

# ENVIRONMENT



Management of environment:

What are the different approaches in partner regions?

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## Introduction

Climate change and pollution of the air, water and soil we are living on and eating/drinking from, are more than ever topics with high urgency drawing our attention. Jointly conducting research to the problems at hand threatening our environment will highlight this issue and its urgency, thus mobilizing awareness for it.

The following survey is the result of our investigations into the environmental circumstances, the laws surrounding this issue and the social and economical context of environmental change in the participating EU member countries. These investigations were undertaken by the five schools collaborating in our TIE project and focused on four different subtopics:

1. Energy
2. Water
3. Garbage
4. Global warming

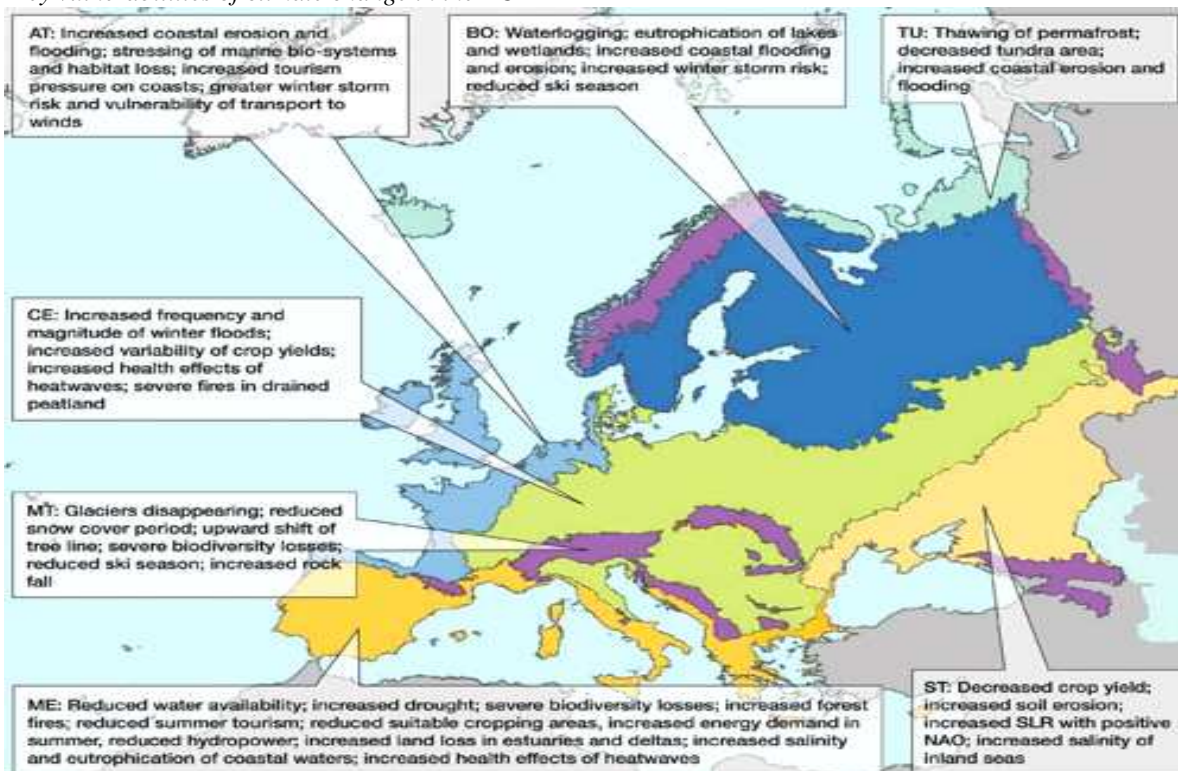
We addressed these subtopics by putting forward questionnaires in order to properly compare the environmental 'state of affairs' in the partner countries.

After gathering the results we could draw general conclusions based on some remarkable differences and similarities.

Moreover, we discussed our findings in common assemblies to enable better understanding of the recent problems and allow more critical analysis of measurements taken by authorities.

All in all, working on the topic 'Environment' clarified our view on the somewhat technical and abstract problems involving this issue and helped us to think about future solutions to a matter concerning each and every world citizen.

### *Key vulnerabilities of climate change in the EU*



Source: ECDC

# Energy

## Introduction

In this topic we compared our different partner countries (Germany, Poland, Lithuania and Italy) about our energy topic. When we talk about this, you might think on things like energy markets, pollution, the role of the government, etc. These are nowadays one of the most important energy subtopics in the European Union. We tried to describe these processes and compared the differences and similarities among these states. So we figured out how and what are the main situations in the countries of our partner schools.

### Concerning energy markets:

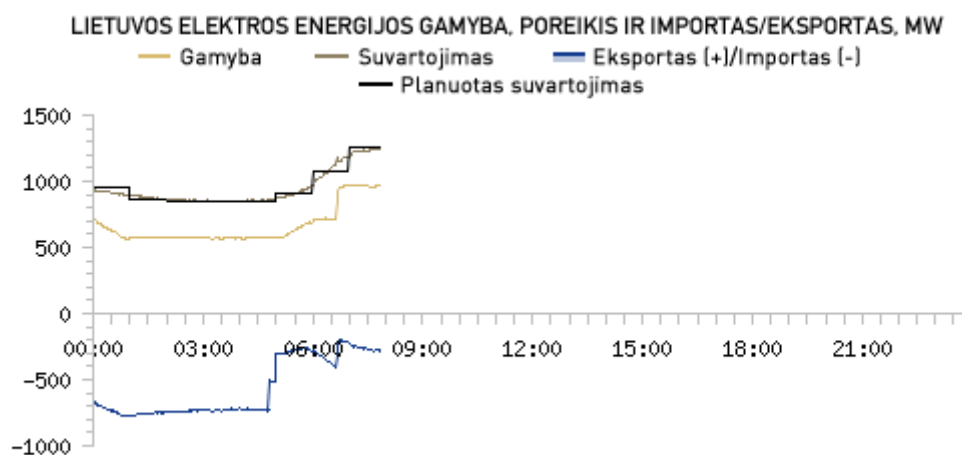
Privatizing and globalization are dominating our European energy market. Since the European Union decided one common energy market is a main target, countries are developing together one energy market. As we researched the answers of our partner schools, we found out that nowadays every country in the European Union has an open energy market. However, governments are still trying to improve energy quality and take protectoral measures for end consumers; this is also one of the goals that is maintained by the Italian government. Lithuania and Poland were the last countries that decided to open their energy markets in 2007. Most big problems disappeared when governments privatized their energy markets, though in Germany there are still some problems. In this biggest economy of Europe, we have four big suppliers that rule the biggest part of this market. Because of this, the German energy market isn't that open-minded and it's hard to understand how it works. Because of the European integration, differences among our partner countries disappeared more and more. Summarized, the all-in-one privatization helps the European integration a lot. Let's work to one European energy market!

### Concerning energy sources:

All partner countries use similar energy sources. Though, there are differences in the usage of energy. All countries need oil, gas, coal. These sources are most-used. While researching this subject, we surprisingly saw that Lithuania uses a lot of wood and natural gasses. The reason for this is that Lithuania has a lot of forests and it's exceptionally that this country uses national gas. Of course, every country uses this kind of gas, but Lithuania definitely is an exception in this way. All countries do improve their usage of renewable energy sources (for example the ingenious usage of waterpower in Italy), but we tell more about this later. Within the EU, there is a Baltic energy cooperation called BALTSO (Foundation of Estonian, Latvian and Lithuanian Transmission Systems Cooperation and Organization). Perhaps this is the beginning of one European energy era.

