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Dear Tim

Energy Mad Submission on NSW Energy Savings Scheme Rule Change 2017-2018

Thank you for the opportunity for Energy Mad to submit feedback on the proposed changes to the NSW Energy Savings Scheme (ESS) Rule Change 2017-2018.

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 3 of this document titled *"About Energy Mad"*.]

Energy Mad's expertise is in residential lighting. Our Submission therefore focuses on HEER residential lighting, and is organized into an Executive Summary and into an analysis of the NSW residential lighting market.

We welcome the positive engagement with stakeholders that is demonstrated by this consultation process and the NSW Government's commitment to continuous improvement of the NSW ESS.

Energy Mad's two key recommendations to create **sufficient financial incentives from ESCs for whole home lighting retrofits to become viable at scale, therefore overcoming the current market barriers to energy efficiency**, are:

1. Set the **Activity Definition E11 Electricity Savings Factors for incandescent and halogen lamps to 0.53MWh per general purpose incandescent or halogen lamp replaced in Residential Buildings; and 1.05MWh per general purpose incandescent or halogen lamp replaced in Small Business Buildings**.
2. **Remove the requirement** for Activity Definition **E11** and Activity Definition **E3** lamp replacement installations to be performed or supervised by a licensed electrician.

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

We hear that selected ACPs will be contacted early 2018 for internal ESS Rule Change workshops. Energy Mad, given its residential lighting expertise, **would appreciated being invited to the relevant workshop**.

1. Executive Summary

- 1.1 There has been **little improvement in the uptake of efficient general-purpose lighting in the NSW residential market from 2010 to 2016**, because most residential purchasers still choose inefficient lighting due to its lower purchase cost relative to more expensive energy efficient options.
- 1.2 **Business as usual is therefore unlikely to transform the NSW general purpose residential lighting market** and replace current inefficient general purpose incandescent and halogen lamps with efficient lamps.
- 1.3 There are **32 million general purpose incandescent and halogen lamps in NSW residential premises** that could be replaced with LEDs through Activity Definition E11 of Schedule E of the Home Energy Efficiency Retrofit (HEER) sub-method of ESS Rule §9.8.
- 1.4 Activity Definition E11 of the HEER sub-method of the ESS Rule therefore has the potential to generate one of the largest future sources of energy savings for the ESS.
- 1.5 This would remove the current dependence on commercial lighting for the bulk of the ESS certificate creation.
- 1.6 **The lack of current ESS residential activity is due to the financial incentives from the revenue earned by the Energy Saving Certificates (ESCs) being too small.**
- 1.7 Energy Mad believes the following two amendments to Schedule E of Activity Definitions for Low Cost Activities for Home Energy Efficiency Retrofits (clause 9.8) are necessary:
 - a. Setting the Activity Definition E11 Electricity Savings Factors for incandescent and halogen lamps to comparable values as Activity Definition E1 for *“Tungsten halogen Lamps (240V)”*, where the Energy Savings Factor would be:
 - a. **0.53MWh per general purpose incandescent or halogen lamp replaced for Residential Buildings;** and
 - b. **1.05MWh per general purpose incandescent or halogen lamp replaced for Small Business Buildings.**
 - b. **Removing the requirement** for Activity Definition **E11** and Activity Definition **E3** lamp replacement installations to be performed or supervised by a licensed electrician.
- 1.8 These two amendments would create **sufficient financial incentives from ESCs for whole home lighting retrofits to become viable at scale, therefore overcoming the current market barriers to energy efficiency.**
- 1.9 This should also increase the **participation rate of lower income households**, who predominantly require Activity Definition E11 and E3 lamp replacement installations.

2. Analysis of the NSW Residential Lighting Market

2.1 Only the commercial lighting market efficiency has been improved by the ESS

- a. The overall efficiency of the **commercial** lighting market in NSW has been improved and, in some cases, transformed by both the ESS and the evolution of the global lighting market.
- b. However, the ESS cannot have impacted the **residential** lighting market in NSW, because little residential lighting activity has been undertaken in the ESS.
- c. We provide data in the following sections demonstrating the lack of improvement in the uptake of efficient general-purpose lighting by the residential lighting market in NSW over the last 6 years.

