



Oakley Greenwood

Current Status of DR in the NEM: Interviews with Electricity Retailers and DR Specialist Service Providers

prepared for:
Australian Energy Market Commission



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1. Background and purpose

1.1. Background

On 30 March 2015, the COAG Energy Council (the Energy Council) submitted a Rule change request to the Australian Energy Market Commission (AEMC or Commission) that seeks to create a demand response mechanism (DRM) in the National Electricity Market (NEM).

The rule change request was submitted in response to the recommendations made by the AEMC in its *Power of Choice* review, completed in 2012. The Rule change request proposed a mechanism that would allow the demand side to participate in the spot market without requiring customers to become market participants or otherwise bid into the central dispatch system. Rather, a new class of market participants, demand-response aggregators (DRAs), would organise and schedule customers' demand response in reaction to prices in the spot market. The rule change would also allow DRAs to offer spot market loads to the frequency control ancillary services (FCAS) markets and get paid for such participation.

1.2. Scope

As part of its consideration of the Rule change request, the AEMC sought quantitative evidence regarding the amount of demand-response capacity that is currently available in the NEM through several different contracting forms offered by electricity retailers to customers that consume 100MWhpa or more. More specifically, the AEMC sought quantitative information on

- the magnitude of demand response capacity that is currently subject to different contractual forms with an energy retailer; and
- the number of businesses that provide Demand Side Management (DSM)¹ services to large customers and/or retailers, and a description of their product and service offerings.

1.3. Approach

Oakley Greenwood (OGW) was commissioned to develop and conduct interviews with a sample of retailers and DR specialist service providers to gather the quantitative information of interest. The retailers and DR specialist firms to be approached to participate in the interviews were agreed with the AEMC.

For the purpose of the interviews undertaken with both the retailers and the DR specialist service providers, DR was defined as being comprised of either end-use loads that can be reduced, or the output of a generator connected on the customer side of the meter that can be increased in response to either (a) short-term wholesale price increases, or (b) short-term adverse network conditions.

The interviews completed with DR specialist service providers was augmented with desktop and web-based research.

¹ Demand Side Management services include the provision of energy efficiency products and/or services, energy management products and services (including specialised software), as well as demand response products and services, including advisory services, specialised software and load aggregation.

1.4. Disclosure

Oakley Greenwood is a specialist consultancy serving the energy and water industries. While our main areas of focus are in policy and regulatory matters, we do provide some advisory services to end customers regarding energy and carbon matters. This occasionally includes identifying opportunities clients may have regarding the exercise of DR and making them aware of applicable programs or services that are available through electricity retailers or aggregators. We are also an Accredited Certificate Provider under the NSW Energy Savings Scheme.

2. Retailer survey

2.1. Sample

Nine retailers were selected by the AEMC to be included in the survey. These retailers included large first tier retailers as well as large and small retailers that have entered the market since the unbundling and privatisation of the industry.

Responses were obtained from seven of the nine retailers that were approached to take part in the survey.

A copy of the interview guide is presented in Appendix A.

2.2. Amount and types of DR available from their customers

Retailers were asked to provide information on the amount of DR that they currently have under contract.

Two of the retailers declined to answer this question, but both made it clear that they have a material amount of demand responsive load. The amount of demand-responsive load reported by the other 5 retailers ranged from none to 130MW. The total amount of demand reduction capability reported by these five retailers was 235MW.

The retailers were also asked to provide information on the nature of the contractual arrangements they offer or have in place with customers who are willing to reduce load or provide energy injections in response to wholesale market price either on their own or in response to a signal from the retailer. The information provided by the retailers indicated that while a proportion of the demand-responsive load is exercised in response to a signal from the retailer and was motivated by an opportunity to share in a split of the wholesale price avoided by the retailer due to their load reduction, the majority of the demand-responsive load is directly exposed to the wholesale spot price. More specifically, of the 235MW total demand reduction reported by the five retailers that quantified their DR capability, only 35MW responds to a price signal provided by the retailer, while 200MW is directly exposed to spot price. Of the two retailers that did not provide a quantified amount of DR capability, one said that all of their DR load is exposed to the spot price, while the other said that only a very small amount of their DR capability was so exposed.

Only two of the retailers reported that their customers also respond to network price signals (or have done so at some point in the past), and only one of these retailers reported that they (the retailer) took part in identifying or assisting customers respond to network demand-reduction opportunities.

2.3. Notification provided

The retailers were also asked whether they provide notification of expected high-price events to their customers who provide DR or who are exposed to spot price in the wholesale market.

All of the retailers said that they do provide notification. However, in some cases the provision of this notification was described as being a courtesy or added value service provided to the customer. This was typical of retailers whose customers that provide DR do so in response to spot price². In others - including all cases where the customer provides DR in response to a signal from the retailer - notification is provided and was described by the retailer as an integral part of the service.

² One of these retailers noted that they provide information on low-price periods as well as high-price events.

The amount of notice provided tended to be no more than an hour, with 30 minutes being a common response and, in some cases, as little as 5 minutes being reported³. However, the retailers interviewed noted that in most cases the specific amount of notification provided was set to achieve a balance between (a) giving sufficient notice for the customer to take action and (b) ensuring the event is sufficiently likely to occur so that the customer would be as likely as possible to achieve the price they are looking for.

2.4. Compensation arrangements

The interview guide included several questions that sought to elicit information on the structure and level of the compensation provided to customers that provide DR.

The first of these questions ought to determine whether:

- any form of availability payment or a discount is given on the retail energy price, or whether compensation is based only on dispatched DR,
- the customer gets a portion of the difference between spot and retail contract price and if so what proportion, and
- there are any clawbacks or penalties for not responding to the signal.

These considerations do not really apply in the case where the demand response is provided by a customer that is directly exposed to the spot market price. In such cases, avoidance of the price is the sole motivation and the need to pay the price for energy is the 'penalty'. Half of the retailers that responded to the survey noted that customer exposure to the wholesale price constitutes the only source of demand response within their customer base. It should be noted, however, that at least some of these retailers are also willing to provide other arrangements for customers who want to provide DR -- it is just that at present all of their customers who want to provide DR have chosen to do so through exposure to the spot price.

