

# Technical University as a Centre for Sustainability in Transitional Economies

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**ABSTRACT :** Technical universities can and should become not only the centres of broad environmental and sustainability education but also, acting together with business companies, industrial enterprises, public and governmental organisations, the centres of dissemination and practical implementation of sustainability principles. A description of activities of DonSTU faculty on practical implementation of actual projects aiming to increase sustainability in Donetsk industrial region and eastern Ukraine is given in this paper.

## 1. INTRODUCTION

The 1992 United Nations Conference on Environment and Development in Rio de Janeiro set a lasting and sustainable development as a priority goal for the international community. Sustainable development may be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs [1]. It endeavours three key objectives: a socially and environmentally innovative, resource-efficient economy in the developed world; an improvement of economic welfare and quality of life in the developing countries; a healthy natural environment with resources used and conserved wisely - worldwide.

Of special interest and importance is sustainability for countries with transitional economies. The Ukraine took part in the 1992 UN Conference and signed the documents accepted in Rio. By this act, the Ukraine confirmed that the country considers the principle of sustainable development as the most important condition on which the fate and the very possibility to survive for a nation and the whole humankind depends. Sustainability is of vital importance for the Ukraine surviving now through gigantic but wavering political and economic transition. The aim of economic transition is to improve economic performance on a sustainable basis.

The concepts and approaches accepted in Rio imply an essential change in common views on progress, development and growth in human society. In introducing these new concepts and ideas, the role of education and universities is extremely important. Universities are natural centres able not only to provide extensive education and dissemination of the ideology of sustainable development but also, due to their qualified, highly professional and dedicated faculty members, to accomplish practical implementation of sustainability principles in many actual projects. To carry out these projects, universities should multiply their links and co-operation with large and small enterprises as well as governmental organisations.

This paper describes activities of the Donetsk State Technical University (DonSTU) [2] faculty on dissemination and practical implementation of the principles and strategy of sustainable development in some real projects.

## 2. WHAT SUSTAINABILITY MEANS

The principles of sustainability demand to consider as a whole and harmonise three main aspects of development: economic, environmental and social [4].

Economic aspects of sustainability are related to the problem of an effective distribution of limited resources, goods and services to satisfy the needs of all people living now both in developed and less developed countries as well as of all people of future generations.

Environmental aspects of sustainability mean recognition of the necessity to use environmentally friendly production processes and services, co-ordination of produced wastes with the carrying capacity of the ecosphere to preserve our planet suitable for life.

In social and political terms, sustainable development demands a large scale of social justice and safety, the possibility for all people to realise their rights to freedom, equal opportunities and political independence.

The sharp collisions of interests involved with this ideal model of sustainability are obvious [3,4,7]. Even inside a given country the disparity of income and consumption in many cases is immense. In contrast to luxury-oriented life style of the rich elite, for the poor development means satisfying the basic human needs: jobs, food, housing, health services, education. The lack of access to such services gives rise to hopelessness and despair that lead to political unrest, terrorism, revolution, and emigration to high-income countries in search of a better future.

In this way, the ideology of sustainable development encounters the eternal human contradictions between right and wrong, good and evil, forbearance and violence, the rich and poor. The whole history of mankind teaches that these contradictions could not be cancelled.

General acceptance of the concepts, morality and ethics of sustainability seems to be the only way to survive in our imperfect but developing world.

The contribution of each organisation and each individual to realisation of sustainability principles is of great importance. The World Business Council for Sustainable Development has coined the term "the 3 Es", meaning environment, economy and everyone as a shorthand way of explaining what needs to be balanced to achieve sustainable development [1].

### **3. TEACHING THE PRINCIPLES OF SUSTAINABILITY**

An important aim is, therefore, to provide ideology, concepts and approaches of sustainable development to our students, those who will perform engineering tasks and create material basis of development in the near future.

A special programme was developed at DonSTU for broad environmental education: "Concepts and system of measures for rebuilding environmental education". The programme includes as part sustainability issues. It serves as a base for many postgraduate courses. Under this programme, not only teaching, but also research is oriented to the needs of sustainable development in the Ukraine and specifically in Donetsk industrial region. The programme aims to:

- ?? more effective use of all energy sources;
- ?? treatment and disposal of industrial and agricultural wastes;
- ?? recuperation and recurrent use of materials;
- ?? recirculation of industrial wastes;
- ?? environmental review and assessment of all new technologies and engineering solutions.

Both undergraduate and postgraduate courses in sustainable development provided at DonSTU on the base of the programme pursue the following objectives:

- ?? The primary objective is to enhance positive attitude towards sustainable development and environment protection. It corresponds to strategic aim of continual environmental education as it is accepted at DonSTU.
- ?? The second objective is to provide the needed working knowledge to apply sustainability approach in engineering practice, in particular, technology assessment based not only on technical functionality and safety but also on environmental quality and quality of life.
- ?? The third objective is to give comprehension of economic, social and political aspects of sustainability and total environmental management [6].
- ?? The fourth objective is to prepare and develop in students personal, professional and organisational skills necessary to implement practically the principles of sustainable development.