## Concerning fossil fuels:

The governments of every country of our partner schools are increasing their alternative energy sources and they want to reduce the expiring and usage of fossil fuels. The reason for this is that our earth is heating and that we think it's our last chance now to stop this harmful process. If we want to be stronger (and competitive as well), we have to rescue our environment in a European way. The Lithuanian delegation got an interesting table about their energy production:



*Gamyba: stands for the electric energy produced in Lithuania*

*Suvartojimas: stands for the consumption of electricity*

*Eksportas: stands for the part which is delivered to the European partners*

*Importas: stands for the part of the electricity Lithuania is buying from European partners*

For example in Germany, the price of one megawatt-hour increased with more than 200% in the period 2000-2008. Happily, the German government already decided to increase the budget for renewable energy sources. Lithuania hasn't big problems with expiring fossil fuels, simply because this country doesn't have a lot of this. Poland however has big problems with these fuels because Poland is a big supplier of this. Now we maybe can help Poland to improve and research the quality of renewable energy sources. The Netherlands for example have a big windmill park in the North Sea. Luckily this country also improved the usage of alternative sources. Italy is lucky: this country has an average year temperature that is higher than in the rest of the European Union. If we take this into consideration, we can conclude that Italy doesn't need that much expiring energy sources because they can use alternative sources in an easier way. For example: Italians need less energy to warm their houses.

## Concerning strengths/weaknesses of energy sources

We have to understand that every energy source has its pros and cons. Beneath you can see some mainly used sources in the European Union (so also in our partner countries) with their pros and cons:

Natural gas:

Pros:

1. It is a cheap fuel
2. The Netherlands are in possession of natural gas sources
3. The emission of natural gas is less high than the emission of substances like crude oil.

Cons:

1. By the use of it substances are released that will lead to Climate change (CO<sup>2</sup>)
2. The sources that are available will be exhausted within 60 years.
3. The price of natural gas can raise because of the scarcity that is going to exist.

Oil:

Pros:

1. It is suitable for many applications
2. It is a cheap fuel
3. There are still lots of stocks available

Cons:

1. By the use of crude oil, many substances are released that lead to climate change.
2. The emission is two times as high as the emission from natural gas
3. The price of crude oil can raise because of the scarcity that is going to exist.
4. The dependency on countries outside Europe is great, so the price may vary a lot.

Nuclear power:

Pros:

1. No CO<sub>2</sub> emission
2. Cheap, but it is a point of discussion: The price for Nuclear power depends on what you take into consideration. When you take only the fuel, it's cheap. It isn't when you take the costs of the storage of the waste, the costs of the construction and demolishing of the plant and the risks of accidents into consideration.

Cons:

1. Waste problem (no safe solution for long time storage, no sustainability)
2. Price, see Pros
3. Danger of accidents

Wood:

Pros:

1. Cheap
2. Low pollution

Cons:

1. Cutting of forest leads to destruction of natural habitat, a strict replant is needed.

Coal:

Pros:

1. Coal can be found in lots of places in the world
2. Cheap

Cons:

1. Pollution, like greenhouse gasses
2. The sources that are available will be exhausted within years and the way to get the coal will be difficult, so the price of the coal will rise.

Wind Energy:

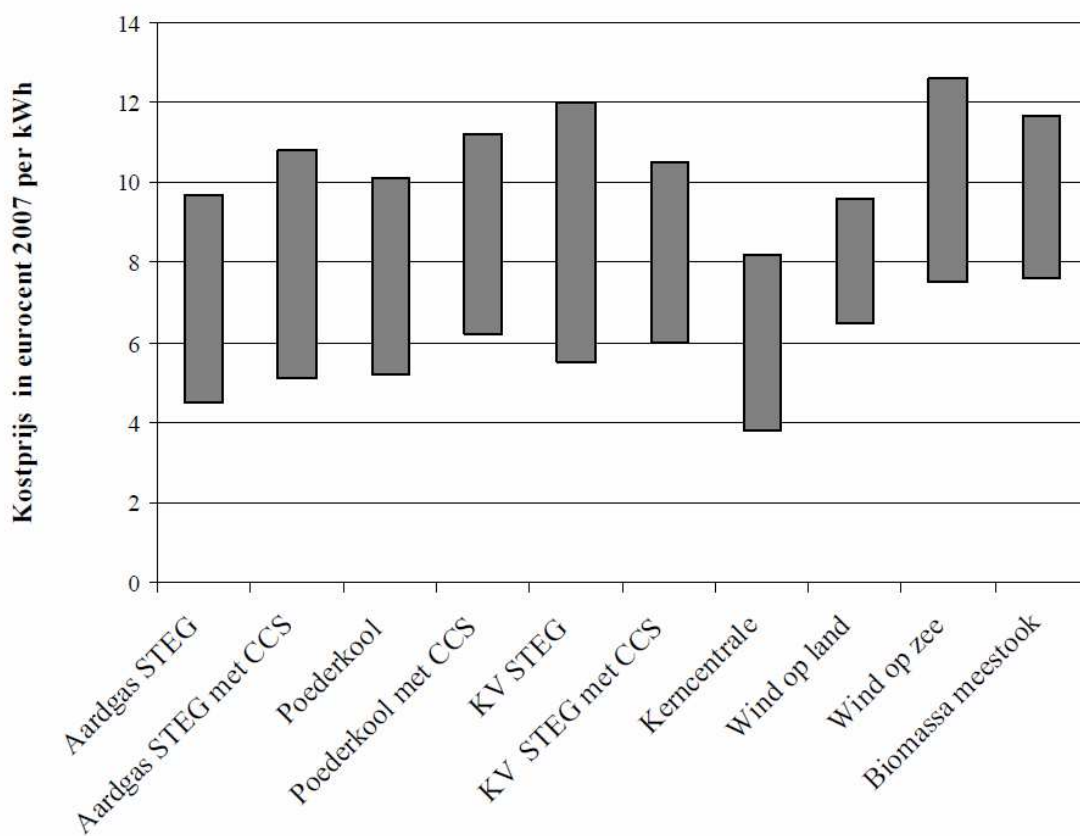
Pros:

1. Environment friendly
2. No emissions

Cons:

1. Expensive
2. No steady production, another power plant needs to run by to produce energy when the mills don't

The ECN (Energy research Centre) in the Netherlands has compared the different kinds of Energy. In the chart here you can see the different of the costs.



Aardgas = Natural gas

Wind = wind turbine

Poederkool = Coal

KV = Oilplant

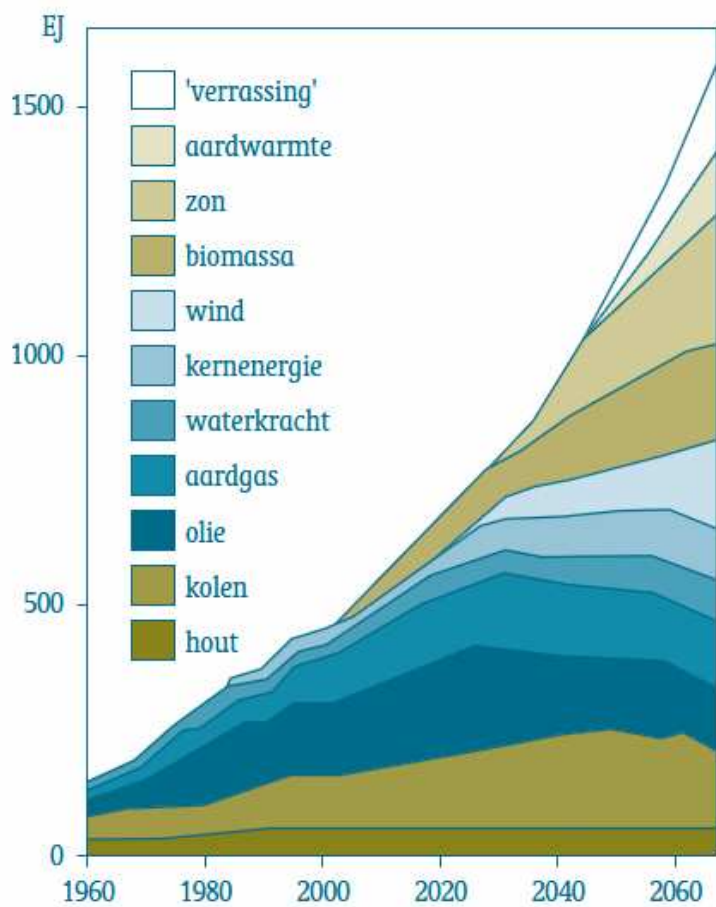
Kerncentrale = Nuclear power

Biomassa = Biomass

In the chart they give a range of the price what the costs are for producing 1 kWh. This chart is made in 2007. For natural gas, Coal and Oil plants they give two possibilities, with and without CCS. By CCS they take the costs of caching and storing the CO2 in the price. The Biomass is a way of producing energy by taking biomass into a coal-plant.

