Taxing Concern?
The Performance of the Green Power Scheme in Australia

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Number 31

August 2000

THE AUSTRALIA INSTITUTE

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Discussion Paper Number 31
August 2000

ISSN 1322-5421

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Executive Summary

This paper examines the effectiveness of the Green Power scheme in encouraging the use of low-emission forms of electricity. Under the Green Power scheme consumers can elect to pay a premium price for their electricity in order to contribute funds towards the purchase and development of alternative energy sources. It is argued that this scheme is an ineffective and inefficient way to achieve the objective of reduced greenhouse gas emissions. This problem is due to the existence of major market failures and the expense incurred in marketing the scheme. It is also argued that the scheme is inequitable and amounts to a 'tax on concern'.

The major market failure in the electricity industry is the existence of negative externalities associated with the release of carbon dioxide when fossil fuels are burnt. Carbon dioxide is a major cause of the greenhouse effect. To overcome this external effect, economic theory advocates that price incentives be put in place to ensure that the use of coal-fired electricity is discouraged and renewable sources encouraged. The Green Power scheme relies on the opposite approach, creating a price premium for 'clean' electricity and a price discount for 'dirty' sources of power.

On the basis of data on the outcomes of the scheme, it is concluded that participation in the Green Power scheme is much lower than was originally expected and that the scheme has had no significant impact on greenhouse gas emissions. While 65 per cent of customers expressed a willingness to pay more for Green Power, after four years of operation fewer then 2 per cent of residential customers are actually participating.

Rather than passing on to consumers the lower prices that are flowing from deregulation of the electricity market, the Federal Government should impose a carbon tax, initially at a low level, to at least maintain the wholesale price of coal-fired electricity. This will discourage increased reliance on coal-fired electricity, raise substantially more revenue than the Green Power scheme and ensure that the right price signals are sent in the market.

1. Introduction

The first Green Power product in Australia, Energy Australia's 'Pure Energy' began operating in 1996. Since then most electricity retailers have introduced similar products. The purpose of the Green Power scheme, coordinated by the Sustainable Energy Development Authority in NSW, is to encourage the use of electricity generated from renewable sources. Since the financial cost of generating electricity from such sources is higher, customers are required to pay a premium price. These schemes are now offered by most Australian retailers to both residential and commercial customers and commit customers to either regular 'contributions' or to paying a higher price per kilowatt hour (KWh) for their electricity usage.

This paper analyses the effectiveness of the Green Power scheme. It will focus on the types of market failures that exist in the electricity industry and consider the extent to which these failures are likely to be overcome by policies such as Green Power.

Using data on participation in Green Power schemes, it is shown that, despite steady growth since their inception, the number of Green Power customers is still extremely small with demand for Green Power yet to exceed the capacity that was already in existence before the scheme was implemented (Sonneborn and Russell 1999).

The paper focuses on the 'consumption-based' Green Power products and ignores discussion of 'contribution-based' products. Consumption-based products attempt to associate the increased financial cost of supplying renewable electricity with a higher price, while contribution-based products simply allow for regular or intermittent donations, such as the rounding up of bills to the nearest dollar. The latter are only tokenistic.

The paper begins with an examination of the Green Power scheme. It then outlines some of the fundamental difficulties in attempting to solve problems of market failure by relying more heavily on market forces in an increasingly deregulated industry. It then considers the amount of revenue raised by voluntary schemes and compares this revenue with potential revenue raised from a carbon levy.

2. The Green Power Scheme

Green Power schemes began operation in Australia in 1996 with a trial scheme run by Energy Australia in Newcastle. Green Power is now available to most electricity consumers in Australia. The stated objective of Green Power is to reduce the amount of greenhouse gas emissions resulting from the generation of electricity (SEDA 2000). In the words of the NSW Sustainable Energy Development Authority: 'When you join a government approved Green Power scheme, your electricity company agrees to buy electricity from renewable sources, replacing electricity that would have been generated at a coal-fired power station' (SEDA 2000a).

The nature of the electricity distribution grid, however, is such that individual customers cannot be supplied electricity from a particular source. Rather, electricity supplied to the grid by all power generators becomes a homogenous product, with all electricity customers receiving a 'mix' of electricity from various generators regardless of their participation in the Green Power scheme. Green Power customers are not purchasing a different product to other electricity consumers. They are volunteering to help fund research, development and capital expenditure associated with the provision of renewable energy.

