13.0 CHARGES AND TAXES ON BATTERIES

13.1 Introduction

It is widely recognised that batteries present a particular challenge to the management of municipal and other wastes. Batteries frequently incorporate heavy metals which have the potential to cause considerable harm if disposed through either landfilling or incineration. Also, lead acid accumulators contain sulphuric acid. Quite apart from this, some of the metals used are inherently recyclable and of some market value (subject to commodity price fluctuations). This applies also to the plastic container and the acid in the case of lead acid batteries.

However, the nature of batteries is such that in the municipal waste stream in particular they arise in small quantities. In these cases, collection costs are likely to be high (as densities for separate collection will be low) unless specific schemes are set up with this intention in mind. Also, the increased use of, for example, mobile electronic equipment will lead to more concentrated streams in the future (especially with take back of electronic equipment becoming more prominent with the Directive on Waste Electrical and Electronic Goods).

Some charges could be used to encourage use of rechargeable batteries, reducing the need for disposal.

In this chapter, we review taxes on batteries in Belgium (Section 13.2), Italy (13.3) and Hungary (13.4). Although there was more information available on Belgium, we have chosen to present an introduction to the Italian and Hungarian case studies to broaden the scope of the study and ensure that a geographical balance is provided. The Italian case covers lead acid batteries, the Belgian case covers all sold batteries. The choice of Hungary presents a useful opportunity to explore tax systems in a country which will be a member of the EU in the near future.

13.2 The (foreseen) Belgian Battery Tax and charge through BEBAT Voluntary Agreement

Introduction: Process Development of the Tax

There has been a legal debate in Belgium on how to regulate the use, collection and recycling of batteries in such a way as to minimise pollution. In both 1988 and 1990, the Belgian battery industry concluded a voluntary agreement (VA) with the Belgian state to set up a mercury reduction or elimination programme. As a result, the percentage of mercury batteries rose to 95%. One year later, EU Directive 91/157/EC stated that member countries had to take measures to mark and collect some batteries separately in order to eliminate the harmful effects of batteries containing dangerous materials (see Box 9 for the development of legislation and Member States' obligations).

Box 9: Legislative Background to the Batteries Tax and Voluntary Agreement

The legal framework concerning batteries can be divided into three levels: European, federal and regional. At the European level, two directives concern the use of batteries:

The Directive of 18 March 1991 (91/157/CEE) concerns only the most harmful batteries, i.e., batteries containing more than 25 mg of mercury (except alkaline-manganese batteries) or more than 0.025% of their weight in cadmium, or containing more than 0.4% of their weight in lead, and alkaline-manganese batteries containing more than 0.025% of their weight in mercury. The Directive states that the Member States must ban the commercialisation of alkaline-manganese batteries containing more than 0.025% of their weight in mercury (except the alkaline-manganese batteries in button form). Member States were also required to take measures to organise the separate collection of used batteries. Therefore, all sold batteries must be marked with information on the separate collection, recycling and the content of heavy metals. Member States were obliged to set up programmes to reduce the amount of heavy metals in batteries, to promote batteries containing less dangerous material, to encourage the progressive reduction in the number of batteries in household waste and to promote research into cleaner technology.

The second Directive of October 4, 1993 (93/86/EEC) states that all batteries referred to in the Directive above must have an identifying mark on them as of 1/1/1996. The mark is an image of a waste container crossed, indicating that these batteries need to be collected separately.

In Belgium, the government imposed a tax on all sold batteries on July 18, 1993, and the tax was scheduled to come into effect on 1/1/94. This tax was implemented as part of the general ecotax law (which emerged as part of a political deal required by the Green parties as a condition for helping the majority in parliament), which determined a range of products that should be taxed.

Although the proposed tax was never implemented, the threat of the tax allowed a voluntary agreement to be signed, whereby a voluntary scheme would be launched and supported by a charge on the battery (See BEBAT VA discussion further below).

Although the use of mercury in batteries has declined over the years (in 1985 the alkaline batteries accounted for 75% of the mercury in batteries in Europe and only 31% in 1990) as a result of design changes, the environmental problems are still significant in three ways:

1. Some existing batteries still contain heavy metals. These metals are still present because:
   - The older batteries produced before the decision of the producers to add no more mercury are still being consumed;
   - A minority of 'cheap' batteries produced by factories in South East Asia and imported on the Belgian market still contain certain amounts of mercury;
   - Rechargeable batteries contain cadmium. Although these batteries have a longer life span than non-rechargeable ones, their lifetime is still finite so they are ultimately discarded (they become waste);
2. Other components of batteries can be harmful to the environment;
3. All batteries contribute ultimately to the waste stream.

When batteries are landfilled, the heavy metals and other materials are freed through oxidation process and end up in the groundwater. When they are incinerated, some of the mercury and other toxic metals are dispersed through the flue gas. Neither of these processes allows the recovery of some valuable metals (copper, manganese, zinc etc.). Though some incinerators may be able to extract some metals post incineration (from the bottom ash), the quantity of the metals concerned is probably too low to make this worthwhile. In any case, the materials are contaminated by slag so are made less valuable.

