

A Comparison of Key Figures: The City-Cleaning Performance of European Cities

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Comparison of Key Figures

On the occasion of this conference the Municipal Department 48 and ARA asked the ITWWL to conduct a study on:

Littering Evaluation in Vienna and Other European Cities

Project components:

- Comparison of cities regarding littering & street cleaning
- Collection of quantitative data on litter



Project Component 1:

Comparison of the following cities



Barcelona



Brussels



Frankfurt



Vienna

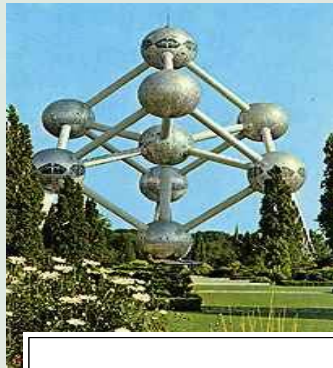


Prague

Comparison of the following cities



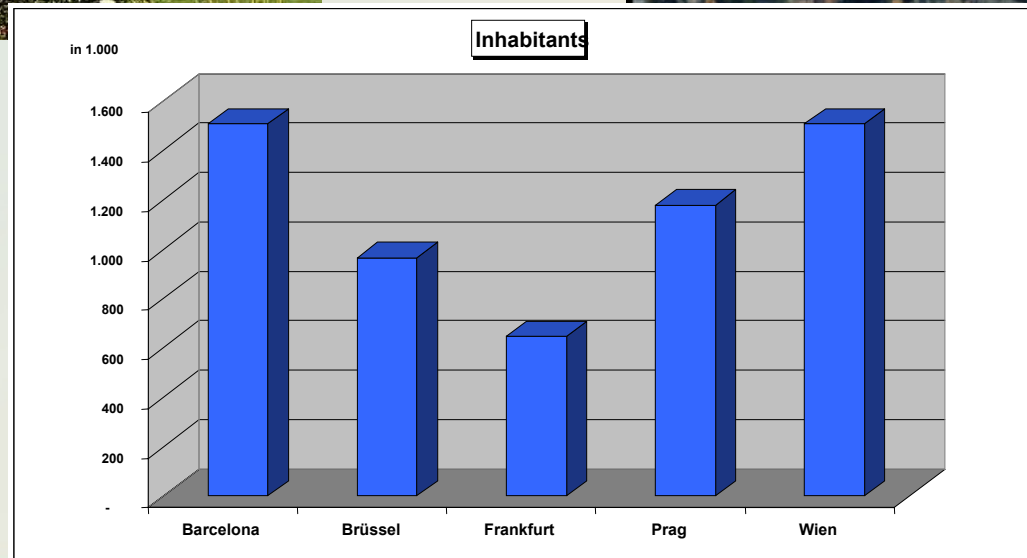
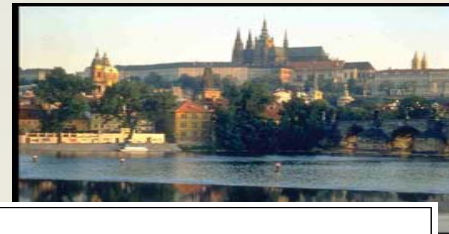
Barcelona



Frankfurt



Vienna



Areas under the Responsibility of Street Cleaning

Area / Responsibility:	Yes	No	Sometimes
Public roads	Barcelona Frankfurt Vienna		Brussels Prague
Expressways in urban areas	Brussels Prague	Barcelona Frankfurt Vienna	
Roadside green	Prague	Barcelona Frankfurt Vienna	Brussels



Areas under the Responsibility of Street Cleaning

Area / Responsibility:	Yes	No	Sometimes
Sidewalks	Barcelona Frankfurt		Brussels Prague Vienna
Pedestrian zones	Barcelona Frankfurt Vienna Prague		Brussels
Train stations		Barcelona Frankfurt Brussels Vienna Prague	



Areas under the Responsibility of Street Cleaning

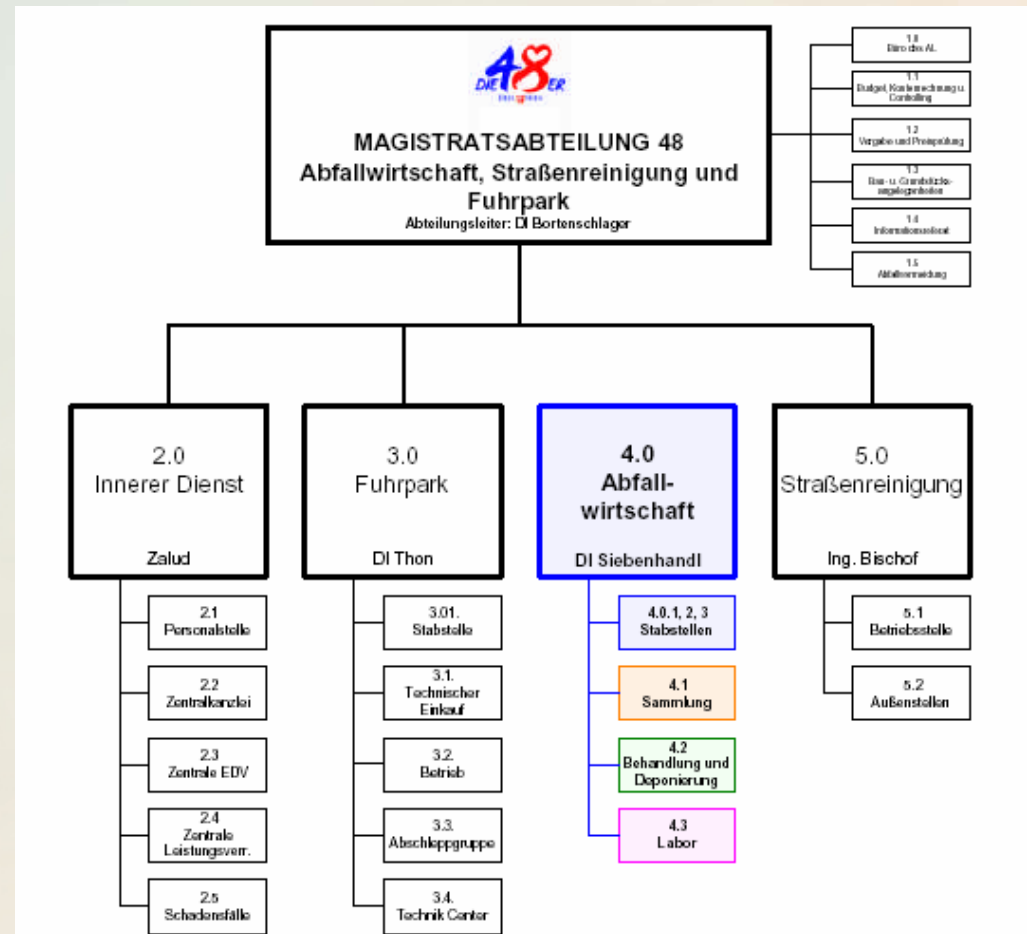
Area / Responsibility:	Yes	No	Sometimes
Subway stations		Barcelona Prague Vienna	Brussels Frankfurt
Municipal parks	Prague	Barcelona Frankfurt Vienna	Brussels
Area around recycling containers	Barcelona Prague Vienna		Brussels Frankfurt



Different Approaches to Municipal Street Cleaning

SPECIAL SITUATION: VIENNA

- Municipal cleaning integrated into municipal department



Different Approaches to Municipal Street Cleaning

- Now privatized, formerly municipal approach: **Frankfurt**
- Public tender and award of contract to private companies: **Barcelona**

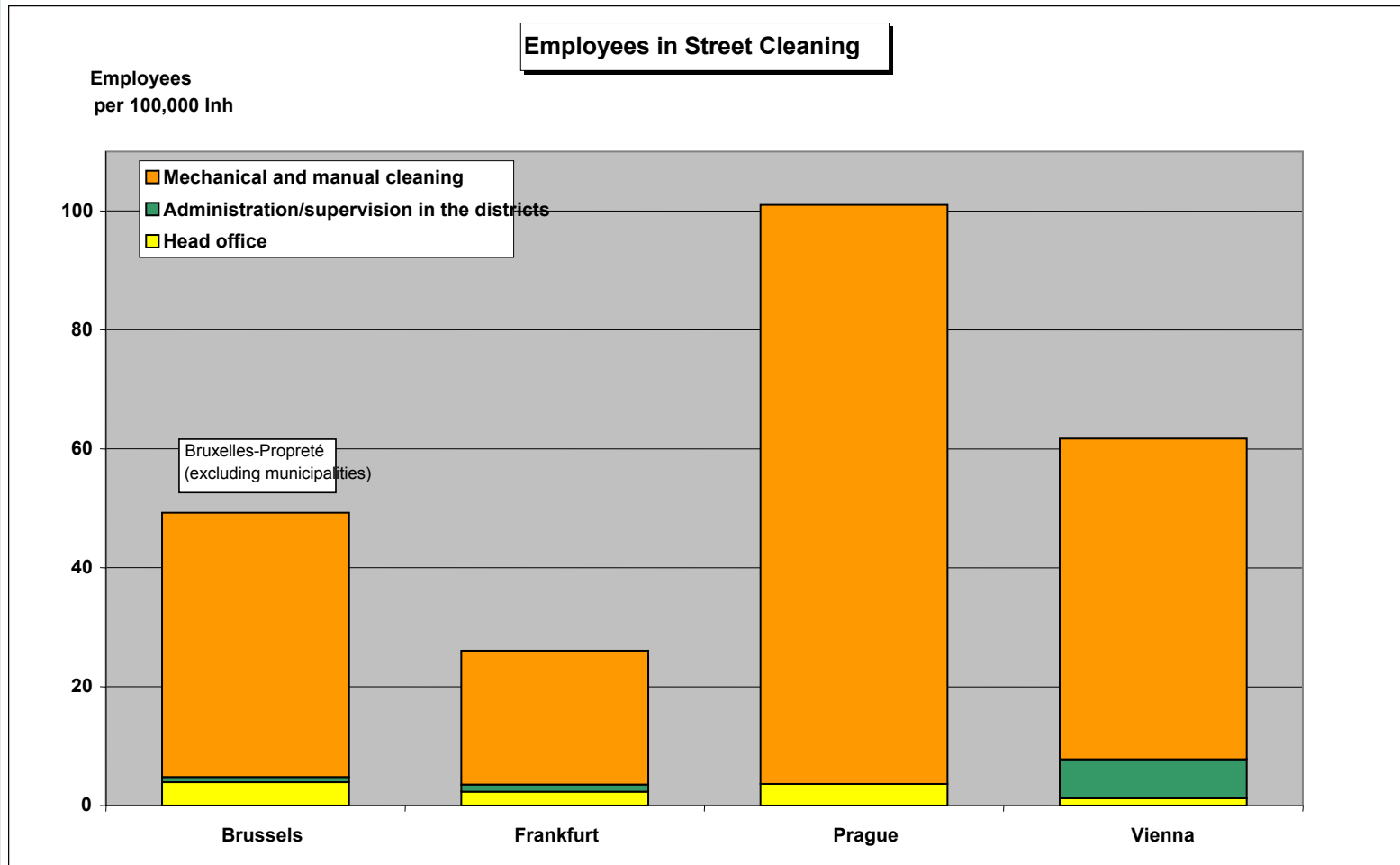
	Responsibility for municipal street cleaning	Carrying out of municipal street cleaning
Vienna	MD 48 (Municipal Department of the City) 	MD 48 (Municipal Department of the City)
Frankfurt	FES (private company, formerly Department of Waste Management and City Cleaning)  Frankfurter Entsorgungs- und Service GmbH	FES (private company)
Barcelona	Ajuntament de Barcelona  Ajuntament de Barcelona	private companies (tender procedure)

Different Approaches to Municipal Street Cleaning

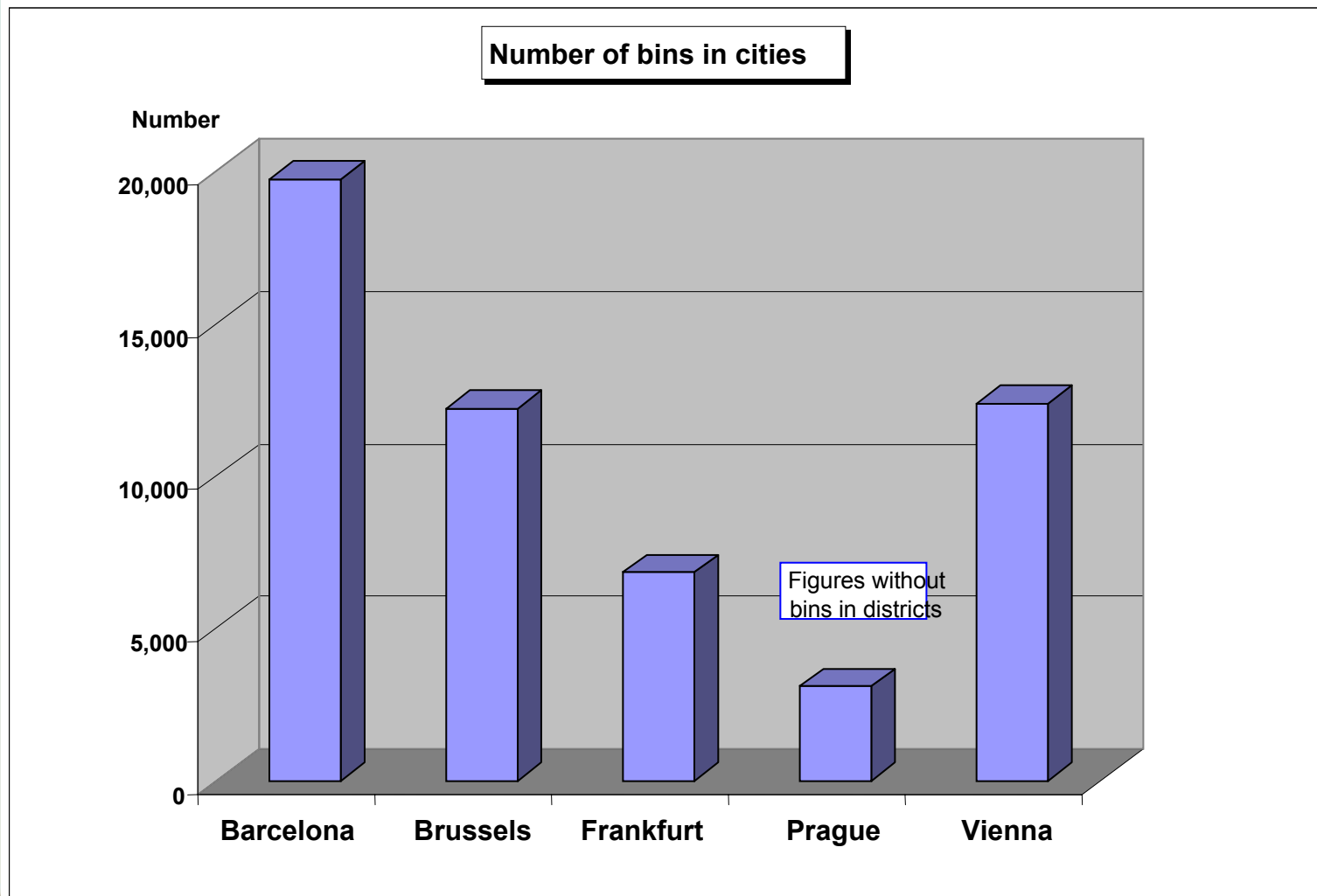
- City government and districts share responsibility: **Prague**
- Regional government and municipalities share responsibility: **Brussels**

	Responsibility for municipal street cleaning	Carrying out of municipal street cleaning
Prague 	Important places, expressways, tourist attractions: Municipal Department of the City	2 private und 1 municipal company (tender procedure)
	Other areas: Under the responsibility of the districts	Districts or private companies
Brussels 	Important places, expressways, tourist attractions: Bruxelles-Propreté (Brussels region)	Bruxelles-Propreté
	Other areas: Under the responsibility of municipalities	Municipalities in the Brussels region

