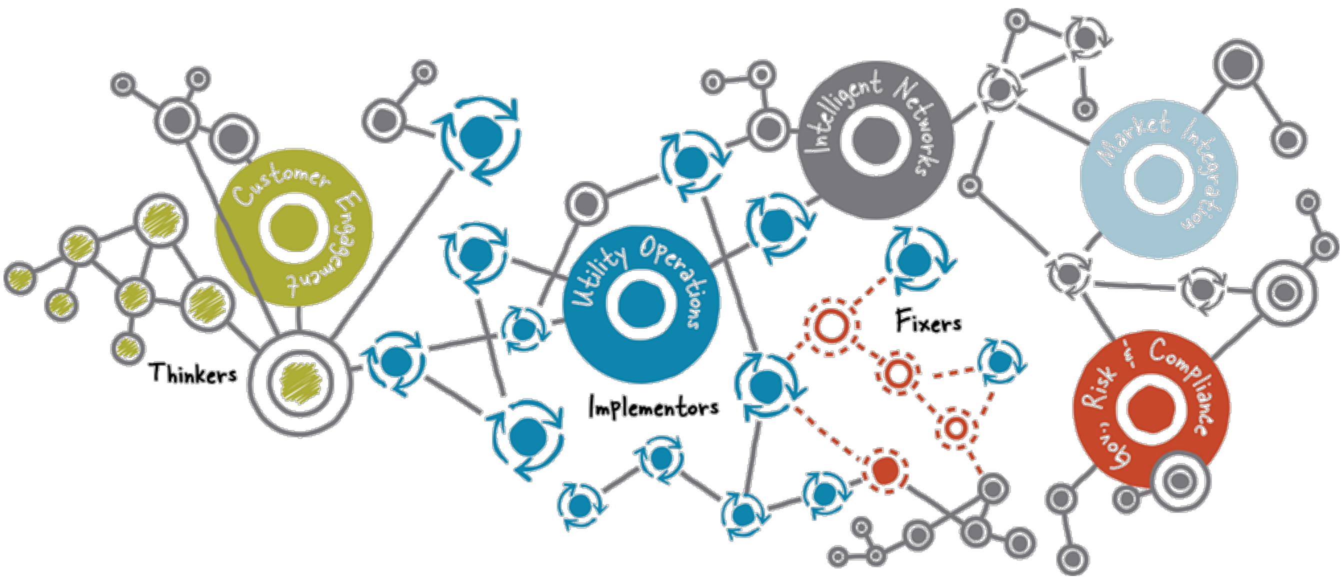

Consumer Data Right: Priority Energy Datasets

Discussion Paper Response by Utilligent Asia Pacific

Prepared by:

Utilligent

In everything we do, we believe that an innovative and thriving utilities sector is central to a sustainable future on earth.

26 September 2019

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Executive Summary

Utilligent would like to thank the Treasury for this opportunity to contribute to the Consumer Data Right reforms. We have been impressed to the commitment to engagement demonstrated through the first phase of these reforms (financial services) and are encouraged by the possibilities this second phase now represents for the energy sector.

Utilligent is a global specialty strategy, operations, and technology advisory firm focused on telco, utilities, and infrastructure owners. Headquartered in the United States, Utilligent works with some of the largest and most innovative utilities in the world, as well as supporting innovative disruptors seeking to gain traction in the utility sectors. We are committed to Australia and Asia Pacific, with Utilligent Asia Pacific headquartered in Melbourne and working with utilities across the region.

We have structured this submission into three key sections:

1. The first section provides an introduction and overarching comments regarding the CDR reforms for the energy sector. Here, we provide suggestions and perspectives that fall outside the specific questions raised within the discussion paper or highlight in greater detail recurring points that we touch on across multiple questions.
2. The second section provides direct answers to the questions posed in the discussion paper. We have structured this to reflect the structure of the discussion paper itself and included an entry for each question. Where we have no specific input to provide in response to a particular question, we have stated such.
3. The third section includes our two appendices. Appendix A provides a consolidated list of the use cases we identified as part of our submission to this discussion paper, while Appendix B provides further detail on Utilligent.

Thank you once again for this opportunity. If additional detail is required to clarify any of our responses, we would be happy to engage further.

Sincerely,

Robert Batten, principal consultant.

Introduction & Overarching Comments

The Consumer Data Right reforms represent a transformational opportunity for the Australian energy sector—a sector that has been undergoing significant disruption and must transform if it is to meet the increasingly sophisticated needs of Australians. The electrification of everything, the industrial internet and machine intelligence, the proliferation of energy resources within the distribution network, and an ongoing imperative to curtail greenhouse gas emissions are all drivers for the digital transformation of energy services and the increasing appearance of innovative and disruptive new business models.

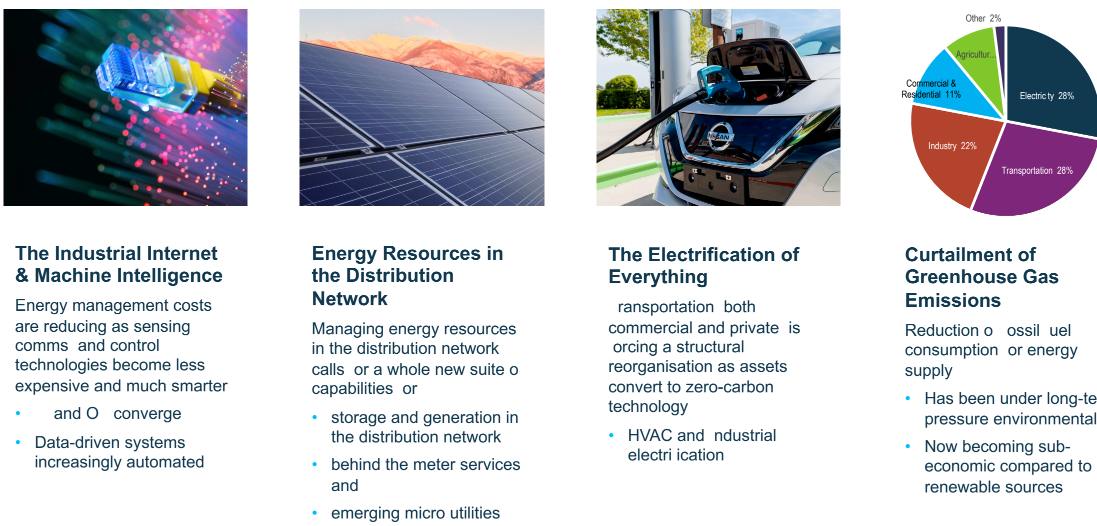

Figure 1 Drivers behind the energy transition

Underpinning all of these advances, and the transformations themselves, is data. Timely, reliable access to appropriate quality data will be fundamental to the new era of energy services in Australia, making these reforms a critical enabler for the nation.

