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Appliance and Building Energy Efficiency Branch  
Department of the Environment and Energy  
GPO Box 787, Canberra, ACT, 2601, Australia

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**RE: Review of the Greenhouse and Energy Minimum Standards Act 2012 (GEMS Act)**

Dear Ms Collyer,

Thank you for the opportunity to write to this important review. I am particularly interested in demand management for domestic electricity use, and as such have read widely on efficiency labelling, but also a range of other fields related to energy demand. I am a scholarship postgraduate student in urban design and a renewable energy consultant.

I greatly encourage COAG and the Minister for the Environment and Energy to enforce and raise minimum efficiency standards. I am very happy to read of the reported savings for households and the avoided emissions. I believe there are many more and great gains to be had: I write to make three observations of what I see as the challenge, and suggest four possible opportunities.

Firstly, as I am sure you are aware, electricity demand in Australia has tracked population growth since at least 1970 and is predicted to climb 50-100% by 2050 [ENA]. There was a inflexion in demand from 2012-2015 which is variously attributed to the Rudd Government carbon price; business efficiency standards introduction (such as LEDs); closure of high demand industries (such as manufacturing and aluminium) and/or the increased cost of electricity itself. This inflexion has ended and demand continues to climb. Possibly four large influences, even together, have only made a modest impact on electricity demand, which has rebounded. It appears very difficult to cap demand.

AEMO has performed its own study-of-studies on several popular zero-carbon plans for Australia: one observation it makes early in its report is that 100% renewable energy supply will need to be at least twice the name plate generation capacity of current carbon-emitting generators it will replace [AEMO13]. This is to compensate for variability. As per the upper projection for demand above, which may double, it thus appears that by 2050 we may need four times the current baseload generation capacity to be largely met by wind, hydro, solar and possibly others. If so, I am not convinced that Australia is on track to zero carbon or even minority carbon and that much greater measures may need to be taken.

In my assessment, the only other tenable solution is demand management and there is great scope to expand the messages given to consumers. Energy consumers have a hard time estimating the electricity demand of appliances, with the higher demand appliances determined to consume even less than they actually do [Attari]. In addition, consumers are easily confused or tricked about supplies they consume [Wansink] and electricity measurement units ("power" and "energy", also Watts and Amps) are hard to differentiate. Many consumers already feel that they are efficient and conservative, others feel it is their right to consume energy since they pay for it. Even when obliged, consumers have struggled

to shift electricity demand times [ABC2010]. Supporting consumers and giving them accurate, real-time information about their demand, their choices, their costs and their impacts is a very promising research field.

Consumers can respond to signals and substantially conserve. Melbourne is the international poster child for water conservation with demand having halved during the 03-09 drought and it has stayed down ever since. This is attributed to the Yarra Water Target 155 campaign which used innovative group signals to bring about behaviour change in whole streets at once [Liubianas]. Energy is obviously different to water demand but I am optimistic people will significantly reduce their energy demand with the right help (such as GEMS). Here are some other ideas I hope are of interest:

1. Consumers obey tradespeople in selection of large electricity consumption devices [Energyrating]. This means that the decision over efficiency competes with practical and economic concerns of the tradesperson, suppliers, salespersons and others. Educating tradespeople, suppliers and installers on the final costs to the household and the environment is mandatory. To make competing energy cost and emissions information more salient can GEMS labels possibly state in dollar terms the payback time and ultimate gains, in dollars, a device choice offers? Could a form of GEMS labelling (or supplemental label) simply state total financial benefit and total environmental benefit?
2. Consumers who install several energy efficient systems nonetheless install devices that together can still consume a lot of electricity. This is a systemic problem that labelling cannot fix, but if electricity tariffs and other means cannot suppress home demand caused by “lots of devices”, then I wonder if (advisory) limits can be imposed on the power of devices any one consumer (or household address) can purchase. I appreciate the market itself negatively reinforces this via costs, but the resulting electricity demand is not price elastic [CSIRO16] and our goals for demand (above) are challenging. It seems wise to issue a signal for consideration if the decision is between 4, 5 or 6 split systems for one address.
3. Consumers who save money through efficient devices tend to spend this money in the greater economy either on more energy or on energy intensive goods and services - called the rebound effect [Gillingham]. I would like the GEMS programme to consider how freed monies due to efficiency could be identified and somehow redirected from creating more emissions. One way to do this would be to link energy efficient purchases to discounted debt. This has worked for solar-rates programmes [Darebin]. For example, CEFC funded debt could be offered for efficient purchase rather than cash rebates. This way more efficient devices are purchased and savings might be recouped via regular repayments, perhaps via energy bills. While this appears to keep bills “high” in fact the occupant is paying down an efficient device (which could change the very negative associations energy consumers have with energy retailers [EY]!).
4. It is becoming important to educate consumers on embedded and final energy since this consumption is more costly to the environment than operational energy. Up to 1995 when the ABS last reported on final energy, 53% of all energy created nationally was consumed indirectly by the home in goods and services. Embedded energy is even more pervasive since energy intensive goods imported from overseas are simply another form of energy consumption. I wonder if GEMS can assess embedded energy and advise consumers on labels and public literature. Consumer choices informed by the embedded energy of a good or appliance may very well be different than they are today. For one, appliances made in Australia have a lower transport energy cost than

