

CAETS Visiting Committee

Oh-Kyong Kwon, CAETS President-Elect; President of the National Academy of Engineering of Korea
Hugh Bradlow, CAETS Board Member, President of the Australian Academy of Technology and Engineering
Ruth David, CAETS Secretary/Treasurer, Foreign Secretary of the US National Academy of Engineering

Hosts

Wendy Lerner FRSNZ¹, President of Royal Society Te Aparangi²
Richard Blaikie FRSNZ, Chair of the Academy Executive Committee
Geoff Chase FRSNZ, Incoming Convenor – TASE
Andrew Cleland FRSNZ, Chief Executive
Gill Sutherland, Director, Academy Operations

Background

During the 2016 CAETS Council Meeting in London, delegates from the Royal Society Te Aparangi, representing New Zealand's academy for "science, technologies, and the humanities" presented a case for election of the Society into CAETS membership. The feedback provided by CAETS at that time indicated an application would be welcome, but would be scrutinized to ensure that the engineering-related component was not subsumed under science. Rather, it must have a distinct identity within the Academy.

Subsequent to that discussion, the Society modified both its governance structure and its Fellows election process to align with CAETS Membership Criteria. The Society submitted an application for CAETS Membership on 18 December 2018. In March 2019 the CAETS Executive Committee designated the Visiting Committee noted above, which completed an onsite visit on 23-24 May 2019. This report summarizes that visit and substantiates their recommendation.

Recommendation of the CAETS Visiting Committee

The Visiting Committee concluded that the steps taken by the Royal Society Te Aparangi since the 2016 discussion address the concerns expressed by CAETS Members at that time, and that the Academy component of the Royal Society satisfies the CAETS Membership Criteria. It therefore recommends election of the Society as a member of CAETS, with the understanding that the CAETS Delegate will be the Convenor of the College of Technology, Applied Sciences and Engineering (TASE) or his/her designated representative.

Historical Overview of the Royal Society Te Aparangi

The Royal Society of New Zealand was originally constituted by an Act of Parliament in 1867 as the New Zealand Institute with a mandate encompassing science and the arts. Periodic updates to the Act occurred, with the most recent being in 1997 and 2012. The Act establishes the Society as a private body independent of Government.

¹ Fellow of the Royal Society of New Zealand

² In 2017 the Society commemorated its first 150 years and in 2019 celebrates 100 years of the Fellowship. These commemorations were used to rebrand as Royal Society Te Aparangi (the legal name remains Royal Society of New Zealand). The Maori name Te Aparangi translates to "a group of experts."

In 1919 an Academy was established within the New Zealand Institute and it began the election of Fellows. In 1933 the Institute was renamed the Royal Society of New Zealand and its scope was narrowed to encompass only science. From the early 1970s into the 1990s, engineering and applied sciences were increasingly recognized as being included as part of a widening definition of science for the election of Fellows. The first engineer was elected in 1971 and the next in 1978. Increasing numbers were elected in the 1980s and 1990s. In 1997 the Act was updated to explicitly encompass “science and technology,” defined as including the applied, biological, earth, engineering, information, mathematical, medical, physical, social, and technological sciences. In 2012 the Act was further widened to include the humanities in addition to science and technology.

Since its establishment the Society has maintained a broad-based membership, beginning with provincial learned society bodies. Under the 1933 and 1965 Acts the Society was seen as membership-based; the two types of members were the Fellows within the Academy and organizational members like regional branches of the Society and discipline-based learned societies such as the New Zealand Institute of Chemistry.

Changes to the Act in 1997 made a clear separation between the body governing the Academy (the Fellowship) and that governing the broader Society. That Act also allowed for individual members (Companions) as well as organizational members of the Society. In 2012 the nomenclature was amended to refer to two governing bodies: 1) an elected Council for the Society as a whole, and 2) an Academy Executive Committee (AEC) elected by the Fellows, which is responsible for the Academy and operates according to Bylaws established by the Academy.

