Co-funded by the
Erasmus+ Programme
of the European Union

Integrating education with consumer behaviour relevant to energy efficiency and climate change at the Universities of Russia, Sri Lanka and Bangladesh (BECK)

Partner report on current state of higher education and its relationship with consumers' behaviour on energy efficiency and climate change

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1 INTRODUCTION

The purpose of this series of country reports is to obtain general philosophical, pedagogical and practical understanding on the status of higher education and its impact on consumer behaviour relevant to energy efficiency and climate change in BECK partner and European partner countries. It will also provide a basis for understanding and evaluating the capabilities of partner institutions on integrated education for energy efficiency and climate change. The results of these reports will inform a capacity building framework, which will form the basis for development of modules on energy efficiency and climate change during the BECK project.

The reporting approach is based on the Capacity Needs Assessment Methodology (CAPNAM) proposed by the United Nations (2013).

The report includes chapters on the following:

- Methodology. This section describes the methodological approach used to collect and analyse the data that informs the findings presented in this report.
- Context. Provides an overview of the regulatory, socio-political, and cultural factors that shape policy on the consumer behaviour relevant to energy efficiency and climate change in the country in general, and education in particular.
- Scope and coverage of education policies on consumer behaviour relevant to energy efficiency and climate change by the Higher Education Institution (HEI). Examines the illustrative policy and planning issues relevant to integrated education on consumer behaviour relevant to energy efficiency and climate change.
- Description of capacity types. Evaluates the existing state of capacities of HEI in the field of integrated education on consumer behaviour relevant to energy efficiency and climate change. As defined by the CAPNAM analytical framework, the four types of categories are institutional, organisational, individual, and the knowledge base.

2 Methodology

Please describe the methodological approach used to collect and analyse the data that informs the findings presented in this report. For example, this may include focus groups, interviews, document reviews and literature reviews.

The data that informs the findings presented in this report were collected using various methods. These methods can be divided into two parts: 1) collection and analysis of existing (secondary) data (for example, documents on the official website of Peter the Great St. Petersburg Polytechnic University (https://www.spbstu.ru/), publications in the press devoted to the problem under consideration, normative documents, etc.); 2) the collection of new data by conducting a survey among students of the international master program Energy Efficient and Sustainable Building.

3 CONTEXT

This section provides an overview of the regulatory, socio-political, and cultural factors that shape policy on the consumer behaviour relevant to energy efficiency and climate change in the country in general, and the education in particular. Please answer following questions.

3.1 Socio-political and cultural context

What are the socio-political and cultural contexts providing the framework for educational policy planning in the field of consumer behaviour relevant to energy efficiency and climate change in the country? Are there any regulations, plans, etc.?

Today energy efficiency and energy saving are the most important priorities of the world economy. These areas offer opportunities to address such pressing global problems as the growing shortage of energy resources and negative impact on environment.

Improvement of energy efficiency and energy conservation is key task in creating conditions for sustainable energy development at all society levels - local, regional, national and global.

Public awareness campaign in the field of consumer behavior relevant to energy efficiency and climate change:

At the local level in schools and universities:

Russian wide project “SPARE” is held in schools every year (it is the largest international educational project for schoolchildren on education relevant to climate change and energy efficiency). The main topics of this project are:

- Projects on energy conservation, energy efficiency and renewable energy.

- Projects on implementation of energy saving and energy efficiency

- Renewable energy supply projects

- Energy saving projects through resource saving measures

- Public awareness/promotion of energy efficiency

Peter the Great St. Petersburg Polytechnic University provide different type of seminars, forums (for example, International Youth Forum «ECOBALTICA»), "Greenday" festivals, master's programs, internship programs related to the implementation of energy efficiency programs and problems associated with climate change.

At the governmental level:

Annual all-Russian projects competitions in the field of energy saving and energy efficiency ENES are held with Russian Federation Ministry of energy and Interdepartmental coordination Council for energy saving and energy efficiency in order to stimulate at regional and municipal levels implementation of projects for improving energy efficiency and promoting energy-saving lifestyle among the population. Also in July 2018 was signed Federal law about information support for the regional programs implementation, which provides public awareness campaign in the field of consumer behavior relevant to energy efficiency and climate change in the country.

