11 June 2018

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Department of Environment, Land, Water and Planning (DELWP)
Level 2, 8 Nicholson Street
Melbourne

Dear Emma

Energy Mad Submission on Proposed Victorian Energy Efficiency Target Regulations 2018

Thank you for the opportunity for Energy Mad to submit feedback on the proposed Victorian Energy Efficiency Target Regulations 2018.

Energy Mad's *"Why?"* is to *"save enough electricity to power New Zealand for one year"*.

It is 40% of the way there, having **saved $4.1 billion electricity in 2.5 million homes.**

Over **1.1 million Australian homes** have had Energy Mad's energy saving CFL and LED Ecobulbs installed through energy efficiency scheme, electricity utility and State Government projects in NSW, Victoria, Queensland, South Australia, the ACT and Western Australia.

Over **50 Accredited Providers** have purchased Energy Mad's Ecobulbs for their installation activities in the Victorian VEET, the South Australian REES, the ACT EEIS and the NSW ESS Schemes.

[More information about Energy Mad can be found in Section 5 of this document titled *"About Energy Mad"*.]

Energy Mad's expertise is in residential lighting. Our Submission therefore focuses on residential lighting, and is organized into the following sections:

1. An Executive Summary.
2. Summary Feedback on the proposed Victorian Energy Efficiency Target Regulations 2018.
3. Proposed amendments to Part 21 Activity – Incandescent lighting, Scenario 21A: Replacing incandescent GLS lamp with LED GLS Lamp.
4. Summary Melbourne Residential Lighting Data.
5. About Energy Mad.

We welcome the positive engagement with stakeholders that is demonstrated by this consultation process and congratulate DELWP on their various proposed improvements to the Regulations and to the Victorian Energy Upgrades program.

We would be happy to provide further information as required by the DELWP Team to clarify any information contained in this response.

1. Executive Summary

1.1 Energy Mad agrees with the proposed changes to the Victorian Energy Efficiency Target Regulations.

1.2 Based on the Residential Lighting Report data, we calculate there are 56 million general purpose incandescent, mains voltage halogen and CFL lamps remaining in Victorian residential premises.

1.3 This high remaining number of inefficient general-purpose lamps in Victorian residential premises is likely due to the higher cost of **LED lamps, which is restricting their uptake**.

1.4 **Victorian Energy Upgrades incentives** remains the **most effective approach** to deliver the large remaining residential energy efficient lighting upgrade opportunity in Victorian premises.

1.5 Energy Mad therefore proposes **CFLs become eligible for replacement with LEDs in Scenario 21A**.

1.6 This would simplify the administration of Scenario 21A and improve the integrity of Victorian Energy Upgrades by removing the current risk of CFLs being erroneously replaced by LEDs under Scenario 21A.

1.7 We have provided a proposed new Table 55 for Scenario 21A with lower weighted average *"Input value" "GHG equivalent emissions reductions variables"* to account for the lower average wattage of CFLs relative to incandescent GLS lamps.

1.8 These proposed new Scenario 21A Input values would make it economic for Accredited Providers to re-enter or ramp-up their Residential Victorian Energy Upgrade activities around Part 21 Activities. (**Noting lower Input values would not make this activity economic for Accredited Providers**).

1.9 The proposed amendments to Scenario 21A, combined with DELWP's *"fresh start"* initiative, would deliver **significant volumes of cost effective VEECs**.

1.10 This would remove the current dependence on commercial lighting for the bulk of the VEEC creation.

1.11 The resulting increase in Residential Victorian Energy Upgrade activities would **create a significant number of new Victorian jobs**.

If you have any further questions about this submission, please contact Chris Mardon (Founder, Energy Mad) at:

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Mobile: +64 21 041 2981

Kind Regards

Dr Chris Mardon
Founder, Energy Mad

2. Summary Feedback on the proposed Victorian Energy Efficiency Target Regulations 2018

2.1 Energy Mad agrees with moving the technical requirements from the "*Victorian Energy Efficiency Regulations 2008"* to the "*Victorian Energy Upgrades Specifications 2018"*, and the process by which that document can be updated by the department.

2.2 Energy Mad agrees with introducing flexibility into the proposed Regulations so that emerging technologies and products can be quickly integrated into the Victorian Energy Upgrades program.

2.3 Energy Mad agrees with providing all activities in the proposed Regulations with a *"fresh start"* in terms of the number of times an activity can occur at a premise.

2.4 Energy Mad agrees with the removal of compact fluorescent lamps as eligible products for installation (current Schedule 21).

