

Recycle yourself

how to start a recycling project at school



Waste: a fast growing problem

How to deal with waste

More about recycling

PET recycling: a success story

Education in recycling projects

Start yourself: what to do?



RECYCLE YOURSELF

How to start a recycling project at school

Since the transition of the Polish market in 1989 the amount of waste has increased four times for each household



The municipality of Narewka introduced a new waste collection system. It includes recycling of aluminium, PET, glass and paper.



Green Way set up a recycling project at primary schools. PET bottles are collected in 'big bags'.



Pupils and environmental projects go well together. Especially when using the interactive teaching method.



Contents

Waste: a fast growing problem

The amount of waste is growing fast. At the same time the composition of waste is changing. These trends cause problems for the public health and the environment.

How to deal with waste

Solutions can be found in other methods of waste treatment, in particular recycling of materials. The new Polish law on waste offers possibilities for implementing these methods.

More about recycling

Waste materials can be transformed into new products in an economically feasible way. Therefore a clean and separate collection of different materials is necessary.

PET recycling: a success story

The non governmental organization Green Way started a small scale recycling project in primary schools. This became a huge success. The project can be used as an example for others that are willing to start such a project.

Education in recycling projects

Pupils of primary schools collect PET bottles and aluminium cans. Besides that also education about environmental problems and waste is introduced. This combination of action and education has proven to be of great value.

Start yourself: what to do?

If your school or municipality doesn't have a recycling program, you can start one yourself. Two important elements should be kept in mind: the project cycle and the action plan.

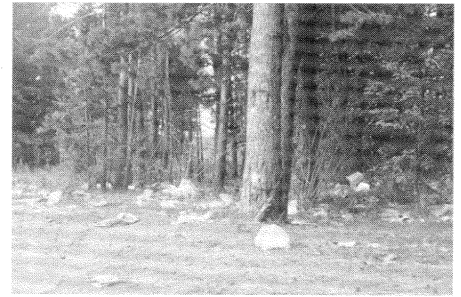
Waste: A fast growing problem

In Poland the amount of waste is growing fast, year after year. At the same time the composition of waste is undergoing huge changes: more packaging materials, more plastics and much more hazardous waste like batteries and medicaments. The traditional ways of dealing with waste, dumping on landfills and burning it by people themselves, are no longer satisfactory. Both for the sake of the public health and for a healthy environment, Poland will have to find solutions to deal with the waste.

Increase in the amount of waste

The amounts of both household and industrial waste have risen the last decades all over Europe. It appears that the amount of waste rises linearly with the standard of living. Poland is doing everything it can do to increase the standard of living, so a further increase in waste seems inevitable. Countries in East and Central Europe, like Poland, show an even higher increase after the transition. This is confirmed by the growth in landfill size, as well as by the increase in litter that can be found in forests, near roadsides and on riverbanks.

Reasons for the big increase in waste are the new lifestyle of consumption, the increase in the number of wealthy people and the low ecological awareness of the society. Typical is the growth in the use of garbage-creating products (for example bananas, citrus fruits or small portions of food in disposable packings) and of plastics.

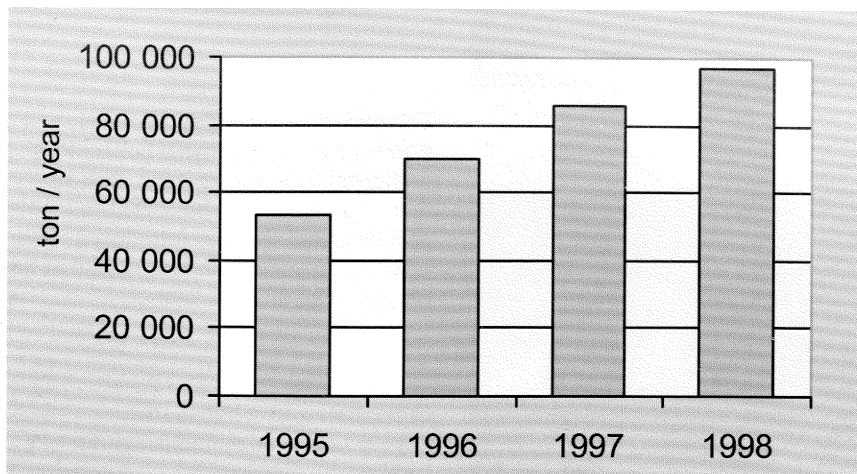


Litter is a form of pollution that is easily recognised. The amount of litter rises as a result of using more packaging materials (i.e. plastics).

Doubling of the amount of household waste in Bialystok

Typical for the increase in household waste is the situation in Bialystok, the biggest city in the northeast of Poland, with a population of 290 000 residents. The quantity of domestic waste put on the landfill in Hryniewiczze, near Bialystok, was monitored between 1995 and 1998. In this period the weight almost doubled, while the volume rose by 63%. In 1998 each citizen of Bialystok produced about 2 m³ of waste, which equals 335 kg.

Quantity of household waste produced in Bialystok in recent years.



Source: seminar twinning Eindhoven – Bialystok on waste management, 1999.

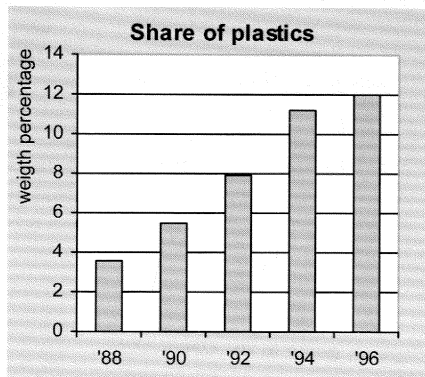
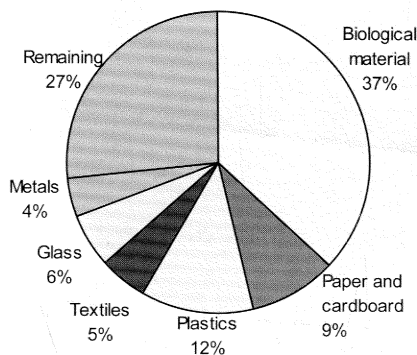
The changing composition of waste

The amount of waste per citizen and the composition vary depending on the characteristics of the community, the standard of living and the housing structure. About 40 to 50% of the municipal waste is of biological material, also called bio-waste. This includes waste from gardens and public green spaces, but also remains of vegetables and fruits in the domestic waste. The rest of the waste consists of glass, metals, plastics et cetera.

The composition of domestic waste has been changing over the years. An example is the growth in the share of hazardous waste, like batteries, oil, chemicals and medicaments. Also more and more plastics are used to make products like pencils, bottles, CD's, toys and the dashboards of cars. In Poland the rapid transition since 1989 made these changes even more drastic. Before 1989 for example, hardly any PET bottles were used for soft drinks. Polish people were often jealous of these bottles coming from the West. In 1995 already 500 million bottles a year were used in Poland. These bottles finally end up on the landfill and the former jealousy has now changed place with worries.

Composition of household waste

Morphological research on household waste carried out in Bialystok shows that the main component of waste is biological material (about 37%). Other components are paper, plastics, textiles, glass and metals. The remaining part consists of not mentioned components, like small hazardous waste, and all unidentified waste. National data for Poland show the same picture, but with a little higher percentage of glass and metals at the expense of the remaining part. 12% of the waste consist of plastics. This share has increased threefold since 1988, as is shown for Warsaw.



Left: The morphological structure of household waste in Bialystok in weight percentages, 1998.

Source: seminar twinning Eindhoven – Bialystok on waste management 1999.

Right: Share of plastics in household waste in Warsaw, 1988-1996. Source: Poradnik.

containers in neighbourhoods and put it on a landfill. All these methods of waste treatment harm the environment and the public health.

Waste is a potential sanitary and epidemiological problem because of the way it is dispersed throughout human settlements and because of the high content of organic matter. That facilitates the spread of disease-causing micro-organisms, germ-carrying insects and vermin. When burning waste in an open fire polluting gas are formed. One of these is dioxin, a carcinogen. When dumping waste on a landfill emissions also occur. For example methane gas, a greenhouse gas, is formed by digestion of biological waste. This gas is a greenhouse gas. Other emissions can be more hazardous, like toxic materials. Emissions that leach out of the landfill can pollute the ground and groundwater in the immediate environment.