The other half of the retailers that participated in the survey reported offering and having customers who have taken up arrangements whereby customers do not have to be exposed directly to the spot market price. Rather, the customer pays a retail contract price at all times and provides demand-response on a voluntary basis when notified by the retailer⁴. This may be done on a more 'opportunistic' or more 'pre-arranged' basis.

In the more 'opportunistic' approach, the customer receives notification of a likely price event and chooses whether to respond or not. In the event that they do (and in some cases they have to let the retailer know that they are going to respond), they receive a percentage of the wholesale market price savings that response produces for the retailer - which is a product of wholesale market price (minus their contract price) and the amount of load reduction they provided in the event. In return for that demand reduction (which can also be delivered by the customer's use of on-site generation to reduce the use of mains power) the customer receives a payment based on a proportion of the wholesale market price savings and the amount of load reduction they provide.

³ There was also one case in which the retailer has direct control of a battery within a customer's facility. This allows that DR capability to be exercised without any notice.

⁴ Note that the 'response' can take a variety of forms including a real (even if temporary) reduction in their end use load, an apparent reduction in their end-use load through the use of on-site generation to meet some of their end-use requirements, or (in some cases) export of energy from an on-site generation sources.

In the 'pre-arranged' approach the customer states an intention to respond with regularity based on a threshold spot price level. This level of intention may reflect the nature of the load reduction capability the customer has available. The less that the exercise of the capability can vary core business operations or costs, the more likely the customer will be able to respond to events that meet their price threshold, and therefore the more likely they may be to state an intention to respond with regularity. Such an intention may be of higher value to the retailer as it may (particularly if the retailer has access to a number of such customers) allow the retailer to reduce the amount of hedge cover it purchases in the contract market. These sorts of arrangements generally include:

- an availability payment generally provided on a quarterly basis (or at least the option to get an availability payment, with the trade-off being a lower percentage of the wholesale market price savings when dispatched), in addition to
- a dispatch payment which is calculated for each dispatch event by multiplying the agreed percentage of the spot price saving by the amount of load reduced by the customer.

Where an availability payment is provided, the arrangement will generally also include some form of clawback. The clawback entails a proportion of the availability payment being sacrificed in the event the customer does not provide a specified minimum proportion of the demand reduction that they have nominated in response to notification by the retailer of a price event that meets the customer's price threshold. The clawback is almost always limited to the total amount of the availability payment, though repeated failure to respond to events may result in the retailer ending the arrangement (or transferring it to the opportunistic basis).

One of the retailers that reported offering DR arrangements that do not involve the customer taking spot price exposure said they currently have both types of arrangements in place with customers. Both of the other two retailers that reported offering DR arrangements that do not involve the customer taking spot price exposure said they offer arrangements resembling both the 'opportunistic' and 'pre-arranged' approaches outlined above, but did not disclose how much of their DR capability is available through either of those arrangements..

2.5. Demand response price threshold

Respondents were also asked at what wholesale price level customers generally begin to reduce their load (or commence substitution of grid-delivered electricity with on-site generation).

In responding, the retailers noted that because almost all of their arrangements are voluntary there is no set price threshold they could specify with absolute certainty at which customers will always reduce their load or use on-site generation to meet at least some portion of their load. However, several offered \$250 - \$300/MWh as the likely bottom wholesale market spot price at which demand response activities are likely to begin. Others to whom this number was mentioned agreed that it was a reasonable figure.

Similarly, several said that by \$1,000/MWh all of the DR available from their customers would generally be participating. Others to whom this number was suggested agreed that it was a reasonable figure.

Interestingly, the retailers said that in general, the DR available for any particular customer would all be available at a single price, and that customers tend to either provide all of their available DR in any particular price event, or none at all. One retailer explained that the customers' response was not particularly nuanced or sophisticated - it was either available or not, and once the customer decided to respond they did not provide additional DR capacity as the price available increased.

2.6. Credit issues associated with pool-price pass through retail contract arrangements

Another question sought to determine whether the retailers undertake any investigations or impose any conditions on customers that take pool-price pass through arrangements, given that the retailer remains financially responsible for settlement of those purchases in the wholesale market.

Two of the six retailers that have DR capacity said the credit checks they undertake with their DR customers are no different than the credit checks they undertake with other customers.

The other four said their credit considerations regarding customers taking pool-price pass through arrangements were more rigorous than those used with standard retail contract customers. These arrangements included:

- stricter credit checks and security deposits based where possible on an assessment of the price risk posed by the customer's load profile,
- the use of customised risk premia,
- discussions with the customer to ensure that they fully understand the risks posed by a pool-price pass through arrangement and have realistic means for responding to price spikes, and/or
- reserving the right not to enter into a pool-price pass through arrangement with any particular customer.

2.7. Duration of contracts that include demand response

The retailers were also asked to provide information on the typical duration of the DR contracts they enter into with their customers.

All of the retailers who have DR arrangements with customers or have customers who take some exposure to wholesale electricity market spot prices stated that there is no difference in contract durations between customers who provide DR and customers who don't. At present most contracts with larger commercial/industrial customers tend to be anywhere from 1 to 2 with some three-year contracts still in place. All of these retailers also noted that the contract durations being sought by virtually all of their customers have reduced over the last several years.

2.8. Availability by season and jurisdiction

The participating retailers were asked to characterise the availability of the DR that could be made available by their customers in terms of its geographic spread, its availability by season, and the amount of time it can be maintained on any single occasion.

Only three of the retailers interviewed provided information on the geographic spread of the DR capacity available from their customers. For these retailers, most of this capability is located in Victoria and South Australia.

Four of the retailers with demand-responsive loads said that significantly more DR is generally provided in summer months. All of these retailers said that this was primarily a by-product of the fact that higher wholesale prices tend to occur more frequently in the summer. These retailers reported the difference being anywhere from 100% (i.e., no DR being available), to DR capacity falling by 75% in winter as compared to summer.

However, the retailer that reported the largest amount of DR said they did not find that the DR capacity they had differed between summer and winter.

When asked about how long their customers are generally able to sustain their DR on any single occasion, the retailers first noted that, in all but one of their cases, they only offer voluntary DR products. As such, the duration of response is really up to the customer. Retailers commonly reported that the duration that customers provide is essentially a function of how long the price remains above their threshold level.

