# **CAETS** International Council of Academies of Engineering and Technological Sciences, Inc.



# **The First** 35 Years 1978 - 2013

### Member Academies

National Academy of Engineering (ANI) Argentina *www.acadning.org.ar* 

Australian Academy of Technological Sciences and Engineering (ATSE) *www.atse.org.au* 

Royal Belgian Academy Council of Applied Sciences (BACAS) *www.kvab.be* 

Canadian Academy of Engineering (CAE) *www.cae-acg.ca* 

Chinese Academy of Engineering (CAE) *www.cae.cn* 

Croatian Academy of Engineering (HATZ) *www.hatz.hr* 

Engineering Academy of the Czech Republic (EA CR) *www.eacr.cz* 

Danish Academy of Technical Sciences (ATV) *www.atv.dk* 

Technology Academy Finland (TAF) *www.technologyacademy.fi* 

National Academy of Technologies of France (NATF) *www.academie-technologies.fr* 

German Academy of Science and Engineering (acatech) *www.acatech.de* 

Hungarian Academy of Engineering (HAE) *www.mernokakademia.hu* 

Indian National Academy of Engineering (INAE) *www.inae.org* 

The Engineering Academy of Japan (EAJ) *www.eaj.or.jp* 

The National Academy of Engineering of Korea (NAEK) *www.naek.or.kr* 

Academy of Engineering (AI), Mexico *www.ai.org.mx* 

Netherlands Academy of Technology and Innovation (AcTI.nl) *www.acti-nl.org* 

Norwegian Academy of Technological Sciences (NTVA) www.ntva.no

Slovenian Academy of Engineering (IAS) *www.ias.si* 

South African Academy of Engineering (SAAE) *www.saae.co.za* 

Real Academia de Ingenieria (RAI), Spain www.real-academia-de-ingenieria.org

Royal Swedish Academy of Engineering Sciences (IVA) *www.iva.se* 

Swiss Academy of Engineering Sciences (SATW) *www.satw.ch* 

Royal Academy of Engineering (RAEng), United Kingdom *www.raeng.org.uk* 

National Academy of Engineering (NAE), United States *www.nae.edu* 

National Academy of Engineering of Uruguay (ANI) *www.aniu.org.uy* 

#### International Council of Academies of Engineering and Technological Sciences, Inc. (CAETS)

Incorporated June 30, 2000 District of Columbia, USA E.I.N. 52-2251297 An IRS Section 501(c)(3) organization

Internet: www.caets.org E-mail: caets@nae.edu William C. Salmon, Secretary/Treasurer 112 Pleasant Grove Road Locust Grove, Virginia 22508 USA Mobile: (1) 703-527-5782

CAETS Records National Academy of Engineering 2101 Constitution Avenue, NW Washington, D.C. 20418 USA

### Introduction

This booklet provides a brief description and short history of activities of CAETS, an independent non-political, nongovernmental international organization of engineering and technological sciences academies, with only one member academy per country.

The first meeting, held in 1978, was titled "1st International Convocation of Academies of Engineering and Similar Institutions." In 1985 the name "Council of Academies of Engineering and Technological Sciences (CAETS)" was agreed. On incorporation in 2000, the name became the "International Council of Academies of Engineering and Technological Sciences, Inc. (CAETS)."

The CAETS Objectives (page 2) were developed in the General Rules and Guidelines in operation in the 1980s and 1990s and edited to Bylaw format in 2000.

The CAETS Strategy (pages 2-4) began with a five-year plan in 2006 and has evolved to a continuing plan of priorities.

The five Founding Academies (page 5) were involved in the 1978 convocation and the subsequent convocations, and helped form the nature of and the launching of CAETS in 1985. Thereafter, new member academies were added through the election process.

The Growth and Activities of CAETS (pages 6-13) identifies the steps taken in the evolution of the organizational structure of CAETS, the member academies hosting convocations and symposia, and other meetings called to consider dealing with the growth of the membership. In the early years, 1978 to 1985, management was by the Convocation Steering Committee. During the next period, 1986 to 2000, CAETS was operational through its Governing Council. Since 2001, CAETS has had a Board of Directors and a Council.

The Officers (pages 14-15) are listed for the period when the leadership was known as the Convocation Steering Committees (1978 to 1985), for the growth period (1985-2000), and, with the Members of the Board of Directors, for the post-incorporation period (2001-2008).

CAETS Statements, CAETS Reports, and the Proceedings of the CAETS Convocations (pages 16-19) demonstrate the

breadth of interest of the membership of CAETS. The 2006 CAETS Statement, "The Role of Hydrogen in Our Energy Future" (pages 16-17), is an example of the most recent preferred form of useful product of the CAETS annual meetings.

The CAETS Rotation Schedule (page 20) describes the nonelective process that identifies member academies that may host convocations, symposia, and annual meetings of the Council and nominate their members for CAETS leadership positions.

There is much related to the growth of CAETS and its activities that is not recorded here. The existence of CAETS, as well as its membership requirement for self-governance, has encouraged the creation and development of national academies focused on engineering and technological sciences. The exchange of experiences among the member academies has fostered efforts by individual member academies to become more effective in contributing to important national issues with significant engineering content, and efforts by regional groupings of academies to contribute to similar regional issues.

To support the activities of CAETS, each member academy is responsible for its participants' expenses. In the early years, hosts of convocations covered the meeting expenses. Later, as attendance grew, registration fees helped to offset some - but not all - meeting expenses. Also in the early years the US National Academy of Engineering (NAE) covered all costs of the secretariat. In the late 1980s, as the membership grew, the member academies agreed to share the direct costs of the secretariat each year after expenses were totaled, with the NAE providing the up-front operating funds for each year. Beginning in 2001, dues collected at the beginning of the year were intended to cover costs of that year. CAETS repaid NAE over the next four years for the secretariat expenses for the year 2000. In 1999 the nominal annual dues were \$3,000 (US). Since 2005 some academies have agreed to pay a higher fee, which has permitted some to pay less.

This material was compiled from several sources, including History and Summary of Activity, 1978-1999, a CAETS report prepared by Steven N. Anastasion, Vice President and Secretary of CAETS, 1985-1999.

# **CAETS** Objectives

The Objectives, as stated in the CAETS Bylaws, Article 1:

Consistent with its Articles of Incorporation and in support of its mission, CAETS will:

- (a) Provide an independent non-political and non-governmental international organization of engineering and technological sciences academies, prepared to advise governments and international organizations on technical and policy issues related to its areas of expertise;
- (b) Contribute to the strengthening of engineering and technological activities in order to promote sustainable economic growth and social welfare throughout the world;
- (c) Foster a balanced understanding of the applications of engineering and technology by the public;

- (d) Provide an international forum for discussion and communication of engineering and technological issues of common concern;
- (e) Foster cooperative international engineering and technological efforts through meaningful contacts for development of programs of bilateral and multilateral interest;
- (f) Encourage improvement of engineering education and practice internationally;
- (g) Foster establishment of additional engineering academies in countries where none exist; and
- (h) Undertake other projects, programs, and activities not inconsistent with section 501(c)(3) of the Internal Revenue Code and any applicable law of the District of Columbia.

## **CAETS Strategy**

#### Preamble

CAETS, the International Council of Academies of Engineering and Technological Sciences, Inc., consists of those national academies of engineering and technological sciences which, as judged by their fellow member academies, have satisfied an agreed set of criteria for membership. CAETS was established in 1978 and incorporated as a charitable non-profit corporation in the District of Columbia (USA) in 2000. Its Articles of Incorporation, Bylaws and Operating Procedures set forth its objectives and governance arrangements.

