

Waste and Energy

*Dr. Dalius Dapkus
Vilnius Pedagogical University,
Lithuania*





GD Bildung und Kultur

LLP/AT-230/22/08

Permission to use is granted on the following conditions:

The use is for educational purposes only

No fees or other income is charged

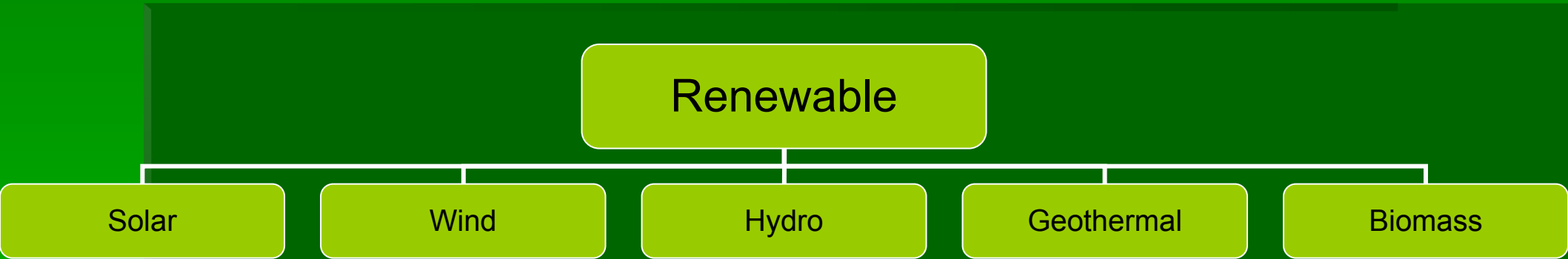
Appropriate reference to this source is made.

Data sources are indicated except pictures and drawings having been taken by the authors respectively publishers.

This project has been funded with support from the European Commission.

This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Sources of Energy



Non-renewable

```
graph TD; A[Non-renewable] --- B[Oil]; A --- C[Gas]; A --- D[Coal]; A --- E["Uranium (nuclear)"]
```

Oil

Gas

Coal

Uranium
(nuclear)

Waste (garbage) materials

are materials or items which are unusable or unwanted and thrown away.

Waste material can be:

- *Dangerous,*
- *Undangerous,*
- *Inertic.*

Dangerous waste:

- Waste of oil products.
- Waste polluted with oil products.
- Waste of dangerous transport equipment.
- Waste polluted with heavy metals.
- Waste of chemical materials.
- Waste of medicine.

Undangerous waste:

- e.g., food waste.

Inertic waste:

- e.g., glass, concrete, bricks, etc.

Some facts about waste products:

- *Approximately 1.3 billion tons of waste accumulate in the European Union every year.*
- *Of these, 40 million tons are dangerous waste products.*
- *The amount of waste products increases in approximately 15% every year.*
- *It could be suggested that the amount of waste will increase by 45% till 2020.*
- *The amount of electronic waste increases very rapidly: it doubled during 10 years.*

Waste in Lithuania:

- Approximately 6.2 million tons of safe waste are gathered in Lithuania per year.
- Of these, 20% are home waste products that are poorly sorted.
- More than 50 000 tons of plastic waste accumulate in Lithuania per year.
- Approximately 389 kg of waste are thrown up by every Lithuanian citizen, it could increase to 640 kg in 2020.
- Dangerous waste material is poorly sorted and separated from daily waste in Lithuania.

For you to discuss:

What are the ways to manage waste materials in your country?

The ways of waste management:

- *Waste material can be buried,*
- *Can be sorted and recycled mechanically,*
- *or biologically (e.g., composting, aerobic resolving),*
- *or burned.*

The ways of waste management:

- *Waste material can be buried,*
- *Can be sorted and recycled mechanically,*
- *or biologically (e.g., composting, aerobic resolving),*
- *or burned.*

- *Dumping of waste:*
- *To bury waste in the ground is the most popular way.*

Negative impact on the environment:

- *polluting materials diffuse into the ground, ground water, evaporate to air.*

Dumps in Lithuania:

- *holes were excavated in the ground and waste was left there.*
- *heavy metals, toxins and other dangerous materials could easily pollute the ground and water.*
- *About 67% of waste was stored in such dumps.*
- *Some kinds of waste (e.g. liquid, flammable, explosive, medical, etc.) can not be buried.*

Recycling of waste materials.