3.2 Status of education

What is the current state in education on consumer behaviour relevant to energy efficiency and climate change? Is it important at your country? Please specify.

Energy efficiency is considered to be one of the main directions of combating climate change. It is difficult to identify the "climate" potential of individual measures, but it is possible to use integrated classifications reflecting different benefits of energy efficiency to improve policy. This is relevant for Russia, which is in the process of actively shaping climate policy and potentially considers energy efficiency as its Central element.

To promote programs related to energy efficiency and climate change, various competitions of youth initiatives, conferences, topics related to the issues of climate action at national and local level, development of renewable energy, role of public in promoting popularization programs in Russian Federation are held.

3.3 Funding

Is funding sufficient for integrated education on consumer behaviour relevant to energy efficiency and climate change at your country? Please specify.

Within the framework of various government programs, such as the 5-100-2020 Project, funding is provided for activities aimed at consumer behavior relevant to energy efficiency and climate change, but this amount of money is insufficient. Funding is also provided for a number of European projects, such as Erasmus + Program of the European Union, ERASMUS+ MARUEEB-master's degree in innovative technologies of energy efficient buildings for Russian and Armenian universities with participation of employers, CBC ENI Russia-Finland: energy-efficient systems based on renewable energy sources for Arctic conditions (EFREA), etc.

3.4 Educational needs

What are the needs in integrated education on consumer behaviour relevant to energy efficiency and climate change (please list up to 5 major needs at country level):

- Implementation and broadcasting of European experience and practices of energy efficiency and climate change in Russia through various training seminars, conferences, youth forums and competitions.

- Raising public awareness of climate change causes and consequences at all levels of education: schools, universities.

- Build capacity of the student's internet community on climate change issues, raise public awareness and improve understanding of climate change causes and consequences and promote energy efficiency programs.

- Creation laboratory facilities for studying energy efficiency and its impact on climate change

- Conducting training sessions, scientific seminars on the impact of climate change on public health.

3.5 Educational gaps

What are the gaps in integrated education on consumer behaviour relevant to energy efficiency and climate change (please list up to 5 major gaps at country level):

Energy efficiency has been considered a large, low-cost energy resource for economy of country. However, despite policymakers' efforts to improve it, the progress in actually achieving energy savings so far has been relatively slow.

Energy efficiency and climate change are not observed in complex way in Russia. The most effective measures in solving problem of climate change in the energy sector, according to Russian Social and Environmental Union, introduction of renewable energy sources, as well as energy-saving and energy efficient technologies.

Most important element of implementation and broadcasting energy efficiency practices - creation integrated training centers with supporting of leading energy-efficient equipment manufacturers on basis of leading Russian universities. In addition, these centers will be successfully addressing issues of student's career guidance and their employment in professional sphere.

Gaps:

1. Dialogue with population and formation of public opinion:

1.1. Development of public organizations dialogue and government authorities, scientific community and business representatives on topics related to sustainable energy, reducing negative impact of energy on climate, socio-economic adaptation to global climate change.

1.2. Mechanism creation for coordination and consideration of opinions and positions of all stakeholders in decision-making in Russian Federation (energy development strategies in Russia; implementation and evaluation of climate change adaptation programs; etc.)

1.3. Information exchange on consumer behavior relevant to energy efficiency and climate change.

2. Legislation:

2.1. Legislative framework and Federal target programs development in the field of climate and energy aimed at reducing greenhouse gas emissions and preventing climate change and its consequences through priority of sustainable energy development: renewable energy sources, energy efficiency and energy saving, as well as forecasting and planning of adaptation measures;

2.2. Creation and implementation of short-term and long-term plans for renewable energy and energy efficiency development at regional and municipal levels;

2.3. Consolidation of targets for renewable energy development at legislative level.

3. Energy consumption, energy efficiency and energy saving:

3.1. Implementation and application of stringent energy efficiency standards for buildings and vehicles.

3.2. Modernization of production facilities and equipment to improve energy efficiency.

3.3. Reduction of energy consumption per unit of GDP at least twice in 5 years (which corresponds to the current world level); by modernizing existing production facilities, primarily through stimulating the development of high technologies and improving management.