In this chart you can see that 1 KWh for example by natural gas will cost between 4,3 and 9,8 eurocent.

Shell, one of the leaders in the world of producing oil, has made a prognosis of the use of the different kinds of energy, see the chart below:



- Verrassing* = *Surprise*
- Aardwarmte* = *Geothermal*
- Zon* = *Sun*
- Biomassa* = *Biomass*
- Wind* = *Wind*
- Kernenergie* = *Nuclear plant*
- Waterkracht* = *Hydropower*
- Aardgas* = *Natural gas*
- Olie* = *Oil*
- Kolen* = *Coal*
- Hout* = *Wood*

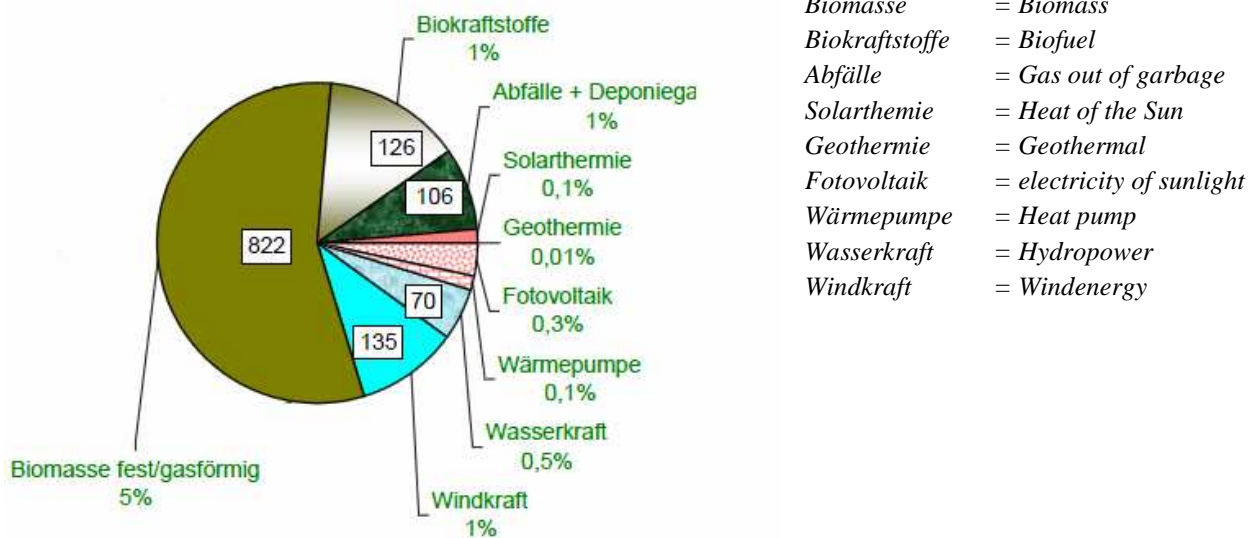
You can see the consumption of energy will rise very quickly and the part of the alternative sources will rise. Shell accepts also a new form of energy, the part called surprise or 'verrassing'.

## Concerning alternative energy sources

In all the countries of our partner schools both the government and private companies do invest in alternative energy sources, like wind- and solar energy. In most of the cases the government takes a leading position in developing alternative energy sources, for example investing money and doing research. NGO's also play an important role in this process (for example: Greenpeace, WWF). They lobby for better environmental circumstances and more research by government organizations. They also do a lot by themselves (for example: taking action against polluting companies).

As we said before luckily in every partner country renewable energy use is being stimulated by NGO's and politics. In Poland for example several projects have been started to build wind turbines and so stimulate renewable energy sources.

Also in Germany the part of the alternative energy is rising quick. In 2007 this part was 5%, in 2010 it was already 9%. The biggest part in Germany of the alternative energy sources is the biomass. In the chart below, you can see how the 9% of Germany was made:



|                       |                           |
|-----------------------|---------------------------|
| <i>Biomasse</i>       | = Biomass                 |
| <i>Biokraftstoffe</i> | = Biofuel                 |
| <i>Abfälle</i>        | = Gas out of garbage      |
| <i>Solarthermie</i>   | = Heat of the Sun         |
| <i>Geothermie</i>     | = Geothermal              |
| <i>Fotovoltaik</i>    | = electricity of sunlight |
| <i>Wärmepumpe</i>     | = Heat pump               |
| <i>Wasserkraft</i>    | = Hydropower              |
| <i>Windkraft</i>      | = Windenergy              |

Obvious is that NGO's paid earlier attention on environmental problems than the government did. Especially in Germany this is being recognized.

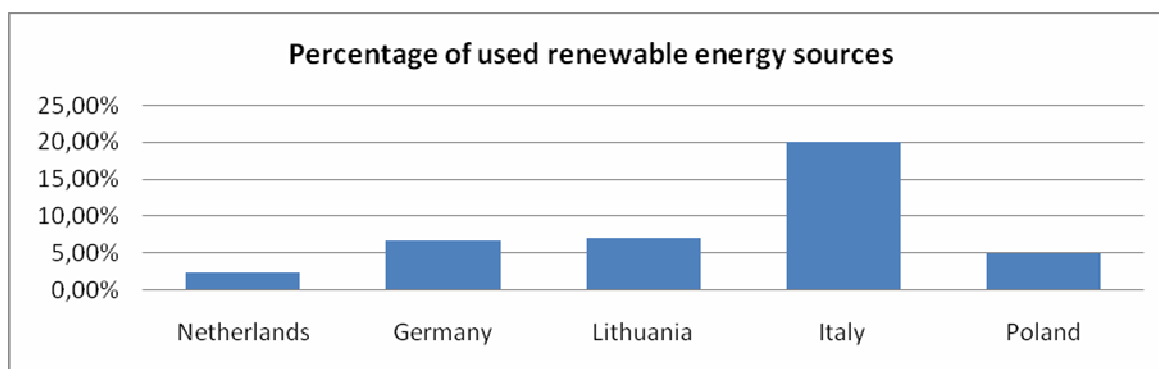
Concluded we may say that every European country is on the right way. Maybe the European Union can take action so that these stimulating measures are more efficient and effective, because environmental problems don't stop at borders.

## Concerning penalties/taxes about energy:

In the Netherlands you simply have to pay more taxes when you pollute more. This is a simple, but effective system. This is not only being ruled in the Netherlands, also in a country like Lithuania. An effective rule in Italy is that you have a maximum amount of heating energy use per day. If you reach this maximum point, you can't get warm your house or building any longer.

We already have a European system concerning this subject. Companies can trade so called 'emission rights'. This means that they can 'buy' more rights to pollute more. If they need less energy, they can sell it to other companies who just need to produce more. This is an important joint-venture between European private-company life and the European Union itself.

## Concerning usage of renewable energy sources:



For our research we asked the partners to give us the percentage of used renewable energy. We decided to take the percentages of 2007. They were available in every county.

As you can see this is one of the few topics that show big differences. What is the reason for this? First of all every country stimulates the usage of renewable energy (European Union also supports this), but unfortunately this doesn't mean that national people directly do what their government wants. What you directly see, is the high percentage in Italy. Italy is a relative warm country so it doesn't heat buildings and houses that much as in the other European countries. Secondly the higher percentage in Germany is because the German government invests relatively more than an average European budget in climate change, pollution, alternative energy sources etc. The Netherlands are busy at the moment with building windmill parks and giving subsidies to companies that use renewable energy sources. We expect that the Dutch number (2,4%) will increase the next years.