Both the dumping and the burning of waste can be considered as a loss of raw materials and energy that is stored in the waste. This is especially important for materials that are rare or expensive. And finally the space needed for landfills will increase rapidly the coming years. In 1995 landfills covered already 3020 hectares in Poland. This is about the size of 4100 soccer fields!

The question is how to deal with these waste problems. In 1998 in Poland a new law was passed at the national level about how to treat waste. It defines the responsibilities for municipalities on waste collection and treatment and includes restrictions on landfills

Problems related to waste

In the past the treatment of waste in Poland was not regulated. In rural areas people used to dispose of their garbage by burning it themselves or putting it on an illegal or semi-legal landfill. In urban areas, especially in larger cities, waste collection was usually organized by the local government. A private waste carrier removed the domestic waste from



An old landfill, without any special measures taken to protect the environment.

Waste problems caused by plastics

The increase in plastics in waste makes it more difficult to deal with the waste. Most plastics are not or hardly biodegradable. This means that once brought into nature or dumped on a landfill these products will stay intact for hundreds of years. So the waste will accumulate for all these years! Because a lot of food is not consumed at home, its packings (often made of plastics) are disposed of all over, mostly in garbage bins. However a lot is also littering the landscape. The additives in plastics, like colouring matters, can be hazardous. Examples are heavy metals like cadmium, mercury and chrome, which come free in exhaust gas when burning the plastics.

Most plastics are hardly biodegradable: if king Jagietto, going to the Grunwald battle (1410), had taken water with him in PET bottles, the empty bottles would even have survived the end of communism in Poland.



How to deal with waste

Whatever method of waste treatment is chosen, neither the public health nor the environment should suffer any damage from it. This means that dumping of waste on old landfills and open, uncontrolled burning of waste should be abandoned. The easiest way to deal with waste on the short term is dumping on well-prepared landfills. In an attempt to deal with the growing amount of domestic waste also new methods should be examined. Examples are recycling, composting, incineration and prevention. The new national law on waste management offers possibilities to implement these methods.

How to handle household waste

Controlled disposal of waste at a modern landfill is a responsible method of waste treatment. On these landfills special precautions are taken to prevent harm to the surrounding environment. A disadvantage of this method is the fact that the measures taken to prevent emission to the environment have to be held up in perpetuity or at least till all waste is stabilised. This can take hundreds of years. And, as mentioned before, the landfills need more and more space, while the raw materials and energy that are stored in the waste are lost.

But there are other ways to deal with waste: recycling, composting, incineration, and prevention. The first three methods use the treasure of energy and materials from waste, for example to produce new products out of it. The latter is in the long term the best solution: prevent that waste originates, by avoiding unnecessary packaging materials and producing quality products that last a long time.

Incineration, composting and recycling

Incineration of waste in a special incineration plant solves the problem of space required for landfills. Also the energy that the waste contains is used, however the raw materials are lost. The emissions in the exhaust gas are restricted by after-treatment of the gas. In Poland hardly any household waste is incinerated, probably because of higher costs. In several other European countries incineration is increasing.

In rural areas biological waste is often composted or fed to animals by farmers. Composting bio-waste can also be done in a composting plant. For doing so it is very important to collect pure bio-waste separately at the households.



Recycling is a good option for waste treatment. It has three advantages: the growing amount of waste is dealt with, the environment is taken care of (less use of energy and raw materials and less pollution) and last but not least it offers economical advantages. The economical advantages exist because money can be saved by reducing the use of energy and primary materials. And also costs, involved with dumping of waste on landfills, can be reduced. Poland has some experience with recycling. Before the transition the recycling of some materials was obliged out of necessity. Students for example were obliged to collect 10 kilogram of paper every semester. In the transition of 1989 this rule was abolished.

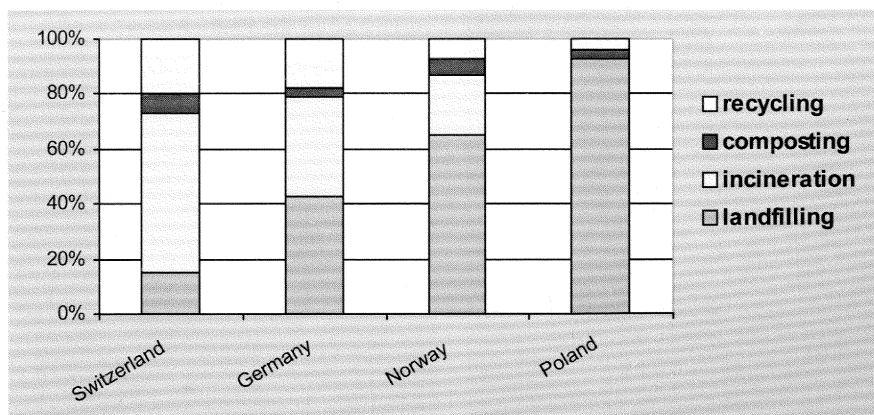
Changing law on waste

At the end of 1998 the Polish government implemented a new law on waste management. It is an attempt to deal with the increasing amount of waste and its changing composition. Also EU-admission defines minimum standards to be reached concerning this issue. The same trend is visible in other East and Middle European countries.

According to this law the local municipalities were given an increased responsibility for the domestic waste. Every municipality has to ensure that all

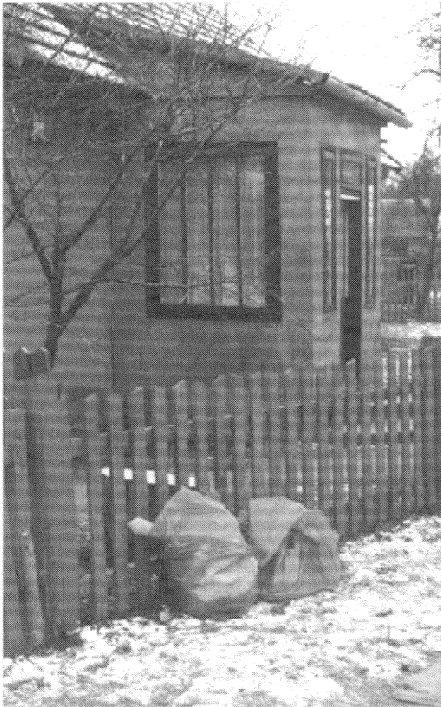
Exploring possibilities

The chart shows how several European countries are treating their waste. Most of the waste is treated by landfilling or incineration. But in Switzerland up to 30% of the waste is recycled or composted. In Poland almost all municipal waste is dumped on a landfill. Poland still has to start exploring the other methods of waste treatment.



Share of different waste treatment methods in several European countries.
Source: SEW 1997.

residents are serviced by a waste collection system. The municipalities have to choose such a system and have to create conditions under which the system can work. For doing so they are allowed to create local laws on waste. By the year 2000 every municipality also has to make a waste management program. This program has to include the expected amount of waste for the nearby future and the way the municipality wants to deal with the waste. The law also includes restrictions for landfills: minimum standards are set.



Before this national law was introduced only 50% of the households was served by a collection system, the rest of the waste was put on illegal landfills or burned by the people themselves. At the end of 1999 about 78% of the households had a waste collection system. Many municipalities have chosen for the common system of an already operating private waste carrier to remove the waste from containers in neighbourhoods. But this is not necessarily the best system. The municipality of Narewka is one out of sixty municipalities that implemented another system.

New law in practice in Narewka

Narewka is a small municipality in the northeast of Poland, near Bialystok. Narewka has almost five thousand

residents, and the municipality covers 339 square kilometres. Just like most Polish municipalities, the municipality of Narewka used to let a private waste carrier remove the domestic waste from containers in the central village. This waste was put on an unprotected landfill, just outside the village. The residents of the fifty surrounding settlements disposed of their waste in their own way. Obligated by the changed law on waste, Narewka had to set up a new system that would serve all households.

The municipality chose for collecting household waste in plastic bags. This system is quite normal in some European countries, but not in Poland. Each household collects the household waste in disposable plastic bags. The full garbage bags can be placed at the street side, every two weeks in the central village and once a month in the surrounding villages. The municipality collects them, so no private waste carrier is needed. The waste is removed to a new landfill. By a new local law residents are obliged to use the garbage bags or to bring their waste to the new landfill themselves.

