

Представленная методика обработки результатов независимых экспертных оценок технического состояния объекта недвижимости позволяет в процентном выражении определить степень физического износа отдельных конструктивных элементов и здания в целом. Реализация построенной модели выступает в качестве инструмента, позволяющего муниципальным властям оптимально формировать реестр объектов, требующих капитального ремонта [10].

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MODERNIZATION OF THE CURRICULA IN SPHERE OF SMART BUILDING ENGINEERING – GREEN BUILDING (GREB)

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The analysis of the enterprises needs concerning recruitment of engineers in the sector of the technical building management in Russia, Uzbekistan and Mongolia showed that

electrical or automation engineers only partially meet the needs of market. Smart Houses and Smart Cities require interdisciplinary competencies and leading skills.

This article describes a new Erasmus+ project (EU-granted), which will be implemented in 2016–2019 years. The name of the project: “Modernization of the Curricula in sphere of smart building engineering – Green Building (GREB)”. The project aim is to update and quality increase the curricula (BA&MA) in sphere of High-Tech Green Buildings and Smart Cities in Russia, Uzbekistan and Mongolia to meet the needs of sustainable development in a global world.

New interdisciplinary model of engineers training and two cycles (MA and BA) of competence-based curricula will be created as the project result. The necessary infrastructure – Network "Green Buildings" will be carried out.

Developed curricula and courses will allow growing R&D engineers with strong interdisciplinary skills: electronic-automation and computer from one side and energy and thermal of the building on the other part. They will be able to analyze the problem and find innovative solutions.

This BA and MA programmes brings together students from different fields to study in interdisciplinary teams that increases understanding of different backgrounds and offers students opportunities to collaborate with research projects and companies. Students receive a wide conceptual design skills and it greatly increases employment opportunities.

Keywords: Curricula, Green Buildings, Smart Cities, skills.

МОДЕРНИЗАЦИЯ УЧЕБНЫХ ПРОГРАММ В СФЕРЕ ИНЖЕНЕРНЫХ СИСТЕМ УМНОГО СТРОИТЕЛЬСТВА – «ЗЕЛЕНОЕ СТРОИТЕЛЬСТВО» (GREB)

A. Тоззи

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Анализ потребностей организаций в отношении найма инженеров в сфере управления строительством в России, Узбекистане и Монголии показал, что инженеры по электрическим системам и автоматизации лишь частично удовлетворяют потребности рынка. Развитие «умных домов» и «умных городов» требует междисциплинарных знаний и ведущих умений.

В данной статье описывается новый Эразмус+ проект (ЕС-удовлетворено), который будет реализован в 2016–2019 гг. Название проекта: Модернизация учебных программ в сфере инженерных систем умного строительства – «зеленое строительство» (GREB). Целью проекта является обновление и повышение качества образовательных программ (бакалавр и магистр наук) в сфере высокотехнологичных «зеленых» зданий и «умных» городов в России, Узбекистане и Монголии для удовлетворения потребностей устойчивого развития в глобальном мире.

В результате проекта будет создана новая междисциплинарная модель обучения инженеров на основе компетентностного подхода и двухуровневого образования. На выходе будет осуществляться подготовка специалистов по разработке инфраструктурных сетей «зеленых» зданий.

Разработанные учебные программы и курсы, позволят получить инженеров R&D с развитыми метапредметными умениями: электронная автоматизация и компьютеризация с одной стороны и энергетика и отопление здания с другой стороны. Они будут способны анализировать проблемы и находить инновационные решения.

Это двухуровневые программы объединяют студентов из разных областей для исследования в междисциплинарных командах, что повышает понимание разных основ и дает возможность учащимся взаимодействовать с исследовательскими проектами и компаниями. Студенты получают широкие навыки в концептуальном проектировании, и это значительно увеличивает возможности их трудоустройства.

Ключевые слова: учебные программы, «зеленые» здания, «умные» города, навыки.

Introduction

According to the action plan of European Community concerning energetic efficiency, European Union must reduce of 20 % (with respect to the level of 1990) the emissions of greenhouse gas, reduce of 20 % the electric consumption, increase of 20 % the part of renewable energies in the total consumption of energy (DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the energy performance of buildings).

