



TM1

Energy awareness

Being aware of the importance of energy (for our life)

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Introduction

Many barriers to increase energy efficiency are related to people's behaviour rather than technological issues. Raising individuals' awareness and keeping people involved in energy management activities in their homes and in their workplace is vital to ensure energy efficient behaviours. This module aims to reflect on the need to address societal aspects (e.g. individual's motivations and behavioural changes, institutional practices, etc.) beyond technological ones when raising energy awareness and implementing policies and projects. It will trigger discussions on values, motivations and barriers related to energy savings in our daily routines. It will also draw attention to the vital **importance of social sciences and humanities (SSH)** for addressing the socio-technical challenges related to secure, clean and efficient use of energy.

In this module, the students will explore why and how SSH can help address energy issues and will reflect on how cooperation between technical and SSH disciplines could be enhanced. It is of utmost importance that technology students are aware of the social aspects in the implementation of energy policies or projects and that they understand the terminology and concepts so that they can frame questions more broadly when addressing social issues in this context.

In the debates on the future of energy policy, there is often a tendency to start with the type of technology rather than to think of the social and political aspects of policy implementation. This may result in controversial debates, as the **wider societal and political context** is not sufficiently addressed. For instance, different societal groups perceive a gas pipeline crossing a pristine environmental area in different ways. Some groups value the economic development it may bring whilst environmental groups perceive it as an unacceptable threat to the environment. Nowadays, developing energy policies which address the three core trilemma dimensions conceptualised by the World Energy Council - **energy security, energy equity and environmental sustainability** – demands recognition of the complex intertwined links between public and private actors, governments and regulators, economic and social factors, natural resources, environmental concerns and individual actions. As part of this complexity, social sciences can help to:

- Understand or acknowledge social and individual behavioural factors;
- Assist in framing priorities and questions for policy-making based on the diverse societal values and concerns;
- Form the basis for more informed decision making and communication strategies with the public;
- Open up spaces for robust policy debate.

Thus, firstly, social sciences describe human behaviour and social conditions and assess the consequences of changes to those behaviours and conditions due to policy implementation. Secondly, they try to understand how social and natural scientific knowledge is used as evidence in the policy process. Thirdly, social sciences and humanities help shape and configure policies.

The teaching module is composed of 2 successive sessions:

1

Session 1: Introduction to energy awareness

introduces the energy awareness and students are asked to reflect on their own behaviour regarding energy consumption.

🕒 90 minutes

2

Session 2: Workshop and role play

is based on the energy policy in Canada; students play a game with cards in teams of 4 up to 6, where they discuss different priorities regarding the adoption of sustainable energy policies and present their agreed (or not) policy in class. This approach will enable students to grasp the sense of the importance of SSH and the complexity of changing behaviours regarding energy use and consumption when making policy decisions on energy issues.

🕒 180 minutes

Session 1:

Introduction to energy awareness

a) Session objectives

This session is intended to give students a general knowledge of why energy awareness is important in order to understand the difficulties of changing consumption and production patterns and the complexities of energy policy-making. It starts with making students reflect on their own energy use, consumption and opportunities to increase energy efficiency in their home and study place. Afterwards, students reflect on the importance of social sciences as a supporting tool to make decisions on energy policies as well as the importance of raising public awareness of the benefits of adopting energy efficiency behaviours.

b) Session scope

Behaviour change

Energy user's behaviour is a key factor influencing the way they respond to energy efficiency policies and whether they choose (or not) to adopt energy efficient technologies and services. Therefore,

» *UNDERSTANDING HOW THE DESIGN OF POLICIES AND TECHNOLOGIES CAN AFFECT ENERGY USERS' BEHAVIOUR IS CRUCIAL FOR REALIZING ENERGY EFFICIENCY GOALS*

Behavioural models are key to understand what consumers do and why they do so. The insights of behavioural sciences point out that people are more inclined to take action on an issue when they think other people are doing better than they are. Thus, social pressure is powerful to change people's behaviour. Energy efficiency measures rely on people adjusting their energy consumption behaviour.

There are different types of instruments which can be used to influence behaviour – economic instruments, communicative instruments, infrastructural provisions or regulatory instruments. When formulating an intervention strategy to change behaviour, there is often a mixture of these instruments. In addition, there are motivating, enabling and reinforcing factors of behaviour. Motivation by itself is not enough; one has to be 'able' to perform the desired behaviour. Thus, motivating (knowledge, attitude, awareness, etc) and enabling factors (financial, organizational, technical, etc) can influence individuals to start the desired behaviour, but in order for it to be permanent, it requires reinforcement. Reinforcing factors are external to the individual and include feedback from peers, experts, authorities and customers.



Jeni Cross, Ph.D., is currently Associate Professor in the Department of Sociology. She earned a bachelor's degree from Colorado State University and received her Ph.D. in Sociology from the University of California at Davis.

Jeni's research interests include community attachment/sense of place, land use and conservation, sustainability, inter-agency collaboration, social networks, and social norms. [...] Her current projects include research on land conservation decision-making, energy conservation and sustainability in public schools, and inter-agency collaboration related to organizational transformation.

Source: <https://www.libarts.colostate.edu/people/jecross/>

Jeni Cross, who is a sociology professor at Colorado State University, talks about the three myths of behaviour change, which include:

1

MYTH: Education is enough to change behaviour.

TRUTH: You can change behaviour if you make the information tangible, tell people exactly what you want them to do and create a unique message for each audience;

2

MYTH: Changing attitudes changes behaviour.

