

**REVIEW OF THE NABERS RULING:
‘PROPORTIONING OF ENERGY USED BY COGENERATION AND
TRIGENERATION SYSTEMS’**

SUBMISSION

1. EXECUTIVE SUMMARY

The City does not support a moratorium on precinct scale decentralised energy trigeneration or cogeneration systems whilst an industry/government accreditation standard is created. This would take time, may never happen and would leave poorly performing stand alone small scale cogeneration and trigeneration systems in stand alone buildings with a higher NABERS rating than the much better performing precinct scale trigeneration systems with much higher energy efficiency and carbon abatement.

The existing July 2010 NABERS ruling on precinct scale trigeneration systems allowing for the accounting of both low carbon electricity and zero carbon thermal energy imported into a building from a precinct trigeneration energy centre must be retained until an industry/government accreditation standard has been created.

Other countries are able to proportion electricity and thermal energy from precinct, district energy or community energy scale cogeneration and trigeneration systems in their equivalent to NABERS ratings such as the Standard Assessment Procedure or SAP ratings in the UK Building Regulations Part L2A and associated Compliance Guide¹.

To do otherwise would undermine the efficacy of a NABERS rating applying a higher NABERS rating to a small scale stand alone cogeneration or trigeneration system with much lower energy efficiency and carbon abatement attributes than a large scale precinct scale trigeneration system.

Such a perverse NABERS ruling would also conflict with Australian Government’s carbon pricing mechanism and targets to reduce greenhouse gas emissions.

As regards reporting the amount of low emissions electricity (light or dark ‘Green Power’) in future NABERS Energy Rating Certificates and accompanying Rating Reports NABERS would be better to adopt two ratings in the NABERS ratings – one for energy consumption and one for the emissions for that energy consumption as they report in the UK.

¹ UK Department of Communities and Local Government ‘Non-Domestic Heating, Cooling and Ventilation Compliance Guide 2006 http://www.planningportal.gov.uk/uploads/br/BR_PDF_PTL_NONDOMHEAT.pdf
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3. BACKGROUND

The July 2010 NABERS ruling does not restrict cogeneration or trigeneration to single buildings with multiple tenants or even private district generation systems. The term 'private' is not even used in the July 2010 ruling so it is not known what is meant by this term. The July 2010 ruling even defines a district generation system and sets out the minimum metering requirements for accounting for supplying the generated electricity to external third party clients subject to a NABERS rating over the 'grid'.

Question 1 – Potential double counting of emissions and corresponding double benefit under NABERS when the co/trigenerated electricity is delivered via the grid?

There is no potential double counting of emissions, real or otherwise, with the precinct scale trigeneration systems proposed by the City of Sydney. There is no mention at all of distributed generation being accounted for in the National Greenhouse Accounts (NGA) Factors for the purchase of grid electricity by end users. Indeed, distributed generation below 30MWe is exempt and not dispatched to the National Electricity Market. Approved distributed generation above 30MWe can also be non-dispatched to the National Electricity Market. Although the City's proposed trigeneration network may be 360MWe or more, trigeneration will be built in 4MWe modules, well below the 30MWe exempt limit.

The only way that distributed generation - cogeneration and trigeneration is accounted for in the NGA Factors is in the emission factors for natural gas distributed in a pipeline. This is no different to the scenario for small scale stand alone cogeneration and trigeneration in stand alone buildings. Therefore, the low carbon emission factor for electricity generated by precinct scale cogeneration or trigeneration is not the same as the purchase of grid electricity by end users since the former is approximately 50% less carbon intensive than grid electricity and should be taken into account in the NABERS rating as per the July 2010 ruling.

It is believed that the principle reason for misunderstanding the 'double counting' issue for precinct scale or district generation systems is the use of the term 'the grid'. The grid is the transmission grid on which the National Electricity Market and the associated NGA Factors are based. Buildings in cities are connected to the distribution network and generation connected to the distribution network is distributed generation or decentralised energy. This is very different to large scale renewable energy connected to the transmission grid which forms part of the National Electricity Market and the NGA Factors for purchased grid electricity by end users.

The only issue for precinct scale or district generation systems to be considered is the import and export metering which NABERS set out in their original July 2010 ruling and the ability to trade the low carbon electricity

between meters such as the *CogentPower* trading system that will be used for the City's trigeneration system.

