National Irrigators' Council

Energy Security Board
Post 2025 market design

Removing barriers to Australia's agricultural competitiveness

Contents

The National Irrigators' Council (NIC) is the national peak body representing irrigators in Australia. The Council supports thirty three (33) member organisations covering the Murray Darling Basin states, irrigation regions and the major agricultural commodity groups. Council members collectively hold approximately 5,500,000 mega litres of water entitlements.

The Council represents the voice of those involved in irrigated agriculture who produce food and fibre for Australia and significant export income. The total gross value of irrigated agricultural production (GVIAP) in 2017-18 increased to $17.7 billion (up 14%) {Australian Bureau of Statistics}

The sector produces essential food such as milk, fruit, vegetables, rice, grains, sugar, nuts, meat and other commodities such as cotton and wine.

The Council aims to develop projects and policies to ensure the efficiency, viability and sustainability of Australian irrigated agriculture and the security and reliability of water entitlements. The NIC advocates to governments, statutory authorities and other relevant organisations for their adoption.

Contact: Steve Whan
CEO: National Irrigators' Council
02.6273 3637
0429 780 883
ceo@irrigators.org.au

Opening remarks

National Irrigators' Council (NIC) thanks the Energy Security Board (ESB) for the opportunity to comment on the Post 2025 Market Design consultation paper. NIC does not have the resources to provide a detailed technical response to all aspects of the consultation paper, but rather our comments will focus on broad questions of policy and industry tools or mechanisms, during this period of transition of the energy market, that will reflect a greater level of fairness in the system and deliver lower energy costs for agriculture consumers and rural communities.

NIC has consistently raised the negative impact on Australia's ability to produce food and fibre, from high energy costs. This issue has played a role in reducing the viability of agriculture businesses and undermining the competitiveness of the Australian agriculture sector.

We recognise Australia's energy system is changing rapidly, presenting opportunities for the productive agriculture sector to be part of these changes, where opportunities exist for example, in stand-alone systems and micro grids and to participate in the opportunities presented within the Government's Technology Investment Roadmap, ARENA's Bioenergy Roadmap, microgrids and over time, the renewable energy zones.

We see the rapid pace of change occurring in the electricity market and the evidence of these changes where in 2020 there are 2.2 million households in Australia with solar PV on their rooftops, up from 100,000 a decade ago.

This rapid growth of variable renewable energy into the system also poses challenges around system security and grid design, ensuring enough supply when solar and wind aren't generating. This is when services such as frequency, voltage control and inertia are typically provided by baseload coal power stations. It is clear that the increased proportion of renewables into the system, combined with the decline and closure of coal power generation, is causing system challenges.

It is a well-known fact that Australian energy policy has been subject to years of inconsistency and more than a decade of politicisation, particularly around the overlapping of climate and energy policy. Future NEM investment will rely on the capacity of Governments and key decision makers to resolve many of these external factors and create a greater level of certainty.

Since 2014, NIC has convened a group of peak agriculture bodies *(Ag Energy Taskforce*[1]*)* to draw attention to the impacts of the high cost of energy for Australia's highly efficient and productive agriculture sector. High energy costs have been a significant factor in impeding Australia's transition from a 'mining boom' to a 'dining boom'. The Australian Farm Institute noted in late 2018: *Australian industry – including agriculture – is rapidly becoming uncompetitive against countries with cheaper and more reliable power.* [2]

NIC and the Taskforce have consistently argued the need for a long-term price ceiling of eight cents for electrons and eight cents for distribution – 16 cents per kilowatt hour total maximum. We continue to highlight that Australia has moved from a country which enjoyed a competitive advantage in energy costs, to being one where energy is now a competitive disadvantage.

We are alert to the emerging opportunities in energy policy and the technologies that provide alternative options, enabling farm businesses greater control over their energy supply and costs.

Agriculture is one of the hardest hit sectors where irrigators have seen their competitiveness and ability to achieve a profit diminish rapidly as the price of pumping water for those on the grid has

[1] *Agriculture Energy Taskforce: National Irrigators' Council, NSW Irrigators' Council, NSW Farmers, Cotton Australia, National Farmers' Federation, Bundaberg Regional Irrigators Group, Central Irrigation Trust (SA), CANEGROWERS, Dairy Connect, Queensland Farmers Federation, Australian Grape & Wine, Pioneer Valley Water, Australian Dairy Farmers, Dairy Australia*

[2] *Australian Farm Institute: The impacts of energy costs on the agriculture sector, August 2018*

escalated. Similarly, agricultural activities involving processing, packaging and cool storage have been severely impacted by high energy prices.