2.2 The general purpose efficient lighting uptake in the NSW residential market has hardly improved since 2010

- a. The change in uptake of efficient lighting in the NSW residential market since 2010 can be established by comprehensive data from the second lighting audit of 180 Australian homes, 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 home audited, including the fitting type, the lamp technology, the lamp wattage and light colour, dimmers, sensors, etc.);
 - b. Included the audit of 40 homes in Sydney;
 - 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 homes undertaken by E3 Equipment Energy Efficiency in late 2010.
- b. Table 1 compares the percentage penetration of general purpose lighting in Sydney residential homes in 2016 with the Australian penetrations in 2010:

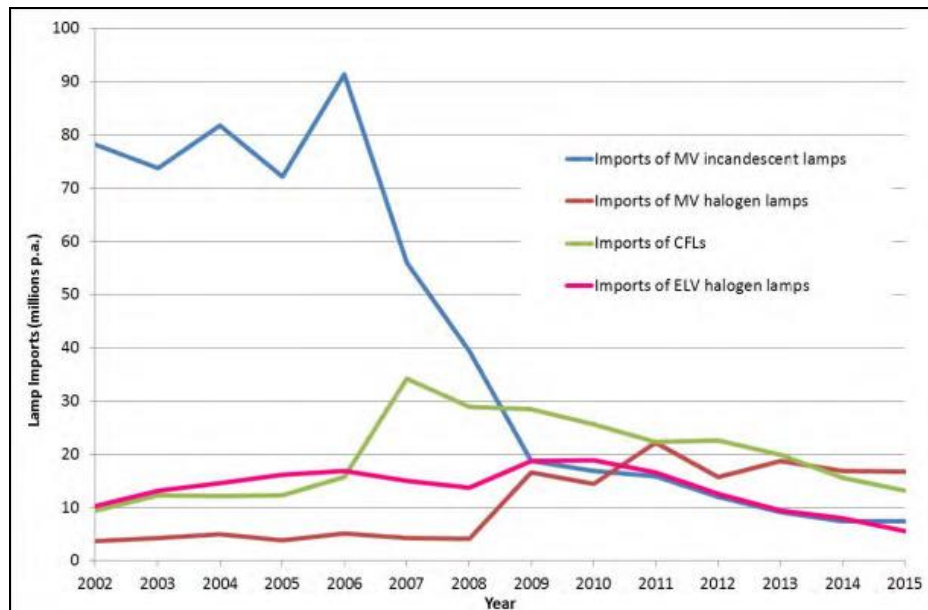
Table 1 Comparison of residential general-purpose lighting percentages between 2016 and 2010

Lighting Technology	2010 Australian Data	2016 Sydney Data
Compact Fluorescent Lamp	31%	32.2%
Incandescent	23%	16.9%
Mains Voltage Halogen	9%	16.7%

- c. The key findings 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 homes in 2010 to 16.9% 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 16.7% of all lamps in 2016;

- d. Therefore, the **total inefficient general purpose incandescent plus halogen penetration has changed little in NSW since 2010** (32% of all lamps in 2010 versus 33.6% in 2016).
- d. The high remaining number of general purpose incandescent plus halogen lamps in NSW residential homes is further supported by the import lamp statistics (see Figure 1), where an estimated **29 million general purpose incandescent and halogen lamps** were imported into Australia in 2015.

Figure 1 Imports of different lamp types from 2002 to 2015



- a. Based on the Residential Lighting Report data, we calculated there are 32 million general purpose incandescent and halogen lamps in NSW residential premises that could be replaced with LEDs through Activity Definition E11 of Schedule E of the Home Energy Efficiency Retrofit (HEER) sub-method of ESS Rule §9.8.
- b. This high remaining number of inefficient general purpose incandescent and halogen lamps in NSW residential homes is due to the higher cost of **LED lamps, which is restricting their replacement** with efficient LEDs.

2.3 Business as usual is unlikely to transform the NSW general purpose residential lighting market

- b. The lack of improvement in the uptake of efficient general-purpose lighting in the NSW residential market appears to be caused by most residential purchasers still choosing the inefficient options because of the lower purchase cost relative to more expensive energy efficient options.
- c. Business as usual is therefore unlikely to transform the NSW general purpose residential lighting market and replace current inefficient general-purpose lamps with efficient lamps.
- d. We note the Objectives of the ESS under the Electricity Supply Act 1995 include:
 - a. A principle objective to create a financial incentive to reduce the consumption of electricity by encouraging energy saving activities;

