



## Latest news

- President of the Republic of Croatia has visited HATZ
- Voted and formally recognized the new Statute of the HATZ
- Members of the HATZ awarded by the National Awards for Science
- “Annual 2009 of the Croatian Academy of Engineering” is published

## New Technologies

### Color Management Expansion on Infrared Spectrum with the INFRAREDESIGN Theory

At the beginning of INFRAREDESIGN (IRD) discovery, our research has mainly dealt with the “carbon black” color which has excellent properties in the near infrared (NIR) spectrum. Fortunately, precisely that color, marked by graphic artists as K, is used as a substitute for the same CMY (Cyan, Magenta, Yellow) application, whereby they are replaced. This is known as GCR (Grey Component Replacement), UCR (Under Color Removal) and UCA (Under Color Addition) separation system in the process of reproduction. We set CMYKIR (Cyan, Magenta, Yellow, Black, InfraRed) algorithm of separation [1], tested and applied to many materials and graphical representations of hidden images [2]. A general theory was developed with five set principles [2] on which CMYKIR separation is based. Each ton of color was associated with the continuous space of CMY and K replacement with respect to RGB settings and color settings by which are defined materials and properties of color penetration on material on which it is applied. The continuous space of CMY and K replacement allowed separation with information brought by the external image ignoring abovementioned GCR and other methods. Two information are merging as two separate images or as two pieces of information generated with computer graphics algorithm [3]. The method uses properties of CMYK (Cyan, Magenta, Yellow, Black) process colors continuously from value  $X_0$  to  $X_{\max}$  [1]. In contrast to these four process colors, the industry uses a vast number of colors with custom mixed inks in many gradations. Their common name is spot color.

Two properties of matter: first; light absorption and reflection (A/R) from matter create experience of color in our eyes for wavelengths of 400 to 700 nm, other wavelengths are invisible for our eyes. Secondly; instrument can measure ratio of A/R light from matter and such information display as an image regardless of which wavelengths are present. Our focus is on the near infrared region. Visible region is described by three independent values in one of the systems, either RGB (Red, Green, Blue), or Lab (Lightness a b), or for example HSB (Hue Saturation Brightness). For the NIR region we are introducing the fourth value Z. Therewith we are suggesting the extended ZRGB space covering waveband from 400 to 1000 nm. It has



## CONTENTS

Color Management Expansion , on Infrared Spectrum with the Infraredesign Theory .....	1
Visit of the President of the Republic of Croatia to the HATZ .....	3
Higher Education Learning Partnerships – The Results of the TEMPUS HELP project .....	4
News – new Statute of HATZ.....	5
“Annual 2009 of the Croatian Academy of Engineering” .....	6
National Awards for Science .....	
Short CVs of the awarded HATZ members.....	
25 <sup>th</sup> Assembly of the HATZ.....	9
Short description of the HATZ Awards .....	9
Life Award “The Power of Knowledge” .....	10
Annual Awards “Rikard Podhorsky” .....	10
Awards to the Young Scientist “Vera Johanides” .....	10
Acknowledgements .....	10
Celebration of the 340 <sup>th</sup> Anniversary of the University of Zagreb and the Day of the University – 2009 <sup>th</sup> year .....	11
Short CVs of the promoted to the Professors Emeriti and awarded members of the HATZ.....	12
CAETS .....	14
Euro – CASE.....	16

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*An example of INFRAREDESIGN pictures (RGB and Z)*

been proven that there is no correlation between Z, R, G and B values. This means that we can create an infinite number of RGB colors with same Z and same RGB color tones for different Z.

Our eyes don't perceive the Z value. It is measured instrumentally, and its A/R value is brought in our eyes with the IR camera as a grayscale image. It is possible to make an invisible graphic, which is manifested in a different waveband: invisible in the visible spectrum (VS) and visible in the NIR. And opposite result: visible in the VS and invisible in the NIR [4]. Color management that deals with wavelength range from 400 to 700 nm, we are expanding to 1000 nm and it also has implementation [5]. The outcome is new knowledge about mixing dyes, pigments, and about properties of absorption and reflection of light from matter.

## Reviews, awards and public response

Coming out of the laboratory experimental conditions and revealing of the first results in scientific journals, conferences and dissertation defenses at our university, was testing of the set thesis on the management of dyes with intention of creating a double image. We obtained confidence to open a new door: we entered worldwide exhibitions of innovation and competitions in which we presented INFRAREDESIGN to the panel of top experts. They evaluate innovations according to several criteria, especially their impact on the practical applicability and potential market success.

Achieved awards and recognitions ([www.infraredesign.net](http://www.infraredesign.net)) from European metropolis via England, Germany, Romania, Hungary, Spain, Greece, to Russia, Taiwan, United States, Malaysia, India, and finally, Croatia, gave us confidence that the innovation is at the global level and it is completely original, practical and extremely valuable for today's state of



*INFRAREDESIGN team. From left: V. Žiljak, I. Stanimirović, J. Vujić, K. Pap*

technology and global market. These awards attract media, potential customers, but also ordinary citizens. Therefore, we had to customize IRD innovation for such a manner of presentation. International judges and their way of assessing and evaluating further influenced designing of the IRD technology towards better visibility and easier comprehension of the essence of the invention itself. That led to a new innovation of ZRGB apparatus with dual cameras.

With this apparatus the area of detection of absorption and reflection of light received a new value at laboratory and presentation level. It created a new way for further fundamental and experimental development aimed at research of properties of various materials, and specific reactions of flora and fauna in the near-infrared range.

Participation at the World Exposition in itself carries a level of security in terms of the invention. When we appear with different variations of our invention in the form of article, newspaper report, television show or presentations at international exhibitions of invention, we are consciously exposing ourselves to the judgment of world's intellectual, innovative and amateur public. It is essentially a primary test for the innovation itself, how much of its own strength as an idea does it have to be accepted by the broad scientific and professional milieu. We decided that the innovation itself becomes a brand name INFRAREDESIGN which is nowadays recognized both in the international scientific community as well as among common people. In Croatia IRD is recognized as a top national achievement, made here, conceived and theoretically explained. In all this, associations of innovation play an important role because through them we entered innovation exhibitions, but also colleagues from different universities and schools, and businesses that have helped in the implementation of expensive testing.

Courage to move in the direction of commercialization with our innovative idea would not exist if all mentioned procedures were not performed, from writing research papers to awards received at international exhibitions followed by media coverage and public recognition. IRD is such a powerful innovation that so far has no competitive ideas because of its easy recognition and detection by which protects itself throughout the whole time.

