Legislating Climate Change: Australia's Renewable Energy Target legislation examined by a solar farmer

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ABSTRACT

This paper examines the concept of sustainable development and the need to consider its 'three pillars' – the social, economic and environmental impacts as one interrelated concept - the *triple bottom line* (TBL). The rationale of the TBL is that no single influence can exist in isolation for an indeterminate period of time. An imbalance between the three overarching factors in favour of one over the interests of the other two, will adversely affect the others and ultimately itself. An enterprise focussed solely on profit, at the expense of society and the environment, will not be able to be sustained indefinitely.

This paper focuses on the impact of carbon emissions caused by industrialisation, and its reliance on fossil fuelled energy sources. It briefly examines how the carbon cycle functions and successive Australian governments' legislative attempts to address carbon emissions to mitigate the impact of greenhouse gasses on global warming.

Finally it places the impact of those legislative requirements on industry to dilute carbon emissions with energy sourced from renewable sources in the context of how the Solex solar farming project in Carnarvon Western Australia, receives economic benefits from that legislative intervention to encourage renewable energy based industry.

The Solex project competes directly with fossil fuelled industry to manufacture and market its products.

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1 INTRODUCTION

In order to provide background and context, this paper looks broadly at the concept of sustainable development. It reviews the concepts of the three major aspects of sustainable industries: the economic viability of industrial development, the influences of industry on society impacts and the impact industry has on the natural environment.

It is suggested that unless those three factors are positive contributors, or at least have a neutral impact on each other, a particular industry will ultimately fail. A fiscally profitable venture which damages society and/or the natural environment cannot continue indeterminately. Likewise, a socially desirable project which continually requires external financial inputs and/or damages the natural environment cannot be sustained indeterminately. Further, a practice of conservation and preservation of the natural environment which totally prevents exploitation of those resources by excluding industry and society will ultimately be destroyed by economic and social interests that desire to exploit those natural resources for the benefit of mankind.

The problem facing mankind is how to manage the conflicting interests of the three groups of factors: those resources, human wants and needs in such fashion that use of those natural resources are not destroyed in the long term – that is the development of industrial projects are able to function without creating a negative impact, and thereby destroying society and/or the natural environment.

This paper initially looks at how the three aspects of sustainable development correlate. It considers the philosophies of Australia's major political factions and how they represent the interests of each group of factors that compromise the TBL.

It then considers atmospheric pollution, caused by industrial development since the late 19th Century, and Australia's attempts to mitigate greenhouse gas emissions from the use of combusting fossil fuels as an energy source.

Finally it places the operations of the Solex project within the context of Australia's carbon dioxide emission control legislation.

2 THE TRIPLE BOTTOM LINE

In 1987 the United Nations World Commission on Environment and Development issued its Report of the World Commission on Environment and Development: Our Common Future (the Brundtland Report). It defined sustainable development as being 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.[1]

The report further defined sustainable development as being

1 Gro Harlem Brundtland, *Report of the World Commission on Environment and Development: Our Common Future*, UN Doc a/42/427 (1987) 41.

> a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations.[2]

From the concept of sustainable development developed a corporate reporting system which incorporated social and environmental impacts of its operations as well as its fiscal accounting reports.

The *Macquarie Dictionary* defines the 'Triple Bottom Line' as being 'a form of auditable company reporting which seeks to balance financial gain against responsibility to society and to the environment, in response to a corporate strategy that aims for economic, environmental and social gain.'[3] Therefore 'progressive businesses'[4] or 'responsible corporations' not only report their operations in terms of the fiscal, or economic, profit of an enterprise expressed in monetary units, but also their contributions to the benefit of society generally, with consideration to preservation and conservation of the natural environment.

Twidell and Weir suggest 'the aim of sustainable development is for the improvement [in the quality of life and standard of living of the world] to be achieved whilst maintaining the ecological processes on which life depends.'[5] They further suggest that 'at a local level, progressive businesses aim to report a positive *triple bottom line,* i.e. a positive contribution to the economic, social and environmental well-being of the community in which they operate.'[6]

Strange and Bayley consider that 'the core of sustainable development is the need to consider 'three pillars' *together*: society, the economy and the environment'.[7] That concept of the 'three pillars' has crystallised into the socio-econo-enviromental concept of the *triple bottom line* (TBL). The influencing factors of social-economic-environmental impacts, and the relationship between those factors, are illustrated in figure 1.

2 Ibid 43.

3 John Bernard et al (eds), *Macquarie Concise Dictionary* (4th ed, 2006) 1311.

4 John Twidell and Tony Weir, *Renewable Energy Resources* (2nd ed, 2006) 2.

5 Ibid.

6 Ibid.

7 Tracey Strange and Anne Bayley, *Sustainable Development: Linking Economy, Society and Environment* (2008) 27.

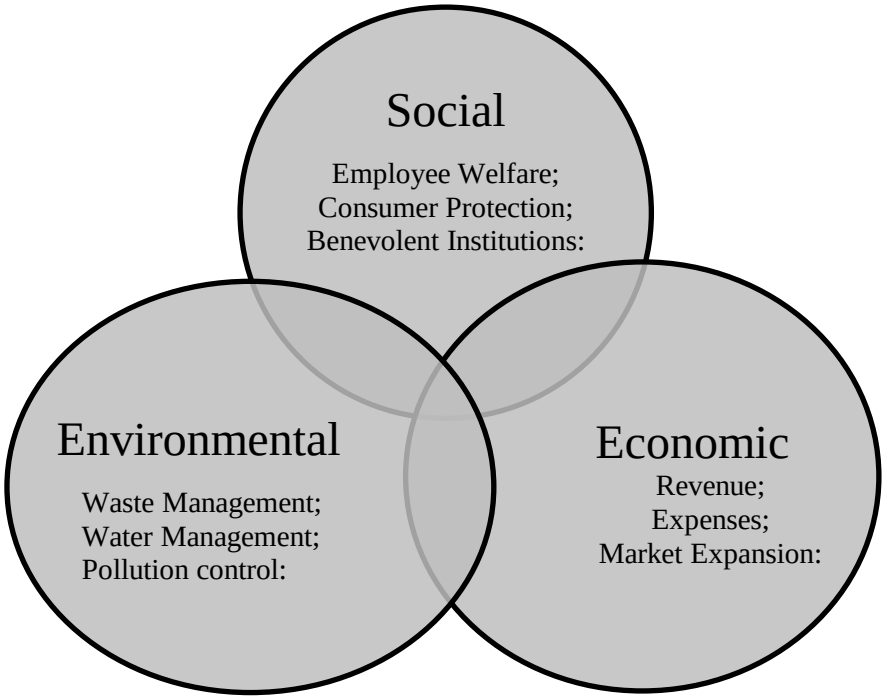

Figure 1: An illustration of the Triple Bottom Line factors incorporating some examples of each.

In 1990, the Australian Government recognised that ecologically sustainable development represented one of the greatest challenges to the nation's government, industry and society in coming years. It recognised that while there was no universally accepted definition of ecologically sustainable development it suggested a definition as being

> Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.[8]

The national strategy document identified the goal for ecologically sustainable development as being 'development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.[9] To support that strategy the Australian Government enacted the Environment Protection and Biodiversity Conservation Act 1999. The act is intended to provide a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the Act as matters of national environmental significance.

Specifically section 3 (1) of the Act prescribes it as being

> (a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and

8 National Strategy for Ecologically Sustainable Development - Part 1 Introduction. Prepared by the Ecologically Sustainable Development Steering Committee, Endorsed by the Council of Australian Governments December, 1992, 1.

9 Ibid.

(b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and

(c) to promote the conservation of biodiversity; and

(ca) to provide for the protection and conservation of heritage; and

(d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples; and

(e) to assist in the co-operative implementation of Australia's international environmental responsibilities; and

(f) to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and

(g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.[10]

In September 2003 the Western Australian government produced a sustainability strategy policy that, among other objectives, it was intended to

> Develop a State Strategic Planning Framework for the Public Sector that reflects sustainability and the triple bottom line. [and]
>
> Incorporate sustainability principles and practices based on the Sustainability Act into relevant legislation as it is reviewed or drafted.[11]

In 2004 the Western Australian Local Government Act 1995 was amended to address a range of matters including provisions to incorporate the sustainability themes into the content and intent of legislation. The Act states:

> In carrying out its functions a local government is to use its best endeavours to meet the needs of current and future generations through an integration of environmental protection, social advancement and economic prosperity.[12]

The Planning and Development Act 2005 (WA) introduced a specific purpose of the Act regarding sustainability.[13] Among the purposes of the Act it specifically states that it is 'to promote the sustainable use and development of land in the State.'[14]

The emphasis on sustainability within the principal legislation governing planning practice in WA is an important reflection of the role for promoting sustainable development through planning. In 2006, the City of Cockburn became one of the first local authorities in Australia, and the first in Western Australia, to adopt the definition of sustainability. In 2011 it adopted a sustainability strategy to embed that philosophy into its administration.

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10 *Environment Protection and Biodiversity Conservation Act 1999 (Cth) s 3(1).*

11 Government of Western Australia, *Hope for the future: The Western Australian State Sustainability Strategy a vision for quality of life in Western Australia*, (2003) 55.

12 *Local Government Act 1995* (WA) s 1.3(3).

13 *Planning and Development Act 2005* (WA) s 3.

14 Ibid s 3.1(c).

Sustainability in the City of Cockburn is defined as:

> Pursuing governance excellence to meet the needs of current and future generations through an integration of environmental protection, social advancement and economic prosperity.[15]

Despite those changes to legislation and adoption of environmental conservation policies by Federal and Local authorities, the *Sustainability Act* (WA) was never introduced to, or enacted by, the Western Australian Parliament.

The brief history of the adoption of sustainability legislation in Western Australia indicates that the implementation of policies for sustainable development is determined by the actions of government.

While it is generally considered in Western Democracies, that parliament reflects the 'will of the people', in fact, in Australia Parliament tends to consist of a loose conflagration of political groups each with their own focus or political philosophy.

The author was an Independent Candidate for the Gascoyne region's Western Australian parliamentary seat for three election campaigns – 2001 - 08.[16] As such, he was involved in negotiations with candidates of other political parties and closely studied the political philosophies of the major political factions of the Australian Parliaments.[17] He has noted the differing underpinning philosophies of each of those parties and their differing primary focus in relation to the primary factors of the TBL.

Therefore, this paper suggests that a fourth factor should be considered when examining the concept of the triple bottom line – that of its 'binding agent' – political philosophies of governing bodies as illustrated in figure 2.

