

University of Otago
Otago Energy Research Centre
Annual Report 2009

1. Centre Mission

The Otago Energy Research Centre's mission is *to inform New Zealand's energy transformation*. To achieve this, the OERC's objectives are to:

- a) bring together researchers from throughout the university whose work can contribute to New Zealand's energy research needs;
- b) promote new research activity in sustainable energy research, including cross-disciplinary collaborations;
- c) support skills development in postgraduate students;
- d) enhance the national and international profile of Otago University as a centre of excellent energy-related research.

2. Centre Personnel

- **Convenor:** Prof Rob Lawson
- **Steering Group:** Prof Gerry Carrington (Physics), Assoc Prof Bob Lloyd (Physics), Mick Abbott (Design), Assoc Prof Julian Eaton-Rye (Biochemistry), Dr Paul Thorsnes (Economics), Ceri Warnock (Law), Dr Inga Smith (Physics), Dr Louis Leland (Psychology), and Dr Janet Stephenson (CSAFE/Geography).
- **Advisory Board:** Prof Colin Campbell-Hunt (Management), Prof Carolyn Burns (Zoology), Emeritus Prof Peter Holland (Geography).

Department	Researcher	Department	Researcher
Accountancy	Dr Ralph Adler	Information Science	Prof Martin Purvis
Anthropology	Dr Martha Bell	Information Science	Dr Maryam Purvis
Biochemistry	Dr Julian Eaton-Rye	Information Science	Dr Peter Whigham
Biochemistry	Dr Martin Hohmann-Marriott	Law	Nicola Wheen
Chemistry	Assoc Prof Keith Gordon	Law	Ceri Warnock
Chemistry	Prof Keith Hunter	Marketing	Dr Juergen Gnoth
Chemistry	Dr Barrie Peake	Marketing	Dr David Holdsworth
CSAFE	Assoc Prof Hugh Campbell	Marketing	Dr Andrea Insch
CSAFE	Assoc Prof Henrik Moller	Marketing	Prof Rob Lawson
CSAFE	Dr Janet Stephenson	Marketing	Prof Sarah Todd
CSAFE	Dr Solis Norton	Physics	Prof Gerry Carrington
Design	Mick Abbot	Physics	Assoc Prof Bob Lloyd
Design	Prof Thomas Bley	Physics	Dr Eric Scharpf
Design	Dr Sarah Wakes	Physics	Dr Inga Smith
Economics	Assoc Prof Paul Hansen	Physics	Dr Zhifa Sun
Economics	Dr Paul Thorsnes	Politics	Dr Geoffrey Craig
Geography	Assoc Prof Claire Freeman	Psychology	Dr Louis Leland
Geography	Prof Richard Morgan	Surveying	Dr Renaud Mathieu
Geography	Dr Michelle Thompson-Fawcett	Tourism	Dr Anna Thompson
Geology	Assoc Prof Dave Craw	Tourism	Dr David Duval
Health Sciences	Prof Philippa Howden-Chapman	Prev & Social Med	Prof Hank Weiss
Health Sciences	Dr Robin Simmonds		

3. Objectives for 2009 were:

1. Maintain a similar or improved level of networking and collaboration amongst the OERC energy research community as during 2008, through funding a part-time administrator, and having monthly meetings of the OERC committee, meeting at least twice a year with the Advisory Committee, having at least one General Meeting of OERC, and holding research symposia and workshops.
2. Maintain and develop relationships between OERC and the National Energy Research Institute, other energy research organisations, and the wider stakeholders, through having an OERC member on the

- NERI Management Committee, taking and creating opportunities for networking, accepting invitations to represent OERC locally and nationally, and inviting stakeholders to OERC events where appropriate.
3. Grow at least one novel energy research concept to a stage where it is suitable for a UORG or external funding application, through offering a small contestable fund for OERC members to use for research concept development.
 4. Encourage postgraduates to take up energy research, support their progress and provide opportunities for interactions across departments, through offering conference funding, summer scholarships, meeting/research discussion sessions, and holding a postgraduate research workshop and a research symposium.
 5. Maintain the profile of energy research at Otago by means of the OERC website, presentations, energy research database, and the 'Energy Update' newsletter.

4. Centre Activities and Outcomes during 2009

1. Research Centre meetings

The OERC Steering group met monthly at the Centre for Innovation Board Room and will hold a general meeting in December to affirm membership of its Steering Group for 2010. We held a very successful day-long Research Symposium on November 4, 2009 and a Postgraduate Research Workshop on September 8, 2009. A general meeting with research updates from OERC staff personnel was held on July 30. The planned meetings with our Advisory Group have not happened for a variety of reasons. In 2010 we would like to review the purpose and need for an advisory group since we note that as a "Theme" the OERC is not technically required to have such a group and while the OERC has a wide range of external links, there are no external members in its current advisory group. If the Research Committee wished to express any views prior to that review the OERC would be pleased to receive them.