These new reforms, welcomed by Utilligent, follow in the footsteps of other successful initiatives from around the world, some complete and others ongoing, which provide lessons Australia can draw on. These include the Green Button Alliance[1] and the Orange Button Program[2] in the United States (commenced in 2011) and the Energy

[1] https://www.greenbuttonalliance.org

[2] https://orangebuttondata.org

Data Taskforce reforms underway in the United Kingdom.[3] Indeed, multiple studies conducted in the United Kingdom have highlighted the potential benefits of opening access to energy data, including a finding that "A smart and flexible system can contribute to cumulative savings of up to £40bn by 2050".[4] Further, several of the objectives and use cases will directly address the issues identified by the Victorian auditor-general, John Doyle, in his review of the benefits realised through advanced metering infrastructure rollouts within his state.[5]

In order to provide a consolidated list of use cases, we have included a table in Appendix A that describes each of the ones discussed throughout the document.

Beyond Consumer Data

The primary objectives for the CDR reforms for energy have been stated as being to help "consumers to find and switch to the best energy deals, that incentivises greater competition between energy retailers and, over time, delivers innovative retail products that help consumers better manage their energy generation and use."[6]

These objectives are ones Utilligent wholeheartedly supports. However, in designing the rules, standards, and implementation for these reforms, we believe consideration must be given to other, larger societal benefits available through the appropriate application of datasets involved. In particular, consideration should be given to which datasets included within scope not currently held by AEMO may be of benefit for National Electricity Market planning and operational purposes, as well as for other social benefit purposes, such as academic research.

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[3] https://www.gov.uk/government/groups/energy-data-taskforce

[4] Sanders et al. An analysis of electricity system flexibility for Great Britain. The Carbon Trust, November 2016.

[5] Doyle, John. *Realising the Benefits of Smart Meters.* Victorian Auditor-General's Report. September 2015.

[6] The Treasury. "Consumer Data Right – Priority Energy Datasets". Accessed 24 September 2019 at https://treasury.gov.au/consultation/c2019-t397812.

While this falls outside the direct objectives of the CDR reforms, the ACCC recommendation for an AEMO gateway data access model[7] makes it a logical consideration as part of the implementation process. Utilligent believes taking such action, leveraging such infrastructure within the distribution networks, could support AEMO in managing a more resilient and stable national network. We would like to note that we are not proposing AEMO be given any additional control over the distribution network, but that visibility of the network is becoming increasingly important to support effective balancing.

> *"As the system becomes more disparate, diverse and decentralised, data sharing will be crucial to coordinate the wide range of actors undertaking new roles across the sector and ensure system stability."*[8]

Australia is a world-leader in the data it makes available to AEMO, and which AEMO in turn makes available to the public, but as the market rapidly evolves, new datasets may prove invaluable in the broader context. This, in turn, will raise questions regarding appropriate privacy protections as data becomes ever more granular. These privacy risks must be identified and managed as part of the design of the framework and will require careful thought and consideration, but it should be possible to find an appropriate balance between societal benefit, privacy risk, and privacy controls.

Network Digital Twin

One objective Utilligent believes is of import is the further development of a network digital twin (a virtual model of network assets and operation). Through its current datasets, AEMO have an impressive digital twin for many assets within the National Electricity Market, but this model typically stops at the substation. Even among most DNSPs, visibility of the low-voltage network is limited, as noted in the AEMC/ARENA Regulatory DEIP Dive in 2019[9] (see diagram below). This limitation in network visibility hampers network planning and operation and has direct impacts on

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[7] Australian Competition & Consumer Commission. *Consumer Data Right in Energy. Position paper: data access model for energy data.* August 2019.

[8] Sandys et al. *A Strategy for a Modern Digitised Energy System: Energy Data Taskforce Report.* Energy Systems Catapult 12 June 2019.

[9] SA Power Networks. *Maximising Customer Value from the Network in a High-DER Future.* Presented at the AEMC/ARENA Regulatory DEIP Dive, 6th June 2019.

consumers by limiting network management of DER or planning and management of network constraints.[10]

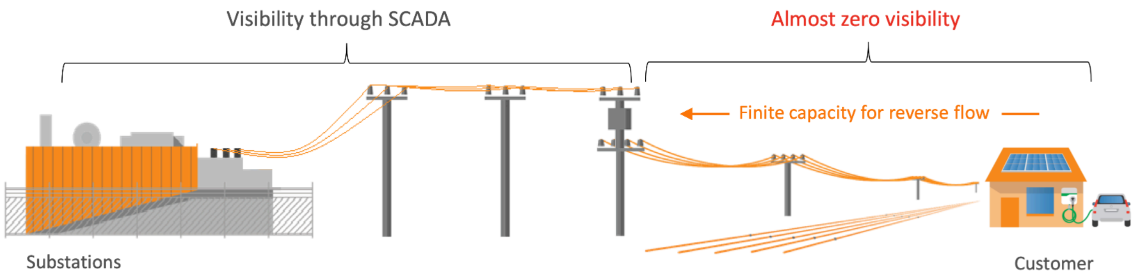

Figure 2 The low-voltage network visibility challenge[11]

Extending this model deeper into the distribution network to provide visibility of properties and distributed energy resources[12] will improve the ability of AEMO and DNSPs to balance the network and maintain stability. This view was supported by the Energy Systems Catapult report from earlier this year.[13]

Privacy Considerations

Management of personal privacy under the Consumer Data Rights reforms will be of critical importance and will be complex. Modern analytics employed by new energy services companies has already begun to demonstrate the intrusive potential for energy data to generate personally identifiable information. For example, services such as that provided by Sense[14] can analyse energy consumption patterns to identify individual appliances within a household and track their usage. Through this means, it can know when you watch TV and for how long, when you cook dinner, or how long you spend in the bathroom. To accomplish such a feat, most such services rely on a behind-the-meter device which captures similar data to household meters, but at greater

[10] Australian Energy Market Commission. *Integrating Distributed Energy Resources for the Grid of the Future.* 26 September 2019.