3.4. Inclusion in priorities of Russian Federation state policy of energy saving in construction, housing and communal sector, given that the energy saving potential in this sector is 40-70%.

3.5. Labelling systems and other mechanisms that reveal environmental information about products from energy efficiency point of view.

4. Area of adaptation to climate change:

4.1. Conducting research on climate change for nature, human health, economy, social situation in Russia and certain regions.

4.2. Increasing public financial and institutional support for climate change research.

4.3. Adoption of national and regional climate change programs, taking into account the most vulnerable areas, population groups and natural sites.

4.4. Developing new and supporting existing education programs on climate change and energy.

4.5. Conducting scientific investigation to identify the economic consequences of climate change for Russia, comparing the cost of measures to reduce greenhouse gas emissions.

4.6. Ensuring alignment of conditions and opportunities for sustainable development of all Russian Federation regions through action in the field of climate change within the country.

4 POLICIES RELEVENT TO HIGHER EDUCATION, AND THEIR RELATIONSHIP WITH CONSUMER BEHAVIOUR ON ENERGY EFFICIENCY AND CLIMATE CHANGE

This section examines the illustrative policy and planning issues relevant to integrated education on consumer behaviour relevant to energy efficiency and climate change. Please answer following questions.

4.1 Policy and planning

Please describe policy and planning issues currently being addressed by the HEI in the field of integrated education on consumer behaviour relevant to energy efficiency and climate change.

The question of energy efficiency is one of the most priority for SPbPU. The policy of the HEI is to create Eco-campus and influence the students and staff behavior relevant to energy efficiency and climate change.

Now the administration of the HEI implement administrative decision to increase energy efficiency of the University. For instant complex decisions of the campus modernization were implemented (like energy efficient engineering systems, building retrofitting, waste management, pollution control, etc.) the planning issue is to create Green Campus with the energy zero cycle.

The Future Eco Campus will become an experimental base for the city, influencing consumer behavior relevant to energy efficiency and climate change. If the experience will be successful it could be transferred to the city of Saint Petersburg.

The administration of the SPbPU is trying to attract students and staff attention to these initiative by creating special projects with the participation of the students.

Master program “Energy Efficient and Sustainable Building” was created. The program is connected with the questions of energy efficiency and climate change. Specialized conferences and seminars, "Greenday" festivals devoted the questions of energy efficiency and climate change are held regularly.

4.2 Gaps in policy and planning

Please describe other, if any, policy issues that are not currently being handled by the HEI but should be considered.

Implementation European educational practices to existing educational programs, and students research.

Organization internships for teaching staff and students to the Universities which implement best practices in the field of integrated education on consumer behavior relevant to energy efficiency and climate change.

N.B. The responses to these questions do NOT require describing each policy and planning issue but only the identification of the type of issues being addressed and those not being addressed. The questions are only meant to understand the scope of coverage of important issues by the HEI.

5 CAPACITY TYPES

This section aims at assessment of the existing state of capacities in the HEI for integrated education on consumer behaviour relevant to energy efficiency and climate change. As defined by the CAPNAM analytical framework, the four types of categories are institutional, organizational, individual, and the knowledge base.

5.1 Institutional capacities

This part describes the institutional capacities at HEI level. Please answer following questions.

1. Please provide brief presentation of the HEI.

Peter the Great St. Petersburg Polytechnic University (SPbPU) is a major Russian technical university providing courses in engineering, physics, economics, humanities and information technology. SPbPU offers 50+ Bachelor's degree programs, 200+ Master's degree programs, 90 doctorate programs and 90 PhD programs, in addition to non-degree and international education programs. SPbPU is a national research university which combines multidisciplinary R&D activities with advanced technology to prepare graduates to work in today's competitive marketplace.

