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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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5

CONTENTS

1	Introduction	3

- 2 Methodology 4
- 3 Context

3.1 Socio-political and cultural context

5

3.2 Status of education

3.3 Funding 6

- 3.4Educational needs6
- 3.5 Educational gaps 6

4 Policies relevent to higher education, and their relationship with consumer behaviour on energy efficiency and climate change 7

5

- 4.1 Policy and planning 7
- 4.2 Gaps in policy and planning 7
- 5 Capacity types8
 - 5.1 Institutional capacities 8
 - 5.2 Organisational capacities 11
 - 5.3 Individual capacities: Staff skills 12
 - 5.4 Access to Information, Knowledge and Technology 14



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.

The content of this report is related to the BECK Project and reflects only the author's view. The National Agency and the Commission are not responsible for any use that may be made of the information it contains.



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.

Documents and literatures reviews and interviews with departments, leading teachers and staff was carried out to collect and analyse the data.



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.?

- EU and Estonia Policy quidelines (EU directives) All new buildings have to be "nearly zero energy buildings" in 2020 (https://www.rehva.eu/eu-regulations.html);
- Estonian Qualifications Authority (occupational standard Chartered specialist in energy performance of buildings, level 8) (www.kutsekoda.ee);
- Educational Regulations (www.hm.ee);
- Strategic Plan of TalTech.

Table 1. Energy policies with specific references to changing consumer behaviour and/or smart meter roll-out) source: Achieving energy efficiency through behaviour change.

Energy policy	Reference to consumer behaviour change and/or smart meter roll-out
Directive 2005/89/EC on security of supply	Encourages the adoption of real-time demand management
Directive 2006/32/EC on end-use energy services	Encourages the introduction of smart meters
Third liberalisation package (*)	Requires transparency in energy billing information and encourages the introduction of smart meters

Note: (*) The third liberalisation package entered into force in September 2009 and includes a number of directives and regulations. For details, see the European Commission website http://ec.europa.eu/energy/gas_electricity/legislation/legislation_ en.htm.

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.

A number of preconditions is met and in principal university is ready to work in this area:

- Strategic plan of TalTEch supports (see arengukava);
- National policy supports;
- Research funding policy supports;
- Existing competence in the university (e.g. N-zeb, building lifecycle research groups);
- Cooperation demand and experience of information technology and engineering schools in research and in industrial projects;
- Knowledge gained in different different international projects.



3.3 Funding

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

- Main funding covers only teaching activities;
- research and development funding is mainly via grants and projects;
- no sufficient special funding for curriculum development.

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):

Around 70% of Estonian apartment buildings were built during the period 1960 to 1990 and need to be serious improvement from the energy efficiency viewpoint. The digital systematization of data and energy efficient solutions for reconstruction and maintenance of apartment houses will be developed. This works in tact with the main objective of energy efficiency policy which aims to increase efficiency and effectiveness and quality of the economy. Partner contributes through identifying the state of the art and best practices in energy efficient solutions and economic performance during the lifecycle of the building, digitalisation of information delivery, research of on site practices and their impact on the quality of outcomes.

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):

- Lack of staff and time;
- Insufficiency of funding;
- Knowledge for educators (training: time and funding);
- Implementation in curricula (knowledge, time, funding);
- Training courses for lifelong learning (time);
- Special integrated modules.



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.

On October 2012, the European Union adopted the Energy Efficiency Directive in reaction to the fact that EU Member States were not on track to reduce primary energy consumption by 20 % by 2020.

The implementation of this directive, and other policies that have been adopted in recent years, will require a change in consumer behaviour and energy consumption practices (Achieving energy efficiency through behaviour change, EEA Technical report No 5/2013, <u>https://www.eea.europa.eu/publications/achieving-energy-efficiency-through-behaviour/at_download/file</u>.





Source: Adapted from the NOA model described in Darton 'Methods and Models'.

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.

N/A

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.

Tallinn University of Technology (TalTech) was established in 1918. It is the only technological university in Estonia, the flagship of Estonian engineering and technology education. Here the synergy between different fields (technological, natural, exact, economic and health sciences) is created and new ideas are born. TalTech is to become one of the leading technological universities in the Baltic Sea region.

The mission of Tallinn University of Technology is to be a promoter of science, technology and innovation and a leading provider of engineering and economic education in Estonia.

High-quality programs and successful alumni

Study and teaching is based on internationally recognized research and the graduates are highly rated on the labour market. The University's approximately 70,000 alumni have shaped the economic landscape of present-day Estonia.

Excellence in research and innovation

TalTech is a university, which by relying on academic competencies and professional management, responds actively to the needs of the rapidly developing society and is involved in tackling the challenges of the digital era.

