



TIAC Advisory Report:

**New Technology Opportunities
Driving Economic Growth**

**'Reducing the impact of energy prices for
Western Australian businesses'**

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Assisted by Inotek Corporation Pty Ltd

Introduction and Scope of Advice

There is generally a well-accepted link between high energy costs, decreased productivity and deteriorating competitiveness of businesses^[1]. Energy prices have effectively doubled in Western Australia since 2008^[2].

The Technology Industry and Advisory Council (TIAC) has developed an advisory paper regarding the opportunity presented by new energy technologies to reduce the pressure of rising energy prices to Western Australian businesses. Two opportunities exist, one being to create new business opportunities through the deployment and development of new technologies, and the second being the potential for wider economic growth through constrained energy pricing and improving productivity.

TIAC's advice presents a technology and business operation perspective. Many existing discussions represent the utility and system operational perspective.

TIAC sought technical assistance from Inotek Corporation Pty Ltd that included the feedback of several knowledgeable stakeholders within the West Australian energy industry with a firm understanding of i) the types of new energy technologies that could reliably save businesses money and ii) the barriers preventing adoption of these technologies.

This advisory paper will examine the opportunities and barriers to reduce energy costs to WA businesses from two different perspectives, as follows:

- End user driven: Technologies deployed behind the meter on the premises that are typically owned by the business operator (end user savings: small scale renewables, small scale storage and energy efficiency)
- Energy supplier driven: Technologies deployed within the network (anywhere from generation to end user location) that are not owned by the business operator (supplier savings: large scale renewable energy high voltage power lines and centralised energy storage etc.)

This advisory paper provides the WA Government with new ways of considering the energy issue and economic reform. TIAC's informed discussions were focussed on driving a positive impact on electricity pricing for West Australian businesses now and into the future, while noting the need for security of supply.

Public utilities such as Water Corporation, and local council services such as street lighting, are major consumers of energy. Reduced energy costs, new energy efficient technologies, new market models and cost reflective network pricing can deliver direct savings to the State and local governments.

For the purposes of this advisory paper TIAC has elected to largely ignore the impact of a future where carbon is priced as it may distract from the strategic discussion. This risk should not be ignored as it could add a significant premium to energy pricing given the carbon intensity of the Western Australian energy system (SWIS). Carbon pricing could also accelerate disruptive change that would then impact existing asset value and the viability of the least efficient generation capacity.

The deployment of new distributed technologies, while impacting employment in centralised utilities, will see increased levels of employment in technology deployment and maintenance. This new employment will be widely deployed across many small to medium businesses that will be engaged in the energy system. Companies taking advantage of cheaper energy to expand operations will also have capacity to increase employment.

Electricity Pricing Primer

There has been considerable focus on electricity prices in WA in recent times with an extensive market review conducted between 2014 and 2016 culminating in several recommendations designed to promote a lower cost of supply through a more efficient market^[3].

Today approximately two thirds (2/3) of the typical charges on an electricity bill for WA business relate to network charges (network usage and capacity charges). Only one third (1/3) of the typical business electricity bill relates to generation charges.

There does not appear to be any significant upward pressure on generation charges for the foreseeable future due to an oversupply of generation capacity (coupled with falling energy demand) in the market until up to 2024/25^[4]. The quality of the coal resource at Collie is however decreasing and both companies which operate the coal mining operations have recorded significant losses in the past few years.

Overall electrical system costs do not appear to be falling despite an oversupply of generators, as higher network costs look to continue to increase over the forward estimates. The higher network costs are a result of Western Power investing very significantly in the transmission and distribution network in the state over the past decade. As the network infrastructure that was built typically has a life of approximately 40 years, this infrastructure will take a long time to be paid off. With Western Power being one of the largest holders of government debt, technology options to reduce or abate future investments while maintaining energy security, all while raising sufficient income to reduce existing debt, is a critical issue for the government in managing its finances and addressing energy prices.

