

ARENA

# DEIP DYNAMIC OPERATING ENVELOPES WORKSTREAM: NATIONAL REGULATORY AND POLICY DESIGN ISSUES

WORKSHOP SUMMARY NOTES  
THURSDAY 12 NOVEMBER 2020



Australian Government  
Australian Renewable  
Energy Agency

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# BACKGROUND

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The Distributed Energy Integration Program (DEIP) is exploring the value that dynamic operating envelopes (DOEs) could offer to the energy transition. This workstream aims to:

- › build a shared understanding of the opportunities and challenges
- › share insights on approaches currently under investigation
- › identify reforms that could be implemented to establish DOEs.

The workstream is led by a DEIP Working Group consisting of representatives from the Australian Renewable Energy Agency (ARENA), Energy Security Board (ESB), Australian Energy Market Operator (AEMO), Australian Energy Regulator (AER), Australian Energy Market Commission (AEMC), Australian National University (ANU) and SA Power Networks.

Background information and previous workshop summaries can be found on the [DOE workstream webpage](#).

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# INTRODUCTION

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On 12 November 2020, over 40 participants from across the industry – consumer groups, networks, research organisations, market bodies, retailers, aggregators and other organisations – met to discuss national regulatory and policy design issues relating to DOEs.

Participants considered four key policy and regulatory topics:

1. Regulation of allocation principles
2. Standardisation of customer connection agreements
3. Information and market processes
4. Monitoring and enforcement.

Participants identified areas under each topic that would benefit from national consistency and then discussed how this might be achieved. This document summarises those discussions.

# THEMATIC SUMMARY OF GROUP DISCUSSIONS

## THEME 1: REGULATION OF ALLOCATION PRINCIPLES

Allocating network capacity is the process of determining how much network access each customer is able to use at any given time without breaching the physical limits of the grid. The allocation principles that underpin the efficient and equitable allocation of network capacity through DOEs are a foundational technical, regulatory and policy design issue.

One of the challenges of identifying, harmonising and regulating for national consistency in DOEs is that the principles span a range of social, economic, and technical elements. This includes issues related to minimum allocations, fairness, vulnerable customers, power system and local network support services.

PRIORITY ISSUES RAISED	
ISSUES RAISED IN GROUP DISCUSSION	POTENTIAL SOLUTION PATHWAY
<p><b>A. How is the allocation calculated and by whom?</b> The group considered that the overriding objective for allocating network capacity and who performs the calculations that determine the DOE for each customer, needed to be determined as a priority.</p>	<ul style="list-style-type: none"> <li>• <b>Coordinated input from all stakeholders</b></li> </ul> <p>The party that develops the allocation principles will need to integrate diverse considerations represented by various stakeholders including:</p> <ul style="list-style-type: none"> <li>› Consumer representatives and advocates, and potentially consumers directly, must be able to contribute preferences about allocation principles. It is important to ensure that there are clear financial incentives and objectives to engage with customers while developing these allocation principles.</li> <li>› Governments may contribute to the allocation principles through federal or jurisdictional legislation.</li> <li>› AEMO can propose relevant system security use cases and considerations.</li> <li>› The AEMC can consider economic outcomes and consumer protections as detailed by the NEO and current national electricity rules.</li> <li>› DNSPs will contribute allocation principles that ensure physical and operational limits are respected alongside other considerations related to safety and flexibility.</li> </ul> <p>Using the allocation principles, DNSPs will develop technically robust methods for calculating and publishing DOEs within their network. The AER could review and monitor the DNSP methods (not just the specific allocations) and ensure consistency with allocation principles. The AER will also need to consider related expenditure proposals.</p>
<p><b>B. Who reviews allocation principles and allocations and who assesses fairness?</b> Allocation principles, and the specific allocations, need to be reviewed to ensure that they are fair and equitable.</p>	
<p><b>C. To whom or what is the allocation granted?</b> The capacity allocation could be granted to an individual customer (i.e. the connection point) or an aggregate allocation could be given to the aggregator who represents a collection of customers and connection points in the market.</p>	
<p><b>D. DOEs and network support services</b> Further consideration is needed to ensure DOEs and network support services are effectively integrated. Although the as-built and as-operated poles and wires determine the available network capacity, it is possible to procure services (including local network services) to optimise the availability of the capacity for customers and connection points based on their intended timing and usage of the network capacity.</p>	<ul style="list-style-type: none"> <li>• <b>Further work required</b></li> </ul> <p>Future work is needed on this topic, however there are several approaches by which such services could be procured:</p> <ul style="list-style-type: none"> <li>› By distribution network service providers from customers and aggregators (within the Chapter 6 rules and obligations).</li> <li>› Between customers, retailers and aggregators which essentially amounts to some form of capacity trading.</li> </ul>
<p><b>E. Need to consider economic efficiency when seeking national consistency.</b> It is essential that the regulation and harmonisation of the allocation principles for DOEs results in a positive outcome for customers. In this context, ensuring that such regulation and harmonisation is fit-for-purpose and contributes to a reduction of costs for customers is vitally important.</p>	<ul style="list-style-type: none"> <li>• <b>Demonstrate clear consumer benefits</b></li> </ul> <p>More work is needed on this topic, however the goal must be to choose which aspects of the regulation of allocation principles are made nationally consistent so as to ultimately reduce costs for customers.</p>
OTHER ISSUES RAISED ON THIS TOPIC	
<p>F. Does network visibility impact the regulation of allocation principles and if so how?</p> <p>G. What is the relationship between compliance with DOEs and the regulation of allocation principles?</p> <p>H. Are allocation principles only applied to steady state behaviour and if so how are transient excursions outside of a DOE dealt with?</p>	