Design of the Tax

The tax on batteries was to be 20 BEF (0.5 EUR) per battery sold (20-30% of sales price) for all batteries, except batteries that are difficult or dangerous to remove, e.g., those in medical appliances. Batteries would also be exempt if they were part of a deposit refund scheme. The deposit had to be at least 10 BEF (0.25 EUR) per battery, and batteries subject to this system were to have a mark on them to indicate this. All batteries fell under this tax whether they contained mercury or not. Due to negotiations with the battery industry and subsequent voluntary agreements, this tax was never actually implemented. A voluntary agreement resulted in the ecotax law for batteries being changed on March 7, 1996. The voluntary agreement was signed on June 16, 1997. Batteries were now to be exempted from the ecotax once a voluntary collection and recycling scheme was set up. The following conditions applied:

- The system had to be financed by the battery industry;
- Up to the year 2000, certain target percentages for recycling had to be met.

If these conditions were not met, an ecotax on batteries would be levied on all household batteries sold in Belgium (see section below on the BEBAT voluntary agreement).

The battery industry set up a non-profit organisation called BEBAT to co-ordinate the collection and recycling of batteries and ensure that the target percentages were reached (targets under the BEBAT VA section).

Negotiation of the tax within Belgium

Environmental policy is mainly dealt with by the three regional governments of Flanders, Wallonia and Brussels. The national government is left with only limited powers in this field; mainly related to product standards, nuclear waste and to the negotiation and implementation of international treaties and laws (e.g., EC Directives), and consumption taxes. There is no hierarchy of legal systems in Belgium so decisions have to be arrived at by negotiation between all stakeholders.

At the regional level, each region has its own environmental law and its own regulations concerning the treatment of waste, including batteries. Each of the three regions treats batteries as being 'small chemical waste'. This means they have to be collected separately. In order to do this, each region has municipal fixed collection sites at which the inhabitants can dump their waste in prescribed containers. Public or private collection and recycling companies periodically collect this waste and deliver a certificate of destruction or recycling to confirm that the waste is being treated in accordance with the regional legislation.
In the Flemish region, the legislation obliges vendors to take back any used battery that they have sold.

Following the introduction of the idea of BEBAT, and the De Caevel 1995 study results, a majority of the Ecotax Commission finally agreed with the introduction in the law of a paragraph stating that batteries were not subject to the ecotax once a voluntary collection scheme for all batteries was set up.

During the course of the negotiations that led to the voluntary agreement, the industry accepted the demands of the Ecotax Commission to include all batteries in the agreement (not only the 'harmful ones' (those containing mercury), while the authorities accepted the demands of the industry to install a voluntary collection system. Both sides agreed on the target collection percentages after negotiations. The agreement was signed for a 5-year period, with yearly evaluations.

Intentionality of the Tax

Belgian federal ecotaxes are product taxes. Their main aim is to change the structure of relative prices in the Belgian economy, thus providing consumers with an incentive to change their consumer patterns in an environmentally friendly way. Underlying this approach is the

idea that the change in consumer behaviour would feed back into the economic system and change producer behaviour. The overall objective is to reduce pollution.

The ecotax was intended in theory to discourage the use of batteries and to encourage the use of alternatives. However the alternatives are limited. Once a product using batteries has been purchased, batteries will continue to be used until a new product is purchased which does not use batteries. Hence, the substitution possibilities exist only where there is an option to purchase products which do not use batteries in favour of those that do. An example might be the use of a bicycle dynamo instead of battery powered lights, or use of solar powered calculators instead of battery powered ones.

Belgian ecotaxes are not of the Pigouvian type. Their tax rate is not related in a precise way to the environmental damage the products are causing. The level of the tax rate is relatively high and set explicitly to put pressure upon the producers and the consumers to adapt to their behaviour.

Complementarity within Portfolio of Policy Instruments

Codes of conduct:
In addition to the eco-tax law, the Belgian battery industry (represented by FEE and Fabrimetal) signed two codes of good conduct (January 1988 and April 1990) with the Federal Ministry of Economic Affairs and the Federal Secretary of the Environment, in anticipation of the European directive of 1991. These codes included a commitment by industry to replace the mercuric oxide batteries by zinc-air batteries before the end of 1990 and to reduce the content of mercury in alkaline batteries. There has been a decrease in the amount of mercury in batteries, but this was, in any case, a global trend and primarily due to advances in technology.

The BEBAT negotiated agreement:
The negotiated agreement is an agreement between the federal government, the regional governments of Flanders, Walloon and Brussels, and the Belgian battery industry. The latter is represented by BEBAT, a non-profit organisation founded by the battery industry for the sole purpose of this negotiated agreement. In legal terms, the agreement states that BEBAT is responsible for collecting and recycling used batteries that were sold on Belgian territory.

BEBAT places collection boxes at approximately 20,000 collection points (market stores, photo shops, jewellers, schools, etc.) at no cost for the owners of the collection points. During the first year BEBAT started an awareness campaign to inform the consumers and distributors about the new system.

The financing of the 'collection and recycling contribution' was agreed to be paid by members of the organisation (i.e., battery producers and distributors). This contribution would be passed on to the consumers through a price increase. This price increase was set by the Royal

Decree of April 16, 1996 and is far lower than the ecotax of 20 BEF – and is 4 BEF per battery. This 4 BEF has been raised to 5 BEF per battery in January 1999.

