CURRICULUM VITAE

Name: Christopher Greig

Present Position:

- Theodora D. ’78 & William H. Walton III ’74 Senior Research Scientist, Andlinger Centre for Energy and the Environment, Princeton University.
- Honorary Professor in Chemical Engineering, The University of Queensland.
- Honorary Professor in Chemical Engineering, The University of Melbourne.

Non-Executive Director Roles:

- Australian National Low Emissions Coal/CCUS R&D Fund

Qualifications: BE(Hons), Chem. Eng., University of Queensland (1982)
ME St., Chemical Eng., University of Queensland (1984)
PhD Chemical Eng., University of Queensland (1995)

Prior Positions held

Full time Executive/Academic Roles

- Associate Director for External Partnerships, Princeton E-ffiliates Corporate Partnership Program (2020-2022)
- Andlinger Visiting Fellow in Energy and the Environment, Princeton University (2018 – 2020)
- Professor in Chemical Engineering, Director, UQ Energy Initiative, and Director, Dow Centre for Sustainable Engineering Innovation (2011 – 2020)
- CEO and Project Director, ZeroGen Limited – an early-mover carbon capture and storage (CCS) Company (2007 -2011)
- Executive General Manager, Projects & Development, Ensham Resources Ltd – a subsidiary of Idemitsu Kosan (2004 – 2007)
- Managing Director and Chairman, JJ McDonald Group (2000 – 2004)
- Founder and Managing Director, STG Pty Ltd, STG-FCB Group (1986 – 2000)

Non-Executive Roles

- Director, The Energy Policy Institute of Australia (2014 - 2018) (Chair 2017-2018)
- Non-Executive Director & Chair of Nominations & Remuneration Committee, Seymour Whyte Limited, ASX-listed engineering contractor (2013 – 2017)
- Non-Executive Director, Deputy Chair, Chair of Risk Committee, Gladstone Ports Corporation (2012 - 2016)
- Non-Executive Director, Golding Group Pty Ltd (2009 - 2014)
- Non-Executive Chairman of Western Metals Limited (2008 – 2013)
- Non-Executive Director, LogiCamms Limited, (2008 - 2012).

Awards:

- Fellow of the Australian Academy of Technological Sciences and Engineering (ATSE), 2013
- Fluor Chemeca Award for Excellence in Engineering Management, 2001
- Engineers Australia (Queensland Division), - Engineering Product Design of the year, 1996
- Engineers Australia (Queensland Division), Engineering Project Management of the year, 1996
- Premier’s New Queensland Exporter Award, 1996
- President’s Medal, Australian Society of Sugarcane Technologists, 1990

Overview:

Chris Greig's professional career began during his PhD, as cofounder of a successful start-up company which grew under his leadership, to become a globally recognized supplier of specialized sugar equipment and turnkey process plants, focused in developing countries, and other industrial minerals processing facility in Australia. Following the sale and exit from that venture after 14 years as Managing Director, Chris went on to hold senior executive and non-executive roles with privately owned and listed companies in the resources and energy sector, covering engineering, construction and operations for a further 12 years. During his career, Chris worked throughout Asia-Pacific, the Americas, Europe and Africa, and has always maintained a strong focus on sustainability.

Chris has spent the past 12 years of his 35-year plus career creating an impact in academia, leveraging his professional career as an entrepreneur, senior executive and company director, with extensive experience in general management, technology development and commercialization, and the leadership of complex industrial projects. He has become an internationally recognized expert on energy transitions. His research sits at the intersection of engineering, business and social sciences and focuses on understanding the critical challenges for mobilizing the transition at the national, subnational and corporate levels. His research is deeply engaged with the private sector. Commencing as a Professor at the University of Queensland he led both the UQ Energy Initiative and the Dow center for Sustainable Engineering Innovation, before moving to Princeton in 2018.

More recently, he conceived the *Rapid Switch* and the *Net-Zero X* Initiatives, major new international, interdisciplinary research efforts which aim to accelerate progress on climate change by developing granular roadmaps to net-zero, and identifying and resolving the critical bottlenecks that slow our progress in climate mitigation. During two years as the Gerhard R. Andlinger Visiting Fellow in Energy and the Environment at Princeton University in the United States, Chris led this initiative and the influential Net-Zero America study. He subsequently accepted a continuing position as the Walton Senior Research Scientist at Princeton's Andlinger Center for Energy and the Environment. Chris also led the Center's External Partnerships program, and Princeton E-ffiliates Partnership – the University's flagship corporate member program from June 2020 through September 2022.

Experience:

2018 – Current Princeton University

- Theodora D. '78 & William H. Walton III '74 Senior Research Scientist in the Andlinger Centre for Energy and the Environment. Leading the Rapid Switch Initiative, Chris examines the challenge of deep decarbonization of the energy and industrial sectors in different regions of the world. His principal areas of research focus on the intersection of engineering, business and the social sciences (including policy), with a special interest in global, national and sectoral energy transitions, CCUS, fuels and industry decarbonization.

  Formerly the Gerhard R. Andlinger Visiting Fellow in Energy and the Environment.

