Submission on Adapting ISP Rule Changes

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I agree to publication of this submission. This submission reflects my personal vies.

Written submissions responding to this consultation paper must be lodged with Commission by **18 July 2024** via the Commission's website, www.aemc.gov.au. find the "lodge a submission" function under the "Contact Us" tab, and select the project reference code relevant to the rule change request:6 Please use the project code **ERC0395** for all submissions.

Contents

Energy Context in relation to gas-fired electricity, T&D

Future electricity consumption levels and demand profiles (real time, daily, seasonal and trends) are very uncertain as we are entering a period of disruptive change driven by climate action, eastern Australian gas supply constraints and electrification.

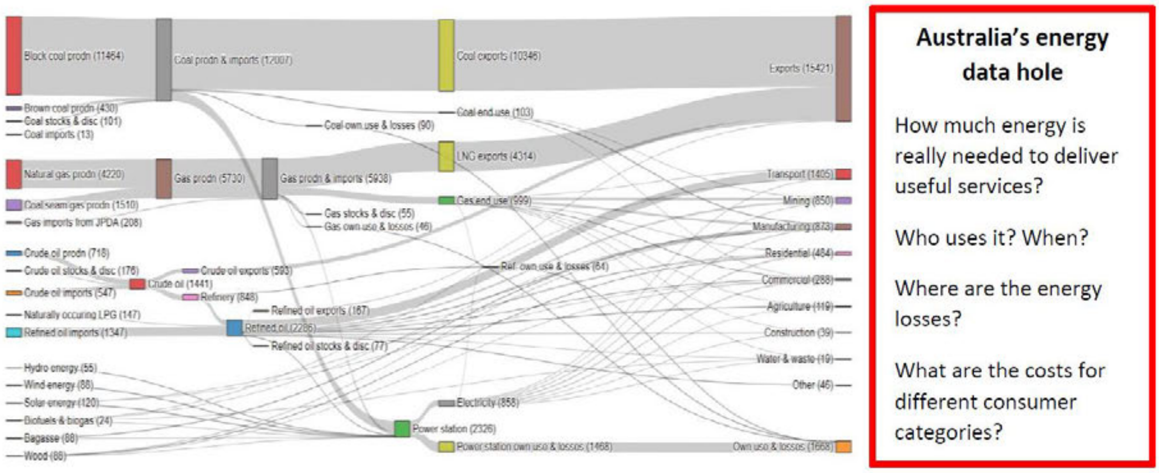
It is important to remember that demand for energy is *derived* from the perceived demand for valued or essential services that require multiple inputs. These include appliances, consumables, maintenance services, energy, the energy technologies used, and the energy sources available. Yet Australian energy analysis focuses on the fine print of supply. This is a high risk approach in the present context.

Amory Lovins. In his recent visit, demonstrated the enormous potential of radical energy efficiency, which is largely unrecognised in Australia, It is our invisible and forgotten fuel.

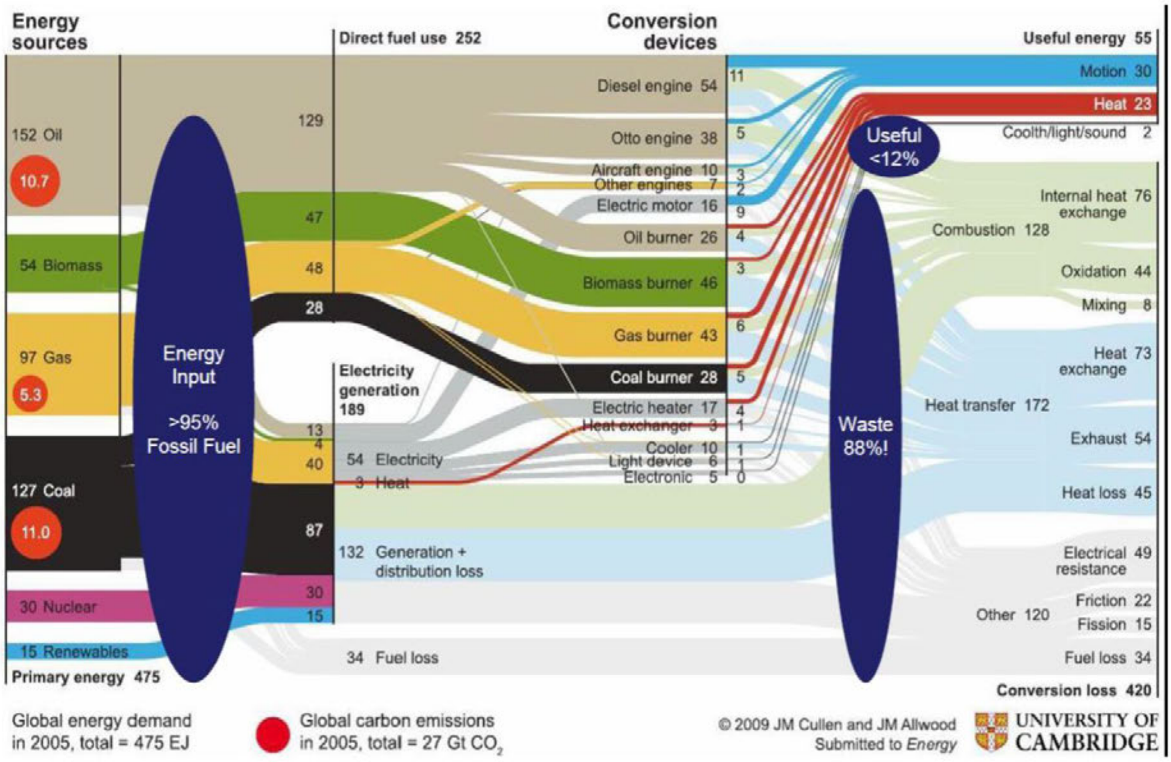
Fifteen years ago, Cullen and Allwood analysed the global energy system and concluded that just 12 percent of the primary energy harvested delivered useful services: 88 percent was lost in supply and inefficient end-use technologies.

