

envac

A MAGAZINE FROM THE WORLD
LEADER IN AUTOMATED WASTE COLLECTION

CONCEPT



THEME: RECYCLING

2:06

NEWS – GREENWICH, AUTOMATED RECYCLING – TROMSØ, APPLYING TECHNOLOGICAL DEVELOPMENTS – STAKKEVOLLAN, THE WORLD'S FIRST COMBINED ENVAC AND OPTIBAG SYSTEM – SPAIN, RECYCLING IN SPAIN



RECYCLING – AN OPPORTUNITY AND A CHALLENGE

It is becoming increasingly more evident that we need to do a better job of conserving our mutual resources. If everyone on Earth consumed at the rate of those living in the West, we would need several planets Earth to provide for everyone. The amount of raw materials we consume and the amount of waste we produce is directly related to economic growth. It is easy to realise that we cannot sustain our present consumption and habits but must instead sever the correlation between economic growth and expenditure of Earth's resources. But how? We can make monumental inroads by designing more resource-economic production methods, converting to renewable materials and by reusing and recycling more.

For the waste industry, more recycling constitutes both an opportunity and a challenge. How can we convince households and commercial players to recycle more? And at the same time guarantee that the collected renewable waste is of sufficient quality?

In this issue of Envac Concept we will take a closer look at a few techniques for effective waste collection and separation that will enable us to improve the level of recovery. The combined vacuum system and Optibag facility, the first of its kind in the world situated in the small town of Tromsø in north Norway, is an excellent example of how innovative initiatives can make conditions better for residents, waste collectors and our global environment.

But while technical innovations can help us realise many of our goals, we ourselves must still modify our behaviour. A new technical solution usually makes it possible for us to make behavioural changes, but only if users accept the technology. This is precisely what makes the advances in Spain and London so interesting. New solutions have been introduced in these areas and simultaneously generated a general acceptance among the population for waste separation.

Jonas Törnblom
Editor

Publisher
Christer Öjdemark,
President & CEO
Envac Centralsug AB

Editor-in-chief
Jonas Törnblom,
Director Corporate Marketing &
Communication
Envac Centralsug AB
jonas.tornblom@envac.se

Editorial board
Jonas Törnblom
Maria Ståbi



Tromsø, Northern Norway

Writers
Jonas Törnblom
Maria Ståbi
Mercedes Toscano

Photography
Envac Centralsug AB
Jan-Olof Yxell, Chalmers,
Rune Stoltz Bertiniussen

Production
Maria Ståbi &
ReklamAssistans, Motala

Repro
Lithoteknik, Motala

Printing and distribution
AB Danagårds Grafiska, Ödeshög



ENVAC CENTRALSUG AB
SE-117 84 Stockholm
Sweden
Office address: Bryggvägen 16
Tel: +46 8 775 32 00
Fax: +46 8 726 18 16
www.envac.net

NEWS

WORLD'S FIRST PROFESSORSHIP ENDOWED IN INDUSTRIAL RECYCLING

A professorship in industrial recycling has been endowed at Chalmers University of Technology in Sweden. Long-term support for the project is provided by Stena Metall, part of the Stena Sphere, owner of Envac.

The focus of the professorship is on chemical engineering, filling a void in the research world. Possible development areas include recycling of rare metals and recycling metals and plastics from waste that now ends up incinerated or in landfills.

It will be the only professorship in the world devoted entirely to this type of recycling.

Long-term focus on sustainable society
“Waste is a resource and sophisticated recycling has a bright future. We are very pleased to have the opportunity to find concrete solutions in this important area, which fits perfectly with Chalmers’ work on technology for sustainable development,” says Krister Holmberg, Dean of the School of Chemical and Biological Engineering.

“Recycling offers great potential both in terms of research and financially. Developing new industrially viable methods to recycle is of great concern. This is a major challenge, but absolutely necessary for society from an environmental and sustainability perspective.”



*Christian Ekberg,
Professor industrial
recycling, Chalmers*

BREAKTHROUGH FOR ENVAC IN THE EAST EUROPEAN COUNTRY, LITHUANIA

Envac has received its first order for an underground waste management installation in Vilnius, Lithuania. The project is a new construction project that includes housing, offices, and shops measuring 65,000 m². The site is located just outside the centre of Vilnius and the Envac system is scheduled for operation in 2010. The system will have the capacity to handle two waste fractions (mixed waste and paper/plastic). Envac estimates the value of the order at SEK 17.5 million.

