AMS
International Technologies

Energy White Paper Taskforce
Department of Industry
GPO Box 1564
CANBERRA ACT 2601

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Attention Ms Margaret Sewell

Dear Ms Sewell

AMS International Technologies welcomes the opportunity to make a submission in response to the Federal Government Department of Industry Energy White Paper issued in December 2013.

We greatly value the ability to provide input into this critical undertaking based upon our industry insights into the National Electricity Systems & Grids and set against our extensive understandings of both Australian and International technologies within this field.

Should you have any questions or comments in relation to this submission, please contact
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Yours sincerely

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Introduction

As a participant and observer in the electricity market, AMS has developed insights into the critical role of smart metering/smart grid infrastructure. The early deployment of this infrastructure is a pre requisite for the efficient and timely transformation of the electricity sector to improve its efficiency and fairness to the benefit of consumers and businesses and hence the wider economy. It urges the Australian government to develop an integrated policy package to support early and efficient deployment of smart metering.

The Need for Australian Government Intervention

There are a number of barriers that prevent change market led change. These include the existence of statutory monopolies for the transmission and network businesses, including metering services in most jurisdictions. Continuing ownership of network assets by some State governments may also represent a barrier to timely and efficient change. Further barriers arise due to the fact consumers do not have timely access to consumption information, as a result of which electricity suppliers tend to have market power.

The existing regulatory architecture relies primarily on the States and jurisdictions to drive change. With the exception of Victoria, which implemented the AIMRO based mandated deployment of smart meters, the experience so far with respect to the adoption of modern metering and effective retail competition suggests the States and Jurisdictions are either lacking the enthusiasm for driving change or had limited success in driving change.

Policy development to support a timely and efficient national smart metering roll out has been slow and policy targets have regularly been missed. Benefits have been under stated, while costs have been over-stated. Links between smart metering and effective retail competition have been missed. Links have also been missed between smart metering, pricing reform and the efficient adoption of new and emerging energy technologies. In the absence of smart metering and pricing, there is likely to be excessive investment in network infrastructure and various combinations of delayed and premature adoption of new technologies, such as solar PV and battery electric vehicles.

Problems with Inherited Policies (SCER)

Inherited SCER policies with respect to Demand Side Participation are in AMS' view deficient in a number of ways. These include:

- The notion that adoption of smart metering should be optional. In a heavily regulated industry, with a high level of market concentration, this policy approach is unlikely to result in the widespread adoption of smart metering (especially alongside the idea that use of interval data to settle the market should also be optional). The present policy position merely entrenches and reinforces existing inefficiencies. It removes the impetus for more efficient and competitive retail prices. The policy position is therefore inimical to energy security and competitive energy markets.
- The notion that the use of smart metering data to settle wholesale markets should be a matter for each jurisdiction. Again, this retrenches and reinforces inefficiencies. It removes the financial incentive to deploy smart meters and the impetus for more efficient and competitive retail prices.

To be clear, AMS supports the removal of the current arrangements for mandated monopoly smart metering exclusively by distributors (under the Smart Meters Act). Those arrangements were clearly in error. The inherited SCER policy, however, goes too far in the opposite direction.

Smart metering is necessary for more efficient retail and network tariffs required to address falling electricity infrastructure productivity. It offers the potential to reduce existing cross subsidies that encourage inefficient electricity use. It also offers the potential to empower consumers and thereby drive competition, lower costs and lower prices. Smart metering also provides the communications and control infrastructure essential to the adoption of distributed generation and battery electric vehicles. In the absence of this infrastructure, there are significant risks to energy security and economic growth objectives.

Need for Leadership and a New Direction from the New Government

Leadership from the Australian Federal Government is necessary to overcome the barriers and obstacles and make right the errors in current policy directions. The Australian government has limited direct levers, including its leadership of SCER.

