

Senate Economics Committee – Inquiry into Residential Electrification.

The benefits of Consumer Energy Resources.

Chris Lehmann 19th September 2023

Introduction

Master Electricians Australia (MEA) is the trade association representing electrical contractors recognised by industry, government and the community as the electrical industry's leading business partner, knowledge source and advocate. Our website is www.masterelectricians.com.au

MEA believe that the quickest, most equitable, and efficient way to meet the challenges of residential electrification during the energy transition, is the use of Distributed Energy Resources (DER) technologies. This is the idea that rather on relying on large scale, generation, transmission, and storage that is reliant on massive government expenditure, that advances in small scale renewables technology and the financial integration platforms to support them, can be organically distributed throughout the existing electrical distribution network infrastructure.

This is infrastructure that the Australian community has already paid for over the last 100 years and DER effectively puts more generation and decisions around usage of electricity into the hands of residential and business consumers. The use of the term DER has more recently morphed into Consumer Energy Resources (CER) reflecting the reality that there is a large and growing amount of consumer electrical infrastructure that remains chronically underutilised and its capacity to contribute to electrical grid and price stability largely ignored.

The current federal government's *Powering the Nation*¹ focuses primarily on big picture, big project, publicly funded, centralised infrastructure, with tens of thousands of kilometres of HV transmission lines constructed to get the electricity into our cities and towns from the remote generation infrastructure to the power points, lights, and appliances in our homes and businesses. Minister Bowen is correct when he says that solar is the cheapest form of energy available, but only if it used near where it is generated. The current government strategy makes passing references to community batteries, and home Battery Energy Storage Systems (BESS) but the focus is overwhelmingly on large projects.

MEA has responded to many consultations on the benefits of the implementation of DER/CER and have published a high-level policy document² that outlines our vision of turning every home and business in the country into a power station.

The dream of changing the energy demand curve (the ducks back), by taking the excess/cheap energy produced in the middle of the day, and using it during times of peak demand, thereby flattening the demand curve and stabilizing electricity prices can be realised in a reasonably short period if we collectively make some rational, sensible decisions. The technology is here now, the regulation just needs to catch up, and the workforce of electrical businesses across the country stands ready to make it happen.

Over the course of this submission, we will address the questions posed in the terms of reference and demonstrate why MEA believe that prioritisation of DER/CER in government policy could use existing technology and the power of the free market to improve energy security in Australia and reduce energy prices more swiftly than current policy settings.

¹ <https://www.energy.gov.au/government-priorities/australias-energy-strategies-and-frameworks/powering-australia>

² <https://masterelectricians.com.au/wp-content/uploads/DER-Policy-Working-Paper.pdf>

Definition of “Household Electrification”

For the purposes of this submission, MEA defines household electrification as the process of utilising electricity as the sole energy source in the home for appliances, lighting, space heating, cooling, cooking, and water heating. This would also include the household and its appliance’s ability to communicate and respond to the grid in an interactive way.

It also refers to maximising the available footprint of the household infrastructure to generate and store electricity where feasible.

Abbreviations

MEA – Master Electricians Australia

PV – Photovoltaic, (Solar Panels)

BESS – Battery Energy Storage Systems

EV – Electric Vehicle

EVC – Electric Vehicle Charger

HEMS – Home Energy Management Systems

VPP – Virtual Power Plant

CER – Consumer Energy Resources (private renewable generation and storage infrastructure)

DER – Distributed Energy Resources (interchangeable with CER definition)

Ducks Back – A colloquial description of the energy demand curve

TOU – Time of Use (tariffs that reflect the spot price of electricity based on demand)

DNSP – Distribution Network Service Provider (Energex, Western Power, SAPN etc)

NEM – National Electricity Market

ACCC – Australian Consumer & Competition Commission

AER – Australian Electricity Regulator

AEMO – Australian Electricity Market Operator

AEMC – Australian Electricity Market Commission

CEC – Clean Energy Council

CEFC – Clean Energy Finance Corporation

SME's – Small to Medium Employers



(a) the economic opportunities of household electrification, including but not limited to:
(i) long-term reduction of energy price inflation,

The theory of CER being applied broadly in the NEM, whereby the energy consumer utilises their own PV and BESS infrastructure and enters trading arrangements with others on innovative billing platforms to use their own electricity at peak times or export their excess capacity into the grid, would mean that peak power pricing would reduce as more and more participants entered the market.