The negotiated agreement deals with several aspects of collecting and recycling a fixed percentage of used batteries in Belgium. BEBAT is required to fulfil certain collection percentages. These percentage recycling rates are identical to those mentioned in the ecotax law (relating to the proposed deposit-refund system) and the actual amounts collected (BEBAT, 1998) are as follows:

- 40% in 1996 – Actual: 1264t of 2768t, or 44.9%: target met;
- 50% in 1997 – Actual: 1332t of 2572t; or 51.9%: target met;
- 60% in 1998 – Actual: 1844t of 3074t; or 58.7%;
- 67.5% in 1999 – Actual: 1834t or 65.7%;
- 75% in 2000 – Estimate: 1978-2000t or 66-68%;

These percentages are calculated as follows:

$$\frac{\text{Weight of the collected amount of batteries during year x}}{\text{Weight of the sold amount of batteries during year x}}$$

The collected amount of batteries includes the batteries collected by the urban waste companies of the regions through the public collection sites as well as those collected by BEBAT.

The batteries collected by BEBAT must be recycled according to the agreements signed with the three regions. For monitoring purposes, BEBAT is required to provide information to the Ecotax Commission, the regional governments and the federal government at fixed intervals. Following an annual report, the Ecotax Commission advises the governments on whether to allow the voluntary agreement to continue. If the prescribed percentage for any year was not reached, all sold batteries would become subject to the ecotax the following year and BEBAT would be fined.

The first agreement ended on 31/12/2000 and is continuing providing no new conflicting regional legislation is introduced, but each party has the right to end the agreement if one of the parties is non-compliant.

The arguments of the battery industry were mainly financial ones. Since there is no substitute for batteries, they argued that the consumers would be the main victims of the ecotax, spending a total of 1.5 billion BEF (37 MEUR) annually. The higher price and lower sales were predicted to lead to a fall in employment in the industry, which employed 2000 Belgians. Competitively, it was argued that the Belgian battery producers and distributors would be at a disadvantage.

Environmental Effect of the Tax

The theoretical idea behind conventional ecotaxes is to encourage the use of alternatives by taxing the more polluting goods. This reasoning is difficult to apply to batteries, however, since there are only real substitutes where the product which uses batteries is being replaced (and these decisions may occur relatively infrequently).

The environmental intent of this instrument is more to increase the volume of separately collected batteries. This was implicit both in the design of the original tax (which would have exempted those batteries where a deposit refund a scheme was in place) and then in the negotiated agreement which replaced it.

Before the voluntary collection system, only a small number of batteries were collected separately by the Regions through their public collection sites. Following the introduction of BEBAT, the number of batteries collected rose significantly. BEBAT collects many more batteries than the regions do, and seems to have taken over the role of separate battery collection from the regions - the percentage of batteries collected by the regions decreased as the percentage collected by BEBAT grew. This is probably due to media campaigns and the high profile BEBAT obtained by the placement of boxes in shops and public places, as well as the performance incentive faced by the industry, i.e., application of a tax if targets are not met (so essentially, there is a non-compliance fee in place).

When comparing the collection percentage of a deposit-refund system with a voluntary collection system, a voluntary collection system performs better than a deposit-refund system during the first years of its existence in almost all situations (De Caevel, 1995).

In the case of batteries, more batteries would be collected with a voluntary collection system in the first two years, since in that case old batteries can be collected. After the first two years, the amount of batteries collected annually would be more or less the same for both systems. However, this depends on the design and implementation of these instruments.

Effects on Producers

In 1997 the total income of BEBAT amounted to 260 million BEF (6.5MEUR), while total costs were 235 million BEF (around 6MEUR). This resulted in a net profit of 28 million BEF, while in 1996 there was a net profit of 64.4 million BEF. However, BEBAT incurred a net loss of 49.4 million BEF in 1998, and they projected bigger losses in 1999. The higher costs are due to:

- The improvement of recycling techniques, which lead to a higher recycling percentage but also an increase in costs
- The growing percentage of batteries that need to be collected by BEBAT, requiring ongoing and more intensive media campaigns.

The agreement has been negotiated by the battery industry as a whole and although concerns have been raised with respect to the compliance costs of the individual firms (labelling the batteries with the BEBAT logo would be far more costly for smaller firms) the industry itself has never complained about this.

Competitiveness and Trade Impacts

There are only a small number of 'free riders', consisting mainly of small South East Asian brands that are enclosed in toys and watches. However, since these brands cannot be bought separately, there is no demand to switch to these cheaper batteries. This reduces competitive disadvantages to a minimum, while a deposit-refund system or a tax of 20BEF would result in far greater competition disadvantages, as it appears that demand becomes more elastic when the price increase is bigger (Ameels, 2000).

Depending on the demand elasticity of batteries, the price increase could lead to a decrease in demand. A field study (Dimarso, 1995) found that more than 50% of consumers had no idea of the exact price of batteries, while only 14% knew exactly how much they had paid for a battery. The subjective price elasticity seems to be rather low when the price increase is only 5BEF per battery but the reaction of the consumer becomes clearer when the price increase is bigger than 10 BEF per battery. The study also shows that only a minority of the Belgian consumers would buy their batteries in a foreign country even if battery prices were significantly increased. There are no practical substitutes for batteries, so the main competition issues would be consumers buying their batteries in a foreign country. Batteries are probably not the type of consumable that people tend to buy in bulk.

The indirect costs of the agreement are mainly born by BEBAT and financed through the collection and recycling contribution. The individual firms' compliance costs (labelling of batteries) are also covered by a part of this collection and recycling contribution. 1 BEF of the original price increase of 4 BEF per battery is allocated to the cost of labelling the batteries.