TRUTH: Attitudes follow behaviour, they do not predict it. You can change behaviour by setting behavioural expectations and connect to people's values;

3

MYTH: People know what motivates them to take action.

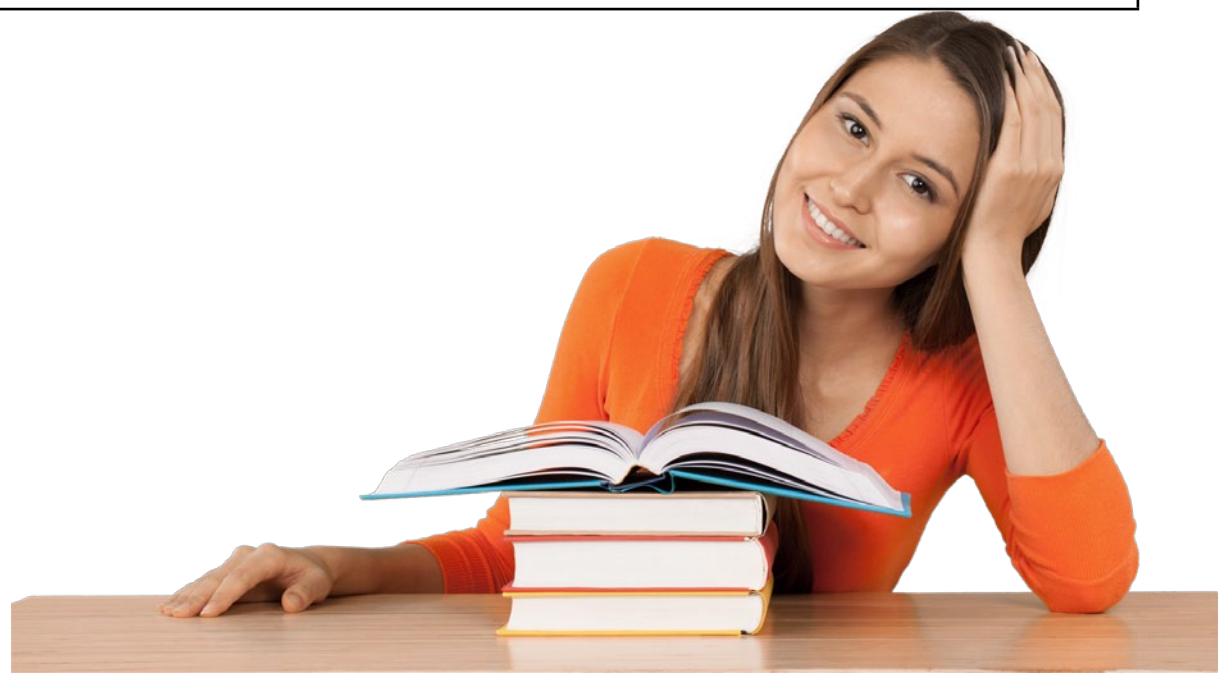
TRUTH: Social norms influence our behaviour, other people doing it is most influential in changing behaviour

Energy studies need social science

Professor Benjamin Sovacool has examined 4,444 full-length articles published between 1999 and 2013 in three leading journals and has found that the field of energy studies lacks interdisciplinary focus and it infrequently uses social science methods and concepts. Under 20% of all energy research is currently performed by social scientists. He argues that a broader pool of expertise is needed to understand how human behaviour affects energy demand and the uptake of technologies.

c) Pre-reading

No.	Author and title	Description
1.	Laskey, Alex. How behavioural science can lower your energy bill https://www.youtube.com/watch?v=4cJ08wOql0c&t=6s	Introductory video from Alex Laskey as part of TEDTalk (2013) on behavioural science and how to lower energy costs.
2.	Cross, Jenni. Three Myths of Behaviour Change https://www.youtube.com/watch?v=I5d8GW6GdR0	Introductory video as part of TEDTalk (2013) discussing on changing behaviours and what we think we know but we do not know.
3.	Sovacool, K. Benjamin. Diversity: Energy studies need social science. "Nature" 2014, Vol. 511, Issue 7511, pp. 529-530. DOI: 10.1038/511529a	Nature article (2014) from a sociologist discussing that a broader pool of expertise is needed to understand how human behaviour affects energy demand.



d) Session activities

Activity 1:

Introductory presentation

Methods	Interactive lecture
Keynotes	None
Materials	TM1-ST1-RM1-Energy awareness presentation (slides 1-16) TM1-ST1-RM2-Introductory videos
Required accessories	Computer + projector
Time allocation	30 min
Learning outcomes	Basic knowledge of energy awareness

The purpose of this activity is to make students reflect on the difficulties of promoting a change in behaviour regarding energy production and consumption. The teacher can start by asking students why we should save energy, why they think this topic is important (e.g. climate change, money savings, for future generations, etc). Then the teacher can show the first 3:38 minutes of the TED talk of James Brew on the value of energy efficiency (TM1-ST1-RM2 – introductory videos) which provides more motivations for saving energy in a fun presentation or can show the whole video.

After showing the scope of the presentation, the teacher can start asking students the same questions which were used in the TED2013 video by Alex Laskey “**How behavioural science can lower your energy bill**” (TM1-ST1-RM2 – introductory videos):

- How many of you have checked your email today?
- How many of you are checking it right now?

- How many of you have checked your bank account today? Or last week?
- How many of you have checked your household energy bill last month? Last winter?