The rationale for an individual's participation in Green Power is that by doing so it will encourage electricity retailers to source more of their electricity from renewable sources. That is, if customers express a willingness to pay a premium price for 'clean' energy then electricity retailers will be willing to pay the generators of renewable electricity the higher prices necessary to cover the higher costs of generating renewable electricity. It is therefore argued by advocates of Green Power schemes that as more people join, a greater proportion of the total electricity supply will be sourced from renewable sources.

Another important dimension to the Green Power scheme is its role as a marketing tool. Whilst the effectiveness of relying on marketing to overcome substantial market failure will be discussed further below, the acceptance of the existence, cause and likely consequences of the greenhouse effect that is evident in the marketing of Green Power should not be overlooked. According to the marketing brochure sent to Energy Australia customers in the Newcastle trial '(a)n increase in ...(greenhouse gasses)...will intensify the greenhouse effect and raise the earth's average temperature' (Energy Australia 1997).

Similarly, the Energy Australia web site currently states that:

> By utilising renewable energy sources, the environmental impact from the continued build-up of greenhouse gases leading to global warming is minimised. When one considers that the last 10 years have been the hottest on record and that this trend is expected to continue, Pure Energy is more than a responsible investment. (Energy Australia 2000)

The following sections will evaluate the effectiveness of relying on a voluntary approach to the greenhouse problem. This analysis will begin with a theoretical appraisal of the operation of the scheme. Data on participation over the past two years (the only period for which data is available) will then be presented and discussed.

3. Market Failure in the Electricity Industry

The quotations provided above show that there is little doubt, even amongst the retailers of coal-fired electricity, that the burning of coal is the major source of carbon dioxide emissions in Australia and that such emissions are likely to have a substantial effect on the global environment within our children's lifetimes. Such an unintended outcome is clearly a negative externality, the existence of which, if resources are to be efficiently allocated, must be incorporated into any policy solution.

The existence of externalities, and the solution of a Pigouvian tax, have a long history in the economics literature. Systems of licensing and quotas to reduce negative externalities have also been discussed at length. More recently, economists have focussed on alternatives such as tradeable quotas as a means to ensure least cost implementation of necessary abatement.

This paper is concerned with the effectiveness of a different approach; volunteerism. The role for voluntary action in resolving market failure was first suggested by Coase (1960). Coase's theorem set out the conditions under which individuals' actions would converge towards the optimal outcome. In part, these assumptions include:

- complete property rights;
- zero transaction costs;
- perfect information; and
- the absence of free riders.

While the work of Coase has been influential within the economics literature, little, if any, policy has been based upon its conclusions. There are several reasons for this. Coase essentially assumes that the outcomes of perfect competition can be replicated in an unregulated market even when market failure such as externalities exist. The need to rely on the remaining assumptions of perfect competition, particularly the existence of complete property rights, costless information and the absence of free riders, however, led to Coase's theorem being of more interest to economists than policy makers. As Green Power does nothing to overcome the absence of property rights covering atmospheric pollution Coase's theorem cannot be relied upon as a foundation for those expecting Green Power to overcome market failure.

In addition, the assumption that individuals will not act as free riders plays an important, but contradictory, role for advocates of reliance on voluntary rather than regulatory solutions to market failure. When a good or service generates benefits that are both non-excludable and non-rival then it is said to be a public good. Public goods can only be efficiently supplied by the government, as only the government has the capacity to extract payment through compulsory taxation. If left to the market the quantity supplied will be sub-optimal because 'free riders' behaving in their self-interest, will elect to receive the benefits associated with the good or service but choose not to pay. Advocates of voluntary approaches are faced with a contradiction. On the one hand voluntary approaches are considered to be superior to interventionist ones as

they rely on the efficiency of self-interested parties making rational decisions. At the same time however, they assume that individuals will be willing to overcome their self-interest and voluntarily contribute to the cost of running the scheme in question. The underlying assumptions of deregulation and reliance on voluntary action are incompatible.

4. Equity Considerations for Voluntary Schemes

Equity is another important aspect of relying on voluntary schemes. While a carbon tax would raise revenue according to an individual's or firm's contribution to the problem, and an income tax would raise revenue based on an individual's capacity to pay, the result of a voluntary scheme is the equivalent of a tax on environmental concern. That is, only those people who are both informed enough about the extent of global warming and concerned enough to participate in a voluntary scheme will incur any financial penalty. Yet any potential benefits associated with their actions will be distributed evenly throughout the community.

Such an approach runs contrary to the 'polluter pays' approach. The setting of the default option as non-participation also creates an environment where underreaction is more likely than overreaction. Such an approach, given the magnitude of the problem needing redress, is also a violation of the precautionary principle.

