that is progressively removing those barriers. The CRA report also concluded that the problems were now reasonably well understood and recommended that the focus of attention should move to implementation of practical solutions.

The absence of a consistent and comprehensive Code of Practice relating to embedded generation has been noted in a number of the reports as being a material barrier.

A Code of Practice is envisaged to deal with a range of practical information and procedural practices by distributors and proponents of embedded generation to ensure all relevant parties had access to a guide endorsed (or developed) by regulators for the conduct of the often complex interaction necessary between developers and distributors.

We understand that the SCO is aware that progress has been made in some jurisdictions to develop a Code of Practice and believes that the industry participants and regulators should remain the key parties.

CRA understands that SCO agreed at 14 May 2003 meeting that "SA [South Australia] request that the Regulators' Forum (jurisdictional government regulators) develop a Code of Practice for Distributors and that SA commence drafting a scoping document that outlines what MCE would seek to be included in this Code of Practice". In order to undertake this task, it is necessary to also document the current status of work that may address the barriers to participation by embedded generators and in particular in relation to a Code of Practice.

2.1.1. Scope of Work

The SCO's terms of reference required we:

- Prepare a summary and high-level comparison of the overall environment for embedded generation in all jurisdictions, including for example the manner in which technical and pricing arrangements are managed and the role of each of the key regulatory instruments used; and

- Assess the role played or intended for a Code of Practice within each jurisdictional arrangement and possible enhancements over and above that envisaged currently including possible items for inclusion either directly in a Code of Practice or a related instrument at the discretion of the relevant regulator.

The work will rely primarily on public information. It is intended the study be a "desktop" analysis and that the format be appropriate to facilitate discussion between the SCO and jurisdictional regulators on these matters.

2.2. STRUCTURE OF REPORT

This report is structured as follows:

- Section 3 provides a summary and high-level comparison of the overall environment for embedded generation in all jurisdictions and Appendix A assesses the role played or intended for a Code of Practice within each jurisdictional arrangement;

- Section 4 suggests key elements of a Code of Practice and Section 5 provides a preliminary assessment of how well existing jurisdictional arrangements for embedded generation rate against each of the proposed elements; and

- Section 6 discusses possible enhancements to jurisdictional arrangements over and above that envisaged currently.

3. ENVIRONMENT FOR EMBEDDED GENERATION ACROSS AUSTRALA

3.1. REGULATION OF EMBEDDED GENERATION

Headline issues including pricing and performance obligations are generally addressed under the auspices of the NEC (where relevant), ACCC determinations, and high level licences and codes. A Code of Practice is usually viewed as a procedural document designed to facilitate implementation of higher level obligations. These include interactions between stakeholders, for example an embedded generator proponent and a distributor. As result a Code of Practice is more likely to be of value to small players and new entrants dealing with large incumbent or monopoly entities and is often focussed on distributors. Larger proponents are often better informed and resourced.

It is important to note that many of the procedural matters that might be dealt with in a Code of Practice could also be part of one of the higher level documents.

This highlights a difficulty in designing a standard format or content for a Code of Practice as there is scope for different approaches to these high level documents in different jurisdictions

3.2. REGULATIONS ON EMBEDDED GENERATION COMMON TO ALL NEM REGIONS

The ACT, NSW, Victoria, Queensland and South Australia form the National Electricity Market and consequently use the National Electricity Code (NEC) as a key instrument in the regulation of connection of embedded generation.

The National Electricity Code deals with a wide range of issues pertinent to the planning, installation and operation of embedded generation, including:

- The physical operation of embedded generation within a distribution network;
- Access arrangements for embedded generation to a network and how these operate in relation to the regulatory framework governing distribution networks;
- Pricing principles for distribution networks and how these affect embedded generation;
- Registration; and
- Settlements.

These arrangements are complimented by jurisdictional arrangements described in subsequent sections.

3.3. ACCC Regulatory Test

The ACCC Regulatory test for new interconnectors and network augmentation (ACCC 1999) requires that network companies compare network options with alternative options, such as embedded generation and demand side management.

The NSP administers the regulatory test and each test is made public (through NEMMCO or the jurisdictional bodies) with proponents of alternative options able to put forward alternative solutions. Areas where augmentation is likely to be required are intended to be published in various NSP Annual Planning Reports in the years prior to the augmentation becoming critical.

This is intended to give participants time to work up alternative options. Once the timing becomes tighter, the TNSP develops more detailed augmentation options and these are put forward either in the Annual Planning Review (for small augmentation and parties have 20 working days to comment) or in separate Regulatory Test announcements.

3.4. Summary of Jurisdictional Arrangements

Table 1 provides a summary of where various issues concerning embedded generation are addressed in existing jurisdictional codes, legislation, guidelines and other arrangements.

The table reveals that:

- NSW, Victoria, SA and the NT are well on their way to addressing many of the issues that a code of practice for embedded generation would address;
- Queensland, the ACT and WA have a number of issues of concern to embedded generation which do not appear to be addressed, at least in readily available public information (shown as — in the table). Although we are aware that major reviews are currently underway, particularly in WA; and
- Tasmania's Electricity Code covers many issues that other jurisdictions include in embedded generator guidelines or codes of practice.

A more detailed discussion of arrangements in each jurisdiction is provided in Appendix A.

Table 1: Summary of Jurisdictional Arrangements Concerning Embedded Generation

	NSW	VIC	QLD	SA	ACT	TAS	WA	NT
Connection agreements and charges	Distribution Code	ESC 2000 Distribution Pricing Determination Distribution Code Distribution licenses	*Electricity Act 1994* QCA 2001 Distribution Pricing Determination DNSPs' Pricing Principles Statements	Electricity Distribution Code Electricity Pricing Order (EPO)	—	Tasmanian Electricity Code	Electricity Distribution Regulations 1997 Electricity Distribution Technical Code & Planning Criteria Regional Electricity Distribution Technical Code Access Guideline for renewable generators Balancing arrangements for renewable generators	*Electricity (Third Party Access) Act 2000* Electricity (Third Party Access) Code System Control Technical Code Network Connection Technical Code

Table 1 (cont): Summary of Jurisdictional Arrangements Concerning Embedded Generation

	NSW	VIC	QLD	SA	ACT	TAS	WA	NT
Network augmentation	Investment Guidelines IPART Price Determination	ESC precedent – AGL Somerton	*Electricity Act 1994*	Electricity Distribution Code EPO ETSA Utilities Distribution Licence ESCOSA Guideline No. 12	—	Tasmanian Electricity Code	Electricity Distribution Technical Code & Planning Criteria Electricity Transmission Technical Code & Planning Criteria Transmission Networks Spare Capacity Report	UC "Framework for Negotiation of Discounted Network Tariffs" PAWA Networks " Framework for Negotiating Agreements for Network Services for Embedded Generation and Similar Situations", March 2002

Table 1 (cont): Summary of Jurisdictional Arrangements Concerning Embedded Generation

	NSW	VIC	QLD	SA	ACT	TAS	WA	NT
DNSP planning process & information disclosure process	Demand Management (DM) Code of Practice	ESC 2000 Distribution Pricing Determination	*Electricity Act 1994*	Electricity Distribution Code ESCOSA Guideline No. 12 Forthcoming ESCOSA guideline on embedded generation	ICRC's November 2003 draft decision on distribution network pricing in period 2005–2009	Tasmanian Electricity Code	Electricity Distribution Technical Code & Planning Criteria Electricity Transmission Technical Code & Planning Criteria Transmission Networks Spare Capacity Report	—
DNSPs' negotiating obligations	DM Code of Practice	ESC 2000 Distribution Pricing Determination ESC precedent – AGL Somerton *Forthcoming* ESC Guideline on embedded generation	DNSPs' Pricing Principles Statements	Electricity Distribution Code ESCOSA Guideline No. 12 *Forthcoming* ESCOSA guideline on embedded generation	—	Tasmanian Electricity Code	Electricity Distribution & Transmission Regulations, which by design are very prescriptive regarding what access seekers and Western Power must do to ensure non-discriminatory network access.	Electricity (3rd Party Access) Code Discounted Network Tariffs Negotiation Framework Network Access Negotiation Framework