In AMS' view, the Australian government should consider reverting to tying Commonwealth Grants with energy market reform. History suggests that Tied Funding was essential in the formation of the national energy market and the elimination of the former state monopolies. The reform experience since tied funding ceased has been disappointing.

Some Specific Policy Directions for Consideration

AMS commends the government consider the following policy initiatives in the course of the 2014 Energy White Paper process:

1. Support far reaching reform of network pricing to remove existing cross subsidies between different consumers (for example air conditioning, Solar PV and geographically.) Cross subsidies lead to inefficient investment and costs, creating a burden for consumers, businesses, and the economy. It may also lead to the economic stranding of significant network infrastructure, depending on future market and technology developments. Smart metering data is a pre-requisite for efficient pricing.

2. Initiate a review of the current regulatory framework whereby the present allocation of risk between network businesses and customers (strongly in favour of network businesses) is reviewed. There is a significant risk the present allocation yields a systematic over-investment in traditional grid infrastructure that may in the future be stranded due to market, consumer and technology change. The scope of network statutory monopolies should be reviewed - for example monopolies over network connections in jurisdictions other than NSW should be removed. Consideration of other areas where networks could be subject to competition should also be considered - for example the UK model whereby local networks may be owned and operated independently (last mile competition).

3. Consider setting a strict time limit for decisions on smart metering deployment: Use funding and other levers to change regulatory framework so as to set a sunset date for use of non-interval meter data (dumb meters) for settling the wholesale market, say by 30 June 2020. From that date, metering data must be of half hourly resolution and must be submitted to the market within 24 hours in the normal course of business (with very limited exemptions).

This means retailers will need to arrange for the installation of smart metering for all customers before this date. Smart meters will be funded from within retail prices (rather than as regulated charges). Where smart meters are deployed inefficiently, investors in retailers, networks and metering companies, not consumers, will bear any cost overruns.

4. Support effective and timely consumer access to consumption data, so they can manage their consumption in real time and retail competition can be effective. At present, retailers have significant market power and are able to extract significant rents from consumers, especially in jurisdictions without regulated price caps. Timely data access requires smart meters (point 3) and is a pre-requisite for removal of remaining regulated retail price caps without detriment to consumers.

The Way Ahead

We suggest that in the course of developing its White Paper, the Australian government give consideration to the initiatives identified above and significant operational issues that will have substantial impact on growth of the Australian economy, security of energy supply, energy productivity and adoption of alternative energy. AMS would welcome the opportunity of engaging in further exchanges of perspectives and information in the course of the development of the White Paper. AMS has access to some market insights and proprietary information that may be relevant to the policy development process.

Significant Real-life Grid Issues

1 Investment Recovery Model for Power Distributor

Current Investment Recovery Model for Power Distribution Businesses has no mechanism for Power Distribution Businesses to bear the risk associated with investment decisions that result in an over capacity in the network. In the current regulatory environment where a demand forecast is made and investment approved by the regulator all the risk for a return on the investment is borne by the Power Distribution Businesses customers. This is an unusual situation in a free market economy.

Currently if energy consumption does not meet the forecast, the price to the consumer is increased. These increased prices will make alternatives such as Photovoltaic (PV) more attractive for those with the resources available. It also leads to more rationing by the economically disadvantaged. Potentially creating a spiral of falling demand. This lack of a mechanism for writing off unwise expenditure by the Power Distribution Businesses is impacting on the following issues

Energy security: Commercial Investment decisions are being made by the best-informed members in the decision making process. But they bear no downside risk in the event of an incorrect investment decision. It can be expected that this situation as a method of process will lead to an over-investment, which is the situation that currently exists in the NEM and consumers are paying the price.

Growth of the broader economy; The overinvestment in the last five years in distribution infrastructure has led to a large increase in the price of power. Energy is a fundamental input to the wealth creation process. Energy that is more expensive than necessary has by definition a negative impact on the broader economy.

