Abstract

A survey of the needs of the renewable energy industry in Australia for education and training has been carried out. It has identified a strong demand for training at University, technical college and community levels. Several key areas of training such as energy efficiency and energy management need more attention. Respondents indicated a need for initial training courses and ongoing short courses to keep practitioners up to date. There was also strong support for renewable energy education for the community and for schools in order to raise awareness and assist market development.

1. INTRODUCTION

The renewable energy industry is experiencing an unprecedented boom as a result of growing international concern about global warming and the other impacts of using fossil fuels. This has led to a substantial increase in demand for power generation systems and this is placing a strain on the supply of skilled personnel. Already there are signs of a shortage of skilled people to design, install and maintain renewable energy systems. This problem could hamper the development of the industry and lead to a decline in the quality of systems delivered to customers. Such problems in the seventies, following the first oil crisis, contributed to a reaction against renewable energy in the early eighties.

Quality issues are particularly important for power supply systems that are to be deployed in remote areas where the cost of servicing them is generally high. (Lloyd et al 2000; Lowe et al 2001) Also for a fledgling industry, like renewable energy, quality products are essential for the development of consumer confidence. (Jennings 1997)

Courses in renewable energy have been offered by universities, technical colleges and industry for many years. Some of these were designed specifically to meet the needs of industry while others were developed in response to student demand, teacher preference or Government initiatives. Some efforts have been made in recent years in Australia to standardise the curriculum for technical training to address the needs of industry (Giffard et al 2000; Lund et al 2000) but little attention has been given to developing a coherent set of offerings for Universities or professional development courses.

Because of the shortage of experienced instructors and the cost of establishing teaching facilities it is desirable that Government, industry and educational providers cooperate to identify training needs and to share the costs of developing courseware and running training courses.

The Australian Cooperative Research Centre for Renewable Energy (ACRE) was established by the Australian Government in 1996 to help develop an internationally competitive Australian renewable energy industry. Part of its task involves the development of education and training programs to assist with the provision of skilled personnel for the renewable energy industry. Over the past five years ACRE has developed courses suitable for use in universities, technical colleges, schools and short courses for industry. Many of these are now available on the internet where they reach a wide audience throughout Australia and internationally. (Jennings and Lund 2001; Jennings et al 2001; Lund and Jennings 2000)

In order to determine whether its courses are meeting the needs of the renewable energy industry, ACRE recently conducted a survey of industry personnel in Australia. The aim of this survey was to determine the needs of industry for education and training and to identify priority areas for further development.
This paper will describe the results of this survey and our assessment of the current and future needs for renewable energy education and training in Australia. From our experience in offering these courses internationally we are aware that many other nations have similar training needs and the results of this survey may have much wider relevance.

2. METHODOLOGY

The survey was conducted in two stages during year 2001.

The initial questionnaire was prepared and circulated in March 2001 among one hundred and eighty individuals associated with one hundred thirty five industry groups, utilities and government agencies involved in renewable energy in Australia. The survey was intended to provide basic information on the training needs of the renewable energy industry with a view to formulating a long term policy to address the growing demand for courses related to renewable energy and greenhouse gas abatement. The survey covered the perceived need for on-going education/training courses related to renewable energy and greenhouse gas abatement technologies; the level of interest in training programs/course offerings; the preferred duration of such courses; the current status of courses offered and training programs available.

The results of the first survey indicated a strong need for ongoing education and training courses for professional development as well as increasing community awareness of renewable energy and greenhouse gas abatement technologies. As a follow up to this survey, and in order to create a co-operative relationship between industry, academia and government for course development, another questionnaire was distributed in July-August 2001. This survey focussed on getting some idea of specific areas requiring more emphasis for training and education; the reasons for such training programs; the training/education needs for their own organisations; the preferred course provider; course accreditation; issues that need to be addressed in community education courses; and the perceived importance of renewable energy education and training programs, in general.

3. RESULTS

The list of participants for this survey was collected from various databases and industry associations. It comprised of renewable energy equipment manufacturers, system designers and installers, engineering consultants, builders, architects, local government authorities, corporations and utilities. Out of one hundred and eighty individuals contacted, ninety four people responded whom eight didn’t want to participate in the survey. The break-up of the eighty six survey respondents comprising of seventy one different industry organisations is shown in Figure 1. Eight organisations had more than one participant in the survey.

![Figure 1 Background of Survey Participants.](attachment:image.png)
Renewable Energy Education & Training - Meeting the Needs of Industry

The initial survey showed great interest in an on-going program of education and training courses related to renewable energy and greenhouse gas abatement technologies. Most respondents preferred short courses of one to five days duration although there was also interest in award courses for initial training of staff. Short courses should aim mainly at updating energy professionals about new technological developments. Target audiences for these courses could include engineers, managers, researchers, designers, planners, installers as well as policy makers.