2.5 Energy Mad agrees with the changes to incandescent lighting (current Schedule 21, proposed Part 21), including requiring a 60-degree beam angle for downlights installed in residential premises.

2.6 Energy Mad believes that the consultation, transition and commencement periods envisaged for the scenarios in the *"Guidelines for Updating the Victorian Energy Upgrade Specifications"* are appropriate.

2.7 Energy Mad agrees with the other proposed changes to the Victorian Energy Efficiency Target Regulations.

3. Proposed amendments to Part 21 Activity – Incandescent lighting, Scenario 21A: Replacing incandescent GLS lamp with LED GLS Lamp

3.1 Currently the decommissioning requirements of *"Part 21 Activity – Incandescent lighting, Scenario 21A: Replacing incandescent GLS lamp with LED GLS Lamp"* are *"Mains voltage incandescent GLS lamp of at least 25 watts (tungsten filament type of 18 watts (tungsten halogen type)"*.

3.2 Energy Mad proposes that Compact Fluorescent Lamps (CFLs) of greater than 5 watts become eligible for replacement with LEDs in Scenario 21A.

3.3 The proposed decommissioning requirements would therefore become *"Mains voltage GLS lamp of at least 25 watts (tungsten filament type), 18 watts (tungsten halogen type) or 5 watts (CFL type)"*.

3.4 Lower weighted average *"Input value" "GHG equivalent emissions reductions variables"* would apply for Scenario 21A, to account for the lower average wattage of CFLs relative to incandescent GLS lamps.

3.5 Tungsten filament, tungsten halogen and CFLs earning the same *"Input values"* would simplify the administration of Scenario 21A.

3.6 It would also improve the integrity of Victorian Energy Upgrades by removing the current risk of CFLs being erroneously replaced by LEDs under Scenario 21A.

3.7 Table 1 provides the proposed new *"Table 55 – GHG equivalent emission reduction variables for Scenario 21A"* of the proposed "*Victorian Energy Upgrades Specifications 2018"*. The existing *"Power Factor Multiplier"* and *"Regional Factor"* would remain unchanged.

3.8 This has been simplified to three minimum light source efficacies of 66, 79 and 95 lumens/watt from the existing Table 55.

3.9 The last two columns of the proposed new Table 55 list the current and proposed *"Input values"* for the various *"Conditions"*.

3.10 The calculations and assumptions used to develop the proposed new Input values are listed in Table 2.

3.11 These proposed new Scenario 21A Input values would make it economic for Accredited Providers to re-enter, or ramp-up their Residential Victorian Energy Upgrade activities around Part 21 Activities. (**Noting lower Input values would not make this activity economic for Accredited Providers**).

3.12 The proposed amendments to Scenario 21A, combined with DELWP's *"fresh start"* initiative, would deliver significant volumes of cost effective VEECs.

3.13 This would remove the current dependence on commercial lighting for the bulk of the VEEC creation.

3.14 The resulting increase in Residential Victorian Energy Upgrade activities would create a significant number of new Victorian jobs.

3.15 Many CFL lamps in residential Victorian premises are due to reach the end of their lifetime over the next few years. The recycling of CFL lamps under this proposed amended Scenario 21A would have a positive environmental impact, relative to the bulk of these CFLs otherwise being disposed of in Victorian landfills.

Table 1 Proposed *"Table 55 – GHG equivalent emission reduction variables for Scenario 21A"*

Input type	Condition		Current Input value	Proposed Input Value
Abatement Factor	Upgrade product has a minimum light source efficacy of 66 lumens/watt	Lifetime is at least 12,000 and less than 15,000 hours	0.33	0.18
		Lifetime is at least 15,000 and less than 20,000 hours	0.41	0.22
		Lifetime is at least 20,000 and less than 25,000 hours	0.55	0.30
		Lifetime is at least 25,000 hours	0.68	0.37
	Upgrade product has a minimum light source efficacy of 79 lumens/watt	Lifetime is at least 12,000 and less than 15,000 hours	0.34	0.20
		Lifetime is at least 15,000 and less than 20,000 hours	0.43	0.25
		Lifetime is at least 20,000 and less than 25,000 hours	0.57	0.33
		Lifetime is at least 25,000 hours	0.72	0.41
	Upgrade product has a minimum light source efficacy of 95 lumens/watt	Lifetime is at least 12,000 and less than 15,000 hours	0.36	0.22
		Lifetime is at least 15,000 and less than 20,000 hours	0.45	0.27
		Lifetime is at least 20,000 and less than 25,000 hours	0.60	0.36
		Lifetime is at least 25,000 hours	0.75	0.45
PF Multiplier	Power factor of the upgrade product is less than 0.90			1
	Power factor of the upgrade product is at least 0.90			1.05
Regional Factor	For upgrades in Metropolitan Victoria			0.98
	For upgrades in Regional Victoria			1.04