Then, the teacher asks students why we do not pay attention to our energy use, why it is important to save energy and how we can get people to start paying attention to the energy we are using and start wasting less of it (slide 5 on the role of behavioural sciences). The video explains the behavioural science experiment undertaken by some graduate students in California showing what drives a change in behaviour to lower the impact on energy consumption. The experiment showed that the message which had an impact on neighbours to reduce energy was not related to economic incentives (saving money), being good citizens or protecting the environment, but rather, whether the neighbours were using less energy.

» **SOCIAL PRESSURE IS A POWERFUL FORCE TO CHANGE OUR BEHAVIOUR.**

The lecturer briefly presents the main factors influencing consumer behaviour related to the patterns of electricity production and consumption (slide 6). The main tools that have been applied to improve energy efficiency or to reduce energy use have mostly been technological and economic. In energy economics, the rebound effect refers to the fact that new and more efficient technology can lead to less-than-expected savings or even greater energy consumption. Stanley Jevons maintained in 1865 in his book “The Coal Question” that efficiency renders energy more affordable and hence, it is wrong to assume that the economical use of fuel is equivalent to a diminished consumption. This is often referred to as the Jevon’s paradox. In some cases, where increased consumption more than cancels out any energy savings, this rebound effect is known as “backfire”.

Usually, when economic incentives are removed, behaviour reverts back to baseline conditions. However, behavioural approaches can help reduce energy use. A common belief is that turning devices off and back on again uses more energy than just leaving them on. In fact, it is more efficient to turn off lights if you are leaving a room for more than one second. However, providing information alone will rarely have lasting effects on behaviour. Issues such as trust in the person that communicates, a simple message, engagement of end-users, social pressure, etc., also play a role in motivating a change in behaviour.

» **SOCIAL SCIENCES ARE NEEDED TO UNDERSTAND HOW HUMAN BEHAVIOUR AFFECTS ENERGY DEMAND AND THIS WILL BE A KEY MESSAGE FOR STUDENTS TO CAPTURE AT THE END OF THIS SESSION.**

The three myths of behaviour change (TM1-ST1-RM2 – introductory videos) are presented and later on explained one by one (see slide 9 presentation TM1-ST1-RM1 and notes): i) education is enough to change behaviour; ii) trying to change attitudes and iii) people know what motivates them. An example the teacher can mention (slides 14-16 of the presentation) follows: it is more effective to leave a message in a hotel room stating that a great number of clients are reusing towels rather than stating that in order to protect the environment the hotel

asks you to reuse towels. The teacher should answer the question at the beginning of the video about which campaign is more effective to reduce littering (A or B). B campaign is the most effective because it utilises social norms and it also uses modelling and it shows someone doing the behaviour that you are interested in. Campaign A shows the behaviour that you're not interested in having people do "everyone is littering". Not only can you be ineffective in your campaign, but you can create a social norms campaign that increases the behaviour they are trying to reduce. They use social norms in a way that is ineffective.

Activity 2:

Energy consumption patterns

Methods	Participatory lecture, exercise and discussions
Keynotes	None
Materials	TM1-ST1-RM1-Energy awareness presentation (slides 17-20)
Required accessories	Computer, projector, flip chart, markers of different colours and tips
Time allocation	40 min
Learning outcomes	Understanding the difficulties of changing energy consumption patterns

