Low Carbon Australia Submission to the Senate Select Committee on Electricity Prices – September 2012.

Introduction

Low Carbon Australia is pleased to contribute to the Senate Select Committee on Electricity Prices Inquiry.

About Low Carbon Australia

Low Carbon Australia Limited (LCAL) is a public company limited by guarantee formed by the Australian Government with initial funding of more than $100 million and the structure, mandate and capability to be a flexible vehicle for the delivery of finance and other programs aimed at preserving and enhancing the Australian natural environment.

LCAL is in many respects a 'pilot model' for the Clean Energy Finance Corporation (CEFC). LCAL operates a revolving fund for clean technology finance through its Energy Efficiency Program (EEP) - on a smaller scale (approximately $80m), and a narrower investment remit.

LCAL has been operating in the marketplace since early 2010 and its experience to date has focused on providing energy efficiency finance in the commercial and industrial sectors. As a small pilot fund, LCAL has taken the approach of co-investing in innovative financing with companies with significant customer reach. This is an effective means of demonstrating and catalysing change in the marketplace on a wider scale, achieving private sector financial leverage to realise greater total investment, greater capacity building of the marketplace and realising greater amounts of carbon savings than LCAL could achieve investing its small fund alone. LCAL has also used its funding to finance individual energy efficiency project proposals to provide demonstration projects.

Response to Issues in Committee's Terms of Reference

Low Carbon Australia's submission is structured by responding in order to each of the Committee's terms of reference as follows below.

A. Identification of the key causes of electricity price increases over recent years and those likely in the future

There is no single cause of electricity price rises. The recent paper by AGL's Paul Simshauser and Tim Nelson[1] identifies the drivers of increased energy process, which can be summarised as follows:

Generation Costs (estimated 36% of retail price)

1. Increased fuel prices driven by increased global demand for energy. Australia is an open export economy, and the key energy commodities of oil, liquefied natural gas, coal seam gas and coal are priced domestically according to global supply and demand (or at least, future supply and demand). As global demand

[1] Simshauser, Paul & Nelson, Tim (2012) 'The Energy Market Death Spiral – Rethinking Customer Hardship', AGL Applied Economic and Policy Research Working Paper No.31. Brisbane: AGL Limited available online at < http://www.aglblog.com.au/wp-content/uploads/2012/07/No-31-Death-Spiral1.pdf> .

increases, one can expect this to be reflected in domestic electricity prices, and that is in fact what we see.

2. The effect of the carbon price, although this is very much secondary to fuel costs.

Network Costs (estimated 46% of retail price)

3. The network infrastructure investment cycle. Australia is presently engaged in 'catch up' network investment to compensate for years of under-investment. Simshauser and Nelson describe a seeming economic 'pork cycle'[2] driven by a mismatch between investment geared to *anticipated* demand and the *actual* demand:
    a. initial over investment leading to a capacity glut,
    b. followed by an investment blackout,
    c. demand reaches and then overtakes supply,
    d. prompting another investment cycle to catch up.[3]
4. Within the network infrastructure investment cycle itself – Simshauser and Nelson identify three further drivers:
    a. Ageing infrastructure being replaced as it reaches the end of useful life (Simshauser and Nelson estimate about 1/3 of network costs – using their estimate of these accounting for 46% of the retail price this would alone equate to about 15% of the retail price of electricity)
    b. Meeting the RET and other GHG targets
    c. Costs of servicing peaking demand.

The Productivity Commission has identified the primary cost drivers post 1997-98 as

> *…(The) growing relative peak demand for electricity during summer which led to further capacity investment but which lowered average capacity utilisation; a shift to higher cost underground electricity cabling; and a move away from large coal-fired power stations towards generally higher cost gas-fired power and renewable energy sources. In more recent years, a cyclical pattern of investment associated with replacing ageing network infrastructure assets may have added further (albeit temporary) downward pressure*.[4]

In addition to these costs, there is another network cost which is specific to and embedded in Australia's settlement patterns – as Pierce (2012) rightly points out:

> *A primary physical characteristic which has shaped the NEM is the narrow but dispersed distribution of load and generation centres along the east coast of Australia…. To serve such a widely distributed load, the NEM incorporates over 750,000 kms of distribution and 40,000 kms of transmission infrastructure. As a comparison, in the United Kingdom there are around 800,000 kms of distribution and 25,000 kms of transmission infrastructure serving a population which is more than three times that served by the NEM.*[5]

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[2] E.g. Stearns, Larry D. & Petry, Timothy A. (1996) *Hog Market Cycles*. Fargo: North Dakota State University available online at http://www.ag.ndsu.edu/pubs/ansci/swine/ec1101w.htm#future .

