



THE UNIVERSITY OF  
**AUCKLAND**  
Te Whare Wānanga o Tāmaki Makaurau  
NEW ZEALAND

**BUSINESS SCHOOL**  
ENERGY CENTRE

# The Energy Centre Annual Report

May 2017-2018

**Annual Report to The Energy Education Trust of New Zealand**



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## Introduction

The Energy Centre aligns its programme with the following strategic themes:

- Undertake independent research and business and policy analysis on energy-related issues important to New Zealand's future
- Carry out research that is cross-disciplinary, drawing upon (as appropriate) economics, engineering and the physical, environmental and social sciences
- Act as a bridge for open and informed dialogue between the energy industry, government and the community
- Provide energy-related education that creates future leaders for academia, business and government

The Centre's programme draws on, and benefits from, the enthusiasm and expertise of numerous individuals across campus. We acknowledge the following sustained contributions:

- **Dr Anna Berka** (Research Fellow)
- **Mr Bart van Campen** (Engineering Science)
- **Dr Tony Downward** (Engineering Science)
- **Dr Julie MacArthur** (Political Studies)
- **Professor Mark Greer** (Dowling College, USA)
- **Dr Stephen Poletti** (Department of Economics)
- **Dr Mingyue (Selena) Sheng** (Research Fellow)
- **Dr Kiti, Suomalainen**, (Research Fellow)
- **Dinah Towle** (Business School)
- **Dr Le Wen** (Research Fellow)
- **Associate Professor Golbon Zakeri** (Engineering Science)
- **Dr Vincent Wang** (School of Environment)

### Staff updates

**Anna Berka** returned from maternity leave in October 2017.

**Kiti Suomalainen** returned to the Centre in January 2018.

### Visitors

**Oliver Browne** graduated from the University of Auckland in Economics and Engineering Science. He worked as a research associate in the Centre, estimating the economic consequences of market power in the electricity sector with co-authors Steve Poletti and David Young (EETNZ Post-doctoral Fellow). Oliver is completing his PhD at the University of Chicago.

**Dr Steve Heinen**, a PhD candidate, returned to the University College of Dublin in January 2018. Steve is now working for Vector and contributed to Summer School 2018.

**Yishuai Ren**, a PhD candidate from the Business School of Hunan University, Hunan, China, returned to Hunan to complete his PhD. Yishuai's visit was funded by the China Scholarship Council (CSC). He published two papers in international journals while visiting the Centre. Both papers investigated China's approach to a low-carbon economy.

**Wenjing Wu**, Shaanxi Normal University, Shaanxi, China, is visiting the Centre until August 2019. The CSC provided financial support for Wenjing's stay at the Centre. Her research project focuses on financial instruments to promote energy restructuring and industrial upgrading of energy production in China.

**Ming Yi**, China University of Geosciences, Wuhan, China, will visit the Centre from August 2018 to August 2019. CSC has provided financial assistance for Ming's visit.

In September, two international students started their PhD research at the Energy Centre.

**Wenwen Zhang** completed her undergraduate degree at the Nanjing University of Finance and Economics, and a masters degree at the China University of Mining and Technology. CSC has provided financial assistance for Wenwen's thesis *China's Energy and Environmental Analysis and Comprehensive Simulation of Climate Policy*. Her research will simulate impacts of climate policies on China's economy, energy and environment.

**Lingli Qi** completed a Bachelor of Economics at Huaibei University and a Master of Economics at the University of Science and Technology, Beijing. Lingli received the Spicer-Glenn PhD scholarship to support her research into *New Zealand's emissions trading scheme (ETS) and its impact on business and economic growth*. This topic is particularly relevant to policy initiatives underway under the Labour government. Her research will also examine the impact of the ETS on China-New Zealand trade.

# Postgraduate research

## BCom Honours

**Harry Kleyer**, *Integrating solar generated electricity*, modelling solar generated electricity, household demand and pricing.

**Caity Butcher**, *Driving Changes for New Zealand Energy*, covers the impact of different scenarios for EV charging on the composition of NZ's generation profile, with a particular focus on cost, renewables and installed capacity.

## PhD research in progress

**Mahbubeh Habibian**, *Multi-stage Stochastic Co-Optimization of Demand Bids and Interruptible Load Reserve offers for a Strategic Major Consumer of Energy in New Zealand Electricity Market* (Supervisor: Golbon Zakeri).

**Melody Meng**, *The role of social and environmental returns analysis of impact investment decisions in the renewable energy market in Mainland China* (Supervisors: Chris Woods and Basil Sharp).

**Lingli Qi**, *Benefits, Barriers and Design for New Zealand's Emissions Trading Scheme: Integrated Environment-Economy-Energy Analysis by CGE Model*, (Supervisors: Basil Sharp and Steven Poletti).

**Wenwen Zhang**, *Climate change impacts on energy consumption based on a CGE model*, (Supervisors: Basil Sharp and Steven Poletti).

## PhD completions

**Sina Ahmadzadeh Mashinchi**, *Energy-Environment-Economy Modelling* (Supervisors: Basil Sharp and Stephen Poletti). Sina provided empirical evidence on the extent to which decarbonising policies in New Zealand cope with emission reduction targets and how various economic factors need to be taken into account when evaluating current conditions and deciding future actions. The thesis was submitted in December 2017 and Sina is now revising the thesis for re-submission.

**Milad Maralani**, *The potential impact of energy-saving technological change on the New Zealand economy* (Supervisors: Basil Sharp and Golbon Zakeri). Milad's model of the economy examines the impact of energy-saving technological change on energy use and how capital moves between sectors.

**Mahsa Moshrefi**, *Efficient Consumption of Energy* (Supervisors: Basil Sharp and Erwann Sabai). Marsha's research finds the share of primary supply from renewable energy resources is associated with more efficient energy consumption in OECD and OPEC countries.

*PhD students Milad Maralani, Melody Meng, Lingli Qi and Wenwen Zhang*





# Achievements 2017-2018

Programmatic achievements through May 2018 and key performance indicators (KPIs) are listed in Appendix A along with impacts in Appendix C. Impact is defined as “contribution to (and beyond) academia, involving interactions with internal and external stakeholders for the mutually beneficial exchange of knowledge, and understanding of issues and challenges facing the energy industry, government and community”.



## Highlights

### Auckland solar

Launched in October 2017, the Auckland solar rooftop map is freely available to the public. This initiative, led by Dr Kiti Suomalainen, has attracted numerous users, resulted in a great deal of community interest and is currently leading to research collaboration with Mercury Energy.

[www.solarpower.cer.auckland.ac.nz](http://www.solarpower.cer.auckland.ac.nz)

### Wind

Dr Le Wen found statistical evidence that wind-generated electricity reduces wholesale electricity prices. Price reductions occur not only at the grid injection point but also at other neighbouring nodes. Transmission constraints can moderate the impact of price reductions. Price volatility is higher when wind-generated electricity enters the market and hydro storage is low.

### Transport

The Centre's programme on transport-related research had a significant boost when a collaborative proposal on inductive power transfer roadway charging systems received funding from MBIE. Dr Selena Sheng will lead the Centre's contribution, beginning initially with research on the uptake of electric vehicles.

## Peer-reviewed articles

**Batstone, S., G. Pritchard, G. Zakeri.** Non-invasive test scheduling of the grid over live electricity markets, (accepted) *Interfaces*.

**Berka A.** (2017). Community energy in the UK: A Short History, Chapter 59 in: *Handbook of Participation and Energy Transitions* (Eds. Holstenkamp L., Radtke J.), Springer VS Wiesbaden. DOI: 10.1007/978-3-658-09416-4, ISBN: 978-3-658-09416-4.

**Berka A., E. Creamer** (2017). Taking stock of the local impacts of community owned renewable energy: a review and research agenda, *Sustainable and Renewable Energy Reviews*.

**Berka A., J. Harnmeijer, B. Slee** (2017). Crossing the Rubicon: the 2015 UK renewable electricity reforms and implications for Scotland. Chapter 8 in: *A Critical Review of Scottish Renewable and Low Carbon Energy Policy: Implications for the Independence Debate*, Wood G. and Baker K. (Eds.), London: Palgrave Macmillan. DOI: 10.1007/978-3-319-56898-0, ISBN: 978-3-319-56898-0.

**Harnmeijer, A.** A comparative analysis of the costs of onshore wind energy: is there a case for community specific support? (accepted), *Energy Policy*.

**Harnmeijer, A.** Taking stock of the local impacts of community energy: a review and research agenda, (submitted), *Renewable and Sustainable Energy Reviews*.