Disappointingly, as part of our engagement over many years with energy policy and regulatory entities, **it is evident that there is a significant gap in the understanding of the impacts of high energy costs on the capacity of productive agriculture and rural industries to remain competitive.**

Recommendations:

- Caution against the imposition of exaggerated costs associated with unwarranted and unnecessary regulation in market design development to avoid 'gold plating'.
    - Proposed regulatory and/or policy changes should include a cost benefit.
- Require that policy and/or regulatory proposals put forward by energy regulator and infrastructure owners, provide a 2-3 page 'regional and rural implications statement', which details the likely impact of the proposal or reform, drawing stakeholder attention to issues that would have regional and rural impacts.
- Specific recognition of the particular needs of the agriculture sector and regional communities in all elements of market design.
- A design which supports the Ag Energy Taskforce's price objective of a medium to long term price capped at 8 cents per kilowatt-hour for the electrons (R) and a similar ceiling of 8 cents per kilowatt-hour for the network (N).
- A rule change via the Australian Energy Market Commission (AEMC) to enable the AER to optimise an electricity network's regulated asset base (RAB) similar to the pre-2006 NEM rules that required the regulator to optimise the transmission and distribution network regulated asset base/s.
- Recognition in AER calculations that Rate of Return for network owners should be based on low risk and low cost of finance models as opposed to the current Rate of Return which is generating super normal or 'monopoly' profits.
- A national food and fibre tariff model/s.
- The productive agriculture sector included in the cohort of large commercial and industrial consumers (C&I) in recognition that the sector is an important contributor to the production of Australia's food and fibre and is rightly seeking to be competitive, and to provide jobs and export opportunities
- Fundamental reform of the National Electricity Market (NEM) to address the lack of genuine competition, the operation of the contract bidding process and a market where consumers' interests are fairly represented.
- Stability and certainty in national energy policy to allow investment.

Introduction

Australia's agricultural industries play a significant role as economic drivers in local economies, providing flow on benefits to the national economy. Industries include cotton, rice, sugar, wine, almonds, horticulture and dairy. Energy use across the agriculture sector is variable, dependent upon the industry and the intensification of operations at various times. Energy is used for pumping irrigation water, pasteurisation, cool rooms, processing plants and moving product. Operations that require heating, cooling or irrigation have higher levels of electricity use. Some industries have stable electricity consumption year round, while in others there is seasonal variability.

The NIC and Ag Energy Taskforce have long participated in the various policy and market design iterations, providing input through various government related submissions. The rapid adoption of renewable technologies has created an increasingly dynamic system, and against this backdrop we have sought to highlight the needs of agriculture industries, often challenged to operate in a competitive market in providing food and fibre for Australia and for export.

Australian farmers and agriculture industries are embracing technology to enhance production and operational efficiencies, and increasingly farmers are adopting renewable energy solutions to manage the cost of electricity, off-set unavoidable peak demand charges and working to decarbonise the 'energy mix'.

Despite the impact of prolonged drought and the significant challenges facing some industries, the value of farm production is expected to be $59 billion in 2019-20, supported by high commodity prices in some sectors. [3] Over the past ten years, electricity costs have increasingly become a significant cost input factor in Australia's food and fibre production, impacting the ability of farmers and industries to remain internationally competitive while utilising modern, water-efficient irrigation equipment.

Clean Energy Finance Corporation (CEFC)[4] data shows a progressive commitment among Australian farmers to invest in energy efficiency and renewable energy technologies. In the last three years farmers have taken up loan incentives offered by the CEFC, spending over $100 million on 417 on grid and 20 off grid solar power projects, more than any other single sector. These projects were also on average larger than other sectors, with loans almost seven times the average at over $250,000. Farmers took additional loans with the CEFC to the value of $100 million during this time, to improve the energy efficiency of farm buildings and production systems.

The true picture of agricultural investment will be somewhat higher as these figures do not include projects where farmers have purchased renewable or energy efficiency technologies outright or sought funding elsewhere.

While agriculture industries are taking up the opportunities available to them in the global effort to reduce emissions, it is also important to recognise that farmers and their respective industries will generally invest in these opportunities only if there is an economic imperative with a sound operational and business case, and not solely from an emissions reduction perspective.

A paper titled *Maximising Consumer Outcomes from Retail Electricity Markets* [5] in 2019 noted the opportunity for regional and rural Australia to determine whether they are best served by a centralised one-size fits-all approach to electricity rules and regulations, as provided by the NEM.

The paper suggested that rural and regional communities benefit the least from the current market structure, and that the regulatory and institutional frameworks that govern the NEM are not primarily focussed on maximising outcomes for these consumers, and recommended:

- consideration of the costs and benefits of separate market arrangements for regional and rural areas, including the potential for a vertically integrated electricity system for rural and regional communities; and,
- that any vulnerability/hardship strategy acknowledge the increased vulnerability of regional and rural communities to changes in the affordability or reliability of electricity, and have specific initiatives to address this vulnerability.