[3] Note that these cycles of underinvestment swinging to oversupply do not appear to be a new phenomenon – such a cycle is also described in a similar in NSW in 1949 see Smith, Stewart (1997) *Electricity and Privatisation.* Sydney: NSW Parliamentary Library Research Service available online at <http://www.parliament.nsw.gov.au/prod/parlment/publications.nsf/0/1557AA00C61A7E39CA2575F200225A78/$File/Elect&Priv.pdf> .

[4] Topp, Vernon & Kulys, Tony (2012) *Productivity in Electricity, Gas and Water: Measurement and Interpretation.* Canberra: Productivity Commission. Available online at <http://www.pc.gov.au/research/staff-working/electricity-gas-water> .

[5] Pierce, John (2012) *The Australian National Electricity Market: Choosing a New Future* (Conference Paper presented to the World Energy Forum 13-16 May 2012). Australian Energy Market Commission.

B. Legislative and regulatory arrangements and drivers in relation to network transmission and distribution investment decision making and the consequent impacts on electricity bills, and on the long term interests of consumers

Electricity supply and generation in Australia has long been dominated by government, originally at the local municipal level, before becoming under the central control of the states.[6] The National Electricity Market is partially de-regulated. While the wholesale trading of electricity through the NEM itself occurs fairly efficiently, network standards are regulated to protect the general community interest in continuity of supply, and the downstream retail market is regulated by state based regimes of fixed pricing.

As a regulated commodity, legislative and regulatory drivers are prime influencers on investment decision making and consequently on electricity bills. The most direct way in which a regulatory/legislative arrangement can impact investment decision making and electricity bills is by direct price control of the tariff. For example, at the more interventionist end of the spectrum, the Queensland State Government has recently frozen the tariff via passage of the *Treasury (Cost of Living and Other Legislation Amendment) Act 2012*. By contrast, at the least interventionist end of the spectrum the Victorian State Government has entirely deregulated retail pricing.[7]

However, there are a myriad of other ways in which transmission and distribution systems investment decision making can be influenced, for example through various NEM Rules established by the regulator. What is perhaps more important than the "what" of identification of each specific legislative and regulatory arrangement and how each individual levers investment decision making (and consequent downstream price impacts) is the "why" – as Ben-David (2012) states:

> *Markets and competition are much better equipped than bureaucrats, technocrats and the well-intended, when it comes to satisfying customers' needs and expectations. Nevertheless, regulatory frameworks must be encouraged to evolve so that they continue to reflect the deep economic realities of the underlying market. While the regulatory framework must be consistent with that market reality, it must also strive to realise greater possibilities. It is the unending role of the regulatory framework to promote the maximum competition possible, but no more.*

As was cited in Topp & Kulys (2012):

> *An efficient national transmission system requires improved locational signals to generators, better efficiency incentives for Transmission Network Service Providers (TNSPs), and proper national planning, coordination and system integration for national, market-wide grid development.*[8]

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[6] Smith, Stewart (1997) *Electricity and Privatisation.* Sydney: NSW Parliamentary Library Research Service available online at <http://www.parliament.nsw.gov.au/prod/parlment/publications.nsf/0/1557AA00C61A7E39CA2575F200225A78/$File/Elect&Priv.pdf> .

[7] Ben-David, Ron (2012) *Retail Energy markets: A case for Economics Redux,* paper presented to the Consumer Utility Advocacy Centre 7 March 2012. Melbourne: Essential Services Commission. Available online at < http://www.esc.vic.gov.au/getattachment/757a7111-1912-4575-a4db-335b95242b16/Retail-Energy-markets-A-case-for-economic-redux.pdf> .