In Germany, as we saw earlier, it also has increased.

As we see these differences, Italy is a good example. People need to pay more attention on environmental issues. It can (it already does) harm their own life circumstances.

## Conclusion:

As you can read, all countries are on the right way. But we still need to fight climate change and pollution. The only solution for this is working together in a European Union that becomes more important for all of us. As we said, problems and the usage of energy don't stop at borders. We hope that more and more people understand that this energy topic is a process that affects all of us.

## **water**

How much water does one person use per day in your country?

*Answer Germany:*

- Ca. 130 liter
- 42l toilet
- 39l shower, bath
- 18l washing machine
- 8l personal hygiene
- 8l dishwasher
- 7l flowers, garden
- 4l cleaning
- 4l cooking, drinking
- 2l car washing

*Answer Poland:*

Average consuming water in Poland is 203 litres per capita per day (in Gorzow 150 l per capita per day)

*Answer Netherlands:*

In the Netherlands, one person uses per day an estimation of 126 liter water.

*Answer Lithuania:*

20 years ago one person consumed 250 liters of water, but in recent years - only about 82 liters.

*Answer Italy:*

In Italy one person uses about 293 litres water per day.

*Analysis*

The people in Lithuania use the least water of all the countries. They use about 82 liters water. The people in Italy use the most water of all countries. They use about 293 liters a day. The temperature in Italy is higher than in other countries, so they use more water. In Poland they use 203 litres a day per person and in the Netherlands 126 liters.

What is the average price of one m<sup>3</sup> water?

*Answer Germany:*

There are regional differences  
1,50€ - 2,70€ plus 2,40€ waste water charges

*Answer Poland:*

5zł 22gr (1.34 €)

*Answer Netherlands:*

One m<sup>3</sup> water costs €1,36

*Answer Italy:*

The average price of one m<sup>3</sup> water is 0,40 €.

*Analysis*

In Italy the price of one m<sup>3</sup> water is the cheapest of all the countries. In Germany the water price is the most expensive. These prices are from the tap. In parts of Italy you can't drink water from the tap. So you have to buy bottles of water. So the prices are also cheaper, because water is dirty. In other countries the government cleans the water, and that costs money. So the prices are also higher.

Where does the drinking water come from?

*Answer Germany:*

70% ground water

Spring water

Rivers

Lakes

Barrages

*Answer Poland:*

About 50% of drinking water drunk in Poland comes from surface waters e.g. rivers and lakes and the same amount from groundwater.

*Answer Netherlands:*

Two-third of our drinking water comes out of the ground; the other water comes from surface water like rivers and lakes.

*Answer Italy:*

The drinking water, in Italy, comes from the head of the rivers that flow up from the Italian mountains or out of grounds.

*Analysis*

For all countries is it the same. Most from the drinking water comes out of the ground and from lakes and rivers. It is the easiest and the most advantageous way to get water.

What are the quality demands for the drinking water and what laws do you have for the quality of water?

*Answer Germany:*

- *Water has to be free of materials which are not of natural origin*
- *It has to be marked by its natural percentage of minerals and micronutrients*
- *The percentage of unwanted natural materials must not overstep certain limits*  
→ § 6 Abs. 2 TrinkwV
- *Filling station has to be equal with the place, where the water comes from*

*Answer Netherlands:*

The water companies take water samples daily to ensure the water quality. We have the Water supply law and the Water supply decree. These two laws are going to be replaced by the Drinking water law and the Drinking water decree in the spring of 2010. These two laws include the allowed amount of 65 substances in the drinking water.

For example:

- nitrate: < 50 µg (but normally includes only 25 µg in Holland)
- lead: < 10 µg (but normally includes only 1 µg in Holland)
- fluorine: not allowed
- chlorine: < 1,1 µg (but normally includes only 0,1 µg in Holland)”

Answer Italy:

Italian drinking water is a bit dirty or not so high quality. In Italy new laws have recently been introduced to protect waters and aquatic ecosystems. Essentially, these laws aim at preventing water pollution and recovering polluted aquatic environments, to assure all possible uses of water and the survival of aquatic animal and plant communities. Tuscany Regional Administration commissioned the A.R.P.A.T. (Provincial Agency for Environmental Protection) to monitor water bodies in order to classify their quality and to evaluate the most suitable steps to reach the quality standards according to the new law. This thesis reports laboratory and field activities at the ARPAT of Siena in the framework of preliminary steps of water body monitoring and classification. In particular, technical procedures for the assessment of physic-chemical and microbiological parameters of aquatic ecosystems are presented.

*Analysis*

In Germany and in The Netherlands it is almost the same. Every country has its own requirements for the quality of water. In Germany and the Netherlands the drinking water shouldn't include some kind of materials and minerals. And for the Netherlands there are 2 laws, which include the allowed amount of 65 substances in the drinking water: the Water supply law and the Water supply decree. In Italy the drinking water has not a high quality. There they have new laws to protect water and aquatic ecosystems and these laws aim is to improve the water quality.

Is there any water pollution, like the discharge of cooling-water or filthy water from factories? If yes, does it cause problems? (for example: for flora & fauna, for the fishery)

*Answer Germany:*

- Agriculture contaminates drinking water with herbicides, pesticides and fungicides
- Industrial waste water is discharged in rivers  
→ Dead waters, even if the number has decreased
- Law: §324 StGB: people who pollute water will be punished with imprisonment up to 5 years or with fine

*Answer Poland:*

The state of surface waters in Poland was undergoing constant deterioration.

The quality of the waters is described on the basis of analysis of physiochemical and biological features e.g. the temperature, taste-, rate, hardness, cloudiness and demand for oxygen.

The water is classified in one of the 3 classes of cleanliness.

- First class – water is clean, being suitable for consumption, use in the food industry, pharmaceutical use. In the first class the amount of oxygen is equal to the normal situation. The quantity of the bacteria is below 10000 per cm<sup>3</sup> at the bottom of the container.
- Second class – is moderate water which is possible to be used for the animals. The content of oxygen is reaching the half satiation. The number of bacteria is rating out below 100000 per cm<sup>3</sup>.
- Third class - is water which is possible to exploit in the industry and agriculture where the lack of oxygen is no problem. The quality of this water consists in an amount of bacteria which exceeds 100000 per cm<sup>3</sup>.

Water which is polluted but not can be classified in the above classification is called polluted water. (In Poland in 2005, 57% of surface waters is excessively polluted and could not be classified).

To increase the quality of the surface water, the government makes it difficult for the industry to use and pollute water. This industrial water will be recycled on mechanical, chemical or biological ways

*Answer Netherlands:*

Yes, there is pollution. The Netherlands have a lot of water coming from all sides. We have problems with water pollution that had evolved in other countries. The rivers take the polluted water to the Netherlands and cause drinking water problems, fish die and water birds who eat the fish are threatened. Another problem is the excessive use of manure. Because of excessive use of nitrate-rich manure in agriculture during previous decennia, large quantities of nitrate have leached trough the soil to the groundwater. Nitrate pollution poses serious problems, especially for the water supply companies, amongst others because of heavy metals mixing with water.

We don't have pollution from waste water. The Netherlands are one of the first countries who developed a legislation designed to protect surface waters. Now, all the waste water has to be treated before it returns to the natural water system.

*Answer Italy:*

In Italy water pollution has incredibly increased, rivers and the Mediterranean Sea are contaminated by the discharge from factories and from citizens but also from agriculture. Water pollution affects plants and organisms living in these bodies of water, the effects are damaging individual species but also the natural biological communities. Contaminants may include organic substances such as detergents, food processing, insecticides and herbicides and inorganic substances such as acidity caused by industrial discharges, chemical waste, heavy metals...