Quantifying the monitoring costs of the government is difficult. Monitoring would probably be more costly in the case of the implementation of the ecotax or the deposit-refund system as both cases would require more administration. As neither of these options includes the recycling of batteries (and the ecotax system does not even include the collection of the used batteries) the government system might not have been as efficient as BEBAT in collecting and recycling the used batteries.

As regards exports, only the batteries sold in Belgium were to be subject to the tax. No loss of competitiveness for Belgian exporters would therefore be implied even if non-compliance had triggered imposition of the tax. Own-use imports were anticipated to be small so taxing at the point of sale was deemed to be appropriate.

Industry estimates indicate that the market of rechargeable batteries is growing faster than the market for non-rechargeable (primary) batteries. About 80 per cent of these rechargeable batteries are not sold separately but enclosed in goods. According to the American National Electrical Manufacturers Association (NEMA) (1994), the U.S. retail market for rechargeables is growing twice as fast as the retail market for primary batteries, with compound annual growth rates of 9% from 1992 to 1994.

Before the voluntary collection system for batteries in Belgium, only a small percentage of them were recycled. The public waste companies considered them to be hazardous waste, and consumers were supposed to collect them separately, but there were no incentives to do so. Of the small number of batteries that were collected separately, only the nickel-cadmium batteries were being recycled.

Recycling in Belgium is done by three different companies, according to the type of batteries (see Table 77).

Table 77. Recycling of Belgian Batteries

INDAVER Antwerp	Mercuric Oxide button cells
SNAM France	Rechargeable batteries
REVATECH Liege ERACHEM Tertre	Other types

Source: BEBAT, 1999

According to Dimarso (1997):

- Approximately 70% of consumers claim to separate batteries from other household waste and this number is growing;
- Awareness of the importance of separation is growing;
- 90% of consumers surveyed find the BEBAT concept positive;
- 78% intend to use the BEBAT collection boxes; and
- The use of collection boxes becomes habitual once they have been used the first time.

Impact on Employment

As the tax was dropped there is nothing to say regarding employment impacts. Regarding the employment associated with the BEBAT scheme, this relates to the use of additional revenue raised from the charge on batteries to finance appropriate collection and recycling systems. The related employment would have come about with alternative collection and recycling systems that allow compliance with the EU Directives and therefore no conclusions on net employment can be drawn.

13.3 Battery Price Surcharge in Italy

Design and Development of the Tax

Lead batteries are seen as to constitute an important consumer good, as well as an important source of environmental damage. To promote recycling by financing the battery recycling consortium COBAT (Consorzio Obbligatorio per Batterie Asciutte) was established, financed by a price surcharge (sometimes called the Italian battery tax).

The Italian law 475/88, required the creation of COBAT (a non-profit organisation), with the specific target of the full separate collection of used lead batteries. The Italian authorities were anticipating the EU Directive 91/197/EC, which stated that member countries had to take measures to mark and collect certain batteries separately in order to eliminate their harmful effects. The Italian situation before the introduction of this law showed a high level of recycling of this particular waste, but with a high variability due to the fluctuations of lead prices on international markets.

The rates of the surcharge on batteries were established by the Ministry of the Environment and Industry and are based on the ampere-hour rating of starting batteries and, until 1996, on the sale price of industrial batteries. Since 1997 the surcharge on industrial batteries has also been based on ampere-hours. Table 78 shows the evolution of rates since 1991.

Table 78: Battery Surcharge Since 1991 ***(values in Italian Lira (EUR) or %)***

	Starting Batteries <9Ah	**Starting batteries >9Ah**	**Starting batteries from 10 - 70 Ah**	**Starting batteries > 70 Ah**	**Industrial batteries**
1991	500 (0.26)	1,900 (0.98)			1%
1994	500 (0.26)		2,000 (1.03)	4,000 (2.07)	2%
1995	500 (0.26)		1,700 (0.88)	3,400 (1.76)	1.7%
1996	400 (0.21)		1,300 (0.67)	2,600 (1.34)	1.3%
	Starting batteries <20 Ah		Starting batteries from 20-70 Ah		
1997	200 (0.1)		800 (0.41)	1600 (0.83)	3 x Ah
1998	400 (0.21)		1600 (0.83)	3200 (1.97)	6 x Ah

The level of surcharge is calculated to guarantee the financial coverage of the total cost of separate collections. There is no direct linkage to the environmental characteristics of the batteries. This means that when revenues obtained through the sale to the recyclers are high,

surcharge rates are lowered, and vice versa when the lead price on the market is low. This is confirmed by data which show that:

- In 1994 the average sale price of a battery was 70.2 L/kg and the average surcharge was 162.7 L/kg, in 1997 the sale price was 167.0 L/kg and the surcharge 65.1 L/kg
- In 1998 the average sale price was reduced to 108.2 L/kg (due to a fall in lead prices on the international market) and the average surcharge rose to 72.8 L/kg

Table 79 shows the percentage of total costs accounted for by the surcharge. After a long period of decline, the percentage rose in 1997 and was over 50 % in 1998.