[8] Topp, Vernon & Kulys, Tony (2012) *Productivity in Electricity, Gas and Water: Measurement and Interpretation.* Canberra: Productivity Commission, at p63. Available online at <http://www.pc.gov.au/research/staff-working/electricity-gas-water> .

C. Options to reduce peak demand and improve the productivity of the national electricity system

It is well documented that peak demand in Australia is essentially driven by the increasing penetration and use of household appliances, in particular air conditioners.[9] The cost of air-conditioners has declined (originally through tariff reductions and later through the rise of Chinese manufacturing and manufacturer competition) promoting their widespread installation which has resulted in externalities in the form of rising costs to the network and the community as a whole.

The Australian Government (through COAG in conjunction with the States, territories and New Zealand) has responded taken a stride in this direction through introduction of the *Greenhouse and Energy Minimum Standards Bill 2012* into the Parliament.

Specifying mandatory product efficiency standards for air-conditioners (but also for dishwashers and the like) is certainly one way that government can reduce the community-wide impact of an individual appliance installation.

Even within multiple unit dwellings, the air-conditioning solution is typically adopted household by household, unit by unit. This adds to the ratio of soft costs (i.e. installation) to capital equipment (i.e. the air conditioner) and also drives overall expense.

Low Carbon Australia is well acquainted with this type of challenge. While LCAL's current Energy Efficiency Program does not operate in the general residential sector, the company has been involved in financing the retrofit of commercial buildings for energy efficiency, typically through upgrading lighting and Heating Ventilation and Air-Conditioning (HVAC) systems.

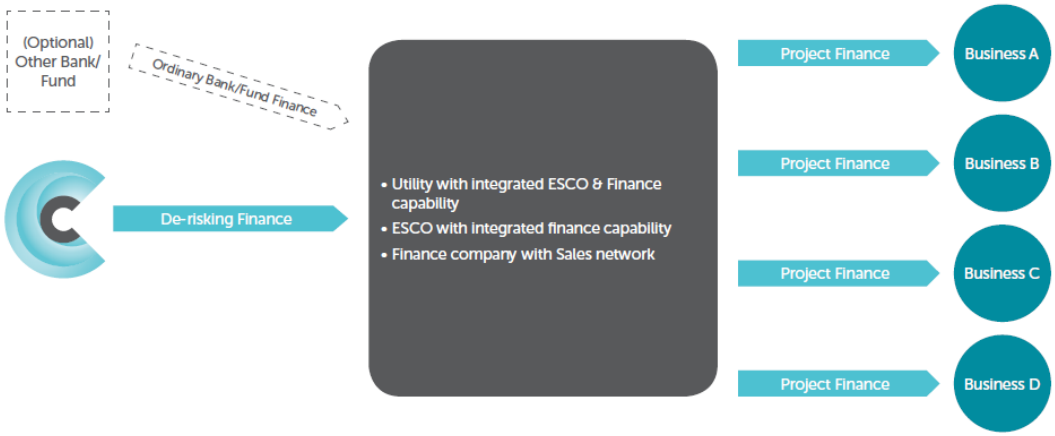
In Low Carbon Australia's view there are two other measures that could assist in relief of peak demand:

- Firstly, an opportunity exists in multiple unit dwellings, hotels and the like to replace individual air-conditioners and consolidate to more efficient provision of HVAC , either within the building (e.g. by body corporate) or, in very high-density residential areas, 'district' or 'precinct' cooling. Producing chilled air at scale can potentially realise the economies of scale, and the cost, energy and carbon savings that come with it – driving down cost to households and relieving peak demand.
- Providing non-grant, finance-driven incentive to slowly build a equipment finance/vendor/installer capability to service the stronger retrofit opportunity in households. Low Carbon Australia has established similar products to service the commercial sector and generic descriptions of these models of 'demand aggregation' are illustrated overleaf.

[9] No.8 above at ch4.

Generic Demand Aggregation Model #1, showing flows of finance to the end project.

This requires an entity with the capability to deliver finance (signified by the grey rectangle in centre) to the end user (Businesses A-D). These arrangements allow for more efficient servicing but are more complex to establish.

