

# DOES ASSET MANAGEMENT OF POWER TRANSFORMERS HAVE TO CHANGE TO ACCOMMODATE LARGE-SCALE SOLAR AND WIND?

*Many new solar and wind farms are intending to connect to the grid, often in rural areas where land is cheaper. However, since these areas are often lightly populated the infrastructure owned by the utility might be relatively sparse. Consequently, as the solar and wind is integrated, should the utility/owner make changes to their asset management policies of power transformers to obtain optimal network use?*



A new project is commencing at the Transformer Innovation Centre (TIC) at The University of Queensland, to answer whether asset management should change, being driven by our industrial partners. So far, an initial review of industry practices has found that the following points are plausible:

- Power transformers which have been lightly loaded throughout their life may now be run at high load, and modelling is required to determine how the residual life of their insulation will change, whether the utility will need to replace the transformer sooner than expected.
- Dissolved gas levels may change, due to the inverter output having fast switching transients present. This may complicate diagnosis of faults.
- Potential for high voltages due to resonance issues.
- Poorer power quality causing the transformer to run hotter.
- Can be more frequent tap changer operations to steady voltage fluctuations.
- Transformers may become overloaded if one feeder fails, and the other takes the full current.

To resolve these concerns, the TIC has established a project to work with the local utilities and renewable companies to assist with the integration of large scale solar and wind.

In particular:

- Long term monitoring of utility zone substations in Queensland and NSW over three years, to ascertain how transformer life is impacted.
- Measuring power quality at zone substations.
- Performing laboratory-based experiments using the Centre's research transformer.
- Developing software tools for the utilities to monitoring condition, and life remaining, or power transformers when solar is present
- Assist the utilities/owners make the best decisions during contingency events on the thermal management of transformers.

## **PROJECT HAS COMMENCED THIS YEAR.**

The team will work in conjunction with the project partners to implement the developed tools and knowhow into their business practices and engineering policy framework, ensuring that the partners receive the best value for their investment into this project.

If your company sees value in signing up to be a partner of this project or if you have enquiries, please contact:

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## NEXT CPD COURSE - POWER TRANSFORMER TAP CHANGERS - DESIGN, MAINTENANCE AND RETROFIT 27-28 JUNE 2018

The next advanced CPD course will be held at the University of Queensland St Lucia campus in Brisbane.

The course will deliver theoretical background information with hands-on experiences suited to procurement, asset strategies, operations and maintenance managers and engineers in generation, transmission and distribution, renewables, manufacturing, mining, industrial and infrastructure organisations.

The speakers will include industry experts from:

- Manufacturers of tap changers including ABB and Reinhausen,
- Transmission and distribution companies,
- Service and testing and companies,
- Researchers from The University of Queensland.

### Key Learning Outcomes:

- Understand the basic principles of tap changers, including oil, vacuum.
- Learn the basic arrangement of regulating windings, benefits and issues of oil and vacuum diverters. Tap changer considerations for renewables and grid integration.
- Understand tap changer designs and applications, differences between diverter and selector type, Loading capability, the effects on transformer windings.
- Become familiar with OLTC maintenance for oil and vacuum types. Learn about the steps to take for high diverter moisture content.
- Participate in a forum for OLTC fault investigation and emergency supply restoration.
- Understand retrofit options where oil diverters are replaced by vacuum.

- Understand the benefits of dynamic resistance tests.
- Be informed of innovative condition assessment of tap-changers using acoustic measurements, signal processing techniques used and results from field trials, case study.
- Be exposed to how some utilities are implementing life cycle oriented maintenance of tap changers.
- Moisture tolerance, life extension.
- Learn about OLTC failures due to silver sulphide formation.