## THEME 2: STANDARDISATION OF CUSTOMER CONNECTION AGREEMENT

Customer connection agreements are currently developed separately by each local network service provider. The high-level content of these agreements are approved by the AER but the current process has limited customer input. This high-level oversight is a deliberate aspect of the Rules to allow for recognition of local conditions and state obligations. The customer connection agreement will typically call up other documents and guidelines - some of these are on the DNSPs website and some are Australian Standards or state Regulations. This diversity of requirements can make it difficult for manufacturers and installers to be sure that they are compliant.

The increasing sophistication of consumers and consumer devices, and the development of DOEs, means that consumers will be interacting with the energy systems in different ways and the specific terms of connection agreement may be more material. There is an opportunity to reconsider the customer connection agreement process.

PRIORITY ISSUES RAISED	
ISSUES RAISED IN GROUP DISCUSSION	POTENTIAL SOLUTION PATHWAY
<p><b>A. Engagement/Social Licence</b></p> <p>The group noted the rate of product and technological innovation, the group identified the need to manage customer expectations, as well as improve associated communications about the need for change.</p> <p>Overall, consumer education programs were discussed but did not have unanimous agreement.</p>	<ul style="list-style-type: none"> <li>• <b>Obligation on sellers</b></li> </ul> <p>The obligation to inform customers about DOEs is partly on the sellers of the products and services impacted by capacity allocations. In this case this was most likely the installer, retailers and aggregators.</p> <p>Oversight of the engagement was most likely needed (at the state government or national level) and customer advocates may also have a role in forming requirements.</p> <p><b>Next Steps:</b> Review the existing customer connection process to identify challenges and opportunities for improving overall outcomes for new consumers.</p>
<p><b>B. Data transparency, visibility and standards</b></p> <p>The group identified the need for governance around the sharing of customer data. This could include LV data, DER operational, registration and compliance data.</p> <p>Privacy of confidential and personal data was identified as a concern/risk.</p>	<ul style="list-style-type: none"> <li>• <b>Responsibility of Market Body</b></li> </ul> <p>The group considered that the governing body would need to incorporate cross-disciplinary perspectives. Through working groups, it was important to balance technical efficiency with customer values. ESB or the proposed AEMC Standards body was considered the most appropriate body.</p> <p><b>Next Steps:</b> Consider the outcomes of the ESB Data Strategy. Identify data standards as a potential standards rule change for the (future) AEMC Standards Governance Committee.</p>
<p><b>C. Transparency of import/export limits</b></p> <p>The group considered that DOE allocation principles would be important in gaining customer trust and understanding and that the fair and transparent setting and communication of these principles through the connection agreement was critical for success.</p>	<ul style="list-style-type: none"> <li>• <b>Development of standard connection processes</b></li> </ul> <p>The group considered that state governments or AER would set a process by which the limits would be created and shared with consumers. Oversight would also be provided by this entity.</p> <p>The process would need to balance complexity, equity/fairness and also give consideration to the incentives inherent in the process.</p> <p>The DNSPs would be responsible for implementing that process.</p> <p><b>Next Steps:</b> Monitor development of the DOE models and trials. Consideration of regulatory intervention only if the transparency or outcomes of the DNSP processes are considered insufficient.</p>
<p><b>D. Compliance with limits</b></p> <p>The group sought to tackle the issue of customer (or their DER) compliance with the DOE limits. For example; what happens if a customer consumes more or exports more than the DOE limit?</p> <p>The group also considered that the role of the retailer and the installers was also important in this process as they may have direct control of the DER operations (under contract with the customer).</p> <p>The group was concerned with the risk of multiple parties and lack of clear responsibilities.</p>	<ul style="list-style-type: none"> <li>• <b>Obligation on DNSP</b></li> </ul> <p>Given the current contractual arrangements in the NEM, the DNSP is the likely responsible agent for this role.</p> <p>The penalties process will need consideration, and may require standardisation.</p> <p><b>Next Steps:</b> Monitor development of the DOE models and trials. Consideration of regulatory intervention only if the processes or customer penalties are deemed to be onerous or disproportionate.</p>