[11] SA Power Networks. *Maximising Customer Value from the Network in a High-DER Future.* Presented at the AEMC/ARENA Regulatory DEIP Dive, 6th June 2019.

[12] An intent captured in the recent Australian Energy Market Commission ruling requiring AEMO to establish a register of distributed energy resources.

[13] Sandys et al. *A Strategy for a Modern Digitised Energy System: Energy Data Taskforce Report.* Energy Systems Catapult 12 June 2019.

[14] https://sense.com

granularity. However, as smart meters and inverters become more advanced and demands on the energy system more complex, the granularity of household meters has been increasing. As such, it would be wise to consider such privacy risks when developing rules and frameworks for sharing such consumption data. Utilligent believe such risks can be managed through the application of appropriate design principles and controls. For example, a principle of data minimisation should be applied, ensuring the data shared is constrained to suit the purpose for which it has been provided. This could include providing multiple versions of a dataset—one granular, for purposes that require it, and one protected by data masking techniques, for those purposes that do not require the same level of granularity.

Another important consideration for energy data is operation of consent frameworks in the context of multi-person households. Energy consumption data shared for a household could capture personally identifiable information belonging to all residents of the premise. This was shown to be possible in a 2008 study out of the School of Electrical Engineering and Computer Science at Washington State University, where sensor event data was analysed to identify the individuals within the test environment responsible for each event.[15]

There are several questions of privacy law and consent that must be considered as part of these reforms, including whether the homeowner or energy supply contract holder has the right to provide consent on behalf of others who live in the house (in particular, this question relates to shared-housing or tenancy arrangements, rather than couples or families), and whether any special arrangements are required when minors are included in the datasets. These are questions that should be posed to the Office of the Australian Information Commissioner, the answers to which must be incorporated into the data sharing consent model to be implemented as part of the reforms.

While there are a number of complex privacy issues to be resolved as part of the Consumer Data Right reforms, there are also many lessons to be learned from other industries and jurisdictions that can help guide the way forward. For example, and beyond the work completed for the financial services CDR reforms, the European Union Smart Grid Task Force Expert Group Two have released several reports regarding the management of cybersecurity and privacy in smart grids, including data

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[15] Crandall, Aaron S., and Cook, Diane. *Attributing Events to Individuals in Multi-Inhabitant Environments.* School of Electrical Engineering and Computer Science Washington State University. 2008.

impact assessment templates.[16,17] Utilligent further note that the Australian Computer Society has been leading a cross-industry group in the development of a privacy preserving data sharing framework.[18] While this framework is not yet complete, there may be valuable lessons in the work to date that could inform the privacy framework implemented for these CDR reforms.

International vs. Local Standards

AEMO has been developing a data standard for the National Electricity Market (NEM) (aseXML) since 2000 in consultation with market participants. In doing so, it has enabled the development of the NEM itself. At the time AEMO began the aseXML standard, few—if any—international standards existed, so it made sense to develop its own, which it did so leveraging many best practices of the time. However, since then a suite of international standards have risen to prominence and are employed in markets globally, including the United States, the United Kingdom, the European Union, China, and many others.

Consideration will need to be given as to whether the consumer data standards developed as part of these reforms conform to local standards, the international standards, or forge a new path (noting that some of the datasets targeted will not yet exist in AEMO's aseXML standard).

Utilligent does not yet recommend a specific direction in this regard, as greater consideration is needed. It is worth noting that the aseXML standard is currently employed throughout the energy sector in Australia and forms the backbone of current integration architectures. Therefore, regardless of decisions made as part of these reforms, or independently by AEMO, this existing standard and associated systems will remain in significant use for the foreseeable future. As such, we can surmise: any adoption of international standards for CDR interfaces will require mapping and translation between the international standards and the aseXML standard; adopting international standards may decrease the burden of integration for new market entrants but will increase the burden of adaptation for existing market participants; if

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[16] European Union Smart Grid Task Force Expert Group Two. *Recommendations for the European Commission on Implementation of a Network Code on Cybersecurity.* July 2018.

[17] European Union Smart Grid Task Force Expert Group Two. *Data Protection Impact Assessment Template for Smart Grid and Smart Metering Systems.* 13 September 2018.

[18] Australian Computer Society. *Privacy Preserving Data Sharing Frameworks: Report on July 2019 Directed Ideation # 2 Series.* 9 August 2019.

aseXML is utilised for the CDR interfaces, it will require some adaptation before it could be used in a modern web service context.

Power of Choice

Utilligent believes these reforms represent an opportune time to note concerns we have regarding the Power of Choice reforms in regard to smart meters, which is an aspect that does not appear to be delivering the full intended benefits. Under these reforms, responsibility for the procurement, installation, and servicing of smart meters has been shifted from the distribution network service providers to the retailers. This appears problematic in several ways:

- It hasn't solved the problem of real-time visibility of consumer data. If anything, these reforms appear to have made the problem worse.
- It has complicated the asset management of smart meters, with a fragmented market emerging and greater burdens on retailers.
- It has limited the possible advantages from economies of scale in the supply chain, installation, and asset management.

Specifically, Utilligent has concerns about the accessibility of data from smart meters: live smart meter data should be available to AEMO, the distributor, and the customer's retailer by default,[19] other participants (such as aggregators) gaining access only if explicitly granted such access via the mechanisms proposed by the CDR reforms. We make the observation that it is live meter data that is needed by stakeholders, not a proliferation of meters.