- b. Assisting households and businesses to reduce electricity consumption and electricity costs.
- e. Energy Mad believes the Objectives of the Act are still valid, because there is evidence of significant opportunity to save energy through energy efficiency, and because there remains a need for financial incentives to help overcome persistent market barriers to energy efficiency in the residential sector.
- f. The NSW ESS therefore remains the most effective approach to deliver the large residential energy efficient lighting upgrade opportunity in NSW residential homes.
- g. Based on the 32 million general purpose incandescent plus halogen lamp residential replacement opportunity outlined in Section 2.2 of this document, and based on the large residential energy savings delivered by the VEET Scheme from comparable replacement activities, Energy Mad believes Activity Definition E11 of the HEER sub-method of the ESS Rule has the potential to generate one of the largest future sources of energy savings for the ESS.
- h. This would remove the current dependence on commercial lighting for the bulk of the ESS certificate creation.
- i. However, the lack of current ESS residential activity is due to the financial incentives from the revenue earned by the Energy Saving Certificates (ESCs) being too small.
- j. Energy Mad believes the following two amendments to Schedule E of Activity Definitions for Low Cost Activities for Home Energy Efficiency Retrofits (clause 9.8) are necessary to overcome this lack of financial incentive:
 - a. Set the Electricity Savings Factors for incandescent and halogen lamps to comparable values as Activity Definition E1 for “*Tungsten halogen Lamps (240V)*”, and
 - b. Remove the requirement for Activity Definition E11 and E3 lamp replacement installations to be performed or supervised by a licensed electrician.
- k. These two amendments would create **sufficient financial incentives from ESCs for whole home lighting retrofits to become viable at scale, therefore overcoming the current market barriers to energy efficiency.**
- l. These two amendments are detailed in the following two sections.

2.4 Setting the Electricity Savings Factor for incandescent and halogen lamps to comparable values as Activity Definition E1 for “*Tungsten halogen Lamps (240V)*”

- a. The residential and small business “*Building Activity Energy Savings*” of Activity Definition E11 are the same regardless if the general lighting purpose lamp replaced is an equivalent light output 15W CFL, a 53W halogen or a 75W incandescent lamp.
- b. We believe the formula for “*Deemed Activity Energy Savings*” is appropriate for CFL lamps replacements.
- c. However, it grossly understates the energy savings for halogen and incandescent lamp replacements.
- d. Because the average Sydney home lighting comprises 16.7% general purpose halogen lamps and 16.9% general purpose incandescent lamps, a separate (relative to CFLs) higher “*Building Activity Energy Savings*” is appropriate for general purpose halogen and incandescent lamp replacements.

- e. The Activity Definition E1 Tungsten Halogen Lamp (240V) Energy Savings Factor for $\leq 15W$ New Lamp Circuit Power is:
 - a. 0.53MWh per lamp replaced in Residential Buildings; and
 - b. 1.05MWh per lamp replaced in Small Business Buildings.
- f. Given the similar wattages for halogen general purpose lamps, Energy Mad recommends two new “*Residential Building Activity Energy Savings*” “*sections*” be created for general purpose halogen and incandescent lamp replacements in Activity Definition E11, where the Energy Savings Factor would be:
 - a. **0.53MWh per general purpose incandescent or halogen lamp replaced in Residential Buildings;** and
 - b. **1.05MWh per general purpose incandescent or halogen lamp replaced in Small Business Buildings.**
- g. This would understate the savings for some higher wattage incandescent general-purpose lamps replaced.
- h. However, while setting the Energy Savings Factors at the level of the more efficient general-purpose halogen lamps is still conservative, this would create a **sufficient financial incentive from ESCs for whole home lighting retrofits to become viable at scale**, while being straight forward to administer.
- i. This should also increase the **participation rate of lower income households**, who predominantly require Activity Definition E11 and E3 lamp replacement installations.
- j. Having a separate “*Building Activity Energy Savings*” for general purpose incandescent and halogen lamps is straight forward to administer, because it is easy to distinguish general purpose incandescent and halogen lamps from general purpose CFL lamps (noting the greater ease to distinguish between them than between Activity Definition E1 ELV Tungsten Halogen Lamps with electronic transformers, ELV Tungsten Halogen Lamps with magnetic transformers, or 240V Tungsten Halogen Lamps).

