

Pre-Release Version

Barriers to Demand Management and an Action Plan to Overcome Them

Report by Exigency Management Pty Ltd

For

Energy Users' Association of Australia

March 2007

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Acknowledgement

Exigency Management Pty Ltd, on behalf of Energy Users' Association of Australia wishes to acknowledge the funding support of the Advocacy Panel, without which this report would not have been undertaken.

Disclaimer

This report was prepared by Exigency Management Pty Limited, following a series of interviews of large energy users, in which their knowledge of, experience with and attitudes towards Demand Side Response were discussed. Exigency Management Pty Limited drew on these interviews, supplemented by its wider experience of demand side issues, to prepare this report. Therefore, whilst Exigency has endeavoured to reflect the common themes and issues on DSR arising from the interviews, the final report reflects the informed view of Exigency and not necessarily those of any individual interviewee.

Definitions in this Report

Whilst no commonly agreed definitions exist, Demand Side Response (DSR) is commonly held to include demand shedding as well as on-site generation, despite generation being strictly a “supply side” response.

In this report, Exigency offers the following definition which it has found helpful in better understanding the market opportunity and barriers:

Demand Side Response: The short term response by a user to a price signal or request by a third party in the form of load reduction or increases in self-generation.

In this definition, “short-term” is held to mean several minutes to several hours (but usually 1 to 4 hours). The use of “short term” in the definition seeks to distinguish such measures from broader energy efficiency measures, which may be regarded as a more “steady state” or long-term response to a price signal or other incentive.

Whilst all forms of response should be treated in a non-discriminatory manner, there are differences in the current treatment of generation and load-shedding (measurement, regulation) affecting market access. Similarly from the Users’ perspective, potential differences exist between the operational risk profile of the two alternatives.

1 Introduction

The latest update to the NEMMCO Statement of Opportunities (published 30th January 2007, following December 2006 survey), records 163 MW of committed- and 476 MW of non-committed- Demand Side Participation projects in the NEM. Anecdotally and in addition to the totals above, there may be several hundred MW of further demand side potential in the NEM that is not currently being deployed.

This report was commissioned by Energy Users's Association of Australia to investigate what barriers exist to the deployment of Demand Side Response (DSR) in the market and to determine an action plan to overcome these barriers.

The Action Plan set out in this report is designed to facilitate the further deployment of DSR capacity, including load-shedding and distributed generation, through a small number of coordinated measures. Some of these measures involve simple rule changes that systematically remove barriers to DSR and support efficient outcomes, consistent with the Market Objective.

2 Summary Findings

The following external barriers to DSR deployment currently exist:

- *Attenuation of wholesale energy price signals.*
- *Lack of transparency in Reserve Trader market signals.*
- *Discriminatory regulatory treatment of Capex and Opex for network reliability.*
- *Lack of transparency in network reliability price signals.*
- *Lack of explicit regulatory controls on networks to provide access for DSR facilities.*
- *Limited opportunity of DSR to participate directly in the wholesale energy market.*

Internal barriers to DSR uptake are summarised as follows:

- *Lack of corporate knowledge on the DSR supply chain and/or value chain.*
- *Perceived contractual restrictions.*
- *Perceived imbalance of costs and risks relative to benefits.*
- *Operational practices.*
- *Past experience of DSR*
- *Internal investment decision making*

It should be noted that in many cases the above barriers have been successfully identified and overcome. This is particularly the case for organizations with significant response capacity which also require low effective energy costs in order to compete successfully in their served markets.

3 Summary Action Plan

Overcoming the identified barriers will require coordinated, focused and appropriately funded actions. These actions fall broadly into the following categories:

3.1 Capacity Building to Overcome Internal Barriers

An industry-wide plan, coordinated by EUAA with appropriate industry, government and energy market funding is required to build capacity to assess, plan and implement DSR facilities. This will include the following work streams:

3.1.1 DSR Options

- EUAA to develop users' guide to the DSR value chain, identifying the opportunities, market segments, market processes and means of participation in DSR activities. The guide will be supported by case studies, highlighting operational considerations and how challenges have been overcome; and
- EUAA to provide evaluation tools to support users' evaluation of DSR opportunities. These will supplement the existing DSR benefit modeling tool to incorporate more detailed cost and risk assessment.

3.1.2 Contracting DSR

- EUAA to coordinate obtaining legal advice on the contractual rights with respect to DSR and potential restrictive practices by Retailers;
- EUAA to encapsulate DSR options in standard form retail contracts and provide stand-alone standard form DSR contract(s) for users; and
- Users to incorporate DSR options into their energy procurement processes to provide an objective evaluation of offers available to them.

3.2 Lobbying for Change to Overcome External Barriers

3.2.1 Industry DSR capacity survey

- EUAA to coordinate industry survey to quantify the DSR capacity in the market, by type, size, lead-time and firmness;

3.2.2 Rule Changes

- EUAA to lobby on behalf of users for network regulatory impediments to DSR to be systematically removed under jurisdiction and National Electricity Rules
- EUAA to request rule change via AEMC requiring price guidance and clearing price data from the Reserve Trader Market to be published
- EUAA to lobby on behalf of users for changes to market rules to allow DSR facilities to participate directly in the wholesale energy market.

4 Background to Review

Exigency was commissioned by Energy Users Association of Australia (EUAA) and funded by the Advocacy Panel to prepare this report.

The report follows earlier studies including: *Electricity Demand Side Management Study – Review of Issues and Options for Government*, CRA Asia Pacific Pty Ltd and Gallagher Associates for VENCORP, 7 September 2001; *Trial of a Demand Side Response Facility for the National Electricity Market: Independent Consultant’s Report*, Pareto Associates Pty Ltd, April 2004; and *Demand Side Response in the National Electricity Market Case Studies – End User Awareness Program*, Fraser Consulting Services for EUAA (Supported by AusIndustry (Project DB 1175) April 2005).

In Australia DSR pre-dates the NEM (at which time it was deployed under bilateral contracts with the local utility or generator) but has increased since the NEM was established. Yet there is a widely held view DSR has not reached its full potential, which is in turn seen as an impediment to economic efficiency in the NEM.

This report was commissioned in order to identify actual barriers to uptake after almost a decade of NEM operation and coincided with the establishment of a Ministerial Council for Energy working group charged with developing a DSR policy framework as part of the Council of Australian Governments (CoAG) energy market reforms.

This report includes an *End User Demand Management Action Plan* developed specifically for end users to facilitate the further deployment of DSR.

This report will be submitted to MCE working group to assist with the formulation of DSR policy and it is also anticipated that the EUAA will use the Action Plan to facilitate greater use of Demand Management by its members, other users, retailers, network service providers, aggregators and the market more broadly.

5 Demand Side Response – Main Markets Served

There are currently three main markets for DSR:

- Wholesale electricity market
- Reserve trader market
- Network reliability market

5.1 Wholesale Electricity Market

Within the NEM, scheduled market generators are bid every 5 minutes and wholesale settlement prices are set for each half hour according to the stack of generation bids.

DSR can be deployed to reduce exposure to wholesale prices. Within a contracting arrangement, the ultimate buyer is usually a retailer, possibly interfacing to an aggregator.

On the other hand, users may participate directly in the wholesale market by entering into a pool contract with the retailer or by registering as a market customer to take pool price exposure on the total load. In such circumstances, the customer may reduce its energy bill by shedding load or generating during periods of high spot prices.