## Some references of the authors on innovation Infraredesign

1. Žiljak, Vilko; Pap, Klaudio; Žiljak, Ivana. CMYKIR security graphics separation in the infrared area. // *Infrared Physics and Technology* (ISSN 1350-4495) 52 (2009), 2-3; 62-69
2. Pap, Klaudio; Žiljak, Ivana; Žiljak-Vujić, Jana. Image Reproduction for Near Infrared Spectrum and the Infraredesign Theory. // *The Journal of imaging science and technology* (ISSN 1062-3701) 54 (2010), 1; 10502 -1-10502 -9
3. Pap, Klaudio; Žiljak, Ivana; Žiljak-Vujić, Jana. Process color management for producing double images. // *Annual 2008 of the Croatian Academy of Engineering* (ISSN 1332-3482) 1 (2008); 395-410
4. Žiljak, Vilko; Pap, Klaudio; Žiljak, Ivana. Infrared hidden CMYK graphics. // *Imaging science journal* (ISSN 1368-2199) 58 (2010), 1; 20-27
5. Žiljak, Ivana; Pap, Klaudio; Žiljak-Vujić, Jana. Infrared design on textiles as product protection. // *Tekstil* (ISSN 0492-5882) 58 (2009), 6; 239-253

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## **President of the Republic of Croatia Prof. Ivo Josipović, Ph.D. has visited the Croatian Academy of Engineering**

On Wednesday, September 15th, 2010 the President of the Republic of Croatia Prof. Ivo Josipović, Ph.D. with associates paid a visit to the Croatian Academy of Engineering in Zagreb, Kačićeva 28. He has met the members of the Governing Board of the Academy lead by its President Prof. Stanko Tonković, Ph.D. Members of the Academy



have informed the President about the history, organization, activities, publications and aims of the Academy from its foundation in 1993 up to now, and thanked him for the visit and interest in the work of the Academy. Special attention has been paid to the results obtained at home and abroad, as well as to the association with other related Academies around the world. Members of the Governing Board of the Academy acquainted the President with their plans for the future and wishes that the Government, the Croatian Parliament, ministries and economic sector of Croatia would benefit even more from the knowledge and experience of the members of the Croatian Academy of Engineering. Some of them are more renowned abroad than at home (best emphasized at the presentation of the latest achievement of Croatian scientists called

“Infraredesign”, also having been presented to the President of the Republic of Croatia).

The President has pointed out that education in the field of engineering sciences and application of technical achievements in industry today represent some of more important factors for the faster coming out of the recession we have found ourselves in. Without a more significant integration of technical and biotechnical achievements within our economy, Croatia could not set off with its technological development and preserve the quality of its environment, with the possible lag behind to be perceived in particular at the moment of entering the EU.



During his visit the President has received a Medal of the Croatian Academy of Engineering, the highest recognition the Academy awards to individuals, the importance of which could best be suggested by the fact that the President of the Republic of Croatia is only the second person receiving the Medal.

*Stanko Tonković*



## Higher Education Learning Partnerships – The Results of the TEMPUS HELP project

Over the past two decades Central and Eastern Europe has experienced unprecedented economic, social and political change. The process of transition has required significant adaptations at all levels of the economy and society. Most relevant to the HELP project, which has been funded with European Commission TEMPUS support, from 2009 to 2012, are those new skills needed by enterprises and their labour forces that contribute to encouraging innovation, increasing competitiveness and raising productivity. However, the reform of adult learning and skills training in Central and Eastern Europe has been slow.

Rates of participation in training continue to lag behind average levels in the European Union. In Croatia, according to the data from 2007, only 2.9% of the adult participated in the training, while in United Kingdom 26.6%. This needs to be addressed if Europe as a whole is to become the most competitive and dynamic knowledge-based economy in the world. Training must not be seen as an option but rather a fundamental component of good business practice. By improving competitiveness at different levels, training enables businesses to realise their goals more efficiently and effectively. The bottom line is that training directly affects business profitability.

A main concern of the HELP project is to raise awareness of the importance of training in successful business. As part of the project a training needs analysis (TNA) was undertaken in Croatia, Hungary, Romania and Serbia to understand better the training situation in the region. It explored employers' attitudes towards training, current training practices and the nature of current skill shortages.

The distribution of companies by size that participated in the Croatia TNA was: micro 4.4%, small 6.7%, medium 26.7%, and large 62.2%. Most companies, especially

smaller ones, were enthusiastic about the prospect of cooperation. For higher level employment categories, the businesses surveyed considered a combination of qualifications and experience important in the workplace. Work experience alone was considered more relevant to the employment of unskilled workers. Most employers were satisfied with the willingness of graduates to learn, their theoretical knowledge and communication skills. The lowest levels of satisfaction were expressed for the organisational and practical skills of graduates. The most important skills indicated were organisational, leadership and communication but these are often lacking. The lowest ranking in importance in the workplace was soft skills. Most businesses indicated a willingness to invest in training programmes. The objectives of training programmes had the strongest influence on businesses when choosing training. Of those surveyed a majority confirmed that a One Stop Shop would contribute significantly to meeting the training requirements of their business.

The close correspondence of the results between countries suggests the pressing need to increase the availability of and access to demand-driven training. One way to realise this is for education institutions to work more closely with business in mutually beneficial partnerships structured around training and business development. In this way, the relevance of education and training can be improved and applied towards improving business productivity, employment opportunities, personal, national and regional prosperity.

Prof.dr. Milena Mandić, contact person for Croatia,  
Faculty of Food Technology, Osijek

<http://ptfos.hr/index.php/en/projects#help> or  
[www.tempus-help.uns.ac.rs/](http://www.tempus-help.uns.ac.rs/)



## News

## New Statute of the Croatian Academy of Engineering has been verified

After the vote, the new Statute was unanimously adopted at the Annual Assembly of the Academy held on March 27, 2010.

By the decision of the City Office for General Administration of the City of Zagreb of May 14, 2010, registration of the new Statute of the Academy was granted in the Register of Associations of the Republic of Croatia was granted under number 00001146.

Upon the entry into force of this Statute, the Statute of the Croatian Academy of Engineering from May 28, 2003 becomes invalid, as well as the amendments of November 5, 2004 and February 28, 2006.

The most important changes are as follows:

### ➤ Departments of the Academy (*renamed*)

1. Department of Architecture and Urban Planning
2. Department of Bioprocess Engineering
3. Department of Electrical Engineering and Electronics
4. Department of Power Systems
5. Department of Civil Engineering and Geodesy
6. Department of Graphical Engineering
7. Department of Information Systems
8. Department of Chemical Engineering
9. Department of Communication Systems
10. Department of Transport
11. Department of Mining and Metallurgy
12. Department of Mechanical Engineering and Naval Architecture
13. Department of Systems and Cybernetics
14. Department of Textile Technology.

### ➤ Categories of the members of the Academy are as follows:

- **natural persons**
  - Member of the Academy
  - Associate Member of the Academy
  - Member Emeritus of the Academy
  - Honorary Member of the Academy
  - International Member of the Academy
- **legal entities and natural persons from legal entities or independent from legal entities supporting the work of the Academy**
  - Member Amicus of the Academy
  - Supporting Member of the Academy.

### ➤ X. TRANSITIONAL AND FINAL PROVISIONS

#### Article 46

Upon the entry into force of this Statute Regular Members of the Academy become Full Members and Associate Members of the Academy are included in the process of determining eligibility (points) for the acquisition of status by the Academy under the Regulations on the Election of the Academy Members. Associate Members who are eligible for a category of members of the Academy become Full Members of the Academy.