PRIORITY ISSUES RAISED	
ISSUES RAISED IN GROUP DISCUSSION	POTENTIAL SOLUTION PATHWAY
<p><b>E. Customer control within their premises</b></p> <p>The group noted the issue of customer control of DER. While they considered it likely that the customer would contract with a trader/retailer for operational control of the DER, they were concerned about the ability for the customer to switch retailer/trader or manage devices and equipment manually if required.</p>	<ul style="list-style-type: none"> <li>• <b>Develop a device access protocol</b></li> </ul> <p>Work was required to determine the circumstances in which aggregators/retailers are able to lock DER devices to a particular provider and when it is appropriate to mandate open access.</p> <p>Open access standards would likely require a regulatory response by Governments or Market Bodies as the market is currently resulting in restricted device access in many cases.</p> <p><b>Next Steps:</b> Ongoing monitoring of DER marketplace to gauge the level of customer lock-in. Also consider the potential benefits of a closed ecosystem in terms of customer ease of use and supporting the deployment of new markets.</p>
OTHER ISSUES RAISED	
F. None	

### THEME 3: INFORMATION AND MARKET PROCESSES

The group explored a range of potential interactions between DOEs and market and aggregator systems and processes. These were generally considered complex and would require a dedicated effort to work through the extensive detail.

Of particular importance were the specific information flows that would allow aggregators to factor in DOEs into their market participation strategies. It is important not to underestimate the cost and effort required to amend aggregator and market systems (e.g. MarketNet). The system level at which DOEs would be assigned (connection point, NMI, phase, device etc.) needs to be resolved in order to understand the extent of aggregator responsibilities and therefore what market processes are appropriate.