[3] *ABARES Agricultural Overview: March quarter 2020*

[4] *The Clean Energy Finance Corporation (CEFC) is responsible for investing $10 billion in clean energy projects on behalf of the Australian Government to assist lower Australia's carbon emissions by investing in renewable energy, energy efficiency and low emissions technologies.*

[5] *Maximising Consumer Outcomes from Retail Electricity Markets, prepared by Ash Salardini for the 2019 Energy Consumers Australia Gill Owen Scholarship.*

In recent years the cost of energy has had a serious impact on the ability for Australian farmers to produce food, fibre and renewable fuel for Australians. Electricity is used for the operation of pumps for irrigation, cooling for storage and processing and packaging.

Australia transitioned from having the fourth cheapest electricity cost in the OECD in 2004 to being the fourth highest in 2018 (ACCC, 2018, p. 23). This is impacting on Australia's ability to compete globally, with resultant significant job losses and loss of income.

These issues are very real for a sector that has the objective of boosting its contribution to the Australian economy from the current $60 billion per annum to $100 billion in less than a decade.

Some producers have been forced off the grid or out of business. Export competitiveness is disappearing and, as price takers Australian farmers are seeing real impacts on their viability. That is despite the agricultural sector having a bigger take up of solar power projects than any other sector.

Emerging opportunities

Australian farmers are the potential early adopters of appropriately scaled technology emerging from policy initiatives and developments like the Technology Investment Roadmap process. The agriculture sector's role in any national policy framework and the technology roadmap is important because the sector can be an adopter of energy technologies for on-farm use. This is both in generating energy and reducing demand; as potential exporters of energy and feed stocks; and in sequestration through land management.

The core issue with future grid planning is to ensure that the grid's structure, design and costs facilitate rural consumers and the agricultural sector in taking up new technology and being connected to the grid, rather than presenting a barrier. This should be a key consideration.

Agriculture should be considered in this process with specific targeting and programs.

We would like to see:

- Technologies that can be rolled out on a scale which will make their use viable on farms and in agricultural processing.
- Network cost and regulation that does not impede the take up of new technologies e.g. making grid connection and microgrids practical and affordable.
- Australia's productive rural industries at the forefront in planning, including planning and financing for demonstration projects and extension services to promote take-up.
- An overarching national energy and emissions policy that provides policy certainty for investors, which includes rules around carbon farming.

Technology Investment Roadmap and Bioenergy Roadmap

NIC and Taskforce members are alert to the opportunities for the agriculture sector in the Technology Investment Roadmap and the development by ARENA of the Bioenergy Roadmap.

The Technology Roadmap discussion paper released in May 2020 noted: a range of energy producing opportunities from waste (EfW) technology solutions, currently adopted widely across Europe, North America and Asia. The paper details existing technologies capable of processing various waste feedstocks including mixed solid waste, process engineered fuel (PEF) and organics (e.g. food waste, biosolids, wood waste). EfW technologies can be used to generate a variety of primary and secondary products including:

- Co-generation systems for producing steam for direct use in industry along with electricity.
- Biogas for use in condensing boilers, conversion into heat and electricity in co-generation systems or further refining into bio-methane as a substitute for natural gas.
- Bio-fuels, biochar and other value-added products.

Potential technologies might include:

- Anaerobic digestion: Technology typically used to process organic source separated waste streams (including food waste, agricultural waste and biosolids) to produce biogas which can be converted into electricity.
- Combustion (incineration): Technology typically used to process municipal solid waste (MSW) to produce high-pressure steam which can be converted into electricity.
- Gasification: Technology used to process separated waste streams (e.g. wood waste, biosolids) to produce a synthetic gas (syngas) which can be converted into electricity or other value-added products.
- Pyrolysis: Emerging technology used to process separated waste streams to produce a syngas for conversion into electricity along with value-added products such as biochar.

Further opportunities exist as part of these technologies in the development of industrial parks which might be located close to a micro grid and/or a REZ, attracting a range of industries, including companion industries. For example, this could be in the case of a maturing bioenergy market where the concept of industrial parks could serve to reduce technical and financial barriers.

- Affordable storage options are critical to the take up of renewables. Many agricultural electricity uses, such as irrigation pumping do require overnight or quick high capacity response (for example harvesting flood flows). Energy solutions for farms therefore will differ with storage being an important future component.

NIC submission to the ARENA Bioenergy Roadmap noted the enthusiasm for bioenergy as part of the energy solution for agriculture, noting that agriculture should play a central role as a fundamental building block of the plan as well as a key end user.