One final concern relating to equity arises from the fact that at present 79 per cent of the energy sourced from renewable generators and sold as Green Power is generated by power sources that already existed when the Green Power scheme was implemented (SEDA 2000b). That is, the vast majority of Green Power capacity was already in existence. Green Power customers are being asked to pay a premium price for electricity from sources that had already been constructed before the builders knew it would be possible to sell such power at a premium price.

SEDA stipulates that 60 per cent of a retailer's Green Power should come from 'new' sources, that is, generators built after the implementation of the scheme. The most recent audit of the scheme indicates that at present only 21 per cent of Green Power comes from such sources. Given the extent of the excess capacity that already exists in the Green Power, the form and extent of the sanctions that will be imposed on those who fail to meet this requirement will be important. Such detail is not available in the most recent audit of the scheme (SEDA 2000b).

A further equity consideration arises from the introduction of the '2% renewables target'. While this bill is still before Parliament it is expected that, by 2010, retailers of electricity will have to source an additional 2 per cent of their supply from renewable sources. Under such circumstances it is likely that, in addition to ensuring that the Green Power scheme attracts supply from 'new'[1] renewable generators, retailers will have to source Green Power from schemes that are not contributing to meet the 2 per cent target. If this is not the case then Green Power customers would be paying a premium price to help retailers meet their statutory responsibilities.

[1] That is post 1997 capacity.

5. Efficiency Considerations for Voluntary Schemes

Taxes are levied, products are marketed; the costs and responsibilities of these mechanisms are substantially different. When a government announces a change in its tax regime, that change becomes law. It is the responsibility of agents to comply with those laws. Most taxes are collected from distributors or employers, rather than consumers or employees directly. This system simplifies the task of both collection and the dissemination of information. Companies employ accountants and auditors to ensure that they comply with all relevant tax laws. Achieving a high rate of tax compliance is therefore relatively easy.

Marketing a product, on the other hand, requires a large amount of time, imagination and money to ensure that not only are people aware of new products, but that they are convinced of the need to purchase it. Unlike taxation, in the case of product marketing, people's default behaviour is to not purchase.

This basic difference between levying taxes and marketing products raises the issue of the relative efficiency of relying on a voluntary system to raise funds for Green Power. Not only is the amount of voluntary funding quite small (see below) but the resources required to extract that funding are substantial. Television advertising for Sydney costs up to $10,000 for a 30 second commercial, similar amounts are necessary to purchase full-page advertisements in newspapers, and the production costs of TV advertisement such as that used by SEDA is likely to be in excess of $150,000.[2] Compared to the estimated revenues accruing from Green Power schemes these costs are substantial. The annual report by SEDA (SEDA 2000b) on the performance of Green Power makes no mention of the annual advertising budget.

The efficiency of a tax can be defined with reference both to its impact on people's behaviour and its cost of collection. Voluntary schemes have changed the behaviour of fewer than 2 per cent of the eligible customers (SEDA 2000c). More importantly, the marketing and administration expenditure required to achieve that change is likely to account for a large portion of the revenue collected.

Finally, in a deregulated market the effectiveness of relying on higher prices to encourage use of a particular product must be questioned. While the results presented below suggest that few people are likely to participate, the success of Green Power, were it to be achieved, would raise doubts about the merit of deregulating the electricity industry. That is, if advertising could succeed in convincing a substantial number of consumers to pay more for their electricity than necessary, then the market cannot be described as a competitive one. Rather than customers putting pressure on retailers to seek efficiencies and continuously lower the input cost of electricity, the likely outcome of such a market would be growth in non-price competition, increased costs, increased barriers to entry and the potential for reduced technical efficiency. An analysis of the number of people who have elected to participate in such schemes, as well as the amounts of revenue expended, is presented below.

[2] Unfortunately the exact costs associated with such activities have not been publicly revealed. The annual audit of the program could provide a detailed outline of advertising and administrative expenses if it sought to inform policy makers on the efficiency of the Green Power program.

6. Performance of Green Power to Date

After four years of operation fewer than 2 per cent of residential customers are participating in the Green Power program. Fewer than 2000 firms are currently participating nationwide (SEDA 2000b). Whilst supporters of the Green Power scheme claim publicly that such results are an indicator of success, reference to a range of different criteria indicate otherwise.