Paper

- *it is made of cellulose obtained from wood.*
- *Each ton of recycled paper saves 17 trees, 26460 liters of water and energy, which is enough to heat a medium house for six months.*

- *There is no harm for the environment if we use the same amount of wood as it increases per year.*
- *Recycled paper can be used to make new boxes, notes, paper handkerchiefs, toilet paper, boxes for eggs, tablecloths and many more useful things.*
- *Problems in Lithuania: no motivation to gather or sort paper material.*

Recycling of glass:

- *Good characteristics: it is transparent, inert for most of products, it is not conductive for gas.*
- *Disadvantages: it is quite heavy and fragile.*
- *It is still irreplaceable in alcohol, pharmacy and chemical industry.*
- *There are many types of glass packages which are difficult to wash.*
- *There are many advantages in glass recycling: stock and energy is saved, less waste gets to the environment, and it is easy to gather glass remnants.*

- *It is possible to save about 35% of energy if glass waste is reprocessed.*
- *It helps to reduce CO₂ emission to atmosphere as well.*

Recycling of cans

- *Cans are used to keep paint, polish, to pack some building and hazardous materials, alcoholic and non-alcoholic drinks.*
- *Since metals are non conductive to gas, water, microorganisms or light rays, there is no alternative to replace them in the future.*
- *Empty metal packages take the same place as full and their transportation is irrational, so it is the main weakness of metal packages.*
- *The recycling of metal package is simple. It is easy to sort, it is useful economically and ecologically.*
- *Recycling one ton of cans save 1.5 tons of iron ore, 0.5 ton of coal and 40% of water.*

Recycling of plastic

- *PVC (polyvinyl chloride) was firstly made in 1912.*
- *Polythene was made in 1933.*
- *Plastic was started to use in packaging industry in 1950's.*
- *More than 60% of packaging is made of plastic, so there is a huge amount of plastic waste thrown every day.*
- *Plastic packages are not heavy, so it is possible to save energy during their production.*
- *Anyway, they do not decompose in the ground for a long time.*
- *Recycling of plastic is quite easy, but it is not easy to sort it from mixture of plastics.*

- *It is difficult to clean plastic so it is not usable for food packing after the recycling.*
- *Such plastic can be used for the production of waste bins and their bags, some parts of furniture, tubes and other materials.*
- *It is hard to sort and recycle mixtures of polymeric waste.*

The ways of future development of plastic packages:

- To produce stronger plastic sheets and to reduce thickness, their diameter and the mass.
- To create plastic with features such as suspending of smells, which would be suitable for the replacing of aluminium.
- To create plastic sheets with controlled and regulated permeability of gas. The package should contain suitable air composition inside which would provide environment needed for products such as fresh fruits, vegetables or meat.
- To create plastic materials which would be able to disintegrate after some time. Plastic materials should

Waste of electronic equipment

- *Electronic waste is one of the most polluting sources due to heavy metals.*
- *It increases very rapidly.*
- *Manufacturers are responsible for their equipment recycling.*

Tyres

- *On the average, every Lithuanian citizen throws away about five kilograms of tyres.*
- *Tyres emit benzene.*
- *It penetrates into soil and ground water, so there is a possibility to consume it through drinking water.*
- *Tyres are recyclable mechanically. It enables to get granules which could be used for the asphalt works.*

Waste to energy. All organic waste contains energy.

How to get and to use it ?

It is possible to burn garbage and use its heat energy to make steam to heat buildings or to generate electricity.

GARBAGE *energy*

- *It takes 1 ton of garbage to equal the heat energy in 250 kg of coal.*
- *It costs more to generate electricity than it does at nuclear or hydropower plant.*

Burning of waste

- Advantageous, as it reduces quantity of garbage;
- No need to establish new dumps.
- But burning garbage releases the chemicals and substances found in the waste.
- Some chemicals can be dangerous to people, the environment, or both, if they are not properly controlled.

- 1. Garbage is burned, releasing heat.**
- 2. The heat turns water into steam.**
- 3. The high-pressure steam turns the blades of a turbine generator to produce electricity.**
- 4. Transformatgion of electricity.**

A ton of garbage generates about 525 kWh of electricity, enough energy to heat a typical office building for one day.

1 ton of garbage is reduced to 150-300 kg of ash.

- Waste should be burned on high temperatures and the obtained energy should be used to heat buildings or in power plants.
- anti-pollution devices, including scrubbers, fabric filters, and electrostatic precipitators are installed to stop materials appearing to the air.
- Problem of utilization of these filters in order to prevent them from getting to dumps.
- EU has strong directives concerning burning.

To burn or recycle?

An example: Spittelau in Vienna

Capacity-

17 tons of garbage per hour;

6 megawatts of electricity,

and 60 megawatts of heat.



For you to think and discuss:

What solutions can be suggested in order to reduce the amount of garbage?

What are the solutions?

- It is necessary to reduce the material used for packing of products.
- It is recommended to buy products without packages, to use plastic bags repeatedly. Paper bags are better than plastic ones.
- Concentration of products can reduce the quantity of packages.

- **Reuse or reparation of a product is recommended instead of throwing it to dump.**
- **It is possible to sell or to give a product free of charge for those who need it.**
- **Choosing of recycling packages can save the environment.**

- **Electronic waste should be returned to specialized companies which are responsible for collecting and recycling of such kind of waste.**
- **Try to buy and use rechargeable batteries.**

- **Try to find out more about item or product's origin and ways how it was made. We can stop companies to produce dangerous products or items if we are not going to buy it.**
- **Try to improve ourselves as customers. Try to consider what will be the future of a product which we are going to buy.**
- **Try to buy long-time usable products.**

Thank you for the attention!