

# **Geography of Energy in the higher education – the point of view of young geographers**

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## **Abstract**

The paper aims to describe different practices of teaching energy issues in Geography in selected European universities. The discipline Geography of Energy integrates wide geographical topics starting with geopolitics, international security, natural resources and followed by environmental challenges, sustainable development and spatial planning. The discipline also contains questions regarding climate change and air quality, renewable energy, opportunities for small and medium enterprises and private households in renewable energy sector, increasing energy prices and its influence on different social groups, global rival of bio-energy and food, etc.

The research made on the content of the Geography of Energy shows the great diversity of teaching practices in different universities. The integrated discipline would help geography students to participate more in public policy while using geographical tools and methods.

Key words: Teaching, Geography of Energy

## **Introduction**

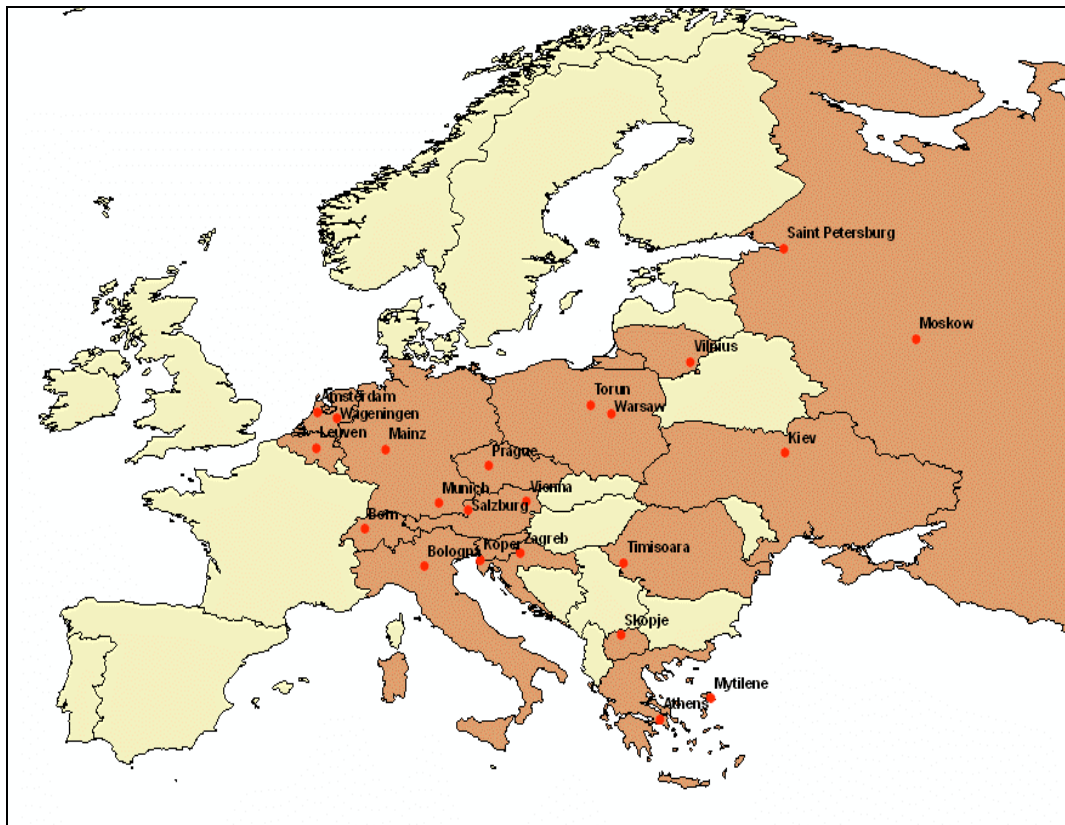
Global, regional and local energy issues play a big role in current world policy and economy. The big challenge for geographers is to incorporate these issues in the Geography curriculum not only at schools but also in higher education. As the author of the paper is also European Geographers Association for Students and Young Geographers (EGEA) representative, the attitude of graduating geography students and young researchers about energy issues teaching at the universities is presented. Global challenges and local solutions are nowadays geographers focus and the importance of the energy issues integration in Geography studies in higher education should be taken in a big consideration.

The need for an integrated course, which would provide geography students with the tools for dealing with existing and upcoming challenges using geographical understanding and methods, is emerging from the replies of interrogated geography students and young researchers.

## **The State of Energy Issues Teaching in Geography**

To get an overview on energy issues teaching in geography 22 universities from 16 different European countries were surveyed. The survey aimed to cover more or less equally all parts of Europe, the map of countries together with the table of the universities that participated in the survey provided (Figure 1, Table 1). To represent students and young researchers'

attitudes 1-2 graduate students, PhD students or young postgraduate students from each university were questioned.