Those that have the capacity to install their own infrastructure or have the wherewithal to participate in the electricity market, would inevitably positively affect the pricing of power for all participants in the market by reducing the peak demand curve, helping those consumers whose individual circumstances do not pro-actively permit them to take direct action.

(ii) long-term employment opportunities,

Over 90% of all Electrical Contracting businesses in Australia are SMEs, and SMEs also employ and train over 80% of all licensed electricians in this country. It follows that most of the work that would be undertaken to implement CER into the physical infrastructure of homes and businesses across the nation (rooftop PV, BESS, HEMS, EVCs) would be SMEs, providing local employment and training for skilled occupations, leading to well-paid careers and employment.

(iii) the scaling up of domestic capacity.

The CEFC in its 2019 report³ found that over 2 million rooftop solar PV systems had been installed and that this was only a fraction of the capacity available for the growth of rooftop PV, with a calculated national potential of 179GW of installed solar, which would produce an annual output of 245TW, this is greater than the 2019 annual consumption of 200TW. Whilst they did not suggest that all this potential capacity could or should be achieved, it shows the scale of the available resource to contribute to the electrical needs of the nation.

Since this time, the CEC (Clean Energy Council) has reported⁴ that in 2022 alone, another 310 000 installations were added to the grid increasing the capacity of solar by 2.7GW in a single year, bringing the total number of installations in the country to over 3 million at the end of 2022. This demonstrates the rapid growth of capacity in the NEM contributed by rooftop solar.

(b) the macro-barriers to increasing the uptake of home electrification.

Regulatory inaction is the macro-barrier. It is MEAs position that using the existing infrastructure of rooftop solar PV, and the exciting possibility of bidirectional EVs and BESS, is not being hampered by a lack of available technology or platforms. The widespread introduction of CER to shift daytime oversupply curves

³ [www.cefc.com.au/media/rcalz41c/isf-rooftop-solar-potential-report-final .pdf](http://www.cefc.com.au/media/rcalz41c/isf-rooftop-solar-potential-report-final.pdf)

⁴ <https://www.cleanenergycouncil.org.au/news/australian-rooftop-solar-breaks-new-ground-in-2022-clean-energy-australia-report>

to cover evening demand and bring stability to energy pricing, is being stymied purely by a combination of regulatory inaction, retailer self-interest, and DNSP inertia.

Unless there is an incentive provided from regulatory reform for retailers to integrate innovative energy products, in the form of the threat of competition from new and innovative retailers (such as Amber Energy⁵), then they will continue to sell as much electricity as they can, for as much as they can, for as long as they can, to consumers.

(c) the total upfront cost and longer-term benefits of household electrification and alternative models for funding and implementation.

The approximate cost to install BESS to a home is approximately \$1000 - \$1300 per KW, with the average home battery being 8-10KW, for an approximate cost of \$8000 to \$13000. BESS is best installed in conjunction with an existing or new solar system. However, if flexible cost reflective time of use (TOU) and generation tariffs are introduced into the market by retailers, it is possible that dwellings or businesses that do not have the room for solar could install battery storage to use at peak pricing periods.

Consumers could even buy into a Virtual Power Plant (VPP) scheme, even without PV and BESS. A VPP could have the battery storage at another location and arbitrage the price of electricity for the consumer, allowing them to pay to charge up their share of battery capacity at a cheap time of the day and then use that energy at an expensive time of the day.

The possibility of using bi-directional enabled vehicles to act as BESS to soak excess capacity during periods of energy oversupply and returning it to the grid at times of undersupply could add immense BESS capacity to the grid. As EVs typically have a battery of around 70KW, they have up to 7 times the capacity of a static home battery, as well as the added incentive of having another productive purpose of transport. This makes the economics of battery storage at a household level more attractive.

Currently DNSPs are seeing EVs as primarily a threat to the grid, but if policy and regulation caught up to the rapid uptake of EVs they would become an invaluable asset to the grid.

(d) the marginal cost of abatement for household electrification compared to alternative sectors and options to decarbonise the economy.

With most of the energy transition policy focused on mega projects that drag vital skills away from other important infrastructure projects vital to Australia's future and bake in sunk costs that will need to be recovered by higher network charges, energy price relief seems to be a long way off for most consumers.