15 City of Cockburn, *Sustainability Strategy 2013 – 2017*, (2013), 5.

16 Western Australian parliamentary terms are for four years, unless otherwise terminated by the Governor of Western Australia.

17 Australia is a Federation consisting of one Federal Parliament and seven State and Territorial parliaments. The political parties of each state are broadly affiliated with, or part of their Federal counterparts. The level of cohesion varies from party to party.

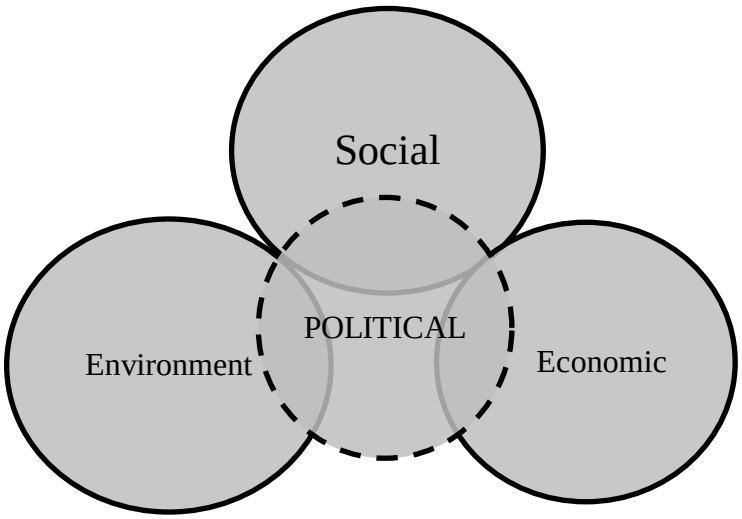

Figure 2: The Triple Bottom Line factors showing the political factor binding the relationship.

In Western Australia, the 'left-wing'[18] Australian Labor Party (ALP) government lost office in September 2008, and it appears that government action as to 'sustainable development' ceased at that point. The succeeding 'right-wing'[19] Liberal Party (LP) subsequently advised that the Western Australian Sustainability Strategy 'is no longer being referred to as it was a policy of a previous government and is out-dated'.[20] It appears that governmental policies, and governmental approaches to the concept of sustainable development, differ between the 'left' ALP and the 'right' LP.

A detailed examination of left-wing and right-wing political philosophies is beyond the scope of this study, however it is reasonable to suggest that the 'left', generally represented by the ALP, tends towards social democracy and the welfare of society, while the 'right', generally represented by the Liberal and National Parties, tends towards industrialism and the welfare of the economy in fiscal terms.

Further, this paper considers that, in Australia, it is the Australian Greens Party that represents environmental interests. However they also state 'today, the Greens recognise that speaking for the environment is not enough — we also need to speak on behalf of others who are disadvantaged in our society: children, refugees, students, individuals and families living in poverty.'[21] Figure 3 develops the illustration of the TBL shown in Figure 1 to show the Australian political parties general philosophical perspectives.

18 Bernard et al, above n 3, 684.

19 Ibid, 1048.

20 Letter from Ken Baston Western Australian Minister for Agriculture and Food to Vince Catania Western Australian Member for North West Central, 27 January 2015 (copy held by author).

21 The Greens <http://greens.org.au/our-story> at 13 February 2015.

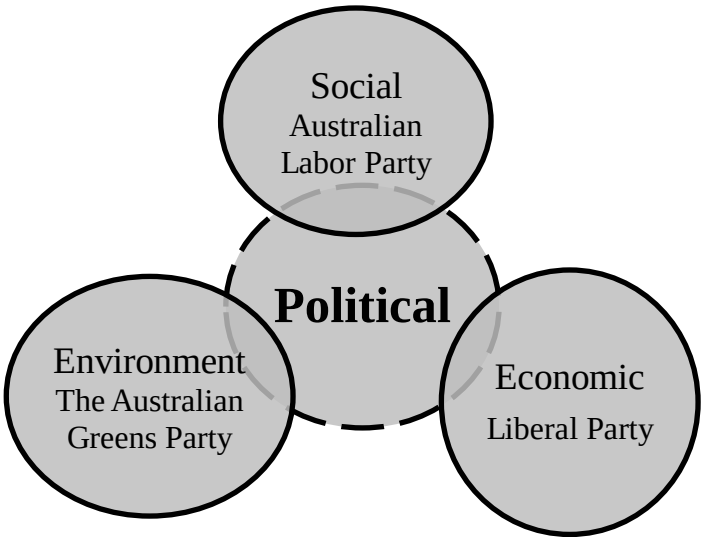

Figure 3: The Triple Bottom Line factors showing the Australian political parties representing the respective factors.

Further discussion in this paper is based on that broad assumption above. It is suggested that in attempting to bring all aspects of the TBL together, the Solex Project is considered to be an amalgamation of the three political philosophies.

This paper now moves on to discuss the impact of industrial development on the Earth's natural environment. In particular it looks at the discharge of *Greenhouse Gasses* into the atmosphere caused by the combustion of fossil fuels as an energy source. Those Greenhouse gases affect to constituency of atmospheric gases and contribute to an increase in the Earth's atmospheric temperature, a concept referred to as *Global Warming*.

3 GLOBAL WARMING AND THE CARBON CYCLE

This section examines part of Australia's attempt to reduce the impact of *Global Warming*. While detailed examination of the causes of *Global Warming* is beyond the scope of this study, there is good evidence that the major factor affecting global warming is attributed to a rise in the level of atmospheric carbon dioxide (CO_2). 'We know for sure that, because of human activities especially the burning of fossil fuels, carbon dioxide in the atmosphere has been increasing over the past two hundred years and more substantially over the past fifty years.'[22] It is generally accepted that action must be taken to mitigate the impact of rising CO2 emissions on global warming.[23]

Prior to outlining the operations of Australia's renewable energy target this section provides the following outline as to the mankind's impact of changing carbon dioxide composition of Earth's atmosphere. The overview provides background as to why it is considered desirable to substitute fossil fuelled energy sources with non-polluting, renewable energy generation systems.

22 Sir John Theodore Houghton, *Global Warming: The Complete Briefing*, (3rd ed, 2004) 8.

23 Ibid 10.

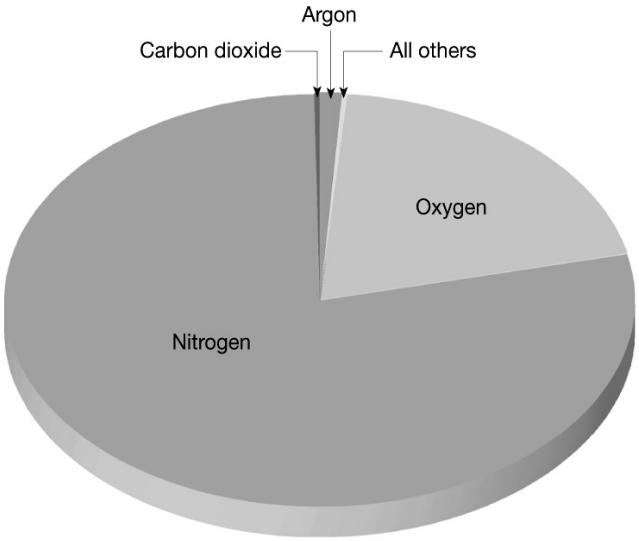

Figure 4: The modern composition of Earth's atmosphere.

As illustrated in Figure 4, the modern composition of Earth's atmosphere is roughly 78 per cent nitrogen, 21 per cent oxygen. The other 1 per cent is made up of carbon dioxide 0.037 per cent and the remainder, mostly inert gases such as argon, neon and the like, as well as water vapour, methane, nitrous oxide and chlorofluorocarbons.[24]

To provide an understanding of the dynamic processes 'through which carbon is transferred in nature between [the atmosphere and] a number of natural carbon reservoirs'[25] Figure 7 is illustrated to depict the carbon cycle.

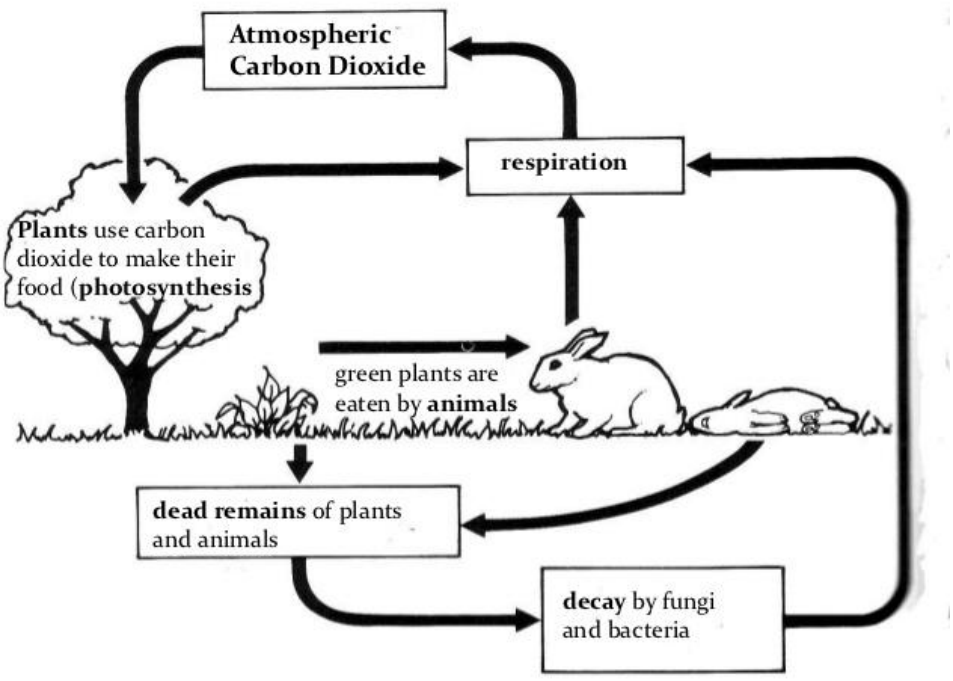

Figure 5: The basic carbon cycle.

24 Ibid 16.

25 Ibid 29.

Houghton considers that

> Because carbon dioxide is a good absorber of heat radiation coming from the Earth's surface, increased carbon dioxide acts like a blanket over the surface, keeping it warmers than it would otherwise be. With the increased temperature the amount of water vapour in the atmosphere increases, providing more blanketing and causing it to be even warmer.[26]

While the concentration of carbon dioxide appears negligible, at less than 0.05 per cent of the total composition of the atmosphere, today it is at more than 25 per cent higher than at any time in the past 420,000 years. The recent increase in atmospheric CO_2 has occurred since the beginning of the 'industrial' era (defined as since 1750) and most of that increase has occurred over the past 50 years. The increase in atmospheric CO_2 is primarily from burning of fossil fuels (land-use changes and cement manufacturing also contribute) with half of this increase having occurred since the mid 1970s.[27]

To provide background and context this paper notes that in order to indicate savings in fossil fuel and emissions, this paper assumes that 1kWh (unit) of energy requires 300ml of diesel fuel[28] and produces 650mg of emissions in doing so.[29] It is noted that they are average assumptions and actual data may vary considerably from system to system and fuel type to fuel type.