Opportunities for the agriculture sector to be part of a transition to bioenergy/biofuels are twofold; firstly, there is capacity for the agriculture and horticulture sectors to be the major contributors of feedstock. Agriculture already produces substantial potential feedstock. This could feed into a properly established bioenergy/biofuels market with waste or other feedstock supplied into the market for use in the production of off-farm bioenergy. There is also wide potential for bioenergy generation on-farm for use by the business and/or export into the grid.

Agriculture's potential involvement in bioenergy comes both as a source of renewable energy for the rest of society and as energy users.

The sector is seeking to be engaged in the development of bioenergy policy including looking at accountability frameworks and technical and regulatory requirements. That engagement must recognise that agriculture's potential use of bioenergy will come at a range of scales from small on-farm energy solutions through to supplying large off farm and grid scale bioenergy production.

Bioenergy can play a role in this storage and exploring those options in the roadmap will be useful.

The development of an agreed National Waste Strategy and renewed interest by jurisdictions opens up further opportunities, we hope, for negotiated mutually compatible frameworks and solution with the relevant government authorities.

Current economic and regulatory impediments are not restricted to the national energy law framework but also include the management of energy from what jurisdictions classify as waste material.

To enable these new grid usage models to work, associated new rules developed by the AEMC will be necessary. This will include rule changes that allow virtual metering around the concept of a Technology Roadmap and Bioenergy Roadmap.

Across the grid, considerably higher levels of planning and data collection are required to ensure there is no reoccurrence of historically inaccurate demand predictions.

We recognise the changes that are occurring beyond the electricity industry driven in part by digital technology. These include:

- An increase in smart appliances and smart meters, where retailers, aggregators and others are creating new opportunities to create value for consumers.
- The introduction of new innovative retail products (such as the aggregation of pool pumps for demand response).
- Consumers not needing to monitor electricity prices and decide how or when to participate in the market, as these decisions are set up to happen autonomously.

The wholesale market and the five-minute settlement rule

The ESB consultation paper suggests that the proposed introduction of certain regulatory and market tools will ultimately result in lower prices for consumers. This includes the five minute settlement rule (expected to start in 2021) designed to *'deliver sharper real-time price signals to support efficient operational and investment signals, particularly for flexible and dispatchable resources'*.

The fact that pricing is currently set at every five minutes, yet financial settlement is made every thirty minutes leaves distortion in the market and opportunities for prices to be pushed up.

This has long been an anomaly in the system where the continuation of 30-minute settlement periods leaves the door open for the potential for higher prices and reduced competition *(National Energy Guarantee draft paper, page 13, paragraph 8).* As the technology already exists to move immediately to the shorter five minute settlement time, we would not expect that the cost of implementing this tool in 2021 to be built in and sheeted back to consumers.

Five minute settlement provides a better price signal for investment in fast response technologies, such as batteries, new generation gas peaker plants and demand response.

We note that SA Power Networks (SAPN) is currently applying a 5-minute operating envelope to Tesla's virtual power plant.

Regulated Asset Base (RAB)

During this period of transition, we again raise the issue of the RAB (regulatory asset base) as part of the changing system and the examination of future market design. It would be an unacceptable outcome if the end result saw users paying for systems, tools, regulatory frameworks and market arrangements that resulted in a gold plating of the system. Consumers should not be expected to meet the costs of an expensive system that has arisen due to a perverse application of the rules where electricity networks are receiving significant returns combined with a 'gaming culture' from the providers of energy and distribution services.

The ACCC in their 2018 report on *Retail Electricity Pricing Inquiry* on the RAB write down recommended that *the governments of Queensland, NSW and Tasmania should take immediate steps to remedy the past over-investment of their network businesses in order to improve affordability of the network. With appropriate assistance from the Australian Government, this can be done:*

- *in Queensland, Tasmania and for Essential Energy in NSW, through a voluntary government write-down of the regulatory asset base*
- *in NSW, where the assets have since been fully or partially privatised, through the use of rebates on network charges (paid to the distribution company to be passed on to consumers) that offset the impact of over-investment in those states.*

Such write-downs would enhance economic efficiency by reducing current distorting price signals. The amount of the write-downs and rebates should be made by reference to the estimates of overinvestment by the Grattan Institute, and should result in at least $100 a year in savings for average residential customers in those states.

Disappointingly, there has been no progress to date on this matter.

We have consistently raised the need for a comprehensive assessment of the economy-wide costs and benefits of revising the electricity network and transmission businesses' regulated asset bases to efficient levels. The assessment should include an examination of the potential reinstatement of the original (pre-2006) NEM rules that required the regulator to optimise the transmission and distribution network regulated asset bases.