Energy storage is the only way to make renewables a reliable energy source and making the decarbonisation of the economy a reality, breaking the "ducks back"⁶ and moving the oversupply curve during the day, to the undersupply in the evening.

Large scale energy storage projects such as Snowy 2.0, Marinus link and the Qld Pioneer-Burdekin and Borumba pumped hydro that have been fed into the modelling for emission reduction and electricity price stabilisation are either stalled or behind schedule. The only viable and incremental option for energy

⁵ <https://www.amber.com.au/>

⁶ <https://www.synergy.net.au/Blog/2021/10/Everything-you-need-to-know-about-the-Duck-Curve#>

storage to be rapidly deployed is CER, ramping up the integration of home batteries and bi-directional EVs could begin as soon as enabling tariffs and regulation is enacted. As stated before, the technology is there, much of it is Australian designed and developed and is ready to scale up.

The existing cohort of Electrical Contracting businesses around the country are upskilling to meet the challenge of residential electrification and to incrementally deliver on the ground results that will inexorably reduce the evening peak demand curve, and therefore the price.

(e) the optimal timeline for household electrification accounting for the likely timing of decarbonising electricity.

MEAs expertise is the Electrical Contracting Industry, and its mission is supporting Electrical Contractors, improving safety and technical standards, and supporting skills development. We have an opinion on macro policy, but our focus is on measures that will have a practical effect in the community, and we firmly believe that more focus is needed on CER to rapidly increase the amount of distributed storage to facilitate time shifting of energy and make progress on stated decarbonisation targets.

(f) the impacts and opportunities of household electrification for domestic energy security, household energy independence and for balance of international trade.

MEA believe that domestic energy security is best served by distributing the generation assets throughout the grid and not concentrating generation and transmission bottle necks in a smaller number of large renewable energy zones. The distributed nature of DER/CER would build resilience in the network in much the same way that the internet is a now a widely distributed, self-healing system in many respects.

The analogy of the internet is a useful one, as the conduits and wires that used to just carry telephone traffic are now the arteries of commerce, entertainment, communication, and learning. In the same way, the electricity grid is now just not a method of delivering electricity to homes and businesses generated in massive power stations in regional areas, but a network that carries electricity both ways, generated and stored by a myriad of technologies, and is a medium of exchange.

MEA believe that if the uptake of CER and BESS increases as we believe it will, serious consideration should be given to the implementation of the CSIRO and FBICRC *State of Play- Australia's Battery Industry* report⁷ which outlined a roadmap for the benefits of creating a domestic battery industry. Given the expected demand for batteries, domestic battery industry would enhance our energy security and provide the opportunity for a host of high value spin-off industries.

(g) the impacts of household electrification on reducing household energy spending and energy inflation as a component of the consumer price index.

There will always be a cost to consumers to maintain the grid and to pay for the platforms that are used for billing and trading of electricity, however MEA believe that if CER is integrated into the network in a well-managed way, Australia will again become a low-cost jurisdiction for energy. This will fuel more productive

⁷ https://fbicrc.com.au/wp-content/uploads/2020/10/20-00191_MR_REPORT_FBICRC-StateOfPlayBattery_WEB_201002.pdf

capacity for our industries and free up personal capital to relieve cost of living pressures, contributing to lower inflation.

(h) solutions to the economic barriers to electrification for low-income households.

The introduction of storage capacity into the grid through CER will undoubtedly have the effect on lowering electricity pricing for all. Whilst MEA envisage that those consumers with CER infrastructure will most likely move to cost reflective TOU and generation tariffs, there will need to be maintained a default flat, general light, and power tariff for consumers less able to engage in CER.

Having said that, if retailers embrace the offering of innovative products such as VPPs, there could be energy plans available to those in rental accommodation or low-income cohorts that could still offer reductions on current electricity pricing, without having to invest directly in CER infrastructure.

Governments should also convert social housing and government building infrastructure to be integrated into the CER network and offer incentives for landlords to invest in the installation of CER infrastructure on investment properties.

(i) the effectiveness of existing Australian Federal, state, and local government initiatives to promote and provide market incentives for household electrification.