Two retailers - one of whom caters to customers with the ability to manage their loads - reported that 4 to 6 hours would be about the maximum their customers with DR capability can comfortably provide load reductions. It was also noted however, that customers with on-site non-intermittent generation (i.e. generators) can provide longer durations, but that it was seldom economic to do so.

The retailers were also asked how long the amount of DR that their customers currently make available will remain available over the coming several years.

The retailers noted that this is primarily a function of the duration of the customer's contract. Based on the typical contract durations noted above, most of the retailers would expect their current DR capacity to roll off entirely between 2018 and 2019. However, that does not account for customers who re-new their retail contracts and the DR provisions within them, plus any customer acquisitions that include DR capacity. In this regard it should be noted that when a customer that provides DR capacity moves from one retailer to another, they may continue to make their DR available, in which case there is no change in the amount of DR available in the market as a whole.

2.9. Changes over time and plans for the future

The retailers were asked how the amount of DR their customers can provide compares to the amount available 5 to 10 years ago. Their answers indicated that the changes - at least in absolute amount - have not been material. Only one retailer said the amount had changed a lot - and in that case it had been an increase. Another said the current amount of DR was a bit more than in the past, and two said it was a bit less. Three said it was about the same.

It is worth noting that:

- The retailer that reported the highest amount of DR said this amount is about the same as in the past.
- The retailer that reported the second highest amount of DR said that amount represented a bit of growth over previous years.
- The retailer that reported the third highest amount of DR said that amount represented somewhat less than it had in previous years.
- The retailer that reported the fourth highest amount of DR said that this was about the same as in previous years.
- The retailer that reported having no DR at present said that was the same as in the past - because they have never had any customers that provided DR.
- And, of the two retailers that declined to provide an answer to the amount of DR they currently have, one said that the amount has been growing a bit every year, and the other said their current amount was a bit less than in the past.

When asked for their views on what had caused the changes in the amount of DR their customers provide and the overall level of their customers' interest in DR, every respondent cited the lack of volatility in wholesale prices at present as having a definite and material downward pressure on customers' interest in DR arrangements over the past several years.

However, almost all of the respondents also noted that recent increased volatility has produced some renewed interest among customers. This was most often reported with regard to SA and QLD, but one retailer said that there has also been renewed interest in TAS in response to the supply/demand balance issues that resulted from Basslink being out of service and water levels being exceptionally low⁵.

Two retailers cited two other factors that have tended to increase interest and activity in DR:

- the activity of brokers and DR specialists; and
- the availability of more sophisticated technology that assists customers in providing DR and the better DR products that those technologies have enabled.

Finally, the retailers were asked whether they are currently seeking to get more load under DR contracts. All of the retailers that were interviewed replied in the affirmative⁶.

⁵ Basslink was returned to service on 14 June, and water levels in Tasmania's dams have recovered materially.

⁶ One of the retailers noted that, based on their experience in other markets, allowing DR to be used in the FCAS market, as is contemplated in the Rule change, will significantly increase the level of interest and participation in DR in the NEM. It should be noted that this was a spontaneous comment on the part of that retailer - the survey did not specifically ask about this.

3. DR specialists survey

3.1. Sample

Six DR specialists were selected by the AEMC to be included in the survey. These DR Specialists were requested to participate in the survey to obtain their perspectives of the levels of DR currently available in the NEM, the specific services they provide and their viewpoints on how the levels of DR will change over time.

The DR Specialists included organisations that act as aggregators and those that provide advisory services and/or software to end customers and may not directly implement DR actions.

Responses were obtained from five of the six DR Specialists that were approached to take part in the survey.

A copy of the interview guide is presented in Appendix A.

3.2. Amount and types of DR they have arranged

The DR Specialists were asked about the quantities of DR provided into the market to be split between DR provided on behalf of retailers and distributors and direct assistance to end customers. The quantities of DR provided into the market as reported by the DR Specialists that responded to the survey can be categorised as shown in Table 1 below:

Table 1: Quantity of DR currently in the market by DR Specialists responding to the survey

Direct Assistance	On Behalf of Retailer	On behalf of distributor
200+ MW	50-99 MW	1-9 MW

The DR currently being arranged in the market can also be categorised as being of the following types:

- Load shifting - involves the shifting of specific loads from a period when a price spike is occurring to another period when the energy prices are lower.
- Reduction / interruption of discretionary loads - involves the shedding of specific loads that are usually non-essential during the period of a price spike.
- Reduction / interruption of major loads - involves the shedding of a significant load for a period of time and may involve major plant, or potentially a full plant shutdown. Usually this would require significant planning, e.g. build-up of stockpiles or sourcing of materials and/or product from elsewhere in the supply chain.
- Small scale generators - involves the operations of back-up generators within a facility to generate power and either relieve some of the facility load, or provide supply directly to the grid.

Regarding the types of DR that has been currently arranged in the market, the DR Specialists provided the responses shown in Table 2 on the following page.

Table 2: Type of DR currently in the market

Types of DR	Quantity of DR (%)
Load Shifting	35%
Reduction / Interruption - Discretionary	20%
Reduction / Interruption - Major Load	10%
Small Scale Generation	35%

One company indicated that they only target small scale generation as the mechanism for providing DR. It was also suggested that with the introduction of more cost effective storage solutions the levels of DR available in load shifting and discretionary loads will increase.

The DR Specialists were also asked about the pricing arrangements that their customers utilise based on the following categories:

- Standard DR program offering available from the retailer - involves the DR Specialist advising or facilitating the customer’s access to an existing retailer offering under a standard DR Program or similar mechanism. These retailer-driven initiatives offer a similar participation incentive to any customer wishing to participate.
- Some exposure to spot pricing - occurs where a customer has some knowledge and exposure to spot prices and is able to make a determination regarding potential DR activity based on existing prices and/or forecasts of future prices.
- Individual bespoke DR arrangement through a retailer - involves the DR Specialist advising or facilitating the customer’s access to unique or bespoke DR arrangements with a retailer. The customers accessing these arrangements are usually either a large end user, or a multi-site entity, who are seeking a better deal than a standard offer, or can offer a more tailored solution.