Ability to integrate new and alternative energy sources into the gird; Investment over the last 5 years has been focused on increasing reliability of the network and its ability to continue to supply power to all consumers under peak demand conditions driven by extreme weather conditions and the growth of domestic Air Conditioning. In parallel with this, both State and Federal government policy to promote the deployment of renewable energy has seen the number of small scale roof top PV installations grow from about 6000 in 2007 to in excess of 1 million today. The presence of large scale domestic PV is fundamentally changing the mode of operation of the Low Voltage (LV) distribution network.

Evidence of this change can be easily seen particularly in the daily demand profile in the Queensland network where on hot days the demand flat lines from 10 am until after 4 pm then starts to peak as the sun goes down.

Anecdotal evidence from within some Regional and Stated based Power distribution Businesses that suggests that current control systems designed to manage a network of 1 million plus energy consumers and about 10 to 20 large energy sources are ill suited for one that has in excess of 340k unmanaged domestic power sources plus the 10 to 20 large ones.

The presence of PV means some LV networks are net suppliers to the grid whilst others are not. Due to limitation with current instrumentation systems it is understood that the grid operator is unable to ascertain which is which in real time. This limitation can under certain circumstance undermine the stability of the gird a whole.

As such investments maybe required to ensure that the Regional and the Stated based Power distribution Business can continue to manage their Regional State based Network. It has been suggested that the political requirement to minimize investment in the network because of the way it flows thru to higher prices for consumers is limiting appropriate enhancements to enable the timely management of distributed generation

It is suggested that the Federal Government needs facilitate an update for the funding model so that the Power Distribution Businesses bear an appropriate level of risk for investment decisions that they make. When the builders of the various toll roads got the usage forecasts wrong, the toll road operator could not put an additional charge on all road users. Why should Power Distribution Businesses enjoy this privilege ? This policy initiative may need to include providing funding for a transition process and changing regulation to enable Demand Response and deployment of smart meters to ensure that the consumers are fully informed about their energy consumption

2 Impact of Unmanaged Consumer Driven Investment in Residential Photovoltaic / Solar Power Installations on Network Stability

Impact of unmanaged Consumer driven investment in residential Photovoltaic / Solar Power Installations on the Low Voltage network and the ability of the Power Distributors to maintain Network Stability.

It is becoming apparent in many parts of Australia that the continuing growth of residential Photovoltaic / Solar Power Installations are having substantial effects on the Power Distributors ability to manage their Local Area Low Voltage Networks.

In summary the Power Distributors are finding that within a geographic region depending upon the concentrations of Photovoltaic / Solar Power Installations there will be great variances in terms of Load concentrations, some local areas will be

contributing power back to the Network through the collectively outputs from the micro-generators (rooftop Solar / PVs) whilst some local areas will be moving towards Peak Load status.

The fundamental issue is that the Grid Operators (Power Distributors) do not have visibility of these substantive variances across their entire Network and under conditions of nearing Peak Load, requiring the shut down of some Local Area Low Voltage Networks the Grid Operators will be effectively working blind. This could have disastrous outcomes, by shutting down a local area without complete knowledge, they may inadvertently be shutting down a Local Area Low Voltage Network that was actually contributing power to the grid, thereby increasing the overall load on the entire network and increasing the degree of network instability.

The Federal Government needs to ensure network stability is a major priority issue as increasing network stability and reducing the resultant shut-downs will impact on energy security, and energy and workforce productivity.