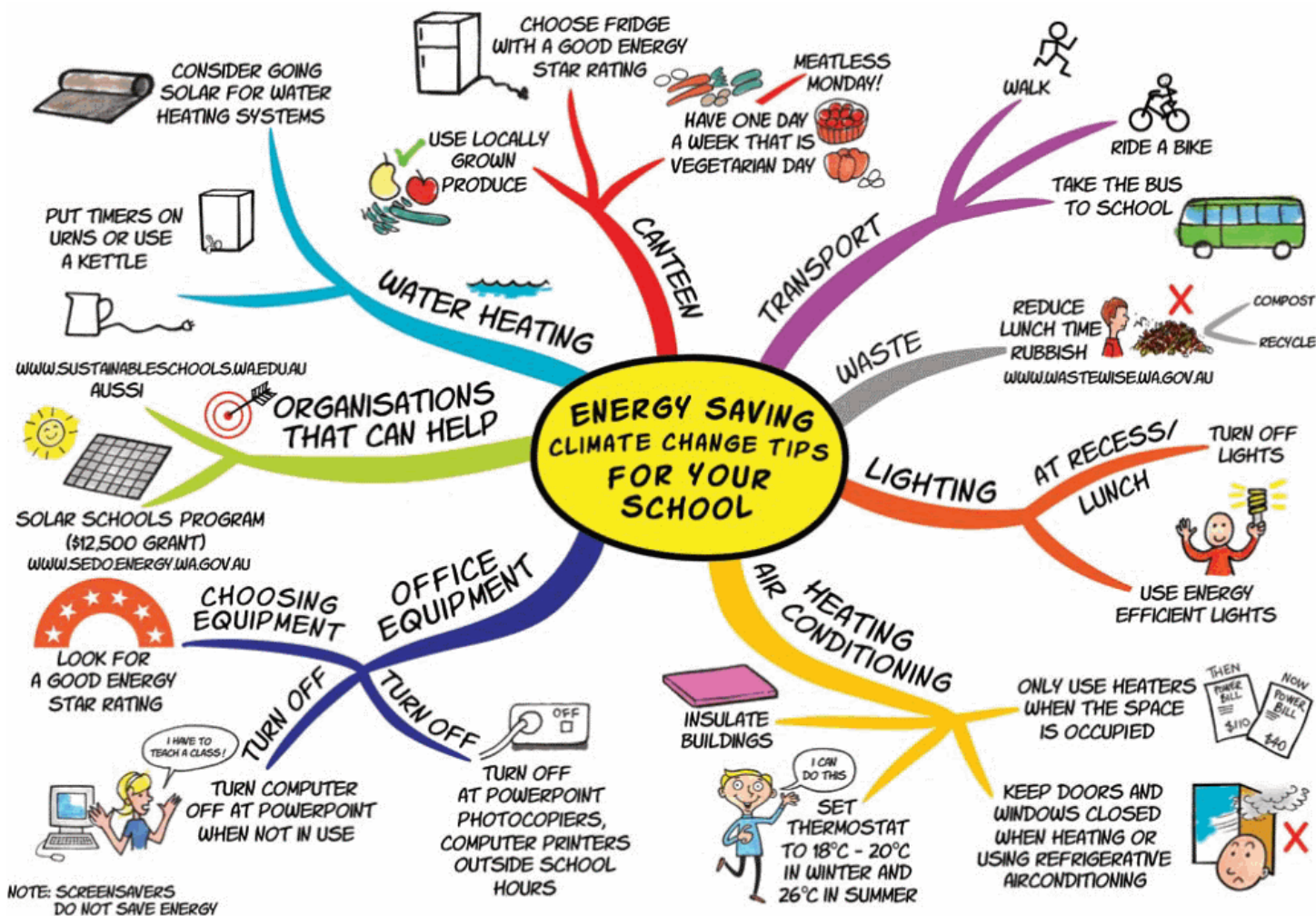
Every day we make decisions that have an impact on the environment and in the use of energy. According to Eurostat (2018), energy use in households accounts for about one-quarter of all the energy used in the EU¹(slide 17). Students are encouraged to reflect on the **consequences of certain energy consumption patterns**. For this, the teacher starts this activity by distributing empty sheets with the energy impact self-assessment matrix for each student. Students spend a few minutes to fill in the matrix which is intended to help them gain an appreciation for their own impact on energy use. Once the matrix is filled in, students have to discuss and compare results in

¹https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_statistics_-_an_overview#Final_energy_consumption

groups of 2 or 3 and there is a general discussion with the whole class to see if they have similar or different results and why.

The feedback to the energy impact self-assessment matrix can be summarized in a mind map or similar. The teacher asks for or chooses one or two volunteers to draw the mind map on the board, based on the ideas provided in a participatory debate with the rest of the class. An example of an energy saving mind map in a school is shown in Figure 1 below.

Figure 1. Energy Saving Mind Map



A question that can be asked is: *what do you think could help your colleagues raise awareness of their energy consumption patterns?* The answer could be having more knowledge of my energy consumption through smart meters, having more knowledge of the neighbours' energy consumption, financial incentives, etc.



Source: <http://www.mindmapart.com/galleries/jane-genovese/>

Activity 3:

Summary discussion

Methods	Presentation
Keynotes	None
Materials	TM1-ST1-RM1-Energy awareness presentation (slides 21-26) TM1-ST1-RM3-energy impact self-assessment matrix
Required accessories	Computer, projector
Time allocation	20 min
Learning outcomes	Awareness of social sciences for decision-making

This last activity focuses on the role of social sciences to understand attitudes towards energy use, which has been mentioned already in the previous activities. For this, the study of Benjamin Sovacool analyzing studies articles (4,444 articles) in energy research over 15 years (from 1999 to 2013) is shown. It shows that there is a bias towards science, engineering and economics over social sciences and humanities and a lack of interdisciplinary collaboration. Behaviour and energy demand was investigated in less than 2.2% of papers. There are few social scientists in national and local energy bodies and thus, there is no input on policy-making into how to alter lifestyles and social norms, but research mainly focuses on technical issues. He claims that universities should develop courses focused on solving energy problems, granting agencies should prioritize and direct more money to behavioural work, and energy journals should broaden their scope.

» *IT IS IMPORTANT TO RECOGNIZE THAT THE ENGINEERING-BASED APPROACHES AND THE SOCIAL-SCIENCE APPROACHES TO CERTAIN PROBLEMS DIFFER:*

both approaches use different tools and ask different questions. For engineers, the collection of data and measurements which are constant over time and space is important, whereas social scientists rely on a number of qualitative methods (e.g. the collection of experiences,

insights, cultural narratives, etc.) which may only be valid for certain times and places. Additionally, ethical issues play a much larger role in the social sciences. Both approaches are valid but the way they address problems is different. The teacher can ask students to try to formulate questions regarding energy use in commercial buildings from the point of view of the engineering-based approach and social science-based approach. See for example the table below comparing both types of questions:

Engineering based questions	Social science-based questions
<ul style="list-style-type: none"> • How much energy is used in a building (predicted or measured)? • Where is the energy being used? • How much energy can be saved? • What is the time period for technology adoption? • What are the market barriers? • What are the appropriate energy targets for new construction? • How do you add more functionality to the energy management system? • What are the carbon credits for improved energy efficiency? 	<ul style="list-style-type: none"> • What services do owners and occupants value in commercial buildings? • How are design decisions made that ultimately affect the health, productivity and comfort of occupants? • Who determines changes in the building operation? • Who gains and who loses in any proposed change? E.g. how do manufacturers and the government department responsible for energy come to mutually satisfying “solutions”? • What are the possible unintended outcomes from a proposed change? • What information and incentives do building operators need to effectively operate their buildings? • How does society recognize the consequences of increased energy consumption?