The participants in the survey expressed a need for more emphasis on the areas of energy management, energy policy, energy efficiency, system design and development, remote area power supply systems (RAPS), environmental issues and system installation, operation and maintenance. There was also limited interest in other areas such as bio-energy, co-generation, solar thermal systems, system controls and economic issues. Figure 2 shows the main areas which the respondents believe need attention for training and education. It should be noted here that most of the respondents showed an interest in more than one specific area.

![Figure 2 Industry Need for Course Offerings.](image)

It was strongly expressed by the participants of the survey that there is a gap in the availability of quality education and training programs for energy management. Only three participants disagreed and six were unsure about it. The number of universities providing undergraduate or post-graduate courses in renewable energy and energy management is limited. A similar situation exists for TAFE colleges that deliver vocational courses on renewable energy at the Certificate IV level. Some of the respondents believe that these courses don’t meet the real industry needs and provide insufficient understanding of real work situations. Also, due to poor marketing, many people are unaware of the availability of these courses.

Many participants indicated that their company had educational needs and would be interested in using education and training courses in renewable energy and energy efficiency in the near future. Very few had their own in-house training program and where they did it was usually directly related to work place issues. Most of them relied on regular conferences, workshops and short courses/training programs offered by ACRE, technical training institutions (TAFE), or industry groups (such as SEIA).

In regard to the preferred course/training provider, there was no clear answer to this question as the needs are diverse. It will depend on the prior knowledge and experience of the person concerned and the specific area in which they need more training.

Although many agreed with the accreditation of courses to maintain their credibility and quality control, it will depend on the type of courses and training programs offered. Professional and industry organisations such as the Institution of Engineers Australia and the Sustainable Energy Industry Association (SEIA) could play an important role here.
All participants agreed with the opinion that public awareness about various aspects of energy management, environmental and greenhouse gas issues and the benefits of renewable energy technologies is low. Broad knowledge of these issues is important for the public and should be included in all the courses offered. Thus the general public will benefit from an understanding that renewables can be supplementary to existing power generation systems and reduce a proportion of greenhouse gas emissions in the short term.

Finally, survey participants agreed that education and training is very important to the development of the renewable energy industry. It is particularly vital in order to enhance the reputation of renewables as an important alternative and also to create a greater awareness and commitment leading to future energy demand. This should be coupled with quality control measures to maintain the reputation of the industry.

4. ANALYSIS

This survey has demonstrated the need for quality education and training courses and a comprehensive national training program in renewable energy and greenhouse gas abatement technologies.

The strong interest from industry in energy management, energy policy and energy efficiency indicates the relevance of these related areas to the development of the renewable energy industry. There is a need to include such units in the current and proposed award courses and for the professional associations to liaise with the Universities and TAFE about accreditation needs and curriculum content. Government has an important role as the funding agency for Universities and TAFE to co-ordinate this process to ensure that the training offered meets the needs of industry and national development.

The survey also identified the need to create greater understanding and awareness within the community about renewable energy and greenhouse gas abatement technologies. Possibly a change in attitude about the use of renewable energy and energy efficient products and services can be achieved through information and mass communication. Appropriate school education courses could also produce substantial change in the longer term. Adult education and training programs will also be useful to promote the use of renewable energy technologies amongst the general public.

ACRE in conjunction with Murdoch University, Western Australia has successfully developed and run a range of graduate diploma, graduate, post graduate and short courses in renewable energy technology, energy policy, energy economics, energy efficiency and greenhouse gas abatement technology. (Jennings and Lund 2001) These courses are available on campus, externally by distance education as well as via the internet. (Lund and Jennings 1999, 2000, 2001) This area is emerging as a new discipline designed to meet future energy planning needs within the context of ecologically sustainable development. Through its TAFE project ACRE also seeks to meet the increasing demand for qualified and trained designers, installers and repairers of renewable energy systems. (Giffard et al 2000)

Several other institutions are now offering modern, specialist courses in renewable energy engineering and these are proving very popular with students. (Wenham et al 2000, 2000a). This supports our findings that there is a widespread public need for renewable energy education.

5. CONCLUSIONS

This survey has demonstrated the urgent need for quality education and training courses to meet the growth in the renewable energy and greenhouse gas abatement industries.

Award courses and short courses are needed that cover topics such as energy management, energy policy and renewable energy systems. These courses need to be provided in a format that suits busy professionals engaged in a rapidly expanding industry.

Although the data for this survey was all collected in Australia we are aware that the issues and training needs are relevant to many other countries. The strong international response to ACRE's education and training programs has demonstrated that these needs exist in most countries where the renewable energy industry is flourishing.
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REFERENCES


