

## NEWSLETTER

### API Linking Industry and Universities to Strengthen Academic Quality

One of API's Strategic Objectives is to strengthen academic quality and industry experience to enhance student university education by:

- a) Facilitating a sustainable supply of world class academics with real world industry skills and proactive industry engagement (to help deliver graduates with relevant education and skills through up to date industry experiences)
- b) Collaborating with universities and industry to match industry driven innovations matched with the research strengths of universities across Australia.

### SUMMARY

***Industry driven innovation projects/initiatives which the API facilitated and ENA funded with other industry partners will total \$5.33M over the next 2 years.***

***The cash funding of these projects by ENA through member contributions will be only 20% of the total project costs due to the substantial leveraging that has been achieved: \$5 of research/innovation work for every \$1 of cash contribution.***

***API's objective in its collaboration with ENA on the Innovation Initiative is to strengthen the skills of future STEM professional graduates working in the energy industry by enhancing the capability of university academics and their teaching curriculum. This will be achieved through academics working collaboratively with industry on industry driven "real world" research and innovation such as the projects scoped by industry over the last 12 months. API is also well placed to assist with "knowledge sharing" to both industry and academia of the outcomes of all innovation and research in the energy industry to provide a sustainable supply of industry STEM professionals with contemporary skills.***

Further details are provided in the following Newsletter.

### Achievements in last 12 Months

#### **1. Solar Enablement Initiative (SEI Project) – ARENA Funded Project**

The API in partnership with the Energy Networks Australia (ENA) Asset Management Committee facilitated and co-funded an industry driven project to release renewable energy back to the grid.

The Australian Renewable Energy Agency (ARENA) has awarded \$1.19 million in funding to the University of Queensland for the development and trial of the new and innovative network analysis tool which aims to give distribution network service providers (DNSP) increased visibility of their medium voltage networks. The project, totalling \$2.88 million, helps networks to improve their evaluation of larger rooftop solar PV connections for residential, commercial and industrial customers connecting to the grid.

The project involves adapting and trialling a new state estimation algorithm (SEA) that estimates the network's operational conditions from data largely already available to distributors. The effectiveness of the system will be demonstrated using seven medium voltage distribution feeders located in South-east Queensland, Victoria and Tasmania nominated by the participating distributors for the trial.

Currently some parts of the network are assumed to be at capacity, which reduces the amount of new PV systems that customers can install and limits their export capability. The network analysis tool has the potential to allow distributors to more precisely assess the actual loading conditions and thereby identify additional PV carrying capability that can be allocated to existing and future PV installations by allowing a higher in-feed of excess PV power. This functionality will be made available to planning and connection assessment engineers through a new semi-automated network analysis computer program developed with the aim of improving distributor's PV connection assessment processes for connection applications currently being referred to costly manual assessment.

The SEA and automatic capacity and PV export assessment functionality will also be trialled in real-time mode for monitoring the operating conditions of an MV network and dynamically adjust the allowable PV export limit for an existing 60kW PV system operated by a local school. The aim is to explore the opportunity, technical feasibility and possible benefits to customers and distributors of dynamic PV carrying capability assessment and automated allocation of identified capacity on a short term basis. Lifting PV export restrictions, statically and dynamically, will benefit customers, the environment and the distribution company through increased utilisation, safety and efficiency of its distribution network.

ARENA CEO Ivor Frischknecht said UQ's research was vital in improving energy productivity.

"The University of Queensland's project offers a real breakthrough in providing medium voltage installations to not only allow for a greater percentage of Solar PV to enter the network, but also in increasing the renewable energy makeup of the NEM and aligning with ARENA's key investment priorities." Mr Frischknecht said.

The Solar Enablement Initiative Project Director, Professor Simon Bartlett AM, said the project would be good for energy consumers.

"Around two million homes in Australia already have a solar PV system, and this development will enable the energy industry to support its customers as this number continues to grow,"

"The award of the \$1.2 million ARENA grant together with \$1.5 million of industry support from API, ENA, TasNetworks, United Energy, Energy Queensland, Springfield Corporation, Aurecon and Redback Technologies, demonstrates industries commitment to work with outstanding universities UQ and QUT to develop and trial innovative technologies to help deliver sustainable, secure, and affordable electricity to all Australians," said Professor Bartlett.