The results of the survey are provided in the table below.

Table 3: Pricing arrangements for DR currently in the market

Pricing Arrangements	Split (%)
Standard DR program offering available from a retailer	30%
Some exposure to spot pricing	25%
Individual bespoke DR arrangement through a retailer	45%

3.3. Availability by season and jurisdiction

DR Specialists were asked about the quantities of DR that are available both seasonally and regionally, and the average duration that DR can be sustained.

All DR Specialists indicated that there is no variation in the quantities of DR or its duration across the seasons.

When asked specifically about the duration of the DR activities, the responses were more dependent on the type of DR being actioned, as follows:

- For quick response DR from selected actions (e.g. interrupting refrigeration, air conditioning, etc.) the maximum duration is up to 1 hour.
- For other interruptible DR and load shifting, the potential DR duration is more often in the 2- to 4-hour range.
- For selected interruptible DR (primarily the larger loads) and small scale generation the potential duration could be as long as 10 hours.

The DR specialists also commented on the regional location of the DR they arrange. This split has been weighted based on the quantities of DR identified by each organisation.

Table 4: Regional locations of DR currently in the market

Regional Locations	Split by State (%)
Queensland	32%
New South Wales / ACT	15%
Victoria	20%
South Australia	33%
Tasmania	0%

It should be noted that this split does not include the Aluminium smelters as the quantity of DR provided is so large it significantly skews the results.

3.4. Who engages their services

More detail was requested regarding who engages the services of the DR Specialists and in particular, what the split is between direct customers and utilities, and of the direct customers, which sectors are the most active.

Most of the DR Specialists will work with the end customers directly, either assisting the end customer take action for themselves, or acting on behalf of retailers and distributors. There is significantly less engagement with the retailers or distributors in either an advisory or support capacity.

One company indicated that they worked for distributors in the past but no longer do so, while another indicated they are on a distributor’s panel, but have yet to receive any work via this mechanism. Other companies advised that they provide advisory services and software to assist the end customer evaluate their potential to undertake DR activities and also provide information regarding potential mechanisms under which the end customer could (a) participate in DR activities, including facilitating access to programs and initiatives run by retailers and distributors, or (b) take direct action as a result of spot price variations. Typically, the decision to take action during any period remains the responsibility of the end customer.

The types of end customers participating are primarily commercial and industrial (C & I) users, however the size of the end customer varied from one DR Specialist to another. Some of their comments include:

- One organisation will target any C & I customers with an average site load above 250 kW, and may consider smaller facilities if part of a large portfolio of sites.
- Other organisations would not target end customers that are small and have limited engagement to facilities with a total site load of > 1 MW.
- The DR Specialists also indicated that commercial end customers are generally more receptive to the advice the DR Specialists provide than are industrial end customers.

3.5. Services offered

The DR Specialists were asked about the range of services they provide to end customers. Most of the companies will provide advisory services and are also able to assist actual DR participation through the provision of DR automation software. A limited number of companies surveyed indicated they provide hedging support, or assist with competitive tendering. Several companies offer software to provide customers with the ability to make spot price forecasts, however, not all of them provide spot price forecasting services directly.

Regarding the services provided to assist retailers develop or administer DR:

When asked about the services provided to assist retailers develop and / or administer DR, the majority of the companies indicated that they are a turn-key provider of end-to-end services including recruitment of end customers, managing, reporting and making payments. One of the companies indicated that they do work with retailers, however, would not elaborate on the types of services, while one company indicated that they do not work with retailers.

Regarding the services provided to assist distributors develop or administer DR:

When asked about the services provided to assist distributors develop and / or administer DR, two of the companies indicated that they are a turn-key provider of end-to-end services including recruitment of end customers, managing, reporting and making payments. One of the companies indicated that they do work with distributors, however, would not elaborate on the types of services. The remaining companies indicated that they do not work with distributors.

The DR specialists were asked about other supplementary demand side management services they provide, over and above demand management activities. Some of the companies indicated that they have specialised in demand reduction and demand management services and do not provide services beyond these activities. Other companies indicated that they provide additional services including energy efficiency, energy productivity and energy supply quality advisory services. Only one company indicated that they specifically provide carbon management services, while others indicated that greenhouse gas emission reduction is seen as a side-benefit and are not actively promoting this as an outcome or providing direct services in the area.

The DR Specialists were asked about the proportion of company business that is comprised of DR services or other demand side services. The firms interviewed indicated that the provision of DR services comprised anywhere from 50% to 100% of their total business base. Other demand side services accounted for anywhere from 10% to 50%. Two companies indicated that they also provide “other energy related services”, but did not elaborate on what those were.

3.6. Changes over time

Finally, the DR Specialists were asked their impressions of how the level of DR available in the market has changed in the past 5 years and how they believe it will change in the next 5 - 10 years.

Most companies indicated their perception was that the level of DR had decreased significantly over the last five years, however, two companies indicated the reverse, and reported that they have seen increases in DR activity with their end customers.

The outlook was more positive with most companies reporting an expectation that the level of DR would increase over the next 5 - 10 years, while two companies indicated that the level of DR would probably remain about the same.

Regarding the comments on the levels of DR over the last five years, both positive and negative comments were made, as follows:

- On the positive side, the DR Specialists reported that there is an increasing level of awareness in the marketplace, continued improvement in advisory services and recognition by end customers that providing DR can be arranged with little to no impact on operations.
- On the negative side, the DR Specialists noted that there have been instances where (a) retailers and distributors have sought to change price offers or terms within existing contracts with customers, and (b) distributors have attempted to terminate contracts or have required unrealistic costs for connections and that these practices have created a level of distrust among the affected customers regarding the sincerity of the retailers and distributors about DR. Another area of concern mentioned by the DR Specialists related to unrealistic expectations on the part of end customers regarding the fee or portion of the DR benefit charged by the DR Specialist. This has hampered the implementation of DR in certain instances, though the DR Specialists also noted that they are seeking to overcome this perception on the part of end-use customers through increased education and awareness building.