The course details and online registration link can be found on the TIC website [www.itee.uq.edu.au/TIC-cpd](http://www.itee.uq.edu.au/TIC-cpd)  
Contact Professor Tapan Saha, for TIC research or general enquiries, The University of Queensland  
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## REGISTER NOW - EXCELLENT COURSE ON HIGH VOLTAGE INSULATORS BY GLOBAL EXPERT

The Australian Power Institute and CIGRE Australia have joined to bring to Australia, Dr Wallace Vosloo - one of the worlds pre-eminent experts on High Voltage Insulators to present a Master Class Series on Outdoor High voltage Insulators.

Dr Vosloo will present the two-day master classes across Australia in Perth, Melbourne, Sydney and Brisbane in the second half of July 2018.

### PURPOSE:

To understand key factors of overhead line and substation insulators and appreciate the parameters that influence their performance and life.

The emphasis of the course is "practical" and simple procedures etc for the design and operation of electrical transmission and distribution systems.

### TARGET AUDIENCE

Utility staff and consulting engineers who select, install and maintain insulators for outdoor high voltage lines and substations. Engineers and technical staff involved in the specification, procurement, design and asset management of insulators.

The course also covers insulator types, characteristics, electrical, mechanical, material and environmental considerations, insulator selection, tests and specifications, failure mechanisms, handling and installation practices, line and substation performance improvement, and pollution mitigation techniques are all dealt with in detail, with emphasis on practical field application.

### ABOUT THE PRESENTER

**Dr Wallace Vosloo, (Pr.Eng, NHD, BSc (Physics), PhD(Eng.Sci), FSAIEE, SMIEEE)** Dr. Vosloo has over 25 years of experience in the field of High

Voltage Engineering. He is the Corporate Specialist High Voltage at Eskom and presents various training courses in the field of High Voltage Engineering.

He has authored and co-authored over 100 papers in topics related to the field of high voltage insulators. He has also written the books "The Practical Guide to Outdoor High Voltage Insulators", co-authored by Roy Macey and Dr C de Tourreil and "High Voltage Engineering Practice and Theory" along with Dr JP Holtzhausen.

Dr Vosloo is a recipient of the SAIEE President's Award for his contribution to the development of high voltage insulator research and investigation capabilities and standards in South Africa and the Claude de Tourreil Memorial Award for Lifetime



Dr Wallace Vosloo

Achievement in the Field of Electrical Insulation. He is also an active member of various national and international working groups.

### NOTE:

Each Master Class will have a minimum of 12 participants based on registration number two weeks prior the event.

To ensure an interactive event, numbers will be held at a maximum of 35.

### Testimonials for Dr. Vosloo from other classes he has presented:

*"The presenter is an expert in this field. He was well organised and presented the material in such a way that kept the audience on their toes and interested and has a brilliant sense of humour."*

*"Examples discussed are related to practical activities I deal with. Presenter well prepared and experienced with sense of humour to entertain the class. Presenter willing to hand over information freely."*

*"The presenter, himself, is good, accommodating - he knows his story. The course was great and very useful, the way it was introduced. I've learnt lot of things about insulators, didn't know the story behind it can be so broad. Now I know more about its importance."*

*"Overall the course was great, excellent instructor full of humour. I enjoyed it. He made it easy to understand the theoretical aspect of insulators."*

**Places are LIMITED - REGISTER now for this unique opportunity to participate in this MASTERCLASS!**



### DATES & LOCATIONS

The course will be held in the following cities with the following dates:

**Perth:** 17-18 July 2018

**Melbourne:** 23-24 July 2018

**Sydney:** 26-27 July 2018

**Brisbane:** 31 July - 1 August 2018

### COURSE PRICE

\$1,200 + GST for API/CIGRE members

\$1,500 + GST for non members

\*Course fees include catering and electronic course material.

For more information and to register visit [www.cigreaustralia.org.au/cigre-events/api-and-cigre-masterclass-on-high-voltage-insulators/](http://www.cigreaustralia.org.au/cigre-events/api-and-cigre-masterclass-on-high-voltage-insulators/)