Table 1 (cont): Summary of Jurisdictional Arrangements Concerning Embedded Generation

	NSW	VIC	QLD	SA	ACT	TAS	WA	NT
Embedded generator proponents' information disclosure requirements	DM Code of Practice	Distribution Code *Forthcoming* ESC Guideline on embedded generation	As for other generators	Electricity Distribution Code ESCOSA Guideline No. 12 Forthcoming ESCOSA guideline Licensing requirements	—	Tasmanian Electricity Code	Electricity Distribution Technical Code Regional Electricity Distribution Technical Code Access Guideline for renewable generators	Electricity (Third Party Access) Code System Control Technical Code Network Connection Technical Code UC Licensing Manual

Table 1 (cont): Summary of Jurisdictional Arrangements Concerning Embedded Generation

	NSW	VIC	QLD	SA	ACT	TAS	WA	NT
DNSP technical requirements for embedded generation	Distribution Code	Distribution Code	*Electricity Act 1994*	Electricity Distribution Code	—	Tasmanian Electricity Code	Electricity Distribution Technical Code Regional Electricity Distribution Technical Code Access Guideline for renewable generators	System Control Technical Code Network Connection Technical Code
Network support payments	Distribution Code Regulatory Precedents — Tower/Appin & Smithfield	ESC precedent – AGL Somerton ESC 2000 Distribution Pricing Determination Forthcoming ESC Guideline on embedded generation	DNSPs' Pricing Principles Statements	EPO Forthcoming ESCOSA guideline on embedded generation ESCOSA Efficiency Carryover Mechanism	—	Tasmanian Electricity Code	Balancing arrangements	—

Table 1 (cont): Summary of Jurisdictional Arrangements Concerning Embedded Generation

	NSW	VIC	QLD	SA	ACT	TAS	WA	NT
Network pricing principles	IPART Pricing Principles Methodology IPART Price Determination	ESC 2000 Distribution Pricing Determination	DNSPs' Pricing Principles Statements	EPO	—	Tasmanian Electricity Code	Electricity Distribution Pricing & Charges paper	PAWA Network Pricing Principles Statement EPO
TUOS pass through – principles and/or methodologies	IPART Precedents — Tower/Appin & Smithfield IPART's 2005 DNSP regulatory review	ESC precedent – AGL Somerton ESC 2000 Distribution Pricing Determination	DNSPs' Pricing Principles Statements	EPO Forthcoming ESCOSA guideline (EG) ESCOSA Efficiency Carryover Mechanism	—	Tasmanian Electricity Code	Electricity Distribution Pricing & Charges paper TUOS pass through not part of WA pricing regime	—
Avoided network augmentation costs	IPART Precedents — Tower/Appin & Smithfield IPART's 2005 DNSP regulatory review	ESC precedent – AGL Somerton Forthcoming ESC Guideline on embedded generation	DNSPs' Pricing Principles Statements	EPO Forthcoming EG guideline Efficiency Carryover Mechanism	—	Tasmanian Electricity Code	Electricity Distribution Pricing & Charges paper DUOS pass through not part of WA pricing regime	Discounted Network Tariffs Negotiation Framework

Table 1 (cont): Summary of Jurisdictional Arrangements Concerning Embedded Generation

	NSW	VIC	QLD	SA	ACT	TAS	WA	NT
Metering requirements	Metering Code	Metering Code	Metering Code	Metering Code Forthcoming EG guideline	—	Tasmanian Electricity Code	Electricity Distribution Technical Code Regional Electricity Distribution Technical Code	Network Connection Technical Code
Asset stranding	Prudential investment guidelines IPART's 2005 DNSP regulatory review	ESC 2000 Distribution Pricing Determination ESC precedent – AGL Somerton	QCA 2001 Distribution Pricing Determination	Forthcoming EG guideline ESCOSA Efficiency Carryover Mechanism	—	—	Capital Contribution Policy for Network Revenue Determination Policy & Guidelines for Treatment of Past Capital Contributions by Contestable Customers	—

Table 1 (cont): Summary of Jurisdictional Arrangements Concerning Embedded Generation

	NSW	VIC	QLD	SA	ACT	TAS	WA	NT
Buy-back rates	IPART Pricing Principles Methodology IPART Price Determination	Forthcoming ESC Guideline on embedded generation	—	Forthcoming EG guideline	—	—	Electricity Distribution Pricing & Charges paper Balancing arrangements Renewable Energy Buy-Back Scheme (REBS)	Balancing arrangements
Standard contracts	DM Code of Practice	Forthcoming ESC Guideline on embedded generation	—	Forthcoming EG guideline	—	Some guidance is provided in the TEC, but no contract template.	Electricity Distribution & Transmission Regulations Contract Proformas, available on request from Western Power REBS	Some guidance is provided in the Licensing Manual, but no contract template.

4. CODE OF PRACTICE FOR EMBEDDED GENERATION

4.1. PURPOSE

A Code of Practice is very much a procedural document designed to facilitate implementation of high-level principles, in particular when interactions are required between the different stakeholders, for example an embedded generator proponent and a distributor. As result a Code of Practice is more likely to be of value to small players and new entrants dealing with large incumbent or monopoly entities and is often focussed on distributors.

It is important to note that many of the procedural matters that might be dealt with in a Code of Practice could also be part of one of the higher level documents. However, it can be advantageous to address procedural issues in a single document, which may be amended more readily to suit evolving circumstances than the higher-level instruments.

4.2. ELEMENTS OF A CODE OF PRACTICE

We suggest that a Code of Practice for embedded generation should contain the elements listed in Table 2, or at least provide a directory as to where information on the content on each element can be found.

NSW appears to be the jurisdiction currently most advanced towards having a Code of Practice for embedded generation. However previous regulatory precedents in other jurisdictions (e.g. the Somerton case in Victoria, see Appendix B.2.4) have provided precedents and spurred development of codes in all jurisdictions. The NSW Demand Management Code of Practice (NSW Ministry of Energy and Utilities 2001) provides a good starting point on which to base an Embedded Generation Code of Practice, as:

- Many of the issues regarding negotiation, planning processes, information disclosure, etc., are common to both demand management and embedded generation are addressed;
- It is reasonably comprehensive; and
- It appears as if regulators in Victoria and SA are already using the NSW Demand Management Code of Practice, along with their own research and consultations, to inform the development of guidelines for embedded generation.

Consequently, some elements listed in Table 2 are drawn from the NSW Demand Management Code of Practice, while others are drawn from regulatory reviews in other jurisdictions and CRA's reports to COAG (CRA 2002) and ESCOSA (CRA 2003). As noted earlier a number of the elements listed may be part of other regulatory documents, for example pricing provisions, however it would be important that each is listed in the proposed directory section of a Code of Practice.