**MacArthur, Julie L.** (2018) "Chapter 55: Community energy in Aotearoa/New Zealand" in Lars Holstenkamp and Jörg Radtke (eds) *Energy Transition and Participation*, Springer VS. [https://doi.org/10.1007/978-3-658-09416-4\\_55](https://doi.org/10.1007/978-3-658-09416-4_55).

**Sheng, M., B. Sharp** (2017). The Influence of Urban Forms on Transit Behaviour in the Auckland Region. Conference proceeding of the 7th Annual International Conference on Qualitative and

Quantitative Economics Research (QQE 2017) 5–6 June 2017, Singapore.

**Sheng, Mengyue, Basil Sharp.** Aggregate road passenger travel demand in New Zealand, (revise and re-submit) *Transportation Research Part A: Policy and Practice*.

**Sheng, Mengyue and Basil Sharp.** Commuter's Transport Mode Preferences and Network Effects in New Zealand, (revise and re-submit) *Journal of Transport Economics and Policy*.

**Suomalainen, Kiti, Vincent Wang, and Basil Sharp** (2017). Rooftop solar potential based on LiDAR data: Bottom-up assessment at neighbourhood level, *Renewable Energy*, 111, 463-473.

**Zakeri, G., J. Khazaei and S. Oren.** Single and Multi-settlement Approaches to Market Clearing under Demand Uncertainty, (accepted) *Operations Research*.

The following journal articles were not listed in the 2016-17 Annual Report:

**Downward, A., D. Young and G. Zakeri.** (2016). Electricity contracting and policy choices under risk-aversion, *European Journal of Operational Research*, 251, 3, pp 846--859.

**Flores-Quiroz, A., R. Palma-Behnke, G. Zakeri, R. Moreno,** "A column generation approach for solving generation expansion planning problems with high renewable energy penetration", *Electric Power Systems Research*, 2016, 136, pp 232--241.

**Wu, A. Philpott, G. Zakeri.** Investment and generation optimisation in electricity systems with intermittent supply, *Energy Systems*, 2016, DOI: 10.1007/s12667-016-0210-z.



## Working papers

**Sheng, M. and B. Sharp** (2018). Economic Growth and Transport Carbon Dioxide Emissions in New Zealand: A Cointegration Analysis of the Environmental Kuznets Curve.

**Wen, L. and B. Sharp** (2017). The Spatial Analysis of Wind Generation on Nodal Prices: Evidence from New Zealand.

**Wen, L. and B. Sharp** (2017). Spatial Analysis of the Merit-Order Effect of Wind Penetration in New Zealand.

**Wilson, P., G. Williams, B. Sharp, K. Suomalainen** (2018). Polynesian Pathways to a Future Without Electricity Grids, Draft NZIER Report.

## Presentations

**Berka A, J. MacArthur J. and C. Gonnelli**  
A generic framework for inclusive energy governance: explaining the state of local and community energy in New Zealand, submitted to IPSA 25th World Congress of Political Science, 2018.

**Berka A.** Characteristics of inclusive energy governance pathways: a country comparative study, submitted to IPSA 25th World Congress of Political Science 2018.

**Berka A.** Localism, social economy and sustainable development: a reconciliation based on cultural variants of economic life, submitted to SCORAI 2018: Sustainable Consumption: Fostering Good Practices and Confronting the Challenges of the 21st Century.

**Julie MacArthur** was invited to participate in a round table on deliberative cultures with John Dryzek, Mark Bevir, Marit Hammond and Quinlan Bowman, at the American Political Science Association Annual Conference, San Francisco, 28 August-2 September.

**MacArthur, Julie and Christina Hoicka.** "Local forms and eco-social functions: community energy models in Canada and New Zealand". International Public Policy Association Annual Conference, National University of Singapore, Singapore, 28-30 June 2017.

**Sheng, S.** "Challenges and Solutions to Auckland's Transport" – presented at Energy Centre's 'In conversation: on Challenges and Solutions to Auckland's Transport', on Monday, 12 June 2017.

**Sheng, Mingyue and Basil Sharp.** "The Influence of Urban Forms on Transit Behaviour in the

Auckland Region" – 7th Annual International Conference on Qualitative and Quantitative Economics Research (QQE 2017) 5-6 June 2017, Singapore.

**Sheng, M. and B. Sharp** "The Influence of Urban Forms on Transit Behaviour in the Auckland Region". Paper presented at the 7th Annual International Conference on Qualitative and Quantitative Economics Research (QQE 2017) 5-6 June 2017, Singapore.

**Suomalainen, K.** "Rooftop solar potential based on LiDAR data: An Auckland case study", Otago Energy Research Centre Seminar Series, 4 May 2017.

**Suomalainen, K. and V. Wang.** "Auckland rooftop solar potential: Where were we? An exciting update on recent developments", Energy Centre Research Seminar, 26 July 2017.

**van Campen, Bart.** "Ohaaki consenting, modelling and resource assessment review: the best place to look for lessons on sustainable geothermal operation and monitoring"; 39th New Zealand Geothermal Workshop, November 2017.

**van Campen, Bart.** "Analysis of New Indonesian Tariff System and Impact of Feasibility of Geothermal Plants in Eastern Indonesia in the Next Decade"; 39th New Zealand Geothermal Workshop, 22 - 24 November 2017.

**van Campen, Bart.** "Comparación de Marcos Regulatorios para la Geotermia", and participated in a discussion panel for the 'Reunion de la Geotermia', Colombia, December 2017.

**van Campen, Bart** presented a conference paper: "Planning the Electrification of Rural Villages in East Nusa Tenggara Using Renewable Energy Generation"; PYC International Energy Conference, Jakarta, Indonesia, December 2017.

**Wen, L. and B. Sharp** (2017). "The Spatial Analysis of Wind Generation on Nodal Prices: Evidence from New Zealand". Conference proceeding of the 40th IAAE International Conference, 18-21 June, Singapore.

[www.iaee.org/en/publications/proceedings.aspx](http://www.iaee.org/en/publications/proceedings.aspx).

Wen, L. and B. Sharp (2017). Spatial Analysis of the Merit-Order Effect of Wind Penetration in New Zealand. Conference proceeding of the 15th IAAE European Conference, 3-6 September, Vienna, Austria.

[www.iaee.org/en/publications/proceedings.aspx](http://www.iaee.org/en/publications/proceedings.aspx).

## Presentations not listed in 2016 Annual Report

**Bart Van Campen, Pablo Sanchez-Alfaro, Sebastian Puschel-Lovengreen, Patrick Dobson:** Geothermal Costs and Policy Impacts in Chile and Latin America. New Zealand Geothermal Workshop, 23-25 November 2016, Auckland, New Zealand.

**Bart Van Campen, Jim Lawless, Jim Randle, Surya Darma:** Can Geothermal Regulation Enhance (Technical) Innovation - Evidence and Case Studies from NZ and Indonesia. 38th New Zealand Geothermal Workshop, 23-25 November 2016, Auckland, New Zealand.

**Bart Van Campen, Pablo Sanchez-Alfaro, Sebastian Puschel-Lovengreen, Patrick Dobson:** Geothermal Costs and Policy Impacts in Chile and Latin America. New Zealand Geothermal Workshop, 23-25 November 2016, Auckland, New Zealand.

## Research seminars

Research updates are integrated into our regular meetings involving Centre cross-faculty collaborators (Engineering, Political Studies) and PhD students:

**Oliver Browne,** University of Chicago: Water rights in Idaho - transaction costs and efficient water allocation, 21 June, 2017.

**Kiti Suomalainen and Vincent Wang:** A public web-based tool to access solar energy potential on Auckland rooftops, 26 July, 2017.

**Selena Sheng:** Aggregate road passenger travel demand in New Zealand, Energy Centre, 18 August, 2017.

**Andrea Raith:** Energy Optimisation in Strategic Transport Models, Engineering Science, 13 September, 2017.

**Steve Heinen:** Residential space heat electrification in a system with high penetration of wind - a planning analysis by, 14 December, 2017.



# International networks and collaboration

The Centre's programme on renewables (wind, geothermal, hydro and solar), market design, transport and climate change provides a solid foundation for research-informed contributions to New Zealand's energy challenges. Collaboration with domestic and international research centres is a hallmark of the Centre's programme. In addition to providing opportunities for research, project-based collaborations have contributed to growth in enquiries for postgraduate research in the Centre.