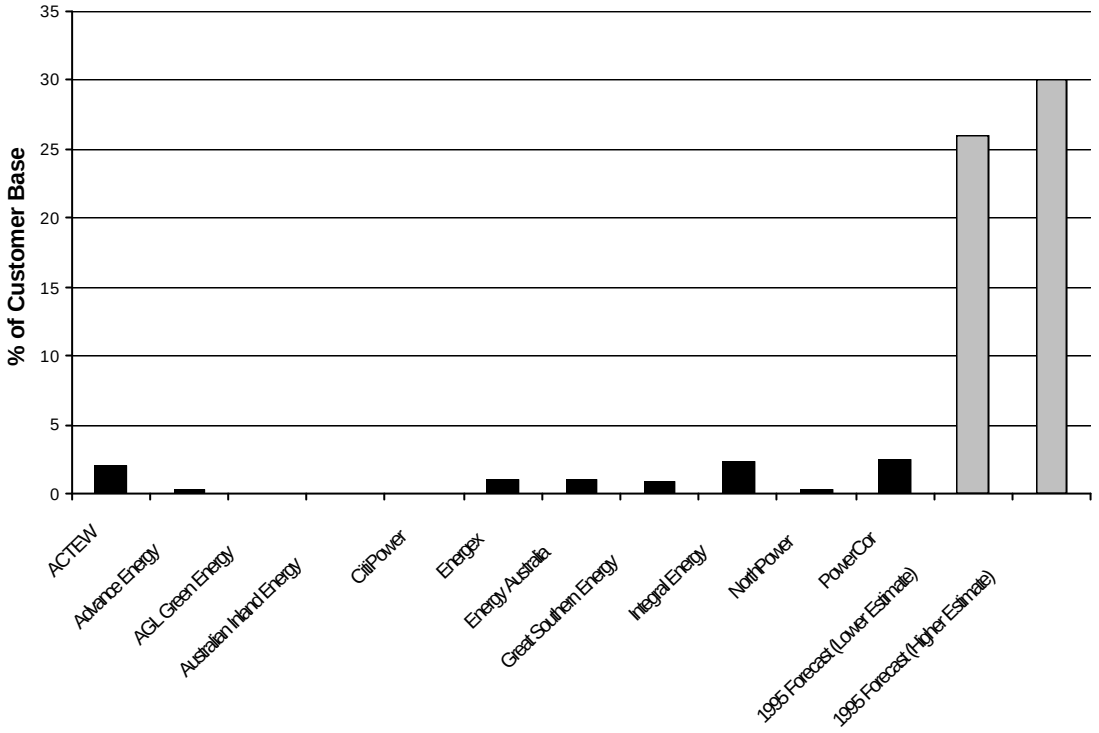
Firstly, when launched in 1997 Energy Australia referred to market research that indicated that 65 per cent of its customers had expressed a willingness to pay more for electricity that came from 'green sources' (Energy Australia 1996). Withers *et al.* (1994) also found that, on average, people were willing to fund a 15 per cent increase in government expenditures on the environment with increased taxes. In market research conducted for Orion Energy, Green Power Services (1995) forecast that by the year 2000 participation in Green Power schemes would be between a lower estimate of 26 per cent of residential customers and a higher estimate of 30 per cent (Green Power Services 1995:2). In a poll by AC Neilsen (1998), 67 per cent of respondents indicated that they would be 'very likely' or 'likely' to contribute to Green Power schemes. Between 12 and 14 per cent of business customers were also expected to participate voluntarily. The actual performance of the various Green Power schemes is compared with the forecast performance in Figure 1.

Another way of assessing the performance of Green Power is to consider the amount of greenhouse gas emissions that have been abated due to its introduction. Sales of renewable energy under the Green Power program were equal to 135,826 MWh in 1998/99 (SEDA 2000b). Of this total only 39,689 MWh (29%) came from generators built after the Green Power began operation. To put the scale of Green power in perspective, of the total amount of electricity consumed in 1998 (55,920,000 MWh) Green Power accounted for 0.24% (NSW Ministry of Energy 1999, SEDA 200b)

Another method for determining the success or otherwise of the Green Power scheme is to compare the amount of Green Power energy sales to the generating capacity of the Green Power approved sites. Although detailed information on the sources of Green Power used by individual retailers is not available, Sonneborn and Russell (1999:3) estimate that sales of Green Power account for less than one third of the renewable energy generation capacity that existed prior to 1997.

More promisingly, Figure 2 shows the increase in participation that distributors of Green Power products have reported over the year to May 2000. While such growth is encouraging, participation remains substantially lower than expected. Similarly, the gap between the number of people expressing a willingness to participate and the number that actually does so remains substantial. If new customers continue to join up at the rate that has been achieved over the last year then it will be more than 20 years before 1 million households are participants.