Illustrated in Figure 6, there are three general methods of addressing the issue of increasing atmospheric CO_2 by implementing:

- Actions to reduce emissions caused by the combustion of fossil fuel by using substitute (renewable) fuels;
- Actions to reduce the volume of existing atmospheric CO2 by increasing physical carbon storage within the Earth's surface – carbon sequestration and increased vegetation; and
- Actions to reduce energy consumption, and therefore reduce demand for electricity generation.

26 Ibid 9.

27 Jonathan H. Sharp With assistance from Ferris Webster, John Wehmiller, Joseph Farrell, Willett Kempton, Ronald Ohrel and Douglas White. 'Increasing Atmospheric Carbon Dioxide' College of Marine & Earth Studies University of Delaware (2007) at < http://co2.cms.udel.edu/Increasing_Atmospheric_CO2.htm > 27 August 2013.

28 Santiago Arnalich, *Epanet and Development. How to Calculate Water Networks by Computer* (2011) 153.

29 Soli J Arceivala and Shyam R Asolekar, *Environmental Studies: A Practitioner's Approach* (2012) 46.

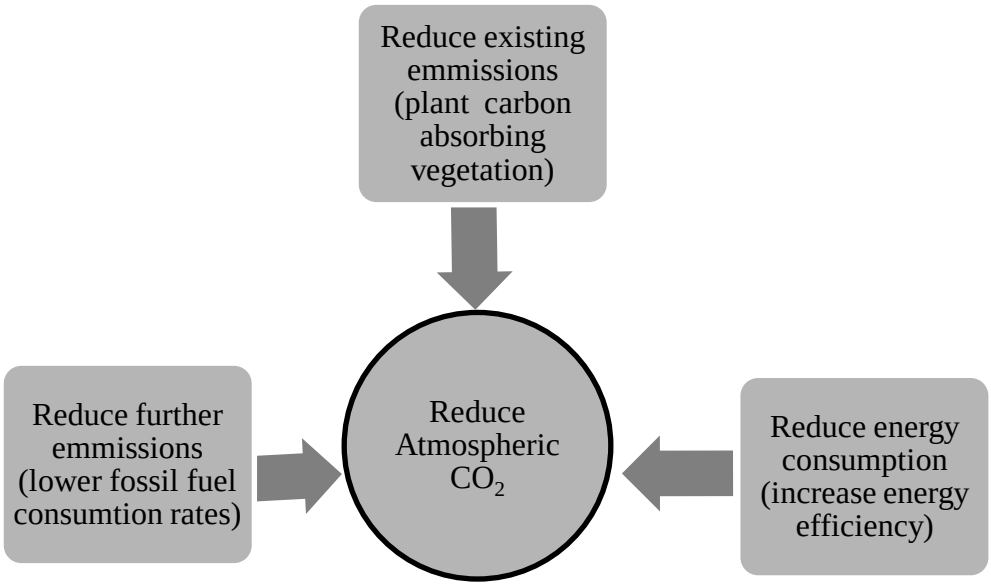

Figure 6: Methods of reducing atmospheric CO_2

This paper focuses the first method – actions to reduce emissions caused by the combustion of fossil fuel by using substitute (renewable) fuels and will discuss that method in the context of renewable energy produced by the Solex solar farm.

As part of its commitment to protecting the environment by reducing atmospheric pollution, in particular rising volumes of carbon dioxide caused by the combustion of fossil fuel, the Australian Government legislated to encourage generation of electricity from renewable sources.

The following section examines the legislation that supports Australia's legislative program to reduce atmospheric carbon dioxide emissions.

2.4 AUSTRALIA'S RENEWABLE ENERGY TARGET

In June 2000, the Australian Government crystallised the desire to bring renewable energy into Australia's energy mix by passing a Bill to enact 'an Act for the establishment and administration of a scheme to encourage additional electricity generation from renewable energy sources, and for related purposes.'[30]

Undoubtedly enacting that legislation was in accordance with the Australian Government's response to the 1987 Brundtland Report and to meet its United Nations commitments through the respective enabling legislation – t*he Environment Protection and Biodiversity Conservation Act 1999 (Cth).*

The Bill was introduced to the Australian Parliament to 'implement [sic] a commitment to introduce a mandatory target for the uptake of renewable energy in power supplies in order to contribute towards the reduction of Australia's greenhouse gas emissions.'[31] The 'mandatory

30 *Renewable Energy (Electricity) Act 2000* (Cth).

31 *Renewable Energy (Electricity) Bill 2000* (Cth) Explanatory Memorandum.

target', initially referred to as the Mandatory Renewable Energy Target (MRET), became to be known more simply as the Renewable Energy Target (RET).

The passing of the Bill created the *Renewable Energy (Electricity) Act 2000* (Cth) (REE Act). The basic principle of the Act is to 'dilute' atmospheric pollution by requiring a purchaser of electricity to demonstrate that a percentage of that electricity has been generated from a renewable energy source.

In practical terms, the onus placed on each purchaser to 'dilute' the consumption of fossil fuelled energy with renewable energy would be impossible. The concept of physically 'mixing' renewable energy sourced electricity with fossil fuelled generated electricity at a central point is little more than a philosophical concept devoid of practicality. However the RET scheme is somewhat ingenious in overcoming that problem. The Act places the onus to mix renewable energy generated electricity with fossil fuelled generated electricity on electricity wholesalers.

The administrative process by which the 'dilution' is validated is rather simple. 'A registered person may create a certificate for each whole Megawatt hour (MWH) of electricity generated by an accredited power station that the person operates during a year'[32]from an eligible renewable energy source. The 'eligible renewable energy sources' are listed in section 17 of the REE Act.

To validate the 'dilution' an electricity wholesaler must surrender a number of renewable energy certificates (RECs) for each 100MWh purchased in each calendar year commencing 1 January 2001.[33] That number percentage began at 0.24 per cent for the 2001 year and was originally intended to rise to 20 per cent in the year 2021.[34] At this point it is sufficient to accept that a percentage is legislated. How the 'dilution' is quantified is examined in greater detail in the following section.

Therefore for every 100MWh of electricity purchased by a wholesaler, that wholesaler produces a number of renewable energy certificates, created from an accredited renewable power station. Should the prescribed percentage for a particular year be 5.98 per cent, as it was in 2010, then a wholesaler purchasing 43 800 MWh in a year must surrender 2619 RECs to illustrate that 5.98 per cent of that electricity was generated from renewable energy sources. In that manner, the physical connection as to the precise energy mix of the source of supply becomes irrelevant on a broad scale.

An illustration of the process of 'dilution' is presented in the following hypothetical example: A wholesaler purchaser of electricity in South Australia, which has purchased electricity from coal fired generators in the La Trobe Valley in Victoria, purchases RECs, created by a solar farm in Western Australia, from a trader in New South Wales, to comply with the legislative requirements by surrendering those RECs to demonstrate the required 'dilution' of emissions.

32 *Renewable Energy (Electricity) Act 2000* (Cth) s 18.

33 Ibid s 4.

34 Ibid s 39.

Alternatively a wholesaler may choose to pay a 'renewable energy shortfall charge' in lieu of surrendering a REC.[35] For convenience, the concept and economic consequences of the option of the shortfall charge is discussed at the end of this section.

To provide background, a brief history of the Australian RET is provided on the Australian Government's Clean Energy Regulator Internet website:

> Renewable energy has an important role to play in reducing Australia's greenhouse gas emissions and reaching the goal of 20 per cent renewable energy by 2020.
>
> Known previously as the Mandatory Renewable Energy Target, the Renewable Energy Target has been in operation since 2001, with the initial aim to source 2 per cent of the nation's electricity generation from renewable sources. In 2009, this was increased to ensure renewable energy made up the equivalent of 20 per cent of Australia's electricity (41,000 GWh).
>
> Since its beginning in 2001, the Renewable Energy Target has increased the number of installations of small-scale renewable energy systems, and successfully stimulated investment in renewable energy power stations. As at July 2014:
>
> - Over 400 renewable energy power stations have been accredited, and
> - Over two million small-scale renewable energy systems have been installed.
>
> In 2013, over 20.4 million small-scale technology certificates and 14.6 million large-scale generation certificates were validly created.[36]

Discussed later in more detail, there were significant legislative changes to the REE Act in 2011. At this point, the most relevant change is to the concept of the terminology of the REC. In 2011 two classes of REC were created – small-scale technology certificates (STCs) for installations of less than 100kW capacity, and large-scale generation certificates (LGCs) which are created by installations in excess of 100kW capacity. Therefore, for the purposes of this discussion for renewable energy certificates created prior to 2011 they are referred to as RECs, and those created after 2011 are referred to as either STCs or LGCs as is appropriate. Where RECs have transitioned to LGCs, as in the case of the Solex Solar Farm, only the current term, LGC, is used.

By enacting the RET, the Howard Liberal Government, had made a positive step towards sustainable development and reducing greenhouse gas emissions. Initially the 2001 targeted reduction was a modest 0.24 per cent of Australia's electricity generation from renewable sources. However the goal was to reach 20 per cent by 2020. That was to be a very worthy contribution to the reduction of atmospheric pollution by greenhouse gases.

While there has been significant scientific research and debate as to the precise volumes of atmospheric pollution caused electricity generation, this paper suggests that the RET is estimated according to broad assumptions. Finally, the actual percentages referred to are rather forecasts of estimates than quantifiable calculations.

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35 Ibid s 36.

36 Australian Government, Clean Energy Regulator, *The History of the Renewable Energy Target* (2014) Renewable Energy Target <http://ret.cleanenergyregulator.gov.au/About-the-scheme/History-of-the-RET> at 29 March 2015.

That scope of inaccuracy, created by the concept of forecasting rather than projection of statistically established data, has given rise to uncertainties. Those uncertainties have in turn, given rise to overriding political debate as to the actual social and environmental implications of fossil fuelled electrical generation.

Forecasting can only ever be a 'best guess' of what is likely to happen as there will always be factors existing at the time of the forecast is given to which the forecaster could never have been certain, or even aware of.