Table 79: Percentage of Total Costs of Recycling Accounted for by the Battery Surcharge

Year	1991	1992	1993	1994	1995	1996	1997	1998
%	52.4	65.1	79	61.2	39.3	31.5	34.4	51.2

The financial activities of the non-profit organisation are mainly funded through two main sources:

- Revenues obtained from the sale of used batteries to recyclers and
- The specific surcharge on the sale of leaded batteries (paid by manufacturers and importers of batteries), the rate determined by the Ministry of the Environment and of Industry

The prices of used batteries are mainly related (positively) to the market prices of recycled materials (mainly lead) and (negatively) to the disposal costs of scoriae, which recyclers still have to pay. Hence the movement up and down of the surcharge keeps total revenues more or less constant as material prices fall and rise. In all the Italian battery price surcharge collected approximately 24 billion Liras (12 MEUR) during 1994.

Most spent lead batteries in Italy come from the heaviest users such as ENEL, Telecom, FF.SS (State Railroads), and the Army. A smaller percentage come from auto shops and car mechanics. During 1995 about 130,000 tonnes of starter batteries were put into commerce, along with 30,000 tonnes of industrial and traction batteries.

Organisational Roles and Administration

COBAT: COBAT is required to organise both the separate collection of used batteries and the sale of batteries to the recycling industries or their transfer to the disposal plants (if recycling is not economical). To implement these requirements, COBAT stipulates contracts with specific potential owners of used batteries (car industry, machine shops, municipalities, national rail society etc.) in which different collection prices are defined on the basis of weight, distances and type of battery. The Ministry of Industry and the Ministry of

Environment have a representative on the board of directors and on the board of auditors of COBAT.

Environmental Effect

During 1995, COBAT gathered 154.000 tonnes of spent batteries from the industrial and artisan sectors, of which 1.362 tonnes were exported to France. Of the batteries collected and recycled, 50.8% came from northern Italy, 13.5% from the Centre, and 29.7% from the South (see Table 80).

Table 80: Tonnes per Year of Batteries Collected by Cobat

Year	1991	1992	1993	1994	1995	1996	1997	1998
Tonnes	134,000	150,000	148,000	154,000	155,000	165,000	164,000	166,500

It has been estimated that COBAT has led to an annual average increase in the percentage of used batteries collected of about 24%. From the 166 500 tonnes of batteries collected in 1998, 90000 tonnes of recycled lead have been reclaimed, almost 35% of national demand.

According to Professor Majocchi of Pavia University, the surcharge is an instrumental charge with small incentive potential, as it is not directly related to the environmental characteristics of batteries.

Impacts on Internal Market, Competitiveness and Trade

There is no obvious effect on the Internal Market, trade or competitiveness.

Impact on Employment

While new jobs are supported by the surcharge supported activities to ensure the collection and recycling of batteries, these jobs would have come about with the implementation of the EU Directive. No statistics are available on the number of jobs that are supported, and no analysis is available that looks at the net effect on the economy, though this is thought to be small given the scale of the total costs.

13.4 The Hungarian Car Battery Charge

Introduction

Most of the national environmental budget comes from central government revenues. The environmental revenues from municipalities are very low. Due mainly to the implementation of product charges, the share of earmarked central funds has doubled since 1991 and it accounted for 40% of total environmental revenues in 1998.

Existing charges include charges for use and abstraction of water, for waste collection and disposal, for mining and changes in use of agricultural land, and product charges. These charges mainly aimed to raise funds.

Charges are often used in association with other regulatory instruments, fines, command and control tools, although they account for a much larger share of state revenue. The 1995 Act on product charges introduced charges on other products, such as packaging materials, refrigerators, refrigerants and car tyres. A product charge has been imposed on gasoline since 1993. In 1998, a new product charge was also implemented on lubricant and used heating oils. Between 1993 and 1996 total revenues coming from product charges increased in real terms, but it decreased in 1997 as the charge rate had not changed since 1995. In February 1998 and in 1999 again the charge rates had increased. In 1999 some smaller modifications were also implemented, to make the system more strict and enforceable.

In 2000, the Ministry of Environment planned to carry out a research on the optimal use of the different types of instruments, focusing on the main environmental objectives, socio-economic situation and expectable trends in development.

In Hungary, the LIII/1995 law on the general principles for the protection of the environment established economic instruments in this field. The battery 'charge' belongs to a group of product charges that encourage the user of the environment to reduce any negative impacts on the environment.

The charges are levied on the product itself and are determined according to the weight, quantity, per unit etc. Product charges are in place on batteries, as well as on packaging materials, fuel, tires and refrigerators.

Intentionality of the Battery Charge

The reason to introduce the charge was to reduce the pollution of the environment by these products and to establish supporting financial resources for the reduction and prevention of their impact. This product charge is an economic incentive, although the amounts determined

are not high enough to encourage large scale improvements in environmental performance. Hence, there is need for the redistribution from the Environmental Fund Program to achieve higher level of environmental protection.

Used car batteries, according to the 102/1999 Government Decree, are designated as hazardous waste, given their lead and sulphuric acid or cadmium and alkali contents. The most widespread usage is of acidic lead batteries and to a lesser extent nickel-cadmium batteries are used. In general the stock of motor vehicles and thus the stock of car batteries has increased by 4% annually in the past years. This rise in waste generation was mitigated by gradual quality improvements that lengthened the lifetime of the batteries. The total amount of generated lead waste from car batteries, however, had increased from 11,086 tonnes to 16,240 tonnes between 1992 and 1997. The number of waste batteries increased from 753 to 1,034 items.

The collection of used batteries from private users was difficult until the implementation of the product charge, since consumers were not (economically) interested in taking back the used batteries to the collecting points. The product charge still does not encourage small user, but in case of the bigger users it is worth collecting the used batteries. Small users normally leave their used batteries in auto services.