Vilnius, Lithuania



You have two choices – you either let the households separate their waste or you do it

“We save a lot of money on collection by taking care of the waste separation process. In addition, the quality of the separated waste is considerably better than if the households themselves took care of separation at the source,” explains Peter Dalley of the Greenwich Council in London on the decision to invest in an ultra-modern, fully automated separation facility for municipal recycling waste.

Residents of Greenwich in south London no longer separate their recyclable waste at the source. Instead they place everything in the same container – paper/magazines, plastic, glass, metal, aluminium and cardboard – all mixed together. This enables the residents to save on storage space and the municipality saves on collection fees. In addition, the solution makes it easier to encourage waste management.

ONE OF THE WORLD'S MOST ADVANCED FACILITIES

The recycling facilities in Thames-

mead in Greenwich Council have been in operation for two years. 75,000 tonnes of recyclable waste from 350,000 households is separated per annum in a highly automated installation housed in a building measuring 40x120 m.

“The merf” (MRF stands for Material Recycling Facility) separates the waste into five main fractions. “We run three shifts a day with up to 20 employees working each shift,” Peter Dalley explains. “We intensify

the manual fine separation process depending on the level of quality we want to achieve, which is governed by the current market price on separated

“The merf” in Greenwich separates the waste into the following fractions:

- Paper
- Cardboard
- Aluminium
- Steel
- Three plastic fractions



In the recycling facility in Greenwich the waste is separated into five fractions

materials.” The maximum number of employees working each shift is never more than 20.

PARTNERSHIP WITH INDUSTRY

The Birchmere facility, which cost EUR 8 million to build (the building including technical equipment), is operated through a partnership between Greenwich Council (50%) and the US company Cleanaway. Greenwich Council has guaranteed 30,000 tonnes per year and Cleanaway

35,000 tonnes per year. Greenwich also receives part of the facility’s profits and royalties from the sale of materials.

POPULAR AMONG USERS

“This has been an enormous success for the municipality,” says Peter Dalley proudly. “The collection system is very popular among municipal residents since it is so easy to use. We didn’t force the system on anyone. We sent out application cards to all

households so they could register for participation. 72% volunteered to participate in this collection system. The municipality plans to soon also start collecting domestic food waste, which means we will have achieved our goals,” says Peter Dalley. “The success of the project is supported by a recently conducted survey that indicates that in all of London, the residents of Greenwich are most satisfied with their waste collection.”

The facility handle recyclable waste from 350.000 households every year.





Applying technological developments – not always smooth sailing



Tromsø's sanitation department, Renovasjonen, has a bold target - to eliminate all heavy waste transports in the city's housing areas and thereby improve the quality of living and the work environment for waste collection. Moreover, the world's first waste vacuum system with a direct connection to an optical waste separation installation has recently been launched.

Located 250 kilometres north of the Polar Circle, Tromsø with its 62,000 inhabitants is one of the world's northernmost cities. It is far from obvious that the task of pioneering technological advances in the field of waste collection would fall on Tromsø. "Our perspective is to think in new, modern and efficient ways," explains Bård Jørgensen, MD for Renovasjonen in Tromsø.



*Bård Jørgensen, MD Renovasjonen, Tromsø
Photo: Rune Stoltz Bertiniussen*

The first installation of a waste vacuum system was carried out at the hospital in Tromsø in 1993. But it was not until 1998 that Bård Jørgensen took in interest in the technology out of pure curiosity. "I was on holiday in Sweden and read about underground waste management systems in a Swedish newspaper. It was after reading that article that I contacted Centralsug as Envac was called at that time." Staffan Eriksson, head of Envac's operations in northern Europe, recalls the conversation. "Who is this madman, I wondered. We had never previously installed a waste vacuum in a city of this proportion and certainly not north of the Polar Circle."

But that initial contact with Envac proved to be just one of many. Bård organised study trips to Bergen and later also to Gothenburg where Envac had reference installations. A conference was arranged in Tromsø to introduce the system for the first time to the municipality's decision makers in September 1999.

Renovasjonen had already decided several years earlier that it wanted a better waste collection system for the city. Subsequently, the municipality resolved in May 1997 to implement a waste separation process for organic and mixed waste.