TIAC discussed three questions:

1. In the interests of keeping electricity prices low, should publically owned networks be encouraged to seek a financial return above the risk-free rate?
2. If above risk-free rate returns are encouraged, should these profits be applied to the improvement of the network?
3. How should the network be improved?

Efficient Pricing

Advisory Box 1 – TIAC advice on Network Returns

Possible advice could include:

- The publically owned networks should be allowed to seek a financial return above the risk free rate of return, however there should be a limit to overall size of profit to reduce the incentive to grow the asset base.
- The long term goal of a government owned network should be to minimise future investment through transition to an efficient, effective and secure energy model reflective of changing technology and cost structures.
- That profits generated by the network not be returned to consolidated revenue, rather be directed to reducing network debt, meeting the Government's financial policy objectives while reducing the debt costs that translate to increased energy pricing.
- That the reduction of the debt held by the network operator will allow greater policy flexibility in the medium to longer term and prepare the Western Australian energy system for future technological change.
- Any investment decision making model should incorporate an analysis of risk posed by technological change.

Much has been made of cost reflectivity issues within the WA electricity market in the past. Electricity pricing in the WA market is still not truly cost reflective.

Network capacity charges paid by WA businesses attempt to apportion some cost reflectivity to end users (i.e. 1/3 of the bill directly related to system level peak usage) but this ultimately ignores a central driver of network cost, being the infrastructure investment required to transport an electron to its ultimate destination which is currently priced equally across the network irrespective of distance.

Under the current model, high energy density CBD located businesses are effectively subsidising the cost to supply electricity to other system users, particularly in rural and remote regions (fringe of grid).

True network cost reflectivity would most certainly drive different behaviours in terms of asset selection by end users and energy suppliers.

TIAC discussed four questions:

1. Would a system where network charges were based on cost per distance of electron carriage reduce the cost of electricity for businesses?
2. Are there cost effective solutions available to any end user who would experience price rises in any new cost reflective model?
3. How would any new cost reflective model affect the current and future value of the existing transmission and distribution network?
4. Are there any early learnings (system wide cost reductions / increases) from international experience where public network buy backs are starting to take place (i.e. Germany)?

Advisory Box 2 – TIAC advice on Cost Reflective Pricing

Possible advice could include

- The Government analyse the level of distance based cross subsidisation of the network to inform government decision making on new network investment business case analysis. The goal being to minimise future network debt, operating costs, cross subsidisation and impacts on energy pricing.
- Investigate technologies and models to improve electricity supply services to fringe of grid customers while reducing the average length of the network from generation to usage.
- Should cross subsidisation or subsidies be provided, the process and subsidy should be transparent with the goal of understanding and constantly reducing the need for subsidies as technologies are deployed to a distributed network model.
- That subsidies be removed once a consumer or business usage cost per kWh equals the retail price paid as at 1 July 2017. This will allow competitive cost reflective pricing in the medium term.
- Investment models for new or replacement fringe of grid infrastructure should also consider the cost of transporting the electricity and maintenance of the long transmission lines over the life of the investment.

New Technology - Arbitrage Opportunity

The SWIS/ NWIS have already begun to experience the impact of new energy technology. We are starting to see a proliferation of distributed “behind the meter” technologies such as solar PV, energy efficiency and possibly soon, electricity storage. The acceleration in distributed energy technology has given rise to the “prosumer” (who both produces and consumes energy).

Whilst energy is relatively cheap (i.e. the generation component of the bill), the network charges are not, with prosumers initially appearing to proliferate on the basis of bundled bills in the residential market and rapidly falling Solar PV pricing (i.e. Solar PV panels dropped 75% + in price between 2008 and 2017).

In more recent times Solar PV re-sellers have successfully started to apply the business case to unbundled bills where there are separate generation, network and capacity charges, all with paybacks of <5 years. As electricity storage prices drop over the coming years, it is expected that Solar PV and Storage will become viable propositions on even the most difficult competitive scenarios (i.e. unbundled bills).

