

**EDITORIAL***Issue dedicated to Institute of Environmental Engineering (APINI) 25 years anniversary*

# 25 Years History

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The Institute of Environmental Engineering (APINI, Lithuanian acronym) was established with the support of Danish Technical University in 1991 as an independent research unit affiliated to Kaunas University of Technology. In 1994, Pollution Prevention Centre was founded at the institute based on a co-operation agreement with World Environment Centre (USA). The centre promotes sustainable development, pollution prevention and waste minimization in industry. Since the establishment, APINI systematically builds the capacity on international, national and local levels, and implements sustainable development, resource efficiency and cleaner production programmes and projects.

The main research areas of the APINI are sustainable development, cleaner production and resource efficiency (RECP), life cycle assessment (LCA) and Eco-design, environmental management systems and standards (EMS), integrated waste management, surface water quality modelling and management, and chemicals risk assessment and management. The APINI has implemented more than 100 international projects (FP, INTERREG, BSR, Leonardo, ERASMUS), many studies on environmental impact assessment, waste management, resource efficiency, chemicals control, and has published 33 books (independently or in cooperation with international partners). Since 2001, more than 50 articles have been published in ISI Web of Science cited journals, as well as over 100 articles in other international databases and over 80 articles in other peer reviewed journals.

RECP methodology was introduced in Lithuania in 1992. Since that time twelve RECP programmes (three of

them integrated with EMS) were performed in different economic sectors with the participation of 119 companies representing 15 branches of industry. The projects developed within the RECP programmes covered all the main environmental areas, such as reduction of water pollution, emissions to the atmosphere, solid waste, and an effective use of water and energy resources. The Institute of Environmental Engineering was the initiator of resource efficient and cleaner production strategy implementation in Lithuania. All this period the APINI is the main institution in the country to work in the area. These activities have been actively supported by the Lithuanian Confederation of Industrialists. Most of RECP programmes in Lithuania have been developed and implemented with the support from donors and international organisations. Several countries, particularly the USA, Norway, Denmark, Sweden, the Netherlands, were supporting activities in this field. All programmes pursued similar goals but from different approaches. Experience from Lithuania, where different donors/organisations have been active, shows the complementarity of these approaches for introducing preventive environmental practices into the industrial sector.

In 1992–2016, together with different donors and in co-operation with different foreign and local partners, the APINI supported more than 200 Lithuanian companies to implement cleaner production projects. The most active were textile and food industries. 245 cleaner production experts have been trained in long-term training programmes. The most successful was Lithuanian–Norwegian RECP programme, in which the Norwegian

RECP methodology has been efficiently adapted to the needs of Lithuanian industry, and RECP activities have been practised widely in companies–participants. The programme started in 1996, and until 2001 five trainings were performed; 56 Lithuanian industrial companies participated in the programme, and 626 cleaner production proposals (269 of them “good housekeeping” measures with no or minor investments) were generated. Environmental, technical and economic evaluations of the proposals were made. Companies implemented 126 of the proposals within the programme using their own funds. Economic results show that the average payback of all RECP projects, developed within the programme, were shorter than two years.

The starting point is that the RECP assessment according to APINI methodology results in feasible preventive innovations, followed by the process of input to capital budgeting, in which the profitability of innovations is compared with the profitability of alternative investment options (e.g., market expansion, new product development, etc.). This may result in RECP investment proposal, which may be regarded as the company’s intention to invest in a particular innovation, provided finances can be made available. Whether or not the planned investment will eventually take place, depends on the company’s ability to collect capital, either from its own resources or by attracting external funds.

In 1998, the Nordic Environment Finance Corporation (NEFCO), under APINI initiative, established a special Revolving Facility for the Baltic States and North West Russia. NEFCO is a risk capital institution financing environmental projects in Central and Eastern Europe. It was established 1990 by the five Nordic countries (Denmark, Finland, Iceland, Norway and Sweden). The environmental, technical, institutional, economical and financial feasibility of the project should be demonstrated through an adequate feasibility study. NEFCO requires projects to meet reasonable profitability criteria but, this having been established, focuses more on the environmental effects. In this way NEFCO represents a green equity concept, unlike commercial investment funds.

The Revolving Facility SPIN (the **S**ystem for **P**reventive **I**Nnovations) addresses the needs to enhance the financing of the RECP projects that otherwise would not have been implemented with a high leverage for donors and an effective use of scarce resources. The Facility

enables financing of smaller investment projects in the target countries. It constitutes a follow-up of various RECP programmes and projects supported by donors in Central and Eastern European countries.