Question 2 - How should on-site energy generation be treated within a NABERS rating?

The final consumption of electricity and thermal energy generated by on-site generation should be accounted for in the NABERS rating after the consumption of the on-site generation auxiliaries. Auxiliaries will include electricity consumed by heating and cooling circulating pumps, etc, offset by any displaced electricity that would have otherwise been used by a heating and cooling system before the application of on-site generation.

Question 3 – How should useable energy generated by co/trigeneration systems and exported off-site be treated within a NABERS Energy rating?

Electricity exported off-site should be matched between the trigeneration energy centre or district generation export meter and the import meters of the third party buildings taking electricity from the trigeneration energy or district generation centre. Auxiliaries such as the electricity consumption of the thermal reticulation network circulating pumps should form part of the electricity consumption of the energy centre. In other words, the export meter must register useable electricity exported off-site after the auxiliary electricity consumption.

The emission factor for the useable exported electricity consumed by third party buildings in the NABERS rating should be based on the NGA Factor for natural gas distributed in a pipeline taking account of the electrical efficiency of the gas engine. In other words, all of the gas consumed by the cogeneration or trigeneration engine must be accounted for in the emission factor for the exported electricity.

Any surplus electricity not matched by the electricity consumption registered by third party building meters should be outside of any NABERS rating.

The emission factor for thermal energy (heating and/or cooling) consumed by third party buildings in the NABERS rating should be deemed to be zero carbon since this is waste heat as all of the emissions for the gas input to the cogeneration or trigeneration engine should be accounted for in the generated electricity emission factor, taking account of the electrical efficiency. Buildings will always be physically connected to the thermal reticulation network and metered so there will be no doubt about verifying the thermal energy consumption of buildings in the NABERS rating.

It would not be acceptable or indeed technically correct to assign any of the gas input emissions to the cogeneration or trigeneration recycled waste heat since thermal energy is zero carbon waste heat and can be used or not used (ie, rejected) whereas generated electricity under the laws of physics will

always be consumed whether by third party buildings and/or exported to the local public wires electricity distribution network.

To assign any of the electricity generation gas engine input emissions to the recycled waste heat would provide an inaccurate NABERS rating as it would apply an emission factor to the generated electricity that could never be guaranteed. Not only would this produce a false NABERS rating it would also become unmanageable by NABERS. See also answer to Issue 3.

Question 4 – How should low/zero emissions externally supplied to a building be treated in a NABERS Energy rating?

This depends on where the energy is generated. If it is a large scale renewable energy scheme connected to the transmission grid forming part of the National Electricity Market and therefore, already accounted for in the NGA Factor for the purchase of grid electricity by end users this should be treated as Green Power.

If it is distributed generation or decentralised renewable energy connected to the local electricity or gas distribution network outside the National Electricity Market and therefore, not accounted for in the NGA Factors it should be accounted for in the NABERS rating on the same conditions as precinct or district generation scale systems as set out in the answer to Question 3. This will be exempt generation, either below 30MWe or non-dispatched to the National Electricity Market.

Renewable electricity owned by the City will be exported to other buildings owned by the City utilising the same *CogentPower* trading system as trigeneration.

In some instances large scale cogeneration or trigeneration systems above 30MWe and dispatched to the National Electricity Market may supply thermal energy to buildings in precincts. In this case thermal energy only should be accounted for in the NABERS rating.

Question 5 – How should NABERS communicate the use of low/zero emissions electricity in a rating to assist industry in understanding both the environmental performance and energy efficiency of a building?

The use of low/zero emissions electricity should be communicated to industry as part of the NABERS star rating providing it meets the conditions as set out in the answers to Questions 3 and 4.

Industry can be further assisted in their understanding of qualifying precinct scale or city-wide district generation systems for NABERS rating purposes by providing a scheme of compliance or verification for:

1. New developments where precinct or district scale generation is to provide electricity and/or thermal energy from distributed generation or

- decentralised energy connected to the distribution network as part of its planning conditions or other development approval process such as the Dandenong trigeneration scheme; and/or
2. Existing development where precinct or district scale generation is to provide electricity and/or thermal energy from distributed generation or decentralised energy connected to the distribution network as part of a published or publicly exhibited plan such as the City's Decentralised Energy Master Plan – Trigeneration and the forthcoming Decentralised Energy Master Plan – Renewable Energy.