To indicate the inaccuracies of 'forecasting', Table 1 illustrates how the legislation establishes the relationship between the estimated volume of renewable energy sourced electricity and the renewable power percentage charge required to achieve that outcome. It also projects the total volume of electricity estimated to be consumed to estimate the accuracy of the legislated percentage of LGCs required to be surrendered by liable parties.

Year	Required GWh of renewable source electricity[37]	Renewable power percentage[38] LGCs (RECs)	Estimated total electricity consumption GWh Required GWH/RPP	Actual electricity consumption GWh[39]
2001	300	0.24	125000	224641
2002	1100	0.62	177420	227563
2003	1800	0.88	204545	226452
2004	2600	1.25	208000	236581
2005	3400	1.64	207317	245642
2006	4500	2.17	207373	247568
2007	5600	2.70	207407	251227
2008	6800	3.14	216560	257998
2009	8100	3.64	222527	244414
2010	12500	5.98	209030	241586
2011	10400	5.62	185053	
2012	16763	9.15	183202	
2013	19088	10.65	179230	
2014	16950	9.87	171732	
2015	18850	11.11	169667	
2016	21431	tba		
2017	26031	tba		
2018	28637	tba		
2019	31244	tba		
2020	33850	tba		
2021-30	33000	tba		

Table 1: The renewable energy sourced electricity and the renewable power percentage charge.

37 Ibid s 40.

38 *Renewable Energy (Electricity) Regulations 2001* (Cth) reg 23.

39 Australian Government, Department of Agriculture, Australian *Energy Statistics – Energy Update 2011* (2015), <http://www.agriculture.gov.au/abares/publications/display?url=http://143.188.17.20/anrdl/DAFFService/display.php?fid=pe_abares99010610_12c.xml> at 13 June 2015.

Examination of the data shown in table 1 reveals the discrepancy between 'the estimated amount of electricity that will be acquired under the relevant acquisitions during the year'[40] and the actual consumption for that year.

Note the RET at the time of writing was ultimately to be 33 000 GWh. Watts[41] suggests that it is only once an event has occurred that the circumstances leading to that event can be examined and rationalised. It is therefore suggested that argument surrounding the rigid application of strict quantitative data, and various energy production targets, distracts from the philosophical intent to 'dilute' fossil fuelled energy production with non-polluting renewable energy sources. It is further suggested that political influences will likely alter the RET in the future.

It is suggested that the rigid adherence to what appears to be scientifically established or based data, has merely supported political argument which has become distracted from the prime objective – to replace polluting and limited energy resources with non-polluting and unlimited energy resources.

However Australia's use of solar energy is comparatively low when considered with the high rates of solar energy installations of other OECD countries. This is despite the findings of an Australian Bureau of Agriculture and Resource Economics (ABARE) report that 'Australia also has higher incident solar energy per unit land area than any other continent in the world.'[42]

The report suggests a primary influence in the exploitation of a country's solar resource is not the abundance of the resource, but rather 'the distribution of solar energy use amongst countries reflects government policy settings that encourage its use, rather than resource availability'. [43] It appears that, in Australia, political argument has become focussed on the economic aspects and has become based purely on fiscal analysis. That has further distracted from the central argument of combating atmospheric pollution through the use of fossil fuel.

The RET has become a very sensitive political issue between the socialist favouring ALP, the economist Liberal Party and the environmentalist Greens. In 2010 the Rudd ALP government increased the RET from its originally targeted 4.27 per cent for the 2010 year to 5.98 per cent, rising to 10.65 per cent (more than half way to its original target of 20 per cent by 2020) in 2013.[44]

The ALP government also introduced other legislation aimed at promoting sustainable projects such as its mining rental resource tax and a tax on carbon emissions. It is noted that

40 *Renewable Energy (Electricity) Act 2000* (Cth) s 39.

41 Duncan J Watts, *Everything is Obvious: How Common Sense Fails,* (2011) xiv.

42 Geoscience Australia and Australian Bureau of Agriculture and Resource Economics, Australian *Energy Resource Assessment* (2010) 264.

43 Ibid 264.

44 Australian Government, Clean Energy Regulator, *The Renewable Power Percentage Target* (2014) Renewable Energy Target <http://ret.cleanenergyregulator.gov.au/About-the-Schemes/About-the-renewable-power-percentage/Annual-targets> at 29 March 2015.

industry reacted strongly to those taxes, and a concerted political campaign focussed on repealing those taxes was conducted in 2010 to replace the ALP government with a more economically biased Liberal government.

In 2014, the Abbott Liberal government repealed both the mining tax and the carbon tax. Interestingly, the ultimate outcome of 20 per cent electricity generation from renewable sources by 2020 appears to have remained the RET for the Abbott Liberal government. However it also appears there was considerable political pressure to reduce, or even abolish, the RET for Australia in 2015.

To illustrate the political influence on the RET pricing mechanisms, Figure 7 presents an indication of how various political decisions have affected the market price of LGC market prices during the period 2003 – 11. This paper suggests that the market price for LGCs became less of an influence on reducing pollution, and became little short of a market place for speculation by 'investors' manipulated by varying political philosophies, which prevailed from time to time in the Australian Parliament.

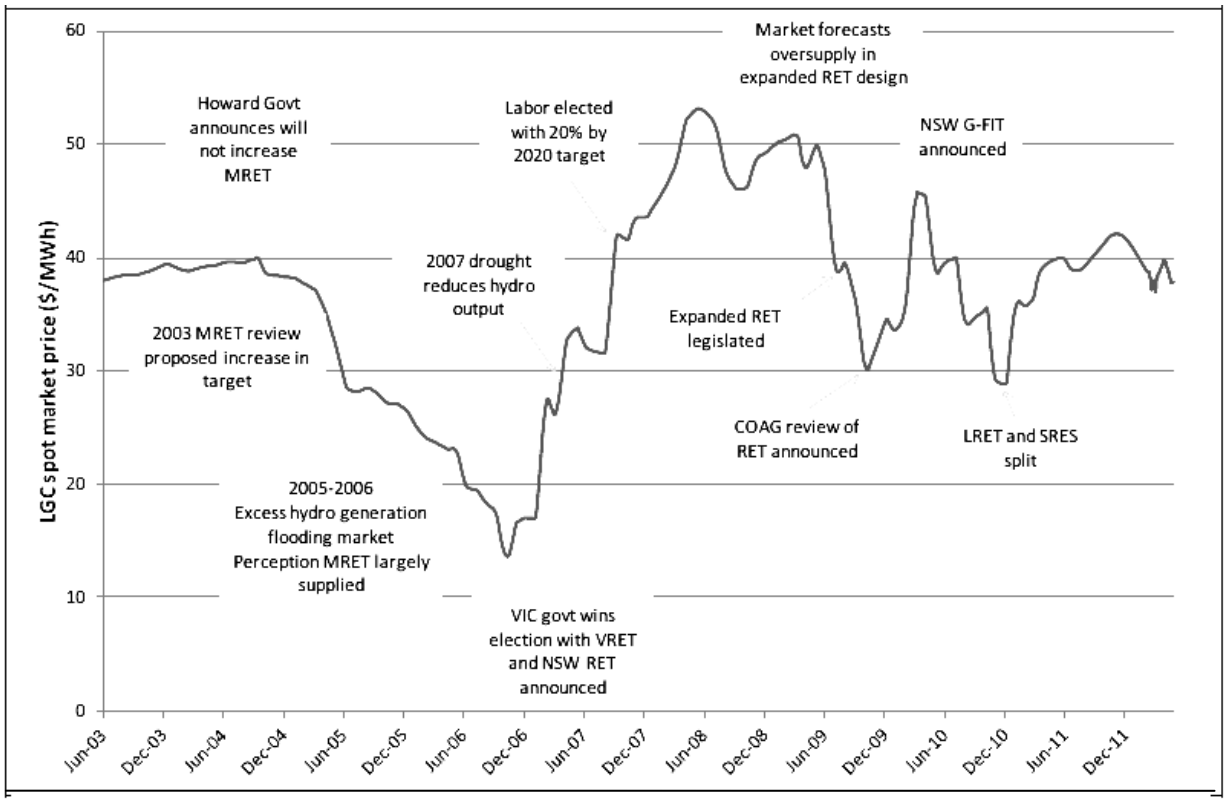

Figure 7: Political influences on the LGC/REC market prices 2003-11.[45]
(Source: ROAM Consulting Pty Ltd)

45 ROAM Consulting Pty Ltd, 'Solar Generation Australian Market Modelling' (Report to the Australian Solar Institute, 2012)38. Underlying spot price curve sourced from Green Energy Markets and the Clean Energy Council.

It is suggested that rather than attempt to accurately determine annual electricity consumption, which can only ever be forecasts or estimates at best, that a subjective approach be adopted to set the RET, and corresponding fossil fuelled energy tax rate.

To provide support for the concept of a subjective renewable power percentage for a desired annual RET the following rational is suggested. Data provided by the Australian Energy Regulator as to the National Electricity Market (NEM) electricity consumption illustrated in figure 8, suggests that Australia's total electricity consumption is somewhere in excess of roughly 200 000 GWh.

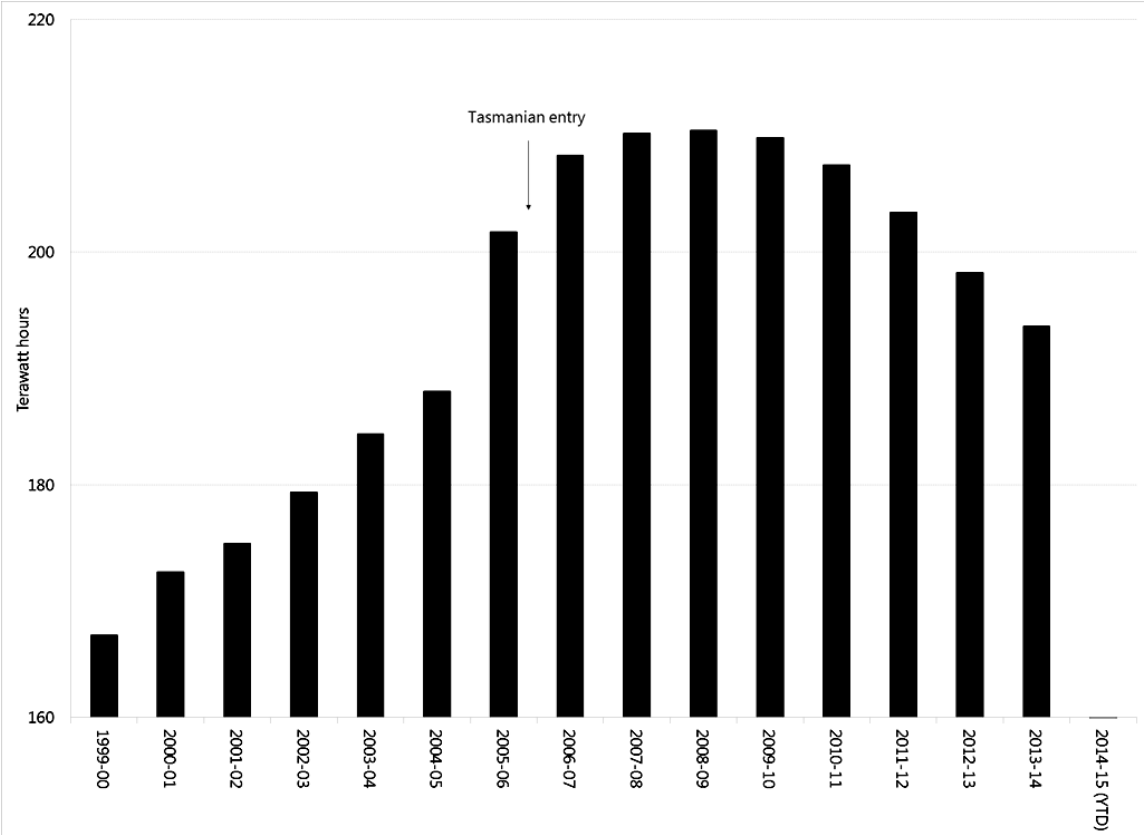

Figure 8: National Electricity Market electricity consumption 2000-14.
(Source: Australian Energy Regulator[46])