These forecast price reductions in electricity storage over the coming years and further price reductions in solar PV will only exacerbate further the tensions within the electricity system between the prosumer and energy supplier.

To date the prosumer has not demonstrated any regard for the historical decisions made by the participants of the electricity system for the greater good of the system. Prosumers are focused on making use of every available arbitrage opportunity to protect against further price increases.

One positive aspect of the rise in prosumers for the Government is that prosumers lead to a distributed investment model for the delivery of generation capacity, reducing the long term need for government debt and investment.

TIAC discussed three questions:

1. Why did it take so long for the existing energy system providers to enter the prosumer supply market? What can we learn from this?
2. Are the existing energy system providers now in the market offering viable alternatives for prosumers to take market share?
3. Should they be encouraged to compete more aggressively on energy system security and return on investment grounds? (i.e. quality of equipment & gain some return on a devaluing asset: publically funded network)

Advisory Box 3 – TIAC advice on Consumer Generation

Possible advice could include:

- Consumer generation is a trend that will continue to grow – the most important thing that the government can do is to develop a network and generation transition strategy.
- Given the potential for a perceived conflict of interest by the legislated retailer and network operator in selling or approving prosumer installations, an independent body should be established to approve applications for installation of renewable energy systems.
- The role of the network operator and retailer should be to monitor market trends, adjust to the market driven directions and, where there are technical issues, develop technology solutions to resolve the issues, creating economic development opportunities for technology suppliers.
- The government owned retailer and network operators contribute to development of technical requirements to inform transparent compliance frameworks that endorse and encourage approval.
- Consider the role that local governments, through their infrastructure and services, could play in a distributed energy model by providing energy security and stability. Local government may install battery systems to do this while accessing that energy for community services such as street lighting.

End Users: New Technology Opportunities and Barriers

Most business users with high energy charges in the contested markets are now serviced by unbundled tariff structures, which are hard to deploy distributed energy technical solutions against. However as eluded to previously the market savvy re-sellers are now constructing businesses cases on the more difficult unbundled tariff structures with medium term payback periods. The challenge still exists in that even though businesses will complain about the cost of energy, when presented with cost effective alternative's they struggle with the payback (even though they can be less than 5 years).

Many opportunities exist to reduce energy costs to the end user on a behind the meter basis, including:

Viable Today

- Solar PV (viable today: primary opportunity: avoided generation / network usage)
- Energy Efficiency (viable today: primary opportunity: avoided generation / network usage)
- Wind (viable today but much more site specific than solar: primary opportunity: avoided generation / network usage)
- Large Load Demand Side Management (viable today: opportunity: capacity charges)
- Combined Heat and Power (viable in certain use cases where there is a large thermal load: opportunity: avoided generation/ network usage)

Viable Future (price reductions or regulatory changes)

- Electric Storage (becoming more viable – required further price reductions: primary opportunity: avoided network capex)
- Peer to Peer Trading (regulatory change required: avoided network charges: arbitrage of short haul localised generation assets)
- Micro Wind (available on small boats – but could easily be deployed to complement solar without the social issues or land access costs associated with large scale wind farms)

Despite the opportunities there are still significant barriers to widespread adoptions of cost saving distributed energy technologies by businesses including:

- The effort required by businesses to gain a solid understanding of the economics of the current opportunities vs, the level of savings available (i.e. investigation efficiency)
- The requirement for retailer support to install solutions whilst still in contract (i.e. competing interests)
- The long payback time frame of new technologies when compared to alternative investments more aligned with core business
- Agent principle issues associated with tenant / landlord relationships (i.e. incentive to invest)

TIAC discussed two questions:

1. Would businesses benefit from a toolkit that outlines new technologies and potential savings available?
2. Could WA benefit from a program designed to unlock tenant / landlord issues and deploy greater levels of distributed energy such as the Sustainable Melbourne Funds Environmental Upgrade Agreements program or the US PACE programs?