The RABs of Australia's electricity networks have been artificially inflated and been allowed to grow to excessive levels. Over the past couple of decades, the networks' RABs have increased by around 400%. These growth rates now put Australian electricity networks' RAB levels significantly higher than their international counterparts; it is unacceptable that the RAB per connection levels of Australia's distribution networks are now up to nine times the levels of networks in the United Kingdom.

The excessive returns on RABs account for the majority of networks' revenues, and result in excessive network prices being shifted back to the consumer. A rule change is necessary via the AEMC to change the way electricity networks' RAB is calculated as part of their network costs in their submissions to the AER pricing determinations. The regulatory framework for gas pipelines requires the assets to be optimised and the value of unused and redundant assets to be written down. The asset revaluation was removed from the electricity pricing rules, not surprisingly just prior to the electricity RAB valuations taking off.

Why is the regulatory pricing framework that applies to gas and electricity networks not consistent? If it were, electricity networks would be entitled only to a return on their useful and used assets, a small step towards real cost reflective pricing, and a big step to provide confidence that future network construction will be done cost effectively

Power of Choice Reforms

We welcome the consultation paper discussing a series of options to make it easier for consumers to engage in the energy market. An example is cost-reflective pricing – which would introduce distribution prices that better reflect the different ways households and businesses use energy. The rules provide better signals to consumers to reduce their peak demand and to optimise the use of their distributed energy resources.

On a similar level, we support the move to competition in metering – where the use of smart meters is enabling consumers more opportunity to access a wider range of electricity services and gain better information about how they can change their electricity use to save money.

We note the AEMC's final rule in June 2020, to facilitate wholesale demand response in the NEM with the mechanism to commence on 21 October 2021. From our perspective, this is a good outcome as a transitional measure and designed to put demand response on equal footing with generation capacity, adding to the resources capable of providing resources at times of need.

We have previously argued for a rule change which would enhance the ability of agricultural energy consumers to access lower prices by way of better access to wholesale demand response mechanisms. The rule change can be a positive contributor to enabling primary producers - particularly those with substantial demand from irrigation pumps, processing, packaging or cooling - to better structure their energy use to avoid peak or critical demand periods and therefore bring down their overall power costs.

It is critical that when the new rule comes into force, that there are additional opportunities for consumers to access these arrangements and any price benefits passed on consumers.

Research undertaken for the Ag Energy Taskforce by Sapere Research Group (funded by Energy Consumers Australia), "Empowering Irrigation Consumers Electricity Purchase Arrangements", indicated that among irrigation energy consumers there is a clear knowledge gap.

Respondents generally indicated they would like to be able to engage in demand response, but felt they would not be able to, whereas assessment of their actual energy consumption indicated that their operations were suitable for appropriate demand response management. The work undertaken in concluding this, included surveys and interval data analysis. The outcomes are discussed further below.

The Sapere research confirmed that irrigators were paying excessive costs for networks compared to the demand they generate. The assessment based on survey results and analysis of interval data was very relevant to the demand response question because it highlighted that:

There was no evidence to suggest that irrigation demand was high let alone increases during extreme heatwaves, when maximum annual demand and very high power supply costs are most likely.
It appears unlikely pumps are running at full capacity at times of peak system demand. Across states and different types of primary produce, use of pumps predominantly coincides with times when system demand is at just 30-55 per cent of system annual maximum demand.

Seasonal irrigation demand peaks in late spring (Queensland) or early summer (elsewhere) reflect rainfall variations between regions. Demand peaks are not driven by very high temperatures.

While about 45 per cent of irrigation equipment operates continuously over a day, other equipment is operated predominantly overnight and at a minimum during afternoons (at the mostly likely time of system peaks).

Pump demand profiles are demonstrated by interval data generally to be 'flat': that is when pumps are being used, demand is at/above 90 per cent the pump's maximum demand.

The non-coincidence of maximum irrigation demand with maximum system demand has a direct effect on the delivered cost of electricity, both wholesale and network (transmission and distribution), for irrigators. For example, **Error! Reference source not found. Error! Reference source not fo und.** *provides the volume weighted average (VWA) wholesale electricity costs of individual irrigation demands compared with the VWA costs of the system demands represented by the deemed profile for small customers. These clearly demonstrate the reduced wholesale cost (using half hourly wholesale price data for the relevant periods) of different irrigation profiles compared with the relevant deemed demand profile."* (Sapere Research Group, 2018, p. vii)

Recognising the needs of Australia's productive agriculture sector

The consultation paper makes reference to the diverse needs of large commercial and industrial (C&I) consumers and acknowledges that *C&I consumers already bear a large proportion of system costs (consultation paper, page 17).*

This cohort will include many of Australia's agricultural industries that have production processes that rely heavily on power. Unfortunately, the consultation paper does not specifically recognise the vital agricultural sector not does it acknowledge a specific need to design a system suited to rural and regional industries.

