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TM3

Energy and the public

How societies communicate and decide about energy issues?

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Introduction

We all depend on continuous energy supply in our day-to-day activities. As people living in the EU states we take it for granted that a source of electricity will be there whenever we need it. It is a considerably less self-evident matter, how the electricity we rely on is supposed to be produced and distributed.

» *THE ENERGY SECTOR STANDS AT A CROSSROADS TODAY AND NEWLY EMERGING OPTIONS OF ENERGY STRATEGIES CHALLENGE THE OLD WAYS OF DOING THE BUSINESS.*

Other teaching modules, especially the one dedicated to philosophy and ethics of energy development, explore some of the systemic mechanisms behind this change: raising environmental awareness, the influx of technology innovations and its reflection, and wide-ranging business with energy resources shaping the international relations.

This module approaches technical students as potential future energy experts, who will need to integrate social or societal aspects of energy issues into their expertise and decision-making. Its focus is twofold: on people as stakeholders in energy issues and on policies and practices of energy governance. These are two sides of the same coin. Albeit this process occurs gradually and inconspicuously. Individuals, communities and businesses

» *LEARN TO THINK ABOUT ENERGY PRODUCTION AND CONSUMPTIONS IN NEW TERMS.*

They explore new views, practices and values, seek opportunities, change their patterns of behavior, but also feel uncertain about future development, and are sometimes concerned. Energy policies, projects and facilities attract attention, spark public debates and provoke protests. On the other hand, the evolving multi-level political framework of energy governance in the EU conditions this gradual process, in which people assume the role of stakeholders in energy transition. Their engagement depends on policies, (inter)national authorities, state institutions and legally binding rules of the game.

» *THE STUDY OF THE INTERCONNECTION BETWEEN ENERGY STAKEHOLDERS AND ENERGY GOVERNANCE OBVIOUSLY GOES BEYOND THE PURELY TECHNICAL WAY OF REASONING.*

Energy experts seriously interested in this vast subject can hardly bypass the contribution of social sciences. The aim of this module is to present an introduction, which conveys basic knowledge of the subject and teaches competences and skills that technical students may benefit from in practice. The scope of the module is necessarily selective and by no way covers the subject in detail and complexity. It functions rather as a general overview that opens the door for students to follow up various specialized topics according to their own interests. The module is divided in three sessions explaining how to study public opinion about energy, how the energy governance in the EU in general works and how stakeholders can participate in the decision-making about energy issues.

The teaching module is composed of 3 successive sessions:

The module consists of three interlinked sessions. To explore thoroughly the topic of the module, it is advisable that all three sessions follow one after another connectedly or in three single days. However, each session is optional and it is possible to select only one separate session without going through the others. Sessions combine lectures and presentation of materials with interactive elements and with group and project work.

1

Session 1: Public opinion on energy issues in a nutshell
explains, what are public opinion surveys and how to read social data related to energy issues.

90 minutes

2

Session 2: Energy governance in the EU and its stakeholders
provides a basic overview about the energy governance in the EU and focuses on the concept of energy stakeholder

90 minutes

3

Session 3: Communication among stakeholders and their participation in the decision-making
is devoted to the communication among stakeholders, introduces an array of practices for participation of stakeholders in the decision-making and trains students to use them.

180 minutes

Pre-readings help the teacher to prepare for the class and may be suitable for students attending the class as well. The teacher may assign students to read some of them before the class.

Session 1:

Public opinion on energy issues in a nutshell

a) Session objectives

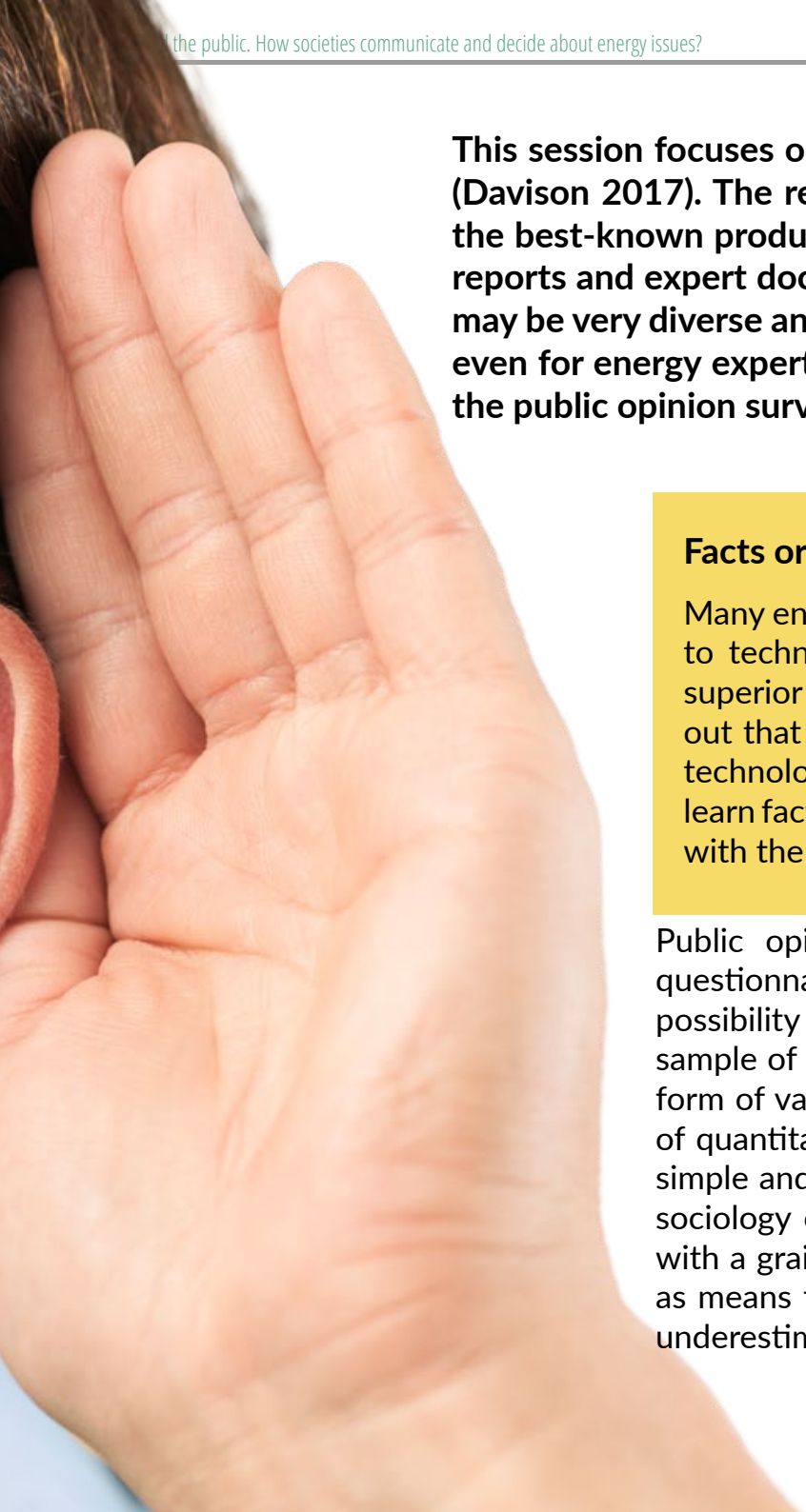
Students will learn the basic principles of public opinion survey methodology and will gain competence to read and interpret the reports presenting social data related to energy.