Table 2: Potential Elements of Code of Practice and their Contents

Element	Content
Information disclosure protocol	Information on what data needs to be disclosed regarding emerging network constraints; when; by whom; and how this relates to the network planning process. May also define the types of information to be included in and sought by Request for Proposal for non-network solutions to constraints.
Protocols for DNSP dealings with embedded generation proponents	Outlines contact procedures; timeliness of responses; fees for services; and DNSP's competitive neutrality obligations.
Negotiating Framework	Sets out framework for negotiations between DNSPs, embedded generators, and third parties. Includes information on relevant jurisdictional and NEC dispute resolution procedures. Required by Clause 6.14.7 of NEC.
Specification protocol	Defines financial threshold at which it is considered "reasonable" for a DNSP to issue Request for Proposal for non-network solutions to constraints. See also, Information Disclosure Protocol.
Evaluation protocol	Defines procedure for evaluating options for resolving emerging network constraint — network augmentation, Demand Management, Embedded Generation, others.
Standard contracts	Template contracts, particularly for small generators, covering issues relating to connection, rebates, buy-back rates, and standby charges.
Avoided TUOS calculation	Defines methodology used to calculate avoided TUOS payments and relationship of this methodology to regulatory decisions concerning distribution revenue determination and pricing.

Table 2 (cont): Elements of Code of Practice and their Contents

Element	Content
Avoided DUOS calculation	Defines methodology used to calculate avoided DUOS payments and relationship of this methodology to regulatory decisions concerning distribution revenue determination, distribution pricing, prudent investment guidelines, and efficiency carryover mechanism. DUOS rebates for small embedded generators.
Network support payments	Defines methodology used to calculate value of network support payments and relationship of this methodology to regulatory decisions concerning distribution revenue determination, distribution pricing, prudent investment guidelines, and efficiency carryover mechanism. Also sets out regulatory treatment of shortcomings in network performance due to non-performance of embedded generators with network support contracts.
Avoided network augmentation costs	Defines methodology used to calculate value of avoided network augmentation costs and relationship of this methodology to regulatory decisions concerning distribution revenue determination, distribution pricing, prudent investment guidelines, and efficiency carryover mechanism.
Pricing methodologies	Regulator approved DNSP methodologies for calculating connection fees; network tariffs; buy-back rates; and charges for evaluating embedded generation proposals.
Metering requirements	Metering requirements for embedded generators, by size of generator. Whether interval metering or net metering is required and relationship of metering to pricing.
Licensing requirements	Licensing conditions for embedded generators — jurisdictional and any relevant NEC requirements.
Connection requirements	Defines: • technical requirements; • who pays for “deep” and “shallow” connection costs; • where boundary between “deep” and “shallow” points of network lies; and • risk allocation.

5. INDICATIVE ASSESSMENT OF CURRENT JURISDICTIONAL ARRANGEMENTS

This section provides an indicative assessment of the state of development of publicly available existing jurisdictional arrangements for embedded generation against the proposed elements for a Code of Practice for Embedded Generation listed in Table 2. A more detailed discussion of arrangements in each jurisdiction is provided in Appendix A.

We have had considerable difficulty assembling the information to make these comparisons because of the different approaches and presentation of information. The assessments do not purport to be comprehensive, and in some cases may omit relevant information or downplay developments either currently underway or planned. The arrangements involve a large number of pieces of legislation, codes, regulatory guidelines and precedents a number of which are under review. A full audit of each jurisdiction's arrangements has not been practical Given the "desktop" nature of the engagement we have not had the opportunity to cross check the data or the assessments with relevant authorities. Hence assessments are a best effort in the circumstances. We consider that the difficulty we have had in assembling information is indicative of the position proponents would face, and has led us to the recommendation for a common look and feel for a Code of Practice and that any code should include a directory of where key matters are addressed in the particular jurisdiction.

NSW has published the most comprehensive range of material directed at embedded generation (in conjunction with demand management) and has therefore been used as the benchmark for the assessment. The evaluation generally makes one of the following comments regarding a jurisdiction's progress with each Table 2 element:

- ***Good*** — comprehensive treatment of all or most of element content;
- ***Fair*** — partial treatment of element content. Clarification may be needed of how general methodologies are to be applied to embedded generators;
- ***Promising*** — efforts currently underway which may offer comprehensive treatment of all or most of element content; and
- ***Scope for further development*** — effort required to develop element content.

Where it has not been obvious from this broad review if some matters have been addressed or not (and if so where) – these have been noted as "not readily apparent" and needing development, at the very least to identify where it has been addressed.

5.1. NEW SOUTH WALES

Table 3: New South Wales

Element	Instrument(s)	Assessment
Information disclosure protocol	DM Code of Practice, Annual *Electricity System Planning Review (ESDR)*	Good
Protocols for DNSP dealings with embedded generation proponents	DM Code of Practice; see Negotiating Framework	Good
Negotiating Framework	General guidelines are currently under development by NSW DNSPs. IPART considering whether to have specific guidelines for embedded generation.	Under review Promising development
Specification protocol	DM Code of Practice	Good
Evaluation protocol	DM Code of Practice	Good
Standard contracts	Currently under development — foreshadowed in DM Code of Practice	Under review Promising development
Avoided TUOS calculation	NSW precedents prior to end of existing regulatory period. IPART soon to release paper on methodology to be applied in regulatory next period.	Good
Avoided DUOS calculation	NSW precedents prior to end of existing regulatory period. Information forthcoming on methodology to be applied in regulatory next period.	Good
Network support payments	NSW precedents prior to end of existing regulatory period.	Good. Future treatment needs clarification.
Avoided network augmentation costs	NSW precedents prior to end of existing regulatory period.	Good. Future treatment needs clarification.
Pricing methodologies	IPART Pricing Principles Methodologies (PPM); DNSP Price and Service Reports	Fair. Schedule 5 of PPM dealing with EG yet to be developed.
Metering requirements	Clause 7.2.5 of NSW Metering Market Operations Rule (No. 3 of 2001)	Good
Licensing requirements	Distribution Code	Good
Connection requirements	Distribution Code	Good

5.2. VICTORIA

Table 4: Victoria

Element	Instrument(s)	Assessment
Information disclosure protocol	2000 Distribution Price Determination, Annual Planning Reviews, Forthcoming ESC Guideline on EG.	Under review – Promising
Protocols for DNSP dealings with embedded generation proponents	2000 Distribution Price Determination, Forthcoming ESC Guideline on EG.	Under review – Promising
Negotiating Framework	2000 Distribution Price Determination, Forthcoming ESC Guideline on EG.	Under review – Promising
Specification protocol	2000 Distribution Price Determination, Forthcoming ESC Guideline on EG.	Under review – Promising
Evaluation protocol	2000 Distribution Price Determination, Forthcoming ESC Guideline on EG.	Under review – Promising
Standard contracts	Forthcoming ESC Guideline on EG.	Under review – Promising
Avoided TUOS calculation	Somerton precedent, Forthcoming ESC Guideline on EG.	Under review – Promising
Avoided DUOS calculation	Somerton precedent Forthcoming ESC Guideline on EG.	Good Under review – Promising
Network support payments	Somerton precedent Forthcoming ESC Guideline on EG.	Good Under review – Promising
Avoided network augmentation costs	Somerton precedent Forthcoming ESC Guideline on EG.	Good Under review – Promising
Pricing methodologies	Forthcoming ESC Guideline on EG.	Under review – Promising
Metering requirements	Forthcoming ESC Guideline on EG.	Under review – Promising
Licensing requirements	*Electricity Industry Act 2000*, Forthcoming ESC Guideline on EG.	Under review – Promising
Connection requirements	Distribution Licences, Distribution Code, ESC Guideline on EG.	Under review – Promising

5.3. SOUTH AUSTRALIA

Table 5: South Australia

Element	Instrument(s)	Assessment
Information disclosure protocol	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Protocols for DNSP dealings with embedded generation proponents	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Negotiating Framework	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Specification protocol	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Evaluation protocol	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Standard contracts	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Avoided TUOS calculation	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Avoided DUOS calculation	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Network support payments	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Avoided network augmentation costs	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Pricing methodologies	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Metering requirements	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Licensing requirements	Forthcoming ESCOSA Guideline on EG.	Under review – Promising
Connection requirements	Forthcoming ESCOSA Guideline on EG.	Under review – Promising

