Victoria – The Smart State

In July 2016 I first wrote[1] about the potential for Victoria to leverage its investments in advanced metering infrastructure to become a *smart state.* One year later, in July 2017, I wrote[2] about this same opportunity. In this paper I describe how the Victorian Government may be able to better serve the residents and businesses of Victoria by becoming a Smart State. Taking a more holistic approach to its investments in advanced metering infrastructure, rooftop solar incentives, and any future incentives to promote the adoption of distributed energy resources, could help materially reduce energy costs to the State's energy consumers.

Australia is leading the world with one in four households having rooftop solar, equating to two million installations[3]. In addition to rooftop solar, the signs are Australia will scale out its adoption of other distributed energy resources such as battery storage, electric vehicles, and the connected home. A recent publication[4] stated Australia would have the world's most distributed grid by 2020.

At a National-level, there is a drive to introduce regulatory changes to allow multiple trading contracts. In other words, a consumer could sign-up to one service provider to buy power and sign up to another to sell the energy they generate from their rooftop solar or save from taking part in a demand response event.

Closer to home in Victoria a recent $1.24 billion funding initiative by the Labor government[5] will see 650,000 Victorian households with the new solar solution over the next ten years.

While such rapid adoption of distributed energy resources is an exciting development to help consumers reduce their energy bills and their impact on the environment, there are underlying risks that if not addressed could result in problems for consumers in years to come. We must remember, Australia leads the adoption of distributed energy resources within a liberalised market. This leadership position means we can only learn from our own mistakes as others have not gone before us.

There are three emerging risks for consumers that could have quite dire consequences at scale.

Firstly, there are no standards for distributed energy resources or demand response.

Imagine a consumer signing up with a service provider to sell excess energy to the grid. The service provider will pay that consumer more money if they can control when the energy is produced, how much is produced, and how long it is produced. To achieve this level of control, the service provider will need to install a device or devices at the consumer's home or business. Such a level of investment in labour, education, and the equipment itself need to be recouped. The service provider will do this by either trying to sign the consumer up to a contract or include an exit fee.

Now imagine the consumer is a few months into their arrangement with the service provider and they want to sign-up with a different service provider who is offering a better deal. Because there are no technical standards, it is unlikely the new service provider will be able to use the technology installed by the previous service provider. So, what happens? The existing service provider needs to be contacted to uninstall the device or devices, and the new service provider needs to come in and install their new device, or devices.

[1] https://www.waynepales.com/is-victoria-missing-an-opportunity-to-create-a-smart-state/

[2] https://www.waynepales.com/is-this-victorias-time-to-shine/

[3] https://reneweconomy.com.au/two-million-australian-households-now-have-rooftop-solar-and-they-vote-90424/

[4] https://www.aemo.com.au/-/media/Files/Electricity/NEM/DER/2018/OEN-Final.pdf

[5] https://www.premier.vic.gov.au/cutting-power-bills-with-solar-panels-for-650000-homes/

If we look at most energy consumers across Australia, they rarely switch energy retailers even though there are much better deals out there, despite there being low barriers to switch. Now imagine a consumer who has spent time and money on having their home physically connected to a service provider's demand response system. It would need to be an incredibly attractive offer for that person to go through the time and money to move from their existing service provider. This lack of standards would directly impact the effectiveness of competition.

Secondly, relying on public communication networks to control the dispatch of energy.

While public communication networks are becoming more reliable, they do still fail[6]. For distributed energy resources to play an active role in energy markets the communication networks much be secure and reliable, so the energy aggregator can guarantee they have control over the consumer's equipment when they need it.

Finally, there may be a lack of focus on the local power network, which may lead to higher costs.

To my mind, the most concerning issue is the lack of focus on the local network. Often the most significant component of a consumer's energy bill is the network cost. There is an opportunity with distributed energy resources and demand response to optimise the network, deferring or altogether abandoning the need to make certain infrastructure upgrades, in turn driving down the network charges a consumer needs to pay. With a purely market-led approach where a consumer can change service providers, a Distribution Network Service Provider (DNSP) can never be sure they will have secured sufficient demand-side capacity, and so the default position will continue to be to build more infrastructure.

