

A RETROSPECTIVE VIEW OF ACRE

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ABSTRACT

The Australian Cooperative Research Centre for Renewable Energy (ACRE) closed in December 2003 after 7.5 years of operation. It had been established in 1996 as part of the Australian Government's greenhouse response strategy and had attempted to forge an alliance between industry, Government and Universities to promote the development of renewable energy in Australia. ACRE achieved some notable successes in research and education, but in the end it failed to attract sufficient support from industry and government, and it therefore failed to gain a renewal in the 2002 CRC selection round. This retrospective look at ACRE is intended to provide an historical record of this ambitious venture, with an analysis of its successes and failures and the lessons that can be learned for future ventures into this field. Much has already been written about ACRE's objectives and work plan so this review will focus on the wind up of the CRC and the transfer of its assets.

1. INTRODUCTION

The Australian Cooperative Research Centre for Renewable Energy (ACRE) was established in July 1996 following a special round of CRC applications in 1995. ACRE was hosted by Murdoch University in Perth, WA and began with 21 members who formed a company known as ACRE Ltd to run the CRC. The original members consisted of eight Universities, seven small companies, four power utilities and two government agencies. The Board of ACRE Ltd appointed a Managing Director to run the CRC and he selected program managers and project leaders. (ACRE Annual Report, 2003; ACRE web site)

ACRE commenced operations early in 1997 with eight programs and 28 projects and work began on a ninth program soon after. However, after failing to obtain extension funding for this additional program, it was suspended in 1998.

Following the year 2 review, ACRE Ltd restructured the CRC to consist of 3 programs plus a Directorate, located at Murdoch University. Three Product Executives were appointed to replace the nine Program Managers and the Program Managers Committee was abolished and replaced by a Research Advisory Committee to the Board. The number of projects was reduced from 28 to 12, although several new projects were commenced in later years.

The initial Managing Director, Martin Thomas, resigned in June 1998 and was replaced in October 1998 by Dr Frank Reid, who resigned in May 2003 and was replaced by

Professor Philip Jennings, who managed ACRE Ltd until it was deregistered in June 2004.

ACRE received a very positive Year 5 review in 2001 and plans were formulated for a successor to be known as ACRE2. The proposal for ACRE2 was submitted to the 2002 CRC round and was short-listed but ultimately failed to obtain funding. The official reasons given were that there was insufficient industry funding and the proposed research program was not of sufficient quality.

The Board of ACRE Ltd therefore decided in January 2003 to wind up the CRC as quickly as possible. However the members objected to this course of action at an Extraordinary General Meeting (EGM) of the company in May 2003 and requested that the remaining projects should be continued until they could be disposed of to suitable parties who were prepared to complete or carry on the work. The Board of ACRE Ltd resigned in August 2003 and was replaced by a new Board elected by the members at an EGM.

Nine of the original member organisations resigned from ACRE at the end of the initial funding period on 30 June 2003 and the remaining 10 members approached the CRC Secretariat in DEST with a wind up plan and a proposal for a Residual Activities Agreement. This Agreement was a variation to the Commonwealth Agreement that established ACRE and its purpose was to enable ACRE Ltd to wind up its affairs in an orderly manner that ensured that the best outcomes were obtained for Australia from the funds invested in CRC.

After several months of negotiations the Commonwealth accepted this proposal from ACRE Ltd and a Residual Activities Agreement was signed in November 2003. It included transitional funding for eight projects that were to be transferred to new owners who wished to continue the work commenced by ACRE. The new owners were located in Queensland, New South Wales, Northern Territory and Western Australia.

A WA successor to ACRE was established at Murdoch University and has been named RISE (Research Institute for Sustainable Energy). The Queensland successor to ACRE is called QSEIDG (Queensland Sustainable Energy Industry Development Group). These successors are partly funded by the industry development component of the Australian Greenhouse Office's Rural Remote Power Generation Program and their focus is on industry support rather than research and development (see RISE web site).

The Residual Activities Agreement ensured that ACREs assets were not lost and the bridging funds provided ensured that these projects were transferred in a healthy state to their new owners.

The CRC work of ACRE ceased on 31 December 2003 and the management company, ACRE Ltd, wound up its affairs and was deregistered before the end of the 2003/4 financial year.

2. ACRE'S MAJOR ACHIEVEMENTS

Amongst the many achievements from ACRE are the following:

ACRELab

Australia now has a world-class, national renewable energy testing and standards laboratory in ACRELab. It can test stand-alone and grid-connected renewable energy systems up to 50 kW. It has active working links with the US National Renewable Energy Laboratory and the European Union. It offers extensive assistance to the Australian renewable energy industry to compete internationally. This facility is crucial for the quality assurance commitment of the Bushlight Project. ACRELab is now called ResLab (Renewable Energy Systems Laboratory) and is operated by the Research Institute for Sustainable Energy (RISE) with support from a grant from the Australian Greenhouse Office through the RPPGP program (see the RISE and ResLab web sites).