5.4. QUEENSLAND

Table 6: Queensland

Element	Instrument(s)	Assessment
Information disclosure protocol	*Not readily apparent*	Scope for further development
Protocols for DNSP dealings with embedded generation proponents	DNSPs' Pricing Principles Statements (PPS)	Scope for further development
Negotiating Framework	Pricing Principles Statements	Fair.
Specification protocol	*Not readily apparent*	Scope for further development
Evaluation protocol	*Not readily apparent*	Scope for further development
Standard contracts	*Not readily apparent*	Scope for further development
Avoided TUOS calculation	Pricing Principles Statements	Good
Avoided DUOS calculation	Pricing Principles Statements	Good
Network support payments	Pricing Principles Statements	Good
Avoided network augmentation costs	Pricing Principles Statements	Good
Pricing methodologies	Pricing Principles Statements	Good
Metering requirements	Metering Code	Fair. Scope for Increased transparency re: EG.
Licensing requirements	*Electricity Act 1994 (Qld)*	Fair
Connection requirements	*Electricity Act 1994 (Qld)*	Fair

5.5. TASMANIA

Table 7: Tasmania

Element	Instrument(s)	Assessment
Information disclosure protocol	Tasmanian Electricity Code	Good
Protocols for DNSP dealings with embedded generation proponents	Tasmanian Electricity Code	Good
Negotiating Framework	Tasmanian Electricity Code	Good
Specification protocol	Tasmanian Electricity Code	Fair
Evaluation protocol	Tasmanian Electricity Code	Good
Standard contracts	Tasmanian Electricity Code	Fair
Avoided TUOS calculation	Tasmanian Electricity Code	Fair
Avoided DUOS calculation	Tasmanian Electricity Code	Fair
Network support payments	Tasmanian Electricity Code	Fair
Avoided network augmentation costs	Tasmanian Electricity Code	Good
Pricing methodologies	Tasmanian Electricity Code	Good
Metering requirements	Tasmanian Electricity Code	Good
Licensing requirements	Tasmanian Electricity Code	Good
Connection requirements	Tasmanian Electricity Code	Good

5.6. AUSTRALIAN CAPITAL TERRITORY

Table 8: ACT

Element	Instrument(s)	Assessment
Information disclosure protocol	*Not readily apparent*	Scope for further development
Protocols for DNSP dealings with embedded generation proponents	*Not readily apparent*	Scope for further development
Negotiating Framework	*Not readily apparent*	Scope for further development
Specification protocol	*Not readily apparent*	Scope for further development
Evaluation protocol	*Not readily apparent*	Scope for further development
Standard contracts	*Not readily apparent*	Scope for further development
Avoided TUOS calculation	*Not readily apparent*	Scope for further development
Avoided DUOS calculation	*Not readily apparent*	Scope for further development
Network support payments	*Not readily apparent*	Scope for further development
Avoided network augmentation costs	*Not readily apparent*	Scope for further development
Pricing methodologies	ICRC Draft Decision on an Alternative Pricing Methodology	Under review - Promising
Metering requirements	ActewAGL "Service & Installation Rules for Connection to the Electricity Distribution Network"	Fair. Scope for increased transparency re: EG.
Licensing requirements	*Utilities Act 2000 (ACT)*, ICRC Utility Licensing Guidelines	Fair
Connection requirements	ActewAGL "Service & Installation Rules for Connection to the Electricity Distribution Network"	Fair

5.7. WESTERN AUSTRALIA

Table 9: Western Australia

Element	Instrument(s)	Assessment
Information disclosure protocol	Electricity Distribution Technical Code, Regional Electricity Distribution Technical Code, Access Guideline for Renewable Generators, Electricity Distribution Regulations	Good
Protocols for DNSP dealings with embedded generation proponents	Distribution Technical Codes, Access Guideline for Renewable Generators, Electricity Distribution Regulations, Distribution Access Technical Code, Network Policies NP 2005-1 and NP 2005-2, Pricing Policy.	Good
Negotiating Framework	Electricity Distribution Regulations, Distribution Access Technical Code, Network Policies NP 2005-1 and NP 2005-2	Good
Specification protocol	Distribution Access Technical Code, Network Policies NP 2005-1 and NP 2005-2	Good
Evaluation protocol	Electricity Distribution Regulations, Distribution Access Technical Code, Network Policies NP 2005-1 and NP 2005-2	Good
Standard contracts	Contract pro-formas available on request from Western Power, Renewable Energy Buyback Scheme (REBS)	Good
Avoided TUOS calculation	*Not supported under WA pricing regime*	Scope for further development
Avoided DUOS calculation	*Not supported under WA pricing regime*	Scope for further development
Network support payments	Electricity Distribution Technical Code	Fair
Avoided network augmentation costs	*Not supported under WA pricing regime*	Scope for further clarification
Pricing methodologies	Network Pricing, Users' Guide to Access to WP's Distribution Networks Energy Balancing arrangement Renewable Energy Buyback Scheme	Good. Under review – promising Good
Metering requirements	Electricity Distribution Technical Code, Regional Electricity Distribution Technical Code, REBS	Good
Licensing requirements	Distribution Technical Codes, Access Guidelines& Codes, NP 2005-1+2	Good
Connection requirements	Distribution Technical Codes, Access Guidelines & Codes, NP 2005-1+2	Good

5.8. NORTHERN TERRITORY

Table 10: Northern Territory

Element	Instrument(s)	Assessment
Information disclosure protocol	Network Planning Criteria, Network Concept Plans	Fair. Scope for greater transparency
Protocols for DNSP dealings with embedded generation proponents	Access Code	Review proposed by regulator
Negotiating Framework	Access Code, Negotiation Frameworks for Discounted Network Tariffs & Network Access	Good
Specification protocol	Network Planning Criteria	Fair. Scope for greater transparency
Evaluation protocol	Network Planning Criteria	Fair. Scope for greater transparency
Standard contracts	*Not readily apparent*	Review proposed by regulator
Avoided TUOS calculation	*Not readily apparent*	Review proposed by regulator
Avoided DUOS calculation	*Not readily apparent*	Review proposed by regulator
Network support payments	Balancing Arrangement, Negotiation Frameworks	Good.
Avoided network augmentation costs	Negotiation Frameworks	Fair. Scope for greater transparency
Pricing methodologies	Network Pricing Principles, Network Access Negotiation Framework	Good.
Metering requirements	Network Connection Technical Code	Good.
Licensing requirements	Licensing Manual, Access Code	Good.
Connection requirements	Access Code, Network Connection Technical Code, System Control Technical Code	Good. Review proposed by regulator.

6. CONCLUSIONS

The environment for embedded generation has evolved considerably over the last few years. In the NEM, NSW, Victoria and South Australia are the most developed or have work in train that will facilitate embedded generation. WA, the NT and Tasmania's jurisdictional arrangements are quite detailed in their treatment of embedded generation. However, across the country, development has been inconsistent and is incomplete. Understandably the focus of attention to date has been on high level issues such as pricing, cost sharing and high-level technical requirements. There has been relatively less attention to transparency and access to information about processes and documentation. One of the key roles of a Code of Practice is to provide that transparency.