b) Session scope

Monitoring and regulation of energy systems produce plenty of data about all kinds of customers connected to energy distribution grids or otherwise utilizing the existing infrastructures. However, sometimes energy experts may want to learn more about people's views, values and expectations or about patterns of behavior and facts that cannot be read from the "hard" data generated by the operation of energy systems themselves. How to proceed in case we are interested in such social data? In general, we need to contact the people from our target group or population, ask them questions we are concerned with and analyze their answers. An efficient and reliable way to accomplish this is to design and conduct some kind of empirical sociological research. There is a rich array of methods we may choose from and apply in such research according to what we want to find out and according to whether our target population consists of individuals, households, companies, municipalities or otherwise defined communities of energy users. Sociological research can be very inventive and creative in finding ways for reaching almost any possible group we want to study.

Data in engineering and social sciences

The teacher may remind students of important features of technical data, such as the data volume, dynamical range, and accuracy, statistical and systematic errors. Sometimes, technical data give evidence of social phenomena: e.g., it is possible to read the data about electricity consumption of households as an information about patterns of behavior related to electricity appliances. In other cases, accessibility of technical data triggers important legal and social issues on privacy and copyrights. If your car registers your driving preferences, may your car service know? May your insurance company know?
Social data differ from technical data considerably. They are mostly an aggregate result of questionnaires or interviews with individual people (respondents). An important difference lies also in the fact that in public opinion surveys, we usually do not have data about the whole population, but only work with a sample of respondents representing the given population. However, even purely social data may convey interesting information concerning technologies. E.g., we may ask individuals, households, municipalities, companies to indicate, what electricity appliances they have, how they use them, how difficult is it for them to pay the bill for electricity supplies, etc.



This session focuses on one particular type of sociological research, namely on public opinion survey (Davison 2017). The reason for this choice is that the public *opinion survey* is commonly regarded as the best-known product of sociological knowledge, the results of which are often included in various reports and expert documents and appear also frequently in the media. The subjects of these surveys may be very diverse and extend to the area of energy and technologies in general. It is therefore useful even for energy experts or technicians, when they are aware of the methodological principles behind the public opinion surveys and are able to read and understand correctly the resulting social data.

Facts or opinions?

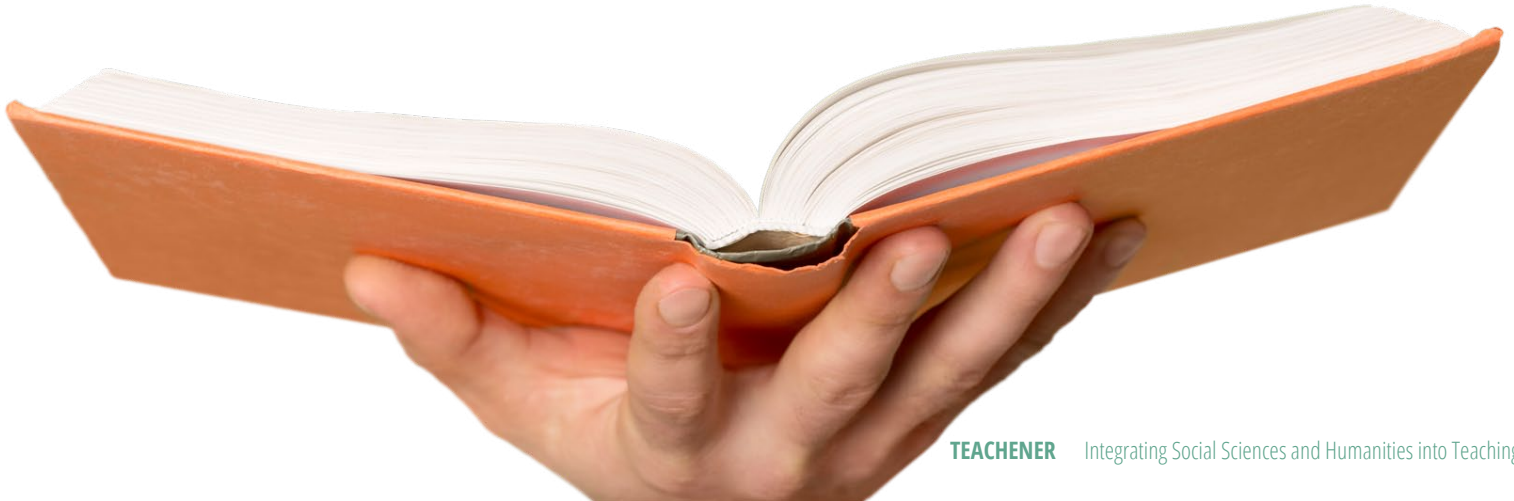
Many engineering students tend to underestimate the importance of social data with respect to technical data. The teacher might wish to explain students that indeed, knowledge is superior to public opinion, however, public opinion is often decisive. It is important to point out that survey of public opinion follows rigorous methodology, in many respects similar to technological standards – social data are analysed with statistical methods, and as a result, we learn facts on public opinion. This knowledge is then instrumental for informed communication with the public.

