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27 July 2020

To whom it may concern,

Thank you for the opportunity to provide feedback on the Whole of House Component report for NCC 2022 report.

Renew (Alternative Technology Association Inc trading as Renew Australia) is a national, not-for-profit organisation that supports residents and consumers to live sustainably. We have been providing expert, independent advice on sustainable solutions for the home to households, government and industry since 1980.

We thank the ABCB and consultants for the work undertaken that is reflected in the report.

We strongly welcome this model and the framework for achieving NZRE and an increase in stringency to energy efficiency standards.

We understand this report to present in detail the parameters and methodology of the model, and look forward to engaging with the social cost-benefit analysis process within these parameters over coming months.

As the process takes place, we are hopeful that a range of assumptions and inputs can be sensitivity tested, in particular on financial, economic, environmental and social costs.

We believe a key priority of the regulatory process must be to ensure that thermal shell performance is maintained and strengthened for new builds. In our view it is important for the overall energy performance of homes that solar PV energy generation can not be traded off against thermal performance.

Comments on a selection of specific points are as follows.

**2.2: Metrics**

Acknowledging that this section is yet to be completed, we believe that greenhouse gas emissions should be costed at a higher rate than that indicated and hope that this can be modelled. The paper

indicates $12/tonne carbon cost, however total health, social and environmental costs of carbon pollution are typically considered significantly higher.[1]

### 3.3: Equipment Efficiency

We would be interested to learn more about the selection in the modelling of medium efficiency gas appliances and low efficiency electric, heat pump and other heating and cooling equipment. We believe there is a need to include an appropriate price alongside the appropriate efficiency of the heat pump. A $5k heat pump is very high efficiency; a medium priced heat pump with a CoP lower than about 3.5 may cost approximately $3500. The selection of different efficiency and quality levels across appliances may affect ultimate NZRE calculations.

### 5.8 Photovoltaics[2]

We support the assumptions made in section 5.8 on solar PV systems, albeit noting anecdotally that fewer than 5% of panels might be south-facing.

We would appreciate clarification of whether export limits on PV will be modelled. This will have an impact for the biggest solar systems.

### 5.6 Equipment type/performance analysis

We agree with the use of survey data for appliance consumption apart from heating & cooling. We note there may be limitations applying this to hot water as this can vary so much depending on shower number, duration and flowrate.

### 5.9 Financial settings and assumptions

As the report notes, the 1% learning rate selected (with a sunset period of 10 years) is conservative. Indeed, it is at the lower bound of the range of rates recommended in the cited methodology. This is particularly conservative given:

- the rapid learning and development occurring in the area of small-scale renewable energy generation and storage; and

[1] Estimates on the social cost of carbon vary widely, but are much higher than the $12/tonne de facto EES price. See e.g. https://linkinghub.elsevier.com/retrieve/pii/S0959652618334589

[2] Renew has longstanding expertise in solar modelling for consumers and clients, in particular via our Sunulator platform: https://renew.org.au/resources/sunulator/. We would be interested in how best to integrate elements of the proposed Whole of Home model within our future analysis, and would welcome opportunities to receive any further information about related aspects of the model.



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- the change from 5 to 6 Stars standard for new homes (as Renew understands that price increases in the housing market were negligible).

It is our hope that as this process continues, modelling will be undertaken with at least a sensitivity analysis using higher learning rates.

As noted previously, the discount rate of 7% is highly unrealistic and should be dropped. This will severely underestimate long term societal benefits of any measures assessed.

**5.11 Greenhouse gas intensity assumptions**

We accept that it is appropriate to base assumptions on the National Greenhouse Account Factors data, however we note that this is likely to significantly understate the climate impacts of natural gas, in large part due to methane emissions.[3]

We understand from the tables presented that reduction rates in greenhouse gas intensity for electricity production (reflecting an increase in renewables) will be accounted for in the model.

**5.12 Societal Cost of fuels**

$12/tonne significantly underrepresents the social and environmental cost of carbon emissions. Estimates of social cost of carbon emissions vary, but are rarely valued internationally at less that $USD50/tonne, and are likely significantly higher. While the $12 figure might reflect a de facto ERF price, it is appropriate in modelling social and environmental costs to apply a realistic and higher social cost for greenhouse gas emissions alongside this figure.

**6.2 Appliance improvement costs**

Noting that the section has been described as preliminary only, Renew would be happy to have further input into this area and may be able to provide further cost estimates across the listed appliance range if required.

Page 58 implies that a heat pump hot water unit costs $5k. This is a top-of-the-line model, but earlier the doc talks about an “average” unit. Average unit’s (installed) cost is in the order of $3k to $4k.