Future Proof

The energy sector is transforming at an increasing rate and it is imperative the solutions implemented by the CDR reforms are able to keep pace. We cannot anticipate every change that will occur in the sector, but there are some patterns that allow us to anticipate certain trends. For example:

- Energy monitoring is becoming more granular, with measurements being taken at increasingly smaller intervals. This is evident in both the established market context (such as the shift to five-minute settlements) and the consumer context (as evidenced by the proliferation of behind-the-meter monitoring solutions).

[19] In order to minimise the privacy risk, AEMO and the distributor may receive a masked version of the data that limits any personally identifiable information.

These developments have proven the value of more granular data in extracting greater insights and delivering new or improved services, so we can assume the trend will continue. Any standards and interfaces developed should be designed with this in mind, such that scalability at higher granularity does not become an inhibitor to innovation.

- Energy monitoring is becoming more complex, with an expanding range of data types captured to extract insights and deliver value. Rather than simple consumption measurements, modern services look at: grid import and export (in both kVa and kW), power factor, battery charge and discharge (both household and EV), solar generation, and power quality. Any dataset standards must include sufficient flexibility to capture a range of data types to support these new models.
- Distributed energy resources are now and will continue to be a key part of the future Australian electricity system.[20] If these resources are to be managed effectively, it must be visible, which means current metering data may prove insufficient. Consideration should be given to capturing DER monitoring data directly (for example, from inverters, rather than meters) to augment meter datasets and the Distributed Energy Resource Register and enable the visibility and management of dispatchable resources within the distribution networks.
- Reviews have been proposed of distribution network pricing schemes to develop fairer pricing models in high-DER environments.[21] Any data standards implemented should be designed with the various proposed pricing schemes in mind to ensure these models can be supported if and when they are implemented.

[20] Australian Energy Market Commission. *Integrating Distributed Energy Resources for the Grid of the Future.* 26 September 2019.

[21] Australian Energy Market Commission. *Integrating Distributed Energy Resources for the Grid of the Future.* 26 September 2019.

Specific Responses

This section of our document addresses the specific questions raised in Treasury's discussion paper in the context of the discussion points for which they were raised.

Priority Datasets

National Metering Identifier Standing Data Fields

Question 1: What other NMI datasets should be designated to support basic comparison and switching use cases?

Utilligent note that the NMI standing data fields identified in the discussion paper do not include any values from the "CATS_NMI_DATA", which captures identifying information regarding the NMI itself. The need to include these fields will depend on the workflow of each of the use cases, but some of these fields may be required. For example, if these datasets are assumed to be returned after a verification process to ensure the request has captured the correct NMI, then it may be acceptable (and appropriate, under data minimisation principles) to exclude them from the result set. However, if not, some of these fields will be required—such as the set of physical address fields.

Other fields that may be relevant, depending upon the implementation approach, include the various status code fields (such as NMI or meter status codes) and the various from date and to date fields.

Energy Switching Use Case

In its most basic form, we do not anticipate this use case requiring significant data. Switching from one energy provider to another should only require a minimised dataset, with basic consumer information (for verification purposes, as the destination retailer will still be required to gather and verify the consumer information as part of security and privacy practices) and connection information. Depending on the process determined for the switching use case under CDR, it may be appropriate to include the party and role information from NMI standing data to facilitate the identification of parties that must be involved in the switching process.

Notwithstanding the above, it is possible a basic switching use case may be combined with other, more complex use cases. For example, the consumer may be switching to a more complex service with the new retailer where use cases such as Model Training, Tailored Energy Plans, or Virtual Power Plants and Demand Response Schemes may apply. For this reason, Utilligent recommend the reform process do not consider use cases as stand-alone constructs, but components that may be combined to create a set of services (similar to product bundling/wraps in the financial services industry).

Plan Comparisons and Recommendations Use Case

This scenario is significantly more complex than a basic switching use case, as energy plans have become more complex and current trends indicate this will continue. A simple comparison is possible (and provided as a service in-market today) using basic NMI standing data, product data, and simple billing or metering data (see "Table 1 Data required for simple plan comparisons"). But, as the market becomes more complex, these services will require significantly more data to provide an accurate service.

Table 1 Data required for simple plan comparisons

Data	Explanation
NMI standing data	Basic product comparisons will need minimal NMI standing data as described in the discussion paper (noting that this data is per metered source within a NMI, and not a single record per NMI).
Retail product data	Basic product comparison will require access to a register of available retail product data covering eligibility, tariff structures, and other pricing-relevant information.
Billing or metering data	A basic product comparison can be completed using either basic historical metering data, or historical billing data. However, if limited to only these simple datasets, results will be of limited accuracy and of limited value where complex tariff structures are possible or for premises with solar and/or batteries.

If more complex and accurate plan comparisons are to be possible, services will require access to more informative datasets. Specifically, they would require asset information from the Distributed Energy Resource Register and detailed historical metering data (separate stream for each metered feed/tariff), including:

- Grid import,
- Grid export,

- Solar generation or self-consumption,[22] and
- Metered units of measure and time of day codes.

Question 2: What advanced use cases could be supported by additional NMI standing data fields, and what fields are these?

Utilligent believes the additional fields identified as part of our answer to "Question 1" should be sufficient to support most use cases. We note, however, that we do not suggest the use cases can be supported by only the addition of these fields, as fields from other datasets may also be required. For a complete description of the use cases referenced see Appendix A. Utilligent believes all identified use cases will rely on NMI standing data (either a subset or the full set of fields).

Metering Data

Question 3: Should the priority datasets designation cover all meter types? If not, which datasets should be outside the scope of the initial designation, and why?

There is value in providing metering data for all types of meters, including manually read meters, as that data can still be used for simplistic plan comparisons and solar sizing recommendations. However, the level of value represented is significantly reduced, so its relevant priority should be similarly reduced.

Question 4: What advanced CDR use cases might more frequent smart or interval meter reads support?