Public opinion surveys are based on quantitative methodology (Babbie 2009). They use questionnaires to collect data from a number of respondents large enough to provide for the possibility of their analysis in statistical terms and for the possibility to generalize from the limited sample of respondents to the population as a whole. Outputs of the surveys usually take on the form of various tables, graphs or summary indicators. Many people are impressed by this ability of quantitative methodology to reduce the complexity of social matters and squeeze it in a few simple and straightforward figures. Others are more cautious and point out that this bringing of sociology closer to the methods of measurement common in natural sciences has to be taken with a grain of salt. The best way to appreciate duly the assets that public opinion surveys offer as means for acquiring information on populations or societies is to avoid both their over- and underestimation (Poynter 2016).

The session does not burden the technical students with detailed elucidation of multiple steps comprised in the methodological procedure of designing, conducting and evaluating the results of the survey. It confines the theoretical explanation to a minimum necessary for the students to get an idea of what all is going on in this type of sociological research. The main emphasis is put on their building the practical competence to read reports containing social data and assess relevance of these data for the decision-making about energy issues.

c) Pre-reading

No.	Author and title	Description
1.	Davision, W. Phillips et al. 2017. Public Opinion. Encyclopædia Britannica. https://www.britannica.com/topic/public-opinion	This text clarifies the history and meaning of the tricky concept of public opinion and explains the method of public opinion measurement.
2.	Babbie, Earl. 2009. The practice of social research. Belmond: Wadsworth, pp. 253–295.	The book is a standard introduction to the methodology of social research. The selected chapter is dedicated to the survey methodology.
3.	Poynter. 2016. Understanding and interpreting polls. POYNTER. https://www.poynter.org/shop/self-directed-course/understanding-and-interpreting-polls-international/	This online crash course is for journalists and any lay persons working with the survey data. The course gives better understanding of how polls are conducted, what to look for in the methodology and how to determine the objectivity of a poll.



d) Session activities

Activity 1:
Overview of the survey methodology

Methods	Presentation, discussion
Keynotes	None
Materials	**TM3-ST1-RM1-introductory video**
Required accessories	Computer with internet access, projector, speakers
Time allocation	15 min
Learning outcomes	Understanding of the basic principles of public opinion survey.

At the outset of the session, the teacher plays a video summarizing the basic information about public opinion surveys. The video introduces students briefly and efficiently to the topic that will be subject of further explanation in the following lecture. In the discussion about the video, teacher focuses on encouraging interest in the topic and on interconnecting it with the role of technical experts. Questions such as these may stimulate the discussion: Do you know the method of public opinion surveys from your own experience? Do you consider such surveys as a relevant source of information about other people's views? Do you think they can be important for energy experts? The discussion should get to the point, when energy issues are explicitly considered in connection with surveys. Then it will be easier for the teacher to proceed to the next activity, which starts with marking off this connection in general terms.

Activity 2:
Procedure of the public opinion survey

Methods	Lecture
Keynotes	None
Materials	**TM3-ST1-AM1-PP lecture**
Required accessories	Computer, projector
Time allocation	20 min
Learning outcomes	Understanding of the methodology of public opinion survey.

In any field of human and social life, people with views on various matters associated with their activities, develop knowledge, behave or act in a certain way, make value judgements, perceive and take into account various facts. This happens in relation to energy issues as much as to any other issues people may be concerned with. The concept of public opinion spells out the practical need to find out, what "people" think, what they value, how they are likely to behave.

» *In the energy sector, the data about public opinion may be very useful for making informed and socially adequate decisions.*

Even though questionnaire surveys mostly do not guarantee a perfect knowledge, they offer a tool to understand better than if we rely on selective information. Results of such surveys may be helpful in shaping decisions about energy policies, projects and facilities.

The purpose of the guided lecture is to give students a flavor of how the public opinion surveys are set up and conducted. The survey methodology is one of the most technical parts of sociological knowledge. It entails a structured sequence of decisions and steps that are usually carried out by teams of researchers with a view of managing not only the process of data collection itself, but also: a) data validity (we measure what we want to measure); b) data reliability (we would arrive at similar results, if we were conducting the survey one more time). To deliver a lecture on methodological procedure of public opinion surveys may be challenging for a teacher with technical education.

It is likely that preparing for this session will require more time and attention than in the case of some other sessions. It is advisable to spent some time with the literature listed at the end of the chapter.

Besides comments concerning the concept of public opinion and the relevance of surveys for dealing with energy issues, the lecture concentrates on four key features, what is important to take notice of, when reading reports analyzing social data: a) delimitation of the target group; b) type of sampling; c) number of respondents; d) date of the data collection. In addition to it, some other methodological concepts are briefly sketched, such as representability of the sample to the target population, standardization of questions in the questionnaire or technological alterations of a questionnaire (with the help of a computer, telephone or web), data processing and analysis.

Activity 3:
Reporting and interpreting social data

Methods	Presentation
Keynotes	None
Materials	**TM3-ST1-RM2-report** **TM3-ST1-RM3-report** **TM3-ST1-RM4-report** **TM3-ST1-AM2-PP group work** **TM3-ST1-AM2-PP group work** **TM3-ST1-AM3-handout**
Required accessories	Computers operated by students, printed materials
Time allocation	30 min
Learning outcomes	Competency to read and assess reports presenting social data related to energy.

This group work gives students an opportunity to practice data analysis and interpretation on concrete examples of survey reports. The teacher asks students to divide themselves in groups consisting of maximally 5 students. Each group will read and review a different short summary report from a survey, which is assigned to them by the teacher. The task is to read the report and agree in the group on: a) what are its main or most interesting findings; b) what is unclear or missing in the report; c) what they would do differently, when reporting the social data. Students have roughly 25-30 minutes time to complete the task using ready-made PP document template, which provides for the possibility of comparing the results among groups. While students in the groups go through the discussion, the teacher stays attentive and ready to assist them.

