

South Pacific Engineers Eye Progress



South Pacific Engineers Association President Leiatua Tom Tinai leads delegates during a visit to the Port Moresby water treatment plant.

Members of the Council of the South Pacific Engineers Association (SPEA) reported significant progress in their home nations when they met in Port Moresby in April. Representatives from five of the Council's six chapters were at the meetings – hosted by the Institution of Engineers Papua New Guinea (IEPNG) – and IPENZ Chief Executive **Dr Andrew Cleland FIPENZ** and Engineers Australia President **Merv Lindsay** also attended.

The primary purpose of SPEA is to create a body of sufficient size and standing so that engineering issues can be advanced with governments of the national chapters. After just one year of formal existence the Council is proving its worth, with a great deal of progress reported by each of the chapters. In Fiji there is a proposal to develop a new registration act modelled on New Zealand's Chartered Professional Engineers Act. Samoa has reported significant advancement of its competence assessment procedures, while in Tonga and the Cook Islands a great deal of progress has been made towards forming national engineering bodies with government backing. Three public policy documents developed by SPEA have been welcomed by both national governments and regional bodies.

In Papua New Guinea, the benefits of SPEA are proving more dramatic. The country is undergoing an engineering-led economic renaissance. It has an arrangement with Exxon Mobil to exploit its major natural gas reserves from the highlands. From an elevation of 3000 metres, the gas will be piped 400 kilometres to the coast, and then travel 300km through a submarine pipeline to a facility near Port Moresby. A capital investment of US\$15 billion will create an LNG facility with an output of 6.6 million tonnes per year (translating to an outbound energy flow of around 10 gigawatt) with a projected life of 30 years.

At the peak of construction it is expected 10,000 workers will be deployed on the project. The PNG Government has required significant local content, but thousands of engineers will be brought in from outside the country for various periods of time. The IEPNG, as the registering body, is working alongside the project to ensure engineers attain registration expeditiously. At the same time, the project should provide the impetus to move the country's registration systems and procedures closer to what in New Zealand would be regarded international good practice.

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President's Message

Board Forms Earthquake Response

The Engineering Profession Forum is an important event in the IPENZ calendar. It is a special occasion where the many groups and organisations involved in the professional engineering sector meet under one roof to share ideas and discuss issues. It is also an opportunity for IPENZ to listen carefully to feedback from its Members and get guidance on the initiatives IPENZ is currently managing.

This year's Forum, held in March in Wellington, provided feedback on a wide range of issues including the IPENZ strategic plan, the refreshed Sustainability Plan of Action, IPENZ branding, professional self-regulation, competence assessment procedures, and the development and maintenance of appropriate technical standards. However, if there was one key issue that really attracted attention it was the Christchurch earthquakes. In particular, Members asked about the role of IPENZ in major natural disasters such as the tragic earthquakes. Given that for New Zealand, the Christchurch earthquakes require an unprecedented scale of remedial engineering works to get the region up and thriving again, it is absolutely understandable for Members to be raising these questions.

At the April meeting of the IPENZ governing Board these questions were discussed in the context of how can IPENZ best serve its Members and the people of Christchurch in what will be a long-term rebuild of the city encompassing almost every component of our profession.

In response to this challenge, the Board has agreed to form a strategic leadership group that will drive our response and interactions on this extremely complex undertaking. The full membership of this group is now being determined but I am delighted to report at this early stage that **Kevin Thompson DistFIPENZ**, former Managing Director of Opus, and **Dr Nicki Crauford FIPENZ**, former Chief Executive of the Institute of Directors, will be members.

The range of issues to be considered is extensive and includes the following questions:

- Should IPENZ have a role in Civil Defence emergencies?
- How can IPENZ best contribute to the Royal Commission?
- How can IPENZ assist with the development of improvements in professional practices?
- How can IPENZ better inform the public on the engineering issues involved?
- How can IPENZ contribute to reviews of the Building Act, and what insight can IPENZ provide

into the overall rebuilding process including, for example, consideration of urban planning forms, sustainability and resilience?

Each of these topics by itself is no small undertaking, and together has the potential to dominate the Institute's work programme for some considerable time.

