



DYNAMIX policy mix evaluation



Reducing municipal waste at the local level
in Slovakia

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1 Resource/Issue

Name of resource targeted (or focus of the case study, if the policy mix is broader than the specific resource(s) we have decided to analyse).

This case study tackles management of municipal waste.

2 Geographical area of policy mix coverage

Country name, and region or city if appropriate (if policy mix is applied regionally or locally)

The area assessed is the Municipality of Palàrikovo, a region of Nové Zámky in Slovakia, which is a rural town with around 4,500 inhabitants.

3 Policy context

3.1 Needs assessment: The environmental problem/resource challenge

What is the environmental problem/concern (consider both quantity and quality), e.g. soil erosion, excessive use of non-renewable or renewable resources and the crossing of environmental thresholds/tipping points for impact, resource scarcity concerns?

Are there any economic or social problems related to the issue and environmental problems – e.g. is there important price volatility, (risk of) unavailability of resources for the economy or society?

Who is the target group affected that have been, are or will be beneficiaries of the policy response?

Until 1999, the Municipality of Palàrikovo was disposing almost all of its generated waste at the local landfill, in the proximity of Palàrikovo.

The impetus for changing the approach to municipal waste management was the need to close the old municipal landfill in 1999, due to stricter national legislation,¹ although no particular environment issue was affecting neither the municipality of Palàrikovo, nor to the region of Nové Zámky. The decision of Palàrikovo Municipality to opt for an alternative to landfilling was therefore driven mainly by the necessity to save on municipal budget and not to target any environmental issue. Thus, in 1999, the Municipality started implementing an integrated waste management system based on recycling and composting principles.

Landfilling is the less preferable waste management method due to the high amount of material discarded in the environment. The increasing problems concerning resources scarcity and depletion the world has been facing since the past years, cannot justify the loss

of resources (which can be used as secondary raw materials and energy sources) generated from waste. Moreover, landfilling aggravates environmental degradation: soil and water contamination, dispersion of hazardous/toxic substances in the environment, greenhouse gas emissions, risk of explosions, landscape degradation, etc. Thus, avoiding landfilling and promoting waste recycling has had reinforced interest at international level due to resource scarcity and the need to halt environmental degradation.

The major economic issue related to the decision by Palàrikovo Municipality to choose another waste management system was related to the need to close the local landfill and to find an alternative method for the disposal of waste.

The first step taken by the municipality was an analysis on the existing situation in order to determine the composition of municipal waste and to assess the feasibility of disposing waste into another landfill. The municipality concluded that preservation of the existing system of deposition of waste to a landfill would have been significantly more expensive than previous years (Moňok 2006).² Furthermore, it concluded that if for people to have incentives to separate household waste, a comfortable system of collection would have to be created, while keeping a cost effective system.

The main effect of the policy mix is expected to be in the municipal budget, since the main driver of the policy was economic. To a broader extent, inhabitants are indirect beneficiaries of the policy response as the savings from waste management can be used for financing other services (creation of infrastructures, education, etc.) and since the employees in the waste collection centre sited in Palàrikovo belong to a socially marginalised group (see also paragraph on social assessment).

3.2 Policy context and policy needs

What policy challenge(s) did the problem pose and what policy challenges does it still pose?

What is the policy context related to the policy mix being evaluated? What policies have been put in place to address the issues, what policies are currently in place and which ones are already foreseen for future introduction (e.g. to address past, existing and future objectives)?

What sort of policy response did (and does) the problem call for?

The main policy challenges identified within the Palàrikovo case study are related mainly to the necessity to achieve high participation of inhabitants in the separation and collection process, and to prevent behaviours such as illegal dumping. In addition, Palàrikovo also had to comply with national legislations on municipal waste management, and with mandatory collection targets to get the funding from the deputed national body (the National Recycling Fund).

The policy context has been shaped by several laws and regulations. In 1991, Slovakian government started closing operated landfills and upgrading their technical level. In 1992 the national regulation on landfills was amended (Slovakian Governmental Regulation No 606/1992 Coll. on waste management) and landfills that did not comply with the requirements were closed. This process continued until 1997, when the main document regulating landfilling, was further amended and first standards STN 83 81 01-05 on landfills were published (State of Environment Report of the Slovak republic 1994).³

In late 1990s Slovakia started the negotiation process to join the EU, which implied adapting national legislation according to EU requirements. At EU level, the Landfill Directive 99/31/EC establishes targets for landfilling, biodegradable municipal waste and municipal waste

recycling. For example, biodegradable municipal waste going to landfills must be reduced to 75 % of the total amount (by weight) of biodegradable municipal waste produced in 1995 or the latest year before 1995 for which standardised Eurostat data is available. Within EU Member States, 12 countries (including Slovakia) have been given a derogation period of 4 years for all targets, meaning that they must reach their targets by 2010, 2013 and 2020 if landfilled waste in 1995 exceeded 80 % of total waste generated (Council Directive 1999/31/EC).⁴

To comply with EU regulation, in 2002 the Waste Act, known as “new Waste Act”, was amended. (Act No. 223/2001 Col. on Waste and on Amendment of Certain Acts as later amended: acts No. 553/2001 Col., 96/2002 Col., 261/2002 Col., 393/2002 Col. and 529/2002 Col.). The act regulated waste collection in municipalities, aiming of implementation of the strategies by 2004, and set collection and recycling targets to be achieved.