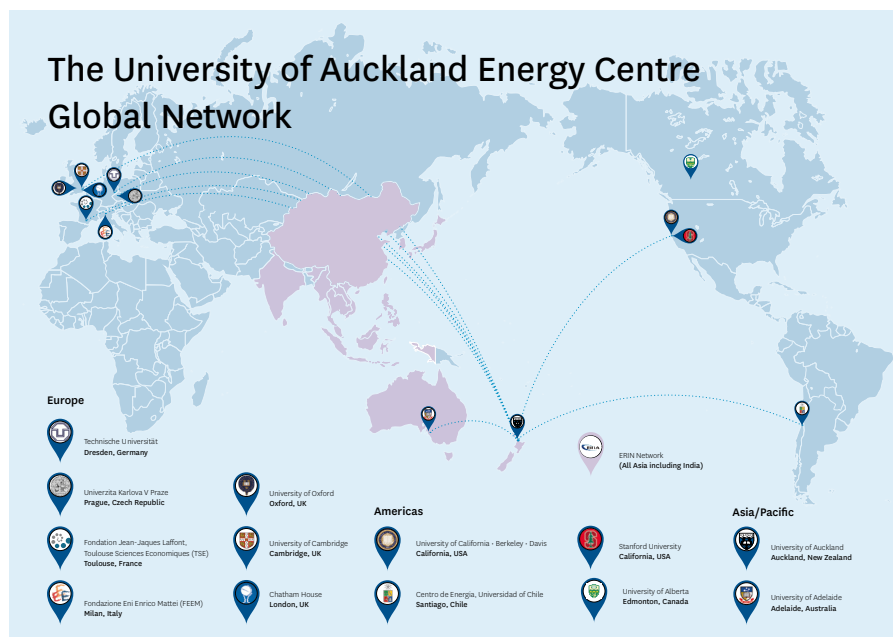
## Energy Research Institute Network (ERIN)

Basil Sharp attended the 7th Annual Meeting of ERIN in Bohol, Philippines, on 7 August 2017. Presentations covered the cleaner use of fossil fuels and safer use of nuclear energy. The presentation on nuclear safety focused on preparedness and called for collaboration across countries reliant on nuclear energy, notably Korea and Japan. The morning session was followed by the 1st East Asia Energy Forum: How to Supply and Use Fossil Fuel. Growth in electricity demand is projected to increase by 120% through 2040. Despite anti-coal lobbying and a lack of social acceptability, coal is still expected to contribute about 50% toward electricity supply. Over 130 million people have no access to electricity in the ASEAN region.

Basil Sharp participated in "Public Acceptance Week for Nuclear Energy", an event organised by the Economic Research Institute for ASEAN and East Asia (ERIA) and the International Energy Economics of Japan (IEEJ), 5-9 February 2018. The event included participants familiar with nuclear facilities in Wales (Wylfa), England (Hinkley) and the US (Diablo). It included a visit to the Fukushima site where "clean up" operations will continue for many years into the future, and also a nuclear fuel processing facility at Aomori. Processing Japan's used nuclear fuel is a massive undertaking. Low radioactive waste is stored in sealed barrels and covered over in pits. High radioactive waste is stored in specially designed metal containers for the waste material to cool, which can take decades. Globally, there is no facility available for disposing of nuclear waste. Finland is building a tunnel, deep into bedrock, that will become available to nuclear plants around the world for disposing of highly radioactive waste. In the meantime, Japan's options for electricity generation, beyond nuclear power, are limited.

## Business NZ Energy Council

Business NZ Energy Council (BNZEC) sponsored a multi-year contract to host and develop an economic model of New Zealand's electricity system. John Carnegie (BNZEC) proposed the initiative with the support of Dr Steve Batstone (Whiteboard Consulting). Dr Kiti Suomalainen will lead the project, supported by Golbon Zakerei (Engineering Science) and Basil Sharp. Dr Suomalainen will visit the Paul Scherrer Institute in Switzerland, which developed the initial model. The Centre will further adapt and develop the model to represent New Zealand's



electricity market. As noted in the press release (Appendix D), BNZEC will request analysis of, and reporting on, electricity scenarios. The model will also provide an opportunity for PhD research.

## National Science Challenge

Golbon Zakerei leads the project Agile and Resilient Manufacturing (\$854,442). The project team is working closely with NZ Steel and the Major Energy Users Group (MEUG). Golbon's team will help them better understand the electricity market and write submissions to the Electricity Authority with a clear, quantitative understanding of the issues involved.

## MBIE Endeavour Fund Research (gas hydrates)

Gas hydrates are ice-like substances of natural gas that exist beneath large areas of the world's seafloor. Scientists have suggested that these deposits exceed the combined deposits of land-based fossil fuels. Recovery is a challenge and we know little of their commercial viability. The Centre worked on the bid with GNS Science (Crown research Institute) and our contribution addresses the following question: "What are the likely socio-economic implications of gas hydrate production in New Zealand?" (total award \$7.6m over 5 years). The project provides a three-year PhD scholarship, plus \$9,000 a year for the Energy Centre.

## MBIE Endeavour Round (IPT roadway charging systems)

This is a multidisciplinary project with the Faculty of Engineering as lead partner. The project's objective is to maximise the economic benefit of roadway inductive power transfer (IPT) systems through development of in-ground systems that safely deliver energy to electric vehicles. The project received funding for 5-years at \$11.8m. Selena Sheng and Basil Sharp will contribute to an economic analysis of scenarios involving the placement of IPT roadways, electric vehicle uptake, investment options, and their associated costs and benefits. Benefits of implementation will include reducing EV battery range anxiety, which will increase the uptake of NZ vehicle owners purchasing an EV vehicle.

## Worldwide Universities Network

Dr Steven Poletti and Basil Sharp received a grant facilitating international research collaboration between economists working on the integration of renewable electricity markets. Steve and Basil will participate in a workshop at the University of Alberta, Edmonton, Canada, in May 2018.



# Plans for 2018-19

## Research

### Energy efficiency

Project lead: Dr Le Wen

- Residential energy efficiency
- Energy use and efficiency in New Zealand's Industrial and Trade, Primary, and Services Sectors
- Collaboration with MBIE and StatsNZ

### Energy policy

Project lead: Dr Anna Berka

- Case study of New Zealand locally-owned renewable assets
- Redistributive effects of energy policy
- Locally owned renewable projects in New Zealand, focusing on Māori initiatives
- Financial feasibility of stand-alone solar/battery projects

### Energy systems modelling

Project lead: Dr Kiti Suomalainen

- Development and maintenance of New Zealand energy model
- Research on potential future energy pathways for New Zealand
- Scenario analysis in collaboration with Business New Zealand Energy Council

### Solar

Project lead: Dr Kiti Suomalainen

- Collaborative study with Mercury Energy to investigate how electricity consumption behaviour changes after installing solar. Further data analysis of LiDAR study results for detailed quantification of solar energy technical/economic potential in Auckland
- Further development of the Centre's public solar tool

### Transport

Project lead: Dr Selena Sheng

- Factors influencing uptake of electric vehicles in New Zealand
- Development of inductive power transfer road charging system
- Economic growth and carbon emissions from transport

### Wind

Project lead: Dr Le Wen

- Effects of wind generation on nodal electricity prices
- Improved modelling of spatial networks
- Optimal location of wind farms



## Education

The Centre contributed to the following courses.

- CIVIL770 Transport System Economics (Selena Sheng)
- ENG721 Resources (Stephen Poletti, Milad Marani, Bart van Campen, Stephen Poletti, Golbon Zakeri, Tony Downward)
- ECON 372 Energy Economics (Stephen Poletti)



# Outreach



## Energy Economics Summer School

The 2018 Energy Economics Summer School, held 19-22 February, had a good mix amongst its 70 attendees, with 30 from industry and the public sector, and 40 students including some from Turkey and Brazil.

This year's programme (Appendix B) included two new themes that drew positive feedback from attendees: renewables in Europe and electric vehicles.

Overall feedback confirms many benefits from the four-day course, including:

- Variety of topics and "real" situations
- Diverse experience and background of participants
- Clear and concise presentation material
- Wide point of view of energy resources etc.

We received several emails of thanks, for example:

*'I just wanted to say sincere thanks for conducting a very insightful and an interesting program. The presenters were very engaging, each of them being subject matter experts in their respective areas and they provided a very good overview of their topics as well as a head start to those attendees who want to do a deeper dive later on.'*

## Summer School in Energy Economics brochure

A new Summer School brochure has been produced in hard copy and is also available for download on our website.



### Welcome to the Energy Centre Summer School in Energy Economics

**An efficient and reliable energy system is fundamental to economic growth and wellbeing in New Zealand. The Energy Centre invites you to join specialist commentators and academics to discuss this important subject.**

The Summer School programme outlines key issues facing New Zealand, including dependence on imported liquid fuel, developing and integrating renewable sources of energy, transport and climate change.

University of Auckland academic staff will share inter-disciplinary knowledge and recent research. Guest speakers from industry and the public sector will provide insights sharing their skills and practices.

#### Format

The format of the programme will include presentations and lectures; case studies and small group tasks; interaction with practitioners and participation in a simulation game.