Evidence

Analysis and Management of the Impacts of a High Penetration of Photovoltaic Systems in an Electricity Distribution Network by S. J. Lewis, Engineer, Endeavour Energy (previously known as Integral Energy)
http://www.ceem.unsw.edu.au/sites/default/files/uploads/publications/AnalysisandManagementofPVsystemswithIEEEcopyright.pdf

Solar Power Integration Challenges: Intermittency and Voltage Regulation Issues by Dr. Mahmoud B. Zayan
http://www.saudiaramco.com/content/dam/Publications/Journal%20of%20Technology/Spring2013/Article_13.pdf

Overcoming Solar PV Grid Issues Urban Areas by international Energy Agency
http://www.iea-pvps-task10.org/IMG/pdf/rep10_06.pdf

High Penetration of Photovoltaic (PV) Systems into the Distribution Grid by U.S. Department of Energy Office of Energy Efficiency & Renewable Energy, Solar Energy Technologies Program, Systems Integration Subprogram
http://www1.eere.energy.gov/solar/pdfs/pv_grid_penetration.pdf

3 Not waiting for a Cataclysmic Event as the Catalyst for Change within the Electricity Network

Imperative of not waiting for a compelling event within the Electricity Network to provide the catalyst for change:

The fundamental changes that have recently occurred to the production and consumption of electricity have primarily been driven by the wide scale deployment of domestic Air-conditioning and roof top PV.

The impact of these changes are compounded by the reduced effectiveness of domestic storage hot water as a load that could be managed by the Power Distribution Businesses via either timers or ripple control to mitigate the size of network peak demand. A very recent example of the impact of this reduced scope for the Power Distribution Businesses to effectively manage peak load occurred in mid Jan 2014 in Victoria.

When issues occurred on the supply side with a couple of generators being unavailable and hot temperatures were experienced in Victoria the only tool available to the Victorian Power Distribution Businesses to maintain network stability was mass disconnection of customers.

On the 15th some customers lost power, it was expected that in excess of 100k customers would be disconnected on the 16th and a call went out to consumers to limit their use of A/C.

Fortunately this heat wave event was during the xmas/ new year industrial shutdown, hence the load was lower than a normal weekday, Alcoa reduced its consumption of power the peak was a little lower than expected and the major outage didn't occur.

However, we may not be as fortunate next time leading to a major outage which may lead to rolling blackouts and serious disruption to industry and transport dependent upon a reliable supply of electricity. Such an event will provide proof positive of the need of a call to action by out political and business leaders. However, this will only be the start of the crisis as it will take several years to deploy the systems and infrastructure required to ensure that the Power Distribution Businesses have the appropriate information and tools to ensure that they can manage the network in times of stress.

Whilst this remedial work occurs which can reasonably be expected to take several years there will be inevitable flow on impacts to growth in the economy as a whole and potential damage to electrical equipment as a result of reduced security of our energy supply.

4 Engagement of Residential Energy Customers – Demand Side Participation

Engagement of Residential Energy Customers in the proposed change process to enable them to become proactive energy aware consumers, aware of the underlying costs on the energy they are consuming and choosing more cost effective use of energy.

To make major shift in reducing Energy Consumption, thereby reducing the potential of Peak Load shut-downs the Federal Government will need to ensure the introduction of two co-jointly linked key initiatives.

Firstly by creating and rolling out nationally an energy conservation programme focused on the residential consumers, establishing the need for the residential consumer to better manage their power choices and reduce their costs in doing so.

Secondly by ensuring the rollout of Demand Side Participation capability thereby enabling the residential consumer to be able to monitor their energy consumption on an hourly / daily basis and to make informed choices on how to best minimise energy consumption. This will require the rollout of smart metering solutions, establishing an in-home energy consumption display.

Currently some vested interests within the Power Distribution and Electricity Retailing sectors are more comfortable maintaining the status-quo and are accordingly downplaying the benefits that will flow from the full introduction of Demand Side Participation whilst at the same time overly emphasising the costs of the roll-out of smart metering technologies.

Globally there are currently smart metering technologies that are internationally standards based that would substantially reduce the costs of rollout and installation of smart metering comparable against the recent Victorian smart meter roll-out.