### *Analysis*

In all countries, water pollution is caused by agriculture and in Germany and Italy also by the discharge of filthy water from factories. Especially The Netherlands have problems with polluted rivers, evolved in another country.

What does the government do to make people moderate the use of water?

#### *Answer Germany:*

- No laws, just recommendations/ appeals to go easy with the use of water
- Maybe the waste water charges make the people being moderate
- People get lots of information about the scarcity and the worthiness of water

#### *Answer Poland:*

People need to save through the use of equipment for energy-efficient, such as dishwashers, washing machines, and after the saving water while bathing, but there is not much done by the government to encourage the changes.

#### *Answer Netherlands:*

The government tries to save water by informing people, taxes and with subsidies for water saving measures.

#### *Answer Italy:*

There are many and different ways to moderate the use of water; for example using a mixer tap in each tap or making periodical hydraulic control on your water system or finally preferring showers rather than baths. Local Councils fix some time bands to water gardens during the summer to make people moderate the use of water. From now and then awareness campaigns are held by the Ministry of Agriculture and Environment on the media and in schools.

### *Analysis*

In Germany, The Netherlands and Italy the government tries to make people aware of the importance of moderating the use of water through campaigns and by informing them. Actual laws don't exist in any country. In both the Netherlands and Germany a certain kind of waste water charges exist.

What is the procedure for the conversion of filthy water (for example: sewage) to drinking water and is the quality of water from the tap the same as the quality of drinking water?

*Answer Germany:*

- First: mechanical purification
  - Screen
  - Grit chamber
  - Grease trap
- Second: biological purification
  - Activated sludge
- Third: advanced wastewater treatment
  - Settling of purification bacilli and phosphorus
  - Chemical purification (mainly used for purification of industrial waste water)
    - Precipitation
    - Flocculation
    - Neutralization
    - Flotation
- Yes, the quality of water from the tap is the same as the quality of drinking water.

People drink water from the tap and sometimes even prefer it compared to water out of bottles.

*Answer Poland:*

Water Treatment. The removal of deposits from dirty water to get drinking water that is sufficiently well purified, it is suitable for consumption. Substances that are removed during purification and treatment include bacteria, algae, viruses, fungi, minerals and pollutants resulting from human activities. Many of these deposits can be hazardous to human health and according to accepted standards they are removed to improve the smell, taste and clarity of water.

Treatment of water for municipal use (tap water, drinking water), industry (especially food), medicine and pharmacy.

Few people drink water from the tap. Most people drink water out of bottles.

*Answer Netherlands:*

Broadly speaking, the treatment of surface water includes the following steps:

- for filtration
- aeration
- dose of chemicals that fasten the flocculation and sedimentation of impurities (iron chloride, aluminium salts)
- filtration through rapid sand filters and / or charcoal
- filtration with slow sand filters
- storage in reservoirs

Furthermore, controlling the pH (with hydrochloric acid, lye or lime water) and/or hardness of the water can be necessary.

Chlorine is since 2005 no longer allowed as a primary disinfectant in the Netherlands. The water companies now treat the water with ozone or ultraviolet light. UV light breaks, in combination with peroxide organic waste and organic micro pollutants down. No harmful residues remain behind in the water.

The quality of water from the tap is the same as the quality of drinking water. That is decided in the Water supply law. People drink water from the tap.

*Answer Lithuania:*

Few people drink water from the tap. Most people drink water out of bottles.

*Answer Italy:*

Sewage disposal is an example of procedure for the conversion of filthy water into drinking water. It includes physical, chemical and biological procedures. Its objective is to produce a waste stream (or treated effluent) and a solid waste (or sludge) suitable for discharge or re-use back into the environment.

By law, the water from the tap in houses and public places is drinkable, so its quality is the same as of drinking water.

Few people drink water from the tap. Most people drink water out of bottles.

*Analysis*

In all countries, the quality of the water from the tap is the same as the quality of drinking water. In each country the conversion from filthy water into drinking water includes physical, chemical and biological procedures.

In Lithuania, Poland and Italy most people don't drink water from the tap.

## Conclusion

Treatment of water by authorities in order to make it more suitable for usage in households is off course influencing the consumer price of water. Still, the relative price of water measured by its value to our modern lifestyle seems to be very low and does not make us aware of this; fresh water is a natural resource with limitations. National and European authorities could give more stimuli to enforce active attitudes towards searching for durable solutions to the use of fresh water.

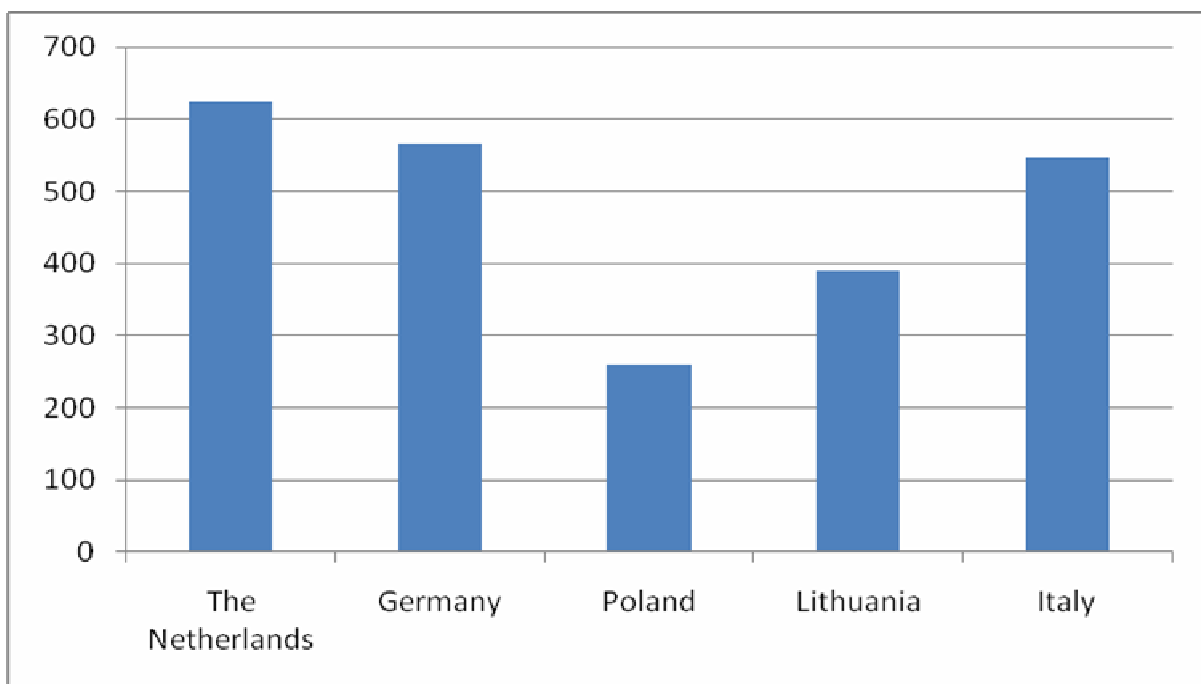
The quality demands of our drinking water vary greatly between our countries. The levels of water pollution and the political activity to protect our drinking water seem to differ even more. On this point there is in general a gap between political ideals and actual national and communal protective legislation. Most important here seems to be the conflict of interests between the protection of this natural resource and those of (inter-)national industries. And in the end this is always a question for consumers: Are people willing to pay more for a more sustainable use of water? Price increasing measurements will continue to be hard nuts to crack, but might at the same time be the only solution towards a sustainable economic growth and most of all a healthy environment.

## Garbage

How much garbage does one person produce per year (in kilos)?

| Country         | Garbage in Kg |
|-----------------|---------------|
| The Netherlands | 625           |
| Germany         | 566           |
| Poland          | 259           |
| Lithuania       | 390           |
| Italy           | 548           |

The answers come from the same webpage: Eurostat. The information is from the year 2006. Germany and Italy are estimated values.