#### Vision

CAETS envisions a world in which national and international decision-making on economic, social, and environmental issues are properly informed by relevant engineering, scientific and technological considerations and in which the peoples of all countries benefit fully from the capabilities of engineering, science and technology.

#### Mission

The mission of CAETS is to foster engineering and technological progress for the benefit of societies of all countries. CAETS provides the organizational mechanism through which engineering and technological sciences academies of the world can work together on important issues at the intersection of technology and society.

Through communication and sharing of best practices, CAETS member academies are able to draw on the total global experience and expertise of other member academies to address issues at the national level and, collectively, to encourage use of the best engineering and technological advice by key global intergovernmental institutions for the benefit of all peoples of the world.

#### **Priorities**

#### 1. Address and advise on significant international engineering and related issues on the basis of CAETS Symposia and Convocations.

The theme, purposes and objectives for the Symposium (one day) or Convocation (more than one day) of the annual CAETS meetings are proposed by the host academy and discussed with and approved by the CAETS Council at least one year in advance for a Symposium and two years in advance for a Convocation. The desired product of these meetings is a Statement, of about 2,000 words, whose preparation is coordinated by the host academy and which reflects the consensus of the presentations and discussions of the meeting. The statement is reviewed and approved by the Council.

The theme selected should be of current major interest to a majority of CAETS member academies. Early consultation with interested member academies helps focus the purposes and objectives of the technical meeting and leads to identification of speakers, many, but not all, being members of CAETS member academies, who provide, collectively, the expertise covering the highlights of the issue, the pros and cons, and recommendations. A program committee, including host academy and other experts in the field, constructs a coherent program and assists in the early drafting of the Statement.

Hard copies of the Statement are produced and distributed by the CAETS Secretary to relevant international organizations. Copies of the statement are sent to member academies for distribution to appropriate national leaders and agencies. Member academies report at the following Council meeting on the results of their distributions.

(Note: As an example, the 2006 CAETS Statement, "The Role of Hydrogen in Our Energy Future," is included on pages 16-17 in this booklet.)

2. Promote constructive collaboration with international technological organizations of the UN System, and IAC, ICSU, WFEO and other non-governmental organizations.

CAETS has an important role in working with kindred international organizations to advance matters of shared concern at the global level, both within and beyond the United Nations System.

CAETS has working relations, including, on occasion, Observer status at governing body sessions, with the United Nations Educational, Scientific and Cultural Organization (UNESCO), its Intergovernmental Oceanographic Commission (IOC) and the World Meteorological Organization (WMO). Contacts have also been made with the Food and Agriculture Organization (FAO), the UN Development Programme (UNDP), the UN Environment Programme (UNEP) and the UN Commission for Sustainable Development (CSD). CAETS has consultative status with the UN Economic and Social Council (ECOSOC).

CAETS is a member of the InterAcademy Council (IAC), collaborates with the International Council for Science (ICSU), and has a cooperation agreement with the World Federation of Engineering Organizations (WFEO).



*R. Dandliker (SATW) representing CAETS at World Climate Conference-3, Geneva, 2009* 



CAETS Council Meeting, Tokyo, 2007

CAETS should expand and strengthen such international collaboration in areas of mutual interest, based on the interests and resources of individuals and their respective CAETS academies. These activities are coordinated through the CAETS Committee on International Organizations (CIO).

### 3. Discuss national technology and academy operational issues of mutual interest at annual Council meetings.

CAETS Council meetings include two discussion sessions, each of approximately one hour duration and each devoted to a single issue. The Board of Directors selects the two topics one year in advance, and interested member academies provide briefs (1 to 2 pages on each subject) four to six weeks prior to the Council meeting. Using the briefs as a starting point, the Council meeting discussions are lead by members of the Board of Directors. The annual collation of submissions by member academies to "Issues of Concern" and "Activities of Interest" are excellent sources of appropriate Council discussion topics.

The annual CAETS meetings also provide valuable formal and informal opportunities for interaction among leaders of member academies, including the opportunity for extended personal contacts during the immediate post-meeting tours of technical/cultural sites and facilities.

- 4. Encourage topic-specific collaboration through interacademy committees/working groups involving representatives of a few or several member academies. CAETS should expand and strengthen such multi-academy collaboration in areas of mutual interest, based on the interests and resources of individuals and their respective CAETS academies. There are two such activities in continuing operation:
- The CAETS Noise Control Technology Committee (NCTC), which includes individuals representing several

member academies, works on global noise policy, focusing on promoting the adoption of policy to effectively use available technology for reducing the noise emissions of the world's principal noise sources. Its efforts are to provide policymakers and their staffs with technical evaluations and recommendations for the implementation of noise control technology, with initial focus on Europe due to ongoing EU difficulties in achieving a quieter Europe.

- The CAETS Committee on Energy recently produced a report on "Opportunities for Low Carbon Energy Technologies for Electricity Generation to 2050." This report reflects the work of representatives of several member academies with the leadership of one academy, ATSE.
- 5. Encourage bilateral collaboration between member academies and multilateral collaboration among member academies within regional groups.

Bilateral cooperative agreements/arrangements between member academies are developed based on mutual interest and involve collaboration in a few or several areas. Member academies are involved in regional groups, such as the European Council of Academies of Applied Sciences, Technologies and Engineering (Euro-CASE) and the East Asia Round Table Meeting of Academies of Engineering (EA-RTM).

6. Promote and encourage the growth of national academies of engineering and technological sciences.

CAETS encourages the creation of new academies of engineering and technological sciences in countries where none exists, consistent with the CAETS criteria for membership. CAETS welcomes leaders of such new and developing academies to attend CAETS meetings as Observers. Leaders of engineering and technological sciences sections of science academies in such countries are also welcome to attend as Observers.



L. to R.: B. Raj (INAE) and D. W. Kum (NAEK) signing bilateral Memorandum of Understanding, Mexico City, 2011



CAE (China), EAJ and NAEK representatives at 6th East Asia Round Table Meeting of Academies of Engineering (EA-RTM), Seoul, 2002

### Membership Chronology

### Founding Member Academies (1978)

Australian Academy of Technological Sciences and Engineering (ATSE) [Formerly Australian Academy of Technological Sciences (ATS)]

Royal Academy of Engineering of the United Kingdom (RAEng) [Formerly the Fellowship of Engineering (FoE)]

Academy of Engineering (Mexico) (AI) [Formed in 2002 by merger of the National Academy of Engineering (ANI, Founding Member) and the Mexican Academy of Engineering (AMI)]

National Academy of Engineering (United States) (NAE)

Royal Swedish Academy of Engineering Sciences (IVA)

### **Elected Member Academies**

### Year Elected

Danish Academy of Technical Sciences (ATV)	1987	
Swiss Academy of Engineering Sciences (SATW)	1988	
National Academy of Technologies of France (NATF)	1989	
[Formerly Committee for Applied Sciences of the		
French Academy of Sciences (CADAS)]		
Technology Academy of Finland (TAF)	1989	
[Formerly The Finnish Academies of Technology (FACTE)		
The Engineering Academy of Japan (EAJ)	1990	
Royal Belgian Academy Council of Applied Sciences (BACAS)	1990	
The Norwegian Academy of Technological Sciences (NTVA)	1990	
Canadian Academy of Engineering (CAE)	1991	
Netherlands Academy of Technology and Innovation (AcTI.nl)	1993	
[Formerly Netherlands Society of		
Technological Sciences and Engineering (NFTW)]		
Hungarian Academy of Engineering (HAE)	1995	
Chinese Academy of Engineering (CAE)	1997	
Ukrainian Academy of Engineering Sciences (UAES) (Inactive)	1998	
Academy of Engineering in Poland (AIP) (Inactive)	1998	
National Academy of Engineering (Argentina) (ANI)	1999	
Engineering Academy of the Czech Republic (EA CR)	1999	
Indian National Academy of Engineering (INAE)	1999	
Royal Academy of Engineering (Spain) (RAI)	1999	
The National Academy of Engineering of Korea (NAEK)	2000	
Croatian Academy of Engineering (HATZ)	2000	
Slovenian Academy of Engineering Sciences (IAS)	2000	
National Academy of Engineering of Uruguay (ANIU)	2000	
German Academy of Science and Engineering (acatech)		
South African Academy of Engineering (SAAE)		