Activity 4:
Presentation of results & debriefing

Methods	Presentation, discussion
Keynotes	TM2-ST1-AM4-reading tips
Materials	**None**
Required accessories	Computer, projector
Time allocation	25 min
Learning outcomes	Competency to interpret and discuss social data

In the last activity, teacher asks representative(s) from each group to present in about 5 minutes the outcomes of the group task. While listening to these presentations, the teacher uses a board or flipchart to note down the main findings the given group arrived at. After each presentation, he or she may pose additional questions: What is the most important finding in the report? Why do you think it is so important? Do you find sufficient information concerning the data collection in the report, or is something missing? Does anything in the report seem strange to you? After all groups have finished, the teacher uses his or her notes to check, whether their presentations reflected sufficiently the pieces of knowledge delivered in the lecture and evaluates each group accordingly. At the very end, it is possible

to sum up the main message of the session: Social data help us to understand and explain energy issues. We learned some basic practical rules for working with such data and we practiced them.

e) Additional resources

No.	Author and title	Description
1.	European Commission. 2015. Attitudes of citizens towards shale gas in selected european regions. Brussels. http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/Survey/getSurveyDetail/yearFrom/1974/yearTo/2015/surveyKy/2066	Two examples of reports analyzing social data related to energy and comparing them among the EU member states. Eurobarometer surveys are the basic tool that the European Commission uses to gather information about the views that Europeans have on various subjects.
2.	European Commission. 2008. Attitudes toward Radioactive Waste Management. Brussels. http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_297_en.pdf	

Session 2:
Energy governance in the EU and its stakeholders

a) Session objectives

This session aims to familiarize the students with the framework on energy governance in the EU and explain the concept of energy stakeholder. Students will learn to perceive and analyze impacts of energy issues on stakeholders and will gain confidence in verbalizing and exchanging views on this matter.

b) Session scope

The second session is less about people's views and behavior and more about general political setup that generates conditions for people, collectivities or for any kind of actors to engage in many ways in energy related issues. The term 'energy governance' expresses this focus. Across the EU states to which the whole EduKit is targeted, energy governance takes place in a multilevel-framework of democratic institutions and is backed and regulated by legal systems. Some of the institutions and legal norms are more centralized and overarching. They are part of the evolving project of 'energy union' that is steered by the European Commission in order to tackle the challenges associated with energy transition. Other institutions and norms are rather national, regional or local and reflect the need for autonomy and diversity. Both sides of energy governance seem to be indispensable, but to strike a balance between them is a matter of continuous disputations and power games (Buchan 2009; Taulus 2016).

Energy governance and systems engineering

In some respect, the challenges of energy governance are comparable with the challenges of systems engineering. One of the options for the teacher is to compare these two terms, and exemplify the systems engineering, e.g. on the technological issues of siting a major project, e.g. a large power plant. Even from the engineering point of view, it is hard to meet all different technical constraints (fuel transport, waste management, water supply, geological subsoil, etc.). On top of these issues there are societal challenges, including human resources, public acceptance, legal and economic constraints, etc.

Technical students are surely to some extent aware of various phenomena linked with energy governance. On the other hand, this sphere is likely to remain rather hidden for them behind the technical staff they are themselves directly busied with. The first part of the session sketches some of the main features of energy governance framework in the EU and brings the attention of students to the diversity of actors engaged in energy issues. The vision of energy transition implies a huge task of gradual dismantling and rebuilding the bulk of outdated facilities and infrastructures. However, to set this whole process in motion will require considerable revisions of inherited strategies, policies and laws and designing of new ones at all levels of governance (European Commission 2017).

This is where the inclusion of the SSH point of view becomes crucial. **A multitude of actors is involved in endless negotiations about projects reshaping the energy future of Europe. These actors occur on all levels of the decision-making hierarchy; they have different interests and represent colliding values. It turns out that the deciding about energy is in fact a large-scale social process.** The second part of the session expands on this topic.

During the debates of recent decades, the concept of "(energy) stakeholders" has established itself as a key approach for grasping the variety of those, who feel involved in the processes of decision-making about energy, because they already are or will be impacted by the decisions taken. The range of the concept, however, is considerably broad. It may refer to: various governance bodies and state institutions; corporations and private companies; scientists, technicians and experts of many professions; nongovernmental organizations; municipalities; civic initiatives; communities of users; and of course, in the last instance, it refers to individuals and their households. Energy stakeholders perceive the current situation from different angels. While some of them see opportunities to profit from emerging new conditions, others fear that the change might have unwanted consequences for them.
In their group work, students will practice the energy stakeholder analysis. It is an umbrella term for diverse techniques that can be employed with a view on exploring and mapping the social or societal impacts of energy issues. The session shows energy stakeholder analysis as an area, in which technicians and energy experts can benefit from the expert knowledge provided by the social sciences and the humanities.

c) Pre-reading

No.	Author and title	Description
1.	Buchan, David. 2009. Energy and Climate Change. Europe at the Cross Roads. Oxford: Oxford University Press, pp. 1–27.	This book analyzes the energy governance in Europe from many viewpoints. The introductory passage of the book provides a useful overview of political principles and recent history of the EU energy governance.
2.	Taulus, Kim. 2016. Introduction to Energy Law. Oxford: Oxford University Press.	The first chapter of this book introduces into the principles of the EU energy governance from the juridical perspective.

No.	Author and title	Description
3.	European Commisssion. 2017. Third Report on the State of the Energy Union. Brussels. https://ec.europa.eu/commission/publications/third-report-state-energy-union_en	The EU is advancing towards its 2020 and 2030 energy and climate targets. This key EU policy document looks at the state of Energy Union as of the end of 2017.

d) Session activities

Activity 1:

European Energy Union

Methods	Presentation, discussion
Keynotes	None
Materials	**TM3-ST2-RM1-introductory video**
Required accessories	Computer with internet access, projector, speakers
Time allocation	15 min
Learning outcomes	Understanding of the project of Energy Union.

Since the foundation of the European Steel and Coal Community in 1951, the European integration included collaboration on energy policy.

» *TODAY, WHEN ENERGY TRANSITION IS UNDERWAY TOGETHER WITH AN EFFORT PUT IN DECARBONISATION AND SHIFT TO A MORE ENVIRONMENTALLY FRIENDLY WAYS OF ENERGY PRODUCTION AND CONSUMPTION, THE IMPORTANCE OF ENERGY GOVERNANCE INCREASES.*

However, the EU consists of national states located in diverse geopolitical settings and with different types of economies. In this regards, it does not surprise that the agenda of energy governance is very complex and labyrinthine. The current session confines itself only to the elucidation of its basic principles.