Associate members who are not translated in the Academy Full Members in accordance with the preceding paragraph may subsequently meet the established conditions (points) for members according to the Regulations on the Election of the Academy Members and become Full Members of the Academy. Otherwise they retain the same status of Associate Members, and all vested rights acquired under the Statute of the Croatian Academy of Engineering from February 28, 2006 as Associate Members.

At the Associate Members of the preceding paragraphs shall not apply pre-condition of the obligation of being Associates of the Academy for translation into the category of the Full Academy Member.

Upon the entry into force of this Statute Associate Members become Associates of the Academy, Members Emeriti become Emeriti of the Academy, Honorary Members become Honorary Members of the Academy, Corresponding Members become International Members of the Academy, Members Amici become Members Amici of the Academy, and Supporting Members become Supporting Members of the Academy.

#### Article 26

The Assembly may decide in plenary session or outside the sessions by the electronic voting of all members of the Assembly.

Therewith REGULATION ON THE ELECTION OF MEMBERS OF THE CROATIAN ACADEMY OF ENGINEERING also enters into force as “internal regulation”.

All available at <http://www.hatz.hr/>.

Stanko Tonković

We are glad to inform you that during June, 2010. we have published our new yearbook

## “Annual 2009 of the Croatian Academy of Engineering”

### Editorial

#### Dear readers,

As you can see, the Annual 2009 of the Croatian Academy of Engineering has been actually divided into three parts.

#### Part I. Papers

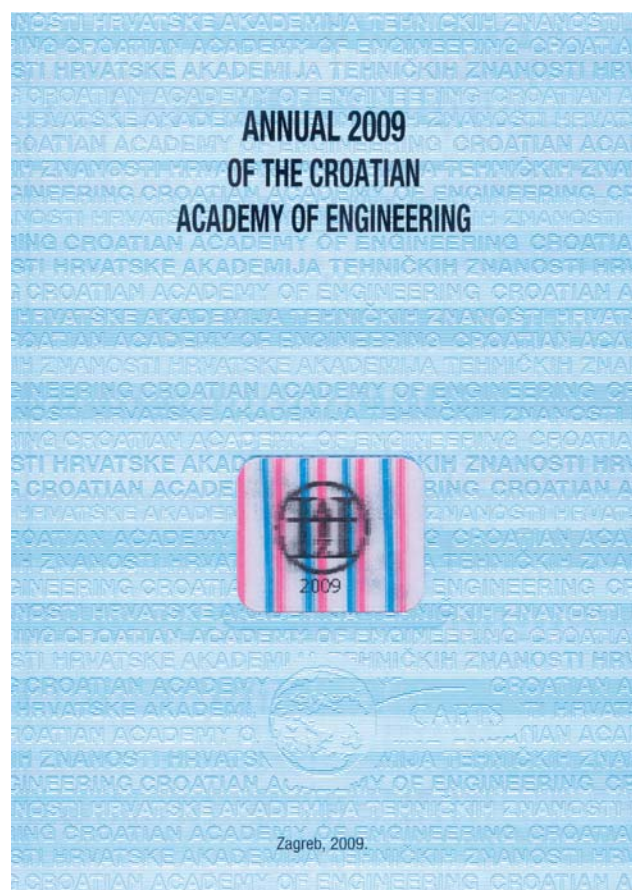
As one of the differences or changes from the past Annuals, the authors of the Part I. – Papers in the *Annual 2009* are the members of the Croatian Academy of Engineering, participants of several conferences sponsored by our Academy, or members of some of the sponsor organizations. The arrangement of papers has been done following the contributions and contents of the papers, i.e. the first two of them are of the general interest, the next four are from the field of geoinformation, the next three deal with the issues from the scientific field of graphical engineering, and the last four papers are from different scientific fields.

#### Part II. International Cooperation

In this part we have presented the main news related to the international cooperation of the Academy, concerning the agreements and the news from the CAETS and the Euro-CASE.

#### Part III. WHO IS WHO in the Croatian Academy of Engineering

This part is issued regularly when some changes in the Academy's membership occur. The latest one is related to the 24<sup>th</sup> Annual (Elective) Assembly held on March 14<sup>th</sup>, 2009. According to proposals of the Departments of the Academy, the elections for the promotion of the existing Members, or the admission of new Collaborating Mem-



bers of the Academy, have taken place. The new list of members and their status is presented herein.

At the end, I am very pleased to have the opportunity to extend my sincere thanks to all sponsors and to all who had contributed, by investing their time and efforts, in publishing of this Annual that we have in front of us.

All papers have been reviewed, but not English language edited. Each author has provided for her or his paper's proof-reading.

*Prof. Stanko Tonković, Ph.D.  
Editor-in-Chief*



## State Awards for Science

31 State Awards for Science for 2009 were granted on the occasion of Croatian Independence Day on October 8, 2010. State Awards for Science are granted for exceptional achievements in scientific research, new scientific discoveries and scientific accomplishments made by the implementation of the results of scientific research achieved by scientists, researchers and junior researchers. Four types of awards are granted – for Lifetime Achievement, Annual Award for Science, Annual Award for Popularization and Promotion of Science and Annual Award for Junior Researchers.

The awards have been presented to the winners by the Minister of Science, Education and Sports, **Radovan Fuchs**. In his speech he has said that science and the rewarded scientists highly contribute to the development of Croatia, showing them by State Awards that scientific research and knowledge-based society are being encouraged on the highest level. He has emphasized that science can be developed only in conditions of full freedom of research and hence all that stands in the way represents an obstacle to the development of the country. *Science is an area where we can compete on an equal footing with countries that are financially much stronger than us*, said the Minister.



Academician **Ivo Senjanović** was born in Split in 1940. He received high education at the University of Zagreb: he graduated from the Faculty of Mechanical Engineering and Naval Architecture (FAMENA) in 1967, got his M.Sc. degree at the Faculty of Civil Engineering in 1969, and Ph.D. degree at the Faculty of Mechanical Engineering and Naval Architecture in

1970. He was employed at the Ship Research Institute from 1967 until his transfer to FAMENA, where he was elected for assistant in 1969, assistant professor in 1972, associated professor in 1978, and full professor in 1983. He was visiting researcher at the University of California, Berkeley, 1973, and at Det Norske Veritas 1974/75.

He has published over 200 papers in distinguished national and international journals. He is a recognized scientist in the field of shell theory and submarine strength, numerical methods for strength and vibration analysis of ship and offshore structures, thin-walled girder theory with application to ship structures, non-linear dynamics and chaotic motion of ship and floating units in waves, launching of ships from horizontal berth by means of turning pads, design of cargo tanks on liquefied gas carriers, hydroelastic analysis of container ships etc. His team from FAMENA takes part in EU project Tools for Ultra Large Container Ships (TULCS), together with 12 European institutions under the leadership of Bureau Veritas, Paris.