For example, the area of improving professional practices by itself is likely to encompass the methodologies involved in assessing damaged buildings in a post-earthquake environment. It is also likely to involve reactivating the land-use planning task force formed after the September earthquake, primarily as a result of the extensive liquefaction problems arising at that time. And of course, it is possible consideration will be given to improving the performance of ductile structures during earthquakes through revised design practices.

It is my view that IPENZ cannot afford to not be involved in these matters. I hope, given the depth and breadth of issues involved, Members will understand that outcomes may take considerable time to evolve. As this work progresses, it will be particularly important to keep Members well-informed on our progress, and I will be watching to ensure we achieve this.

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The PNG Government is clearly very supportive of SPEA. At the closing event of the week the **Hon. Sam Abal**, the acting Prime Minister, welcomed the SPEA visit and indicated the Government was committed to raising engineering standards in the country. Mr Abal emphasised PNG's commitment to providing the secretariat for SPEA as it grows so it can survive without direct support from IPENZ. Nevertheless,

he acknowledged the importance of support from Australia and New Zealand.

It is now four years since IPENZ decided to facilitate the formation of a regional engineering body. SPEA is now taking form, and will increasingly develop a life of its own to fulfil its mission: "To develop the engineering capability for the region to be environmentally and economically sustainable, and resilient".

Women in Engineering Launch Plan



Immediate Past President Garry Macdonald and the Hon. Hekia Parata at the Women in Engineering launch.

Minister of Women's Affairs, the **Hon. Hekia Parata**, was at the breakfast launch of an initiative to encourage more women into engineering. *The Retention and Renewal of Women in Engineering: An IPENZ Plan to Encourage Diversity in and Sustainability of the Engineering Profession* was produced by Women in Engineering, a task force established in 2010 by then-President **Garry Macdonald FIPENZ**.

The line-up of speakers included Ms Parata, Mr Macdonald, **Elena Trout FIPENZ**, Chair of the Women in Engineering Task Force, and **Tracey Ayre GIPENZ**, Project Manager for Women in Engineering.

It was noted at the event that women make up just 13 per cent of professional engineers and 10 per cent of the IPENZ Membership. The proportion of each Membership class made up by women, along with the long-term aspiration targets for each Membership class, is shown in Figure 1.

The involvement of women in the engineering profession presents the opportunity to:

- Tap into more skilled individuals and ensure the profession employs the best and brightest graduates
- Provide the engineers New Zealand needs
- Ensure the profession is relevant and representative of the society it serves
- Increase the profession's competitiveness.

Work in the following areas is required to meet the IPENZ vision for a more diverse profession:

- Researching both the barriers to women remaining and advancing in the profession, and the economic benefits of increased diversity
- Investigating young women's choices when selecting school and university subjects, and the need for a self-awareness programme for all engineers
- Reviewing the IPENZ subscription structure and wording
- Investigating or amending Personal Development Partner scheme components on work practices, Continuing Professional Development and competence assessment
- Profiling female engineers whose work is exemplary and engineering employers with exemplary practices
- Collaborating with Engineers Australia and other professions
- Celebrating progress made at the IPENZ Centenary in 2014.

Following the launch, the focus now turns to implementing the proposed actions, which is a long-term programme for IPENZ. The progress will be overseen by a body consisting of **Graham Darlow FIPENZ** (Chair), **Peter Mathewson MIPENZ**, **Vanessa Stoddart** and Elena Trout.

Retention and Renewal can be downloaded from www.ipenz.org.nz/ipenz/downloads/RetentionRenewal_WIE.pdf

IPENZ welcomes your thoughts and feedback on this project. Please contact Tracey Ayre at policy@ipenz.org.nz

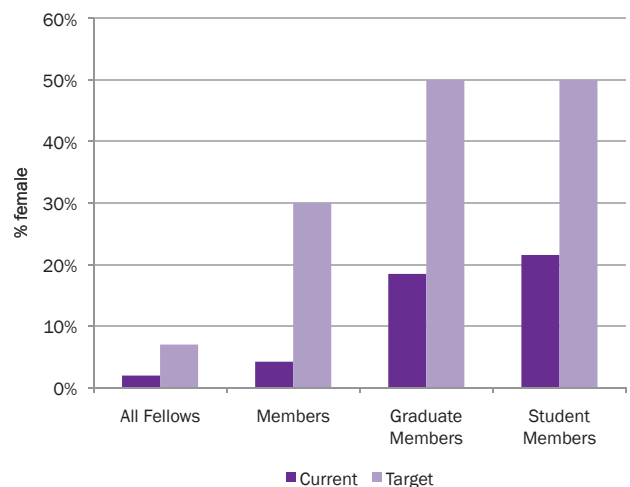


Figure 1 – Current proportion of Membership classes that are female Members and aspirational targets.