Nowadays, the project of Energy Union represents the top level of energy governance in Europe. It was one of the flagships of the European Commission in the period from 2014. The initial video projection in the session explains this project and puts it into the context of the ongoing energy transition in Europe. The teacher frames the discussion about the video with questions such as: Is the project of energy union an adequate response to the challenge of energy transition in Europe? Will it be possible to put this political idea in practice? Is further integration in energy sector desirable? Will it work on national, regional and local level? The discussion should draw the attention of students to political and social scale of the project.

Feasibility, profitability and acceptability

The teacher should point out that it is by far not straightforward to find a consensus on an energy project. In the current society, the profitable options seem to be no longer acceptable due to environmental risks. Meanwhile, technology proposes feasible energy options that presently need a subsidizing policy. Students would be aware of the political consensus on subsidizing the renewable resources, but need not realize that many supporting technologies might make the existing policy more efficient – if subsidized. Possible examples, where consensus has not been found yet, cover energy storage into batteries or investments into underwater cables, e.g. between Germany and Norway. Even in these cases, the dispute is not only economic, but also environmental.

Activity 2:
Group work

Methods	Lecture
Keynotes	None
Materials	**TM3-ST2-AM1-PP lecture**

Required accessories	Computer, projector
Time allocation	20 min
Learning outcomes	Understanding of the energy governance framework in the EU, understanding of the concept of energy stakeholders.

The guided lecture delivers students some basic facts about energy governance in the EU. It summarizes the basic strands of the EU energy policy, briefly hints at the legal system of energy governance and mentions some of the most important energy policy institutions. To become familiar with this topic, it will be useful for the teacher, if he or she reviews the related literature listed in the resources collection before the session.

The concept of energy stakeholders bridges between the lecture and the following group work.

» ***The framework of energy governance determines rights and duties of those, who are involved in the energy sector.***

It creates conditions, under which individuals and collectivities (e.g. communities, institutions or corporations) decide about their actions and interact among each other. This takes place on international, national and local level and with respect to various stages of energy business, be it energy production, distribution and supply, consumption, or dismantling and waste management. Results of such interactions among various actors give rise to energy issues that may affect many people.

The concept of energy stakeholders will firstly be introduced by the teacher in this vast and general meaning encompassing all possible ways of how an energy project, facility or infrastructure may impact people's reasoning and lives.

Activity 3:
Dukovany nuclear power plant (case study)

Methods	Presentation
Keynotes	None
Materials	**TM3-ST2-AM2-PP case study** **TM3-ST2-AM3-handout**
Required accessories	Computer, projector
Time allocation	10 min
Learning outcomes	Understanding of the energy governance framework in the EU, understanding of the concept of energy stakeholders.

Nevertheless, from the practical point of view, it is important for technical students to learn to recognize and analyze impacts on stakeholders in terms that are more concrete. Such an opportunity will be provided to them by the case study of Dukovany nuclear power plant, through which the general considerations on stakeholders will be narrowed down to one concrete empirical example. After the teacher uses PP presentation to provide basic information about the facility, he or she goes on with the group work.

Activity 4:
Energy stakeholders analysis

Methods	Group work
Keynotes	None
Materials	**TM3-ST2-AM4-PP group work**
Required accessories	Computer, projector
Time allocation	20 min
Learning outcomes	Competence to analyze impacts of energy issues on stakeholders, competence to verbalize and exchange views about stakeholders.

The teacher asks students to divide themselves in two groups and distributes to each group a short summary of the presented case study with the facility situated on the map. Each group will fill in the ready-made PP document template referring to one of the two scenarios: a) no new reactors are constructed and the plant will be decommissioned; b) construction of reactor(s) will prolong the operation of the plant considerably (for another 30 – 50 years). The task of each group is to identify and describe for the given scenario: a) who are the stakeholders; b) positive impacts on stakeholders; c) challenges or negative impacts faced by stakeholders.
The teacher instructs students to leave the technical dimensions of the issue aside as much as possible and focus only on social or socio-economic impacts. He or she also encourages them to explore various impacts related to international, national and local level of governance. Students may search for information on-line during the exercise.

Activity 5:
Presentation of results & debriefing

Methods	Presentation, discussion
Keynotes	TM3-ST2-AM5-reading tips
Materials	**None**
Required accessories	Computer, projector
Time allocation	25 min
Learning outcomes	Competence to analyze impacts of energy issues on stakeholders, competence to verbalize and exchange views about stakeholders.

In the final part of the session, presentations of results of the group work reveal, how students understand the role of stakeholders: what stakeholders they identify, what impacts they perceive as the most or less important, how they weigh the three spatial dimensions of impacts comparatively (local and regional, national, international). The teacher provides students with feedback and stresses the case of Dukovany, albeit unique and linked with centralized nuclear energy sector, was outlined to illustrate features that may arise in many different types of energy projects as well. The message the session is supposed to convey to technical students is that it is possible to study impacts on stakeholders in systematic way and employ sociological research tools.

e) Additional resources

No.	Author and title	Description
1.	Frantál, Bohumil et al. Distance matters. Assessing socioeconomic impacts of the Dukovany nuclear power plant in the Czech Republic: Local perceptions and statistical evidence. "Moravian Geographical Reports" 2016, Vol. 25, Issue 1, pp. 2–13. DOI: 10.1515/mgr-2016-0001	Both journal articles analyze public perception and socioeconomic impacts. of the Dukovany nuclear power plant.
2.	Horská, Hana et al. 1996. Perception of the Dukovany Nuclear Power Plant (Czech Republic) by Local Population. "Moravian Geographical Reports" 1996, Vol. 4, Issue 2, pp. 19-34. http://www.geonika.cz/EN/research/ENMgr/MGR_1996_02.pdf	

Session 3:
Communication among stakeholders and their participation in the decision-making

a) Session objectives

The goal is to understand the peculiarity of the processes of communication on energy issues and to learn to employ various practices for participation in decision-making. Students will gain competences to choose participative practices suitable for the given type of communication and to introduce measures to benefit local stakeholders. They will be ready to design comprehensive communication strategies.

b) Session scope

The third session approaches the topic of energy stakeholders in an even more practical vein. What energy experts are supposed to do, if there is already some existing energy project with widely perceived and discussed controversial impacts on stakeholders, or is such a project due for the near future? How they are supposed to cope with a situation, when representatives of various types of stakeholders protest or voice publically their disagreement with the project? When they mobilize resources for active resistance against it? As the democratic framework of the energy governance in the EU equips energy stakeholders with a number of rights, similar situations occur frequently, no matter, if the project in question is related to wind, solar, biogas, thermal, coal, nuclear or any other source of energy.

