



„Solution for clean air environment” - lesson plan

Duration	1 hour
Age	10 - 14
Type of classes	didactic and educational activities
Goals	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● printed puzzle exercise, printed text to read

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. Puzzle exercise

Teacher distributes paper with exercise below (and shows slide 2 and 3). Students are supposed to connect concept with adequate definition. When they finish their work, teacher check with them correct answers and he/she makes sure scholars understand it.

Concepts:

- Fossil fuels
- Sources of pollution
- Renewable energy sources
- Filters, catalysators
- Low emission zones
- Energy efficiency



- g) Improved waste management
- h) Ministry of environment
- i) Laws and regulation
- j) Emission standard

Definitions:

- areas where most polluting vehicles are regulated (usually in larger cities)
- energy coming from sun, wind, water, biomass
- policies that control air pollution on national and international level
- factories, chimneys, incineration plants, exhaust fumes, power stations
- instead of burning waste, it is recycled or reused
- tools for air protection
- legal requirements governing air pollutants released into the atmosphere
- central state body for environment protection, including air
- natural materials like coal, oil, gas; its burning pollutes the air
- energy is saved by thermal insulation or greener household appliances

Correct answers (slide 4):

- a) Fossil fuels – natural materials like coal, oil, gas; its burning pollutes the air
- b) Sources of pollution – factories, chimneys, incineration plants, exhaust fumes, power stations
- c) Renewable energy sources – energy coming from sun, wind, water, biomass
- d) Filters, catalysators – tools for air protection
- e) Low emission zones – areas where most polluting vehicles are regulated (usually in larger cities)
- f) Energy efficiency – energy is saved by thermal insulation or greener household appliances
- g) Improved waste management – instead of burning waste, it is recycled or reused
- h) Ministry of environment – central state body for environment protection, including air
- i) Laws and regulation – policies that control air pollution on national and international level
- j) Emission standard – legal requirements governing air pollutants released into the atmosphere

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

Each student gets a 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 5 and 6)

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, PM_{2.5}). 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 Małopolska, 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 (PM_{2.5}) 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?

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 (slide 7):

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. Film screening

Teacher displays this short video: <https://www.youtube.com/watch?v=yMnniiRuh2A> (slide 8). It shows how EU's LIFE programme supports initiatives to improve air quality across the European Union on three examples from different countries. If there is remaining time, teacher discuss with students the content of



the video, whether they heard about these solutions before or whether they know any other ways how to improve air quality and protect air in Europe and in their country/region/village. If preferable teacher may use different video that also displays possible solutions to air pollution in Europe, for instance with good practices from their own country.

4. Reflexion

In order to revise, game with a dice is used. Depending on the number of pupils, they are divided into pairs or small groups. First student cast a dice and answer the question according to a number thrown (slide 9). Subsequently, another scholar is playing. Ideally, every group shall answer all the questions .

1. Describe – What measures do you know about air protection in your country?
2. Compare – what is it like, similar theme? What else must be protected similarly like air?
3. Associate – what does come to your mind when you hear air protection? (5-10 words)
4. Analyse – why is it existing, why has it been established?
5. Apply – what can you personally do to protect it?
6. Argue – for and against burning of the coal (pupil who casts a dice chooses which side he/she wants to defend; the rest of the group tries to disprove his/her arguments.)

5. Additional Activity - Taking Action

Creation of presentation

Students can apply their understanding of air pollution and air protection by creating an informational presentation about this topic in small groups. Presentation may be presented in the class in the form of science forum in school to inform teachers and pupils from other classes. In this way, students will revise their knowledge, enhance creativity and presentation skills and help to raise awareness on this issue.

The teacher completes the lesson by showing slide 10.

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