- Associate Director for External Partnerships in the Andlinger Centre, responsible for leading the Center's external relations with private sector, public and not-for-profit organizations. Leadership of recruiting and stewarding corporate partners under the Princeton E-filliates Program (2020-2022)

- Joint Principal Investigator on **Net-Zero America**, an influential study on what it would take to take the US economy to net-zero emissions by 2050. This project has received acclaim from media, governments and corporates in the United States and internationally (Sponsored by BP, ExxonMobil and Dow),

- Joint Principal Investigator on **Net-Zero Australia**, on what it would take to take the Australian net-zero emissions by 2050, and substituting its export fossil fuels (Australia is the world's largest exporter of coal and LNG) with zero-carbon energy carriers, by 2060 (Sponsored by Worley, Dow, APA, Fortescue Future Industries, Future Energy Exports CRC and Future Fuels CRC).

- Joint Principal Investigator on **Net-Zero India,** and **Net-Zero Thailand**, on what it would take to take the Thai economy to net-zero emissions by 2070 (sponsored by Siam Cement Group).

- Principal Investigator for sponsored research on executing the transition to net-zero – examining the investment decision, project development, and construction of energy assets, along with supply chains and human resources (sponsored by Worley).
- Joint Principal Investigator for sponsored research examining the challenges for deep decarbonization of the American chemical industry (sponsored by Deloitte)
- Co-Investigator for sponsored research examining opportunities and development pathways for large scale deployment of CO_2 capture and utilization coupled with bioenergy and industrial facilities in the United States (sponsored by ExxonMobil, BP, Deloitte, and Weyerhaeuser).
- Joint Principal Investigator for sponsored research examining the challenges to deliver on a global scale clean hydrogen economy (sponsored by Deloitte).
- Course coordinator for ENE372 – Rapid Switch – the challenges for a low carbon future – offered Spring semester. An interdisciplinary undergraduate course on energy transitions with enrolments across various engineering disciplines, mathematics, geosciences, computer science, religion, politics, and history. Received a Dean's commendation for outstanding teaching in this always oversubscribed undergraduate course.
- Invited lecturer for Climate and Energy module for George Washington University's National Security Leadership course for senior management in the US Department of Defense, ongoing since 2019.
- Principal lecturer for an intensive 3-day course to senior government, business and NGO leaders – "Navigating Pakistan's Sustainable Energy Transition" in partnership with Center for Economic Research in Pakistan.
- Lead organizer of the Andlinger Center Annual Meetings and annual Retreats attended a mix of more than 100 industry, government and academic leaders, 2018-2022.
- Delivered the 2022 prestigious General Paul M. Nakasone 4 Star Invited Speaker Address on "Climate and Energy as Transnational Security Risks" to the National Security Agency.
- Delivered a number of keynote presentations to various organizations inside and outside Princeton University, in the US, UK, Switzerland, Germany, Italy, China, India and Australia.
- Conceived, developed and delivered a new interdisciplinary undergraduate course on energy transitions (Rapid Switch). First offered in 2019, this course is fully subscribed to the enrolment cap with enrolments across various engineering disciplines, mathematics, geosciences, computer science, religion, politics, and history.

2011 - 2018 The University of Queensland

- Professor in the School of Chemical Engineering, Dow Chair & Director of the Dow Centre for Sustainable Engineering Innovation. The Dow Centre was established with a US$10 M gift from the Dow Chemical Company Foundation. The Centre is hosted within the School of Chemical Engineering but has a University-wide mandate to pursue strategies to *move the needle* in the sustainable production and utilization of energy and materials. Played a limited supporting role in helping secure the first gift in 2012 and a significant role in securing a further gift of US$3.5 M in 2018. Core programs have included low-CO_2 iron production, low-CO_2 hydrogen and fuels production, Rapid Switch, Circular Economy, Next Generation Fertilizers, and Fighting Food Waste.
- Director of the UQ Energy Initiative. Established and led the University-wide initiative to lead the energy research strategy across all faculties and institutes. The role provided strategic context, techno-economic assessment and engagement with government, industry, NGO's, and research funders, as well as public outreach. The initiative emphasized a whole-of-system, transdisciplinary approach incorporating primary energy extraction to processing, conversion, distribution and utilization of fossil and renewable energy systems for power, fuel and industrial applications. Played a significant role in establishing, and fundraising over A$25 M for new research centers covering unconventional gas, CCS and energy poverty. (Stepped down in December 2017).
- Co-Chief Investigator on A$4 M Printed Energy Cooperative Research Centre (Projects) grant and A$3 M Electric Mobility grant (both current) which are both co-funded by Industry.
- Universities' nominee on the Advisory Board of Australian Solar Thermal Research Initiative, a formal research collaboration encompassing the Australian Renewable Energy Agency, CSIRO and six Australian Universities including UQ.

- Former Chair or member of Advisory Boards for the UQ Centre for Coal Seam Gas, UQ Geothermal Energy Centre of Excellence and UQ School of Chemical Engineering.
- Established and co-led the UQ Energy Poverty Research Group – a cross-disciplinary research program looking at energy and livelihoods in the developing world.
- Advised 14 (graduated) PhD scholars and multiple masters and undergraduate theses.
- Conceived, developed, coordinated and lectured a new interdisciplinary course for final year undergraduate and Masters Engineering students, "Professional Practice in the Business Environment". This course started in 2013 with 55 students and grew to become a compulsory capstone course for over 700 students in 2018.
- Member of the Advisory Board for the International Energy Centre (IEC), a joint venture between UQ, UWA and U Newcastle offering postgraduate courses in Energy Studies. The IEC was not attracting quality students and was loss-making. Recommended its closure and transitioned the program to UQ, raised the start-up funding and led the program until a program leader was recruited. The rebadged UQ Masters of Sustainable Engineering program attracts over 50 domestic and international students per year. Within the program, I developed, coordinated and lectured the course, "Energy Investment and Finance".
- Guest lecturer in various Engineering courses around Energy Policy & Economics, Innovation & Strategic Management.