For example, let's assume a DNSP has secured enough demand-side capacity to ensure they can avoid upgrading a transformer on their network. Now let's consider several consumers are deciding to leave the DNSP's demand management plan to sign-up with other service providers, for the sake of this example we can call these *network defectors*. Let's assume these *network defectors* reduce the Megawatt (MW) under management by the DNSP to the point that the transformer now needs to be upgraded. The question needs to be asked, is the small increase in financial benefit to these individual *network defectors* a better outcome overall than having avoided a transformer upgrade and remove those costs being passed on to everyone, including vulnerable consumers?

An alternate approach that could drive down energy costs for all Victorians

Victoria is in a unique position to not only mitigate the risks described in this paper, but to lead the world in demand management ensuring energy decisions are in the best interests of its residents and businesses and not for the shareholders of large corporations.

In 2009, Victoria's DNSPs, under the instruction of the State government commenced the rollout of smart meters. For a variety of reasons, there has always been a perception that the smart metering program never delivered a return on investment for Victorian taxpayers. What many people don't know is to support the smart meters, the DNSP's rolled out a state of the art IPv6-based mesh network. A network designed to go beyond smart meters and support smart cities, designed to act as a secure and reliable communications backbone for the Internet of Things.

There is an opportunity for a consortium, including but not limited to the Victorian Government and the Distribution Network Service Providers (DNSP) to deliver a single

[6] https://www.abc.net.au/news/2018-05-21/telstras-mobile-services-back-to-normal-levels-after-outage/9782754

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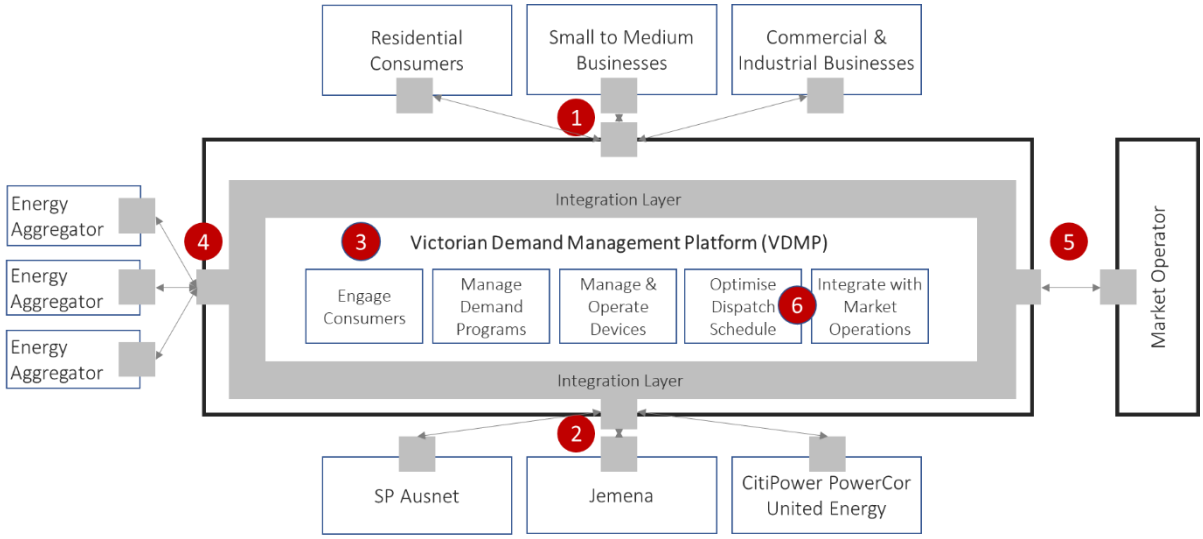

Figure I: Victoria's Demand Management Platform (VDMP)

State-wide Demand Management Platform that will mitigate the risks flagged in this paper and drive down energy costs for all Victorians while supporting competition. Figure I, above, shows the key components of the Victorian Demand Management Platform (VDMP) and how those components deliver benefit to consumers.

There are a handful of simple principles that shape the design of the VDMP:

1. Reducing Victorian Energy costs are a priority
2. Ensuring Victorian's are not *locked-in* to service providers when looking to sign-up to sell their excess energy or take part in demand response programs
3. Extract the most value from Victoria's investment in its smart metering infrastructure
4. Extract the most value from Victoria's planned investment in funding 650,000 Victorian's have rooftop solar, and any future incentives for the adoption of distributed energy resources (DER).