Advisory Box 4 – TIAC advice on End User Support

Possible advice could include

- The State Government develop an online tool that provide analysis of potential costs and savings based on systems that may be compatible with grid connection and approval frameworks.
- The tool also list or refer to the Clean Energy Council accredited system retailers and installers.
- Should Synergy continue to be a solar system retailer, the government should remove Synergy from any role in the approvals process for behind the meter systems.
- The Government develop low cost programs to encourage the development of technologies to address network issues associated with increased penetration.

Energy Suppliers: New Technology Opportunities and Barriers

Traditional energy suppliers can also benefit from new energy technologies, which in turn could reduce prices for WA businesses through the flow through of cheaper operating costs.

Generation

Historically the WA generation mix has been largely dependent on coal (baseload) and gas (peaking) with RET obligations largely met through large scale wind installations. There are potential emerging issues to this including:

- Capital expenditure costs for both coal and gas plants are on the increase, leading to higher generation costs for any new installation.
- The cost to extract coal domestically is on the increase (economies of scale are not being realised), leading to higher generation costs
- Meeting RET obligations through a continued focus on wind is not ideal as the generation profile is not always a good match with the system load profile

Large scale solar PV represents an opportunity as follows:

- Capital expenditure costs have been falling dramatically in recent times with the latest ARENA funded projects financed with PPA's of < \$90/ MWh, leading to cost competitiveness with wind in certain Australian locations
- Solar PV's generation profile is a better match with the system load profile (when considered for RET obligations)
- If capital costs keep falling (along with financing costs) it may not be too long until competitiveness with coal (already competitive with gas) based on increasing fossil fuel generation capital expenditure pricing

Network

Network infrastructure investment has historically been focused on the installation of poles and wires to meet energy demand. With the recent price reductions in electrical storage and solar PV, there are new emerging alternatives as follows:

- Addressing increasing peak demand through community or behind the meter electrical storage (in combination with Solar PV in certain instances)
- Better education and roll-out of demand side management at peak times
- Refurbishing aged network assets at the end of long feeders with micro grids (i.e. solar PV/ wind + storage/ diesel) where appropriate.

Retail

Whilst WA businesses have been benefiting for some time from low generation costs and low retail further opportunities exist (with regulatory change) to further reduce overall costs to businesses including:

- Providing businesses with the opportunity to reduce costs through avoided long haul network costs via localised peer to peer energy trading
- Virtual aggregation of businesses to lower cost of assets via buying collectives through initiatives such as energy wheeling

TIAC discussed four questions:

1. Do the current energy regulations reward the deployment of the most cost-effective solution (i.e. will a network operator deploy a micro-grid as an alternative to poles and wires)?
2. Would the private sector competing for asset placement in the regulated asset base speed up deployment of lower cost solutions?
3. Can we devise a system where we better apportion the risk for uncompetitive energy assets into the future?
4. Should we encourage rapid pilot demonstration of the latest distributed technology opportunities to generate reliability data to enable inclusion in the regulated asset base?

Advisory Box 5 – TIAC advice on Energy Supplier Opportunities

Possible advice could include

- While the Weighted Average Cost of Capital (WACC) is essential in calculating networks costs to be charged to ensure the network is viable, how the WACC is calculated be more closely linked with cost effective investment decisions reflecting network distance subsidisation and distance based variable maintenance costs versus technology deployment options.
- Private micro grid investment on fringe of grid should be encouraged and form part of future investment analysis frameworks.
- Diesel generation in regional and remote locations can be very expensive and impact economic activities and business viability, it can also involve considerable expense for the State Government in the case of cross subsidisation for residential and small business users. Reduced remote and regional islanded system cross subsidisation through deployment of new cost effective technologies when investments need to be made (eg Solar and storage replacing solely diesel installations in remote locations)
- Establish selected regional micro grids as technology testing sites for generation technology, integration and storage where the results can be applied widely to improve energy security.