There are a varied range of advanced use cases that could be enabled by more frequent interval meter data, especially when combined with more complex streams. We have included a complete list of use cases in Appendix A, but as a specific answer to this question we would suggest the following:

- Model Training: Machine learning models can be trained using historical consumption data to provide personalised recommendations and optimisation to improve energy efficiency and reduce bills, among other possible services.

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[22] Solar generation or self-consumption would be useful, but optional for this use case, as it could be estimated from a combination of property information, asset information from the Distributed Energy Resource Register, and meteorological data (which could be sourced independently).

- Plan Comparisons & Recommendations: More detailed metering data provides a more accurate usage profile for comparison services, allowing them to model projected prices under different energy plans with greater accuracy and confidence.
- Solar & Battery Sizing: More detailed metering data can enable the development of more detailed models to assess the impact of various solar and battery configurations.
- Appliance Analysis: Appliance disaggregation and analysis is not possible without short-interval meter data—usually including advanced data types.
- Tailored Energy Plan: Through analysis of household energy usage and available distributed energy resources, retailers can develop personalised/tailored energy plans that best-fit the consumer's requirements.
- Adjacent Services: There is the potential for adjacent services in non-energy markets to leverage metering data for consumer benefit, such as for inputs into property valuations or insurance assessments.
- Virtual Power Plants & Demand Response Schemes: Accurate metering data will be utilised in targeted demand response programs combining energy plan details and current consumption. These may involve automated controls or consumer engagement models.
- Equipment Monitoring & Asset Health Check: Short-interval meter data, preferably with advanced data types (such as power quality), are necessary to enable effective monitoring of on-premise equipment (for example, solar panels, fridges, hot water cylinders, etc.).
- Security Monitoring: The most basic security monitoring use case (detecting power consumption that indicates a person is present while the residents are away) is possible with relatively coarse smart meter data (at least daily meter reads). However, the shorter the interval of meter reads, the more advanced this monitoring can become.
- Home Automation & Optimisation: Short-interval metering data could be utilised by home automation or energy optimisation platforms to control consumption or provide recommendations to consumers.
- Peer-to-Peer Trading: Peer-to-peer trading between retail energy consumers is expected to require detailed meter data for the control logic.

Question 5: Would the proposed datasets support the use cases identified above? What other use cases could smart meter data support and what specific datasets would be required?

While smart meter data is mandatory for many of the above use cases, by itself it cannot satisfy the needs of all the use cases. Some of the additional data required is captured in the discussion paper under other datasets (NMI standing data, retail product data, Distributed Energy Resource Register, etc.), but not all. One dataset worth noting is monitoring data for distributed energy resources, providing information on energy generation, battery storage level, and battery discharge rate. This level of behind-the-meter data has not been included in market datasets previously, so would be breaking new ground and may take time to implement. Notably, this information would typically be provided by an inverter, so cooperation would be required from the inverter manufacturers.

Question 6: How can the above privacy risks be balanced against the significant potential consumer benefits of supporting new use cases?

As noted in our overarching comments, the threats to privacy as more detailed and comprehensive energy data becomes available are significant. These threats are not limited to the energy services contract holder but are present for all occupants of the premises. Several studies have shown it is possible to identify individuals within an environment[23] or users of a device[24] based upon sensor data alone. Based upon this research, and the level of appliance disaggregation possible with some in-market analytics solutions, it is reasonable to assume that individual profiles could be developed of people living or working within the premise based upon energy data. These profiles could, in theory, become detailed and sensitive, capturing information about individual usage patterns of the premises and its appliances.

Utilligent acknowledges that with current technology, such invasive insights may be hard to achieve without access to more accurate behind-the-meter monitoring device data (not currently covered by the scope of the CDR reforms). However, continuing advances in social analytics, combined with the increasing trend towards more detailed market data, suggest these threats will grow in relevance over time. Importantly, robust privacy frameworks are difficult to retrofit, and are often done so with sub-standard results, leading Utilligent to the conclusion that these threats must be mitigated in the initial design of the CDR implementation.

Taking the above into account, it becomes clear that protecting individual privacy under the CDR reforms is an important objective, and that a robust privacy framework will be required. The design of this framework must consider the privacy of all

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[23] Crandall, Aaron S., and Cook, Diane. *Attributing Events to Individuals in Multi-Inhabitant Environments.* School of Electrical Engineering and Computer Science Washington State University. 2008.

[24] Molay, David, Koung, Fan-Hal, Tam, Kingston. *Learning Characteristics of Smartphone Users from Accelerometer and Gyroscope Data.* Stanford University. 2013.

reasonably impacted individuals (e.g., all residents of a house). This naturally raises questions about the extent of consent: Under current contractual structures, can the account holder legitimately provide consent for such data capture for all residents of the premise? Or will changes to standard account contracts be necessary? Utilligent recommends referring such questions to the Office of the Australian Information Commissioner.

While detailed energy data does represent privacy risks, it can also deliver significant benefits to consumers and the community. Utilligent does not believe the privacy risks are of a nature to prevent the capture or use of such data, but rather inform the need for strong privacy protections to be incorporated into the data sharing frameworks, ranging from informed consent, to technical protections upon the data itself. Utilligent recommends robust cybersecurity and privacy frameworks be incorporated by design into all aspects of the CDR reforms and associated standards. This should include assessing international best practice standards for suitability (such as the NIST Cybersecurity Framework[25], the Australian Government Information Security Manual[26], or the EU handbook on security of personal information[27]) as well as emerging standards and frameworks, such as the NIST Privacy Framework[28] or the ACS Privacy Preserving Data Sharing Framework.[29]

Some key considerations for the implementation of a privacy framework should include (this is not an exhaustive list of considerations):

- consent, including authority to provide consent, informed nature of consent, duration of consent, uses and distribution covered by consent, and revocation of consent;
- data minimisation, including the possibility of different versions of a dataset for different purposes (e.g., for purposes that don't require the complete dataset in

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[25] National Institute for Standards and Technology. *Framework for Improving Critical Infrastructure Cybersecurity.* 16 April 2018.

[26] Australian Signals Directorate. *Australian Government Information Security Manual.* October 2019.