Table 2 Calculations and assumptions used to develop the proposed new *"Table 55 – GHG equivalent emission reduction variables for Scenario 21A"*

Input type	Condition		Current Input value	Lifetime	W (MV GLS)[1]	W (CFL)[2]	Efficacy (CFL)[3]	W (LED)[4]	W (CFL-LED)[5]	% (MV GLS)[6]	% (CFL)[7]	W (Weighted Saving)[8]	Proposed Input Value[9]
Abatement Factor	Upgrade product has a minimum light source efficacy of 66 lumens/watt	Lifetime is at least 12,000 and less than 15,000 hours	0.33	12,000	27.5	13.8	56.7	11.8	1.9	28.7%	27.7%	15.0	0.18
		Lifetime is at least 15,000 and less than 20,000 hours	0.41	15,000	27.3	13.8	56.7	11.8	1.9	28.7%	27.7%	14.9	0.22
		Lifetime is at least 20,000 and less than 25,000 hours	0.55	20,000	27.5	13.8	56.7	11.8	1.9	28.7%	27.7%	15.0	0.30
		Lifetime is at least 25,000 hours	0.68	25,000	27.2	13.8	56.7	11.8	1.9	28.7%	27.7%	14.8	0.37
	Upgrade product has a minimum light source efficacy of 79 lumens/watt	Lifetime is at least 12,000 and less than 15,000 hours	0.34	12,000	28.3	13.8	56.7	9.9	3.9	28.7%	27.7%	16.3	0.20
		Lifetime is at least 15,000 and less than 20,000 hours	0.43	15,000	28.7	13.8	56.7	9.9	3.9	28.7%	27.7%	16.5	0.25
		Lifetime is at least 20,000 and less than 25,000 hours	0.57	20,000	28.5	13.8	56.7	9.9	3.9	28.7%	27.7%	16.4	0.33
		Lifetime is at least 25,000 hours	0.72	25,000	28.8	13.8	56.7	9.9	3.9	28.7%	27.7%	16.6	0.41
	Upgrade product has a minimum light source efficacy of 95 lumens/watt	Lifetime is at least 12,000 and less than 15,000 hours	0.36	12,000	30.0	13.8	56.7	8.2	5.6	28.7%	27.7%	18.0	0.22
		Lifetime is at least 15,000 and less than 20,000 hours	0.45	15,000	30.0	13.8	56.7	8.2	5.6	28.7%	27.7%	18.0	0.27
		Lifetime is at least 20,000 and less than 25,000 hours	0.60	20,000	30.0	13.8	56.7	8.2	5.6	28.7%	27.7%	18.0	0.36
		Lifetime is at least 25,000 hours	0.75	25,000	30.0	13.8	56.7	8.2	5.6	28.7%	27.7%	18.0	0.45

1. Average lifetime wattage saving of mains voltage incandescent GLS lamp replacement calculated by (Current Input value) x (1,000,000) / (Minimum Lifetime Rating).
2. Average Melbourne CFL wattage calculated by (154.1 watt whole house) / 11.2 CFLs per house). Data extracted from Table 16 of July 2016 E3 Equipment Energy Efficiency *"2016 Residential Lighting Report"*.
3. Average Melbourne CFL efficacy calculated by (8,730 lumens whole house) / 154.1 watt whole house).
4. Wattage of the equivalent lumens output LED calculated by (CFL watt) x (CFL Efficacy) / (LED upgrade minimum efficacy).
5. Average lifetime wattage saving by replacing CFL with LED calculated by (CFL watt) - (LED watt).
6. % Melbourne residential lamps incandescent or mains voltage halogen. Data from Table 12 of July 2016 E3 Equipment Energy Efficiency *"2016 Residential Lighting Report"*.
7. % Melbourne residential lamps that are CFLs. Data from Table 12 of July 2016 E3 Equipment Energy Efficiency *"2016 Residential Lighting Report"*.
8. Weighted average watt saved calculated by [(Lifetime watt MV GLS replacement) x (% Melbourne MV GLS lamps) + (Lifetime watt CFL GLS replacement) x (% Melbourne CFL GLS lamps)] / (% Melbourne MV GLS lamps) + (% Melbourne CFL GLS lamps).
9. Proposed new Input value for replacing mains voltage incandescent and CFL GLS lamps calculated by (Weighted average watt saved) x (Minimum Lifetime Rating) / (1,000,000).

