



NSW Energy and Resources Knowledge Hub Forum

16 June 2017

Report on
Proceedings



Background

The NSW Energy and Resources Knowledge Hub has two platforms: METS NSW and Energy NSW

Energy NSW was established to support the energy equipment, technology and services sector for NSW. It provides a platform to share information and knowledge and supports energy businesses to navigate a complex and changing environment. Participation in Energy NSW provides access to leading research, industry best practice and associated areas of interest related to energy technologies and services.

On 16 June 2017, the NSW Energy and Resources Knowledge Hub hosted the Energy NSW Industry Forum at the Newcastle Institute for Energy and Resources (NIER). The forum targeted energy businesses in renewables and new energy technologies alongside government, industry bodies and research institutions.

The forum provided a snapshot of government energy initiatives across NSW departments. This was followed by a facilitated discussion focussed on the following questions:

- Where will future energy jobs come from and what are the skills required?
- What needs to happen to support a thriving energy technology and service sector for NSW?
- What are the key barriers and risks to the development of an energy technology and services sectors?
- How could the Energy and Resources Knowledge Hub best support businesses in the energy sector?





Key Agencies Represented

NIER was established with the clear agenda to provide a new collective based model for critical research in energy and resources. As a multidisciplinary research hub, NIER is driven by a vision of global leadership to address the rapidly emerging issues of resource sustainability, productivity, and the transformation of the energy system.

NERA is one of six Growth Centres established by the Australian Government under the Industry Growth Centres Initiative. National Energy Resources Australia (NERA) has been established to maximise the value to the Australian economy by having an energy resources industry that is globally competitive, sustainable, innovative and diverse. Through a national focus, NERA's role is to grow collaboration and innovation to assist the energy resources industry manage cost structures and productivity, direct research to industry needs, deliver the future work skills required and promote fit for purpose regulation.

The NSW Government was represented at the forum by the Department of Resources and Energy, NSW Renewable Energy Advocate, Office of Environment and Heritage and the NSW Department of Planning.



Presentations



Please note:
All presentations are available on the NSW Energy and Resources Knowledge Hub website
<http://www.energyinnovation.net.au/projects/energy-nsw-industry-forum>

Introductory statements were made by Alan Broadfoot, Executive Director for the Newcastle Institute for Energy and Resources.

The Newcastle Institute for Energy and Resources is a state and federally funded Institute that encourages best practice collaboration between research and industry, creating an industrial innovation platform. The Institute embeds research students in companies and embeds industry within the research sector. It directly transfers knowledge and skills to enterprise.

Alan Broadfoot provided an overview of the NSW Energy and Resources Knowledge Hub outlining the benefits in collaboration and leveraged opportunities. He said Energy NSW represents a facilitation model that leverages the collective capacity of all the groups working together, distributing knowledge to groups and businesses across the state.

Charlie Dowsett, Executive Director, NSW Department of Industry highlighted the opportunities within the energy transition to renewable energy for new jobs, skills and training particularly in regional NSW.



Miranda Taylor, CEO NERA

Participants were provided with an overview of the role of the National Growth Centre for energy and resources (NERA) and a briefing of the priorities for NERA in the context of the *Independent Review into the Future Security of the National Electricity Market*, by Chief Scientist Dr Alan Finkel. Funding opportunities were also discussed for the commercialisation of new energy related technologies and services.

Once in a generation opportunity

Australia has an inherent advantage in all forms of energy

Policy uncertainty challenges investment and innovation

Finkel Blueprint offers a once in a generation opportunity to agree a pathway to lower emissions whilst enabling the economy to adapt

Australia's energy resources industry must also lead and adapt

The value of Commonwealth funding schemes was emphasised particularly the CRC-P program funds. These funding mechanisms enable applied research across the industry. Participants were informed of the funding available for collaboration/commercialisation projects through NERA.

NERA's role

Creating an innovation platform for energy resources stakeholders to:

1. Manage costs and optimise productivity of current assets through ability to harvest external knowledge and rapidly adopt innovation and technology
2. Maximise efficiency and environmental performance through fast adoption of a range of clean and renewable technologies, and by reducing carbon emissions
3. Build agile, resilient supply chains working across multiple industries.