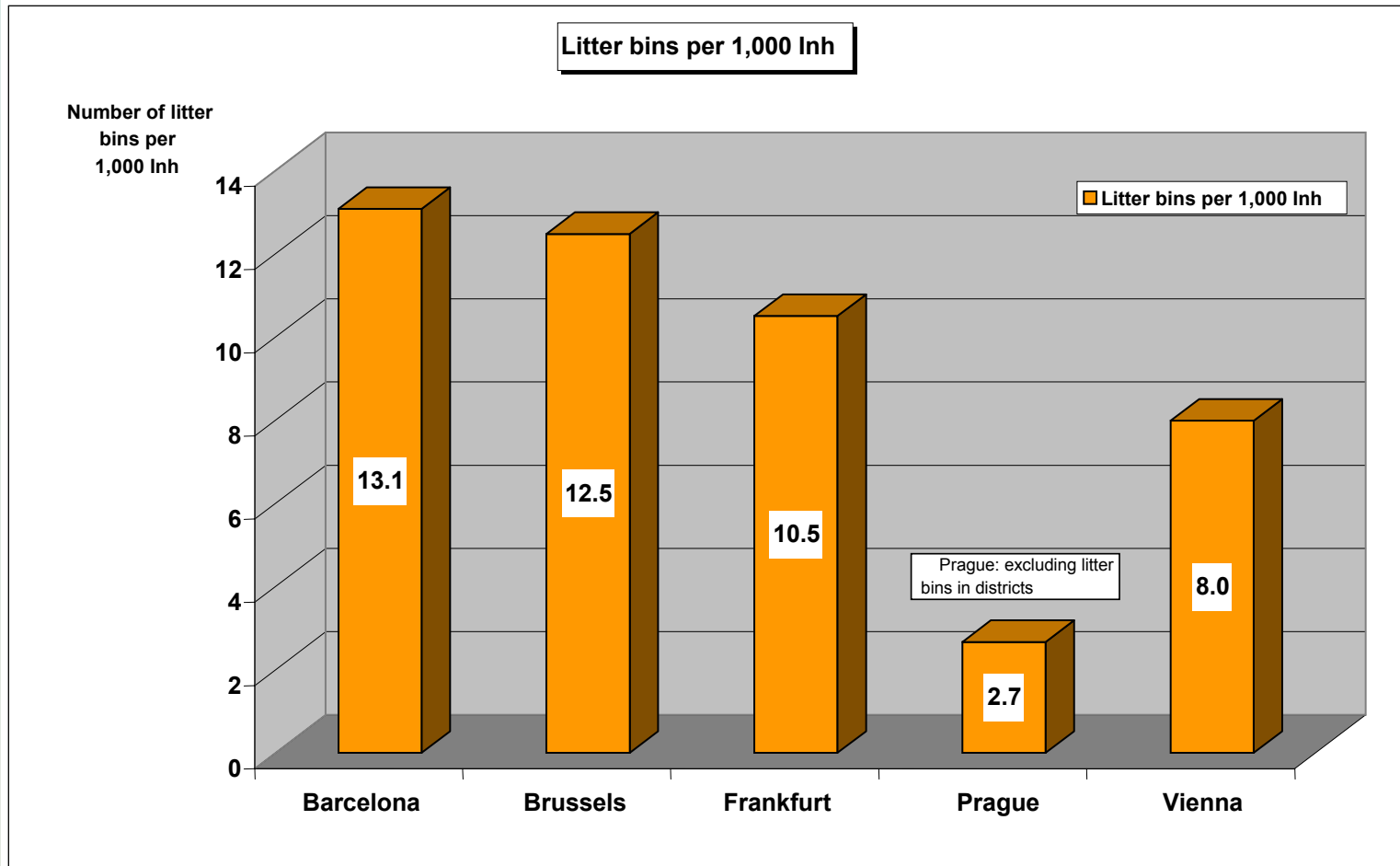
Employees in Street Cleaning



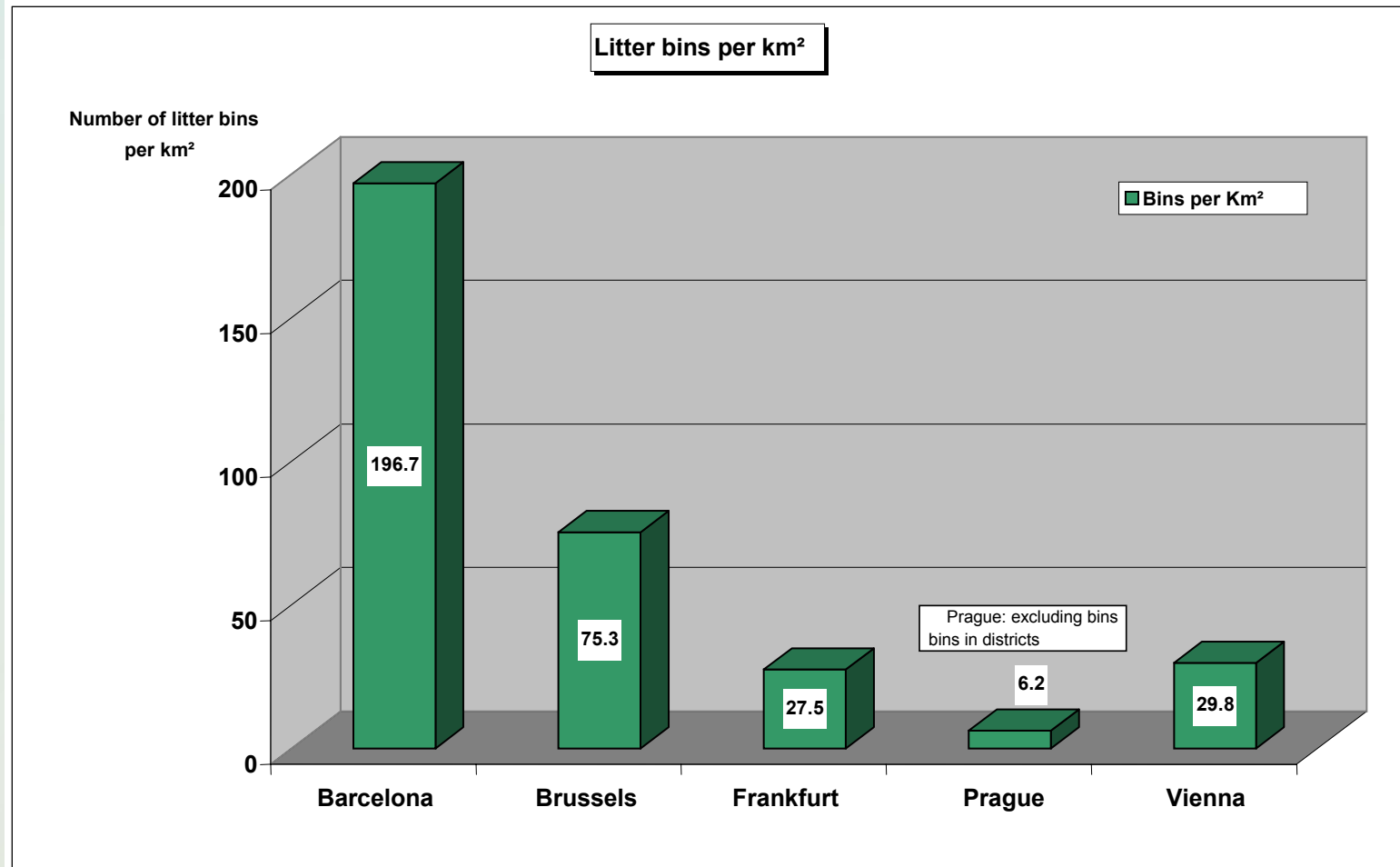
Litter Bins in Cities



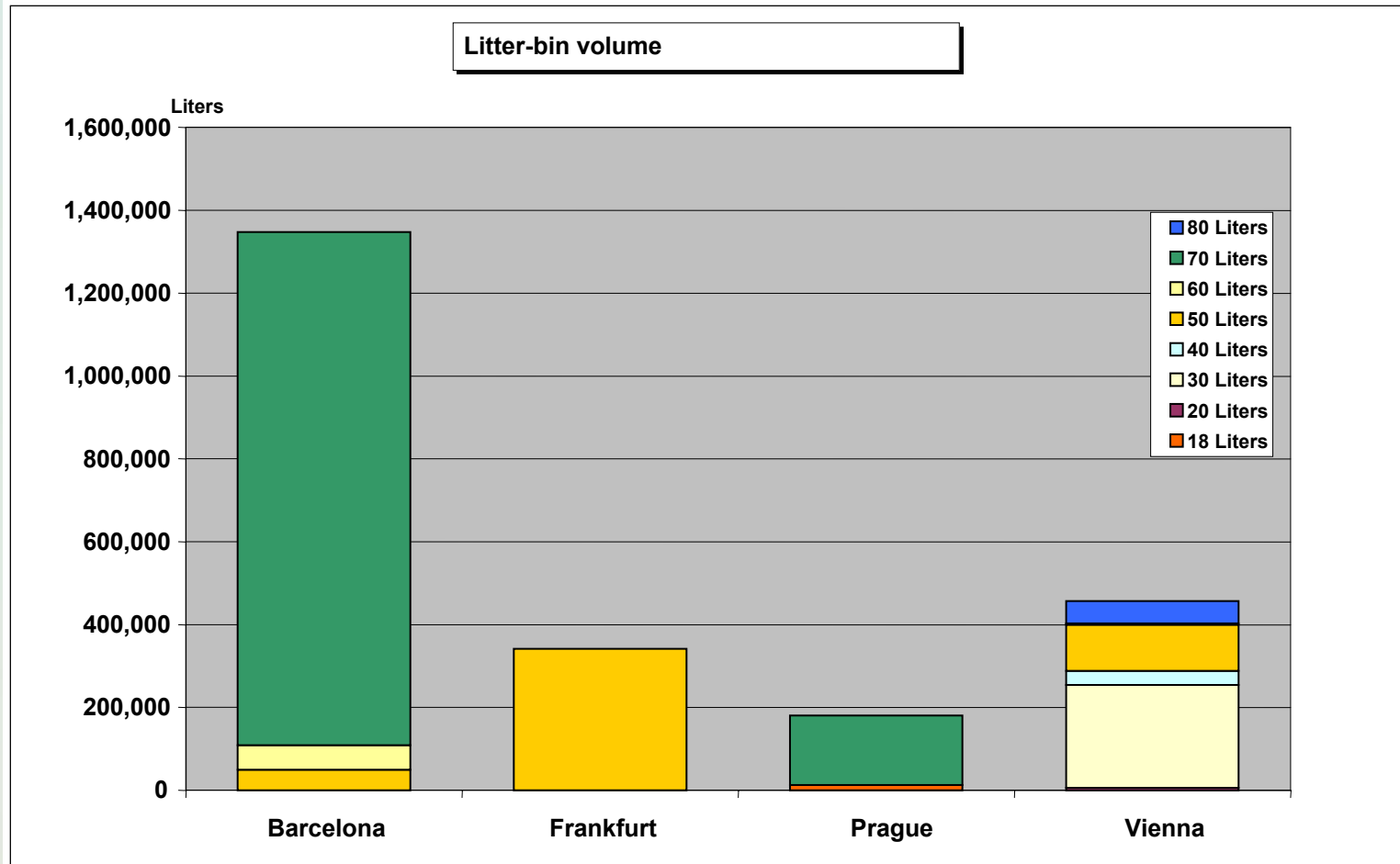
Litter Bins per Inhabitant



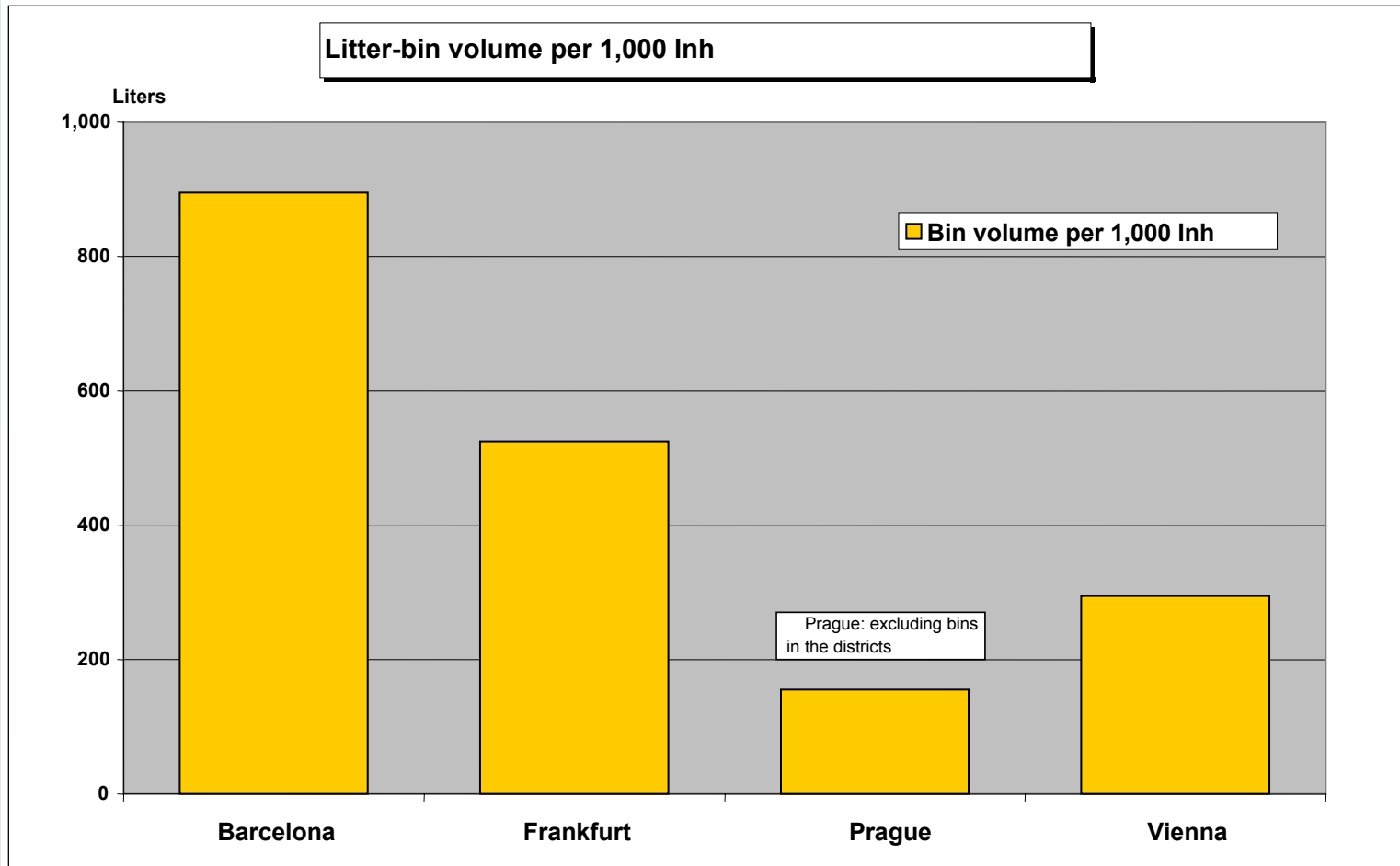
Presence of Litter Bins per km²



Litter-Bin Volume Provided

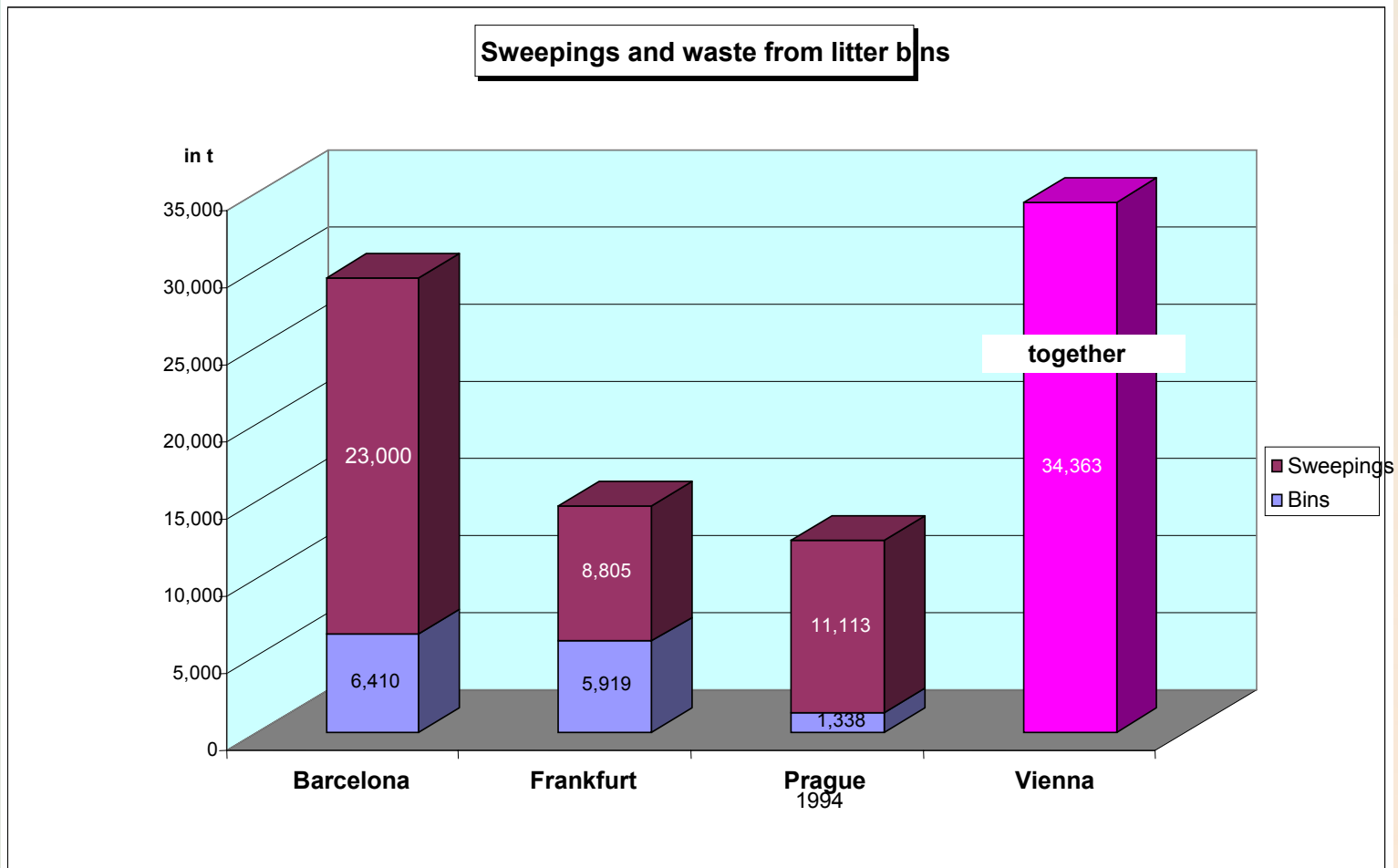


Litter-Bin Volume Provided per 1,000 Inhabitants

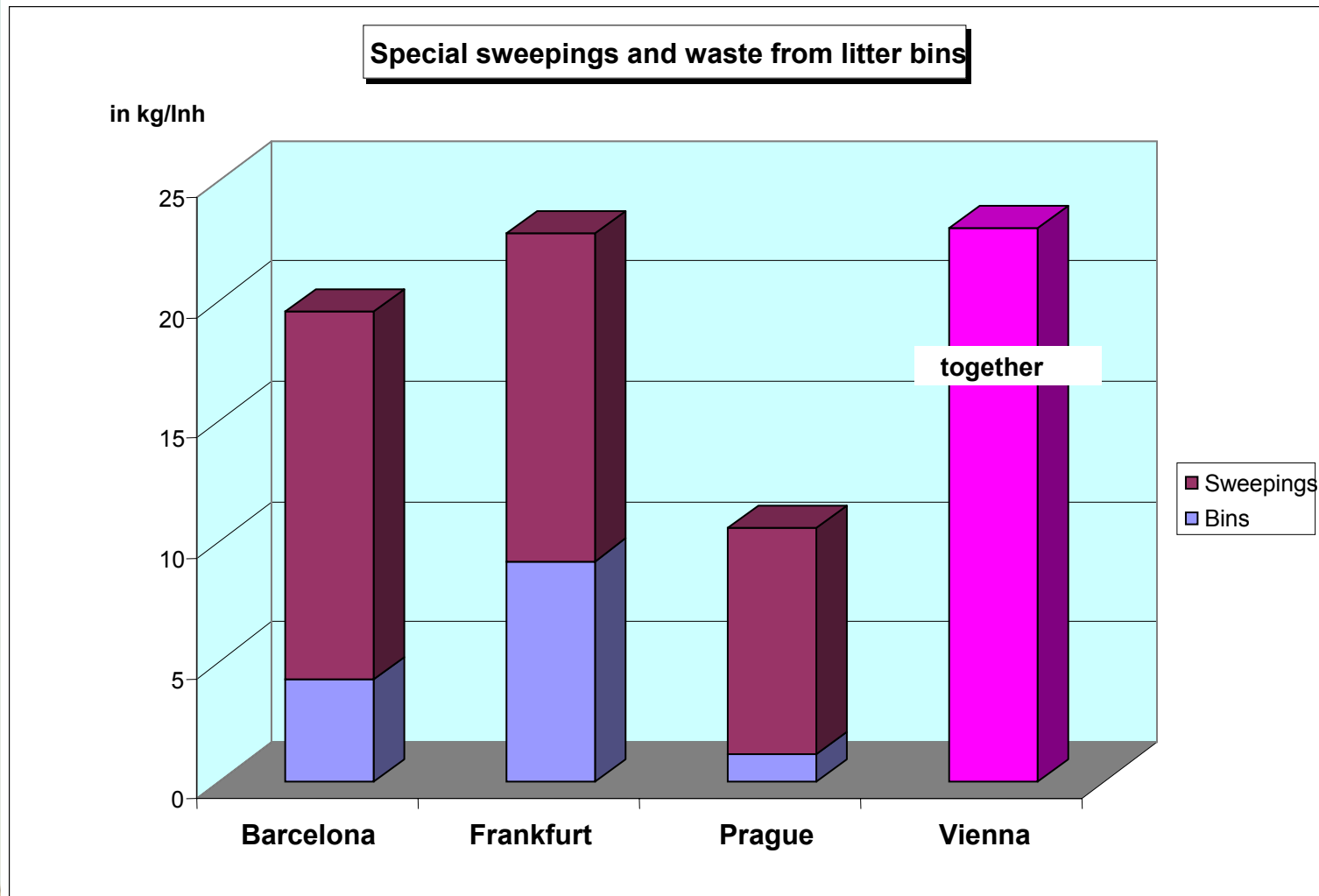


Waste Collected by Street Cleaners

Absolute Sweepings and Waste from Litter Bins



Special Waste Collected by Street Cleaners : Sweepings and Waste from Litter Bins



Project Component 2: Litter Quantities

Project Coordination:



Mag. Ableidinger (ITWWL)



Project Component : Litter Quantities



Possible units of analysis for littering studies:

- Weight
- Volume
- "Visible surface"
-

This study was conducted by counting littered items:

- Unit of analysis = number of littered items



Data Collection in the Following Cities:



Barcelona



Brussels



Frankfurt



Prague



Vienna

Procedure of the Analysis

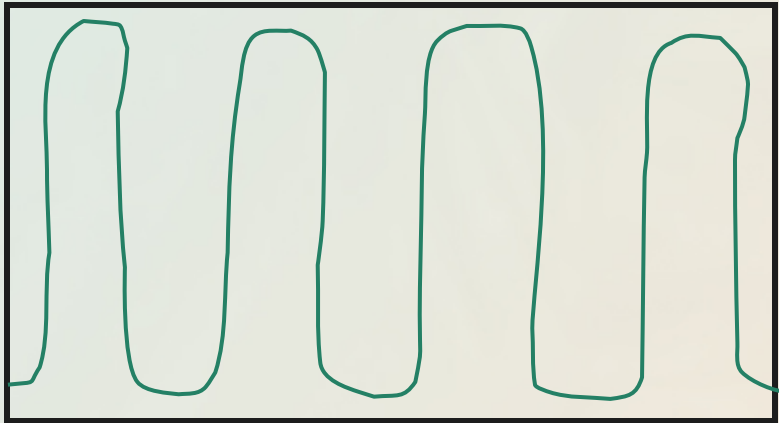


- Selecting sites where survey is conducted
- Obtaining information on sweeping cycles at each site
- Inspection of the potential survey units
- Determining and pacing off the areas and distances to be examined
- Counting littered items at the sites on 4 days
- Converting results into standardized areas and distances
- Analysis



Survey Units

- In each city
- one central square popular with tourists
- one shopping street
- one central park and
- one major railway station
- were selected, paced off and surveyed.



Pacing off squares



Survey Unit "Square"



Barcelona: Av. de la Catedral



Brussels:
Grand' Place



Frankfurt: Römerberg



Prague: Staromestske namesti



Vienna:
Stephansplatz

Survey Unit "Street"



Barcelona: Passeig de Gracia



Brussels:
Av. Louisa



Frankfurt: Bergerstraße



Prague: Vaclavske
namesti



Vienna: Mariahilfer Straße

Survey Unit "Park"



Barcelona: Parc de la Ciutadella



Brussels:
Parc du Bruxelles



Frankfurt: Güntersburgpark



Prague: Riegrový sady



Vienna: Stadtpark



Survey Unit "Train Station"



Barcelona: Sants Estacio



Frankfurt: Hauptbahnhof



Brussels:
Gare Centrale



Prague: Hlavni nadrazi



Vienna: Westbahnhof

Data Entry Form