## **2. API & ENA Innovation Framework Projects (4) Driven by Industry in Collaboration with Universities/research Organisations**

Over the last nine months, business cases for four new innovation projects have been developed and the projects have been approved by ENA for implantation. At a total combined project cost of \$2.255M, ENA’s total cash contribution is \$940k and involves ten ENA Member utilities working with six university/research organisations over a timeframe of 18 months with clear deliverables and benefits identified up front. A “one team” approach to all projects has been adopted with all projects having an industry project coordinator working collaboratively with a university/research organisation lead researcher.

| <b>Project</b>   | <b>Business Case Summary</b>  |
|--|---|
| 1.Management of voltage on local networks and excessive variation caused by swings between generation and demand | The total project cost is estimated to be \$675k, and comprises \$215k cash funding from ENA, \$212k UoW in-kind funds, \$30k ENA/API in-kind funding, and \$210k project partner in-kind funding.<br><br>The Project duration is 18 months.  |
| 2.Intelligent Network Sensing requirements   | The total project cost is estimated to be \$535k, and comprises \$250k cash funding from ENA, \$180k UQ in-kind funds, \$30k ENA/API in-kind funding, and \$75k project partner in-kind funding.<br><br>The Project duration is 18 months.  |
| 3.Conductor Condition Monitoring and Replacement   | The total project cost is estimated to be \$595k, and comprises \$275k ENA cash funding for additional UQ staff and other direct project costs, \$200k UQ in-kind contribution, \$30k ENA/API in-kind contribution,\$90k Project Partner in-kind contributions (6 companies at \$10k pa over 1.5 years)<br><br>The Project duration is 18 months. |
| 4.Quantifying Catastrophic Bushfire Consequence  | The total project cost is estimated to be \$450k and comprises \$200k Cash Funding of Bushfire and Natural Hazards CRC Activities by ENA, \$100k In-kind costs of CRC, \$120k Industry in-kind costs (assuming 6 companies at \$20k each), \$30k ENA and API in-kind costs<br><br>The Project duration is 14 months.                              |

The Implementation Committee for each project (consisting of the Industry Project Team and the Researchers) will provide monthly reports to the API & ENA Steering Group on progress.

Milestone reports will be provided (generally 6 monthly) and these will be communicated to the broad API & ENA membership including university partners detailing the outcomes of identified milestone deliverables in the agreed business cases.

### **3. Australasian Transformer Innovation Centre (TIC)**

The API through its support of the API/Powerlink Chair of Electricity Transmission from 2012-2017 facilitated the creation of the TIC and became a founding member of the TIC member in 2017.

The Australasian Transformer Innovation Centre is based at the University of Queensland and focuses on the asset management of power transformers in the modern electrical network.

The TIC applies innovative industry driven research supplemented by industry experience together with professional training to help TIC members to operate their transformer fleets sustainably and efficiently. The group includes industry experts in transformer asset management, as well as researchers and educators from leading Australian universities.

The TIC already has 20 industry members and the following research projects have been initiated;

- Investigation into the Loading of Transformers with Vegetable Oils during Emergency Events” to be undertaken from August 2017 to June 2018
- “Development of PD Analytic Tools for Ester Fluid Filled Transformers”. The project aims to investigate how to process and interpret PD signals acquired from two representative PD measurement systems (an inductive measurement system and a capacitive measurement system.
- Criteria for Retro-filling Existing Transformers with Ester Fluids” has been approved and aims to:
  - (a) Provide data associated with the risks of retro-filling various transformer types with ester fluids
  - (b) Develop a listing of issues for transformer owners to consider before retro filling
  - (c) Seek to develop algorithms for thermal performance calculations based on transformer design and internal construction parameters
- High frequency modelling of distribution transformers with high penetration of renewable energy systems: lifetime and resonance predictions.

For more information on the TIC and details on how to join the TIC contact;

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**For further information on any of the matters covered in this Newsletter please contact:**

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