[27] European Union Agency for Network and Information Security. *Handbook on Security of Personal Data Processing.* December 2017.

[28] National Institute for Standards and Technology. *NIST Privacy Framework: A Tool for Improving Privacy Through Enterprise Risk Management (Preliminary Draft).* 6 September 2019.

[29] Australian Computer Society. *Privacy Preserving Data Sharing Frameworks: Report on July 2019 Directed Ideation # 2 Series.* 9 August 2019.

full granularity, a version of the dataset that has been masked in one or more ways may be provided instead);

- data masking, covering aggregation, anonymisation, and other related techniques;
- compliance, including whether specific standards should be dictated for participants and whether a form of certification should be required; and
- breach management, including notification requirements.

As always, any frameworks developed and implemented must also ensure compliance with Australian Privacy Act 1988 (Cth). However, consideration must also be given to state and territory-based privacy legislation, which may apply to participants in the National Electricity Market.

Question 7: How long do retailers and/or metering data providers store metering data on a specific customer or site?

Utilligent has no input toward the specific question asked. However, we would like to note that the duration this data should be held for may change depending on the specific use cases Treasury decide to support under the CDR reforms.

Question 8: Is there commercial value in allowing consumers to port their historic metering data (and other data as appropriate) to a new retail service provided when they switch to a new product? Are there other solutions that may be more appropriate?

Utilligent believes that porting historical metering data to a new provider does not add any value as part of a simple retailer switch use case. However, it is possible that switching retailers may involve multiple use cases defined in this document. For example, the product the consumer switches to may include aggregation services that utilise historical data to build a consumer profile and minimise the impact of discharge or demand response events. In this case, the new retailer may (legitimately) desire access to the historical data for the purposes of pre-training their product model for the consumer (which in turn could lead to better consumer outcomes).

Customer Provided Data

Question 9: What data do market participants use to on-board a customer and what data is required to support efficient switching between different retail electricity service providers?

Utilligent has no input toward this question.

Billing Data

Question 10: How is retail customer billing data shared between market participants now, and is there a general industry standard for billing information?

Utilligent has no input toward this question.

Question 11: What consumer use cases might the priority designation of retail billing data support through the CDR?

Utilligent believes the following use cases (further detailed in Appendix A) would be supported through the priority designation of retail billing data through the CDR:

- Model Training
- Plan Comparisons and Recommendations
- Solar and Battery Sizing

Utilligent would like to note that where detailed smart meter data is available, that meter data would provide more value than historical billing data (under most use cases). However, billing data may be a suitable alternative where meter data is for a more limited period or unavailable for other reasons.

Retail Product Data

Question 12: Would designation of all product data classes currently held by the AER and Victoria EnergyCompare be sufficient to support basic comparison and switching use cases? Should product information tailored to individual consumers also be designated?

Based upon the information provided in the discussion paper, Utilligent believes the data held by the AER and the Victorian EnergyCompare would be sufficient to support the energy plan switching use case.

In regard to the Plan Comparisons and Recommendations use case, Utilligent believes this data would be largely sufficient. Including tailored product data represents a risk as it potentially exposes personally identifiable information in a way not anticipated by the identified individuals and could increase the risk exposure faced by individuals. Utilligent suggest that:

- if the consumer requesting a product comparison is currently on a tailored plan, that tailored plan data must be provided to the comparison service and the consumer should be adequately informed that this is happening; and
- tailored plans may be included in the retail product dataset only if they have undergone sufficient masking to ensure the individuals those plans are provided to cannot be identified.

Register of Distributed Energy Resources

Question 13: What other use cases do stakeholders consider may be supported by the designation of the Distributed Energy Resources Register as a priority dataset?

Use cases that could benefit from access to the data designated for the Distributed Energy Resources Register include (see Appendix A for complete descriptions):

- Model Training
- Plan Comparisons and Recommendations
- Solar and Battery Sizing
- Tailored Energy Plans
- Adjacent Services
- Virtual Power Plants and Demand Response Schemes
- Equipment Monitoring and Asset Health Check
- Complex Tariff Structures

Note: several of these use cases would be significantly enhanced if DER monitoring data (e.g., from a smart inverter) were also available under CDR.

What Electricity Datasets are Proposed to be Covered Under the Initial Energy CDR Rules?

Question 14: Does this table accurately map the holders of the various classes of data described in this paper? If not, what classes of data do you not hold, or what qualifications would you place on the categories of data held?

Utilligent has no input toward this question.

Complex Energy Datasets for Future Implementation

Question 15: What other datasets do stakeholders believe should be considered for future implementation? Is there a strong case for bringing implementation of these datasets forward?

Beyond the missing NMI standing data identified above, Utilligent believes the primary dataset missing from this discussion paper is related to distributed energy resources. The Distributed Energy Resources Register will provide a valuable dataset for DER standing data: it will provide information on what DERs are connected to the network. But it will not provide real-time operational data on those DERs that will be necessary to improve network stability or deliver the next generation of energy services. At a minimum, Treasury should consider including time-series dispatchable resource[30] data for DERs within the intended scope of the CDR reforms. Ideally, this data would be available in real-time for network and service operation and as a historical dataset for research, planning, and model training. This data will become mandatory if DERs are to be used for network balancing and stability, as suggested by the UK Energy Task Force[31] and the AEMC.[32] It will also enable (or enhance) a range of services aligned to the use cases we have identified, such as:

- Model Training,
- Plan Comparison and Recommendations,
- Home Automation and Optimisation,
- Tailored Energy Plans,
- Virtual Power Plants and Demand Response Schemes,
- Equipment Monitoring and Asset Health Check,
- Outcomes as a Service,
- Complex Tariff Structures, and
- Peer-to-Peer Trading.

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[30] Utilligent defines DER dispatchable resource as stored energy that can be used on-demand and dispatched at the request of network operators or approved energy service providers.

[31] Sandys et al. *A Strategy for a Modern Digitised Energy System: Energy Data Taskforce Report.* Energy Systems Catapult 12 June 2019.

[32] Australian Energy Market Commission. *Integrating Distributed Energy Resources for the Grid of the Future.* 26 September 2019.