Most important reason for the municipality to decide for this system is the price: it is much cheaper to collect the waste by using bags instead of containers. When using containers, each settlement should have its own container, and these have to be rented. And as mentioned before, by using bags no private waste carrier is needed. This lowers the costs and offers employment to people in the municipality. A second advantage is the possibility to separate and recycle certain materials of the domestic waste. This will be described in the next chapter.

The new landfill in Narewka is prepared according to the latest regulations. The bottom of the landfill is formed by a thick plastic layer to protect the ground against pollution from the waste above. Also ventilation shafts are placed on the landfill. These have to ensure that when the landfill is full, formed gas can flow away. These extra protecting measures made the preparation of the landfill more expensive. Because of the separation of recycled materials there is less waste to be dumped on the landfill. In this way it takes a longer time before the landfill is full.



At regular intervals the full garbage bags can be placed at the street side. A tractor with trailer is used for the door-to-door collection of the bags.

More about recycling

Recycling is a good option for waste treatment. Several waste materials, like paper, glass, iron and aluminium, can be transformed into new useful products. In this way materials can 'loop' back to the consumer. 'Closing the loop' means buying products made from recycled materials. In this way the use of virgin materials and energy is reduced, as well as the total amount of waste. To make recycling successful, clean and separate collection of the different materials is needed.

Reducing waste

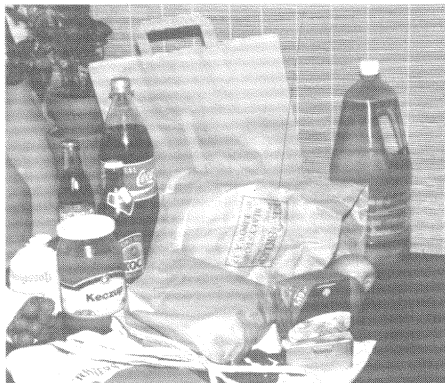
Recycling can have a massive impact on the generation of waste, as is shown below. In the upper pictures the possibility to recycle packaging materials is fully used. After the goods are consumed only a bottle and a packing are left. The lower pictures show the results when recycling is not taken into account during shopping. A huge amount of waste (packings) is left over. Imagine for yourself the effects that recycling can have on the amount of waste for a whole country!

As a result of preventing waste by recycling less pollution occurs and less space and money is needed for landfills. Also less raw materials and energy is needed when recycled materials are used during the production of goods.

Saving energy and material

Saving energy is important for materials that need a lot of energy during production. Among these materials are iron, aluminium and glass. Recycling these materials almost always results in a reduction in energy use during production. And thus it results in money saving. This can be a reason for a manufacturer to pay a small fee for collecting of these materials. For example, it takes approximately 100 Mega Joules to produce 1 kilogram of polyester clothing from oil. The production of the same quantity from recycled PET bottles only takes approximately 4 Mega Joules.

Saving material is important for materials which have a limited total quantity on the earth. Examples are oil and copper. Recycling can help prevent running out of these materials. Recycling is also important for materials with a high market value, like gold. The high market value makes it easier to recycle these materials in an economically feasible way. When a PET bottle is cleaned and refilled 9 times instead of producing a new bottle 10 times, the producer needs a lot less oil.



The amount of waste left over when recycling is taken into account. During shopping attention is paid to the used packaging materials. When disposing of the waste all materials are separated, most are recycled. Only a bottle and a packing are left over.



The same kind and quantity of products are bought, but recycling is not taken into account. The amount of waste left over is much larger.

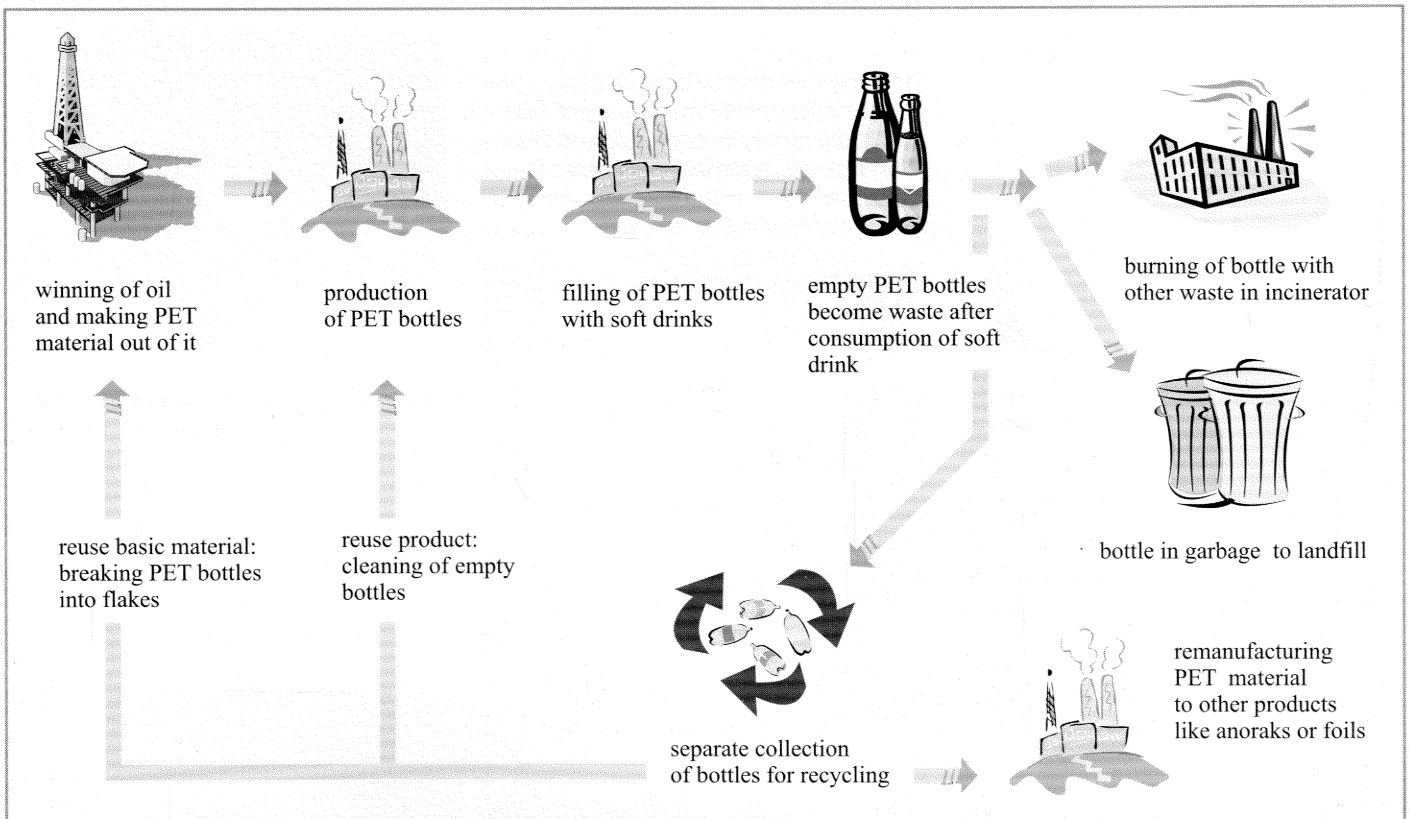


An example: the recycling of PET bottles

PET material is commonly used to package liquids (food and non-food), because of its lightweight, durable and resealable properties. Let us follow the 'life' of PET bottles for soft drinks. PET bottles are produced, like most plastics, out of oil. Once produced they go to a soft drink factory, which fills them up. Consumers, like you and me, buy and drink these soft drinks. The empty PET bottle that is left over is considered waste.

The difference is made when the PET bottle becomes waste. When thrown into the garbage in Poland it mostly ends up in a landfill. PET is, like many plastics, hardly biodegradable and will stay unchanged in the landfill site for hundreds of years. When burned in an incinerator, it produces water and carbon dioxide, a greenhouse gas. Additives in the PET bottle, like colouring materials, the screw tops and the glue to hold the label can create pollutants or carcinogens.

When the bottles are collected separately from other waste they can be reused. This can be done by re-using the bottles or by using the material of the bottles.