SPbPU educates more than 31,000 students with about 6 000 international students including from over 100 countries. The university has partnerships with about 300 universities, about 130 scientific and research institutions and over 150 companies from over than 50 countries. SPbPU is home to over 20 international research centers which carry out research collaborations with major companies including LG, Electrolux, GM, Statoil, PHILIPS, etc.

2. Please describe general model of studies according to different levels (bachelor, master, PhD).

Bachelor's degree takes 4 academic years to complete, while Master's degree takes 2 academic years to complete, and Postgraduate programs takes at least 3 years to complete. Applicants for degree programs are enrolled according to the results of entrance examinations based on test scores.

3. Please provide key facts and figures about the HEI:

3.1. Number of students: more than 31 thousand students

3.2. Number of academic staff: more than 6 thousand of teaching staff and faculty members

3.3. Student/Academic staff ratio: 11

3.4. Number of Faculties (please specify): 11

- Institute of Humanities
- Institute of Civil Engineering
- Institute of Biomedical Systems and Technologies
- Institute of Computer Science and Technology
- Institute of Metallurgy, Mechanical Engineering and Transport
- Institute of Advanced Manufacturing Technologies

• Institute of Applied Mathematics and Mechanics

• Institute of Physics, Nanotechnology and Telecommunications

• Institute of Physical Education, Sport and Tourism

• Institute of Energy and Transport Systems

• Institute of Industrial Management, Economics and Trade.

3.5. Number of graduates: more than 2000 per year

3.6. Number of study programmes: more than 460 programs for different education levels

3.7. Number of international academic partners: more than 340

3.8. International rankings of the HEI (if any): QS Global World Ranking: #404, THE World University Ranking #201

4. Please describe main education and research areas of the HEI.

- Energy –efficient and Sustainable Buildings;

- Green Building;

- Renewable Energy Sources;

- New materials end etc.

5. Is there any strategic priorities given to integrated education on consumer behaviour relevant to energy efficiency and climate change at HEI level? Please specify.

The main strategic priority of HEI is integration teaching modules on consumer behavior relevant to energy efficiency and climate change into existing educational programs of the different levels of studies (bachelor, master, PhD). Also, one of the major priorities is to focus on research projects of energy efficiency and climate change considering the different levels of studies (bachelor, master, PhD).

6. What are the needs at HEI in integrated education on consumer behaviour relevant to energy efficiency and climate change (please list up to five major needs):

Needs:

1. Integration teaching modules on consumer behavior relevant to energy efficiency and climate change into existing curricular on different levels of studies (bachelor, master, PhD).

2. Using teaching modules of other Russian Universities relevant to energy efficiency and climate change for implementation into the SPbPU curricular, including e-learning courses, like MOOC.

3. Increasing consumer's responsibility of students, through the integrated education on consumer behavior relevant to energy efficiency and climate change.

4. Organization of special open activities on consumer behavior relevant to energy efficiency and climate change for students, which are integrated into educational process.

5. Creation of student's volunteer teams, which are will be organized different activities on consumer behavior relevant to energy efficiency and climate change.

7. What are the gaps at HEI in integrated education on consumer behaviour relevant to energy efficiency and climate change (please list up to five major gaps):

Gaps:

1. Uniform curricular design methodology with a focus on integrated education on consumer behavior relevant to energy efficiency and climate change on different levels of studies (bachelor, master, PhD) needs of development.

2. Integration of European best practices and cases.

3. The culture of energy efficiency and climate change, including waste-management, water management, etc. is not enough developed.

4. The better support of the student's projects relevant to energy efficiency and climate change from the side of the city administration and business is necessary required.

5. A lack of relationships with business partners and stakeholders.

5.2 Organisational capacities

This part describes the organisational capacities pertinent to integrated education on consumer behaviour relevant to energy efficiency and climate change at HEI. Please answer following questions.