Extending the innovation boundary

- 3 **External innovation** - engage with multiple external knowledge experts, use technology to verify and de risk adoption of innovation
- 2 **Emerging innovation** - work with vendors, extend external collaboration and create new value
- 1 **The safe zone** - look internally, improve margins and keep cash coming in

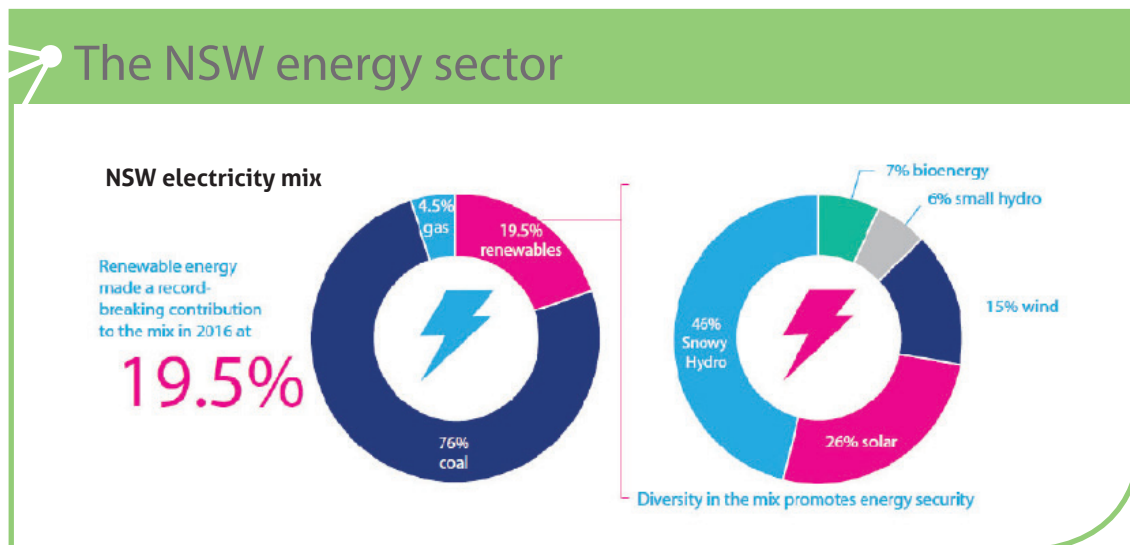
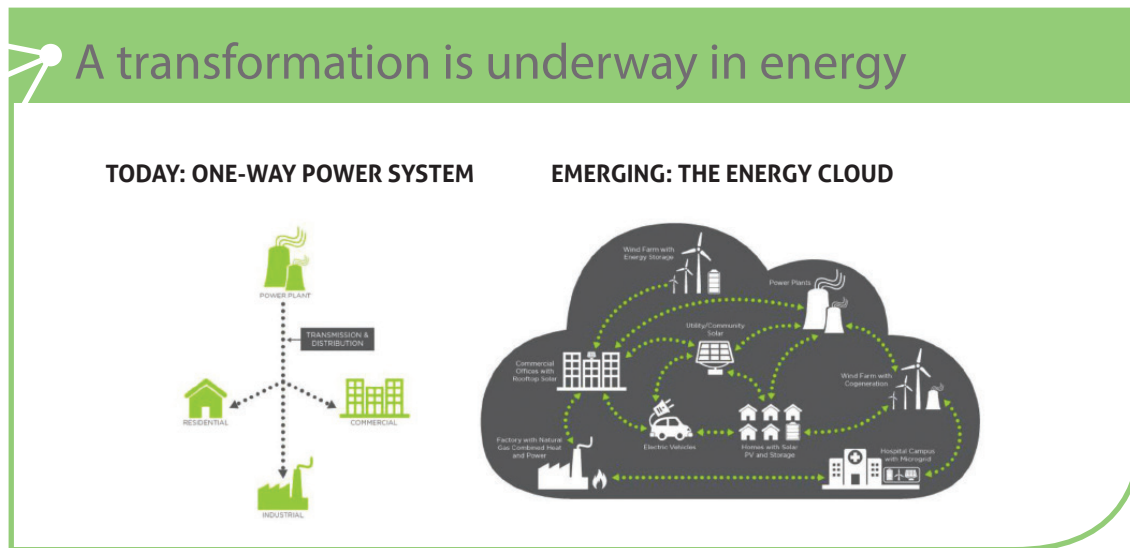