APPENDIX A: CDR Use Cases Highlighted in this Response

The following table provides a description of each of the use cases identified for this response. This list of use cases is not presented in any order and Utilligent have not attempted to quantify the total value of any use case. Rather, this list is an exploration of possibilities to help inform the current discussion.

Table 2 Use cases

Use Case	Description
Model Training	There are an increasing number of consumer products and services available in the market that utilise data analytics and machine learning to deliver various benefits. For example, analysing consumption patterns and environmental data to optimise the charge and discharge cycles of residential battery installations. These services typically start with a generic model, that must then be trained using captured data from the household—personalising the service to the consumer. By making available historical consumption data via the CDR, it may be possible for such services to pre-train their models on the consumer's own data, reducing the time to benefit.
Plan Comparisons & Recommendations	There are a range of services in market that analyse consumption or billing data and provide the consumer with a comparison of available energy plans, highlighting those that will deliver the lowest energy bills. Most of these services rely on simplistic, coarse consumption data, such as the aggregated consumption data available on retail statements. By making available retail product data and detailed consumer data, the accuracy and value of these services could increase, particularly for households with solar or battery installations.
Energy Switching	Making various datasets available via the CDR could streamline some aspects of consumers switching energy

	providers. However, Utilligent believes this is likely to be of limited value unless one of the other use cases identified in this document is incorporated into the process (such as switching to a new energy provider who needs to pre-train a model as part of the specific product the consumer has selected).
Solar & Battery Sizing	In a similar manner to retail plan comparisons, all solar and battery companies Utilligent is aware of complete an analysis for potential clients as part the pre-sales process. This typically involved using the coarse, aggregated data from the consumer's electricity bills to determine a recommended installation and report on the anticipated return on investment. These assessments are relatively simplistic but could be significantly improved (and automated) if more detailed historical consumption data were available.
Appliance Analysis	Some innovative energy services companies have developed algorithms that can study detailed consumption data and disaggregate patterns, identifying the energy profiles and usage of individual appliances within the household (the US company Sense[33] is an example). Using this data, such services can provide consumers with more accurate visibility of their consumption patterns, provide detailed recommendations to improve energy efficiency (and reduce bills), and even identify issues with appliances. To date, such services all appear to rely on behind-the-meter monitoring devices to capture the detailed data necessary to enable this type of analysis, but as smart meters and inverters continue to increase the quality and granularity of data captured, similar services may become possible without the need for separate, dedicated devices.
Home Automation & Optimisation	There are a growing number of services in market who use machine learning and artificial intelligence to automatically optimise energy consumption. Actions affected by these services include (not exhaustive): adjusting charge and discharge cycles for battery

[33] https://sense.com

	installations; switching solar generated power between self-consumption and grid-export; activating specific appliances only during periods of grid export (e.g., EV charging[34]); and controlling appliances (e.g., pool pumps, HVAC, etc.). These services are rapidly converging with the home automation market and Utilligent expects these mass consumer automation platforms will soon integrate or incorporate energy optimisation products and solutions.
Tailored Energy Plans	Some business models are emerging where consumers are offered a tailored tariff in return for their participation in a virtual power plant (VPP) or demand response scheme. This is in contrast to the (currently) more prevalent model of providing rebates in return for each discharge/response event. Such tailored plans are simpler for consumers to understand and make their savings clearer but are not possible if the energy services company doesn't have access to detailed consumption data to calculate household profiles. These profiles allow the companies to calculate the likely quantum of participation in VPPs or demand response schemes and therefore the returns, which is necessary before a tailored tariff can be determined.
Adjacent Services	There is the possibility of CDR data being applied in contexts outside the energy sector that may be worth considering in the scope of future benefits. For example: • By analysing longitudinal consumption data for a household, it should be possible to calculate property energy efficiency ratings that may prove useful in property valuations. • By analysing metering data, it may be possible to inform property usage models that support the development of more personalised insurance policies.

[34] https://myenergi.com/product/zappi/

Virtual Power Plants and Demand Response Schemes	Virtual power plants (VPPs) and demand response schemes leverage excess (or discretionary) energy storage and consumption to either: sell excess power on the wholesale market during periods of high wholesale prices; reduce costs by self-consuming stored energy (or reducing consumption) to avoid periods of high wholesale prices; or to improve network stability.[35,36] Many VPPs and demand response schemes are being run directly through energy providers, but others are designed to operate independently. They typically gain access to the necessary data through a direct relationship with the consumer and device manufacturers (such as smart inverters). However, there may be benefits in making some aspects of consumer and network data available to these providers via the CDR.
Equipment Monitoring & Asset Health Check	Some assets, such as solar panels, can be assessed for performance remotely—if the right data is available. For example, by combining asset installation data (available in the proposed Distributed Energy Resources Register), generation data, and weather data, it should be possible to determine if the panels are generating as much energy as they should.
Security Monitoring	With access to detailed energy consumption data, it would be possible to augment traditional security monitoring by identifying inexplicable energy patterns. This could be as simple as active energy consumption while the residents are indicated as away, through to identifying anomalous behaviour patterns which could indicate a range of circumstances, including: • intruders, • damage or vandalism, or

[35] Australian Renewable Energy Agency. "AEMO to trial integrating Virtual Power Plants into the NEM". 5 April 2019. https://arena.gov.au/news/aemo-to-trial-integrating-virtual-power-plants-into-the-nem/

[36] Australian Renewable Energy Agency. "$12.5 million boost to virtual power plants". 30 May 2019. https://arena.gov.au/blog/12-5-million-boost-to-virtual-power-plants/

	• equipment faults.
Outcomes as a Service	As the energy sector transforms, we have seen a new class of energy service emerge: "outcome as a service". Under this model, consumers are provided services that typically consume significant energy as a flat-rate service that includes the cost of the equipment and electricity in a single fee. For example, some energy services companies can now offer heating as a service, where consumers pay a flat fee to heat their house and do not pay for the electricity required to run their household heating appliances and infrastructure.
Complex Tariff Structures	The electrification of everything is driving the development of new forms of energy tariffs. For example, some energy providers now offer a separate electric vehicle charging rate in addition to their regular household tariffs. Another driver of more complex tariffs has been the increasing penetration of DER within distribution networks, leading to capacity issues within those networks. One response by DNSPs has been to develop dynamic export restrictions for residential solar, such as the framework to be implemented by SA Power Networks in the 2020–2025 regulatory period.[37]
Peer-to-Peer Trading	Peer-to-peer trading, or the ability for retail customers to sell their excess electricity (generated through DERs) to other retail customers, has been raised as a possible future feature of the NEM.[38]

[37] Australian Energy Market Commission. *Integrating Distributed Energy Resources for the Grid of the Future.* 26 September 2019.