Incentives over the past 20 years for solar have created a robust, competitive market for rooftop solar PV and have spawned innovative products and technologies that have been developed domestically. Now that the solar PV industry has been established, the time is right to incentivise the storage market and to encourage the Australian developers to scale up the innovative technologies that are just waiting to be put to work.

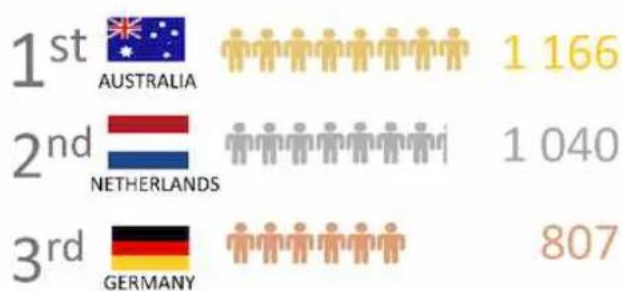
MEA believe that subsidies and incentives should now be directed towards the storage market, and that CER supporting regulation be swiftly enacted, co-ordinated with the states and territories as a matter of public importance.

(j) Australia's current standing against international standards, particularly with respect to the uptake of rooftop solar, batteries and electric household appliances.

Australia is a world leader in the take-up of solar, with the highest W/capita rating of 1166W for every person, and the 5th highest penetration rate of 15.1% of our national energy mix coming from solar PV⁸.

⁸ <https://reneweconomy.com.au/australia-again-tops-global-solar-per-capita-as-world-installs-240gw-of-pv-in-2022/#:~:text=Taking%20this%20into%20account%2C%20the,at%20the%20end%20of%202022.&text=above%2017%25%20and%20the%20Netherlands,%25%2CE2%80%9D%20the%20report%20says.>

SOLAR PV PER CAPITA 2022 Watt/capita



In the recent CSIRO Renewable Energy Storage Roadmap⁹ in section 3.2 it discusses Major Grids and the role of energy storage, MEA believe that CER is a tool that can be used to satisfy 3 of the 4 conditions *time shifting energy, avoiding or deferring transmission and distribution investment*, and also *grid support*. MEA are not positing that CER is the only answer to energy storage and grid stability, but believe that it could be major contributing factor, especially in the realm of time shifting of energy and reducing the need for a proportion of planned new transmission infrastructure.

MEA believe that giving Australians control and choice over their energy usage and generation will lower energy prices, firstly for those who can afford to make the investment in BESS and EVs, then secondly as more and more energy is shifted from times of oversupply to times of peak demand, will reduce energy prices for all.

A recent Austrade study¹⁰ confirmed the status of Australians as early adopters of technology, with this in mind MEA believe that with a program of targeted government incentives in the form of subsidies, the public would respond positively to the integration of CER into the NEM.

⁹ https://www.csiro.au/-/media/Do-Business/Files/Futures/23-00033_SER-FUT_REPORT_RenewableEnergyStorageRoadmap_WEB_230310.pdf

¹⁰ <https://www.globalaustralia.gov.au/why-australia/powered-innovation#:~:text=Australia%20is%20a%20nation%20of,track%20record%20is%20already%20impressive.>

Conclusion

The path to net-zero and the cost of the energy transition cannot be reliably and affordably achieved by sole reliance on mega projects, funded in large part by the public purse, leaving a legacy of more debt for future generations. The need, and the associated cost of thousands of kilometers of HV transmission lines servicing thousands of acres of solar and wind farms, could be greatly reduced by simply using the existing transmission infrastructure in our cities and towns, where the electricity generated on rooftops of the nation could be used and stored closest to the source of production.

Residential Electrification and the adoption of CER is a win-win-win proposition. An immediate win for the consumers who invest in private CER infrastructure and reduce their energy costs. A medium-term win for all consumers and the grid, as peak electricity prices steadily reduce and the strain on the electricity network abates, and a win for the environment as Australia makes real progress on living up to its obligations under international agreements.