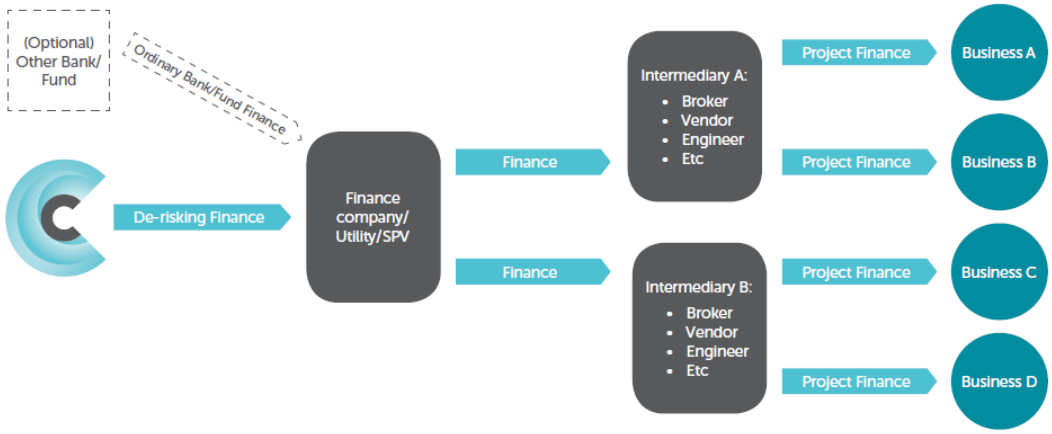


Issues in the Australian market:
- Retail utilities typically do not have an integrated finance and ESCO capability
- Australian ESCOs typically do not carry integrated finance
- Finance companies have little experience in selling EE and carbon abatement products

NB: ESCO* Energy Services Company

Generic Demand Aggregation Model #2, showing flows of finance to the end project..

Here the central financier (signified by the grey rectangle in centre) uses intermediaries in the market (Intermediaries A and B) for outreach to the end user (Businesses A-D). As per the above, these arrangements allow for more efficient servicing but are more complex to establish.



Issues in the Australian market:
- Requires existing networks
- Requires accreditation process for intermediaries
- Requires time

It is doubtful that the private sector will find sufficient return to develop and implement either of these initiatives alone.

Overseas experience

'Green Deal'
Some examples from elsewhere include in the UK where in early 2010 the UK government launched the 'Warm homes, greener homes' initiative, eventually the 'Green Deal' which includes a Pay as You Save model (PAYS). The Green Deal financial mechanism eliminates the need to pay upfront for energy efficiency measures and instead provides reassurances that the cost of the measures should be covered by savings on the electricity bill.

Property Assessed Clean Energy (PACE) Programs
In the United States, many states and municipalities have schemes whereby efficiency improvements can be financed from contractual assessments on existing properties (i.e. property taxes). Cities and municipalities can finance projects by issuing a bond - or raising funds through other means - to pay for initial installation costs with repayment made through tax rolls. City and municipal agencies, in cooperation with local utilities, can work to formally integrate property tax-based and other contractual assessments as a financing option under any public, private, and utility EE programs. Property Assessed Clean Energy (PACE) Programs finance energy efficiency upgrades through long-term loans that are repaid via an annual property tax assessment. Loans under PACE programs are secured by placing an additional lien on a property that is senior to the existing mortgage debt. PACE financing programs are particularly well suited for residential energy efficiency projects but are also applicable to commercial facilities.

PACE programs must also address and overcome concerns banks and other finance providers who are first mortgage holders regarding the placement of a priority tax lien on a property.

On bill financing
On-bill finance is a feature of many US state program, with utilities in California, Connecticut, Rhode Island, Massachusetts, and other states having offered different variations for more than 10 years. The energy utility offers its customers an unsecured loan that covers 100% of EE equipment and installation costs. The customer then pays the loan via an on-the-bill financing surcharge that is added on to the regular energy bill. Energy savings realized from the EE project typically equal or exceed the monthly OBF loan repayment obligation.