This includes irrigators who pump and pressurise water or producers who process, package or refrigerate food and fibre products.

Australia should have a comparative advantage for those producers – offering reasonably priced power from the grid. As noted earlier, the high cost of electricity generated power has resulted in

some agriculture industries moving to and/or exploring off grid solutions. These are in some cases diesel and diesel/solar hybrid solutions. Industries are also taking up opportunities offered through the Australian Renewable Energy Agency (ARENA), for example, to power irrigation pumping systems using solar photovoltaic (PV) energy and other approaches such as renewable bioenergy running on biogas from waste streams associated with intensive livestock industries.

Many industries, however, are not in a position to move to off grid solutions. For these industries, the most significant impact of the high cost of electricity is producers finding themselves unviable and in the case of irrigated agriculture, deciding to move out of a particular irrigated crop. This in turn impacts the ability for the crop to grow in a timely manner for harvest and to a quality and quantity being achieved that enables a return on the investment.[6]

It would be a perverse outcome for irrigators, who have legally invested in infrastructure - which is enabling the efficient use, application and storage of irrigation water – then as a result of high energy prices to be forced to use that infrastructure less, or at worst, that infrastructure becomes redundant.

Some are choosing to convert their farms from intensive irrigated agriculture to lower value dry land agriculture and sell valuable water to maintain their short term viability.

We would like to see the productive agriculture sector included along with references to large commercial and industrial consumers (C&I). This is in recognition that the sector is as equally important as Australia's large manufacturing industries are producing food and fibre and are rightly seeking to be competitive, and to provide jobs and export opportunities

NIC's recommendation is that the 2025 policy work should include a specific rural and regional impact statement along with market design consideration of the needs of rural industries, agriculture and the needs of rural and remote consumers.

Renewable Energy Zones (REZs)

REZs in New South Wales will play a role in delivering affordable energy generation through the period of the anticipated retirement of thermal power stations over coming decades.

Battery storage will be a critical component in the development of REZs.

REZs will support the coordinated development of new grid infrastructure in energy rich areas, connecting multiple generators in the same location. This will involve combining generation, transmission, storage and system strength services to support a secure, affordable and reliable energy system.

We note AEMO's work on REZs for the purpose of the ISP (Integrated System Plan) defines REZs as *'areas in the NEM where clusters of large-scale renewable energy can be developed to promote economies of scale in high-resource areas and capture geographic and technological diversity in renewable resources'*.

The funding agreement in mid-2020 with ARENA (Australian Renewable Energy Agency) to enable TransGrid to undertake feasibility and planning works for the Central-West Orana REZ is an important first step towards this ambition. The engagement process with local communities over coming months will be important in terms of design elements involving route identification and potentially, environmental surveys.

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[6] *A comparison of cotton bales/hectare from rainfed crops against those with partial or full irrigation, illustrates the impact of limited water on plant growth and resulting crop yield.*
In 2018-19 the cotton industry grower's survey reported 1.47 bales/hectare as the average yield for rainfed, 8.08 bales for partial and 10.23 bales for full irrigation. 1 bale = 217.7kg. Source 2019 survey p13.

It is suggested that the new zone will add at least 3,000MW of electricity capacity to the system. This is a further important piece of the infrastructure puzzle as coal fired power stations close at the latter part of the decade. And in practical terms, investment in new infrastructure will enable renewable energy providers to connect to the grid with the aim to support more affordable, reliable and clean energy for New South Wales.

We understand construction of the Central-West Orana REZ is due to commence late 2022. We are aware that two further REZs are expected, one in in the north of NSW and in the south of the state. It is expected that these projects will attract significant private sector investment in regional areas.

Over the long term, the aim is that all three REZs are expected to provide a significant amount of NSW's future electricity supply, with more than 17,000 MW of new generation expected to connect over the next 10 years.

We expect these zones to integrate and not compete with the grid. We also expect these zones to integrate with agriculture and provide opportunities rather than being a 'paddock vs panels' competing land use pressure or result in the loss of highly productive agricultural land. We would hope they also enable the development of downstream processing and manufacturing in these centres. A process that fits within the state planning regimes that helps determine the business case and/or value proposition in relation to developments of REZs will be necessary, as will engagement with communities and identified regions via the usual processes.

The role and impact of new technologies

The transformation occurring in the energy sector is enabling both physical technologies for the generation, storage and use of power; and 'soft' technologies that can monitor, manage and secure trade power. The availability of these technologies is increasing rapidly.

New models for grid usage such as virtual net metering, peer to peer trading etc. are being examined, including but not limited to:

- Where a farmer has multiple network connections, they can have renewables connected to the main NMI/account, and credit against consumption at a separate pump connection against the solar generation (with a 'grid transport fee');
- A farm business could generate enough power at one site with a bioenergy plant to cover the consumption at a number of separate (but nearby) sites, by offsetting that consumption against generation at the main site (with a 'grid transport fee).