PRIORITY ISSUES RAISED	
ISSUES RAISED IN GROUP DISCUSSION	POTENTIAL SOLUTION PATHWAY
<p><b>A. Behind-the-meter complexity</b></p> <p>The group noted significant complexity with multiple parties being physically or financially responsible for power flows at a connection point that is subject to a DOE. Device-level performance (e.g. solar) could be undermined by other devices (e.g. EVs) and separately submetering devices greatly increased complexity, cost and coordination risk.</p> <p>The effectiveness of performance management at the connection point-level will depend on the ability of a single customer Energy Management System (EMS) to be aware of, and manage for, all devices. Allocations at the sub-connection NMI level seemed technically workable but may introduce equity issues if customers use multiple NMIs to increase their allocation.</p>	<ul style="list-style-type: none"> <li>• <b>Not resolved</b></li> </ul> <p>Generally, it was considered that allocations should be made at the connection-point level on a net-load (load minus generation) basis. However it was noted that there was considerable complexity and risk to be resolved and that technology and technology interoperability standards were not at a level of maturity where this could be managed optimally for customers or the system as a whole.</p> <p><b>Next steps:</b> Develop and assess BTM coordination options with market participants and EMS providers. This will likely need to align with the ESB P2025 2SM participation models (ie assessment of MTR etc.)</p>
<p><b>B. Market visibility and systems integration</b></p> <p>Issues could result from inconsistency of API framework between networks, aggregators and AEMO.</p> <p>While there are clear benefits in DOEs being visible to the market, it is important not to underestimate the complexity of 'behind the scenes' processes such as AEMO's MarketNet and retailer/aggregator systems.</p>	<ul style="list-style-type: none"> <li>• <b>A national cost-efficient approach</b></li> </ul> <p>Costs for retailers/aggregators can be reduced through national consistency and options need to be subject to cost-benefit analysis. Given the significant economic/market implications, this lends itself to AEMC Data Governance Committee leadership. AER and State Governments may have an ongoing oversight role.</p> <p>While a framework for interoperability needs to be developed, adoption of the full framework will likely be contingent on high-DER and aggregator uptake. Consistent application of 2030.5 should also be considered across APIs.</p> <p><b>Next steps:</b> Audit to identify potential market systems interactions and interfaces in consultation with market participants. Use cases also need to be defined (e.g. network DOE, AEMO Dispatch/FCAS, real time data, aggregator DER control etc.) building off API Working Group work where appropriate.</p>

PRIORITY ISSUES RAISED	
ISSUES RAISED IN GROUP DISCUSSION	POTENTIAL SOLUTION PATHWAY
<p><b>C. Information challenge for aggregators</b> Aggregators will need forecast or capacity constraints information for their customers in order to plan their market participation across multiple timeframes.</p>	<ul style="list-style-type: none"> <li>• <b>Integrated approach to information and market systems</b> Design options need to be subject to cost-benefit analysis and a systematic review of aggregator information requirements. Given the significant economic/market implications, this lends itself to AEMC leadership. Aggregators need a nationally standardised API for DNSP interactions. <b>Next steps:</b> Audit to identify potential market systems interfaces in consultation with market participants. This could be noted in/ supported by the ESB's data strategy.</li> </ul>
<p><b>D. Information challenge for customers</b> The stakes for customers managing a DOE could be quite high (especially C&amp;I load envelopes) and they will need to understand what they need to do and when. It is important that risks and responsibilities are clearly assigned so they can be effectively managed.</p>	<ul style="list-style-type: none"> <li>• <b>Common information requirements</b> A consumer representative group such as ECA could establish mandatory requirements for installers and networks. This could be enforced via the ACCC New Energy Code (for installers) and the AER (for networks). This could be supported by a publicly accessible database for network capacity and simple messaging about the 'why and how' of DOEs. The role of the retailer/aggregator in information provision needs to be clearly defined. Realistic use cases should be developed around customers negotiating a DOE, reflecting the likely constraints in that process. <b>Next steps:</b> Consolidate learning from SAPN implementation and identify customer knowledge gaps. There may be benefit in reviewing the current Customer DNSP Connection Agreement process and improving that, before layering on complex DOE arrangements.</li> </ul>
<p><b>E. Operating across multiple markets</b> Questions remain regarding the firmness of DOEs and under what conditions they may be exceeded. For example can they be exceeded for a short duration frequency response, or to provide a local network support service. Aggregators will have to make risk-based decisions as not all devices and behaviours will be known or within their control. DOE design should be consistent and compatible with P2025 outcomes including Unit Commitment for Security, resource adequacy, two-sided markets and ahead markets.</p>	<ul style="list-style-type: none"> <li>• <b>Further work required</b> Detailed process flows need to be created to illustrate how DOEs will interact with market information, interactions and decisions over time. <b>Next steps:</b> A review should be conducted to identify potential information and constraint models, and cross market interactions and hierarchies. Distribution/transmission interface issues identified and prioritisation developed.</li> </ul>
<p><b>F. DOE time intervals</b> There is an open question as to how dynamic DOE intervals need to be and their dispatch frequency (e.g. 5 min or 30 min, issued day-ahead or adjusted in real time (or both)). There are trade-offs in making the systems more dynamic. While more dynamic is ideal, there could be large costs for all parties and so it may be better to start with simple approaches. However, it is also useful to build systems to be future-capable.</p>	<ul style="list-style-type: none"> <li>• <b>Cost benefit analysis of options</b> A cost-benefit analysis could be done to evaluate trade-offs. This could either be done at the national (AEMC) or local network (DNSP) level depending on the level of national consistency sought. AER should be responsible for oversight of local implementation. <b>Next steps:</b> Consider experience of trials and develop and test use cases to determine implementation issues.</li> </ul>