We are proud that the Lifetime Achievement Award has been given to the member of the Croatian Academy of Engineering **Ivo Senjanović** (for engineering), the Annual Award for Science in natural sciences for bio-sciences to the members **Gordana Kralik** and **Jagoda Šušković**, and the Annual Award for Popularization and Promotion of Science to the member **Josip Marušić** (for engineering).

He successfully uses his knowledge and skill for solving challenging technical problems for needs of Croatian Shipyards and foreign companies. He helped in introducing contemporary methods and engineering tools in the practice of Croatian shipyards, which raised the competitiveness of Croatian shipbuilding industry on the demanding world market and increased the quality of produced ships.



Prof. **Gordana Kralik**, Ph.D. was born in Kneževu in 1943. She graduated from the Faculty of Agriculture in Osijek in 1965 in Agronomy, scientific field Animal Science. In 1974 she obtained Master of Science Degree in Biotechnical Sciences, Agronomy, Animal Science. She obtained PhD (in Food Chemistry and Technology) in 1976 from the

Faculty of Food Technology in Zagreb and another PhD in 1985 in Biotechnical Sciences (Agronomy) from the Faculty of Agriculture in Osijek. She started her scientific career at the Faculty of Agriculture in Osijek, being appointed young researcher in 1968, scientific assistant in 1974, assistant professor in 1977, associate professor in 1980 and full professor in 1987. The Senate of Josip Juraj Strossmayer University of Osijek promoted her to full professor in tenure in 1997. Within undergraduate and graduate university study programs of Special Zootechniques she teaches courses "Biological and Zootechnical

Principles in Pig production”, “Biological and Zootechnical Principles in Poultry Production” and “Biometrics in Zootechniques”. She is a coordinator of postgraduate doctoral study “Animal Breeding” and postgraduate master study “Production Systems in Animal Breeding”. She also coordinates several international and national scientific projects. As a coauthor she published 326 scientific and 61 professional papers, 10 books and 3 monographs. She participated in over 60 international scientific symposia. In September 1999 she was conferred a title Doctor Honoris Causa from the Pannonia University of Agronomy in Keszthely, Hungary. In 2009 she was elected as associate member of Croatian Academy of Engineering, within the Department of Bioprocess Engineering. In 2010 she was conferred the State Award for Science 2009 for the area of Biotechnical sciences. Since 1998 she is rector of Josip Juraj Strossmayer University of Osijek.



Prof. **Jagoda Šušković**, Ph.D. (Klobuk, Ljubuški, 1955); full professor with permanent title at the Faculty of Food Technology and Biotechnology University of Zagreb. Her scientific work covers different fields of biotechnology, biochemical engineering and industrial microbiology, with special interest in biotechnological production of microbial meta-

bolites (lactic acid, antibiotics, alkaloids, amylolytic and proteolytic enzymes), and production and application of lactic acid bacteria as probiotics and functional starter cultures. For her contribution in the development of probiotic concept and application of starter cultures in Croatia, she has received National Award for Science for the year 2009. She has also won 1<sup>st</sup> Award of the Association of Polish Inventors and Rationalizers, for the production and application of starter cultures, on the 5<sup>th</sup> International Fair of Innovations, New Ideas, Products and Technologies ARCA (2007), Annual Award “Rikard Podhorsky” of the Croatian Academy of Engineering (2006) and Acknowledgement for the long-time successful cooperation and extraordinary contribution in the promotion of high education, science and profession on the occasion of 50th anniversary of the Faculty of Food Technology and Biotechnology University of Zagreb (2006). She is chief-coordinator of doctoral study in “Biotechnology and Bioprocess Engineering” and undergraduate study “Biotechnology” at the Faculty of Food Technology and Biotechnology. She is a member of the National Board for the Biotechnical Sciences and the Editorial Boards of the scientific journals “Food Technology and Biotechnology” and “Mljekarstvo”.



Prof. **Josip Marušić**, Ph.D. is born on 3<sup>rd</sup> February at Jamena. Graduated from the high-school in 1961 at Vinkovci. Got a degree in C.E. in 1966, awarded BSc in 1980, and got his Ph.D. in 1986 at the Faculty of Civil Engineering University of Zagreb. From 1967 to April, 1981 he worked as a design engineer, construction site manager, and technical and

chief director of the “Biđ-Bosut” water supply company in Vinkovci. Since 1981, he is employed with the Faculty of Civil Engineering University of Zagreb. From 1981 to 1986 as senior lecturer, assistant professor until 1991, associate professor until 1997, full professor until 2001 and full professor with tenure since 2001. He is a mentor of 115 degree dissertations and 3 master’s theses, and a mentor of 1 and co-mentor of 2 Ph.D. degree dissertations. According to the contractual cooperation programme with the Croatian Waters he was in charge as coordinator and the chief person responsible for conducting the process of working out the “Long term water management development plan from 1986 to 2005” and “Danube-Sava Multi-purpose Canal”. He is a scientific expert and consultant for water management. He was a main coordinator of research and study projects according to the programme of Water Management Company and the Ministry of Science and Technology from 1992 to 2000. A vice-president of Croatian Waters Management Board from 1991 to 1994, and the Head from 1994 to 2000. A Head of hydro-engineering section in the project “The Plan of Irrigation and Management of Agricultural Land and Waters in Croatia 2004 and 2005”, and a member of the Expert Team for the monitoring of the works’ execution. Until today, he published in total 235 papers (47 at international scientific conferences, 22 in public proceedings of the HAZU, 26 chapters in books and manuals, 30 in public proceedings of domestic conferences with international participation, 29 in domestic scientific journals, and 81 of other expert and scientific studies). A head of 16 scientific and organization boards, and a member of 47 Review committees and Editorial staff member of public proceedings in Croatia (35) and abroad (12). Editor-in-chief of a scientific journal HRVATSKE VODE. and Organizing committees. He is a member of ICID, IAH, IWRA. In April, 2002 he became a full member of the Croatian Academy of Engineering. In October, 2005 he became a full member of the Scientific Committee for Transportation of the Croatian Academy of Science and Arts.



## 25<sup>th</sup> Assembly of the Croatian Academy of Engineering

Annual Assembly of the Croatian Academy of Engineering was held on March 27<sup>th</sup>, 2010 at the Grand Hall of the Faculty of Mining, Geology and Petroleum Engineering and the Faculty of Food Technology and Biotechnology, Pierottijeva 6, Zagreb. The Assembly was attended by 92 members of the Academy and distinguished guests from the academic community. The Assembly was opened by Prof. Stanko Tonković, Ph.D., the President of the Academy who extended greetings and support of the President of the Republic of Croatia, Prof. Ivo Josipović, Ph.D. and the premier, Mrs. Jadranka Kosor. After welcoming speeches of the guests the Assembly continued with its work out of which relevant information about the activities in the previous year were presented.

