Global education module

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TITLE:	Agrofuels – should we produce fuel?
AGE GROUP:	12+
SUBJECTS:	geography, biology, chemistry, economics, mathematics, ethics
TIME REQUIRED:	45 minutes

Agrofuels – should we produce fuel?

the aim of the exercise:

- to sensitize students to the topic of responsible agriculture
- to become acquinted with the economic and social aspects of sustainability
- to understand the following concepts: agrofuel, biodiesel

related subjects: geography, biology, chemistry, economics, mathematics, ethics
age group: 12+
number of participants: 10-30 people
tools: photocopied texts
time required: 45 minutes
Description of the exercise:
The facilitator divides the group into smaller groups (3-6 students) and distributes the text on agrofuels (Appendix 1) to each group.
Instruction: "*Biodiesel (or agrodiesel) is one of the two kinds of agrofuels. What do you think of agrofuels? Are they a good or a bad solution? Why? Write your answers on the poster.*"
After the groups have written down their answers, they share them with each other. Then they get a new instruction:
Instruction: "Do the maths:"
A 100 m^2 plot yields 65 kg wheat per year, from which:
(1) 65 kilos of bread,
(2) 21 kilos of pork (if pigs are fed with wheat),
(3) or 17 litres of biofuel can be produced, which is enough to drive for 233 km.
If we distribute these amounts evenly throughout the year, how much can we consume of these products per day?"
Second question:
"The above quantities cover how many percent of our daily need if an average Hungarian consumer eats 135 grams of bread, 170 grams of meat and uses fuel enough to drive 27 km per day?"

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After doing the calculation, participants discuss the results. (The correct answers are: on a 100 m^2 plot, 137 % of our daily need of bread, 21 % of our daily need of meat and 25 % of our daily need of fuel can be produced.)

After announcing/reviewing the results, the facilitator distributes the texts on the negative consequences of agrofuels to the groups. After they finish reading the text, he or she gives a new instruction to participants:

"Based on this new information, do you think it is worthwhile to use arable lands for biofuel production?

Discuss your thoughts in the group and write them down on the poster."

Following the exercise, groups share their thoughts with each other.

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The European Union is made up of 28 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance and individual freedoms. The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders.

Appendix 1

What is biodiesel?

Biodiesel is a type of non-toxic, biodegradable fuel, which is made of raw vegetable oil, recycled edible vegetable oil, recycled edible animal fat, and the oil which is the side product of paper and cellulose production. Compared to traditional petrodiesels, biodiesel is more flammable, has higher cetane ratings, and produces less GHGs, which in turn result in climate change. Biodiesel blends (a mixture of biodiesel and petrodiesel) can be used in any diesel engine. Biodiesel viscosity becomes higher at low temperatures, which is especially striking in blends containing higher amounts of biodiesel. In order to avoid high viscosity, the composition of the biodiesel blend has to be changed. Research is still going on as to how to reduce biofuel production costs and how to solve the problem of high viscosity at low temperatures.

Environmental advantages

During the combustion of biodiesel, the emission of greenhouse gases into the atmosphere is lower than in the case of traditional petrodiesel. The blend made with 20 % of biodiesel (B 20) emits 12-18 % less pollutants while the 2 % blend (B 2) emits 1-2 % less. During the entire process, from crop cultivation through the collection of animal fat until fuel production, pure biodiesel emits 60-100 % less GHGs into the atmosphere, depending on the base material. Biodiesel can be produced from certain wastes, which also contributes to the reduction of GHG emissions, as the decomposition of waste would also produce methane.

Social and economic advantages

Biodiesel can be made from local, renewable sources, such as agricultural and food industry by-products (slaughterhouse waste, recycled cooking oil, inedible oils, excess crop). This means recycling substances formerly classified as waste, which can create new markets for the local industry and reduces waste management costs.

AVANTAGES OF BIODIESEL:

- Biodiesel reduces the greenhouse effect. During the combustion of biodiesel, the same amount of carbon-dioxide is emitted, and then is absorbed back into the plants through photosynthesis, as was initially absorbed by the plants used to produce the biodiesel (closed carbon cycle).
- The energy balance of biodiesel is positive. Much more energy is produced through biofuel production than is used by the process. Depending on the substances used, one litre of biodiesel can produce as much as six times more energy than the amount needed for its production.
- Biodiesel does not contain phosphorus, which contributes to acid rain.
- During the combustion of biodiesel, considerably less carbon-monoxide, ash and hydrocarbon are emitted into the air than in the case of carbon-based fuel.
- Biodiesel does not contain benzene or any other aryl compounds.
- Biodiesel is non-toxic and non-hazardous.
- Biodiesel naturally degrades in 30 days; therefore, it is completely suitable for use in protected waters, ski areas, etc.
- Biodiesel will remain an important fuel source. As a renewable energy source, it protects the environment and reduces our dependence on crude oil.