4. Results of web research

Desktop research was conducted to identify the companies contributing to demand response activity by end customers. To assess the extent of the support provided, the companies' service offerings were compared against a range of potential services including:

- **Identify opportunities for curtailment** - involves the provision of advice to end customers regarding what potential unit operations and or processes may be able to participate in a demand response activity, including load shedding and load shifting. Advice may include the broad identification of potential opportunities through to detailed action plans for implementation.
- **Support to tender for large loads** - includes the provision of advice on opportunities to leverage the demand response opportunities as part of energy contract negotiation, or as part of a call for significant demand response load.
- **Spot price forecasting / technologies** - provides end customers with the information necessary to actively participate during demand response events. This can include services ranging from the provision of spot price information and forecasts of potential price spikes which would allow the end customer to take action themselves to avoid significant price penalties for operating during these spikes, through to automation of demand response activities.
- **Hedging support** - involves the provision of complex contract negotiation advice to enable the end customers to limit their exposure to significant price fluctuations.
- **Enable / support participation in DR programs** - provides end customers with advice and support in the identification and participation of DR programs managed by other parties and can include identification of opportunities, evaluation of price points that justify involvement, negotiation with program managers and ongoing assistance to maximise involvement.
- **Other DSM services** - covers the range of other services that the service provider might make available to end customers and identifies those companies that are purely DR service providers. It also shows certain how certain service providers have extended their offering - both traditional DR service providers taking up more generalist DSM services and energy management companies (or sub-groups) identifying opportunities for providing advice to their clients.

The research was undertaken using a variety of sources available through the internet. This included:

- reviewing partner and panel lists from a variety of organisations including the NSW Office of Environment and Heritage, Victoria's Essential Services Commission and organisations such as the Energy Efficiency Council;
- identifying service providers through industry support groups who list a range of providers, e.g. demandresponse.com.au;
- accessing knowledge of Oakley Greenwood consultants; and
- general web searches using selected key words.

Once a potential company was identified, their company web site and supporting marketing collateral was reviewed to identify if the range of services they provide includes demand response activities that match the groups identified above.

The table presented on the following pages is a consolidation of the desktop research undertaken to identify the range of businesses in the NEM that provide demand response services to large customers and/or retailers.

There are a range of other demand side management service providers that provide services into the NEM, ranging from small entities through to significant engineering companies, who participate in a variety of energy efficiency and energy management activities. The research indicated that there are between 80 and 100 companies that fall in this category. These companies have not explicitly listed demand response activities within their service offerings on their web-sites, however, some may, from time to time, participate in a number of the services identified in the table above.

Table 5: Summary of services provided by DR Specialist firms

Company	Location – Australian Head Office (Other Australian locations)	Services					
		Identify opportunities for curtailment	Support to tender for large loads	Spot price forecasting / technologies	Hedging support	Enable / support participation in DR programs	Other DSM services
Altus Energy	SA	✓	✓			✓	✓
Australian Energy Consultants	NSW	✓				✓	✓
CQ Partners	SA (QLD)	✓	✓		✓	✓	✓
Ecosave	NSW (VIC)	✓				✓	✓
Energetics	NSW (VIC, QLD, WA)	✓	✓		✓	✓	✓
Energy & Management Services	NSW	✓	✓			✓	✓
Energy Action	NSW (VIC, WA, ACT, NT)	✓	✓		✓	✓	✓
EnerNoc	VIC (WA, NSW)	✓	✓	✓	✓	✓	✓
Enman	VIC	✓	✓			✓	✓
Global-Roam	QLD	✓		✓			

Company	Location – Australian Head Office (Other Australian locations)	Services					
		Identify opportunities for curtailment	Support to tender for large loads	Spot price forecasting / technologies	Hedging support	Enable / support participation in DR programs	Other DSM services
Greensync	VIC	✓		✓	✓	✓	
Key Energy and Resources	VIC	✓	✓		✓		✓
Negawatt Energy Solutions	QLD	✓	✓		✓	✓	✓
Northmore Gordon	VIC	✓				✓	✓
Oakley Greenwood	QLD (VIC, NSW, SA)	✓				✓	✓
Out Performers	NSW (VIC)	✓	✓			✓	✓
Schneider Electric Sustainability Services	NSW (VIC, QLD, SA, WA)	✓		✓		✓	✓
T & O Consulting	VIC	✓	✓			✓	✓
Total Energy Solutions	VIC (NSW, QLD)	✓				✓	✓
Trans Tasman Energy Group	VIC	✓	✓			✓	✓
Velocity Energy	QLD	✓		✓		✓	✓

Company	Location – Australian Head Office (Other Australian locations)	Services					
		Identify opportunities for curtailment	Support to tender for large loads	Spot price forecasting / technologies	Hedging support	Enable / support participation in DR programs	Other DSM services
WSP	NSW (VIC, QLD, SA, WA, ACT, NT)	✓				✓	✓

5. Key findings and observations

This section draws on the findings of the interviews and OGW's experience and professional judgement to provide relevant observations.

5.1. Retailer interviews

The key findings and observations gleaned from the interviews undertaken with electricity retailers included:

- The amount of DR available from end-use customers varies widely across retailers in both absolute terms and as a percentage of their total load. Available amounts within the retailers interviewed ranged from zero to over 100 MW.
- It is clear that some retailers are much more focussed on demand response than others and this variation exists within various types of retailers. That is, some large retailers are taking a very pro-active approach to DR while others are not. The same variation exists among smaller, new entrant retailers, though smaller retailers that specialise on the larger customers tend to be the most likely to be active in offering DR agreements or approaches that include spot exposure, or a combination of the two.
- Having said that, it is also clear that virtually all of the retailers see DR in its wider sense - as a means for allowing customers to access tailored product and pricing arrangements - as an important element in being able to acquire customers.
- However, as several of the retailers noted, the transaction costs associated with such tailoring has also meant that these arrangements are typically only provided to larger commercial and industrial customers (primarily those with an average load of about 5 MW or more. Several retailers also noted that it is possible that developments in DR-enabling technology and software will allow these arrangements to be provided to the next smaller tranche of commercial and industrial customers in the medium term. One retailer said that their view is that small business and domestic customers represent the real opportunity for significant increases in DR participation, and that this would be almost entirely the result of technology enablement.
- Based on the results of the interviews it appears that the pool-price arbitrage arrangements⁷ that typified most DR arrangements some time ago have largely (though not completely) been replaced by customers taking some exposure to pool price and then managing their load (and in some cases purchasing hedges from a party other than their retailer).
- According to the retailers interviewed and OGW's observations, the factors that seem to have been responsible for the increased take-up of spot exposure seem to be the confluence of:

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These arrangements typically included (a) notification by the retailer of a likely upcoming high spot price period, (b) voluntary participation by the customer on an event-by-event basis, (c) no availability payments, and (d) a split (generally close to 50/50 of the difference between the spot price and the customers retail contract price between the customer and the retailer.

