



PERGAMON

Renewable Energy 22 (2001) 113–118

**RENEWABLE
ENERGY**

www.elsevier.com/locate/renene

Renewable energy education for sustainable development

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Abstract

Rising international concern about global warming and the rapid development of the renewable energy industry over recent years has led to a need for multidisciplinary programs in energy studies. We have developed a postgraduate program in energy studies which is based on the principles of ecologically sustainable development. This program combines work in energy technology with energy policy, energy economics and environmental and social issues. The program is offered on campus at Murdoch University and by external study, via the internet, throughout Australia and overseas. It has attracted considerable interest from students seeking to find new opportunities within the renewable energy industry. This paper outlines the philosophy of the energy studies program, its implementation and outcomes. © 2000 Elsevier Science Ltd. All rights reserved.

1. Introduction

Energy is essential for all forms of life. Most obtain it through natural processes associated with ecological cycles such as the hydrological and carbon cycles. These natural cycles are characterized by the recycling of natural resources and by the absence of waste products [9]. However in our quest to increase power supply to meet the needs of development and population growth we have begun to cause

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irreversible damage to the biosphere, which supports all forms of life. Serious air pollution problems have been caused by burning fossil fuels in motor vehicles, homes, factories and power stations. Global warming now appears to be underway as a result of the enhanced greenhouse effect, which is partly caused by our extensive use of hydrocarbon fuels [3].

Concern about these problems has risen rapidly over the past decade and international action is now underway to address the causes [2]. This is taking the form of international treaties with mandatory restrictions on the use of fossil fuels by industrialised nations. These may be achieved via fuel substitution, energy management, improved energy efficiency, the use of renewable energy systems and restrictions on land clearing [1].

Some of the solutions are technical but there are also other important ways of tackling these problems. They involve policies, legislation, economic incentives and education. All of these initiatives have an important role to play in modifying human behaviour and moving society towards a sustainable future.

2. Energy and ecologically sustainable development

Ecologically sustainable development (ESD) has been defined in various ways including:

Development which meets the needs of the present without compromising the ability of future generations to meet their own needs [11] and, Improving the quality of life while living within the carrying capacity of supporting ecosystems [4].

The World Commission on Environment and Development [11] emphasized the importance of teachers and education for ESD by saying:

The world's teachers ... have a crucial role to play (in helping to bring about) the extensive social changes (needed for ESD) ([11], p. xiv).

The IUCN [4] underlined the importance of changing attitudes through education:

Sustainable living must be the new pattern for all levels, individuals, communities, nations and the world. To adopt the new pattern will require a significant change in the attitudes and practices of many people. We will need to ensure that education programs reflect the importance of an ethic for living sustainably ([4], p. 5).

Agenda 21 defined more precisely the role of education in developing sustainability and set out a challenge for educators in the following terms:

Education is critical for promoting sustainable development and improving the

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