2. OERC Administrator

Funding was set aside in the 2009 OERC budget to employ an administrator (Dr. Solis Norton) for 7.5 hours a week. The Departments of Physics and Marketing have generously extended this support to 12.5 hours and CSAFE has provided accommodation and office support for Dr. Norton.

3. Research Accomplishments

Research-related highlights during 2009 include:

- The acquisition of two FRST grants – a multidisciplinary three year project on Energy Cultures headed by Rob Lawson and Janet Stephenson and a six year programme for Keith Gordon on high efficiency organic photovoltaics.
- Keith Gordon was acting leader for the Energy Section of the Focal Point Program, an IIOF FRST funded initiative between New Zealand and Korea.
- The development of a collaborative research relationship with the Waitati community, a 'transition town' that is actively reducing its energy consumption. Working with a community liaison group, Otago research expertise (academics and postgraduates) has been applied in areas of mutual interest including the study of potential sites for locating a wind turbine and attitudes to small-scale wind energy. A research liaison meeting between the OERC and Waitati community occurred June 18, 2009.
- An Energy Workshop was held on June 29, 2009 with the Waitati community to investigating a business model suitable for ownership of a wind turbine by the community.
- The international journal Energy Policy produced a Special Edition (vol 37 issue 9 in 2009) on New Zealand Energy Strategy in which OERC members have two papers (Graham, Stephenson and Smith, and Smith and Roger).
- Martin Hohmann-Marriott received a FRST postdoctoral Fellowship to define the interface of biological nanowires with photosynthetic metabolism. He will investigate the potential to directly generate electricity from single cells and entire ecosystems.
- Energy Cultures study: field work for Timber Industry Energy Use case study and Brockville community case study (Principal Investigator: Rob Lawson; funding: UORG 2009).
- Samuel Lind, a PhD student of Keith Gordon's received a top achiever award for his research focusing on the theoretically driven rational design of dyes for energy capture.

4. Postgraduate activities and support

- Summer student bursaries were awarded to (a) Peter Wilson (CSAFE) for analysis of household energy use data associated with the Energy Cultures project and (b) Oliver Howitt (Physics) to study the dependence of New Zealand's international trade on fossil fuels for transport and support services. One further bursary will be assigned by the end of November.

- Conference funding was awarded to Paul Young (Masters student, Physics) to travel to the UK and attend the UK Energy Research Centre Energy Summer School and to Solis Norton to present a paper at the Massey University Post Graduate Energy Conference. Andrew Forest (Masters student, Physics) also received funding to assist publishing the results of his project.
- Maintenance of an email list of all known students doing energy related research to coordinate student activities and distribute information regarding lectures, workshops, funding and other miscellaneous items.
- A postgraduate networking lunch was held on March 27, attended by approximately 30 postgraduates.
- The Postgraduate Workshop was held on September 8, with 8 presenters including keynote speaker Associate Professor Samuel Mann and approximately 25 in attendance.
- A research grant will be offered to a graduate or post graduate student to further develop the OERC website.

5. *Links and collaborations*

- Gerry Carrington and Janet Stephenson have respectively been Convenor and Otago representative for NERI up until its transition to a Trust in October 2009, at which point they became its inaugural trustees. NERI has undergone significant change of structure and operation in 2009 and members of the OERC have been critical to ensuring its continuation. The OERC has been responsible for allocating student support money on behalf of NERI to students in biochemistry and marketing and for completing other work on behalf of NERI. Projects in the latter area include the development of a Demand Side Research Strategy for FRST and work with engineering students at Canterbury University on the demand for energy related tertiary courses.
- OERC has close links with the Energy Efficiency and Conservation Authority. EECA are a partner in the Energy Cultures FRST project run by Lawson and Stephenson and regularly attend OERC meetings, including the annual research symposium.
- Links between the OERC and the Massey University Energy Research Centre are being developed by way of presentation of energy related research at the Massey Postgraduate Energy Conference by Solis Norton and his meeting with key MUERC staff. Links between Energy and Water Resources Department in the Norwegian Ministry of Petroleum and Energy were formed during the visit and OERC presentation by advisers Ingebjørg Erlandsen Tofte and Bente Anfinnsen, October 2, 2009.
- A link was formed between OERC and the Clean Tech Law and Business Journal (Washington DC, USA) during the visit and attendance by editor Jeewon Kim at the OERC networking meeting, July 30.
- The OERC has an extensive email network for regular events including standard distribution lists operated by the university in addition to 61 postgraduate students, 47 University of Otago staff, and 20 interested parties beyond the university. Consequently invitations to OERC events reach several hundred people.
- The OERC also has good reciprocal relationships with the DCC through Mr. Neville Auton, their energy manager. There is current collaboration and exchange of data regarding research being undertaken in North East Valley.