INITIAL DOUBTS

Staffan Eriksson at Envac was however not the only one with doubts about the idea of a waste vacuum in Tromsø. The building developer for the first housing area scheduled to be equipped with a mobile waste vacuum system was initially very sceptical. After much persuading, he finally agreed to install a waste vacuum. The first underground waste transport system, a mobile vacuum system, was installed in the Nedre Hansmark housing area four years after the first talks. A decision the developer has not regretted. Renovasjonen provides certain financing assistance to get started. For instance, Renovasjonen reduces the tariff by between 15 and 17% for those areas that have installed the waste vacuum system. Building developers are also eligible for smaller advanced financing. "We did have one building developer who said no," Bård Jørgensen tells us, "but he came back six months later when he discovered how impossible it was to integrate the bins and containers in the buildings."



FORERUNNERS PROMOTING TECHNOLOGICAL ADVANCES

Odd Aune, MD for Envac in Norway confirms that many were sceptical, critical even, in the beginning.

“Once the decision was finally taken, the reaction was positive and now basically everyone agrees with the initiatives,” says Odd Aune. “The municipality is a forerunner in Norway and has shown the way for many other municipalities. The decision to

invest so consistently in rationalising waste collection has entailed a significant change in infrastructure thinking as a whole, not only in Tromsø.”

Both Germany and Spain have taken an interest in the process, as well as China and Canada. Renovasjonen has in this way carved out a place for Tromsø on the map of the world.

“The positive reactions we receive from our users are most important to us,” says Bård Jørgensen. “We hear

things like ‘we feel sorry for everyone who has a regular bin’ and ‘it is nice and orderly’. We are therefore now convinced it is time to take the next step in terms of development - combining a vacuum system with an Optibag system without any intermediate transportation. It will be the first of its kind in the world,” Bård Jørgensen explains proudly.

Aerial view Tromsø: Rune Stoltz Bertiniussen



The world's first combined Envac and Optibag system

Traditional waste collection solutions comprised of several waste bins and containers are coupled with significant transportation and safety issues in densely populated housing areas. It was on this premise the municipality of Tromsø planned its future waste management structure.

The opening ceremony for the city's eco park, Tromsø Miljøpark (TMP), was attended by guests from all the Scandinavian countries on 8 September 2006 and marked the start of a multi-year venture to address waste management in northern Norway. Attitudes in respect to waste have changed, shifting from a problem to a resource.

Tromsø has invested in modern technology and has, among other solutions, the city's first optical waste separation installation for household waste. The equipment delivered by Optibag AB, a subsidiary to Envac automatically sorts five different fractions and has a capacity of 10 tonnes waste per hour.

"This is the most modern Optibag installation in the world today. Not only is this the first with a direct

connection to a waste vacuum system, the installation also has a few other interesting innovative features that facilitate direct, in-line processing of waste which converts waste to resources directly," says Stefan Holmertz, Managing Director of Optibag.

OPTIBAG - EASIER RECYCLING

Optibag is a fully automatic optical sorting system of source-separated household waste that uses different coloured waste bags. The households are provided with waste bags in different colours and separate their waste at home. Tromsø uses green

for food waste, red for paper, yellow for cardboard packaging, blue for plastics and other colours for the energy fraction.

One of the biggest advantages is that the households can throw all waste bags into the same inlet. This reduces the amount of space needed for waste storage and improves waste logistics, but also means fewer collections and fewer transports with heavy sanitation trucks in the housing areas.

The coloured bags are transferred at the terminal to a conveyor from which the bags are automatically

sorted using camera technology. Analyses show that 97-100% of the residents properly sort their waste and that the equivalent is sorted out at the installations. using camera technology. Analyses show that 97-100% of the residents properly sort their waste and that the equivalent is sorted out at the installations.



*Bård Jørgensen,
inauguration of
Tromsø Miljøpark
September 2006
Photo: Rune Stoltz
Bertiniussen*



CONT. NORWAY

The two sorting conveyors are dimensioned to sort several thousand bags per hour and the installation can be equipped with both additional capacity and fractions should the need arise. The Optibag system is designed to handle waste from the 62,000 residents of Tromsø and the 627 surrounding islands. Construction of the entire TMP eco park, complete with the fully integrated Envac waste vacuum from Stakkevollan, has been budgeted at about NOK 100 million.

ENVAC AND OPTIBAG IN THE SAME SYSTEM

The waste vacuum system in the nearby residential area of Stakkevollan, home to 3,500 residents, is the first in the world to be connected directly to an Optibag installation. Bård Jørgensen, Managing Director for Renovasjonen in Tromsø is very proud as he launches the new Optibag system and the unique vacuum installation at the opening ceremony.