Reuse of the PET bottle

The easiest way of recycling PET bottles is to refill the bottles. Specially designed thick wall PET bottles can be cleaned and refilled. For collecting these bottles a system of money deposits is used. The disadvantage of this system is that the transporting, sorting and cleaning of the bottle costs money and uses energy. Also temporarily storage and handling asks an effort of the shopkeepers. This system is hardly used in Poland.



Reuse of the PET material

Used PET bottles can also be cleaned, broken into flakes and reshaped into new PET bottles. This process is technically very difficult: a degradation of properties of the plastic will occur. Other materials can be recycled into new products without degradation, like glass and metals. For instance discarded cars are dealt with this way.

Another way of recycling PET bottles is using the PET material for the production of other products. PET material can be reformed to polyester fibres, which can be used for making T-shirts, carpets and fibre fills. Fibre fill is thin hair-like fibre that can be used to insulate ski anoraks, sleeping bags, et cetera. It takes 35 two-litre PET bottles to make the fibre filling for one sleeping bag. And it takes 5 two-litre PET bottles to make one square foot of carpet.



Good examples of products made of recycled material: foils used as packaging materials and anoraks insulated with fibre fills. Both are produced from recycled PET bottles.

Source right photo: Internet.

Making foils out of PET bottles

GTX Hanex Plastics is a producer of PET bottles in Poland. Since 1995 Hanex has been working to create a system to regain wasted

PET bottles that can be used in production of packaging materials. In that year the non governmental organization Green Way started the collection of PET bottles by pupils. Hanex took in the collected PET bottles and paid a little fee for every bottle collected.

The recycling of waste PET bottles is done in several steps:

- First the labels are removed from the bottles. If not done properly, the labels and the glue can cause trouble during recycling. The bottles are sorted by colour. The screw tops are taken to another company for recycling.
- The empty bottles are broken into flakes. Flakes are small bits of shredded PET bottles that can be washed and melted in the recycling process.
- The flakes are washed to remove all dirt. Then the washed flakes are dried at a temperature of about 120°C while centrifuging.
- The dried flakes are put in an extrusion machine, which heats the flakes and makes foil out of them. The foil is made on the base of 'three layer' technology. The inside layer is made out of recycled PET and forms 70% of the total weight. Both layers on the outside are made out of virgin PET material, each covering 15% of the weight.
- This foil is finally cut and put on rolls. The foil can be made with a maximum width of 1200 mm and thickness in the range of 0,15-1,0 mm.

Clean and separate collection

PET material from bottles has to be cleaned before it can be transformed into new useful products. Usually cleaning of recycled materials is needed. Contamination of the material will make it difficult to recycle. Problems also arise when all different kinds of waste are put together. From that point on, recycling becomes much more difficult and expensive. For example a very small amount of pottery in a load of glass can make it useless for recycling. To make recycling successful, clean and separate collection of the materials is needed. The best way to do so is separation of waste at the source, which means in the households.

In the waste collection system of the municipality of Narewka, described in the previous chapter, several methods of collecting waste are implemented. All these systems are based on the separation of waste in the households.

Separate collection in Narewka

In Narewka glass, PET bottles, aluminium cans and paper are collected separately. Most of the waste is collected in plastic garbage bags. Plastic bags with four different colours are used, each for collecting a specific component of the household waste: black for PET and aluminium, blue for glass, white for paper and green for the rest of the waste.

Another collection system is developed for residents of apartment buildings. Usually they do not have enough space in their house to store four garbage bags. Therefore containers are placed close to the apartment buildings for the collection of the recycled materials. A regular container is used to collect the rest components.

PET bottles and aluminium cans are also collected at the primary schools in Narewka. This is part of a larger educational program on the environment: pupils learn about waste and the environment. This improves the community awareness. Finally, residents are allowed to bring the separated waste to a recycling centre.

The recycling centre is situated near the new landfill. The separated waste, gathered by the municipal waste collection system, is transported to the recycling centre. Here the raw materials are inspected and when necessary some additional separation by hand is done. For this one extra employee is needed. His salary equals the money the municipality receives for some of the collected materials. The separated materials are stored. On request they are picked up for recycling by companies in the region.



The photo to the left shows the three containers for recycling materials that are placed close to apartment buildings. On the right, a view of the recycling centre. Here four fractions of waste (aluminium, glass, paper and PET) are stored separately until the companies that recycle the materials pick them up.

PET recycling: a success story

In 1995 the non governmental organization 'Green Way' started a project to stimulate the recycling of PET bottles in Bialystok. In the project pupils of primary schools are collecting the bottles. The program was started on a small scale. Soon the program appeared to be very successful. In 1998 pupils were saving more than 15 000 bottles a day from being dumped at the local landfill. The project can be seen as an example for others that are willing to start a comparable project.

In the beginning...

After the volunteers of Green Way organized an action day called 'Clean up the world' in 1994, they realised that a single action day was not enough to deal with the waste problem. They wanted a more structural approach and so they started to think about a program to stimulate the recycling for one specific raw material.

At first Green Way thought about the recycling of tires of cars. But in Poland there was no factory, which could treat the tires for recycling. Based on these practical arguments, another waste component had to be considered. Around the same time GTX Hanex Plastics, producer of PET bottles, wanted to start with the recycling of used PET bottles into packaging foils. By chance Green Way and Hanex got to know each other and both decided to go along together. By doing so the choice to stimulate the recycling of the PET material was made.

How to choose a recycled material:

- aluminium cans: low weight, low volume, good price
- PET bottles: low weight, high volume
- iron: heavy
- glass: heavy, sharp
- paper: heavy, no value

Is a factory, recycling centre or municipality willing to accept the collected materials? How can you collect the material? How can you transport and store the material?

Collecting PET bottles

Green Way decided to use containers for collecting the used PET bottles. The self-made container consisted of a big plastic bag hanging in a frame. Hanex provided the bags for free. Usually the bags are used for transport of PET granulate for the production of PET bottles. After use of the granulate the bags are left over. The frame was especially made for this application. When a big bag is full of PET bottles, it is tied up and taken out of the frame. Another empty big bag is put back in the frame.

This system proved to be very effective:

- the container is reasonably priced;
- the collected bottles in the bag can be pressed from above;
- the container can easily be placed and transported;
- the full big bags can be moved and lifted on the truck by hand;
- no specific vehicle, like for example a waste truck, is needed for the transport.

The prototype of the container was placed on the beach of a public swimming pool in Bialystok. The action immediately got media attention, because it was a new initiative. The media attention was very important at this stage, because a large public received information about the action going on.



The first big bag to collect PET bottles was placed on the beach of a public swimming pool in Bialystok. This photo appeared in a local newspaper. Source photo: *Gazeta Współczesna*, July 31st, 1995.

Collecting at primary schools

Supported by the positive reactions from the media and the public, the volunteers of Green Way started to examine the possibilities to expand the project. They thought of pupils in primary schools to collect the bottles. Leaflets were sent to all primary schools in Bialystok. Ten schools directly wanted to join the project. A meeting was organized to inform representatives of these schools. Another ten frames were constructed and placed in the schools.

At three of the ten schools the project became an immediate hit but at the other

ones the results were poor. The enthusiasm of the teachers involved, seemed to be one of the key factors for success. For that reason a series of meetings was set up. Once in two weeks all participating teachers (one per school) were invited. In these meetings a lot of discussion took place about the practical problems of collecting PET bottles, because the project was totally new. The teachers and the volunteers of Green Way shared their experiences and together had to search for solutions. In this way the three successful teachers and the volunteers succeeded in making the others enthusiastic as well.

"Children are as policemen"

Jarek Zgiet of Green Way explains why it is so important to involve primary schools. "I think there are more reasons. First a practical point: teachers and pupils can easily be approached. Most of the time they are very enthusiastic too. This is really important when you start a recycling project. You're almost sure of success: pupils will start to collect very fanatic!"

Another point is the central position of schools in society. When the pupils are involved in a recycling program in school they'll introduce it at home. A teacher once told me: "Children are as policemen: they care and make sure that their parents do not act in the wrong way." So the program also influences their parents. And after that others will follow. It is a snowball effect.