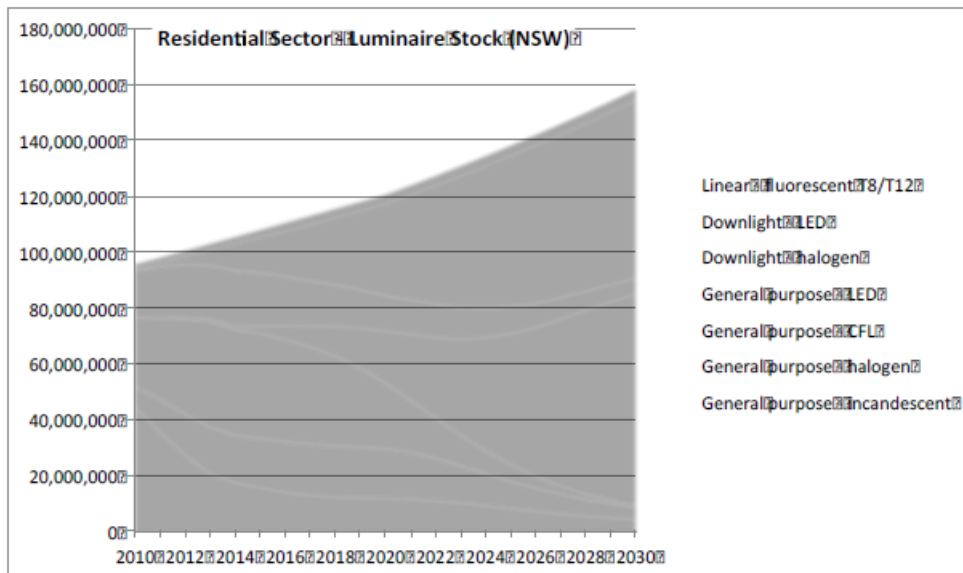
2.5 Removal of the requirement for Activity Definition E11 and E3 lamp replacement installations to be performed or supervised by a licensed electrician

- a. The removal of this electrician installation requirement would result in increased **E11** (and **E3**) activities, at lower ESC prices.
- b. The removal of the electrician requirement should **increase the participation rate of lower income households**, who predominantly require Activity Definition **E11** and **E3** lamp replacement installations.
- c. The removal of this electrician installation requirement would also harmonize these activities with the equivalent VEET, REES and EEIS Scheme activities that don’t require an electrician to replace such lamps.

2.6 Commentary on Selected Residential Lighting Data in the Appendices to the 2017-18 ESS Rule Change Consultation Paper

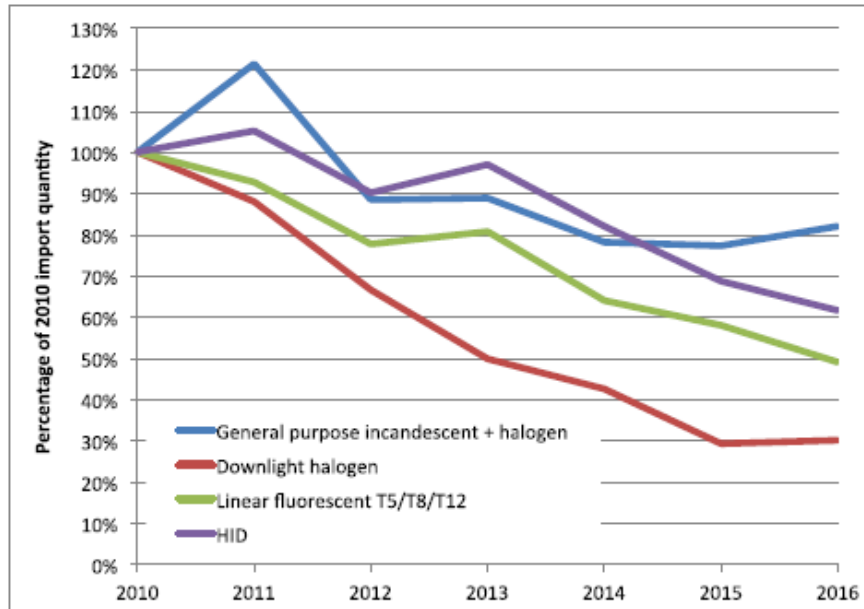
- Energy Mad congratulates the ESS team on delivering energy saving upgrades of over 3.7 million lights, to over 10,000 NSW business sites, and the associated energy savings since 2011.
- Energy Mad notes that the ESS has yet to deliver a comparative benefit to the 2.8 million NSW residential homes, with very few of these yet to benefit from the ESS.
- Energy Mad congratulates Common Capital and Belitich Associates for the extensive quantitative and qualitative study into the impacts of the NSW energy efficiency policy on the lighting market contained in the November 2017 NSW Lighting Market Impact Evaluation (LMIE).
- The following figure, the estimated baseline of NSW stocks of luminaires, is extracted from Figure 38 of the LMIE Final Report (LMIE).