“We have had major problems with household waste collection on occasion, particularly in terms of transportation issues and the presence of large sanitary trucks inside the housing area,” Bård explains.

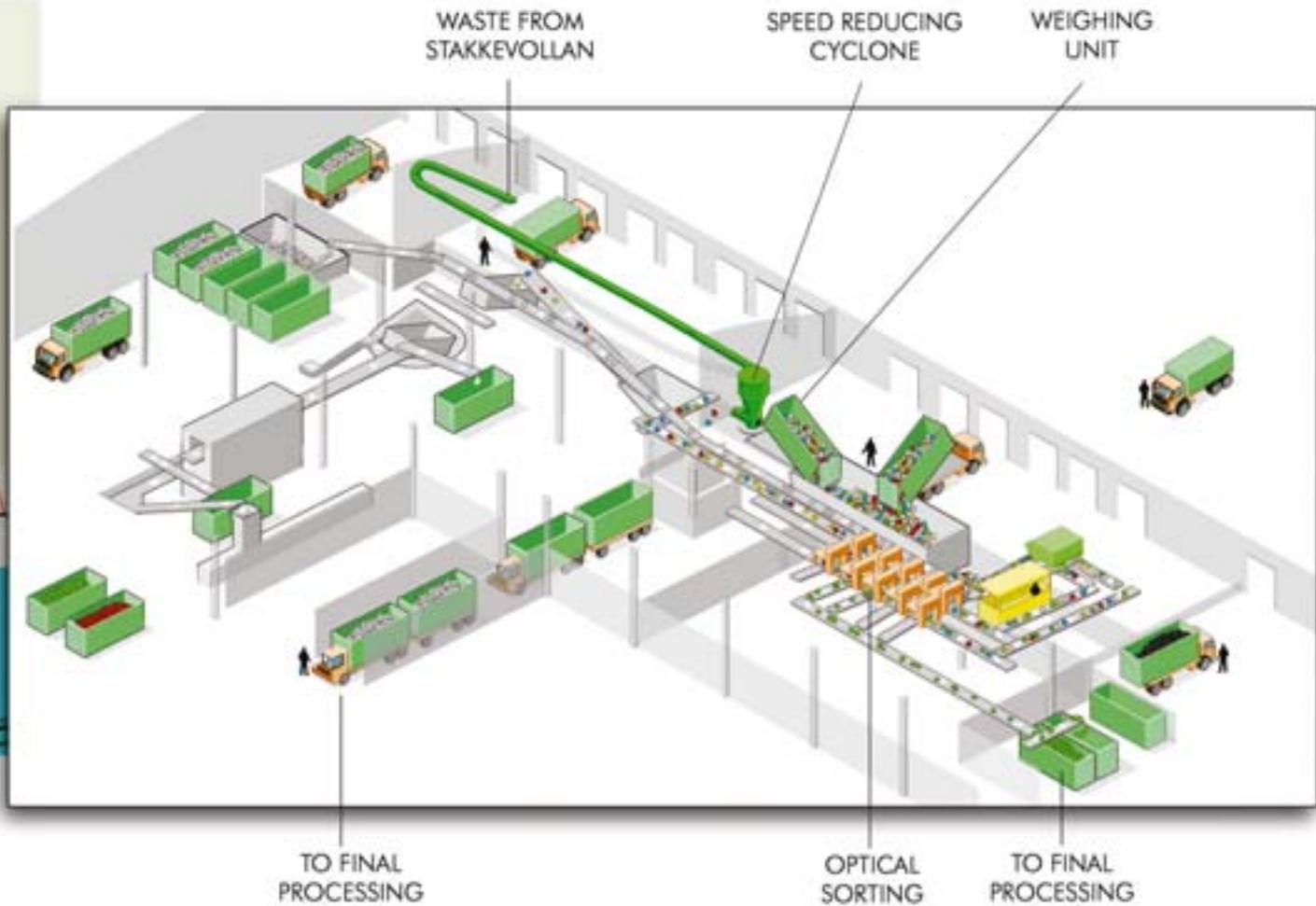
“One of our biggest challenges is that we generally have long winters with lots of snow and frozen waste bins that are difficult to transport, which causes work-related injuries and wear and tear on materials. We expect to be able to considerably limit these



problems now. I also want to emphasise the enormous improvement this will have on the living environment in Stakkevollan. All waste containers have now been replaced with indoor or outdoor inlet so all waste is automatically transported down to the underground optical waste sorting installation. This means we no longer need sanitation trucks in the area. It has been very exciting to work on this environment and engineering project” says Bård Jørgensen in closing.

