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Dear Regulations Team,

Lighting energy efficiency proposals

Thank you for advising me of the proposed lighting energy efficiency measures. I do have some comments relating to the New Zealand situation; these are given below. With respect to Australia, I shall merely remark that I note their belief that a new technology for minor energy-using articles used intermittently and for varying periods can, in 2017, be approached in the same way as a major appliance with a technology largely established and used constantly (such as a refrigerator) was a quarter of a century earlier. I find that belief both somewhat touching in its simplicity and tragic in that it has lead to less than ideal regulatory measures.

Background

I am a retired consulting engineer with an energy efficiency specialisation. In 1994 I took on the role of standards engineer for the New Zealand Energy Efficiency and Conservation Authority (EECA). In this capacity I devised, developed, introduced and implemented energy performance standards and regulations for appliances and equipment. I was personally responsible for all aspects of the programme, including the policy development, supporting analyses, the original parliamentary bill, coordination between departments, consultation with stakeholders (including overseas interests) as well as for the standards and regulations themselves. I drafted the original lighting section of NZS 4243 for the Building Industry Authority and also the 2007 revision for the Department of Building and Housing where the lighting section was placed into its own part (Part 2). I am a long-standing member of the Illuminating Engineering Society (of Australia and New Zealand) and for over twenty years was a participating member of the standards committees relating to lamps (EL-041) and lighting design (LG-001); I am still an observing member of these committees. I have been engaged to advise the ASEAN and South Asian blocs and the Government of China on lighting energy efficiency matters.

LED MEPS

The economic analysis on which the NZ proposal is based is seriously flawed. The base case, or non-intervention scenario, is not well defined, but appears to assume that LED lamps will replace incandescent lamps. This is despite the significant penetration of compact fluorescent lamps and the increasing adoption of LED lamps and luminaires. The analysis makes the mistake of assuming that all lighting points are used equally, whereas in typical dwelling just a few lamps are used for substantial periods. (In the Electricity Commissions scheme of the mid noughties the household ration for subsidised lamps was five per household.)

However, the proposed LED MEPS cannot claim the benefits arising from the change of lighting technology; these belong to any information programme that may be undertaken. The benefits of an LED MEPS may claim only the savings from preventing the sale of relatively low efficacy models. And given a trend for the higher efficacy models to be the higher output ones, the MEPS benefits may well be taken as increased output and not decreased power. An LED MEPS may even result in an increase in energy use.

The potential energy savings from an LED MEPS are not great. While an increase in efficacy from, say, 110 lm/W to 120 lm/W looks impressive, in terms of reduced inefficiency and power it is a gain of only 0.8 W per 1000 lm. Compare this with the typically 69 W per 1000 lm saved by changing from incandescent to CFL. Savings per household on five lamps used for 1200 hours per year amounts to around 5 kWh per year, or between $1 and $1.50. On a national scale, taking into consideration that many will take any benefit as increased light, that some will opt for the higher efficacy lamp anyway, that some will opt for light sources integral to a luminaire, and that it will take several years for LED lamps to replace CFLs as the latter fail, the benefit from an LED MEPS will amount to perhaps $50,000 per year accumulating. The net present value of the LED MEPS programme for the first ten years would be a bit less than $1.4 million. With the costs of administering and enforcing the MEPS taken into account, the proposal is not worthwhile.

The proposal includes a number of other performance parameters, and this is of doubtful legality. While other MEPS have other performance criteria, these are used to define the product. For example, a refrigerator must act like a refrigerator and keep food cool. A lamp's function of producing light can be seen by anyone who buys one. Granted the CFL MEPS includes other performance criteria, but these were already established by the specification issued by the Electricity Commission for its market transformation programme. However, with the exception of the pathetic switching withstand requirements, the specification is a good one and, with some editing to excise the Australian compulsory MEPS components, would make a good New Zealand Standard for voluntary compliance and for referencing by information programmes.

A general comment is that any New Zealand compulsory energy efficiency labelling or performance requirement must use a New Zealand Standard for the technical requirements. While the regulations do allow for other documents, these generally do not have the input from all stakeholders required for legislation. Other documents have been called up by the energy efficiency regulations, but these were in effect late drafts of Standards, the publication of which was being delayed by slow Australian action.

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Building lighting energy density limits

It is good that the NZBC Clause H1 requirements for lighting in commercial buildings are being reviewed, but the following observations need to be taken into consideration.

- The advent of solid state lighting means it is now even easier to design a lighting installation that easily meets the requirements for working plane illuminance and energy density, but that results in a very poor visual environment. It is likely that new design performance parameters will be developed that concentrate on perceived brightness and average surface emissions. Joint Standards Committee LG-001 is due to revise AS/NZS 1680 to take account of recent developments in lighting sources.
- The original requirements of NZS 4243 were intended to make designers think about lighting energy use and to avoid the worst designs, such as using a myriad of low voltage tungsten halogen narrow beam lights for general lighting. It was not intended to restrict sensible design.
- Do not expect effective enforcement of NZBC Clause H1 lighting requirements. This is a specialist subject that is often outside the scope of building consent authorities who are more likely to concentrate on core clauses such as fire protection, structural matters and, more recently, weather-tightness. Also, the lighting in commercial buildings is often installed for tenants during fit-out after the main building work has been completed. Compliance then depends on the architect and lighting designer being aware of the H1 requirements, which in the past has not always been the case.

Concluding remark

I am available to amplify the comments above should that be wished.

Sincere regards

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