LEGISLATIVE ASSEMBLY FOR THE AUSTRALIAN CAPITAL TERRITORY

SOLAR 93 CONFERENCE OF THE AUSTRALIAN AND NEW ZEALAND SOLAR ENERGY SOCIETY

SUPPLEMENTARY REPORT

BY

THE STANDING COMMITTEE

ON CONSERVATION,

HERITAGE AND ENVIRONMENT

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Committee Members

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Background and Introduction

The Conservation Heritage and Environment committee was re-established on 27 March 1992 with a responsibility to report *inter alia* on energy and resources matters.

In November 1992 the committee presented its report to the Assembly on renewable energy [1] following a thorough examination of the issues pertaining to solar, wind, hydro and thermal energy.

The report has served as a focus for the ACT community in matters relating to energy efficiency, matters which are now being expressed in the planning of ACT urban housing development and the construction of ACT housing. The committee notes, for example, a greater community awareness of the need for solar orientation of houses in order to obtain maximum benefit from winter sun and summer shade, and policies adopted by the government in relation to solar configuration in new housing developments. The ACTEW energy efficient house in Banks and other demonstration houses are giving further impetus to the moves towards taking advantage of the abundant solar energy source.

It is important that the committee keep abreast of energy development issues and it does so through researching contemporary energy issues and taking advantage of any opportunities arising which allow for contact with the industry. Our colleague Mr Lou Westende, for example, obtained information at first hand on wind farm technology during a private visit to Europe.

The committee benefited substantially from representation at the Solar 92 Conference held prior to the finalisation of its renewable energy report, and the Solar 93 Conference held in Fremantle from 1 to 5 December provided a valuable opportunity for me and the committee secretary to renew and sustain the contacts made in 1992 and to assess current developments.

The purpose of this supplementary report is to inform the Assembly, briefly, on renewable energy innovation and application, solar buildings, solar thermal applications and wind electrics primarily from information gained at the Solar 93 Conference.

Renewable Energy Innovation and Application

The Australian renewable energy industry is not large at present, but over the next decade energy demand in the Asia-Pacific region will be driven by economic growth influenced by growing global concern for the environment. [2]

The committee's report on renewable energy recognised the importance of issues associated with the adoption by Australia in 1990 of greenhouse emission targets stabilised at 1988 levels by the year 2000 and its conditional commitment to the

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[1]Renewable Energy, The Case for Energy Efficiency in the ACT, Report by the Standing Committee on Conservation Heritage and Environment, November 1992

[2]W D Gould, Toward a Renewable Energy Industry Strategy, Solar 93, p399

Toronto target of a 20 per cent reduction in all greenhouse emissions by the year 2005.

Australian industry has a wide range of technologies including solar thermal, photovoltaics, solar hot water systems, hydro and wind electrics and has world leading technology in many of them, much of which has been, or is being, developed under Energy Research and Development Corporation (ERDC) projects. The cost of energy from these technologies has been consistently falling over the past 10 years.

All uses of renewable energy, including domestic solar hot water systems, biomass, hydro, photovoltaics, windmill water pumping and passive building heating probably contribute more than 24 per cent of the total primary energy use in Australia. When all forms of solar energy use are taken into account, including those which are not traded, such as solar use for crop production, natural lighting and so on, the figure for renewable energy use in Australia may amount to 24,000 times the amount of energy use derived from fossil fuel. [3]

Putting this in more tangible terms, renewable energy technology is the least cost option under existing fossil fuel powered systems for a great many applications especially in remoter locations. Photovoltaic systems are now used extensively by Telecom for its communication network.

The major challenge with renewables is not to invent them but to get them into the market place at prices which can compete with electricity generated by more conventional means such as by coal fired power stations. Another factor is that environmental costs are not factored into the energy pricing equation. If they were, renewables would be far more price competitive with fossil fuel powered energy sources.

Solar Buildings

The built environment accounts for about 50 per cent of the energy consumed in most developed countries. Buildings consume natural resources in the form of raw materials and the energy required to extract, manufacture and place them on site. Many of these materials and their processing are also environmentally harmful. Activities within buildings produce heat and wastes which are transported back into the environment. [4]

A major challenge is the creation of buildings which not only fulfil their customary social, functional and aesthetic requirements but minimise their impact upon the environment by limiting what they take from it in all forms, including direct energy demand, and what they give back.

It is claimed that solar designed buildings in temperate climates can save between 60 and 90 per cent of total energy demand and an integral part of building energy

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[3]Renewable Energy Sources and Systems, ERDC, November 1993, pp2,3

[4]Bruce Forward, Designing for the Greenhouse, Environmental Issues in Design Education, Solar 93, p111

demand reduction to these levels is through the use of thermal mass. This can account for up to 30 per cent of energy savings. [5]

Guidelines for the Australian Conservation Foundation (ACF) Green Home developed during 1992/93 have led to the ACF licensing a number of preferred Green Home builders in Victoria, and it is hoped that the guidelines will be developed for all Australian climatic regions over the next two years. [6]

The Green Home integrates energy efficient, solar building design into a marketing package with broad appeal and in achieving this offers tangible and significant environmental benefits, financial incentives for builders and owners, practicability in a suburban context and a high standard of comfort, security and aesthetics.