5.2 Reserve Trader Market

NEMMCO currently operates reserve trader markets in Victoria and South Australia, as those are the parts of the NEM that require them, as an insurance policy to meet periodic forecast shortfalls in supply. Users can bid directly or through an aggregator, in response to periodic tenders organized by NEMMCO. Participating users may be called on with between 24 hours and 4 hours notice. Payments are made for both availability and for usage. Reserve Trader Prices are not published.

5.3 Network Reliability Market

LNSPs and TNSPs may call for DSR to address localized network constraints and avoid or defer network capital investment. Response reliability is critical (ie if the DSR is called but unavailable then the network capital investment cannot be avoided) for which participation of aggregators may be required to ensure that enough DSR can be delivered through a portfolio of diverse DSR sources. DSR for networks is organized through closed tenders. No price guidance or outturn prices are published, though IPART (NSW) for example, has indicated that the remuneration for such capacity should be equivalent to the regulated return (on network assets).

5.4 General Observations

In essence all of the above markets can be supported by all modes of DSR and Generation with suitable interval metering for *ex-post* validation and settlement. In general terms, whilst the faster and more reliable modes of response are more valuable, even manually instigated DSR can be deployed to serve each of the three markets described above.

On the other hand, participation in other markets, such as NEMMCO Frequency Control Ancillary Services (FCAS) Markets, would require SCADA¹ type systems to provide a fast and reliable (eg centrally dispatched) response.

¹ System Control and Data Acquisition

6 Roles of Market Participants

The roles of various participants are described to provide a better understanding of the DSR market.

6.1 NEMMCO

NEMMCO (National Electricity Market Management Company) is the Independent Market Operator and Independent System Operator for the National Electricity Market. In its IMO role, it sets and settles wholesale market prices at regional reference nodes based on generator bids against forecast demand. There is very little user DSR participation in this market (other than through market customers and users on pool contracts), although user response has an indirect impact in terms of reducing demand and potentially, the generator bid stack.

Whereas the wholesale market is the main market operated by NEMMCO, it also operates several other markets, including reserve trader and FCAS. Currently, end users can participate in reserve trader arrangements, but participation in FCAS markets is dependent upon having reasonably sophisticated SCADA systems in place.

6.2 Retailers

Retailers sell energy to end users, usually in the form of fixed time of use prices (eg peak and off-peak prices). They settle on half-hourly wholesale market prices and engage in risk management, often in the form of swaps with generators or financial intermediaries. Unless a retailer is a price-maker (eg a “Gentailer”), a retailer is always financially advantaged by sharing pool exposure mitigation with an end user via DSR.

In some cases, retailers that enter into DSR contracts reportedly do not call on the response capacity as much as the market price signals would indicate and this is perceived in some cases to be due to “market positioning”. However, experience varies between users and by retailer.

Also of concern is the fact that relatively few retailers appear to actively offer response clauses in their contracts, such that there is considerable buying power among a small number of retailers. Users who push for greater than “50/50” pool price sharing are informed, (rationally), that they will be called in lower order of priority relative to arrangements that provide retailers with a greater share of benefits.

“Savvy” users can contract their DSR with a party other than their energy retailer, but this does not appear to be widely known or deployed and the default position tends to be contractual restrictions being imposed under the energy retailer’s standard terms and conditions.

6.3 Network Service Providers

Transmission and Local Network Service Providers are rewarded through regulated charges for efficient network capital investment. Some more enlightened network owners (eg EnergyAustralia) have observed that investment in peak network capacity is economically irrational (ie the investment is largely redundant as it is used less than 1% of the time).

Their response (encouraged to some extent by Regulators) has been to look to demand side measures to defer the capital investment, particularly where network capacity is constrained.

It should be acknowledged that the challenge for network service providers in examining DSR alternatives is that the DSR must provide levels of reliability consistent with normal network planning requirements. Otherwise the network investment can not be deferred.

On the other hand, and in the absence of clear regulations, the network service providers enjoy considerable bargaining power and informational advantages that limit the opportunity for DSR to be deployed for network reliability and other DSR markets.

These systemic advantages are evident in a number of ways:

- **Regulatory treatment of DSR.** In general terms, the regulatory incentive for network service providers is weak, requiring only that DSR be examined or offering only modest incentives to procure DSR. Western Australia offers perhaps the most robust requirement to consider DSR alternatives as part of the proposed Access Arrangement, under the Regulatory Test or New Facilities Investment Test.
- **Procurement processes.** Where network owners call for expressions of interest or tenders for DSR, they typically involve closed arrangements without price guidance or outturn cost data, this makes it hard for users to determine whether it is worthwhile to respond to such opportunities.
- **No standard connection procedures or agreements.** Where a provider wishes to connect a DSR facility such as on-site generation to the grid, the User essentially has to undergo a discovery process to understand the technical, procedural and cost implications. The User must negotiate with the network service provider and seek critical information from the same party. In these circumstances, if the network service provider has other priorities or sees commercial disadvantage in connecting the DSR, it can frustrate the process with impunity.
- **Limited reporting of DSR uptake.** Even where required to examine DSR options, the network service providers do not tend to report the outcomes of their evaluation of DSR alternatives. Exceptions to this general situation include Energy Australia but even in this situation, limited information is provided in support of decisions to deploy DSR or otherwise.

6.4 Aggregators

Aggregators can potentially add value to end users as follows:

- Understanding the regulatory and systems requirements.
- Amortizing the costs of monitoring and participation among many users.
- Doing the “heavy lifting” in terms of responding to market opportunities.
- Creating portfolio benefits to enhance the firmness and timing of the DSR supply.

The report by Pareto Associates: Trial of a Demand Side Response Facility for the National Electricity Market: Independent Consultant’s Report, 2004, concluded that a DSR facility could:

“Interact with a large number of end-users, each with differing levels of DSR capacity, timing, flexibility and in different locations across the NEM. This would allow DSR to be offered to buyers in a dependable, predictable form. In effect, the DSR facility operator marshals value for both sellers and buyers by:

- Allowing sellers flexibility to specify the timing, terms and conditions of DSR in advance, without any external and unwanted interference with their ‘normal commercial activities’;
- In advance, providing dependability and predictability of volume and price for DSR buyers by mixing, matching and substituting DSR offers made by sellers to meet individual buyers’ requirements;
- Allowing aggregation of sufficient DSR volume to potentially impact on energy market spot price; and
- Allowing aggregation of sufficient DSR volume, in specific parts of constrained networks, so that network service providers could defer augmentation, improve utilisation of existing assets and even improved service standards (by reducing the likelihood of forced off-loading during periods of highly volatile extreme peak demand.”

Our assessment is that Energy Response, which has established an aggregation facility in the NEM, now meets several of the above objectives but that market and regulatory barriers still remain.

6.5 Comparison of NEM and WA Markets

The primary difference between the NEM and WA energy markets is that the former is an energy-only market and WA is an energy and capacity market. In the latter case, capacity payments potentially provide greater planning certainty for users contemplating DSR initiatives.

Network Reliability has similar drivers in both markets. The new Access Arrangement (2006) in WA requires that the network business undertakes evaluation of alternatives to network investment as part of the New Facilities Investment Test. This could include DSR alternatives going forward.