The School will be divided into two parts. The first part will review economic models for analysing energy policy, including basic models of supply and demand, and dynamic models demonstrating the role of uncertainty in energy policy analysis.

The second part will focus on energy markets, emerging technologies, transport planning and energy policy insights into the practical aspects of energy supply will come from industry representatives.

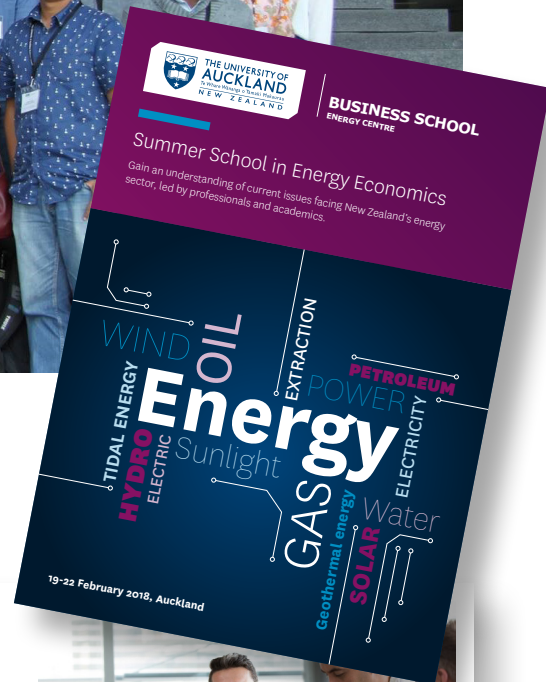
#### Who should apply?

The Summer School is particularly relevant to:

- Those already studying related topics at an undergraduate or postgraduate level.
- Those who are considering studying in a field related to the Summer School's topics and would like an introduction to key issues.
- Undergraduates or graduates considering a career in the energy sector.
- Current and newly employed energy sector professionals seeking an update on the New Zealand energy sector.

#### About the Energy Centre

The Energy Centre is based in the Economics Department of the University of Auckland's Business School. It provides research policy analysis and educational programmes to help business and government confront energy issues of national significance to New Zealand. The Centre has strong links to the School of Engineering and the Faculty of Science.



#### How to apply

Summer School is offered at no cost to participants. There is a limit of 60 places allocated on a first-come, first-served basis. Meals and coffee breaks will be catered for. A certificate of participation will be awarded to the attendees.

**Apply online at our website:**  
[www.business.auckland.ac.nz/summer-school-energy](http://www.business.auckland.ac.nz/summer-school-energy)

**Application deadline:**  
15 February 2018.

**Register here:**  
Summer School in Energy Economics

**Date and time:**  
Monday, 19 February to Thursday, 22 February 2018  
9am to 4pm

**Venue:**  
Room 040, Level 0, Owen G Glenn Building,  
12 Grafton Road, Auckland 1010

**Further information:**  
[energy@auckland.ac.nz](mailto:energy@auckland.ac.nz)

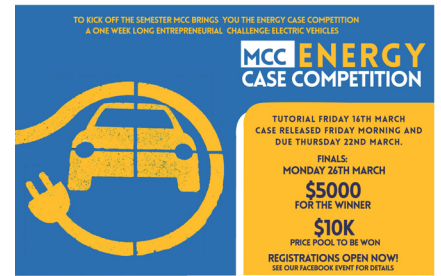
#### What previous Summer School attendees enjoyed most:

- Real-life examples
- Linking economic theory to discussion topics
- A variety of perspectives from a range of speakers
- Learning about alternative sources of energy, related costs and benefits, comparing New Zealand to the rest of the world
- Insights into different markets
- Help in structuring a postgraduate research topic
- An overview of the electricity market

## Renewable energy project management

Basil Sharp and Bart van Campen contributed to an MFAT bid "ASEAN Renewable Energy Short Term Training Scholarships: Renewable Energy Project Management proposal." Twenty-eight participants from ASEAN countries attended a two-week long course on renewable energy. MFAT sponsored the visit of attendees from energy agencies in their respective ASEAN countries. Basil Sharp contributed a four-hour session on the economics of renewable energy on May 2017. Bart van Campen organised and led a four-day field tour and practical NZ renewable energy sector experience.





*Team Elon Musk (Jason Lawrence, Jade Beckmann, Molly Quirke and Kauri Backmann) with judges of the 2018 Electric Vehicle Challenge Phil Jones, Peter Sewell, Tim Henaghan and Chris Money.*

## Student case competitions

On 31 July 2017, in collaboration with the Management Consulting Club (MCC), the Energy Centre launched its inaugural challenge “Design a business model for a local lines company”. Teams of four undergraduate students enrolled at the University of Auckland competed for five team prizes to the value of \$12,600. Twenty-eight teams registered for the challenge, which is above average for such a specialised topic. Basil Sharp and Golbon Zakeri read 20 submissions and ranked them according to the following criteria: clarity of writing, complying with assumptions, clarity of argument/evidence for the case, whether the model was implementable, and innovation. Five submissions went forward to the final. The final presentations, judging and awards took place on 7 August 2017. Each team had ten minutes to present their case, followed by questions from the panel. The judging panel consisted of Dr Stephen Batstone, Bryan Mogridge, Peter Sewell, Cristiano Marantes (Vector) and Professor Greg Whittred (former Dean of the Business School). Panel members quizzed each team and brought a wide range of commercial realism to the event. Participants received feedback.

[uoamcc.co.nz/competitions/](http://uoamcc.co.nz/competitions/)

A second MCC Case Competition was held 15-26 March 2018: “Advise the Prime Minister on practical policy that will achieve the stated target of 64,000 electric vehicles by the end of 2021.” Teams of four undergraduate students enrolled at the University of Auckland competed for five team prizes to the value of \$10,000. Thirty-four teams submitted reports. Kiti Soumalainen and Basil Sharp initially screened the submissions,

ranked them, and forwarded five submissions for presentation to the panel of judges. Final presentations, judging and awards took place on 26 March, 2017. Each team had ten minutes to present their case, followed by questions from the panel. The judging panel consisted of Tim Henaghan (EETNZ), Peter Sewell (EETNZ), Phil Jones (SBN), and Chris Money (EY).

## Transport

An “in conversation” event covering challenges and solutions to Auckland’s transport was held on 12 June 2017. Attended by university staff and students and representatives from across the public and private sectors, discussion featured research staff from the Energy Centre and Faculty

of Engineering, as well as Auckland Transport and the Ministry of Transport. The event attracted over 130 registrations.

Speakers agreed that the challenges facing Auckland are complex and there are no easy answers. Finding lasting solutions and funding will require collaboration between multiple stakeholders spanning local and central government, the private sector, mana whenua, community and transport user groups.

On 24 August 2017, the Energy Centre hosted a follow-up roundtable discussion attended by Auckland Transport, MR Cagney and staff from the Faculty of Engineering, to identify some useful research projects that will help to develop transport solutions, particularly in the Auckland area.







## The University of Auckland Sustainability Week

For Sustainability Week, October 2-6 2017, we produced a poster display showcasing staff members and students across the University who are collaborating on research and teaching for sustainability.

"TEDxUOA Whakapapa-Discovery of the Past, Present and Future" featuring Basil Sharp, was held at the Business School on October 7, 2017. Basil's presentation began with the early stages of transportation and associated congestion and pollution, then transitioned to present day modes and the future of electric vehicles.

## Energy Matters

On 20 September 2017, Global Green Shift: China as a Driver, led by Professor John Mathews, Macquarie University, Sydney, was held at Decima Glenn. Around 90 people attended. John presented evidence that China is driving a global green transition to enhance its energy security and clean up its urban environment. Professor Mathews also presented his seminar to public sector officials, Business New Zealand, and met with staff from the Ministry for the Environment on 22 September in Wellington.

On March 19 2018, we held Road User Pricing, led by Professor Michiel Blimer, University of Sydney. Over 90 people registered. Michiel discussed a fair user-pays system on Australian roads that would be acceptable to all stakeholders, could be implemented in stages and which assumes relatively simple technology similar to electricity user charges. Professor Blimer presented his seminar to Ministry of Transport officials in Wellington on 20 March.