Figure 1 illustrates the data hole. Failure to ensure quality data on the efficiencies of end-use systems (not just individual items of equipment) as well as the potential for future improvement through optimising use, technology improvements and redefining the ways we provide services means we will overstate the scale and cost of energy supply infrastructure required. In turn, this will distort energy and climate policy and program design and create higher risks for investors in energy infrastructure and services.

Figure 1. Australia's energy data framework compared with a more comprehensive one.



From Cullen, J. M., and J. M. Allwood, 2010: Theoretical efficiency limits for energy conversion devices. *Energy*, **35**(5), 2059–2069, doi:10.1016/j.energy.2010.01.024



Our policy approach is also focused on financial and technological issues that drive the price and availability of electricity (including gas-fired electricity) and gas. The social dimension is poorly addressed. A mass-produced technology that offers perceived benefits to consumers can capture market share very quickly. If people do not trust energy suppliers they may take 'defensive' action, investing in measures that allow them to maintain control and resilience.

Gas and electricity comprise a small proportion of input costs to most households and businesses, and many consumers see them as 'fixed/uncontrollable' costs. They have little idea of how their energy is being used. Fixed charges can be a significant proportion of retail prices, while most retail energy tariffs bear little resemblance to actual supply costs. So it is no surprise that 'economically rational' energy policy has not worked very well. The energy sector is actually applying 'bounded rational' approaches that focus on energy costs and issues. Consumers also apply bounded rationality, but based on very different perspectives and logic.

With regard to gas and gas-fired electricity, there are some urgent issues. These include:

- A rapid shift to variable renewable electricity, mainly solar and wind. Their variability has been used to justify ongoing substantial gas-fired electricity generation because of its quick response and availability of gas supplies that allow it to 'fill gaps' for extended periods. The case for nuclear has also been based on a claimed need to 'firm' variable renewables, ignoring the many other options to manage and supplement this variability.
- A transition away from fossil gas towards efficient electric technologies across all sectors, particularly buildings. In many cases, despite significant up-front costs, these solutions are cheaper and often work better. They are often more flexible and efficient. This raises challenges for remaining gas consumers, who will have to share costs of gas infrastructure across declining numbers of consumers and gas consumption.
- Emerging shortages (mainly in winter) of gas supply to southern states, which also affects availability and cost of gas-fired electricity. This is largely driven by inefficient (gas and resistive electric) heating in inefficient buildings. Gas generators are able to charge high prices in the spot market at times. In future, gas-fired generators may have to compete for gas with industrial customers with high temperature heat requirements – it is not clear who would win.
- Blurring of traditionally separate markets: electric vehicles are replacing transport fuel but adding to electricity consumption. In much of Australia, gas has provided cheap heat and industry has located where it can access gas. Changing industrial processes, renewable electricity and pressures to decarbonise are changing business planning.
- Recognition that global heating is driven by the concentration of greenhouse gases in the atmosphere, and that it correlates closely to cumulative emissions, not annual emissions. Urgent action is needed, and reduces the risk of runaway climate change and its impacts. Few Australians seem to understand these basic facts, fuelling debate about far-off or unviable options such as nuclear power and supply of cheap hydrogen to homes to meet distant 2050 targets. At the same time there is a dissonance between energy contributing 80 percent of Australian emissions but comprising just a few percent of most household and business input costs.

Energy policy and system design must become more integrated across energy sources, delivery methods and energy services. For example, there may be a case to merge gas and electricity distribution policy and operators, to smear costs and facilitate change.

On this basis, the separation of the proposed rule changes is an outdated approach. Of necessity my responses will blend issues.

Better integrating gas market analysis into the ISP

The ‘need’ for gas to supplement variable renewables

Variable renewables cannot, by themselves, reliably supply all of our electricity and heat. But we can change our demand for energy supply through targeted energy efficiency and smart demand management.

The ISP focuses on electricity supply, so it does not effectively address gas-related factors such as the impact of efficient building electrification on electricity demand. Assumptions that electrification will dramatically increase electricity demand are risky. A lot of gas technologies are far less efficient than many believe, and deliver heat at temperatures higher than processes actually require. And gas equipment can use significant amounts of electricity for fans, pumps, controls and other functions. Electric fan heaters and other resistive electric heating options are much less efficient than a heat pump. A combination of an efficient building and heat pump technologies can reduce gas and electricity consumption.