7 Market Drivers and Implications for Users

The development of the End User Response market continues against the following backdrop:

1. Continued growth in load and peak demand (NEMMCO's *Statement Of Opportunities*, July 2006 identifies 8,000 MW of new generating capacity required within the NEM over the next 10 years, against a reported backdrop of only 400MW of demand side participation).
2. Continued transmission constraints affecting the economic efficiency of the electricity market.
3. Increasing focus on climate change that will lead to higher costs due to increasing renewables, restrictions on "dirty technology" or the establishment of an emissions trading regime.
4. Drought conditions that, if continued, will adversely impact the ability of conventional generation to meet demand.²
5. The move toward national regulation of networks under the AER.
6. Further consolidation of the Retail market through privatization and acquisition.
7. The wider deployment of smart metering, with a policy focus on reducing peak demand.

Items 1 to 4 tend to enhance the opportunity for DSR, both in terms of price and scope.

Item 5 has the potential to enhance the opportunity for Users if a persuasive case can be made to the AER for more transparency and clearer incentives.

On the other hand, items 6 (see section on Role of Market Participants: Retailers) and 7 have the potential to adversely affect the market opportunity for Users.

Whilst market consolidation continues, with fewer retailers, the less competition there is likely to be for Demand Side Management. Further, the trend towards vertically integrated generator-retailers will tend to maximize the utility of self-generation, at the expense of DSR.

If deployed on a wide scale (as is currently contemplated by the Council of Australian Governments), smart metering has the potential to be a least incremental cost DSR provider, compared to DSR that may be provided by large users. This is explained further in the following section.

² Including the impact of water shortages for cooling, EPA restrictions on the temperature impact of water releases from industrial plant including generators and the impact of bushfires on transmission capacity

7.1 Impact of Smart Metering

The recent focus on wide scale deployment of smart metering has concentrated on peak demand reductions, primarily through Time of Use or Critical Peak Pricing.

Smart meter-based DSR is potentially of particular appeal to market participants for the following reasons:

- It may be deployed with higher levels of statistical reliability than, for example, a large user who may elect not to supply at that particular moment for operational reasons. (This may be offset to some extent by the role of aggregators);
- geographical coverage of smart meters means that DSR may be targetted virtually anywhere on the network, thereby accommodating constraints across the network as and when they arise; and
- the costs to market participants (whether they be retailers or network service providers) of obtaining DSR, once the smart meter infrastructure is deployed, could be significantly lower than the costs of large user response, even allowing for notification costs and customer incentives.

Consequently, larger users will have to work harder and smarter to extract DSR benefits than in an environment without wide deployment of smart meters.

We anticipate that in this environment more large users will move towards “self-managed” DSR; that is, taking a mix of pool exposure and swap contracts and aligning their production operations to movements in wholesale prices on a continuous basis.

8 Internal Barriers to User Participation & their Causes

8.1 Business Focus

Business Focus is a major driver of DSR capability. Essentially, where the user's served market demands high levels of delivery availability (eg products or services), this tends to limit the amount of DSR response that the user is able to deploy, either because it directly impacts short-run productivity or poses a risk to operations dedicated to serving the user's customers.

Where this occurs, users need to be convinced that DSR can be deployed without adverse risk to the core business, or that the DSR benefits in the form of bottom-line impacts and/or lower overall energy costs materially outweigh the incremental costs and risks.

- *Lack of corporate knowledge on the DSR value and supply chains.* In some cases, organizations are reluctant to deploy response capacity without a better understanding of the market opportunity, participation options and market procedures. Although this could be argued to be an external barrier, our experience is that the information resides in multiple locations, some of which are publicly available. Whilst some users have worked through this information to assess the opportunity, formulate policies and participate in demand side measures, many users struggle to assimilate this knowledge. Consequently, the barrier reflects an inability on the behalf of organizations to understand the market opportunity, which may be compounded by the lack of a suitable, market-based information resource; and
- *Perceived contractual restrictions.* Unless a user has deployed DSR independently, there is a general perception that it can only be contracted through the Retailer. Whilst some users have satisfactory arrangements with their retailers, the perceived lack of competition and incentives acts to reduce the amount of capacity deployed.

8.2 Organisation Structure

Whilst there is no single "magic" organization structure in which DSR is deployed, users who actively participate in DSR exhibit one or more of the following features:

- Supporting executive (usually CEO or CFO);
- Supportive energy management function that understands the market opportunities and the business implications;
- Good rapport and shared understanding of costs, risks and benefits between "energy management" and "operations";

- “Asset Management” focus, which recognizes lifetime costs, risks and benefits within the user’s “production” environment; and
- Well developed risk management skills.

8.3 Role of Energy Management

Among Users there is usually an energy management function that is responsible for energy procurement and ongoing contract management. Where there are ongoing energy management activities (eg energy efficiency and/or DSR) there is commonly good rapport between this function and operations. Conversely, where the ongoing energy requirement has traditionally been more passive, there may be unresolved issues that must be worked through before DSR can be widely deployed. In some instances, the energy management function is part of operations, which can assist communication and understanding.

Where energy efficiency measures have been progressed, this has tended to create a conducive environment for DSR, both in terms of optimizing “steady state” energy usage and building rapport with operations.

A lack of any of the above can result in simplified judgments being made on DSR, which creates the following barrier:

- *Perceived imbalance of costs and risks relative to benefits.* Whilst the amount of notional DSR capacity may be high, effective capacity under-utilised due to a lack of information or analysis on the costs and risks of DSR. This can either result in DSR facilities not being established, or where already deployed, overly conservative operating assumptions are made, such that the firmness and value of the DSR is reduced. In general terms, a rigorous assessment of benefits, costs and risks is a significant exercise involving several stakeholders that is more likely to be undertaken if the benefits can be identified to be sufficiently attractive early on and/or a rigorous assessment is warranted because low energy costs are business-critical for the user.

It should be noted that in some cases these perceptions may be real, that is, the costs and risks to core business activities have been worked through extensively and found to be too great to undertake any DSR, but in other cases, the data on which to make an informed decision may be lacking.

8.4 Operations

For users who have traditionally deployed DSR, it is “standard operating procedure” and operations are fully engaged in the process.

On the other hand, where DSR is not part of “business as usual”, the primary focus of maintaining high levels of productive capacity and/or service reliability may act as a barrier to DSR deployment. This may be due to:

- Perceived complexities in introducing DSR change procedures, including the procedures for reversion to “normal” operating levels and the business rules governing when such action may be inappropriate.
- Perceived risk of loss of business due to interruptions to customer supply of commodity or services.

Operations challenges may become problematic if, for example, the call period straddles shift changes or production assets are due for upgrade and plant and equipment cycling is perceived to create an additional risk.

A further consequence of these operational considerations is that lead times of several hours to a day ahead may be required to provide the DSR response, which precludes the opportunity to benefit from unpredictable, short run price spikes or fast response requests.

The resulting barrier can be described as follows:

4. *Operational practices.* In some cases, the perceived impact on the business operations is seen as too great an impediment to deployment. This may arise because of particular working practices that would require too much organizational change relative either to the potential gain or the potential adverse impact on core business objectives. As a consequence, DSR is either not deployed, or if available, is underutilised relative to the market opportunity.

8.5 Past Experience of DSR

Past experience is an indicator of attitudes to DSR and future deployment. In essence, organizations with a successful track record of DSR are likely to continue or enhance their DSR activities in the future.

For users who have deployed DSR in the recent past (eg the last 2 to 3 years), their trial experience could have a significant impact on their future intentions. A good experience (economic gain, successful operational deployment and no adverse impacts) will tend to support further, possibly wider DSR deployment.