In addition, the Slovak Republic set a National Recycling Fund as an economic instrument to support municipalities in implementing waste separate collection, recovery and processing (the Regulation of the Ministry of the Environment of the SR No. 516/2001 Col. on rates for calculation of the fees to the Recycling Fund as amended the Regulation of the Ministry of the Environment of the SR No. 337/2002 Col. and the Regulation of the Ministry of the Environment of the SR No. 733/2002). However, the main future policy challenge is related to the fact that the National Recycling Fund, an essential instrument for Slovakian municipalities to manage waste, will probably cease to exist within next years. Thus, it is not clear to Palàrikovo Municipality how it will be possible to keep this system working.

The problem was posed as a municipal budget problem. Possible policy responses to increase municipal budget are very diverse (e.g. increase of taxes on goods, increase of charges for licenses, etc) and not necessarily related to environment. Still, the Municipality chose to mobilise the solution to the problem around environmental issues.

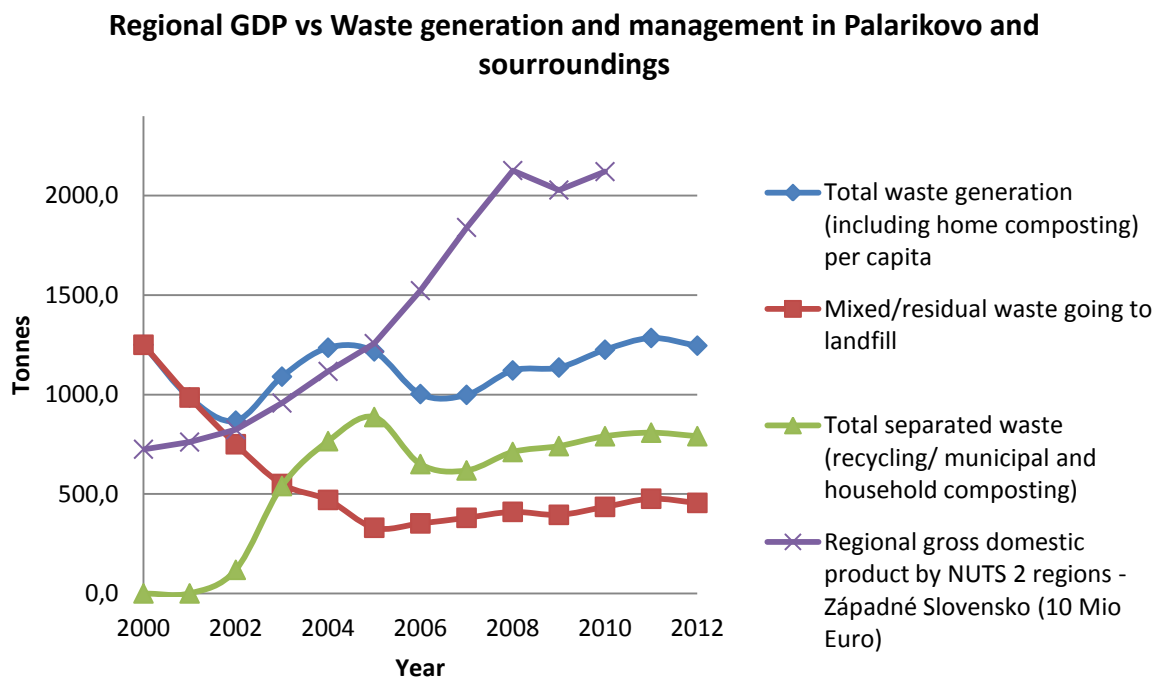
3.3 Historical performance and projections into the future: Insights on decoupling

What has been the trend vs. GDP (or other economic performance metrics, such as sectoral growth) and what type of decoupling has been achieved?

Palàrikovo has managed to achieve impressive results in terms of decrease of waste going to landfill and increase of recycling and composting since 1999. **Error! Reference source not found.** benchmarks total waste generation in Palàrikovo, total separated waste (including recycling and composting) and total landfilled waste (in tonnes) against the Regional Gross Domestic Product in Zapadne Slovensko, (the region Palàrikovo is belonging to according to NUTS 2 codes), expressed in 10 million Euro (Eurostat 2012).⁵ The latter is thus expressed with a different unit and refers to a broader area. Still, it can be argued that while total waste generation has remained steady, Palàrikovo achieved notably results in terms of decrease of waste going to landfill (a reduction of about 64 % since 1999) and of recycled and composted waste (about 64 % of total generated waste in 2012). In recent years, the amount of total generated waste has been floating between 1,000 and 1,250 tonnes per year since 2000. The GDP in the region of Zapadne Slovensko shows a positive trend since 2000, with an expected stagnation in 2008 due to the global crisis.

Given that the economy in the region kept growing, the output material flow in Palàrikovo (indirectly related to total material consumption) has remained steady, the amount of recycled and composted waste has increased and the landfilled waste has decreased, it can be than argued that relative decoupling has been somehow achieved, as recycling in general decreases the rate of resource depletion. However, it is yet not possible to determine if absolute decoupling has been achieved as data do not directly refer to resource use.

Figure 1: Palàrikovo waste management policy mix instruments and their actual and performance towards decoupling, 2000-2012



Source: Author's compilation

4 Drivers affecting change: resource use/ environmental issues

What are the drivers affecting resource use (driving demand for the resource and leading to resource overuse) or other environmental impacts?

The drivers affecting resource use are related to production of waste, such as household incomes, lifestyle changes and consumption patterns.

Palàrikovo Municipality's population was around 4,500 inhabitants in 1999, when the waste generation was around 1,300 tonnes, mainly due to biological waste (around 50 %) as the community of Palàrikovo is in a rural area and most households have gardens.

5 Situation/trend prior to introduction of policy mix

Information on the baseline situation before the policy mix was introduced.