**Figure 1:** Surveyed countries with location of the universities

**Table 1:** The list of surveyed universities

Name of the university	Name of the university
University of Amsterdam	Charles University in Prague
Harokopio University of Athens	Paris Lodron University of Salzburg
University of the Aegean	Ss. Cyril and Methodius University in Skopje
University of Bern	Russian State Hydrometeorology University, St. Petesburg
University of Bologna	West University of Timisoara
Taras Shevchenko National University of Kyiv	Nicolaus Copernicus University in Torun
University of Primorska, Koper	University of Vienna
Catholic University Leuven	Vilnius University
Johannes Gutenberg-University, Mainz	Wageningen University
Lomonossov Moscow State University	Warsaw University
Ludwig-Maximilians University of Munich	Zagreb University

Except Wageningen University which offers a course in Sustainable Energy, all other surveyed universities do not offer Geography students any courses devoted to geographical approaches on energy issues. Some energy topics are incorporated in other subjects (e.g. Environment – Nature – Society and Development and Management of European territory at Harokopio University of Athens, Environment at Ss. Cyril and Methodius University in Skopje, Economics in ecology and meteorology at Russian State Hydrometeorology University, St. Petersburg, Economic geography, Sustainable regional development, Regional

geography at University of Bern, Economic geography at West University of Timisoara and Zagreb University, Geography of industry and transport, Socio-economic geography of Poland, Political and economical geography at Nicolaus Copernicus University in Torun, Physical geography and Spatial planning at University of Vienna, Economics of nature resources and environment at Vilnius University, Socio-economic geography at Warsaw University). These examples show that the topic is very widely spread among several geographic disciplines, mainly concentrated in Economic Geography but also included in Physical Geography, Spatial Planning, Environmental and Political disciplines.

To construct a new discipline, the respondents were asked to provide details about different aspects of energy issues which are in focus at their universities. The results are described here and show that a great diversity of energy issues are taught at different Geography departments. The results of the survey also clearly states that there is nothing like a complete and common attitude on this problematic issue.

There are universities which offer a basic understanding about the energy issues and focus mainly on the overview of the energy issues in the world and in the particular country, they limit themselves with teaching the main definitions and describing natural resources (e.g. Taras Shevchenko National University of Kyiv). Different energy sources and their spatial distribution, trends in consumption and questions concerning sustainability, traditional and modern concepts of economic geography, theoretical approach and models are taught at Zagreb University.

In Greek universities (Harokopio University of Athens, University of the Aegean) the main content is the alternative energy resources that exist in Greece (aeolian, water, sun) and their usage, the main focus is on the most popular and effective ones which could provide the benefit to the country. A discipline like Environmental and Urban Planning deals with the applications of different energy sources. Natural resources management, renewable energy, EU energy policy, climate change, energy waste management, trans-European networks of energy are also taken in consideration.

In another southern European country – Slovenia – geographers (University of Primorska, Koper) also pay a lot of attention to energy issues. The main topics are renewable energy sources in the country (especially wind power plants - still a big topic of dispute between scientists, land managers and politicians), nuclear power plant efficiency (concerning Krško nuclear power plant) and problems with disposal of radioactive waste, reducing oil consumption by using public transport.

In the Czech Republic, at Charles University in Prague there are two main aspects taken by geographers concerning this field: energy and peak oil (within human geography, focused on relation between industry, energy consumption, development, peak oil) and renewable energy sources (within physical geography, dealing with possibilities of using wind, water, solar energy).

Mainly sustainable development and climate change, followed by geopolitics, natural resources, renewable energy, planning are in focus at University of Bologna. Natural resources, renewable energy also are in focus at Ludwig-Maximilians University of Munich. Implementation of renewable energy sources in existing cities are taught at Wageningen University.

The main topics covered at Lomonossov Moscow State University are the principles of energy production (power plants of different types, hydropower plants, nuclear plants of different types, other types of plants), spatial distribution of oil, natural gas, coal supply and oil, natural gas, coal demand, production and distribution of energy throughout the world, the role of main energy companies in different regions, natural resources, geopolitics and renewable energy as well. Brief description of sources of renewable energy, summer/winter time switching (daylight time saving), meteorology and winter time energy usage, energy production related to marine polar regions (prevaillingly engineering point of view): oil, gas, gas hydrate, tidal, wave, wind energy, peat and coal energy are taught at Russian State Hydrometeorology University, St. Petersburg. Many physical geography topics like natural resources, renewable energy and also planning deal with energy issues as well.