Box 10: Dry Batteries: A problem not yet addressed

There are no economic instruments in place regarding dry batteries in Hungary. Within the Ministry of the Environment, there have been some studies and short assessments carried out on possible tools for encouraging the collection and legal disposal of dry batteries. One option is to impose a product charge and another is to implement a deposit-refund system.

Quantities: In 1995, approximately 82 million dry batteries were sold in Hungary. In general the demand for dry batteries is between 60 and 100 million dry batteries per year, which means 3000-4000 tonnes of used batteries annually. For the appropriate planning of a set of regulation tools, the data on total dry battery consumption would need to be more accurate.

The market share of domestic production decreased from 100 % to app. 25%, because of (*inter alia*) the obsolete and environmental unfriendly quality of the domestic products. According to recent estimations, 20-40% of the total dry batteries are illegally transported into Hungary through the black market. The illegal imports are coming from NIS countries and China.

Environmental Issues:
Mercury pollution: The legal dry batteries do not contain mercury (since 1994). The domestic producers state that the domestically produced batteries fulfil the European requirement, but there is no data available to support this one way or the other. As 40% of the released carbon-zinc batteries are domestically produced, the real mercury pollution can

be only roughly estimated - approximately 48 tonnes of mercury are expected to be released into the environment from used dry batteries between 1997 and 2010.

Cadmium pollution: From 1995 the imported Western European batteries do not contain cadmium. Between 1997 and 2010 approximately 190 tonnes of cadmium is expected to be released into the environment.

Zinc pollution: Zinc is used in many types of dry batteries. Most zinc is in carbon-zinc found in alkali batteries. The gradual quality improvement resulted in a significant reduction of zinc emissions (approximately 1100 tonnes in 1989, but only 750 tonnes in 1995). In 2010 zinc emissions are expected to be 600 tonnes, resulting in approximately 10540 tonnes of zinc released into the environment between 1997 and 2010.

Design and Development of the Tax

The product charge on car batteries was introduced at a national level on January 1st, 1996, following the 1995 Act on Product Charges. Before its implementation an *ex ante* impact assessment study was carried out by the Ministry of Environment and Regional Policy which mainly focused on the revenue estimations and the costs of the waste generated by disposal of used batteries.

The charge rate was 38 HUF/kg in 1996 and 1997 and 41 HUF/kg in 1998. From 1999 two categories were distinguished: in the case of batteries filled with electrolytes 45 HUF/kg, others were 63 HUF/kg in 1999. From February 2000, the charge rates are 50 HUF/kg for batteries filled with electrolytes and 70 HUF/kg for other types (see Table 81).

Table 81: Evolution of Product Charge Rates in HUF (EUR) / kg

Type	1995	1996	1997	Jan-Feb 1998	Feb-Dec 1998	1999	Jan-Feb 2000	Feb 2000
Batteries filled with electrolite	38 (0.14)	38 (0.14)	38 (0.14)	38 (0.14)	41 (0.14)	45 (0.17)	45 (0.17)	50 (0.19)
Batteries not filled with electrolite	38 (0.14)	38 (0.14)	38 (0.14)	38 (0.14)	41 (0.14)	63 (0.24)	63 (0.24)	70 (0.26)

No product charge is in place for dry batteries, see Box 3 for current approach and considered policy tools.

Box 11: Hungarian Experience in Selective Collection of Waste Batteries

Until 1998, the Ministry of Environment and Regional Policy provided financial resources for used dry battery collection in schools, public institutions and municipalities. No other organisations supported this process. As a result of this ministerial program approximately 21% of the used dry batteries were collected and disposed of in adequate hazardous waste landfill. From 1999 the Ministry no longer provided support for this program.

There are no companies which can recycle or refill the used dry batteries in Hungary. The collected used batteries can be disposed of in hazardous landfill sites or – in case of reusable batteries – exported. The transportation to foreign countries is very expensive, incurring two or three times the cost of disposal in Hungary.

The 90% of collection rate would cost at least 535 MHUF (on basis of 1997 prices) which could be collected from a 7 HUF product charge on each dry batteries if no illegal import occurs, and 14 HUF if the illegal import is taken into account. (The consumer price of dry batteries was in 1997 between 60 – 100 HUF/each.)

Revenue and Use of Revenue

The main purpose of the charge was to raise funds for waste management related to the used batteries, therefore, 75 per cent of the revenue was originally earmarked. Later this was revised, and from 1997 the earmarked use of revenues had been abandoned and the total income was set aside for general environmental purposes.

The revenue collected was 642 million HUF (2.4 MEUR) in 1997. The distribution of the revenue is done by the Fund through the Institute mentioned above. These revenues are earmarked for the following purposes:

- at least 75% should be used for environmental investments (in the form of financial support, low interest loans, loan guarantees);
- 2-5% is reserved for averting environmental accidents;
- the remaining revenue goes to public environmental tasks (education, research, awareness raising, etc.) and;
- to the administration costs of the Fund.

All these investments promote environmental protection and have positive effects. Table 82 summarises the revenues from the product charge on car batteries and the use of the collected fund.