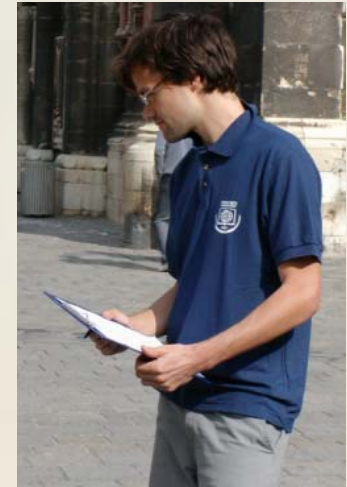
- Designed as tally sheet
- Waste fractions (rows)
- Domains (columns)

Beverage containers

Non-beverage packaging

Other

- Differentiation "small - large"
(x, y or z > 15 cm)



Stadt: WIEN		Datum: 3. September 2003	
Beobachtungsfeld:		Uhrzeit:	
erhoben von:		Erhebungsblatt-Nr.:	

Papier, Karton	P.-Verpack.: Getränke	P.-Verp.: NICHT-Getränke	Zeitung	Hygienepapier	Werbematerial	Papier - sonstiges
	klein					
	groß					
Biogenes	Essensreste	Holz	Vegetabilien	Hunde- / Tier-Kot	biogen - sonstiges	Kaugummi
	klein					
	groß					
Kunststoffe	PET-Getränke-Flaschen	KSt-Getränke-Becher	KSt-Verp.: NICHT-Getränke	Verbundstoffe	Kunststoff - sonstiges	
	klein					
	groß					
Glas	Glas-Verp.: Getränke	Glas-Verp.: NICHT-Getränke	Glasbruch	Glas - sonstiges	Zigarettenpackerl	Zigaretten (einzeln)
	klein					
	groß					
Metall	Getränke - Dosen	Metal-Verp.: NICHT-Getränke	Metall - sonstiges	sonst. mineralische Stoffe	Zigaretten (Häufung > 5)	
	klein					
	groß					
Diverses	Textil	Sperrmüll *	Problemstoffe *	"schwarzer Sack"	Undefinierbares	
	klein					
	groß					

NICHT erfaßt werden: Streusplitt, Äste, Zweige, Laub
* bitte umseitig kurz beschreiben!

Data Entry Form: Example of Completed Form

Datenerhebung

Stadt: BRÜSEL Datum: 27.08.03
 Beobachtungsfeld: Rue Louise Uhrzeit: 13⁰⁰
 erhoben von: Louise M. Erhebungsblatt-Nr.: 1

Papier, Karton	P.-Verpack.: Getränke	P.-Verp.: NICHT-Getränke	Zeitung	Hygienepapier	Werbematerial	Papier - sonstiges
	/	[4]	/	[7]	[1]	[14]
Biogenes	Essensreste	Holz	Vegetabilien	Hunde- (Tier-)Kot	biogen - sonstiges	Kaugummi
	/	[29]	/	[1]	[25]	[90]
Kunststoffe	PET-Getränke-Flaschen	KSI-Getränke-Becher	KSI-Verp.: NICHT-Getränke		Verbundstoffe z.B. Tetrapack	Kunststoff - sonstiges
	/	/	[50]		[3]	[20]
Glas	Glas-Verp.: Getränke	Glas-Verp.: NICHT-Getränke	Glasbruch	Glas - sonstiges	Zigarettenpackerl	Zigaretten (einzeln)
	/	/	[5]	/	[1]	[1]
Metall	Getränke - Dosen	Metall-Verp.: NICHT-Getränke	Metall - sonstiges	sonst. mineralische Stoffe	Zigaretten (Häufung > 5)	[1]
	/	[26]	[4]	/	/	[1]
Diverses	Textil	Sperrmüll *	Problemstoffe *	"schwarzer Sack"	Undefinierbares	[312]
	[1]	/	/	/	/	/

NICHT erfasst werden: Strausplitt, Äste, Zeige, Laub
 * bitte umseitig kurz beschreiben!

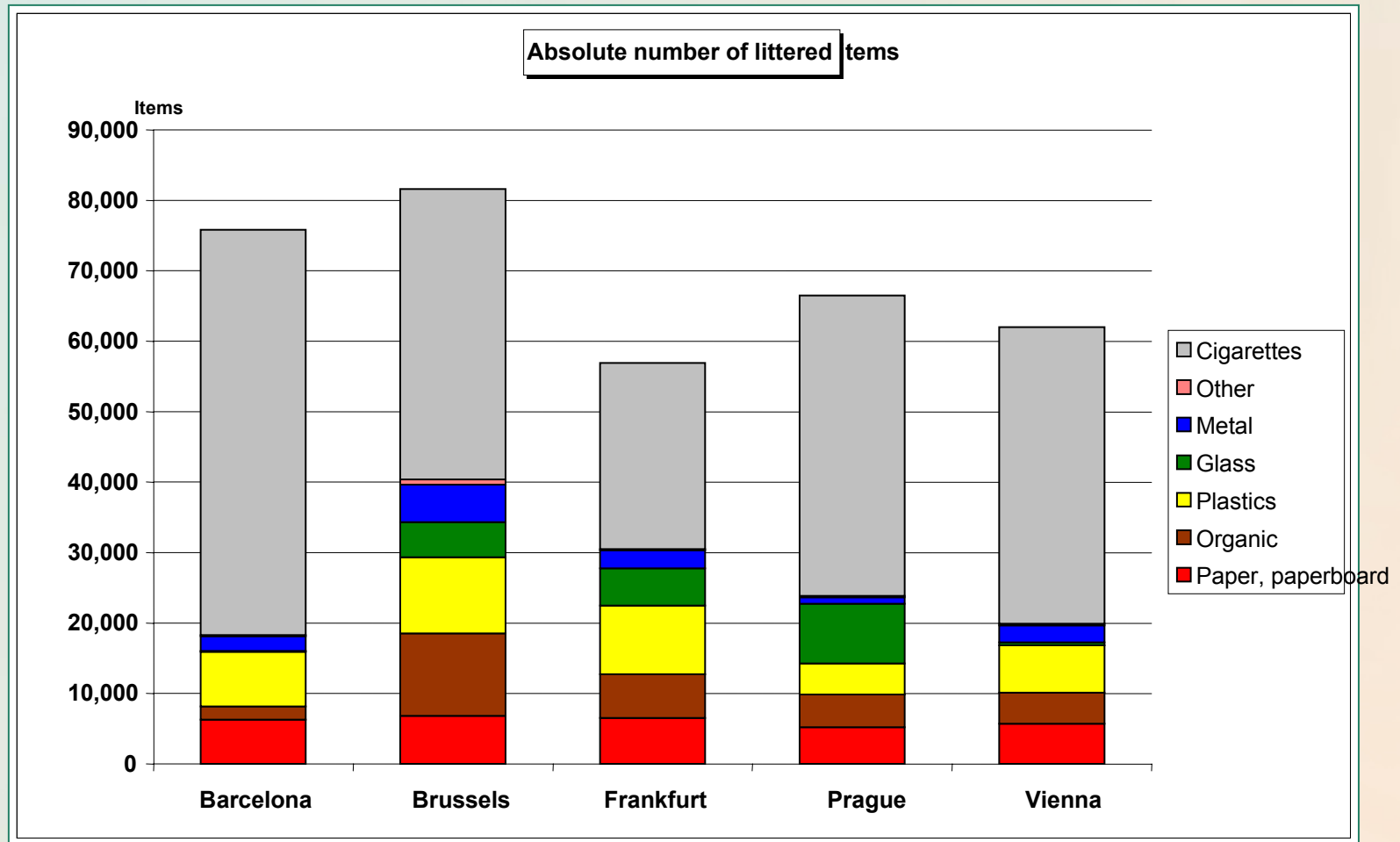
Institut f. Technologie und Warenwirtschaftslehre