Inspiring environment

TalTech offers its students exciting student and cultural life and the best accommodation and sporting opportunities in the Baltic Sea region. The TalTech campus is also a home to more than 200 high-tech companies (e.g. Skype).

Creating the future

TalTech is in charge of nurturing the next generation of engineers and advancing engineering culture in Estonia, contributing to the sustainable development of the society and increased national prosperity with its innovative services. Our vision is innovative Estonia in a sustainable world.

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

- Bachelor studies 3 years (180 ECTS);
- Master studies 2 years (120 ETCS) ;
- Integrated engineering studies 5 years (300 ETC);
- PhD 4 years (240 ETCS).



- 3. Please provide key facts and figures about the HEI:
- 3.1. Number of students: 11 208 from 94 different countries.
- 3.2. Number of academic staff: 1, 837 employees from 51 different countries, 1019 academic staff.
- 3.3. Student/Academic staff ratio: 10,999.

STUDENTS*	STAFF*
11,208 13% international students from 94 countries 597 PhD students	1837 from 51 countries 46 average age
3452 enrolled students 90 PhD students	employees 49% female staff
2264 16% international students graduates 62 PhD students	academic staff 70% below 50 years old
study programmes 33 international study programmes	Q1Q 4% international
68,313 ^{3%} international alumni	non-academic staff

- 3.4. Number of Faculties (please specify):
- 4 Schools and Estonian Maritime Academy;
- 20 Departments, including Tartu College, Virumaa College and IT College.

STRUCTURE OF

BO	ARD OF GOVERNO	RS		Aud	lit Committee
Rector			UNIVERSITY COUNCIL		
	VICE-RE • Resea • Library • Certific	CTOR FOR RESEAR rch Administration O / cation Centre	ICH Iffice	VICE-RECTOR F • Office of Acad • Open Universi	OR ACADEMIC AFFAIRS emic Affairs ty
SCHOOL OF INFORMATION TECHNOLOGIES Department of Software Science Department of Health Technologies Thomas Johann Seebeck Department of Electronics I T College	SCHOOL OF ENGINEERING Department of Civil Engineering and Architecture Department of Electrical Power Engineering and Mechatronics Department of Materials and Environmental Technology Department of Mechanical and Industrial Engineering Tartu College Virumaa College	SCHOOL OF SCIENCE - Department of Geology - Department of Chemistry and Biotechnology - Department of Cybernetics - Department of Marine Systems	SCHO BUSIN GOVE • Depa Econ Depa Innov Gove • Depa • Depa Admi	OL OF IESS AND RNANCE rtment of ar Nurkse ar Nurkse rtment of ation and mance trment of Business nistration	ESTONIAN MARITIME ACADEMY
DIRECTOR FOR ADMINISTRAT • Information Technology Servi • Personnel Office • General Office	ION DIRECTOR FOR FIN ces • Finance Office	IANCE D	IRECTOR FOR FAC	ILITIES DI At •	RECTOR FOR INNOVATION ND BUSINESS RELATIONS Innovation and Business Relations

- 3.5 Number of graduates: 2264 graduates (15, 9% foreign graduates), 62 PhD graduates.
- 3.6. Number of study programmes: 93 (33 international).
- 3.7. Number of international academic partners: more than 300 (https://www.ttu.ee/international-cooperation/partners/).
- 3.8 International rankings of the HEI (if any): QS Global World Ranking #601-650.



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

- 1,221 scientific publications;
- 4.85 average number of citations in the last 5 years;
- 53.7% proportion of scientific publications in international co-authorship;
- 62 defended PhD degrees;
- top 7 countries of cooperation for publication in 2017 (Finland, Germany, Russia, USA, Sweden, Latvia, France).

Research areas:

- engineering;
- technology;
- natural sciences;
- social sciences.

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.

Currently priority is given to applications addressing the following challenges in the Baltic region (ETAG Estonian Research Council):

- Public health; translational medicine; health technologies
- Migration; social inclusion
- Regional cyber security; public security
- Environmentally friendly solutions
- Regional economic development; employment; labour market regulations and social policy
- More effective use of resources

Research area

The Building Lifecycle Research Group approaches the building lifecycle as a whole, integrating the construction process and its outcomes with management strategies, technologies, building materials, economics and facilities management. Recent research has included:

- Multi-attribute decision making methods for the assessment of different management strategies;
- Developing and providing BIM-related know-how;
- Different aspects of construction economics and management in the major fields of civil engineering;
- Surveys on the building life cycle and technical conditions of housing;
- Disaster resilience of built environment;
- Educational aspects of civil engineering, etc.
- Regulation of construction activities and creation of normative materials and standards for the Estonian construction industry;
- Energy saving and the renovation of buildings.