Facts – combined Envac and Optibag installation in Stakkevollan

Number of waste fractions (Optibag)	5
Types of waste fractions	Organic, incinerable, paper, cardboard packaging and plastics
Start of operations	September 2006
Capacity	10 tonnes waste/hour
No of connected apartments in Stakkevollan	1750 apartments
No of inlets	42 outdoor inlets
Length of pipe network, metres	4650 metres



© 2006 Envac AS



Recycling in Spain

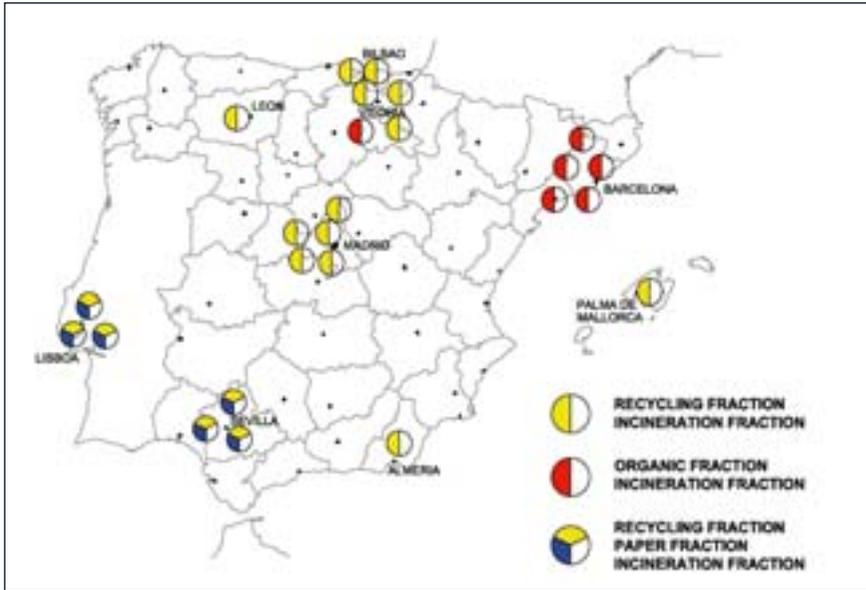


In many places in Spain the issue of recycling is still in the teething phase, however others have experience since 15 years. Spanish municipalities are however systematically applying new technologies and methods to realise a sustainable and environmentally-sound waste management solu-

tion. An essential part of this task includes informing the citizens and convincing them that their participation is a condition for a working recycling system.

The different municipalities in Spain recycle to various extents. Environmental schemes and targets also vary from municipality to municipality, see map on following page.

Underground waste transport systems can manage several waste fractions in one and the same system. Most of the Envac systems in Spain are designed to handle two types of waste, recyclable and rest. There are also several installations that manage three fractions (rest, recyclable and paper). In addition, a four separate waste fractions system was recently installed by Envac Iberia in Tarrasa, a city located in northeast Spain.



Cities with Envac system with recycling



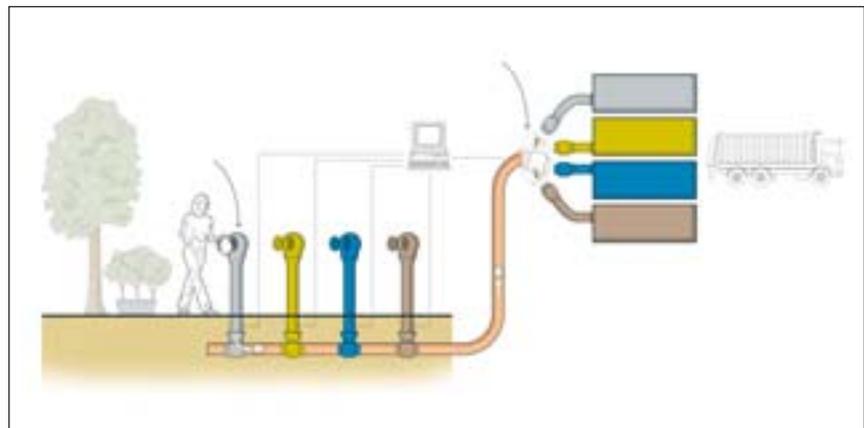
Inlet Envac underground waste management, Barcelona

EFFECTIVENESS AND SORTING LEVELS

Studies that compare the effectiveness of different collection systems in terms of people's tendency to separate waste at the source are usually complicated to perform. It is difficult, impossible even, to find comparable areas with the same demographics in respect to population, living arrangements and consumption patterns. Studies conducted in areas that use Envac systems can therefore only be compared with the city's average figures or with other areas that are more or less comparable.