Summary Melbourne residential lighting data can be found in Section 4 of this Submission.

4. Summary Melbourne Residential Lighting Data

4.1 The change in uptake of efficient lighting in the Victorian residential market since 2010 can be established by comprehensive data from the second lighting audit of 180 Australian househoulds, as detailed in the July 2016 E3 Equipment Energy Efficiency *"2016 Residential Lighting Report",* that:

a. Involved trained auditors gathering data about every individual light fitting in every househould audited, including the fitting type, the lamp technology, the lamp wattage and light colour, dimmers, sensors, etc.);

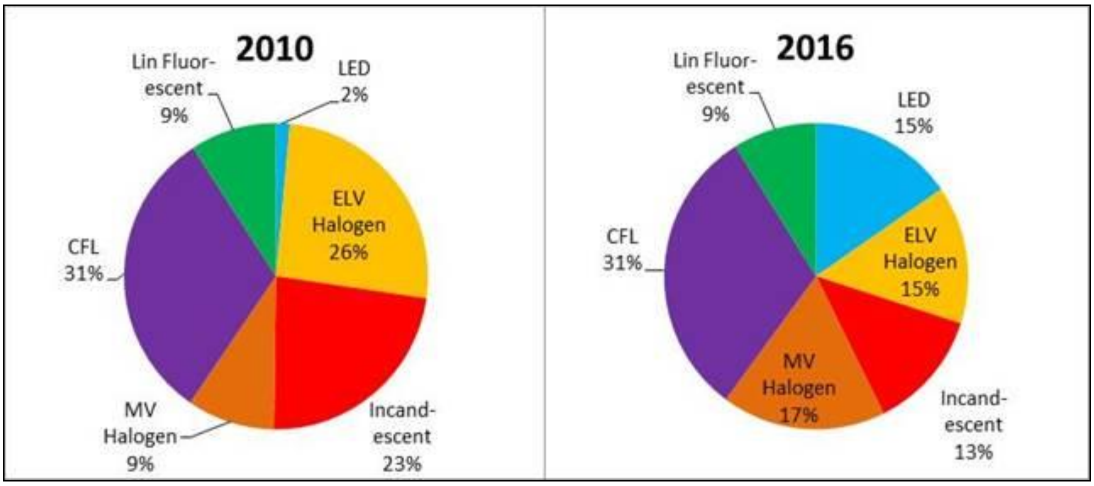
b. Included the audit of 40 househoulds in Melbourne;

c. The results were weighted to be demographically representative; and

d. Allowed the change in the residential lighting market efficiency since 2010 to be determined by comparing the 2016 audit information with the information gathered from the first lighting audit of Australian househoulds undertaken by E3 Equipment Energy Efficiency in late 2010.

4.2 The following graph is extracted from the report:

Figure 1 Share of Australian household lighting technologies in 2010 and 2016



4.3 Table 5 compares the percentage penetration of general purpose lighting in Melbourne residential househoulds in 2016 with the Australian penetrations in 2010:

Table 3 Comparison of residential general-purpose lighting percentages between 2016 and 2010

Lighting Technology	2010 Australian Data	2016 Melbourne Data
Compact Fluorescent Lamp	31%	27.7%
Incandescent	23%	13.0%
Mains Voltage Halogen	9%	15.7%

4.4 The key findings for Melbourne households were:

a. There is little change in the penetration of CFLs since 2010;

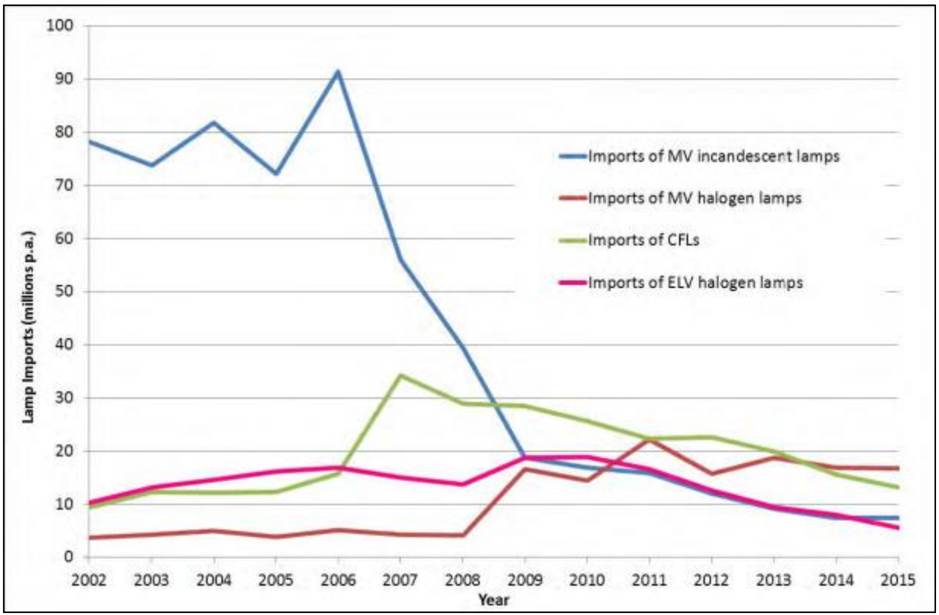
b. The penetration of incandescent lighting has fallen from 23% of all lamps in residential households in 2010 to 13.0% of all lamps in 2016;