those made overseas, especially if the device components are also made in Australia. This does not mean, however, that trade is bad for the environment because many overseas suppliers have much more efficient manufacturing methods and greener sources of manufacturing energy than Australia does. But this is hard for consumers to know and assess and is even mis-advised. As an example, insulation over R3 has a net negative environmental impact [Stefan], but environment.vic.gov.au advises R3 as the minimum insulation to install. I hope GEMS might consider this and be expanded to label high embodied energy consumables (aluminium, chlorine, paper products etc), as well as efficient appliances.

I would like say again that GEMS is excellent and in its expanded, national form will reap greater rewards for consumers and the environment. I hope it can expand further in scope and reach as I have suggested. Below I some topic references and example sources - I can provide a full bibliography if needed.

Best regards and thank you for this opportunity.



Craig Burton  
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### **Selected references**

Chlorine and other electricity intensive industries (Germany):

<https://www.ecofys.com/files/files/ecofys-fraunhoferisi-2015-electricity-costs-of-energy-intensive-industries.pdf>

Insulation

Stefan: Embedded energy and insulation:

<https://www.thefifthestate.com.au/columns/spinifex/higher-star-ratings-for-housing-dont-necessarily-save-energy>

State Gov't advice

<http://www.sustainability.vic.gov.au/You-and-Your-Home/Building-and-renovating/Insulation/Ceiling-insulation>

Demand predictions

Industry.gov.au 1986-2020: 50% <https://industry.gov.au/Energy/Energy-information/Documents/energyuseaustralianresidentialsector19862020part1.pdf>

ENA to 2050: 100%

[http://www.energynetworks.com.au/sites/default/files/roadmap\\_interim\\_report\\_summary\\_final.pdf](http://www.energynetworks.com.au/sites/default/files/roadmap_interim_report_summary_final.pdf)

World to 2060: 100% [http://www.worldenergy.org/wp-content/uploads/2016/10/World-Energy-Scenarios-2016\\_Executive-Summary-1.pdf](http://www.worldenergy.org/wp-content/uploads/2016/10/World-Energy-Scenarios-2016_Executive-Summary-1.pdf)

ABS Final energy

ABS: 53% of all energy used by households (1995 the last time final energy consumption was reported)

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/0/7C10C76736F68A5FCA2575DF001CA9A2?opendocument>

AEMO study of zero carbon (2013) twice current name plate needed to meet demand with renewables

<http://www.environment.gov.au/climate-change/publications/aemo-modelling-outcomes>

Wansink: Consumers and consumption of energy

“Bottomless” consumption study:

[https://www.researchgate.net/publication/227344004\\_Mindless\\_Eating\\_The\\_200\\_Daily\\_Food\\_Decisions\\_We\\_Overlook](https://www.researchgate.net/publication/227344004_Mindless_Eating_The_200_Daily_Food_Decisions_We_Overlook)

Attari: Bias in estimating consumption of higher consuming devices:

<http://www.pnas.org/content/107/37/16054.full>

ABC10: Consumers can't shift time of energy demand

<http://www.abc.net.au/news/2010-04-22/energy-australia-allows-users-to-ditch-smart-meters/405940>

Liubianas: Yarra Water Target 155 water demand management

[http://marketing.conference-services.net/resources/327/2958/pdf/AM2012\\_0124\\_paper.pdf](http://marketing.conference-services.net/resources/327/2958/pdf/AM2012_0124_paper.pdf)

Energyrating: Large energy device choices affected by tradespeople/installers

[http://www.energyrating.gov.au/sites/new.energyrating/files/documents/Report\\_Climate\\_Rating\\_Labels\\_Research\\_Round\\_1\\_0.pdf](http://www.energyrating.gov.au/sites/new.energyrating/files/documents/Report_Climate_Rating_Labels_Research_Round_1_0.pdf)

CSIRO16: Energy demand is price inelastic (page 456)

<https://www.sciencedirect.com/science/article/pii/S1364032115015270>

Gillingham: Rebound effect and energy consumption

<http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-14-39.pdf>

Darebin: Repaying renewable energy system purchases through council rates

<http://www.embark.com.au/display/public/content/Darebin+Solar+Savers+model+description;jsessionid=357FC37CCAEB586F532066722C3EBB44>

EY: Ernst and Young study into electricity retail customer churn (2012)

<http://www.ey.com/au/en/newsroom/news-releases/feeling-powerless---time-and-effort-stops-consumers-switching-for-a-better-electricity-deal>