The beneficial outcomes of undertaking this initiative would be multiple:,

the more informed and enabled residential consumers would reduce energy consumption, thereby reducing potential episodes of Peak Load shut-downs

the Grid Operators would have absolute transparency of their Local Area Low Voltage Networks understanding where the fluctuating load points were and where rooftop Solar PV micro-generation were making a contribution back to the grid, again thereby reducing the potential episodes of Peak Load shut-downs

furthermore the Grid Operators would be able to provide constant feedback to the major power generators on load requirements, thereby more cost effectively managing energy production.

overall there would be improved energy security, improved energy efficiencies increasing energy productivity and better utilisation of alterative energy sources.

Evidence

The Role of Demand Side Participation in Managing Generation Intermittency. Workshop Report
http://www.ukerc.ac.uk/support/tiki-download_file.php?fileId=2220

Realising the Benefits of Smart Meters for Consumers and Industry by ERAA Smart Meter Working Paper 1
http://eraa.com.au/wp-content/uploads/ERAA_WP1-Benefits-of-smart-meters.pdf

Cost Benefit Analysis of Smart Metering and Direct Load Control Overview
Report for Consultation
Report for the Ministerial Council on Energy Smart Meter Working Group by NERE Economic Consulting
http://www.nera.com/extImage/PUB_SmartMetering_ConsumerImpact_Feb2008.pdf

Cost Benefit Analysis for the Comprehensive Use Smart Metering 2012 German Federal Ministry of Economics and Technology by Ernst & Young
http://www.bmwi.de/English/Redaktion/Pdf/cost-benefit-analysis-for-the-comprehensive-use-of-smart-metering-systems,property=pdf,bereich=bmwi2012,sprache=en,rwb=true.pdf

5 Remotely Read Interval Meters as an Enabler for Effective Retail Competition

Remotely read interval meters as an enabler for effective retail competition:

It is currently being suggested that deregulating tariffs will deliver significant benefit to consumers in that it will enable price competition.

We would contend that without deployment of remotely read interval meters the scope for competition between the retailers will be limited to a minor discount around the current regulated tariff. The reason for this is that the fundamental basis for an effective competition is for retailers to be able to develop products that appeal to different consumers because they have differing needs and patterns of energy use.

At this point in the absence of interval meters it is assumed that ALL consumers have the same load and consumption pattern. This consumption pattern known as the Deemed Profile is asserted to be “about 95% accurate”, with most consumers being within +/-5 % of this profile.

Recent studies by Sapere Research Group and others indicate that this assertion significantly understates the variation as it is closer to a 20% variation around the deemed profile and the distribution of these is highly skewed. In effect a relatively small number of customers who are expensive to supply with electricity, in that they have high consumption needs when electricity is costly to produce and their supply is being subsidized by a large number of consumers who have a very stable electricity needs and low cost profile to supply.

We would contend that the only effective way of enabling consumers to identify retailers that are offering products that suit their needs is for the consumer to be fully informed of their energy consumption patterns is by the deployment of meters that provide this information.

Then the consumer will be able to make fully informed choices from the range of products offered. The deployment of these meters combined with the removal of the deemed tariff will in our view provide a far more effective platform for the benefits of competition to flow through to consumers and the wider community.

Evidence

Residential Electricity Tariff Review Report Commissioned by the Energy Supply Association of Australia by Deloitte Access Economics January 2014
https://www.deloitteaccesseconomics.com.au

Scoping study for a consumer energy data access system (CEdata)
by Sapere Research Group August 2012
http://www.innovation.gov.au/energy/Documents/energyMarket/CEdata-scoping-study.pdf

The Smart Grid Opportunities for Solutions Providers 2010
by McKinsey & Company Consulting
https://www.mckinsey.com/

AEMC Review Power of Choice Review Draft Report
Supplementary Paper
Principles For Metering Arrangements In The NEM To Promote Installation of DSP Metering Technology 6 September 2012
http://www.aemc.gov.au/media/docs/Principles-for-metering-arrangements-in-the-NEM-to-promote-installation-of-DSP-metering-technology-2dbde592-1280-4c4f-8c00-380889b4122f-0.pdf

6 New Technology Deployment:- Utilisation Power Storage and Electric Vehicle Latent Power Storage Capabilities

Deployment of new technologies such as Electric Vehicles (EV) and Distributed Power Storage in addition to PV and their potential impact on the Power Distributor to maintain reliability of supply and network stability with a focus on following issues.

