9th July 2018

NEPP Secretariat
Department of the Environment and Energy
PO Box 787
CANBERRA ACT 2601

By email to: NEPPSecretariat@environment.gov.au

To whom it may concern

Re: Response to Draft Trajectory for Low Energy Homes Report

The Alternative Technology Association (ATA) welcomes the opportunity to contribute to the *Draft Trajectory for Low Energy Homes Report*. We commend the Department for the ongoing work to improve the quality and efficiency of housing for all Australians, whether they rent or own their own home.

The ATA supports 250,000 people each year who are making their own investments in energy efficiency and renewable energy technologies, many who have chosen to build well above minimum standards. The experiences of our household members in addition to our own independent research clearly demonstrates that investing in efficient residential buildings results in high comfort levels, low energy bills, significant economic returns and prepares these homes for climate resilience.

The evidence is clear that the implementation of a nationwide energy performance measure in the National Construction Code (NCC) for new residential buildings and significant renovations has improved the quality of Australian homes. Compliant 6 Star homes use less energy when compared to pre-2010 era homes, and over the past decade, there has been an upswing in consumer and industry awareness of the comfort, economic and environmental benefits of improved thermal energy building performance.

But much more needs to be done. A decade of evidence shows that in many climate zones the minimum standard is set too low to protect households from high bills and the dangers of extreme weather events. In addition, if the NCC is to meaningfully contribute to the Australian Government's commitments under the Paris Agreement, and for a net-zero carbon economy by 2050, the stringency of building energy performance measures needs to increase commensurately.

Consumer understanding must be improved regarding the interrelationships between upfront building cost, ongoing energy bills, occupant comfort levels and public health. From an economic standpoint alone, very few Australian's pay cash for a home – meaning that the upfront price is nowhere near as important as greater transparency over operational costs – both mortgage repayments and energy bills.

ATA has conducted several case studies of Class 1A dwellings in Victoria built up to 2.2 Stars above the mandatory minimum. Many of these homes are built as 'all-electric' (i.e. no gas or other combustion technologies) with medium to larger sized solar photovoltaic (PV) systems. ATA typically finds that these homes:

- have only $10K to $15K 'cost-premium' (i.e. additional capital cost);
- have ongoing energy bills that hover between zero and $500 per year (typical saving in the order of $2.5K per year) and without the need for high feed-in tariffs or energy storage; and
- achieve high comfort levels as reported by occupants.

Consumers and industry now have a much greater choice of efficient and cost-effective technologies, renewable energy, appliances and materials compared to a decade ago, and these are continuing to reduce in price and increase in value. Improvements to the Code underpins this work, however complementary measures to improve the performance of existing homes also must be a key focus of any long-term national strategy.

Please find attached our response to the *key questions*, and please do not hesitate to contact us for further information.

Yours sincerely

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CEO
Alternative Technology Association

Attachment A: ATA Response to Key Questions

1. Do you think there should be a target for the sector and if so, what do you think it should be?

Yes. A target is essential to guide policy settings and to enable appropriate adjustment when national targets change and evolve.

The NCC has a clear and essential role in transitioning the building industry to net-zero energy and a target is vital to providing certainty to consumers and industry, and must be consistent with our Paris commitments as well as longer term targets (i.e. 2050) to transition the economy to low carbon.

To achieve this, a clear trajectory is required that includes incremental increases in the minimum energy performance requirements over the next 25 years.

The range of objectives for the housing sector – lower bills, improved health and comfort, improved resilience during extreme weather and blackouts, reduced carbon emissions – suggests a dual target that embraces these objectives:

- An energy usage target linked to our Paris commitments for emissions reduction; and
- A resilience target for building thermal performance (exclusive of powered heating or cooling) for extreme weather.

ATA believes it is a missed opportunity that the Australian Building Codes Board did not receive a directive to increase energy performance stringency as part of the 2019 update to the NCC, despite strong evidence the current 6 Star minimum is too low and is not delivering for Australian households.