#### OTHER ISSUES RAISED ON THIS TOPIC

- G. The risks and rewards may also be greater for C&I customers. Commercial customers can already negotiate bespoke arrangements and they may have more capacity for testing DOE models.
- H. What is the consumer responsibility vs retailers. How are customers going to know the impact of what they are doing (e.g. turning on a device that causes their envelope to be breached)?
- I. It is not clear what would or should happen if a customer does not follow a DOE signal? Are limits hard, flexible or incentives based?
- J. How can spare capacity be shared? If it is not able to be shared, then there may be a structural underutilisation of available capacity with flow on costs to the system.
- K. Capacity should be allocated to the aggregators. Certainly don't go below connection point level. If the instruction issued is at the aggregator level then they have more flexibility to manage their fleet. However to manage their participation, aggregators will need visibility of network topology in relation to their connected customers.
- L. Consumers need information to inform their investment such as, potentially, current and likely future constraints by season and time of day.
- M. Generally, networks will want to know the connection point information rather than device or aggregator capability and performance.
- N. What communications will aggregator systems rely on (Wifi, mobile etc.) and what are the arrangements for loss of communication? What is the impact of latencies in different use cases?
- O. What information about a customer connection should be private, what should be shared?
- P. Given the increasing cost and complexity, is there a risk that some aggregators will exit the market. What are the implications of this for competition and customer choice?
- Q. Does data access and ownership have implications for the regulation of allocation principles and if so how?

#### THEME 4: MONITORING AND ENFORCEMENT

The group explored the question of how the application of DOEs should be monitored and how to ensure compliance. This was from two specific perspectives:

What kind of monitoring, reporting obligations, incentives and/or penalties should be applied to DNSPs to ensure that they are allocating capacity and setting DOEs in accordance with national or jurisdictional guidelines, and providing customers transparency around this process

What kind of monitoring, technical standards and enforcement regimes are required to ensure customers and customer equipment conform to the DOE and associated requirements in the connection agreement, noting that customers may have a financial incentive to exceed their allowed capacity.

There was some discussion around the need to progress common national technical standards for DER and the exchange of data. It was noted that some of these issues will be informed by current ARENA trials in this area.

#### PRIORITY ISSUES RAISED

##### ISSUES RAISED IN GROUP DISCUSSION

**A. Security concerns with BTM devices, need for two way communications and data**

It is possible that remote control could lead to security concerns, so the end-to-end security of the communication pathway from DNSP to the device in the home that receives the DOE needs to be considered. This could be via a home gateway, or the smart meter, or could be direct to an end device like an inverter.

DOEs can be informed by real time data from sub-meters.

Devices operating with a DOE need well-defined behaviour on loss of communications to revert to a safe, known operating state. Device standards also need to consider issues like allowed ramp rates when DOE limits change.

##### POTENTIAL SOLUTION PATHWAY

- **Cyber-security, data and interoperability standards,**

There is a need to define cyber-security standards for two-way communication. This should reflect the respective roles of AEMO, the Commonwealth and AEMC under the proposed DER Technical Standards Rule Change.

**Next steps:** Progress cyber-security, data and interoperability standards through a refreshed process with industry engagement. Ensure data standards take into account the potential for system performance data (e.g. voltage), fallback behaviour, ramp rates, etc. Progress with current ARENA trials that will inform these issues.