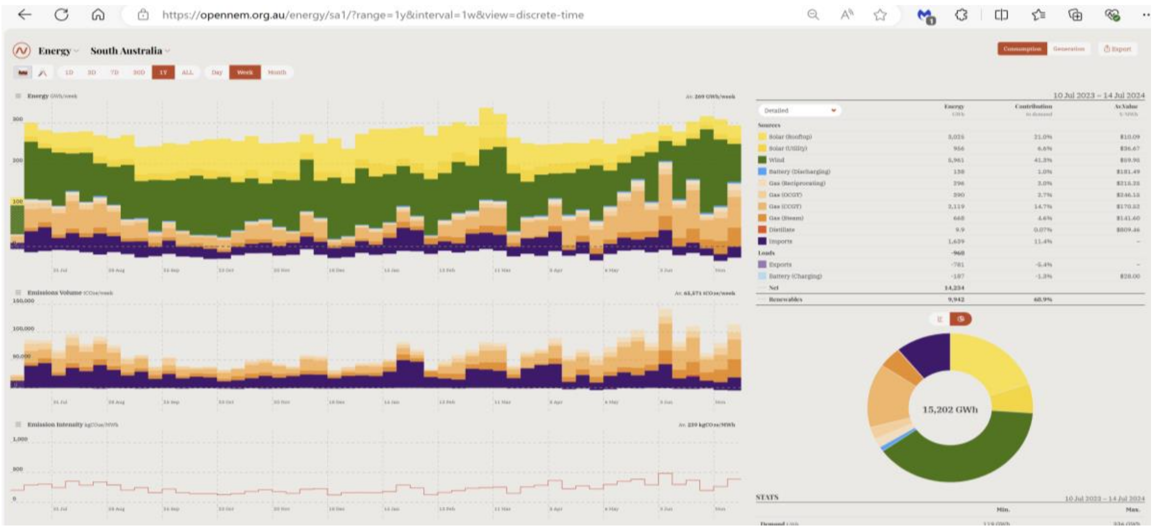
The ISP should stop focusing so much on gas-fired electricity as the future gap filler. It should actively encourage development of other options that do not involve fossil gas, nor drive delays in emission reduction while we wait for technology development and cost reduction of some solutions. It should use a generic name such as ‘gap filling’ or ‘variable RE firming’ solutions’.

The ISP also should better recognise the significant uncertainties created by disruptive change. A well-resourced annual Demand-side Statement of Opportunities would help to build awareness of emerging technological and business model opportunities. One element of this uncertainty is the increasing interventions of governments through subsidies and incentives that reflect state and regional level circumstances.

But there is a real issue that can be addressed by multiple options

We do need to better understand the factors that create a gap between solar and wind generation and demand – by addressing both demand and smart ways of generating and supplying energy to fill the remaining gaps. South Australia, which often has high dependence on gas fired generation in extreme weather as shown in Figure 2, could be a good pilot site for an integrated approach.

Figure 2. South Australian weekly electricity supply July 2023 to July 2024 (source OpenNEM). Overall annual gas generation supplied 24% while wind and solar provided 69%, but the situation was very different in winter.



There are many alternatives to gas to fill gaps in supply from wind and solar. For example, a recent IEEFA paper ([Optimising the 'Battery of the Nation' | IEEFA](#)) showed how a combination of building and appliance energy efficiency (to reduce summer and winter peak electricity demand and consumption, virtual transmission' across Bass Strait and optimisation of management could allow Hydro Tasmania to hoard more stored water, then provide significant amounts of electricity to Victoria in extreme weather. The Victorian government's decision to fund a third of the capital cost of the Marinus cable shows that this potential has been recognised.

Heat pumps are improving in efficiency and delivering higher temperatures. Less efficient electric technologies such as electric boilers and induction metal melting can now compete with gas in industry when their comparative efficiency, flexibility and precision are factored in.

Demand management can help, but this can be tricky stuff. For example, electric vehicles offer potential to store and supply electricity. But over a multi-day dip in solar and wind generation, EVs are net consumers of electricity if they are driven. They can help with short term shortages, but they have their limits. On the other hand, replacing an electric hot water service with a heat pump HWS saves enough electricity to run an EV driven average annual kilometres, though it has less capacity to suck in daytime 'excess solar' electricity in sunny weather.

Multi-fuel generators with fuel storage can play a useful role. We have many of these. When load factors are very low, using these existing generators, even with expensive renewable fuels, may be cheaper than new gas generators, while avoiding carbon emissions.

Figure 3 shows my analysis of NEM data for the past year from OpenNEM. Instead of showing electricity generation in Gigawatt-hours, it presents the output of solar and wind generation as percentages of total NEM generation on each day.

Solar's lower and more variable winter share of generation is not just due to shorter, cloudier days. Our electricity consumption is higher in winter, especially in southern regions and on colder days. We use quite a bit of electricity to heat buildings and run fans and pumps for gas heating equipment. Consumption for lighting and other activities also tends to increase due to shorter days, and behaviour changes. For example, households in Melbourne suburb Bayside, most of whom use gas, consume over 50 percent more electricity in mid-winter than in summer.

Wind complements solar, but a need to supplement their output remains. Demand profiles will change as we electrify, improve efficiency, drive demand management and energy storage of varying duration. As we switch from gas, winter electricity demand is expected to increase, though by how much is very uncertain, so the winter 'solar gap' may increase or be offset by growth in solar generation.

Figure 3a. Percentage of daily electricity generated provided by solar and wind generation.