» *During implementation of energy projects, technicians and energy experts may easily face problems they have not been prepared for by their technical education.*

This matter is partially touched upon in other teaching modules, especially in the TM7 – Conflict Management and TM5 – Technology assessment as a tool for the society. SSH aspects covered in these modules are therefore left aside here. The session draws in particular upon the energy stakeholder analysis explained and practiced in session 2 and elaborates on it further. It conceives of

» *energy stakeholders as embedded in the web of socio-economic relations, which are subject to impacts produced by diverse implementation aspects of energy projects, facilities and infrastructures.*

This quite often gives rise to processes of opposition, defensive

Pro-active communication in technology

To prevent undesirable defensive communication, a pro-active communication of the plans before their implementation is required. Teachers are invited to ask students on their experience with pro-active communication. Many engineering students participated e.g. in science fairs where universities present their programs in order to find new juniors. Students should be able to conclude that pro-active communication is rewarding and important, however, at the same time, demanding on resources and its efficiency is difficult to evaluate. Teachers should mention that large power companies often outsource these 'soft knowledge' and rely on external Public Relation experts to advise on pro-active communication methods.

communication and action not intended strictly in technical implementation plans. Another bundle of potential problems is entailed by the fact that especially in more advanced stages of projects the implementation of specialized tasks is outsourced and yielded to subcontractors. Contracts based on non-transparent tenders or perceived by the public as expensive or unreasonable may undermine the reputation of the project and cast a shadow on the given energy technology.

The first part of the session familiarizes technical students with processes of communication developing around energy issues and thus makes them more receptive and capable to anticipate possible disruptive effects these processes might have on time and cost efficiency of technical solutions. The session draws upon the concept of *participative democracy* outlined in a more theoretical vein in the module Ethics and philosophy of energy development as a complement to the procedures of representative democracy. This time, however, the lesson treats participative democracy rather as an *array of practices* that it is possible to employ in the decision-making about technical projects, facilities and infrastructures with view of making their technical design more socially acceptable. This is also the view of participative democracy endorsed by the framework of energy governance in the EU. The session also explains basic types of *measures to benefit stakeholders*.

c) Pre-reading

No.	Author and title	Description
1.	Callon, Michel et al. 2009. Acting in an Uncertain World. Cambridge – London: The MIT Press, pp. 153–190.	Chapter 6 of the book describes several important practices of participation in the decision-making. It focuses especially on organization of "hybrid fora", which enable the communication between experts and lay public.
2.	OECD, Nuclear Energy Agency. 2013. Stakeholder Confidence in Radioactive Waste Management. An Annotated Glossary of Key Terms. https://www.oecd-nea.org/rwm/docs/2013/6988-fsc-glossary.pdf	The document explains SSH concepts used in debates on the nuclear waste management.

No.	Author and title	Description
3.	Kåberger, Tomas, Johan Swahn. 2015. Model or Muddle? Governance and Management of Radioactive Waste in Sweden. In: Mez, Lutz, Achim Brunnengräber (eds.). Nuclear Waste Governance. Wiesbaden: Springer, pp. 203-226.	This text updates on the Swedish approach to the siting of the deep geological repository.

d) Class activities

Activity 1:

Decision-making about the deep geological repository of nuclear waste in Europe

Methods	Presentation, lecture, exercise
Keynotes	None
Materials	**TM3-ST3-RM1-introductory video** **TM3-ST3-AM1-PP lecture**
Required accessories	Computer, projector, speakers, flipchart (board), markers
Time allocation	40 min

Learning outcomes	Understanding of the impact of energy projects on social relations, understanding of the implementation aspects of energy projects from the SSH point of view.

The session commences with a broader elucidation of the problem associated with the disposal of the most dangerous nuclear waste in Europe (spent nuclear fuel, high-level waste, not intermediate and low-level waste). The teacher presents the matter to students as an extreme and historically unprecedented case, in which, owing to its complexity, almost all problems and questions related to communication and participation in decision-making arise that energy experts and technicians may face in other, less complex cases as well. It is also a case to which a broad international attention is paid and which concerns every European country using nuclear energy.

The teacher should be clear about the technical concept of the deep geological repository as the globally preferred solution for disposing of the nuclear waste. It is the precondition for presentation of the matter from the SSH viewpoint. To secure that students also have basic technical information about the concept, the teacher plays one of the listed informatory videos about the repository. It is important to stress the key geological criterion for the repository site selection (mostly the granite massif is preferred).
The following explanation of the matter is based on a short power point presentation framing the whole issue from the SSH viewpoint. On one hand, the solution of the problem with nuclear waste is being sought on an international level. As the construction of a joint international deep geological repository appears to be politically unpassable, the top European legislature obliges the EU member states to pursue in timely and legally correct manner the way to the siting, construction and operation of their own national deep geological repositories.

On the other hand, the issue assumes local meaning in the last instance, because some local community has to accept the project of the repository in its vicinity. As nobody in general jubilates at realizing the nuclear waste might find its final rest under his or her home, to secure such an acceptance in any local community becomes extremely challenging. Local communities considered for the siting of the repository are usually scared. Not only due to the possible risk of (invisible) radiation, but also due to the change it would entail for the current social or socio-economic relations, which are embedded in certain history, traditions and ways of living often not connected with nuclear energy.

Only a few states have so far managed to negotiate or to come close to negotiating the site for their national repository: especially Finland, where the repository is already under construction, and in Sweden, where the national radioactive waste company is close to getting permission for building it. Experts often regard the Swedish project as the most successful in terms of communication with public. It is advisable for the teacher to focus on it during the pre-class reading.

