# ENERGY WHITE PAPER 2014 – ISSUES PAPER

**SUBMISSION TO DEPARTMENT OF INDUSTRY, AUSTRALIAN GOVERNMENT ON THE ENERGY WHITE PAPER 2014 – ISSUES PAPER**

**Request for Submissions**

This submission is made in response to Australian Government's request for submissions on the above Energy White Paper 2014 – Issues Paper.

## EXECUTIVE SUMMARY

The City, in principle, welcomes this Issues Paper and the issues that need to be addressed by the Energy White paper 2014. However, there is significant scope for Australia to take advantage of innovative alternative and emerging energy resources and technology developed in other advanced economies that would set Australia on a path of sustainable energy for the nation as well as sustainable energy exports.

## 1. THE ENERGY WHITE PAPER – TERMS OF REFERENCE AND PROCESS

The City agrees with the terms of reference of the Energy White Paper and makes its submission against these terms of reference. In connection with this the Australian Government should also work closely with local government, particularly major cities which represent a significant portion of Australia's gross domestic product (GDP) and consume a significant portion of the nation's energy.

For example, the City of Sydney local government area represents 25% of NSW GDP and 8% of Australia's GDP, and this is reflected in its energy consumption.

## 2. THE SECURITY OF ENERGY SUPPLIES

***The Government seeks comment on ways community expectations can be better understood and reflected in reliability standards.***

Consumers, in principle, want security of energy supplies but not at a cost that becomes unaffordable and/or inconvenient. The over expenditure in electricity networks and energy consumption forecasts that were so disastrously wrong is a prime example of this. Systemic failures in the regulation of electricity networks (eg, transmission businesses are both responsible for setting and meeting reliability

standards) have led to over-engineering of reliability standards without proper consideration of the value placed on reliability by consumers or of cheaper alternatives to achieve reliability standards. In NSW, the Productivity Commission estimates electricity supply was implicitly valued at $9 million/megawatt-hour by the distribution networks – which they estimate is around 150 times more than what consumers are willing to pay[1].

The City commissioned the Institute of Sustainable Futures, University of Technology Sydney 'Close to Home: Potential benefits of Decentralised Energy for NSW Electricity Consumers' report[2] which established that over 2010-15, electricity network businesses in Australia would be spending over $46 billion, more expenditure than the proposed $34 billion National Broadband Network!

In NSW, electricity networks are undertaking capital expenditure of $17.4 billion over the 5 years to 2013/14. This represents $2,400 per person and an 80% increase on the previous 5 year period. Average electricity prices in the Sydney electricity distribution network area are expected to increase by 83% during this period with the proportion of electricity bills that goes to pay network charges to rise from 40% to 60%.

The Institute of Sustainable Futures went on to estimate that the City's plans to supply 70% of the Local Government Area's electricity needs from a 360MWe trigeneration network by 2030 could achieve savings in deferred electricity network costs and avoided costs of new power station capacity to serve the city's growing demand in the order of $1.5 billion by 2030.

Based on the Institute's report, the City made the case for regulatory reform in its submission to the Australian Energy Regulator on the draft 5 year electricity network determination. However, only limited gains were made in the Regulator's final determination and the Institute's report was largely ignored.

Another example is peak power. A key part of the reason for surging electricity prices is the need to build electricity assets for peak power demand, primarily electric air conditioning, for 4 days of the year to meet high demand on hot days. $11 billion of network assets is built to meet demand for just 100 hours a year and as much as 25% of electricity costs result from peak demand, primarily electric air conditioning, which occurs over a period of less than 40 hours a year.

A 2kW reverse-cycle air conditioner costs $1,500 a year to operate and yet imposes costs on the electricity network of $7,000 since it adds to peak demand[3]. These network costs are not paid by the consumer operating the air conditioner but by all NSW electricity consumers whether or not they own air conditioners.