IPENZ Foundation Helps Canterbury

An additional \$5,000 of IPENZ Foundation funding has become available to provide support to Canterbury Members affected by the earthquakes who require assistance.

In recent years, the Foundation has funded two National IPENZ Foundation Scholarships (which are worth \$5,000, fully-funded by the Foundation and available to students across New Zealand). Four further scholarships have been co-funded by IPENZ Branches. There are six of these Branches, which through various means – tagged funds or active fundraising – have offered to co-fund scholarships. These Branches are Auckland, Taranaki, Nelson-Marlborough, Hawke's Bay, Wellington and South Canterbury; the first three co-funded through tagged funding, the latter three via actively fundraising. The Branches contribute \$2,500 towards a scholarship and the Foundation matches that sum to make up a \$5,000 scholarship.

This year, the Foundation Trustees – recognising there may be calls on Foundation funds as a consequence of the Canterbury earthquakes, and finding there were two top scholars from their regions – approached the Canterbury and Waikato-Bay of Plenty Branches. Both Branches agreed to co-fund their top scholars, freeing up \$5,000 of Foundation funding should



Matt Hawkins, recipient of an IPENZ Foundation co-funded Branch Scholarship in 2005, at the Le Mans car race in France. Mr Hawkins studied mechanical engineering at The University of Auckland and automotive engineering in Europe.

there be a need to provide financial or other support to Canterbury Members.

Branches raise funds in a variety of ways. The Hawke's Bay Branch, for instance, last year ran a forum on climate change, and the surplus from running that event was put towards the scholarship fund.

Competence Assessment Update

The Competence Assessment Board (CAB) met in April to discuss the next phase of the review of the IPENZ competence assessment standards.

At the latest stage of the review the CAB considered improvements to the moderation of standards and the way fully-informed decisions are made in relation to assessing standards. In particular, the following suggestions were made: strengthen the peer review/moderation process, and focus more attention on engineers considered marginal in terms of competence or who sometimes produce poor quality work.

Earlier, at the Engineering Profession Forum in March, the following broader questions were raised about the competence assessment process:

- Should the onus be on assessors to extract career episode reports from candidates?
- In order to draw out negative evidence, should candidature be publically-notified, or increased requirements placed on candidates to declare any potentially negative issues?
- In place of candidates producing evidence against the 12 elements, should they be required to verbally defend their work samples to an assessment panel?
- Should the reassessment term be increased to six years?
- Should the assessors' remuneration be changed (with potential impact on registration fees)?

- In order to increase recognition of those passing competence assessments to reach registration and competence-graded Membership, should a graduation ceremony be introduced?

Background

In 2003 IPENZ implemented outcomes-based assessment and competence for the first time in New Zealand's engineering history, signalling a move away from the standard route to competence (the right education and experience). Since then neither the competence standard for CPEng nor the competence assessment process have changed fundamentally.

The first phase of the review of the competence assessment process was conducted by an independent consultant in 2010. The review was conducted to ensure the competence assessment process produced consistent results which met or exceeded international best practice, was candidate friendly, cost-effective and sustainable.

Overall, the CAB was satisfied with the outcome of the 2010 assessment review, but one of the major findings was that the quality of the assessment process could be improved by strengthening the moderation of assessments. Moderation is a process that reduces the extremes in assessments and is broad-ranging in that it can cover components such as assessor training, guidelines and exemplars.

The CAB will meet again in May to discuss the next phase of the review.

Commemorating a Railway Icon



The plaque unveiled by IPENZ recognises the engineering heritage of Makohine Viaduct. The Heritage Board promotes items of engineering significance such as the viaduct, which at its completion in 1902 was thought to be the second highest in the world. Image courtesy of Mike Mellor.