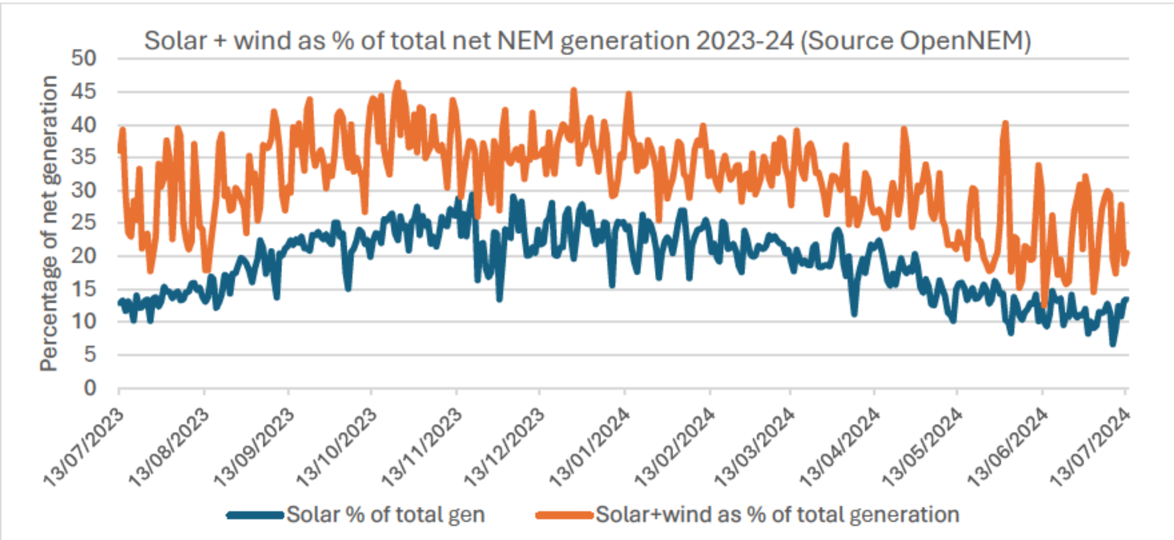
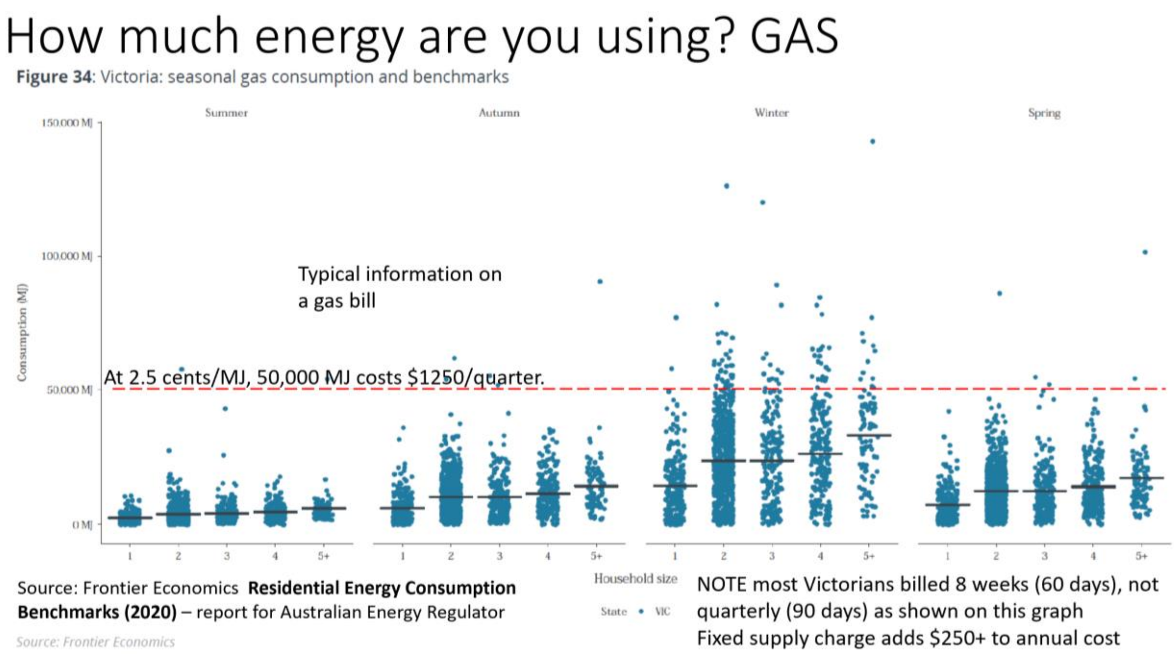


Figure 3b. Screenshot of OpenNEM electricity generation for the same period (a day later) as the data for Figure 3a. This shows that winter solar generation is lower while demand for fossil fuel sourced generation is higher and summer solar generation is higher and total generation is similar to winter.