As the NEM does not include electricity consumption in Western Australia or the Northern Territory, a further statistical basis encompassing those states is considered. Table 1 includes those states but is also subject to some under-reporting. The data given in table 1 suggests the national average is closer to 240 000 GWh, though that data is some years out of date.

Be that as it may, if 200 000 GWh was accepted as a subjective baseline then the RET 'estimation' is simply a matter of deciding what percentage target is desired and the increment calculated from volume to percentage by dividing it by 2. That is a 20 per cent target is achieved be setting 40 000 GWh as the required GWh of renewable source electricity. Simplicity has long been held as one of the essential criteria of a 'good tax

46 Australian Energy Regulator *National Electricity Market electricity consumption* (2015) <https://www.aer.gov.au/node/9765> at 17 July 2015.

system'[47] and is the basis for this recommendation, it may not, however, be politically desirable to some parties.

5 THE IMPACT OF THE RET TO ENERGY GENERATORS.

Australia's Renewable Energy (Electricity) Act

Please note this discussion ignores the argument that fossil fuelled energy production has no effect on atmospheric pollution or 'climate change'. That philosophical position assumes that given there is no impact, no RET is required. However to address that viewpoint within the scope of this paper, the 'no impact' position requires no 'dilution' and therefore all rates of 'shortfall charges', and related calculations of fossil fuelled/renewable energy production, ratios and fiscal impacts would be set at zero.

Data provided by the Australian Energy Regulator shows that electricity consumption for the NEM[48] in 1999 – 2000, the year of the introduction of the REE Act, was 167 100 GWh.[49] As previously noted the NEM is limited to eastern Australia, therefore a broader indication of national consumption is provided from statistical data available from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABRES). That data indicates that the total electricity consumption for Australia for the 1999 – 2000 year was 210 230GWh.[50]

This analysis considers the ABRES data to examine section 40 of the REE Act which prescribed, that in order to attain 0.24 per cent of 'dilution' for the 2001 year, 300GWh of renewable sourced electricity was required. ABRES statistics reveal that in 2000 – 01 Australian electrical consumption was 224 641GWh. Therefore the 300GWh figure was a mere 0.13 per cent of the total consumption.

Assuming all electricity purchased was done so by 'liable entities'[51] then the volume of renewable energy certificates required to be surrendered in 2001 would have been:

224 641 000 MWh x (0.24/100) = 539 138.

To consider the economic forces of supply and demand on price the volume of RECs created in the 2001 year is examined. Data provided by the Clean Energy Regulator shows that 619 906 RECs were created in 2001 of the 1 708 454 eligible for creation. Therefore in 2001 supply exceeded demand by around 15 per cent. Examined in detail in the following section,

47 CCH Australia Ltd, *The Asprey Report: An Analysis*, (1975) 8.

48 The Australian Energy Regulator (AER) regulates energy markets and networks under national energy market legislation and rules. Its functions mostly relate to energy markets in eastern and southern Australia. The National Electricity Market (NEM), covers Queensland, NSW, Victoria, South Australia, Tasmania and the Australian Capital Territory (ACT). Australian Energy Regulator <https://www.aer.gov.au/> at 12 June 2015.

49 Australian Energy Regulator, *State of the Energy Market 2010*, (2010) 21, <https://www.aer.gov.au/> at 12 June 2015.

50 Australian Government, above n 39.

51 *Renewable Energy (Electricity) Act 2000* (Cth) s 35.

it is expected that the trade price of a REC in 2001 would have been somewhat less than its theoretic value of the shortfall charge and its 'tax effective' premium. As at July 2015 there were 655 RECs from 2001 that remained valid.[52]

The administrative position in 2010 remained relatively unchanged to that in 2001 save for the changes to the target volumes.

In 2010 the statistical position was –

Required GWh	12 500 GWh
Renewable Power Percentage	5.98 per cent
RECs generated	41 008 102
Electricity Generated	241 586 000 MWh

Therefore, in 2010 the requirement of 12 500 GWh of electricity to be produced from renewable sources as shown in table 1 to produce a theoretically based RET percentage for that year of 5.98 per cent, had actually risen to only 5.17 per cent of the total electrical consumption in real terms, and not the 5.98 per cent decided upon.

If it is assumed that all electricity purchased was done so by 'liable entities',[53] which in fact, given the numerous exempt power generators in Australia, it is not, then the volume of renewable energy certificates required to be surrendered in 2010 would have been:

241 586 000 MWh x (5.98/100) = 14 446 843.

Data provided by the Clean Energy Regulator shows that 35 524 421 RECs were created in 2010 of the 41 008 102 eligible for creation. As at July 2015 the 'oversupply' of RECs continues and at that time 784 362 RECs from 2010 remained valid.[54]

Detailed annual analysis of compliance of the RET targets is beyond the scope of this paper and some 14 years later, the above calculation has the benefit of hindsight. In 2000, when the RET was established, the projected results were no more than a 'best guess' scenario. Section 39 of the REE Act provides that the annual percentage is established by regulation. Failing that a percentage is set by regulation, it outlines a formula to establish the renewable power percentage. It should be noted that, despite appearing to be a very precise formula, based on scientific principles, it is an 'estimate'.[55]

52 Australian Government Clean Energy Regulator, *Register of Large-Scale Generation Certificates* <https://www.rec-registry.gov.au/rec-registry/app/public/lgc-register> at 13 June 2015.

53 *Renewable Energy (Electricity) Act 2000* (Cth) s 35.

54 Australian Government Clean Energy Regulator, *Register of Large-Scale Generation Certificates* <https://www.rec-registry.gov.au/rec-registry/app/public/lgc-register> at 13 June 2015.

55 *Renewable Energy (Electricity) Act 2000* (Cth) s 39 (3) (b).

Despite the inaccuracies in the 'dilution' calculations caused by forecasting models, and of course resistance from 'liable entities' to a new tax, the 'dilution' system began to work. Liable entities also found a few 'loop holes' in the legislation.

It is trite to state that where taxes exist; tax evasion and avoidance soon follow. The REE Act and its 'shortfall charge'[56] are no more than the imposition of a carbon tax, no matter how well disguised. That government's role is a little different in this scenario, the charge on 'liable entities' is akin to a tax and the creation of RECs for sale is a form of a government subsidy. In this case rather than flowing through 'general revenue' the two parties, (taxpayer and beneficiary) deal, more or less, directly.

The key 'tax avoidance' matter is the 'tax deductibility' of the 'shortfall charge'. Any charge made in accordance with the operation of the Act is not considered a 'business expense' and therefore not tax deductible.[57] On the other hand, if a 'liable entity' purchases a REC from an accredited (renewable energy) power station, the cost of purchase of that certificate, to avoid the tax, is considered to be a business expense and therefore is tax deductible.[58] Liable entities therefore prefer to purchase RECs and claim the cost as a tax benefit rather than pay the shortfall charge.

The accounting, or fiscal, implications between the payment of a non-deductible and the purchase of a deductible commodity raises the commercial value of a REC beyond the cost of the value of the shortfall charge of $A40. By purchasing a REC the liable party gains a commercial advantage of the amount of income tax that would otherwise have to be paid. In Australia during the years under consideration the corporate tax rate was 30 per cent.

A legal academic might refer to such a series of financial transactions as 'acceptable tax avoidance', that is the government has intentionally designed its legislation to operate in that fashion.

Therefore, with the introduction of the REE Act in 2000, the Australian government had effectively introduced a carbon tax and trading scheme, albeit that the accuracies of its RET were somewhat doubtful. That too, created an industry for scientists, lobbyists and commentators to investigate and debate the impacts of climate change, air pollution, the fairness of the tax regime, and so on.

For 10 years from its inception in 2001 until the end of 2010 the uptake of renewable energy and the carbon trading system established by the REE Act, its related legislation and regulations, remained relatively unchanged. The modest liability of one REC for every 400MWh of electricity traded in 2001, increased incrementally to 6 RECs for every 100MWh traded in 2010.

However Australia's reasonably effective and efficient 'carbon trading system' became complex and convoluted in 2011. The Rudd, ALP government, amended the REE Act to encourage the installation of small renewable energy generation units (SGUs). The

56 Ibid s 36.

57 Ibid, s 7A.

58 Letter from the Deputy Commissioner of Taxation to Alexander Fullarton, 5 January 2006 (Held by Author) Notice of Private [Tax] Ruling 59756.

amendments were targeted at encouraging households to install primarily solar pv and solar hot water systems in their homes. The discussion of solar hot water systems is beyond the scope of this paper other than to note such systems are also eligible to earn RECs.

The 2011 legislative amendments effectively added a second tier of RECs to a 'liable party's' requirement to surrender RECs in accordance with the volume of electricity purchased.

The REE Act was 'amended' as to the creation and surrender of RECs. Division 4 – creation of certificates which consisted of 11 sections contained within four pages of legislation was increased to 22 sections contained in 14 pages. The Act expanded from 102 pages in 2001 to 231 by 2015.

It is noted that tax legislation in Australia generally has evolved into an extremely complex and convoluted legal discipline. Examining of the fascinating history of Australia's income tax legislation is beyond the scope of this paper, however s 160 of the *Income Tax Assessment Act 1936* (Cth) (ITAA 1936) is referred to as an example of ever developing complexity of Australian taxing legislation.