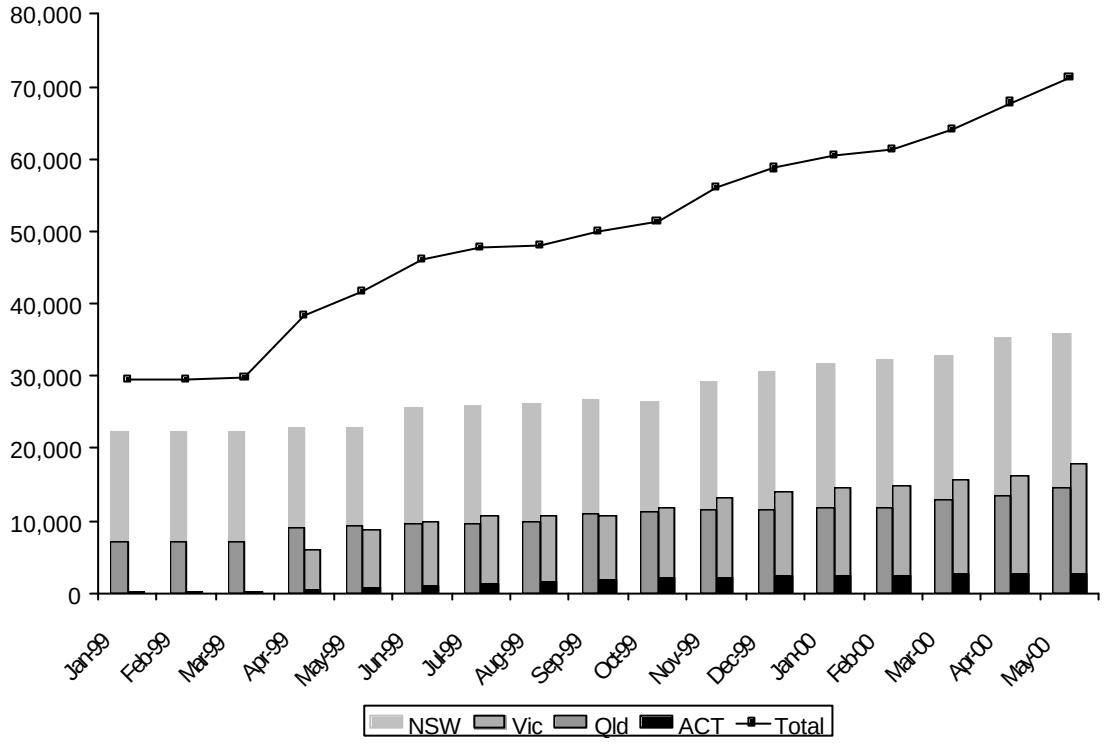
Figure 1 Comparison of actual and forecast participation



Source: SEDA Audit (2000b); Green Power Services (1995).

Figure 3 demonstrates a major problem with reliance on voluntary schemes; customer retention. Unlike a tax, voluntary schemes must not only seek to encourage new members; they must also work at maintaining the existing customer base. Energy Australia, the retailer with the longest history of providing Green Power products, experienced a substantial decline in participation during 1999. Such a decline indicates that it is not only difficult to attract participants to the Green Power scheme, but that retaining them may also provide difficulties. While increased and refined advertising designed to reinforce the decision to participate may be beneficial, and presumably led to the subsequent surge in participation from mid-1999, such an approach is likely to have a substantial impact on the amount of funds available for investment in new renewable capacity. That is, greater advertising effort comes at the expense of increased investment in renewable capacity. No information regarding the operating costs of the SEDA program or the costs incurred by the electricity retailers is provided in the annual Green Power audit (SEDA 2000b).

