



ENERGY AND ENVIRONMENT

RIGA TECHNICAL UNIVERSITY
RESEARCH

01

ON THE INSTITUTE OF INDUSTRIAL ELECTRONICS AND ELECTRICAL ENGINEERING



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The Institute of Industrial Electronics and Electrical Engineering deals with the design and development of power electronics, power electronics equipment, and high-powered semiconductor converters. We deal with the development, manufacturing, launch and testing of semiconductor control methods, as well as with the research of various control methods.

Alternative energy equipment – wind generators, fuel cells, small hydro power stations, also cogeneration equipment, which is closely connected with it. “Green” invertors, as these electric energy converters are called, are highly necessary as they are essential in manufacturing small, automatic, autonomous and combined power stations and power generating equipment, including microturbines, which run on gas. We are also interested in sun power engineering, as semiconductor converter plates convert direct sunlight into electricity, and we address the issue how to coordinate this process with the consumer.

The situation is similar as regards hydrogen power engineering, fuel cell elements. When electricity has been generated, a question arises – how and at what efficiency rate this energy can be transmitted to consumers. We persistently work on the improvement of this process, in other words, on the improvement of energy efficiency.

The scope of our interests also covers everything that is connected with the performance of mechanical work powered by electricity, which is called electric drive. It is present in all production lines, all vehicles, and robots.

In nature energy propagates and is used in a variety of ways, and we try to learn how. We are still not able to use energy as efficiently as it occurs naturally in all processes, however, step by step we are getting closer.

Nowadays, electronics, equipment,

and software are most rapidly developing, old technologies keep quickly disappearing. At present many military and space technologies enter our daily lives. As we know, the first fuel cells, which had been originally developed for spaceships, were used already at the end of 1950s. Of course, at that time they worked as well as they could, nowadays the technology has considerably developed. Also solar cell batteries as autonomous energy source were used already on the first satellites. Talking about solar panels on the roof tops – why not introduce them in Latvia? Solar radiation is everywhere, everything depends on semiconductor element layer, how effective it is, what efficiency rate it has in converting this radiation into electricity. We have been studying these issues for many years. If in Riga sunny sides of all roofs were covered with solar panels, energy consumption of the city would decrease by approximately one third. The only question is how much it would cost to cover these roofs with solar panels. Moreover, solar panels are not eternal, and at present investment payback period for this type of energy source is at least 12 years, which is the shortest time possible. Furthermore, power electronic unit would be necessary to match the harvested energy with the regular network voltage. But as everything is getting cheaper and more efficient, it is possible that it may become reality some day.

Energy will be always necessary. In future every household, may be every individual, will use a personal source of energy. They will be miniaturized, for example, your car will be your power station. Such opportunities and groundwork already exist; most likely, we will see them in the remote future. Our children and grandchildren will get integrated into that system.

Let us meet in the future!