Challenges for the grid

We recognise the challenges for the electricity grid with the rapid growth of variable renewable energy into the system. The Energy Security Board annual report card released in February 2020 focused discussion on grid capability noting the challenges within current grid design. To ensure security and stability when there is insufficient solar and wind generation coming into the system, given services such as frequency, voltage control and inertia are usually provided by baseload coal power stations.

NIC has frequently outlined significant concerns with the equity of network pricing. Excessive return built in to pricing for network owners is imposing unsustainable costs on farmers, inequitable pass through costs are punishing agricultural consumers for issues they have no control over; and restrictive rules (albeit sometimes related to network capacity) are even making it hard for farmers to export power generated on site into the grid or via virtual private networks.

It is recognised though that investment will be required to ensure transmission and distribution networks have the capacity to cope with the injection of renewable energy into the grid, the cost of which will ultimately be passed on to consumers.

The equity of network related charges is directly relevant to a bioenergy strategy, because they act firstly as disincentives to the take up of on farm grid connected generation and secondly the cost of integration and poor integration is passed through producing a very real negative perception for consumers and the broader community.

Frequency controlled ancillary services (FCAS)

We note the ESB is considering the procurement options for operating reserve, frequency control, inertia and system strength with three options being canvassed. Option 3 discusses Spot Market based procurement where the use of spot markets are used to procure essential system services.

Frequency control ancillary services (FCAS) are currently procured through co-optimised spot markets. Option 3 may be an attractive way forward if (as suggested) it could extend to incorporate the demand curves for some services rather than a fixed demand requirement, purchasing services in a manner which maximises the value of the services provided.

This could be beneficial particularly in situations where supply is inconsistent, or 'lumpy'.

Current arrangements are putting unbudgeted, unexpected and retrospective costs on consumers for system problems that they have absolutely no influence over, and with no way of avoiding the additional cost.

We cite the recent experience in South Australia where NIC member, Central Irrigation Trust (CIT), received a retrospective $60,000 increase in their power for a single month due to AEMO providing an ancillary service (with associated ancillary charge) to stabilise the grid as a result of the failure of the interconnector.

CIT supplies irrigation water to 1200 Riverland fruit, vegetable, grape and nut farmers, where these businesses are already burdened with increased cost because of drought and high energy prices.

It is clear why ancillary services are called upon to stabilise the grid, though there is something very wrong with National Energy Market (NEM) rules, where under current arrangements, these charges are passed on to consumers.

NIC has raised this matter in a number of forums, following which we received approaches from AEMO who committed to look at ways to alleviate the spike in costs in the future. It is important that these issues are flagged and understood as and when they occur.

Storage

The importance of storage cannot be overstated when we know it is expected that there will be an increasing role for storage – including through pumped hydro storage, battery storage and demand response, including utility scale and distributed resources.

Improvements in the development and cost of battery systems and storage technology are integral to the development of renewable energy systems into the future. Storage capability, particularly adjacent to solar farms, will work in conjunction with market operators to identify and alleviate congestion in the grid.

With the increased take up of renewables, the importance of battery storage technology and cost has become increasingly urgent to support grid stability.

We have previously discussed the importance of maintaining inertia in the system (the store of kinetic energy). This is in supporting the resilience of the power system and, following any disturbance in the system, reducing the rate at which frequency changes, and thereby increasing the resilience of the power system to such disturbances.

We do not have the technical knowledge to offer further insights on this issue, however we note the reference in the ESB consultation paper to the technology under development with two battery storage installations in the NEM being trialled. It is too early to understand whether these technologies can deliver the system requirements and replace or supplement synchronous inertia.

Our concern is that in undertaking future network design the ESB ensures that farmers who chose to utilise storage have the capacity to connect to the grid if they chose at reasonable cost and potentially be part of virtual micro grid opportunities.

Stand-alone power systems (SAPs) & Microgrids

It is expected there will be opportunities for a developed bioenergy sector to provide energy to stand-alone power systems.

The Queensland Farmers' Federation (QFF) will partner with Cotton Australia, ReAqua and Constructive Energy with funding received through the federal government's Regional and Remote Communities Reliability Fund to consider whether microgrids can offer benefits to agricultural electricity consumers as well as networks. This may enable farmers to benefit from more secure, affordable and reliable energy.

The project will analyse four demonstration virtual microgrids in New South Wales and Queensland, to test their suitability in different circumstances. In addition, it will include community consultation and workshops, data collection and modelling to understand costs and benefits and provide guidance to industry and government. With one in four growers currently using solar on farm, it is not unexpected that the sector is seeking to explore energy solutions.