Germany, Italy and the Netherlands are the countries which produce the most waste per person per year. There are of course some differences between these countries, but not as big as the differences with Lithuania and Poland. Together they even produce less waste than one of the other three countries.

We choose to collect our facts out of one source, instead of using the answers we got from each individual country. We noticed that the information from different sources differs a lot, so to be able to compare all of the countries we used the information from one single source.

What kinds of products are being recycled in your country?

The Netherlands: The different types of recyclable materials collected include:

- All types of paper/cardboard
- Glass jars and bottles
- Compostable materials
- All types of Iron
- Aluminum
- Copper
- Plastics
- Motor oil
- Tires
- Metal cans
- Beer bottles through deposit systems
- Plastic soda containers through deposit systems
- Ink cartridge
- All types of batteries
- Clothing and toys for second-hand use
- Construction timber
- Concrete and bricks used as road fill, or grinded down and mixed as new
- Household appliances - may also be returned through shop when buying new products

*Germany:*

- Waste paper
- Glass waste
- Batteries
- Plastic material / packages
- Parts of old cars
- Organic material
- Sometimes clothes, metals

*Poland:*

Plastic, paper and glass and aluminium (as the price of aluminium waste is tempting for the poor who collect it and sell)

*Lithuania:*

Paper, glass, plastic, and metal

*Italy:*

In our country plastic, paper, glass and aluminium are being recycled.

Products that are recycled in every country are plastic, paper, glass and aluminium. Germany and the Netherlands have got more sorts of products that are being recycled, such as batteries, parts of old cars and household appliances.

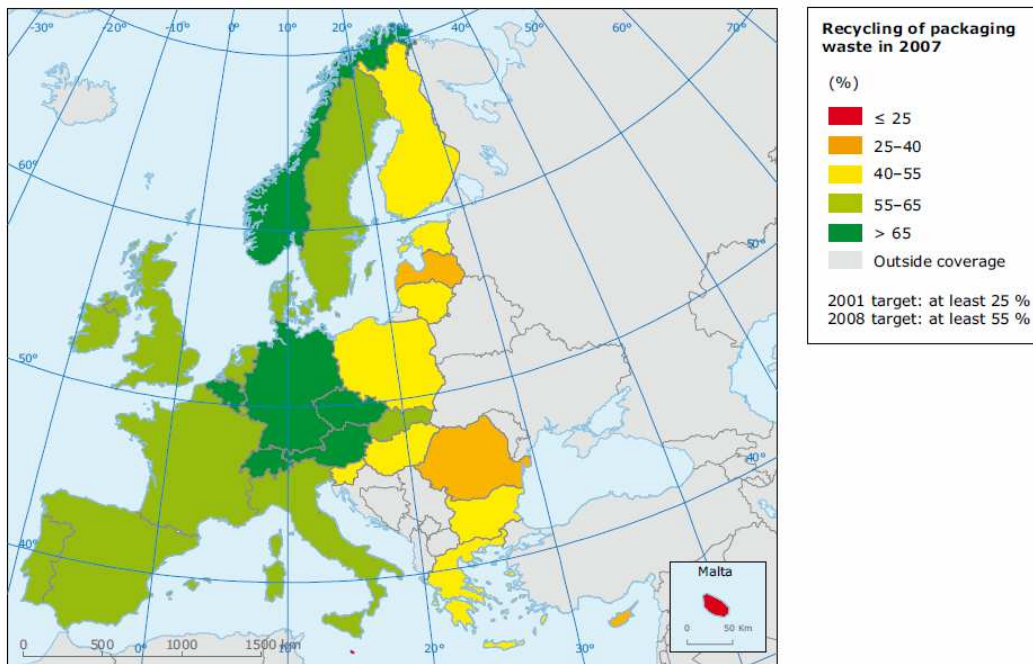


Figure 1:  
Recycling rates  
for packaging  
waste in 2007 by  
country

Source: Eurostat data centre on waste, 2010; BAFU, 2010.

This figure shows that Germany recycles most of its packaging waste, followed by Italy and the Netherlands. Poland and Lithuania recycle the lowest percentage of its packaging waste according to this figure.

Is garbage being separated? And if so, how?

*The Netherlands:*

Yes, our garbage is being separated. Into organic waste, paper and carton, plastic, chemic, compost, electronic, household refuse, textile and glass.

*Germany:*

In Germany a lot of different types of garbage are separated:

- Used batteries
- Old oil and oil cans
- Pharmaceuticals
- Construction waste
- Non returnable bottles and cans
- Electronic scrap
- Organic waste
- Glass waste
- Metal waste
- Paper waste
- Returnable bottles and cans
- Residual waste
- Contaminant

- Bulky waste
- Textiles
- Packaging waste

The underlined ones are collected in tons and fetched by a garbage collection service. Bulky waste is also fetched, but it is of course not collected in tons. Returnable bottles and cans are collected at beverage markets. The other (mostly more special) types of garbage have to be brought to waste collection places.

*Lithuania:*

Yes. There are separate containers on the streets and in the back yards for:

- 1) Paper and cardboard
- 2) Plastic
- 3) Glass
- 4) Metal

Every municipality has to arrange municipal recycling yards (a special place with separate containers for paper, plastic, glass, etc for 600 residents in the cities and for 800 residents in smaller municipalities).

*Poland:*

Through special bins for plastic, paper and glass. Baskets are in different colours, so we can sort.

*Italy:*

Yes, garbage is being separated. In fact people have to put every type of it in its respective bins, separating glass and aluminium, plastic, paper and organic.

A common way to separate garbage is through bins, which people can throw their different sorts of garbage in. The products that are being separated the most are paper, glass, plastic and metal. Organic material is also being separated in most of the countries.

Germany and the Netherlands also have some extra products which are being separated like chemical products, electronic appliances and textiles. They are often not collected in bins, such as glass or plastic, but, for example in Germany, have to be brought to special waste collection places.

Does garbage on the street cause any problems? And if it does, what kind of problems (in your region)?

*The Netherlands:* Garbage doesn't cause huge problems on the street. We don't have that huge mess in the streets, only some pieces of chewing gum and cigarette butts. And sometimes people put some trash in the roadside.

*Germany:* The pollution of public streets is not a big problem in Germany. Most of the streets are clean here, only on places which are visited daily by a lot of people, rubbish could be found. In a lot of cities there are cleaners which are employed for low salary to clean streets and squares.

*Lithuania:* Not all municipal recycling yards are aesthetic.

*Poland:* The problem is people, not garbage, because although there are many bins, some people seem not to see these and throw litter (chewing gum wraps etc) in the streets.

*Italy:* Obviously garbage is a problem, when it's not appropriately gathered up. It can cause inconveniences to traffic and pedestrians, as well as stench, but in Lombardy this situation is not as common as elsewhere.

In the Netherlands, Germany and Poland aren't any problems with garbage on the streets, only some pieces of chewing gum and cigarettes. The problem is people, because there are enough bins on the streets. In Lithuania there are dumps and they aren't nice.

In Italy it is a bigger problem, because there are problems for traffic and pedestrians.

Are there any harmful effects in the processing of waste (garbage)?

*The Netherlands:* We have different kinds of processing waste, and they all have different harmful effects. The most harmful is to fill land (which is putting solid waste in the ground and then cover it with earth) and discharge it into the water. These are the most harmful because the substances come directly in the ground, water and air. Waste incineration (burning garbage) has also harmful effects, because of the harmful substances that come out with the fume. Recycling is the best sort, but still has some harmful effects because it takes energy and the cleaning pollutes the water.

*Germany:* There are many harmful effects in the processing of waste. Especially weak people like children, babies, unborn children and pregnant women are affected with a high amount of receiving harmful substances. In the processing of waste dissociation of products, dumps and exhalations including Dioxin and Furan are delivered.

There are also harmful effects in the further use in our environment. After processing the waste it reaches us in form of e.g. road construction or via air and water.