Industry Standards

Standards are essential to the development of a healthy industry. ACRE was active in the development of renewable energy standards both nationally and internationally. ACRE staff were involved with all aspects of the production of national RE standards, and played key roles in the International Electro Technical Commission and the International Energy Agency standards in the area. This work has also been transferred to RISE and ResLab (see ResLab web site).

RETINA

The Renewable Energy Technology and Innovation Network Australia, RETINA, is an industry network focused on technology and innovation. It is an initiative of the Renewable Energy Industry Action Agenda, which is being delivered through the development of a Technology Roadmap and the network's activities. The Technology Roadmap provides an industry overview of the critical technology gaps and opportunities within the industry. It was developed through the collaboration of 180 leaders from industry, the research community and government. RETINA provides programs and services that focus on encouraging a culture of market-driven innovation and facilitates the implementation of the Technology Roadmap. RETINA is now hosted by the BCSE (see BCSE web site).

Bushlight

ACRE and the Centre for Alternative Technology in Alice Springs (CAT) developed a visionary concept for providing renewable energy to more than 200 remote Aboriginal communities. This project was funded by the AGO, ATSIC and State Governments and ACRE and CAT were contracted to deliver a coordinated infrastructure, installation and support program for renewable energy services in indigenous communities throughout central Australia. The feasibility and the need for such a program was demonstrated by ACRE and CAT research on RAPS systems and their performance in the field. With the demise of ACRE, this work will be carried on by CAT with some assistance from RISE on standards, testing and systems design.

Wind Turbine Manufacturing

ACRE and Westwind Turbines Pty Ltd have developed a family of small wind turbines from 3 to 30kW in capacity. The turbines use state of the art permanent magnet generator technology. The tower is tilt-up so that it can be easily installed in remote areas – and taken down quickly in cyclone prone areas. Three 20kW machines were installed into the Exmouth grid in 2003. The wind turbine project is a good example of CRC activities linking research undertaken at universities with industry. The future of this program is in doubt at present due to lack of funding, but most of the technology is now commercial and is being sold by Westwind Turbines Pty Ltd (see Westwind web site).

Advanced Solar Collectors

In collaboration with the Australian National University, Solahart and Western Power Corporation ACRE developed advanced collectors for photovoltaic and combined heat and power systems. One of these systems is being demonstrated on the Murdoch University campus at Rockingham, WA. This work has considerable potential for future commercial applications. ACRE's intellectual property has been transferred to the ANU, who will continue the research in partnership with industry (see CSES web site).

EcoCarbon

EcoCarbon Inc. is Australia's industry forum for capacity building and research in emissions trading and other market-based mechanisms for greenhouse gas abatement. EcoCarbon has attracted international attention to its seminars and activities. A computer simulation of the emissions trading market, the Virtual Emissions Trading Program (VETP), has been developed as a sophisticated tool for education, research and policy analysis. EcoCarbon will work with RISE and continue its work to develop capacity for emissions trading in Australia.

Web-based Renewable Energy Education

ACRE has developed an on-line Masters program in renewable energy that serves the needs of students from all over Australia and overseas for continuing professional development in the sustainable energy field. All ACRE education offerings were prepared for web delivery as well as for face to face teaching. The program was one of ACRE's major success stories and student demand has been strong and sustained for the past five years. This work has been transferred to Murdoch University and will be continued by them (see Rise web site and Jennings and Lund (2000)).

TAFE Innovation

The TAFE on-line education program attracted national recognition as a pioneering venture between the TAFE sector and a CRC. It was successful in developing course materials to support the new renewable energy qualifications within the National Training Package. TAFE materials are also used for a range of industry training and accreditation short courses. The Queensland Sustainable Energy Industry Development Group, QSEIDG, which is hosted by the Queensland University of Technology, will continue the developmental work (see Brisbane North TAFE web site).

Information and Short Courses

ACRE ran a highly successful web site and a program of short courses, workshops and conferences for industry and researchers. The highlights included the World Renewable Energy Conference in Perth in 1999, several international workshops and the Renewables Roadshow for the WA Government and the AGO. The ACRE web site provided information about renewable energy for the public, especially schools. It attracted over 100,000 hits in seven years (see ACRE web site).