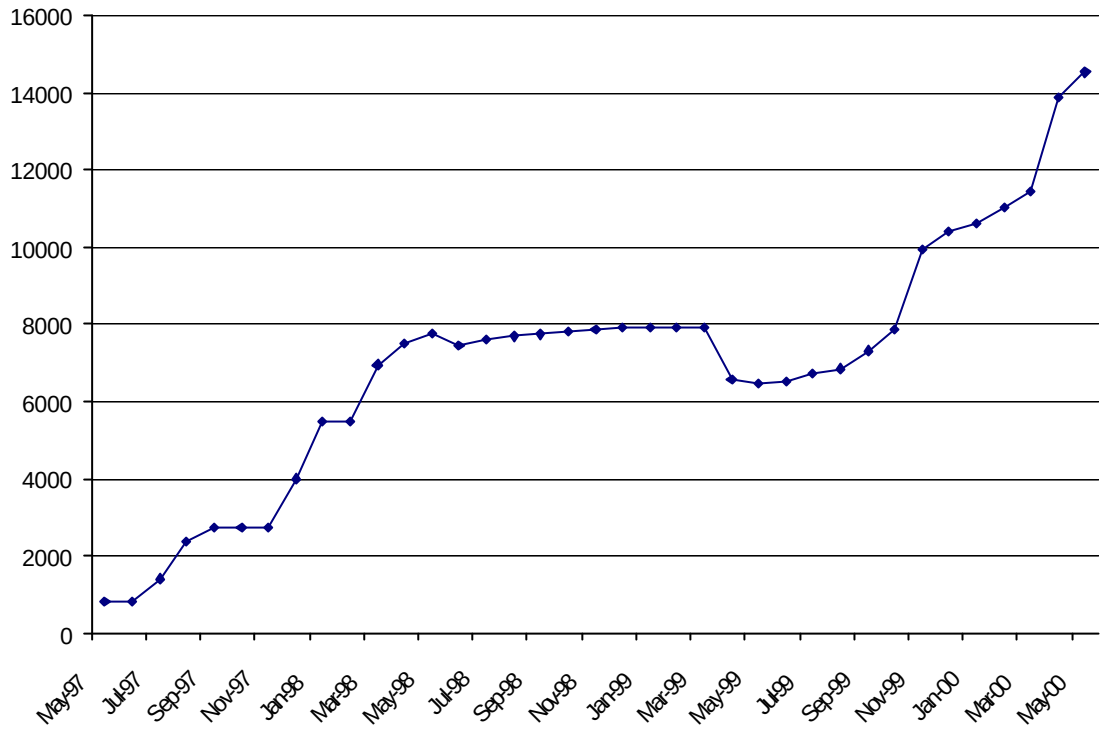
Figure 2 Participation in Green Power schemes by State



Source: SEDA (2000c)

The issue of customer retention has been discussed in the USA where similar Green Power Schemes are in operation (see Farhar and Houston 1996; Byrnes, *et al*. 1995; Farhar 1999). In a survey of market research conducted by U.S. distributors of Green Power products, Farhar (1999) reports that citizens of the U.S. seem to express similar desires to pay more for energy from green sources. She also reports that customers may be prone to dropping out if they are not continually reminded of the benefits of participation.

Figure 3 Residential participation in Energy Australia's Pure Energy program



Source; SEDA 2000c

7. Green Power vs Carbon Levy

From both an economic and policy perspective, the main question in regard to the voluntary schemes outlined above is not whether or not they provide any benefit, but whether it is the most effective method of achieving the stated objective of reducing greenhouse gas emissions.

There are two separate, though related issues in regard to such an objective:

1. How to discourage the use of fossil fuels; and

2. How to raise revenue to fund the capital expansion of non-fuel sources of electricity.

With regard to the first issue, the Green Power proposal does nothing more than provide an opportunity for individuals to fund an alternative. Not only does the price of the polluting good remain unaffected, the price of the alternative is substantially higher (see Denniss 1998).

A carbon levy on the other hand goes to the source of the problem. A levy on a

polluting good serves to increase the market price of the commodity. Such an increase in price pushes the equilibrium closer to the point of allocative efficiency. It is the pursuit of allocative efficiency that has been the driving force behind the move towards deregulation.

Tables 1 and 2 provides some estimates of the relative effectiveness of a carbon tax and voluntary schemes in raising revenues.

Table 1 Estimated revenue from Pure Energy

Current Number of Pure Energy Customers (May 2000)	71,245
Premium for 100% Pure Energy Supply (Energy Australia)	$182.00
Maximum Annual Revenue	$12,966,590
Actual Revenue 1998/99 (SEDA 2000b)	$6,657,737

Note: The above calculation assumes that all customers elect to pay the 100% levy, this is not the case but detailed breakdowns are not available.