- At the Euro-CASE Board Meeting in Paris in May 2009 the Academy became full member of Euro-CASE. Thus the Academy has become 21<sup>st</sup> member of this eminent international association of national academies of engineering and the only one from a non-member country of the European Union.
- On June 23<sup>rd</sup>, 2009 “Agreement on Cooperation between Croatian Academy of Engineering and Austrian Academy of Science” was signed as the first agreement of our Academy with an academy of science.
- On September 11<sup>th</sup>, 2009 the Ministry of Science, Education and Sports of the Republic of Croatia gave a permit to the Academy for conducting research activities in the field of technical sciences and the Academy was registered in the Register of Scientific Organizations under No. 0338.
- At the proposal of the Ministry of Science, Education and Sports the Academy has taken over the organization of the 300<sup>th</sup> anniversary of the birth of Ruđer Bošković. Financing options are being considered at the moment. Central celebration is scheduled for May 18<sup>th</sup>, 2011.
- Throughout 2009 and up to now the Academy has taken auspices or co-patronage over 14 scientific, scientific and professional or professional conferences.
- On the basis of the results of secret voting the Assembly has adopted new Statute of the Croatian Academy of Engineering and Bylaw on Membership by acclamation.
- In the ceremonial part of the Assembly acknowledgements were presented to former chairpersons of the Committees of the Academy, Prof. Nikola Bogunović, Ph.D., Prof. Marijan Bošnjak, Ph.D. and Prof. Jasna Kniewald, Ph.D., as well the awards to the winners of the Academy Awards for 2009.
- Awards to the Young Scientist “Vera Johanides” were granted to Ana Bucić-Kojić, Ph.D., Assist. Prof. Zvezdana Findrik, Ph.D., Assist. Prof. Mirela Kopjar, Ph.D., Helena Otmačić Ćurković, Ph.D. and Antonio Petošić, Ph.D.
- Annual Awards “Rikard Podhorsky” were granted to Prof. Antun Galović, Ph.D., Prof. Sonja Jurković, Ph.D. and Prof. Branko Salopek, Ph.D.
- Life Achievement Award “The Power of Knowledge” was granted to Prof. Žaneta Ugarčić Hardi, Ph.D.



*President of the Croatian  
Academy of Engineering  
Prof. Stanko Tonković, Ph.D.*

## LIFE AWARD “THE POWER OF KNOWLEDGE”



**Full Prof. Žaneta Ugarčić-Hardi, Ph.D.**  
**University of Osijek, Faculty for Food Technology**

The award is given for notable scientific contribution in the field of food technology achieved during the post war period in the war-stricken Osijek and very difficult conditions for scientific research, as well as the transfer of knowledge in the economy, where filled pasta is manufactured in the dough factory “Croatia”, Osijek, and the organization of the international congress of Croatian technologists in manufacturing and processing flour “Flour-Bread” which is held every other year from 1997 under the auspices of the Croatian Academy of Engineering.

## ANNUAL AWARD “RIKARD PODHORSKY”



**Full Prof. Antun Galović, Ph.D.**  
**University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture**

The award is given for scientific contributions to the economy’s particularly important area of technical thermodynamics, as well as written textbooks Thermodynamics I and Thermodynamics II, Collection of Exercises in Thermodynamics II, and extended Thermal Plates.



**Full Prof. Sonja Jurković, Ph.D.**  
**University of Zagreb, Faculty of Architecture**

The award is given for architectural design and implementation of the multi-purpose hall “Žatika” in Poreč in 2008, as well as entry into the shortlist in her category at the World Architecture Festival in Barcelona (WAF 2009).



**Full Prof. Branko Salopek, Ph.D.**  
**University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering**

The award is given for enhancing cooperation with the industry in the area of mineral processing, environmental protection and recycling, as well as outstanding contribution to the promotion of the work of the Academy in the Center for Environment Protection and Development of Sustainable Technologies over the past five years.

## AWARD TO THE YOUNG SCIENTIST “VERA JOHANIDES”



**Assist. Prof. Ana Bucić-Kojić, Ph.D.**  
**University of Osijek, Faculty for Food Technology**

The award is given for scientific contributions to the field of food technology, special educational activities, and collaboration with the industry.



**Assist. Prof. Zvezdana Findrik, Ph.D.**  
**University of Zagreb, Faculty of Chemical Engineering and Technology**

The award is given for outstanding scientific contributions in the field of chemical engineering and industrial biotechnology, winning poster presentation at the summer school Industrial Biotechnology in Bologna in 2006, as well as significant activities at the Center for Environment Protection and Development of Sustainable Technologies and participation at conferences of the Academy.



**Assist. Prof. Mirela Kopjar, Ph.D.**  
**University of Osijek, Faculty for Food Technology**

The award is given for scientific contributions to the field of food technology, and in particular for the participation in the TP-project and postdoctoral studies abroad.



**Research Assoc. Helena Otmačić-Ćurković, Ph.D.**  
**University of Zagreb, Faculty of Chemical Engineering and Technology**

The award is given for outstanding scientific contributions in the field of chemical engineering and electrochemistry, as well as international activities.



**Research Assoc. Antonio Petošić, Ph.D.**  
**University of Zagreb, Faculty of Electrical Engineering and Computing**

The award is given for outstanding scientific contributions in the field of ultrasound in medicine, electromechanical and acoustic characterization of ultrasonic transducers, as well as his doctoral thesis awarded by silver medal “Josip Lončar”.

## ACKNOWLEDGEMENTS



**Full Prof. Nikola Bogunović, Ph.D.**

for efforts and an extremely successful chairmanship of the Committee for Awards for the period from 2003 until 2009,



**Full Prof. Marijan Bošnjak, Ph.D.**

for efforts and an extremely successful chairmanship of the Committee for Ethics for the period from 2003 until 2009,



**Full Prof. Jasna Kniewald, Ph.D.**

for efforts and an extremely successful chairmanship of the Committee for International Cooperation for the period from 2003 until 2009.

## Celebration of the 340<sup>th</sup> Anniversary of the University of Zagreb and the University of Zagreb Day 2009

University of Zagreb celebrated the 340<sup>th</sup> anniversary of its foundation by the special session of the Senate held on November 3, 2009 in the hall of the Rectorate. The University of Zagreb Day was also marked on the occasion. Rector of the University of Zagreb, Prof. Aleksa Bjeliš, Ph.D. presided over the special session and the attendants were welcomed by distinguished guests: President of the Rectors' Council and Rector of the University of Split Prof. Ivan Pavić, Ph.D., Deputy Mayor of the City of Zagreb Jelena Vukičević Pavičić, Vice Prime Minister Prof. Slobodan Uzelac, Ph.D., and envoy of the Croatian President Mr. Stipe Mesić and President's Advisor for Science and Education Prof. Izet Aganović, Ph.D.



Photo: Balaban

Special session was also attended by other distinguished guests: Minister of Science, Education and Sports of the Republic of Croatia Radovan Fuchs, Ph.D., auxiliary bishop of Zagreb Msgr. Vlado Košić, State Secretaries Prof. Dražen Vikić-Topić, Ph.D. (MOSES) and Zoran Šikić (Ministry of Culture), Chairman of the Board of Education, Science and Culture of the Croatian Parliament Prof. Petar Selem, Ph.D., rectors of Croatian universities, former rectors of the University of Zagreb, deans and members of the Senate and other bodies of the University, as well as many others.