# The Growth and Activities of CAETS

### The Convocation Steering Committee

### Washington, D.C., United States, 1978

During the early 1970s, members of the U.S. National Academy of Engineering (NAE) and the Royal Swedish Academy of Engineering Sciences (IVA) discussed the notion that occasional meetings of engineering academy leaders would benefit all organizations involved. On October 31, 1978, the NAE (US) organized and chaired the 1st International Convocation of Academies of Engineering and Similar Institutions in Washington, D.C., with representatives present from: the Australian Academy of Technological Sciences (ATS); the Danish Academy of Technical Sciences (ATV); the Academy of Engineering (ANI, Mexico); the Fellowship of Engineering of the United Kingdom (FoE); the U.S. National Academy of Engineering (NAE); the Royal Swedish Academy of Engineering Sciences (IVA); and the Finnish Academies of Technology (FACTE). Engineers from Israel and India were also present. In addition to presentations on the respective academies' histories, functions, and objectives, the participants discussed the relationships of their engineering academy to their national society, their sister academy of sciences, and to other national academies of engineering. IVA was asked to chair a planning committee to organize a second convocation.

#### Melbourne, Australia, 1980

ATS (Australia) hosted the 2nd Convocation of Engineering and Like Academies in Melbourne on April 8-9, 1980. Representatives from the academies of Sweden, the United States, the United Kingdom, Mexico, and Australia addressed the theme, "The Management of Technological Change," while participants from Yugoslavia, India, and Japan also made statements. The participants agreed to establish an informal secretariat for information exchange among the interested academies, and NAE (US) agreed to be its host.

#### Oaxaca, Mexico, 1981

ANI (Mexico) hosted the 3rd Convocation of Engineering Academies and Like Organizations in Oaxaca on September 21-22, 1981. Participants gave presentations on national developments in "Engineering Education." At the meeting's end, the participants decided that some structure for this loose "international federation" would be useful. A Steering Committee was formed with ATS (Australia) as president, ANI (Mexico) as vice president, and IVA (Sweden) and NAE (US) as members.



Participants at the 3rd CAETS Convocation, Oaxaca, Mexico, 1981

#### Stockholm, Sweden, 1983

IVA (Sweden) hosted the 4th Convocation of Engineering Academies in Stockholm on May 29-June 1, 1983. Using a revised format and the theme "Important Technological Trends," each of the five academies organized a session with three or four speakers. It was not necessary that all speakers be from CAETS member countries. At its meeting following this convocation, the Steering Committee agreed that in view of growing interest and participation by other engineering academies it would be useful to form an umbrella organization. The organization, called the Convocation of Academies of Engineering and Technological Sciences, would have a president and vice president; these positions would rotate among members every two years, and the president's academy would host the convocation. ANI (Mexico) was named president and NAE (US) the vice president. NAE (US) agreed to provide the Convocation Secretariat, and guidelines for the Convocation's organization and attendance were adopted. Further, the Fellowship of Engineering (FoE) of the United Kingdom was invited to join the Steering Committee.

### Washington, D.C., United States, 1983

The Steering Committee met again on November 3, 1983 in Washington, D.C. In addition to discussing the location and theme of the next convocation, committee members considered the objectives, nature, and character of the organization, as well as the criteria and method for admitting new members. The Steering Committee asked ANI (Mexico) and NAE (US) to prepare a draft document of objectives and rules for discussion at the next Steering Committee meeting.

#### London, England, 1985

The FoE (UK) hosted the 5th Convocation in London on June 10-14, 1985, organizing presentations under the theme "Global Interaction of Technology." At the meeting that followed, Steering Committee members considered the draft rules prepared by ANI (Mexico) and NAE (US). The group made a number of changes and asked that a revised version be prepared. At the end of the meeting, NAE (US) became the president and ATS (Australia) the vice president.

### Washington, D.C., United States, 1985

The Steering Committee met in Washington, D.C., on October 4, 1985, to plan the 6th Convocation and to consider the revisions to the draft rules. After making additional changes, the Committee adopted the General Rules of the Council of Academies of Engineering and Technological Sciences (CAETS). The General Rules provided for a Governing Board of the Council to include a representative of each member academy. The Board began with the five founding members: the Australian Academy of Technological Sciences (ATS); The Fellowship of Engineering of the United Kingdom (FoE); the National Academy of Engineering of Mexico (ANI); the U.S. National Academy of Engineering (NAE); and the Royal Swedish Academy of Engineering Sciences (IVA).

# CAETS and the Governing Board

### Washington, D.C., United States, 1987

The NAE (US) hosted the 6th Convocation in Washington, D.C., on March 30-April 1, 1987, with the theme "Globalization of Technology." The format was more integrated, with speakers invited from other member academies. At the Governing Board meeting following the Convocation, the Council elected the Danish Academy of Technical Sciences (ATV) to membership. Denmark was placed at the bottom of the rotation list, the mechanism used to identify the member academies which would serve as president and host a convocation in the future.



Panel at the 6th CAETS Convocation, Washington, D.C., 1987. L. to R.: L. Ramqvist (IVA), P. Aigrain (CADAS), P. Gyllenhammar (IVA), and M. M. Lasso (ANIAC)

#### Sydney, Australia, 1988

ATS (Australia) hosted the 7th Convocation in Sydney on October 12-14, 1988, with the theme "Technology for Living on the Frontiers." At its meeting on October 16, 1988, the Governing Board approved the first CAETS Financial Policy, with the principle of equal cost-sharing by members for operations. The Board also considered membership applications from the Swiss Academy of Engineering Sciences (SATW), the Committee for Applied Sciences of the French Academy of Sciences (CADAS), the Norwegian Academy of Technological Sciences (NTVA), and the Finnish Academies of Technology (FACTE). It admitted SATW, bringing total membership to seven. It postponed considering the CADAS and NTVA applications until it received more information about their activities. Further, the FACTE application was deferred to a later meeting because of inadequate time for its review.

#### Stockholm, Sweden, 1989

At its October 29, 1989 meeting in Stockholm, the Governing Board convened a Working Group to review the structure and operation of CAETS in light of the prospective increase in membership, and to review the General Rules and suggest appropriate revisions. The Board elected CADAS (France) and FACTE (Finland) to membership, bringing total membership to nine.

#### Copenhagen, Denmark, 1990

The Working Group met in Copenhagen on June 7-8, 1990, and recommended amendments to the General Rules. Included in its recommendations were that the Governing Board continue to include all CAETS member academies; the positions of president and first vice president each have two-year terms; the position of vice president/secretary be filled by Board appointment; and voting by written proxy be permitted on all specific Board action items. The Steering Committee would now consist of the president, first vice president, vice president/secretary, and the past president.

#### Acapulco, Mexico, 1990

ANI (Mexico) hosted the 8th Convocation in Acapulco on November 6-9, 1990. The format included three plenary topics, followed by three working groups, each dealing with one of the plenary topics and preparing views for consideration at the closing plenary. At its meeting on November 9, the Governing Board decided that the consensus conclusions and findings of the closing plenary session deserved international dissemination as a special CAETS report. The report, "Harnessing Technology for Development: A Summary of the Eighth Convocation," served as a summary of the Convocation and was well received.