These network costs are significantly amplified for a city such as the Sydney CBD. For example, if implemented the Trigeneration Master Plan will displace 542MW of electricity peak demand, primarily electric air conditioning, which all NSW electricity

[1] Productivity Commission Electricity Network Regulatory Frameworks April 2013, p.12
http://www.pc.gov.au/__data/assets/pdf_file/0016/123037/electricity-volume1.pdf
[2] Institute of Sustainable Futures, University of Technology Sydney 'Close to Home: Potential Benefits of Decentralised Energy for NSW Electricity Consumers November 2010'
http://www.isf.uts.edu.au/publications/dunstanlangham2010closetohome.pdf
[3] Australian Government 'Draft Energy White Paper – Strengthening the Foundations of Australia's Energy Future December 2011 http://ret.gov.au/energy/Documents/ewp/draft-ewp-2011/Draft-EWP.pdf
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consumers are currently paying for. This is equivalent to taking 271,000 - 2kW reverse-cycle air conditioners off from peak electricity demand.

In terms of safety, reliability and security of supply other advanced economies address these issues through the implementation of decentralised energy networks such as precinct cogeneration and trigeneration systems which have been operating for decades in a safe and reliable manner with some systems reporting 99.99% reliability. Precinct cogeneration and trigeneration with underground networks also provides a high degree of security of supply that is beginning to be seen as climate change adaptation or as protection against extreme climate events compared with the more exposed overhead poles and wires of electricity grids.

For example, when Hurricane Sandy hit the US in 2012, it caused major damage as well as power losses across 24 states with damages of $66 billion, excluding losses due to business interruption. However, those consumers who were connected to precinct cogeneration or trigeneration continued to receive their energy supplies. Co-op City in the Bronx, New York is just one example of this where 60,000 residents, six schools, three shopping centres and the police precinct continued to receive their electricity, heating and cooling in island generation mode when the electricity grid's poles and wires were blown down and remained unfixed for several weeks.

As can be seen in other jurisdictions, precinct cogeneration and trigeneration is embraced not only to reduce emissions but also to reduce energy costs by turning distribution networks from passive networks into active networks which also lend themselves to smart grid operation.

***The Government seeks comment on ways to increase new gas sources to meet demand and measures to enhance transparency in market conditions.***

New renewable gas sources are available to Australia by taking advantage of innovative alternative and emerging energy resources and technology developed in other advanced economies. For example, renewable gas derived from waste, converted into substitute natural gas and injected into the gas grid for domestic gas supplies and renewable energy mining and exports via 'power to gas' for the international export market. This is set out in more detail under 8 - Alternative and Emerging Energy Sources and Technology.

***The Government seeks comment on issues relating to the regulation of energy infrastructure.***

The energy world is changing. Many energy consumers are becoming energy prosumers impacting on traditional monolithic energy generation and infrastructure and energy markets. Resisting change by maintaining or further imposing regulatory barriers to alternative and new technologies will just simply lead to an energy market 'death spiral'. In the last 5 years residential renewable energy has been booming. Australia has now installed more than 2 million small-scale renewable energy systems[4] with capacity to displace approximately 6,882 GWh of electricity annually,

[4] Clean Energy Regulator 'Australia Reaches Two Million Small-Scale Renewable Energy Installations http://ret.cleanenergyregulator.gov.au/Latest-Updates/2014/Australia-reaches-two-million-small-scale-renewable-energy-installations

equivalent to the electricity supply to over 1 million homes for a year, enough electricity to power Perth, Hobart, Darwin and Canberra combined.

Maintaining or imposing further regulatory burdens and costs to prosumers risks driving increasing numbers of households off the grid and increasing network charges for remaining households. In the next 5 years household solar batteries and other technologies could become affordable providing prosumers with the choice to go off grid in the face of 'business as usual' energy markets.

Regulatory reform of energy and energy infrastructure is therefore, is key for an integrated and coherent energy policy. This is set out in more detail under 3 – Regulatory Reform and Role of Government.

## 3. REGULATORY REFORM AND ROLE OF GOVERNMENT

***The Government seeks comment on priority issues, barriers or gaps within COAG energy market reform agenda***

The City has made 14 submissions so far to Australian Government, NSW Government and energy regulators setting out the case for regulatory reform with detailed proposals to remove the regulatory barriers to decentralised energy, cogeneration/trigeneration, renewable electricity and renewable gas. The key regulatory reforms required can be summarised, as follows:

**Electricity Regulatory Framework**

1) Introduce a benefit-reflective network tariff for decentralised electricity generators to reflect their role in avoiding/deferring future capital investment by electricity networks.

2) Ensure the regulatory framework established under the National Electricity Rules facilitates connection of decentralised energy generators and sale of decentralised electricity.