## World Environment Day, 5 June 2017

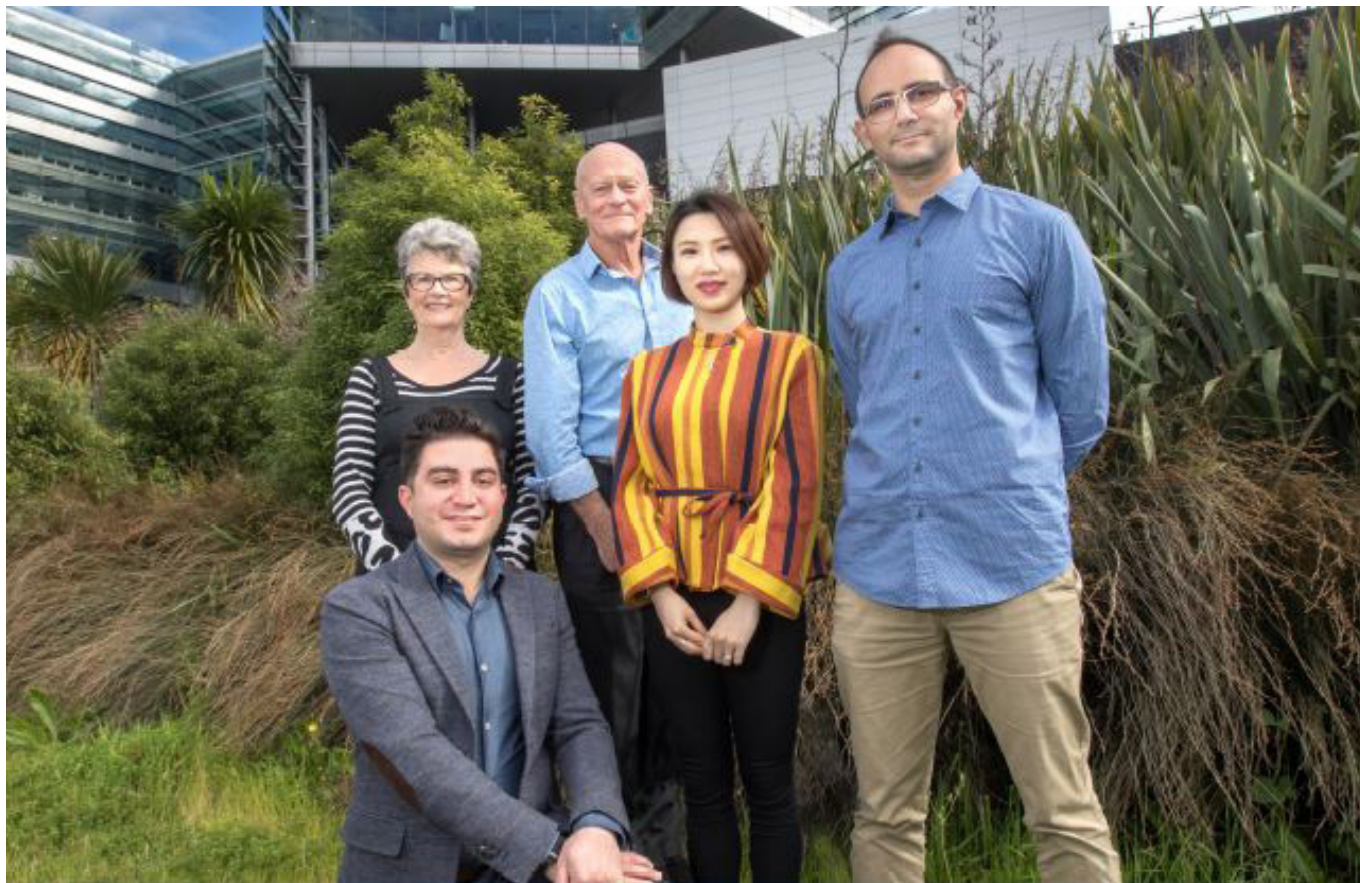
This campaign tied in with this year's transportation theme, highlighting the greenhouse gas emissions issues facing Auckland.



## World Water Day, 22 March 2018

The Energy Centre World Water Day campaign invited consideration of how changes in the climate will affect New Zealand's water resources.





**Professor Basil Sharp (centre back), Chair in Energy Economics and Director, with Dinah Towle, Coordinator, Dr Selena Sheng, Research Fellow, Dr Erwann Sbal, Senior Lecturer, Economics, and Milad Maralani (front), Doctoral Candidate, Energy Centre, Faculty of Business and Economics.**

*New Zealand has a wonderful opportunity to lead the world in developing sustainable energy. We aim to underpin this with research, teaching and community outreach. The Energy Centre is a vital bridge between industry, government and the community. Our researchers independently analyse New Zealand's key energy challenges, drawing on expertise in economics, engineering and physical, biological and social sciences. We collaborate with business in our annual Summer School in Economics and cross-faculty teams are tackling energy challenges based on real world issues.*

*Our research on the integration of wind, geothermal and solar power into the market appears in leading academic journals, and shows that wholesale prices fall as more wind enters the mix. We are particularly proud of our innovative research into Auckland's solar opportunities and have developed an online tool to estimate your home's solar generation potential. Increasingly we will focus on energy-efficient transport, including public transport and electric vehicles.*

## Integrating renewable electricity and sustainable transport into the New Zealand economy



Showcasing sustainability  
research and teaching



[www.auckland.ac.nz/sustainability](http://www.auckland.ac.nz/sustainability)



## From The University of Auckland 2016 Annual Report

The Energy Centre featured in UOA 2016 Annual Report to donors -  
'Know your solar potential', by B. Sharp and K. Suomalainen.

# Know your solar potential

One way New Zealanders can embrace low carbon technology is to go solar – using PV (photovoltaic) panels on our roofs to generate energy from the sun.

But how do we know if our roof can produce enough energy? And what sort of panels should we be using? And where?

These are questions a research project at the University of Auckland's Energy Centre has been tackling over the last three years with major funding from the Energy Education Trust of New Zealand.

International research shows there are twelve potentially economically disruptive technologies that will alter the way people live and work in the future. Two of these are energy storage and renewable energy. With this in mind, one of Auckland Council's goals is to generate the power equivalent of 176,565 homes using solar PV, by the year 2040.

"So our project has assessed the city's solar potential," says Professor Basil Sharp, Director of the Energy Centre.

In 2015, postdoctoral fellow Dr Kiti Suomalainen, who specialises in sustainable energy systems, began work with Vincent Wang, a PhD student with experience in geographic information systems (GIS) to build a topography of Auckland's buildings and trees over 334 suburbs. They looked specifically at how the sun lands on all the roof surfaces.

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"This is the benefit of collaboration with Auckland Council and across disciplines."

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"We used the Council's LiDAR (Light Detection and Ranging) data," explains Kiti. "It uses light pulses to sample the surface of the earth and is a powerful observation tool that provides highly accurate 3D information of target areas."

Kiti's team then used the digital 3D model of the city to calculate the slope and aspect for each square metre of roof area. "As a result we were able to calculate the average annual solar radiation per square metre for each roof in the study area."

Using this information the Energy Centre compared the city's solar potential against the Auckland Council target, showing that if 250,000 roofs across the city have major solar systems on them by 2040, then the target is feasible.

But the work hasn't stopped there. With the help of \$1.5 million additional funding from the Energy Education Trust in 2016, the Energy Centre has built a web tool called SolarPower so Auckland homeowners can go online and estimate their rooftop's solar PV generation potential for different PV system sizes and technology options.

"This is the benefit of collaboration with Auckland Council and across disciplines," concludes Professor Sharp.