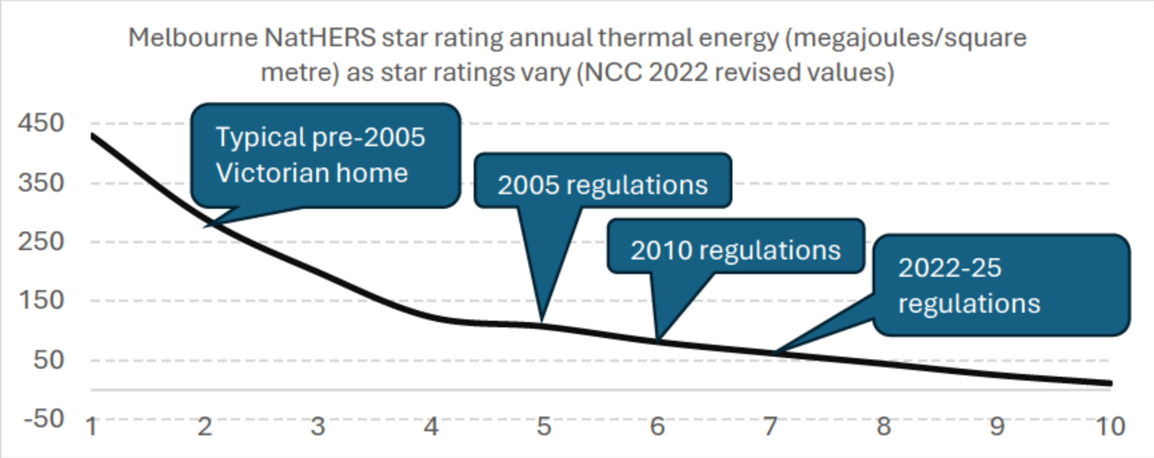
If we poorly manage electrification, our electricity demand will increase while utilisation of energy supply infrastructure will decline, increasing fixed electricity costs as we replace gas heating. If we drive efficient electrification the outcome could be very different. Targeted commercial and residential building upgrades and appliance replacements can disproportionately cut gas use while also reducing peak demand and future electricity consumption. Figure 4 shows the distribution of gas bills in Victorian homes. Some industrial demand also has seasonal peaks, so targeted energy efficiency measures could also help. Clearly there are some big opportunities for savings. Retailers must be encouraged or regulated to act.

Figure 4. Distribution of Victorian household gas bills



Combining upgrades of building thermal performance with a shift to electric heat pumps can cut heating energy requirements. As shown in Figure 5 for Victoria, upgrading a typical 2-star dwelling to 4 stars (well short of the now mandated 6-7-stars for new homes) would halve thermal energy requirements. Combining this with replacement of gas ducted heating with split system heat pumps as well would cut overall end use heating energy requirements by 70-90%. Smaller capacity heating equipment would be required.

Figure 5. Energy ratings using the NatHERS building rating system.



Many commercial buildings use very inefficient gas systems for water and space heating. Their building envelopes are typically very inefficient and the heat/cooling distribution losses are often high.

Combining commercial building upgrades and efficient electrification can deliver substantial benefits. One recent example of an aquatic centre upgrade and electrification project saved $325,000 in gas bills in its first 10 months of operation.

The National Construction Code and the NABERS rating scheme focus on reducing annual energy and carbon emissions. Unfortunately, in most Australian climates this discourages building designs that minimise peak winter and summer efficiency.

This is because most Australian climates have substantial periods of moderate to cool weather when a thermally leaky building allows more internally generated heat and solar gain to leak from the building, reducing cooling energy requirements. Overall, this often means a thermally worse building can gain a higher energy rating. Unfortunately, this approach leads to increased peak electricity (and gas if it is used for heating) demand and larger capacity, more expensive HVAC equipment. Despite this issue, NABERS has demonstrated annual savings of 30 to 40% and, with the Green Building Council of Australia's Green Star scheme and mandated Commercial Building Disclosure at time of lease for some categories of commercial buildings, has created a culture that focuses on energy efficiency and decarbonisation that is world-leading.

There are many emerging alternatives to fossil gas, some of which involve new models for gas. For example, off-grid pipes from landfills, sewage plants and regional digesters supplied by biomass wastes, potentially in regions that have not had access to reasonably priced gas in the past, could supply local industrial and large commercial sites. For example, farm biomass waste quantities tend to peak at times when electricity use of harvesters and processors is high.

Farmers who face high network charges for metering across multiple meters could use portable storage to go off-grid for some activities.

Responses to questions

Better integrating gas market analysis into the ISP

Question 1: Should greater gas market analysis be required under the ISP?

(a)Would requiring AEMO to include greater analysis of gas in the ISP provide benefits to electricity consumers? This includes information to inform the following:

- further analysis of future gas demand and pricing
- developing projections about the future utilisation of gas infrastructure
- collating pipeline closures or conversion dates
- reflecting updated gas generator fuel costs

Should the rules be amended to explicitly require this?

(b) Should the rules be amended to enable AEMO to utilise gas information provided to it under other functions?

Yes to both (a) and (b). More focus on retail gas prices as drivers of demand, not just wholesale, is important for consumers to make decisions. Most consumers engage with energy through retailers. The influence of fixed charges and, in some sectors, demand charges, on consumers can be significant. It is puzzling that Victorian residential gas consumers pay the highest fixed charges when this is where the highest density of consumers is. Maybe retailers are shifting risk to consumers through high fixed charges. It would be useful if the shares of network and retailer fees in fixed charges were made transparent.

Gas use for industrial process heat is not well understood. Estimates of efficiency of gas systems is often very optimistic. Overstating gas end use efficiency distorts the amount of electricity needed to replace gas. Further, it seems that temperatures at which heat is delivered are significantly higher than required by many processes. This impacts on the extent to which heat pumps can replace gas use. Electric technologies may also change process design, as they can be modular, located at or near point of use, more precisely used and flexibly managed, and more easily switched off when not needed.