The once single section, which had once related to a rebate in the case of disposal of assets of a business of primary production, by 1998 after an attempt was made by the Keating ALP government to 'reform' the legislation by at least renumbering the ITAA 1936, through its Tax Law Improvement Project (TLIP), [59] it had expanded to more than 63 entire Divisions of over 450 sections ranging from s 160 AAAA to s 160 ZZZJ.[60] Similarly s 23 of the REE Act had expanded into 10 sections and ranged from s 23 to s 23F.

Further, in 1997, an attempt to reform Australia's income tax legislation produced the outcome of a second income tax assessment act working in conjunction with the ITAA 1936. The *Income Tax Assessment Act 1997* (Cth) (ITAA 1997) was intended to entirely replace the ITAA 1936 but the process was truncated by a change of government and now Australia has two concurrent income tax assessment acts. Given the REE Act is a mere 15 years old compared to the ITAA 1936 of nearly 80, it will be interesting to see how far the complexity of the REE Act 2000 develops over the forthcoming 65 years.

In 2011 the Rudd ALP government adopted a policy of encouraging householders to install domestic solar pv systems. The intent was to create increased subsidies, funded by liable parties' to reduce the capital cost of primarily domestic installations.

The amendments to the REE Act created an additional class of REC – the Small-scale Technology Certificate (STC). The creation and required percent of that system of REC creation trade and surrender of those certificates was conceived to run in parallel with the RECs which were renamed Large-Scale Generation Certificates (LGC).

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59 The Keating ALP government attempted to reform the income tax legislation by introducing the *Income Tax Assessment Act 1997*. The *ITAA 1997* was to have eventually replaced the *ITAA 1936* over a suggested period of five years. Some changes did occur but the ALP lost government in 2000 and the opposing interests of the Liberal Party abandoned the Tax Law Improvement Project (TLIP) in favour of its A New Tax System (ANTS) series of tax legislation. Australia currently operates with two pieces of income tax legislation the *ITAA 1936* and the *ITAA 1997*.

60 *Income Tax Assessment Act 1936* (Cth).

This paper does not examine the STC system in depth, as its operations are complex and beyond the scope of the Solex project, which is an 'accredited' power station and therefore not considered a 'small generation unit'. That is despite the Solex solar farm being less than 100kW capacity in 2011.[61] However to provide the reader with background and context the following discussion is given to illustrate the role of political philosophy in enacting legislation aimed at encouraging renewable energy sources to reduce atmospheric pollution caused through the use of fossil fuelled energy based electricity generation.

A RET was not set for the STCs system but a renewable power percentage was regulated. Regulation 23A of the *Renewable Energy (Electricity) Regulations 2001* as amended in July 2015 set the small-scale technology percentage as following:

(a) for 2011—14.80%;
(b) for 2012—23.96%;
(c) for 2013—19.70%;
(d) for 2014—10.48%;
(e) for 2015—11.71%.

For comparison, the renewable power percentage for LGCs for the same years, as shown in table 1, is as following:

(k) for 2011— 5.62%;
(l) for 2012— 9.15%;
(m)for 2013—10.65%;
(n) for 2014— 9.87%;
(o) for 2015—11.11%.

The amendments of 2011, targeted at encouraging small domestic solar pv installations and solar hot water systems, are complex. Liable parties are required to comply with both renewable power percentages. Therefore they must purchase and surrender both LGCs and STCs to comply with the provisions of the REE Act in order to avoid the shortfall, which was increased to $A65 as part of the amendments.

As of January 2011 the total liability for 'liable parties' is therefore the combined cost of purchase and surrender of LGCs **AND** STCs.[62] Thus in 2012, for every 100MWh of energy purchased by a liable party, that party was required to surrender 9.15 LGCs AND 23.96 STCs. The total cost to the liable party in 2012, assuming it had purchased those certificates from a registered renewable energy generator in January 2012, would have been:

9 LGCs @ $A40.00 = $A 360.00
24 STCs @ $A32.50= $A 780.00
Total purchase = $A1 140.00[63]

61 Regulation 3 (2) (c) defines a *small generation unit* as being 'a device whose energy source is solar (photovoltaic) is a small generation unit if:

(i) it has a kW rating of no more than 100 kW; and
(ii) it generates no more than 250 MWh of electricity each year

62 Email from Timothy Huntly Gordon, Liable Party Accountant, to Alexander Robert Fullarton, 29 June 2015.

63 Prices sourced from Solex accounting records.

In terms of the basic unit of the energy market, the kilowatt hour (kWh) the impost was $A1140.00/ 100 000kWh or 1.14 cents/kWh. The effect of income tax benefit/liability to both parties is discussed in the following section.

However the fiscal advantage of purchasing the tax deductible credits over paying the non-tax deductible shortfall charge is obvious.

33 x $A65 = $A2 145 (2.145 c/kWh)

Accounting entries for the creation and surrender of RECs is reasonably simple. Fullarton has adopted a primary production style of 'livestock account'.

Given that livestock increase naturally, are purchased, sold, and die the accounting treatment of the creation, trade and surrender is considered, by Fullarton to be similar. The only exception being RECs cannot be killed for internal use (rations). However if a liable party, fossil fuelled generator was to construct a solar, or other renewable energy generation system to supplement its energy demands then it could surrender its own registered RECs and fulfil the conditions that would create that type of transaction.

The consideration of creating RECs in a similar way to breeding sheep or cattle supports the argument that solar energy harvesting is nearer to the concept of the primary producing activity of farming than it is to the industrial activity of fossil fuelled energy production through the use of internal combustion engines or similar mechanical device.

In the accounts of Solex a 'Renewable Energy Certificate Account' contains similar terminology as found in a primary producer's Livestock Trading Account, *mutatis mutandis*. It is noted that in Australia, a primary producer is not considered such under the ITAA 1997 simply due to the taxpayer 'carrying on a primary production business', the business must be defined as a 'primary production business' pursuant to section 995-1.

A detailed examination of political influence on tax legislation and administration in Australia is beyond the scope of this paper, however a brief illustration of the definition of primary production as it applies to solar farming is given to provide context.

Hunting of animals is not considered a primary production business as it lacks the consideration of animal husbandry. In Australia, a Kangaroo Shooter, who hunts the outback for kangaroos for meat and pelts, is subject to the vagrancies of the natural environment for his 'harvest'. He is not considered a primary producer. On the other hand a fisherman, who hunts in the sea for fish and crustaceans for meat and other products, who is also subject to the vagrancies of the natural environment, and who does not husband his livestock, is considered a primary producer. The difference is that fishing is defined as a primary production business in s 995-1, and hunting is not.

A cereal farmer who uses solar energy to grow his crops and harvests the product is considered as primary producer s 995-1, but at the time of writing this paper, a solar farmer who harvests solar energy to produce electricity is not. Therefore tax concessions provided to primary producers as defined in s 995-1 are not afforded to solar or wind farmers. That is despite the similarities of harvesting their products from the physical environment, and their production being subject to the vagrancies of the weather patterns of that environment.

There are other such convalescences in other Australian taxation legislation such as Australia's Goods and Services Tax (GST), however detailed discussion of Australia's taxation legislation per se is beyond the scope of this paper.

Australia's Carbon Tax 2011-14

It is noted, however that in addition to the RET legislation which is considered in this section, during the period 2011-14 Australia had a *Clean Energy Act 2011* (Cth) under which a carbon tax of $A23 per tonne of carbon dioxide emitted (a carbon unit) was levied on industries that emitted in excess of 25 000 tonnes of pollutant gases per annum.[64] Though detailed discussion of that legislation is beyond the scope of this paper, it is useful to briefly examine that legislation as the tax impacted on the market for RECs and the costs of operation to liable parties under the RET.

It is noted that the legislation defined a *carbon unit* and defined the cost in 2012 to be $A23 and rose each year to $A25.40 by 2014.[65] It appears that the carbon unit was to apply in a similar fashion to the shortfall charge of the REE Act and applied to CO_2 emissions rather than energy produced by a generator.

The Legislation was extremely complex, with many exemptions and off-sets for certain enterprises such as 'high emitters' and 'trade sensitive' industries. Also how the emissions were to be calculated was not explained in simple terms. Regulation 8.3 (5), quoted below, prescribed the method by which emissions, expressed in tonnes of CO_2 (equivalent), was to be calculated.

Regulation 8.3(5)

Step 1 — Work out the emissions ($\mathbf{E_{ij}}$), in CO_2-e tonnes, of each greenhouse gas (**j**) released by the operation of the facility during the relevant period from the combustion of each fuel (**i**) consumed by the facility for the purpose of producing electricity, as follows:

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ij}}{1\,000}$$

where:

***Q**_i* is the quantity of the fuel (**i**) consumed by the facility for the purpose of producing electricity as reported for the facility under subparagraph 4.22 (1) (a) (i) of the NGER regulations for the relevant period.

***EC**_i* is the energy content factor of the fuel (**i**) as reported for the facility under paragraph 4.07 (2) (a) or 3 (b) of the NGER regulations for the relevant period.

64 *Clean Energy Act 2011* (Cth) s 20(4).

65 *Clean Energy Act 2011* (Cth) ss 94 - 100.

***EF*$_{ij}$** is the emissions factor determined as follows:

(a) if Method 2, 3 or 4 was used for reporting the fuel (**i**) and gas (**j**) in relation to the facility under the NGER Act for the relevant period — the factor reported for the facility under paragraph 4.07 (3) (a) of the NGER regulations for the relevant period;

(b) in any other case — the factor specified in Schedule 1 to the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* for the relevant period.

Step 2 — Add together the **E**$_{ij}$ amounts worked out for the facility under step 1. [66]

The carbon units were then surrendered at a cost of $A23 each for every tonne of CO_2 emitted.

A model of how the carbon tax was to impact on the Australian economy was carried out in 2011 by Siriwardana, Meng and McNeill. The analysis suggested that with a carbon tax rate of $A23 per tonne

> Australia's real GDP may decline by 0.68 percent, consumer prices may rise by 0.75 percent, and the price of electricity may increase by about 26 percent as a result of the tax. Nevertheless it allows Australia to make a substantial cut in its CO2 emissions. The simulation results imply an emission reduction of about 12 percent in its first year of operation. The tax burden is unequally distributed among different household groups with low-income households carrying a relatively higher burden. [67]

This paper suggests that a closer cost of the carbon tax rate of $A23 per tonne, expressed in cents per kilowatt hour, and based on a generally accepted standard that 300 ml of diesel is required to generate 1kWh of electricity and produces 650mg of pollutant gas in doing so was more likely to be

1000l = 1000kWh = 650kg CO_2 or 0.65 tonne x $A23 = $A14.95/1000kWh = 1.495c/kWh.