ATA's case studies demonstrate a minimum standard of 7 Stars is cost effective now. ATA is currently undertaking a Victoria-specific project to model a rage of scenarios and household types to understand the consumer value of building to higher levels of energy efficiency as well as all-electric with solar PV. Once complete, we will then be seeking to undertake this work across all Australian climate zones to further demonstrate the case.

Ultimately the target for the sector should cover all homes – new and existing. While the draft paper focuses on the 52 per cent of residential buildings that will be built after 2019, the fact remains that almost half of 2050 buildings exist now. These must be dealt with to achieve any meaningful energy and carbon reductions from this sector.

Sub-targets are required for each (new and existing) to best inform policy and regulation for new construction and the wider policy and regulatory framework that covers existing homes (e.g. appliance standards, mandatory or aspirational standards for rental homes, specific standards for major appliance replacement, energy efficiency certificate schemes, etc). Sub targets may differ in different jurisdictions due to different proportions of new and existing homes in their housing mix.

2. Which Performance Metric/s do you think would be most appropriate for the NCC? Are there others that should also be considered?

- **Thermal performance metric:** The NatHERS Thermal Performance metric is used to assess the energy performance of new residential buildings and major renovations in Australia. ATA believes that while it has challenges, a thermal performance energy metric remains the best way to define the initial approach to forecasting/assessing building efficiency, with specific regard to heating/cooling loads.

  It is a sound basis upon which to increase the minimum requirements and reduce heating/cooling loads for new and existing buildings and take advantage of the plethora of cost-effective opportunities that exist to further improve building performance.

  However, resourcing is needed to support continual improvement of the NatHERS system. To date, essential upgrades to the NatHERS software take too long. The backlog of efficiency products not yet available in the system frustrates designer attempts to use the software as a design tool (in addition to the regulatory requirement), and therefore makes it challenging to model cost-effective efficiency improvements for their clients.

- **Air changes per hour (APH):** may be a useful metric to complement energy performance measures at both the software modelling stage and post-construction to require minimum performance. There are proven benefits for energy saving and occupant health associated with airtight buildings with adequate ventilation, particularly during extreme temperature periods, such as heat waves.

- **Appliances:** Appliance (i.e. non-thermal) related energy use should be considered at least for major and/or fixed appliances which are decided at build stage (e.g. hot water, lighting, potentially white goods if offered as part of a home sale 'package').

  Maximum energy caps should be introduced based on medium to high efficiency products available in the market and this requirement should be ramped up over time. When applied as standard across the industry, this is another way (besides banning inefficient tech through E^3) of ensuring inefficient technology is no longer installed in new (or existing) homes and will lead to price reductions of the medium to higher quality tech as economies and scale in purchasing are realised.

- **Health and safety requirements:** Introduction of specific health and safety requirements in relevant sections of the Code to complement energy requirements. This would include mechanical ventilation requirements for airtight buildings and free-running indoor temperature limits during periods of extreme weather.

3. What components do you think should be included in the scope for the NCC? For example, should renewable energy be included?

To meet the stated objectives for improving the energy efficiency of homes, the scope should include all significant contributors. Thus, the following should be included in scope:

- **Space conditioning (heating and cooling) and hot water appliances:**
  This must also include an allowance (when calculating space conditioning energy usage) for usage of portable heating or cooling appliances in primary living areas in homes with no installed heating or cooling – unlikely for new homes, but essential for measures that target existing homes.

- **On-site renewable energy generation and storage:** Should be included as these affect energy usage, costs and emissions. However, ATA does not support substitution of an increased minimum thermal energy rating with solar PV or storage (e.g. a minimum 7 Star requirement met with a 6 Star build + solar PV). The evidence is clear that it is already cost effective to build to a higher thermal rating than 6 Stars and these thermal measures/rating should be satisfied first, prior to on-site renewable energy/storage being considered.