I discuss the problems with estimation of efficiency of utilisation of gas and inadequate consideration of matching supply temperature to process temperature in my submission to the *Future Gas Strategy* consultation. See Submission Future Gas Strategy Alan Pears final.4dcfe4dd2a615.dc95156097e2b.pdf (storage.googleapis.com) OR https://storage.googleapis.com/converlens-au-industry/industry/p/prj27dea2ada2e0dc2bc348a/spc27dea2fac382afd56326b/Submission%20Future%20Gas%20Strategy%20Alan%20Pears%20final.4dcfe4dd2a615.dc95156097e2b.pdf?GoogleAccessId=storage%40omega-winter-188807.iam.gserviceaccount.com&Expires=1721492184&Signature=Z%2FoL4ARzBeP8p73Jh0MXzqtMUUaR3LnUqQRe4wt8YSzrxzdSt8eW%2FFOFyTjFkSyMrMjGialtwyCgdq4LXlh2mFx84kZQ%2BVoG0zG771Fi%2FSTWbOBe0OtlrAETg4ScYjD6JTJe8L6Cx9H6NRID6eclhb0T5b4wunPULGW3b%2Fe5UOm%2B38J%2Bu%2FHtHe76Q%2F092RaQXBTZJrlnxBtM1truPktygmZ0%2FenEhS%2BABcHsK%2FeO0PimRyQXHfs8ivj41BdxIi0s5K2adXfC0gVi4MuWqox%2BO0j8waxqO94xpLARFZqJ5BockJC7Ohq%2FCHqKM2tGszLFLyUVukB088%2FLl3TmZaY0gQ%3D%3D

Note that this links to the PDF which shows all of the graphics in my submission. The automatically transcribed version in the main list does not show my graphics.

While it may be beyond the ISP's role, improved planning for the phase-out of low pressure gas grids is needed. Cost and complexity of implementation, and how costs are allocated, will impact on the speed of change.

More analysis of costs of electricity from gas-fired generators at low load factors is needed. CSIRO prices are based on 20% load factors but AEMO expects 5% and it could be even lower. My rough calculations suggest that shifting from 20% to 5% load factor could double electricity prices from gas generators. And gas generators often bid in high prices when market conditions allow it. Consumers need to know the likely real prices of gas-fired generation, not the theoretical wholesale costs.

Regarding Clause 5.10.2, given the wide range of uncertainty regarding the future, AEMO should also flag the uncertainties of outcomes beyond the boundaries of scenarios included in the ISP. Some examples could make this more tangible for decisionmakers. As I understand it, the present ISP is based on current government policies. In practice, policies, technologies and business models are shifting fast, so the ISP should consider a range of possible (and unlikely at present) government policies and other factors and their implications. Fears of energy shortfalls and blackouts, or a few bushfires or floods, can significantly shift state and/or federal government policies and consumer decision-making.

Question 2: Will the proposed solution support a more robust ISP by better integrating gas and electricity infrastructure developments?

a) Will requiring AEMO to carry out further analysis of gas in the ISP improve the ISP analysis? Why or why not?

(b) Is it appropriate for AEMO to use gas information available to it under the NGR for the purpose of the ISP? Are there any risks that we should be aware of in extending the use of or publication of specific information?

Yes to both (a) and (b). There are always risks associated with providing greater transparency, and incumbents often highlight this because they benefit from information asymmetry. Efforts should be made to manage the risks, but greater transparency is increasingly important at a time of rapid and disruptive change, so consumers and analysts can make better-informed decisions. Industries should not be allowed to rely on information asymmetry and resulting market distortions for profit.

While it is beyond the present ISP, increased consumer access to gas data and existing end use efficiencies is important to empower and inform them so they can make competent decisions regarding their investment in building efficiency, industrial process equipment and appliances.

Question 3: What are your views on the costs and benefits of requiring AEMO to undertake additional gas analysis in the ISP?

(a) What do you consider to be the benefits of the proposed solution? Is there anything that might erode the benefits of reduce the likelihood of the benefits being achieved?

(b) What do you consider to be the costs of the proposed solution?

Failure to expand analysis of gas and to factor in the complex interactions between gas, electricity and energy services would be very costly, and delay decarbonisation. We are in early days, so we need access to flexible resourcing for data collection and publication, and for analysis, that allows us to respond to changing circumstances.

Question 4: What implementation considerations need to be considered?

(a) Do you have any concerns about sharing gas information received under the NGR for the purposes of developing the ISP? Is there sufficient clarity on what information should and should not be publicly disclosed?

(b) Are there any other implementation issues that should be considered?

Of course there are concerns about sharing information, especially for incumbents who benefit from information asymmetry. Information requirements are changing fast, so we need institutional capacity to track this and adjudicate in the public interest to provide useful information as circumstance evolve, and to actively alert consumers and analysts to its existence and how to access it.

It is a concern that AEMC may have decided to drop its 3-yearly survey of residential consumer electricity and gas costs, as shown earlier in Figure 4. This is important information. And the raw data behind this study should be made widely available.

AEMO will need additional resources and will need to engage with a broader range of interests, particularly on the demand side. Those groups will also need additional resources to be able to respond.

Optimisation of energy efficiency options, demand management, disruptive technology change and evolving business models offers enormous benefits, but the institutional responses identified must include resourcing of those capable of analysing and dealing with rapid change.

At present, we are not in a position to specify many aspects of this situation due to rapid change and limited demand-side analytical focus to date, so mechanisms to allocate resources as needs arise will be needed.

Question 5: Are there alternative ways in which further analysis can be included within the ISP instead of the proposed rule change?