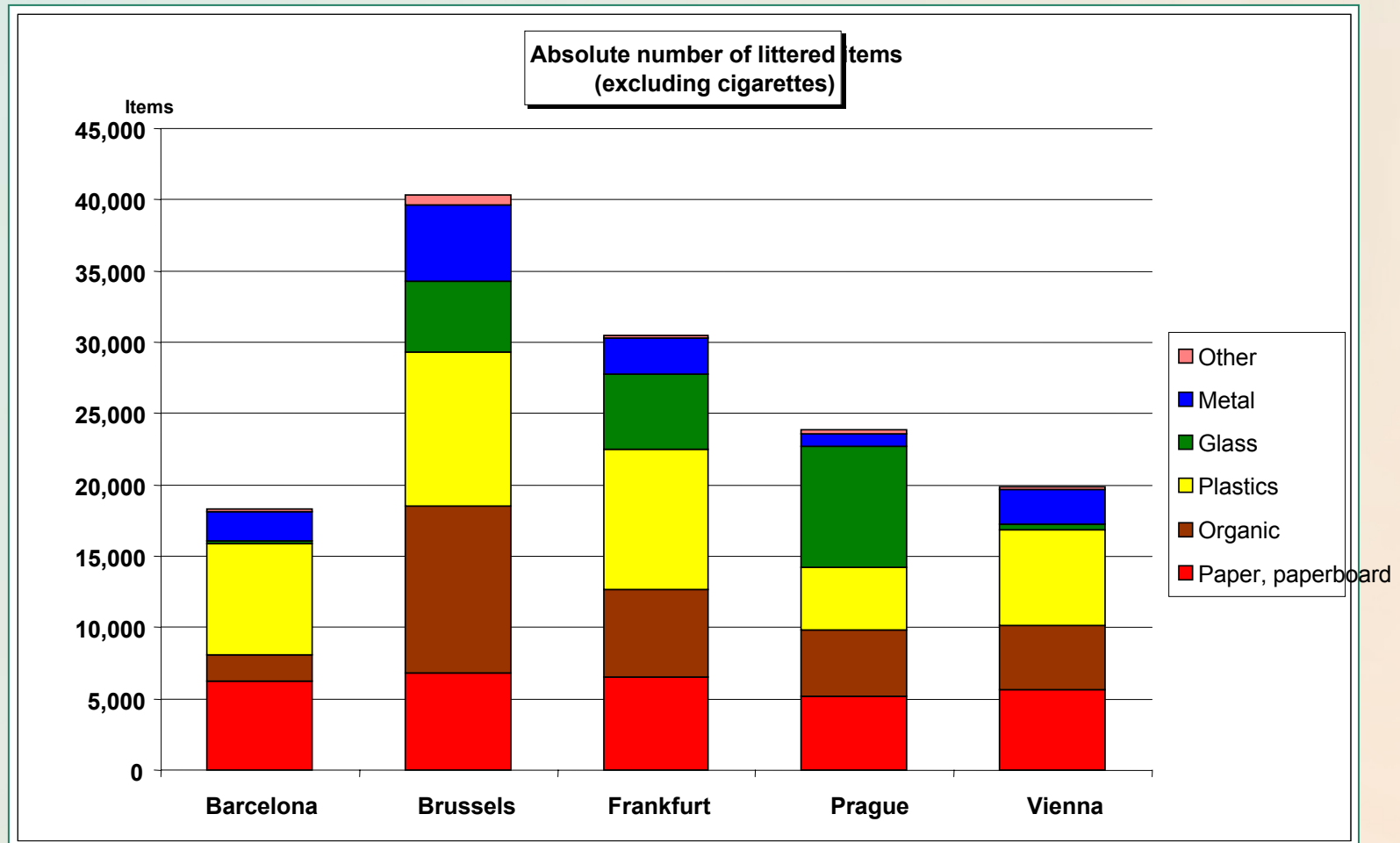
Littering-Studie: Datenblatt Felderhebung

Results:

A total of 280,813 littered items were found



Absolute Numbers Excluding Cigarettes



Conversion into Standardized Areas/Distances



e.g. "Altstädter Ring", Prague
area surveyed:

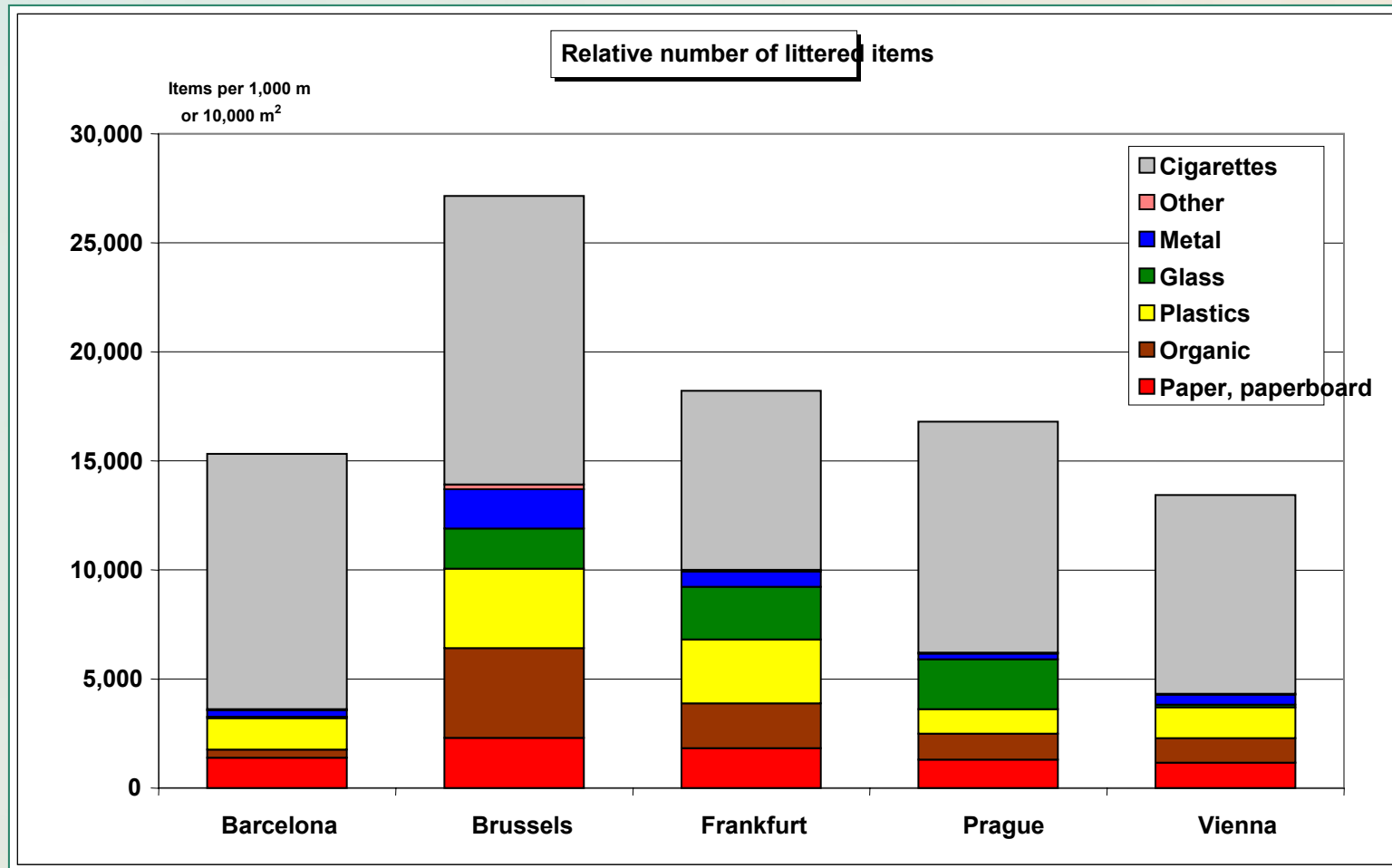
10,488 m² total area

1,277 m² total deductions (outside seating areas, monuments,...)

9,211.00 m² total area surveyed

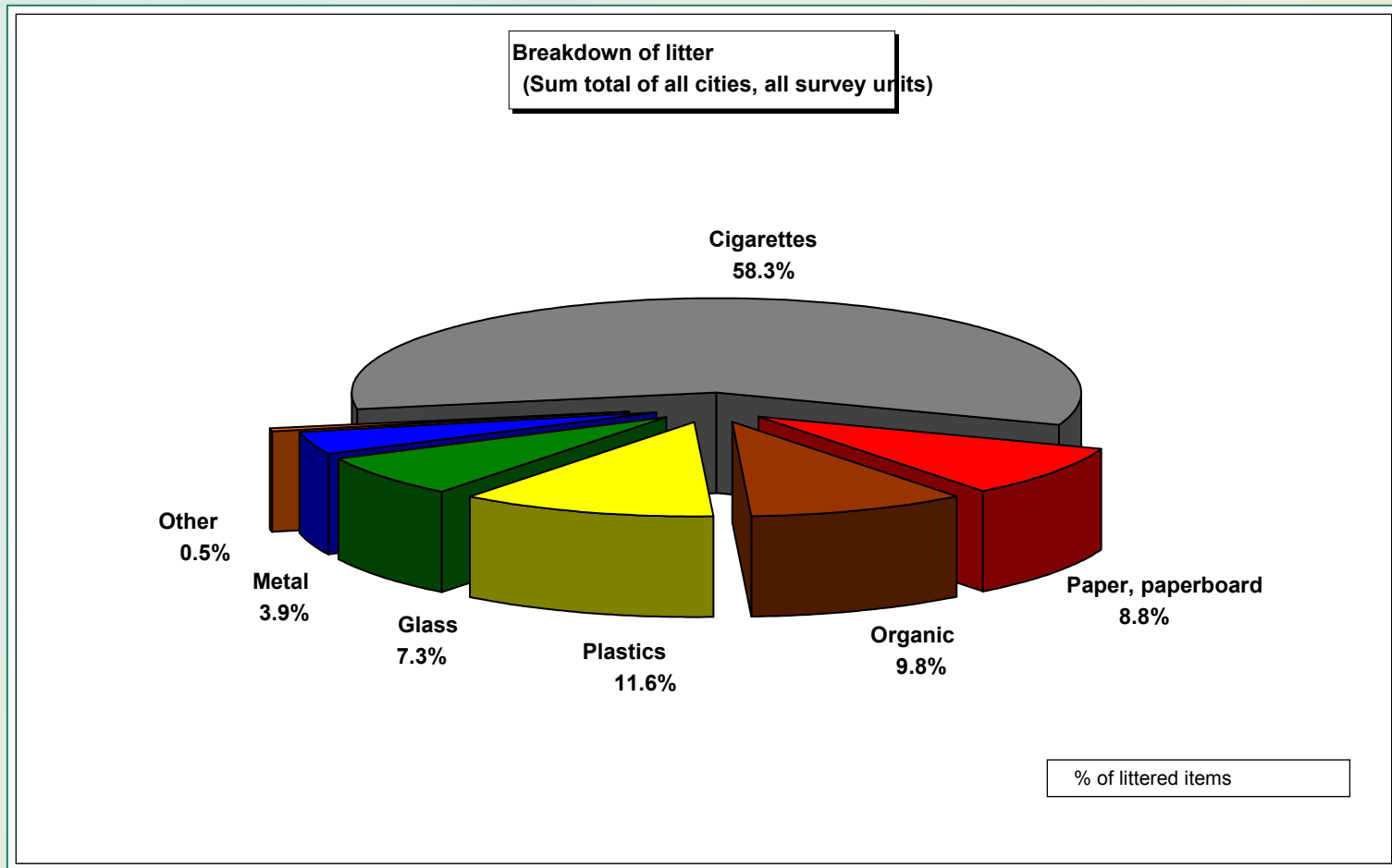
Relative Numbers:

Based on standardized areas or distances



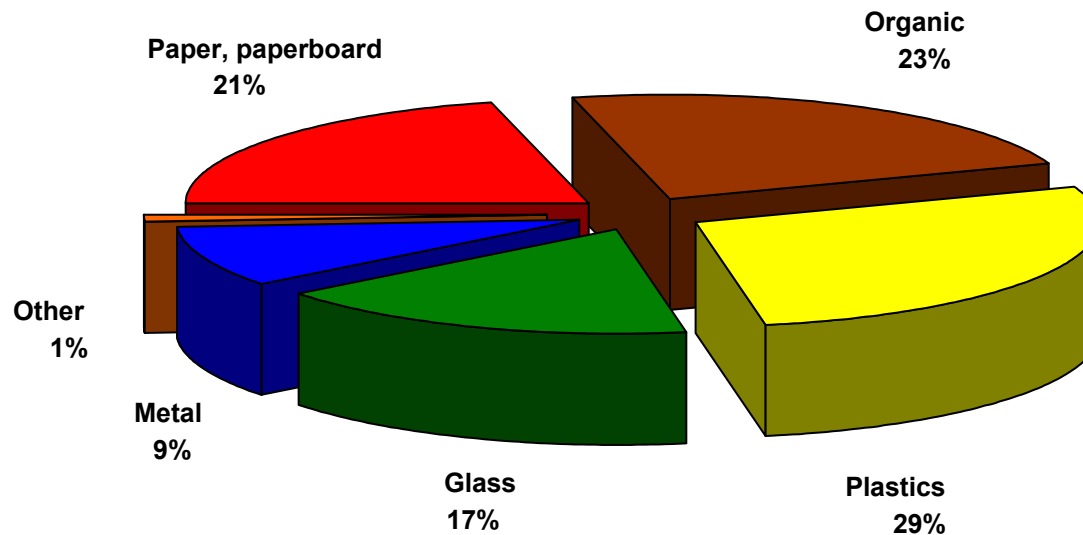
Breakdown of Litter

Cigarettes: the largest portion in all cities and all survey units



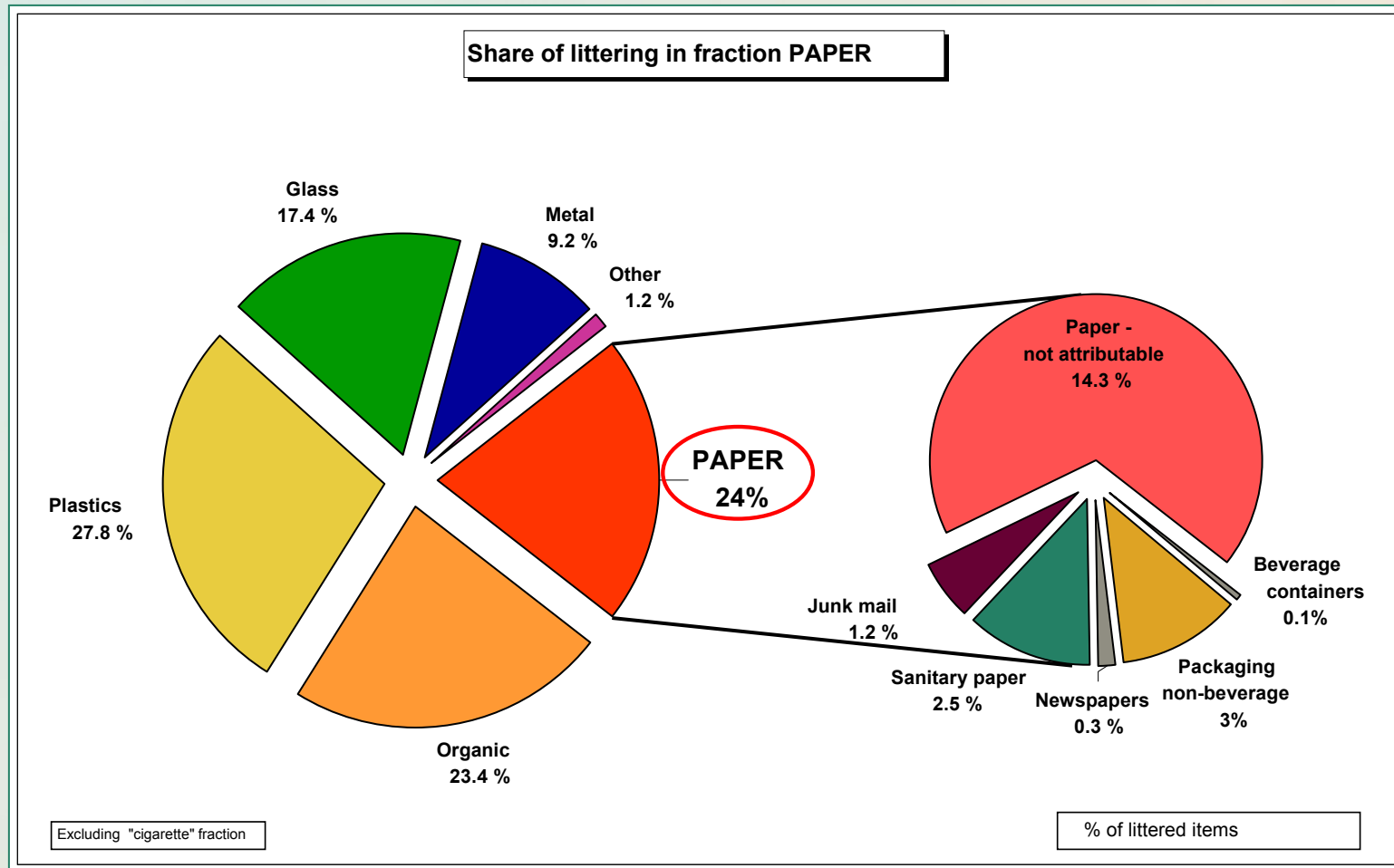
Breakdown (excluding cigarettes)

Breakdown of litter – excluding cigarettes
(Sum total of all cities, all survey units)



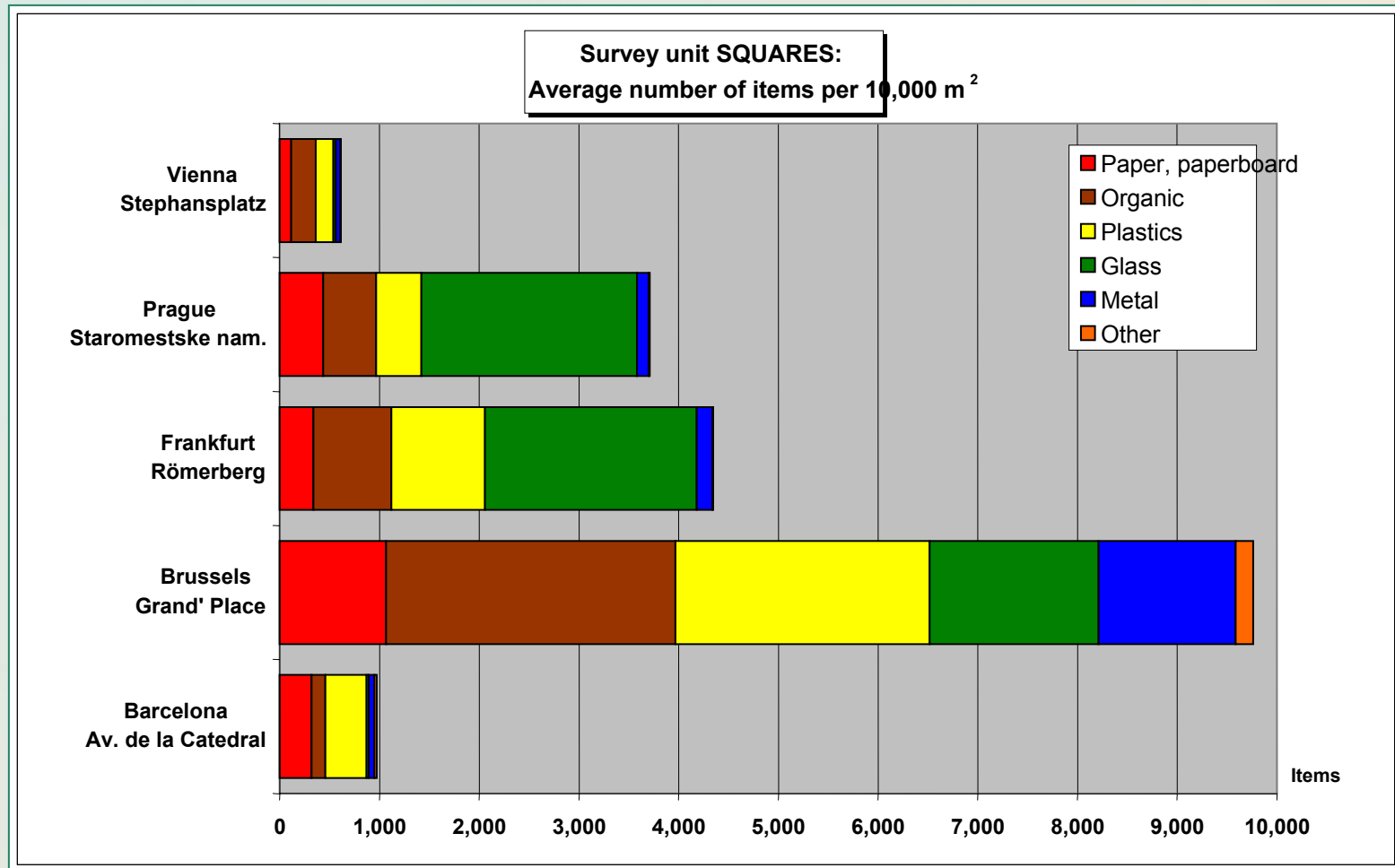
% of littered items

Breakdown of Individual Waste Fractions: e.g. Paper



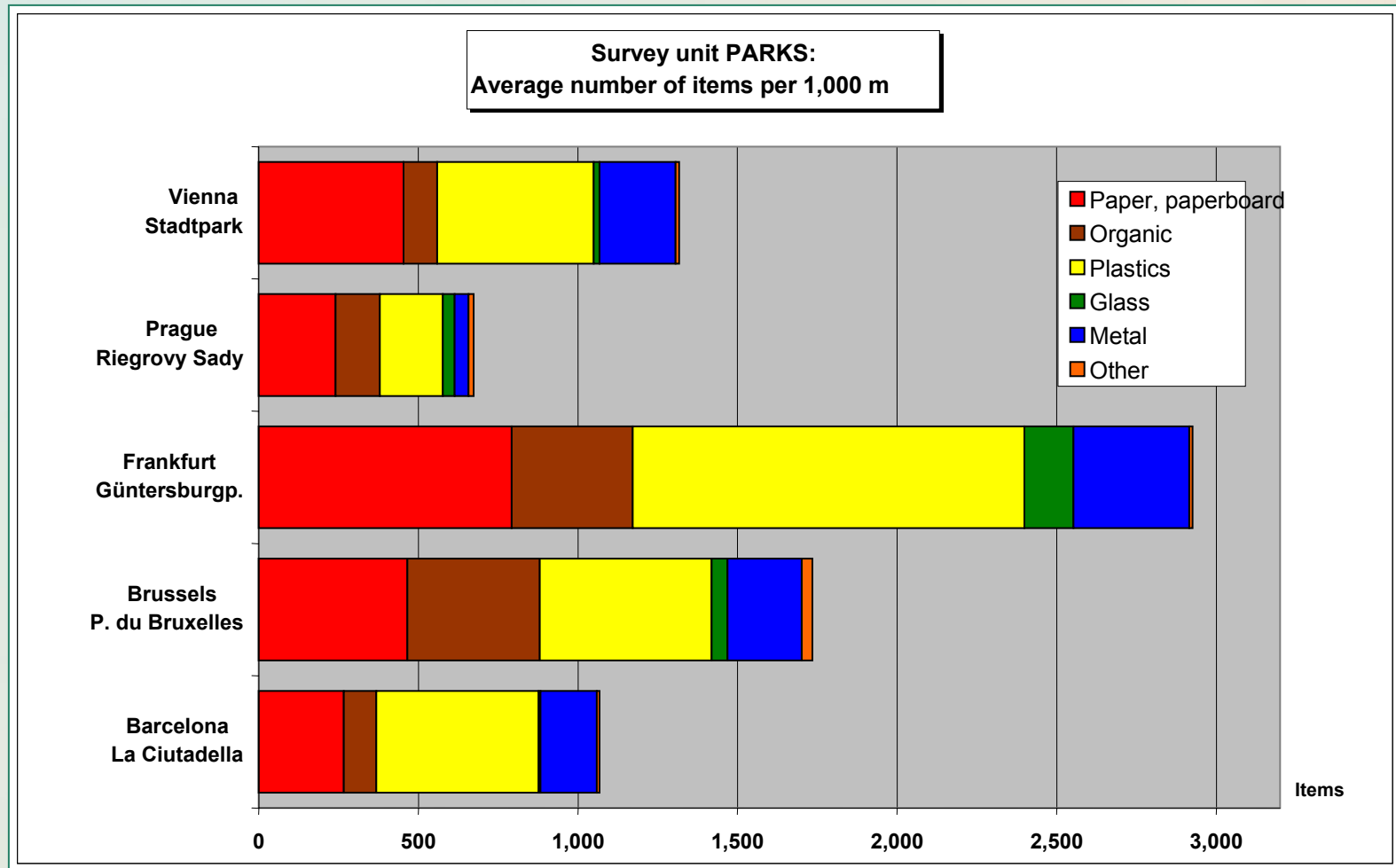
Analysis of Survey Units

e.g. "Square"

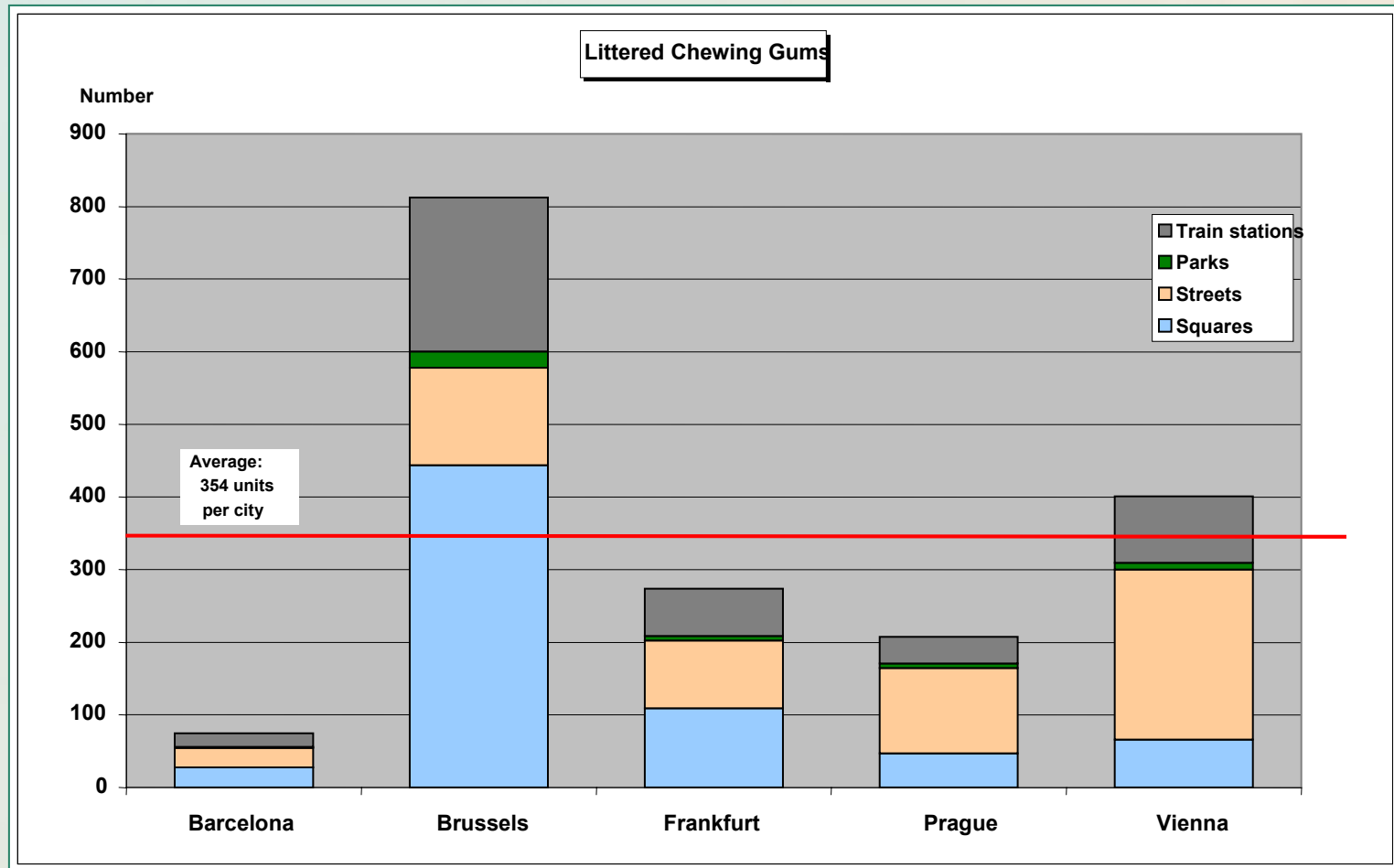


Analysis of Survey Units

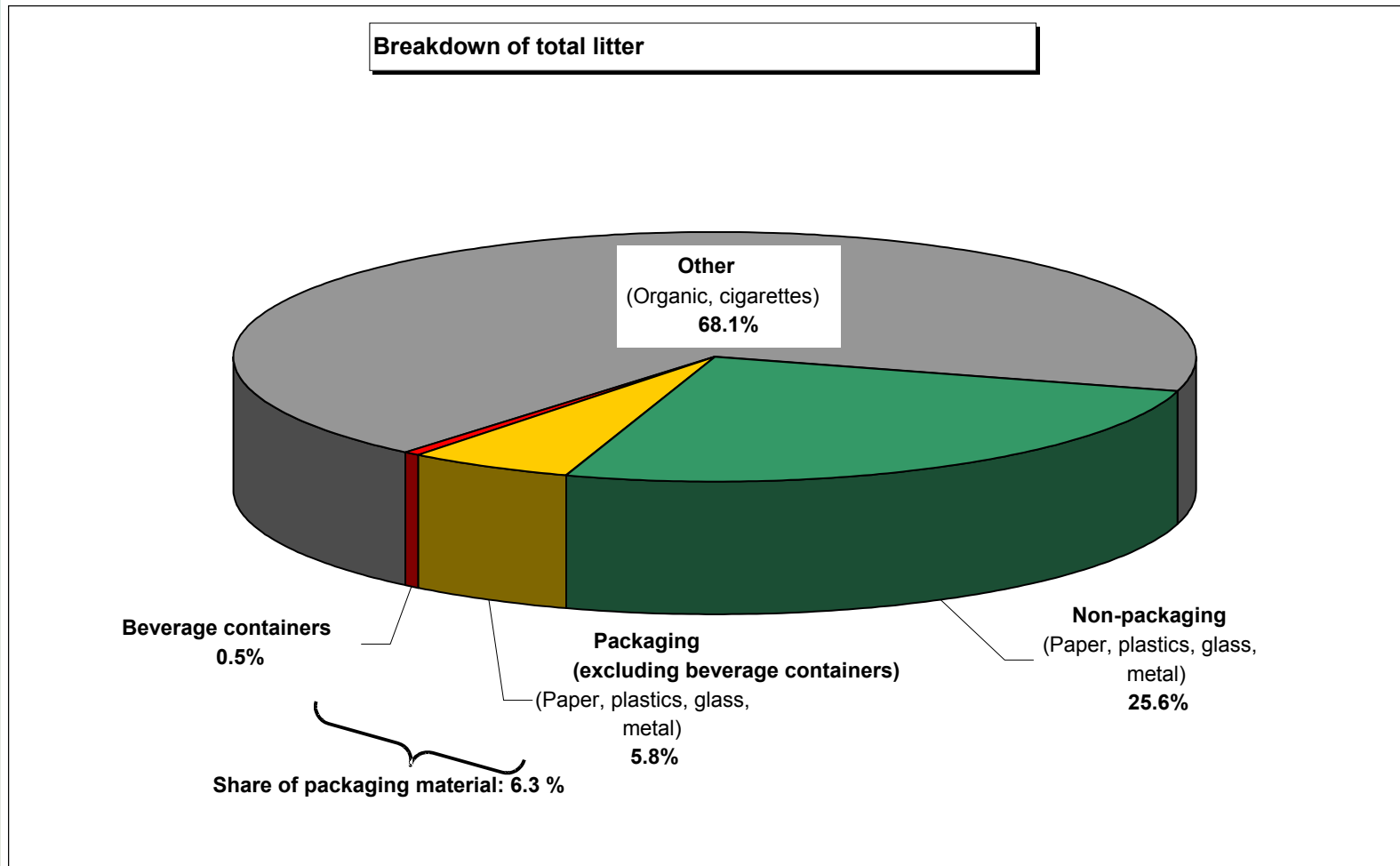
e.g. "Park"



