

## Electrical Engineering Committee 1990-2012

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The Electrical Engineering Committee of Polish Academy of Sciences was under the direction of the following people listed according to term of office between 1990 and 2012.

### Term of office 1990-1992

Professor Zbigniew Ciok, member of Polish Academy of Sciences	Chairman
Professor Mirosław Dąbrowski, member of Polish Academy of Sciences	Vice Chairman
Professor Andrzej Horodecki	Vice Chairman
Professor Tadeusz Koter	Vice Chairman
Professor Kazimierz Mikołajuk	Scientific Secretary

### Term of office 1993-1995

Professor Tadeusz. Śliwiński, full member of Polish Academy of Sciences	Chairman
Professor Stanisław Bolkowski	Vice Chairman
Professor Mirosław Dąbrowski, member of Polish Academy of Sciences	Vice Chairman
Professor Andrzej Horodecki	Vice Chairman
Professor Tadeusz Koter	Vice Chairman
Professor Kazimierz Mikołajuk	Scientific Secretary

### Term of office 1996-1998

Professor Tadeusz. Śliwiński, full member of Polish Academy of Sciences	Chairman
Professor Zbigniew Ciok, member of Polish Academy of Sciences	Vice Chairman
Professor Mirosław Dąbrowski, member of Polish Academy of Sciences	Vice Chairman
Professor Andrzej Horodecki	Vice Chairman
Professor Kazimierz Mikołajuk	Vice Chairman
Dr Hab. Eng. Tadeusz Skoczkowski	Scientific Secretary

\* The paper was presented at the Plenary Session of the Electrical Engineering Committee organized to commemorate the 60<sup>th</sup> anniversary of the establishment of this Committee

Term of office 1999-2002	
Professor Zbigniew Ciok, member of Polish Academy of Sciences	Chairman
Professor Janusz Turowski	Vice Chairman
Professor Mirosław Dąbrowski, member of Polish Academy of Sciences	Vice Chairman
Professor Tadeusz Skoczkowski	Scientific Secretary
Term of office 2003-2006	
Professor Kazimierz Zakrzewski	Chairman
Professor Stanisław Bolkowski	Vice Chairman
Professor Zbigniew Ciok, member of Polish Academy of Sciences	Vice Chairman
Professor Mirosław Dąbrowski, member of Polish Academy of Sciences	Vice Chairman
Professor Tadeusz Skoczkowski	Scientific Secretary
Term of office 2007-2011	
Professor Kazimierz Zakrzewski	Chairman
Professor Stanisław Bolkowski	Vice Chairman
Professor Zbigniew Ciok, full member of Polish Academy of Sciences	Vice Chairman
Professor Mirosław Dąbrowski, member of Polish Academy of Sciences	Vice Chairman
Professor Tadeusz Skoczkowski	Scientific Secretary
Current term of office 2011-2014	
Professor Andrzej Demenko	Chairman
Professor Tadeusz Citko	Vice Chairman
Professor Stanisław Bolkowski	Vice Chairman
Professor Romuald Włodek	Vice Chairman
Professor Tadeusz Skoczkowski	Scientific Secretary

The Electrical Engineering Committee of the Polish Academy of Sciences has repeatedly, during its 60 years of existence, expressed its opinion about the developmental trends of the discipline in a global, as well as national context, presenting specific studies for the purpose of decision-making centers in the country. It is important to note the valuable document developed in 1994 under the direction of former Chairman Professor Dr. Eng. Tadeusz Śliwiński entitled "Assessment of the Electrical Engineering Discipline in Poland".

An analysis on the distribution of academic staff, in particular independent research workers in electrical engineering faculties in various academic centers was conducted.

Based on the achievements of the various Departments, it was possible to assess the actual state of the research conducted in the different Institutes, Departments and facilities as well as its impact on staff development and student education. Through this, it was possible to obtain an opinion concerning the attractiveness of electrical engineering amongst people undertaking technical studies.

One of the last reports, which was created under the direction of the next chairman, Professor Dr. Hab. Eng. Zbigniew Ciok, was to develop the study: "The challenges faced by elec-

trical engineering in the twenty-first century” in 1999. Despite the passage of more than a decade it is still valid and worth referring to nowadays.

Electrical engineering, which emerged from physical and chemical studies initiated by the perspective discoveries of A. Volta, A.M. Ampere, M. Faraday, G.R. Kirchhoff, G.S. Ohm, J.C. Maxwell, as well as by the inventions of T.A. Edison's, G. Bell and others, was developed more than two hundred years ago. The following questions were therefore posed in the reports of the Committee for Electrical Engineering:

- Do cognitive elements still remain within the discipline?
- Does it still have a scientific outlook of development?
- Does it still perform the same role in the development of society as it did at the beginning of the twentieth century?
- Does it contribute to the achievement of higher economic and cultural levels of societies?