Last but not least are the positive long-term effects. Waste is a long-term problem, it won't just disappear. We chose the bottom-up approach. The pupils will grow up and be adults later, and we hope that by that time they are still separating waste for recycling!"



"Dealing with waste is more than part of a single lesson, it is a daily routine"

Elzbieta Chmielewska is a teacher at primary school no 5 in Hajnowka. A few years ago the school joined the PET recycling project. Asked about her experience of the project she starts talking very enthusiastic. "We received a letter of the mayor, that explained what the program was about. The mayor was encouraging us to join. First time we collected PET bottles was during an action week called 'Clean up the world'. 29 pupils started with collecting. After that week all pupils of our school joined the program. And with great success. We collected that many PET bottles that we won the first prize: a colour television.

Each school has partial freedom in the course of lectures. We chose to give many lessons about environment and environmental problems, especially for 12-13 years old students. And I think it is a good choice. In this way for example dealing with waste is more than part of a single lesson it is a daily routine. The pupils even developed a school law about how to deal with waste. All people in school, teachers and pupils, live up to this law!"

Organization and education in schools

Most of the schools had one teacher who coordinated the collecting of the PET bottles. The school coordinator was charged with informing the pupils, teachers and parents about the project. Another responsibility was to take care of the bookkeeping of the PET project. For every class records were kept of the involved pupils and the amount of bottles they collected. This job was often done by one of the pupils. The coordinator collected all the records. These records were used to award the pupils, but also to order more containers if necessary.

To give the recycling project more impact on pupils and to support the implementation of the project on schools Green Way developed an educational program. In the lessons pupils learn about local environmental problems like waste and pollution of air and water. More teachers got involved to give these lessons. To prepare them, Green Way organized workshops about the educational materials.

Introduction of awards

To stimulate the pupils to collect more PET bottles, a reward system was introduced for the best collectors. There were both prizes for schools (for example a colour television) and for individual pupils (from a small prize like a cap, to a big prize like a bike). But Green Way did not want to award only the top collectors. Therefore besides these prizes, every pupil who collected more than 100 bottles a year was made honorary member of Green Way. In this way all involved pupils received acknowledgement.



Costs and proceeds:

Costs

- individual awards 1 Euro / pupil
- school awards 125 Euro / school
- containers 60 Euro / school
- transport

Proceeds

- fee for collected materials
- subsidy
- sponsoring

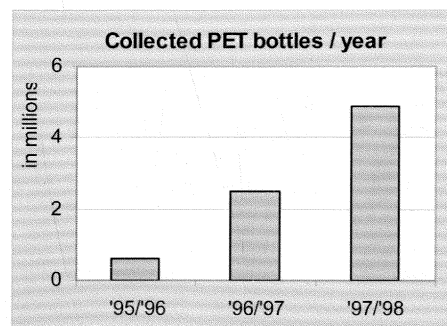
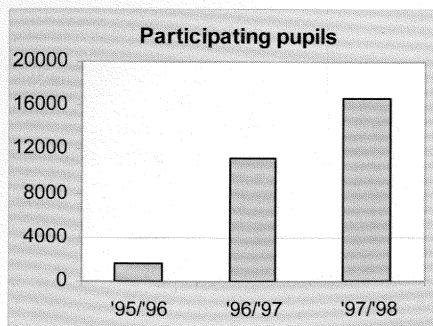
Stowarzyszenie GREEN WAY w Białymstoku	
	Legitymacja Członka Honorowego Nr 1186.
	PAULINA IGNATIUK
Data urodzenia... 28.08.1989 Adres zamieszkania... BIAŁYSTOK ul. BRONIEWSKIEGO 6c/28 Szkoła Podstawowa Nr 27...	
	
(Pieczęć Stowarzyszenia)	

Legitimations for pupils of primary schools as proof of being an honorary member of Green Way.

The introduction of awards is a difficult decision. First it runs into a lot of money. Second the collection of PET bottles should not be depending on awards, but should be done out of responsibility for the environment. On the other hand, in this way schools and pupils are rewarded for their efforts. And the awards are very effective. As a result of the introduction of prizes the number of collected bottles rose quickly. More and more pupils were willing to join. The average number of collected bottles was around 300 for every pupil.

Results

Between 1995 and 1998 the amount of collected PET bottles in and around Białystok reached a total of more than 8 million, from which almost 5 million bottles were collected just the last year. Just to compare, 400 million PET bottles were produced in Poland and another 100 million were imported in 1995. The number of collected bottles was not evenly spread over pupils. The top collectors handed in thousands to ten thousand bottles a year. These die-hard even continued collecting during the summer holiday.



Results of the PET recycling project: at the left participating pupils and at the right the collected PET bottles / year.

Transport and storage

The pupils collected large volumes of bottles. Most schools were not able to store many full big bags on the schoolyard. So through the year Green Way picked up the big bags with PET bottles and transported them to a local storage place. For this purpose they were allowed to use the grounds of the private waste carriers in Bialystok.

Once a year, in the summer holiday, Green Way transported all the full big bags from the local storage to the production plant of Hanex in Sokolka, some fifty kilometres from Bialystok. Hanex paid the costs of these transports.



How to organize transport and storage:

Who will take care of the transport: the factory, the recycling centre, the municipality or a private waste carrier? Preferably don't do it yourself.

Is it possible to store the collected materials at school? Think about volume, weight and smell. For a factory or recycling centre it is easier to pick up all the materials from one central storage place, but than you need local transport from each school to this storage.

“The distribution and the transportation of the big bags took a lot of time. All work was done at a voluntary base and we also had our normal daily jobs. This often meant long days of work,” tells Arthur Roskal of Green Way. “More and more schools were willing to join the program. In the second year already 64 schools were participating. From that point on I quit my job and started to transport the big bags with PET bottles full time.”

Pupils of primary schools with their collected PET bottles in big bags. Green Way transported the full big bags to a local storage, and once a year from the local storage to the recycling plant.

Forming partnerships:

In this way you can bring in additional skills, more financial and personal resources and build broader support. The alliances might include:

- a factory that takes material for recycling
- a recycling centre
- local businesses
- city or regional agencies
- schools and institutions
- non profit organizations
- funding organizations
- the municipality

Identify the support you want to get out of your partnership.

Identify the groups with an interest in recycling and waste prevention.

Show them how they can benefit. Come with comprehensive data and show the broader benefits of your recycling project.

Expanding of the project

Jarek Zgiet of Green Way continues: "At that time we found a new sponsor, or actually they found us. The Fund of Environmental Protection and Water Management approached us. Part of the deal to get sponsored was that we had to expand the PET project to other cities and villages. So I contacted the management of national parks in three nearby situated districts."

From that moment on Green Way no longer organized the start-up workshops for teachers. They taught the park officials how to give the workshops and how to expand the project to the primary schools in and around their parks. As a result in the third year 112 schools were participating. Most of the 'new' schools were able to store the big bags in their own schoolyard or at a local storage place. Nevertheless the transport of the big bags took a lot of time. Green Way was still taking care of this task.

At the end of 1998 Hanex didn't want to pay anymore for the costs of the transport from the local storages to the plant. Green Way was not able to pay these costs or to find a sponsor. The municipality of Bialystok didn't realise that this would break down the project. As a result the project stopped at most schools in Bialystok. In most of the villages in the districts surrounding Bialystok the project is still going on. Some of these municipalities implemented the PET recycling project at schools in their own waste management system, like Narewka did.

Ready for action

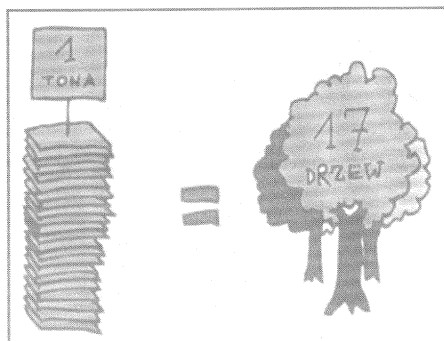
Jarek Zgiet: "Our success proves that teachers, pupils and society are ready for actions like this. However, when you want to start up a recycling project yourself you should not take the last phase of our project as an example. You can better focus at the way we started. Always start a project like this in your own environment on a small scale. Just start at your own school, in your neighbourhood or the municipality you are living in. Then you have the most chance to be successful."