3) Introduce a feed-in tariff for cogeneration/trigeneration (as a precursor to the implementation of the above reforms) to promote the transition to decentralised energy.

4) Provide similar powers for thermal network operators to carry out their core business activities as are provided to electricity operators.

**Building Energy Efficiency Standards**

5) Reverse the October 2012 NABERS ruling that disadvantages decentralised electricity produced via precinct trigeneration and renewable energy.

6) Reform the Building Energy Efficiency Disclosure Act 2010 so that it recognises both electricity and thermal energy outputs of precinct cogeneration/ trigeneration.

7) Fully recognise the benefits of thermal energy from cogeneration/ trigeneration under the NSW Energy Savings Scheme.

8) Fully recognise the benefits of decentralised energy in the Building Code of Australia.

9) Remove regulatory impediments under competition law to the supply of thermal energy from precinct cogeneration/trigeneration.

**Sustainable New Building Development**

10) Amend the Strata Schemes Management Act to exclude the supply of thermal energy as part of sustainable new development from the provisions of section 13 of the Act.

11) To promote new sustainable development, provide new development with access to similar provisions as now apply under Environmental Upgrade Agreements legislation for existing development.

12) Increase the threshold for precinct trigeneration to be state significant development under SEPP (State and Regional Development) 2011 and streamline application of this SEPP to precinct trigeneration.

**Gas Production and Distribution**

13) Remove the application of higher hot water tariff gas distribution charges from cogeneration/trigeneration schemes displacing gas fired heating and hot water boiler systems.

14) Reform the Gas Act and Regulations to enable renewable gas to be supplied to consumers via the gas network.

15) Amend the draft NSW Energy from Waste Policy Statement to facilitate the production of renewable gases from waste.

16) Amend the NSW Waste Avoidance and Resource Recovery Strategy 2013-21 to capture the full environmental and economic value of recovering all waste resources, including renewable energy, from waste streams.

The specific detail of the regulatory reform required can be found in one of the recent City of Sydney submissions – Submission by the City of Sydney to the Inquiry by the Public Accounts Committee into Cogeneration/Trigeneration in NSW[5]. Although the submission was made in connection to precinct cogeneration/ trigeneration the regulatory reforms required also apply to decentralised renewable electricity and renewable gas.

The City's submission of written and oral evidence to the NSW Public Accounts Committee identified reform of the electricity regulatory framework as a key issue,

[5] Submission by the City of Sydney to the Inquiry by the Public Accounts Committee into Cogeneration/Trigeneration in NSW, September 2013 http://www.sydney2030.com.au/wp-content/uploads/NSW-Inquiry-into-cogeneration-and-trigeneration-submission.pdf

barrier and gap to decentralised energy not currently being addressed by the COAG energy market reform agenda.

In particular, network charges for exporting locally generated electricity to local consumers must be reduced and reflect the actual use of local distribution network. For example, non-intermittent decentralised energy generators make no use of the extra-high-voltage transmission infrastructure and much less use of the distribution network when sending out electricity to local customers. Despite this, consumers of non-intermittent decentralised energy generators are charged for the unused portion of network infrastructure at the same rate as consumers of remote coal-fired power stations using the full network infrastructure.

Historically, regulatory reform of the National Electricity Rules (NER) can take a very long time to come to fruition. For example, the proposed rule changes to the NER for connecting embedded generators to the electricity distribution networks was submitted by the Property Council of Australia, Climate Works Australia and SEED Advisory to the Australian Energy Market Commission in April 2012 but commencement of the rule will not occur until October 2014, some 2½ years later.

In view of the historical delays to regulatory reform, it is proposed that a feed-in tariff is introduced as an interim measure to encourage the early development of decentralised energy, such as precinct trigeneration. The tariff should be a combination of the value of local electricity generated and the value of network benefits afforded.

There is a very successful system already operating in the UK, which could easily work here. It is called the common distribution charging methodology.

Specifically, the City proposes that a network credit tariff should be introduced for decentralised energy generators that supply consumers within the distribution network. The scale of this credit tariff should be calculated on the basis of the positive benefits that particular classes of decentralised energy generators make in terms of deferred network investment.

This is the approach adopted in the United Kingdom by the Office of Gas and Electricity Markets (Ofgem). It is transparent and equitable. Each distribution network publishes the applicable credit tariff to be paid to decentralised energy generators as part of their annual schedule of distribution tariffs.