In addition, NABERS should be revised to provide both energy consumption and greenhouse gas emission ratings which overcome most if not all of the differences of opinion in the industry and provide a much better NABERS product for building owners and occupiers.

4. DEFINITIONS

The omitted definitions from the July 2010 ruling must be reinstated, together with any further definitions required to communicate with industry.

5. BASIC PRINCIPLES OF NABERS AND COMMERCIAL BUILDING DISCLOSURE PROGRAM

The Commercial Building Disclosure program should also be corrected to allow for precinct or district scale generation not dispatched to the National Electricity Market in its ratings in the same way as set out for NABERS in this submission. The Commercial Building Disclosure program should also be revised to include both energy consumption and greenhouse gas emission ratings as set out in the answer to Question 5.

6. REVIEW OF KEY ISSUES

Issue 1: Potential double counting of emissions and corresponding double benefit under NABERS when co/trigenerated electricity via the grid

As confirmed by the Department of Climate Change and Energy Efficiency who administer the NGA, NABERS current position and as set out in more detail in the City's submission there is no double counting of electricity generated by co/trigeneration (low emissions electricity) delivered to other buildings via the grid.

However, this could be better communicated to industry if NABERS did not refer to this as the grid but as the local distribution network.

Issue 2: How should on-site energy generation be treated within NABERS rating?

NABERS position on this issue is correct.

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Issue 3: How should useable energy generated by co/trigeneration systems and exported off-site be treated within a NABERS Energy rating?

NABERS position on this issue is not correct, particularly with regard to thermal energy. Allocating generation energy inputs to useable thermal energy exported off-site will lead to perverse and distorted outcomes.

As set out in the answer to Question 3 the recycled waste heat from local electricity generation that would otherwise be rejected into the atmosphere at remote centralised power stations that co/trigeneration is displacing is zero carbon.

Apportioning a share of the gas input to a gas fired co/trigeneration engine would just simply make gas fired electricity generation emissions appear lower than it actually is (and lower than gas fired centralised energy power stations with a like for like electrical efficiency) without any guaranteed commensurate proportionate apportionment/savings in emissions for thermal energy since thermal energy may or may not be used in its entirety whereas as under the laws of physics generated electricity will always be consumed and can always have an emission factor assigned to it.

For example, if a 4MWe co/trigeneration gas engine generates 4MW of electricity and 4MW of thermal energy and 50% of the input emissions (say 236kg CO₂ per MWh) were assigned 50:50 to each output this would have the effect of assigning 118kg CO₂ per MWh to electricity which will always be consumed and 118kg CO₂ per MWh to thermal energy which will not always be consumed. The co/trigeneration system may use 50% or none of the heat meaning that 59kg CO₂ per MWh or 118kg CO₂ per MWh would not be accounted for in a Building's NABERS rating and yet the full input emissions will still exist and unaccounted for.

This approach is technically incorrect, misses the point of co/trigeneration in recycling waste heat as a useable form of energy that would otherwise be wasted and would incentivise heat dumping by building owners or energy providers seeking to provide a false NABERS Energy rating.

Issue 4: How should low/zero emissions energy externally supplied to a building be treated in a NABERS rating?

NABERS position on this issue is incorrect, unhelpful and creates an unfair and unlevel playing field between competing technologies.

As stated in the answer to Question 3 electricity generated by exempt distributed generation below 30MWe or is not dispatched is not covered by the NGA Factor for the purchase of grid electricity by end users and so would provide an unfair and distorted outcome for this form of generation, particularly in relation to competing small scale stand alone co/trigeneration

for stand alone buildings which has a comparatively poor energy efficiency and carbon abatement compared to large scale precinct or district scale generation systems

There should not be a moratorium on precinct scale decentralised energy trigeneration or cogeneration systems and the existing NABERS ruling on precinct scale trigeneration systems allowing for the accounting of both low carbon electricity and zero carbon thermal energy imported into a building from a precinct trigeneration energy centre must be retained until an industry/government accreditation standard has been created.

Issue 5: How should NABERS communicate the use of low/zero emission electricity in a rating to assist industry in understanding both the environmental performance and energy efficiency of a building?

As set out in the answer to Question 5.

Allan Jones MBE
Chief Development Officer, Energy and Climate Change
23 August 2012