Russia, Uzbekistan and Mongolia are developing their economies mainly due to coal, oil and gas production. However, in recent years, these countries have a strong interest in alternative energy sources and the construction of intelligent buildings. The State Program of RF, titled "Energy Saving and increasing of energy resources efficiency to 2020" is working out. In according to the program the electricity savings should be up to 30%.

Uzbekistan has also developed a strategy for the development of renewable and alternative energy sources for 2012–2020. (Decree of the President of Uzbekistan Republic dated 2015, May 5th, 2015 N PP-2343 "About measures to reduce energy consumption, and implementing energy-saving technologies in sectors of economy and social sphere for 2015–2019."

The Parliament of Mongolia approved the National Programme in the field of renewable energy up to 2020 . The program provides increasing the sector of renewable energy technologies in the total energy supply from 0,9 % in 2005 to 20–25 % in 2020.

The rapid urbanization, also in nations with vast population, has been costly and environmentally damaging. The building occupies the first place in the world in energy consumption (41 %). In the house 33 % of the energy used by people is done by the electric devices. If there is a good automated management of all these devices, a strong reduction of the consumption can be expected. Concerning electric heating, decrease of the temperature of 1 degree during 24 hours reduces the electricity use of 7 %. A better isolation and a better architecture and engineering design are not enough to fulfil EU requirements. It is necessary to make building more "intelligent" and more innovative.

The analysis of the enterprises needs concerning recruitment of engineers in the sector of the technical building management in Russia, Uzbekistan and Mongolia showed that electrical engineers and computer science or

automation engineers only partially meet the needs of professionals. Engineers at consulting firms are able to design an acquisition chain and the signal processing of a quantity related to technical building management (temperature, degree of humidity, level of light). But, their lack of knowledge of the standards relating to building, of the main features of the different materials used in building, and of the thermal aspect of the building does not allow them to offer optimal solutions. At the extreme, the system design could be totally ineffective when it is installed in a building, because this ignorance of thermal-energy aspects of the building does not allow them to take into account all the constraints in designing such a system.

Smart Houses and Smart Cities require the presence of professionals with multidisciplinary competencies and leading skills.

This calls for an increasingly multilateral collaboration between organizations and experts for the building of new competencies, skills and capabilities to respond and adapt to the negative impacts of urban structural changes.

Universities, key actors in this process, they are rethinking their role and responsibilities, introducing entrepreneurial programs, stimulating student initiatives, commercializing research and creating university spin-offs.

It is therefore important to update and to increase the quality of curricula in sphere of High-Tech Green Buildings in Russia, Uzbekistan and Mongolia to meet the needs of sustainable development of a global world.

The project Overview

A consortium of 16 universities and enterprises of the European Union, Russia, Mongolia and Uzbekistan had received a grant from the EU Erasmus+ program in the area of KA2 "Cooperation for innovation and the exchange of good practices "Capacity Building in the field of Higher Education". The name of the project: "Modernization of the Curricula in sphere of smart building engineering – Green Building (GREB)" (574049-EPP-1-2016-1-IT-EPPKA2-CBHE-JP).

The wider objective of the project is updating and quality increase of curricula in sphere of information and construction engineering – green building (High-Tech Green Buildings) in Russia, Mongolia and Uzbekistan to meet the needs of sustainable development of a global world.

The project is targeted at solving of two specific problems:

1) Development and testing of new interdisciplinary Model and BA&MA programs of engineering practical-oriented education for High-Tech Green Buildings to increase awareness and response to environmental changes.

2) Create an interaction platform (Network "Green Buildings" – NGB) of education, science, production and authorities with the aim to form modern professional competences of a specialist in accordance with needs of sustainable society in sphere of Civil Engineering. Furthermore NGB centers can be seen as Living Laboratories where practical case studies methodologies

and development results within urban development are studied and disseminated.