Decentralised energy generator tariffs are calculated annually based on a standard methodology provided by the national energy regulator (Ofgem). They vary for different classes of generator depending on the size of the generator, the level of intermittency and the time of operation.

The value of the credit for each class of decentralised energy generator in each of the UK distribution networks is on the public record and is disclosed on the Energy Networks Association Common Distribution Charging Methodology website[6].

[6] UK Energy Networks Association 'Electricity – Common Distribution Charging Methodology' http://www.energynetworks.org/electricity/regulation/duos-charges/common-distribution-charging-methodology.html

The approach used in the UK provides a decentralised energy generation proponent with certainty up-front as to the tariff it will receive. As the tariff is a recognition of deferred network investment, it is equitable for existing users of the distribution system and saves all consumers on the distribution network money through avoided network investment.

**Benefit-reflective network tariffs: the economic argument**

- Benefit-reflective network tariffs slow growth of the transmission and sub-transmission networks, with their associated energy losses and extremely high capital costs.
- This in turn slows increases in network tariffs and provides benefits that are felt by all consumers of the National Electricity Market.
- Benefit-reflective network tariffs provide more consistent rewards to decentralised electricity generators for the benefit they provide in keeping capital-intensive upstream network investments that would otherwise occur, to a minimum.

**Benefit-reflective network tariffs: calculating the numbers**

- Detailed calculations are required to inform the precise level of reduction in charges available for localised generation, either by location or by time of day.
- This submission has referred to the method that applies in the UK. Such a system could be adapted to apply to the National Electricity Market in Australia.
- Information about the UK methodology used to calculate benefit-reflective tariffs can be found at: http://www.dcusa.co.uk/Public/DCUSADocuments.aspx?s=c
- (Alternatively, use a search engine to find UK DISTRIBUTION CONNECTION AND USE OF SYSTEM AGREEMENT – Common Distribution Charging Methodology Schedule 16)

***The Government is seeking comment on possible measures to promote greater price transparency in gas markets.***

Renewable gas grid injection is emerging as a significant energy market in Europe and the USA. Renewable gas derived from waste is converted into a substitute natural gas to the same specification as fossil fuel natural gas and injected into the gas grid. This significantly increases the recovery of the primary renewable energy resource and maximises end use energy efficiency compared to electricity only generation at remote waste sites.

Power to gas technologies are also being utilised in Europe to overcome the intermittency of renewable electricity generation, such as solar and wind, with the gas being injected into the gas grid either as hydrogen or substitute natural gas. Hydrogen can be injected into the gas grid with a concentration of up to 15%.

Regulatory reform is required to enable consumers to purchase renewable gas from a renewable gas generator. Consumers can purchase renewable electricity directly from renewable electricity generators via a power purchase agreement so consumers should be able to purchase renewable gas from a renewable gas generator via a gas purchase agreement. However, at the moment it is not possible for a consumer to purchase renewable gas in the same way as renewable electricity under the existing gas regulatory regime.

Regulatory gas reform is also important for major gas consumers such as industry. Major gas consumers could insulate themselves from international oil and gas price rises by building gasification plants to convert their waste into renewable gas or by purchasing renewable gas from renewable gas generators over the gas grid on a long term gas purchase agreement and the gas regulatory regime should not stand in the way of this.

***The Government is seeking comment on areas where further privatisation of government-owned assets would contribute to more effective regulatory frameworks and better outcomes for consumers.***

The further privatisation of government-owned assets could contribute to more effective regulatory frameworks and better outcomes for consumers if there was better policed regulation and transparency. However, experience of electricity network infrastructure privatisation in Europe and the USA is mixed.

In Germany, privatisation of energy grids has proved to be expensive and unpopular with consumers to the point that municipalities, under pressure from voters, are setting up their own local energy companies and buying back electricity, gas and district heating grids. Prior to 1997, the grids were owned by municipalities but between 1997 and 2002 the grids were privatised by most municipalities and sold to major European energy companies. However, following dissatisfaction with increasing energy prices and public opposition to coal and nuclear electricity municipalities are now setting up their own local energy companies and buying back energy grids. Since 2007 more than 170 municipalities have set up their own energy companies and bought back more than 200 local grid concessions.