Figure 2 Estimated stocks of residential luminaires in NSW (Figure 38, LMIE Final Report)



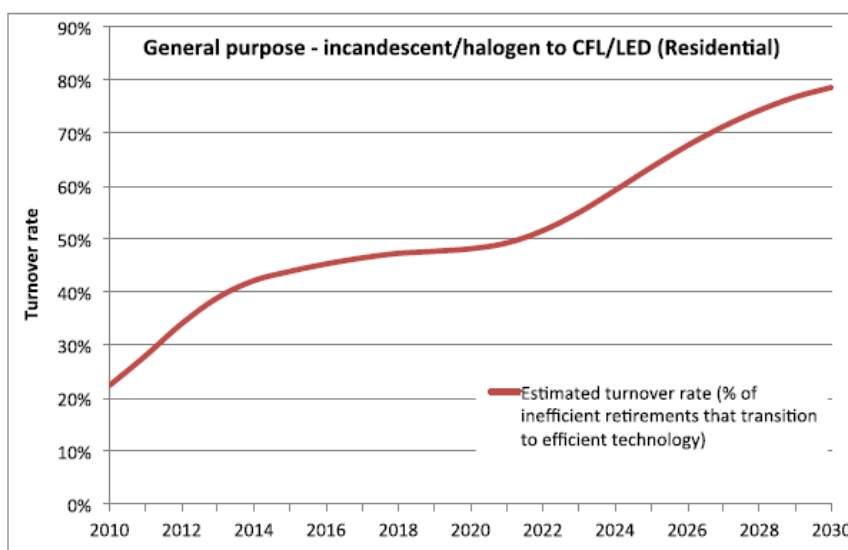
- We agree with the 2016 NSW residential sector luminaire stock numbers for general purpose LEDs, CFLs, halogens and incandescents in Figure 38 of the LMIE, noting they appear to have been sourced from the same July 2016 E3 Equipment Energy Efficiency “2016 Residential Lighting Report” we referenced earlier in this document.
- However, we disagree with the LMIE Figure 38 baseline projected back to 2010 that shows a significantly higher total of general purpose incandescent plus halogen lamps, and a significantly lower number of CFLs.
- Instead we believe the totals for general purpose incandescent plus halogen lamps, and general purpose CFLs, to have been relatively constant between 2010 through to 2016.
- This is supported by the analysis undertaken earlier in this Submission, using the comparable residential lighting data from the E3 Equipment Energy Efficiency “2010 Residential Lighting Report”.
- The following figure, the Australian import quantities of conventional lamp types, relative to 2010 quantities, is extracted from Figure 4 of the LMIE Modelling Assumptions Report.

Figure 3 Australian Import quantities of conventional lamp type, relative to 2010 quantities (Figure 4, LMIE Modelling Assumptions Report, source: ABS 2017)



- j. This shows the number of general purpose incandescent plus halogen lamps has stabilized at around 82% of the 2010 number.
- k. Because of the 20% importation increase in 2011 (presumably due to the introduction of MEPS for general purpose lighting), and because of the longer life for general purpose halogen lamps relative to the general purpose incandescent lamps they displace, this further confirms a relatively constant total of general purpose incandescent plus halogen lamps from 2010 to 2016.
- l. The following figure, the predicted turnover rate for general purpose lamps, is extracted from Figure 39 of the LMIE.

Figure 4 Predicted turnover rate for residential general-purpose lamps in NSW (Figure 39, LMIE Final Report)



- m. We believe the preceding analysis in this section demonstrates the actual turnover rate for general purpose incandescent and halogen lamps to CFLs and LEDs from 2010 to 2016 was significantly lower than that predicted by Figure 39 of the LMIE.
- n. It is therefore likely that the turnover rate for general purpose lamps from 2017 onwards is overstated in Figure 39 of the LMIE.
- o. The NSW ESS therefore remains the most effective approach to deliver the large residential energy efficient lighting upgrade opportunity in NSW residential homes for general purpose incandescents plus halogens.
- p. Based on the evidence provided in our Submission, we therefore disagree with the Chapter 27 *“Recommendation”* on page 222 of the LMIE to *“Review the eligible lighting technologies to potentially remove general purpose lamps, downlights, and traffic signals”*.

3. 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?**".

- 3.1 Developed and sourced the ultra-high performance CFL and LED "**Ecobulbs**" that replace incandescent and halogen lamps.
- 3.2 **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).
- 3.3 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.
- 3.4 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.
- 3.5 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.
- 3.6 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.
- 3.7 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.
- 3.8 Supplied energy saving bulbs to **all 8,000 Walgreens** (the world's second largest retailer) United States stores.
- 3.9 Globally Energy Mad's Ecobulbs have saved **19,000GWh** of energy for households and businesses, reducing their bills by **\$4.1 billion**.
- 3.10 Being **New Zealand's fastest growing company** by winning the 2007 Deloitte "**Fast 50**" Award.
- 3.11 New Zealand award winners for business, energy efficiency, sustainability and clean technology, and innovation.
- 3.12 **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/>.

Kind Regards



Dr Chris Mardon
Founder, Energy Mad