„Solution for clean air environment" - lesson plan

Duration	1 hour
Age	15 - 19
Type of classes	didactic and educational activities
Goals	• students deepen their awareness and understanding of the need of air protection • students get familiar with EU activities within the framework of air protection solutions • students enhance communication and negotiation skills
Methods	brainstorming, discussion, didactic games
Forms of work	Individual, in groups, collective
Needed material	• printed text to read, cards with inscriptions for role play

Attention: During the lesson, it is worth using the dedicated presentation available to download from the "Clean Air" website.

The presentation consists of slides related to topics discussed during the lesson. The teacher after completing each exercise can use a slide (or slides) summarizing the given issue, to remind the most important information and to systematize the knowledge of students. The presentation also includes slides with exercises and the answers to them.

1. I.N.S.E.R.T. - Analysis of articles

Each student gets a short text to read (can be find below). While working individually, they are asked to draw markers while reading:

√ (check mark) for information I have already known
+ for new information or information that I can identify with and believe it
- for information I disagree with or it is in contradiction with what I know
? for information I do not understand, and I want to know more about it (slide 2 and 3).

This method is called INSERT (Interactive Noting System for Effective Reading and Thinking). It forces students to work actively with the text and thus learn more from reading. Once they are finished, teacher discuss the tags, clarify all the "?" and discuss contradictory information.

All of the information in the text are correct.

Reading text:

Air pollution is causing around 400 000 premature deaths in Europe per year. Heart disease and stroke are the most common reasons for premature death attributable to air pollution, followed by lung diseases and lung cancer. Air pollution is perceived as the second biggest environmental concern for Europeans after climate change and people expect the authorities to implement effective measures to reduce air pollution and its effects. Increased recognition of the effects and costs of air pollution has led international organisations, national and local authorities, industry and non-governmental organisations (NGOs) to take action.

Air pollution has been one of Europe's main political concerns since the late 1970s. European Union policy on air quality aims to develop and implement appropriate instruments to improve air quality. The main instruments are directives setting ambient air quality standards to provide protection from excessive pollution concentrations, based on the latest research on the health effects of air pollution. One of the most important legal acts in the European Union in the field of air protection is the Directive 2008/50/EC on ambient air quality and cleaner air for Europe (CAFE directive). There is extensive body of legislation which establishes health based standards and objectives for a number of pollutants present in the air. It describes the basic principles concerning the assessment and management of air quality and set pollutant concentrations thresholds that shall not be exceeded. In case of exceedances, authorities must develop and implement air quality management plans. The directive sets out also information and alert thresholds, which specify above which concentration of air pollutants people should be informed and alerted about danger . But we have to know that directive 2008/50/EC, despite the well-documented adverse health effects of brief exposures to particulate matter, lays down information and alert thresholds for SO2, NO2 and ozone only, which means that EU Member States are not obliged to adopt such thresholds for particulate matter (PM10, PM2.5). The decision as to whether adopt them or not rests with the Member States.

National government has many ways how to minimize the air pollution. For transport pollution it is: subsidizing public transportation, putting bans on the presence of automobiles in the city centre or creation of cycling routes in the city. In rural areas are the main air pollutants households burning coal and wood so government in order to reduce this is subsidizing replacing boilers or supports subsidies for house insulation. In addition to support, specific legal provisions are also introduced in the countries, ordering liquidation/replacement of old, high-emission boilers to a new ecological source of heat, for example renewables. It is also possible to ban the burning poor quality fuels, such as wet wood or poor quality coal. Such solutions are introduced by individual voivodships in Poland, for example in Ma łopolska, where by the end of 2022 all boilers, fireplaces and stoves that do not meet the emission standards must be replaced.

Particulate matter, nitrogen dioxide and ground-level ozone, are now generally recognised as the three pollutants that most significantly affect human health. Long-term and peak exposures to these pollutants range in severity of impact, from impairing the respiratory system to premature death. Around 90 % of city dwellers in Europe are exposed to pollutants at concentrations higher than the air quality levels deemed harmful to health. For example, fine particulate matter (PM2.5) in air has been estimated to reduce life expectancy in the EU by more than eight months. Benzo(a)pyrene is a carcinogenic pollutant of increasing concern, with concentrations being above the threshold set to protect human health in several areas, especially in central and Eastern Europe.