A barrier to future deployment arises where organizations have had an unfavourable experience of DSR. This may occur where an organization has invested time to implement

change procedures to provide DSR but without the DSR being called subsequently. (This may be compensated to some extent by availability payments, as in the Reserve Trader market). An alternative scenario involved DSR facilities being activated and causing and interruption to normal business activities. This may be summarized as follows:

5. *Unfavourable past experience of DSR.* Where DSR has been deployed, the experience in some cases of not being called or of adverse operational impacts has been damaging to the further deployment of DSR within the organization. The impact may include diminished benefits (eg availability payments only) and/or operational disinterest, potentially resulting in wavering support for DSR support from operations personnel and/or DSR sponsors.

8.6 Internal Investment Decision Making

DSR investment decisions may be inhibited by the following:

- Attitudes to sunk investment in plant that discourage consideration of upgrades or replacement to exploit DSR opportunities and mitigate risks;
- Hurdle rates for “non-core” DSR might be higher than those for “core business” activities, so that DSR investment does not have a high priority; and
- Internal accounting treatments may misalign or mis-time costs and benefits, such that the business case for DSR is undermined. In the extreme, this could mean that DSR opportunities are not being factored into the investment appraisal of investment in new and replacement plant and equipment, to the detriment of the organization.

If there is a robust risk management framework in the organization, the investment decision may be better supported by a rigorous evaluation of the risk reward balance. This can be worked through objectively to determine appropriate DSR decisions. In certain instances, DSR may be seen as enhancing overall business risk, where for example, the business is susceptible to power failures on the grid.

On the other hand, the lack of a robust risk management framework may contribute to inaccurate and adverse judgments on the perceived costs, risks and benefits of participating in DSR activities.

- *Internal investment decision making.* DSR investments or investments in plant that support DSR may be deferred or declined unless a clear investment decision process is in place, supported by a robust risk management framework and appropriate accounting arrangements.

9 External Barriers to User Participation & Their Causes

9.1 Consolidation and Specialisation in the Retail Market

For many DSR providers, market access occurs via the retailer. Such arrangements are becoming increasingly restricted by the increasingly limited amount of choice available to Users.

In broad terms, the retailers who are willing to buy DSR products have tended to be the large incumbent retailers, whilst new entrants have tended to offer vanilla retail products that do not include DSR arrangements, reflecting marketing strategies and underlying energy risk management expertise.

Consequently, the handful of retailers who accommodate DSR have significant bargaining power and a de facto arrangement exists in the market for DSR which shares the benefits between the retailer and the provider on a 50/50 basis. Indeed, attempts by users to negotiate this up have resulted in a notional gain that is undermined by preferential calls by the same retailers on DSR capacity with the 50/50 arrangement.

This has been exacerbated by the intense and continuing retail merger activity and vertical integration by retailers into generation, which has diminished both the degree of interest by retailers in DSR and the amount of choice available to DSR providers.

Negotiating leverage on is also reflected in retail contracts, which may limit or restrict the ability of the provider to contract DSR with any other party and/or leaving the details of a DSR arrangement to be determined under a separate and subsequent agreement, once the retail contract has been locked in.

Some users have overcome these limitations by bypassing their retailer to contract their DSR with another party.

Other users have overcome this completely by engaging in a pool contract with their retailer or becoming a market customer, thereby taking wholesale market exposure on their total load and gaining full value for their DSR activities.

Even where DSR arrangements operate satisfactorily, their value is adversely impacted by the inherent difficulties of forecasting DSR events. In typical DSR arrangements with a retailer, users typically engage in a day-ahead dialogue to identify (qualitatively) the probability of a “call event” occurring and the expected or required duration of the call (note that such arrangements are unlikely to gain from unexpected events, such as generator failure). This day ahead forecast enables operations to upgrade their readiness and assess whether to respond to an eventual call, or to continue with normal operations. However, this option on behalf of the user is typically matched by the retailer’s option not to

call the DSR capacity. That is, the trigger is not a pre-agreed wholesale price but a “dual-key” decision based on the expected wholesale price.

The market place barrier arising from these arrangements is summarized as follows:

- *Attenuation of wholesale energy price signals.* Unless a user contracts directly with the wholesale market, the price signal is typically shared 50/50 with a third party (usually the retailer), thereby reducing the available benefits necessary to overcome the operating costs and risks of participation. The realised benefits may be further reduced in circumstances where the contracting party does not call on the response capacity.

On a more positive note, where DSR arrangements work to the satisfaction of retailers and users, the issue of establishing a mutually acceptable algorithm for “unserved energy” has been successfully resolved. Whilst such formulae vary considerably in complexity, they broadly determine unserved energy as a function of energy consumed in the periods immediately before and immediately following the call event. This tends to dispel the myth that a major impediment to load-shed DSR is the problem of measurement.

9.2 Lack of Transparency in Reserve Trader Market

Currently, NEMMCO holds intermittent tenders for reserve trader capacity in Victoria and South Australia, and may call for additional capacity over the short term without resorting to tender. Reserve trader capability may be provided by individual users or aggregators using generation and/or load shedding.

Payment for qualifying reserve trader capacity includes an establishment fee, availability payments and usage payments. However, under the current arrangements NEMMCO is required not to provide any price guidance or any out turn prices as a result of the tender.

This creates a barrier for users especially those contemplating whether or not to invest in DSR facilities:

- *Lack of transparency in Reserve Trader market signals.* The provision by NEMMCO of information (procedures, price information) on the wholesale energy market contrasts with a dearth of similar information on the reserve trader market, which contributes to users’ lack of awareness on the nature of this market opportunity.

9.3 Inadequate Regulation of Networks in Relation to DSR

Some network businesses (eg EnergyAustralia) have pointed out the folly of investing in network capacity that is utilized only at peak times (eg less than 1% of the time). Others appear to regard DSR as a threat to their core business either because it reduces growth in the regulated asset base (network reliability) or it impacts revenue streams through reduced capacity and/or peak demand charges.

Even where network owners are favourably disposed towards DSR, the potential operational and reliability implications mean that network managers tend to fall back on well proven traditional methods to the preclusion of DSR.

Overall, whilst regulators have moved to encourage DSR, it is a very immature area of regulation and without clear incentives and obligations on networks, sound DSR schemes will inevitably be hampered by the deliberate or inadvertent actions by the networks.

With few exceptions, regulated networks tend to do only as the regulations demand or allow, such that the barriers to DSR due to inadequate network regulation are as follows:

- *Discriminatory regulatory treatment of capex and opex in the provision of network reliability.* With some notable exceptions (eg proposed WA access arrangement) network regulation tends to favour network investment in network capacity ahead of operating expenditure on network reliability provided by third party DSR.
- *Lack of transparency in network reliability price signals.* Where LNSPs and TNSPs participate, the process of procuring DSR typically involves extremely limited disclosure of price expectations, economic appraisal methodology or pricing outcomes. Consequently, users lack the necessary planning information even to investigate the feasibility of participating in network reliability markets.
- *Lack of explicit regulatory controls on networks to provide access for DSR facilities.* The lack of standard connection agreements and the generally poor guidelines provided by networks to DSR providers means that potential DSR providers are unable to make informed decisions to proceed. The alternatives are either not to proceed or to embark on a potentially arduous and protracted journey of discovery with the network service provider, with considerable uncertainty of the outcome.

