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***Investing in Energy Markets with Major Government  
Policy Interventions***

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## ***Key Points***

- Nine years ago, energy market professional Jim Snow warned of the economic risks of high energy prices in Australia caused by policymakers “picking winners”.
- The recent “Net Zero” policy interventions in Australian energy markets exemplify this risk for energy markets and smack of electoral anxiety.
- To reduce emissions, Australia should return to being confident in implementing well designed market mechanisms and use tradeable instruments that are fuel and technology agnostic, are based on sound economic principles and will give out investment signals to attract investors.
- The policy and stakeholder focus needs to be on the design of these markets and instruments for the transition. There is a high level of flexibility available still to do this by various market sectors (e.g., difficult and expensive to abate sectors), but not by favoring one fuel or technology over another – let the market deliver as it is ready to do so quickly and at the risk of investors – they just need the right settings.

## Executive Summary

In early 2014 I was asked by the Energy Policy Institute of Australia to put into words the underlying economic and community welfare concerns that were arising from high energy prices in Australia, largely driven by energy policy decisions at the time<sup>1</sup>.

More than nine years on we are starting to see those concerns accelerating as energy prices again escalate and as energy supply becomes more uncertain, and again driven largely by energy policy decisions within the transition to net zero emissions. However, this time it has occurred in an environment of increasing cost of living stress on the community (driven in no small part by higher energy pricing as outlined in the 2014 paper), high levels of inflation and interest rates, very tight supply constraints, and with business facing the massive hurdles of decarbonising their energy use in total by 2050 while staying competitive.

For many these pricing trends will be simply catastrophic, forcing more into energy poverty and forcing businesses to reevaluate their viability and operations in a decarbonized world. And Australia is now squarely facing up to the prospects of losing the level of export income tied to carbon based fuels, and the impacts that will have on the economy and Government revenues. The imperative to achieve the least cost decarbonisation must not be lost in the transitional policy settings, and the risks now of that occurring are extremely high in the rush to “pick winners”.

- The net zero emissions transition interventions into the energy markets by Government currently involve an unwarranted return to “central planning”, to “picking winners”, and not enough use of well proven market theory based on sound economic principles.
- They understandably smack of electoral anxiety or even panic and the need to be seen to “do something” to avoid or lessen the inevitable pain of the energy market transition.

History in the Australian energy market though has shown this approach will give rise to poor investment decisions by Government and associated agencies and slant private investment more toward subsidies and not economic outcomes, or see investors simply retreat from investing in the sector until some form of market order is restored. And it is becoming clear that we are starting to witness this destructive trend. This inefficiency from “central planning” and “picking winners” is fundamentally why for example the National Electricity Market was created, and Renewable Electricity Certificates implemented as a key method for decarbonising the electricity sector.


The history also of Governments directly selecting and driving specific energy sector investments where markets could have made those investment decisions has not been very pretty and this remains glaringly the case. Where the outcomes are totally focused on the success of a government preferred fuel or technology option, the original policy imperative to drive emission reductions at the least cost is invariably lost – at the expense of the community and business.

On the other hand, where well thought out tradeable instruments, that are fuel and technology agnostic, have been used to reduce emissions and progress reduction targets, investors have swarmed to participate.

The current high energy prices and major concerns over supply (reliability and adequate supply) in sectors of the energy markets (e.g., gas – which is 90% of the size of the NEM) have been

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<sup>1</sup> The Economic Impact of High Energy Prices in Australia (Public Policy Paper 2/2014)



significantly exacerbated by the well-intentioned but inefficient “picking of winners” in both fuel type and technologies by various Governments to achieve decarbonisation.

The trajectory for customer pricing, supply reliability and certainty, for the economics of our exports and business community is far more deeply concerning than when I looked at these issues in 2014. Developing a cult fervor around select fuels and technologies, and spending large amounts of community money on them is highly fraught and likely to neither deliver the reduction in emissions being sought economically, or sustainable energy pricing for business and the community.

