Robinson, Renee

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Hi!
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Cheers
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INTRODUCTION

This submission is made by an independent Sustainability Consultant who has previously operated as a Residential Home Sustainability Assessor under the Federal govt's former Green Loans Program (GLP), and on the Solar Cities Project (Blacktown, NSW).

The author is qualified as a carpenter and builder with many years experience in the building and construction industry, most recently with a major international construction company, Barclay Mowlem Ltd (now Laing O'Rourke P/L), and as a self-employed assessor and sustainability consultant.

This submission acknowledges the problems and issues outlined in the Allen's Report, but seeks to raise a further issue and suggest some potential solutions to some of the acknowledged problems that do not appear to have been covered thus far.

EXECUTIVE SUMMARY

Based on actual experience of both the building construction and assessment industry, and an informed understanding of the human condition, it is my carefully considered opinion that Option 2 is the most effective option which provides for the lowest cost to the consumer.

The rationale for this consideration is outlined in this submission.

ISSUES THAT NEED TO BE ADDRESSED

Rather than slavishly following the layout of the RIS and commenting on things I don't know anything about, I will attempt to simplify your understanding of the specific issues that I believe need to be addressed and which I believe are currently not being adequately addressed, based on my professional observations of the residential building industry and the residential building assessment market.

Efficacy of the various Options 1-4 as outlined:

Option 1: Full thermal efficiency assessment absolutely requires adequate and accurate knowledge of the thermal mass of a dwellings' walls, and this in turn is reliant on adequate and accurate knowledge of the construction materials and any thermal barriers or insulation within the wall structure.

Such assessment is only feasible and cost-effective in <u>new</u> homes for which current, accurately drawn floor plans exist. As new homes are covered already under provisions within the Cuilding Code of Australia (BCA) this Option is deemed both impractical an unecessary.

It must be noted that, for *most* older housing stocks, plans either no longer exist, are not held by the current home-owner, and in the case of Councils and other regulatory authorities, have often be lost or at best archived and are thus not readily accessible, even if they were accurate and properly reflected the actuality of the building being assessed, and there is no guarantee of that.

For an accurate floor plan to be produced by the assessor, they must have building or architectural background experience in order to produce such item. Currently only NatHERS assessors (and not all of them) have this ability or requirement.

Producing such floor plans will take significantly more time to produce than has been allowed in the costings for Option 1. This is the consensus view among existing/current HERS assessors who already perform these full thermal assessments for the BCA requirements for new dwelling approvals.

Furthermore, it is virtually impossible in most cases to determine – without destructive and/or invasive methods – whether or not an existing building has any insulation installed in its walls.

Ceilings can be checked relatively easily by simple inspection, but exterior walls, whose open upper edges are usually concealed and/or inaccessible to such non-intrusive inspections, cannot.

Ergo, Option 1 cannot produce the same *quality and accuracy* of measurements on *existing* housing stock as it can for BCA thermal performance assessment of new dwellings, without the addition of the cost of invasive inspection techniques and their subsequent repair. This could add a further $1000 per dwelling to the cost of this Option.

Option 2: The costly measurements and invasive inspections techniques outlined above, also apply to Option 2, as assessors would be unable to determine, without those invasive techniques, whether or not an older, existing dwelling had any wall insulation. Most home owners either don't know, can't remember, or didn't own the house at the time of its construction, and so have no accurate knowledge, or any way to *prove* any assumptions or beliefs without invasive techniques.

The consent authority, who should have such information, often does not have it readily accessible, certainly seldom has it accessible without the payment of a search fee, and even then cannot sometimes be certain whether or not such insulation was actually installed.

This 'uncertainty' makes the provison of an *accurate* thermal performance assessment well nigh impossible, without the costly measurement and inspections outlined above.

The non-floor-plan based 'limited thermal efficiency model' would also require significant training of Assessors in abatement measures and techniques and their relative worth and costing.

Such training was provided to GLP HSA's but is not currently provided for NatHERS assessors. This aspect of training must be included as part of the ongoing assessor training regime.

This option should include full 'current usage' assessment of electricity and water consumption based on the actual people currently living in the swelling and most importantly their 'lifestyle' requirements – or actual consumption causative factors.

For example, it is well known and recorded that *behavioural* changes can have at least as significant an impact on a dwelling's *actual* energy and water consumption figures as any installed efficiency measures, such as solar HWS.