Table 2 Estimated revenue from a carbon tax on residential consumers

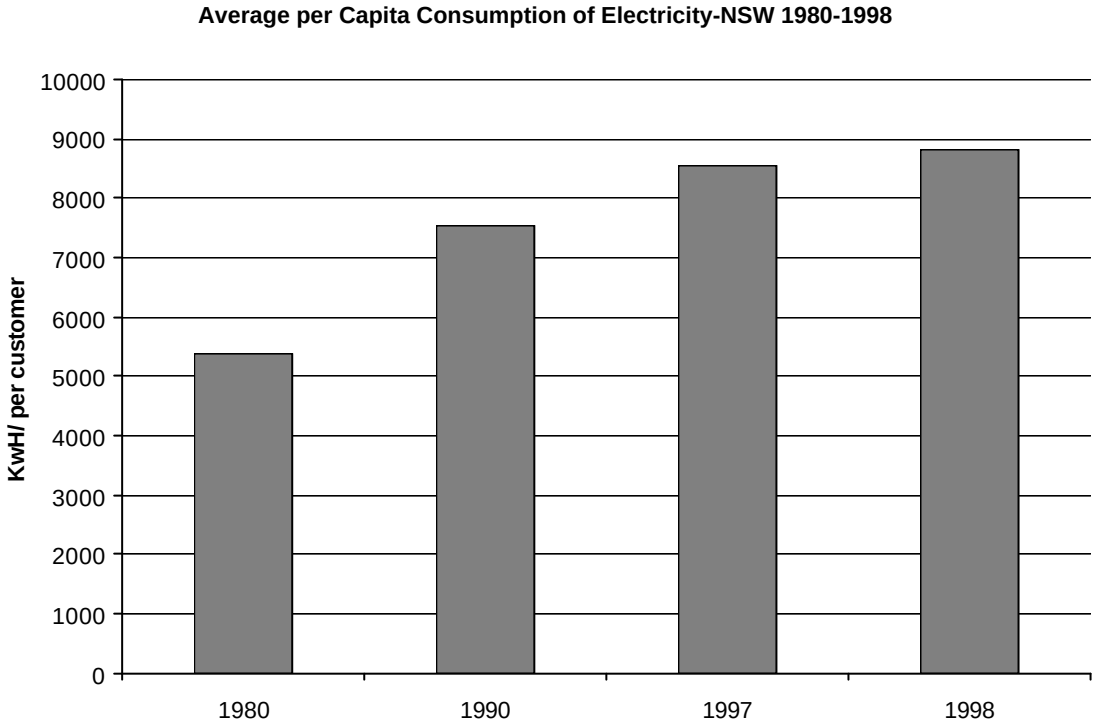
KWh supplied to residential consumers	17,950
Revenue from a 3.6 cent per KWh tax*	$646.2 million
Revenue from a 1.0 cent per KWh tax	$179.5 million
Revenue from a 0.1 cent per KWh tax	$17.9 million

* 3.6 cents is equal to difference between the residential tariff and the 100% Pure Energy tariff offered by Energy Australia.

The estimates of revenue shown in Table 2 are based on the assumption that consumption is not sensitive to price. A carbon tax of 0.1 cent per KWh carbon tax would therefore cost the average household $4.80 per year, it would raise more than the Green Power scheme, be equitable, have very low upfront and administrative costs, have no need for advertising and it would send a price signal in the right direction. It should be noted that the calculations presented above assume that increased prices have no effect on residential demand for electricity. Such an assumption can be justified on the basis that most people have expressed (though not demonstrated) a willingness to pay slightly higher prices for their electricity if it will help the environment. It should of course be realised that if some people did reduce their use of electricity because of the higher prices then this would have even greater environmental benefits. Similarly, if the

demand for electricity is highly elastic then the 'benefits' of deregulation will have a substantial, adverse impact on greenhouse emissions. Figure 4 shows that per capita electricity usage continues to climb in Australia.

Figure 4 Average per capita consumption of electricity



Source: NSW Ministry of Energy and Utilities (1999)

8. Conclusions

Despite the overwhelming evidence that individuals are willing and able to pay higher prices for electricity to help minimise the damage done to the environment, the Green Power program will be unlikely to have a significant impact. This is due to both the nature of the reformed electricity market in Australia, and the nature of the economic problems that need solving. Market forces will not solve problems caused by market failure.

There would seem to be no economic argument that would support the claim that Green Power will result in more efficient outcomes than the imposition of a carbon tax. A carbon tax, through compulsion, would be able to overcome the existence of the externalities in the production of electricity, and overcomes the free rider problem of voluntary schemes.