The answers lie in Government reestablishing their trust in well designed and implemented market structures for more efficient investments to achieve their policy goals of lower emissions. ***They need to seriously and expeditiously consider returning to the use of well designed and implemented market-based instruments that provide an underlying incentive or investment signal for any fuel and technology type that can achieve decarbonization targets.*** This is easily achieved by basing the value of the certificates on abatement actually achieved – wherever and however that is accomplished.

There is a high level of flexibility available still to do this by various market sectors (e.g., difficult but expensive to abate sectors), but not by favoring one fuel or technology over another – let the market deliver as it is ready to do so quickly and at the risk of investors – they just need the right settings.

And it needs to be recognised that there have also been “loser” technologies that have not carried the favour of policy and been potentially retarded in their development and any capability to deliver good economic outcomes such as with biomethane and other alternative methane-based gases, and nuclear power options.

- The banning of nuclear power<sup>2</sup> for use in the grid for some 25 years whilst maybe well intentioned at the time (e.g., related to nuclear proliferation) has nonetheless excluded a technology option that has been developing around the world from due consideration (and development). It appears that this may have been the case for far too long now as in 2016, the South Australia Nuclear Fuel Cycle Royal Commission after extensive deliberation recommended that the ban be removed.
- Nuclear technology may or may not be able to compete with the other options, but the key point is that “picking winners” also means there are “loser” technologies, and some that have not even got to the starting line.

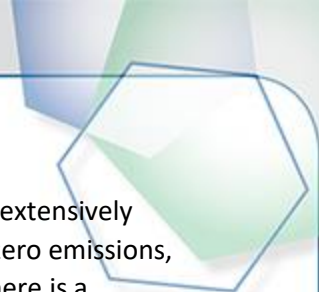
Government can still look to favour emerging technologies through development subsidies but should only do so where Australia gains a major economic advantage either internally or through exports. Providing incentives for imported technologies just adds to pricing pressures and stymies innovation within Australia. But equally this support must be limited to the early development cycles, until the underlying incentives for carbon reduction take over the commercialization.

## The case to return to economic and market principles to underpin efficient energy investments

The impacts of high prices are now acute and far more obvious as energy intensive businesses in Australia face up to their obligations to reduce carbon emissions while trying to also deal with

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<sup>2</sup> This policy issue and technology option was also more thoroughly discussed by Robert Pritchard in his EPIA public policy paper of May 2018.



increasingly expensive electricity and gas costs. The community is also now suffering extensively from escalating energy prices. The levels of investment required to transition to net zero emissions, and the associated risks of poor policy choices, is becoming better understood and there is a growing realisation that this transition will inevitably impose significant additional costs on the community, and business.

The key questions now for business and the community are about:

- The efficiency of the transition pathways and how Government manages these issues, and
  - Equally, what roles for markets and for Government interventions and major investment?
- The actual reliability and affordability of energy for the community and business within the transition, and
  - The resultant relative equity outcomes within the community and business – is there a social licence for high energy prices with uncertain reliability and supply - will that issue alone derail the interventions, add cost, etc.?
- What are the likely realities of capturing economic opportunities from the transition to net zero emissions in Australia – and can they offset the obvious impending loss of exports?

Australia faces even more of a fundamental economic risk than it did in 2014, especially as the exports of carbon-based energy resources that have provided a rich offsetting stream of taxation revenue and jobs is also set to phase out. To understand the impacts of escalating prices for energy it is instructive to examine and debate these key questions.

## Efficiency of the transition pathways – what role for Governments and markets?

The rapid and major interventions of the various levels of Government in Australia into the energy sector is deeply concerning if they are uncoordinated and ignore both economic and market principles. The probability of failure is high if:

- There are attempts to “pick winners” to try and address initially a very well-intentioned policy drive for decarbonisation, and
- Then to double down and try to fix what has become a fundamental problem of rising energy costs and lower supply certainty and reliability as a result.