In December 2018 the Society approved new General Rules that take effect on 1 July 2019. Under these rules, the Academy is organized into six domain-based Colleges, each of which elects a Convenor for the domain. That Convenor is a member of the Academy Executive Committee (AEC). The six Colleges are:

- Humanities
- Social and behavioral sciences
- Biological and environmental sciences
- Physical, earth and mathematical sciences
- Medical and health sciences
- Technology, applied sciences and engineering (TASE)³

The two lead roles in the AEC, Chair and Deputy Chair, are elected by the members of the AEC plus any other Fellows serving at the time on the Council; these elections are thus decided entirely by Fellows. Procedures are in place to ensure that these roles are shared across the six domains, including requirements that each newly elected person must be from a different domain than the incumbent and that the Chair and Deputy Chair must be from different domains.

Summary of Visit

During the visit the Committee met with the Society’s senior leadership (hosts noted above) as well as a representative selection of Fellows and Companions from the TASE domain. The discussions were both informative and candid. The Committee also had an opportunity to meet with other organizations that contribute to the vitality of New Zealand’s TASE-related professional communities, including Engineering New Zealand, Science New Zealand, and Independent Research Association New Zealand. It became clear from these

³ The Visiting Committee had extensive discussions with Professor Geoff Chase, Incoming Convenor for TASE.

discussions that while the Royal Society has a unique role as New Zealand's only Academy, it fosters strong relationships and productive interactions with other professional organizations whose objectives are aligned with those of the Society.

The Committee noted that the Society is also actively engaged with international bodies including membership in the International Science Council (sciences and social sciences), the Union Académique Internationale (humanities), and the InterAcademy Partnership (science and medical/health sciences). It hopes to broaden its international contribution through membership in CAETS (engineering and technological sciences).

Discussions with Society/Academy leadership addressed each of the CAETS Membership Criteria; findings are summarized below.

Alignment with CAETS Membership Criteria

In accordance with CAETS Bylaws, Section 3: **A member of CAETS shall:**

a) Be representative of the engineering and technological community of that country

The Royal Society Te Aparangi is New Zealand's only Academy for science, technology and the humanities. While election of engineers into the Academy dates back to 1971, it was not until 1997 that the Parliamentary Act under which the Royal Society operates was updated to explicitly include technology. As of late 2018, out of a total Fellowship of approximately 400, there were approximately 30 Fellows who are engineers, and 40 who are technological or applied scientists.

b) Subscribe to the non-political, non-governmental international character of the Council

The Act under which the Society operates establishes the Society as a private body independent of Government. The Act (as updated) sets out that for the purpose of the advancement and promotion in New Zealand of science, technology, and the humanities, the functions of the Society are:

- i. To foster in the New Zealand community a culture that supports science, technology, and the humanities, including (without limitation)—
 - a. The promotion of public awareness, knowledge, and understanding of science, technology, and the humanities; and
 - b. The advancement of science and technology education;
- ii. To encourage, promote, and recognize excellence in science, technology and the humanities;
- iii. To provide infrastructure and other support for the professional needs and development of scientists, technologists, and humanities scholars;
- iv. To establish and administer for members a code of professional standards and ethics in science, technology and the humanities;
- v. To provide expert advice on important public issues to the Government and the community; and
- vi. To do all other lawful things that the Council considers conducive to the advancement and promotion in New Zealand of science, technology, and the humanities.

The Society demonstrates its commitment to international engagement through active participation in professional bodies including the International Science Council and the InterAcademy Partnership.

c) Have a peer elected membership with criteria for election based on significant personal contributions to engineering, technological sciences, or related activities

The Academy recognizes four 'fields' in which the criteria for Fellowship can be demonstrated:

- Science

- Social sciences
- Humanities
- Technology, applied sciences and engineering

TASE Criteria for *Distinction in Research*:

- Intellect; scholarship; international reputation; and peer recognition
- Intellectual achievement; innovation; and an ability to creatively synthesize and critically interpret knowledge in a way that has impact on the field.
 - Examples of impact include: Significant changes in the way a body of knowledge is organized and used; longevity of impact of citation; major changes to practice in a professional community; major changes in relevant public policy and/or government investment strategy; successful promulgation of new products, processes, IP, or services based on the research; significantly increased investment in the research program over an extended period of time by potential technology transfer partners or end-users.