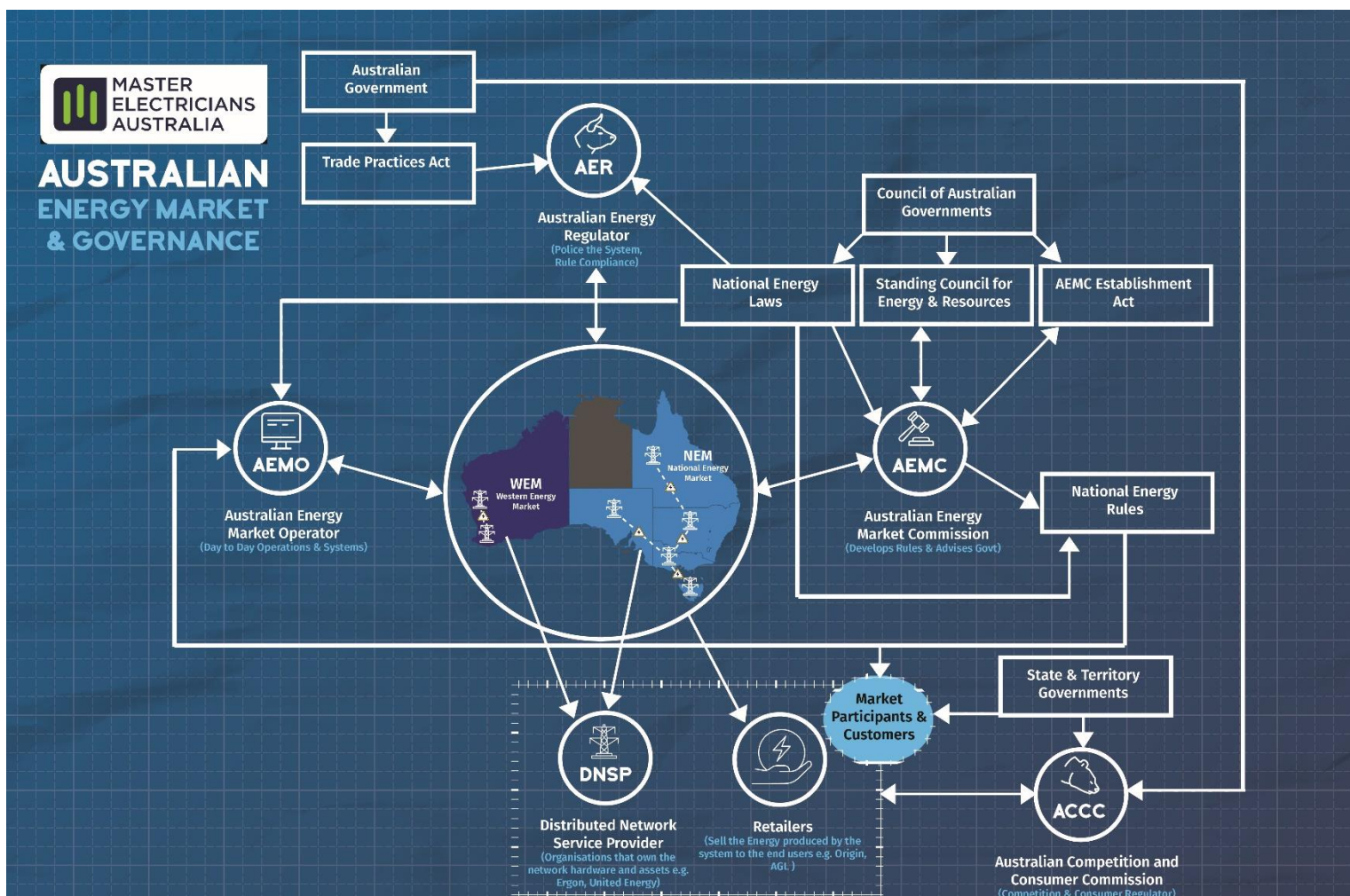
Allowing the millions of Australian homes and businesses to co-invest with the governments of the Commonwealth in the energy infrastructure of the nation, would reduce costs to the taxpayer and allow millions of Australians to recognise the best return on their installed assets.

The time for delay has passed, MEA urge the federal parliament to work with the AEMC to swiftly mandate rule changes to normalize flexible trading of generation from BESS and bi-directional enabled EVs, freeing up the market to adopt CER solutions. This would then ensure that AEMO and AER could implement these new rules and enforce them with DNSP's and retailers to achieve reductions in peak energy demand and reduce electricity prices. The federal government should also prioritize continuing collaboration with the states and territories on a coordinated national approach on CER to ensure the most uniform and productive outcome. It is MEA's position that the most effective fulcrum for the government to leverage change in this convoluted and over-regulated landscape is the AEMC, as they are the head of power for rule changes in the market.