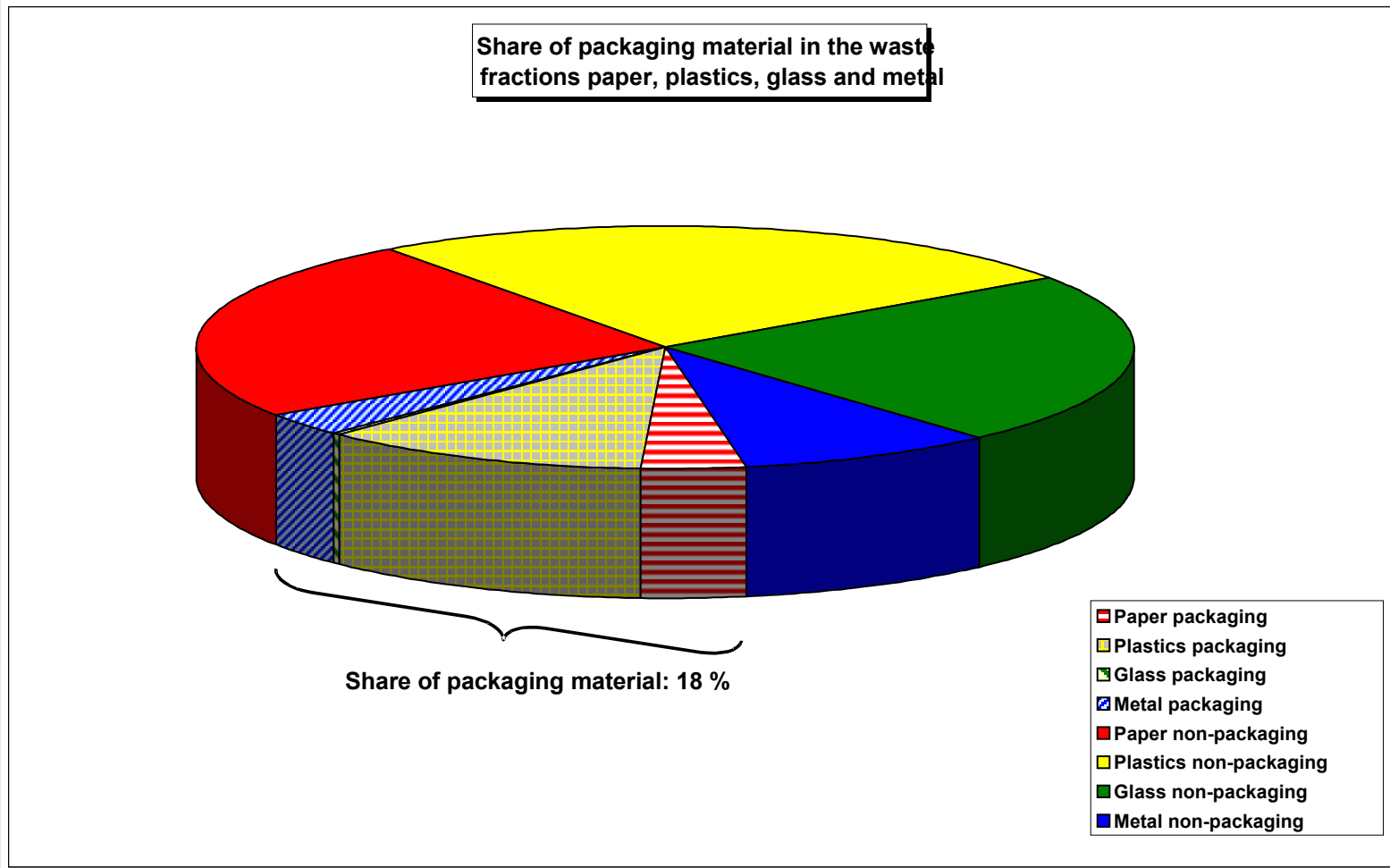
Results "Chewing Gums"



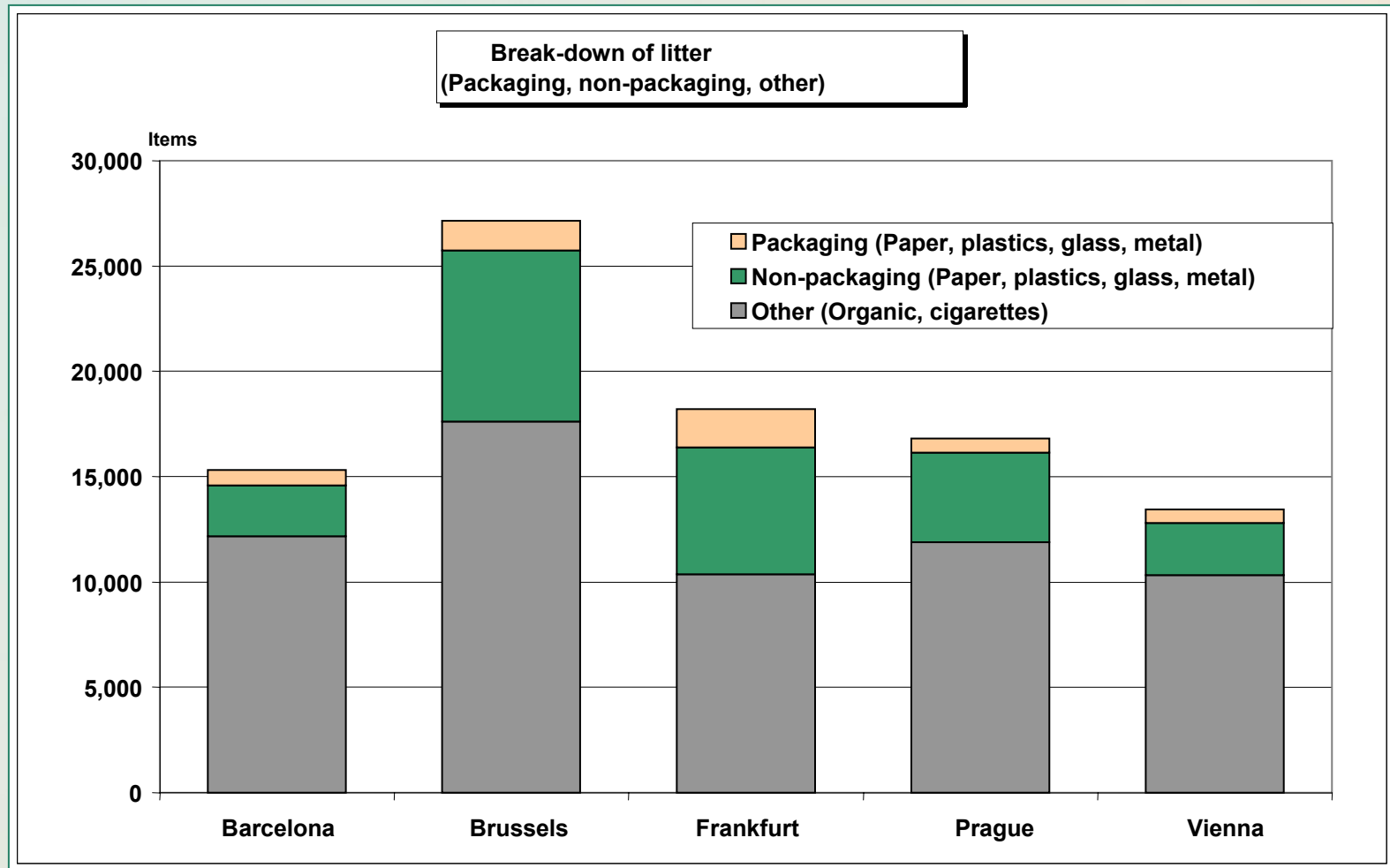
Share of Identifiable Packaging Material in Litter



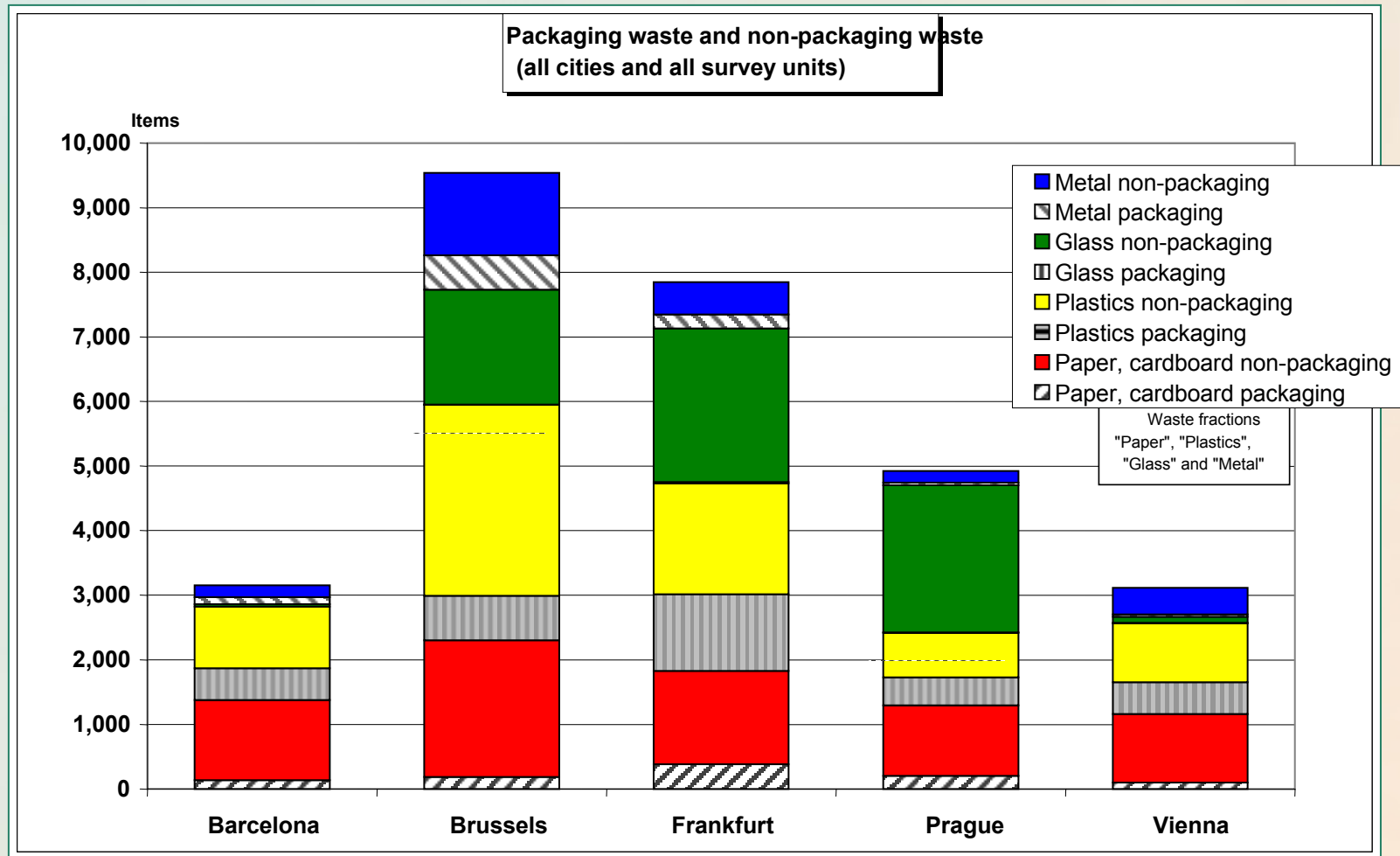
Share of Packaging Material in Relevant Fractions (Sum Total of All Cities)