Storage of PET bottles at the production plant of Hanex. Thanks to this PET recycling project a total of 8 million PET bottles were recycled between 1995 and 1998.

Education in recycling projects

For both the separate collection system of Narewka and the PET project in Białystok, primary schools occupy a special place. Not only are the pupils collecting PET bottles and aluminium cans, but also education about environmental problems and waste is introduced. Meanwhile this combination of action and education has proved to be of great value. And at least as important: pupils and teachers are really enthusiastic about it!



Environmental education

An important advantage of starting recycling projects at schools is the possibility to combine education about environmental problems with the action to solve these problems; they positively influence each other. More knowledge about environmental problems may stimulate the pupils to collect PET bottles or aluminium cans. On the other hand, lessons about waste and waste problems are more interesting when you are also helping to solve these problems!

From the beginning of the PET project Green Way, the organization that set up the PET project, strongly stimulated the introduction of environmental education. The volunteers of Green Way prepared lessons that could be used and adapted by teachers. For the lessons a new, more challenging, educational approach was chosen, the so-called 'interactive teaching method'. Workshops were organized to make teachers familiar with both the lessons and the new teaching method.

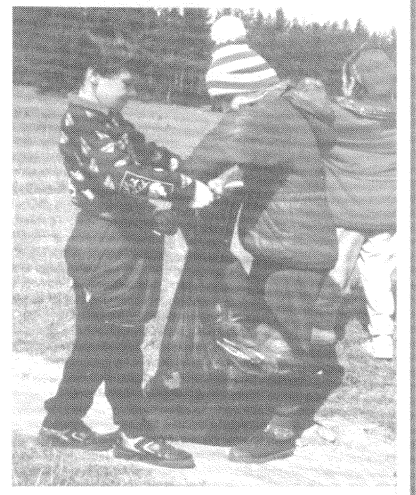
Lessons about the environment

Green Way prepared a set of lessons called 'School Agenda 21'. This name refers to 'Agenda 21'. This is an action plan set up by world leaders and environmental organizations to lead the world into the 21st century in a sustainable way. In the lessons several teaching methods are used, like lectures, mathematical tasks, practicals and role-plays. However pupils have to fulfil a great part of the tasks independently. This is characteristic of the interactive teaching method. The main objective of the lessons of School Agenda 21 is to give the pupils awareness about environmental problems in their own 'local' environment. In these lessons they have to examine, describe and analyse for example the surrounding environment of the school. By doing so they will find out themselves about local environmental problems, like the pollution of the air or the water.

There are several possibilities for using the educational materials. They can be used in a more structural approach (in normal lessons), but also to support a single project (for example an action day like 'Clean up the world'). The lessons are prepared in such a way that they can be used in different types of lessons, from biology and ecology to history and mathematics. The educational materials are suitable for several levels, so they can be used in different classes. Finally the materials can directly be used, however teachers are stimulated to change the lessons according to their opinions and their specific situation.

Subjects dealt with in School Agenda 21:

1. Make a map of the school and the surrounding areas.
2. Look for trees, bushes and other plants in this area. Determine the kind and size of the plants and make a note of them in your map.
3. Study the health condition of the trees.
4. Look for animals in the surrounding of the school and determine their kind.
5. Make inventories of air pollution in different ways. Count for example working chimneys on houses, chimneys on factories or the amount of cars passing in a busy street. With this information estimate the amount of carbon dioxide emitted in the surrounding of the school.
6. Study waste. Measure the total amount and the amount of the different fractions of your own household waste. Make an inventory of illegal garbage dumps in the city. Make a proposal for a school law about how to deal with waste.
7. Make an action plan of the actions you intend to take for next year.



The interactive teaching method

In the interactive teaching method the pupils are 'learning by doing'. They have to fulfil tasks, working in small groups. The groups independently have to find out how to do the tasks. They also have to make an allocation of the tasks. So in the interactive teaching method the working method of the pupil takes a central role, not the information gathered and learned. Some examples of the subjects can be found in the textbox.

Artur Brzezinski, a teacher and writer of the educational materials, explains some advantages of this way of learning: "Simply transferring knowledge to pupils is not enough. The pupils need to do something themselves, like a practical. In this way they are going to think for themselves, especially when not all the parts of the practical are shown before or explained in detail.

Artur Brzezinski, teacher and writer of the lessons, about the enthusiasm of the pupils: "Children have very much energy: they can't sit still all day and listen concentrated to a teacher. In the interactive teaching method they can take 'action' themselves, and they love it! And when the environment becomes cleaner they can see the effects of their work. In the case of the recycling projects they even can win awards!"

Pupils forget facts learned by heart. Or the facts get out of date and are no longer useful. But pupils can keep using the method of thinking we taught them. They can use the experience of looking for and analysing information, reporting, making decisions, taking actions and getting results; and not only in the ecological field. They can apply it in many other fields, both in daily life and in their later career.”

The classical Polish teaching system emphasizes learning facts by heart. So the interactive teaching method is new for most teachers in Poland. It has proved to be relatively easy to use the interactive teaching method in primary schools. For secondary schools it seems much harder: students have to learn a lot of specific facts and methods, leaving not much time for learning by doing.

Learning by doing in a role-play

Jarek Zgiet of Green Way gives an example of the tasks the teachers have to fulfil during the workshop. “The teachers are split up in several groups to solve a ‘realistic’ problem: a PET bottle fabric wants to start a plant in a local park. Some group represents the management of the plant, other groups the residents, the municipality and an environmental non governmental organization. Then the groups start negotiating. Every group has arguments pro and against the plant. A new plant will bring new jobs, the local park was not really well maintained and the direction of the plant is willing to give a donation for a new park. But on the other hand a new plant can bring extra waste and polluted gas in the neighbourhood, and the residents are prepared to fix and improve the old park. Finally the groups have to reach an agreement. Most of the time they don’t succeed. It’s remarkable that pupils almost always reach an agreement, when the same role-play is used in their lessons.”

Workshops

The workshops to prepare the teachers for the environmental education combine several goals. First and most important is to get some experience of the interactive teaching method. Jarek Zgiet of Green Way, also leader of the workshops explains this purpose: “At the workshops we are trying to teach the teachers how to teach. We give them the fishing equipment, they do the fishing and each in his or her own way.” In the workshop the teachers themselves are learning by doing, like the philosophy of the interactive teaching method. Of course they can ask for coaching, from the leader of the workshop and from the other teachers who are participating. For the teachers it is important that they can share their experience with each other. A second purpose is to become familiar with the environmental educational materials for the pupils. The teachers will also learn some facts about environmental problems. The last but not least purpose is to make the teachers enthusiastic: both for the way of teaching and for the environment.

Start yourself: what to do?

Recycling projects on a small scale can be really successful. You can start a recycling program by yourself. This chapter is intended to be helpful and instructive. It deals with setting up a recycling project. In this case, the collecting of materials is combined with environmental education. Teachers of primary schools and non governmental organizations are the best partners to jointly initiate such a project. But of course others – other teachers, management of national parks, regional environmental education centres, municipalities and consultants – can also use this information to start up a comparable project.

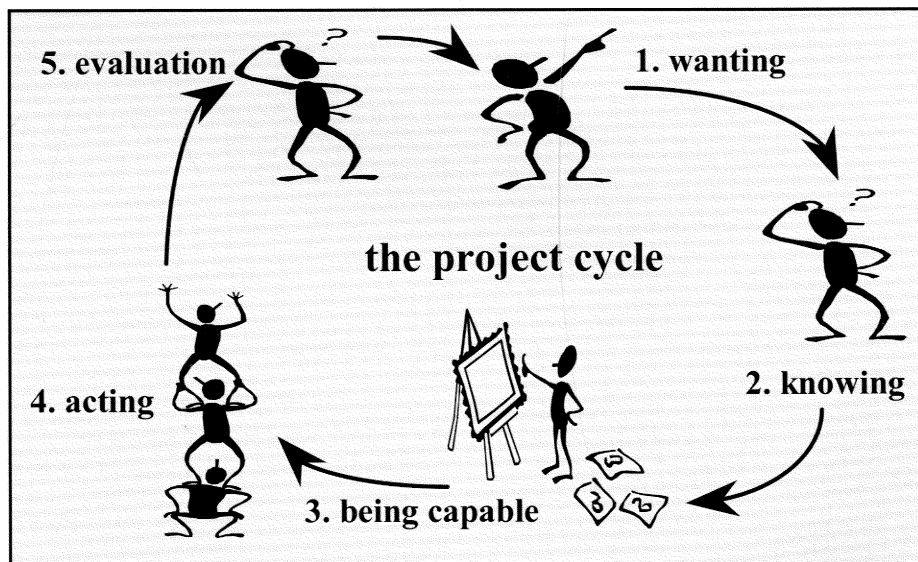
A project runs in general in a circle, the project cycle. This accounts for the phase of the idea, the phase of the development of the project, as well as the phases of implementation and evaluation. Often a project begins with the urge to do something (wanting). Orientation is a necessity to improve your knowledge (knowing). With the help of some instruments (being capable) you are ready to start (acting). It's good to look over your shoulder after a period of running the project (evaluation). Being critical will give you insight in strong and weak points.