MEA believe that the ACCC also has a role to play, ensuring that consumers have the widest possible access to competitive products and practices, and that new market players are not disadvantaged by existing legacy retail operators.

Please consult our explanatory infographics in the Appendices to inform your understanding of our submission and the electrical energy market landscape.

Appendix A – The Australian Energy Regulatory Environment



Appendix B – MEA “Energy Policy on a Page”



Current Policy

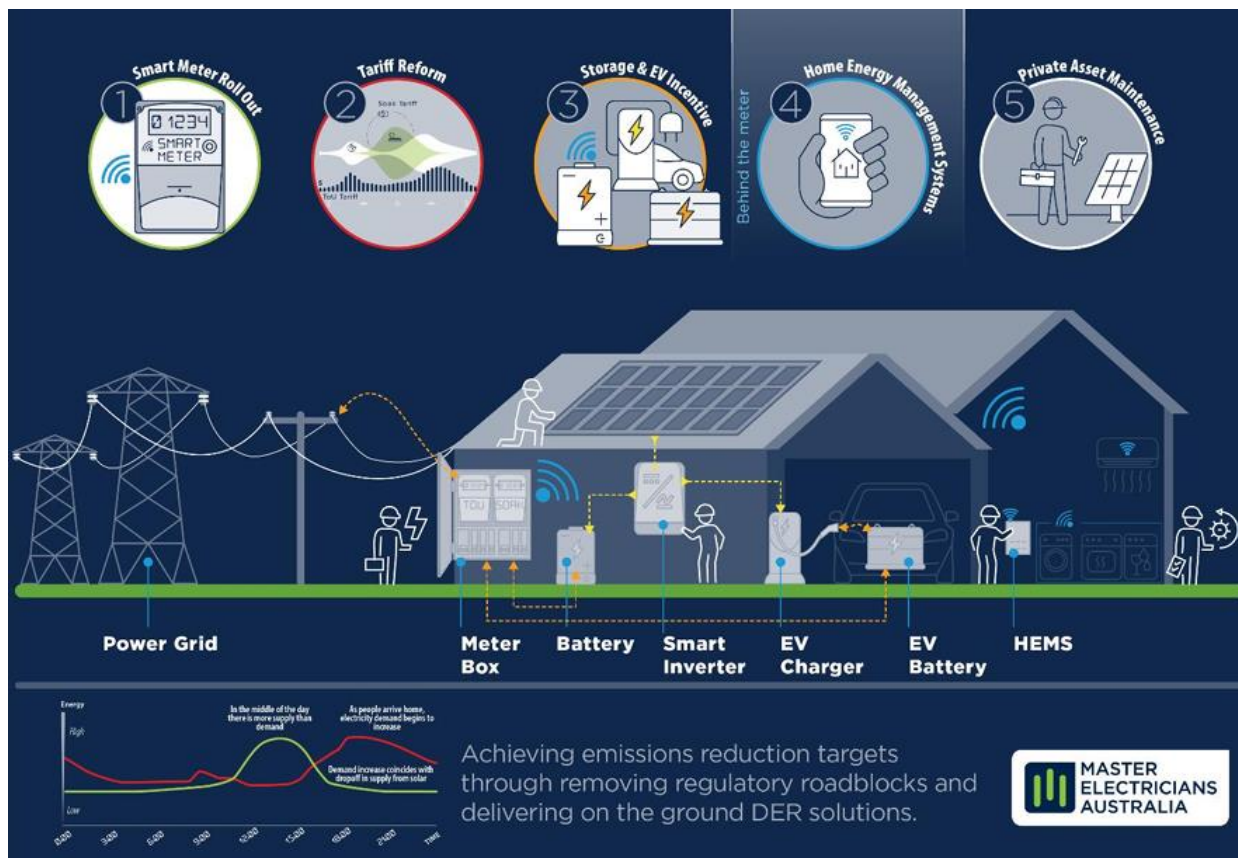
- There's a fundamental shift in global energy policy.
- Current focus is on BIG picture public infrastructure projects, with EBA workforces, and BIG solutions.
- Timelines and targets for Net Zero are unrealistic.
- Timelines for switching off reliable coal will ↑ prices.
- Loss of “rotational inertia” will reduce grid stability.
- The Energy regulatory environment is confusing.
- There is an underutilisation of installed rooftop Solar.
- There is not enough focus on household and business efficiency solutions. (i.e phasing out of incandescent bulbs 2009)
- Roll-out of Smart Meters too slow and expensive for older buildings, in an over-regulated market.