### **4. REAL PROJECTS AIMED TO INCREASE SUSTAINABILITY**

DonSTU faculty does not only teach the principles of sustainability. Those principles are also used as a guide in their practical activities. The faculty is taking an active part in developing the strategy for Donbass economic and social development, solving its environmental problems in the process of economic transition. Donetsk industrial region (Donbass) has inherited many serious problems of economic development and environment protection. That requires significant improvement in environmental management and the integration of environmental policy with other policies dealing with economic development, market reform, privatisation, legal reform, and total democratisation of society.

Together with the State administration in Donetsk region and other organisations, DonSTU faculty took an active part in developing "Complex programme for social and economic development in Donetsk industrial region (Donbass)". Sustainable development was a basic idea put into the basis of these documents. The development and practical realisation of this programme confirmed the role of Donetsk Technical University as a recognised scientific and engineering centre in Ukraine.

As an example of projects carried on jointly by DonSTU faculty and international partners development of technology for ground control over abandoned mines may be mentioned. That has been a two-year research project in the frames of partnership between West Virginia University (USA) and Donetsk State Technical University that has been established since May 1992. It had started from exchange of faculty and students and has developed into a multipurpose programme.

Civil Research and Development Foundation (CRDF, USA) has funded the project. This is a non-profit organization, which delivers financial support to scientific groups from the former Soviet Union States on competition basis.

Grant UG1-308 that was funded from CRDF dealt with technology of ground control over an abandoned mine. The project is mutually useful for the USA and Ukraine because there are more than 70,000 abandoned coal mines in USA and more than 50 coal mines are expected to be closed in Ukraine in near future and 20 mines have been already closed. There is no efficient and economical technology to prevent delayed subsidence that causes great damage for surface utilities (buildings, electric towers, pipelines, roadways, rivers, etc.). The only well-known method is filling of the abandoned mines with waste rock or ash from power stations. However this method did not prove its efficiency in practice. There is no experience to close, eliminate or conserve deep (hundreds of meters) vertical shafts. Filling of the shafts does not work because the filling material consolidates and a shaft becomes empty. There are a great number of cases when surface falls and comes down around abandoned filled vertical shafts. Scientists developed new technologies to prevent surface subsidence over abandoned mines. These technologies are being tested in laboratory and in a number of closed mines [5].

Several concrete projects were performed by DonSTU faculty in the frames of bilateral Program to Promote Sustainable Development in Ukraine sponsored by the US Agency for International Development [6].

In June 1997 a three-day train-the-trainer workshop «ISO 14,000 Environmental Management System (EMS)» was carried on. The workshop was organised by the Donetsk office of Environmental Protection and Technology (EPT) project. The lectures, seminars and case studies at the workshop were provided by trainers from DonSTU prepared previously at the Donetsk EPT office. The primary aim was to provide the working knowledge of the ISO 14,000 EMS standards and their design elements and implementation steps to representatives of Ukrainian industry. A large group of leading academics from DonSTU were invited and took an active part in the workshop. Their main concern was the adoption of general principles and also of the structure and contents of training in environmental management systems at higher school.

As a follow-up of the workshop, a pilot project aiming to introduce ISO 14000 EMS at two industrial enterprises in Donetsk region had been carried on. The experience gained in the course of implementing this project was of primary importance for consequent adoption by the Ukraine of ISO 14000 standards on EMS.

Now the DonSTU faculty are involved into diverse activities related to development the strategy and realisation of the projects in the frames of Special (Free) Economic Zone. In 1998 the Law was adopted by Ukrainian government according to which the status of special economic zone was given to specified territories in Donetsk region.

For practical realisation of new possibilities opening by that Law, Council on Special Economic Zone was organised at DonSTU. Its functions include:

- ?? providing training on specific business and engineering activities in special economic zones;
- ?? review and assessment of investment projects that are proposed;
- ?? assessment and approval of measures to attract financial resources;
- ?? conduction of Ukrainian and international tenders for investment projects;
- ?? consideration and approval of new technological and engineering projects developed at the university for enterprises in the Special economic zone;
- ?? expert conclusions on investment projects.

Important contribution into sustainable development of New Independent States is their integration into international community and, at the same time, development of their traditional relations. In this respect, foundation by DonSTU and Taganrog Radiotechnical University of a joint educational institution called Russian-Ukrainian University provides a good example. The main aims of the Joint University are:

- ?? integration of Donetsk Technical University and Taganrog Radiotechnical University into the international system of engineering education;
- ?? training specialists for Ukrainian and Russian enterprises and organisations as well as for overseas countries according to international standards including training provided in foreign languages (English, German, French) and part-time training at European universities;
- ?? organisation and carrying out joint scientific research, conferences, exhibitions and presentations.

More than a year time period that passed after formation of the Joint University has already proved its effectiveness.

## **5. CONCLUSIONS**

Technical universities are natural centres for wide dissemination of the principles and ideology of sustainability and broad environmental education. Courses in sustainable development are provided at Donetsk State Technical University for undergraduate and postgraduate students as well as a form of continuing education for representatives of industrial enterprises and businesses. Sustainability is a guiding principle in practical activities of DonSTU faculty, in performing actual projects aiming to increase sustainability in Donetsk industrial region and throughout Ukraine.

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