Hamburg with a population of 5 million established their energy company – Hamburg Energie, in 2009 and by the end of 2012 had become the second largest energy supplier in Hamburg. Hamburg Energie has so far purchased 25% of the local grids and the City of Hamburg won a referendum in 2013 to buy back the remaining 75% of the grids. The City has already reached agreement with the private utility to buy back the electricity grid for €495 million when the concession expires at the end of 2014. The concessions for the gas and district heating grids expire in 2016 and

2019, respectively, and the City has already negotiated an option to buy back the district heating grid in 2019.

It should be noted that City analysts had worked out that they could reduce the profits of the grids by 50% and use the remaining 50% of profits to recycle into local renewable energy, reducing energy bills and accelerating the installation of local renewable energy generation. In this instance, the City of Hamburg believes that the energy grids should be non-profit making and using the balance of profits to deliver its renewable energy targets (33% by 2020, 50% by 2030 and 80% by 2050).

This is a model that could be adopted by publicly owned energy infrastructure companies, reducing consumer's energy bills as well as providing a revolving fund for the accelerated delivery of renewable energy which in the long run will insulate Australian consumers from ever increasing fossil fuel prices and minimising energy infrastructure costs. Following the Hamburg example, the $1 billion a year profit that NSW Government makes out of the electricity networks that it owns could reduce NSW consumer's electricity bills by $500 million a year and invest $500 million a year in NSW renewable energy. This would deliver far greater positive economic impact to NSW consumers as a whole than the $1 billion loss in revenue to NSW Government.

## 5. TRADE AND INTERNATIONAL RELATIONS

***The Government seeks comment on ways to grow the export of value-added energy products and services.***

The City's Renewable Energy Master Plan[7] identified Australia's vast renewable energy resources and the potential for renewable energy mining and export.

Australia's renewable energy resources are many times greater than Australia's annual energy needs. The annual solar radiation falling on Australia is approximately 58 million petajoules (PJ), about 10,000 times Australia's annual energy consumption. This compares with the 8,053PJ of black coal and the 1,086PJ of natural gas that Australia exported in 2010/11 at an economic value of $31 billion.

Australia also has some of the best wind resources in the world. Good wind energy resources extend hundreds of kilometres inland from the coast and offshore. Australia also has the 2nd largest offshore wind energy resource in the world after the Russian Federation. Australia's marine or ocean renewable energy resources are also immense. For example, the wave energy resource from Geraldton to Tasmania alone would supply five times Australia's total energy requirements. However, most of this renewable energy resource is in remote locations and likely to remain untapped with current traditional narrow mindset and thinking.

Utilising emerging 'power to gas' and liquefied renewable gas (LRG) technologies is a game changer enabling Australia to access its vast renewable energy resources in the remotest parts of Australia for itself and for export, including solar, wind and marine energy resources that do not have to be located anywhere near an electricity

[7] City of Sydney 'Decentralised Energy Master Plan – Renewable Energy, December 2013 http://www.cityofsydney.nsw.gov.au/__data/assets/pdf_file/0003/153282/Renewable-Energy-Master-Plan.pdf

or gas grid. The liquefied natural gas (LNG) infrastructure already exists in Australia and is currently being expanded for LNG exports so LRG can take advantage of this.

Australia is well endowed with mining expertise using complex engineering methods to extract fossil fuels for domestic consumption and for export so is well placed to use its mining expertise to take advantage of a new renewable energy mining market that is safer and cleaner than fossil fuel mining and able to provide continuous economic development and employment for the mining industry. Many of these potential renewable energy mining locations are in the same place as fossil fuel mining locations so mining licence swaps would be possible making it easier for the mining industry to move from fossil fuel mining and exports to renewable energy mining and exports.

The potential for renewable energy mining and exports was beyond the scope of the City's Renewable Energy Master Plan but if such a potential could be realised Australia could replace its fossil fuel exports with renewable energy exports contributing towards global emission reductions instead of increasing them at the same time as maintaining or increasing the economic potential of Australia's renewable energy resources which would never run out.

See also comments on 8 – Alternative and Emerging Energy Sources and Technology.

***The Government seeks comment on ways to support business to maximise export opportunities for Australia's energy commodities, products, technologies and services including the value of Australia's participation in the variety of increasing of international forums.***

See above.