9.4 Limited Opportunities for DSR to Participate Directly in the Wholesale Energy Market

Whilst the wholesale market regulations for generation-based DSR are generally clear and reasonably accommodating, the same does not apply to load-shedding forms of DSR. That is, whereas a user can participate in the wholesale market by exposing the total load (including DSR) to wholesale prices, the user can not separately offer its load-shedding capacity directly into the same market.

- *Limited opportunity for DSR to participate directly in the wholesale energy market.* We recognise that the most immediate and effective way to participate on the demand side in the wholesale market is to take a pool contract with a retailer or to register as a market customer. We also envisage that increasing numbers of users will adopt this approach in order to minimise their energy costs. However, for some users this approach may be impractical and for such customers who remain on fixed

price retail contracts there should be an opportunity to sell load-shedding capacity into the market in the same way that a user might sell generation into the market.

This status quo actually makes the role of NEMMCO, as Independent System Operator more difficult, because it must adjust for increasing load volatility arising from unregistered DSR capacity for which there is no available “trigger price” data.

10 Action Plan to Overcome Identified Barriers

An action plan is required to overcome the identified internal and external barriers. In essence, internal barriers may be overcome through a capacity building programme, whilst external barriers will require a programme of lobbying for change. Both programmes will need to be coordinated through the EUAA.

Overcoming the identified barriers will require coordinated, focused and appropriately funded actions. The individual actions can be tackled through the following activities:

10.1 Capacity Building

Barrier	Workstream	Action Responsibility
Lack of corporate knowledge	DSR options Users' guide	EUAA, with input from Users
Contractual restrictions	DSR contracts	Users, with coordination of EUAA
Imbalance of costs, risks, benefits	DSR options Users' guide	EUAA, with input from Users
Operational practices	DSR options Users' guide	EUAA, with input from Users
Past Experience	DSR options Users' guide	EUAA, with input from Users
Internal Investment Decision Making	DSR options Users' guide	EUAA, with input from Users

10.2 Regulatory Changes

Barrier	Workstream	Action Responsibility
Attenuation of wholesale prices	DSR contracts (see capacity building) See also direct participation in wholesale market	Users, with coordination of EUAA (as above)
Reserve Trader Transparency	Rule change to publish price guide and out-turn prices	EUAA rule change application to AEMC
Discriminatory treatment under network regulation	Capacity Survey Remove regulatory disincentives to network reliability DSR	EUAA to coordinate survey and lobby on behalf of Users
Lack of transparency in network reliability price signal	Explicit regulatory obligations on networks in procuring DSR	EUAA to lobby on behalf of Users
Lack of explicit regulation on network access for DSR	National standard connection agreement	

Barrier	Workstream	Action Responsibility
Direct participation in wholesale energy market	Capacity Survey Market Rule change to treat load-shed DSR in same way as equivalent generation	EUAA to lobby on behalf of Users for rule changes via AEMC

10.1 Capacity Building

An industry – wide plan, coordinated by EUAA with appropriate industry, government and energy market funding is required to build capacity to assess, plan and implement DSR facilities. This will include the following workstreams:

10.1.1 DSR Options: Users' Guide

EUAA to develop users' guide to the DSR value chain, identifying the opportunities, market segments, market processes and means of participation in DSR activities. The guide will be supported by case studies, highlighting operational considerations and how challenges have been overcome; and

Some information is available for users wishing to explore DSR opportunities and deciding whether and how to participate in the market. Unfortunately this information is dispersed and in general, not well indexed. Consequently, it is available for those who know where to look or have the capacity/inclination to do so, but this does not apply to the majority of Users.

It is recommended that EUAA creates an information resource that pulls all of the relevant information into a single repository and supplements this with a participation guide for users developed by the EUAA as the best placed organization to do so.

Such a resource would describe the various markets available to DSR providers in each jurisdiction, supported by pricing information and evaluation tools to assist the user to determine whether the opportunities available are sufficiently attractive.

Participation options would be described, including the kinds of entities that could potentially contract for DSR. Potentially, the resource would identify those organizations that have a proactive interest in engaging DSR services.

Compliance requirements would be described, including tendering requirements where appropriate, together with requirements for validation and settlement.

Finally, the contractual framework would be described, identifying where standard agreements are available or alternatively, where bilateral contracts will need to be negotiated.

The resource will remove many of the informational barriers to participation in the DSR markets and should be updated periodically as participants and regulators increase their encouragement and facilitation of DSR capacity.

10.1.2 DSR Evaluation Tools

A spreadsheet tool is available from the EUAA that can assist in recording these details, as a first step to assessing the overall DSR opportunity. This tool would be further developed

to facilitate User self-assessment. A further tool should be developed to help Users to determine the costs and risk profile of deploying DSR within their operations

It is envisaged that this additional tool would take the form of a spreadsheet, and have provision for set-up costs, operating costs and costs of resuming normal operations. Self-assessment modules would be created to identify opportunity costs and identify key risks, so that a risk-adjusted cost may be incorporated into the suite of evaluation tools.

It is envisaged that the guide will also include the following step-by-step guide sections:

10.1.3 Carry out initial high-level assessment of DSR capacity

This is the first step to determining the potential benefits from DSR. It is important to make a realistic determination of capacity, by location, in terms of:

- type of response, (eg load reduction, generation);
- amount of response (MW);
- frequency of response (how often the user is prepared to provide it and any limitations on this);
- lead time for response (ie how much notice is required in providing); and
- Indicative trigger price for response (to compensate response costs and operational restoration costs).

These details will assist not only in sizing the overall capacity, but will help identify which markets the DSR elements are capable of serving (eg Network Reliability, Wholesale market, Reserve Trader, FCAS).

A spreadsheet tool is available from the EUAA that can assist in recording these details, as a first step to assessing the overall DSR opportunity.

10.1.4 Assess overall energy risk capacity and tolerance

The DSR capacity determined in the previous step should be examined in the context of the user's overall demand. Modeling of this will identify the amount of DSR capacity the user can realistically offer the market, together with the extent to which the user can counter high priced events.

With this in mind, the user should assess the organisation's overall energy risk tolerance, ie, the extent to which it is prepared to take pool price exposure, the frequency with which and under what circumstances it is prepared to offer DSR.

The required approach is similar to other financial risk management decisions that may be adapted from the organizations treasury procedures. This approach will determine whether the user moves to a pool based contract, hedges with a mix of swaps and DSR, or takes a fixed price retail contract and contracts the DSR capacity separately.

10.1.5 Quantify DSR benefits based on realistic assumptions

For the wholesale market, quantification is achieved by modeling DSR capacity and trigger prices against pool price forecasts (this could be based on historic data available from NEMMCO website, in the first instance). Sensitivity analysis may be built into the quantification, ranging from the extremely conservative 50/50 benefits share currently available from retailers to greater benefit user shares through alternative arrangements.

Dollar values for DSR in Reserve Trader and Network Reliability markets are harder to come by, since they are not published. EUAA or aggregators may be able to provide suitable data for modeling purposes, noting that the availability of these markets varies by jurisdiction.

10.1.6 Conduct detailed DSR business case

If the indicative benefits are attractive, ie, they are financially material to the user, then a more detailed business case exercise should be undertaken.

In addition to more robust modeling of benefits, the business case should clearly identify the operating cost impacts of DSR activities, noting in particular any DSR investment costs, expected costs of initiating DSR, incremental costs of operating DSR and any costs of returning to normal operations, allowing for key assumptions and drivers.

Key risks of operating DSR should also be identified, including any relevant risks of not activating DSR measures.