Knowing both the *behaviours* and the *actual* consumption provides the opportunity for a far more accurate assessment of the 'potential' for consumption – or reduction – for any given property.

None of the existing assessment tools takes this CRITICAL factor into consideration sufficiently, if at all. Only a human assessor observing the building and speaking with the homes' occupants can make such a necessarily qualitative assessment.

For example, knowing that the current occupant's family includes two teenagers, neither of whom is apparently willing to take showers of less than 20mins duration, and which *behaviour* is clearly the *causative factor* creating their excessive consumption of energy for hot water production, could positively influence the choice of a prospective buyer or lessee who is sufficiently aware of their *own family's* very different behaviours, and thus, very different consumption patterns.

It is my carefully considered opinion, based on my experience of both this industry and human nature, that an assessment report explaining these factors to potential purchasers or lessees, along with suggested mitigation measures both *behavioural* and *physical* will achieve *far* greater results in terms of actual greenhouse gas emission reductions, than simply measuring the buildings and providing them with a 'rating'.

Option 3 and 4: Self assessment will not achieve the desired outcomes. See above. Home owners will either not perform any such assessment accurately – for the same reasons of perception of potential loss as are applicable to lessees and real estate agents, or they will simply get it wrong.

Human nature being what it is, vendors have a vested interest in NOT spending any money on a property they intend to sell, nor do they have any incentive to highlight potentially price-sensitive failings of their property.

For that reason, the provision of assessments must NOT be performed by vendors, lessees or real estate agents as all have a vested interest in minimising the true situation. This would be akin to allowing vendors to provide 'building construction' examinations, or 'pest examinations' such as those currently required by most lending authorities and which are paid for by purchasers.

Some people from the real estate sector may attempt to argue that not all those in their sector are likely to behave in that regard, which only shows their utter ignorance of the reality of human nature.

No-one but a saint would willingly divulge or publicise any information that would potentially cost them money. And anyone who believes otherwise is kidding no-one but themselves.

Potential improvements to pricing and cost of RBMD

Currently the proposal for the issue of "energy efficiency" Certificates requires that any changes, potentially improvements to the energy efficiency of a dwelling, will require the provision of a new Certificate, and the attendant cost of purchasing same.

This is counter-intuitive.

It provides a *dis*-incentive for home owners, especially landlords, to make any improvements, expending capital, knowing that to gain any potential *capital gain* benefit from so doing they will *also* be required to shell out for a new Certificate *as well,* especially as such provision must, by necessity, include a new assessment with its attendant cost.

Thus Certificates should be designed to be upgradable as, with the computerised tools currently available, making a single or minor change to one aspect is simple and requires a few minutes work – with perhaps a provision in the regulations for such change to be 'sighted' by an assessor.

For example, a landlord whose property has previously been assessed with a low rating takes advantage of govt rebate programs to install ceiling insulation and a solar HWS. The assessor makes a quick site visit to sight the changes, alters the parameters in the previously completed assessment (this presupposes that assessment data sets are 'saved' in re-usable form), alters the parameters changed, hits the Enter key, and applies for a new, upgraded Certificate for the property owner.

Potentially an hour's work and the cost of a new Certificate, or an 'Amendment' to the existing certificate. Perhaps a maximum of $75, rather than a $200 or $800 re-assessment.

Such a measure would go a long way to removing the objections of landlords to RBMD. It would also make it easier for home owners to 'upgrade' the Certificates for their home progressively without the major expense of a full assessment each time an upgrade is performed.

Like motor cars being assessed for roadworthiness being re-presented to the inspector with any problems fixed, the *assessment* would not need to be re-done, only the *improvements* acknowledged and the original assessment amended to show this.

Please note that to suggest such a methodology ought to be 'counter-intuitive' for an assessor, as *full* re-assessment would be *far* more lucrative for the assessor. Therefore, I hope you will see this suggestion for what it really is – an attempt to reduce the cost to home-owners *while ensuring the aims of the regulation are achieved.*

[That ends my discussion of the RIS as it stands. The remainder of this paper seeks to address issues that the broader residential energy efficiency measures are explicity <u>not</u> targeting, and which I believe need to be addressed]

Poorly designed appliances

Currently there is no practicable way that any authority can regulate what a buyer does or does not do to the energy efficiency or overall consumption of a property post-occupation.