We have concluded that there is scope for Codes of Practice to:

- Focus on implementation and procedural detail and approach about the items listed in Table 2;
- Provide a directory of key regulatory matters within each jurisdiction. This could comprise a standard list agreed between the regulators that would direct interested parties to where each matter is addressed in that jurisdiction;
- As far as practicable have a common "look and feel" across the jurisdictions. This would in part address criticism about unnecessary duplication and complexity simply due to different approach; and
- At the discretion of the relevant regulatory authority, provide procedural detail about how regulators, distributors and participants should fulfil the requirements laid out in other regulatory documents.

These objectives for a Code of Practice are being met in part, but quite inconsistently across the jurisdictions. We see benefit in providing a more standardised approach that would also facilitate progressive alignment of arrangements where there is no basis for difference.

Due to the differing jurisdictional arrangements and stated development of guidelines for embedded generation, the scope for enhancement varies. Consequently, the future development work on Codes of Practice for embedded generation will necessarily develop differently. The report identifies the scope for improvements in each jurisdiction in Table 3 through to Table 10.

APPENDIX A: DEVELOPMENT OF CODES OF PRACTICE FOR EMBEDDED GENERATION

This section briefly discusses the role played or intended for a Code of Practice within each jurisdictional arrangement.

In the NEM regions of NSW, Victoria and South Australia, jurisdictional regulators and market participants are actively working to develop either a Code of Practice or Guidelines for embedded generation. The relationship such a Code of Practice or Guideline will have with existing jurisdictional arrangements differs because jurisdictional arrangements differ. However, in each case the Code of Practice or Guideline is expected to act as a point of reference on many of the issues relating to embedded generation.

We understand that Queensland and the ACT — along with Tasmania — are at present not developing any Codes of Practice for embedded generation. However, Queensland and ACT regulators have taken steps to implement changes in pricing principles for distribution networks and increased disclosure of information — both of which can facilitate embedded generation. Western Australia, Tasmania and the Northern Territory address many of the issues covered in a Code of Practice in higher-level instruments and are each reviewing details at present. The NT Utilities Commission recently recommended a large number of consultations be held on issues related to a Code of Practice for embedded generation, which are covered in the NT Access Code.

A.1 NEW SOUTH WALES

Over the last three years New South Wales has developed a range of views, which taken together, provide considerable guidance for embedded generation. Much of the NSW work on embedded generation has been subsumed under the heading of "Demand Management" because embedded generation is but one of a broader group of approaches to managing network loading and the costs of meeting reliability, for example ripple controlled loads, time of use metering and tariffs, price sensitive loads, and energy efficiency programs.

Guidance for NSW embedded generation is provided in:

- "NSW Code of Practice: Demand Management for Electricity Distributors" (NSW Ministry of Energy and Utilities 2001). This Code of Practice sets out protocols relating to: a) information disclosure by DNSPs and project proponents; b) specification of network constraints and calls for proposals; and c) assessment of options;

- IPART's review of demand side options that included a detailed review of distributed generation and the barriers to the operation of distributed generation in NSW.[1] Key recommendations from this review (IPART 2002b) that are most relevant to embedded generation included:
  - Development of negotiation guidelines and standard connection agreements for small (less than 1MW) project;
  - Formally set out methodologies for calculating avoided TUOS;
  - Undertake trials of localised congestion pricing in regions of emerging constraints on the distribution network;
  - Clarify the regulatory treatment of non-network investments (such as DM and EG);
  - Review the policy for the roll-out of interval metering; and
  - Consider applying the Australian Standard AS4777 applying to rooftop PV systems to other small distributed generation systems;
- The NSW Distribution Code (IPART 1999);
- IPART's guidelines on prudential investment, which are designed to minimise or eliminate the risk of asset stranding (IPART 2001 and IPART 2002d); and
- Regulatory precedents on the regulatory treatment of payments by DNSPs to the Tower/Appin and Smithfield embedded generation projects.

These are discussed in more detail in Appendix B.1.

Several reviews currently underway are likely to provide further guidance on embedded generation in NSW:

- *Avoided Distribution Costs and Network Pricing* — IPART is currently consulting on how network pricing in NSW could be modified to facilitate demand side options, including embedded generation[2]. The report also covers the regulatory treatment of avoided distribution network costs. It is expected that a final report by IPART's consultants will be published in January 2004, after which IPART intends to issue a draft determination for consultation, with the final IPART determination expected around April 2004;

1 See IPART 2002a and IPART 2002b

2 See SKM and M-Co (2003).

- *DM Code of Practice and Standard Contracts* — An industry working group under the auspices of the NSW Ministry of Energy and Utilities is expected to release an update of the Demand Management Code of Practice in 2004.[3] In particular, this working group is looking to develop a standardised contract for network support services, which could be used as a guideline for negotiations between embedded generators and DNSPs;

- *Negotiation guidelines* — General negotiating guidelines are currently under development by NSW DNSPs, as required by Clause 6.14.7 of the NEC. We understand that IPART are considering whether to create specific guidelines for embedded generation; and

- *Avoided TUOS* — It is expected that IPART will soon release a discussion paper on how avoided TUOS will be handled in the next regulatory period. Until then, its approach will follow that outlined in regulatory precedents concerning the Tower/Appin and Smithfield embedded generators.

In summary, there is considerable information available in NSW on the regulatory treatment of embedded generation, but this is information is dispersed and much of it is currently under review, largely as a result of significant work by IPART to remove barriers to embedded generation.

A.2 VICTORIA

At present, guidance for Victorian embedded generation is provided in:

- the ESC Distribution Code;

- the 2000 Distribution Price Determination;

- Section 161 of the *Electricity Industry Act 2000 (Vic)* for licensing; and

- precedents set in regulating the AGL Somerton embedded generator.

These are discussed in more detail in Appendix B.2.

The ESC is currently consulting on plans to release a guideline for embedded generation. This guideline is expected to provide a single point of reference for many of the issues relating to embedded generation in Victoria. In July 2003, the ESC released an issues paper (ESC 2003) about the guideline and called for submissions**.**

The Victorian guideline on embedded generation is likely to set out standards of practice regarding:

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3 This industry review was, in part, prompted by CRA's advice to the NSW Ministry of Energy and Utilities on the shortcomings in the existing Demand Management Code of Practice.

- Connection requirements of large and small embedded generators;
- Connection costs — shallow versus deep connection costs, who pays, how costs will be determined;
- Information disclosure;
- TUOS payments — how they are assessed/negotiated and how they are treated by the regulator;
- Avoided distribution costs — how they are assessed/negotiated and how they are treated by the regulator;
- Standard rebates for small generators that represent any avoided distribution costs; and
- The allocation of reliability risk between DNSPs, embedded generators and other network users.

It is understood that the ESC is to release a draft guideline on January 2004, with a final guideline in March/April 2004. It is understood also that the ESC intends to set out the metering requirements for embedded generators in the Metering Code, rather than in it embedded generation guideline. This approach to spelling out metering requirements follows the approach taken by IPART in NSW, where embedded generators over 1MW have to meet NEC metering requirements, and those less than 1MW having metering as set out in jurisdictional metering code.

A.3 SOUTH AUSTRALIA

ESCOSA is currently developing a guideline on embedded generation for South Australia. An issues paper concerning the guideline was released in November 2003 (ESCOSA 2003j), along with a discussion paper reviewing the regulatory arrangements and network issues that could affect embedded generation in South Australia (CRA 2003).

ESCOSA's guideline is expected to build on its earlier work that sought to clarify issues relating to embedded generation, such as: regulatory treatment of network assets; network planning and augmentation; information disclosure; and generator licensing.