Share of Packaging Material in Litter

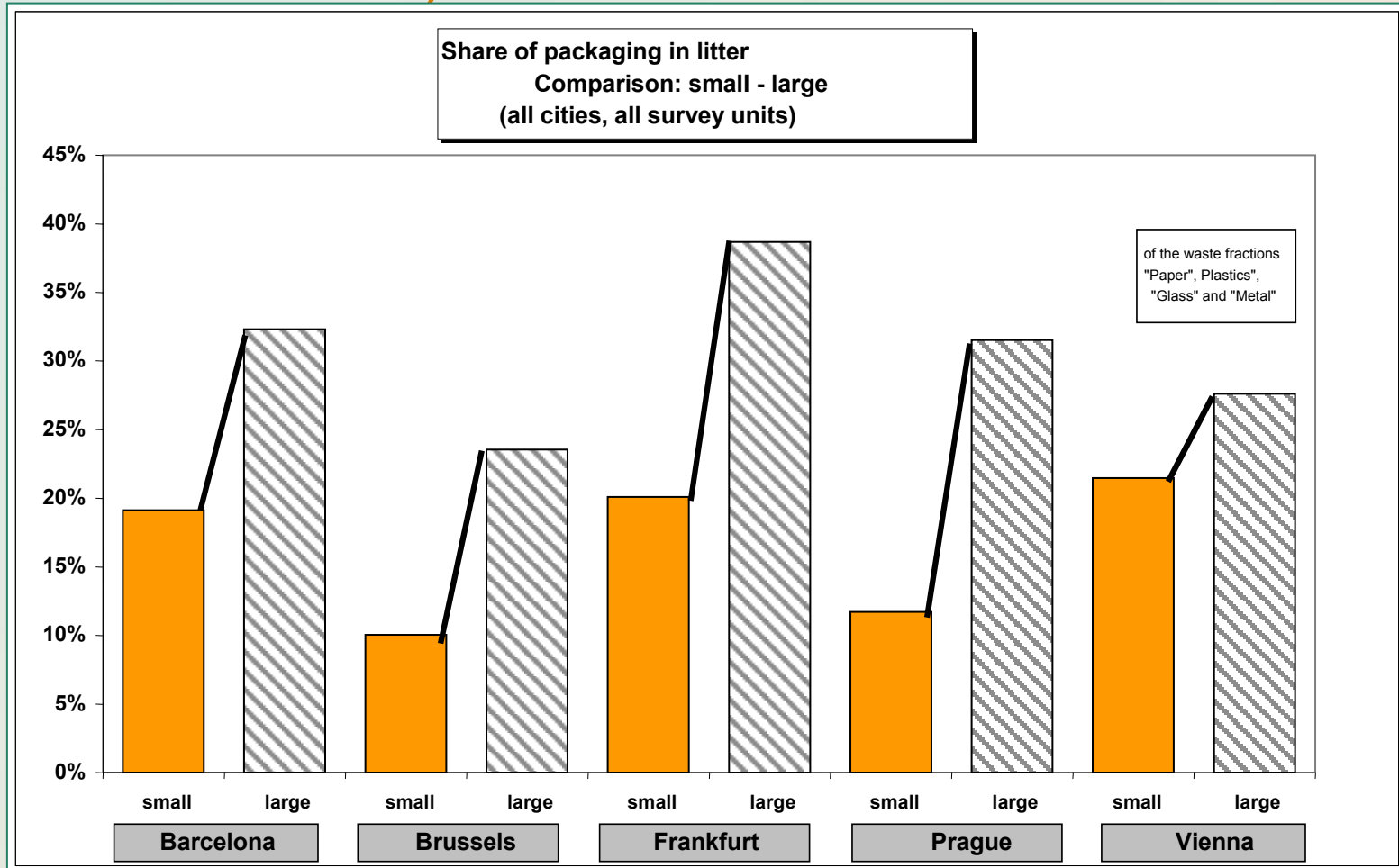


Share of Packaging Material in Litter

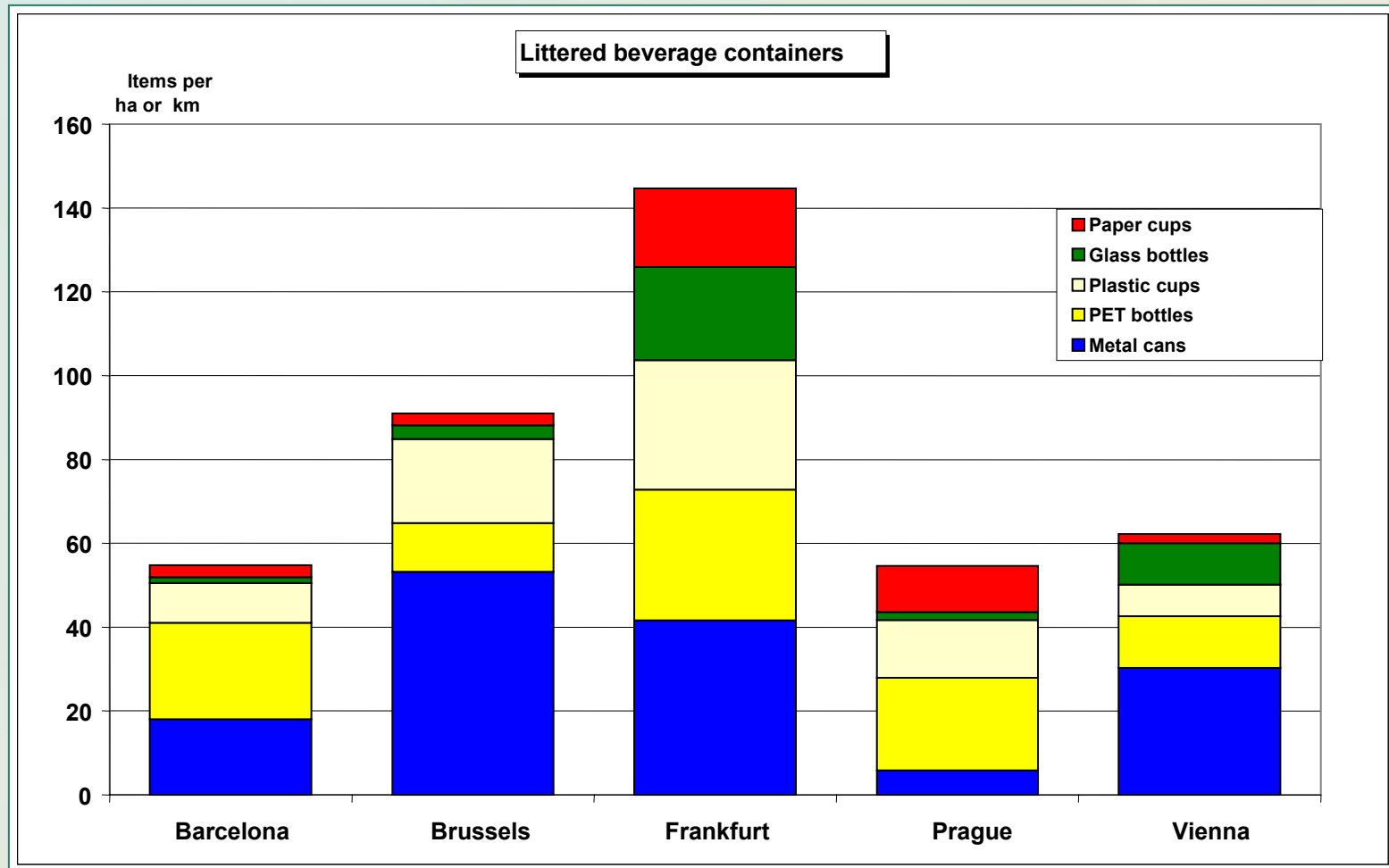


Share of Packing Material in Litter: Higher for large items than for small ones

(Maximum size=15cm)



Littered Beverage Containers - Sum Total of all Units in Each City



Summary of Findings

- The waste most frequently littered is cigarettes
- The composition of litter differs significantly across cities (cf. "chewing gum")
- Typically, litter consists of small objects (< 15 cm)
- The share of packaging material in litter increases with the size of the littered items
- A quantitative litter analysis
 - does not provide information on litter weights and volumes, disposal expenses and the annoyance caused by litter
 - gives a good overview of the littering situation in certain areas
 - provides an abundance of data for detailed analyses



Conclusions of the First Conference Day

- LITTER ABATEMENT
 - 94% of Australians believe that litter is an important environmental issue
- Where is littering on the increase?
 - Recycling sites
 - Public places, parks



Conclusions

LITTER ABATEMENT

INFORMATION AND MOTIVATION

- Appeals to internal norms ("Please help") more effective than to external norms ("You must ...")
- Positive and polite wording is more effective than negative
- Using social control
- Positive incentives
Economic instruments
- Fines (Singapore)
 - first € 500
 - second € 1,000
 - further € 2,500

Prerequisite for laws and checks

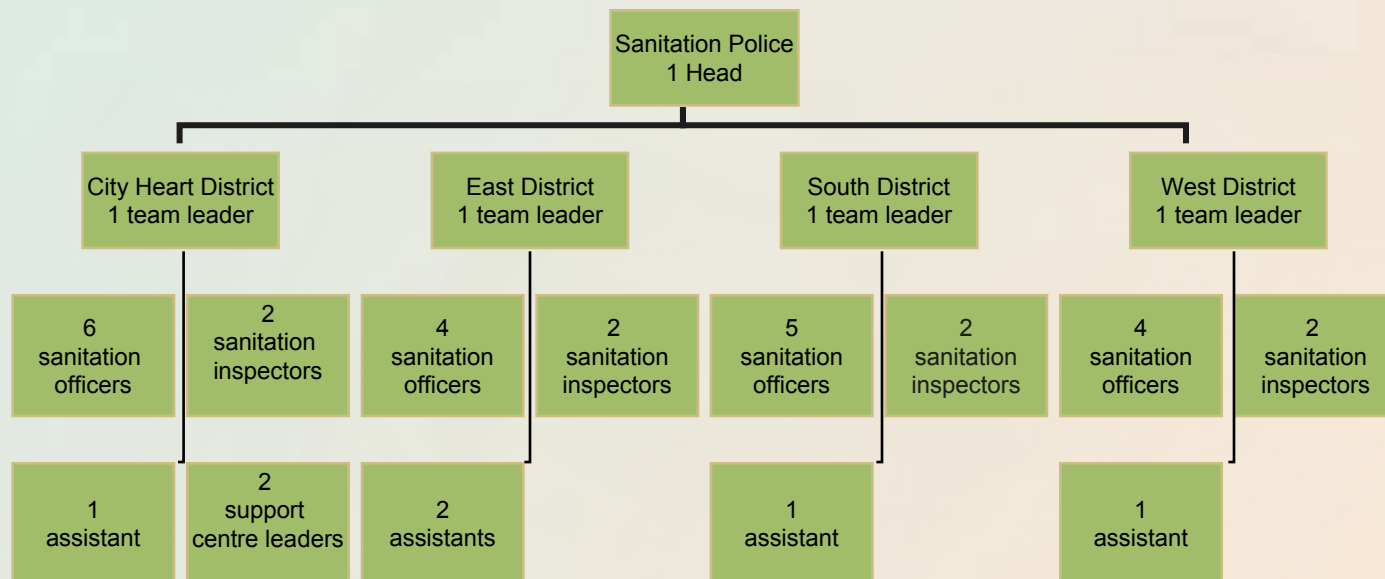
Every possible littering situation should be accounted for
Article 17 of Singapore's Environmental Public Health Act



Conclusions

LITTER ABATEMENT

- Police - Sanitation Police (NL)



Conclusions

LITTER ABATEMENT

Example Australia

- Development of the world's first disposal behaviour benchmark, the Disposal Behaviour Index (DBI).
- The DBI is a mathematical means of reflecting both littering behaviour and bin use.
- It issues a seven-point scale to represent both environmentally desirable and harmful behaviours found at any specific site or location -
 - binning,
 - littering, or
 - recycling.



Conclusions

LITTER ABATEMENT

Level	Definition
1 Low	Area is a litter hot spot, requires urgent clean up
2 Base	Littering is in majority, prompt action needed
3 High Base	Marginally more binning than littering
4 Mid	Littering down to one third of behaviours
5 High mid	Positive binning but littering remains an issue
6 High	Binning greatly exceeds littering
7 Peak	Minimal littering, dominant bin use

Conclusions

LITTER ABATEMENT

Infrastructure

- Provide sufficient number of bins
- Hand out interim waste bags (in soccer stadiums, two-compartment bag for chestnuts)
- Visually appealing bin design
- Litter attracts even more litter
- Periodic clean-ups rather than sporadic major clean-ups

High-Tech Infrastructure (Zurich Airport)

- High level of cleanliness lowers propensity to litter
- High bin density: every 25 meters (or even more often)
- 100 employees cover 20 hours per day
- 12 employees remove chewing gum manually with scrapers for 1 hour per day
- Costs: 8.99m € per year
i.e. 440 €/t in total and approximately 1,000 €/t of waste at terminals



Conclusions

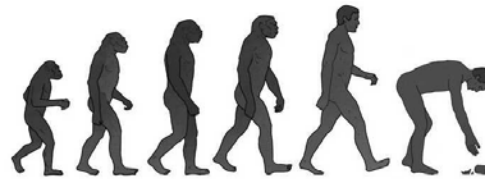
LITTER ABATEMENT

INFORMATION AND MOTIVATION

- "trash is culture" CH



Wir entwickeln uns
schrittweise.



▼
trash ist kultur

Conclusions

LITTER ABATEMENT

Learning

Learning Site Waste Dump



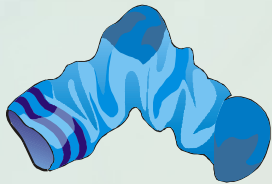
5 years



50 years



1/2 year



5 years



50 years



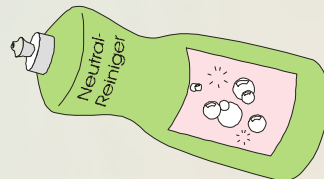
1 year



50 years



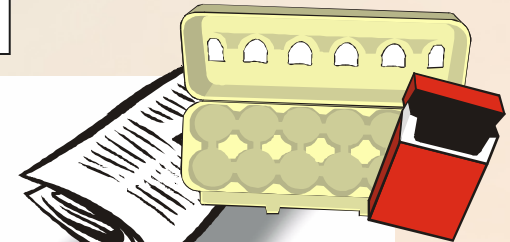
1 000 000 years



100 years



5 years



1 year

Conclusions

DEPOSITS TO REDUCE LITTERING

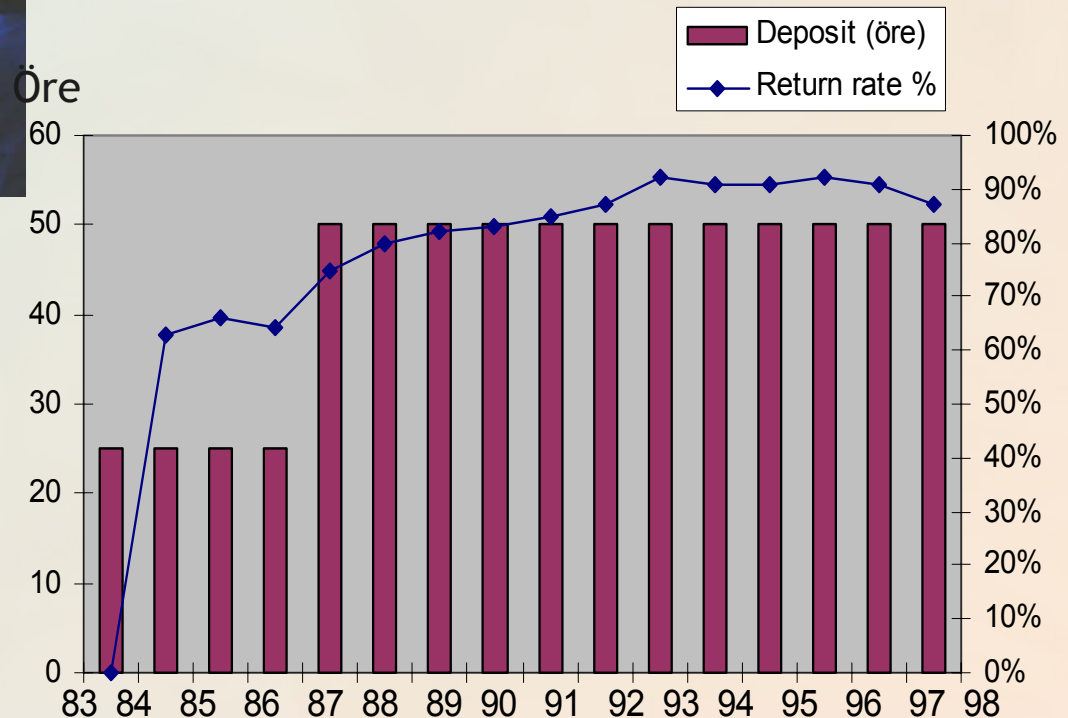


Conclusions

DEPOSITS TO REDUCE LITTERING



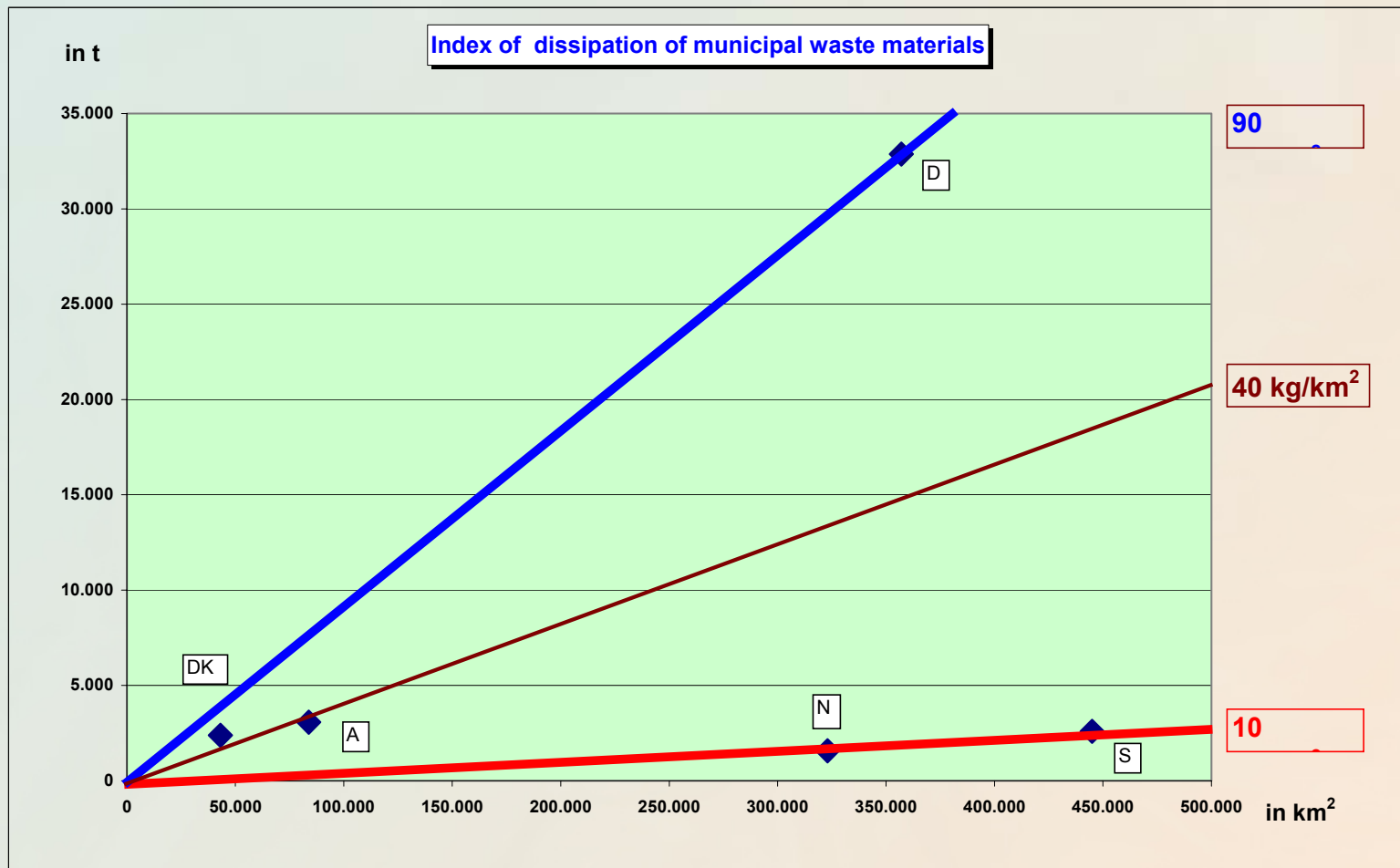
	DEPOSIT		
	DKR	€	ATS
Standard bottles 0.25 and 0.33 l	1.50	0.2015	2.77
1.5 l	4.25	0.571	7.86
Crates	12.50	1.6793	23.11
Liquor	2.25	0.3023	4.16
Liquor 0.5 l	2.50	0.3359	4.62