In 1999 (before the introduction of the first policy measures), the municipality of Palàrikovo had 4,380 inhabitants living in 1,618 housing units, 1,165 of which lived in family houses and 600 of which lived in 34 blocks of flats. The total amount of landfilled waste was around 1300 tonnes (about 300 kg/ inhabitant and per year). This figure was slightly higher than the national average, reported to be around 250 kg/inhabitants/year (EEA 2013).⁶ Before the application of the policy mix the collection rate of sorted waste was close to zero, as no collection system for sorted waste was effective. The waste produced in Palàrikovo was entirely disposed of through a local landfill located at about 15 km from the municipality.

6 Description of policy mix(es)

This section presents the main policy mix that will be the focus of this ex-post assessment.

Lifecycle focus (point of application(s))

of the policy mix):	End of life of products
Sector(s) covered:	Waste management
Scale of application of policy mix:	Local level, mainly
Implementing body:	Municipality of Palàrikovo
Objective of policy mix:	Save money on municipal budget.

6a. Supplementary context questions including elements pertinent to paradigm discussions in DYNAMIX

Timeline for the different phases of the policy cycle (i.e. rationale and objective-setting; appraisal; implementation and monitoring).

Description of the government in power during each of the three following policy phases: rationale and objective-setting; appraisal; and implementation and monitoring.

Does the mix contain policies that are unusual or not typical of the country/ies or regional/local administration that implemented it?

Names of resource efficiency concepts, terms, models, ranking/classification systems, accounting methods etc. used or relied upon in each of the three phases of the policy cycle: rationale and objective-setting; appraisal; and implementation and monitoring, and how they were used (e.g.: ‘waste hierarchy’ – used in objective-setting to link policy objectives to more desirable uses for waste).

In the case of Palàrikovo, the different phases of the policy cycle (rationale and objective-setting; appraisal; implementation and monitoring) occurred in a random way, thus no clear sequence was identified. For instance, some instruments have been introduced before any rational objective was set, and the first monitoring was performed before the appraisal.

The first steps of the strategy were in 1999 by promoting home composting, but without any clear data or objective. From 1999 to 2002, the first materials were collected and awareness to people was provided but again without any clear objective beyond saving on municipal budget. The proper implementation of the policy mix happened in 2004 with the implementation of a better structured waste management system and the creation of the association of municipalities in the surroundings of Palàrikovo. The first monitoring happened in the same year, when Palàrikovo asked for the grant to the Recycling Fund and the first targets on collected materials were set. Also, the PAYT scheme was introduced in 2006, when the stagnation in the amount of collected materials was monitored. Thus, the policy mix was not implemented according to an ordinary policy cycle, but it was rather a learning process where measures were often introduced according to intuition of policy makers.

In 1999 Slovakia was still not part of the European Union, but its membership was under the negotiation process. In January 1999, Parliament passed a constitutional amendment allowing for direct election of the president. Kosice Mayor Rudolf Schuster (independent party at the time of the election) was elected president on May 1999, took office on 15th June 1999, and remained in office until 2004, year in which Slovakia enters the EU. On April 17, 2004, Ivan Gasparovic (movement for democracy), a former Meciar deputy, was elected president and was re-elected to a second 5-year term on 4th April 2009. (Presidency: First half-year Ireland; second half year: Netherlands). Still, it was not possible to determine the composition of the local government.

The two main paradigms analysed are the Waste Hierarchy and the concept of Zero Waste. In both cases, it was interesting to notice how the paradigms were interpreted.

The Waste Hierarchy was first introduced within the document: "Thematic Strategy on Waste Prevention and Recycling" under the 6th Environment Action Programme of the European Community 2002-2012 and ranks as the most environmentally sound strategy for municipal solid waste, emphasising prevention, reuse, recycling and recovery rather than landfilling. A substantial part of the funds necessary to run Palàrikovo waste management system comes from the National Recycling Fund. The Recycling Fund sets established quotas of collected materials that Municipalities have to fulfil in order to get the funding. Thus, the controversial aspect of this system is that the Municipality is actually incentivised to produce waste instead of preventing it, and by promoting recycling the opportunity to reuse waste is also missed.

Palàrikovo's strategy is also often referred as a "Zero Waste Strategy", and according to Friends of the Earth Slovakia (FoE), it was the first Slovakian Municipality implementing a Zero Waste Strategy. In principle, Zero Waste maximises recycling, minimises waste, reduces consumption and ensures that products are made to be reused, repaired or recycled back into nature or the marketplace (Grassroots Recycling Network).⁷ As explained above, Palàrikovo needs to focus its efforts in collecting a sufficient amount of materials, thus it discourages practices that would help in reusing or even preventing waste production. In this context, the definition "Zero Waste" has to be interpreted more as "zero waste to landfilling".

6b. Instruments and orientation of policy mix

Instruments in the mix and whether one type of tool (i.e. regulatory, economic, information) is dominant.

For each instrument, what is its aim? What requirements does it place on relevant players (for example, phasing out a certain substance, meeting minimum recycling targets, etc.)? What reporting requirements exist?

A variety of policy instruments has been applied during the past 14 years. In some cases the role of the instruments has been changing during the years: for instance the PAYT scheme was only introduced in 2006, but it is considered to be a crucial instrument of the policy mix. For this reason, we refer to the policy mix as it was in 2012.

The most important **regulatory** instruments identified are: implementation of stricter requirements for landfills at national level (Slovakian Governmental Regulation No 606/1992 Coll. on waste management), the implementation of the Waste Act in 2002 and the implementation of the National Recycling Fund in 2002.