In other action on November 9, the Board approved the recommendations of the Working Group (Copenhagen, June 7-8, 1990), thus amending the General Rules. The Board also elected to membership the Engineering Academy of Japan (EAJ), the Royal Belgian Academy Council of Applied Sciences (BACAS), and the Norwegian Academy of Technical Sciences (NTVA), bringing the total membership to 12.

#### Paris, France, 1991

The Governing Board met in Paris, France on September 12, 1991. The Board approved creating a CAETS Reserve Fund, with all current members contributing \$2,000 (US) and each new member academy contributing the same amount upon election to membership. The fund would be used sparingly for special projects, such as printing CAETS reports. Also at this meeting, the Governing Board elected the Canadian Academy of Engineering (CAE) to membership.

#### Copenhagen, Denmark, 1992

ATV (Denmark) hosted the 9th Convocation in Copenhagen on May 19-22, 1992, with the theme "The Technological Future." At its meeting on May 23, 1992, the Board reviewed CAETS' growth, increasing costs, encouragement and selection of new members, and mode of operations. The president convened a Working Group to report its findings at the next Board meeting.

#### Trondheim, Norway, 1992

The Working Group met on November 10-11, 1992 in Trondheim and recommended that CAETS continue to operate with minimum bureaucracy, at low costs, and that Governing Board meetings be held annually and include all member academies. Attendees agreed that the rotation list was working well as the basis for convocation host and officer selection.

### Irvine, California, United States, 1993

The Governing Board met on January 8, 1993 in Irvine, California. The Trondheim report was presented and approved as principles for CAETS operations. In response to member academies' expressed interests, this meeting was scheduled for a full day, rather than the usual half day. In addition to the business portion of the agenda, half of the meeting was devoted to discussion of member academy activities and issues each considered to be high priority.



CAETS Governing Board Meeting, Irvine, CA, 1993

#### Zurich, Switzerland, 1993

SATW (Switzerland) hosted the 10th Convocation in Zurich on September 14-18, 1993, with the theme "The Challenge of Developing Transportation for Society." The Governing Board approved the Guidelines for CAETS Operations and changes to the General Rules and Financial Policy at its September 17 meeting. Included in the Guidelines were statements of guiding principles and recommendations for CAETS operations, convocations, finances, products, association with member activities, and institutional associations. The Guidelines were meant to amplify portions of the General Rules and to document statements of policy derived from the General Rules and from Governing Board decisions. The Governing Board also elected the Netherlands Society of Technological Sciences and Engineering (NFTW) as the 14th Council member.

#### Helsinki, Finland, 1994

At its meeting on October 31, 1994 in Helsinki, the Board decided that a draft policy paper on "Engineering and Environment" should be prepared to represent the CAETS position on this important international issue. The paper, to be drafted initially by NAE (US), would be based on the contributions of member academies, circulated before the next convocation, discussed at that meeting, and revised in light of that discussion.

#### Kiruna, Sweden, 1995

IVA (Sweden) hosted the 11th Convocation in Kiruna on June 18-21, 1995, with the theme "Creating Wealth in Harmony with the Environment." The Governing Board meeting that followed on June 22 was held in two sessions. During the first session, the Board elected the Hungarian Academy of Engineering (HAE) as the 15th Council member. During the second session, the Board reviewed the third draft of the "Engineering and Environment" document, considered additional suggestions and adopted a final document, which was signed by the member academy representatives present.

#### Tokyo, Japan, 1996

The Governing Board met in Tokyo on September 13, 1996, following the Engineering Academy of Japan's 4th International Symposium. The Board approved revisions to the General Rules, the Financial Policy, and the Guidelines for CAETS Operations. Thereafter, each member reviewed its programs and plans and identified its high-priority issues. In light of interests expressed by many of the member academies, the Board decided that two hours of the next Board meeting would be devoted to a discussion of engineering education. The RAEng (UK) representative agreed to prepare a short issue paper to help focus the discussion.

#### Edinburgh, Scotland, 1997

The RAEng (UK) hosted the 12th Convocation in Edinburgh on May 21-23, 1997, with the theme "Engineering Innovation and Society." Governing Board members continued discussion of engineering education at the Governing



HRH Prince Philip, Duke of Edinburgh, at the 12th CAETS Convocation, Edinburgh, 1997

Board meeting on May 23. In response to the query on how CAETS could best contribute to the broad array of concerns expressed by the members, NFTW (Netherlands) offered to take the lead in setting up a CAETS Working Party. The Board also approved the formation of a CAETS Strategy Review Group (SRG) to consider the future direction of CAETS, its objectives, organization and management, membership, activities, and international associations. The SRG, consisting of the Steering Committee and representatives of interested member academies, would present its findings at the 1998 Board meeting. The Chinese Academy of Engineering (CAE) was elected to membership at this meeting.

#### London, England, 1997

The Strategy Review Group met in London on September 23-24, 1997. The report of its discussion included mission and objectives; relationship to international bodies and external partners; process of convocations; criteria for membership; regional groupings within CAETS; organizational changes; and financial arrangements.

#### Ottawa, Canada, 1998

The Governing Board met in Ottawa on June 5, 1998 and adopted the SRG's recommended changes to the General Rules and Guidelines for Operations. The changes included adopting a mission statement for CAETS: "To foster effective contributions to engineering and technological progress for the benefit of societies of all nations." The Board also received the summary report of the Working Party on engineering education from NFTW and asked that NFTW formulate its report into a document to be reviewed at the next meeting before being distributed to all members.

On review of the Financial Policy, the Board adopted a change to the annual assessments to the CAETS Operating Fund (COF), effective in Fiscal Year 1999. The change provided for a fixed annual assessment (\$3,000 US), not to be increased for several years. An annual budget would be presented for Board review and approval, and any balance remaining in the Operating Fund at the end of a fiscal year added to the CAETS Reserve Fund.

Also at this meeting, the Ukrainian Academy of Engineering Sciences (UAES) and the Academy of Engineering in Poland (AIP) were elected as the 17th and 18th members of CAETS. The Indian National Academy of Engineering's application was deferred without prejudice until after the CAETS Steering Committee could visit the academy, to follow a new policy that CAETS send a delegation to visit applicant academies before their election.

#### Sophia Antipolis, France, 1999

CADAS (France) hosted the 13th Convocation in Sophia Antipolis on May 24-27, 1999, with the theme "Technology and Health." On May 28, the Governing Board discussed and accepted NFTW's draft report on engineering education. The final report was published and copies were sent to all members and several non-member academies.

The CAETS membership increased to 22 academies at this meeting, with the election of the National Academy of Engineering of Argentina (ANI), the Engineering Academy of the Czech Republic (EA CR), the Indian National Academy of Engineering (INAE), and the Academy of Engineering of Spain (AIE). The application of the National Academy of Engineering of Korea was deferred until after a CAETS delegation could visit Korea.

The Board created the Strategy Task Group (STG) to consider various options for the future functioning of CAETS. The STG was charged with making proposals and recommendations available for Board review at its meeting in October 2000. The vice president/secretary was asked to prepare a Statement of Purpose for the STG meeting.



CAETS Governing Board Meeting, Sophia Antipolis, France, 1999

#### Stockholm, Sweden, 1999

On October 21, 1999, the Steering Committee met in Stockholm and accepted the draft prepared by the vice president/secretary. The STG meeting was scheduled for Paris during March 27-29, 2000. The draft was distributed to member academies for comment. The revised Statement of Purpose, with member comments enclosed, was sent to all members.