Finally, opportunity costs and probability of occurrence should be identified, such as the inability to meet short term customer demand due to DSR activation.

The balance of business case benefits and costs will ultimately determine whether the user proceeds to participate in DSR markets. This will be a function of the nature of the business and risk profile and will vary from user to user. .

10.1.7 Develop DSR participation plan

The user should determine how it will participate in the various DSR markets available to it.

Considerations include:

- whether any automation, metrology or other technical investment is required in order to mitigate operating risks, provide greater responsiveness or otherwise to comply with market requirements (which costs should be factored into the business case analysis);
- whether to participate directly in the market or contract through a third party (such as a retailer or aggregator); and
- Whether to outsource some of the operational or administrative functions or other arrangements necessary to participate in the market.

10.1.8 Incorporate DSR into energy procurement processes

Users to incorporate DSR options into their energy procurement processes to provide an objective evaluation of offers available to them.

Once the user has a detailed understanding of its DSR capacity and how it wishes to participate, this can be incorporated into its energy procurement activities, whether by specific exclusion or inclusion within the retail offer (see also Contracting DSR below).

Where it is intended to be included, the user should provide detailed descriptions of the DSR capacity that it intends to deploy, together with its impact on load characteristics and request specific, quantifiable offers for this capacity from prospective retailers.

The data provided by retailers should be incorporated into a total cost analysis and used to determine contract award.

10.2 Contracting DSR

10.2.1 Legal advice on existing retail contractual clauses

EUAA to coordinate users obtaining legal advice on their contractual rights with respect to DSR and potential restrictive practices by Retailers.

Users with a current retail contract should examine the terms of the agreement to identify whether any of the terms and conditions impact potential DSR activities.

It is likely that one of four circumstances will exist:

- a. The retail contract allows for the user to contract DSR with any party, including the Retailer.
- b. The retail contract is silent on DSR.
- c. The retail contract indicates that the Retailer has an exclusive option on any DSR activities undertaken
- d. The retail contract sets out the terms under which any DSR activities will be carried out

Where there is ambiguity, this may be in the User's favour. However, users should be aware of any material impacts that DSR would have on overall demand (kW and kWh) against which the Retailer would have provided the original quote.

In extreme cases, eg, where the user is being compelled to contract for DSR with the retailer in a manner that is commercially restrictive, then, subject to the remaining term of the contract, the user may wish to seek legal advice regarding 'third line forcing'.

Where the user is prepared to contract with the retailer but the commercial terms are not set out in the retail contract, the user should consider making explicit the conditions under which the DSR will be called, eg by reference to explicit market price triggers. At the same time, the user may wish to retain a veto over whether its DSR response is activated.

10.2.2 Standard Form DSR Contracts

EUAA to encapsulate DSR options in standard form retail contracts and provide stand-alone standard form DSR contract(s) for users;

Standard form DSR clauses and/or agreements would lower legal costs and facilitate the take up of DSR.

It is envisaged that a standard form retail contract under development by the EUAA would make optional provision for the incorporation or specific exclusion of DSR from the energy contract.

This would be supplemented by a stand-alone agreement, detailing the rights and obligation of parties engaging in DSR, noting in particular specific circumstances under which DSR would be called, as well as terms and conditions of any veto rights of either party.

In both cases, the basis of measurement for unserved energy would be documented, so that users have the option to avoid prolonged bilateral negotiations over non-standard formulae.

To the extent that it assisted user participation, there may also be a case for EUAA to work with NEMMCO to develop more user-friendly, plain English documentation for the reserve trader market.

10.2.3 Standard form Network Connection Agreements

A user with stand-by generation capacity can participate in DSR markets while being isolated from the grid supply. Where a user wishes to operate generation facilities in parallel (i.e. simultaneously) with power from the grid, the network service provider will require that the facility conforms to power quality and safety requirements.

Whilst this is rational, there is very little in the way of available and documented procedures and standards, such that considerable commercial discretion rests with the network service provider over whether such a facility is allowed to be connected to the local network and if so, what conditions are to be imposed on the DSR provider.

Default agreements would provide greater planning certainty to users and avoid costly and protracted commercial negotiation. Whilst not seeking to prevent bilateral commercial negotiations where appropriate, the development of standards will facilitate the uptake of DSR by removing one more barrier to participation.

The EUAA could leverage work currently being carried out by Evans and Peck on Connection Agreements in Queensland and work on behalf of Users with policy makers and regulators to develop standard connection terms and conditions that reflect appropriate and legitimate requirements of network service providers whilst avoiding onerous and unnecessary conditions being imposed upon Users. (See also Regulation of Network Service Providers)

The final contract should accurately record the DSR capacity and commercial terms under which it will operate, noting explicitly the terms under which it will be called and identifying what, if any, veto rights are attributed to the parties, together with the circumstances under which such veto could/would be exercised.

10.3 Lobbying for Change

Effective lobbying will require that the extent of DSR is well understood by regulators. Currently, there is no reliable record of the DSR market and regulators and operators must rely on incomplete, outdated and conservative industry estimates. A more robust survey would inform policy makers and regulators of the DSR capacity available, enabling a more systematic approach to facilitating DSR and a greater priority being placed upon its importance.

10.3.1 Industry DSR capacity survey

EUAA to coordinate industry survey to quantify the DSR capacity in the market, by type, size, lead-time, firmness, duration and frequency (ie how regularly it can be deployed).

By surveying available capacity in this way, policy makers will be better informed about the materiality of DSR and can make more effective policies as a result.

The survey should identify in particular, the potential DSR capacity, the amount of DSR currently deployed and the reasons for any differences between the two so that policy makers can gain a better understanding of the economic impact of the identified barriers.

A flow-on benefit will be provided to market operators, who will be in better position to plan both for longer term supply requirements (via Statement of Opportunities) but can better plan operationally to manage short-term system reliability and performance.

10.3.2 Rule Changes

10.3.2.1 Removal of regulatory impediments in existing markets

EUAA to lobby on behalf of users for regulatory impediments to DSR to be systematically removed under jurisdiction and National Electricity Rules

10.3.2.2 Attenuation of Wholesale Price Signals

This will be addressed by:

- DSR contracts that provide for optimal capture of DSR benefits by Users (see Capacity Buidling)
- Direct participation in the wholesale energy market (see below)

10.3.2.3 Regulation of Network Service Providers

EUAA to Lobby policy makers to develop clearer ground-rules and incentives for the deployment of Network Reliability DSR and greater transparency by network service providers in requesting DSR proposals, evaluation criteria, deployment decisions and pricing information covering both DSR and the capital investment alternative(s) as follows:

10.3.2.4 Remove discriminatory treatment of DSR under network regulation

Network regulation should ensure as far as possible indifference in economic incentives between (in-house) investment in additional network capacity and (outsourced) operating expenditure on DSR to provide network reliability outcomes. At a minimum, regulations should provide for cost-recovery for the additional costs of evaluating DSR alternatives to conventional network investment.

Consideration should also be given by policy makers to providing funding for independent organizations to coordinate network reliability DSR, so as to overcome economic impediments that mitigate against responses by individual Users. An analogous model for such an arrangement is the Energy Savings Fund model deployed by Department of Energy Utilities and Sustainability, NSW).

10.3.2.5 Improve transparency of network reliability price signal

Obligations should be placed on regulated networks to engage proactively with network reliability DSR providers (Users and aggregators) in a timely way to enable adequate consideration and responses to potential DSR requirements. This may take the form of an obligation on networks to contact potential providers of network DSR, based on location and load characteristics. Alternatively, networks could be obliged to create pre-registration applications, so that pre-registered interested parties would be contacted directly by the network as part of network planning processes.