(a) Would the development of a procedure or policy enable the same outcome?

(b) What level of prescription vs principle is appropriate when setting out the requirements for the ISP?

We need a flexible framework that can respond to rapid change in understanding of issues and the evolving need for additional data.

Improving demand forecasting and demand-side data in the ISP

The current rules do not require sufficient consideration of demand-side factors. This is a costly and deep cultural failure. For example, present network pricing models undermine the economics of neighbourhood batteries because of ‘postage stamp’ network pricing. Informing market participants, regulators and policy makers is not sufficient: consumers must be informed, empowered and motivated if change is to occur. This means the retail sector’s role must be considered in the ISP.

Question 6: Should AEMO be required to expand consideration of CER and distributed resources in the ISP?

(a) Should the ISP's analysis include greater consideration of the assumptions and contingent factors underpinning the expected development of CER and distributed resources? Why or why not?

(b) Do you agree that AEMO is currently constrained in its ability to access relevant information about distribution network hosting capacity and relevant CER forecasts from DNSPs?

Of course we need much greater consideration of CER and distributed resources, and the potential roles of targeted energy efficiency measures, especially in relation to peak demand. This will require inclusion of the retail sector in the ISP. We also need a range of scenarios so that decision-makers can make assessments of risk, not just AEMO's expectations based on existing government policies that are likely to be ramped up from their present weak levels over time. My proposal for an annual Demand-side Statement of Opportunities (with appropriate resourcing) would be part of this.

Overall this high level proposal seems like a positive step, but the devil we be in the detail.

Question 7: Will the proposed solution address the issues raised by the proponent and improve the robustness of the ODP?

(a) Would the proposed rules enable more in-depth analysis of CER and distributed energy and its impact on operational demand forecasts in the ISP? Why or why not?

(b) What type of demand-side information should be provided by DNSPs that would be useful for the ISP analysis?

The proposed rules are a significant step forward, but they are not sufficient. Consideration of costs on AEMO to manage better data, and on DNSPs to comply is a small subset of costs and benefits for a much wider range of players including retailers and consumers, as well as businesses that deliver services to energy consumers. The decisions retailers make regarding retail tariffs are major influences on retail consumer behaviour and adoption of CER and distributed energy.

As noted recently by IEEFA, DNSPs have been making super profits for years, so it is about time that they were pulled into line, and those historical super-profits should be factored into future decisions on allocation of costs. The costs for AEMO to be properly resourced are small within the broader energy sector and the potential savings they will underpin are substantial. Optimising utilisation of energy supply infrastructure by limiting peak demand and consumption through targeted energy efficiency and demand management will deliver substantial energy and other benefits including improved health and improved business competitiveness.

Question 8: What are your views on the costs and benefits of the proposed solution?

(a) What do you consider will be the benefits of the proposed solution? Is there anything that might erode the benefits or reduce the likelihood of achieving the benefits? Are there any additional amendments that could be made to improve the benefits?

(b) What are the costs DNSPs might incur in complying with requirements to provide further information? Do the benefits outweigh the costs? Should DNSPs be required to provide further information in their DAPRs or elsewhere?

(c) Would the proposed solution impose costs on any other stakeholders? If so, how might these costs be minimised?

See above.

Question 9: Are there important implementation considerations for the Demand-side rule change request?

(a) What implementation issues should be considered? For example, are DNSPs likely to face any challenges in complying with new information obligations?

(b) Are there any transitional measures that should be considered to support the implementation of the rule in time to inform the 2026 ISP?

(c) If adopted, should the development of guidelines be subject to the Rules Consultation Procedures under NER Rule 8.9?

It is important for decisionmakers to have access to consistent information from all DNSPs. If not, DNSPs will be able to benefit from information asymmetries and imperfect regulation. I agree that imperfect information is better than the present situation. There will be a need for ongoing evolution of information requirements.

Also, as noted earlier, energy retailers should also be subject to standardised information requirements that support consumer decision-making and transparency about how costs are allocated, for example what components are incorporated into fixed daily and demand charges.

Facilitating data collection and publication may require a combination of NER obligations and guidelines. It will depend on how cooperative the DNSPs are.

A separate AER issue is that I believe AER has decided to discontinue its 3-yearly survey of residential energy bills used to provide basic information on energy bills for consumers. This is a disappointing situation, as this is the only public information that I am aware of that shows the distribution of energy bills. Figure 4 above presents one of the graphs from the last AER survey in 2020.

Question 10: Are there alternative solutions to those proposed in the Demand-side factors rule change request?

(a) Do you consider alternative, more preferable solutions exist to address the identified issue?

(b) Should guidance on information required to be provided by DNSPs be set out in an AER or AEMO guideline, or in the NER?

It is worth trying the guideline approach first, as it is more flexible, and can be adjusted more easily based on experience. However, if DNSPs do not respond appropriately, more intrusive approaches such as inclusion in the NER should be applied in a timely manner.

Better integrating community sentiment into the ISP

This rule change seems to be based on the assumption that a new powerline will be required, and that community sentiment can impact on cost and timing of construction. There is no doubt that recognition of community sentiment is important, but there are more fundamental factors to be considered.

The need for a transmission asset, and associated community sentiment issues, is based on assumptions about electricity demand and the extent to which other options can make better use of existing transmission assets or involve alternatives. These assumptions must be carefully scrutinised.