#### Paris, France, 2000

During the Paris meeting, March 27- 29, the STG agreed to incorporate CAETS in the District of Columbia, US, subject to approval by the Governing Board. It also agreed to consider incorporating in the United Kingdom or Switzerland, if doing so would be advantageous to CAETS. Draft Articles of Incorporation and Bylaws were discussed. It was agreed that these would be based on current CAETS General Rules and Guidelines, with several significant exceptions. The senior body would be the Council, which would consist of one representative from each member academy. The Board of Directors would include the five officers and a certain number of additional member academy representatives. The terms of the president, president-elect, vice president, and past president would be for one year; the secretary-treasurer would continue to be provided by a member academy and subject to Council approval. The transition to one-year terms from the two-year terms for officers should maintain the existing commitments to member academies for hosting convocations through 2007 by amending the rotation list, as mutually agreed to by member academies, and also include hosts for Council meetings and presidents for the non-convocation years. The name of the organization would include the word "international," and the acronym "CAETS" would continue to be used. Revised documents would be circulated by e-mail for member comments and agreement.

On June 30, 2000, CAETS was incorporated in the District of Columbia as the International Council of Academies of Engineering and Technological Sciences, Inc. (CAETS).

#### Beijing, China, 2000

The CAETS Governing Board met on Friday, October 13, 2000, following an international three-day Convocation on Engineering and Technological Sciences in Beijing hosted by the Chinese Academy of Engineering. The Board approved the incorporation of CAETS and approved the Bylaws, with the exceptions that the vice president position was eliminated to make the "presidential ladder" three years; and the Board of Directors would include four officers and four members. The new Bylaws would take effect on January 1, 2001. In addition, the Governing Board agreed to consider undertaking a CAETS study on energy and climate change. Two committees would be formed; one would prepare a scope of work for the study, and the second would prepare general study procedures for CAETS. Finally, the National Academy of Engineering of Korea (NAEK), the Croatian Academy of Engineering (HATZ), the Slovenian Academy of Engineering Sciences (IAS), and the National Academy of Engineering of Uruguay (ANIU) were elected to membership at this meeting, bringing total membership to 26.

### CAETS Inc. and the Council

#### Espoo, Finland, 2001

The 14th Convocation was held in Espoo, Finland on June 11-15, 2001, with the theme "World Forests and Technology." At its meeting on June 11, the CAETS Council agreed to the procedure for selecting members of the Board of Directors: using the rotation list, every fifth member academy below that holding the office of president-elect, up to a total of four, would be invited to nominate a director. The Council also approved the CAETS Operating Procedures and creation of an Audit Committee, and agreed in principle to a draft of Study Procedures.



Post-Council Tour, Forest Excursion, Finland, 2001

#### Prague, Czech Republic, 2002

The Engineering Academy of the Czech Republic hosted a symposium on "Synergies of Engineering Branches" on August 26, followed by the Council Meeting on August 27. The scope of work for the proposed CAETS study on energy and climate change did not gain the support of a majority of member academies. It was agreed that CAETS' interests in the subject would be devoted to working with NTVA (Norway) on its "Future Energy and Sustainable Use" seminar, to be held in conjunction with the CAETS Council meeting in May 2004.

#### Hollywood, California, United States, 2003

On the CAETS 25th anniversary, NAE (US) hosted the 15th CAETS Convocation in Hollywood, California on May 18-22, 2003. The topic was "Entertaining Bytes" and dealt with the interaction of computers, simulated environmental experience and training and entertainment. At the Council meeting that followed, members approved a Board recommendation on Inactive Status, which is included in the CAETS Operating Procedures. Member academies were asked to prepare papers on specific topics, to be included in a CAETS project on Outstanding Engineering Challenges. This project targeted high school students and the general public and focused on how engineering can improve the quality of life of all peoples.

#### Stavanger, Norway, 2004

The CAETS Council met on May 28, 2004 in Stavanger, Norway, after a two-day seminar on "Global Energy Foresight." The seminar papers presented, along with other invited papers, were published. At the meeting, the President encouraged that CAETS undertake more dynamic activities in the future. To be a more global organization, additional members are needed. Toward that end, the President encouraged member academies to promote the creation of national academies of engineering in neighboring countries and to take other steps to promote CAETS membership. To be more dynamic, additional funds are needed.

### Cairns, Queensland, Australia, 2005

ATSE hosted the 16th CAETS Convocation in Cairns, Queensland, Australia, July 10-14, 2005. The Convocation theme was "Oceans and the World's Future." The Council discussed a draft reflecting the papers and discussion of the Convocation and agreed to a CAETS Statement on the Convocation theme. The Council voted unanimously to elect the German Academy of Technical Sciences (acatech) to membership in CAETS. The Council discussed a draft Strategy 2006-2010. The Council also agreed to establish the Committee on International Organizations (CIO) and the Committee on CAETS Membership (CCM). In light of the majority support, the Council agreed to a tiered annual dues structure. The Council agreed NAE (US) should continue to host the CAETS Secretariat.

#### Brussels, Belgium, 2006

The 2006 CAETS Council meeting was held in Brussels, Belgium on Friday, June 2, following a BACAS symposium on "Clean Energy, including the Hydrogen Economy." The Council discussed a draft reflecting the papers and discussion of the symposium and agreed to a CAETS Statement on "The Role of Hydrogen in Our Energy Future." The President noted that distribution of the CAETS Statement "Oceans and the World's Future," comments of visiting academy representatives, the reports of the CAETS Committee on International Organizations (CIO) and the Committee on CAETS Membership (CCM), and the cooperative relations with several international organizations served to further the priorities and goals of the CAETS Strategy 2006-2010, which had been published and distributed. The Council agreed that cooperation with WMO should continue and that cooperation with WFEO should also be undertaken. The Council also agreed to CAETS' endorsement of the INAE proposed International Conference on "Engineering Education," to be held in Chennai, India, in January-February 2007.



Gathering for technical tour to JAMSTEC, Tokyo, 2007

#### Tokyo, Japan, 2007

The 17th Convocation, hosted by Engineering Academy of Japan (EAJ) on October 23-26, 2007, focused on "Environment and Sustainable Growth." A procedure was agreed for developing a CAETS Statement and a Statement was produced reflecting the theme, papers and discussions of the Convocation. The Council agreed to a Bylaw amendment to extend the term of Members of the CAETS Board of Directors to two years, to permit greater involvement of Board members in the management of substantive discussion topics during Council meetings. The Council agreed to a proposal by IVA for a workshop on "Noise Control Technologies;" to a proposal by SATW on "Strategies for Highly Efficient Conversion and Reuse of Matter and/or Energy;" and to a proposal by ATSE for a project on "Accelerating the Response to Climate Change."

### Delft, The Hague, Netherlands, 2008

AcTI.nl was host to the international symposium on "Delta Technology: Enabling Life in River Deltas" in Delft, Netherlands, on June 26, 2008. The CAETS Council meeting was held in The Hague on June 27, 2008. A report was received on the Workshop on "Transportation Noise in Europe" held June 2-4, 2008 in Southampton, England. The Council approved that the Committee's study on noise control technology be extended from the European to the global scene and that noise at the workplace and noise produced by industrial and consumer products be included. The Council agreed to co-sponsor the HATZ celebration of the 300th anniversary of the birth of Ruder Boskovic. A Council discussion on "Engineering Education" was led by a Member of the Board of Directors.