Romanian geographers at West University of Timisoara mainly deal with a distribution of natural resources worldwide, their location, quantity and use; they also analyze economic activity worldwide, taking into consideration all economic sectors – agriculture, industry, services. The spatial dimension of economic activities, economic flows, main economic actors, markets, economic growth, the evolution of the world economic system, sustainable development, resources issue together with natural resources, their use and their location are in focus there. Energy issues are also included in teaching geopolitics and planning.

Energy sources, energy distribution directions, “green energy” sources and geopolitics (e.g. Russian – Germany Nord Stream pipe project, gas conflicts) are in focus at Warsaw University. Influence of natural resources on industry localization and development, energetic system of Poland, the role of energy in international politics at Nicolaus Copernicus University in Torun.

At the University of Vienna most attention is on spatial planning: issues of land zoning e.g. for wind-power-stations or similar things. In physical geography attention is paid to the climate issues. In some universities it's more technical aspects of renewable energy and research in (new) energy sources are in focus (e.g. Catholic University Leuven). GIS, local and regional models for energy supply and demand, climate change, spatial planning, usage of Information and Communication Technology in energy-related issues, green IT are in focus at Paris-Lodron University of Salzburg.

The answers provided by the questioned geographers show a great diversity and very wide scope of the energy issues in Geography teaching. The next part of the paper deals with the needs, expressed by young geographers, of an integrated discipline and some possible teaching methods.

### **The need FOR a discipline of geography of energy**

The purpose of creation of the course Geography of Energy was to fill the teaching, integrated knowledge and skills gaps stated by young European geographers from various universities. The topic “Geography of Energy” should be included in the programs of Geography studies at universities. Its role shouldn't be restricted only with providing general knowledge but it should also play a significant role in dealing with current environmental, economical and political challenges. It is a very wide and important topic and geographers should not ignore it. Energy topics are currently divided between many geographical disciplines and there is a lack of common and integrated point of view. Topics regarding energy, its political, economic and environmental aspects should be put together as a separate discipline or at least a group of topics in the boundary of an existing discipline.

The course would also provide geographers with a major opportunity to enter and help to shape the public policy debate as

“the impact of geography on the policy realm has been limited. Other social, political and environmental scientists, and even media pundits, shape public perception and government policy in areas where we as geographers could – indeed should – be having much greater influence“. (Martin, 2001).

The integration of economic geography and environmental issues plays very important role in understanding complex energy issues in Geography. Special analytic approaches can link economics, environmental analysis and geography (Hanink, 1995). To integrate all energy issues means to integrate also many other geographic topics together. The response to the emerged need to have an integrated discipline would also contribute to the education of the next generation global change in local places researchers. The discipline should foster a holistic, integrated approach to the energy issues in geography science also include regional geographic research.

Several teaching methods could be applied for this discipline. Collaborative learning, an alternative to traditional independent learning could be one of very appropriate methods to teach Geography of Energy. Students which work in small groups reach a common goal and beside factual knowledge and comprehend concepts also develop higher-order critical thinking skills by synthesizing information and applying factual knowledge and concepts to complex, real-world situations (Yarnal and Neff, 2007).

Another well known teaching method - Problem Based Learning – could also be used to teach Geography of Energy. It is a student-centered educational method that uses problem solving as the starting point for learning and it is designed to develop disciplinary knowledge bases and other skills like creation of problem-solving strategies. This is achieved by confronting students with problems typical of the real world (Beringer, 2007) and simultaneously by placing students in the active role of problem-solvers.

To further concepts and content of the discipline, other possible methods are a subject of another paper. The discipline Geography of Energy is being prepared for Vilnius University, Natural Science Faculty, Geography and Land Management Department. The important task is to find and keep a balance among field, laboratory and library research; among human geography, physical geography and geographic information science; and between quantitative and qualitative research.

## **Conclusions and Discussion**

The importance of the integration of energy issues into geography studies at universities were expressed by young geographers from 22 European universities. The need to fill in existing gaps in Geography curriculum and to provide students with important and up to day courses concerning nowadays world challenges: limited natural resources, climate change, international security should be taken into the big consideration. The topic, the Geography of Energy is a response to the needs and expectations of young geographers and should be offered to geography students at universities.

Different teaching methods could be used during the lectures and seminars. The course of Geography of Energy could be provided for undergraduate or graduate students and using of

different teaching methods could be applied. The content of the course is still under preparation and any contribution is very welcome.

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