Postgraduate Research Training

ACRE supported an innovative postgraduate training project for research students working on higher degree projects in Universities and industry. It included enrichment activities such as annual research conferences, research training, special development courses and support from industry supervisors. The students who completed this program were keenly sought after by industry and universities (see ACRE web site).

Renewable Energy Policy

The ACRE Energy Policy Group performed a valuable service, providing policy advice as required to internal strategic planning processes, responding to the needs of other projects and representing ACRE to a wider audience of policy makers. This work will be carried on by the ASEPG based at the University of NSW.

Renewable Energy Industry Action Agenda

ACRE played a major role in the development and implementation of the REIAA. ACRE nurtured, facilitated and carried out many of the actions described in the Agenda including: effective provision of renewable energy education and training; stimulating and supporting renewable energy research and development and policy development; and initiating significant, new programs such as Bushlight. These are critical to ensuring that the Australian renewable energy industry grows locally and from this base establishes a growing market share in the highly competitive, international energy market. With the demise of ACRE this initiative has been transferred to BCSE..

These are just a few of the highlights of ACRE's research program. There are many more described in ACRE's Annual Reports. There are also several promising projects that had were still developing when the news of ACRE2's failure to gain Commonwealth support was received. Some of these have been transferred to other parties.

3. THE FINAL STAGES OF ACRE

The news that the ACRE2 bid was unsuccessful came as a great shock to those people who were closely involved in ACRE. They had expected that ACRE2 would be funded because of the excellent year 5 report ACRE had received and the obvious need to continue to nurture the sustainable energy industry in Australia. At first there was a sense of despair amongst the participants who had put so much effort into creating ACRE that all of this valuable work would be lost, but some of the participants remembered previous setbacks where government funding had been suddenly withdrawn from the industry and they resolved to make an effort to carry on some aspects of ACRE's work.

Two major developments occurred early in 2003 that led to a much more satisfactory outcome than appeared likely at first. One was the offer of funds by the Australian Greenhouse office to support industry development activities in Queensland and Western Australia through the RRPGP. The second was the offer of a wind-up program or Residual Activities Agreement by the CRC Secretariat in DEST.

The AGO funding, through the State Energy offices, led to the formation of RISE and QSEIDG. These groups will continue most of the testing, standards and industry education activities of ACRE. They also aspire to carry on some research activities if funding can be sourced from Government or industry.

The ACRE Residual Activities Agreement was successful in achieving its major objective of facilitating the smooth transfer of continuing research and training activities from ACRE to their new managers. It allowed ACRE to continue operating for another six months in order to keep the key project teams together and to provide a relatively smooth transition to the new arrangements. The key outcomes of this agreement were:

- The key assets and intellectual property of ACRE was transferred to other organisations that will continue this work.
- All of the remaining ACRE contracts and agreements were transferred to new organisations such as RISE and QSEIDG. This includes some important agreements in regard to international cooperation on standards development and cooperative development of courseware.
- The Bushlight Agreement was restructured and RISE has taken over some of ACRE's responsibilities.
- The intellectual property of ACRE has been distributed in such a way that it will maximise the opportunities for its commercial development for the benefit of Australian industry.
- All of ACRE Ltd's remaining funds were distributed in accordance with the Residual Activities Agreement and the approved CRC wind up plan.
- All of ACRE's work programs were terminated and the ongoing ones were transferred to their new owners.

There were some difficulties associated with the delays in completing the Residual Activities Agreement before the expiry of Commonwealth Funding on 30 June 2003. This was partly a result of the indecision of the ACRE Ltd Board about the best course of action to take after receiving the advice that its bid for ACRE2 had been unsuccessful. However Murdoch University came to the rescue and underwrote the residual activities until Commonwealth funding arrived. They were subsequently reimbursed by ACRE Ltd for their expenses.

Despite these successful outcomes, many of the research projects suffered difficulties following the cessation of Commonwealth funding on 30 June 2003, but this is to be expected when a CRC closes. ACRELab and Bushlight have come through the transition in good shape because these were priority areas for ongoing support. Most of the research projects of ACRE have been terminated as a consequence of the termination of

Commonwealth funding and those that have continued are struggling for funds. This is particularly unfortunate for ACRE's successful wind power and solar concentrator projects and the education and training projects. These projects have very few avenues available to them now for financial support for research and development. This is a serious situation and the national research effort in sustainable energy is clearly in decline at present. This will eventually have an adverse impact on the industry as it will lead to an erosion of intellectual capital.

Another major loss is the leadership of the Renewable Energy Action Agenda of which ACRE had been the champion. Some of this work has passed to the Business Council for Sustainable Energy (BCSE) but the loss of key personnel and funding has been a substantial blow to this initiative.