  In addition, in considering the inclusion of any specific technologies such as solar or storage, ATA does not support the mandating of specific technologies but prefers a performance-based approach, where any eligible, minimum quality technology can be used to meet a particular performance requirement (above a minimum thermal rating baseline).

  The example we would give here is the Victorian regulations relating to the mandatory provision of a new solar hot water system or rainwater tank for all new Class 1A Victorian dwellings. Mandating solar hot water in this way has led to the following two outcomes:

  - The Victorian regs pay no regard to the quality of the solar hot water system being installed. As such, many of the solar hot water systems being installed are essentially a gas instantaneous HW unit with a single flat-plate collector – and perform way below the level of even a medium quality solar hot water system. This is a significant missed opportunity and almost wasted investment;
  - Solar hot water is now outcompeted in most situations by heat pump hot water systems – based on upfront cost, efficiency, running costs and the ability to integrate easily with solar PV. Most new Class 1A Victorian dwellings would be better off with a medium to high quality heat pump than a solar hot water system, for at least the same cost, if not cheaper, and it is a key pathway into an all-electric home that will save them tens of thousands over the life of their mortgage.

- **Fuel source:**
  The Code has an important role in guiding decision making for least-cost outcomes for energy performance. The ATA's 2018 analysis in the report *Household fuel choice in the National Electricity Market*[1] found that all-electric dwellings with solar PV offer between $9k – $16k of value (in net present terms) over 10 years, for dwellings with a 5kW solar PV system and no gas appliances.

  We recommend fuel source as well as the efficiency of fixed appliances (heating/cooling, hot water) should be within the scope of the Code, due to the potential for occupant cost savings (and regarding higher efficiency electrical systems).

[1] http://www.ata.org.au/news/all-electric-solar-homes-save-thousands-over-gas-report/

- **Trajectory for energy performance targets:**
  Administering a clear trajectory of energy performance stringency improvements should be within the scope of the Code. The trajectory should include incremental increases to the minimum energy performance requirements over the next 25 years, starting with a +1 Star rise to the 6 Star minimum at the earliest opportunity.

- **Energy performance retrofits**:
  The Code should include sub-targets relating to energy performance improvements to existing dwellings. This could include owner education on the benefits of energy retrofits and/or incentives to undertake a 'whole of house' energy upgrade to improves energy performance of the existing structure as part of a major renovation that comes under the purview of the Code.

- **Dwelling size:**
  Current thermal performance metrics do not adequately consider dwelling size, despite floor area directly affecting the operational and embodied energy associated with a building. While we note the latest CommSec data show the average floor area of all new dwellings in Australia is 189 square metres – the smallest in 20 years – this is due to apartment construction. Standalone dwellings continue to increase in size and in 2016/17 averaged 233 square metres, among the largest in the world and with an average of just 2.6 people per dwelling (Census 2016).

4. How do you think the NCC could be best verified and strengthened?

To better verify and strengthen the NCC, ATA recommends:

- A clear process for incrementally increasing stringency in the Code from 2022 to achieve net-zero emission homes by 2050 (in line with commitments under the Paris agreement).
- Greater focus on fixed appliances (e.g. space conditioning, hot water) regarding maximum energy use.
- Transparency around energy efficiency measures and independent reviews to verify minimum standards are appropriate.
- Consumers should be considered key stakeholders to the NCC process. Currently there is no consumer stakeholder committee reporting to the ABCB.
- Least cost provisions in the NCC should relate to capital and operational costs, not just the former. Very few Australian's pay cash for a home – meaning that the upfront price is nowhere near as important as greater transparency over operational costs – both mortgage repayments and energy bills.
- Inclusion of measures that relate to climate resilience.
- Alternative pathways to achieve compliance to minimum energy performance must be shown to deliver buildings to the equivalent standard.
- Consumer education – *Your Home* is the only current investment in consumer education regarding efficient residential buildings and it is still unclear if/how this will be updated. We need greater investment and more support for consumer education via NGOs.
- A stronger compliance regime, including auditing and penalties.
- Market leaders should be recognised, and their skills and experiences documented and shared to drive industry best practice. ATA members still find it challenging to identify a design-build team willing/able to go beyond the minimum standard, despite the economic benefits to them as the client, and evidence of hundreds of affordable 7+ Star dwellings already in the market delivering lower bills and superior comfort.