Source: extracted from the paper from (Diamond, Moezzi 2002) “Becoming Allies: combining social science and technological perspectives to improve energy research and policy making”
https://aceee.org/files/proceedings/2002/data/papers/SS02_Panel4_Paper08.pdf

Using social sciences in the context of energy policy decisions may have pros and cons, as shown in slide 25.

PROS	CONS
Prevents wasting money	Slower
Empowers individuals and communities	Requires flexibility
Integrates human dimensions to improve energy policies	Economic resources spent on research
Facilitates more legitimate and robust policies	
Frames energy-saving programmes	

Slide 26 of the presentation summarises the two main points of this first session:

- Simple changes in people's behaviour can lead to significant energy savings, but such changes will only happen if the people are aware of the energy consumption that they have the power to control.
- Social sciences help to understand people's behaviour regarding energy use, which is key to make decisions which will affect them.

e) Additional resources

No.	Author and title	Description
1.	European Environment Agency. 2013. Achieving energy efficiency through behaviour change: what does it take? Technical report No 5/2013. EEA: European Environment Agency, Copenhagen. https://www.eea.europa.eu/publications/achieving-energy-efficiency-through-behaviour/file	This report addresses the interface between policymaking and human behaviour as a means to achieve sustained reductions in energy consumption. It argues that there is potential for energy savings due to measures targeting behaviour. The report focuses on energy efficiency measures and behaviour changes, structural factors (such as the impact of liberalisation and the energy mix and energy tariff structures) and the rebound effect.
2.	OECD. 2017. Tackling Environmental Programs with the help of Behavioural Insights. Policy Highlights. Paris. https://www.oecd.org/environment/tools-evaluation/Policy-Highlights-Behavioural-Insights.pdf	This report reviews developments in the application of behavioural insights to encourage more sustainable consumption, investment and compliance decisions by individuals and firms. It portrays how behavioural sciences have been integrated into the policy-making process. The report covers a variety of policy areas: energy, water and food consumption, transport and car choice, etc.
3.	Dahlbom, Bo, Heather Greer, Cees Egmond, Ruud Jonkers (eds.) 2009. Changing energy behaviour. Guidelines for Behavioural Change Programmes. Instituto para la Diversificación y Ahorro de la Energía (IDAE), Madrid. Supported by Intelligent Energy Europe. https://www.idae.es/uploads/documentos/documentos_10457_BEHAVE_changing_energy_behaviour_09_c5724555.pdf	This publication starts with a brief overview of the importance of behavioural change for a sustainable energy future. It then discusses the theory and planning method for behavioural change programmes and follows with an overview of lessons learnt in 41 cases in Europe over the last years.

Session 2: Workshop and role play

a) Session objectives

This session is basically oriented to conduct a role play simulation exercise based on a specific scenario around a challenging energy policy. The teacher proposes to play a game (“PlayDecide”) in groups of four to eight students in order to improve awareness about energy issues, spread the knowledge about new energy technologies and launch a debate about the effective potential of these technologies, facing pros and cons. Participants are assigned different roles based on the cards in the PlayDecide game. After that, one of the groups or several, depending on the time available, will be randomly chosen to present the policy proposed in front of different members of the audience (e.g. neighbouring communities, political parties, businesses, NGOs, etc.) played by the rest of students. In case the group is small or there is not enough time, the role play can be skipped and the teacher can lead a debate in order to discuss how the groups discussed, what they felt was important and why, whether they could reach an agreement, etc.

b) Session scope

This session is based on the PlayDecide game: a card game for simple, respectful, structured and fact-based group discussion. It enables students to explore a topic in depth in an informal and informative way. Players get familiar with a question, see it from different perspectives and form or clarify their own opinion. The question is whether the participants can reach a positive consensus on that complex issue. The ideal number of players is 4 to 8, with the possibility of splitting large groups into several smaller ones.

Canada – case study



As the population of the world increases and energy-consuming activities in the developed countries expand, the need for energy also increases as well as the emissions of greenhouse gases. Fossil fuels like coal, oil and natural gas, continue to be a dominant energy source but they are a finite resource and supplies will run out. Attempts to reduce greenhouse gas emissions continue to be made but the latest scientific evidence suggests that if little or no action is taken to reduce global emissions, by the end of this century, global warming is likely to exceed the 2 °C target. These energy challenges require governments to invest in renewable energy resources which are clean, safe and inexhaustible. However, how would the infrastructure of a country have to be changed to accommodate renewable energy sources? Does the technology exist to make this type of production viable? Are government policies the right way to invest in renewable energy production? These are the questions to be explored in the PlayDecide game taking Canada as a case study.

The following policy positions for our PlayDecide game can be these ones or groups can define new policy positions:

Policy position 1: the focus should be placed on reducing emissions. We can reduce emissions by changing personal lifestyles, developing incentive programmes, developing stricter regulations and enforcement, and changes in infrastructure including transportation, energy production, energy delivery and industrial usage.

Policy position 2: investment in new technologies, engineering, architecture, and energy production are the most important. Current renewable energy technology falls short of our needs, and investment is needed to find better energy solutions. We need to maintain the current system, using existing resources until these new technologies become available.