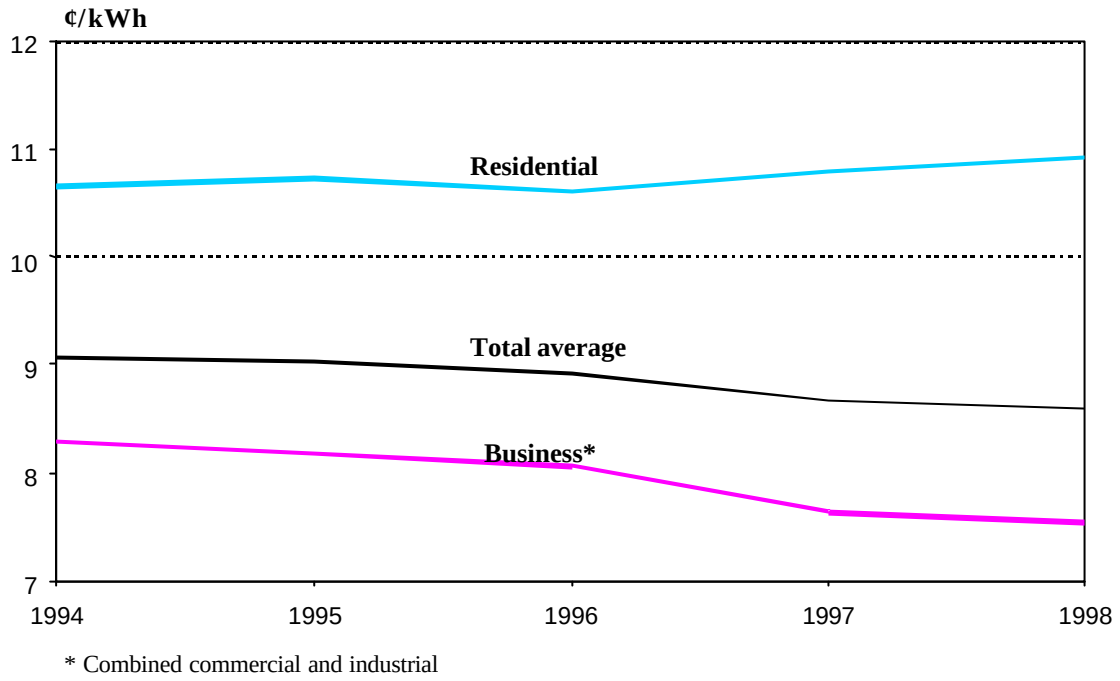
Such a levy would provide a direct incentive towards investment in renewable energy sources as it would reduce the artificial differential in cost of generation between subsidised coal generation and other sources. More importantly, it would provide increased certainty to the infant alternative energy industry.

This is not to say that the Green Power program has been of no benefit, on the contrary. Three useful outcomes have emerged. Firstly, Green Power has led to a much greater awareness of both the greenhouse effect and the solutions that are available. Second, it has managed to include large fossil fuel companies such as Energy Australia in a push towards reduced reliance on fossil fuels. The importance of the admissions made by such companies in their marketing material should not be overlooked. Finally, the scheme has shown that a substantial gulf exists between people's willingness to protect their environment and the likelihood of them actually doing so. That polls and market research regularly find that over 60 per cent of people are willing to pay to protect the environment should be heartening for any organisations or political parties wishing to move on to the next stage of Australia's response to climate change, that is, the removal of subsidised waste disposal for the fossil fuel burning industries and the imposition of a carbon tax.

The biggest danger associated with the Green Power program is that its possible failure may be used as evidence that concern for reducing greenhouse gas emissions is overstated. This is unlikely to be the case. The issue at hand is what is the best way of achieving involvement, not whether involvement is necessary. Voluntary schemes provide a political answer to the greenhouse problem, but not an economic one. There is no attempt to address market failure, nor are there attempts to use economic signals to encourage consumers' behaviour to change. With higher charges for those concerned about the environment and the wholesale price of coal-fired electricity falling for commercial users it would seem that the effects of current policies are based on the exact opposite to what would be suggested by economic theory. Recent price movements are shown in Figure 5.

The principal argument against the introduction of a carbon tax has historically been the degree of uncertainty concerning the existence and extent of climate change. Australia's largest energy supplier is no longer constrained by this uncertainty, boldly encouraging its customers to 'save the planet' by purchasing 'clean' renewable energy.

Figure 5 Australian average electricity prices - nominal



* Combined commercial and industrial

Source: Electricity Supply Association of Australia Limited (ESAA) (2000)

Fundamental problems exist with continued reliance on voluntary approaches. The simultaneous deregulation of the electricity industry raises further problems.

- How can a higher price for 'Green Power' encourage consumption in a deregulated market?
- How can the lower prices for carbon-based fuels resulting from deregulation be compatible with an objective of reducing carbon dioxide emissions?
- How can a voluntary scheme relying on government funded advertising be as efficient at raising revenue for funding the expansion of alternative sources of power as a small tax?

These important questions have not been addressed by proponents of schemes such as Green Power. While economic theory has been used continuously to support rapid changes in education, health, industrial relations and even job search, its advice has been ignored by policy makers when it comes to the environment.

Erratum

p.5 Some information concerning administrative costs and advertising is made publicly available. In 1998/99 the overhead expenses ration was 23%.

p.6 SEDA claims that the percentage of Green Power coming from pre 1997 generators is now 36%.

p.10 The title and first line of Table 1 should read 'Green Power' instead of 'Pure Energy'.

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