2007 – 2011 ZeroGen Pty Ltd

- CEO and Project Director for ZeroGen Ltd. ZeroGen was an SPV established by the Queensland Government which sought to develop a world-first, multi-billion-dollar, advanced coal-fired power project with carbon capture & sequestration. The project was a collaboration between the Australian and Queensland Governments, Australian Coal Association Low Emissions Technologies Ltd, Mitsubishi Heavy Industries and Shell Global Solutions.
- The scope of the project included designing and assessing the feasibility of fuel supply, water and utilities supply, HV transmission infrastructure, integrated gasification with combined cycle power plant, syngas processing, acid gas and CO_2 separation, and CO_2 transport and storage. The project also included the world's first major onshore exploration and appraisal program for storage of CO_2 in deep saline aquifers. ZeroGen invested A$128 million in FEED and feasibility studies, social and environmental impact assessments, and deep subsurface exploration and appraisal activities.
- Chris led the overall project and feasibility study: leading teams of more than 100 different disciplinary professionals and working with key funders and stakeholders to frame the project; designing project delivery and contracting structures; negotiating with key technology providers, contractors and engineering firms; assuring the integrity of capital and operating cost estimates; financial modelling; environmental impact assessment; stakeholder engagement planning; structuring the project finance (circa A$7 Billion); risk assessment and management plans; and the final Independent Expert Review.
- The final outcome was a five-volume, 150,000-word report and associated supporting materials to shareholders and financiers, which recommended cessation and closure of the project due to the lack of financial viability and climate policy uncertainty. I co-wrote and published a book with two members of the team to disseminate the non-confidential learnings globally.

2004 – 2008 Ensham Resources Ltd (owned by Idemitsu Kosan, J-Power Limited and LG Australia)

- Executive General Manager responsible for oversight and leadership of; all significant capital projects – annual spend up to $200 M - including open cut Expansion (from feasibility to implementation) and Feasibility Study for an underground development; negotiation of coal rail freight and port services contracts; supporting negotiation of coal sales agreements with customers in Japan, Korea, Taiwan, India and Malaysia.
- Project Director to initiate recovery of the mine and operations from a catastrophic flood; including development of cost estimates in circumstances of enormous uncertainty, interfacing with shareholders, banks and insurers for funding, and scoping, resourcing and project management of recovery capital works and operations. I subsequently recruited a successor to close-out this project, in order to take up the ZeroGen role.

2000 – 2004 JJ McDonald & Sons Group

- Managing Director and Chairman of a large family-owned group of companies, based in Townsville (North Queensland), with businesses in civil construction, agriculture and quarrying. This small business had annual

revenues in excess of $100 M and projects covered a diverse range of road and rail infrastructure, ports and dams. I was appointed at the request of shareholders and banks, to undertake a major restructuring and turn around task which was successfully accomplished.

1986 – 1999 STG Group & STG-FCB SA

- Founder and Managing Director of a process technology and engineering start-up company formed during PhD studies. Developed and successfully commercialized patented technologies in sugar processing, mineral processing and hydrometallurgy (Exited in 1999 following sale to a listed French industrial engineering group).
- The company was a global leader in specific sugar processing technologies, especially continuous centrifuges – selling its proprietary equipment in all cane sugar producing countries of the world.
- Led several 'turnkey' sugar projects from concept through feasibility and from financing to construction and operation in South East Asia, (receiving the Queensland Government's award for New Exporter of the Year), and one in Australia, (receiving the Australian Institution of Engineers award for outstanding Project Management). These projects typically involved a total all up investment of circa $100 M and our scope included arranging project finance, arranging all regulatory approvals. More than five turnkey projects were completed in Vietnam between 1995 and 1999, at a time when the nation was early in its rebuilding phase after the war.
- The company was also contracted by Comalco Aluminum Ltd (now Rio Tinto Ltd) in 1989, to conceive and develop new dewatering technology for kaolin which was mined in a seam below the main bauxite resource. The process which was developed and patented, involved treating the kaolin slurry to maintain flowability even at 70% solids and dewatering using a novel, multiple effect evaporation system. I played a key role in the process conception (recognized as one of two inventors); bench scale demonstration; pilot plant design and operation; working with Japanese customers to assure product integrity; and scale-up to the first commercial plant at Comalco's Weipa operations.
- Between 1997 and 2000, the company led the process design, engineering and construction of a ~A$100 M demonstration plant for a first-of-a-kind Magnesium production process, and was heavily involved in the feasibility study for the $2 Billion commercial plant.