Also ACRE's attempt to develop a venture capital fund ACRE Fund Management Ltd (AFML) for the renewable energy industry was terminated by the Board when the ACRE2 application failed to gain support.

There were many other lost opportunities such as: terminated projects, lapsed international agreements, loss of continuity, loss of research capacity, loss of intellectual property and loss of support for education and training. Perhaps the greatest disappointment was the loss of momentum in the renewable energy industry as a result of the closure of ACRE and the drift in Government policy on renewable energy. It may be some years before political interest in Australia returns to renewables but in the meantime the leadership of the industry will move to Europe and Japan where the need for continuity of support for developing industries is better understood.

4. LESSONS FROM THE ACRE EXPERIENCE

There is much that can be learned from the ACRE experience. There were many successes that can provide models for future applications and some failures that point to pitfalls to be avoided in the future.

The greatest successes of ACRE came about through the synergies provided by Commonwealth funding and the interaction of groups that would not otherwise have been able to collaborate. This is illustrated by the success of ACRELab, Bushlight, the wind power project, the solar concentrator work, etc. The additional funding provided by the Commonwealth and other sponsors also permitted researchers to undertake ambitious and challenging projects. The involvement of industry partners in ACRE meant that many of the projects were directly relevant to market needs and as a result several of ACRE's industry partners have improved their competitiveness in the market. The additional funding provided to the TAFE and University education projects, the policy analysis and short course training also led to impressive outcomes that will benefit Australian industry over the long term.

The availability of additional funding is a great incentive for collaboration and this is one of the reasons for the CRC Program. ACRE had many successes in collaboration including national and international cooperation in RAPS and fuel cell research and the

development of the Bushlight initiative. The Commonwealth funding also enabled the ACRE postgraduate students to meet annually to discuss their work and to explore opportunities for future research. The contacts they formed through these arrangements will have considerable long term benefits for Australian industry and research.

The ACRE web site was an outstanding success. It was the first point of contact for many enquiries and prospective students. It performed a vital service in providing free, technical information about renewable energy to the public and for directing enquiries to the appropriate person. It attracted more than 100,000 hits over seven years.

ACRE also experienced many difficulties and disappointments and it is worthwhile listing some of these as a guide future applicants for CRCs in renewable energy. The major problem was having too many participants for the funding available and the unreal expectations we had about what could be achieved in seven years. Commercial outcomes need substantial funding and lengthy time frames for success. Seven years is not long enough in an emerging industry where most of the companies involved are small and under-capitalised. As a result ACRE lacked sufficient industry support to justify a second term.

Another problem was the lack of a national sustainable energy policy framework. This leads to short term planning and shifts in funding from renewables to other technologies such as biosequestration and geosequestration which appear to offer easy solutions to greenhouse problems. It is difficult to develop a CRC proposal in sustainable energy technologies when the Commonwealth and most of the States do not have a clear policy agenda for this industry. The failure of the Australian Government to develop a long-term vision for sustainable energy has meant that many promising Australian innovations will not be commercialized and the industry will become increasingly dependent on imported technology.

The failure of ACRE2 and the subsequent bid for a Solar CRC show that future CRC bids from the renewable energy sector are unlikely to succeed unless they are commercially orientated and include major industrial partners. They will need to be based on technologies that are commercial now and for which there is support from large corporations (eg wind farms, biomass conversion, solar design, fuel cell vehicles). They will need to be narrowly focused with few major partners and have large multipliers for Commonwealth funds. This means that the technologies may need to involve hybrids of renewables with fossil fuels as there are few renewable energy firms of sufficient size to participate. Also fossil-fuel hybrids are more likely to make a major contribution to greenhouse gas abatement within a seven year time frame than pure renewables. However, in the longer term there will be a substantial shift to renewables and some large energy corporations have already realised this and they are potential CRC partners.

Finally it is important to ensure that the CRC administration is enlightened and efficient. This is easier to achieve if the Centre is not too dispersed and is relatively narrow in its scope. The administration must maintain close links with the researchers and the industry partners and ensure that the Board is kept in touch with both the market and the research

priorities. CRC management needs to be aware of the delicate blend of staff from industry and academia where the research cultures are quite different. Many research staff are coopted part-time from industry or academia and management must try to make them feel part of the CRC as well as recognising and respecting their roles and responsibilities to their primary employers. In these circumstances the CRC administration must make a special effort to look after morale and promote interaction and understanding amongst staff and researchers. This requires a special type of manager who understands and respects both cultures and is committed to the goals of the CRC Program. The choice of the Board members and the CEO are crucial decisions that can determine the success or failure of the entire operation.

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