NERA's nine sector knowledge priorities

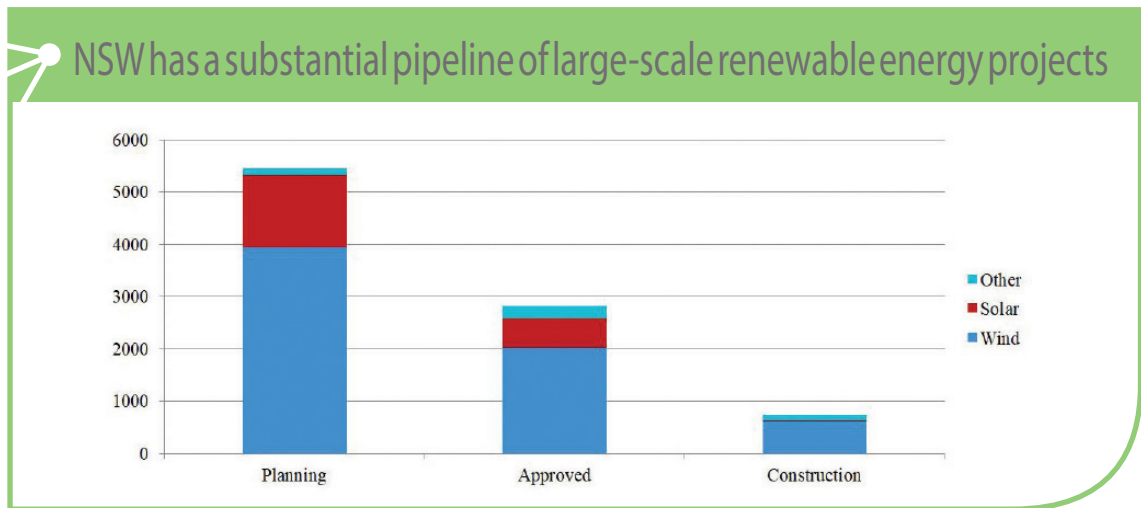
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|  work skills of the future |  Enabling effective collaboration |  Understanding Australia's resource base |
|  Social licence to operate |  Unlock future resources |  New markets, New technologies, New business models |
|  Commercialisation of research and development |  Efficient operations and maintenance |  Regulatory framework optimisation |

Tim Stock, Sustainable Energy Programs, NSW Department of Planning and Environment

Participants received a briefing on the energy transition underway in NSW with a particular focus on growing investment in renewable energy.



NSW has a significant pipeline of large scale renewable energy projects. Transgrid has had connection inquiries for 7000MW of new renewable energy infrastructure. This equates to \$11.5B of investment in NSW.



The NSW Renewable Energy Action plan is based on three core actions - attract investment, build community support and grow expertise. Solar penetration, consumer preferences, rates of technological adoption and tariff structures make NSW suited to battery storage. Batteries storage in homes and businesses will support energy security.

The NSW government is working with businesses to assist in the development of clean energy strategies particularly for regional NSW. It is also providing funding support to 20 businesses wishing to achieve net zero emissions or 100% renewable energy. These businesses are the trailblazers for 2050.

- Each business will develop a 'clean energy strategy' with tangible steps for achieving strong targets, with support from expert advisers
- Key areas of interest so far are corporate PPAs for renewable energy and innovative options for bioenergy
- NSW Government will share findings and case studies in the second half of 2017.

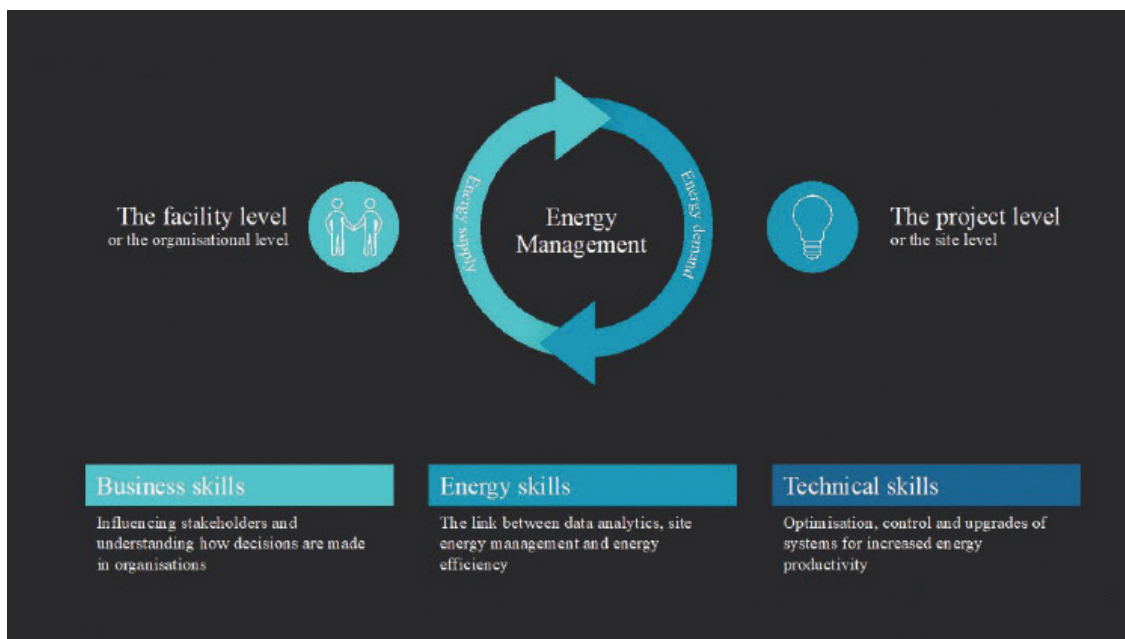
Bradley Anderson, Energy Efficient Business, Sustainability Programs, Office of Environment and Heritage