What Can Be Done?

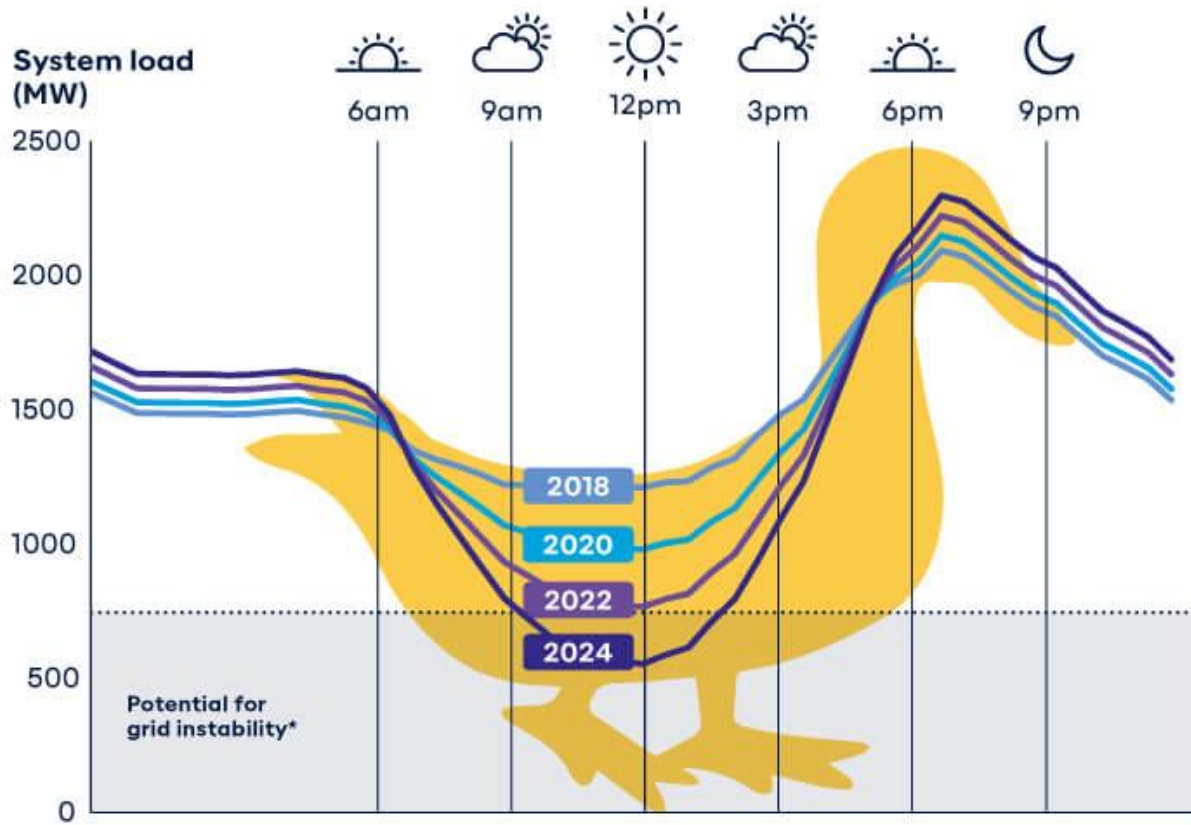
- Speed up roll-out of Smart Meters.
 - Incentivise changes in consumer energy usage with innovative Time of Use Tariffs and Retailer Products.
 - Govt to prioritise consumer focused DER approach, complementing BIG infrastructure projects.
 - Better utilisation of excess rooftop Solar (network providers switching off systems during daytime peak).
 - Govt to incentivise Battery Energy Storage Systems (BESS) in homes and businesses.
 - Incentivise the use of Energy Management Systems to “load shift” energy usage in homes and businesses.
 - Govt to preference bi-directional charge EVs in policies.
 - Speed up rule changes to allow Vehicle to Grid export.
- This combination of Energy Efficiency, Maximising wasted rooftop solar, Tariff reform, and EV Policy - would put control of energy prices in the hands of consumers, increase network resilience, move generation capacity closer to usage, and reduce planned capital outlays. It would also generate employment and skills for SMEs, not big business.