Many states implemented charges to electricity prices to comply with the carbon tax but there appears to be little basis to establish a carbon tax rate of 2.1868c/kWh in Western Australia.[68]

66 Clean Energy Regulations 2011 (Cth) reg 8.3(5).

67 Mahinda Siriwardana, Sam Meng and Judith Mc Neill, 'The Impact of a Carbon Tax on the Australian Economy: Results from a CGE Model' (Working Paper No 2011 – 2, School of Business, Economics and Public Policy Faculty of the Professions, University of New England, 2011) 4.

68 The costs of the Carbon Tax levied by the Western Australian electricity utilities 2011-14 as indicated by the reduction in electricity tariff levied by Horizon Power to Solex 1 September 2014.

In late 2013 the Dairy Australia Limited commissioned an analysis of Australian Dairy Shed energy costs which

> revealed some indicators suggesting a 'rack' carbon price rate of $A0.022 to $A0.0235/kWh in Victoria, $A0.02368/kWh in Western Australia, and $A0.00375/kWh in Tasmania (reflecting that State's reliance on hydro-electricity). If passed on in full, this translated to $A0.80- $A6.40 a day, or 1.5-13% of total bills. However, the extent to which power companies passed on the carbon price in full or in part is unclear.[69]

Ultimately, political factors focussing on the economic costs of the carbon tax, and perhaps its inherent complexity which clearly lead to uncertainty in compliance requirements resulted in the carbon tax being repealed in 2014.

The Liberal Party of Australia ran an electoral campaign in 2013 that focussed, in part, on repealing the carbon tax. By the end of 2015 the Prime Minister remained focussed on the success of the government in repealing the carbon tax legislation. Australia continues to have a carbon tax in the form of the RET, and its accompanying legislation. In 2015 that cost is around $A52 per LGC and $A40 per STC or 1.046c/kWh or $A17.43 per tonne according to the above formula, and calculations.

The graph illustrated in figure 9 shows that Australia's carbon dioxide emissions peaked around 2005, continued to decline to around 2014 and have begun to rise since then. They are projected to be above the 2005 levels by around 2017. It appears that despite the successes of the RET and Carbon Tax Legislation in reducing Australia's carbon dioxide emissions, since the repeal of the Carbon Tax, Australia's emissions have begun to rise once more.[70] There may be other economic, social or environmental factors influencing that rise however the softening of the RET and the repeal of the carbon tax appear to be a strong influence on the reversal of the decline.

69 Dairy Australia, *Australian Dairy Shed Energy Costs* (2015) <http://www.dairyaustralia.com.au/~/media/Documents/Environment%20and%20Resources/22072014-Australian%20Dairy%20Shed%20Energy%20Costs-Fact%20Sheet-July14.pdf> at 8 August 2015.

70 Australian Government, Department of the Environment, *Australia's Emissions Projections 2014-15*, (2015).

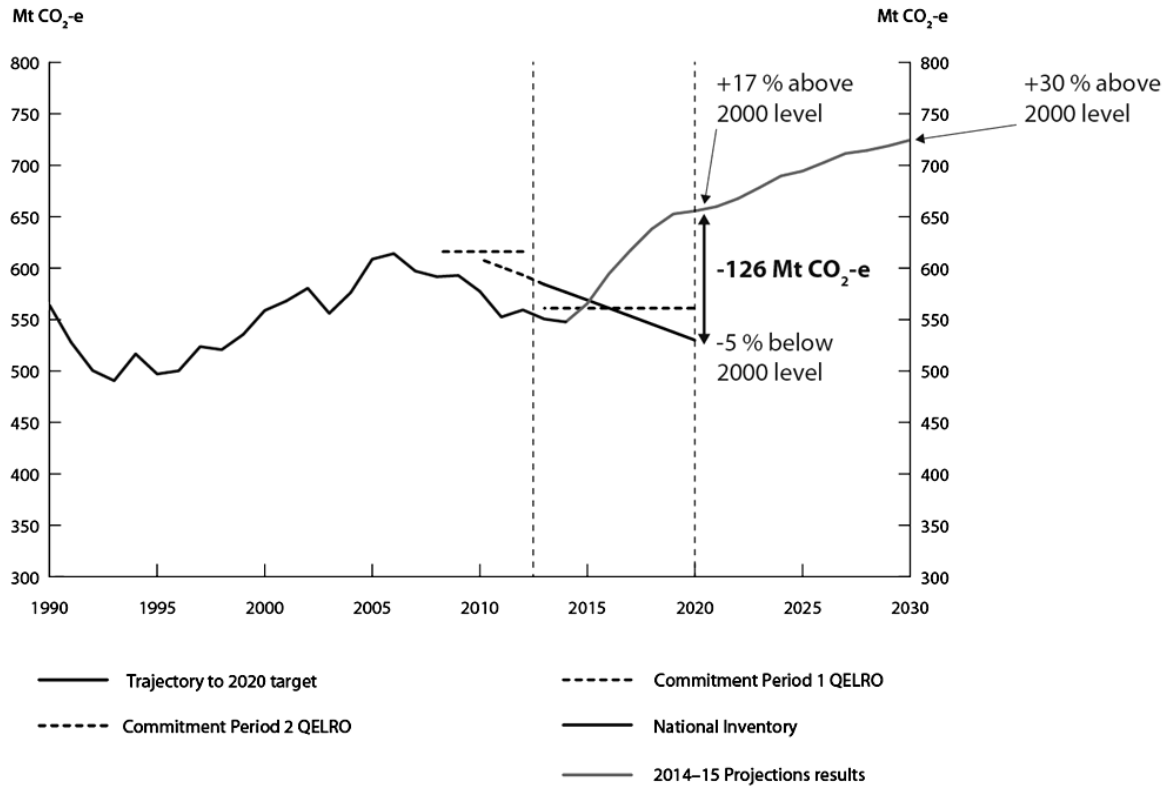

Figure 9: Australia's historical and projected emissions, along with the 2019-20 abatement task.
(Source: Australian Government, Department of the Environment, *Australia's Emissions Projections 2014-15*,)

It is suggested that the introduction of the carbon tax, in addition to the rising compliance costs imposed by the RET legislation, distorted the *economic*, *social and environmental* balance of the TBL in Australia and that economic interests influenced Australia's political landscape to 'restore' the balance. In 2013 economic interests prevailed over the social and environmental influencing factors of the TBL in the mind of Australian electors/taxpayers.

By the middle of 2015, social and environmental interests were opposing the economically driven interests of the Australian political landscape, and the RET remained a key focus of political groups and party policies and electoral platforms at that time.

To place Australia's anti-atmospheric pollution measures in a global context, by 2012 Australia had one of the highest emissions rate in the world. Figure 10 indicates that rate to be nearly double that of its fellow member countries of the Organisation for Economic Co-operation and Development (OECD) average.

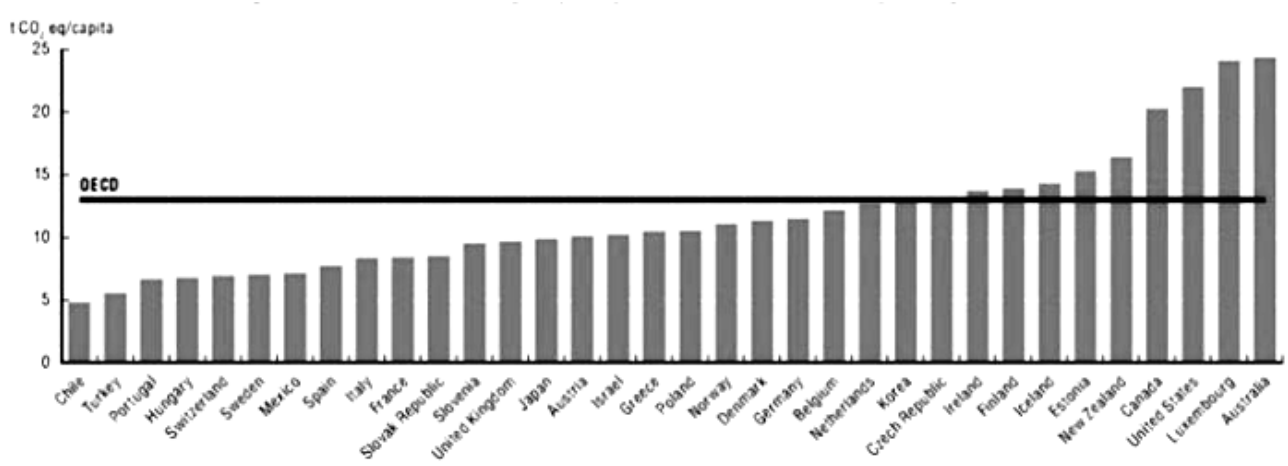

Figure 10: OECD national greenhouse gas emission intensities per capita, 2010.
(Source: OECD Environment Statistics (database), UNFCCC, Greenhouse Gas Inventory Data (2012).

As to amelioration of greenhouse gas emissions through renewable electricity generation, Table 2 shows Australia placed 18th on the United States of America's Energy Information Administration's list of OECD countries data base of renewable electricity generation volumes for 2012.