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- The flash point of biodiesel is 150°C, which makes it one of the world's safest fuels. The high flash point is especially important during transporting and storage.
- Biodiesel is a good lubricant which protects the engines against mechanic stress.

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Appendix 2

What are agrofuels?

Agrofuels are fuels made of non-fossil vegetable oils. There are two types of agrofuels:

- Fuels that mainly contain ethanol (alcohol) can be used in petrol combustion engines. They are made by fermenting and distilling plants rich in carbohydrates (starch and sugar), such as sugar beet, sugarcane, wheat, and maize.
- Agrodiesels, made by extracting oil from the reproductive parts (seeds) of plants (rapeseed, sunflower, palm, soybean), and generally used in diesel engines; these oils are chemically processed to become similar to petrodiesel fuels.

Agrofuels are also called biofuels, despite the fact that the substances used for its production have nothing to do with organic farming.

Who uses agrofuels?

In the EU, agrofuels are massively used, mixed to traditional fossil fuels. According to the agrofuel quotas of the EU, by the end of 2010, 5.75 % of the total fuel consumption has to come from agrofuels. By 2020, this ratio must be at least 10 % in each member state. The provision increases the demand for crops suitable for agrofuel production world-wide.

Why do we use agrofuels?

- The demand for fossil fuels in industrially developed and developing countries is constantly increasing. The growing demand may raise fuel prices.
- The amount of fossil fuels is limited. Fossil fuel reserves will be depleted in a few decades. On the long term, fuel prices will certainly rise; therefore we need alternatives.
- Agrofuels seem an environmental-friendly solution as they are produced from renewable sources. This is the official explanation, but reality is far more complicated.

Where do "our" agrofuels come from?

The EU is unable to meet its agrofuel demand from domestic sources, therefore it depends on imports. Theoretically, two thirds of the EU's arable lands would be needed to cultivate crops from which agrofuels could be produced, in order for the EU to become self-sufficient. As a result of the growing European demand for agrofuels, third-world countries increase their agrofuel production. This may lead to problems in food supply in these countries, because instead of producing food, they concentrate on manufacturing agrofuels.

The biggest agrofuel exporters are Brazil (made from sugar beet) and Indonesia (made from palm oil). In these countries, huge areas of tropical rain forests are deforested and converted to cultivate crops suitable for biofuel production each year. Deforestation is supported by the European Union with financial and technological aids. Until 2001 the EU spent more than 10 billion Euros for that purpose. Without this money, production would have been loss-making in many cases.

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Brazil is currently cultivating crops suitable for agrofuel production on 6 million hectares. According to the plans, this number would increase to 30 million in the near future, and the final goal could be as much as 120 million hectare. Between 1985 and 1996, 5 million people were forced to leave their homes because their lands were appropriated for soy and sugarcane cultivation. 80 % of the Brazilian CO2 emissions is a result of the deforestation effected in order to produce agrofuels.

The suituation in South-East Asia is quite similar. As a result of forest burning for the sake of palm oil production, Indonesia has become the world's fourth biggest emitter of carbon-dioxide. More and more people are threatened by famine because food is produced on less land, resulting in higher prices. According to certain sources, in the next 20 years agrofuel production will be the main culprit for the ever increasing famine in the world.

This was a statement made by the European Environment Agency (EEA, 2008) in its expert's report sent to the European Committee. The report argued against the EU raising the agrofuel quota to 10 % by 2020. Increasing the production of agrofuels will be harmful both to the environment and to people's lives. It will cause irreversible changes in biodiversity and it will threaten water reserves and arable lands.

Adding fuel to the fire?

It is also important to note that although transport is responsible for 14 % of total carbon-dioxide emissions, large-scale industrial agriculture involves the same amount of CO2 emissions. If we add to this the harmful emissions resulting from spatial planning (primarily deforestation), we can conclude that industrial farming contributes the most to global warming. It is paradoxical though that biofuels are still promoted as a possible means to reduce global warming.

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