During the presentation of honorary titles, the title of Professor Emeritus was also granted to six members of the Croatian Academy of Engineering:



Photo: Balaban

- **Senadin Duraković, Ph.D.**, retired Professor of the Faculty of Food Technology and Biotechnology
- **Josip Dvornik, Ph.D.**, retired Professor of the Faculty of Civil Engineering
- **Academician Marin Hraste, Ph.D.**, retired professor of the Faculty of Chemical Engineering and Technology
- **Damir Karlović, Ph.D.**, retired Professor of the Faculty of Food Technology and Biotechnology
- **Zlatko Kniewald, Ph.D.**, retired Professor of the Faculty of Food Technology and Biotechnology
- **Nikola Šerman, Ph.D.**, retired professor of the Faculty of Mechanical Engineering and Naval Architecture



Photo: Bitunjac

Rector Prof. Aleksa Bjeliš, Ph.D. has also presented the Fran Bošnjaković Award for 2009 to the member of the Croatian Academy of Engineering, Nedjeljko Perić, Ph.D., Full Professor of the Faculty of Electrical Engineering and Computing.



Photo: Bitunjac

Program of the University of Zagreb Day continued on November 4, 2009 by the memorial medal award ceremony to Full Professors of the University of Zagreb who were retired in the academic year 2008/2009.

*Croatian Academy of Engineering would like to thank the Office of the Rector of the University of Zagreb for kind transfer of photos from the celebration of the 340<sup>th</sup> Anniversary of the University of Zagreb and University Day.*



## Members of the Croatian Academy of Engineering – Professors Emeriti of the University of Zagreb



Professor Emeritus **Senadin DURAKOVIĆ**

**Senadin Duraković, Ph.D.** was born on 23. February 1937. in Stolac, Herzegovina. In 1970. he earned the degree of Engineer of Biotechnology at the Faculty of Technology, University of Zagreb. Continuing at the Faculty he obtained his M.Sc. degree in Biological Sciences in 1977.,

presenting the thesis entitled “The effects of chosen parameters on the growth of the mould *Aspergillus terreus* ZMTF 310 and on the biosynthesis of aflatoxin B<sub>1</sub>”. For his Ph.D., granted by the Faculty of Technology in 1981., he prepared the thesis on “The influence of mixed mould cultures from the crops surface on biosynthesis of aflatoxins with mould *Aspergillus parasiticus* NRRL 2999”. Joining the Faculty in 1970., as an Assistant in the Laboratory of Microbiology, he rose to Assistant Professor in 1982. and Associate Professor in 1986. As Full Professor of General and Food Microbiology, Faculty of Food Science and Biotechnology, Zagreb, Croatia, since 1987., in 1990. he became Chief of the Laboratory of Microbiology, Department of Biochemical Engineering as well. Senadin Duraković’s primary interest lies in food microbiology and mycotoxicology, while philosophy and Oriental history offer him intellectual exercise. His publications consist more than 80 original scientific papers in microbiology and mycotoxicology and 20 University textbooks. He is a member of the Croatian Microbiological Association, Croatian Association of Engineers and Technicians, Croatian Academy of Engineering and The New York Academy of Sciences. For his achievement in Microbiology, The International Biographical Centre of Cambridge, England, awarded him in the year 2003. the certificate “OUTSTANDING SCIENTIST OF THE 21<sup>st</sup> CENTURY”, in honour of an outstanding contribution in the field of General and Applied Microbiology.



Professor Emeritus **Josip DVORNIK**

**Josip Dvornik, Ph.D.** was retired on October 1st, 2008 as Full Professor in Tenure of the Faculty of Civil Engineering of the University of Zagreb. He was born in Zagreb in 1938. He graduated from the Department of Civil Engineering of the Faculty of Architecture, Civil Engineering and

Geodesy of the University of Zagreb in 1963. In 1971 he obtained his master’s degree and in 1972 his doctor’s degree at the Faculty of Civil Engineering in Zagreb. From his graduation, apart from some short intervals, he has been working at the Faculty of Civil Engineering of the University of Zagreb. He went to the University of Lausanne, Switzerland for specialization in 1989. During his working life he has taken several senior positions as member of the National Scientific Council of the Republic of Croatia, member of the Committee for the “Fran Bošnjaković” Award Assignment, member of the Parent Commission for Civil Engineering, Architecture, Urban Planning and Design, as well as member of the Committee for the “Professor Emeritus” Title Assignment of the University of Zagreb. He has been the mentor of 29 master’s theses and 14 doctor’s theses. In 1986 he received “Nikola Tesla” Annual Award for Scientific Work of the Croatian Parliament. He has been the reviewer of some twenty university text books, monographs or reference books. He has taken part in over twenty construction projects in Croatia and abroad. He is reviewer in the field of ferroconcrete and built constructions, as well as composite structures. He received following international awards: the award of the U.S. firm Wolfram Research and of the U.S. journal Fabric & Architecture.



Professor Emeritus **Marin HRASTE**

Born in Sisak, Croatia, September 24, 1938. He took his Ph.D in chemical engineering at University of Zagreb 1972. He joined the Faculty of Chemical Engineering and Technology, University of Zagreb 1963. From 1982 he was full professor of chemical engineering and from 1993 to 1997 Faculty Dean. In 2009 he was elected professor emeritus at University of Zagreb.

He was visiting scientist in National Research Council of Canada, Ottawa, Canada and University of Technology, Dresden, Germany.

He taught Unit operation, Transport phenomena, Mechanical process engineering and Engineering of particulate systems.

His research interest in which he published scientific and professional papers as well as two textbooks is particle technology with emphasize on mechanical processes for transforming materials, such as size reduction, size enlargement, separation and contacting. Special area of interest was particle characterization and influence of particle size distribution on the equipment performance characteristics and material processing properties. He was leading scientist in several scientific projects.

He is fellow of Croatian Academy of Science and Art, Croatian Academy of Engineering and Croatian Society of Chemical Engineers as well as its representative to European Federation of Chemical Engineering.

He was awarded with the “Order of Danica Hrvatska with the medal of Ruđer Bošković” and with “Fran Bošnjaković” prize.



