

4.1 添付資料-4

Target Quality of Bale's Feedstock

2000/10/12 by JPBA

1) Bottle Shape			
a) Bottle size of 180cc~5.5L			
b) Bottle size of 1~2L			
2) Coloured Bottle			
a) ≤7%			
3) Bale's Quality			
a) Bottle with cap	Target	Plant design	
b) PVC bottle	10%	30%	
c) PE & PP bottle	0.5%	1.0%	
d) PET bottle without mark	0.5%	1.0%	
e) Glass bottle	1%	1.0%	
f) Aluminum can & steel can	ND	0.1%	
g) Paper container	ND	0.1%	
h) Other impurities	ND	0.1%	
4) Bale's Size			
• 600X400X300mm (15~20kg)			
• 600X400X600mm (30~40kg)			
• 1,000X1,000X1,000mm (180~230kg)			

Subjects of PET Recycled Flake

2000/10/12 by JPBA

< Items to be resolved >

< Account measure >

1) Expansion of application

- a) Food contact application
- b) FDA approval

Establishment of management system for recycled PET

- * Clarification of safety criteria
- * Removal technology (contamination)
- * Total management system of feedstock, recycle process & product quality.

2) Improvement of quality

- a) Low IV (App. 0.70 dl/g)

* IV increase (0.80) by LSP or SSP

- b) High haze of bottle

* Improvement of haze by IV increase & contamination removal haze : retention ratio 90%

- c) Contamination (PVC, Label, PP, Sand, Glass, etc)

* Contamination removal by supercycle process
Size : Nonvisible

Basic Policy for PET Bottle Recycle of JPBA

2000/10/12

by JPBA

1) Concept

- a) Introduction of process technology with FDA approval
- b) Sublicense option in Japan