Loan repayment terms are individually structured for each project such that the customer can achieve bill neutrality. Upon any potential transferring of ownership of the property or closing of utility account, the customer must pay off the remaining balance on the OBF loan.

While this financing tool offers a comprehensive solution, its broad-based adoption may be constrained since utilities may be reluctant to perform what are considered traditional banking functions for customers and may be reluctant to take on any risks associated with making loans to customers using their own capital or ratepayer funds. Utilities may require short repayment periods, which can make comprehensive EE retrofits challenging.

Australian experience

Environmental Upgrade Agreements (EUAs)

EUAs are similar to PACE financing. Environmental Upgrade Agreements are an innovative way of financing environmental upgrades in commercial buildings. They are a tri-partite agreement between a building owner, local council and financier. Under the

terms of an EUA, the building owner is advanced funds for the upgrade by the financier in exchange for having a new council charge, an Environmental Upgrade Charge (EUC) levied on the building by the local council. The council then collects this charge and passes it back to the financier.

The City of Melbourne was the first jurisdiction in Australia to make available EUAs as part of its 1200 Buildings Program and legislation was also enacted in NSW to enable EUAs to be implemented across all NSW local Councils. City of Sydney, Parramatta, North Sydney, Newcastle and Wollongong are in train to implement or investigating introduction of EUAs during 2012-2013. The South Australian Government has completed public consultations and has announced that it will take steps towards the introduction of EUAs in that state.

Growing interest in this new form of EUA financing centres on how it can be used to improve the overall value and positioning of buildings – therefore making it an attractive alternative finance option for building owners seeking to upgrade their portfolio in Melbourne and NSW.

The benefits of EUA financing include:
☐ longer terms (up to 10 years), amortising
☐ improved financial performance vs. debt or equity
☐ if ownership of land transfers, the EUA transfers with the land
☐ finance is repaid via property rates / charge collected by council
Low Carbon Australia presently has an Environmental Upgrade Agreement product with NAB and Eureka Funds Management, however availability to residential households is limited (both under the EUA legislation and under the terms of LCAL funding) to multiple unit dwellings (dependent on the specific jurisdiction).

On–Bill Finance

Low Carbon Australia presently offers an On-Bill financing product through Origin. When origin is the energy retiaer for the site where energy conservation measures are being installed, charges for the works can be included as a line item on the energy bill. Subjetc to the type of energy conservation measures installed, Origin aims to structure the cost of repayments so they are offset by the energy savings, potentially delivering cost neutral or positive returns. By terms of its funding mandate the Low Crabon Australia/Origin Energy On-Bill Finance product is not presently available to residential households generally.

Conclusion

In LCAL's view implementing such initiatives require intervention from government at various levels – this can include:

- NEM rules to provide further incentive for network owners to strategically manage demand growth, for example creating incentives to help them identify and target areas where they could offer users low-or-no-cost appliance upgrades on the basis of reaping the efficiency benefit.
- Enacting legislation at State level such as the Environmental Upgrade Agreements legislation in City of Melbourne and NSW, which allows local councils to offer a form of statutory finance for environmental upgrades.
- Removing rigidities in strata-title legislation to make it easier for residents to agree (for example on a two-thirds majority basis) to participate in an energy efficiency scheme.
- The establishment of a program similar to LCAL's Energy Efficiency Program directed to households.
- Effective planning schemes by local and State government that integrate energy demand planning.

D. Investigation of mechanisms that could assist households and business to reduce their energy costs

i. The identification of practical low cost energy efficiency opportunities to assist low income earners reduce their electricity costs

Costs related to behavioural aspects and appliances use

If the GEMS Bill achieves passage presumably the minimum efficiency standards of the nation's appliances stock will gradually rise through time as products reach the end of their useful life and are replaced.

Government (at whatever level) can always continue to educate the community through behavioural campaigns (such as subsidising councils and community organisations to teach householders in their own homes about energy use) and advertising campaigns directed at water and energy conservation.