NIC and the Ag Energy Taskforce provided submissions to the Australian Energy Market Commission (AMEC) in support of the development of SAPS. The falling costs of renewable generation and batteries represents a decrease in the costs of providing off-grid electricity supply, and in some areas off-grid supply may now be less costly than standard supply.

There are potential benefits such as improved reliability for remote customers and reduced carbon footprint. To date, the relatively few customers currently receiving supply from a SAPS can largely be attributed to limitations in the regulatory frameworks and the embryonic nature of the SAPS industry.

The move towards a nationally consistent framework is enabling distributors to develop off-grid supply arrangements for existing customers or new connections where efficient - as identified in the *Finkel Review into the Future Security of the National Electricity Market* and the *2018 ACCC report into retail electricity pricing.*

In terms of regulatory frameworks, we acknowledge that some form of regulation supports assurance to consumers about the quality of the service/product and an assurance about price efficiency of that product. However, we strongly caution against the imposition of additional costs associated with unwarranted and unnecessary regulation around the development of SAPs.

The various models of electricity supply for customers will be delivered through:

- the interconnected grid – which the AEMC refers to as "standard supply"
- an embedded network, which in turn is connected to the interconnected grid
- a micro-grid isolated from the interconnected grid
- an individual power system (IPS), which only provides electricity to the customer in question.

Smart meters

Smart meters at end-user premises, as opposed to simply metering energy use for bulk billing purposes, are required to provide vital information. Smart meters allow both distributor network

businesses and electricity end users to have better information on how energy is consumed, and to better control that use, including in the use of end-user generation systems.

According to the Energy Networks Association (ENA) "*As technology and energy markets develop rapidly, smart meters and other devices will benefit individual consumers. Customers should receive practical information and more rewarding tariff structures that match their needs; be able to control their energy use to get better deals and participate in new markets, such as exporting energy to the Grid through solar panels or supporting energy storage options as these develop commercially*"[7].

While rules are now in place that will allow for a very gradual transition of consumers to smart meters i.e. when a meter upgrade is required or following the completion of the solar bonus scheme, we believe that if future grid needs are to be catered for, it is critical that transition to smart meter solutions should occur much more rapidly.

There are many issues to be resolved to facilitate the roll out of smart meter technology, including:

- issues of smart meter connectivity in regional areas due to telecommunications blackspots
- data privacy and security concerns associated with smart metering arrangements
- education of consumers so they are aware of the shift away from 'bulk' electricity pricing on to time of use and load based metering
- the transitional arrangements for historical costs associated with older meter installations as metering responsibilities shift away from the network companies and on to retailers; and
- transparency of metering costs for consumers as retailers take on metering responsibilities
- the supposition that the smart meter will inform and therefore cause the consumer to change their consumption behaviour, or that they have the ability to do so[8].

In many cases, larger agricultural users have been mandated to 'upgrade' their meters to smart or interval based metres at their own cost. We believe that the challenges associated with a smart meter roll out must be addressed in order to develop a full understanding of our network capacity and the energy needs for the future NEM.

It will be important that network rules allow for localised solutions. The regulatory process should enable the market to respond quickly to allow for widespread adoption of these technologies that would allow customers to increase the utilisation of electricity networks.

For example, businesses in regional areas would benefit from the ability to 'net-off' their generation and use or trade with nearby sites, paying a small fee for the use of the local network (network transportation fee) rather than full network and retail costs. Solutions such as peer-to-peer trading may offer greater local network utilisation and stability, offering new revenue opportunities for DNSPs and result in less sub-optimal options such as 'do nothing' or eventual independence from the grid.

Distributed energy generation may represent a cost-effective approach to increasing the reliability of electricity supply above current grid levels. It may also be accompanied by cost measure benefits of 'local energy trading system' – where utilities can provide customers with solar and storage and allow their output to be traded in a suburban network. Such approaches require significant changes in the way incumbent utilities (e.g. Ergon, Essential Energy) manage their business models and will require networks to look to a more 'distributed' model, while the implications for centralised generation, and for retailers, will also be significant.

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[7] *Changing the Face of Energy Management. Electrical Comms Data. Jan/Feb 2015. Vol. 14 No.6. pp. 32-34.*

[8] *Plant affected by heatwaves can't 'go indoors' as the advice to urban dwellers, hence 24hrs guaranteed supply of irrigated water to a crop at these times can be the difference of having a crop or not. It is a similar situation for maintaining chilled milk pending collection for it to meet human consumption health requirements.*

The rule changes required to allow this to occur must be initiated urgently to ensure that for those who wish to remain connected to the electricity network, this is a viable option for regional businesses, and in fact, the preferred option.

We would advocate that network rules must promote new solutions and not protect existing owners.