As celebration marked the opening of a realigned section of State Highway 1 in Rangitikei in March, IPENZ took the opportunity to help commemorate a feat of engineering that forms a dramatic backdrop to the road. The three-year project was heralded by the **Hon. Simon Power** as a vast safety improvement because it straightens a dangerous four-kilometre stretch between Ohingaiti and Makohine, and replaces a level crossing with an overbridge, eliminating the risk of vehicles colliding with trains.

An IPENZ Heritage Board representative was at the opening, where a plaque commemorating an iconic railway landmark was also unveiled. Towering above the final part of the realigned road on Makohine Hill is the 72-metre high, 227m long Makohine Viaduct. **Mike Mellor**, Wellington Heritage Chapter Deputy Chair, says recognition of the viaduct is highly appropriate

because it was the first major structure to be built by the Public Works Department, the NZ Transport Agency's forebear.

"One disgruntled ex-MP at the time described it as 'only a small affair', but the viaduct was in fact quite an achievement at the turn of the 20th century.

"Before opening, the viaduct was severely tested by a load of 150 tonnes – yet 109 years later it continues to be an integral part of the North Island Main Trunk, with just the locomotives of the many trains day and night each approaching that weight."

Construction of the steel girder viaduct proved cumbersome. At the time construction began in 1896, there was no road access to the Makohine Valley, so materials had to be floated down the Rangitikei River. Flood washouts undermined the viaduct's piers, while labour unrests in England delayed the delivery of machinery by two years.

Extensive timber staging had to be built to support the viaduct's spans until they could be self-supporting, an expensive and time-consuming task. Mr Mellor says there is an impressive photograph of a group of men perched on wooden scaffolding, 70m above the ground.

When it was completed in 1902, it was thought to be the second highest viaduct in the world.

The Makohine plaque was originally unveiled in August 2008 as part of Parliament's celebrations marking the North Island Main Trunk's centenary. It was relocated as part of the realignment project.

The IPENZ heritage programme is tasked with identifying, maintaining and promoting items of engineering interest such as the Makohine Viaduct. Its overall aim is to preserve the legacy of New Zealand's engineering past for future generations.

Is the Paperwork Credible?

SUMMARY

Many engineers recount anecdotes in which imported engineering products contain documentation at variance with the product it supports. Often, these products are sourced from low-wage countries, the attraction being they cost less than those made in New Zealand, or were originally imported from high-wage countries.

The trend is not universal: in one case equipment imported from India matched exactly the supporting documentation. Conversely, an expensive machine tool imported from the United States was full of metal shavings requiring important moving parts to be stripped and cleaned.

The IPENZ Engineering Practice Board asked:

- Is there a government agency tasked with preventing potentially dangerous engineering parts from being imported into New Zealand?
- If not, is there any process or guidance allowing importers to detect untrustworthy paperwork accompanying imported engineering parts?

ANSWERS

There is no government agency tasked with preventing the importation of potentially dangerous engineering parts. However, the Measurement and Product Safety Service (MPSS) performs safety checks for some consumer items. New Zealand has very few mandatory standards for consumer items, but if products fail compulsory tests, the MPSS can enforce a product recall.

For capital items such as engineering parts, free trade under the General Agreement on Tariff and Trade applies. If inwards goods rules are made, the same rules must be applied to local manufacturers. Because inwards goods rules may be seen to be protectionist or technical barriers to trade, and because local industry is averse to prescriptive regulation, there is little support for a mandatory testing regime.

It is possible to specify testing in a contract, regardless of local or imported sources of supply. An international standard for construction procurement, ISO 10845, has recently appeared but IPENZ has not yet reviewed it.

There are inspection organisations and testing laboratories in New Zealand. International Accreditation New Zealand (IANZ) accredits against the requirements of international standards ISO 17020 for inspection organisations and ISO 17025 for laboratories. Accreditation is an independent assessment of competence requiring organisations to demonstrate specific competencies to technical peers and is granted for specific tests or inspections (these are publically listed on the IANZ website).