European Environmental Agency is one of the institution European Union which is measuring how different countries meet allowable and target levels of pollutants. EU to the future wants to achieve levels of air quality that do not give rise to significant negative impacts on, and risks to, human health and the environment. Air pollution also can damage vegetation and ecosystems. It leads to several important

environmental impacts, which affect vegetation and fauna directly, as well as the quality of water and soil, and the ecosystem services they support. Protection of air pollution is matter of everyone.

3. Our ideas - What can be done? - slide 4

We remember the main sources of air pollution and we understand that we cannot do much about natural sources, but we could all of us work on solutions to lower down the sources we can control. Now the teacher asks once more: What can authorities do to improve air quality? To do this exercise the teacher can have written in different colored sheets the following common solutions of cities/municipalities to fight against air pollution:

1. Coal and biomass quality standards as bad combustion leads to more pollution;
2. Promotion/Obligation to replace old boilers by new modern and air-friendly heating systems;
3. Introduction of low emission zones in cities with heavy car traffic. Air pollution by motor vehicle exhaust emissions is a major health problem, especially in the summer;
4. Control of open air fires in the agriculture and uncontrolled waste management practices;
5. Solutions that will allow for better control of emissions from industrial facilities;
6. Support for the poorest citizens in the process of heating system replacement and thermal renovation of houses;
7. Introduction of soft loan programs and tax incentives to encourage the non-poor to replace their air polluting heating systems and conduct thermal retrofits of their houses;
8. Lowering smog alert thresholds;
9. Information to citizens, and network of meters;
10. Use of a planning tool for vulnerable groups to decide on location of schools as a function of NO2 concentration levels;
11. Greening the city;

4. Oxford debate/Role play - slide 5

Required materials: printed small cards with inscriptions: police, residents, parents with children, miners, doctors, the mayor of the city and officials. The room in which the debate takes place can be organized according to need, i.e. into round table.

Description of a game:

a) Teacher is in the role of moderator who is suppose to watch over time and order of the debate. He/she introduces students to the principles of the debate.

b) In oxford debate it is prohibited to insult or ridicule speakers of the opposite party. There is a thesis related to air pollution which is going to be debated. The task is to discuss the thesis and come to an agreed conclusion in the end. Examples of proposed these can be found below.
c) Everyone will be assigned a specific role that must be embodied. Teenagers draw one of the cards by which they choose their role in the debate. Then, the groups are created: miners, residents, parents with children, police, doctors, the mayor and officials.
d) Since there is limited amount of time in the class, it is preferable if teacher can inform scholars few days prior to the debate. Students will have time to discuss their arguments in groups, search information online if needed. In this way, time will be saved as they are already prepared.
e) The moderator gives the floor to each group in turn. The groups choose whether they agree with the thesis or are in opposition to it and present their arguments (in accordance with the characteristics of the group). In case of problems, teacher directs the debate to the appropriate track: parents with children should worry about the health of the kids, the inhabitants have doubts about the financing of new heating, the mayor and officials propose new solutions: co-financing and so on.
f) The final part of the debate is voting. All groups shall reach some decision together. They may debate it or vote by raising their hands.
g) In the end, the moderator summarizes the debate and emphasizes important statements that have appeared in discussion. It is very important that after the debate teacher appropriately summarizes its course and presents the conclusions: he/she reminds and emphasizes the most important statements and possibly corrects those that were not true. He/she also points out to remember how important it is to talk about air pollution, its causes, effects and, above all, solutions that can contribute to improving its quality.

Proposed theses (slide 6):

The first thesis: In our village/town, there should be complete ban on burning coal and wood. More ecological alternatives should be introduced instead.

The second thesis: The fight against contaminated air is expensive. It will be better if the authorities buy residents anti-smog masks, air purifiers rather than fight the causes of air pollution.

The third thesis: Local factory is polluting air very much, it should be closed by the authorities.

5. Reflexion - slide 7

Teacher might use simple pair-share reflexion. Students are paired and then they verbally share something they remember from the lecture in order to review what they have just heard. This is a good tool for teacher to assess students´ understanding of the topic and plan further lessons. Teacher can then ask some of the pairs what they discussed.

6. Additional Activity - Taking Action

Writing a letter

In this activity, students will apply their knowledge on air pollution and air protection by writing a formal letter directed to local municipality, state representatives, local factory managers, their school director and so on. The purpose of the letter is to gain information on local problems of air pollution and suggest possible solutions and regulations to improve the situation. With this exercise, scholars also improve writing skills and realize how they personally can be involved in problem solving of air pollution.

The teacher completes the lesson by showing slide 8.