Specifications require that the Green Home be built from materials with limited environmental impacts. Major environmental features include the use of plantation timbers in preference to rainforest or native forest timbers, emphasis on re-used, recycled and recyclable materials as well as materials with reduced resource impact, use of water-based paints, low-formaldehyde emission particle boards and other finishes with reduced contributions to indoor air pollution, and efficient use of low greenhouse impact fuels such as renewables and natural gas.

These specifications are in line with the committee's recommendations in its November 1992 report on renewable energy. The committee will monitor progress with the Green Home concept.

Solar Thermal Applications

Solar thermal applications are widespread covering domestic, institutional and commercial hot water systems, for heat storage banks in domestic houses, for on-site drying of crops in agriculture, for the drying of food for manufacture, for horticulture and for solar electricity generation.

A feasibility study for a solar thermal power station for Tennant Creek in the Northern Territory indicates that the plant will be capable of providing a 4 megawatt base load electrical power to the town. [7]

Australia's largest solar installation is at the Yulara (Ayers Rock) resort. Some 4200 square metres of flat plate solar collectors are distributed over the majority of the buildings in the resort and they supply the domestic hot water and space heating for the accommodation complex. After 10 years operation the solar collector plates are in good condition.

Pacific Power in collaboration with the University of Sydney has retrofitted a Sydney house, occupied by a representative family, to provide up to 75 per cent of its thermal load including cooking, space and water heating, being supplied by the solar system,

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[5]G F Baverstock, Thermal Mass in Temperate Climates in Commercial Buildings, Solar 93, p196
[6]Peter Brotherton & Alan Pears, The ACF Green Home: Solar Efficient and Beyond, Solar 93, p69
[7]W Stein, Aspects of a Study into the Feasibility of a Thermal Power Station for Tennant Creek, Solar 93, p51

and is monitoring the performance of the system. Pacific Power has also co-funded a solar co generation study with the ERDC to look at the provision of electrical energy and process heat for applications in hospitals and process industries. [8]

The Australian National University ANU) and Pacific Power have an agreement covering the design and costing of large scale dish technology based on the Big Dish prototype at the ANU. Information from these studies will contribute to development of the Tennant Creek solar thermal power station. [9]

Wind Electrics

In its renewable energy report the committee discussed wind electrics, noting overseas experience observed by Mr Westende and work being done by NSW Pacific Power at Malabar. The committee noted that ACTEW planned to study the wind energy potential of the ACT.

Pacific Power is now concentrating on identifying and characterising prime wind sites in conjunction with the CSIRO Centre for Environmental Mechanics with six locations selected in the Forster, Kiama, Crookwell, Gundagai, Cooma and Tilba-Tilba areas. The overall energy cost of wind farm electricity is estimated at 6 to 10 cents per kilowatt hour depending on the wind resource, which is about double the cost on an energy production basis as base load coal derived electricity. [10] However, this costing does not take account of the economies of scale which could be expected from a commercial wind farm, nor the environmental cost of coal fired electricity generation.

The 10 Mile lagoon wind farm at Esperance in south coastal Western Australia is the first major wind farm in Australia. [11] It complies with stringent environmental safeguards and guidelines.

Comprising Nine 225 kilowatt generators, the wind farm has the capacity to supply about 12 per cent of Esperance's power needs, the balance of which is provided by diesel generators. However, because the Esperance system load varies on a daily basis from an early morning minimum of about three megawatts to an evening peak of some 10 megawatts, the wind generators are programmed to provide an overall 30 per cent of the town's system load at this stage which means that the diesel generators do not need to be fully operational. When fully operational, the wind turbines will, among other things, mean considerable savings in the consumption of diesel fuel.

The State Electricity Commission of Victoria in investigating renewable energy resources has, since 1982, been co-operating in wind power prospects. Following site, demonstration and evaluation studies since then, arrangements are now under way for the development of a 10 megawatt wind farm at Toora on the southern Victorian coastline. [12]

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[8]S M Schuck,Renewable Energy Development at Pacific Power, Solar 93, pp509,510
[9]ibid, p510
[10], ibid, pp508,509
[11]John Hartley, Esperance 10 Mile Lagoon Wind Farm, Solar 93, p147
[12]Renzo A Negrelli, The Victorian 10MW Wind Farm, Soalr 93, p153

Implications for the ACT

Developments in solar and renewable energy technology are gathering pace as evidenced by contributions to the Solar 93 conference and they reinforce the committee's findings as outlined in its report of November 1992 on renewable energy.

The committee's recommendations relating to co generation of electricity, the development of solar thermal systems and the sourcing of a legislated minimum quantity of the ACT's electrical energy needs from renewable sources by the year 2000 are not only feasible but an imperative.

The committee observed in its renewable energy report that the full potential of alternative energy forms has yet to be understood by the general public. The committee considered that it is time for governments and their agencies to condition the community to the inevitable adjustments to energy consumption that will need to be made as the greenhouse gas emission targets are met.

While it is encouraging that various electricity generating authorities are making real and considerable efforts to develop renewable energy sources, there has been no notable moves to publicise what is being done, and consequently little public debate about the issues.

It is clear that the structures within society which exert powerful forces on the behaviour of organisations and individuals need to be directed towards accepting the need for structural change in expectations about energy supply and consumption if renewables are to become the accepted energy resource of the future. Structural change of this nature will require broad community support, political commitment and a good deal of patience.

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Chair