This tendency for “central planning” is what largely preceded the opening up 25 years ago of more of the energy sector to market driven forces, and the use of well understood economic instruments and market design principles to try and achieve policy ambitions. Such as the use of tradeable certificates that put an effective price or incentive value on the reduction of carbon and the meeting of emission reduction targets in the electricity sector. The markets then could decide on the efficient routes for that decarbonisation, and this gave rise to a major uptake in renewable electricity options both in the grid and behind the meter. The only real failure here was to make the certificates solely attributable to electricity and not gas as well at the time, or in fact any other energy fuel type and technology option. A technology and fuel type agnostic scheme would have been highly preferable, but these were early days.

Governments in recent times though seem to have lost their confidence in market-led solutions even though this loss of confidence is largely of their own (collective) making. A downward policy

spiral, with previous interventions leading to the need for renewed market designs and associated changes but instead being met with more direct interventions.

- The energy markets, although never perfect by any means, have delivered supply and competitive pricing and an enormous export market revenue even with numerous major Government interventions aimed at emission reductions over the last decade.
- And it was eventually recognised that the electricity market for example did need significant reform so it could continue to operate under the ongoing, fundamental policy changes required to meet the net zero emissions targets by 2050.
- But this has been stymied to a large degree and its implementation lagged the rapid drive for policy change, even though there was time to make the changes.

It is clear that economic market reform is very different to direct Government intervention, as we are now witnessing.

Economic and market theory (and practice/experience) tells us that to walk away from market-based solutions and endeavor to “pick winners” will lead to serious and expensive mistakes, and despite the evidence rapidly mounting that this is the case (just think Snowy 2.0) the “fixes” and “winners” are still coming at pace from Governments. In fact, this is a “back-to-the-future” moment for the energy sector that ignores all the rationale for the original energy reforms that largely removed Government interventions of the type and scale we are seeing today.

While it is well recognised that there is a desire and drive to reach net zero emissions by 2050 the retreat from market-based solutions will add inefficient costs to the sector, cause inefficient investments in solutions and inevitably cost consumers and businesses more than it should:


- High prices are best dealt with through market mechanisms, and
- Energy policy interventions are best implemented by outlining very clearly the objective of the policy. and
  - Using market mechanisms to ensure that the most economically efficient structural changes are made to achieve those policies, and
  - In this case the policy is very clear in that it is to reduce the emissions of carbon dioxide and other greenhouse gases at the least possible cost to deliver a net zero emission outcome in 2050.

**The role for Government that complements this energy policy objective is to ensure fuel type and technology neutrality and allow all technologies and fuel types to compete in achieving these objectives, and to nurture those technologies that show promise, especially where they bring additional wealth to Australia.**

It is not to try and “pick winners” based on an unfounded faith in various options. Such tactics have proven to be very inefficient and expensive for the economies that have tried this approach. In effect what we are witnessing now is akin to the renationalization of the energy supply and is at odds with a productive role for Government working with markets and investors for efficient policy outcomes.

### The affordability and reliability of energy for the community and business within the transition

Costs and reliability fall directly onto the users of energy – business and the community – they are understanding of the need to decarbonise but there is no social licence for high costs with low



reliability, and equally no tolerance for poor Government investments that add to such outcomes in such a rising price environment.

At the same time the inevitability of Australia retreating from carbon-based fuel exports is starting to be realised and the economic impacts will be again felt by business and the community as they wind down. The economy benefited from that buffer in the past decade and again we are seeing this happening with the value of coal and gas exports, but this time it is transitory as decarbonisation starts to bite internationally. Such trade is also under intense scrutiny at the investor level in businesses enterprises, and politically within the community, as the transition to net zero emissions by 2050 gains some urgency.

The 2014 paper outlined that customers and businesses were responding to the escalating prices at that time by not only seeking better deals (shopping around) but by reducing their demand through:

- Conservation – largely cutting waste or moving production to more efficient existing plants (e.g., interstate centralization of production).
- Substitution – moving to lower cost options where this was achievable economically.
- Investment in more efficient products and technologies, and
- Through simply ceasing to use energy through largely producing offshore or importing products.

There was at the time fundamental restructuring of the economy occurring due to these price stresses, with manufacturing declining and energy exports thriving. As in most cases other issues were also impacting, but the competitiveness of many local manufacturing and other businesses had been based on the historical advantages of low domestic energy prices – and this was starting to evaporate, and the survivors had to deploy all the options listed above.