*Lithuania:*

- Lithuania is one of five EU countries which still do not have any modern waste incineration plants, but it is planned to build ones in Vilnius and Klaipėda.
- Lithuania produces about 6,2 million tons of waste per year.
- Only 20% of household waste is sorted.
- 2 million tons of waste is disposed in landfills, and only 450 thousand tons are recycled.



*The dumps in Lithuania:*

*Poland:* It depends what is being processed, if it is plastic which gets burned it is, but when it's paper it's ecological.

*Italy:* Every form of garbage processing creates a heavy environmental impact, such as the eventual production of waste from the processing itself, the use of energy, water and solvents in the treatment and the emission of gas and poisonous dust in the atmosphere.

In every country there are harmful processes and the substances of it come directly into the water, air and ground. Lithuania doesn't have a modern waste incineration plant and most of the waste is disposed in landfills.

### What does the government do to reduce the amount of garbage?

*The Netherlands:* The government has introduced a tax for using packaging. With this tax you have to pay if you sell your products in a wrapping. Giving carrier bags to your customers is also an example.

*Germany:* A very important law concerning waste is the regulation on packaging which is influenced by an EU directive (European law 2008/98/EG). This regulates the hierarchy of waste management:

- 1st step is to avoid waste at all
- 2nd step is to prepare waste for recycling
- 3rd step is recycling

- 4<sup>th</sup> step is to recycle waste in another way, for example energetically
- 5<sup>th</sup> step is to dispose waste

One objective of the regulation is that returnable/deposit bottles and ecologically non-returnable bottles shall be on the market (at least 80% of the bottles). 65% of the amount of waste must be recycled and 55% materially recycled. Furthermore, producers and distributors are forced to take their transport packaging back.

Other regulations are concerned with detailed areas of waste. An example of this is the regulation on accumulators and batteries. Here it is written down that 65% of used lead-acid-batteries, 75% of used nickel-cadmium-batteries and 50% of other used batteries must be materially recycled.

Furthermore, the government promotes the avoidance of waste by making the people care about it. To achieve this, there are brochures for children as well as for adults and waste management is on the curriculum. So children are guided through recycling centres and conduct recycling experiments at school.

*Lithuania:* The Law on Waste management (No. VIII-787, adopted on 16/06/1998 by the Seimas of the Republic of Lithuania) Article 5. Natural resource conservation and waste reduction plans

*Poland:*

1. segregation
  - a) paper
  - b) aluminum and other metals
  - c) glass
  - d) plastic and foil
2. Composting
3. Ecological shopping

*Italy:* To reduce the amount of garbage, the government has done sensitization projects for the citizens about the problem through guidebooks and campaigns. Then, recycling is obligatory by law and, furthermore, the government provides incentives and subsidies to industries that have realized programmes to reduce the production of garbage.

Germany and Italy have both projects to inform people how important it is to reduce the amount of garbage. In the Netherlands there are taxes for selling products in wrappings and in Lithuania there is a special Law on Waste management. The government in Poland uses segregation, composting and ecological shopping.

Each country has its own way to reduce the amount of garbage.

What does the government do to reduce the harmful effects in the processing of waste (garbage)?

*The Netherlands:* The government has introduced a tax for using packaging. With this you have to pay tax if you sell your products in a wrapping. Giving carrier bags to your customers is also an example.

*Germany:* In Germany, the “Bundes-Immissionsschutzgesetz“ is to protect the environment from harmful substances ( as well as from any other harmful effect like noise or vibrations). It regulates the emission and emissions coming from motor vehicles, chimneys, crematoria, garbage incineration plants and other industrial facilities. Because of the improved flue gas cleaning of the garbage incineration plants emissions have decreased considerably, so that 1kg of waste being non-professionally-burned pollutes the environment like 10 tons of waste being burned in garbage incineration plants.

Furthermore, the EU has set a limit on Dioxin which regulates how much pictogram per gram is allowed to be in fish, eggs or milk. If there is more pictogram per gram, the affected food is not allowed to be sold.

*Lithuania:*

- The Law on Waste management (No. VIII-787, adopted on 16/06/1998 by the Seimas of the Republic of Lithuania). Section 4: HAZARDOUS WASTE TREATMENT

- Radioactive Waste Management Agency (RATA) was established in Lithuania.

RATA functions in accordance with the Strategy of Radioactive Waste Management approved by the Government of the Republic of Lithuania, Resolution No. 174, dated 6th February, 2002. On the course of its activities, RATA shall observe the Law on Radioactive Waste Management of the Republic of Lithuania, the Law on Nuclear Energy of the Republic of Lithuania, the Law on Radiation Protection of the Republic of Lithuania, the Law on State and Municipality Enterprises of the Republic of Lithuania, and the other legal deeds of the Republic of Lithuania.

*Italy:* To reduce the harmful effects in the processing of wastes, the government has issued some legislative decrees; the most important one is the so called “Ronchi Decree 22/97”, which introduced 3 different targets:

- Reduce the movement of garbage;
- Use the most suitable technologies in the processing of waste
- Aim to the self-sufficiency in the optimal territorial ambits of the processing of waste.

Besides, in the last few years there has been a strong development of the municipal solid wastes incineration systems that can have environmental impact reduction, studying the formation mechanisms of the pollutants and new abatement devices, and evaluating the total environmental impact. For example, the Institute on the Atmospheric Pollution of CNR attends on many projects aimed at understanding the formation of micro pollutants during incineration processes and moreover it is involved in the development of systems and methods for pollutants emission control.

This kind of research, regarding municipal solid wastes disposal, can be important in order to understand the spatial and temporal distribution mechanisms of the pollutants, but also to develop adequate solutions to make these systems socially acceptable, since they are essential for a long term and correct disposal management.

In Germany they have cleaned garbage incineration plants and this has helped a lot. In the Netherlands you have to pay if you sell your products in wrapping. In Lithuania there is a special law and they have a Waste management, the RATA. In Italy they have 3 targets: reduce the movement of garbage, use the most suitable technologies in the processing of waste and aim to the self-sufficiency in the optimal territorial ambits of the processing of waste. Every country has its own way to reduce the harmful effects in the processing of waste but the EU has set a limit on Dioxin in food and that's for every country the same.

What does the government do to improve the separation of garbage?

*The Netherlands:* The fabrics are obliged to put filters on the chimneys and the government also makes sure that as many products as possible are being recycled, for example by the input of deposit for empty plastic bottles.

*Germany:*

- A bill exists which regulates the separation and recycling of garbage (Closed Substance Cycle Waste Management Act = "Kreislaufwirtschafts- und Abfallgesetz" ) → separation of garbage is performance of duty)
- Separation of garbage is business of town councils/ communes
  - garbage collectors are allowed to refuse fetching badly separated garbage
  - Households can request a second dustbin if they do not manage with one
- Improvement by information: the Federal Ministry of Environment informs young children at kindergartens and schools about the importance of separation of garbage.

*Lithuania:*

- See answer to question number 3
- In 2004-2006 environmental and transport infrastructure ( for waste management as well) was financed by the Cohesion Fund ( EU) to nearly 614 million. Euro.

Note:

- The Cohesion Fund is a structural instrument which helps Member States to reduce economic and social disparities and to stabilise their economies since 1994. The Cohesion Fund finances up to 85 % of eligible expenditure of major projects involving the environment and transport infrastructure. This strengthens cohesion and solidarity within the EU. Eligible are the least prosperous member states of the Union whose gross national product (GNP) per capita is below 90% of the EU-average (since 1/5/2004 Greece, Portugal, Spain, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia)
- For the Cohesion Funds EUR 15.9 billion (in 2004 prices) are available for the years 2004-2006. More than half of the funding (EUR 8.49 billion) is reserved for the new Member States.

- The Law on Waste management (No. VIII-787, adopted on 16/06/1998 by the Seimas of the Republic of Lithuania) Article 30. Municipal waste management  
Every municipality has to place information about the importance of waste separation on its website

*Poland:* The government puts more baskets and the children are educated to segregate the waste, but at this point it is difficult to say whether it is the schools' idea to teach or the part of the curriculum.