Policy position 3: there are promising renewable energy sources that already exist that could work with the proper investment. Like all other technologies, renewable energy has to be economically competitive. Constantly investing in new forms of technology is a waste of time and resources. It makes more sense economically to invest everything in one or two of the most successful types of renewable energy and maximize efficiency and profit.

Policy position 4: the harm we have caused to our planet is irreversible, and our planet has surpassed the tipping point. Many climate models predict that climate change will continue to occur, regardless of how much we reduce emissions. The time for action was decades ago, not today. Our focus now needs to be on how we can adapt to changes in our climate.

c) Pre-reading

No.	Author and title	Description
1.	Craciun, Dana. Role-playing as a creative method in science education. „Journal of Science and Arts” 2010, Vol. 10, Issue 1. http://www.icstm.ro/DOCS/josa/josa_2010_1/c.11_role_playing_as_a_creative_method_in_science_education.pdf	PlayDecide game focused on the need to produce more energy in Canada and the different possible policy positions to face this challenge.

No.	Author and title	Description
2.	Skelton, John et al. 1999. Role play as a teaching methodology. Barmingham: University of Birmingham. https://ler.letras.up.pt/uploads/ficheiros/6089.pdf	To learn more about energy facts in Canada, the teacher and students could get information on energy challenges in Canada by looking at this webpage of Natural Resources Canada. However, assumptions can also be made regarding the energy policies in Canada for the activities described in this session.

d) Session activities

Activity 1:

Presentation of scenario based on PlayDecide game

Methods	Presentation
Keynotes	The teacher should be familiar with the steps and rules of the PlayDecide game before presenting it to the students.
Materials	TM1-ST2-RM1-Instructions for the teacher TM1-ST2-RM2-PlayDecide instructions TM1-ST2-RM3-PlayDecide game energy Canada TM1-ST2-RM4-Canada energy factsheet

Required accessories	1 placemat in A3 format per player 1 pack of story cards 1 pack of issue cards (on blue paper or margins) 1 pack of info cards (on green paper or margins) Yellow cards (on yellow paper or margins) White cards (on white paper) 1 pack of challenge cards (on orange paper or margins) 4 forms of “Theme of Clusters of cards” 1 voting form “policy regulations” Instructions and cards of the PlayDecide game
Time allocation	15 min
Learning outcomes	Students get information about the organization of the PlayDecide game and the role play.

The teacher presents the organization of the exercise based on the rules of the PlayDecide game. The teacher explains the aims of the game and the guidelines and gradually distributes the cards to each of the groups during the duration of the exercise.

Students divide themselves into groups of 4 up to 8 people. Each group has to choose a rapporteur. The starting point for this exercise is to debate within the groups *“Which is the most favourable policy position in order to change our attitudes and habits with regards to energy production and consumption and ultimately, reducing greenhouse gas emissions?”*.



Activity 2:

Discussion on energy and sustainability

Methods	Discussion in working groups
Keynotes	None
Materials	TM1-ST2-RM2-PlayDecide instructions TM1-ST2-RM3-PlayDecide game energy Canada TM1-ST2-RM4-Canada energy factsheet
Required accessories	placemats, instructions and cards of the PlayDecide game
Time allocation	105 min
Learning outcomes	Students gather and share information based on the cards of the Playdecide game, then discuss and finally formulate a shared group response.

This activity uses one of the kits on “Energy and sustainability” of the PlayDecide game (<http://www.playdecide.eu>) to generate discussion among students on different policy positions regarding energy lifestyles and energy awareness. The kit is entitled Energy in the North: a Canadian translation of “Energy & Sustainability”. The teacher has to pace the game, checking the timing and providing new instructions and cards when needed, for each phase. The teacher also goes around the groups to make sure that the students correctly understand the task.

All players have a placemat in front of them. The facilitator provides the cards (one story card) to the other members of the group and chooses also one for him/herself. The other cards are also distributed following the rules of the PlayDecide game. White cards can be used at any time to add information and issues needed. Yellow cards are used to flag that there are guidelines which are being broken or if a member does not understand what is going on. Discussion is open to try to get a consensus on a policy position that reflects the

group's view on how best to change personal lifestyles to reduce emissions considering the different positions. If the discussion is difficult, challenge cards which are face down can be used to take action. Cards are put on the placemat to sustain arguments. Players in the groups are requested to vote among four different solutions offered in the game's kit or new solutions they have come up with.

Activity 3:

Mock Policy debate, role play

Methods	Role playing game
Keynotes	None
Materials	TM1-ST2-RM5-Handout role play session
Required accessories	None
Time allocation	30 min
Learning outcomes	Students can empathize with socio-scientific issues and communicate those.

This role-playing game (as explained in TM1-ST2-M1-handout) is based on the idea that the national government has launched a public consultation process as an important part of the policy-making process. In coordination with national efforts to reduce greenhouse gas emissions, community leaders are looking into feasible options to promote renewable energy and they want to learn about local stakeholders' perspectives on the issue. A town meeting hall is one way through which the national government can consult and involve different stakeholder groups in energy policy making: stakeholder groups are invited to share their positions on the issue, voice concerns, ask questions and listen to the others.

The aim of this role-playing game is to engage the public and interested groups in the development of the energy policy, by listening to their views and opinions and use these to inform decisions. Members of the government present their policy position to local communities

through meetings organised at local councils all over the country. Thus, students participate in a mock town hall meeting where members of the government leaders are seeking input from local communities on how to reduce greenhouse gas emissions via different strategies such as technology, changing behaviours, laws and regulations, etc. Students have to discuss what is their recommendation and how to raise awareness on the energy problem and their solution proposed.