Consumers may not wish to be so regulated, and govts may well be reluctant to legislate in this area, but for the purposes of *national* energy efficiency and *overall* carbon pollution reduction, this may become necessary.

The problem is that the minimum standards for energy efficiency of some appliances are, in some cases, being wilfully mis-represented to the market .

Furthermore, most consumers are utterly bereft of the knowledge necessary to make 'informed decisions' as to the efficacy of manufacturers' or installers' efficiency claims.

Added to which, the measures for such efficiency claims do not take into consideration the *actual* usage of appliances once installed.

It is for this reason that I believe that *mitigation measures* must form part of any assessment of residential buildings, and that such measures include explanatory notes for consumers to enable more efficient *usage* of their major appliances.

Three examples that best demonstrate the inherent *usage inefficencies* of appliances are:

- Dishwashers
- Ducted air-conditioners
- Clothes dryers

Dishwashers

One of the most wasteful and least energy efficient appliances is the dishwasher.

Dishwashers cannot avoid using electricity to operate rotating parts, such as the spray arm and pump, but most modern dishwashers contain a *manufactured inefficiency* in the shape of a water-heating element, coupled with the provision of *only* a cold water inlet.

This situation was allegedly brought about due to unintended damage to inlet valves and internal components of machines by overly hot water from storage hot water systems, and especially solar hot water systems.

Thus it is *not* an efficiency measure but is rather a *risk management* measure by the manufacturers seeking to reduce potential warranty claims.

The unintended consequence of this industry-wide move, especially in light of the push for global net zero emissions for hot water production, is to 'build in' energy inefficiencies.

So how to 'fix' the problem?

Under the existing legislation in NSW, for example, BASIX provides for the installation of a max. 50ºC tempering valve for the bathroom shower, basin and bath, primarily to reduce the risk of scalds.

By simply extending this provision to the dishwasher, the inlet temperature would be standardized and regulated to 50ºC, thus providing dishwasher manufacturers with certainty for their risk management assessment of their units' components.

Appliances could then be fitted with *both* hot and cold taps so home owners could utilise either cold water, or already heated, stored hot water, rather than heating additional water, especially as that hot water component is being heated with more expensive 'peak rate' electricity than a normal hot water service uses. This is especially the case for homes with a solar HWS.

Tempering valves are also a relatively cost effective refit item and could be added at time of purchase of a new dishwasher, provided governments *regulated* this measure, and prohibited installation other than by a licensed plumber.

The necessity for a licensed plumber to install a *replacement* dishwasher would thus, eventually, see the installation of tempering valves in all homes fitted with a dishwasher.

Government regulation of both manufacture and installation of dishwashers would be necessary, but the potential for savings in this area is considerable.

Providing hot water to the dishwasher from already heated, stored hot water – especially if from a solar hot water system – could save each household up to 456kWh in energy per annum, a saving of almost $90, or 0.4 tonnes CO^2.

If only 2/3 of Australian homes conformed this measure alone could save 2.05 million tonnes CO^2–e nationally.[1]

Ducted air-conditioners

Great strides have been made with the efficiency of ducted air conditioning compressors in recent years, but all of these advances need to be viewed against industry wide practices which largely negate these gains.

There are three major problems with most of the installations done in this country:

- The inabiity to provide adequate physical zoning
- The lack of adequate electronic zoning
- The poor standard of included features making ducted A/C inherently inefficient

Physical Zoning
Firstly, there are the generally poorly conceived physical zonings in most homes constructed in the last 20-30 years.

There is a fascination among the less educated and less aware general population for large open-plan living spaces, often with multiple living spaces inter-connected by archways or openings which are unable to be physically 'zoned', or closed off, from each other.

This leads to unnecessary heating (or cooling) of large areas of the home, or at the very least, the inability to *prevent* unnecessary heating (or cooling) of these areas, even though they may not actually be in use.

Government needs to provide incentives for home designers and home owners to encourage the construction of homes which can be better zoned and better regulated for heating and cooling.

For example, archways separating discrete living areas should be required to have a means of closing them off from each other to enable physical (and electronic) zoning to maximise A/C energy efficiency. In other words, 'open plan' needs to be seriously limited either by multi-fold doors or glass screens, or by hangings like curtains or other screens.