After depicting the issue of the deep geological repository in Europe, the teacher guides students to the exploration of various implementation aspects that are nontechnical in their nature and call for the incorporation of the SSH expert knowledge. Teacher starts the exercise by posing questions about the social dimension of the repository:
What does it mean in concrete that the project of geological repository is irreducible to technical issues? Try to name those implementation aspects of the project, which may require assistance of nontechnical sciences. Try to name all such implementation aspects that occur to you. Alternatively, try to describe some social phenomena that this project is likely to trigger and which the technicians alone can hardly sort out.
The teacher writes the answers of students on the board or on the flipchart. Once the discussion seems to be over, the teacher provides feedback to students by presenting the summary slide distinguishing 9 various implementation aspects of the repository that point to the social dimension (communicative, political, legal, economic, ethical, safety, environmental, construction-related, and cultural). Teacher takes his or her time to expand a little bit on the specificity of various implementation aspects.

The teacher opens up the discussion with stimulating questions such as: Have you ever come across ethical problems related to energy? Even if it is not the case, can you fancy such problems, when you think about ethics? If you take into account various energy resources and compare them, which of them are more likely to arouse ethical considerations? Can you explain why or in what sense? The discussion serves as the first exploration of the topic. The teacher may record the findings of the discussion on the board or flipchart, comment on them or even return to them during the later interactive exercise.

Activity 2:
Typology of stakeholders and their communication

Methods	Lecture
Keynotes	None
Materials	**TM3-ST3-AM2-PP lecture**
Required accessories	Computer, projector
Time allocation	10 min
Learning outcomes	Understanding of processes of communication on energy issues.

Teacher takes the case of the deep geological repository as the starting point for the second activity as well. The lecture first describes various types of stakeholders involved in the decision-making about the repository. Compared to other energy issues, which are often more local or regional in its scope (e.g. building of a wind or solar park), the national projects of the deep geological repository are commonly dependent on decisions made by the top state executive and legislative bodies (the Government, the Parliament).

» *Projects of repositories are deemed momentous for the society as a whole, because they concern the responsibility for the produced nuclear waste shared by the given population.*

In this respect, they represent comparable or even more consequential societal commitment as e.g. the decisions about the building of nuclear power plants.

The illustration supplied by the case of the deep geological repository provides material, on the basis of which four circles of communication about energy issues are distinguished:

a) Communication within the state administration;
b) Communication in local community;
c) Communication between the state administration and local community;
d) Communication with the general public. Teacher uses four circles to explain the communication about energy issues in general; no matter what particular energy resource is the subject of communication in the given case.

The problem of finding a common language

Experts often use a specialized style of communication (expert terms, abbreviations, etc.) and struggle to find a common language with the lay public. Students should assess their own personal skills, interests and responsibilities realistically. Not every high-level expert is sufficiently talented and/or prepared for communication with the general public. A project manager need not be an excellent communicator, but needs to understand the importance of excellent communicators.

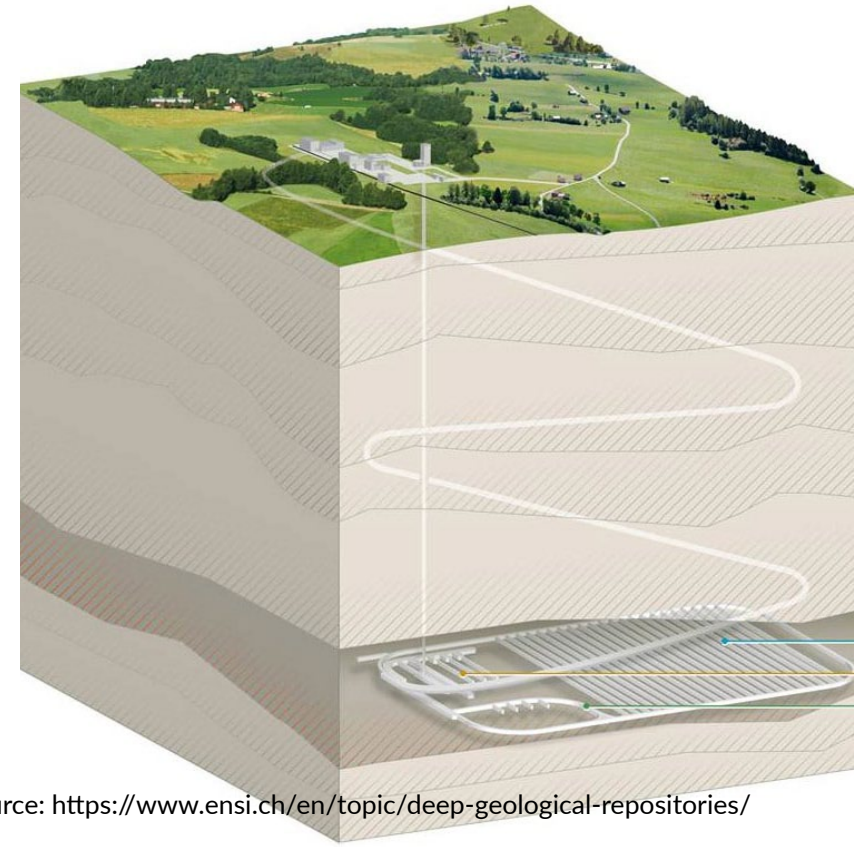


Image source: https://www.ensi.ch/en/topic/deep-geological-repositories/

Activity 3:
Practices for participation in the decision-making

Methods	Exercise
Keynotes	None
Materials	**TM3-ST3-AM3-PP exercise** **TM3-ST3-AM4-handout**
Required accessories	Computer, projector, printed handouts
Time allocation	30 min
Learning outcomes	Understanding of practices for participation in the decision-making.

Communication about energy issues means one-sided provision of information in the first place. Implementation of energy policies commits the responsible institutions (mostly the state ones) to inform continually the public about the development. To act transparently and in accordance with law is vitally important for these institutions, if they are to retain trust of the people. However, the execution of power inevitably entails that many important communications within the state administration occur behind the closed door. The provision of information about these communications to the public than becomes rather a matter of political culture or good will of concrete politicians.

» *On the other hand, making of decisions about energy issues in general involves communication among a multitude of actors, which necessitates discussion, negotiations and participation of stakeholders in the decision-making process.*

In the third activity, the teacher familiarizes the students with various good practices that are suitable for ensuring of such participation. Each practice is presented on a separate PP slide and the teacher asks students, to what circle of communication they would assign it and why. The teacher immediately provides feedback regarding the correctness of each assignment. After the explanation of all practices is complete, the teacher presents the overview of all practices and gives students the handout with this overview.