Depending on the results of the discussion in groups, the teacher can propose one group or the rapporteurs of the different groups to gather together and play the role of the national government presenting their policy position in front of the audience. The audience (the rest of the students) represent different target groups, for instance, neighbouring associations, opposition political parties, environmental groups, companies promoting a different type of renewable energy, etc. The newly formed group of national government representatives will take some minutes to decide together how they will present their policy position, which does not need to be the one they defended during the PlayDecide game. The other group (i.e. audience) will take some time to prepare the questions they will pose to the government representatives.

The teacher organises the desk and chairs in a way that one group is at the front of the class to present if they agreed on a specific policy position and its justification. The teacher will now act as a facilitator of the town hall meeting. He/she will welcome the participants at the meeting, will introduce the members of the group who will present and explain the purpose of the meeting.

The presentation, of approximately 15 minutes, will be followed by questions from the other players. The teacher will encourage students to be creative and have fun playing their new roles! The main goal of the teacher will be to try to work out a compromise to satisfy all the groups to implement a certain energy policy or to highlight the different positions.

Activity 4:

Summary discussion / debrief

Methods	Open discussion
Keynotes	None
Materials	None
Required accessories	None
Time allocation	30 min
Learning outcomes	Students reflect on the different positions and perspectives of stakeholders before taking decisions on energy policies. Increase awareness of the role of social sciences and humanities as an input to policy-making.

Some discussion and final thoughts will conclude the session. The discussion could include the following questions:

- Do you think there are stakeholders' perspectives missing during the role play?
- Did you connect or identify with any of the stakeholder perspectives? Which ones?
- If you were a researcher on social science, how do you think you could help community leaders to make better decisions regarding energy policy?

As a final assignment, students have to write down the main arguments for and against the policy position proposed by the group and reasons why they chose a certain approach.

e) Additional resources

No.	Author and title	Description
1.	International Energy Agency. 2015. Energy Policies of IEA Countries: Canada 2015 Review. Paris. https://webstore.iea.org/energy-policies-of-iea-countries-canada-2015-review	An individual country report reviewing energy policies in Canada: part 1 on policy analysis (general, climate change and energy efficiency); part 2 by sector (natural gas, oil, coal, electricity, renewable energy and nuclear) and part 3 on energy technology research, development and demonstration.
2.	Demain (2015) French film, translated as "Tomorrow". https://www.youtube.com/watch?time_continue=3&v=Bk2LnbrXx_I	A useful resource for this module is the film "Tomorrow" ("Demain" in French from Cyril Dion and Mélanie Laurent https://www.demain-lefilm.com). It shows solutions to replace fossil fuels and the way to the transition to 100% renewables in some countries and cities (Iceland, Copenhagen, Reunion island, etc.), the need to reflect on our consumption and mobility patterns and increase energy efficiency, etc. The movie can be bought through Amazon.

Assessment methods and final assignment

Activity 3 in Session 2 includes the final assignment in which the students are asked to write down the main arguments for and against the policy position proposed by the group and reasons why they chose a certain approach. Issues to be taken into account in this assignment include:

- Role that social sciences and humanities can have in order to help shape and configure the chosen policy;
- Main aspects of an energy awareness campaign.

The proper evaluation and marks awarded for the assignment and module are subject to applicable rules of the institution hosting the module.

Glossary

Behavioural sciences	experimental approach within social sciences which consists of studying human actions in order to understand how people behave and what drives them to do certain actions.
Framing (social sciences)	comprises a set of concepts and theoretical perspectives on how individuals, groups, and societies, organize, perceive, and communicate about different aspects of reality. It involves social construction of social phenomena by mass media sources, political or social movements, political leaders or other actors and organisations.
Humanistic engineering	integration of the humanities and social science disciplines with engineering.
PlayDecide	a card game for simple, respectful, structured and fact-based group discussion. It enables students to explore a topic in-depth in an informal and informative way. Further information at playdecide.eu .
Socio-technical	refers to an approach which has at its core the idea that 'social' and 'technical' aspects are intertwined and should be treated as interdependent parts of a complex system.

Attachment: Syllabus

1. Name of the Teaching Module

Energy awareness. Being aware of the importance of energy (for our life).

2. Brief description of the subject matter

This module aims to reflect on the need to address societal aspects (e.g. individual's motivations and behavioural changes, institutional practices), beyond technological ones, when raising energy awareness and implementing policies and projects. It will trigger discussions on values, motivations and barriers related to energy savings in our daily routines. It will also draw attention to the vital importance of SSH for addressing the socio-technical challenges related to secure, clean and efficient use of energy. The students will explore why and how SSH can help to address energy issues and will reflect on how cooperation between technical and SSH disciplines could be enhanced.

3. Complete SSH problems description

When trying to implement energy policies or projects, the behavioural and social aspects are highly relevant. It is important to look beyond the technology proposed and into the wider socio-technical challenges and opportunities associated with motivating behavior change towards energy efficiency. Taking societal issues into account at an early stage of a project and in the policy-making process may facilitate the implementation of certain technologies or policies. It is of utmost importance that technology students are aware of the social aspects in the implementation of energy policies or projects and that they understand the terminology and concepts, so that they can formulate the right questions when addressing social issues in this context.