New requirements for landfilling in 1992 intended to meet environmental needs. Stricter requirements for landfills concerned the operational characteristics, the technical/natural features of landfills, and the categories of waste suitable or not for landfilling. In particular, new requirements prohibited the functioning of landfills with a natural clay layer or too closed to inhabited areas (for example the one serving Palàrikovo). As a result, 362 landfills were closed between 1999 and 2000, including the one serving the Palàrikovo Municipality.

The Municipality undertook a financial assessment to understand the cost effectiveness of disposal of its waste in another landfill, but this was considered too expensive due to transport costs and dump fees. The restriction was the cause/ external condition necessary to stimulate the change towards alternative solutions to landfilling, rather than a part of the policy mix. It is evidenced as restrictions on landfilling could not be a sufficient instrument alone and negative effects (as the creation of illegal dumpsites) could be generated if no alternative for waste disposal was provided.

The other change in the national legislation happened in 2002 with the publication of the Waste Act. This document regulates household waste collection and sets the recycling targets municipalities have to fulfil, thus it was the legislative driver to implement an environmentally oriented solution.

The Recycling Fund is a non-state special purpose fund to pool financial means to support the collection, recovery and processing of concretely stipulated waste streams. The contributions to the Recycling Fund are paid by the producers and by the importers of stipulated products in accordance with the customs tariff book, and are obtained by multiplying a charge and the quantities of products or materials for which the contribution is paid. The charge is determined from the predicted costs of collection and recovery of waste resulting from those.

The Recycling fund amount received by municipality is calculated based on certain quotas of materials collected, as expressed in the table:

Table 1: Slovakia's National Recycling Fund targets for collected materials (in Kg)

Material	2009	2010	2011	2012	2013
Plastic	275	350	450	550	580
Paper	200	250	310	370	430
Glass	150	200	250	300	350
Metals	15	20	25	35	45

The Recycling Fund provided the necessary funding for the municipality of Palàrikovo to implement an integrated waste management system: for instance, in 2009 the total contribution of the Recycling Fund was 220,540 Euro, which was invested to buy a car press, containers and container lifters.

The integrated waste management system is the **structural** instrument by which it is possible to collect materials and to introduce them into the recycling market. In Palàrikovo it is organised in a collection centre equipped with a waste pressing machine and waste sorting operators. Both sorted and unsorted waste is collected door-to-door and the Municipality is also equipped with centres for municipal composting. Some examples of sorted materials include: cardboard, food carton packaging, more types of plastics and plastic cups, metal and metal packaging, textiles, waste electrical and electronic equipment, cables, tyres, batteries, bulky waste, light bulbs, shoes, textile, toys, and kitchen oil and fat. Since 2006, the collection centre in Palàrikovo is also collecting waste produced by 29 surrounding municipalities that joined into a local association for managing waste (Palàrikovo Regional Collection Yard). The fund received from the Recycling Fund is divided among the municipalities according to the amount of recycled materials each of them have produced.

The collected materials are sold on the market. To further process collected and separated materials, the Municipality has contracted different companies operating at national and international level in the recycling sector. The Municipality of Palàrikovo, together with the network of companies contracted, perform a constant monitoring of secondary raw material prices in order to establish if it is economically viable to sell them.

The participation of inhabitants in proper waste sorting is crucial in order to guarantee the efficiency of the integrated waste management system. Until 2006 this was organised according to a lump-fee scheme (**market based instrument**), and participation was voluntary: inhabitants wanting to participate in the scheme had to sort organic waste. A collection truck was driven around the municipality to collect residual waste and organic waste, while an inspector was checking and reporting who was sorting organic waste. Finally, every 6 months the Municipality would calculate different waste charges for each inhabitant (about 7.40 Euro for those not sorting waste and 4.70 Euro for those sorting waste). This scheme enabled the Municipality to reach about 80 % of participation.

In 2006, as the amount of collected materials started to stagnate, the need for further stimulation of participation was recognised. A "Pay As You Throw" (PAYT) scheme was introduced, charging residents for the collection of municipal solid waste—ordinary household trash—based on the amount in token units thrown away, while the collection of sorted waste is free of charge. This is an economic incentive to increase recycling and to generate less waste. The Municipality started selling 100-liters token for collecting residual waste at a price of 1.30 Euro and organising the collection door-to-door, thus only the token sold by the Municipality will be collected. Nowadays, the system is more developed so that each token is

registered with a bar code, enabling the Municipality to cross-check who bought the token and how many are missing, and to plan the collection in advance. This new system improved the motivation to separate waste. But, to further stimulate participation, the price per token was raised to 1.80 Euro in 2010. In addition, since 2006 transparent bags are distributed for free to sort waste, which are collected monthly. The waste is then transported to the collection centre and separated again according to the content. In some municipalities joining the Regional Collection Yard, the collection is not yet door-to-door.