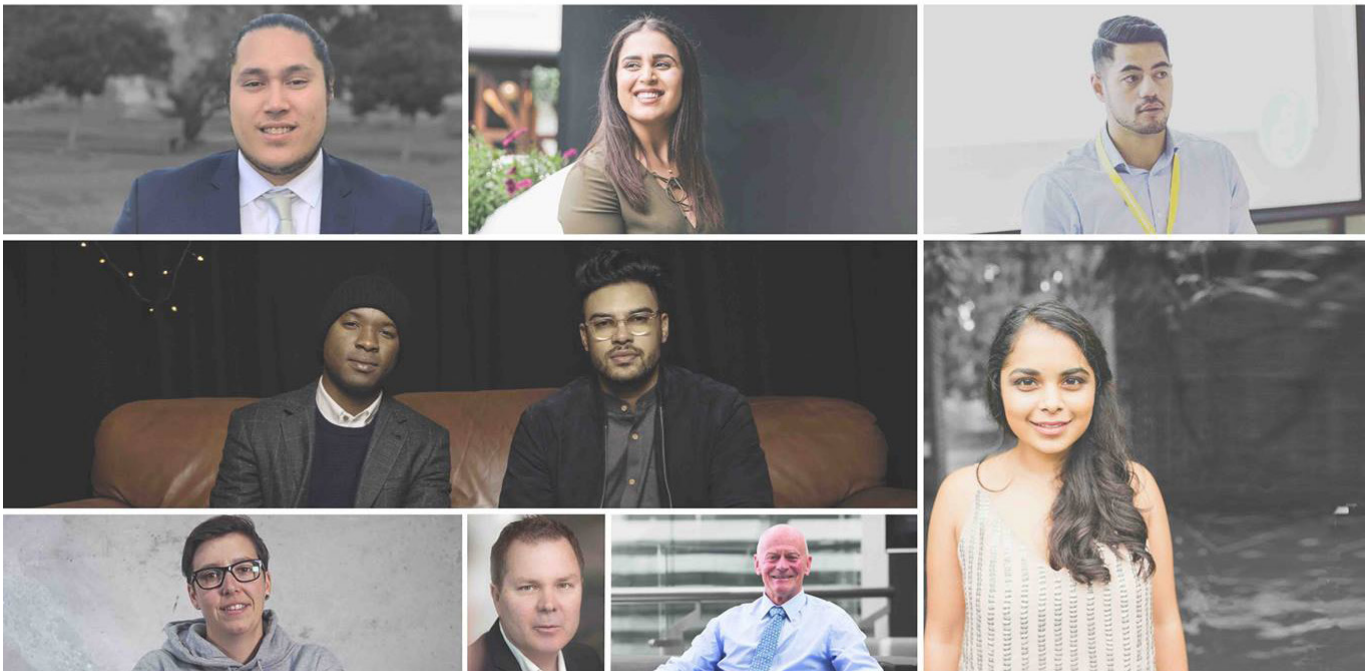


# WHAKAPAPA

## Discovery of the Past, Present and Future

Our inaugural event brings together a diverse group of speakers to showcase unique pieces of culture, creativity, and innovation that have shaped our communities. The theme provides insights on how our ancestry can shape and influence the person we become. Come along and hear people from different backgrounds share their ideas!

**ALL attendees will receive:**  
- FREE food and drinks ALL DAY  
- A goodie bag with tons of sweet deals  
- Into the draw for some awesome prizes on the day



### speakers

**Trent Hohaia** Indigenous Storyteller & Researcher.  
**Rez Gardi** Young New Zealander of the Year 2017.  
**Jupiter Project** New Zealand's #1 Electronic DJ Act.  
**Jarrod Isopo** Former Wellington Youth MPI Liaison.  
**Sharndré Kushor** Forbes Asia 30 under 30.  
**Basil Sharp** Director of the Energy Centre.  
**Greg Cross** Chief Business Officer of Soul Machines.  
**Aliesha Staples** Managing Director of StaplesVR.

### performers

**Paige Singer**  
**Steivie Sikuea** Spoken Word Poetry.  
**Zeal Quartet** Barbershop.

### mc

**Athena Angelou** Flava Radio Station.

tickets are on sale NOW! Purchase at [tedxuoa2017.eventbrite.com](https://tedxuoa2017.eventbrite.com)



# Energy Centre fact sheet

## Objectives

The Energy Centre's mission is to provide research, policy analysis and educational programmes to help business and Government confront energy issues of national significance to New Zealand.

We act as a bridge for open and informed dialogue between the energy industry, policy makers and the community.

We also provide energy-related education creating future leaders for academia, business and the public sector.

## Background

Based in the Economics Department of the University of Auckland Business School, the Energy Centre was founded in 2004 and its programmes are supported by the Energy Education Trust of New Zealand, internal grants from the University of Auckland and external research funds, including international sources of financial support.

The Centre has strong links to and nurtures active cooperation with other university disciplines and groups, including:

- Electricity Power Optimization Centre (EPOC)
- Electric Power Systems Group, the Transport Research Centre
- New Zealand Centre for Supply Chain Management
- School of Engineering and Faculty of Science

The Centre has well-established links with international energy research institutes.

## Ongoing research

The Energy Centre is research-led with a focus on three broad areas: energy markets, resource and environment markets, and transport economics.

As one of the Business School's key strategic research themes, the Centre's priorities are set after consultation with the Energy Education Trust in consultation with partner companies, the energy sector more generally, transport and government agencies. Meetings and seminars provide a vehicle for business and government agencies to engage with the Centre's programmes. Stakeholder participation ensures industry, policy and community relevance.

We are currently engaged in the following projects, many of which are cross disciplinary:

- Electricity, market design, demand side management
- Renewables, wind, solar
- Transport, mode of choice to work, congestion management
- Oil and gas, development, international markets
- Energy efficiency
- Greenhouse gas emission and carbon markets
- Simulations of wind in electricity markets (SWEM)

## Outputs

Our main output areas are:

- Education, including two energy economics courses, scholarships, masters and PhD students
- Published research in international peer reviewed journals, focused on New Zealand's energy sector, especially in the areas of electricity, gas and fuels markets as well as transport and climate change
- Outreach to disseminate research findings, initiate discussions and stimulate interest in the area of energy economics through publications and submissions as well as regular seminars, community events, and workshops

[www.energycentre.auckland.ac.nz](http://www.energycentre.auckland.ac.nz)



## Bid to host IAEE conference 2020

The International Association for Energy Economics (IAEE) invited the Energy Centre to submit a bid to host the 9-12 February 2020 annual conference at the University of Auckland. The bid was submitted in May 2018, with support from the University's Central Events Team, Tourism NZ and the Auckland Convention Bureau (Appendix E).

## Generating Ideas

Four posters were displayed on the large-scale LED screen in the Business School foyer to over 115,000 weekly visitors. These posters are available for download on the website.

- Transport, June 2017
- Water use, August 2017
- Transport, November 2017
- EC research on transport, February 2018

## e-Horizon

The Energy Centre circulated two editions of e-Horizon (June 2017 and February 2018). The newsletter mailing list has grown from 1,684 to 3,669 subscribers over the period May 2017 to April 2018 (over 50%). The link to the Ministry for the Environment website drew the most interest in the June issue. Simon Corbell's seminar Transitioning to a low emission future, co-hosted with the Public Policy Institute, was most visited in the February issue.



**Did you know?**  
Which city has the highest commuting rates:

DRIVING - HAMILTON	85%
PUBLIC TRANSPORT - WELLINGTON	18%
WALKING - DUNEDIN AND WELLINGTON	9%
CYCLING - CHRISTCHURCH	7%

\* Ministry of Transport 2009-2014

Sustainable transportation:  
good for you, good for the environment

Energy Centre **Generating Ideas**

THE UNIVERSITY OF AUCKLAND  
Whero Māori & Te Kōwhiri  
NEW ZEALAND

**Did you know?**

**REDUCING YOUR SHOWER TIME BY  
2 MINUTES CAN SAVE 16 LITRES OF WATER  
AND REDUCE THE AMOUNT OF  
ENERGY USED TO HEAT IT**

\* Watercare 2017

Sustainable water use:  
good for you, good for the environment

Energy Centre **Generating Ideas**

THE UNIVERSITY OF AUCKLAND  
Whero Māori & Te Kōwhiri  
NEW ZEALAND

**Did you know?**

**NEW ZEALAND HAS THE HIGHEST  
MOTOR VEHICLE OWNERSHIP PER CAPITA  
AMONG THE 34 OECD COUNTRIES\***

Moving to sustainable transport:  
good for you, good for the environment

\* OECD (Organisation for Economic Co-operation and Development)

Energy Centre **Generating Ideas**

THE UNIVERSITY OF AUCKLAND  
Whero Māori & Te Kōwhiri  
NEW ZEALAND

**Did you know?**

**IN AUCKLAND, YOU ARE  
MORE LIKELY TO USE PUBLIC TRANSPORT  
IF YOUR NEIGHBOUR DOES.\* WHY?**

- similar demographic = similar transport needs
- shared positive benefits around public transport

\*Dr Mingyue Sheng, Energy Centre

Sustainable transport:  
good for you, good for the environment

Energy Centre **Generating Ideas**

THE UNIVERSITY OF AUCKLAND  
Whero Māori & Te Kōwhiri  
NEW ZEALAND



## Website

The two tables below provide a summary of Energy Centre website analytics. The Summer School page is the most popular, followed by Auckland rooftop solar potential. As expected, page views from New Zealand dominate, followed by India, China and the US. Recent updates to the website have included journal articles and a media section.