6. *OERC promotion*

- Professor Gerry Carrington received the Outstanding Contribution to Renewable Energy award at the 2009 Awards for Excellence and Innovation in Renewable Energy hosted by EECA in May.
- OERC participated in the Otago University Tertiary Info Day May 4 2009 to promote energy research and energy-related courses at Otago.
- Dr Janet Stephenson had an article published in the University of Otago magazine describing OERC related wind farm research.
- Three issues of 'Energy Update' were produced during 2009 – a newsletter of OERC activities, achievements and upcoming events.
- The OERC website is regularly updated with news items and provides a key information source for energy related research occurring at Otago. It ranks as one of the top five hits from a Google search of "energy research New Zealand".

7. *Research symposium*

- The OERC Symposium "Making a difference: energy research, climate change and our future" was held November 4 2009. This event was over 40% larger than in 2008 with 14 presenters including keynote speaker Professor Ralph Sims of the International Energy Agency, Paris, and slightly more than 50 people in attendance. Attendees represented research institutions (Otago, Massey, and Waikato Universities), the National Energy Research Institute, government (EECA), industry (Mighty River Power), Dunedin City Council members, business (TransitionNZ Group Ltd, Powerhouse Wind Ltd, CPG NZ, Energy Link Ltd, Waste Solutions) and local community groups (Waitati Energy Project and the Solar Action Group).

8. Public lectures

- Dr Carly McLachlan (UK), November 19, 2009 – “Stakeholder responses to wave energy: a case study of the Wave Hub, Cornwall, UK”.

9. Community Workshops

- OERC hosted a ‘Systems Thinking’ workshop July 29, 2009 presented by Paul Stephenson (Synergia) assisted by Janet Stephenson and Rob Lawson – for the Waitati community to investigate a business model suitable for the community ownership of a wind turbine.
- Rob Lawson and Janet Stephenson have also run separate workshops for the Waitati and Brockville communities on household use of power in those communities and the adoption of energy efficient behaviours.

10. Translating research into teaching

- OERC has worked with the Centre for Science Communication to identify a postgraduate student able to work alongside an energy researcher to develop a communication package to ‘translate’ the research into a format suitable for use in teaching (either at a university level or secondary/general public). The student was Heather Robertson and her report ‘A summary of housing related research at the Otago Energy Research Centre’, March 2009, is available on the OERC website.

11. Research concept development

- The OERC offered a seed fund for new research as a contestable research grant which was won by Dr Robin Simmonds and Dr Sarah Wakes for modelling the production process of biodiesel from bacteria. It is hoped by the recipients that this research will lead to a University of Otago Research Grant and a Masters project.

5. Centre Outcomes – see comments alongside activities in section 4

6. Budget and expenditure for 2009

1 Contestable seed funding Robin Simmonds and Sarah Wakes	Committed	Paid 2500	Budget: 2500 Remaining: 0
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2 Research meetings & Symposia Research Networking Meeting		350	Budget: 6000
General meeting	350		
Post-Grad workshop		1070	
Symposium		2389	
			Remaining: 1791

3 Postgraduate support Postgraduate lunch student funding: M. Hohmann-Marriott		263	Budget: 9000
student funding: Paul Young		300	
student funding: Solis Norton	600	1000	
student funding: Andrew Forests	1500		
Summer bursary 1: Oliver Howitt	2500		
Summer bursary 2: Peter Wilson	2500		
Summer bursary 3: website updates	2500		
			Remaining: -2163

4 Communications			Budget: 500 Remaining: 500
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5 Administor Solis Norton		7000	Budget: 7000 Remaining: 0
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Total			25000
Spent			12483
Committed			12517
Remaining as at 17/11/09			128

University of Otago
Otago Energy Research Centre
Annual Management Plan and Budget 2010

1. Research Centre Mission

The Otago Energy Research Centre's mission is *to inform New Zealand's energy transformation*. To achieve this, the OERC's objectives are to:

- a) bring together researchers from throughout the university whose work can contribute to New Zealand's energy research needs;
- b) promote new research activity in sustainable energy research, including cross-disciplinary collaborations;
- c) support skills development in postgraduate students;
- d) enhance the national and international profile of Otago University as a centre of excellent energy-related research.

2. Objectives for 2010 (planned activities)

Planned objectives and activities for 2010 essentially remain the same as in 2009 except that three new initiatives are planned as marked below.