Networks would be required to provide explicit advance price guidance (eg hurdle rates and the target cost of augmentation alternatives) as well as outturn price data for successful DSR deployments.

Further, it is envisaged that standard form regulatory reporting procedures are established, so that network service providers are required to demonstrate that economically appropriate decisions are being made with regard to DSR. This could include for example pricing guidance, as well as the financial outcomes arising from the evaluation of specific network investment and DSR alternatives. Through this mechanism, network regulator(s) could assess the extent to which DSR has been considered in an objective and non-discriminatory manner. Findings could be published in periodic regulatory reports and by exception, investigations could be held by regulators based on complaints or underperformance relative industry practices.

10.3.2.6 Explicit regulation providing network access to DSR facilities

Obligations should be placed on Networks to provide explicit terms under which access must be provided to DSR facilities. This could be achieved by a national standard connection agreement, applicable to all network service providers, setting out legitimate rights and obligations of the DSR provider and network service provider. Networks could apply to regulator(s) by exception if they believe that a specific DSR facility should be required to undertake non-standard obligations.

These network regulatory measures would realize a consistent national approach to the consideration of DSR as an alternative to network investment. Such an approach would deliver a repeatable process that users could respond to in a timely and efficient manner. It would also allow for a more equitable treatment of capital and operating cost alternatives and most importantly, provide transparency to users in terms of explicit financial criteria by which DSR alternatives will be evaluated.

10.3.2.7 Reserve Trader Market

Request a rule change via AEMC requiring the publishing of price guidance and clearing price data in the Reserve Trader markets

Currently the reserve trader market lacks pricing transparency, which provides an informational barrier to user participation. It is envisaged that a rule change would be constructed along the lines of issuing pricing guidance to prospective providers of reserve capacity and publishing clearing price data, whilst preserving the individual rights of participants to maintain confidentiality of the salient pricing details of their tender responses.

Such a change would be part of a broader requirement to ensure that calls for tender for reserve capacity are well publicised as part of a transparent, user friendly process.

10.3.2.8 Direct Participation in Wholesale Energy Market

EUAA to lobby on behalf of users for changes to market rules to allow DSR facilities to participate directly in the wholesale energy market.

It is recognized that users can already participate directly in the wholesale market by taking pool exposure for all of their energy requirements to reduce their overall energy costs. This can be achieved through a pool contract with a licensed retailer or by becoming a market customer. These approaches are to be encouraged as they require no rule change and reflect DSR in the purest form.

Currently, for users with a limited amount of DSR capacity who have engaged in a fixed price retail contract, participation in the wholesale market must be via the retailer or other counterparty. This can lead to price signal attenuation and potentially introduces a veto in favour of the buyer, depending on the contract terms.

In such circumstances and as a condition of direct participation, DSR capacity ought to be subject to the same participation requirements as for generation. For example, Market Non-Scheduled load shedding (<30MW) would be subject to the same registration, capacity limits, pricing, metering and settlement requirements as for Market Non-Scheduled generation (<30MW), ie DSR should receive the same market clearing price as generation.

Similarly, scheduled load-shedding DSR would require reasonably sophisticated SCADA systems (as is required for scheduled generators) to provide real-time information to NEMMCO, to assist its Independent System Operator functions.

The facilitation of load-shedding DSR may be further assisted under market rules by the creation of a notional DSR NMI and an accompanying metrology procedure. We believe that such participation would actually assist system balancing by providing the market operator with increased visibility of demand side capacity and enhanced forecast accuracy of demand response.

One argument against this approach is the perceived challenge of measuring “unserved energy” as compared with sent out energy from generators. The fact that retailers contract DSR on a bilateral basis demonstrates that these perceived measurement issues are surmountable.

By creating DSR market participation that is fully equivalent to the generation counterpart, increased efficiency and effectiveness of the electricity market can be achieved. Without this step, and in the absence of wide-scale demand side participation through pool contracts, the market will always be biased in favour of supply side measures.

i. Appendices

i.i Project Scope

The consultant will provide the following as part of this agreement:

- Review the MCE draft report on DSR and other relevant work;
- Assess and report on gaps in the provision and take up of DSR from an end users' perspective;
- Assist in the preparation of EUAA submissions and other input responding to the MCE draft and final reports on DSR;
- As required, attend, present and assist EUAA with preparations from any MCE or related public forum on DSR; and
- Assist EUAA with any advocacy on the results of the above.

MCE agreed to develop a policy/regulatory agenda on DSR in 2005. Recently, the Council of Australian Governments (COAG) asked MCE to progress this work and develop a range of decisions to enhance the effectiveness of DSR. A new higher level DSR Working Group has been formed by MCE to progress this. The MCE work is expected to focus on policy/regulatory impediments to DSR and develop actions to address these. The EUAA will provide end-user advocacy on this and will also develop an *End User Action Plan on DM* that will compliment this work and add an end user dimension to DSR actions.

The consultant will help to identify any barriers of an economic, policy, regulatory, organisational/operational, cultural, legal or engineering kind, in the NEM that might reduce DSR and develop approaches that will reduce these, including:

- Energy efficiency;
- Metering;
- Better risk management by end users or other industry participants;
- Embedded/distributed generation;
- Demand management; and
- Intermittent generation.

The consultant will also produce a *DSR Action Plan for End Users* that will be of practical use to end users and the EUAA, will improve their knowledge of DSR impediments/opportunities, and will compliment the policy/regulatory work of the MCE. Note that the EUAA has held discussions with the MCE's Senior Committee of Officials ((MCE-SCO) in relation to this work and expects that there will be a high level of collaboration with the MCE-SCO in relation to this matter, such that work is well coordinated and complimentary.

Milestones in relation to the performance of this work will be dependent upon when the MCE releases (or provides) copies of relevant material. In the case of the DM Action Plan, milestones will be set separately with the consultant to ensure timely production of output, quality of output and considering the magnitude of the task. The consultant will commence

preparatory work immediately and will meet with EUAA to discuss the results of this, future progress and agree on milestones.

Reports and other documentation will be the property of the EUAA who will retain the copyright. All documentation is to be provided in Word format and also in PDF format, unless otherwise agreed by the EUAA. Drafts to be provided in Word format unless otherwise agreed by EUAA. EUAA reserves the right to release or withhold any reports or information provided and to obtain original copies of any tables, charts and the like, including original data.

i.ii Documented Perceived Barriers to DSR

Barrier	Source	Exigency Finding
Customer awareness of benefits, potential capacity, operational integration and participation	VENCorp Electricity Demand Side Management Study September 2001	Validated through interviews and wider Exigency experience
Quality of price signals	VENCorp Electricity Demand Side Management Study September 2001	Validated through interviews and wider Exigency experience
Ability of aggregators to function in the market	VENCorp Electricity Demand Side Management Study September 2001	One aggregator now established but barriers remain
Factors impinging on users' ability to deploy stand-by generators	VENCorp Electricity Demand Side Management Study September 2001	Valid but relates more to customer awareness than technical or market factors
Factors impinging on Network Service Providers' ability to encourage and benefit from demand response	VENCorp Electricity Demand Side Management Study September 2001	Validated through interviews. Underlying cause is the lack of explicit regulations
(Lack of) awareness of: opportunities, methods, tools, how to implement, funds	EUAA End User Customer Awareness Program April 2005	Validated through interviews and wider Exigency experience.
Contract restrictions: damped signal, limit on activities, low prices	EUAA End User Customer Awareness Program April 2005	Partially Valid. The transparency and attenuation of price signals, is having a greater adverse impact than the actual price levels and should be addressed as a priority.
Risk of adverse impact on business operations	EUAA End User Customer Awareness Program April 2005	Validated through interviews in terms of perceived risk and operating experience.