Many countries have organisations similar to IANZ – these must be assessed for compliance against ISO 17011. IANZ is being assessed this year by the Asia Pacific Laboratory Accreditation Cooperation (APLAC), and IANZ in turn takes

part in the assessment of other international accreditation bodies. IANZ is a signatory to the European Mutual Recognition Arrangement and is also a full member of APLAC.

Most of New Zealand's Asian trading partners are members of APLAC, and their own accreditation organisations accredit testing, calibration and inspection organisations within their own countries. For example, the APLAC member organisation in China is the Chinese National Accreditation Service.

Organisations that have achieved accreditation are encouraged to place their accreditation body's symbol on their test or inspection reports and certificates so that customers can easily identify results from accredited organisations.

An accreditation body symbol is a clear statement the results reported are trustworthy (APLAC-recognised accreditation symbols are available to view at www.aplac.org/documents/pr/aplac_pr_008_issue_47.pdf). Paperwork without this independent assurance may or may not be trustworthy – there is no easy way of knowing.

Fraudulent pieces of paper are still possible to slip past – accreditation does not prevent fraud. However, accreditation bodies are generally government organisations which vigorously prosecute fraudulent use of their symbols. If fraudulent claims of accreditation are suspected a formal process to determine responsibility follows. If the body turned a blind eye to misuse of its symbols there would be grounds for expulsion from APLAC or other regional bodies, which would be a matter of national embarrassment. Accreditation is therefore a powerful tool that may be used in properly written contracts.

ANECDOTAL EVIDENCE

Maintenance Engineering Society of New Zealand

Last year's Engineering Profession Forum heard of a case where heat-treatable alloy steel bars for machine parts, imported with apparently authoritative documentation, failed to develop the required properties after heat treatment. It turned out the documentation and the alloying elements present in the steel were at odds.

During the 2011 Forum the Society reported an example of large roller bearings with fraudulent trademarks.

Recreation Safety Engineers

Large-sized bolts were used for an adventure ride, and the engineers were suspicious enough to carry out physical tests. Less than half the bolts met specification, the others showing cracks under the heads and in the thread roots.

Geothermal Steam Industry

Test certificates falsely indicated a set of pipe fittings had been annealed (heat treatment used to increase toughness by altering the metallurgical grain structure). The information was found to be incorrect only after the fittings had been welded into place, and the cost of repair was more than the original cost of fittings.

Emphasising how students of any age can benefit from technology education is one of Techlink's key marketing focuses for 2011.

Techlink supports and promotes technology in a variety of ways. It is used by teachers as a resource, and parents, being key contributors to students' decision-making, are also a key Techlink audience. Aside from reaching these audiences, Techlink communicates with industry and the wider education community to market the relevance of technology education.

Techlink focuses on four important messages. Firstly, it considers what people may not know about technology education and informs them via engaging forms of communication. One such method is showcasing technology education in action. Techlink publishes regular advertorials in a number of widely-read publications, with a piece about a moveable toy design project at Green Bay Primary School recently running in *North & South*.

The second message focuses on gathering support for the promotion of technology so it becomes a large part of the curriculum. This goal is being met through both encouraging schools to acquire new facilities and resources for teachers, and the sharing of expertise.

Thirdly, because technology is vital to New Zealand's social and economic prosperity, developing technological literacy should be recognised as an integral part of education. There is a strong link between technology and society, and students need to develop the kind of innovative and enterprising skills that will encourage economic growth.

The last message concentrates on highlighting how technology education benefits students themselves. Not only

is technology increasingly recognised as an important step in preparing students for tertiary education, but it also gives them essential skills for work and life. This year, Techlink produced a slideshow about technology education in primary schools, while a promotional brochure incorporating several of Techlink's key messages is under development. Designed with innovation in mind, the brochure is intended to demonstrate how learning about technology is directly benefiting students, and consequently, contributing to the future of New Zealand's economic and social prosperity.



Year 5 Green Bay Primary School student Jillan Piloton cuts out wooden car wheels for her Moveable Toys Technology project.

National Office Staff Update

Several new faces have been added to National Office this year, while some existing staff have moved internally.

Dr Nicki Crauford FIPENZ has been recruited as the acting Deputy Chief Executive, a role she will fill for an initial period of three months. Nicki worked in the electricity industry for a number of years in management roles before becoming Chief Executive of the Institute of Directors. She is not entirely new to IPENZ, having served on its Board for two years (2006–2008). She has also represented Great Britain and New Zealand in fencing at international level, and was a New Zealand National Foil Champion in 1995 and 2005.