#### Calgary, Canada, 2009

The Canadian Academy of Engineering hosted the 18th CAETS Convocation during July 12-17. A CAETS Statement was approved reflecting the presentations and discussions on

the Convocation theme "Natural Resources – Management and Sustainability." The South African Academy of Engineering (SAAE) was elected to membership in CAETS and the Council agreed that SATW would represent CAETS at the September 4, 2009 Ministerial Segment of the World Climate Conference-3 in Geneva. ATSE proposed and the Council agreed to a CAETS Project on the "Evaluation of Strategies to Deploy Low Emissions Technologies for Electric Power Generation in Response to Climate Change." The Engineering Academy of Japan reviewed activities of its project "Eco-Innovation," with special emphasis on its survey of industries and academia.

SATW presented a status report on its project, "Strategies for Highly Efficient Conversion and Reuse of Matter and/or Energy." The Council agreed that the CAETS Executive Committee would meet with ICSU leaders on October 13 in Paris.



L. to R.: B. Pullen (SAAE) receiving CAETS Membership Certificate from J. Leggat (CAE Canada), Calgary, 2009

#### Copenhagen, Denmark 2010

The Danish Academy of Technical Sciences hosted a symposium on "Sustainable Food Systems – Toward Food for All" on June 26, and after discussion the Council approved the release of a CAETS Statement of that title. The

Council approved changes to the CAETS Bylaws providing for annual meetings to include a one-day Symposium or a Convocation lasting up to 2 1/2 days. The theme would be approved by the Council at least one year in advance for a Symposium and two years in advance for a Convocation. The Working Group Report "Deployment of Low Emissions Technologies for Electric Power Generation in Response to Climate Change" was presented and approved as a CAETS Working Group Report, together with a brief summary of recommendations and conclusions as a CAETS Statement. It was further agreed that CAE, Canada, would present the Statement on behalf of CAETS to the World Energy Congress being held in Montreal September 12-16, 2010. The Council agreed to the naming of the "CAETS Noise Control Technology Committee" and that the committee's continuing work on global noise policy would focus on promoting the adoption of policy to effectively use the available technology for reducing the noise emissions of the world's principal noise sources.

The Council discussion topic was "Engineering Education Today – Leading in a Globalized World."



International Food Policy Research Institute Director General S. Fan, Copenhagen, 2010

#### Mexico City, Mexico 2011

The 19th CAETS Convocation was hosted by the Mexican Academy of Engineering (AI) June 27-July 1, with the theme "Engineering Analysis and Management to Reduce Risks." At the request of CAE (China) and with the agreement of IVA and the several academies affected, dates for hosting annual meeting during 2014 through 2019 were adjusted. The Council Discussion topics were "Engineering Academy/National Government Relations" and "Enhancing the Image of Engineering – Engaging Next Generations and the Public." At the request of INAE, the Council agreed that CAETS would be a co-sponsor of the INAE hosted International Conference "Toward a Better Innovation Ecosystem" scheduled for September 20-21, 2012, in New Delhi.

#### Zurich, Switzerland 2012

The Swiss Academy of Engineering Sciences hosted CAETS meetings during August 29-31. The Council approved the Statement on "Urban Development and Public Transportation: Improved Understanding of the Interdependencies," reflecting the presentations and discussions of the August 30 Symposium. The ICSU international research initiative "Future Earth" was presented, followed by expressions that CAETS and ICSU would cooperate on a mutually agreeable basis. The CAETS Working Group on Low Carbon Energy Technologies outlined its draft report on "Opportunities for Low Carbon Energy Technologies for Power Generation to 2050." At the Working Group's request the Council agreed to formally establish the CAETS Committee on Energy. The Council Discussion Topics were "Recent Efforts and Experiences Promoting Engineeringbased Innovation" and "Promoting Discussion with the Public on Engineering, Science, and Technology."



Post-Council Tour of Gotthard Base Tunnel (NEAT), 2012

#### Budapest, Hungary 2013

The Hungarian Academy of Engineering hosts the CAETS meetings during June 26-28 with the Symposium theme of "Innovative Approaches to Engineering Education." The Council Discussion topics are "Nuclear Power: Present National Plans and Attitudes" and "National Efforts to Promote STEM in K-12," where STEM is Science, Technology, Engineering, and Math. The CAETS Committee on Energy completed its report on "Opportunities for Low Carbon Energy Technologies for Electricity Generation to 2050." This report reflects the work of representatives of several member academies, with leadership by ATSE.

### Officers & Members of the **Board of Directors**

#### CAETS Officers 1978 to 2000 Convocation Steering Committee 1978 – 1985

1978
1978-198
1981-198
1983-198
1980-198

1985-1987

N. Bruce Hannay Gunnar Hambraeus Robert Ward Alejandro Lopez Toledo Hugh Miller

NAE, United States IVA, Sweden ATS, Australia ANIAC, Mexico United States

\* Served as vice president the previous year.

#### Council of Academies of Engineering and Technological Sciences 1985 – 2000

1987-1988 1988-1990 1991-1992 1993-1994 1995-1996 (to 9/13/96)1997-1998 1999-2000 (to 12/31/99)Vice President/ 1985 to 1999 Secretary 2000

President\*

H. Guvford Stever David Zeidler Marco Murray Lasso Erik B. Rasmussen Luc Tissot Hans G. Forsberg First V.P. William Barlow David E.N. Davies Michel Lavalou First V.P. Juhani Ahava Steven N. Anastasion William C. Salmon

NAE. United States ATS, Australia ANIAC, Mexico ATV. Denmark SATW, Switzerland IVA. Sweden RAEng, UK RAEng, UK CADAS. France FACTE, Finland United States United States

\* Served as vice president (1985-1990) or first vice president (1991-1999) the preceding two years and past president the subsequent two vears; exceptions noted for 1996 and 1999.



Far left: H. Miller (US) Left: H. G. Stever (NAE)

Right: L. to R.: S. N. Anastasion (US); and M. Lavalou (CADAS)



#### CAETS Officers and Members of the Board of Directors (from January 1, 2001) International Council of Academies of Engineering and Technological Sciences, Inc. (CAETS) President\* FACTE, Finland

Jaakko Ihamuotila 2001 2002 Petr Zuna 2003 Wm. A. Wulf Arne Bjørlykke 2004 John Zillman 2005 2006 Achiel Van Cauwenberghe Jun-ichi Nishizawa 2007 2008 Gerard van Oortmerssen 2009 John Leggat 2010 Klaus Bock 2011 Jose Antonio Ceballos 2012 Rene Dandliker 2013 Janos Ginsztler

Secretary/

Treasurer

2001-present William C. Salmon

United States

HAE, Hungary

EA CR, Czech Republic

NAE, United States

NTVA, Norway

ATSE, Australia

EAJ, Japan

CAE. Canada

AI. Mexico

ATV. Denmark

BACAS, Belgium

AcTI.nl. Netherlands

SATW, Switzerland

\* Serves as president-elect the preceding year and past president the following year.