At present, guidance for South Australian embedded generation is provided in:

- The South Australian Electricity Distribution, Transmission and Metering Codes (respectively, ESCOSA 2003d, ESCOSA 2003k and ESCOSA 2003f);

- The South Australian Electricity Pricing Order (EPO)[4];
- ETSA Utilities' Distribution Licence[5];
- ESCOSA's Guideline No. 12 "Demand Management for Electricity Distribution Networks" (ESCOSA 2003e);
- ESCOSA's *Advisory Bulletin No. 4*, "Licensing Arrangements for the Electricity and Gas Supply Industries" (ESCOSA 2003c). CRA understands that ESCOSA is currently discussing with the SA Government a proposal to change the generator licensing requirements for plants up to 5 MW in capacity; and
- ESCOSA's efficiency carry over mechanism applying to ETSA Utilities, the sole South Australian DNSP (ESCOSA 2003h).

These are discussed in more detail in CRA(2003).

ESCOSA's guideline on embedded generation is likely to provide a single point of reference for ETSA Utilities and those considering developing embedded generation in South Australia.

A.4 QUEENSLAND

It is notable that Queensland has the highest proportion of embedded generation in the NEM — 5.4% of installed capacity in 2003 (see CRA 2003, p. 38).

At present, guidance for Queensland embedded generation is provided in:

- the *Electricity Act 1994*, parts of which serve as the Distribution Code for Queensland;
- the Queensland Competition Authority's (QCA) electricity distribution network determination for the period 2001–2004 (QCA 2001); and
- Pricing Principles Statements by Queensland's two DNSP's, Ergon and Energex.

Beyond the above documents, we have not identified any specific guidelines or other documents that outline how embedded generators will be treated in Queensland. We are not aware of any initiatives to develop such a code of practice — although this is based only on a review of published material.

4 See Treasurer of South Australia 1999.

5 ESCOSA 2003a.

Electricity Act 1994 (Qld)

Technical guidelines relating to distribution networks, akin to those in the distribution codes of other jurisdictions, are found in the *Electricity Act 1994 (Qld)*. The *Electricity Act* sets out conditions for "supply entities", which are equivalent to DNSPs, including:

- Network access and connection (s. 53-54, s. 87);
- Licensing conditions (s. 195–202);
- Safety and technical standards (Ch. 8);
- Obligation to supply (Ch. 3); and
- Other regulatory conditions.

The conditions in the *Electricity Act 1994* which are most relevant to embedded generators are those mentioned above and those dealing with 'Special approvals' (Ch. 2, Part 7), which appear to allow embedded generators to operate under special circumstances.

Final Determination on Regulation Electricity Distribution

The QCA's electricity distribution network determination for the period 2001–2004 (QCA 2001) requires that each DNSP supply a Pricing Principles Statement that outlines how it will treat customers and embedded generators with respect to both tariffs and new connections. The pricing principles statement must show that the pricing does not involve cross-subsidies, is consistent with economic pricing principles and show a high level relationship between the pricing and future distribution augmentation requirements.

There are no specific requirements related to embedded generation.

Pricing Principles Statements

Both Ergon and Energex have produced these Pricing Principles Statements.[6] The Statements generally include embedded generators in the list of customer types and require embedded generators to negotiate connection agreements and supply prudential requirements. The Statements both outline how Avoided TUOS will be calculated. The Jurisdictional Regulator may intervene in the negotiations.

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6 Ergon Energy 2003, *Network Pricing Principles Statement* (Release 3), QCA Approved 16 April 2003, Ergon Energy Corporation Limited, Brisbane.

Energex 2003, *Network Pricing Principles Statement 2003-04*, Energex Limited, Brisbane, March.

Both Statements are similar but not identical regarding the provisions. For example, the Ergon Statement identifies that the Avoided TUOS will be calculated in accordance with Clause 5.5 of the Code, but indicates only generators who are registered as Code Participants will be eligible. Energex's Statement, on the other hand, has a very similar section on Avoided TUOS but nothing appears about Code Participants that implies all embedded generators will be eligible.

This tends to result in inconsistencies between the approaches depending on where in the Queensland distribution network a generator connects.

A.5 AUSTRALIAN CAPITAL TERRITORY

From a review of publicly available material, it appears as if the ACT currently has neither a code of practice nor any guideline concerning embedded generation.

None of ACT codes governing electricity distribution and network services mention the phrase 'embedded generator', including:

- Electricity Service and Installation Rules Code;
- Electricity Distribution Supply Standards Code;
- Management of Electricity Network Assets Code;
- Electricity Network Capital Contributions Code; and
- Electricity Network Use of System Code.[7]

ACT has one Distribution Network Service Provider, ACTEWAGL, which is supplied from the NSW transmission system. ACTEWAGL has well defined connection rules for light industry or domestic connection. To some extent these rules can be applied to an embedded generation installation, but they will need modification to cater for the technical issues associated with generation.[8] There is also no mention of embedded generation in ACTEW/AGL's licence.

7 Information on the regulatory arrangements for DNSPs in the ACT, including various codes, can be found on the website of the ACT's Independent Competition and Regulatory Commission: http://www.icrc.act.gov.au/

8 ACT connection requirements for photovoltaic systems are outlined in ActwewAGL 2003, Appendix A11. Other embedded generators appear to have to negotiate with ActewAGL regarding connection requirements (see ActwewAGL 2003).

However, embedded generation, demand management and distribution network planning feature in recent developments. On 7 November 2003, the Independent Competition and Regulatory Commission (ICRC) released a draft decision concerning distribution pricing in the ACT, in which the ICRC called for increased transparency in distribution network pricing by ACTEWAGL to facilitate embedded generation (ICRC 2003a). The ICRC report sets out distribution pricing principles, calls for increased information disclosure by ACTEWAGL on alternatives to network investment – such as demand management and embedded generation; and draws attention to the issues of negotiating payments for TUOS pass through and avoided capital costs.

A.6 TASMANIA

Currently, few embedded generators have licences in Tasmania. The Office of the Tasmanian Energy Regulator (OTTER) is currently consulting on the need for generators larger than 5MW to have licences.

The principal guideline on embedded generation in Tasmania is the Tasmanian Electricity Code (OTTER 2002). Issues covered in the Tasmanian Electricity Code (TEC) include:

- Technical requirements for embedded generators;
- Avoided network costs;
- Network support payments (Clause 5.6.3);
- Information requirements for embedded generators (Schedule 5.5);
- Standards for connection agreements (Schedule 5.6); and
- Information on the DNSP planning process and information disclosure.

Coverage of embedded generation in these instruments is relatively more detailed than similar provisions of the National Electricity Code, and contains some of provisions other jurisdictions include in lower level instruments. Tasmania is not yet part of the National Electricity Market, so technically the National Electricity Code does not apply to Tasmania.[9] However, the TEC has many similarities to the NEC, and with regard to the technical requirements imposed on embedded generation the similarity is very strong. The TEC contains distribution and transmission pricing and system operation and as such there is no separate Distribution Code.

9 Tasmania will join the NEM when Basslink is completed in 2006.

The only Tasmanian Distribution Licence[10] is very short and does not mention embedded generation specifically.

A.7 WESTERN AUSTRALIA

Western Australia is currently served by Western Power, a vertically integrated utility, which is the state TNSP and DNSP.[11] This will change after disagregation into Generation, Network/System Operation, Retail and Regional components in accordance with current proposals; although network management for both Transmission and Distribution levels will remain within the one organisation. Details of access arrangements at the level that would be covered by a Code of Practice have tended to be dealt with through bilateral negotiation between proponents and Western Power under the auspices of relevant formal Regulations.