2000 – 2011 Other Ad-hoc Management Consulting and Directorships (Selection only)

- Project advisor to the Vietnamese government, Xstrata Coal, Sojitz and Kyushu Electric Power Company to scope the multi-billion-dollar development of a new 4,400 MW pulverized coal fired power generation complex in southern Vietnam.
- Independent reviewer for BHP Billiton of the Business Case estimates for the Uranium recovery section of the proposed Olympic Dam Expansion project.
- Advisor for Enthalpy Pty Ltd on Capital Investment Systems and Project Delivery for major clients including BHP Billiton, Barrick Gold and Stanwell Corporation.
- Lead negotiator for UniQuest Pty Ltd (the commercialization vehicle for the University of QLD) in major technology licensing deals with CSR Limited and OneSteel Limited.

Peer-reviewed Publications

1. M. S. R. Rao, S. Rekker, J. Humphrey, & **C. Greig,** (2023) "Towards the inclusion of equity principles in corporate climate aligned transitions". Submitted to Nature Climate Change, October 2023. Preprint at https://www.researchsquare.com/article/rs-3396847/v1
2. S. Uden and **C. Greig**, (2023) "Off-ramp mitigation policy". Under Consideration by Nature, September 2023.
3. A.Y. Ku, **C. Greig**, and E. Larson, (2023) "Capitalizing on U.S. Clean Hydrogen Hubs". Submitted to Science, In Review by Science, September 2023.
4. E.A. Cruz and **C. Greig** (2023) "Evaluating the Carbon Emissions Intensity of Major North American Banks and Identifying Levers to Motivate Sustainable Change". Submitted to Nature Communications, August 2023.
5. T.A. Gunawan, H. Luo, **C. Greig**, and E. Larson, (2023) "Shared CO_2 capture, transport, and storage for decarbonizing industrial clusters". Submitted to Applied Energy, August 2023.

6. M. Bertagni, R. H. Socolow, E. A. Carter J.M. P. Martirez, **C. Greig,** M. A. Zondlo, T. C. Lieuwen, M. E. Mueller, and A. Porporato, (2023) "Minimizing the Impacts of the Ammonia Economy on the Nitrogen Cycle and Climate". Proceedings of the National Academy of Science, Accepted, September 2023.
7. Rekker, S., Chen, Heede, R., G., Ives, M., Wade., & **Greig, C** (2023) "Evaluating fossil fuel companies' alignment with a Paris-aligned 1.5°C carbon budget", Nature Climate Change, https://www.nature.com/articles/s41558-023-01734-0.
8. N. V. Emodi, S. Rekker, **C. Greig,** B. Wade, J. N. Inekwe, and A. Zakari. (2023) The contribution of cross-border capital flow towards decarbonisation, Journal of Cleaner Production, Volume 405, https://doi.org/10.1016/j.jclepro.2023.137040.
9. E. Mayfield, J. Jenkins, E. Larson, and **C. Greig,** (2023) "Labor pathways to achieve net-zero emissions in the United States by mid-century," Energy Policy. https://doi.org/10.1016/j.enpol.2023.113516.
10. **Greig**, **C**., Winkler, R., Finch, B., Keto, D. & Hobart, S. (2023). "Speeding up Speeding up risk capital allocation to deliver net-zero ambitions". Joule, https://doi.org/10.1016/j.joule.2023.01.003.
11. Grant, N. Gambhir, A., Mittal, S., Koberle, A., and **Greig, C.** (2022) "Enhancing the realism of decarbonisation scenarios with practicable regional constraints on CO2 storage capacity", International Journal of Greenhouse Gas Control. Volume 120, (2022). https://doi.org/10.1016/j.ijggc.2022.103766
12. Rekker, S., Ives, M., Wade, Webb, L B., & **Greig, C**. (2022). "Measuring corporate Paris Compliance using a strict science-based approach". Nature Communications, **13**, 4441 (2022). https://doi.org/10.1038/s41467-022-31143-4
13. O'Bryan CJ, Allan JR, Suarez-Castro AF, Delsen DM, Buij R, McClure CJW, Rehbein J, Virani MZ, McCabe JD, Tyrrell P, Negret PJ, **Greig C.**, Brehony P and Kissling WD (2022) "Human impacts on the world's raptors". Frontiers in Ecology & Evolution. 10:624896. https://www.frontiersin.org/articles/10.3389/fevo.2022.624896/full
14. Pascale, A., Chakravarty, S., Lant, P., Smart, S., and **Greig, C.** (2022). "Can transitioning to non-renewable modern energy decrease carbon dioxide emissions in India?" Energy Research and Social Sciences. Energy Research & Social Science, Volume 91, 102733, ISSN 2214-6296, https://doi.org/10.1016/j.erss.2022.102733 .
15. S. Uden. R. Socolow, and **C. Greig,** (2022). "Bridging capital discipline with energy scenarios". Energy and Environmental Science. https://doi.org/10.1039/d2ee01244h
16. N. V. Emodi, S. Rekker, B. Wade, and **C. Greig,** (2022) "A systematic review of barriers to greenfield investment in decarbonization solutions". Renewable and Sustainable Energy Reviews. https://doi.org/10.1016/j.rser.2022.112586
17. **C. Greig,** S. Uden, and O. Vosshage, (2022). "Defining the value of carbon capture, utilization and storage (CCUS) for a low-carbon future", IEA Greenhouse Gas R&D Programme Technical Report, August 2022. https://ieaghg.org/ccs-resources/blog/new-ieaghg-technical-report-2022-09-defining-the-value-of-carbon-capture-utilization-and-storage-for-a-low-carbon-future
18. Ku, A.Y., **Greig, C.**, and Larson, E. (2022) "Traffic ahead: Navigating the road to carbon neutrality" Energy Research and Social Science, https://doi.org/10.1016/j.erss.2022.102686.
19. C. Zhang, H. Yang, Y. Zhao, L. Ma, E. Larson, and **C. Greig,** (2021). "From ambition and capability to realization: A framework for iteratively assessing and communicating national net-zero emission pathways." iScience, https://doi.org/10.1016/j.isci.2021.103695
20. J. Jenkins, E. Mayfield, E. Larson, S. Pacala, and **C. Greig,** (2021). "Mission net-zero America: The nation-building path to a prosperous, net-zero emissions economy", Joule (2021), https://doi.org/10.1016/j.joule.2021.10.016
21. Lane, J., **Greig, C.** and Garnett, A., (2021) "Uncertain storage prospects create a conundrum for carbon capture and storage ambitions". *Nature Climate Change* 11, 925-93 https://doi.org/10.1038/s41558-021-01175-7
22. **Greig, C.**, and Uden, S., (2021) "The value of CCUS in transitions to net-zero emissions". The Electricity Journal. https://doi.org/10.1016/j.tej.2021.107004
23. A. Daraeepour E.D. Larson, and **C.** Greig. (2021) "Investigating Electricity Market Incentives for Flexible Performance as Variable Renewable Generation Grows," IEEE. 10.5547/01956574.43.5.adar
24. S. Uden, P. Dargusch, and **C. Greig,** (2021) "Cutting through the noise of Negative emissions Technologies", Joule. https://doi.org/10.1016/j.joule.2021.06.013.