#### Members of the Board of Directors

2001	Tomokazu Tokuda	EAJ, Japan	Hans Leuenberger	SATW, Switzerland
	David Davies	RAEng, United Kingdom	Juraj Bozicevic	HATZ, Croatia
2002	Raul Flores Berrones	AI, Mexico	Jeno Baratossy	HAE, Hungary
	Anumolu Ramakrishna	INAE, India	Ki-Jun Lee	NAEK, Korea
2003	Claude Lajeunesse	CAE, Canada	Lena Torell	IVA, Sweden
	Andres Ripoll	RAI, Spain	Alvaro Cutinella	ANIU, Uruguay
2004	Torben Klein	ATV, Denmark	XU Kuangdi	CAE, China
	Arturo J. Bignoli	ANI, Argentina	Germain Sanz	NATF, France
2005	Ben Veltman	NFTW, Netherlands	Alec Broers	RAEng, UK
	Ki Jun Lee	NAEK, Korea	Zlatko Kniewald	HATZ, Croatia
2006	Gerardo Ferrando-Bravo	AI, Mexico	Rene Dandliker	SATW, Switzerland
	R.Natarajan	INAE, India	Asko Saarela	FACTE, Finland
2007	Pan Yunhe	CAE, China	Pere Brunet	AIE, Spain
	Bruno Jarry	NATF, France	Petr Zuna	EA CR, Czech Republic
20081	János Ginsztler	HAE, Hungary	Lena Treschow Torell	IVA, Sweden
	Oscar A. Vardé	ANI, Argentina	Eduardo R. Alvarez Mazza	ANIU, Uruguay
2009	Ho Nam Chang	NAEK, Korea	Stanko Tonkovic	HATZ, Croatia
	Charles M. Vest	NAE, USA	Reiner Kopp	acatech, Germany
2010	William Arnot Wakeham	RAEng, UK	Baldev Raj	INAE, India
	Stig Gustavson	TAF, Finland	Kjell Arne Ingebrigtsen	NTVA, Norway
2011	Francois Guinot	NATF, France	Petr Zuna	EA CR, Czech Republic
	Mike Manton	ATSE, Australia	Achiel Van Cauwenberghe	BACAS, Belgium
2012	Jaime Dominguez Abascal	RAI, Spain	Magnus Breidne	IVA, Sweden
	Andrés Tierno Abreu	ANIU, Uruguay	Hiroshi Komiyama	EAJ, Japan
2013	Dongwha Kum,	NAEK, Korea	Bernard Franković	HATZ, Croatia
	Frank Behrendt	acatech, Germany	Bob Pullen	SAAE, South Africa

<sup>1</sup>*Members served one-year terms until 2008; two-year terms thereafter.* 



CAETS Presidents L. to R.: J. Zillman (ATSE), A. Van Cauwenberghe (BACAS), R. Dandliker (SATW), J. Ginsztler (HAE), Zurich, 2012



CAETS Presidents and Sec/Treas. L. to R.: J. A. Ceballos (AI), K. Bock (ATV), J. Leggat (CAE Canada), W. Salmon (US), A. Van Cauwenberghe (BACAS), J. Zillman (ATSE), P. Zuna (EA CR), Copenhagen, 2010

## **CAETS Statements**

Based on the presentations and discussions at the respective meetings, the Statements listed below reflect the collective judgment of the CAETS member academy representatives and other experts present, with the texts agreed at the Council meeting.

- 2005 Oceans and the World's Future
- 2006 The Role of Hydrogen in Our Energy Future

- 2007 Environment and Sustainable Growth
- 2008 Delta Technology: Enabling Life in River Deltas
- 2009 Natural Resources Management and Sustainability
- 2010 Sustainable Food Systems Toward Food for All
- 2012 Urban Development and Public Transportation: Improved Understanding of the Interdependencies

### The Role of Hydrogen in Our Energy Future

#### The Role of Hydrogen in Our Energy Future A Statement by CAETS, International Council of Academies of Engineering and Technological Sciences Brussels, Belgium June 1-2, 2006

Realizing that the problem of supply, distribution and utilization of available energy sources is of paramount importance for the sustainable development of our modern society, CAETS focused the Brussels meeting on the prospective use of hydrogen as an energy carrier. It engaged the views of experts of its member academies, many of which have already undertaken in-depth studies on these problems and formulated important advice to their national governments.

Recommendations on the use and potential of hydrogen were formulated, as were some general considerations on the energy problems the world is facing.

Fossil fuels will remain the first and most important source of energy for the coming decades. However, since fossil fuel reserves are finite and their use releases greenhouse gases, the following actions are appropriate in order to meet the world's long-term energy needs:

- Promote energy saving measures and enhance the efficiency of energy use.
- Develop non-conventional fossil fuels (e.g., tar sand).
- Use renewable energy sources. (It should be understood, however, that this is not the solution to the energy problem in the next decades).
- Consider nuclear energy for electricity.

Since "business as usual" energy scenarios are not sustainable, CAETS concludes and recommends urgent attention to the following issues:

1. Our governments should develop energy policies based on comprehensive long-term strategies, which include all major potential sources of energy. These strategies should give priority to RD&D projects that will improve energy efficiency and reduce CO2 emissions. Any longterm energy policy should increase the supply of renewable energy and explore the potential of hydrogen as an energy carrier.

- 3. At the present time, the transport sector seems to be the most promising candidate for the first large-scale application of hydrogen. R&D to facilitate break-throughs in fuel cell costs, fuel cell durability, and on-board hydrogen storage systems should be given high priority.
- 4. Large-scale production of electricity from hydrogen appears inappropriate from technical, economical and environmental standpoints. However, in cases of excess electricity capacity, production of hydrogen from electricity (electrolysis) could be economically viable. During peak demand for electricity, the stored hydrogen

could be used to generate electricity by fuel cells to return to the grid.

- 5. In the short term, natural gas conversion (reforming) will remain the primary source for hydrogen production. Although this is a rather mature technology, research on efficiency improvements should be continued. Small-scale natural gas reforming will be an important source for hydrogen during the transition to a full-scale hydrogen economy. Hydrogen from industry by-product (i.e., coke-oven gas and hydrogen from the chlorine alkali industry) could be collected and then purified to supply part of the hydrogen.
- 6. Coal will remain an important source of primary energy for many decades with a noticeable price advantage over natural gas. More RD&D is needed on carbon dioxide capture and storage, which will benefit both electricity generation and hydrogen production from coal.
- 7. If new high-temperature nuclear reactors are developed, research on hydrogen generation from nuclear heat should be promoted.

International Council of Academies of Engineering and Technological Sciences

- 8. Wind energy-to-hydrogen and biomass-to-hydrogen are recognized as important potential technologies for hydrogen production. Exploratory and fundamental research on photo-biological and photo-electrochemical processes should not be neglected.
- 9. As reliable technical and economical data can only be obtained by practical experience, demonstration projects should be started in the various fields of hydrogen production, storage, transport and utilization. Information and campaigns on hydrogen must address public safety concerns in addition to the advantages that hydrogen use could bring to society in the long term.
- 10. Given the amount of work to be done, international cooperation (e.g., on the level of the IEA) is essential to provide guidance and support on key technical challenges and to push for worldwide standards and regulations for hydrogen end-use products (e.g., vehicles using hydrogen as an energy source).

### The Role of Hydrogen in Our Energy Future

A Statement by CAETS, International Council of Academies of Engineering and Technological Sciences Brussels, Belgium June 1-2, 2006

Realizing that the problem of supply, distribution and utilization of available energy sources is of paramount importance for the sustainable development of our modern society, CAETS focused the Brussels meeting on the prospective use of hydrogen as an energy carrier. It engaged the views of experts of its member academies, many of which have already undertaken in-depth studies on these problems and formulated important advice to their national governments.

Recommendations on the use and potential of hydrogen were formulated, as were some general considerations on the energy problems the world is facing.

**CAETS** is the **International Council of Academies of Engineering and Technological Sciences, Inc.** It consists of those national academies of engineering and technological sciences that have satisfied an agreed set of criteria for membership. It was established in 1978 and was incorporated as a charitable non-profit corporation in the District of Columbia (US) in 2000. Its Articles of Incorporation, Bylaws and Operating Procedures set down its objectives and governance arrangements. Its membership and achievements are set down in the CAETS publication *The First 25 Years 1978-2003*.

# **CAETS Reports**

The producing organization and, where different, the publisher is listed.