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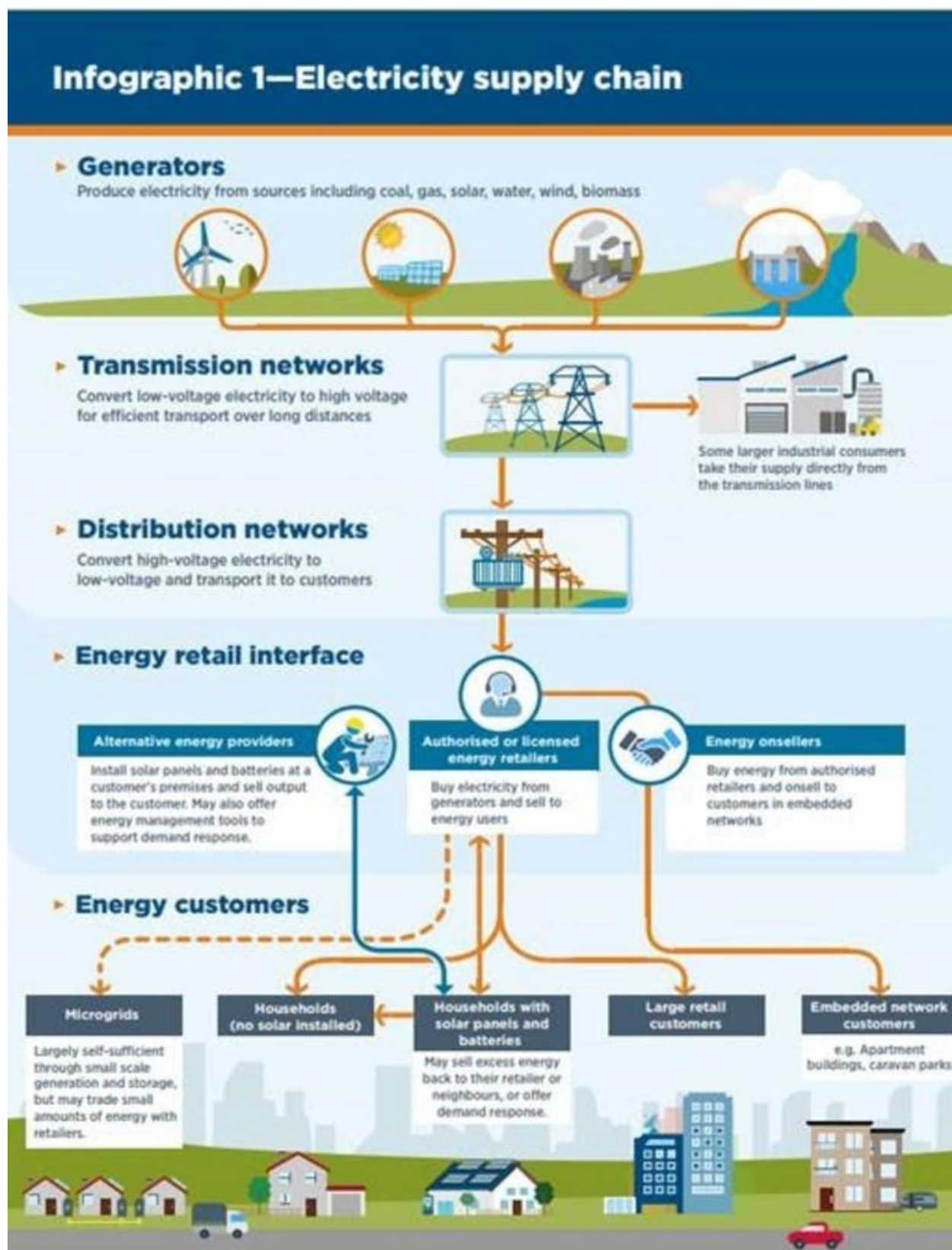
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Appendix C – “Ducks Back” Demand Curve



Appendix D – Simplified Electricity Supply Chain



Appendix E – The Modern Electricity Eco-System

A vision for tomorrow

