

Down to Business: Energy innovation calls for collaborators

As energy demand increases and finite resources are tested, there is increased need to develop energy technologies that efficiently maximise output from sustainable energy resources. Successfully innovating how we produce, transmit, distribute and consume energy relies on effective collaboration for technology development.



NSW is host to major mining, manufacturing and transport sectors, and economic activity across the state is reliant on a cost effective, reliable energy supply.

As a result, new energy technology and service solutions have the potential to significantly transform the NSW economy while achieving energy security and transition.

NSW has the opportunity to be a strong developmental force in promoting exports and attracting investment in energy technologies and services.

While there are significant challenges in meeting the growing demand for clean and efficient energy, there are also opportunities to grow the industry by building collaborative relationships that better engage businesses across sectors.

Research and development is critical to energy innovation, but by itself it is not enough. Strong links between research and industry are fundamental to a comprehensive energy innovation ecosystem.

The NSW Energy and Resources Knowledge Hub is working to enhance those links. An initiative of the NSW Government and led by the University of Newcastle's Institute of Energy and Resources, the Knowledge Hub is increasing competitiveness and productivity by providing opportunities for collaboration and industry linked innovation.

“The NSW Energy and Resources Knowledge Hub is a vehicle to capture opportunities for growth, development, collaboration and innovation across the energy sector,” said Alan Broadfoot, NSW Energy and Resources Knowledge Hub Director.

“The need to address energy security is a progressively pressing issue for countries and economies worldwide. This has created a need for developing and using energy technologies that efficiently maximise energy output from available energy sources,” said Alan.

The Energy Technologies Initiative, produced by the Knowledge Hub, is a showcase of new energy technology and service solutions optimising products to innovate the energy industry.

In collaboration with The Newcastle Institute for Energy and Resources (NIER) at the University of Newcastle, Australian National University, The University of Sydney, The University of Technology Sydney and the Australian Energy Storage Alliance, the video highlights energy innovation projects finding ways to feed our high powered, high demand energy requirements from sources that are, by nature, intermittent and unreliable.

The Energy Technologies Initiatives video includes these projects;

- Advanced Storage Systems - Newcastle Institute for Energy and Resources, The University of Newcastle
- *Network Opportunity Maps for Renewable Energy Demand Management* - Institute for Sustainable Futures, University of Technology Sydney
- *Development of Devices for Energy Conversion and Storage Based on Novel Functional Materials* - Centre for Sustainable Energy Systems, Australian National University
- *Model Predictive Control of Hybrid PV / Storage Systems* - Centre for Sustainable Energy Development, University of Sydney
- *Australian Energy Storage Database* - Australian Energy Storage Alliance

The *Advanced Energy Storage Project* by NIER is improving the power capabilities and efficiency of portable battery storage systems, to give devices like mobile phones and laptops longer life.

“We need an energy delivery and storage solution for the future that can go anywhere and is powerful enough to meet our modern day energy expectations, while complementing renewable energy generation,” said research team leader Scott Donne.

The *Network Opportunity Maps for Renewable Energy Demand Management* from the Institute for Sustainable Futures at the University of Technology Sydney support the evolution of the sector through information sharing.

“There is an information gap in relation to Australian electricity networks. Not being able to see the whole picture of network demand, use and planned works means that decision making is not as well informed as it could be,” said Chris Dunstan from the University of Technology Sydney.

These new maps are filling in this gap by illustrating network opportunities and constraints for the changing national electricity market using updated data.

Mary Hendricks from the Australian Energy Storage Alliance (AESA) has identified a fundamental shift in the use of energy storage.

“We are well on the path to an energy transition from limited and large energy storage solutions, to a future where smaller, fast and flexible units of energy storage will change the way we use and share power,” said Mary.

AESA responded with the *Australian Energy Storage Database* used to track the increasing use of commercial energy storage projects in Australia and New Zealand, making this information freely available.

Residential and commercial renewable energy solutions often involve a portfolio of technologies and systems, and the *Model Predictive Control of Hybrid PV / Storage Systems* from the Centre for Sustainable Energy Development at the University of Sydney adds machine intelligence and smart control to solar power and battery storage systems to optimise use.

This technology learns the troughs and peaks of energy use for a household and maps the most efficient battery charge and discharge cycle with consideration for other important factors such as the weather, grid costs, and the functionality of the batteries themselves.

“Energy for a household can be stored or used optimally, shaving consumption peaks, improving energy efficiency and saving electricity costs,” said lead researcher Anthony Vassallo.

A research team at the Centre for Sustainable Energy Systems at the Australian National University are finding ways to convert unreliable renewable energy sources to high powered, smooth energy for the consumer.

“This sort of technology is crucial to the transition to renewables,” said research team leader, Yun Liu, of their project *Development of Devices for Energy Conversion and Storage Based on Novel Functional Materials*.

Research is already solving the problems of a renewable energy future, creating incredible opportunities for SMEs and other businesses to take these products and services to market.

As the energy industry navigates the most significant transition since its origin, success will need to be underpinned by a collaborative effort to cross fertilise information across sectors and bring in new ways of thinking and doing.

To see the Energy Technologies Initiatives video, find out more about these initiatives or connect with the NSW Energy and Resources Knowledge Hub, visit <http://www.energyinnovation.net.au/>