1. Maintain a similar or improved level of networking and collaboration amongst the OERC energy research community as during 2009, through funding a part-time administrator, having regular (monthly) meetings of the OERC committee, , having at least one General Meeting of OERC, and holding research symposia and workshops. **In addition to established meeting types we are also planning to trial 'Cafe Scientifique' style of meetings to promote debate on energy issues.**
2. Maintain and develop relationships between OERC and the National Energy Research Institute, other energy research organisations, and the wider stakeholders, through continuing Otago University's links with NERI, taking and creating opportunities for networking, accepting invitations to represent OERC locally and nationally, and inviting stakeholders to OERC events where appropriate. **Additionally we are seeking to improve international linkages by proposing an appropriate William Evans Visiting Fellow of interest to the wide range of energy researchers across Otago.**
3. Grow at least one novel energy research concept to a stage where it is suitable for a UORG or external funding application, through offering a small contestable fund for OERC members to use for research concept development.
4. Encourage postgraduates to take up energy research, support their progress and provide opportunities for interactions across departments, through offering conference funding, summer scholarships, meeting/research discussion sessions, and holding a research symposium.
5. Maintain the profile of energy research at Otago, including by means of the OERC website, presentations, energy research database, ensuring OERC members are well represented on NERI's national Capability Map, and through the 'Energy Update' newsletter. **In particular we aim to develop the website as a resource for energy researchers.**

3. Management Structure (including names of Director, Advisory Board and Steering Group members)

- **Convenor:** Prof Rob Lawson
- **Steering Group:** Prof Gerry Carrington (Physics), Assoc Prof Bob Lloyd (Physics), Mick Abbott (Design), Assoc Prof Julian Eaton-Rye (Biochemistry), Dr Paul Thorsnes (Economics), Ceri Warnock (Law), Dr Inga Smith (Physics) and Dr Louis Leland (Psychology), Dr Janet Stephenson (CSAFE, Geography).

- **Advisory Board:** Prof Colin Campbell-Hunt (Management), Prof Carolyn Burns (Zoology), Emeritus Prof Peter Holland (Geography). To be reviewed, see 4.1 of 2009 annual report.

4. Proposed Budget for 2010 (up to \$25,000 max)

Items	Expenditure
1. Administration assistant	\$7500
2. Contestable seed fund for new research	\$2500
3. Research meetings/symposia	\$5500
4. Postgraduate support (summer scholarships, conference funding, meetings)	\$9000
5. Communication (website, newsletters etc)	\$500
Total	\$25,000

5. Justification of Expenditure

1. *Administration assistant:* Since 2008, the level of activity in OERC has been too much to be covered by the convenor and steering committee, and an administrative assistant has been needed. The benefits in terms of meeting arrangements, communications and profile have been enormous. To date the assistant has been funded for 12.5 hours per week with assistance from the Departments of Marketing and Physics, together with space provided by CSAFE. Ideally we would like to maintain that level but we cannot rely on further funding from the Departments, although space at CSAFE is secure. The \$7500 included in the budget for 2010 continues the commitment made in 2009 and will allow Dr. Norton to continue working for the OERC for 7 hours a week.
2. *Seed fund for new research:* OERC started this fund in 2008 with a particular view to supporting interdisciplinary research if possible. The work funded that year went on to secure a \$25000 UORG a few months later and a \$1m FRST grant this year. In 2009 we have funded a joint project between Biochemistry and Design and we wish to continue this investment in novel research projects in 2010.
3. *Research meetings/symposia:* Fostering researcher interactions enhances the quality and relevance of research, and may lead to unexpected synergies. The OERC will use the funding to create situations for researchers (and postgraduate students) to discuss their research and interact with other internal and external energy researchers, and other energy stakeholders (industry, local government etc). This will include meetings, workshops and at least one research symposium. The outcomes will be a more cohesive and vibrant energy research community at Otago and improved national and international research networks. Our proposed budget for this was underspent in 2009 and has been reduced by \$500 to allow for the increase necessary for administrative assistant.
4. *Postgraduate support:* The OERC is committed to supporting post-graduate activities which advance knowledge, enhance research skills and encourage cross-disciplinary links. The planned summer scholarships, conference funding, and meetings aim to create a lively, cohesive and cross-departmental postgraduate research group, and to support students in development of their research capability.
5. *Communication:* Otago University's national profile as a centre of excellent energy-related research will be strengthened by maintaining the website, newsletters, the database of energy researchers, and other forms of communication between researchers, and with stakeholders and the public. We rely heavily on electronic communication but do need to produce some physical materials. Costs for 2009 have in fact been absorbed by participating departments but it is necessary to retain a small budget in case this does not continue.