25. V. Sharma, **C. Greig** and P. Lant, (2021) "What is stopping India's rapid decarbonisation? Examining social factors, speed, and institutions in Odisha", Energy Research and Social Science. https://doi.org/10.1016/j.erss.2021.102117

26. E. Larson, **C. Greig,** J. Jenkins, E. Mayfield, A. Pascale, **C.** Zhang, J. Drossman, R. Williams, S. Pacala, R. Socolow, EJ Baik, R. Birdsey, R. Duke, R. Jones, B. Haley, E. Leslie, K. Paustian, and A. Swan, (2021) Net-Zero America: Potential Pathways, Infrastructure, and Impacts Final report (345 pp), Princeton University, Princeton, NJ, 29 October, 2021. http://netzeroamerica.princeton.edu

27. **Greig C.** (2020). Getting to Net-Zero Emissions. Engineering, Vol. 6 Issue 12. Views and Comments. https://doi.org/10.1016/j.eng.2020.09.005

28. B. Clement, M. Lyu, E. Kulkarni, T. Lin, Y. Hu, V. Lockett, **C. Greig**, & L. Wang (2020), Recent advances in printed thin-film batteries, Engineering, https://www.sciencedirect.com/science/article/pii/S2095809922002053?via%3Dihub

29. Kreutz T., Larson E., Elsido C., Martelli E., **Greig C.**, & Williams. R. (2020). Techno-economic prospects for producing Fischer-Tropsch jet fuel and electricity from lignite and woody biomass with CO2 capture for EOR. Applied Energy. https://doi.org/10.1016/j.apenergy.2020.115841

30. Pascale, A., Chakravarty, S., Lant, P., Smart, S., & **Greig, C.** (2020). The rise of (sub)nations? Sub-national human development, climate targets, and carbon dioxide emissions in 163 countries. Energy Research & Social Science. https://www.sciencedirect.com/science/article/abs/pii/S2214629620301225

31. Larson, E., Kreutz, T., **Greig, C.**, Williams R., Rooney, T., Gray, E, Elsido C., Martelli E., and Meerman, H. (2020). Design and Analysis of a Low-Carbon Lignite/Biomass-to-Jet Fuel Demonstration Project. Applied Energy. https://doi.org/10.1016/j.apenergy.2019.114209 .

32. Balinger, B., Schmeda-Lopez, D., Kefford, B., Parkinson, B., Stringer, M., **Greig, C.** & Smart, S. (2019). The vulnerability of electric vehicle deployment to critical mineral supply. Applied Energy. https://doi.org/10.1016/j.apenergy.2019.113844 .

33. Heynen, A., Lant, P., Smart, S., Sridharan, S. & **Greig, C.** (2019) Off-grid opportunities and threats in the wake of India's electrification push. Energy Sustainability and Society, 9 (1).

34. Small, M., Wong-Parodi, G., Kefford, B., Stringer, M., Schmeda-Lopez, D., **Greig, C.**, Ballinger, B., Wilson, S., and Smart, S. Generating Linked Technology-Socioeconomic Scenarios for Emerging Energy Transitions, (2019) Applied Energy.

35. Kefford, B., Ballinger, B., Schmeda-Lopez, D., **Greig, C.**, Smart, (2018). The early retirement challenge for fossil fuel power plants in deep decarbonisation scenarios. Energy Policy.

36. Curran, F., Smart, S., Lacey, J., **Greig, C.** and Lant, P. (2018). Learning from experience in the water sector to improve access to energy services. Utilities Policy, https://doi.org/10.1016/j.jup.2018.01.005

37. Malakar, Y., **Greig, C.** & Van de Fliert, E. (2018). Structure, agency and capabilities: Conceptualising inertia in solid fuel-based cooking practices. Energy Research & Social Science. Vol 40.