Western Australia is not part of the NEM. The term 'embedded generation' has a different meaning in WA to that in the rest of the country, because there are several private networks, in addition to those of Western Power. "Embedded generation" in Western Australia means any plant ***not*** connected directly to Western Power's wires (transmission or distribution), whereas the NEM classifies any generator connected to distribution as embedded. Hence, in WA, even a small generator directly connected to the distribution network of Western Power would ***not*** be called 'embedded'. In this report, in order to ensure consistency for the purposes of comparison with other arrangements when referring to WA, we use the term 'embedded generation' to mean plant that ***is*** connected to Western Power's *distribution* network only.

10 OTTER (Office of the Tasmanian Energy Regulator) 2001, *Electricity Supply Industry Distribution Licence issued to Aurora Energy Pty Ltd*, Amended 16 October 2001, OTTER, Hobart.

11 In addition to Western Power, there are a number of Independent Power Producers (IPPs) that either sell energy to Western Power under contract or wheel power through Western Power's networks.

Access to the networks in WA is governed by *Electricity Transmission Regulations 1996* and the *Electricity Distribution Regulations 1997* which provide the terms and conditions under which private generators, electricity consumers and others can gain access to Western Power's transmission and distribution networks.[12] These Regulations are, by design, very prescriptive regarding what access seekers and Western Power must do to ensure non-discriminatory network access. For example, the Regulations specify the type of information that must be exchanged between Western Power and access seekers, evaluation processes and timetables. The prescriptive nature of the Regulations was intended to ensure non-discriminatory open-access to Western Power's networks. The *User's Guide on Access to Western Power's Distribution Networks* provides a concise description of the bilateral market arrangements in WA and their implications for network users, access application requirements, pricing arrangements, regulations, technical requirements, capital contributions policy, and application process.

Complementing the network regulations are the *Electricity Distribution Access Technical Code*, *Electricity Transmission Access Technical Code*, and *Network Policies NP 2005-1 and NP 2005-2*. Network Policy 2005-1 is a guideline for independent power producers with plant in the 30-5000 kVA range, while Network Policy 2005-2 details technical requirements for such plant to be connected to the South West Interconnected System (SWIS) Distribution Network.

However, there is special treatment for renewable generators of any size. A separate access guideline for renewable generators[13] exists. A code on balancing arrangements for renewable generators[14] has been developed, and is currently under review. In addition, Western Power operates a "Renewable Energy Buyback Scheme" (REBS). A guideline on REBS sets out the application process, technical requirements, metering requirements and costs, as well as prices at which Western Power will buy and sell power to customers participating in the scheme.

We understand that standard contract pro formas are available on request from Western Power, which can be used as the basis of negotiating an access agreement.

12 A generator connected to one distribution network seeking to wheel power through the transmission network to a load on a different distribution network must contract for transmission as well as distribution access.

13 Western Power 2002a

14 Western Power 2002b

Information on the sharing of network augmentation costs between users and Western Power, and the network regulation process, is contained in *Capital Contribution Policy for Network Revenue Determination* and *Policy & Guidelines for Treatment of Past Capital Contributions by Contestable Customers.*[15]

The *Electricity Referee and Dispute Resolution Regulations 1997* provide a framework in which disputes arising from access applications, access agreements or pricing may be resolved.

An *Electricity Distribution Pricing and Charges* paper[16] details prices at various locations on the transmission and distribution networks.

The *Electricity Distribution Technical Code and Planning Criteria*[17] and a *Regional Electricity Distribution Technical Code and Planning Criteria*[18] detail the technical requirements to be met for the connection of facilities to the transmission and distribution networks, as well as network planning principles and processes. Part of the planning process is the publication of reports on network spare capacity, which provide an indication of the network's capability to sustain additional load and generation.

The technical requirements specified in the documents are generally the same or more stringent than the equivalent requirements in the NEC.

WA has not introduced full customer contestability and while generators may supply customers directly this is more complicated than in NEM states. The WA market is currently undergoing significant reform and there is a general intention to improve the position of embedded and in particular renewable plants (who are often embedded in the distribution system).

A.8 NORTHERN TERRITORY

The Northern Territory – due to its large area, low population, and geographic isolation – is not interconnected with other states and relies on a combination of stand-alone generation in remote areas and grid-power in the three metropolitan areas of Katherine-Darwin, Alice Springs and Tennant Creek. The networks in the three metropolitan areas operate as islanded systems because, so far, it is uneconomic to connect them together.

15 Both available at http://www.westernpower.com.au

16 Western Power 1999.

17 Western Power 1997a.

18 Western Power 1997b.

Like WA, the Territory is not part of the NEM. Prior to 2000, the Power and Water Authority (PAWA) was a vertically integrated government monopoly, responsible for electricity generation, transmission, distribution and retailing. There were also a number of independent power producers (IPPs) supplying mines and industrial facilities, who sold excess power to PAWA under long term power purchase agreements or on a standby basis.

In 2000, the electricity supply industry in the Territory was restructured with the passage of the *Electricity Reform Act 2000 (NT)*, which led to the functional separation of PAWA's network, generation, retail and system control functions.

The monopoly network business is now regulated by the Utilities Commission under the *Electricity Reform Act* and *Utilities Commission Act 2000*.

Access to networks in NT is governed by the *Electricity (Third Party) Access Code*, which is a schedule to the *Electricity Networks (Third Party Access) Act 2000*. The Access Code provides the terms and conditions under which private generators and retailers can gain access to PAWA's transmission and distribution networks. The NT Access Code appears to draw heavily on aspects of the NEM access code, as well as the access code of Western Australia.

The NT Access Code places an emphasis on negotiations between those seeking access and PAWA Networks. Two negotiating guidelines[19] have been approved by the Utilities Commission:

- *Framework for Negotiation of Discounted Network Tariffs* — sets out the principles underlying the framework, eligibility for discounts associated with avoided network augmentation costs or lower levels of network service, the negotiating process, quantum and period of discount, and the role of the regulator; and

- *Framework for Negotiating Agreements for Network Services for Embedded Generation and Similar Situations* — provides guidance on how approved Network Pricing Principles[20] are to be applied to embedded generators and mentions issues likely to be covered in negotiations, such as: connection costs, capital contributions, avoided network augmentation costs, and standby capacity requirements.

In the Territory, like WA, it appears as if there is little distinction between embedded and other generators. As with WA, this lack of distinction is probably due to a single player owning distribution and transmission networks, so connection at the distribution rather than the transmission level has not been an issue.

19 Available at Utilities Commission website, http://www.nt.gov.au/ntt/utilicom/electricity/index.shtml

20 PAWA Networks 2000.

Independent generators are free to enter and compete against PAWA Generation, provided they meet licensing requirements administered by the Utilities Commission, negotiate a network access agreement in accordance with the Access Code, and satisfy technical requirements.

The *Network Connection Technical Code*[21] and *System Control Technical Code*[22], respectively, spell out the technical requirements for generators seeking connection to distribution and transmission networks and operational issues, including the balancing arrangements for embedded generation.

Information requirements for generators seeking connection and access to PAWA's networks are outlined in Attachment 3 of the *Network Connection Technical Code*, along with exemptions for different types of generators. Generators are also obliged to obtain a licence from the Utilities Commission. The *Licensing Manual*[23] sets out the licence application process, information requirements, and licence fees. Metering requirements are detailed in Schedule 4 of the *Network Connection Technical Code*.

The document *Network Planning Criteria*[24] outlines the process used by PAWA Networks to assess network adequacy, system security and the way in which investment options will be assessed. Network Concept Plans, akin to annual planning reports in other jurisdictions, are the product of this process. However, it does not appear as if PAWA Networks is required to publish its Network Concept Plans, which might provide information on emerging network constraints and the potential for embedded generation or demand management to provide network support or delay network augmentation.[25]

Limited competition has been introduced into the retail segment of the industry, with customers whose energy consumption exceeds 750MWh per year able to choose their supplier and those below this demand level supplied by PAWA as franchise customers.