**Appendices**

Timing of use is important and may impact the accuracy of the model. The model includes hot water running in the morning and pool pumps morning and evening. In future, they will more likely be run

[3] https://renew.org.au/our-news/the-gas-industry-is-lying-about-their-emissions/



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around midday to soak up neighbourhood PV. We believe the usage patterns applied should be forward looking and should incorporate changed usage patterns based on PV generation.

We furthermore attach the following comments on the supporting Quantified Residential Energy Efficiency Performance Requirements for NCC 2022 report.

**PR1**

We understand that in calculating heating and cooling load limits PR1 proposes to replace 69 climate zones used by NatHERS with the proxy metrics of Cooling Degree Hours, Dehumidification Gram Hours, and Heating Degree Hours. It is our understanding that this may lead to in some instances to a relative increase in heating and cooling load limits, albeit while bringing greater consistency to calculations for reasons outlined in the report. Comparisons of the proposed 2022 PR1 load limits with 2019 NCC compliance pathways appear to suggest a varied impact across regions. We seek clarification as to whether these comparisons reflect an increase in stringency, and what the impact of an increased stringency would be. We would be concerned by any possibility that an increase in stringency to 7 stars would not in reality result in a significant decrease in energy load due to changed star band calculations.

We support the principle of adjusting for shared fabrics to ensure that performance solutions do not allow for unnecessarily inefficient unshared walls in apartments, townhouses and other buildings with shared walls.

**PR2: Societal cost of energy**

We support the principle of measuring a "societal cost" of energy and the requirement that home energy use is constrained within a "societal energy budget" (p29). We support the intention of this measure to encourage the use of one energy source over another if it imposes a lower cost on society as a whole.

A significant priority must be to ensure that the societal cost of greenhouse gas emissions is accurately reflected in the model and that an increase in stringency genuinely means a reduction in associated greenhouse gas emissions.

The report notes the policy direction from the BMF to the ABCB as:

> *A fuel neutral annual energy usage budget should be quantified in the NCC and set at a level that delivers an overall Benefit Cost Ratio greater than 1:1. This budget should use a delivered energy (MJ/m$^2$) and carbon metric with a conversion factor for different fuel types at a jurisdictional level, to reflect the variation in carbon intensity of different fuels around Australia. This energy usage budget should consist of meeting a minimum thermal performance to deliver comfort and resilience, followed by meeting the remaining energy usage budget in a manner that reduces energy costs and peak demand.*

The report further states (p29):

> *Societal costs of energy vary from location to location, the approach taken in PR2 is to define the meaning of societal cost, however to leave its value unquantified. This allows practitioners to determine the societal cost of energy that is appropriate to their particular project. Verification Method 1, discussed later in this report, provides a method of demonstrating compliance with PR2 where the societal costs of energy are explicitly specified.*

We seek clarification about how practitioners will be permitted to determine or calculate the societal cost of energy in their project. We understand this to suggest that clear region-by-region calculations will be undertaken by the ABCB as a part of this process on the societal cost of energy and that clear location-based environmental cost profiles will be in place. We would be concerned if lack of quantification of greenhouse gas costs allowed for their undervaluing when seeking compliance.

Verification Method 1 (which we understand to be designed as a simplified method for complying with Performance Requirement 2) indicates a flat assumption of environmental costs (greenhouse gas emissions) of electricity of 4.0c / kWh. It is not clear to us how a flat rate assumption for environmental/carbon costs is able to reflect the variance in carbon intensity for different fuel types. (We acknowledge that as the NEM becomes more interconnected it may be appropriate to develop a single national metric, with the carbon cost weighted towards the coal-producing large eastern states.)

It appears very likely that this will be below the actual social cost of greenhouse gas emissions from electricity in most regions. Where coal-generated electricity can be conservatively estimated to have an emissions intensity of 1,000g CO2/kWh, the 4c/kWh rate would be a significant understatement of cost. (Estimates of social cost of carbon emissions vary, but are rarely valued internationally at less that $USD50/tonne, and are likely significantly higher.)

**Import and export benchmarks**

We note the direction of the Trajectory to include as benchmarks for an energy budget in a performance solution the following:

- 5 star gas space heating
- 4 star electric space conditioning
- 5 star gas instantaneous water heating
- Electric lighting equivalent to NCC 2019 allowances

We note also that that alternative appliance configurations (including heat pumps) with equivalent energy use will be considered compliant.

While we note the direction from the BMF in this regard, we believe greater ambition is required for minimum appliance efficiency levels. In particular, we note that the cost difference between 4 star



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and 5 star electric space conditioning is minor and as such we consider that a 5 star standard would be a reasonable benchmark.

Thank you again for the opportunity to give feedback on this report. Please do not hesitate to contact us at any stage.

Yours faithfully,

Rob McLeod

Renew