Katrina Arboleda has joined IPENZ as the Schools Team Administrator/Project Officer. Katrina previously worked at TelstraClear as an Incident Management Analyst while juggling fulltime study for a BCA (majoring in Information Systems

and Human Resources). She replaces **Angeli Hudson**, who moved teams to become a Junior Graphic Designer in the Publications team.

Julia Wye joined IPENZ in February, taking over the role of Techlink Communications Officer. Before coming to IPENZ Julia was completing a BCA Honours degree in Marketing at Victoria University as well as working at New Zealand Post in a customer service role.

In March **Charles Willmot FIPENZ** changed roles to move into the position of Manager of Investigation and Discipline in the Engineering team.

Matthew Winthrop joined the Member Communications team in March. He manages the editorial production of *Engineering Dimension* and *Engineering Direct*. Matthew previously worked at the National Institute of Water and Atmospheric Research in Wellington, writing for its website.

Membership Update

The following is a list of additions and changes to Graduate and Professional Membership classes for the period 9 September 2010 to 8 April 2011.

Elected to Graduate Member:

R Agastya, L S Aho, W J Akepogu, M Alangurli, I R Albinto, J M Aldridge, AMN Al Kharusi, F Al-Obaidi, M J Alsakini, H Al-Tiay, A Amerian, MRM Amin, Y Amin, S An, S J Arewgoda, J C Arts, MAQ Awan, P T Aynsley, RPA Baker, A R Ballard, D Banganay, J Barcelo Guido, M G Barrientos, M P Bayliss, NDC Bernal Correa, M A Betschart, R V Bitac, J R Bodman, A J Bould, A J Bowtell, A H Boyce, D Brody, H D Brownlee, M J Buckland, R Burgos, C J Burrell-Smith, JFG Butler, E M Byrne, S A Cager, H R Cameron, B W Chadwick, V Chamritski, W-T Chan, A Chandra, Y-CJ Chang, A Cherukupalli, L L Chuo, R M Clarry, Alistair M Collins, Anna M Collins, J A Colson, A K Coluso, P J Cook, C K Crequer, G N Crozier, T O Cuthbert-Ashmore, X Dai, M M Dausoa, J Dela Cruz, C Desai, N P Diamond, O D Divino, RDB Dodd, N J Dobbie, K A Donlan, S Dutta, M F Fathalian, S R Faulkner, NHD Fernando, L E Foster, D R Fox, M N Fyfe, J A Galloway, C Gamst, T Gani, D G Garden, T F Garrett, K W Giffney, D M Gleeson, C O Goodwin, M B Greer, K Griffin, R R Gulley, K A Halliburton, K A Hamilton, B F Hanley, J C Hardley, DDA Hegerty, B T Henry, U Hettiappu, G Hill, A M Hodgson, T J Holden, P A Houben, M W Hunt, M J Hurford, J S Ibanez, D M Idle, G R Innes, D Jack, A Jain, EGM Jansseune, AWB Jarman, S R Jayaratne, JTO Johnson, RSA Jumig, W Y Kam, M Kaushal, F Khan, S H Kim, D J Kirkman, A Kumar, M Leon, CAF Leung-Wai, X Liang, A Lightburn, R M Lineses, H Liu, A Lombard, D M Lucinario, M J Lunjevich, J F McBride, G A McCarrison, A McCarthy, A I McFarlane, C R McGlone, S McLoughlin, G A McMullan, F J Maas, N B MacDonald, H R MacMurray, M I Manawadu, K Mareko, D S Marshall, J A Martinez, P J Masemann, S J Matthews, M Medvedeva, M P Miettinen, T Mejr, T G Meyer, A M Millen, D G Mills, B Miralles, M R Miskell, O T Modricker, EUO Mohammed, S W Molineux, D C Moore, T U Morapaya, K H Morison, J P Mulholland, W D Naidu, A G Nicholls, M Nikodem, H N Nikolaison, SMR Nilsson, N R Ocampo III, P N Oehley, J J Orr, J M Osika, D A Osuna Contreras, N L Palamo, SBL Parkin, P Patel, S Patel, W L Patterson-Kane, T M Pervan, A R Phua, S K Pitawala, L Y Poloni, S N Pradeepkumar, O B Pritchard, N E Purvis, X Qu, T C Rabel, S Raman, P Ramasubramaniam, P J Reddin, S N Rhind, J D Rhodes, C J Robertson, D C Robinson, F A Robrigado, TKM Ruland-Marsters, N R Sanderson, J J Sandoval Garay, R S Saplan, B M Shandro, L Sharma, R Sharma, MKZ Shehadeh,