38. Parkinson, B.; Tabatabaei, M.; Upham, D.**C.**; Ballinger, B.; **Greig, C.**; Smart, S and McFarland, E. (2018). "Hydrogen production using methane: Techno-economics of decarbonising fuels and chemicals", International Journal of Hydrogen Energy. DOI: 10.1016/j.ijhydene.2017.12.081.

39. **Greig, C.R.**: "Contemporary research in energy science and engineering", Engineering, 2017, 3(4): 436-438. http://engineering.org.cn/EN/Y2017/V3/I4/436.

40. **C. R. Greig,** T.G. Kreutz, E.D. Larson, J.**C.** Meerman, R.H. Williams, "Lignite-plus-Biomass to Synthetic Jet Fuel with CO2 Capture and Storage: Design, Cost, and Greenhouse Gas Emissions Analysis for a Near-Term First-of-a-Kind Demonstration Project and Prospective Future Commercial Plants," Final report to The National Energy Technology Laboratory, U.S. Department of Energy, 1 September 2017.

41. Parkinson, B., **Greig, C**, McFarland, E. and Smart, S. (2017) Techno-economic analysis of a process for CO_2-free coproduction of iron and hydrocarbon chemical products, Chemical Engineering Journal, 313 (2017).

42. Herington, M., Lant, P. Smart, S., **Greig, C.** and Van de Fliert, E. (2017). Defection, recruitment and social change in cooking practices: Energy poverty through a social practice lens. Energy Research & Social Science. Vol. 34.

43. **Greig, C.**, Bongers, G., Stott, **C.** and Byrom, S. (2016) Energy Security and Prosperity in Australia: A Roadmap for CCS, The University of Queensland, Brisbane. ISBN 978-1-74272-175-0.
44. **Greig, C.**, Baird, J. and Zervos, T. (2016) Financial Incentives for the Acceleration of CCS Projects, The University of Queensland, Brisbane. ISBN 978-1-74272-177-4.
45. Grove, J., Lant, P., **Greig, C.** and Smart, S. (2016). Can coal-derived DME reduce the dependence on solid cooking fuels in India? Energy for Sustainable Development, 546 (2016). Energy Research & Social Science 34.
46. Herington, M., Van de Fliert, M., Smart, S., **Greig, C.** and Lant, P. (2016). Rural energy planning remains out-of-step with contemporary paradigms of energy access and development. Accepted by Renewable & Sustainable Energy Reviews.
47. Larson, E., Baxley, S., **Greig, C.**, Kreutz., T., Meerman, H., & Williams, R., (2015). Design and Commercialisation Analysis for Synthetic Jet Fuel Production from Lignite and Woody Biomass at a Mississippi Site with CO2 Capture and Storage via Enhanced Oil Recovery. 32nd Annual International Pittsburgh Coal Conference, USA.
48. **Greig, C.** (2015). We need to get our energy policy right. Feature article in FOCUS. Published by The Australian Academy of Technological Sciences and Engineering (ATSE).
49. Lane, J., Smart, S., Lopez, D., Hoegh-Guldberg, O., Garnett, A., **Greig, C**, and McFarland, E. (2015). Understanding constraints to the transformation rate of global energy infrastructure. WIREs Energy Environment. Volume 3, 2015.
50. **Greig, C**, Garnett, A., Oesch, J., Smart, S. (2014). Guidelines for scoping & estimating early mover CCS projects. http://anlecrd.com.au/wp-content/uploads/2016/08/ANLEC-Project-1-0512-0205_Milestone-5_Final-Report.pdf.
51. Garnett A. and **Greig C.** (2014). Cost Reduction and Innovation Strategies for Carbon Storage. Published by the International Energy Agency.
52. Garnett A. and **Greig C.** (2014). Investing in CCS: Key project gateways. INSIGHTS 2014: What lies in store for CCS. International Energy Agency.
53. **Greig C**, et al, (2013). A Roadmap for the Development and Deployment of Carbon Capture and Storage in Australia. Report prepared on behalf of the National CCS Council for the Minister for Resources, Environment and Tourism, Australian Commonwealth Government.
54. **Greig, C.**, Baird, J. and Zervos, T., (2013). Mobilising Investment to Accelerate CCS Deployment in Australia. Report prepared on behalf of the National CCS Council for the Minister for Resources, Environment and Tourism, Australian Commonwealth Government.
55. **Greig C.**, (2013). Energy Innovation Policy and the need for a Portfolio Approach. Public Policy Paper 4/2013 prepared on behalf of The Energy Policy Institute of Australia.
56. Garnett A., **Greig C.** and Wheeler C. (2011). The ZeroGen project—Managing risk and uncertainty. Energy Procedia. Volume 4, Pages 5631–5638.