Steps to be taken:

1. Raising of awareness
2. Making a feasibility study
 - 2.1. Looking for stakeholders and finding the market
 - 2.2. Preparing the collection system
 - 2.3. Describing costs and benefits
3. Forming partnerships
4. Starting collection

stakeholders like the municipality, a waste carrier or a recycling centre?

The project cycle accounts for each step. You can go through each step several times following the project cycle, before



Four steps can be identified for setting up a recycling project. This chapter explains all the steps in detail. The order of the first two steps can be changed. Raised awareness in society makes it easier to implement a recycling project. But it also works the other way around: a good plan for a recycling project can help raise awareness in society. Which steps are of interest for you depends on your own situation. Do you already have an educational program on the environment running in schools? Are there possibilities to cooperate with other

you go on to the next step. But the project cycle also accounts for the whole program of setting up a recycling project, as will be explained. Maybe you are considering to start a recycling project yourself. Having this idea puts you in phase one. This brochure is about knowing how and being capable of doing it. If you bring the four steps into practice you are acting, after which evaluation can follow. And after that the project cycle can start all over again for making improvements or expanding your recycling project.

1. Raising of awareness

To raise awareness in society Green Way involved pupils of primary schools in their recycling project. This cleverly combined the availability of a 'lot of helping hands' with the pupils propagating the idea of separation. For that reason environmental education was implemented in the beginning of the recycling project. First of all to make the pupils themselves, the future collectors, more conscious about environmental problems and possible solutions. It also was a perfect method to inform their parents and other members of society on the present state of the environment. This had to make them more receptive to the recycling project: raising their awareness and developing their will to separate, would help to create a supply of PET-bottles.

When schools are involved in your recycling project, informing pupils and parents can be done by the involved

teachers. Possibly you can also print additional instructions for each pupil and each household in the municipality. Or you can make a poster that you can use both in the schools and for the residents in the city. Besides this you can use the media to communicate with citizens. In smaller villages every good initiative will be discussed by everyone in no-time. In bigger cities you should use the media, for example the local newspaper or radio. Make sure that you inform the media about concrete results or actions that are interesting for a larger public.

When no schools are involved in your recycling program, instructions and a good communication through the media becomes even more important to raise awareness. Media attention is also positive for your partnerships. Most of your partners, like businesses and the municipality, will like it when they receive positive attention.

Five tips from Green Way to involve primary schools to raise awareness:

- Don't start too big or too small. Preferably start the recycling project with teachers of five schools, each school represented by at least one teacher. Starting with less than five schools or even one school is practicable, but it can make it more difficult to realise a feasible collection system later on. Starting with more schools will make it more difficult to manage the project.
- In general the teachers will be responsible for the environmental education and later on for the organization of the collection system at school. To find interested and enthusiastic teachers you can send letters or flyers to schools in the municipality or region. You also can approach the regional environmental education centre or the centre of training of teachers. Maybe they can help you.
- It's necessary to prepare the teachers that will be involved with environmental education knowledge. Organizing workshops has proved to be a good way to prepare them. Best is to organize the workshops outdoor, so the teachers can focus completely on the workshop.
- Special educational materials have been developed in combination with this brochure. There are several possibilities to use these materials, for example as support for an action week or in a more structural approach in normal lessons. The educational materials are suitable for several levels, so they can be used in different classes. And the lessons are prepared in such a way that they can be used in different lessons, from biology and ecology to history and mathematics.
- Regularly organize meetings for the teachers who are responsible for the organization of the collection system at the schools. In these meetings practical problems can be solved. Teachers also can share their experiences.

2. Making a feasibility study

In general a feasibility study is an analysis of a problem and several options for solutions. These options are described and 'costs' and 'benefits' are weighed. This enables a choice between the options. It is more easy to analyse only the option that you think is best and make a feasibility study just for this single option. On the basis of your feasibility study you must take a decision: go or no go. If you believe in your project up to that point, you move on to the next step, forming partnerships. If

not, you can choose another option and make a feasibility study once again (a new circle in the project cycle), or you can decide not to go any further.

A feasibility study on a recycling project contains a few key items. First, looking for stakeholders and finding the market, the organization who will take in the collected materials. Second, preparing the collecting system. And last but not least, you have to describe the costs and benefits of the system.

stakeholders	current situation	future situation
company producing soft drinks (in PET bottles)	producing and selling filled PET bottles (no deposit)	producing and selling filled PET bottles (no deposit)
store	selling bottles	selling bottles
consumer/household	consuming soft drinks and disposing PET bottles as garbage	consuming soft drinks and separating PET bottles
primary schools	- - -	collecting PET bottles
(private) waste carrier	collecting household waste (including empty PET bottles), disposing in a landfill	collecting household waste (excluding empty bottles), disposing in a landfill
PET recycler	- - -	using PET material of bottles in production process
municipality	responsible for waste treatment	responsible for waste treatment

In this table the role of the stakeholders is compared in cases of non-separation of household waste (current situation) and separate collection of PET bottles at primary schools (future situation).

General point of attention: finding organizations

During the project you have to approach several organizations: factories, recycling centres, funding organizations, et cetera. You can find these organizations in many ways. At the municipalities office or the Chamber of Commerce you can look for companies and organizations. You can also use the telephone guide or the Yellow Pages. And approach national Polish environmental organizations, for example Green Net (a network of environmental ngo's and consultants): they may have databases of environmental engaged organizations, like recycling companies. The Catalog of Nongovernmental Environmental Initiatives can also be helpful: free.ngo.pl/catalog/main.htm

2.2. Preparing the collection system

Before you can prepare the collection system you have to choose a material to collect. The importance of a factory or recycling centre is already dealt with. Take enough time to look at all the possibilities, because the decisions taken have large impact on the project. The most basic questions are:

1. Make a choice of a material: aluminium (for example beer cans), PET plastics (for example soft drink bottles), iron, glass or paper. What materials are present in the domestic waste? Use for instance the results of the lessons in which pupils analysed their own garbage. How easy is it to control the quality of separated materials? Contamination of the material will make it difficult to

2.1. Looking for stakeholders and finding the market

Two basic questions need answers, in case you are considering starting up a recycling project. How is the domestic waste treated currently and what will it have to look like after you implement your recycling project? It's good to analyse the route of the material you would like to collect and the stakeholders involved, both in the current and in the intended future situation. From a comparison between these two situations you can make a forecaste of the contribution of all involved stakeholders. Also it will become clear who the new stakeholders are: the collector and the recycler of the separated material.

The most important stakeholder is the organization who is going to take in the collected materials. Is there a factory or a recycling centre nearby that is willing to accept the collected material? Or can you cooperate with your municipality, if they are already recycling materials? If it happens that you can't find such an organization, then don't start a recycling project.

If you have some idea which material you would like to separate and recycle, you know what factory or recycling centre to look for. But you can also work the other way around: first find a factory or recycling centre to cooperate and then look for the materials they will accept.

recycle. For the current situation in Poland the best material to choose is probably aluminium: little weight and a relatively high price.

2. How much of the waste material can you collect? In the described projects pupils collected an average of 300 PET bottles or 120 aluminium cans a year. For other materials assume that you'll collect about 40% of the waste component present in the domestic waste of the served households. Use also the results of the lessons in which pupils analysed their own garbage.
3. In which cheap and practical way can you collect the material: plastic bags, containers, boxes, or bins? It must be easy to place, remove and transport. If used at schools, they can't be too big and have to be safe.