1. Is integrated education on consumer behaviour relevant to energy efficiency and climate change sufficiently included in the curricula of HEI? Please specify according to different levels (bachelor, master, PhD):

1.1. Study programme level (Please list relevant study programmes): Level of studying are insufficient in bachelor program "Civil Engineering", master program "Energy Efficient and Sustainable Building".

1.2. Study subject level (Please list relevant study subjects/modules): Only 3 subjects (Energy efficient engineering systems; Energy efficient building materials; Renewable energy sources) are relevant to energy efficiency and climate change in the framework master program "Energy Efficient and Sustainable Building". This represents less than 15% of the total workload. For other educational programs, the number of subjects related to energy efficiency and climate change is even smaller.

1.3. Study topic level (Please list relevant study topics): research topic relevant to energy efficiency and climate change in SPbPU is insufficient.

2. Is funding sufficient for integrated education on consumer behaviour relevant to energy efficiency and climate change at HEI? Please specify.

Funding is insufficient for laboratory equipment, internships and trainings for teaching staff.

3. What are the needs at HEI in integrated education on consumer behaviour relevant to energy efficiency and climate change related to organisation of study process (please list up to five major needs):

Needs:

1. Using European practices in the field of energy efficiency and climate change in the master and bachelor programs.

2. Organization implementing projects of representatives from industries lectures in the field of energy efficiency, as well as representatives of public organizations.

3. Increase of awareness about European studies and green construction practices among young lecturers and researches.

4. Organization student's mobility programs integrated into the educational program in the field of consumer behavior relevant to energy efficiency and climate change.

5. Organization of short termed winter and summer schools' programs devoted to energy efficiency and climate change.

4. Please list up to five major gaps in integrated education on consumer behaviour relevant to energy efficiency and climate change related to organisation of study process:

Gaps:

1. The better equipment of laboratory and demonstration facilities for the research in the field of energy efficiency and climate change is required.

2. Integration European best practices and cases of consumer behavior relevant to energy efficiency and climate change into master and bachelor programs is needed.

3. Student's motivation for making research connected to energy efficiency and climate change within master and bachelor programs should be raised.

4. Climate change and energy efficiency issues in the students' bachelor and master thesis should be included obligatory.

5.3 Individual capacities: Staff skills

This part describes the individual staff capacities pertinent to integrated education on consumer behaviour relevant to energy efficiency and climate change at HEI. Please answer following questions.

1. How many academic staff works at your unit? (which implements the project): about 90 person

2. Is there sufficient number of teachers who specialise in integrated education on consumer behaviour relevant to energy efficiency and climate change? How many?

2.1. At university level: 8

2.2. At your unit/department: 3

3. Is there sufficient number of researchers who specialise in consumer behaviour relevant to energy efficiency and climate change? How many?

3.1. At university level: 10

3.2. At your unit/department: 5

4. Please describe the current state of the staff training in HEI. Is it sufficient?

Staff training in HEI is sufficient in different spheres relevant to different methodic of education process and social development, bur insufficient in sphere like energy efficiency and climate change, because don't have a lot of specialists in this sphere.

5. Please describe the current state of the staff training on consumer behaviour relevant to energy efficiency and climate change. Is it sufficient?

Current state of the staff training on consumer behavior relevant to energy efficiency and climate change is insufficient.

6. Does the academic staff have flexibility in designing its own skill development plans or does it have to follow a centrally determined package?

The flexibility of the academic staff is quite limited by the centrally determined package.

7. Is there staff stability, or does it suffer from high turnover among such professionals?

Staff of SPbPU is stable enough.

8. What staff skills are required for integrated education on consumer behaviour relevant to energy efficiency and climate change (please list up to five major needs):

1. Teamworking with the research staff and students.

2. Project management skills.

3. Personal involvement into the questions of consumer behavior relevant to energy efficiency and climate change.

4. Knowledge of the European experience and practices of consumer behavior relevant to energy efficiency and climate change.