Costs related to Housing and fixed equipment

The difficulty in assisting low income earners to reduce their fixed equipment and housing energy costs is threefold:

- Almost by definition they have no access to capital
- Typically they do not own the property in which they reside – the landlord tenant split incentive is present (landlord owns inefficient equipment but as tenant pays energy bills there is no economic incentive to upgrade)
- They are the group that is least likely to have the required information or the knowledge of how and where to access the information.

Low Carbon Australia has not performed any detailed investigation of this area but it seems that the key to unlocking the energy savings for this sector lies in getting the landlord to upgrade the inefficient capital equipment. Landlords are most likely to be either:

- State and Territory Government Housing Commissions,
- Private landlords, or
- Caravan park and demountable village owners.

Housing Commissions

The State and Territory Housing Commissions can presumably fund their own retrofit program through each jurisdiction's central budgeting process. Each jurisdiction should be encouraged to ensure their housing stock and equipment fixtures are energy efficient, noting that the tenants would receive the benefit.

Private Landlords

At present there is little incentive for a landlord to undertake energy efficient action out of cashflow or debt, because the tenant will typically reap the energy savings and (unlike commercial tenancies where 'green' tenancies attract a premium) the value of capital improvement on the property may be marginal or negligible. The Green Deal from the UK and the Property Assessed Clean Energy (PACE) and On bill financing Programs all provide good examples of ways in which issues impeding investment in energy efficiency, including the so-called "split incentive" can be addressed.

A good portion of this sector is comprised of medium and higher density housing. Much of the medium and high density housing is comprised of buildings held in a scheme of group or community title (e.g. body corporates). As most government schemes are directed at households, this leaves substantial emissions reduction opportunity in building common areas, for example, common lighting; elevators; water use, capture

and storage; water heaters and boilers (including solar), solar generation filters, pumps and heating for pool, spa and sauna areas; and heating ventilation and air-conditioning (HVAC) systems. EUA finance is well suited to this upgrading these type of facilities (particularly if the repayments can be matched to energy savings) as the debt is secured against the property.

Caravan parks/Demountable villages

There may be opportunities to centralise generation but the economics will depend on the size of the facility, where ownership of the van/demountable lies, whether the landlord offers accommodation inclusive of energy utility costs or whether these are metered and passed through to individual site level etc. The ownership/investment/ benefit split may accordingly be split two or three ways even within a single park. These difficulties would make the area marginal at best so it is unlikely that the private sector will be able to overcome these difficulties and it is an area of complexity that is beyond LCAL's present expertise and capacity. In reality a program of direct intervention by the state or NGOs may be the only way of reducing costs for households in this sector.

ii. The opportunities for improved customer advocacy and representation arrangements bringing together current diffuse consumer representation around the country

LCAL has no specific comment in this regard.

iii. The opportunities and possible mechanisms for the wider adoption of technologies to provide consumers with greater information to assist in managing their energy use

There is a strong desire among consumers to have the tools to monitor and manage their own consumption – it is for this reason that banks, ISPs and mobile phone companies et cetera have invested millions in modernising billing platforms and customer interface. This allows marketing differentiation, better intelligence on consumer preferences and further product development in response to customer demand.

There is an inherent difficulty in monitoring energy use where there is no access to real time information and tools such that would allow customers to control their costs, for example:

- by alerting the consumer to a deviation in usage patterns, or to an approach or crossing of a pre-set energy consumption or energy cost threshold
- modelling the cost effect of different usage scenarios
- undertaking product comparison.

There is no doubt that a range of technologies are already available – such as smart metering – which could be further rolled out to enable households to better take control of their energy use. As an example there are software products readily available in the commercial building sector to enable remote monitoring and control of building systems and it is only a matter of time before these applications are made available to the householder as an app device on mobile phone etc, through internet account access to utility accounts where billing platforms allow it.

Another example would be planning requirements for internet enabled smart metering to new developments and housing estates, and a subsidised offer either to the householder or the utility to encourage installation in existing areas. Smart metering accompanied by Time of use billing has proven effective in demand management programs in the US and other countries.

iv. The adequacy of current consumer information, choice, and protection measures, including the benefits to consumers and industry of uniform adoption of the National Energy Customer Framework

LCAL has no specific comment in this regard.

v. The arrangements to support and assist low income and vulnerable consumers with electricity pricing, in particular relating to the role and extent of dividend redistribution from electricity infrastructure

At one level, it is a general rule of business that equity holders are entitled to expect returns from their business enterprises, otherwise these should be constructed as not-for-profits.