4. How can you organize the storage?
In case primary schools are involved: is it possible to store the collected materials at school (think about volume, weight, smell)? Or do you need a local storage place, maybe shared by several schools? For a factory or recycling centre it is easier to pick up materials from one central storage. But then you will need transport from each school to the local storage.
5. How can you organize the transport?
Is a specific vehicle needed for the transport? Who will take care of the transport: the factory, the recycling centre, the municipality or a waste carrier? Preferably don't do it yourself.

2.3. Estimating costs and benefits

For the considered option costs and benefits should be weighted. Which expenses and which revenues are to be expected? Expenses can be containers, transport and rewards for students. Can you get money from the recycling industry for the collected material? Or maybe free service, like transport and storage of the material, promotional materials or prizes? Is it possible to have the municipality fund the project or to get sponsoring from the recycling industry or local business? Can you balance the estimated budget?

Assess the value of the recycling program according to the value of collected materials and the amount of waste diverted from disposal resulting in cost savings. Try also to clarify other results than the quantity of materials collected, for example the number of pupils participating, the increase of knowledge by pupils and by the community about waste and recycling and the expected degree of media coverage.

3. Forming partnerships

After you have made the feasibility study you know the strong and weak aspects of the project. Many times weaknesses are the limited financial and personnel resources. And maybe there is a lack of expertise in some fields. A solution for limited financial means or lack of specific knowledge can be found in forming new partnerships. In this way you can bring in additional skills, but also build broader support.

Identify the groups with an interest in recycling and waste prevention. Try also to clarify the range of organizations or individuals benefiting from the recycling program. This means you have to check your list with stakeholders from the beginning again. Your alliances might include local businesses, city or regional agencies, other schools and institutions, non-profit organizations and funding organizations.

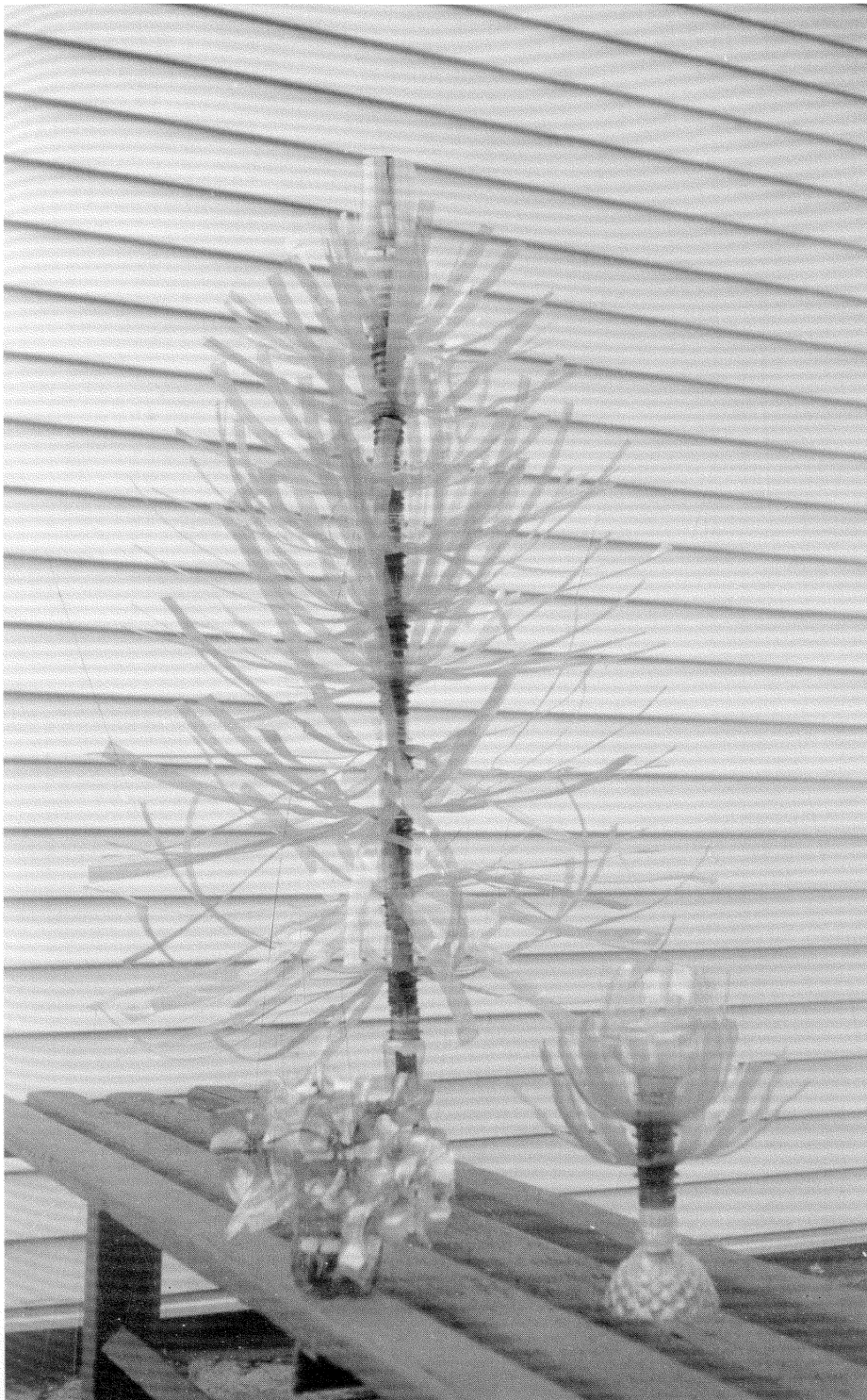
In the feasibility study you documented the broader benefits of your recycling project. These will help you to recruit others to support your program. The more organizations support your project, the more consideration it will get.

Especially getting some important (well known) persons involved, will be good for your project's image and trustworthiness. And maybe their connections can be useful for organizing practical things or getting a sponsor.

General point of attention: applying for funds

To cover the costs it is important to look for sponsors. But you can also apply for funds, in Poland for example for the Fund of Environmental Protection and Water Management. This funding organization operates on different scales: national, regional and municipal. An application to this fund must at least contain:

- A careful description of the project. The project must be part of a wider system. For example Green Way set up the PET bottle recycling program, but it also made it possible to introduce educational programs on schools and for Hanex Plastics to start up a recycling process.
- A financial budget of expected costs and benefits and the amount of money you are applying for. Your organization has to prove that it spends time and money to execute the project. The Polish Voivodship Fund (regional scale) pays a maximum of 50% of the total amount of money needed.
- The tasks and responsibilities for all parties involved.
- The area the project will serve and the goals that are set for the project.
- You have to prove that your organizations co-operates with other organizations.



The Christmas tree and the other plants were made for a national competition about using waste materials. Elzbieta Chmielewska, teacher at a primary school in Hajnowka, supported her pupils to compete in this contest: "A good teacher is just like a dustman: never throwing anything away. All waste materials can be reused in the classroom to make new things of, especially in handicraft lessons!"

Last but not least, try to involve the municipality if it is not already involved. As you read before, in Poland each municipality has by law a responsibility for collecting and treating household waste. On the other side municipalities often have limited financial and personnel resources. Many times you might find a lack of institutional priority for achieving waste prevention and recycling. So be sure to come with comprehensive data and show the broader benefits of your recycling project. Based on the feasibility study you know what you can offer the municipality and what you want the support from the municipality for. This can be for example storage, transport, money or maybe publicity. Don't do this alone, but as a group with all stakeholders involved. You'll be much more convincing.

4. Starting to collect

You have answers now to three questions. What material are you going to collect? How are you going to collect? And who will be participating? These answers enable you to make an activity plan. Start to make a detailed planning scheme with all the actions to be taken, including the party or person responsible for fulfilling the activity, the efforts it takes (financial and time) and the expected results.

Finally you can start the collection system! A lot of practical tasks have to be done. Evaluate how your project is running and make improvements (again a new circle in the project cycle). It is very important to deal with problems that appear, to make sure that the parties involved don't get discouraged. If your project proves to be successful you can start thinking about expanding the project. But not before you have assured yourself that you or the organization can handle an expansion.