Rank	Country	2008	2009	2010	2011	2012
	OECD	1781.398	1834.263	1935.897	2073.911	2156.166
1	**United States**	392.7357	429.652	440.2314	527.4897	508.3602
2	**Canada**	384.587	379.476	366.247	398.286	397.344
3	**Germany**	93.98	99.251	109.635	126.78	142.685
4	**Norway**	139.051	125.309	116.988	120.883	142.412
5	**Japan**	106.065	106.833	115.238	117.692	122.368
6	**Sweden**	81.603	79.894	82.642	83.747	96.967
7	**Italy**	59.445	70.537	78.6	85.325	91.804
8	**Spain**	62.691	74.577	97.908	87.28	86.757
9	**France**	75.052	71.032	79.693	66.294	82.776
10	**Turkey**	34.165	37.869	55.319	57.686	64.637
11	**Austria**	44.775	47.352	45.162	42.473	50.881
12	**Mexico**	48.59	36.512	47.327	46.336	43.857
13	**United Kingdom**	23.292	26.902	27.124	36.254	40.2483
14	**Switzerland**	38.119	37.813	38.246	34.702	40.155
15	**New Zealand**	27.939	30.919	32.599	33.539	31.564
16	**Finland**	27.764	21.78	24.263	23.395	28.233
17	**Chile**	27.072	29.396	24.079	24.537	25.219
18	**Australia**	19.61	19.62	22.357	26.813	23.834
19	**Portugal**	14.86	18.507	28.52	24.257	19.314
20	**Iceland**	16.342	16.709	16.931	17.083	17.423
21	**Poland**	6.792	8.892	11.1045	12.9065	16.868
22	**Denmark**	10.951	10.82	13.151	14.682	14.674
23	**Netherlands**	10.995	12.346	12.763	14.026	12.063
24	**Belgium**	5.478	6.749	7.788	9.665	10.473
25	**Greece**	5.736	8.15	10.576	8.215	10.107
26	**Czech Republic**	3.721	4.639	5.9	7.218	8.016
27	**Korea, South**	4.427	4.751	6.341	7.536	7.123
28	**Slovakia**	4.542	4.8832	5.911	4.827	5.42
29	**Ireland**	3.578	4.0994	3.7254	5.4224	5.2294
30	**Slovenia**	4.271	4.862	4.702	3.846	4.283
31	**Hungary**	2.469	3.01	3.17	2.77	2.644
32	**Estonia**	0.197	0.541	1.044	1.181	1.477
33	**Israel**	0.025	0.099	0.147	0.313	0.475
34	**Luxembourg**	0.322	0.307	0.312	0.302	0.327
35	**Puerto Rico**	0.156	0.174	0.153	0.149	0.148

Table 2: OECD countries volumes of renewable electricity generation 2008-12.
(source: United States of America's Energy Information Administration)

Australia's 23 834 GWh compares with Chile's at 25 219 GWh and Portugal at 19 314 GWh but is far behind that of the United State (508 360 GWh), Canada (397 344GWh), Germany (142 685 GWh), Norway (142 412 GWh) and Japan (122 368 GWh).[71]

It is important to note this data is for total renewable energy generation which includes hydro-electric generation and other systems beyond the scope of this paper. In addition not

71 US Energy Information Administration *International Energy Statistics* (2012) <http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=6&pid=29&aid=12&cid=CG5,&syid=2008&eyid=2012&unit=BKWH> at 29 August 2015.

all renewable energy generators are subject to Australia's renewable energy legislation as they may have been in operation prior to 2000. Therefore comparison of data shown in table 2 with the data in table 1, or other data in this paper, may not reconcile. This comparison is to indicate Australia's global position in renewable energy generation only.

It is significant to differentiate between rates of greenhouse gas emissions as illustrated in figure 12 and renewable energy generation volumes shown in table 2. Australia's renewable energy generation volume shown in table 2 may be reasonably high at nearly 24 000 GWH, however as it has the highest rate of emissions at nearly twice that of its fellow members of the OECD it remains a net polluter. In order to reverse the impact of greenhouse gas emissions Australia needs not only to increase its renewable energy generation but also to decrease its per capita emission intensity.

A considerable influence in addressing those factors is the perspective of the government of Australia in considering the influencing factors of the TBL. In 2015, the perspective of the Liberal Party of Australia as to the relationship between environmental and economic influences of the TBL was indicated in an address given by the Prime Minister to the South Australian Liberal party annual meeting.[72]

> When it comes to emissions per capita, our target – a target that we are absolutely confident that we can and will meet – is the best in the world. So, let's not have anyone say that this is a Government which is indifferent to environmental outcomes. This Government cares passionately about the environment. We only have one planet. We must leave it in better shape for our children and our grandchildren but the last thing we should ever do is clobber the economy to protect the environment because if we clobber the economy, the environment will surely suffer.

This statement appears to indicate that the Liberal Party places economic interests above environmental interests when considering greenhouse gas emission reduction measures. That perspective is consistent with the representation illustrated earlier in figure 5.

In conclusion, it is noted that the Australia's approach to reducing atmospheric pollution, through the implementation of the RET system, is essentially an enforceable limit of industrial carbon dioxide emissions through the use of tracing the issue, trade and surrender of registrable certificates – a 'cap and trade system'. Detailed discussion of that concept of combating pollution is beyond the scope of this paper.

The solar farm provides Solex with a renewable energy source that competes directly with other fossil fuelled reliant industries. That renewable energy source provides a production and marketing advantage to the Solex project. This discussion describes how the Solex project is an economic beneficiary of the Australian RET scheme.

This section has looked at the principles and the basic operation of Australia's RET in terms of volumes of the creation and consumption of carbon credits. To provide clarity of the impact of the RET system in fiscal terms, the following section examines the operation of the RET carbon trading system in monetary terms.

72 Anthony John Abbott, 'Address to the South Australian Liberal Party Annual General Meeting' (Speech delivered at the South Australian Liberal Party Annual General Meeting, Adelaide, 15 August 2015).

6 ACCOUNTING FOR THE RET.

The preceding section examined the structure of Australia's RET system from a philosophical perspective – the reason for the legislation and the principles of its operation. In that examination similarities with taxation legislation were considered. The *ITAA 1936* was compared to the RET and Carbon Tax legislation to illustrate the economic and social impacts of political differing political philosophies of governments on legislation.

To provide clarity for the reader, the fiscal examination of the treatment of accounting entries in the financial reports of liable parties is provided here inclusive of the income tax implications of the RET.

A tax is defined as 'a compulsory monetary contribution demanded by a government for its support'.[73] There is no compulsion on a government to apply tax revenue in any particular manner. Revenue raised from tobacco taxes may be spent on railway infrastructure or parliamentary travel. Alternatively the tax revenue may be allocated to expenditure cancer research or medical and hospital facilities.

Similarly the previously examined carbon tax was purely to the benefit of government revenue. It was not directly allocated to renewable energy infrastructure but according to the socially based policies of the ALP government of the day some of the revenue was allocated to reduction of income tax of lower income earning taxpayers and to social welfare benefits for pensioners. There was no compulsion for the government to match that revenue with expenditure on renewable energy infrastructure.

However an alternative legislative approach to the RET legislation may have been by way of the taxation system where liable parties could have been levied with a 'pollution' tax and the revenue raised allocated to subsidies, grants or rebates paid to renewable energy producers.

The RET system imposes a liability on fossil fuelled energy generators based on the amount of energy they produce. It is, effectively, a consumption tax. The purchase of RECs in order to comply with the RET requirements in lieu of a non-tax-deductible fine or penalty is a system of tax avoidance.

Therefore this paper considers the imposition of purchasing and surrendering RECs, by way of a composite purchase of LGCs and STCs, by a liable party is reasonably considered a tax on those liable parties. The revenue received by renewable energy producers is similar to a rebate, subsidy of grant from the government. In that manner the RET system permits a direct transfer of revenue from liable parties to renewable energy producers around the taxation system.

This section now looks at the accounting treatment of those fiscal transactions and the income tax implications thereof.

73 Bernard et al, above n 3, 1255.

In order to examine the relationship of non-tax deductible expenses to tax deductible expenses in revenue terms the following formula is provided.

Value of non-tax deductible penalty = p
Value of tax deductible REC = r
Tax rate = t

$$\frac{p}{1-t} = r$$

Prior to 2011the 'shortfall charge' was set at $A40,[74] the Australian corporate tax rate prevailing in the period 2001-10 was 30 percent, therefore the value of a REC, in accounting terms, to account for the effect of taxation created a before tax market value of a REC to be:

$$\$A40/(1-0.3) = \$A57.14$$

In 2011 the shortfall charge was raised to $A65[75] for both LGCs and STCs, the corporate tax rate remained unchanged at 30 per cent therefore the before tax market value rose to:

$$\$A65/(1-0.3) = \$A92.86$$

In fact, as illustrated in figure 9, due to the free market forces of supply and demand, the traded price of RECs never reached those levels.

The sale of RECs/LGCs created from harvesting renewable solar energy forms part of Solex's revenue. The following extract of Solex's accounts illustrates its method of accounting for the creation and sale of RECs/LGCs.

Extract of Solex accounts 30th June 2010
Renewable Energy Credits (Livestock A/c)

		Number	Value		
Sales				$A0.00	
less	Opening Stock	34	$A1,467.72		
	Natural Increase	182			
	Purchases	157	$A7,065.00		
		373	$A8,532.72		
less	Closing Stock	373	$A15,812.72	$A7,280.00	-
Gross Profit from RECs					**$A7,280.00**

A liable party's accounts do not reflect similar accounting treatment as the entity does not 'breed' or manufacture RECs. The accounts of the liable party disclose the purchase of RECs as a revenue item in its expense account. Alternatively the disclosure of the shortfall charge

74 *Renewable Energy (Electricity) (Charge) Act 2000* (Cth) s 6.

75 *Renewable Energy (Electricity) (Large-scale Generation Shortfall Charge) Act 2000* (Cth) s 6; *Renewable Energy (Electricity) (Small-scale Technology Shortfall Charge) Act 2010* (Cth) s 6.

is disclosed as a taxation expense in its profit distribution account, as it does with other taxes, dividends and the like.

7 SUMMARY

This paper has examined the concept of sustainable development and the need to consider its 'three pillars' – the social, economic and environmental impacts as one interrelated concept – the *triple bottom line* (TBL). The rationale of the TBL is that no single influence can exist in isolation for an indeterminate period of time. An imbalance between the three overarching factors in favour of one over the interests of the other two will adversely affect the others and ultimately itself. An enterprise focussed solely on profit, at the expense of society and the environment, will not be able to be sustained indefinitely.

The paper focussed on the impact of carbon emissions caused by industrialisation, and its reliance on fossil fuelled energy sources. It briefly examined how the carbon cycle functions and successive Australian governments' legislative attempts to address carbon emissions to mitigate the impact of greenhouse gasses on global warming.

Finally it placed the impact of those legislative requirements on industry to dilute carbon emissions with energy sourced from renewable sources in the context of how the Solex project receives economic benefits from that legislative intervention. It also notes the distinction between national rates of greenhouse gas emissions on a per capita basis and the total annual greenhouse gases emitted by nations.

Australia has a relatively low annual volume of greenhouse gas emissions and a moderate renewable energy electrical generation program when compared to its fellow OECD member nations. However it also has the highest per capita emission rate of the OECD member nations at nearly double the OECD average.

The relatively low emission volumes, disguised by it sparsely populated nation, which covers an area comparable to the entire United State of America with less than 10 per cent of the US population at around 22 million persons. Gives rise to the belief that Australia does not have a greenhouse gas emission problem. In 2015, the attitude of the Australian government towards environmental conservation is being distorted by preferences towards economic considerations of the TBL.

The physical environment in which the Solex project is located, and how it was developed, is discussed in another paper, yet to be written. That paper provides background and context to demonstrate how renewable energy can effectively compete in an industrial application which was previously the realm of fossil fuel – an alternative use for alternative energy pioneered in Australia's Outback.

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