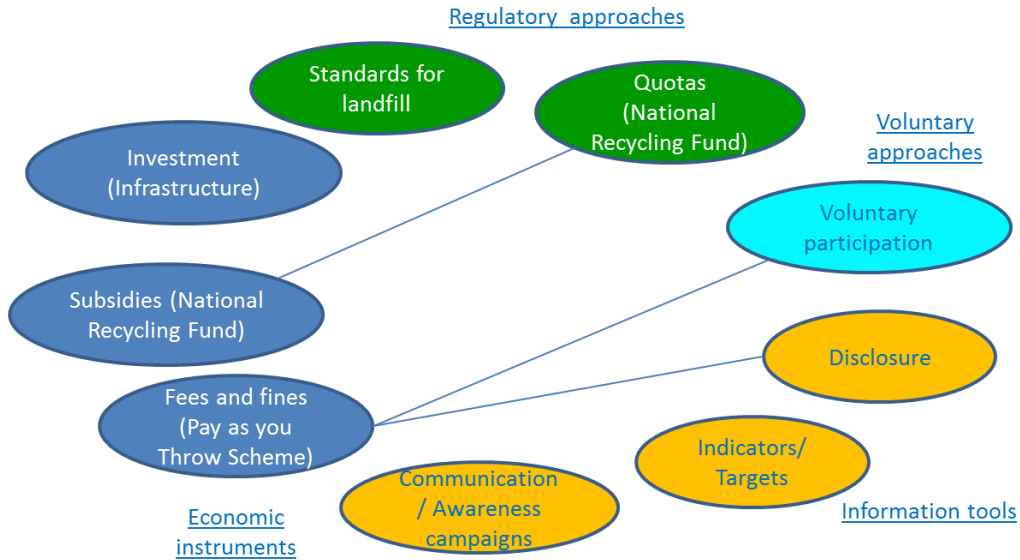
The policies cited above were complemented by implementing an intense awareness program on household composting and recycling (**informative instrument**). The awareness campaign was considered equally important when compared to the PAYT scheme and infrastructure.

First implementation of the project started in 2000 through intensive awareness campaigns that concerned information on biologically decomposable municipal waste and promotion of domestic composting. In 2002 Palárikovo implemented the first waste management facilities and founded the local NGO citizens association called “Palárikovská ekologická spoločnosť” (Environmental Association of Palárikovo). This Association involved local people, especially children, and young entrepreneurs, and played a crucial role for initiating the waste management system. The first collection system was organised by establishing some collection points with large containers placed in the municipality and whose location was disclosed by radio, where people would have to bring their separated waste. It was reported that the association played a crucial role in the education of younger people, as they were proud to contribute to increase municipal budget. Through this waste collection system, the Municipality could start to collect glass, paper and plastic packaging (PET bottles and beverage cartons). The association still exists and keeps providing support for education campaigns, especially in schools.

From 2004 on, the awareness campaign was enriched with information on household sorting practices and municipal facilities. Households still receive twice a year an information leaflet on domestic collection and composting. Public awareness is promoted using local media (press and radio).

FoE Slovakia also played a major role in providing support for awareness and education campaigns on how to separate waste properly. For example, an annual meeting with farmers to promote organic waste composting, or meetings with school to provide education to students and visits to the collection centre, are occasionally held. The external support from FoE Slovakia is considered very important to disseminate awareness and to stimulate curiosity.

Figure 2: Palàrikovo municipality waste management policy instruments and their relationships



Source: Own compilation

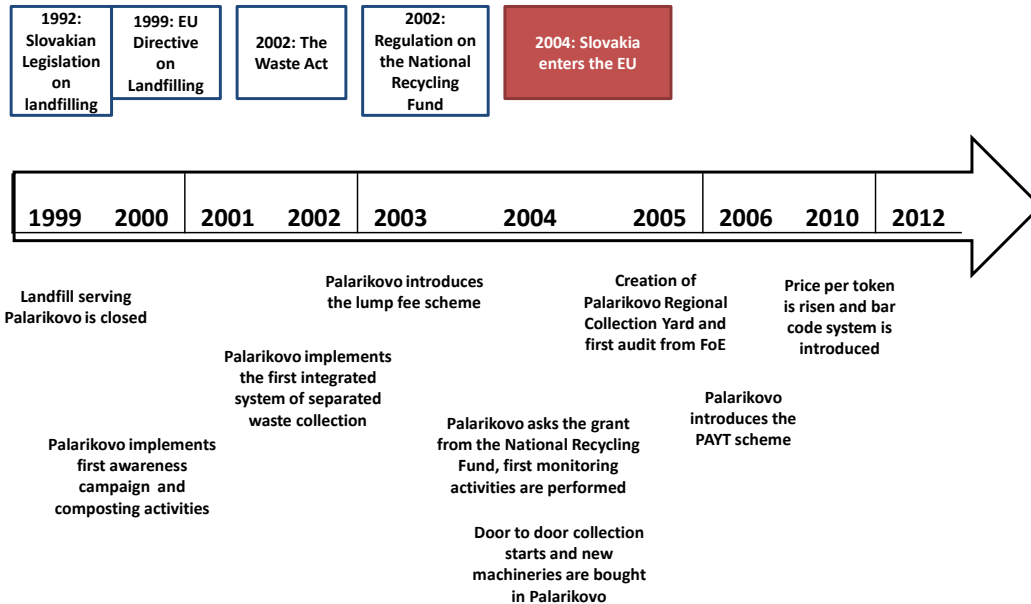
6c. Evolution of policy mix

Evolution of the policy mix throughout its existence –details of the introduction of the first policy tool(s), then all subsequent relevant tools, and related revisions/reforms (e.g. progressive increases in rates applied through economic tools, broader extension of regulation requirements, etc.).

The Municipality of Palàrikovo has been gradually introducing a series of instruments, at first to find a cost effective solution for managing waste, and then to comply with national legislation. The implementation of the system and introduction of the different instruments did not happen in a structured way, having been shaped across the 14 years from a very informal system of waste collection into a well-structured system, that is nowadays able to collect around 20 different types of materials from 29 different municipality surrounding Palàrikovo.

The implementation of the strategy and all relevant changes in the legislation have been addressed in the previous sections and are summarised in Figure 3.

Figure 3: Evolution of the Palàrikovo waste management policy mix, 1999-2012



Source: Own compilation

This waste management system is still active, and it was estimated that about 99% of inhabitants have been actively involved in waste separation and collection since 2003. The model of Palàrikovo, the first Slovakian Municipality having implemented such a waste management strategy, is nowadays implemented in most of the country.