Web page	Page views
Our research centre	375
Study options	426
Scholarships	200
Contact us	104
Our research	486
Publications	211
Energy Matters	440
Outreach	156
Summer School in Energy Economics	1994
Auckland rooftop solar potential	1908

Country	Page views
NZ	1410
India	206
China	111
US	100
Australia	91
Indonesia	91
Singapore	63
Iran	53
Nigeria	47
Germany	45
Mexico	45
Brazil	42
United Kingdom	40
Malaysia	37
Kenya	30
Pakistan	30
France	27
Canada	25

## Opinion pieces

Solar Economics, *Radio NZ Nights*, 30 October 2017

Tool calculates solar power savings, *Southland Times*, 17 October 2017

Tool calculates solar power savings, *Manawatu Standard*, Palmerston North, 17 October 2017

Tool calculates solar power savings, *Timaru Herald*, 17 October 2017

Online calculator reveals solar power savings, *The Dominion Post*, Wellington, 17 October 2017

Tool calculates solar power savings, *Taranaki Daily News*, New Plymouth, 17 October 2017

Tool calculates solar power savings, *Waikato Times*, Hamilton, 17 October 2017

Free new tool launched by Auckland University that gives an economic estimate of the solar panel potential for most Auckland homes, *Interest.co.nz*, 15 October 2017

Can't decide whether to install solar panels?, *NewsHub*, 13 October 2017

Why hasn't solar power really gained traction yet? *Radio Live*, 13 October 2017

New tool helps households work out whether solar pays off, *Stuff NZ*, 13 October 2017

New solar app could help EV owners, *EV Talk*, 13 October 2017

How much cash could a solar panel save you?, *New Zealand Herald*, 13 October 2017

Are solar panels a good investment? Auckland Uni answers, *Future Five*, 13 October 2017

Are solar panels a good investment? Auckland Uni answers, *IT Brief*, 13 October 2017

The problem with trickle-down sustainability, *Newsroom*, 9 October 2017

Basil Sharp: Farmers should not pay for all water pollution, *New Zealand Herald*, 7 September 2017

Teaming up to tackle Auckland's transport challenges, *Sustainability News*, University of Auckland, June 2017

Solving traffic jams - it's all in the mind, *Newsroom*, 13 June 2017

What NZ should learn about renewable energy, *Newsroom*, 12 April 2018

Breaks put on oil exploration, *Radio New Zealand*, 12 April 2018

Free power from the sun, *Juno Investing Magazine*, 1 April 2018

Banning Oil Exploration?, *Radio New Zealand*, 29 March 2018

Mingyue Sheng and Basil Sharp: Fuel taxes not best congestion fix, *NZ Herald*, 5 April 2

Teaming up to tackle Auckland's transport challenges, *Sustainability News*, the University of Auckland, June 2017

Solving traffic jams - it's all in the mind, *Newsroom*, 13 June 2017

Climathon Auckland Blog: Basil Sharp on 'Embracing renewable energy to ensure Auckland's future' 12 September, 2017

Basil Sharp, Newsroom on New Zealand's ETS

## Awards

In August, Dinah Towle received a Professional Staff Excellence Award for her contribution to sustainability. Initiatives such as Generating Ideas and e-horizons are evidence of Dinah's outstanding contribution. We are so fortunate to have Dinah on our team.



# Appendices

## Appendix A: Performance Assessment 2017-2018

### Outcomes against critical success factors and key performance indicators

Programme	CSF	KPI	
Research	Applied research projects	2 project reports	A
	Cross-faculty engagement	2 cross-disciplinary projects	A
	Peer reviewed articles and reports	2 papers in ranked journals	A
	Academic workshops	2 workshops	A
	Conference presentations	3 presentations	A
	Public forums	2 public forums	A
Education	Courses in energy economics	3 courses in energy economics	A
	Summer School	70% satisfaction level	A
	PG completions	2 honours and 2 PhDs	NA
	Teaching into Masters of Energy	Enrolments in ME	A
Outreach	Public seminars	At least 4 presentations	A
	Herald opinion pieces	2 submissions	A
	Newsletter	4 newsletters	NA
	Network	2 ERIN meeting	A

A = achieved, NA = not achieved

### Critical success factors and key performance indicators for 2018-2019

Programme	CSF	KPI
Research	Applied research projects	6 project reports
	Cross-faculty engagement	2 cross disciplinary projects
	Peer reviewed articles and reports	6 papers in ranked journals
	Academic workshops	6 workshops
	Conference presentations	6 presentations
	Public forums	2 public forums
Education	Courses in energy economics	3 courses in energy economics
	Summer School	70% satisfaction level
	PG completions	2 honours and 2 PhDs
	Teaching into Masters of Energy	Enrolments in ME
Outreach	Public seminars	At least 4 presentations
	Herald opinion pieces	2 submissions
	Newsletter	3 newsletters
	Network	1 ERIN meeting

## Appendix B (opposite page): Summer School 2017 Programme



Monday, 19 February		Tuesday, 20 February	Wednesday, 21 February	Thursday, 22 February
9-9.45am	Registration	Overview of electricity market <b>Steve Batstone</b> , Whiteboard Energy	Electricity market structure and models/issues in electricity market modelling <b>Golbon Zakeri</b> , Energy Centre	Geothermal energy <b>Bart van Campen</b> , Energy Centre
9.45-10.30am	NZ Energy/Global trends <b>Basil Sharp</b> , Energy Centre	Solar <b>Kiti Suomalainen</b> , Energy Centre	Distributed generation and battery storage <b>Tony Downward</b> , Energy Centre	Geothermal industry <b>Mike Allen</b> , Geothermal NZ
<b>10.30-11am</b>				
	<b>Morning tea</b>			
11-11.45am	Renewables in Europe <b>Briony Bennett</b> , former Bloomberg New Energy Finance	Wind <b>Kiti Suomalainen/Le Wen</b> , Energy Centre	Grid scale energy storage <b>Mark Booth</b> , Mitsubishi	Local energy innovation <b>Julie MacArthur</b> , Energy Centre
11.45-12.30pm	Energy systems – thinking strategically <b>John Carnegie</b> , Business NZ	Wind <b>Grenville Gaskell</b> , NZ Wind Energy Association	Electricity distribution in a distributed energy future <b>Steve Heinen</b> , Vector	Local energy innovation <b>Anna Berka</b> , Energy Centre
<b>12.30-1.30pm</b>				
	<b>Lunch</b>			
1.30-2.15pm	Transport economics <b>Selena Sheng</b> , Energy Centre	Climate Change <b>Steve Poletti</b> , Energy Centre	Smart Cities <b>Louise Baker</b> , WSP Opus	Group projects <b>Anna Berka</b> , Energy Centre
<b>2.15-2.30pm</b>				
	<b>Afternoon tea</b>			
2.30-3.15pm	Auckland transport <b>Cynthia Gillespie</b> , Auckland Transport	Green growth <b>Rod Oram</b>	Simulation game <b>Tony Downward</b> , Energy Centre	Group projects <b>Anna Berka</b> , Energy Centre
3.15-4pm	Electric vehicles <b>Phil Jones</b> , Sustainable Business Network	Hedging risk for generators/retailers using electricity market contracts <b>Craig Schubauer</b> , Trustpower	2 computer labs 8 & 9, Level 0, OGGB	Refreshments
<b>4pm</b>				
	<b>Finish</b>			

# Appendices

## Appendix C: Impact Assessment

Strategic Themes	Outputs	Outcomes	Impacts
<b>Applied research</b> Undertake independent research and business and policy analysis on energy- related issues important to New Zealand's future	11 peer reviewed articles 6 working papers 1 presentation at conferences 3 successful bids	Successful submissions to leading international journals and conferences; creating networks and contacts; strengthening skills; staying at forefront of energy-related initiatives; and increased engagement through applications relevant to business and policy.	Contributions to discipline; enhanced awareness and understanding of energy-related choices; bi-lateral flow of information and challenges with stakeholders; improved connections with business and community; strengthening agency capability and improved public policy decision-making.
<b>Cross disciplinary</b> Carry out research that is cross-disciplinary, drawing upon as appropriate, economics, engineering and the physical, environmental and social sciences	Membership of cross- disciplinary teams at UoA 2 successful MBIE bids 1 successful international bid	Invitations by faculty teams within the University and research units outside the University to collaborate on research projects. Collaboration with colleagues within the Business School.	Demonstrated benefits of the contribution that the Energy Centre can provide through applications of economics and policy analysis alongside engineering and science.
<b>Outreach</b> Act as a bridge for open and informed dialogue between the energy industry, government and the community	3 requests for assistance from industry & academia 28 opinion pieces 2 e-Horizon newsletters Expansion of website	Growing public perception of Centre as source of independent and forward focussed research and inquiry.  Considerable interest in the Centre's website from New Zealand, India and China.	Contribution to energy initiatives in NZ and abroad  Invitations by IAEE to host conference  Improved relevance to energy research programmes at other universities  Increased awareness of imminent changes in the energy sector "over the horizon"  Validation of EC effectiveness within UoA
<b>Education</b> Provide energy-related education that creates future leaders for academia, business and government	3 courses in Energy 2 PhD completions 2 Energy Matters 4 internal research seminars 2 international visiting students 93% satisfaction level from Summer School	Recognised relevance of the role of energy in society within University curricula and the broader community.	Skill and knowledge level improvement  Rise in educational attainment within energy industry



## Appendix D:

### **New energy sector model for New Zealand**

The energy sector is taking the lead in developing a model for its own future.