Conclusions

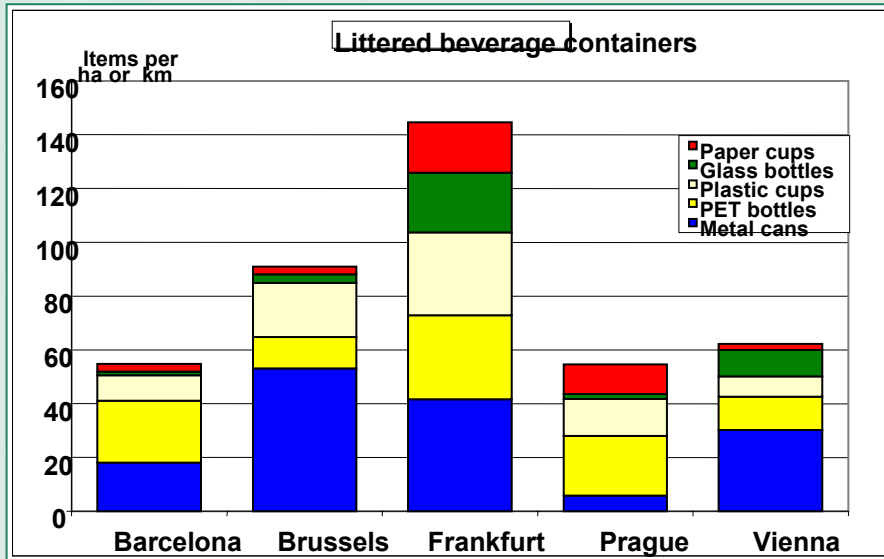
DEPOSITS TO REDUCE LITTERING

Why have different systems?

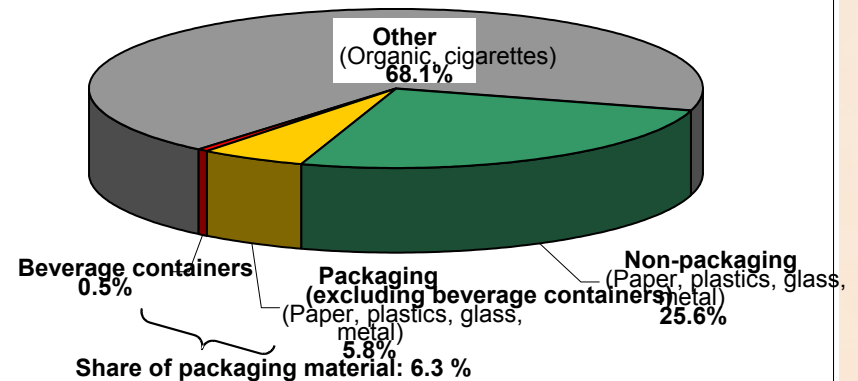


Conclusions

DEPOSITS TO REDUCE LITTERING



Breakdown of total litter



Conclusions

REDUCING THE IMPACT OF ANIMALS

Horse manure in Vienna

142 horses = 500 kg horse manure per day

Without manure-collection device $\Rightarrow$ € 760,000

With manure-collection device $\Rightarrow$ € 470,000

= savings 38%

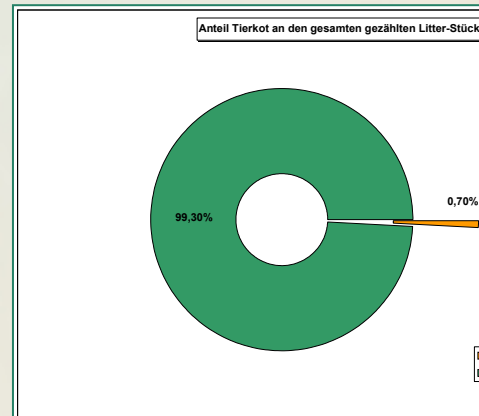


Conclusions

REDUCING THE IMPACT OF ANIMALS

Dogs in Edinburgh

- Cleansing done by hand or machine
- Rapid response service for public complaints
- Environmental wardens since October 2001
- Numbers increased to 33
- 138 notices issued @ £50
- Dog Fouling Bill comes into force on 21 October - £60 fine



Conclusions

REDUCING THE IMPACT OF ANIMALS

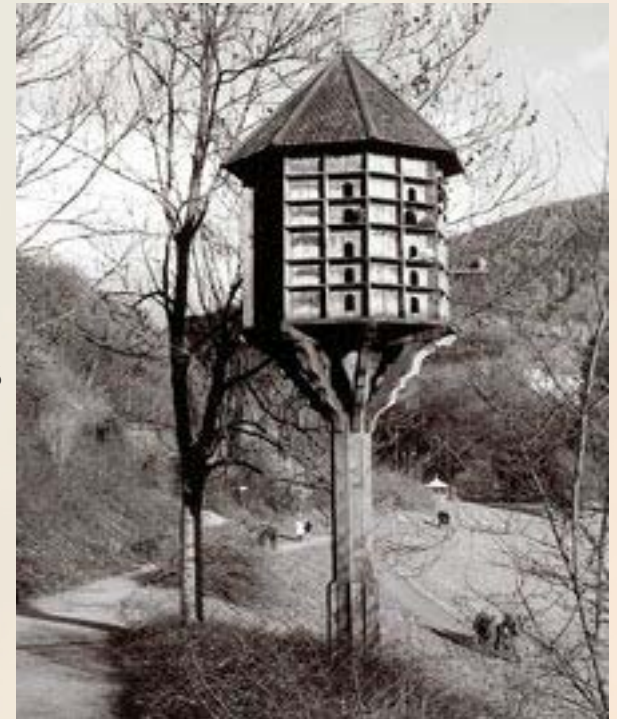
Feral pigeons

Municipal Pigeon Control Techniques :

- Banning pigeon feeding
- Threatening pigeons and scaring them away
- Using airborne predators
- Eliminating pigeons

Recommended Remedial Program

- 80% of the droppings are deposited at the pigeon houses
 - reduces mess significantly
- Reproduction prevented up to 100%
 - significant reduction in pigeon numbers
- Population is healthy
 - lower health risk to humans and animals



Conclusions

GRAFFITI



Conclusions

GRAFFITI

Lehrling muss zahlen:

10.700 € Schaden mit Graffiti

19 U-Bahn-Garnituren und Eisenbahnwagen hat ein 22-jähriger Lehrling mit Graffiti beschmiert. Den Schaden, mehr als 10.000 €, wird er zahlen müssen. Die Strafe – acht Monate bedingt – ist da fast nur Nebensache.

„Wie sind Sie denn auf Graffiti gekommen?“, fragt Richter Georg Olshak. „Früher“ gibt der



Werdensiege-
fasst, müssen
Graffiti-Sprayer
zahlen. Und ein
solches Urteil gilt
30 Jahre lang.

Conclusions

Cause for conflict: GRAFFITI

Individual interests



Common
welfare

Self-actualization

Protection of private /
national property



Conclusions

REDUCING THE IMPACT OF LITTERING

Mallorca: Waste Collection in Old Towns



Tourist attractions
versus
waste management

Conclusions

REDUCING THE IMPACT OF LITTERING

Mallorca: Waste Collection in Old Towns

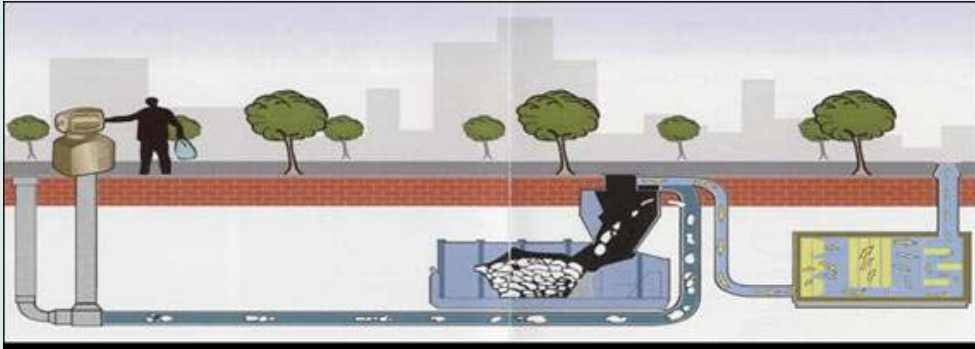


Tourist attractions
versus
waste management



Conclusions

REDUCING THE IMPACT OF LITTERING



Providing economic incentives
in the form of access rights

Spaar de wereld, beloon jezelf



**Vragen?
Pas gevonden?**
Bureau NU-spaarpas
tel. 010-4041160
info@NUspaarpas.nl



1234567890

www.NUsaarpas.nl © Bureau NU-spaarpas

Je NU-nummer is 024680

Mede mogelijk gemaakt door



Conclusions

REDUCING THE IMPACT OF LITTERING

Checking access rights



Conclusions

REDUCING THE IMPACT OF LITTERING

Coastal Zones

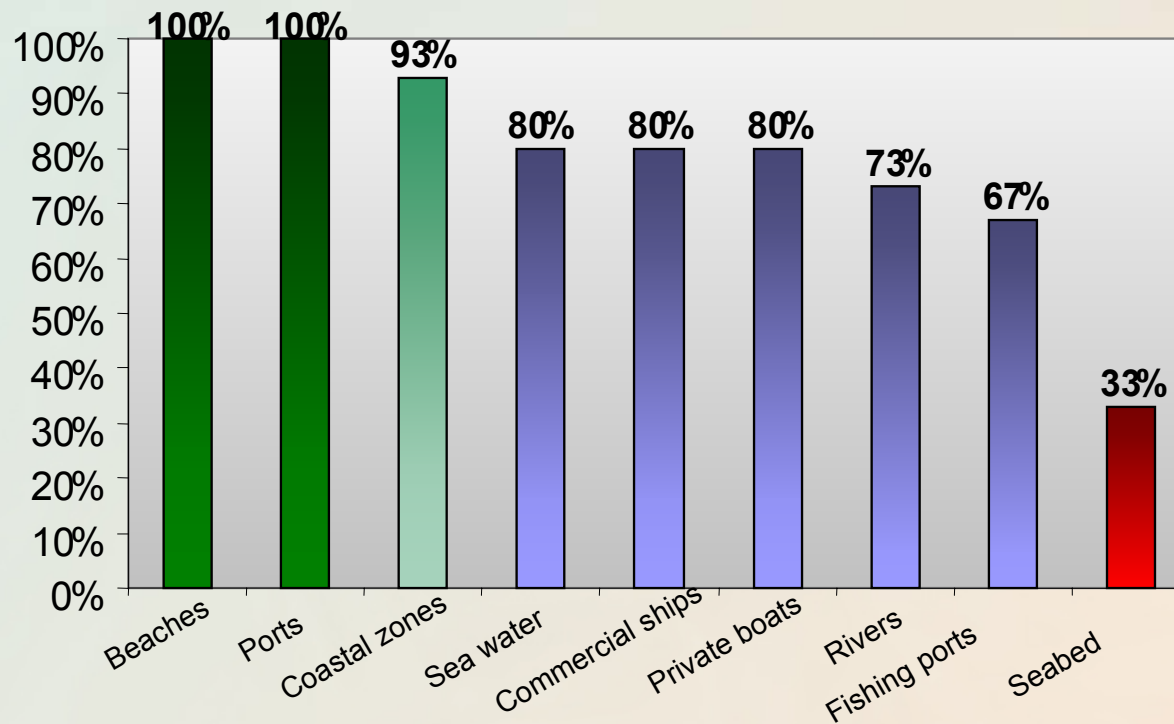


Conclusions

REDUCING THE IMPACT OF LITTERING

Coastal Zones

Litter management policies adopted



Conclusions

REDUCING THE IMPACT OF LITTERING

Phase 1: Clean-up

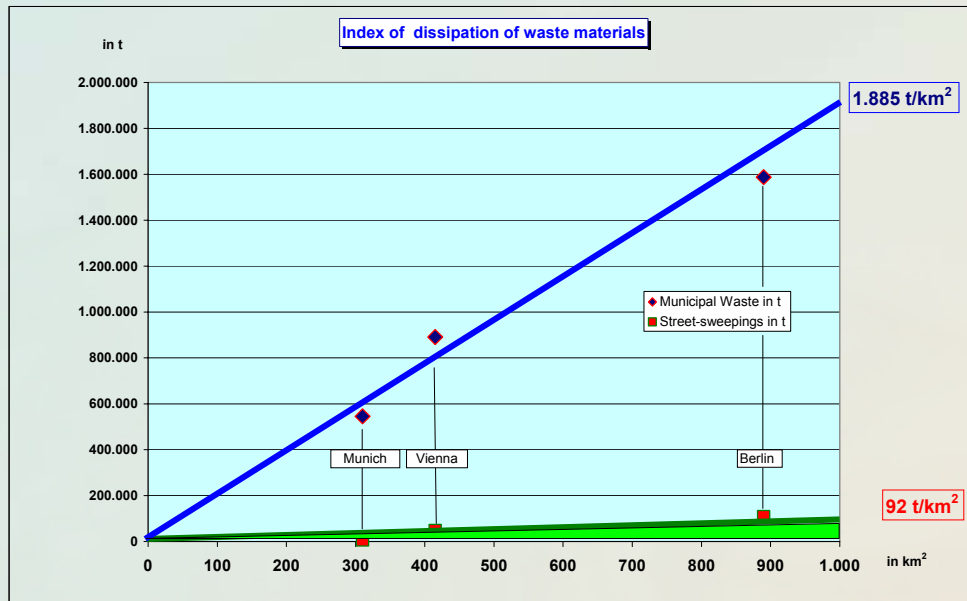


Phase 2: Clean Mountains



Conclusions

THE IMPACT OF LITTERING / GRAFFITI IS VERY COSTLY



THE BOTTOM LINE IS: AVOIDANCE