The last question is the crucial one.

The importance of electrical engineering at the current level of civilization is very large and at the same time not fully appreciated. The importance of this can be seen from a number of reports or one's own experience with system failures and natural disasters. The answer to the previously asked question is obvious.

An important indicator of the role of electricity in society is energy consumption per capita. Electricity consumption per capita in Poland in 1997 was 3,206 kWh, with a world average of 2,258 kWh and 7,645 kWh in OECD countries. This comparison fails in comparison with Norway (24,296 kWh), Sweden (15,348 kWh), the United States (13,132 kWh), Germany (6,426 kWh), or even the Czech Republic (5,660 kWh). These numbers, after twelve years are similar. Projections for 2020 indicate that it will indeed be a bit smaller than the average rate in the European Union, but still much lower than in developed countries.

The main piece of legislation elevating the role of energy management, including the management of electrical energy is The Energy Law passed in Poland in 1997 and revised several times in subsequent years. Reference is made to the highest rank of the act of state in order to highlight the social and economic role of several intertwined disciplines, such as power, electrical, gas and mechanical engineering as well as others.

The adoption of the said act created the possibility of a competitive electrical energy market in Poland as well as the start of market forces able to stimulate the development of services and facilities of the new economic conditions. A completely new challenge was created within the national context, opening an area of research in terms of the commercial aspects of electrical power as well as market management.

Another factor came to the foreground, becoming the stimulator for further electrical engineering development, which is the global trend of sustainable development of society through the rational use of energy.

To ensure economic growth and social development, care must be taken to provide the required amount of power while at the same time ensuring that the devastation of the environment as well as pollution are kept to a minimum. This leads to the need for energy efficient solutions, resulting in reduced long-term costs of the economy and the acceleration of economic development.

Poland still consumes much more energy per unit of Gross Domestic Product (1000 kWh per \$ 1,000 of GDP) than in OECD countries (respectively 245 kWh) and the European Union (respectively 190 kWh).

The need to adjust Polish law to EU law before joining the European Union was another part of the far-reaching consequences for the development and modernization of the energy sector, and thus should have an impact on research and development in the field of electrical engineering.

During this period it is important to simultaneously note the serious structural changes in many sectors of the economy related to ownership transformations, including privatization and the penetration of foreign capital into Poland, not always serving Polish interests well.

Disputes in this regard intensified in recent years in many decision-making and opinion-forming environments, including academic ones after Poland entered the EU. This is undoubtedly a result of globalization, destabilizing the labor market in many EU countries, enhancing economic difficulties and the difficulties of the home base of scientific research, which has been a serious problem over the last few years in Poland.

The huge rise in unemployment, which has also affected the next generation of young people, has created a huge market for the educational needs of the disciplines and specializations allowing to find future employment, and above all, giving hope to find work abroad or locally in emerging foreign companies.

These structural changes have weighed heavily on the condition of the state of higher education (including technical education), which brings together the vast majority of competent researchers. This is a problem faced by most disciplines in Poland, including electrical engineering. The labor market in the electrical engineering as well as the apparatus industry was significantly reduced, and thus the attractiveness of studying electrical engineering began to decline in favor of computer studies, management, law, etc.

We have repeatedly signaled this dangerous phenomenon, keeping in mind the loss of generational continuity with regards to specialist electricians, whose loss will probably be felt over the next few years.

Regardless of the problems that occur with greater or lesser intensity, to keep up with countries with a high degree of industrialization will force action that without scientific research and application as well as without well-organized educational activity cannot be resolved.

In Poland, from 1989 till today there were years of political and economic transformation. After the first years of transition, the Electrical Engineering Committee was composed of the following people between 2003 and 2011: Chairman: Professor Kazimierz Zakrzewski (formerly Professor Zbigniew Ciok); Vice Chairmen: Professor Mirosław Dąbrowski, Professor Zbigniew Ciok, Professor Stanisław Bolkowski (formerly Professor Tadeusz Kaczorek, Professor Janusz Turowski). The structure of the Committee included the following sections:

- 1) Section of Materials and Electrical Engineering Technology – Chairman Professor Bolesław Mazurek,
- 2) Section of Heat Engineering – Chairman Professor Mieczysław Hering,

- 3) Section of Power Electronics and Electrical Drives – Chairman Professor Marian Peter Kaźmierowski (formerly Professor Henryk Tunia),
- 4) Section of Electrical Machines and Transformers – Chairman Professor Kazimierz Zakrzewski (formerly Professor Mirosław Dąbrowski),
- 5) Section of Electrical Power Systems – Chairman Professor Zbigniew Szczerba (formerly Professor Marian Cegielski),
- 6) Section of Electrical Engineering Theory – Chairman Professor Stanisław Bolkowski,
- 7) Section of Electric Traction - Chairman Professor Wiesław Seruga,
- 8) Section of Great Power and High Voltage – Chairman Professor Romuald Włodek (formerly Professor Zbigniew Ciok and Professor Czesław Królikowski).