Emerging options include:

- Aggressive energy efficiency targeted at activities that are significant contributors to peak demand, such as building heating and cooling
- Expanded demand management and response mechanisms
- 'virtual transmission' utilising distributed batteries to manage high demand. Batteries can be 'trickle charged' during periods of low demand, as discussed earlier in this submission. The recent IEEFA paper (Optimising the 'Battery of the Nation' | IEEFA) explores a range of ways this could help
- Techniques that increase capacity, such as linking capacity to wind speed and temperature and other options (eg see for example Electric Power Systems Research. A comparison of alternatives to enhance the utilization of transmission lines. May 1997. *Tam, Kwa-Sur* and https://rmi.org/insight/analyzing-gets-as-a-tool-for-increasing-interconnection-throughput-from-pjms-queue/
- Portable energy storage capacity. Lawrence Berkeley National Laboratories have studied the potential roles of 'battery trains' to complement transmission lines. The batteries are loaded onto freight flatcars and the locomotives are electric. The LBNL research analyses the practicalities and costs of this option. I have analysed the potential for semi-trailer mounted batteries. As energy density improves this option offers potential in various ways. For example, to provide EV charging in rural areas, especially at peak times such as start and end of school holiday periods, for major events in rural areas, for supply after extreme climate events or powerline failures. They could also deliver power from renewable energy generators instead of curtailment or as an interim before they are connected to the grid. When not needed in these ways, the batteries could be used at sites such as data centres, industrial sites, neighbourhoods or other end-use locations just like stationary batteries. They could also 'soak up' excess rooftop solar generation and deliver it to customers 'behind the meter, avoiding T&D and retailer charges.
- Re-wiring existing transmission lines with emerging higher capacity cables
- Design of powerlines to run along rail or road reservations as much as possible.
- In rural areas where SWER lines with high peak demand exist, line losses can be very high at peak times, adding to loads on upstream transmission lines. Improved efficiency and demand management, as well as end-user energy storage or taking consumers off-grid can reduce transmission (and network) capacity requirements and losses.
- Forms of end-use energy storage other than electricity, such as thermal storage. High temperature thermal storage is emerging as an attractive option for industry that would otherwise use gas or, as we electrify, electricity.

Question 11: Do you consider that the current process for developing the ISP is creating uncertainty and inconsistency in how community sentiment is incorporated in the ISP?

(a) Should AEMO be explicitly required to consider community sentiment when developing the ISP? Should TNSPs be explicitly required to share relevant information as part of the joint planning process?

The energy sector has a long history of poor performance in community engagement, so there is significant mistrust.

One problem is that the ISP provides high level proposals for transmission projects based on limited recognition of the alternatives I have outlined above. This means communities do not have clear insights into who will be affected. Maybe clear guidelines on compensation and other measures would reduce perceptions of potential loss.

Evidence that alternatives have genuinely been explored, possibly through involvement of a community committee supported by trusted experts may also help overcome conflict.

Question 12: Are changes required to facilitate a more robust analysis of community sentiment in the ISP?

(a) Do the current rules result in a significant gap in powers and guidance for AEMO to undertake an analysis of community sentiment impacts?

(b) Are there any barriers in the current rules to AEMO requesting community sentiment information and/or undertaking analysis of community impact?

Yes. Experienced, independent social researchers working with community representatives and independent technology experts are needed to build confidence and trust.

Question 13: What are the costs and benefits of requiring enhanced consideration of community sentiment in the development of the ISP?

(a) What are the benefits of the proposed solution? Is there anything that might erode or improve the benefits?

(b) What are the costs of the proposed solution? Is there anything that may reduce the costs?

The costs of failure to manage community sentiment are high. These drive delays in implementation. Further effective engagement can lead to identification of creative solutions that may have lower cost, and which may influence costs of future projects. Around 1990 in Victoria an independent panel was established to resolve conflicts over a proposed powerline near Melbourne. This led to a lower cost, less controversial alternative that allowed communications infrastructure to be combined with the powerline to increase revenue.

Question 14: Are there implementation considerations for the community sentiment rule change request?

See above: improved processes are needed.

Question 15: Are more prescriptive rules necessary to ensure AEMO and TNSPs consider and share relevant information on community sentiment?

(a) Are guidelines a more suitable way for community sentiment to be incorporated earlier in the ISP development process?

(b) Are there other options that stakeholders consider would be a better solution to rule changes (if required)?

Surely recent experiences should be enough to convince AEMO and DNSPs to adopt a different approach! See above for my suggestions.

Question 16: Assessment framework

Do you agree with the proposed assessment criteria? Are there additional criteria that the Commission should consider or criteria included here that are not relevant?

Unfortunately the NEM Objectives create a fundamental problem by using the term ‘price’ instead of ‘cost’. This undermines consideration of options that deliver multiple benefits to the economy and society or are not captured in ‘price’ in other ways. This is a major factor driving the very costly, socially problematic and carbon impacting supply-side focus of Australian energy policy.

While the ISP remains bound by inappropriate Objectives it will be impossible to maximise long term benefits to consumers. Also, the ISP pays too little attention to the roles of energy retailers, who frame tariff structures and influence consumer attitudes to CER and distributed generation.

Unfortunately the energy industry, regulators, policy makers and government energy departments are not highly trusted by residential and business consumers. So there is also a need for strong independent organisations such as Energy Consumers Australia and representatives of community groups and local government to have a high profile role in development and communication of the ISP. They will need significant support from independent experts.