7 Evaluation of policy mix: effectiveness (environmental sustainability)

Does/did the policy mix result in a positive environmental outcome?

Were its stated objective(s) met? Were the instruments used sufficient to meet the objectives?

Did other, unforeseen/unintended positive outcomes or impacts (environmental, social, economic) result? Did other such negative outcomes or impacts result?

Were these objectives set at a level to meet environmental needs (e.g. avoid crossing environmental thresholds/tipping points or achieve more sustainable levels of resource use/extraction (e.g. maximum sustainable yield (MSY) in fisheries)?

Which sectors/actors were identified as having key impacts/influences on the problem/issue? (e.g. specific industrial/ business sectors, consumers, economy as a whole?) Did any of the instruments specifically target these key sectors/actors? Was there significant take-up/implementation of (voluntary) instruments by these sectors?

Was the policy mix applied to a sector previously not targeted by policies on the issue under question, or in a new area/issue – thereby aiming to stimulate change?

What were the anticipated and actual outcomes, impacts and effects of the policy mix on the behaviour of sectors and actors targeted? (e.g. reductions in emissions from industry, increased recycling rates, increase/decrease in certain product purchases, etc.).

Relationships between the instruments, identifying positive/negative influences on the overall policy mix or on key instruments in the mix, as well as any positive or negative impacts from changes to the mix (introduction or termination of instrument(s), increase or decrease in tax/levy/charge, etc.). Level of ‘connectivity’ (strong, weak) between each instrument and the primary one(s).

Are there any indicators, monitoring systems, review processes or other monitoring mechanisms in place to track progress?

The most important outcome achieved by Palàrikovo municipality was the drastic reduction of landfilled waste and increase in recycling and composting since 1999 (see Figure 1 and Table 1). Although in general waste production has remained stable in Palàrikovo since the application of the policy mix, the municipality achieved a notable reduction of landfilled waste from 1,300 tonnes in 1999 to 445 tonnes in 2012, with a minimum of 330 tonnes in 2005. Therefore, Palàrikovo was able to achieve a reduction of 64 % of waste going to landfill compared to 1999 levels. Nowadays, about 37 % of produced waste is landfilled, 40 % is composted (either with through municipal or household composting) and 23 % is recycled.

Over the past 14 years, it was possible to close the life cycle for 50,4 % of all waste produced. In addition, it was reported that due to recycling initiatives, 45 Million Mega joules of energy and 27 000 tonnes of greenhouse gases were avoided in 2011, resulting in a positive environmental outcome.

In 2009, the amount of waste going to landfill increased likely due to the fact that too many permits for private household construction/ renovation were given. The increase of landfilled waste is mainly due to construction and demolition waste, which is not separated by the Municipality.

Table 2: Efficiency of the Palàrikovo waste management system

	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
A	Total waste generation (including home composting) per capita	Tonnes	1250	985	869	1090	1235	1217	1002	998	1121	1136	1225	1284	1246
B	Mixed/residual waste	Tonnes	1250	985	750	550	470	330	352	380	410	395	435	476	455
C	Amount of mixed waste per inhabitant	kg/inhabitant	285	225	171	126	107	75	80	85	91	87	95	106	101
D	Separated raw material (Volume of waste recycled/materials sold on commodity)	Tonnes	0	0	119	175	263	317	150	198	206	241	285	300	291

	markets)														
E	Home composting	Tonnes	0	0	0	195	202	250	205	240	235	220	230	198	210
F	Municipal composting	Tonnes	0	0	0	170	300	320	295	180	270	280	275	310	290
G	Total separated waste (D+E+F)	Tonnes	0	0	119	540	765	887	650	618	711	741	790	808	791

Palàrikovo has already achieved its EU 2020 target of 35 % landfilled waste, by landfilling less than 37 % of waste produced per year. As referred to, the objective of the policy mix was to save on municipal budget by implementing an efficient and cost effective system for waste management. The system has been running successfully within the past 14 years and its objectives have been met.

The **instruments** used were sufficient to meet the objectives, as Palàrikovo is actually saving money from not disposing of waste through landfilling. These **objectives** were set to meet environmental needs, as Palàrikovo could have waited to introduce the new waste management system in 2004, when the national legislation on waste (the Waste Act) would have been mandatory. The law was interpreted in a stricter way and the strategy was implemented in 2002, just after the publication of the Waste Act. Due to its efficiency the scheme was adopted by 29 additional municipalities from the neighbourhood of Palàrikovo (covering a total of 50,000 inhabitants).

The only negative outcome is related to the way the system is structured, namely to the need to achieve certain quotas of collected materials to get the grant from the Recycling Fund. Recycling is preferred to waste prevention and reuse, and waste production is somehow encouraged.

The policy mix was applied to a sector previously not targeted by any policy, as Palàrikovo was the first Slovakian municipality to implement such a waste management system. The amount of landfilled waste decreased while recycled waste increased, thus the outcomes fully match the predicted impacts (although no concrete objectives were set), resulting in a decrease of resources discarded in the environment and the rate of environmental depletion, as well as some savings in terms of energy and greenhouse gases emissions. The implementation of Palàrikovo's strategy also served as an example for the surrounding municipalities and the country to introduce more environmentally sound waste management practices.

The enabling **instruments** identified within the case study are: the PAYT scheme, the integrated waste management system for waste recycling and composting, and the awareness programmes. Strong regulatory instruments as taxes/fees have of a lower level of acceptance: for instance, the obligation to pay a fee based on the amount of waste thrown away could tempt individuals to burn or dump it illegally, which initially occurred in the municipality. Therefore, it was important to encourage people to separate waste, to make them feel like contributing to a common purpose.