TASE Criteria for *Advancement of Technology*:

- Clear description of the innovation/new knowledge for which the nominee is responsible
- Summary of the evidence of impact
 - Examples of impact include: Major changes to practice in a professional community; major changes to relevant public policy and/or government investment strategy or operational strategy; successful promulgation of new products, processes, IP, or services based on the innovation/new knowledge; major cultural or social change within communities of significant size; major environmental change.

The election process includes three steps: Domain-specific Evaluation Panels; Fellowship Selection Committee; Academy Executive Committee. The TASE Convenor chairs the TASE Evaluation Panel, which reviews relevant nominees and prepares a short-list. The Fellowship Selection Committee, which is appointed by the AEC, includes four representatives from each domain and is chaired by the Chair of the AEC. The Fellowship Selection Committee reviews nominations forwarded by the Evaluation Panels and prepares a consolidated list of candidates to be recommended to the AEC for election to the Fellowship.

Although the final decision for Fellows elected occurs at the Academy level, TASE is responsible for the evaluation of its nominees and participates equally in the Fellowship Selection Committee. Further, recent election results demonstrate that TASE has been successful in getting its nominees elected into the Fellowship. In 2018, four of twenty total Fellows elected were from TASE (2 engineering and 2 applied sciences); in 2017, three of sixteen total Fellows elected were from TASE (2 engineering and 1 applied sciences). Of note is the fact that these results predate full implementation of the governance structure and election of the Convenors for the six colleges. Based on discussions with the Society's senior leadership, there is a clear commitment to equitable representation of the six domain-based Colleges among the Fellowship of the Academy. In practice, Fellows of the Academy are elected by their peers.

d) Be governed by its elected membership

Changes to the Act under which the Society operates enacted in 1997 provided a clear separation between governance of the Society and governance of the Academy. The Academy is governed by the

Academy Executive Committee and operates in accordance with Bylaws established by the Fellowship. The AEC includes the Convenors from the six Colleges, each of whom is elected by the College Fellowship and charged with the intellectual leadership role for that College. The Chair and Deputy Chair of the AEC are elected by the AEC on behalf of the Fellowship; provisions are in place to ensure that these positions are appropriately rotated among the six Colleges. Additionally, the President of the Society (elected by the Council), who is traditionally a Fellow (but not required to be) also sits on the AEC. In practice, the Academy is governed by its elected membership, and TASE is equitably represented in the governance structure.

e) Be engaged in significant activities demonstrating that its objectives are compatible with the objectives of CAETS

The Society has a dedicated organization focused on providing expert advice while maintaining a strong emphasis on avoidance of lobbying or promotion of self-interests. Most of the work in this area is self-initiated and largely focused on public education and awareness. Additional programs support the functions of the Society as delineated in the Act (see section b).

The 2018 Highlights report describes a number of specific TASE-related activities that are compatible with the objectives of CAETS, including:

- A 'Bionic Leaf' for Harvesting Energy from the Sun
- Digital Breaths: The Benefits of Bioengineering
- Climate Change: Stormy Weather Ahead
- Latest Science and Technology Information for MPs
- Whiz Bang Science for the July School Holidays
- Exploring the Sea Floor with Sound
- MacDiarmid Medal awarded (to TASE Convenor elect) for physiological modeling of human metabolism used for 'in-silico' testing

f) Have sufficient financial support to pay the costs of CAETS membership and the costs of participation in CAETS activities

The Society has assets exceeding \$10M USD and a turnover of approximately \$5M USD. Approximately 80% of its annual income derives from professional services provision, largely to the government. Additionally, it has an annual income of approximately \$1M USD that is discretionary. Further, based on discussions with the Society's senior leadership, there exists a strong commitment to participate in CAETS as an element of its international collaborations.