The community was also starting to see a fundamental shift to increasing energy prices (mainly power prices) in their households but also more indirectly through escalating costs of goods as the prices flowed through to those sectors – as I stated at the time:

*It is not just traditional industries like metals, bricks, glass, wallboard, etc. that are now affected by high energy prices. The packaged and processed food sector is also heavily affected and is now going through the same restructuring, ...with consequences for food growers.*

*The energy content and cost is significant if food has to be processed and put into containers (glass, steel, plastic), or frozen or has to be cooked and then packaged – which is much of what is found on supermarket shelves. The packaged food industry is also more easily replicated than heavy manufacturing in other countries. As well, brands are increasingly concentrated within global firm ownership. Often it is simply a case of a global firm shifting production to marginal capacity that already exists in offshore jurisdictions. This trend has already started and is likely to accelerate as gas prices continue to rise.*

High energy prices continue to have this effect and are fueling inflationary pressures, which in turn has driven the RBA to increase interest rates, and for the economy to teeter on recession. The pressure to provide welfare increases, and in Australia this has definitely been the case with this round of price rises as we see more and more of the community endure new levels of energy poverty.

The calls for relief are now at fever pitch from both businesses that are exposed and the community that are struggling under the burden. To then have any loss of reliability will be one step too far and



see the social compact for this transition become severely frayed. The issue we saw last winter highlights the problem, with reliability only just maintained at extremely high levels of cost as gas generation had to be deployed to support the loss of coal generation capacity. AEMO had to take a critical and historic decision to fully suspend the electricity market and effectively the gas market.

The costs of this suspension and related compensation inevitably flow through to business and the community.

Again, the solutions lie more in using market-based solutions to achieve policy ambitions and to back away from deep market interventions, from “picking winners” and from assuming “central planning” will solve these ills. Business and the community desperately need a reset – they need reliable sources of energy at an affordable cost, and this requires Government to be agnostic to fuel type or technology and allow the market to better determine the decarbonisation outcomes – within a very broad-based, certificate based, incentive scheme.

One good example is the preoccupation by Government and others with the total electrification of the gas supply, with renewable electricity. This is touted as being both cheaper for consumers and reliable - it is a classic “pick the winner” scenario. But both these arguments seemingly ignore much cheaper, sensible, and reliable options in their fervor.

They are also ignoring the early failures of such implementation such as the lack of social licence for the amount of transmission line that must be built and the enormous diminishing return from attempting full electrification. The overbuild of renewable power generation required is in the order of 30% to 50% (which is clear in the last AEMO ISP) - plant that will be only used for a few days in a year but is not actually dispatchable peaking generation – but must still be paid for by business and the community. And the cost of the transmission expansion will also flow on, and incredibly there is still no coherent answer in terms of the question about the need for deep storage that is dispatchable (like over a month) to actually support renewable electricity generation.

To put it into some perspective, the gas system on the east coast delivers 90% of the energy that the NEM delivers each year - they are roughly equivalent energy delivery systems. To decarbonise Victorian gas demand would mean adding the entire electricity demand of Queensland to that State. The question needs to be asked why would anyone abandon a gas system that is already available to take decarbonised gas, particularly renewable methane? This is a system that has the storage capability of some 50 x Snowy 2.0 already installed and can repower existing gas generation to stabilise the renewable electricity generation from wind and solar – and supply difficult and costly to abate industries and communities? Why would any economy look to duplicate such an asset, let alone a country like Australia where distance and load density are working hard against new build assets?

As yet there is very little recognition by Government that decarbonised gases manufactured from agricultural waste or specific energy crops can participate as they have no carbon credit scheme for them – no way of generating an ACCU for example and assisting even the difficult and costly to abate industries with such gases (which would avoid them spending any capital at all on the transition – same for households that use gas – zero conversion costs)<sup>3</sup>.