Australia should participate in international forums, particularly for alternative and emerging energy sources and technology that could replace Australia's fossil fuel exports with a sustainable higher value and in demand energy commodity exports.

For example, the North Sea Power to Gas Platform could be of interest to Australia. Eleven leading companies in Europe have established the North Sea Power to Gas Platform to further develop the concept of 'Power to Gas' or the conversion of renewable electricity into renewable gas. Power to gas will play an increasingly important role in Europe's future energy system, as it reduces the intermittency of renewable electricity such as solar and wind by converting surplus renewable electricity into renewable gases which can be stored in Europe's existing gas network. These gases have a wide range of uses such as transportation, domestic heating, as feedstock for the chemical industry, and power generation such as cogeneration and trigeneration. They also have a role in renewable energy mining and export.

The consortium comprises Europe's electricity and gas transmission network companies such as Fluxys Belgium, Energinet.dk, Alliander, Gasunie, TenneT, the National Grid in the UK and Open Grid Europe.

Transporting renewable electricity as a renewable gas in the existing gas grid is also more economic than transporting renewable electricity in the electricity grid. The Technical Association of the European Natural Gas Industry, Marcogaz, says that

transporting electricity is 20 times more expensive than transporting the same amount of energy via a gas pipeline.

## 8. ALTERNATIVE AND EMERGING ENERGY SOURCES AND TECHNOLOGY

The Government seeks comment on alternative and emerging energy sources and technology but perhaps misses the point that it is not only about what particular energy sources or technologies should be implemented but also about which entities are implementing alternative and emerging energy sources and technologies.

As part of its research into world renewable energy best practice the City identified that a key component of how other countries were delivering such a large proportion of renewable energy generation was community owned renewable energy.

In Denmark, nearly 50% of domestic electricity demand and 80% of thermal energy demand (heating and cooling) is owned by the consumers themselves in one form or the other. In Copenhagen, the Middlegrunden wind farm in Copenhagen Harbour is 50% owned by a community cooperative with 8,650 residential members living within 2km of the wind farm. More than 150,000 households are co-owners of local wind farm cooperatives, which have installed 86% of all wind turbines in Denmark.

In Germany, 65% renewable energy generation, some 35,000MW, is owned by the consumers themselves as individuals or as cooperatives. The rapid roll out of renewable energy in Germany is now nearly three times the installed nuclear energy generation capacity in 2010 and five times installed capacity in 2011 (after Germany's nuclear phase-out decision). Hundreds of thousands of people have invested in citizen's wind farms across the country representing 90% of wind farms in some states such as North Frisia.

Community wind is one of the fastest growing markets in the USA with 27 states having legislation that allows community renewable energy schemes. Today, there are more than 1,500 wind farms owned by farmers, ranchers, landowners, consumer-owned utilities, school districts, universities and native tribes. The largest concentration of community owned wind farms are in Minnesota (469), Washington (440), California (238), Nebraska (153), Iowa (81) and Texas (51).

Even in the UK, there has been a rapid growth in community owned self-generation from 6% in 2011 to 15% in 2013.

Australia has not been immune to the community owned renewable energy phenomenon. The first community owned renewable energy scheme in Australia was the Hepburn wind farm in Victoria owned by 2,300 members which became operational in 2011.

Over 1.25 million households in Australia now have solar PV systems installed, investing more than $6 billion of their own money in renewable energy. As has already been set out under 2. The Security of Energy Supplies, Australia has now installed more than 2 million small-scale renewable energy systems with capacity to displace approximately 6,882 GWh of electricity annually, equivalent to the electricity supply to over 1 million homes for a year, enough electricity to power Perth, Hobart, Darwin and Canberra combined.

Following what is happening elsewhere around the world, there is strong community interest in directly installing and owning renewable energy and prosumers cannot be ignored in any Australian Government Energy White Paper.

***The Government seeks comment on ways to encourage a lower emissions energy supply that avoids market distortion or increased energy prices.***

See comments on 5 – Trade and International Relations in relation to Australia's vast renewable energy resources and the North Sea Power to Gas Platform and 3 – Regulatory Reform and the Role of Government in relation to regulatory reform needed to encourage a lower emissions energy supply that avoids market distortion or increased energy prices.