There are interest organisations for the management of recyclable waste in Spain, performed some comparative studies in 2006 in two municipalities in the Madrid area that does however indicate interesting differences in the sorting levels of various waste collection methods.

"The system is a triumph not only because the technology functions as intended, but also because the users learn to use the system properly. Convincing citizens that their participation is a crucial aspect in the waste separation procedure is a complex task that requires careful preparation and long-term implementation."
Mr. Juan Megino, Urban Development Councillor of the Town Council of Almería





The study shows that sorting levels of the recyclable fraction in the two areas that have an Envac system:

- Envac-system Majadahonda 59%
- Envac-system Alcobendas 69%

These results can be compared with the average level of sorting of recyclable waste in the Madrid city, using other collection methods.

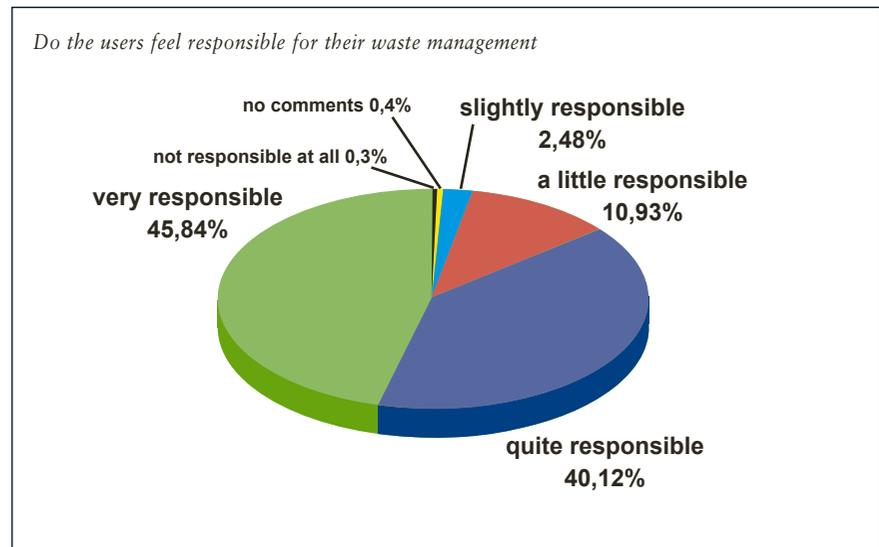
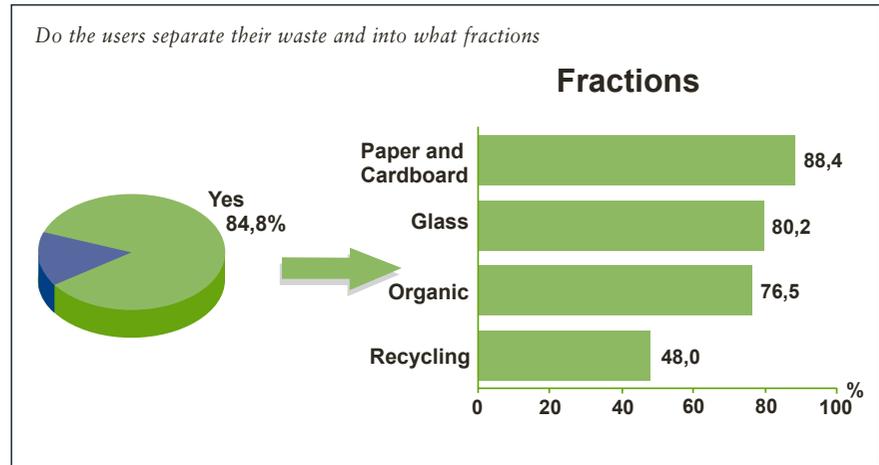
- Collection with Bins 48%
- Underground containers 46%

The results indicate that automatic waste management is a more effective method for achieving a higher level of waste separation.