- significantly less volatility in the wholesale market prices, which makes such exposure less risky⁸;
 - increased sophistication on the part of larger customers who have now been operating in the contestable market for about 10 years;
 - improvements in DR-enabling technology and software and the better DR program offerings they make possible (that is, the ways in which the customer can manage their operations to exercise DR and the ways in which the retailer can employ and integrate these technologies and software in the DR arrangements they offer); and
 - increased activity on the part of DR specialists and brokers.
- Most retailers continue to provide notification of high (and in some cases low) price events. One retailer noted that:
 - all of its DR capacity can respond within an hour of notice
 - about 70% can respond with 30-minutes notice, and
 - about 10% can be provided with 5-minutes notice.

Most of the other retailers reported notification times of only 60 and 30 minutes; some said that in the case of those customers taking spot price exposure, notification is more of a courtesy than a program element.

- For customers with spot price exposure, the ability to avoid the price (and in some cases to export when price is high) is the primary compensation. Where spot exposure is not involved (i.e., more traditional DR arrangements), it appears that customers can access two types of DR arrangements:
 - ‘Opportunistic’ arrangements, under which the customer is informed of events in which spot price is expected to exceed the threshold price nominated by the customer and is paid a percentage of the spot price (perhaps less the retail contract price) multiplied by the amount of load reduction provided by the customer during the event, and
 - A more ‘pre-arranged’ approach, in which the customer states an intention to respond with regularity based on a threshold spot price level. This arrangement generally includes an availability payment (generally made on a quarterly basis) in addition to the dispatch payment available in the opportunistic approach - or at least the option to get an availability payment, with the trade-off often being a lower dispatch payment. Such an arrangement often also includes some form of clawback. The clawback entails a proportion of the availability payment being sacrificed in the event the customer does not provide a specified minimum proportion of the demand reduction that they have nominated in response to notification by the retailer of a price event that meets the customer’s price threshold. The clawback is almost always limited to the total amount of the availability payment, though repeated failure to respond to events may result in the retailer ending the arrangement (or transferring it to the opportunistic basis). Actual penalties (whereby the customer could potentially be out of pocket) were never reported as being part of the arrangements.

As a result, both of these types of arrangements are essentially voluntary.

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We note that significantly reduced volatility will likely reduce the pay-off from DR exercised opportunistically to generate income. As a result, taking spot exposure may pose quite an attractive option for end customers who can use DR as an occasional defensive strategy.

- Retailers indicated that the amount of DR being exercised by their customers - at least in absolute terms - has not changed that much in the past five years. Only one retailer said the amount had increased a lot - and in that case it had been an increase. Another said the current amount of DR was a bit more than in the past, while two said it was a bit less. Three said it as about the same.
- All of the retailers surveyed said they are currently seeking to increase their use of DR arrangements. This appeared to be motivated in the case of most retailers as a means for addressing customers' preferences (where such a preference exists), though a few retailers see such arrangements as a significant (and in some cases the primary) means by which they differentiate themselves in the market. None of the retailers said that their interest in DR arrangements was primarily motivated by the operational advantages that DR can provide to them. However, for one or two of the smaller retailers, it seems that the ability to benefit from the use of DR as a means of reducing their need to manage volume and price risk and/or their dependence on the contract market goes hand in hand with their use of DR as a primary part of the value proposition they offer to customers.

5.2. DR specialists

The key findings and observations gleaned from the interviews undertaken with DR Specialists included:

- OGW interviewed 5 DR Specialists across a range of topics. It is interesting to note that certain of their attitudes tended to be associated with the types of services they provide:
 - Aggregators (companies that actively engage customers in DR, either on behalf of the customer or on behalf of a retailer or distributor) stated that while they remain profitable and continue to be active in the market, they have seen the level of end customers' interest in DR decline as a result of what they described as a lack of direction and impetus in DR. These DR specialists tended to be supportive of a more aggressive approach to regulation with appropriate enforcement of participation which would, in their opinion, result in higher uptake of DR.
 - Advisory / software providers (companies that provide services and information that can help end customers identify DR opportunities and their value, but do not actively engage with customers to deploy DR) expressed less strong views regarding the importance of policies and regulations. These DR specialists, in general, reported that the market for their services was increasing, primarily as a result of end-customers becoming more educated about how to effectively participate in the market. While they agreed that additional focus to DR in policy and regulation could further increase the market for their services, it did not seem, in our view, that this was of as much importance to these firms as it is to the aggregators.

- Some DR Specialists have postulated that there is a substantial amount of DR (potentially in excess of 2,000 MW⁹) being undertaken by commercial and industrial end customers who have access to market data and are operating with exposure to the spot prices. These operations have put mechanisms in place to control site operations and limit the cost impacts of wholesale market price spikes.
 - The DR Specialists have suggested that some of these activities are being undertaken by the end customers independently and without requiring intervention (and possibly even knowledge) of retailers, distributors or aggregators.
 - They anticipate that the number of end customers operating in this manner will probably increase, however, it they believe that this type of activity will be limited to the larger organisations who can justify retaining individuals on staff to monitor and manage these interactions.
- The DR Specialists indicated that most of the participants who are active in the market without the services of an aggregator are larger organisations, with facilities with site demands greater than ~5 MW.
 - Some DR Specialists indicated that while smaller facilities do participate, it is a greater impost on the resources of these organisations which tend to be stretched even under BAU conditions.
 - The DR Specialists commented that easier access to automation and software to assist electricity consumption decision-making within relatively short timeframes could increase the ability and willingness of smaller facilities to exercise DR.
- Other issues raised by the DR Specialists include:
 - There is more DR activity being undertaken in commercial sectors rather than industrial facilities. This is because the management teams in industrial facilities tend to be harder to engage in DR activities due to perceived production constraints. DR Specialists suggested that this perception could be eased through a proactive education program to encourage broader involvement.
 - Several of the DR Specialists felt that certain disruptive technologies (e.g. energy storage) along with the potential closure of certain coal fired generation assets may contribute to significant increase in interest by end customers in DR as a cost management strategy.