The forum gained insight into the suite of existing OEH programs supporting business improvement through energy management. These programs have helped businesses generate 170GWh of electricity savings a year, and \$33.5m a year in energy savings for all consumers.

Energy efficiency is key to NSW's goal of Net Zero emissions by 2050. The gains with energy efficiency are significant. Energy security at lowest cost requires systematic and strategic energy management. Energy use can be managed and controlled through proper business practice, and by reducing the amount of energy a site needs to operate. There is also funding available for NSW business to build up resilience to climate change.

The emergence of new technologies now requires new skills and training and the growth in electric vehicles provides a useful example - the skills sets required for servicing electric vehicles expands the training requirements of existing mechanical trades.

Facilities Management provides another example. Energy efficient and smart buildings require different procedures, regulations, standards and new skills. OEH has developed a technical course in energy efficiency for facilities managers providing enhanced understanding of load profile and energy use.



Sid Rallapalli, Minerals / Resources & Energy Industry Investment & Export Support, NSW Department of Industry

Forum participants were provided with a comprehensive overview of the NSW Advanced Energy Strategy. As a complement to renewable energy, advanced energy was defined as including the Internet of Things (IoT), energy storage, smart meters, demand management software and low emission transport. It was noted that advanced energy can enable efficient integration and optimum performance of clean energy technologies and is an integral part of the transition. It can help ensure an economically responsible framework and is a new conduit for growth, investment, jobs and export.

As it enables integration of renewable energy, advanced energy has significant economic development potential. Globally, renewable energy is a US\$ 1.7 trillion dollar industry that is growing fast, and already twice the size of the global airline industry. It supports 3.3 million jobs in US alone.

In Australia, the renewable energy sector supports 14,000 jobs, including 4000 in NSW.

No technology influences industry, government and consumers as energy does, and advanced energy brings exciting changes to the table such as prosumers and peer to peer trading. New energy economy jobs enable us to compete with other knowledge based economies.

The forum was provided with an update of the NSW Government Climate Change Fund (CCF) Draft Strategic Plan. The plan aims to accelerate advanced energy, increase energy efficiency and adapt businesses to climate change. Strategies include policy directions to guide climate change programs and initiatives that will assist investors/industry to accelerate development. The CCF Draft Strategic Plan for NSW is being considered by cabinet and will be implemented in 2017/18.



Discussion Questions

Following the presentations, forum participants broke into eight small groups to discuss four questions relevant to energy sector growth and support. This section highlights the key themes from the discussion.

Where will future energy jobs growth come from and what skills will be required?

One of the key themes that emerged from this question related to jobs growth in response to the decentralisation of energy markets, particularly for regional areas. With a shift towards smart technology, IT skills will be required across all industries and those with traditional skill sets will need to incorporate new skills. There will be an overall shift towards higher skilled jobs in the energy sector.

A common response was that skill sets will need to be applicable to many industries instead of catering to just one. For example engineering skills, electrical and IT applied in a consultancy type model where the employee can solve problems across numerous industries and sectors. Energy efficiency is another example that can apply across multiple industries and sectors. This model will require agility and the ability to identify and pre-empt skills changes for the future.

Practically, network assets will be smaller. There will be a need for installation and maintenance for decentralised systems. New standards and regulations will need to be applied to help manage these changes.