A priority is given to the projects that have environmental effects for the Nordic region, i.e. to projects leading to reduction of pollution in the Baltic Sea and the Barents Sea regions, or to reduction of transboundary and global air pollution.

Despite successful implementation, one of the major obstacles for broader implementation of these approaches was a lack of properly trained specialists in industry, authorities and other organisations. In 2002, MSc programme in Cleaner Production and Environmental Management was designed to overcome this and other obstacles related to broader implementation of preventive environmental approaches. The need for specialists in cleaner production and environmental management is still underestimated by different stakeholders, despite the fact that knowledge of the programme graduates could help enterprises to improve performance, to reduce environmental impact and to increase market competitiveness, and would be valuable for design and implementation of modern environmental policy tools.

In the area of education and curriculum development, the APINI combines a traditional education in the engineering sciences with studies in the natural and social sciences, with the ultimate goal of educating scholars who are uniquely situated to undertake serious research and policy assessments to tackle sustainable development challenges. The MSc and PhD programme graduates have a unique combination of diverse skills and deep insight into the most challenging problems of future human welfare. Together with experts from industry and governmental institutions, students in the programmes conduct research in a wide variety of areas associated with sustainable development. Students also benefit from being part of APINI research programmes and projects that focus on sustainable development. Moreover, both current students and graduates are invited to conferences and other events organised by the APINI. The most motivated students are offered employment at the APINI.

The major challenge is a lack of traditions in using transdisciplinary approach in the country. Transdisci-

plinary studies and research are generally neglected in national education and research policies. Transdisciplinary study programmes hardly fit in the historically used national classifier of science fields and this poses some limitations on the programme.

The real cases proved that sustainable consumption and production, waste and pollution prevention, as well as energy and material savings are especially meaningful in the market economy. At the same time, a dramatic shortage of high level specialists in sustainability of all economy spheres – national and local government, business, NGOs, academia – was identified. The Programme's students, institute's staff, and large network of companies and organizations created a unique interdisciplinary environment enabling to generate changes for a more sustainable world. The programme aims to provide MSc education to students who have an industrial (i.e. chemical, electrical, mechanical, materials, etc.), business, civil or environmental BSc degree. The institute offers an integrated approach towards current and long-term/strategic environmental issues focusing on all three dimensions of sustainable development for industrial production and consumption. The programme is interdisciplinary and has strong emphasis on engineering, management and policy, and corporate social responsibility to ensure that graduates have a broad understanding and ability to work with complex issues of sustainable industrial development. Students have a possibility to use the obtained theoretical knowledge in individual or group practical assignments, leading to practically applicable sustainability performance improvement projects, which are conducted in industrial companies and organizations. The institute has performed a number of training programs for industrial enterprises in Lithuania and worldwide, and assisted more than 180 companies and organizations to develop and implement sustainable innovations. Students have the opportunity to take part in the projects and acquire valuable practical experience.

Since the beginning of the programme in 2002, students have been involved in the development of more than 50 Resource efficient and cleaner production innovations. The key issue here is prevention, which is crucial, especially where a product or a process is known to cause harm to the environment. The preventive principle is to look to changes upstream in a causal network of the

system of production and consumption. This experience dramatically changes minds not only of students, employees at the companies and organizations, but also minds of their families and community, because the preventive nature of resource efficient and cleaner production calls for a new approaches to product design, consumer demand, patterns of material consumption and entire material basis of economic activity.

The institute's efforts in sustainability research and education became a fertile ground for a larger pilot project in the whole Kaunas University of Technology, and the following results have been obtained so far:

- University authorities view social responsibility as integral to the institutional identity and values;
- University management treats sustainability as a part of the operational strategy;
- good practices initiated by the institute staff and students are maintained at the University level: Green University Campus concept, including energy efficiency and conservation, waste prevention and sorting, sustainable university mobility plan (SUMP), etc.
- at faculties level professional development activities include sustainability as an area with distinct approaches for teaching, learning, and research.

The Institute of Environmental Engineering systematically implements sustainable development programmes and projects in Lithuania and abroad. In 25 years, since establishment, the APINI has increased scope of activities and capacity to tackle key environmental problems and emerging scientific topics, for instance, alternative energy, social responsibility, sustainable university, etc. Extensive co-operation with foreign scientific institutions and universities enabled the APINI to become an advanced and unique institution in Lithuania actively working in many areas of sustainable development. The APINI could be recognised as the most successful department in KTU dealing with sustainability issues. The APINI in 1995 has initiated the scientific journal "Environmental research, engineering and management" and coordinates it until now.

More analytical data on APINI activities obtained during the European accreditation QUESTE-SI are presented in the paper of this Journal "Sustainable university: beyond the third mission".