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This estimate of the aggregate DR capacity that is currently available and being exercised (though not in an aggregate way) by commercial and industrial end customers who have access to market data and are operating with exposure to the spot prices was assembled from the comments provided by several of the DR Specialists. It is based on these respondents' (a) knowledge of the behaviour of specific large industrial facilities, including aluminium smelters, and (b) their conservative (in their view) extrapolation of the number and likely behaviour of other large facilities that they believe to have some level of exposure to spot prices.

Appendix A: Interview guides

Retailer Demand Response Interview Guide

Background and purpose

In March 2015, the COAG Energy Council submitted a Rule change request to the Australian Energy Market Commission (AEMC) that seeks to create a demand response mechanism (DRM) in the National Electricity Market (NEM).

As part of its consideration of this change request, the AEMC is seeking quantitative evidence regarding the amount of demand-response (DR) capacity that is currently available in the NEM through several different contracting forms offered by electricity retailers to customers that consume 100MWhpa or more.

OGW has been commissioned to gather this information. Your organisation has been selected for this interview based on either or both (a) your previous involvement in demand-side activities with large customers, and/or (b) your market share of large customers.

Confidentiality

All of the information you provide will be held in strict confidence. Information provided by individual retailers will not be provided to the AEMC or any other party; OGW will only provide aggregated information to AEMC. Similarly, no comments made by you will be attributed to you personally or to your organisation.

What is DR?

For the purpose of this survey we are using AEMO's definition of DR, which states that DR is:

- either (a) load that can be reduced, or (b) the output of a small generator that can be increased
- in response to either (a) short-term wholesale price increases, or (b) short-term adverse network conditions.

Amount and types of DR under contract

1. About how many MW of DR does your organisation currently have under contract?

_____ MW

(If an exact amount cannot be provided, try the following categories:)

_____ 0 MW

_____ 1-9 MW

_____ 10-24 MW

_____ 25-49 MW

_____ 50-99 MW

_____ 100-199 MW

_____ 200 or more MW

_____ Could not / would not specify

2. How does that compare with the amount of DR you have had under contract in the past 5 to 10 years?

_____ It's much more

_____ It's a bit less

_____ It's a bit more

_____ It's much less

_____ It's about the same

What has caused this difference?

3. Does the availability of the DR you currently have under contract vary by season?

_____ No (go to question 4)

_____ Yes (answer the question below)

Please provide the approximate amount available by season (in MW or % terms)

_____ Summer

_____ Winter (please specify if figures are MW or %)

4. About how long can the DR you have under contract be sustained in any single occasion?

_____ Hrs (in summer)

_____ Hrs (in winter)

5. What is the typical duration of the DR contracts you enter into with customers?

_____ Years

_____ It varies with every customer / there is no 'typical'

_____ Could not / would not specify

6. How much of the DR *that you currently have under contract* will still be available in each of the following FYs?

MW or % (circle one)

_____ 2017

_____ 2018

_____ 2019

_____ Could not / would not provide

7. Can you provide any information on the types of DR contractual arrangement you provide and the approximate amount or percentage of the DR you currently have under contract under each of those types of contractual arrangements? (Go through the list of types first, then come back and get quantities or %s for each of the types they have capacity contracted in.)

MW or % (circle one) of contracted DR capacity

_____ Load or small-scale generation that can respond to a signal from you that conditions warrant the use of DR (**ask 7a then 7f**)

_____ Customers that take some level of exposure to wholesale spot price (**ask 7b, 7c and 7d, then go to 7f**)

_____ Customers that are exposed to some level of network tariff that seeks load reductions (or generation injections) in response to network conditions (**go to 7f**)

_____ Some other form of customised retail pricing signal (**ask 7e - and 7f if applicable**)

_____ Other (describe: _____)

_____ Other (describe: _____)

_____ Could not / would not provide

7a. How are customers who participate in these arrangements compensated?

(Probe for:

- whether any form of availability payment or a discount is given on the retail energy price, or whether compensation is based only on dispatched DR
- whether the customer gets a portion of the difference between spot and retail contract price and if so what %
- whether there are any clawbacks or penalties for not responding to the signal)

7b. In general, at what wholesale price level do customers take exposure (in \$/MWh if possible)?

7c. Our understanding is that when a customer takes a spot price pass-through contract the retailer remains financially responsible for the customers load in wholesale settlement. Given that, do you undertake any additional considerations before signing customers onto such arrangements?

(Listen and probe for additional credit worthiness checks and/or requirements for a specific pre-payment or deposit to cover liabilities for consumption at spot (e.g., advance payment for 55 days of forecasted energy costs).

7d. We have also heard from some parties that in some cases a customer seeking to take a spot price pass-through contract would require authorisation by the Australian Financial Market Association (AFMA) or be required to have an Australian Financial Service License if they want to engage directly in the financial derivative market.

Have you encountered these situations - or others like them? If so, were these issues able to be resolved? How or why not?

7e. Please describe what type of customised pricing arrangements you make available.

7f. Do you provide notification to the customer of the need for DR? If so, please provide the amount of notification you provide in hours/minutes.

_____ Load or small-scale generation that can respond to a signal from you that conditions warrant the use of DR

_____ Customers that take some level of exposure to wholesale spot price

_____ Customers that are exposed to some level of network tariff that seeks load reductions (or generation injections) in response to network conditions

_____ Some other form of customised retail pricing signal

8. Please provide information on the distribution of the amount of the DR you currently have under contract by jurisdiction.