Professor Emeritus **Damir KARLOVIĆ**

**Damir Karlović, Ph.D.** was retired on October 1st, 2008 as Full Professor in Tenure of the Department for Food Engineering of the Faculty of Food Technology and Biotechnology of the University of Zagreb. He was born in Zagreb in 1938. He graduated from the Faculty of Technology of the

University of Zagreb in 1969, obtained his master’s degree at the same faculty in 1977 and his doctor’s degree in biotechnology in 1981. Upon graduation he has worked at Technische Hochschule in Zurich, Switzerland. He has been the head of the Institute for Food and Technology and the Dean of the Faculty of Food Technology and Biotechnology of the University of Zagreb. He has published his scientific works in the field of drying, concentrating, extraction and extrusion in various scientific journals, organized scientific conferences at home and abroad and taken part in development projects for the confectionery industry. Within the faculty he has founded the Center for Food Quality Control which is being certified today for the control of food and general consumer products. For more than 20 years he has been president of the Croatian Academic Sports Society (HAŠK) of the University, 22 clubs of which represent the peak of Croatian sport, and has reintroduced HAŠK to the University where it has originated from. He has always advocated for the academic behaviour of 4000 active sportsmen. Damir Karlović, Ph.D. has also administered important duties in Boards and Committees of several Ministries of the Republic of Croatia at the University of Zagreb. For his remarkable scientific and expert work he has received numerous awards, commendations and medals.

Professor Emeritus **Zlatko KNI EWALD**

Zlatko Kniewald, Ph.D. was retired on October 1st, 2008 as Full Professor in Tenure at the Department of Biochemical Engineering of the Faculty of Food Technology and Biotechnology of the University of Zagreb. He was born in Zagreb in 1938. He graduated biotechnology from the Faculty of Technology of the University of Zagreb in 1961. Upon graduation he has started working at the yeast and spirit factory "Žumberak" in Savski Marof. In 1966 he obtained his master's degree at the Faculty of Pharmacy and Biochemistry of the University of Zagreb where he later habilitated in biochemistry and in 1970 obtained his doctor's degree in biotechnology at the Faculty of Technology of the University of Zagreb. As fellow of the Ford Foundation at the Institute of Pharmacology of the University of Milan, Italy (1968 – 1970) he worked on his doctor's thesis. He was in charge of the Ford Foundation project in Zagreb from 1970 to 1979. He has published 86 scientific works (38 in CC/SCI). For his scientific achievements he has received 23 plaquettes and recognitions. He received "Decoration of Danica Hrvatska with the figure of Nikola Tesla" and Annual "Ruder Bošković" State Award for Scientific Research for 1986 granted by the Croatian Parliament. He is member of several national and international associations and from 2003 to 2009 president of the Croatian Academy of Engineering. He has been member of the Assembly of the University of Zagreb, the author and organizer of the First University of Zagreb Fair in 1996, as well as member, reviewer and expert of several ministries, agencies and associations at home and abroad.

Professor Emeritus **Nikola ŠERMAN**

Nikola Šerman, Ph.D. was retired on October 1st, 2008 as Full Professor in Tenure at the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb. He was born in Zagreb in 1938. He graduated from the Department of Mechanical Engineering of the Faculty of Mechanical Engineering and Naval Architecture in Zagreb in 1963, obtained his master's degree in 1970 and his doctor's degree at the same faculty in 1978. Upon graduation he was working at the factory "Jugoturbina" in Karlovac up to 1965 when he went to the Faculty of Mechanical Engineering and Naval Architecture. He has founded and developed several courses in the field of dynamics and process regulation at under-graduate and post-graduate studies. Apart from lecturing at his own faculty he has also given lectures at the Technical Faculty in Rijeka, the Faculty of Mechanical Engineering in Slavonski Brod and the Faculty of Electrical Engineering and Computing in Zagreb. Besides numerous scientific projects he has been the head of, his activities in solving problems of thermo power plants management and regulation in Croatia should be pointed out, i.e. thermo power plants "Rijeka", "Sisak" and "Plomin". He has been member of the National Council for Higher Education. In 1979 he received Grand Medal of the Faculty of Mechanical Engineering and Naval Architecture and the HAZU Award for 1999. He has made remarkable drawings by computer graphics in the seventies which are kept at the Museum of Contemporary Art in Zagreb. His last exhibition was in Zentrum für Kunst und Medientechnologie in Karlsruhe, Germany in 2008.

### **Prof. Nedjeljko Perić, Ph.D., Winner of the Fran Bošnjaković Award for 2009**



Prof.dr.sc. Nedjeljko Perić (1950) has been professionally working for the last thirty five years as a scientist and researcher in the area of automatic control and automation of complex processes and systems. He has contributed significantly to the development of control engineering and automation in Croatia, with a recognizable international scientific impact. His scientific and professional work can be grouped into two distinct phases. During the first phase he was working at the Končar's Institute of Electrical Engineering (1973-1993) with emphasis on development of the automation systems for complex processes. In particular, he initiated and led the corporate research and development programs for the microcontroller control of electrical machines and related fast processes. The second phase of his work is connected to the employment at the Faculty of Electrical Engineering and Computing in Zagreb (from 1993 onwards), where he has

initiated a broad research activity in advanced control of complex and large scale technical systems. His research results are published in scientific journals (more than 30 papers), proceedings of international conferences (more than 200 papers), and in numerous research studies/reports (more than 60 reports). Prof. Perić has particularly excelled in the leadership of national and international research projects. For his work he has received numerous awards, among others, the Croatian national award for science (for year 2007) for important scientific achievement in development of advanced control and estimation strategies for complex technical systems. He has also received the "Fran Bošnjaković" award (in 2009) for the exceptional contribution to the development and promotion of the automatic control research field within the area of technical sciences. Currently, he holds the post of the Dean of the Faculty of Electrical Engineering and Computing, University of Zagreb (mandate for academic years 2010-2012).

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*Stanko Tonković*

## CAETS

INTERNATIONAL COUNCIL OF ACADEMIES OF ENGINEERING  
AND TECHNOLOGICAL SCIENCES, INC. (CAETS)  
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**CAETS is an independent nonpolitical, non-governmental international organization of engineering and technological sciences academies, one member academy per country, with the following objectives:**

- Prepared to advise governments and international organizations on technical and policy issues related to its areas of expertise;
- Contribute to the strengthening of engineering and technological activities to promote sustainable economic growth and social welfare throughout the world;
- Foster a balanced understanding of the applications of engineering and technology by the public;
- Provide an international forum for discussion and communication of engineering and technological issues of common concern;
- Foster cooperative international engineering and technological efforts through meaningful contacts for development of programs of bilateral and multilateral interest;
- Encourage improvement of engineering education and practice internationally; and
- Foster establishment of additional engineering academies in countries where none exist.

- **Calgary, Alberta, Canada, July 13-17, 2009**
- **Copenhagen, Denmark, June 30, 2010**

### Statements & Reports

<http://www.caets.org/cms/7122.aspx>

**CAETS**  
International Council of  
Academies of Engineering and  
Technological Sciences

**Global Natural Resources –  
Management and Sustainability**  
A CAETS Statement  
Calgary, Alberta, Canada, July 13 - 17, 2009

The 2009 CAETS Convocation, hosted by the Canadian Academy of Engineering, addressed the grand challenges and opportunities associated with the sustainable management of natural resources. Resource activity worldwide is increasingly impacting society in both positive and detrimental ways. Demand for resources threatens to outstrip supply in many areas; extraction, refinement and utilization are contributors to greenhouse gas (GHG) emissions and climate change, and affect water supplies and the land base. Society faces an urgent need to reduce the demands on all kinds of raw materials and energy. New approaches are required to managing global resources and the supply chains they feed, to ensure that humanity's needs are fulfilled for current and future generations. A balance must be struck between economic gain derived from resource exploitation and utilization, and the impacts on society and the environment. Issues related to energy, water management, forestry, and mining/minerals must be considered in an integrated approach and in harmony with nature, which examine their interdependencies and tap the cross-sector opportunities for novel strategies, processes, technologies and solutions.