4. Prerequisites and context

This module is addressed to students in Engineering Faculties which are following an Energy related Master Programme. Students do not need to have a strong technical background on engineering, but knowledge of technical matters will help. Students must have taken or be taking part in courses where energy projects are developed.

The module on Ethics and Philosophy of Energy Development is complementary to this one, by providing the theoretical and historical

background. The module on Ethics and Philosophy is more focused on ‘why’ technologies can be a source of social impact but also of cultural identity, why there is a conflict between the industrial past and the current environmental values and why ethical questions and responsibility should be taken into account when designing energy strategies.

The present module takes a more practical approach focusing on how specific energy policies should address the complex interplay between what are typically seen as distinct “technical” and “social” dimensions and reflect on the contribution by social sciences to energy policies. For this, it is important to raise the students’ awareness on the implications of current energy patterns of consumption.

5. Learning outcomes

a. Knowledge

- Students will have knowledge about a series of social aspects deserving consideration as related to energy projects/policies.
- Students will understand the importance of energy awareness in the implementation of certain energy policies in order to change behaviour.

b. Skills

- Students will be able to analyze a specific energy policy from the social and socio-technical perspective.
- Students will understand the complex interplay between technology-society-culture-environment and economy.

c. Social competencies

- Sustainability and social commitment.
- Team working.
- Effective oral and written communication.

6. Form of classes

- Lecture, workshop, group work, role play, discussion.
- Two sessions (2x45 min and 4x45 min) for up to 24 students.
- At least 70% direct student participation.

7. Teaching methods

- Concept problem presentation (powerpoint) with brainstorming, discussion and mind map.
- PlayDecide as fact-based group discussion around a specific case.
- Role play and debate.

8. Detailed classes plan

- Session 1. Introduction to energy awareness (2x45min)
 - i. Introductory presentation
 - ii. Energy consumption patterns (including an activity to fill in an impact self-assessment matrix and develop a joint mind map)
 - iii. Summary discussion, highlighting the importance of social sciences in policy-making on energy.

MATERIALS: presentation, matrix on energy impact self-assessment, videos.

- Session 2. Workshop and role play (4x45min)
 - i. Presentation of the scenario based on the Playdecide game on energy and sustainability in Canada.
 - ii. Discussion on energy and sustainability in groups.
 - iii. Role play simulating a town hall meeting on defending the agreed energy policy and raising energy awareness.
 - iv. Summary discussion

MATERIALS: PlayDecide game instructions, cards, placemat.

9. TM assessment methods & criteria

A short assignment will be the method of assessment for this module in which the students are asked to write down the main arguments for and against the policy position proposed by the group and reasons why they chose a certain approach. Issues to be taken into account in this assignment include:

- Role of social sciences and humanities can help to shape and configure the chosen policy;
- Main aspects of an energy awareness campaign.

10. Literature and other materials

1. Energy and behaviour change

- 1.1. EEA Technical report. Achieving energy efficiency through behaviour change: what does it take? “European Environment Agency” 2013, No 5.
- 1.2. Dahlbom, Bo, Heather Greer, Cees Egmond, Ruud Jonkers (eds.). 2009. Changing energy behaviour. Guidelines for Behavioural Change Programmes. Instituto para la Diversificación y Ahorro de la Energía (IDAE), Madrid. Supported by Intelligent Energy Europe.
- 1.3. OECD Policy highlights. 2017. Tackling Environmental Programs with the help of Behavioural Insights. Policy Highlights. Paris.

2. Social sciences and humanities in energy

- 2.1. FET Advisory Group. 2016. The need to integrate the Social Sciences and Humanities within Science and Engineering in Horizon 2020 and beyond. FET (Future Emerging Technologies) Advisory Group. <https://ec.europa.eu/digital-single-market/en/news/report-need-integrate-social-sciences-and-humanities-science-and-engineering-horizon-2020>
- 2.2. Fri, W. Robert et al. 2011. Beyond Technology. Strengthening Energy Policy through Social Science. A report of the American Academy of Arts & Sciences. <https://www.amacad.org/sites/default/files/publication/downloads/alternativeEnergy.pdf>
- 2.3. Mourik, Ruth et al. 2017. Energy efficiency and using less – a social sciences and humanities annotated bibliography. Cambridge: SHAPE ENERGY. https://shapeenergy.eu/wp-content/uploads/2017/06/SHAPE-ENERGY-Annotated-Bibliography_ENERGY-EFFICIENCY-AND-USING-LESS.pdf
- 2.4. Ryan, E. Sarah, Chris Hebdon, Joanna Dafoe. Energy research and the contributions of the social sciences: a contemporary examination. “Energy Research & Social Science” 2014, Vol. 3, pp. 186-197. DOI: 10.1016/j.erss.2014.07.012
- 2.5. Sovacool, K. Benjamin. What are we doing here? Analysing fifteen years of energy scholarship and proposing a social science research agenda. “Energy Research & Social Science” 2014, Vol. 1, pp. 1-29. DOI: 10.1016/j.erss.2014.02.003
- 2.6. Spreng, Daniel. Transdisciplinary energy research – Reflecting the context. “Energy Research & Social Science” 2014, Vol. 1, pp. 65-73. DOI: 10.1016/j.erss.2014.02.005
- 2.7. Steg, Linda, Perlaviciute Goda, Ellen van der Werff. Understanding the human dimensions of a sustainable energy transition. “Frontiers in psychology” 2015, Vol. 6. DOI: 10.3389/fpsyg.2015.00805