Books & Non-Peer-Reviewed Reports/Articles

1. **C. Greig**, S. Uden and R. Socolow, (2022) "Maximizing the impact of a history-making federal clean energy investment program". The Hill – Energy and Environment. September 9. 2022. https://thehill.com/opinion/energy-environment/3636069-maximizing-the-impact-of-a-history-making-federal-clean-energy-investment-program/

2. S. Uden and **C. Greig**, (2022) "Why direct-action technology, not taxes, is a better climate bet". The Australian Financial Review. August 21, 2022. https://www.afr.com/policy/energy-and-climate/why-direct-action-technology-not-taxes-is-a-better-climate-bet-20220818-p5batb

3. Paul Ebert, Clare Anderson, and **Chris Greig** (2022) "The infrastructure of net zero: a unique challenge for Australia". The APPEA Journal, CSIRO Publishing. https://doi.org/10.1071/AJ21062

4. C. Anderson, **C. Greig**, and P. Ebert, "From ambition to reality 2: Measuring change in the race to deliver net zero," published by Worley and Princeton's Andlinger Center for Energy and the Environment, August 2022. https://www.worley.com/our-thinking/from-ambition-to-reality

5. **C. Greig** and A. Sharma, (2022) "Why India's clean energy future lies with green hydrogen – not blue". World Economic Forum, Global Agend1, 13 May 2022. https://www.weforum.org/agenda/2022/05/why-indias-future-lies-with-green-hydrogen-not-blue/

6. S. Rekker, **C. Greig,** G. Chen, B. Wade, and M. Ives (2022) "Measuring the Alignment of Iron and Steel Companies with the Paris Agreement". Case Study undertaken on the iron and steel portfolio of Norges Bank.

7. E. Larson, **C. Greig,** J. Jenkins, E. Mayfield, A. Pascale, **C.** Zhang, J. Drossman, R. Williams, S. Pacala, R. Socolow, EJ Baik, R. Birdsey, R. Duke, R. Jones, B. Haley, E. Leslie, K. Paustian, and A. Swan, (2021) Net-Zero America: Potential Pathways, Infrastructure, and Impacts Final report (345 pp), Princeton University, Princeton, NJ, 29 October, 2021. http://netzeroamerica.princeton.edu

8. Clare Anderson, **Chris Greig** and Paul Ebert, (2021) "From Ambition to Reality: Weaving the threads of net-zero delivery." https://www.worley.com/~/media/Files/W/Worley-V3/documents/our-thinking/from-ambition-to-reality/from-ambition-to-reality-report.pdf .

9. V. Sharma, **C. Greig,** and P. Lant, (2021) "Problems looming for India's energy transition" Article in The Conversation.

10. Garnett A., **Greig C.** and Oettinger M. (2013) [Eds]. ZeroGen IGCC with CCS. A case history. UQ Press. ISBN: 978-0-646-91501-2

11. Foster, J., Froome, **C.**, **Greig, C.**, Hoegh-Guldberg, O., Meredith, P., Molyneaux, L., Saha, T., Wagner L. and Ball, B. (2013). Delivering a Competitive Australian Power System (3 Part series)

Invited talks/papers at national and international conferences (selection only):

- Achieving US Climate Goals – Investment Opportunities and Challenges; Keynote address to ArcLight Capital Annual Investor's Meeting, Boston, October 5, 2023.
- Hydrogen Americas 2023 Summit: Catalyzing a US Clean Hydrogen Economy; Opening Address to Deloitte sponsored VIP Executive Roundtable, Washington DC, October 3, 2023.
- From Net-Zero Ambition to Reality: Invited Speech and Panel Discussion; Chatham House gathering of 40 industry executives, The Gherkin, London, Mach 8 2023.
- Net-Zero Australia. Public presentation of final and interim study results hosted by The University of Melbourne. July 12, 2023 (Final), August 25, 2022 (Interim), Melbourne.
- Net-Zero Australia – Opportunities, Challenges and Risks. Address to North Queensland Business Community, July 6, 2023, Townsville.
- Climate change and the global energy transition. Invited Address to the National Security Agency as the General Paul M. Nakasone's 4-Star Speaker. July 12, 2022, Fort Meade, Maryland.
- Net-Zero Australia – Greening an energy superpower. Presentation to Princeton-BP Carbon Mitigation Initiative, April 23, 2022, London.
- Net-Zero Australia: Interim results. Invited presentations and briefings: Australian federal government departments of Prime Minister and Cabinet, Climate Change, Environment and Water, State Government Cabinet Ministers and civil servants – New South Wales, Victoria, Queensland, South Australia, and Western Australia, Morgan Stanley, Commonwealth Bank of Australia, BHP, Herbert Smith Freehills, KPMG, etc. (throughout 2022 and 2023)
- Delivering infrastructure at the speed and scale need for mid-century net-zero ambitions. Invited keynote for CEO Roundtable at UNFCC COP27, November 9, 2022, Sharm El Sheikh, Egypt.
- ESG and Net-Zero Commitments – The good, the bad, and the ugly. Podcast: Interview with ESG Lead Partner at global law firm, Herbert Smith Freehills.
- Bridging capital disciple and energy scenarios to sequence the delivery of ambitious CCUS targets in the U.S.. Invited briefing to Office of Clean Energy Demonstrations, U.S. DOE, April 2022
- Net-Zero America: Potential pathways, deployments & impacts. Invited presentations / broadcast interviews to: Yahoo Finance, Investment News, CNBC, U.S. Senate Energy Committee, Australian department of Prime Minister and Cabinet. Queensland Government Cabinet Ministers, ExxonMobil, BP, Worley, Deloitte, Santos, APA, BHP, Chevron, Microsoft EU, The Queensland Energy Club, BP-Princeton Carbon Mitigation Initiative Annual Meeting,