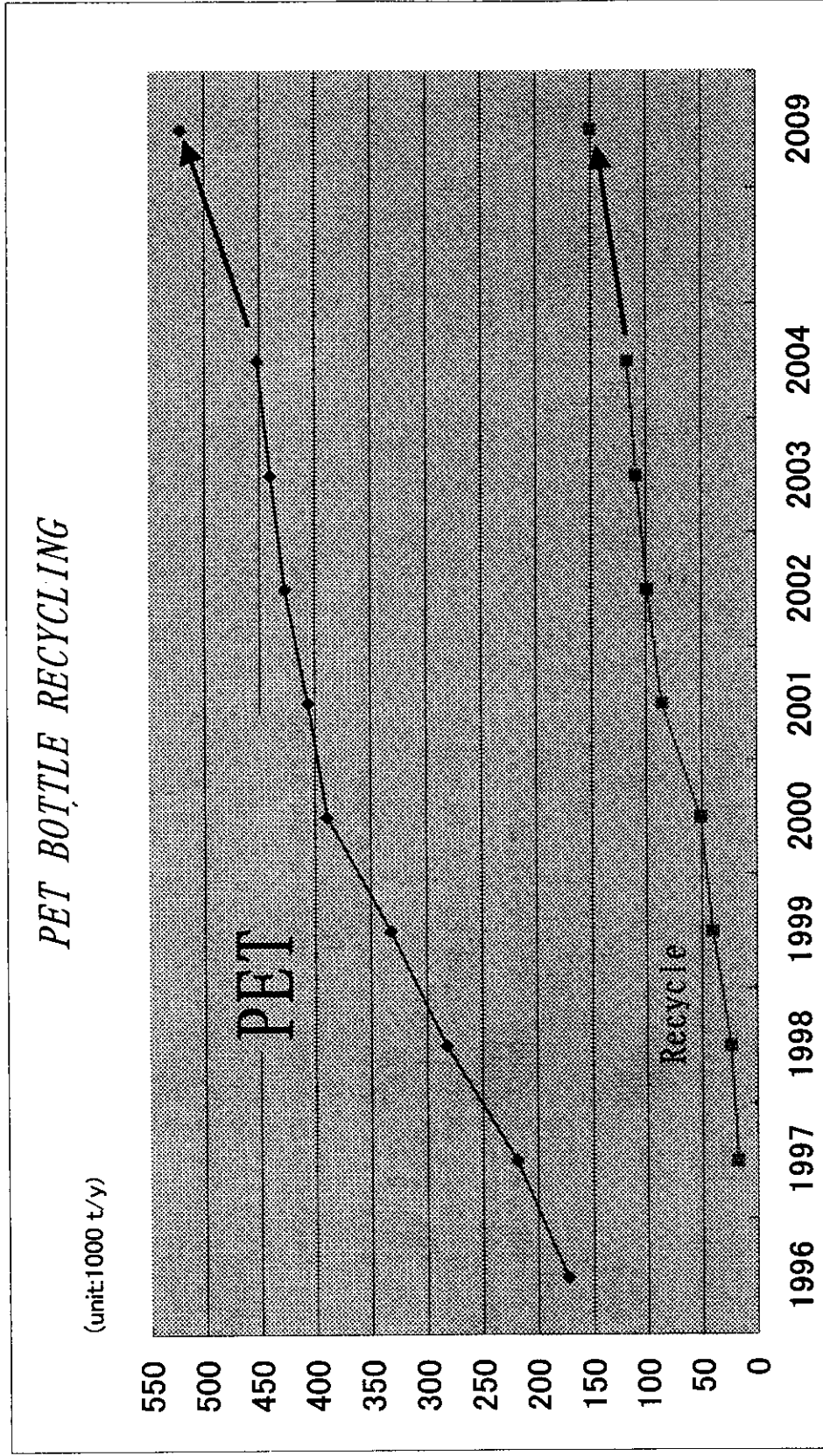
2) Case Study

[Case-A]

- a) Feedstock : Current recycled flake
- b) Capacity : 20,000t/y
- c) Supercycle super-cleaned PET resin pellet
FDA approval level
IV = 0.80 (dl/g)
Haze \leq 5% (Plate thickness 3mm)
 \leq 10% (Plate thickness 4mm)
Food-Contact bottle application (Blend ratio 30%)

[Case-B]

- a) Feedstock : Bale of collected bottles
- b) Capacity : 8,000t/y
- c) Product : Same quality as Case-A



Forecast of PET Bottle recycling in Japan
(2nd category PET bottle) 2000/10/12 JPBA

	Unit	Actual				Forecast			
		1998	1999	2000	2001	2002	2003	2004	
① 2ND Category Production	000mt	282	332	389	406	427	440	452	
② Collection (Bottle, Capring, Label)	000mt	48	76	113	137	157	172	186	
③ Collection Ratio	%	17	23	29	34	37	39	41	
④ Estimated recycable PET (②x Yield 0.7)	000mt	34	53	79	96	110	120	130	
⑤ Flake application	000mt	24	40	51	-	-	-	120	
⑥ Estimated recycled PET to flake	%	71	75	65	-	-	-	92	
⑦ Number of cities and towns		1,011	1,214	2,536	2,692	2,814	2,947	2,978	

< Remarks >

- ・ There are 3,252 cities and towns in Japan.
- ・ JPBA estimated the amount of bottle collection on the basis of the plan by the Ministry of Health and Welfare.
- ・ ①② : Except weight of cap & label.
- ・ ③ : ②/① %