[38] Ibid.

APPENDIX B: About Utilligent

GLOBAL OFFICES

- Los Ange es
- At anta
- Boston
- Ch cago
- Co umbus
- Da as
- Me bourne
- Sydney
- Hobart

FACTS

- A spec a ty strategy, operat ons, and techno ogy adv sory f rm focused on te co, ut t es, and nfrastructure owners.
- 100+ team members.
- G oba Headquarters n Los Ange es.
- APAC Headquarters n Me bourne.
- MBE/WBE Cert f ed.
- Leadersh p cons sts of exper enced and seasoned C eve execut ves from the ut t es, consu t ng, and techno ogy ndustr es.
- Cons stent year over year steady growth s nce ncept on.

HIGHLIGHTS

- Key eadersh p ro es on two of the argest AMI efforts n North Amer ca.
- Led argest p pe ne ntegr ty project n the Un ted States.
- He ped des gn and dep oy the Best Ut ty Webs te n North Amer ca.
- Project managed & arch tected most successfu EAM & ERP SAP mp ementat on n the Un ted States.
- He ped operat ona ze ut ty CEO's v s on of the Ut ty of the Future.
- Led severa IT transformat on and app cat on rat ona zat ons n support of operat ona exce ence.

Figure 3 Utilligent Key Facts

Utilligent are a utility-focused consulting organisation delivering services across strategy, advisory, transformation, and technology. Our consultants have a long history of working in utilities and across solution delivery.

In the Asia-Pacific region, we are focussed on the digital transformation currently underway in utilities, delivering solutions supporting operations management, field service management, project and portfolio management, process re-engineering, API development and data integration, engineering, and visualisation.

CORPORATE & BUSINESS STRATEGY — Growth Strategies, Regulatory Strategy, Capability Development, Business Cases, Rate Cases, Strategic Sourcing

CUSTOMER ENGAGEMENT
- Improving the Customer Journey
- Digital Customer Experience
- Customer Excellence Technologies
- Customer Segmentation & Behavioral Analytics
- Customer Operations

UTILITY OPERATIONS
- Work & Asset Management (WAM)
- Scheduling & Dispatch
- Field Operation/Mobility
- Geo Information Services (GIS)
- Outage Management
- Load Management
- Gas Pipeline Integrity

INTELLIGENT NETWORKS
- Automated Metering Infrastructure (AMI)
- Digital / Smart Grid
- Grid Automation
- Grid Management Systems
- IT and Operational Technology (OT) Convergence
- Intelligent Water Networks

MARKET INTEGRATION
- Demand Response
- Energy Efficiency
- Distributed Energy Resources (DER)
- Virtual Power Plants
- Beyond Grid Edge

GOVERNANCE, RISK & COMPLIANCE
- Enterprise Performance Management
- Operational Risk & Compliance
- Regulatory & Policy Strategy
- Corporate Communication

BUSINESS TRANSFORMATION — Architecture, Business Analysis, Human Centered Design, Analytics, Testing, Program & Project Management, Enterprise Change Management

Figure 4 Utilligent Services

Utilligent's expertise covers all aspects of a modern digital utility. We have leveraged this expertise to develop our market-leading U30 digital utility model. This model covers all facets of the digital utility of 2030 and provides a powerful foundation for any enterprise seeking to develop a utility business.

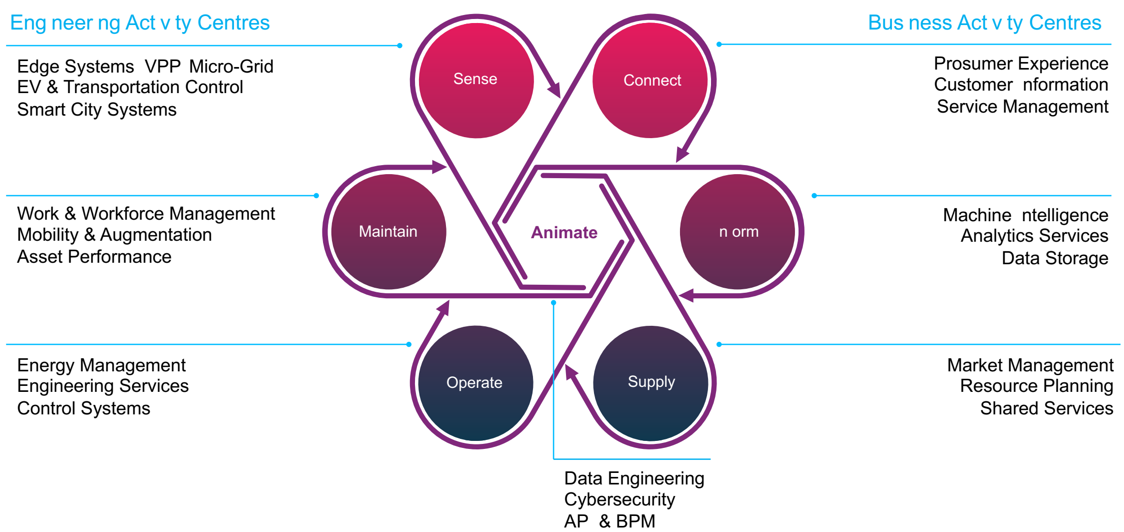

Figure 5 Utilligent U30 model

With Utilligent, you're not just getting technology consultants, you're getting industry experts who not only understand your technology requirements but also understand the criticality of the services you're delivering to your customer.