LCAL has no further specific comment in this regard.

vi. The arrangements for network businesses to assist their customers to save energy and reduce peak demand as a more cost effective alternative to network infrastructure spending

LCAL has commented in this regard at C. above.

vii. The improved reporting by electricity businesses of their performance in assisting customers to save energy and reduce bills

See comments at D. iii) above. LCAL does not wish to comment further on this aspect other than to state that it is aware that there is a significant divergence in the capability of the billing platforms of utility companies, with many still operating legacy systems or in the process of upgrading their systems (accordingly this goal may be relatively easy for some companies to achieve, while for others it may involve significant overhaul of billing platform and associated IT infrastructure).

E. Investigation of opportunities and barriers to the wider deployment of new and innovative technologies, including:
i.direct load control and pricing incentives,
ii.storage technology,
iii.energy efficiency, and
iv.distributed clean and renewable energy generation.

General Business impediments

Financial difficulties generally associated with financing otherwise cost effective energy efficiency and greenhouse gas abatement are as follows:

- *Term:* Many clean energy technologies have payback periods in excess of typical corporate funding finance terms (3 to 5 years) or internal capital allocation hurdles which require rates of return commensurate with 3 to 5 year paybacks.
- *Availability of funds:* Availability of funds for energy efficiency projects are not primarily driven by the technology type but rather by the credit position of the building or industry corporation and the finance market environment.
- *There are other priorities for capital*: Capital may well be available for investment but competing investment needs can displace clean technology investment as a priority.
- *Complexity and internal decision making* adds to time delays.
- *Transactional cost may be too high* for some businesses.
- *Construction requires long project lead-times* which in turn requires patient capital.
- *Availability of grant funding* places a dampener on demand for loan products.
- *Immaturity of the clean technology market* means there is inherent capacity constraints in terms of both skill and ability to successfully manage projects though to conclusion.

In addition, generally many businesses are afraid (whether rationally or not) to change the way they do things. Changing equipment for energy efficiency may be something that they are unfamiliar with, or may pose an implementation or operational risk. Thinking about fixed equipment like lighting and HVAC systems as replaceable, upgradeable and not essential to own (in the same way that they lease photocopiers, vehicles or IT equipment) is a conceptual bridge that many businesses are afraid to cross, for example because it is hard to determine the residual value of this type of second hand equipment as there is no mature secondary market for these assets.

Industry

Since the GFC, Australian Industry has been buffeted by:

- Fluctuating commodity prices
- Rising energy costs
- An unusually strong Australian dollar for a sustained period
- Wage pressures
- Falling productivity
- Falling overseas demand
- Increased competition from imported product
- Consequent falling margins.

Many of these difficulties are interlinked, but in Low Carbon Australia's experience the effect is the same – industry is hurting. Low Carbon Australia has been working with many businesses to help them reduce their carbon liability or to take advantage of the DIISRTE Clean Technology Investment Program grants. As a consequence, Low Carbon Australia has had the opportunity of reviewing the financials of a broad cross section of industries from SMEs to large companies. In Low Carbon Australia's experience (and outside of mining, oil gas and related sectors), much of industry has been doing it tough for two or three years in succession and is extremely thinly capitalised at present. High debt, falling sales and thin capitalisation are not conducive to finance at the best of times. Deployment of energy efficiency and greenhouse gas abating technology is no exception to this rule.

Commercial Buildings

Property value is key to most financial decisions around building upgrades in the property sector. It is important because broadly speaking recent years have seen property values decline in Australian markets across the residential, office, retail, industrial and tourist accommodation sectors.[10] While fundamentals of most sectors continue to improve, investors and financiers remain extremely cautious and sensitive to international developments.[11]

This is for four main reasons:

- Most property owners are going to need to finance the upgrade and the value of the property is going to come into play against the value of the finance when the financier looks to secure finance against the asset.
- Owners are not likely to sink funds into depreciating assets.
- Property investors who have financed their acquisition of the property through non-amortising loans (as is typical in the commercial property sector) may be pouring spare equity into the property to maintain loan-to-valuation ratios and covenants.