Overview of practices for participation in the decision-making and their assignment to the four circles of communication:

Communication within the state administration

It is subject to the general claim on transparency and legal accurateness. It is governed by the rules of representative democracy, administrative routines and political culture.

Communication in local community

Available practices: local public debate, focus group, civic committee (panel), community association (local working group).

Communication between the state administration and local community

Available practices: round table, national working group.

Communication with the general public

Available practices: environmental impact assessment (EIA), online forum, public hearing (e.g. in the Parliament), consensus conference, national public debate.

Activity 4:

Overview of measures to benefit local stakeholders

Methods	Lecture
Keynotes	None

Materials	**TM3-ST3-AM5-PP lecture**
Required accessories	Computer, projector
Time allocation	10 min
Learning outcomes	Preparation for the next session.

At the end of the first part of the session, the teacher uses PP presentation to familiarize the students also with four types of measures to benefit local stakeholders: mitigation, compensation, incentives and guarantees.

Activity 5:

Strategy for communication and participation in the decision-making

Methods	Presentation, project
Keynotes	None
Materials	**TM3-ST3-AM6-PP project** **TM3-ST3-AM7-handout**
Required accessories	Computers operated by students
Time allocation	60 min
Learning outcomes	Understanding of practices for participation in the decision-making.

After the break, teacher agrees with students on their division into groups (at least two students in each group) and students are get ready for elaboration of their own strategy for communication and participation in the decision-making process. The teacher uses PP presentation to relate the outcomes of the first part of the session to this project exercise.

Energy projects usually embrace various practices for participation in the decision-making and measures to benefit local stakeholders with view of facilitating the adoption of the given project by locals and its inclusion into the local community planning. Energy projects, when accepted by the community, cease to be perceived as foreign technocratic interventions. The introduction of energy technologies may, on the contrary, result in local economic growth and, even more importantly, may enrich and transform the cultural identity of the community and its ways of living. To be sure, not every energy project succeeds. In many cases, the local opposition is strong and obstinate. In other cases, uncontrolled vested interests and lobbyism may impair the project. It should be highlighted by the teacher that the practices or participative democracy help to tackle these phenomena and thus underpin the legitimacy of the resulting solution.

The teacher assigns each group a different fictive problem situation linked with the siting of an energy facility. A brief summary text describes the given problem situation, but is schematic enough to allow teacher to frame the situation further (e.g. in relation to the national or regional context known to students), if he or she wishes to. Three descriptions of problem situations are available: siting of a larger wind farm, introduction of a smart grid technology to the municipality and construction of a new reactor in an existing nuclear power plant. The aim of the project is to develop a complex strategy for communication and participation in the decision-making, which will cover the following areas:

a) Identification of the most important stakeholders;
b) Outline of the approach to the communication with stakeholders;
c) Introduction of practices for participation in the decision-making;
d) Introduction of measures to benefit local stakeholders;
e) Tips for empowering of the local community planning.

Each group fills in the ready-made PP document template. Students may search for information on the internet. They have roughly 50 minutes to complete their project.

Activity 6:

Presentation of results & debriefing

Methods	Lecture
Keynotes	None
Materials	**TM3-ST3-AM8-reading tips**
Required accessories	Computer, projector
Time allocation	30 min
Learning outcomes	Preparation for the next session.

After the exercise, representative(s) of each group present the project. Students from other group(s) may react, ask questions and exchange their views. The teacher moderates the interaction, checks up to what extent the projects employ the knowledge presented in the first part of the sessions and provides final feedback to students. The teacher stresses that the success of any strategy is conditional to an ongoing communication and negotiations with stakeholders. The existence of whatsoever perfect strategy document will alone never do the job.

e) Additional resources

No.	Author and title	Description
1.	Durdovic, Martin. 2016. A Guide to Communication and Participation in Decision-Making on Siting a Deep Geological Repository. The Case of the Czech Republic. Prague: Institute of Sociology of the Czech Academy of Sciences. http://www.soc.cas.cz/en/node/4910	Document explains the topic of the session on the case of siting of the repository in the Czech Republic.
2.	Fairley, Peter. 2017. The complex web behind the siting of power plants. “Nature” 2017, Vol. 551, pp. 150-152. https://www.nature.com/articles/d41586-017-07511-2	Article presenting up-to date view of

Assessment methods and final assignment

Assessment of the collective work

During the sessions, students complete their main tasks in groups (up to 5 students in each group). In each session, teacher assesses the performance of the group. Individual students get the same percentage score as their group fellows. Groups do not change; each student remains a member of one group in all sessions. The teacher uses the following assessment tables and issues a separate table to each group for its activity in the given session.

SESSION 1: REPORTING AND INTERPRETING SOCIAL DATA

Aspects of the group performance	Score	25%	20%	15%	10%	5%	
Correct usage of survey methodology principles							Total score
Accuracy of data interpretation							
Ability to grasp the main findings							
Ability to see the weak points							

SESSION 2: ENERGY STAKEHOLDERS ANALYSIS

Aspects of the group performance	Score	25%	20%	15%	10%	5%	
Identification of stakeholders							Total score
Exploration of negative impacts							
Exploration of positive impacts							
Ability to grasp the social dimension							

SESSION 3: STRATEGY FOR COMMUNICATION AND PARTICIPATION IN THE DECISION-MAKING

Aspects of the group performance	Score	25%	20%	15%	10%	5%	
Approach to the communication with stakeholders							Total score
Introduction of participative practices							
Introduction of measures to benefit stakeholders							
Empowering of the local community planning							

Grading – one session:
100 % - 90 % = A
89 % - 75 % = B
74 % - 60 % = C
59 % - 50 % = D
49 % - 40 % = E
Lower than 39 % = F
In case that more than one session is taught, teacher uses the average score to determine the final grade.

Assessment of the individual work

If the teacher wants to assess students individually as well, he or she may ask them to write an essay. Writing of an essay will help students to expand their knowledge and focus on a special topic. Teacher employs the same grading scheme and can use the average of the collective and the individual score to determine the final grade.
Some suggestions of an essay topic:

- *interpretation of a selected Eurobarometer survey report related to energy issues;*
- *reflection on the viability of the EU energy governance framework with respect to the national conditions and/or with respect to a particular source of electricity production;*
- *reflection on the role of participative democracy in the decision-making about energy projects.*