Table 82: Revenue from Car Battery Product Charge
in MHUF (MEUR)

Year	Total revenue	Subsidies for development	Regular subsidies	General use*	Rate of reallocation
1996	540.2 (2,04)	-	28.817 (0.11)	511.383 (1.93)	5.3%
1997	642.2 (2,40)	129.5 (0.46)	40.7 (0.15)	472.0 (1.79)	26.5%
1998	729.3 (2.74)	81.8 (0.32)	37.3 (0.10)	610.2 (2.32)	16.3%
1999	767.904 (2.90)	-	33.6 (0.13)	734.3 (2.77)	4.4%

** Fund is used for other environmental purposes not related to waste management issues of used car batteries*

According to the estimated collection-efficiency-rates there are no serious problems regarding the collection of the product charges in Hungary. In the case of car batteries, this rate is approximately 100%.

Organizational Roles and Administration

In the case of the later implemented product charges, the Central Environmental Protection Fund was initially responsible for collecting the charge from domestic production, but from 1997 this task was also transferred to the tax authorities mentioned above. Thus, the Tax Collector Bureau collects the charges, and then it transfers them to the Environmental Fund Program which is managed by the Environmental Development Institute, a body established by the Environmental Minister in 1999. The Minister is directly responsible for the Fund.

The Fund is responsible for the redistribution of the collected money (this program is also a pool for environmental fines, revenue from privatization, loans, PHARE grants, etc.) in the form of reclaiming the charges for the recollection of these products, support for their re-usage, support for environmental investments, support for local authorities, companies, and environmental NGOs, etc. The redistribution is done through an application system whereby the applications are reviewed by an expert committee and the Environmental Minister approves them. This change has resulted in a more effective collection system since 1997, but the enterprises do not feel that the former data provision toward the Environmental Fund is still necessary. (It is hardly enforceable.)

A reduced charge (50%) is payable on those products that were granted the ‘green cedars’ environmentally friendly Hungarian label. This label is given to products that apply to a certification body, but batteries have not yet been granted the label. The fine for failure to pay the charge levied is one and a half times more than the charge would have been.

The product charges are levied for products generating hazardous waste, but the monitoring of the lifecycle of hazardous waste is not in place yet. From 1996 producers of hazardous waste are required to take care of this waste. 63 per cent do so, but many are compelled to pay regular fees for inappropriate disposal. Only one third of the produced waste is appropriately disposed of.
In the light of the above, the fact that in the present system 90% of the used batteries are recollected is quite impressive. The charges collected are not reflective of the pollution caused (though there has been a form of externality assessment – see below).

A maximum 6.5% of the revenue can be used for the administrative costs.

The change in administrating authorities in 1999 led to the establishment of two registration systems. Hence it has proved difficult to establish long term trends for economic and administrative impacts of the instruments. Regarding the initial and operating costs of the product charge system, the most expensive product charge is the one for packaging materials. Other product charges represent only 5-7% of the total operating expenditures.

Due to the implementation of the product charge system, enterprises - inter alia - were required to implement a new registration system, to develop a new accounting system, to change their computer (mainly software) system and to train their workers. Besides these initial costs they are required to register for the charge and pay quarterly. Importers must fill in questionnaires and transfer payments, apply for refunding, reductions and green label qualifications. The total initial cost to the companies in 1995 and in 1998 (year of introduction and modifications) was approximately 650 - 670 MHUF for all environmental regulations (not only batteries).

Meanwhile government authorities also had to face new costs: imposition and collection of the charges, processing the registration forms, reallocation of revenues, judgement of rebates, modification of legislation, information provision, etc. The initial cost of implementation was 50-100 MHUF, while the total operational cost varies between 300 and 350 MHUF annually. (The financial needs of the system are laid down in agreements between the authorities, and the central fund (Special Credit) transfers the money annually according to those agreements. Sometimes the transferred amount does not cover all the expenses, for instance in the case of the custom guard the cost of environmental data analyses is higher than the transferred sum of money, so the given cost figures can be slightly underestimated.)

Both in the case of industry and authorities, the operating costs in real terms has decreased in recent years. At the current level, the administrative costs of the product charge to the companies do not amount to as much as 3.5% of total revenues. The government authorities' expenditure is less than 2%.

In general, positive waste management results have been registered from the application of product charges and the distribution of part of the revenues to assist in collection of used batteries (also of old refrigerators, paper packaging materials and used tyres).

Complementarity within Portfolio of Other Instruments

The battery product charge was introduced together with the charges mentioned in the introduction. There are other environmental regulatory instruments in place (fees, financial support, etc.), but these do not form a coherent system. The issue of introducing an fee on the environmental burden placed on soil, air and water is being discussed. The Environmental Ministry has developed a concept which has not been approved yet.

The environmental regulatory system in place is not part of the general tax system, there is no program to decrease already existing taxes in return for introducing these charges nor about reforming the tax system from a holistic environmental approach. The battery charge has not substituted another instrument.

Environmental Effect

One of the initial objectives of the product charge system was to encourage the re-use of waste generating products. Regarding environmental effectiveness, conclusions can be drawn by comparisons between former waste generation and waste generation post product charge. Since the main aim of the charges was to raise revenues for environmental subsidies and investments, the analysis should focus on the impacts of subsidies and rebates provided in the past years.

Between 1996 and 1998 the volume of produced and imported car batteries had increased from 11,086 tonnes to 16,240 tonnes in Hungary. Based on a comparison of the estimated quantity of used car batteries and the self-reported (by producers and importers) data on the quantity of produced batteries, the study states that in the case of car batteries the collection efficiency is more than 100%, which means that the calculated total quantity of used products is underestimated. Besides this estimation, it is important to emphasise that the charge is collected by the tax and custom duty authorities, therefore it is collected quite effectively.