SUBSTANTIAL USER BENEFITS

A Gallup survey conducted in 2006 in which 805 Envac-system users in ten different areas in Spain were interviewed indicates that over 90% of the users prefer Envac’s system to conventional waste management solutions. Among the things they value the best, more than 15% feel that the Envac systems are superior since they are better adapted to recycling and more than 85% of the users recycle their waste.

The survey was commissioned by Envac Iberia in the ten areas where the company has installations, namely Pino Montano I and II (Sevilla), San Diego (Sevilla), Vitoria-Gasteiz historical town centre, Ibaiondo (Vitoria-Gasteiz), Valdeasfuentes (Alcobendas, Madrid), the Olympic village in Barcelona, Santa Caterina (Barcelona), Eix Maçia (Sabadell), Santa Ana



(Cartagena) and the Vallehermoso building in Madrid.

The survey shows that users in Ibaiondo and Valdeasfuentes are more accustomed to separating their waste. These results were particularly prominent in the 45-and-older age category.

OLDER PEOPLE ACCEPT RESPONSIBILITY FOR WASTE MANAGEMENT

The survey shows that 86% of all respondents feel that they themselves

play an important role and accept responsibility for waste management.

This was particularly evident in the regions of Valdeasfuentes (Madrid) and Eix Macia (Sabadell) and in the older-than-54 age group. The younger target groups, those younger than 35, do not share this opinion to the same extent.

Envac is aware of this problem. Therefore, information campaigns in collaboration with the concerned

new Envac facility is installed. These campaigns are not only intended to provide general waste management information but are primarily a tool in motivating users to use the system correctly through proper waste separation at the source. The campaign includes a welcome kit that is distributed to all residents in the area.

Some type of small give away, such as a doormat complete with sorting related information, is often enclosed.

Another important feature is educating school classes. Envac regularly hosts school trips at its installations to inform classes about how the system works and what happens to waste after it is thrown away. These

information campaigns are very popular and constitute a vital element in Envac's marketing and customer dialogue.

Children's theatre group appearing on a recycling event at an Envac installation



www.envvac.net

**ENVAC
HEAD OFFICE**

ENVAC CENTRALSUG AB
SE-117 84 Stockholm
Sweden
Visitors: Bryggvägen 16-18
Tel: +46 (0)8 775 32 00
Fax: +46 (0)8 726 18 16
www.envvac.net
info@envvac.se

NORHERN EUROPE

ENVAC SCANDINAVIA AB
Box 8849
SE-402 71 Göteborg
Sweden
Tel: +46 (0)31 65 83 50
info@envvac.se

ENVAC SCANDINAVIA AB
SE-117 84 Stockholm
Sweden
Tel: +46 (0)8 775 32 00
info@envvac.se

ENVAC SCANDINAVIA AB
Sångelekgatan 6D
SE-215 79 Malmö
Sweden
Tel: +46 (0)40 26 63 25
info@envvac.se

OPTIBAG SYSTEMS AB
Box 320
SE-595 24 Mjölby
Sweden
Tel: +46 (0)142 185 00
info@optibag.se

ENVAC DANMARK A/S
Kløvermarksvej 70
DK-2300 København S
Denmark
Tel: +45 7025 1885
kbh@envvac.dk

ENVAC DANMARK A/S
Postboks 1223
DK-8210 Aarhus V
Denmark
Tel: +45 8744 1000
aar@envvac.dk

ENVAC NORGE AS
Ensjøveien 14
NO-0655 Oslo
Norway
Tel: +47 22 08 70 00
firmapost@envvac.no

ENVAC DEUTSCHLAND
GMBH
Sanmannreihe 40A
DE-21031 Hamburg
Germany
Tel: +49 40 600 09 10
email@envvac.de

CENTRALNED BV
Postbus 318
NL-2130 AH Hoofddorp
The Netherlands
Tel: +31 23 569 2596
info@centralned.nl

ENVAC UK LTD
PO Box 4482
WARWICK, CV34 9EF
U.K.
Tel: +44 870 850 0708
info@envvac.se

SOUTHERN EUROPE

ENVAC IBERIA S.A.
Parque Empresarial
El Carralero nave 3
ES-28220 Majadahonda
Madrid
Spain
Tel: +34 91 457 06 11
envvac@envvac.es