- 1987 The International Meeting on Engineering Education for the 21st Century; Proceedings; The Fellowship of Engineering, United Kingdom
- 1991 Report of the Third Workshop on Engineering Education; The Fellowship of Engineering, United Kingdom
- 1991 Harnessing Engineering and Technology for Economic Growth: Opening the Dialogue Between the Engineering Communities of the East and West; Summary Report of the Budapest Conference; National Academy of Engineering, United States

Harnessing Technology for Development; Summary Report of the Eighth Convocation; National Academy of Engineering, United States

- 1992 Technical Resource Information for Central and Eastern Europe; National Academy of Engineering, United States
- **1993** The Role of Technology in Environmentally Sustainable Development; Declaration of the Council of Academies of Engineering and Technological Sciences; Royal Swedish Academy of Engineering Sciences (Edition for the 1996

UN Conference on Human Settlements [HABITAT II] published by the National Academy of Engineering, United States)

- 1994 Engineering Education Report of the Working Party; Netherlands Academy of Technology and Innovation (formerly Netherlands Society of Technological Sciences and Engineering); published by CAETS
- 2004 Global Energy Foresight; The Norwegian Academy of Technological Sciences; published by CAETS
- 2006 Clean Energy for this Century; Royal Belgian Academy Council of Applied Sciences (BACAS)
- 2007 International Engineering Education; Indian National Academy of Engineering
- 2010 Deployment of Low Emissions Technologies for Electric Power Generation in Response to Climate Change; CAETS Working Group on Low Carbon Energy Technologies; published by ATSE
- 2013 Opportunities for Low Carbon Energy Technologies for Electricity Generation to 2050; CAETS Committee on Energy; published by CAETS



### Proceedings of CAETS Convocations

- 1980 The Management of Technological Change; Proceedings of the Second Convocation; Australian Academy of Technological Sciences
- **1981** Engineering Education; Proceedings of the Third Convocation;

National Academy of Engineering, Mexico

**1983** Important Technological Trends; Proceedings of the Fourth Convocation;

Royal Swedish Academy of Engineering Sciences

1985 The Global Interaction of Technology; Proceedings of the Fifth Convocation; The Fellowship of Engineering, United Kingdom

**1987** Globalization of Technology: International

- Perspectives; Proceedings of the Sixth Convocation, National Academy of Engineering, United States
- **1988** Technology for Living on the Frontiers; Proceedings of the Seventh Convocation Australian Academy of Technological Sciences and Engineering
- 1990 Harnessing Technology for Development; Proceedings of the Eighth Convocation; National Academy of Engineering, Mexico
- **1992** The Technological Future; Proceedings and Executive Summary of the Ninth Convocation; Danish Academy of Technical Sciences
- 1993 Sustainable Development: The Challenge of Developing Transportation for Society; Proceedings of the Tenth Convocation (with SATW supplement on Sustainable Mobility); Swiss Academy of Engineering Sciences

- 1995 Creating Wealth In Harmony With the Environment; Proceedings of the Eleventh Convocation; Royal Swedish Academy of Engineering Sciences
- 1997 Engineering Innovation & Society; Proceedings of the Twelfth Convocation;

The Royal Academy of Engineering, United Kingdom

**1999** Technology and Health; Proceedings of the Thirteenth Convocation;

Council for Applied Sciences of the French Academy of Sciences

2001 World Forests and Technology; Proceedings of the Fourteenth Convocation;

The Finnish Academies of Technology

2003 Entertaining Bytes; Proceedings of the Fifteenth Convocation;

National Academy of Engineering, United States (CD only)

2005 Oceans and the World's Future; Proceedings of the Sixteenth Convocation;

Australian Academy of Technological Sciences and Engineering, Australia

2007 Environment and Sustainable Growth; Proceedings of the Seventeenth Convocation; The Engineering Academy of Japan

### Rotation Schedule – January 2013

This schedule is updated each January. The member academy at the top of the list hosts the Annual Meeting of the Council, and Symposium or Convocation and provides the president. The second member academy on the list nominates the presidentelect. At the end of the year, the member academy hosting the meetings goes to the bottom of the list and provides the Past President. The term of office for the President, President-elect and Past President are each one year. It is expected that the same person, once elected President-elect, will serve in the three positions during the three year period.

Eight other member academies, distributed throughout the list, each provide a Board Member for a two-year term. The Council elects the President-elect and four Members of the Board of Directors for the next year at its annual meeting. Member academies with representatives on the Board must be members in good standing. Terms of office begin January 1. (Note: Board Members served one-year terms until 2008, and two-year terms thereafter.)

When elected to membership in CAETS, new member academies are placed at the bottom of the list in the order completed applications are received. By mutual agreement and with approval from the Board of Directors, member academies may exchange places on the Schedule.

Year elected, with actual through 2013 and scheduled. (P – Pres., PE – Pres.-Elect, PP – Past Pres., 3P - 3 positions; BM – Board Member; beginning with 2008 BM tour is two years).

Member Academy	Office	Host of Meeting
HAE, Hungary	BM 02, 08, PE 12, P 13, PP 14	2013 Annual Meeting
CAE, China	BM 04, 07, PE13, P14, PP15	2014 Convocation, 20 <sup>th</sup>
INAE, India	BM 02, 06, 10, PE 14, P15, PP16	2015 Annual Meeting
RAEng, United Kingdom	BM 01, 05, 10, PE15, P16, PP17	2016 Annual Meeting
RAI, Spain	BM 03, 07, 12, PE16, P17, PP18	2017 Annual Meeting
ANI, Argentina	BM 04, 08, 15, PE17, P18, PP19	2018 Annual Meeting
IVA, Sweden	BM 03, 08, 12, PE 18, P 19, PP 20	2019 Annual Meeting
NAEK, Korea	BM 02, 05, 09, 13	
HATZ, Croatia	BM 01, 05, 09, 13	
ANIU, Uruguay	BM 03, 08, 12	
NATF, France	PP 01, BM 04, 07, 11	
TAF, Finland	P 01, PP 02, BM 06, 10, 15	2001Convocation, 14 <sup>th</sup>
EA CR, Czech Republic	3P 01-03, BM 07, 11	2002 Annual Meeting
NAE, USA	3P 02-04, BM 09, 14	2003 Convocation, 15 <sup>th</sup>
NTVA, Norway	3P 03-05, BM 10, 15	2004 Annual Meeting
acatech, Germany	BM 09, 13	
ATSE, Australia	3P 04-06, BM 11	2005 Convocation, 16 <sup>th</sup>
BACAS, Belgium	3P 05-07, BM 11	2006 Annual Meeting
EAJ, Japan	BM 01, 3P 06-08, BM 12	2007 Convocation, 17 <sup>th</sup>
AcTI.nl, Netherlands	BM 05, 3P 07-09, BM 14	2008 Annual Meeting
IAS, Slovenia	BM 14	
SAAE, South Africa	BM 13	
CAE, Canada	BM 03, 3P 08-10, BM 15	2009 Convocation, 18 <sup>th</sup>
ATV, Denmark	BM 04, 3P 09-11, BM 14	2010 Annual Meeting
AI, Mexico	BM 02, 06, 3P 10-12	2011 Convocation, 19 <sup>th</sup>
SATW, Switzerland	BM 01, 06, PE 11, P 12, PP 13	2012 Annual Meeting

# **CAETS People & Places**



Edinburgh, 1997



Geneva, 2011



Calgary, 2009



Copenhagen, 2010

Zurich, 2012



Copenhagen, 2010

Awaji, Japan, 2000



Sophia Antipolis, France, 1999



Copenhagen, 2010



The Hague, 2008





International Council of Academies of Engineering and Technological Sciences, Inc. (CAETS)