According to interviews with regional waste collection companies the waste is mostly collected from big users, since they can provide homogenous waste in large quantities. This situation is reasonable, since it encourages the cheapest collection option, however any increase in the collection-rate could prove rather expensive to reach (because of higher transport costs, capacity building expenditures, export bands, development of selective waste collection systems in settlements, etc.)

There is one more indicator of the incentive effect of the product charges in Hungary. In the frame of the green label system, half of the product charge imposed on labelled products is refunded to the charge payer. However, there are many other aspects - marketing

opportunities, costs of gathering and using the label, etc. which must be considered by a company considering the registration of its products. It is obvious that the product charge in itself is not always sufficient economic incentive to apply for the green product label.

Economic Efficiency of Product Charges

However, positive waste management results have been noted as a result of the distribution of part of the revenue from product charges towards the collection of used batteries (this is also the case for old refrigerators, paper packaging materials and used tyres).

With regards to a comparison of environmental damages in the case of car batteries (waste generation etc.) and collected revenues, research studies estimate a 40-50 per cent rate of efficiency. Estimations have also been made on the effect of increased charge level on inflation in 1999. The multiplication effect of increased prices (through chain of traders) and the consumer's possibility to replace the charged product with another cheaper product had been taken into account. Studies estimate that the inflation rate had increased by 0.45% in total (not only because of car batteries) due to raised product charge levels in 1999. According to their estimation, a further 100% increase of charge level would result in a further 0.61% of inflation rate growth.

Competitiveness Impacts

The price distortion caused by this charge depends on the weight of the batteries since the charge is levied per kilogram of imported or domestically produced car batteries. The biggest Hungarian battery producer initiated the implementation with two different levels of charge, as batteries filled with electrolytes are heavier than those without electrolytes. Imported car batteries are usually not filled with electrolytes (and hence lighter than domestically produced car batteries), which caused a competitive disadvantage for the domestic producer who had to pay a higher charge.

In the case of car batteries, the product charge is approximately 7-8% of the consumer price. It is hardly replaceable with other products so the competition between different producers can have an effect on the price elasticity. If the level of the product charge increases, the growth of the price of the cheaper products will be bigger, since the charge has to be paid after the mass (kg) of batteries.

As the price of the battery is low compared to the price of a car, the financial burden caused by product charge is likely to be transferable to the car consumers. A 100% rise in the product charge would probably result in a shared financing between producers and consumers.

The differences in tax burden across different sectors of the economy are related to the use of vehicles, since the product charges are included into the price of car batteries (see Table 83).

Table 83: Effect of Battery Charge on Different Sectors

Sector	Extra burden caused by the product charge on car batteries in MHUF (MEUR)
Food and tobacco industry	40.484 (0.15)
Light industry	17.067 (0.064)
Chemical industry	14.916 (0.056)
Non-metallic processing industry	5.361 (0.020)
Machine industry	112.712 (0.43)
Trade, services	679.662 (2.57)
Transportation	330.120 (1.25)
Other industry and construction	143.842 (0.54)
Total:	**1.344.164 (5.08)**

The price elasticity of batteries is very low. There is no data available whether the introduction of the charge initiated any changes in the level of pollution. The number of batteries used is quite stable, but a high percentage of them are re-collected. The hazardous waste is then taken to Slovenia and Germany where it is rendered inert, therefore this process reduces the amount of waste getting out to the environment.

Internal Market Effects

The product charge has to be paid on domestically produced and on imported products. The main concern is the waste generation effects of certain products. (Preliminary research needs to be done to chose the right instrument to reach the environmental targets).

Equity and distribution effects

There is no evidence of such effects.

13.5 Summary

Existing tax/charges systems on batteries are increasingly in place to pay for the collection, recycling, treatment of used batteries, whether dry or wet batteries. All Member States have to implement Directives requiring appropriate collection, recycling and treatment of batteries, and accession countries will have to have such systems in place by accession also.

The Belgian approach is considered by many as very successful, whereby a non-profit organisation - BEBAT - was set up to ensure the collection, treatment, recycling and disposal of used batteries within the framework of a voluntary agreement between the federal government, the regions and the Belgian battery industry. Interestingly, a foreseen ecotax on batteries was replaced by the BEBAT voluntary agreement for fear of negative impact on consumer or industry. A charge, included in the price of batteries, finances these activities and only represents approximately one fourth of the initial ecotax rate. In 1999, all agreed targets were met by the BEBAT scheme.

The Italians have adopted a similar approach, setting up the non-profit organisation, COBAT, also (part) financed through a battery surcharge. It is unclear whether the system is as successful as the Belgian one, but significant quantities of batteries have been collected, and it is understood that there is now a very high level of separate collection of batteries (95%), reducing the burden on municipal landfills.

The Hungarian system currently focused on wet batteries (car batteries), rather than dry batteries, and the progress with the car batteries achieved through the scheme should help meet the challenge of implementing the EU directives on batteries.

Other countries have launched battery collection, treatment and recycling schemes as part of municipal waste management practices and linkage to national waste management plans. The funding for these systems often comes from municipal budgets, supported by local taxes e.g. in the Netherlands. It will be interesting to see whether some of these systems will have the battery related waste activities stripped out into a separately explicitly funded activity.