New interdisciplinary model of engineers training and two cycles (MA, BA) of competence-based curricula will be created as the project result. Developed curricula and courses will allow growing R&D engineers with strong skills in electronics and computer science, able to understand, analyze and take into account all constraints related to building and the environment in which it is located. These engineers, with wide conceptual design skills will be powerful actors in establishing relevant specifications relating to the introduction of intelligent systems in and around the building. Smart building engineers will be able to analyze the problem and find innovative solutions in comfort (technical management of buildings, safety, multimedia), home support (disabled, elderly), both in new buildings and renovation after an audit of existing buildings, for individual or collective, in manufacturing and services. This BA and MA programmes brings together students from different fields to study in interdisciplinary teams that increases understanding of different backgrounds and offers students opportunities to collaborate with research projects, companies, organisations and students from other disciplines. Students receive a wide conceptual design skills and it greatly increases employment opportunities.

The main project data:

Participant countries: Italy, Sweden, Spain, Slovenia, Austria, Russia, Uzbekistan Mongolia.

Project themes and priorities: Curriculum development

Subject Areas: Engineering trades: Electricity and energy, Climate engineering, Electronics and automation, Communication systems

Additionally: Computing: Smart home control system, Architecture and construction: Urban planning, Building and civil engineering

Project duration: 3 years

Project start date – 15.10.2016

The project consortium includes 16 universities and companies from the European Union, Russia, Uzbekistan and Mongolia:

Università degli Studi dell'Aquila – Coordinator

Royal Institute of Technology

Madrid Polytechnical University

Construction Cluster of Slovenia

Salzburg University of Applied Sciences

Moscow State University of Civil Engineering

Astrakhan Institute of Civil Engineering

Kazan State University of Archit.&Eng

Ogarev Mordovia State University

Association of Educational Civil Engineering Institutions

Regional public organization "Russian Technical Society"

Tashkent University of Information Technologies

Urgench State University
Karakalpak University
National University of Mongolia
Mongol Ulsyn Shinjleh Uhaan Technologiin

Project Coordinator – University of L'Aquila (UNIVAQ) in Italy. UNIVAQ counts presently 23.000 students, 644 teachers-researchers, 504 administrative and technical staff. The reconstruction of L'Aquila after the earthquake of 2009 promoted a lot of pilot actions and projects connected with Smart Cities. The town is a kind of innovative Lab. Thus local and national authorities, engineers professional associations, enterprises not only are interested in this project but can provide concrete experiences in several settings.

Many staff from UNIVAQ involved in many projects related to Smart Homes and Smart Cities:

- Laboratorio Nazionale Smart City del Consorzio Nazionale Interuniversitario per l'Informatica (CINI) – UNIVAQ hosts one of the knots (local responsible: Henry Muccini);
- Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT) for activities related to Smart City e IoT – UNIVAQ hosts one Research Unit. (Head of the Unit: Fabio Graziosi);
- Project “Innovating City Planning Through Information and Communication Engineering (INCIPICT)” financed by the Italian Government Delibera Cipe n. 135 del 21 dicembre 2012, in support of “development and research after the earthquake of 2009”. (Project coordinator: Fabio Graziosi).

Their knowledge and experience will be very useful for the successful implementation of the project GREB.

At the beginning of the project is planned to mix teachers, researchers, civil engineering firm employees and representatives of builders associations. They will help to assess the issue comprehensively – from the perspective of employers representatives and from the perspective of academic staff in the European Union, Russia, Uzbekistan and Mongolia. Methodology of brainstorming, interviewees with a large number of stakeholders and other effective methods will be used to discuss the following issues at seminars during the 1st year of the project:

- Sustainable and innovative urban planning, eco-design of buildings
- Technical management of buildings
- Smart industry and innovation, promotion of entrepreneurship, commercializing innovations
- Digital living, new ICT and methods of information security for smart buildings
- -Design of electric or electronic devices for building
- -Management of energy inside buildings

The main idea is to form the core of knowledge (curriculum and set of courses for BA and MA) for the formation of a new type of engineer with good

scientific bases able to adapt to the technological evolutions and to provide innovative solutions for High-Tech Green Buildings. The project will not only deal with green buildings but also with automation in buildings, which comprises many aspects that are different from energy saving. This broad conceptual design has a positive influence on employment opportunities.