It is also not sufficient to say “well we don’t think it will work” when it is not even given the opportunity to try and participate – Government and associated pundits are not shrewd investors

<sup>3</sup> I need to acknowledge here that I am actively involved in the development of this sector providing regular advice and consulting support, just as I am in the renewable electricity and energy storage sectors.



or innovators. And AEMO has also started to analyse the opportunity and this year added some 80PJ of biomethane resource to the GSOO (about \$1 billion/year sales value and 15% of the domestic gas use) – on a first pass? Other countries are now pushing well down this track – Brazil has added 140 PJ/year to date and heading for 400PJ/year – Denmark as well, etc. Latest analysis is indicating on the Australian east coast some 350PJ/year and more of resource.

It appears to be a classic issue of favouring one fuel and related technologies over another for no clear reason whatsoever – and ignoring the opportunity that much cheaper and sensible solutions may be able to provide and provide quickly – it simply makes no economic sense and denies the community and business another opportunity – and risks Government actually “**picking very expensive winners**” – as history demonstrates.

Many of the problems that are occurring in both price rises, and reliability concerns are directly attributable to policy implementation decisions – no doubt well-intentioned, but as history shows us direct involvement at the current level in the energy markets by Governments will not elicit the most economical results, if it gets the results at all. There needs to be a rethink and return to more market-based approaches that harness the capability of investors and innovators.

### Deploying New Technologies: What are the likely realities of capturing economic opportunities from the transition to net zero emissions in Australia?

The corollary to this question, for the Australian economy, is can whatever benefits are available from this green transition offset the obvious impending loss of carbon-based exports?

Australia exported in 2020-21 some:

- 10,346 PJ of Coal.
- 4,314 PJ of Gas, and
- Net some 110PJ of LPG.

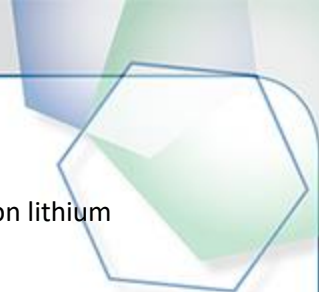
This was in excess of \$150billion in export revenues that year, and latest available data by the Office of the Chief Economist (*Ref: Resources and Energy Quarterly March 2023*) puts coal export sales at \$128billion and gas (LNG) at \$91billion = **\$219billion (about 50% of Australian export revenues in total)**.

These volumes are all slated to reduce to either zero or minor levels by 2050 under a net zero emission world, and even just with commodity price movements alone, as forecast in the Office of the Chief Economist report, could see decreased revenues by some \$120billion by 2028 (with no appreciable movement in volumes exported). These numbers obviously fluctuate with international commodity pricing but the States and Territories for example that have such industries (WA, Qld mainly) have also seen regular bonuses to their budgets from such exports when prices surge (as they have recently).

And, at the same time, Government policies are directed at reducing these exports. So, the question arises as to where will Australia benefit from the transition pathway, and will this be a net benefit?

The main options that have captured Government and others attention seem to be:

- “Green” hydrogen in some exportable form – produced mainly from electrolysis of water using renewable electricity.

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- Minerals - mainly related to clean-energy technologies e.g., largely focused on lithium production and export for battery technology.

But other options do exist and are getting somewhat lost in the rush to “pick winners”:

- Low emission technologies – such as high efficiency methanation reactors, and reuse of carbon dioxide and use of direct air capture carbon dioxide and biogenic carbon dioxide.
- Australian battery technology – such as the Vanadium and other emulsion based redox batteries.
- Biomethane and renewable synthetic methane technologies.

Hydrogen of course has literally been the major focus of Government as it seeks to “pick winners” in the export space as well, and we will return to that below.

On the other matters, according to the Office of the Chief Economist forecast the minerals expansion is gaining some traction with Lithium exports forecast to rise from some \$5billion to circa \$20billion by 2028. But this is not going to provide anywhere near the offsetting revenue required and is not a renewable resource as such.

It is also hoped that the vanadium export business may well flourish, but it does not seem to have the same profile with Government as would be expected, particularly as the battery technology it can drive at very large scale is Australian designed and is being rolled out extensively in places like China. In fact, it is unclear if it even has major support for its use within Australia at the moment at the levels for example seen for hydrogen even though this would make eminent sense. Vanadium does not even appear in the Office of the Chief Economist forecasts, but this may come with time. Other Australian developed redox flow batteries also face the same hurdles.