Costs of impact on operations greater than benefits from DSR	EUAA End User Customer Awareness Program April 2005	Partially Valid. The degree to which this is known, rather than perceived varies between organizations
(Lack of) senior management sponsorship	EUAA End User Customer Awareness Program April 2005	Validated through interviews. In general terms, support from a sponsoring executive is a common feature among those organizations who have deployed DSR
Expected price <\$1000/MWh	EUAA End User Customer Awareness Program April 2005	Illustrative price is conservative relative to wholesale market price data. Un-attenuated price signals should examine outturn prices. On the other hand, price guides for network reliability or reserve trader market are not available.
Notice period too short	EUAA End User Customer Awareness Program April 2005	Partially valid. Some opportunities – eg wholesale energy market, require fast response, however, “slow response” measures can access relevant markets (eg Reserve Trader). Market survey should align DSR capacity to each market segment.
Delivery too unreliable	EUAA End User Customer Awareness Program April 2005	Partially Valid. Portfolio management (eg via aggregation) can be deployed to overcome delivery risk of individual assets/sites
(Lack of) incentives to shorten response speed and/or increase reliability	EUAA End User Customer Awareness Program April 2005	Partially valid. Existing energy markets provide some incentives for this. For Network Reliability greater transparency would assist in clarifying incentives
(Lack of) aggregation process/facility, mechanism for cooperative arrangements	EUAA End User Customer Awareness Program April 2005	Users generally aware of established aggregation facility, however barriers remain.

(Lack of) recognition of free-rider benefits (2-3 times the direct benefits as per case studies)	EUAA End User Customer Awareness Program April 2005	This matter was not raised by interviewees however, price attenuation should be addressed before examining free rider issues.
(Lack of) knowledge of impact on network augmentation	EUAA End User Customer Awareness Program April 2005	Validate through interviews. There is a lack of transparency in the Network Service Provider appraisal process.
(Lack of) understanding of implications for GHGs	EUAA End User Customer Awareness Program April 2005	Not apparent but likely to be very minor in MWh terms and could be negative. Although related, DSR should not be confused with energy efficiency.
No clear basis for estimating DSR value in energy and networks	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Not supported for energy but validated through interviews for reserve trader and for networks
Unclear basis for Distributor bids	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Valid. There is little obligation on networks to issue pricing guidance or disclose details of investment decisions.
Greenhouse impact not understood, but expected to be positive	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Not apparent but likely to be minor. It is not clear that greenhouse impact of load shedding would be positive (generation bid stack is not carbon-priced). Some secondary impacts on energy efficiency possible.
Price offered for interruptible load relatively low	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	No available published data but some anecdotal support.
(Lack of) awareness	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Partially valid. User knowledge ranges from expert to unsophisticated
(Lack of) incentives	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Valid for network reliability. For other markets the incentives are attenuated or users are generally unaware of the opportunities.

(Lack of) DSR facility	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Aggregator established since trial. Interviewees generally aware of the existence of an aggregator in the market, although less clear on how the value chain could work in their favour.
(Lack of) off-market contracting arrangements	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Not supported
(Lack of) inter-functional capability (eg production/energy management)	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Validated through interviews. DSR tends to exist where inter-functional capability is strong.
Perverse incentives – (energy)	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Not supported. Perverse incentives exist in the network reliability market. In relation to wholesale energy market a case can be made for non-discriminatory treatment of DSR in the wholesale energy market, but difficult to argue for “positive discrimination” other than removal of plethora of regulatory and contractual barriers.
Constraints due to (suboptimal) structure of DSR payments (capacity element?)	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Some interviewees noted uncertainty of activities and income stream as a disincentive to participating in DSR
Constraints due to existing T&Cs – eg retail contracts	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Partially valid. With some exceptions, interviewees were generally unaware of their rights within or outside existing contracts or if aware, were reluctant to challenge the status quo.
No clear NSP incentives	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Validated through interviews. There is a general paucity of explicit regulation in this area.

(Lack of) clear measurement framework and basis for DSR.	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Not supported. Interviewees who participate in DSR have developed adequate measurement formulae – but note a lack of a standard formula.
(Lack of) robust estimate of nascent DSR capacity	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Validated through interviews and research. Existing estimates are outdated, conservative and not segmented. Any estimate should be segmented in terms of suitability to different markets
(Lack of) institutional sponsorship for DSR	EUAA Trial of a Demand Side Response Facility for the National Electricity Market: April 2004	Partially Valid – interviewees who deploy DSR have successfully navigated existing framework. However institutional support is required to realize latent DSR capacity in the market place.
Current product attributes (timing and reliability of response)	Exigency hypothesis	Partially Valid – lack of DSR automation but lead times and aggregation can accommodate “slow response” DSR. Survey should explore this further.
Explicit Regulatory (eg unclear/conflicting incentive or mandate)	Exigency hypothesis	Validated through interviews – regulatory treatment of networks discriminates between (in-house) capex and (outsourced) opex
Implicit Regulatory (eg labyrinthine regulations – “too hard basket”)	Exigency hypothesis	Partially Valid – some experienced interviewees knew where to look but many of those interviewed had been discouraged by the complexity and lack of readily available and independent information.
Game theory (eg counter to counterparty position)	Exigency hypothesis	Partially valid – may apply to gentailers in limited circumstances, otherwise a retailer would be always better off through a DSR arrangement.

Contractual (retailer restrictions)	Exigency hypothesis	Partially Valid. Some contracts are restrictive but interviewees were generally unaware of their options and rights
Network procurement (lack of transparency)	Exigency hypothesis	Valid. The lack of explicit network regulation inhibits DSR providers from getting involved in network reliability market.
Organisational awareness	Exigency hypothesis	Partially Validated through interviews. Awareness varies between and within organizations and barriers are lowest where energy management is active.
Management sponsorship	Exigency hypothesis	Validate through interviews. All cases where DSR deployed include a supporting GM/executive
Business Imperatives	Exigency hypothesis	Valid. In circumstances where product/service reliability is critical, DSR is of secondary importance. However, in some of these situations, DSR could potentially ameliorate operational and/or financial risks
Risk/Reward trade-off	Exigency hypothesis	Validated through interviews. However, level of analysis varies between organizations and a more thorough analysis could increase effective DSR capacity.
Capital rationing	Exigency hypothesis	Partially validated through interviews – some evidence that DSR investment not factored into business as usual capital programmes, and DSR is consequently “low priority”

i.iii List of Interviewees

Exigency acknowledges and appreciates the input of representatives of the following organizations (alphabetical order) who were interviewed by Exigency as part of this review:

- Amcor Ltd
- BOC Limited (acquired by Linde Group and subject to subsequent takeover proposal by Wesfarmers)
- Boral
- Brisbane City Council
- Carter Holt Harvey
- Colonial First State Property
- Energy Response
- Melbourne Water
- Orica Pty Ltd
- Rio Tinto
- Sunstate Cement
- Telstra Corporation
- Versacold
- NEMMCO