According to the Statute of the then University of the Scientific Committees, Sections integrated a total of several hundred professionals working in Higher Education, Scientific Research Institutes and industry. This made it possible to organize a number of conferences under the auspices of the Committee, both of a domestic as well as international character. Professor K. Zakrzewski, who was the Representative of the Electrical Engineering Committee, took part in the first Scientific Committee of the Congress of Polish Electricity, organized through the efforts of the Polish Electrical Engineers Association held on the 1-5 September 2009 in Warsaw. The Chairman of the Committee together with the Chairman of the IV Division of the Polish Academy of Sciences Professor Dr. Hab. Eng. Władysław Włosiński, presented a plenary lecture entitled: “The role and prospects of the Electrical Engineering discipline”, expressing opinions derived from individual members of the Sections.

Research carried out for many years during the time of the so-called centralized economy, received support in the form of government and departmental programs or was carried out in close collaboration with the national economy.

The current system of financing includes programs of an international nature which are part of a small percentage of research outlined by the Electrical Engineering Committee, projects funded by the Ministry of Science and Higher Education, local government and any possible contract with companies or industrial plants while currently under the National Research Centers. After access to the European Union the situation has more of a bureaucratic.

The Electrical Engineering Committee of the Polish Academy of Sciences believed that there existed serious factors that would limit, on the one hand commercial competitiveness of our electrical engineering products, on the other, delaying, or preventing, investment in the power sector without foreign capital. This situation has a strategic nature and is likely to influence the health of the economy while at the same time being fundamental to the further development of the country and society in Poland and should be considered in terms of reasons of state.

In order to ensure the development of electrical engineering it is important to raise funds from the European Union, the Ministry of Science and Higher Education, National Research Centers as well as the private sector for cognitive research and application. The Committee has inspired and supported the acquisition of commissioned projects, the creation of ad hoc Consortia etc.

The Electrical Engineering Committee of the Polish Academy of Sciences together with the Association of Polish Electrical Engineers has for years, repeatedly advocated on the forum of the IV Division of the Polish Academy of Sciences as well as directed letters to the Ministry of Economy and Ministry of Higher Education, arguing for the establishment of a Strategic Energy Center in Poland of a non-political nature, with a view to ensuring the safety of energy in Poland as well as a focus on the development of sustainable energy. So far, the efforts have not met with a positive response.

In the years 2008-2010 the Polish Academy of Sciences has set up a team, integrating several Scientific Committees, including the Electrical Engineering Committee and the Committee on Energy to develop "Evaluation and prospects of the energy sector in Poland" comprised of Professors W. Smith, E. Mokrzycki, G. Wrochna, J. Malko, J. Siemek, K. Zakrzewski, Wł. Gajewski. This study was included in the publication entitled "Reflections on the state of the selected areas of science in Poland in assessing Team integration as well as integration and expertise of the Polish Academy of Sciences", Warsaw, Polish Academy of Sciences, 2010, pages 555-614. An important part is the chapter on the distribution of electrical energy, concerning the issues of modernization and the expansion of electrical energy networks in Poland taking in to account the broader aspects of so-called distributed energy. These plans, during the difficult time of the so-called global crisis will have to be selectively chosen. We hope that the further actions of the Electrical Engineering Committee of an expert nature and integrative environment will be able to count on the support of the Polish Academy of Sciences Directorate.

### References

- [1] Electrical Engineering Committee of PAN Assessment of the Electrical Engineering discipline in Poland – collective work, Warsaw, 52 pages (1994).
- [2] Electrical Engineering Committee of PAN, Electrical Engineering challenges posed by twenty-first century (expertise) – collective work, Warsaw, 82 pages (1999).
- [3] Włosiński W., K. Zakrzewski, *The role and prospects of the Electrical Engineering discipline*. Organizational and Scientific-Technical Bulletin of the Polish Electrical Engineers Association, SPECTRUM, September-October (9-10) 2009, pages VII-XIII (2009).