5. Practice of the European cases integration into curricular.

9. Please list up to five major gaps in integrated education on consumer behaviour relevant to energy efficiency and climate change related to staff skills:

1. The better development of teaching staff skills on consumer behavior relevant to energy efficiency and climate change.

2. Academic mobility of teaching staff is not enough.

3. Knowledge of European practices in the field of energy efficiency and climate change is narrow used.

4. Practical skills in using software and simulators need to be raised.

5.4 Access to Information, Knowledge and Technology

Access to information, knowledge and technology is becoming increasingly critical for sustaining long-term growth and development of education. It relates to the capacity to enable academic staff and students to mobilize, access and use information and knowledge, including access to and effective use of internet. Please answer following questions.

1. Do students and teachers have access to the novel educational resources on consumer behaviour relevant to energy efficiency and climate change? Please specify:

Peter the Great St. Petersburg Polytechnic University has access to the educational resources like library of Polytechnic University https://library.spbstu.ru/ru/, Russian scientific electronic library integrated with The Russian science citation index (RSCI) https://elibrary.ru/defaultx.asp, electronic information and educational environment of SPbPU (further EIOS) http://open.spbstu.ru/eios/.

1.1. Printed learning materials in national language:

Printed learning materials will be allocated in https://library.spbstu.ru/ru/, Russian scientific electronic library integrated with The Russian science citation index (RSCI) https://elibrary.ru/defaultx.asp.

1.2. Printed learning materials in English or other languages:

Printed learning materials in English will allocated in bibliographic database Scopus https://www.scopus.com, search platform that combines abstract databases of publications in scientific journals Web of Science https://login.webofknowledge.com.

1.3. Online learning materials (open-source videos, simulators (calculators and software), case studies, text material) in national language:

Electronic information and educational environment of SPbPU (further EIOS) http://open.spbstu.ru/eios/ resource with a variety of materials on consumer behavior relevant to energy efficiency and climate change issues in Russian language, Autodesk Revit software and Energy Optimization for Revit it is fast, flexible and reliable means to improve the performance of a building.

1.4. Online learning materials (open-source videos, simulators (calculators and software), case studies, text material) in English or other language:

A lot of learning materials in the field of mass online education Coursera https://www.coursera.org/

2. Does HEI use MOODLE for educational purposes?

Yes, Peter the Great St. Petersburg Polytechnic University widely use distance learning environment MOODLE for educational purposes https://lms.spbstu.ru/?lang=en

3. Does HEI use computer-based intelligent systems, MOOCs, computer learning systems, big data mining for educational purposes? Please specify:

In 2015 Peter the Great St. Petersburg Polytechnic University was launched electronic information and educational environment of SPbPU (further EIOS) which is it includes electronic information

resources, electronic educational resources, a set of information technologies, telecommunication technologies, appropriate technological means and ensuring the development of educational programs by students. In this platform we have MOOCs in field of energy efficiency.

4. Does HEI use software for integrated education on consumer behaviour relevant to energy efficiency and climate change? Please specify:

HEI doesn't have software for integrated education on consumer behavior relevant to energy efficiency and climate change, but in our institute we widely use Autodesk Revit software.

5. What Information/Knowledge/Technology is required for integrated education on consumer behaviour relevant to energy efficiency and climate change (please list up to five major needs):

1) MOOCs courses with possibilities of integration into existing educational programs.

2) Unified information portal (big data) of training materials on consumer behavior relevant to energy efficiency and climate change.

3) Exchange of knowledge and information between teachers on consumer behavior relevant to energy efficiency and climate change.

4) International interaction between students of education on consumer behavior relevant to energy efficiency and climate change.

5) Development of laboratory facilities and software.

6. Please list up to five major gaps in access to information, knowledge and technology pertinent to integrated education on consumer behaviour relevant to energy efficiency and climate change:

1) Number of thematic MOOCs courses should be raised.

2) Existing curricular are not accompanied by information materials.

3) European best practices and cases of consumer behavior relevant to energy efficiency and climate change is not used enough in the learning process.

4) Technical equipment of training programs should be updated.