The BusinessNZ Energy Council (BEC) and public and private partners have commissioned a comprehensive model of New Zealand's entire energy sector.

BEC Chair David Caygill says the energy sector is critically important to New Zealand, and decisions for the future should be based on the best available information and analysis.

"The new model will help industry participants, regulators and Government clarify our challenges and opportunities as we grapple with important issues such as the end of oil and gas exploration, the electricity sector review, renewable targets, and new technologies and consumer preferences," David Caygill said.

"It will let us develop long-term scenarios about how the sector might evolve and will let us explore the complex interactions between the power, transport and industrial elements of the sector in New Zealand.

"Its use across the public and private sectors will also help us reach common understandings and achieve a more transparent and mature conversation about modelling output."

The model is being developed by the Paul Scherrer Institute, Switzerland's largest federally funded research institute, and modeller for the World Energy Council's scenarios.

The University of Auckland, through the Business School's Energy Centre, will host and maintain the model to provide insights to those working in academia and research fields. It will also be accessible on commercial terms to those who wish to use it.

[www.scoop.co.nz/stories/BU1804/S00625/new-energy-sector-model-for-new-zealand.htm](http://www.scoop.co.nz/stories/BU1804/S00625/new-energy-sector-model-for-new-zealand.htm)

# Appendices

## Appendix E: 7th IAEE Asian Conference 2020 Bid



### CONFERENCE INFORMATION

#### Conference Theme: Energy Transitions in Asia

##### Conference Objective

Energy Markets are in transition. The last few years have seen an extraordinary increase in investment in renewable energy in the power sector, however, there is still a long way to go to decarbonise the electricity system. China is at the forefront of rolling out a new energy system. Costs for renewable generation are reducing rapidly, as production is scaled up. However, much of the deployment is often driven by government policies and incentives. The challenge is for the new technologies to be competitive, and to integrate them effectively into energy systems. New technologies have the potential to disrupt existing energy markets.

Traditional fossil fuel markets have seen dramatic swings in prices, with an oversupply of both coal and oil. Shale oil and gas has had a dramatic impact on the market. Despite the current oversupply there are concerns that lack of investment in developing oil field production could see significant supply shortfalls in the oil market as soon as 2025. Decarbonisation in the transport sector is difficult to achieve for many countries in Asia, however the last few years have seen a dramatic decrease in the costs of producing electric cars which may be a game changer - particularly if coupled with less carbon intensive electricity generation.

Energy markets need to be responsive to these developments, encourage new innovations, whilst managing the transition to low carbon technologies efficiently. Within the region the challenge is to increase the commitments to reduce carbon emissions whilst maintaining robust economic growth.

The conference objective is to understand and debate the implications of the emerging energy transition for energy markets and consider and debate policies to facilitate the transition.

##### Conference Overview

Targeting academics, industry economists and analysts, and policy-makers especially in Asia/Pacific economies of energy exporting countries with substantial interest in meeting Asian demands for energy.

Key topics and issues to be examined and discussed:

- Forecasting Asian energy demands and supplies in total and by primary energy source and geography
- Transition to low carbon energy economy
- The green shift in China
- Energy transitions: Country studies
- Forecasting needed energy infrastructure investments in Asia
- Energy and electricity market reform
- Disruptive Innovation: Technological change and new business models
- Renewable energy and capacity markets
- Transport transitions: Electrification, hydrogen and biofuels
- Geothermal possibilities for Asia
- Energy efficiency
- Economics of new energy sources
- Energy poverty
- Economics of oil and gas
- Possible changes in the structure of Asian LNG, coal and other energy commodity markets
- Electricity storage and intermittent renewable generation
- Finance of Energy
- Local Energy initiatives
- Smart Cities

##### Conference Programme

The proposed programme outline is based on an attendance of 250 delegates (excluding accompanying guests). We have allowed for seven plenaries (three single and four dual plenaries) accommodating, say, 24 speakers and chairs and allowed for 16 poster entrants.

The conference venue can easily accommodate nine simultaneous concurrent sessions. This will permit four blocks of concurrent sessions with four speakers per session, accommodating 176 speakers. Thus, we can easily accommodate 184 delegates wishing to speak in plenary or concurrent sessions or exhibit posters.

These allowances have been made for planning purposes. The Conference Committee will determine the final conference structure.

##### Sponsorship

The University of Auckland is committed to providing sponsorship of \$38,000 to cover the cost of the venue, including audio visual equipment and free Wi-Fi access.

Further, sponsorship of \$20,000 will be sought from New Zealand's large energy providers.



## CONFERENCE PROGRAMME

### Sunday, 9 February 2020

Time	Description	Venue
9:00-15:00	IAEE Council meeting	The University of Auckland Business School
12:00-13:00	Council member lunch	TBC
13:30-16:00	Asian Affiliate Leaders meeting	The University of Auckland Business School
18:00-20:00	Welcome reception and student happy hour	Decima Glenn, the University of Auckland Business School
20:00-22:00	Council dinner (by invitation)	Ostro Restaurant

### Monday, 10 February 2020

Time	Description	Venue
7:30-8:30	Student breakfast meeting	Decima Glenn, the University of Auckland Business School
8:30-9:00	Welcome and opening remarks (Mihi)	The University of Auckland
9:00-10:40	<b>Opening Plenary session:</b> Asian Energy Transitions by 2040 – Geographical, sectoral & fuel-type composition; energy access; efficiency improvements; energy demand; green shift in China. (4 speakers, 20 minutes each, 20 minutes discussion)	
10:40-11:00	Break	
11:00-12:30	Concurrent sessions 1-9	
12:30-14:00	Stand-up lunch and poster session	
14:00-15:40	<b>DUAL PLENARY SESSION</b> <b>Dual Plenary 1:</b> Fossil Fuels x 4 speakers. <b>Dual Plenary 2:</b> Smart Cities	
15:40-16:30	Break	
16:30-17:40	Concurrent sessions 10-18	
19:00-21:30	Sit down dinner with cultural event	ANZ Viaduct Events Centre

### Tuesday, 11 February 2020

Time	Description	Venue
7:50-8:50	Conference planning meeting	The University of Auckland
7:50-8:50	EJ Board of Editors meeting	The University of Auckland
9:00-10:40	<b>Plenary 2:</b> Energy Efficiency	The University of Auckland
10:40-11:00	Break	
11:00-12:30	Concurrent sessions 19-27	
12:30-14:30	Lunch	
14:30-16:10	<b>DUAL PLENARY</b> <b>Dual Plenary 1:</b> Electricity markets – What is “best practice” for accommodating renewables? (e.g. distribution models for lines companies, capacity markets, regulatory environments) <b>Dual Plenary 2:</b> Energy transitions in transport (electrification, hydrogen, EVs, PT)	
16:10-16:40	Break	
16:40-18:10	Concurrent sessions 28-36	
19:00-21:30	BBQ buffet Awards dinner	The University of Auckland Business School foyer and commons

### Wednesday, 12 February 2020

Time	Description	Venue
7:50-8:50	Conference planning meeting	The University of Auckland Business School
9:00-10:40	<b>Plenary 3:</b> Long-term energy scenarios for the Asian region	The University of Auckland
10:40-11:00	Break	
11:00-12:30	<b>Plenary 4:</b> Policies and regulations to achieve Energy Transition (policies, regulation and practice to achieve including investment and energy poverty)	

### Thursday, 13 February 2020

Time	Description	Venue
13:00-17:00	Optional field trip (extra charge)	To be decided



**The University of Auckland  
Business School**

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Auckland 1142  
New Zealand

[www.business.auckland.ac.nz](http://www.business.auckland.ac.nz)

**The Energy Centre**

[www.energycentre.auckland.ac.nz](http://www.energycentre.auckland.ac.nz)  
[energy@auckland.ac.nz](mailto:energy@auckland.ac.nz)

**Professor Basil Sharp**

Chair in Energy Economics  
[b.sharp@auckland.ac.nz](mailto:b.sharp@auckland.ac.nz)

The University of Auckland Business School gratefully acknowledges the Energy Education Trust of New Zealand for their support of tertiary education and research in disciplines relevant to New Zealand's present and emerging energy needs.

The largest provider of philanthropic support for energy education in New Zealand the Trust funds:

- The Energy Education Trust Chair in Energy and Resource Economics
- The Business School's Energy Centre
- The 'Energy Matters Speaker Series'
- Post graduate scholarships and research scholarships

The Energy Education Trust funds a wide variety of energy projects and offers 15 scholarships of \$5000 each to undergraduate and honours year students at all participating New Zealand universities.

[www.business.auckland.ac.nz](http://www.business.auckland.ac.nz)