**Overarching Recommendations**

1. Industry and government must consider sustainable development, stewardship, conservation, recycling, re-use, substitution and responsibility to local inhabitants when assessing the present and future management of our natural resources base.
2. Engineering design as well as industry and government evaluation of a product's sustainability must account for its entire life cycle, including processes for manufacture, services for use and disposal.
3. Adaptations to climate change must be robust against uncertainty, informed by data and research, integrated across sectors and consistent with climate change mitigation policies.

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# CAETS

International Council of  
Academies of Engineering and  
Technological Sciences

## Sustainable Food Systems – Toward Food for All

A CAETS Symposium Statement  
Copenhagen, Denmark, June 29-30, 2010

The 31st Annual Meeting of the International Council of Academies of Engineering and Technological Sciences (CAETS) took place in Copenhagen, Denmark, June 29-30, 2010. A symposium held June 29 focused on how to achieve a sustainable global food system, which allows increased food production while reducing poverty and hunger and over-exploitation of natural resources. It was noted that past advances in food production, obtained in part by over-exploitation of natural resources, as more land was brought into agriculture and new fish stocks were exploited, must be avoided. Achieving sustainable management of natural resources while meeting increasing future food demands was recognized as the key to success.

The conference rejected the notion that efforts to assure food security for all must necessarily be at the expense of the environment. While the continuing need to develop new technologies, particularly in recognition of the vulnerability of food security to global climate change, should not be underestimated, some of the solutions to achieve a sustainable food system are available through regional adaptation and utilization of technologies already developed. Progress toward food security today can be facilitated today by adoption of economically and politically feasible government interventions, for example, to provide access to available technologies to indigent farmers.

Achievement of a sustainable food system will require **reform of the food production system, modernizing the food processing chain, and implementation of policy and market reforms and appropriate economic incentives**. To achieve these goals, the CAETS Council recommends seven actions as enumerated below. These recommendations are based on the views of the speakers and participants, including attendees from member academies, at June 29 Symposium.

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# CAETS

International Council of  
Academies of Engineering and  
Technological Sciences

## DEPLOYMENT OF LOW-EMISSIONS TECHNOLOGIES FOR ELECTRIC POWER GENERATION IN RESPONSE TO CLIMATE CHANGE

Working Group Report  
Executive Summary and Recommendations  
1 September 2010

### PROJECT BACKGROUND

The International Council of Academies of Engineering and Technological Sciences (CAETS) at its Council Meeting in Calgary, Canada, in July 2009 endorsed a project entitled *Evaluation of Strategies to Deploy Low Emissions Technologies for Electric Power Generation in Response to Climate Change*.

A CAETS Working Group was established comprising representatives of CAETS member academies<sup>1</sup>. At a meeting in Tokyo from 2 to 3 March 2010, members of the Working Group:

- Presented reports of the status of energy and electricity generation and related developments in their countries;
- Formed the view that there is limited extant evidence to enable a systematic evaluation of technologies for electric power generation in response to climate change, other than levelised cost of electricity and real option values; and
- Identified key issues for the deployment of low emissions technologies.

Following that meeting, members of the Working Group prepared a report entitled: *Deployment of Low Emissions Technologies for Electric Power Generation in Response to Climate Change*<sup>2</sup>. The report represents a joint effort to document the key technological issues being faced in the deployment of low-emission technologies for supplying electrical energy to meet the world's needs. The following Executive Summary, Collaboration and Issues and Recommendations are taken from the CAETS Working Group report.

<sup>1</sup> The representatives on the CAETS Working Group are listed below:

- Australia - Australian Academy of Technological Sciences and Engineering
- Dr Vaughan Beck (Chair) and Dr John Burgess
- Canada - Canadian Academy of Engineering
- Professor Robert Evans
- Germany - acatech
- Professor Dr Frank Bretznidt
- India - Indian National Academy of Engineering
- Professor Hanuoge S. Malunda

- Japan - Engineering Academy of Japan
- Dr Kazuo Iwata
- Korea - National Academy of Engineering of Korea
- Professor Myungsook Oh
- South Africa - South African Academy of Engineering
- Mr Willem du Preez
- UK - The Royal Academy of Engineering
- Professor John Loughhead

<sup>2</sup> See: [www.caets.org](http://www.caets.org)

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## Euro-CASE

<http://www.euro-case.org/>

### Organisation

The European Council of Applied Sciences and Engineering is an independent non-profit organisation of national academies of Engineering, Applied Sciences and Technology from 21 European countries.

Euro-CASE acts as a permanent forum for exchange and consultation between European Institutions, Industry and Research.

Through its Member academies, Euro-CASE has access to top expertise (around 6,000 experts) and provides impartial, independent and balanced advice on technological issues with a clear European dimension to European Institutions, national Governments, companies and organisations.

### Mission statement

The mission of Euro-CASE is to pursue, encourage and maintain excellence in the fields of engineering, applied sciences and technology, and promote their science, art and practice for the benefit of the citizens of Europe.

In pursuit of this mission the objectives of Euro-CASE are:

- Maintain a leadership role in promoting attention to excellence in applied sciences and engineering and to related issues of key importance to Europe
- Ensure that the societal impact of technological change is given proper attention with full consideration of environmental and sustainability aspects
- Provide impartial, independent and balanced advice on engineering and applied science issues that affect Europe and its people to the European
- Commission and Parliament, and other European institutions

- To promote the importance of applied sciences and engineering throughout Europe and to develop greater public understanding and interest
- Attract young Europeans into careers in applied sciences and engineering in order to ensure future technological progress in Europe
- Draw on the experience and best practices of the national academies of engineering and applied sciences in Europe, developing appropriate information networks

Interesting to visit (Activities):

### Engineering Education

This platform is treating of:

“Ranking of Technical Universities and Measuring Excellence” and more precisely “How engineering is recognised in this ranking system”. It should be interesting to compare pure science and engineering.

“The Implementation of the Bologna Process in engineering Education” a Euro-CASE statement will be written by Reiner Kopp, Acatech (DE) and Petr Zuna, EA CR (CZ) and will be available soon.

Experts from Austria, Croatia, Czech Republic, Germany, Hungary, Netherlands, Norway, Spain, Slovenia, Sweden and United Kingdom are already involved.

This Platform is chaired by Reiner Kopp, Acatech (DE)

Download: “Bologna process 2010” Final Report

By the Core Group Engineering Education

Download: “Ranking in Engineering Sciences” Final Report

By the Core Group Engineering Education