Similarly, the technologies and implementation of renewable methane gases as a direct replacement for natural gas in the existing network, derived from biological processes and the methanation of biogenic carbon dioxide and even direct air capture carbon dioxide are seriously lagging as they apparently are just not seen as opportunistically as hydrogen. It was heartening that the GETCO<sub>2</sub> ARC<sup>4</sup> was funded to develop high efficiency conversion technologies via the best intellect and researchers in our universities but again will hit the barriers outlined of little support by way of commercially focused incentive schemes based on the carbon that can be abated. It is also heartening to see some of the States doing a bit more on renewable gas implementation (such as NSW and Victoria) – but similarly hampered by a lack of a credible carbon credit certification and trading scheme.

Bioenergy Australia is working diligently to try and get this message across but the current glacial pace on simply allowing this neutrality for incentives for abatement is baffling.

Which inevitably brings us back to the great hope of Government and others, the development of an export hydrogen industry. Even from the early days of the cost analysis undertaken by CSIRO in the National Hydrogen Road Map (launched in 2018) it was apparent that hydrogen would struggle to achieve low-cost production – even the magical \$2/kg target was very high priced by gas terms at the time (\$14/15/GJ). Subsequent work by many has shown that even reaching twice this level is challenging and this is exactly what was indicated in that Road Map. This meant that the real markets currently for green hydrogen were more tied to liquid fuel displacement and ammonia

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<sup>4</sup> ARC Centre of Excellence for Green Electrochemical Transformation of Carbon Dioxide, administered by The University of Queensland (Oakley Greenwood is one of 22 industry, University and Technical Agency Participants).



production, and this is becoming even better understood as more work is undertaken on its production costs.

The CSIRO report also demonstrated the very high costs of actually transporting hydrogen and again this is starting to be better understood and proven up, with the inevitable realisation that it is best to produce hydrogen where it is needed.

Therefore, more work was undertaken on how to transport it internationally mainly looking at liquid hydrogen and ammonia. The liquid hydrogen case is rapidly imploding in terms of costs and complex technical issues at scale (which were well known) so the ammonia case seems to have taken a much higher profile.

Green ammonia does have its markets, but it is not yet proving to be the major export bonanza that was initially anticipated. Both this product and that of liquified hydrogen and even compressed hydrogen at the scale required for export purposes (think refinery scale) is starting to be recognised as being major hazard facilities, that will really struggle to get a social license to be exported from any port that has a community close by. It needs the development of new, remotely located ports or additions to existing heavily industrialized ports.

*The longer term opportunities for green hydrogen apart from ammonia trading are likely to lie in using it for manufacturing liquid fuel replacement for diesel and airplane fuels. This is now starting to be recognised and the interesting (and ironic) aspect is that to do this **will require either biogenic or direct air capture carbon dioxide**, to get the source of renewable carbon needed to add to the hydrogen to create such long chain hydrocarbon replacements. In some cases, hydrogen produced locally can also be used in fuel cell driven vehicles and other similar power applications, but this is not directly exportable unless liquid hydrogen is used for the transport of the hydrogen.*

*What is remarkable in this development is that the technology for the one step methanation reactor (as for example in the case of the GETCO2 ARC) is one of the foundation opportunities - internationally. Additionally, the biogenic carbon dioxide that is created in the biomethane process also starts to look extremely attractive.*

*And the kicker is that the synthetic but renewable methane produced in this way is highly scalable and can be easily exported using the existing LNG facilities in Australia.*

The incredibly interesting potential for deploying technologies and fuel options in Australia to fill the export shortfalls demonstrates the real pitfalls of simply backing a perceived “winner”. If grant money and funding initiatives are to be supported by Government in order to create offsets for lost exports they need to have some market-based approach to their allocation, not just put all into one basket to the detriment of other opportunities for Australia. And these options also build on the dire need for decarbonisation of our domestic fossil fuel use affordably and reliably.

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