Specifically, knowledge jobs including STEM, commerce, finance, data analysis and legal skills will be important. The best outcomes will come from multi-disciplinary teams, therefore complementary training will be valuable. Critical thinking and systems thinking will be significant assets.

The question of how to manage the transition from old to new infrastructure encouraged a lively discussion about the legal and regulatory framework for the network. Discussion centred around the complexity of emerging energy systems in the context of a regulatory system not designed to accommodate the evolving market structure. There was repeated concern among forum participants that a failure to adapt has put Australia at a competitive disadvantage internationally.

The forum acknowledged that regulation of the electricity market is an extremely complex task that requires deep knowledge and highly skilled workers. The required regulatory change has occurred and is occurring in other countries. "Changing the rules" is a key strategy employed to successfully diversify the energy mix. The training response to the policy, regulation and technical administration jobs will require highly specialised knowledge and the flexibility to include emerging areas such as peer to peer energy trading and microgrids.

A recurrent theme throughout the day was Australia's failure to commercialise its own Intellectual Property (IP). There is concern that Australia is missing a big opportunity to keep jobs onshore, by not commercialising Australian IP. A funding and development gap needs to be addressed by policy to overcome this. It is not possible to get funding to manufacture IP developed in Australia locally. Effort needs to be made to bring back manufacturing of Australian technology.

Participants flagged jobs growth in the following areas:

Technical

Automation and Robotics

Information Technology

The need for IT featured heavily across all discussions linked to automation.

Specifically **Coding**, **Cyber security**, the **Internet of Things** and **Data analysis**.

Industrial design computer modelling

Remote sensing and modelling

Trades with embedded IT - retrofitting old infrastructure with new technology and specialised components.

Thinking

Critical thinking and systems thinking

IP and the development of knowledge.

Developing standards and new regulatory frameworks

Applied Skills

Commissioning and decommissioning - Integrating old and new systems

Construction and Maintenance - Installation and maintenance for both distributed systems and microgrids in a more dispersed network.

Mechanical/electrical - Electric vehicles

Energy Services and Energy Management - High and medium voltage grid management/Local microgrid management.

Energy production - Including Hydrogen and the manufacture of bioenergy, biogas and bioproducts.

Training and Education - Upskilling in new technologies. Training needs to be multi-disciplinary and embedded in industry.

Energy efficiency - Opportunities for energy efficiency consultants, social scientists and educators advising and teaching on energy market consumption and behaviour.

Training

Multiskilling existing trades - incorporating IT capabilities.

University Industry engagement - industry experience embedded in degree courses taught by industry experts

Creating cross-disciplinary training - There is a need for transformational change in education and training models.

Consultant model - Consulting as a professional discipline, facilitating collaboration, providing solutions.

More collaboration between industry and education systems.

What needs to happen to support a thriving energy and technology services sector for NSW?

Participants responded to this question with the need for culture change, collaboration, leadership and stability.

The group noted that when disruption occurs rapidly, it leaves business and consumers unsupported. Participants felt stakeholder mapping could help to better understand who the key actors are in the energy system and where clusters and skills gaps could be identified. Participants agreed that further analysis of market opportunities would be valuable.

There was widespread discussion around the need for support of Australian IP. There was concern that Australian manufacturers are missing out on home grown innovation through lack of investment in pilot and market demonstration.

It was noted that nurturing innovation means assistance for start-ups (most of whom fail in the first five years). There are energy and technology incubators emerging in cities like Newcastle and Sydney that offer supporting entrepreneurial programs. This enables more start-ups to grow to mature at SME level. SMEs are 1.4% of market yet contribute 34% of GDP. There is therefore a high return on investment for supporting start-ups through the foundational years.

The discussion went on to highlight the need for these programs across regional NSW, not just in Sydney. There is a rural and regional opportunity to provide energy and supply chain access to mining, energy and high tech agriculture.

Participants felt the community needs access to education programs and campaigns related to energy literacy – this is an area the Hub can develop further as a project. Training in energy efficiency would be valuable and this requires behaviour change and a sustained effort.



Participants acknowledged the polarising nature of the energy debate and noted the importance of fostering collaboration, connection, knowledge sharing, communication and the development of energy literacy.

Recommendations

- Map stakeholders in the sector
- Map skills gaps and accreditation pathways
- Feed back to government ideas around policy / regulatory road blocks.
- Extend energy incubator / start-up programs for regional NSW
- Commission Energy NSW to lead an energy literacy program.

What are the key barriers and risks to the development of an energy technology and services sector?