Similarly, in order not to hamper the efforts of waste sorting, a differentiated fee-based scheme had to be complemented by an integrated waste management system capable of collecting and processing waste and able to educate people on their role in this system.

These three instruments are equally important: the PAYT scheme was effective due to the implementation of the education programme that involved people and stimulated waste sorting activities. Nevertheless, the PAYT scheme and the education/awareness programme would not have reduced landfilling/ improved recycling without a properly implemented waste management programme. Therefore, in the specific case of Palàrikovo the link between these three instruments is a strong one.

The most important supporting instrument is the National Recycling Fund. It is the main and most secure source of funding, which covers part of the costs of the waste management system (machinery and equipment). It was also reported that the National Recycling Fund could cease to exist, and a crucial issue will be to find an alternative source of funding.

An additional supporting instrument is the Regional Collection Yard, joining 29 municipalities in the surroundings of Palàrikovo and whose main role is to cumulate collected materials in order to reach the quotas set by the National Recycling Fund. It was evidenced that the importance of the Collection Yard has been growing in the past years as the quotas to be reached increase every year for all the materials (see Table 1).

The Municipality is constantly monitoring the amount of landfilled waste and recycled materials by weighting respective amounts. In addition, the system is monitored through the bar-code method for tracking sold tokens (as described in section 6.2). The other important monitoring mechanism concerns the market price of collected materials. The Municipality of Palàrikovo, together with the companies contracted to recycle collected materials, perform a constant monitoring of secondary raw material prices in order to establish if it is economically viable to sell them.

8 Evaluation of policy mix: efficiency (economic sustainability)

Is/was the policy mix considered cost-effective?

What has been the level of impact on resource use of the policy mix (the effect)?

What have been the costs of implementing the policy mix for target audience (e.g. business, households, etc.)?

What are the costs (financial, human) of implementing the policy mix for the implementing authority – i.e. the administrative/transaction costs?

Were sufficient resources made available to ensure an effective implementation of the policy-mix?

Was anything foreseen in the policy-mix to address competitiveness concerns (e.g. use of exemptions) or minimise transaction costs (e.g. thresholds below which monitoring wasn't required)?

Did the policy mix involve providing financial support (e.g. subsidies, low interest loans, tax breaks etc.) to key actors (e.g. sector, households, etc.)?

Did the measures generate revenues (e.g. in the case of taxes) and if so, was revenue recycled/re-injected into the economy, and to what levels and activities? Did revenue recycling have positive amplifying effects?

In synthesis - was the policy mix cost-effective?

What elements of the mix were (un)helpful in improving cost-effectiveness?

How was relative/absolute decoupling achieved?

Were resource limits or other thresholds taken into account and how were they addressed?

The system is implemented in such a way that part of the budget for managing waste comes from the taxes (through the PAYT scheme), from the National Recycling Fund (by reaching quotas of collected materials) and from selling collected materials on the secondary raw materials market. Market prices for secondary raw material have been driving the decision of which materials are separated and collected by the Municipality, who performs a constant monitoring of their market prices and then decides either to sell the collected materials, or to store them. The materials can then be sold when market prices are high enough.

Although the Municipality of Palàrikovo did not authorise the publication of data on Municipal budget, the money received from the Recycling Fund plus the revenues earned by selling the materials on the market seems to be sufficient to cover the total cost for waste management. Therefore, the system results to be cost neutral.

This calculation is performed without internalisation of environmental costs: landfilling has negative environmental impacts due to resource depletion, environmental pollution and greenhouse gas emission. If these factors are taken into account to roughly estimate cost effectiveness, implementing such a strategy was surely cost effective if compared to keeping landfilling as main waste management practice.

9 Evaluation of policy mix: welfare (social sustainability)

What social impacts have you found associated with the policy mix? E.g. jobs created, reduced health impacts, distributional impacts etc.

Were social aspects included in an ex-ante impact assessment of the policy mix if one was undertaken? What were these?

Has monitoring of social impacts been included in implementation, to identify actual effects compared to anticipated ones?

Was the policy mix designed to not be socially regressive? What measures were undertaken to ensure this?

Were equity concerns addressed and, in case of re-structuring of the economy/sector, measures in the area of reskilling of the workforce foreseen?

What other public acceptability elements were addressed or considered?

To involve inhabitants in the waste management process, crucial factors were cost savings and the awareness campaigns. To increase public acceptability, the PAYT scheme was

accompanied by an intense education programme, through radio, local media, press and involvement of public places, such as the post office, the elementary schools and the nursery. A door-to-door collection was implemented twice a month, to increase the participants' comfort. Thus in this case, the introduction of a tax, an instrument frequently difficult as regards public acceptance, was well mitigated by a properly structured education program that assured the collaboration of inhabitants.

The PAYT scheme turned out to be a fair scheme, well accepted and able to involve 99 % of the population in 2006. The scheme was perceived as being simple and fair: the less waste individuals throw away, the less they pay. Therefore, imposing different fees depending on the amount of residual waste generated brings an economic incentive that motivates people to contribute.

Due to the small scale of application, the system did not have a strong impact on job creation and involvement of local companies in the recycling process. The Municipality contracted different companies operating at national or international level in the recycling sector. However, the system contributed to boosting the creation of the secondary raw material market and created revenues for the Municipality.

In addition, two people are permanently employed in the collection centre (the truck driver and the manager) while around 20 socially disadvantaged or unemployed individuals participating in rehabilitation programs are occasionally employed in the collection centre.

10 Overall assessment

What is your overall view on the success(es) or failure(s) of this policy mix?