*Italy:* To improve the separation of garbage, the government offers a weekly service of dusting, because the separation is imposed to citizens; then there are sorting and collecting centres of garbage.

In the Netherlands there are special dumps for plastic, and they try to recycle as much as they can. Germany recycles also a lot and they have improvement by information. The Federal Ministry of Environment informs young people about the importance of segregation of garbage. In Lithuania they get help from the Cohesion fund for environment and transport infrastructure. In Poland they also educate children to segregate waste and in Italy there is a weekly service to pick up garbage.

## Global Warming

We divided this questionnaire about global warming in three parts: general questions, problems and solutions. We start with the general questions, as to get a grip on the data concerning CO2 emissions. We proceed with a question about problems then and we end with questions about solutions.

We got very different answers to the question “what are the CO2-emissions per year in your country?” In the stat you can see the CO2-emissions and the residents per country. The number of residents is in millions. The CO2-emissions are in millions kg.

|             | residents | CO2-emission | CO2 kg per residents |
|-------------|-----------|--------------|----------------------|
| Lithuania   | 3m        | 20m          | 6,7                  |
| Germany     | 81m       | 841m         | 10,4                 |
| Poland      | 38m       | 280m         | 7,4                  |
| Italy       | 60m       | 502m         | 8,4                  |
| Netherlands | 16m       | 210m         | 13,1                 |

After comparing the results with the residents of the country, you can see that the emission is the highest in the Netherlands, followed by Germany. The emissions per residents follow the state of industrializing of the counties. If we had done this investigation 20 years ago, it would have been a different result. But after collapse of the communism in the east many polluting industries had to shut down, what became a positive effect on the CO2-emissions in the east.

Our next question was: “What is the source of the highest CO2 emissions in your country?” Italy, Germany and Lithuania answered “energy industry”. This could be an explanation for their very high CO2 emissions. Poland answered industrial production of factories and the Netherlands answered with industrial production and energy industry. Clearly, industrial production is less polluting than energy industry.

Then, we proceeded with a question about the problems caused by global warming. Question number three was “what are the main consequences of global warming in your country?”

Almost everyone answered with sea- and river level rising. Only Italy didn't have this particular answer. They did answer with melting of glaciers and that of course will make the river levels rise. The Netherlands and Italy had also answered with a risk for the public health. A lack of fresh water or a lack of food could be a risk for the public health. A warmer temperature could also increase the spread of diseases. Every country answered warmer winters. Italy answered upheaval of ecosystem equilibrium. Germany concluded that it hadn't experienced serious consequences yet, but they expect them in the future. Lithuania concluded that it didn't and wouldn't experience severe consequences, apart from a thinner ozone layer and warmer winters. Poland worries mainly about the sea- and river level rising, while the sea is in the North and many rivers cross Poland. The Netherlands are seriously worried about global warming, since the Netherlands are the natural drain of the rivers in Europe. The Netherlands are also worried about a change in food production and it fears extreme draught or extreme wetness. This shows that Germany, Italy and the Netherlands are most worried about climate change.

After we asked this question about problems we proceeded with questions about solutions. It is necessary to learn the problems but it may be more important to learn the solutions. So we came up with five questions about solutions (some of them divided in a) and b) questions). The questions were: “What does the government do against CO2 emissions?” “What research is being done in your country to find solutions for global warming?” “What are the best solutions to decrease CO2 emissions in your opinion?” “What are the goals concerning the Kyoto protocol for your country” and “Will your country realize these goals?”

The answers to the question “what does the government do against CO2 emissions?” were quite similar. All countries have their own laws to reduce CO2 emissions. They vary from environmental protection to laws to ensure the reduction of CO2 emissions. Also, every country follows the EU directions concerning CO2 emissions. Italy’s measures involve road blocks, taxes and the development of alternative sources. The Netherlands have a policy that is called “Clean and Efficient, New energy for Climate”. Who pollutes will pay more and who saves will be rewarded. The Netherlands are also raising taxes on polluting cars, electricity and fuel. Germany also invests in public transport, in renewable energy and stimulates the development of alternative sources. This is very similar to the Dutch policy of “Clean and Efficient”.

We asked two more questions then, and these questions are related to each other. The first question was “What research is being done in your country to find solutions for global warming?” Italy is busy researching background information concerning global warming. They are looking for methods to produce fresh water from sea water by using solar energy, to reduce the spread of allergies and they have a programme which investigates what the costs and the benefits of renewable energies are. Lithuania and Poland have no research going on about solutions for global warming. Poland is just following the EU guidelines to reduce the CO2 emissions every year. Germany is investigating the exact effects and consequences of global warming. They are researching concrete ways to slow global warming. They are also looking for a protection from global warming. This is to ensure the safety of German people. The Netherlands are also researching for background information of global warming, just like Italy.

The follow-up question was “what are the best solutions to decrease CO2 emissions in your opinion?” Poland answered with building atomic power stations instead of industrial factories. The Netherlands answered with higher taxes on polluting factories, cars, machines etc. and to inform people about the consequences of a decreasing CO2 level. Lithuania wants all energy coming from renewable energy sources. Italy wants to construct more green areas and wants more development of renewable energy sources. Germany is very keen on instant measures to decrease the CO2 level immediately and they think crowd sourcing is a very good idea. This means that everyone adapts to a greener way of life. But for this, they say, people must be made aware first.

Our other and last two questions are also related to each other and concern the Kyoto protocol. The first question, “what are the goals concerning the Kyoto protocol for your country?” was fairly easy to answer. In the table below you can see the goals for each country.

| <b>Country</b>  | <b>Goal concerning Kyoto protocol</b>        |
|-----------------|--|
| Italy           | Reduce 6,5% greenhouse gas emissions in 2012 |
| Germany         | Reduce 21% greenhouse gas emissions in 2012  |
| Lithuania       | Reduce 8% greenhouse gas emissions in 2012   |
| Poland          | Reduce 6% greenhouse gas emissions in 2012   |
| The Netherlands | Reduce 6% greenhouse gas emissions in 2012   |

Germany is definitely successful because they already did realize their goal and reduced already 27% of their CO2 emissions, which is a great accomplishment. Lithuania did also great because they reduced 54% more than what was stated in the Kyoto protocol. Italy will reach these goals if it will keep reducing CO2 emissions as much as it did in the last couple of years. Poland hasn't got any problems at the moment with realizing these goals, so they will reach their goals presumably. The Netherlands aren't sure of realizing these goals yet. They can only emit 200 M Ton per year and at the moment they are slightly above that limit. But they are buying emission rights so that the Kyoto protocol will be realized. Hopefully, the Netherlands will reach their goal too.

## **Final conclusion**

As you could see there were many problems in comparing the different questions and subjects. In the five collaborating countries many topics of the environment are discussed in different ways. Also the numbers we found are different, depending on what the definition is.

It may be a good idea for the European Union to clear out definitions about different kinds of aspects concerning the Environment.

In our survey we saw that the environment is a topic in all countries. Every country is trying to do something about the pollution. That there are differences between the countries is logic, when you look at the context of the county. Water and water pollution are big problems in the Netherlands, for example, but a minor one in Poland. But generally, all the countries are dealing with the problems, even if they have different solutions.

In the future some of the problems are growing bigger and it may be good to think about a European way to tackle the problems. For example global warming is a problem which concerns all countries, in different ways. For the Netherlands it is a problem that the sea level is going to rise, but for Italy the higher temperature and the negative effect for farmland could be a major problem.

Also the still growing consume of energy is something which could be a big problem in the future. The garbage which is produced by producing this energy is not a problem for one country and that's not only the nuclear waste but also the power plants which are producing energy by using gas, coal or oil. The air pollution won't stop by the border, also the nuclear radiation will not. Maybe some cooperation in this area is needed.

In our survey we learnt that there are many ideas to solve problems, so let's do it...

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