PRIORITY ISSUES RAISED	
ISSUES RAISED IN GROUP DISCUSSION	POTENTIAL SOLUTION PATHWAY
<p><b>B. Lack of transparency on curtailment under DOEs</b></p> <p>Networks will need to report on how much curtailment / unserved energy (note: which relates to availability of BTM data) and how much capacity is being provided compared to static agreements. Note that this is a broader question of DNSPs reporting on hosting performance - i.e. even without DOEs there is a desire for more transparency and reporting on actual levels of curtailment due to static limits, AS4777 response modes, etc.</p> <p>DNSPs' ability to measure and report on hosting capacity will vary, but is generally very limited at present.</p>	<ul style="list-style-type: none"> <li>• <b>Network reporting on DOEs</b></li> </ul> <p>NEM and WEM regulators could be tasked with reporting and benchmarking hosting capacity and DOE performance. Alternately, this could be done at the jurisdictional level.</p> <p><b>Next steps:</b> Explore potential to include annual DOE / hosting capacity performance reporting within the existing Regulatory Information Notices (RIN) processes.</p> <p>This also relates to the Access &amp; Pricing rule change, which is considering reporting obligations and performance measures around DNSP DER hosting performance in the context of future DNSP incentives to maintain or improve performance. Related also to AER's VaDER work.</p>
<p><b>C. DNSP access to device and metering data</b></p> <p>The effectiveness of future monitoring and enforcement regimes will depend on data availability (e.g. standing data, export limits and export levels, etc.).</p> <p>Networks outside Victoria also lack visibility of voltage at the customer connection point, which they need in order to estimate hosting capacity and generate DOEs accurately.</p> <p>For DOE compliance, networks need data from the site to confirm that the site is meeting its requirements under the flexible connection agreement. This could include standing data and telemetry from the 'BTM' device that is receiving the DOE. This is not currently within the scope of the AEMC metering review.</p>	<ul style="list-style-type: none"> <li>• <b>AEMC metering review</b></li> </ul> <p>Expand the metering framework to standardise the delivery of voltage measurements from the meter as part of the regular data provided by Metering Coordinators. The AEMC review of the metering framework could address this.</p> <p><b>Next steps:</b> AEMC review to consider DNSP access to meter data and recommend scope be expanded to consider access to BTM/DER device data such as device settings and consider future data needs such as time-series data. Data quality is also important.</p> <p>As a future proofing measure, the AEMC review could also consider measuring and compliance for financial settlement of micro-transactions (transaction from devices BTM) and compliance to the DOE as part of that. Alternatively this could be considered as part of the post-2025 market design.</p>
<p><b>D. Nationally consistent enforcement of connection agreements &amp; DER technical standards</b></p> <p>It is not clear that current processes for enforcement of network connection agreements are fit-for-purpose and sufficient when we have DOEs. The benefits of greater national consistency also need to be considered.</p>	<ul style="list-style-type: none"> <li>• <b>Create monitoring regime and penalties</b></li> </ul> <p>DER technical standards should be nationally consistent and enforceable with appropriate penalties for non-compliance. The first level could be a penalty to revert to the static limit. Disconnection options should be considered at later stages.</p> <p>Consider how to provide customers transparency on the level of performance they can expect when they enter into a connection agreement</p> <p><b>Next steps:</b> Discuss with AER about whether there is scope for a more nationally consistent approach. Progress with current ARENA trials that will inform these issues and current DER technical standards governance reforms.</p>
<p><b>E. Transparency of capacity allocation approach</b></p> <p>The group discussed the benefits of having a nationally consistent reporting framework for networks to provide transparency and customers confidence that DOEs are allocating capacity fairly and consistently.</p> <p>This could include national taxonomy of different customer classes with default levels of service.</p> <p>There should also be an audit trail for network capacity allocation, inc. interventions to take account of planned or unplanned outages, system level constraints, etc.</p>	<ul style="list-style-type: none"> <li>• <b>Consider AER guideline</b></li> </ul> <p>There is potential for AER to set out capacity allocation reporting / audit requirements in a guideline, or this could be the responsibility of jurisdictional regulators.</p> <p><b>Next steps:</b> AER to consider merits of a national guideline. Explore DNSP capability to report capacity allocation method and outcomes through current ARENA DOE trials.</p>
OTHER ISSUES RAISED	
<p>F. Customer complaints processes - need to be incorporated into DOE connection agreements</p> <p>G. National consistency of connection agreements should be considered</p>	

Further information is available at  
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