This alone can save up to 50% of the energy consumption for heating in poorly designed homes. I lived in one, and that's how much I saved by retrofitting 'physical zoning'.

This is especially important for double-storey homes, as the stairwell tends to act like a chimney in winter, sucking all the hot air from downstairs up the stairwell and dissipating it,

[1] Based on 2400W heating element operating for 1/2hr daily; carbon savings based on 900g/kWh life cycle emissions; no. of homes from ABS 2005 Census; 60% of homes with dishwasher

causing the reverse-cycle heating to be run far more often and for longer than would otherwise be necessary were the heat prevented from escaping up the stairwell.

Often the kitchen overlooks the dining room, leads into the family room, which opens into the formal lounge, front hall and the hall to the bedrooms. Often, this can be 60% of the floor area of the home which must, necessarily, be heated or cooled at any one time because it cannot be prevented by physical zoning.

Adequate physical zoning could save each household 432kWh per winter or summer quarterly billing period, or around 860kWh per annum, a saving of almost $170, or almost 0.78 tonnes CO^2-e.

This could provide savings of 2.3 million tonnes CO^2-e nationally.

Electronic zoning

Most ducted A/C installs in this country are done 'down to a price' rather than 'up to a standard', as far as energy efficiency is concerned.

For example, in order to efficiently install and operate a ducted system in a two-storey house, the ducting to the lower floor must be installed during the initial construction phase as it is not cost-effective to retrofit ground floor ducting.

All two storey houses should have such ducting installed *during initial construction* whether A/C is being installed as part of the initial construction 'package' or not.

Some developers are beginning to specify this and convince buyers of the need, but to my knowledge it is not compulsory and it should be. Otherwise, when home-owners subsequently seek to install such appliances it is not possible to install them for maximum energy efficiency, never mind minimal cost.

But ducting, and the electronic zoning which it enables, needs to be installed appropriately, and this is definitely *not* happening in the relatively unregulated Australian market. Systems are being installed based on 'lowest supplied price' rather than 'most efficient installation' basis.

Currently, Supplier A knows that, in order to put food on *his* family's table, he needs to sell a system. Supplier B is in the same boat, as is Supplier C. In order to ensure a sale, suppliers invariably minimise the range, quantity and quality of fittings, ducts, and controllers, in order to minimise the bottom line on the quote, and thus compete with their fellow suppliers.

Home purchasers, being almost invariably economically stretched, inevitably choose the lowest or next to lowest cost quoted. Ergo, they get an inherently inefficient system they are lumbered with for the life of the appliance, or even the life of the home.

As for the physical zoning, electronic zoning needs to be able to separate each living area of the house.

The 'simplified system' that most households finish up with, based on the 'lowest cost option', often utilises inherently inefficient installation methodologies.

These methods include:
- provision of a single return duct for the entire home
- ceiling ducts which cannot be manually closed/opened easily
- motor unit sized for the entire floor area of the home

The return duct

Most homes I assess only have a single return duct, which makes for an inherently inefficient system. I have assessed more than 2000 homes, in both city and regional locations, and only two did not have such inherently inefficient installations.

Why is a single return duct inherently inefficient?

It's simple. In order for 'zoning' to work and make the A/C unit as efficient as possible, already cooled air should be recirculated to the A/C unit.

Just like in your car. You must select the 'Recirculate' setting in order for the A/C to work most effectively – and efficiently. If you set the controls to 'Fresh' air supply the poor A/C unit has to constantly struggle to cool warmer air from *outside* the car.

In almost every double-storey house I've assessed – virtually *all* have the single return duct in the ceiling of the upstairs corridor – which in summer is the hottest part of the house.

Effectively, the A/C unit is made to work like the unit in your car set on 'Fresh', with the A/C unit having to constantly cool *warm* air.

So if the home owner wants to cool downstairs *only*, (the most commonly used living areas), the A/C unit draws air from the *hotter* upstairs corridor, rather than from the - already cooler - downstairs living areas. And winter heating works the same, as the upstairs corridor air will be colder than the already warmed air downstairs.

This principle also applies to single-story homes, in which the return duct is *either* in one zone or another, so whenever the area without the return duct is heated or cooled, it acts less efficiently, and as the return duct is often in a corridor away from the main living areas, this is most of the time.