Much attention in the project will be paid to the Russia, Uzbekistan and Mongolia teachers retraining in the universities of European Union. This will allow one hand to change the outlook of teachers with an emphasis on interdisciplinary knowledge, and on the other - to prepare new courses and to upgrade existing courses necessary for the implementation of the curriculum.

Another innovative solution in the project is the creation of Network of Multidisciplinary centers "Green Building" (NGB) for creative training of civil engineers in the context of interdisciplinary skills. The network will use the up-to-date video conferencing technologies for students to access lectures and seminars conducted by lecturers from leading EU universities. Optional - this will interaction platform for scientists of European universities and university partners, who can discuss online new scientific ideas, involving senior students in the process. Here employers together with university teachers will be able to create a design reference for international teams of students and consult them. Furthermore the planned Centers can be seen as Living Laboratories where practical case studies methodologies and development results within urban development are studied and disseminated. Active participation of the citizens in creating the urban solutions will be supported.

Conclusion

The long term impact indicators of the project:

New interdisciplinary Model and BA&MA programs of engineering practical-oriented education for Civil Engineering in line with best European Union practices to increase awareness and response to environmental changes and quality of life. The number of new type engineers on labor market will increase after completion of the project. They will own methods of design High-Tech Green Buildings and they can design buildings, in accordance with international quality standards.

Modernization and tuning of learning outcomes of two cycles (BA and MA) of competence-based curricula on Civil Engineering will be carried out during the project. Model of engineering education will be rethought to increase awareness and respond to environmental changes. Therefore partner universities will create joint MA program "High-Tech Green Buildings and Smart Cities".

The Network of Multidisciplinary centers "Green Building" (NGB) will be in force. During the project an interaction platform of education, science, production and authorities in order to form modern professional competences of specialists responding needs of sustainable society in sphere of Civil Engineering will be created. Strategy of a sustainable development of

NGB (business plan and road map) was confirmed by all universities and put into practice. NGB centers began to operate independent. They attracting businesses and universities to work together: number of enterprises placing orders for projects for student teams and number of projects realized in universities will be increased. A number of successfully hired graduates of technicians and engineering specialties grows. Interaction between companies from EU, Russia, Uzbekistan and Mongolia becomes more efficient. NGB Centers have become Living Lab, where practical case studies methodologies and development results within urban development are studied and disseminated. Active participation of the citizens in creating the urban solutions supported.

К ВОПРОСУ ОБ ИСПОЛЬЗОВАНИИ ОСАДКА СТОЧНЫХ ВОД В «ЗЕЛЕНОМ» СТРОИТЕЛЬСТВЕ ГОРОДА АСТРАХАНИ

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В статье рассматривается возможность использования осадка сточных вод в «зеленом строительстве» городов. Сделан вывод, что метод компостирования обезвоженных осадков является одним из перспективных с одной стороны для утилизации осадков сточных вод, с другой стороны – для получения плодородного грунта. Таким образом, биотермическая утилизация осадка, т. е. компостирование, позволит решить проблему накопления осадков сточных вод, и оказать содействие в повышении плодородности почв за счет внесения компоста, и использования их в зеленом строительстве.

Ключевые слова: «зеленое» строительство, сточные воды, компостирование.

TO THE QUESTION OF THE USE OF SEWAGE SLUDGE IN THE GREEN CONSTRUCTION OF THE CITY OF ASTRAKHAN

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The article discusses the use of sewage sludge in the "green building" cities. It is concluded that the method of composting the dewatered sludge is one of the most promising on the one hand for the disposal of sewage sludge, on the other hand - to provide fertile soil. Thus biothermic recycle sludge i.e. composting, will solve the problem of accumulation of sewage sludge, and to assist in improving the fertility of soil by making compost, and use them in green building.

Keywords: green building, waste water, composting.

Озеленение городов аридной зоны России является одной из важных задач при решении вопросов благоустройства. Для озеленения требуется значительное количество плодородного грунта. В настоящее время для этих целей снимается плодородный слой целинных