Sustainable Finance Institute Asia, Institution of Chemical Engineers, Citibank, Alliance Bernstein, Top 1000 Funds Annual Conference, Jefferies Fund Management. (Throughout 2021)

- CCUS in Net-Zero Pathways – DOE/NREL Carbon Management and Oil and Gas Research Project Review Meeting (Summer 2021)
- CCUS in Net-Zero Pathways. Keynote at Australian 2021 Carbon Capture Utilization and Storage Conference (Summer 2021)
- Mobilizing Capital for Net-Zero Transitions. Workshop hosted featuring leaders from US financial institutions, DOE, White House Staff, and Energy Industry (Fall 2021)
- Moving Global Decarbonization Pathways from Infeasible to Probable. Snowmass Energy Modelling Forum (Virtual) "Climate Change in a World of Tradeoffs and Synergies", (Winter 2021)
- Enabling a clean hydrogen economy in the United Stated. Opening keynote for the USEA/NREL 2021 Clean Hydrogen Conference (Winter 2021)
- Rethinking the value of cost-optimized energy decarbonization pathways. Snowmass Energy Modelling Forum (Virtual) "Climate Change in a World of Trade-offs and Synergies", 11 November 2020.
- Australia's low-emissions strategy – what's needed. Energy Policy Institute of Australia webinar. 11 June 2020.
- Net-Zero America: Opportunities, Pathways and Pitfalls. Melbourne Energy Institute, Melbourne, Australia, 16 March 2020.
- Planning for a Net-Zero America, Princeton Energy & Climate Scholars meeting, Princeton, NJ, 30 January 2020.
- Energy Dialogues Conference: Achieving large scale carbon sequestration in the U.S. and internationally. Princeton, NJ, 19 February 2020.
- Net-Zero America: Opportunities, Pathways and Pitfalls. Kleinman Center for Energy Policy, Philadelphia, Pa, 28 February 2020.
- European Union PEP 1.5^{o}C Conference – Pathways and Entry Points, Potsdam, Germany (2019)
- Electric Power Research Institute Annual Research Strategic Review – Keynote - Chicago (2019)
- Climate Change Authority – Private Board presentation – Canberra (2019)
- Princeton-BP Carbon Mitigation Initiative 2019 (London), 2017 (Princeton), 2016 (London)
- World Economic Forum - Young Global Leaders Forum, Princeton University (2018)
- Indian Conference on Advances in Energy Research 2017- Keynote (Mumbai)
- 9th Sino-US Joint Conference of Chemical Engineering 2017 (Beijing)
- Australian Engineering Conference 2016. Australia's Transition away from Fossil Fuels (Brisbane)
- McDonnell Alliance Global Energy & Environment Partnership 2016 (Brisbane), 2014 (St Louis) & 2012 (Mumbai)
- New Frontiers for Energy & Chemicals in a Carbon Constrained World 2015 & 2014 (Santa Barbara)
- EnerAsia 2014 (Ahmedabad, India).
- Energy State of the Nation. 2016 & 2013 (Sydney)
- America Australian Chamber of Commerce Energy Conference in Houston (2014)
- Bio-energy and CCS (BECCS): Options for Brazil – IEA Workshop Sao Paulo (2013)
- EPRI CCS Costs Workshop 2013 (USA)
- Australian Ambassadors Global Leadership Address in Washington DC (2012)
- International Energy Agency – Coal & CCS 2012 (Paris)
- International Conference on Clean Energy 2012 (Xian)
- APEC Expert Committee on Clean Fossil Energy 2012 (Gold Coast)
- International Energy Agency, Committee on Energy Research & Technology 2012 (Sydney)
- Various invited presentations to Engineers Australia and Society of Petroleum Engineers

<u>Reports to governments</u>

- Submission in response to the Australian Commonwealth Chief Scientist's Report. "Independent Review of the Future Security of the National Electricity Market". 2017

- Submission to the NSW Department of Environment. “Response to Senate Enquiry on Australia’s Transport Energy Resilience and Security. 2014. NSW Climate Change Policy Framework: Important considerations for taking the aspirational goal seriously - a public interest discussion paper”. 2016
- Submission to ‘Australia’s transport energy resilience and sustainability’ enquiry by the Senate Standing Committees on Rural and Regional Affairs and Transport. Also requested to appear before the committee. 2016
- Submission to Federal Minister for Resources and Energy. Response to the Energy White Paper 2015 “Australia is an Energy Superpower”. 2015
- Submission to State Minister for Energy and Water Supply. Response to the Queensland Government’s “POWERQ: A 3- year strategy for Queensland’s electricity sector”. 2013
- Submission to the Federal Minister for Resources and Energy. Response to the Energy White Paper 2012 “Australia’s Energy Transformation”. 2013

Submissions authored or co-authored on behalf of the Australian Academy of Technology & Engineering.

- Deep reductions in emissions using CCS (Action Statement). 2017
- Advancing energy storage for Australia (Action Statement). 2015
- Enhancing Australia’s solar photovoltaic advantage (Action Statement). 2015
- Doubling Australia's energy productivity (Action Statement). 2014
- Intelligent electricity networks for the future (Action Statement). 2014
- Low emission fuels for transport (Action Statement). 2014
- Nuclear energy is an option (Action Statement). 2014
- A sustainable energy future for Australia (Position Statement). 2014