Sector fragmentation was noted as a critical issue for participants with the need for a unified vision to drive investment and technology development. Currently, the value chain is siloed despite widespread collective capability.

Participants also noted the policy and regulatory framework is based on a centralised distribution model. The emerging model is more like an “energy ecosystem” and requires an appropriate level of deregulation to accommodate it. This question prompted further discussion around the need for clarity in relation to the standards and regulations required for new technology.

Lack of infrastructure is a distribution barrier to solar and wind as some of the best resources are remotely located. Solar output can be implemented in Broken Hill yet there is no infrastructure to connect to the NEM, and the investment costs of connection are significant. High Voltage Direct Current (HVDC) is heavily implemented in other parts of the world to secure access to remote renewable resources. The Kalgoorlie-Port Augusta HVDC interconnector has been suggested. There is an opportunity to couple new network infrastructure with inland rail. This could enable transmission to remote mines and create access to remote renewable resources.

A recurrent theme throughout the day was frustration that Australia is missing a significant opportunity by not commercialising Australian IP.

The funding and development gap to demonstrate from lab to market means it is not possible to foster local manufacturing for IP developed in Australia.

Energy literacy was mentioned again as a key issue. As technology continues to change, the task of updating knowledge and skills needs to be ongoing in educational institutions and workplaces.



How could the NSW Energy and Resources Knowledge Hub best support the businesses in the energy sector?

Participants felt the NSW Energy and Resources Knowledge Hub can provide a neutral environment that opens communication and builds trust. Under the Hub banner, Energy NSW needs to demonstrate that a cohesive and collaborative culture can enable transformational change.

An incubator program that captures the full early life of start-ups was suggested as a potential collaborative venture. Such an incubator would identify skills gaps and provide skills development. Support for start-ups and early business development needs to have regional reach.

Representation, facilitation and providing a strong industry voice were identified as important roles for Energy NSW. Energy NSW can provide informed commentary about what is happening in the sector in Australia and internationally.

It was noted the Hub can be a one-stop-shop for energy information, market intelligence and knowledge transfer. A formal quarterly overview of energy news and research could provide the opportunity for analysis. A quarterly energy index was also suggested. Informal support can be provided by social media.

Participants also wanted Energy NSW to play a role in identifying skills gaps and education pathways. Hub funded hackathons were also flagged as a valuable project stream by accessing live industry problems and use expertise to resolve them.

Participants acknowledged the importance of knowledge sharing as a support role for the Hub who should reach participants through strong communication processes including the web portal, social media and newsletters. It was also noted the Hub's important role as a regional and rural connector sending appropriate information to these networks.

The forum also documented the role of the Hub to encourage informed respectful cross sector government and industry discussion and link across all industries.

At a practical level, participants suggested the Hub facilitate access to funding and to conduct sector surveys to gain a better understanding of local and regional issues and then provide feedback to government.



Next Steps

This report and its recommendations will be provided to the NSW Department of Industry as a record of discussions held on 16 June 2017.

The NSW Energy and Resources Knowledge Steering Committee will review this report on 19 July 2017 with the objective to agree on a series of priority areas and projects for Energy NSW.

The Hub will then seek funding for those projects and where successful, action them during the 2017/18 financial year.



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Forum Attendees

Energy & Resources Knowledge Hub

Evergen

GreenSync

Singleton Solar Farm

2AT Renewables

CWP Renewables

Solar Power Australia

CWP Renewables

HunterNet

Photon Energy

NERA

CSIRO

ERM

Energy Pipelines CRC

Ethanol Technologies

Austrade

NSW Department of Industry

Water Gas Renew Pty Ltd

MyPass

Hunter Research Foundation Ctr

Commonwealth Department of Industry,

Innovation and Science

HCB Solar

Port of Newcastle

Lake Macquarie City Council

Roobuck Pty Limited

TUNRA

Ai Group

Tom Farrell Institute for the Environment

Switchdin

University of Newcastle

Environmental Property Services

Public Interest Advocacy Centre

Ericsson

Energy Efficiency Council

Engineers Australia

Engineers Australia

Ausgrid

University of Newcastle

Newcastle Greens

Community Power Agency

Public Works Advisory

Hitech Materials

Efic

Xylem Water Solutions

Custom Fluidpower

Queensland Government

Omega Energy

McLanahan Corporation PTY LTD

CLEANaS

Ripple Multimedia

Department of Planning & Environment

Energy Solutions