How did the policy mix enable decoupling?

How could it have been improved to achieve its original objective(s) and to achieve absolute decoupling?

Thanks to the policy mix, the Municipality of Palàrikovo managed to achieve impressive results in terms of reduction of landfilled waste and recycling. The policy mix had a positive outcome on resource depletion and apparently relative decoupling was achieved.

Two main points can be evidenced: the importance of awareness raising (a high level of acceptance was achieved, from zero to 99 % of involvement in seven years, and nowadays in many cases people requested the Municipality to introduce separation of more materials) and the way the system is organised (due to the Recycling Fund, the system is driven by the necessity to reach certain quotas of collected materials: thus, the Municipality is actually encouraged to produce waste and opportunities are lost). It is likely that this success was achieved thanks to the small size of the village, creating a stronger perception of collectivism.

In addition, all instruments aim at treating waste rather than preventing it, under the assumption that waste has already been created. While this approach appears to be necessary to perform the first shift on the waste hierarchy – from landfilling to recycling, it is inappropriate for preventing waste. To perform a stronger shift in the waste hierarchy - from recycling to reuse and prevention - it is necessary to approach lifestyle and consumption patterns rather than to act on waste already produced.

In this context, it is interesting to mention the strategy implemented in the UK that addresses lifestyle and consumption patterns and aims at minimising waste production. The “Recycling for Great Manchester” strategy was implemented in the region of Manchester in 2009. It developed a 750 Million Euro construction programme aiming at building state of the art waste management facilities, based on the implementation of an integrated recycling and waste management system plus an advanced education programme, through a website in which residents are informed about waste management practices and facilities in order to reduce, recycle and recover waste. The website collects a broad variety of actions to switch to a “zero waste behaviour”, including tips for waste reduction (receipts to cook leftovers, tips to avoid food waste and reduce packaging waste, services for avoiding junk mail and for reusable clothes nappies), reuse (information on second hand markets and repair shops), recycling (tips for home-recycling, information on collection points), recovery (education on waste-to-energy system) and composting (tips for home composting and education). An Education Centre is provides further information and organises educational meetings in schools and organisations. SMEs can ask for support to achieve responsible waste disposal. Since its application in 2009 the amount of waste collected reduced from over 1.4 million tonnes in 2004/05 to around 1.1 million tonnes in 2010/11 that involved around 973,000 households. The facilities provide the most cost effective integrated cradle-to-grave collection and disposal solution.

In conclusion, there is scope for progress to homogenise terms, reach a common understanding on paradigms and implement an actual “Zero Waste Strategy”.

Table 3: Examples of Zero Waste Strategy campaigns globally

Location	Goals	Instruments	Achievements	Future
Canberra , Australia	No-waste by 2010, meaning 95 % recycling	Landfill pricing	73 % recycling	Recycling remaining 5 %; more producer responsibility
Kamikatsu, Japan	Zero waste Declaration, meaning no waste to landfill or incineration by 2020	Separation of waste into 34 different streams; Zero Waste Academies to gather and disseminate expertise	75 %-80 % of household waste is recycled or composted	
New Zealand	Zero Waste by 2020 goal, meaning no waste to landfill or incineration	Strong preference for Voluntary instruments; landfill tax and by –laws also used in some areas	Little data on overall recycling rates, some districts successfully using Zero Waste goal to drive grassroots initiatives	Better waste generation data; continued emphasis on education

San Francisco , USA	Zero Waste to landfill by 2020; 75 % diverted from landfill by 2010	1990 State legislation: 50 % diversion from landfill by 2000	67 % recycling rate	Producer responsibility, addressing consumer culture
Flanders , Belgium	Residual per capita waste should not be more than 150 Kg in a year	Variable charging for collection of household waste based on weight or volume; producer responsibility for some waste streams; landfill bans/ high tax	In 2004 , 71 % of all municipal solid waste was recycled or composted;	Shifting the focus to waste prevention and reduction
Bath and NE Somerset , United Kingdom	Zero waste goal not an absolute goal, a framework within which to develop initiatives; interim target of 50 % recycling of household waste by 2020	No specific instruments beyond Landfill Tax/ Directive. Emphasis on education and training	37 % recycling of household waste, one of the highest rates in UK. Kerbside collection from all households	Focus on arresting the growth in waste despite predicted Population increase in the area

Source: Hill et al, 2006

11 Relevance to the EU and transferability

Can the policy mix be applied at the EU level? Is it transferable to other Member States/countries?

What lessons are there that may be of general interest regarding policy mixes and what issues are there as regards transferability of the insights?

The success achieved in Palàrikovo already served as an example to the whole country when it comes to implementation of waste management systems.

An important factor of success was the small size of the municipality and its population, that allowed for a door to door collection system to be effective, and whose awareness campaign was able to emotionally involved people. The transferability of such a system could be possible in regions that are geographically and socially similar, for instance rural areas of new Member States with lower GDP, education and environmental consciousness, and typically further away from achieving EU 2020 goals on landfilling.

12 Stakeholder contribution

What insights did stakeholders provide?

All the content reported in this text was provided by Ing. Iveta Markuskova, employed in the environmental and waste activities sector at the Municipality of Palàrikovo (web site: <http://www.obecPalàrikovo.sk/kontakty.html>). Ing. Markuskova, who is also the responsible person for Palàrikovo waste strategy and one of its creators, gave us an interview (original language: Slovak; interpreter: Michal Sedlacko) and organised a visit at the collection centre. We acknowledge Ing. Iveta Markuskova and Palàrikovo's major Dr. Bernard Roštecký for the information provided for this case study and their kind collaboration.

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