Compare this scenario with split systems, in which the wall-mounted head unit is *also* the return duct taking air only from the room in which it is installed, and which it is seeking to heat/cool. Such systems are inherently *much* more efficient.

Multi-head split-system units operating off a single compressor are both cheaper *and* more efficient, for both installation cost and energy efficiency, as householders only need to cool the space they are actually occupying, not the entire home.

Having an efficient compressor unit is NOT the whole story and can in fact mask the real inefficiencies of air-con installs.

Ceiling vents

An alternative energy saving methodology which would be more cost effective for many households is the provision of easily closed ceiling vents.

This would enable home occupiers to *close* the vents in unused rooms, therby reducing the *volume* of air the A/C unit needs to heat/cool, thereby reducing the motor run time and thus its *actual* energy consumption.

The most common form of ceiling vent fitted in recent years is a circular plastic vent with either a fixed opening or a threaded 'disc' which can be spun open or closed to regulate air flow rate into the room.

These are the cheapest duct available, hence what is most commonly fitted. Unfortunately, because closing or opening the duct requires standing on a chair or step-ladder, it is not able to be achieved easily, so is not performed.

Regulating *either* a more readily openable/closable duct, either manual or electric operation, would provide householders with the ability to better regulate their A/C usage.

Only if it is *mandated* will a level playing field be achieved, forcing all suppliers to quote on the same basis.

At least one supplier markets a square, metal duct with a louvred opening/closing mechanism operated from floor level by simply flicking a small lever. If the homeowner cannot reach this small lever while standing on the floor it can easily be reached with a wooden spoon or broom handle. Simple, quick, easy and therefore more likely to be utilised.

So legislating a *minimum provision* of ceiling vents with a closing mechanism that can be operated by a person standing on the floor would soon have suppliers seeking innovative technologies to provide this feature.

Efficient sizing of motor unit

Currently, suppliers advise homeowners to size the motor and compressor unit of the A/C unit to enable it to cool/heat the entire home.

At first glance, this would seem sensible. Should the householder wish to heat or cool the entire house, this would be possible even during extremes of temperature.

However, this ignores the fact that *most* homes never require this feature. Seldom do all zones in a multi-zone home need to be heated/cooled simultaneously.

Even in homes where two living areas are occupied, say for watching TV in the evenings, generally the other living areas: kitchen, dining, bedrooms, formal lounge, are probably *not* being used at the same time.

Fitting a compressor unit that would cope with the more usual *occupation patterns* would be inherently more energy efficient, as it would consume far less power than the much larger motor unit necessary to heat/cool the entire house.

Similar to multi-head split systems, such installations would only heat/cool the areas in which people actually are, rather than unnecessarily cooling/heating rooms with no-one in them.

And as a smaller motor unit would also be less expensive for the consumer to purchase, it is deemed that an *education* campaign is necessary to properly inform potential purchasers of the energy efficiency (and thus lower running cost) inherent in such installation.

Clothes dryers

There will always be the odd occasion, the emergency, when an item of clothing needs to be quickly dried to get the kids off to school or Mum off to work. In my professional opinion, from an overall national energy efficiency perspective, this is the only time dryers should be used.

One area where cultural practices let householders down in this area is that, unlike Europe and America, we do not have a ‘drying room’ culture.

So let’s start one.

Provide a regulatory mechanism whereby a fully insulated 'drying room' (in which the hot water heater is located, perhaps) is given 'brownie points' for energy efficiency, as it effectively does away with the need for an energy-hungry clothes dryer.

Similarly, outdoor all-weather covered areas dedicated to hanging clothes to 'solar dry' could also earn 'brownie points' in the energy rating trade-off.

For example, making provision for a dryer would score negative points, while a drying room or undercover clothes line would score positive points.

And for the same reason, any strata management legislation that contains prohibitions on verandah mounted clothes airers or pull-out clothes lines should be repealed. New construction of apartments can be designed to have a better concealed area for such purposes provided for each lot, perhaps by partly walling in the balcony.

Eliminating unnecessary clothes dryer usage could save the average Australian household as much as 500kWh per annum, a cost saving of almost $100, or 0.45 tonnes CO^2.

This measure could save 2.7 million tonnes CO^2–e per annum nationally.

Declaration:

I submit that the above is wholly my own work and is based on a professional assessment of the energy efficiency issues facing the Residential Building sector.

Yours sincerely

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