In addition, the City's Renewable Energy Master Plan identifies the potential of renewable gases that can be recovered from virtually all forms of waste that are not otherwise recycled, such as from residential, commercial and industrial waste, sewage and landfill. Beyond the city, renewable gases can be sourced from livestock manure, agricultural stubble and husks from crops or non-native forestry off-cut waste or environmentally beneficial energy crops such as oil Mallee crops contributing to both Australian Government direct action and carbon farming initiatives.

Another biomass feedstock opportunity could be the use of bushland fire hazard reduction materials, particularly where near to renewable gas collection or generation plants. Utilising these combustible materials for renewable gas production could significantly reduce the current fire hazard reduction burn-offs, with consequential air pollution and adverse health impacts, and the risk of accidental bushfires.

Thermal gasification of dry and semi-dry wastes such residential, commercial, industrial and biomass waste produces a synthesis gas or syngas, anaerobic digestion of wet wastes such as livestock manure and sewage produces a biogas and landfill produces a biogas directly. The gases from these wastes can be converted into a substitute natural gas (SNG) and injected into the gas grid to supply to end consumers.

Utilising renewable gas from waste or bioenergy for injection into the gas grid recovers typically 80% of primary renewable energy resource at end use whereas generating electricity only from waste or bioenergy resources recovers typically 20-35% of primary renewable energy resource for on-site or grid electricity export uses. Therefore, renewable gas grid injection can deliver up to four times as much primary renewable energy resource at end use than electricity generation only. Government should encourage this emerging renewable gas market by removing the regulatory barriers to renewable gas grid injection and undertaking research and demonstration projects, possibly with funding from the Australian Renewable Energy Agency.

In addition to the clean fertiliser and biochar the by-products of renewable gas generation can also be used as carbon sinks. Buried in the ground or blended with topsoil, it may hold carbon for hundreds or thousands of years, locking away carbon dioxide rather than allowing it to escape into the atmosphere as methane where it would act as a greenhouse gas 21 times more powerful as a greenhouse gas than carbon dioxide over 100 years. Due to its negative carbon attributes by-products of

renewable gas generation should be eligible for carbon credits as it is on the Carbon Farming Initiative positive list.

As regards avoiding market distortion or triggering energy price increases it should be noted that state governments earning significant profits out of state owned monopoly electricity networks currently creates market distortions and triggers price increases. Better use can be made of state owned monopoly assets such as the City of Hamburg example given under 3 – Regulatory Reform and Role of Government.

***The Government seeks comment on the need to review existing network tariff structures in the face of rapidly growing deployment of grid-backed distributed energy systems, to ensure proper distribution of costs.***

See comments under 3 – Regulatory Reform and Role of Government. In particular, the reforms to the electricity regulatory framework proposed by the City which calls for the introduction of a benefit-reflective network tariff for non-intermittent decentralised or distributed electricity generators to reflect their role in avoiding/deferring future capital investment by electricity networks.

***The Government seeks comment on any barriers to increased uptake of LPG in private and commercial vehicles and CNG and LNG in the heavy vehicle fleet.***

See comments under 3 – Regulatory Reform and Role of Government in relation to renewable gas grid injection which could also be deployed for transport.

In Stockholm, Sweden, 40% of buses are supplied with renewable gas via the gas grid from renewable gas derived from waste and injected into the gas grid.

***The Government seeks comment on any barriers to the increased uptake of electric vehicles and advanced fuels.***

See comments under 3 – Regulatory Reform and Role of Government in relation to renewable electricity supplying electric vehicles and renewable gas grid injection which could also be deployed for transport.

In the UK, regulatory reform enabled renewable energy generator and supplier Ecotricity to launch Electric Highways with Welcome Break motorway service stations providing free top up electricity to electric vehicles travelling along motorways. Since then Ecotricity has installed electric vehicle charging points at Roadchef and Moto Services service stations. Ecotricity now has 89 electric vehicle charging stations along the M1, M4, M5, M6, M25, M40 and M42 as well as at IKEA stores throughout the UK and at various other locations powered by Ecotricity's own renewable electricity. Electric vehicle owners register for a free swipe card. There are more than 5,700 electric vehicles in the UK with sales increasing rapidly (up 25% in Q3, 2013). The electric car industry has set a target of selling 1.5 million electric cars by 2020.

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7 February 2014
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