With the every increasing interest in EV combined with their production costs becoming evermore cheaper, their touring range substantially increasing and most importantly their exceptionally cheap costs of fuel in comparison to petrol / diesel will lead to the greater adoption of EVs by the general populace. The impact of this would be significant.

It has been estimated that one EV on fast charge is equivalent to a small “McDonalds Restaurant” on the Local Area Low Voltage Networks in terms of power load. Further examination on the adoption of EVs has concluded that if there were more than four EVs on fast charge in a Local Area Low Voltage Network there would be effectively a meltdown of the local power transformer. If this eventuated there would substantive increase in the risk of network instability

However there is also a substantive upside to the increase of EVs, as each EV has its own battery and with the utilisation of a smart grid this could be become a source of power during near Peak Load episodes Furthermore the accessing of EVs in conjunction Residential Distributed Power Storage Batteries in the future could provide a strong buffer against Peak Load episodes however as there is a down side with EV fast charging there similar issues with Residential Distributed Power Storage Batteries.

The Federal Government needs to ensure network stability is a major priority issue as increasing network stability and reducing the resultant shut-downs will impact on energy security, and energy and workforce productivity.

Evidence

Article: Impact of electric vehicle fast charging on power system voltage stability
Journal: International Journal of Electrical Power and Energy Systems
http://espace.library.uq.edu.au/view/UQ:320702

KEMA Electric Vehicles and the Smart Grid
http://www.dnvkema.com/Images/EV%20ebookD1V3.pdf

Royal Institute of Technology
Electric Vehicle Charging Impact on Load Profile
http://www.diva-portal.org/smash/get/diva2:588875/FULLTEXT01.pdf

AMS Conclusion

As we have articulated above, whilst these real-life-grid-based issues, are critical to the short, medium and long term health of the Nations Electricity Systems and need to be addressed as a matter of urgency.

Surely the most profound and crucial guide-post to direct the Government future plans must be its own objectives of SCER's Demand Side Participation Program and that is and we quote the overarching objective

"To promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity through an optimal level of demand side participation" and furthermore and again we quote

> "• Improving pricing and incentives: consumers need clear signals about the cost of their energy consumption in order to efficiently manage their demand, and supply chain businesses need appropriate incentives to implement and facilitate demand side participation options.
>
> • Informing choice: consumers and demand side providers need a range of information so that they can identify and implement efficient demand options.
>
> • Enabling response: a range of technologies, skills, and supporting frameworks are required to support pricing, information, and demand management options, and to enable timely responses to market signals.“

If the Government is to be "fair-dinkum" in the development of its Energy White Paper for both the current on-going and future directions and initiatives; the Government needs to focus on what is going to make the most difference for the greater good of the ecomony by improving productivity and the consumer by reducing the cost of energy.

To drive these outcomes the Government needs to seriously consider what are the most effective drivers to make real change happen, there are potentially two options either through

1) incentivising State owned electricity enterprises for energy productivity effectiveness initiatives based on their outcomes OR
2) utilise the tried and true method of Tied Funding Grants.

More recently the CSIRO Future Grid Forum stated as part of their launch of their Changes & Choice initiative to do nothing in terms of the development of the National Electricity System was not an option; as a the impact of not doing anything would have substantial impacts on the quality of life Australians enjoyed and would put at risk the future development of the Australian economy.

AMS implores the Government to strongly consider the policy directions outlined previously in the introduction and in doing so this will address the greater part of the Significant Real-life Grid Issues required to be remedied.

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