ZEBE – Centre of Excellence for zero energy and resource efficient smart buildings and districts

ZEBE Center of Excellence in Research (CER) contributes to energy and resource efficiency improvement in buildings and districts. On European level ZEBE CER contributes to European objective of 20% primary energy savings in 2020 that is one of the five headline targets of the Europe 2020 Strategy for smart, sustainable and inclusive growth. Research is focused to zero energy, recourse efficiency, and renewable energy topics under three main themes:



- Zero energy and resource efficient smart buildings;
- Resource efficient wooden structures and composites;
- Intelligent and efficient energy management for ZEB.

ZEBE CER aims to conduct research needed for the development of smart buildings, being based on active and passive solutions, more efficient material use and use of more efficient energy solutions, which allow to seek for complete solutions in this area. Expected results can be utilized and applied in construction and energy sectors especially when moving to build nearly zero energy buildings as well as in deep integrated renovation of existing buildings, both being the areas Estonia has already been able to take decisive steps in order to be among key players in EU.

In the three research themes three TAITech research groups are working:

- Nearly Zero Energy Buildings (nZEB) research group, Jarek Kurnitski, Targo Kalamees;
- Power Electronics and Demand Side Management (IEEM) research group, Dmitri Vinnikov, Argo Rosin;
- Wooden Structures and Composites (WSC) research group, Meelis Pohlak, Jüri Majak.

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):

The needs at HEI in integrated education on consumer behaviour relevant to energy efficiency and climate change are:

- new courses integration in existing programmes;
- sufficient research funding;
- the staff;
- special integrated modules;
- knowledge for educators (training: time and funding).

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):

The gaps at HEI in integrated education on consumer behaviour relevant to energy efficiency and climate change are:

- lack of staff and time;
- insufficiency of funding;
- implementation in curricula (knowledge, time, funding);
- training courses for lifelong learning (time);
- special integrated modules.

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):
- Masters level (5 year integrated engineering studies in Structural Engineering and Construction Management Programme.



- 1.2. Study subject level (Please list relevant study subjects/modules):
- Special studies: Module of Construction Project Management
- 1.3. Study topic level (Please list relevant study topics):
- Construction management Simulation

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

The university has a number of ongoing, funded research projects which target energy efficiency and climate change particularly in relation to nearly zero energy buildings. Although these have enabled the university to develop considerable energy efficiency and climate change expertise, the funding for these research projects is specific to stipulated deliverables and, therefore, integrated education on consumer behaviour remains underfunded.

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):

The needs at HEI in integrated education on consumer behaviour relevant to energy efficiency and climate change related to organisation of study process are:

- Appropriate staff for teaching;
- Trainings;
- Special modules integration in curriculum.

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:

The major gaps in integrated education on consumer behaviour relevant to energy efficiency and climate change related to organisation of study process are lack of staff, time for preparation and funding.

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):

Five persons in parallel with other responsibilities.

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:
- 2.2. At your unit/department:

People have specific working load including teaching, research and development projects. There are no people working only on this particular issue.



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:
- 3.2. At your unit/department:

People have specific working load including teaching, research and development projects. There are no people working only on this particular issue

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

- 3 professors
- 1 associate professor
- 1 PostDoc researcher
- In addition Master students can be engaged

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

It might be better.

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

Yes.

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

The staff is stable.

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):

- improvement of interdisciplinary teamwork abilities;
- improvement of knowledge in coinciding subjects;
- improvement of ICT skills.

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:

- improvement of interdisciplinary teamwork abilities;
- improvement of knowledge in coinciding subjects;
- improvement of ICT skills.



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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:

- 1.1. Printed learning materials in national language: Lecture notes are in Estonian (available in the intranet)
- 1.2. Printed learning materials in English or other languages: Novel printed materials are mainly in English, few copies in the library.
- 1.3. Online learning materials (open-source videos, simulators (calculators and software), case studies, text material) in national language: text material text material are in Estonian (available in the intranet).
- 1.4. Online learning materials (open-source videos, simulators (calculators and software), case studies, text material) in English or other language: open-source videos, simulators (calculators and software), case studies are in English.

Academic staff is required to provide e-learning support at least for compulsory subjects.

2. Does HEI use MOODLE for educational purposes?

Yes

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

Computer learning systems are used.

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

This depends on the topic. There is certain software available for students.

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):

- ICT;
- The digital systematization of data and energy efficient solutions;
- Building life cycle management;

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:

- ICT;
- The digital systematization of data and energy efficient solutions;
- Building life cycle management;



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