F Shirwali, G Sidorov, Z A Sima, G Singh, S Singh, R A Slight, B K Smith, M J Smith, R A Sprosen, A Sreekumar, B M Stephenson, H J Stephenson, L G Stephenson, R J Stewart, A H Storey, J Studnicka, Z Su, K J Summerhays, L Sutherland, R J Sutton, R G Swanston, ERT Taylor, T C Teoh, D M Thomas, J Tu, LHC Tu, J R Turley, A M Tyrrell, T Umar, N Uran Botero, C R Urmsen, IPF Vaai, D K Vaithialingam Arulananam, P T Valili, S Vallesi, J B van der Gouw, C J van Houtte, Y R Wang, A J Washington, D Westwood, J Wang, A C Wilding, C N Williams, A Williamson, S T Williamson, KHA Win, M L Worth, Y Xue, Z Yang, C M Yap, A B Ycong, MGE Yortt, L Zhang, Zhiyuan Zhang, Zun Zhang, M Zhou, W H Zhou.

Elected to Professional Member:

YCK Au, A Bargh, B Bahr Aliloom, M I Batchelor, M N Beijeman, A J Blackford, P J Bourne-Webb, A C Bridgman, A T Brimelow, M A Broughton, B R Burdett, C J Burr, J Caldwell, P Campbell, A S Chew, O Chung, A N Clarke, R G Clarke, P Coleman, R A Coles, J S Cordwell, S Cottam, S K Cotter-Tait, M J Cowan, W A Crilly, S F Croft, P T Currie, S R Cutfield, S A Danks, H R Denize, R P Dhakal, B J Disley, S Duboka, B A Duncan, H T Duxfield, M R Easton, H R Eaton, J D Fletcher, D Ford, S T Glenny, K S Goble, M L Grant, N R Harrison, A R Holland, N R Homerston, C J Howard, S-PH Hse, M W Jacob, M A James, A T Jarvis, S R Jayaratne, D N Jayasinghe, AP Johnson, S B Jones, J L Kaczon, H Kahyaoglu, N Kalidas, S E Kazhenov, C Keepa, RWP Kelly, RWJ Kilgour, L K Kirkpatrick, M J La Franchie, R A Lamb, M W Leizour, Y M Leung, W W Li, F S Lin, A A Liu, P D McCallum, E B McDonald, R T McDonald, B G McGowan, L MacKinnon, P J Macey, K D Mair, P Malan, SOR Man, K A Marshall, GJD Masson, P C Meek, D Mhatre, ADR Mitchell, G F Mitchell, J Moffat, P D Moodie, T A Moore, D J Mulholland, A-M Mulligan, K Nelson, K L Ng, M I Nixon, S P Norton, ADC Nutsford, T F O'Boyle, B G Parkes, C J Parkes, B N Pasco, K W Pat, B K Patel, E L Patrick, T M Peters, LJ Piggot, G P Rae, V N Rambisheswar, F Richter, M-K Richter, S S Roberts, G D Robertson, C C Rodger, V S Romero, R J Sanders, N D Sardareva, S A Scard, K M Schicker, J R Schwaderer, C B Schwartze, P J Scott, R A Scott, S Sharma, M P Sheehan, M J Silvester, I A Simmons, G M Smeal, R A Staal, N Suprpto, R B Szrot, PKY Tang, C M Taylor, D J Taylor, NAC Taylor, H S Thakur, N S Trotter, K Tsui, M A Utting, R van Ballegooy, SMJ Vanderpump, A Vietri, M R Whiteside, M J Williams, R G Williams, J M Wright, VHI Wong, J M Zame, L Zheng.



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