MW or % (circle one)

_____ QLD

_____ TAS

_____ NSW/ACT

_____ Could not / would not provide

_____ VIC

_____ SA

9. Are you currently seeking to get more load under DR contracts?

_____ Yes

_____ No

In either case, probe for the possible impact of the following factors:

- Customer preferences (increased or lack of interest)
- The retailer's market positioning
- Level or volatility of wholesale prices
- Generation supply/demand conditions (over-supply or tightness)
- Changes in network pricing (particularly optional or mandatory critical peak pricing or peak demand rebates)
- Regulatory changes

Demand-side specialist Interview Guide

Background and purpose

In March 2015, the COAG Energy Council submitted a Rule change request to the Australian Energy Market Commission (AEMC) that seeks to create a demand response mechanism (DRM) in the National Electricity Market (NEM).

As part of its consideration of this change request, the AEMC is seeking quantitative and qualitative information on the amount of demand-response (DR) capacity and the types of demand-side services that are currently available in the NEM for end-customers that consume 100MWhpa or more.

OGW has been commissioned to gather this information. Your organisation has been selected for this interview based on our and/or the AEMC's awareness of your business.

Confidentiality

All of the information you provide will be held in strict confidence. The information you provide will not be provided directly to the AEMC or any other party; OGW will only provide aggregated information to AEMC. Similarly, no comments made by you will be attributed to you personally or to your organisation.

What is DR?

For the purpose of this survey we are using AEMO's definition of DR, which states that DR is:

- either (a) load that can be reduced, or (b) the output of a small generator that can be increased
- in response to either (a) short-term wholesale price increases, or (b) short-term adverse network conditions.

Demand-side services could relate to DR or to other demand-side objectives, including energy efficiency, bill savings, energy productivity, energy supply quality, greenhouse gas emission reductions, etc.

In this survey we will be primarily interested in your involvement in DR, but will also want to at least catalogue your activities in other demand-side services.

Types of DR services offered

1. Do you provide DR services to the following: (Y/N)

- _____ **End-customers directly** on an individual basis
- _____ End-customers directly but on behalf of an electricity **retailer** (i.e., the retailer has engaged you to recruit, engage and manage DR from end-customers)
- _____ End-customers directly on behalf of an electricity **distributor** (i.e., the distributor has engaged you to recruit, engage and manage DR from end-customers)
- _____ Electricity **retailers in an advisory or support capacity** (i.e., to help them develop or dispatch DR but not to recruit or engage it)
- _____ Electricity **distributors in an advisory or support capacity** (i.e., to help them develop or dispatch DR but not to recruit or engage it)

2. About how many MW of DR that you have directly arranged and is currently active in the market falls into each of the following categories:

_____ **End-customers you have assisted directly** on an individual basis
_____ End-customers you have assisted directly but on behalf of an electricity **retailer**
_____ End-customers directly on behalf of an electricity **distributor**

(If an exact amount cannot be provided, try the following categories:)

_____ 0 MW
_____ 1-9 MW
_____ 10-24 MW
_____ 25-49 MW
_____ 50-99 MW
_____ 100-199 MW
_____ 200 or more MW
_____ Could not / would not specify

3. Of the DR **you have directly arranged** and is currently active in the market, about what proportion of it involves:

_____ Load shifting (moving energy use to another time period)
_____ Reduction/interruption of discretionary loads (e.g., any of the following on a temporary basis: changing heating or air-conditioning set points, reducing the number of lifts in operation, reducing lighting levels, interrupting low utilisation processes, etc)
_____ Reduction/interruption of major plant or full plant on a temporary basis
_____ The use of small-scale generation

4. Thinking about the DR that **you have directly arranged or arranged on behalf of a retailer**, about what proportion of has been made available by the customer in response to:

_____ An arrangement offered by the retailer that offers a share of the wholesale spot price saving to the customer in exchange for the customer reducing load when notified by the retailer (or you on behalf of the retailer)
_____ The customer taking some level of exposure to wholesale spot price
_____ Some other form of customised retail pricing signal (please describe)

5. Approximately how much of the DR (in MW or %) that **you have directly arranged** in any capacity is in each of the following jurisdictions:
_____ QLD
_____ NSW/ACT
_____ VIC
_____ SA
_____ TAS
_____ Could not / would not provide

6. What sorts of customers do you find are most likely to be able to provide DR in terms of their size and business activity type?

7. Of the total DR that you have arranged and is currently available in the market, about how much is available (in MW):
_____ in summer
_____ in winter

8. About how long can the DR that you have arranged and is currently available in the market be sustained on any single occasion?
_____ Hrs (in summer)
_____ Hrs (in winter)

9. Please tell me about the specific DR-related services you provide to end-customers. (Listen and probe for: DR automatization software, spot price forecast services, hedging support services, and competitive tendering assistance incorporating DR. But note all services mentioned.)

10. (If applicable) Can you tell me a bit more about the services you have provided in helping electricity retailers develop and/or administer DR?

11. (If applicable) Can you tell me a bit more about the services you have provided in helping electricity distributors develop and/or administer DR?

Other demand-side services

12. Which of the other following other demand-side services does your company provide (recognising that these categories overlap somewhat, but considering the primary motivation of the customer):
- energy efficiency
 - demand management (management of demand as compared to energy efficiency, but not for DR)
 - energy productivity
 - energy supply quality
 - greenhouse gas emission reduction
13. About what % of your total business activity is comprised of
- DR services (either directly to end customers or electricity retailers or distributors)
 - Other demand-side services
 - Any other energy-related matters

The present and the future

14. Has the amount of work you do in DR increased or decreased in the past 5 years?
- Increased a lot
 - Increased a bit
 - Remained about the same
 - Decreased a bit
 - Decreased a lot

What have been the primary causes for these changes?

15. Over the course of the next 5 to 10 years, do you think that DR activity will:
- Increase a lot
 - Increase a bit
 - Remain about the same
 - Decrease a bit
 - Decrease a lot

What do think will be primary causes of that increase or decrease?

In either case, probe for the possible impact of the following factors:

- Customer preferences (increased or lack of interest)
- Level or volatility of wholesale prices
- Generation supply/demand conditions (over-supply or tightness)
- Changes in network pricing (particularly optional or mandatory critical peak pricing or peak demand rebates)
- Regulatory changes (specify:)