The VDMP is based on these four principles and delivers the following benefits (each of the points below corresponds to the same number in Figure I above).

1. Device Connectivity – Providing a standard, secure, low-cost platform for third-party providers of distributed energy resources to connect to the grid.
2. Victoria's Smart Metering Network – Leveraging Victoria's State-wide smart metering network, to deliver a low-cost, reliable, and secure mechanism to remotely control distributed energy resources.
3. Centralising Core Functions – Reduce the costs of providing demand response services by centralising them into a single State-wide function.
4. Increase competition – Remove the ability for energy aggregators and energy retailers to *lock-in* customers.
5. Market Operations – The market operator would only need to interact with a single entity for demand management.
6. Service Stacking - Leveraging the full capacity available with both distributed energy resources and demand response through service stacking.

A Staggered Approach

Moving to the VDMP in a single step will likely be met with much resistance. A staggered approach could be considered. Instead of it being rolled out at State-level, it could be rolled out at the DNSP-level, refer figure II below. As figure II shows, while you would lose the benefits associated with centralising many of the demand management capabilities, and some of the benefits rationalising the number of service providers who need to engage the market operator, all other benefits would remain. The success of the staggered approach would require all DNSP's to agree on leveraging their existing advanced metering infrastructure to create de facto standards. Then the transition to the VDMP would become a relatively simple one over time.

In conclusion, there is no global *best-practice* on how distributed energy resources should be integrated into the market and the power grid to deliver the best outcomes for consumers. Everyone is finding their way. The logical thought is always to turn to open market design.

While a market-led approach is usually the right principle, we need to factor in risks, such as the lack of mature standards, and the expectation that most DER will leverage public communication's infrastructure, and question if the timing is right for a pure market-led model. The current thinking ignores the unique position Victoria is in where they already have a state of the art, secure and reliable mesh network. The mesh network is designed to enable any third-party provider of distributed energy resources to connect to it.

Do you believe the ideas described in this paper could deliver demand management services to Victorians at a lower cost, and in a more reliable and secure manner than the alternate options?

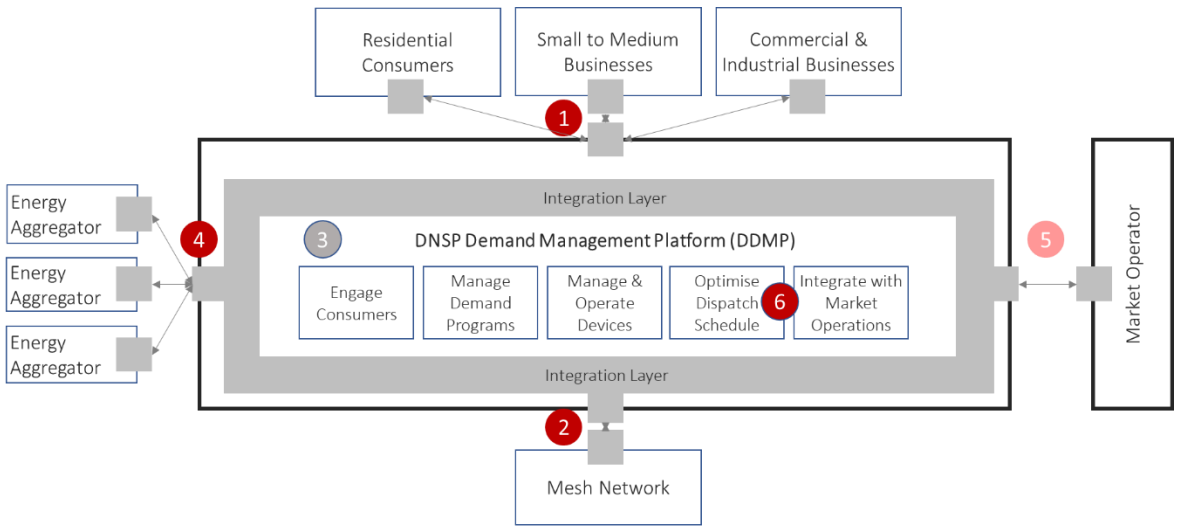

Figure II: DNSP Demand Management Platform (VDDMP)