Energy Efficient and Water Reduction Programs on households in Australia

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Abstract

In 2009, the Australian government has formulated strategies to provide $3.9 billion 'Energy Efficient Home Package' for cutting energy waster and $12.9 billion 'Water for the Future' plan for reducing the use of drinking water, aim of tackling climate change and reducing green house emission. Under the strategies, there are incentive schemes for households of the existing homes, which include a) rebates of up to $500 for installing a new rainwater tank or a permanent grey water treatment system; b) offers of up to $1,600 ceiling insulation or installation of solar hot water system or an assistance of up to $1,000 installing insulation in private rental properties; c) cash rebates of up to $8,000 for the installation of solar photovoltaic systems on homes; and d) providing detailed, quality household sustainability assessments and green renovations packs to Australian households as well as access to low interest Green Loans of up to $10,000 each to make existing homes more energy and water efficient. This paper studies whether the incentive schemes motivate households and how much attraction of the schemes for households. The paper starts to review government policies for home energy efficient and water reduction programs in Australia and compare schemes provided by other countries. Case studies on incomes and expenses for a standard family, costs and benefits, as well as impacts on households of taking the government incentive schemes are examined. The paper comments on the current incentive programs provided by the government and argue that education on attitude toward saving electricity and water should be one of the important parts of the programs.

Keywords

Energy efficient, water reduction, incentive program, households, Australian government

paper discusses the current incentive programs provided by the government and concludes.

2. REVIEWING ENERGY EFFICIENCY AND WATER REDUCTION PROGRAMS

It has been identified that current sea level rise is due partly to human-induced global warming (Nathaniel, et al., 2007). Such impacts may include increased coastal erosion, higher storm-surge flooding, changes in surface water quality and groundwater characteristics, increased loss of property and coastal habitats. Governments around the countries have adopted strategies to tackle these issues. The strategies focus on energy efficiency and water reduction in a long-term aim to reduce carbon footprints.

The UK government has released new legislation on businesses and local authorities to cut carbon emissions by 80% by the year 2050 (Carbon footprint, 2009). As buildings are responsible for almost 50% of the energy consumption and carbon emissions, which is almost twice that of cars and planes, the government produces Energy Performance Certificates (PEC) and Display Energy Certificates (DEC). The PEC provides an energy efficiency rating for the building rated A-G, records and reports on the energy efficiency of a property as a building. Potential buyers or tenants can be informed about whether the property offers energy efficiency savings and thereby inform their decision whether to buy or occupy that building. There are penalties of 12.5% of the rateable value of the building applying to owners or landlord if they are unable to present an EPC on the request of a potential buyer/tenant (Carbon Footprint, 2009). Figure 1 displays the energy efficiency rating. The DEC measures the operational efficiency for public authority buildings (e.g. local and central government, and universities) with an area over 1000m^2 and the actual energy consumption over a 12 month period.

The objectives of the US government are to reduce water consumption intensity (gallons per square foot) 2% annually through to the end of fiscal year 2015, or 16% by the end of fiscal year 2015 from a 2007 baseline (US Government, 2009). This is because water requires significant energy input for treatment, pumping, heating, and process uses. Water efficiency rebates for single-family homes in the US are available for two types of water-efficient products. One type of rebate includes high-efficiency devices (rebate $350), high-efficiency clothes washers (rebate $135), and high-efficiency toilets (rebate $100). Another type of rebate consists of landscape irrigation devices, weather-based

100,000 new houses have also been ruled out from the program. There are arguments about whether the program will be a cost effective way to develop a sustainable renewable energy system.

TABLE 1. THE RET SCHEME FOR HOUSEHOLDS IN AUSTRALIA

Solar Schools Plan	$481 million	For schools to install solar panels and improve energy and water efficiency
Green Loans	$300 million	In subsidized loans for households to install solar hot water, insulation, rainwater tanks and green water recycling
Photovoltaic Rebate Program	$202 million	In rebates for households installing solar panels
Low Emission Plan for Renters	$150 million	For rebates to landlords insulating rental properties.

Renewable energy generation is a long-term strategy and development of a robust industry because of higher cost compared to conventional fossil fuel electricity generation. Solar photovoltaic technology has become popular as it generates energy directly from sunlight. Many countries have adopted necessary measurements to tackle the issues though there are differences between these countries, such as natural resource endowments, political and economic systems and cultural traditions (Energy Information Administration, 2005). Table 2 is a summary of the policies used by these countries.