c. However, the falling penetration of incandescent lighting has been offset by the rise in mains voltage halogens from 9% of all lamps in 2010 to 15.7% of all lamps in 2016;

d. Therefore, the **total inefficient general purpose incandescent plus mains voltage halogen penetration has changed little in Melbourne since 2010** (32% of all lamps in 2010 versus 28.7% in 2016).

4.5 The high remaining number of general purpose incandescent plus halogen lamps in Victorian residential households is further supported by the import lamp statistics (see Figure 3), where an estimated **29 million general purpose incandescent and mains voltage halogen lamps** were imported into Australia in 2015.

Figure 2 Imports of different lamp types from 2002 to 2015



4.6 Based on the Residential Lighting Report data, we calculate there are 56 million general purpose incandescent, mains voltage halogen and CFL lamps remaining in Victorian residential households that could be replaced with LEDs through a modified *"Part 21 Activity – Incandescent lighting, Scenario 21A: Replacing incandescent GLS lamp with LED GLS Lamp"* that also allows the replacement of CFLs with LED.

4.7 This high remaining number of inefficient general-purpose lamps in Victorian residential households is likely due to the higher cost of **LED lamps, which is restricting their uptake**.

4.8 **Victorian Energy Upgrades incentives** therefore remains the **most effective approach** to deliver the large remaining residential energy efficient lighting upgrade opportunity in Victorian households.

5. About Energy Mad

Energy Mad's ***"Why?"*** is to ***"save enough electricity to power New Zealand for one year!"***

Energy Mad has achieved the following successes that has got it 40% of the way towards achieving this *"Why?"*:

5.1 Developed and sourced the ultra-high performance CFL and LED *"Ecobulbs"* that replace incandescent and halogen lamps.

5.2 **2.5 million homes** have Energy Mad's Ecobulb energy saving light bulbs from 80 electricity utility projects, and from wholesale and retail distribution, in 14 countries (including New Zealand, Australia, the United States – 33 utility projects including a New York wide project – and Germany).

5.3 Over **1.1 million Australian homes** have had Energy Mad's energy saving CFL and LED Ecobulbs installed through energy efficiency scheme, electricity utility and State Government projects in NSW, Victoria, Queensland, South Australia, the ACT and Western Australia.

5.4 Over **50 Accredited Providers** have purchased Energy Mad's Ecobulbs for their installation activities in the Victorian VEET, the South Australian REES, the ACT EEIS and the NSW ESS Schemes.

5.5 Developed and implemented 37 New Zealand household and commercial Ecobulb CFL projects with government, 25 electricity utilities, 450 supermarket stores and 240 Shell New Zealand convenience stores. 5.0 million Ecobulbs were sold and installed, with 57% of New Zealand homes having purchased five or more Ecobulb light bulbs each.

5.6 These New Zealand Ecobulb projects used funding from 25 electric utilities and the New Zealand government. They involved direct mail to utility customers, along with innovative point of sale displays.

5.7 They included developing the innovative monitoring methodology to measure the peak load, electricity savings, and carbon dioxide emission reductions arising from the Energy Mad Ecobulb projects. These projects were independently verified to the Clean Development Mechanism of the Kyoto Protocol.

5.8 Supplied energy saving bulbs to **all 8,000 Walgreens** (the world's second largest retailer) United States stores.

5.9 Globally Energy Mad's Ecobulbs have saved **19,000GWh** of energy for households and businesses, reducing their bills by **$4.1 billion**.

5.10 Being **New Zealand's fastest growing company** by winning the 2007 Deloitte *"Fast 50"* Award.

5.11 New Zealand award winners for business, energy efficiency, sustainability and clean technology, and innovation.

5.12 **Listed** on the Main Board of the New Zealand Stock Exchange in October 2011.

Further information about Energy Mad can be found at http://www.energymad.com/.