A comprehensive review of the Access Code was undertaken by the Utilities Commission in 2003. The Utilities Commission's final report (UC 2003a) recommended a wide range of further consultations on changes to the Access Code on issues affecting embedded generation, including:

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21 PAWA Networks 2003a

22 PAWA 2002

23 UC 2001

24 PAWA Networks 2003b

25 The Utilities Commission is responsible for publishing an *Annual Power System Review* (see UC 2003b), however that focuses on energy supply and demand in the Territory, and leaves the assessment of network adequacy and network planning up to PAWA's *Network Concept Plan*.

- Information disclosure between networks and access seekers (recommendation 18);
- Default use-of-system and/or default connection agreements (recommendation 20);
- Streamlining the process used to assess connection agreements (recommendation 25);
- Allowing generators to contract directly with customers (recommendation 30);
- Changes to the current system for rationing existing network capacity, which favours incumbent generators (recommendation 40);
- Clarifying contractual arrangements that are to apply with respect to the provision of connection services and network services to different categories of user (recommendation 31); and
- examining the role that might be played by the regulator in oversighting the setting of capital contributions (recommendation 59A).

The implementation of the Commission's recommendations has the potential to clarify many of the issues which are likely in a code of practice for embedded generation.

APPENDIX B: EMBEDDED GENERATION IN NSW AND VICTORIA

B.1 NEW SOUTH WALES

As discussed in Appendix A.1, NSW's guidelines on embedded generation are expected to be updated in early 2004. The updating of the NSW Demand management Code of Practice and IPART's review of network pricing (SKM and M-Co 2003) highlight the fact that NSW is in the process of putting into place some of the recommendations concerning embedded generation that were contained in IPART (2003b).

The existing of state-based instruments in New South Wales which affect embedded generation include: the *Electricity Supply Act 1995 (NSW)*, IPART Distribution Code,[26] the *Electricity Supply Amendment Act 2000 (NSW)*, and precedents set in regulating the Smithfield and Tower/Appin embedded generators. These are briefly reviewed below.

B.1.1 Distribution Code

The NSW Distribution Code (IPART 1999) is more explicit about the regulation of embedded generators than any other to date in the NEM. It describes, for example, the system for compensating for TUOS avoidance where an embedded generator is present.

IPART defer quite substantially to the National Electricity Code in their own Distribution Code on issues related to embedded generation such as:

- Access procedures and charges;
- Procedures for governing network planning and augmentation;
- Connection agreements (clause 5.5); and
- Network support payments (chapter 6).

IPART also appear to have taken cues from the NECA transmission and distribution review that covered some issues of embedded generation. The review explicitly discussed TUOS pass through, standby charges, network bypass, network access and pricing.

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26 IPART 1999, *Regulation of New South Wales Electricity Distribution Networks — Determination and Rules under the National Electricity Code*, National Electricity Code Determination 99-1, Independent Pricing and Regulatory Tribunal of NSW, Sydney, December 1999.

B.1.2 Investment Guidelines

IPART has also done some work on producing prudential investment guidelines for regulated electricity distribution networks. If these can be used successfully, then they may increase distributor's willingness to use embedded generators because they are certain to recover their investment over time. The review on the evaluation of capital and operating expenditure data, is to be part of the Tribunal's 2004 revenue determination for NSW distribution businesses.

B.1.3 Precedents

The regulatory precedents of Smithfield and Appin Tower Colliery — although both existed prior to the National Electricity code — provide at least a partial guide for embedded generators from a perspective of the cash flows to and from an embedded generator.[27]

However, as some of the decisions about these cases have been retrospective, they raise some questions of investment risk for both other potential generators and distribution companies.

B.2 VICTORIA

Key instruments relevant to embedded generation in Victoria include: the ESC Distribution Code, the 2000 Distribution Price Determination, Section 161 of the *Electricity Industry Act 2000 (Vic)* for licensing, and precedents set in regulating the AGL Somerton embedded generator.

B.2.1 Victorian Distribution Code

The Victorian Distribution Code[28] is far less detailed than that of NSW[29] regarding embedded generators and is primarily concerned with technical issues. With regard to embedded generation, and excluding technical areas, the issues the distribution does cover are:

- Connection Agreements;
- Good faith in negotiations; and
- Parallel connection arrangements.

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27 For a discussion of these precedents, see IPART 2002a and IPART 2002c.

28 ORG 2002.

29 See IPART 1999, Ch. 12.

B.2.2 Distribution Licences

The Victorian distribution licences contain an obligation for a distributor to offer to provide connection services to embedded generators.[30] The offer must be made within 65 days of the application by the generator and must include a price and terms that are fair and reasonable. The Distribution company must have regard to any relevant Guidelines (such as the one currently being drafted, see below) when making their offer.

B.2.3 Distribution Price Determination

The 2000 Distribution Price Review Determination (ORG 2000a) highlighted a number of areas where the ESC intended to focus on improvements that assist embedded generation (and DSM). These included:

- A requirement for Distribution Companies to publish annual planning reviews that highlight network constraints and facilitate non-network options where they are economically efficient;
- A requirement for Distribution Companies to publish annual Tariff Reports that highlight tariff policies including features that provide signals for customers to consume less electricity;
- A requirement for Distribution Companies to make a contribution to embedded generation connection costs, based on the costs avoided by the DB; and
- The Price Review moved to a Tariff Basket approach which reduced incentives on DNSP's to increase the volume of electricity distributed and included an efficiency carry-over mechanism intended to ensure DNSP's had incentives to use demand side management or embedded generation as options instead of network augmentations.

Clause 3.3.2 of the Price Determination (ORG 2000b) sets out how TUOS will be passed through to consumers. This clause was referred to in the AGL Somerton precedent.

30 For example, see Ch. 6 of ESC 2002, *Electricity Distribution Licence — AGL Electricity Limited*, as varied on 29 April 2002, Essential Services Commission, Melbourne.

B.2.4 AGL Somerton Precedent

The AGL Somerton case was used as a precedent by the ESC to guide future embedded generators or distribution companies.[31] The case involves a gas turbine embedded generator in north-east Melbourne which was required to compensate for the load growth (residential & industrial) around the Somerton area that was beginning to stress the network. AGL Distribution sought to develop embedded generation using AGL Power Generation instead of upgrading the network.

For the purpose of transparency, the ESC made available the detailed correspondence that went on between the embedded generator, the distribution company and the regulator. This correspondence shows how the ESC plans to regulate embedded generation. This is not to say that all embedded generators will undergo the same process as the AGL Somerton case. The ESC was not completely happy about the level of transparency in this negotiation. They believed that there should have been more information in AGL Distribution's annual planning report.[32] However, the ESC decided that, on balance, the outcomes were correct and that the embedded generator should be allowed in the distribution asset base.

The ESC set the following main precedents regarding the case:

- Full pass-through of avoided TUOS charges to the embedded generator (as per NEC), but indicated they will look in future at partial pass through;
- Approved payments of avoided transmission & distribution costs to the embedded generator;
- Approved network support payments sought by AGL Somerton;
- The ESC noted TUOS pass-through & avoided transmission cost pass through was consistent with ESC pricing principles;
- The ESC indicated that prudent investment principles were used; and
- Sought advice from VENCorp on avoided costs estimates provided by AGL.

31 See http://www.esc.vic.gov.au/electricity286.html for information on the ESC's regulatory decision on the Somerton embedded generator.

32 See ESC 2001, 20 March 2001 letter from Richard Bolt (ESC Director of Energy Regulation) to Des Hemmings (GM, Electricity Networks, AGL) re: Proposed Somerton Power Station, Essential Services Commission, Melbourne.

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