TABLE 2. SOLAR SUBSIDY PROGARM AMONG COUNTRIES

Country	**Photovoltaic Energy Subsidy Program**
Australia - PV rebate program	- subsidize households for PV installation - Renewable Energy Certificates (RECs)
Japan - Net metering - 70,000 solar roofs with investment subsidies (1994) - PRS (2002)	- sets parameters for connecting small distributed PV & wind systems to the grid. - encourage the use of PV systems in residences. - educate consumers about PV technology.
U.S. - Energy Tax Act 1978 - Extended to 1985 & 1988 - PURPA	- 10% tax credit for business investment in wind, solar, geothermal, & ocean thermal. - required utilities to buy power from renewable producers. - purchase price for power at utilities 'avoided cost', which was defined by the States. - purchase incentive for private energy producers.
Germany Electricity Feed-In Law (1991) Renewable Energy Law (2000)	- obligated utilities to buy power from renewable producers. - purchase price for power was 90% of the retail rate.
Denmark - Investment subsidy (1979-89) - Production subsidy & other support mechanism (1981 & 1992)	-30% capital grant to individuals who installed wind, solar or biogas digesters. - additional production incentive for private renewable energy producers. - law obligated utilities to buy power from renewable

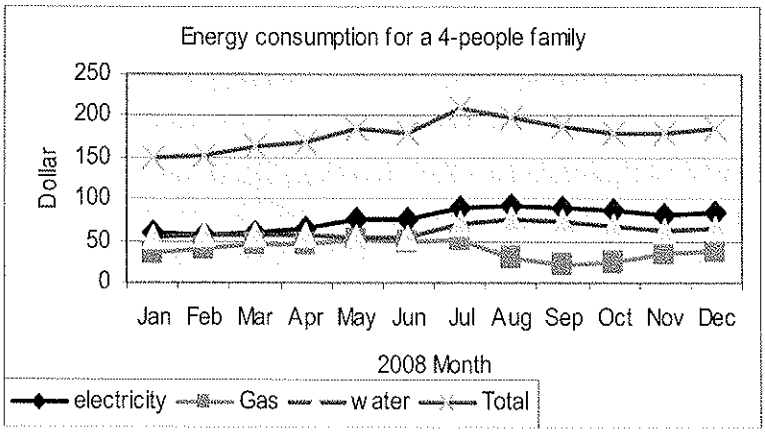

Figure 2. Energy, gas and water costs of a family for four people

The analysis consists of using payback period with and without discounted cash flow methods to estimate the costs and benefits of an investment on insulation, rainwater tank and Photovoltaic by taking Rebate Program. The estimating procedure involves:

a. investigating the costs of investments that include the costs of products and installation.
b. the government rebates given for installing the products.
c. estimating the benefits or bill savings per year from the investment.
d. calculating the discounted payback period for each of the investments.

Assume 8% discount rate is used for estimating discounted payback period. The estimating results are shown in the Table 3.

TABLE 3. PAYBACK PERIOD FOR INVESTMENTS

	Insulation	Rainwater Tank	Solar PV
Total Investment	- $2,000	-$2,000	-$20,000
Rebates	$1,000	$900	$75,00
Bill savings	$200	$187	$458
Payback (years)	5	5.9	27
Payback (discounted 8%)	> 7	>10	>50

The materials used in the construction of building as well how buildings are insulated, heated, ventilated and powered, all contribute to its carbon emissions. Insulation is very effective at slowing down the transferral of heat as it is made by a fibrous material acting as a barrier between the interior walls and exterior walls of a building to trap air. According to Australian Homeowner Insulation Program (EHWA, Australia, 2009) provides assistance of maximum amount of $1,600 to help eligible owner-occupiers install ceiling insulation in their existing privately-owned homes, if the applicants meet

4. DISCUSSION, SUMMARY AND CONCLUSIONS

More than 70,000 rebates have been claimed by NSW householders, saving more than 1 billion litres of water and 50,000 tonnes of greenhouse gas emissions a year (EUS, NSW, 2009). However, not all families have realised the potential savings for such investments. Though the government provides low interest loans (EWHA, 2009) to encourage families to invest in insulation, rainwater tank and solar systems, the additional interest expenses will be an additional burden to families, especially in the current economic climate. There are also some ongoing expenses such as maintenances which need to be added to the family budget. The government may have to also provide additional incentives to compensate for the low interest loans.

This study suggests that it takes at least 5 years to recover the households' initial investment on insulation and 7 years on rainwater tanks excluding maintenance costs. In particular, it requires at least 27 years for households' to break even their investment on solar panel systems. A question thus can be asked whether the government rebate system is attractive enough for all households to participate in tackling climate change issues.

The author argues that the government objectives in tackling the climate change issues by setting targets for reducing green house gas emissions, reducing energy and water consumption, generation and use of renewable energy is based on a rebate system to encourage and attract public participation can be effective but is only one of many strategies that can be deployed. As capital constraint, governments are limited to inject large amount of money into these rebate systems.

Relying on these rebate systems to appeal public interest on climate change and reducing green house emission is not sustainable in the long term. The effects and consequences of climate change and green house emissions will have a direct impact on our generation and future generations. It is also very important to increase awareness on the effects and consequences of global warming and to educate people based on factual data so we can all make informed decisions by improving on the way we live responsibly for future generation.

This paper has explained the rebate programs on insulation, rainwater tank and solar panel systems provided by the Australian government. Different rebate policies from UK, US and Canada have compared to the programs in Australia. The study has also presented a case study using payback period method to analyse investment period for installing insulation, water tank and solar system from a given scenario. The constraints

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