ENVAC IBERIA S.A.
Diputación, 276 -2º-1A
ES-08009 Barcelona
Spain
Tel: +34 93 342 64 33
barcelona@envvac.es

ENVAC IBERIA S.A.
Edificio Albia 2
C/San Vicente 8-1a
pl. Local C
ES-48014 Bilbao
Spain
Tel: +34 94 447 46 60
bilbao@envvac.es

ENVAC IBERIA S.A.
Avenida Innovación s/n
Edificio Hércules,1 Oficina 5
ES-41020 Sevilla
Spain
Tel: +34 95 425 06 52
sevilla@envvac.es

ENVAC IBERIA S.A.
Avenida Cochabamba, 24-1º
ES-28016 Madrid
Spain
Tel: +34 91 443 03 06
centro@envvac.es

ENVAC IBERIA S.A.
Avenida Pio XII, 1 esc 3,2, 1
ES-46009 Valencia
Spain
Tel: +34 96 155 16 48
levante@envvac.es

ENVAC IBERIA S.A.
C/Lascaray, 6 bis - Oficina 12
ES-01008 Vitoria
Spain
Tel: +34 94 515 10 07
bilbao@envvac.es

ENVAC IBERIA S.A.
Avenida de los Juegos del
Mediterráneo, s/n
ES-04131 Retamar Almería
Spain
Tel: +34 950 20 88 44
sevilla@envvac.es

ENVAC FRANCE
13 avenue des Saules BP61
69922 Oullins Cedex
France
Tel: +33 (0)4 72 66 18 00
contact@envvac.fr

ENVAC PORTUGAL
Alameda dos Oceanos,
3.15.02D-Esc 7
Parque das Nações
PT-1990-217 Lisbon
Portugal
Tel: +351 21 895 89 20
info@envvac.pt

ENVAC ITALY
Via Vincenzo Monti, 8
20123 Milano
Italy
Tel: +39 (0)2 46 71 22 38
info@envvac.it

ASIA

ENVAC FAR EAST LTD.
RM 4401, 44/F
China Resources Building
26 Harbour Road
Wanchai
Hong Kong
Tel: +852 2869 8838
envvac.hk@envvac.com.hk

ENVAC FAR EAST LTD.
c/o Swedish Trade Council
Room 1101 International
Trade Building
333 Keelung Road, Sec 1
Taipei - Taiwan
Tel: +886 2 2757 6573
ben.yang@swedishtrade.se

ENVAC MACAU LTD.
Rua Dr. Pedro José Lobo
no. 1-3
Ed. Banco Luso Internacio-
nal, 12º -andar
Salas 1209
Macau
Tel: +853 6233717
vkchan@envvac.com.hk

ENVAC ENVIRONMENTAL
TECHNOLOGY CO.LTD
Office 1509, Guo Lu (CITS)
Mansion
1277 Beijing Xi Road
200040 Shanghai
China
Tel: +86 21 322 208 58
patrick.zhou@envvac.com.cn

ASIA

ENVAC ENVIRONMENTAL
TECHNOLOGY CO.LTD
Office 3208, Wandao Plaza Building 6
93 Jianguo Rd
100022 Beijing
China
Tel: +86 10 582 035 21
patrick.zhou@envvac.com.cn

GUANGZHOU
ENVAC ENVIRONMENT
TECHNOLOGY CO.LTD
Rm 3318, CITIC Plaza,
233 Tianhe Bei Road
510613, Guangzhou, P.R.
China
Tel: +86 20 389 112 66
yuky.wu@envvac.com.cn

ENVAC SINGAPORE PTE. LTD.
161 Lavender Street, #02-10
Singapore 338750
Tel: +65 6292 5123
info@envvac.com.sg

ENVAC MALAYSIA
Envac (M) Sdn Bhd
Lot 216 B, 2nd Floor
Podium Block, Faber Towers
Jalan Desa Bahagia, Taman Desa
58100 Kuala Lumpur
Malaysia
Tel: +60 3 7984 85 57
envacmsia@envvac.com.my

ENVAC CENTRALSUG KOREA
7F, Kyobo Building
1-16, Pyollyang-Dong, Kwachon-Shi
Kyonggi-Do, 427-040
Korea
Tel: +82 2 507 2702
cskorea@envvac.co.kr

ENVAC MIDDLE EAST FZE
Emaar Gold & Diamond Park
P.O. Box 213412
Dubai - UAE
Tel: +971 (0)4 341 52 50
info@envvac.ae