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[10] ANZ Research (2011) *Australian Property Outlook / 13 December 2011.* Melbourne: ANZ available online at http://www.anz.com/resources/b/4/b4a8208049796e70ab9bfbfc8cff90cd/Australian-Property-Outlook-December-2011.pdf?CACHEID=b4a8208049796e70ab9bfbfc8cff90cd accessed 6 July 2012.

[11] Ibid.

- Demand is susceptible to general economic conditions: companies are generally risk averse when considering investment in new capital projects that are non-core business.

Apart from access to finance, the two main barriers to adoption of energy efficient measures within the built environment commercial sector are the information barrier and the principal-agent barrier. The principal-agent barrier relates to a disconnect between who chooses the technology and who pays the ongoing costs – this is explained in the diagram below:[12]

	Principal chooses technology	Agent chooses technology
Principal pays the energy bill	**1:** The principals select the energy-using equipment and pay the energy bill. They have an incentive to select efficient equipment and lower their energy use. There is no principal–agent problem.	**2:** The agents select equipment on behalf of the principals, and the principals pay the energy bill. As a result, the agents may not have an incentive to select efficient equipment. This type of relationship occurs between landlords and tenants.
Agent pays the energy bill	**3:** The principals select the equipment, but do not pay for the energy bill. As a result the principals have no incentive to select efficient equipment or lower their energy use. For example, staff select company cars but do not pay ongoing fuel costs.	**4:** The agents select the equipment on behalf of the principals, and pay the energy bill. As a result, the agents have an incentive to select efficient equipment, but the principals do not have an incentive to lower their energy use. This occurs in hotels.

In property, the principal-agent relationship manifests as the landlord (agent)– tenant (principal) or owner (agent) /occupier (principal) split incentive.

The information barrier relates to a lack of easy access to adequate information on performance. The efficient adoption of established technologies and practices requires individuals to know:
• the options available
• the approximate costs and benefits of the different options
• how to deploy the options (including hiring experts)
• the cost of investigating the options. Some of this is caused by market failure.

Often these barriers are interlinked, with the effect of strong disincentive to act.

Residential Property

In relation to investment properties, the barriers to uptake in the residential property sector are similar to those in the Commercial property sector above. Particular characteristics are also examined at D.i) above.

Distributed clean and renewable energy generation

[12] Reproduced Table 17.1 from Garnaut, R (2008) *The Garnaut Climate Change Review: Final Report.* Port Melbourne: Cambridge University Press at p414 citing IEA (2007) *Mind the Gap: Quantifying principal–agent problems in energy efficiency*. Paris: International Energy Agency. © Commonwealth of Australia 2008.

Low Carbon Australia confines the following comments to non-solar distributed generation (e.g. gas fired or bio-gas fired generation, co-generation and tri-generation).

Australian industry is showing particular interest in reducing carbon liability and exposure to electricity price increases through capture and combustion of waste bio-gas for energy. This is particularly the case in intensive livestock production and processing (e.g. piggeries and abattoirs) where significant waste can be converted to fuel stock. The barriers to in-business adoption of this technology are again the general barriers and industry barriers discussed above.

District tri-generation and cogeneration involves construction of gas fired generators scaled at a size to deliver a specific power output (Megawatts) as well as providing buildings and industries with heat and cooling. The proposed City of Sydney tri-generation projects involve a multitude of gas fired generators (330MW total) at zoned sites to supply electricity to neighbouring buildings via connections to the electricity grid. Projects such as this require significant co-operation and support by State and Local government, business, residents and network owners, and wherever possible legislative impediments to the adoption of such co-operative schemes ought to be removed or streamlined.

Key to the commerciality of much distributed generation is the securing of a power purchase agreement to allow the ability to export electricity to the grid. There are legitimate issues of network owners in regards ensuring that feed-in does not in fact damage the grid, but apart from this the issue is of ease of access in order to promote competition.

F. Any related matter.

Low Carbon Australia has no additional comments to make.