5. Do you think anything has been missed in the scenarios being modelled and what are the implementation issues that need to be considered?

Yes. The ATA is concerned that there is no modelling in the scenarios beyond +1 Star above the current minimum energy performance standard, despite growing evidence of the consumer benefits of higher performance in some climate zones. There are a number of other issues in the draft paper's models:

- Good quality heat pump hot water systems now out-compete solar hot water systems on price, efficiency and energy costs. They also integrate far easier with solar PV – with even a modest solar PV system size (e.g. 3.0 kilowatts) able to provide >90 per cent of a 1kW-input heap pump's annual load. This leads to virtually free hot water for home occupants and is almost zero net carbon.

  Heat pumps must be included in all scenarios where hot water is modelled otherwise the modelling will fail to consider the most effective technology currently in the market.

- Higher efficiency air conditioners must also be modelled – 7 Star units are now available in the market with co-efficients of performance around 6.0 – see: https://www.daikin.com.au/our-product-range/split-system-air-conditioning/us7#tech-specs

- *Increase 3* only considers a maximum 1 Star increase above the 2019 requirements. Higher levels of building efficiency must be modelled (and in both 2022 and 2025) to properly consider where the economically optimal level is considering relevant costs and benefits. ATA has witnessed relatively low build cost-premiums for homes up to 8.2 Stars (see: https://www.liveatthecape.com.au/about.html)

  The industry may need longer than 2022 to transition to 8 Stars or above, but that isn't a valid reason not to include it in the modelling for 2022 if that modelling is trying to understand where the optimal level of efficiency investment is.

6. Do you have any other comments or suggestions?

Yes.

Compliance:
The ATA is concerned about energy efficiency compliance issues and would like to see a more rigorous compliance regime that gives households greater confidence their homes are built to the designed energy performance standard. They could include:

- A combined design and performance-based metric that includes the option for airtightness testing to achieve energy performance compliance under the Code. We note that market leaders and factory-built prefabricated housing products are already undertaking quality assurance checks in this way.
- A checklist and education program to support industry (including building surveyors) to specifically check energy performance measures are in place. Currently beyond basic tests for air leakage are undertaken through the build process, and there is little checking for correct installation of insulation, for example, which could be mandated.

Public education:
Investment in consumer education around the benefits of higher performing homes is essential to grow support for the scheme from those who most benefit from it.

Through our own public education programs including Speed Date a Sustainability Expert events, Sustainable House Day, public lectures/seminars, our two publications *ReNew* and *Sanctuary* and one-on-one consultations we regularly hear from consumers that they struggled to find designers/builders who can deliver higher performance; and yet industry regularly claims there is little consumer demand for more efficient homes. A properly funded public education program should:

- Include investment in an information campaign that includes educational materials and marketing/advertising, in addition to investments in updating *Your Home*.
- Demonstrate the interrelationship between upfront building costs, ongoing energy bills, occupant comfort levels and public health.
- Provide a checklist to support consumers ask questions of their design team, and confident their dwelling meets the stated energy performance standard.

Existing homes:
It's critical that the recommendations of the trajectory for Low Energy Homes work, in addition to informing revisions to the NCC, also drive policy change regarding existing homes.

As shown in the consultation document, 75 per cent of dwellings in 2030 and 48 per cent of dwellings in 2050 will have been built before 2019; and the experience of many organisations working with vulnerable households is that poor quality older housing, often rented, is a significant driver of financial and health problems.

Explicit targets and concrete policy recommendations to improve the energy and thermal performance of are critical in reducing national carbon emissions as well as improving health outcomes, improving resilience to the effects of extreme weather, and reducing energy bills for vulnerable Australian households.