APPLICATION OF RECYCLED PET

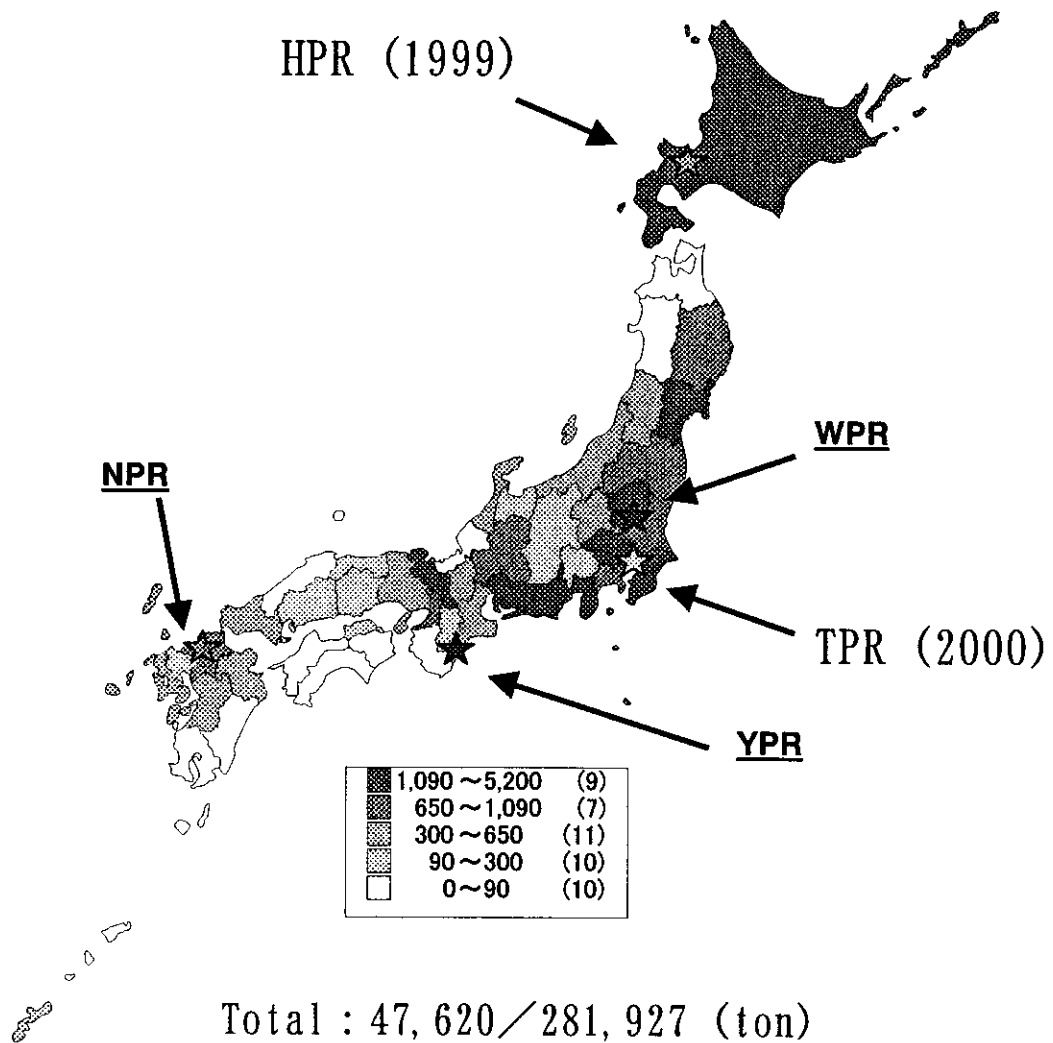
10/12/'00 JPBA

(T/Y)

	'95	'96	'97	'98	'99	'00 (FORECAST)	'04 (FORECAST)	'09 (FORECAST)
FIBER	401	1,199	6,036	16,895	25,540	32,010	60,000	60,000
SHEET	639	701	1,444	5,218	11,635	13,384	30,000	30,000
BOTTLE	400	537	390	211	179	1,781	21,000	51,000
INJECTION	9	—	368	1,265	2,550	2,240	5,000	5,000
OTHERS	148	100	160	187	250	1,367	4,000	4,000
TOTAL	1,597	2,537	8,398	23,776	40,154	50,782	120,000	150,000

MAP OF PREFECTURES

Classified Collection of PET Bottles (1998)

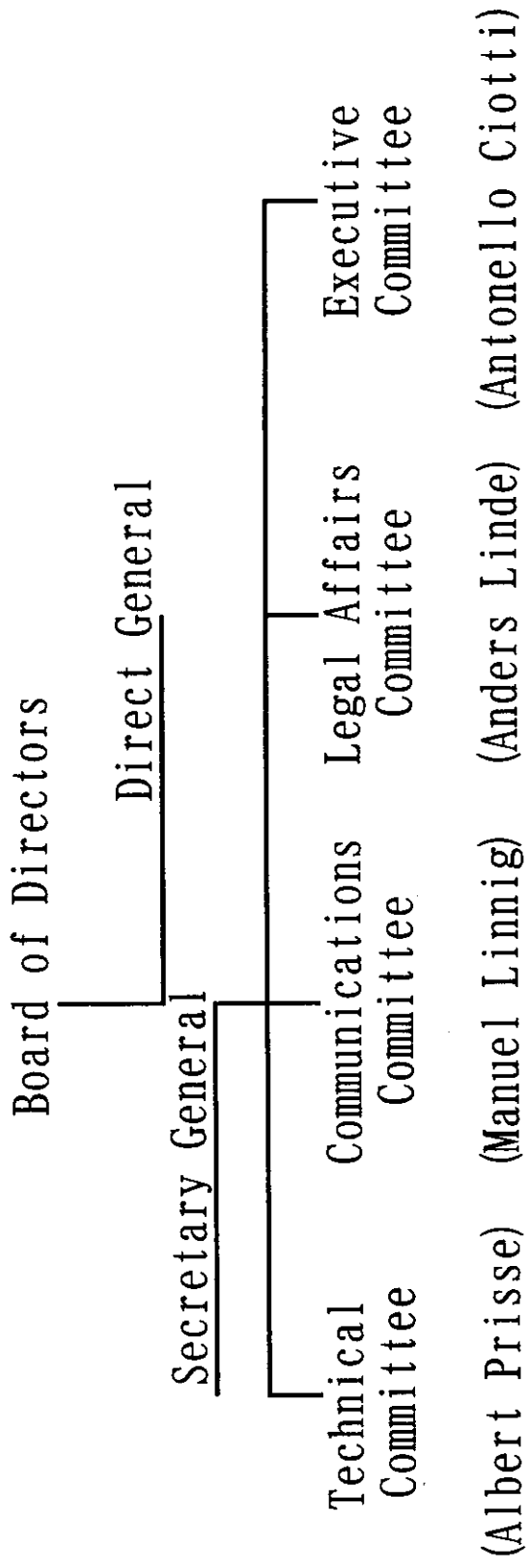


Number of autonomies.

collecting PET bottles : 764 / 3,233

4.1 添付資料-11

<PETCORE ORGANISATION>



4.1 添付資料-12

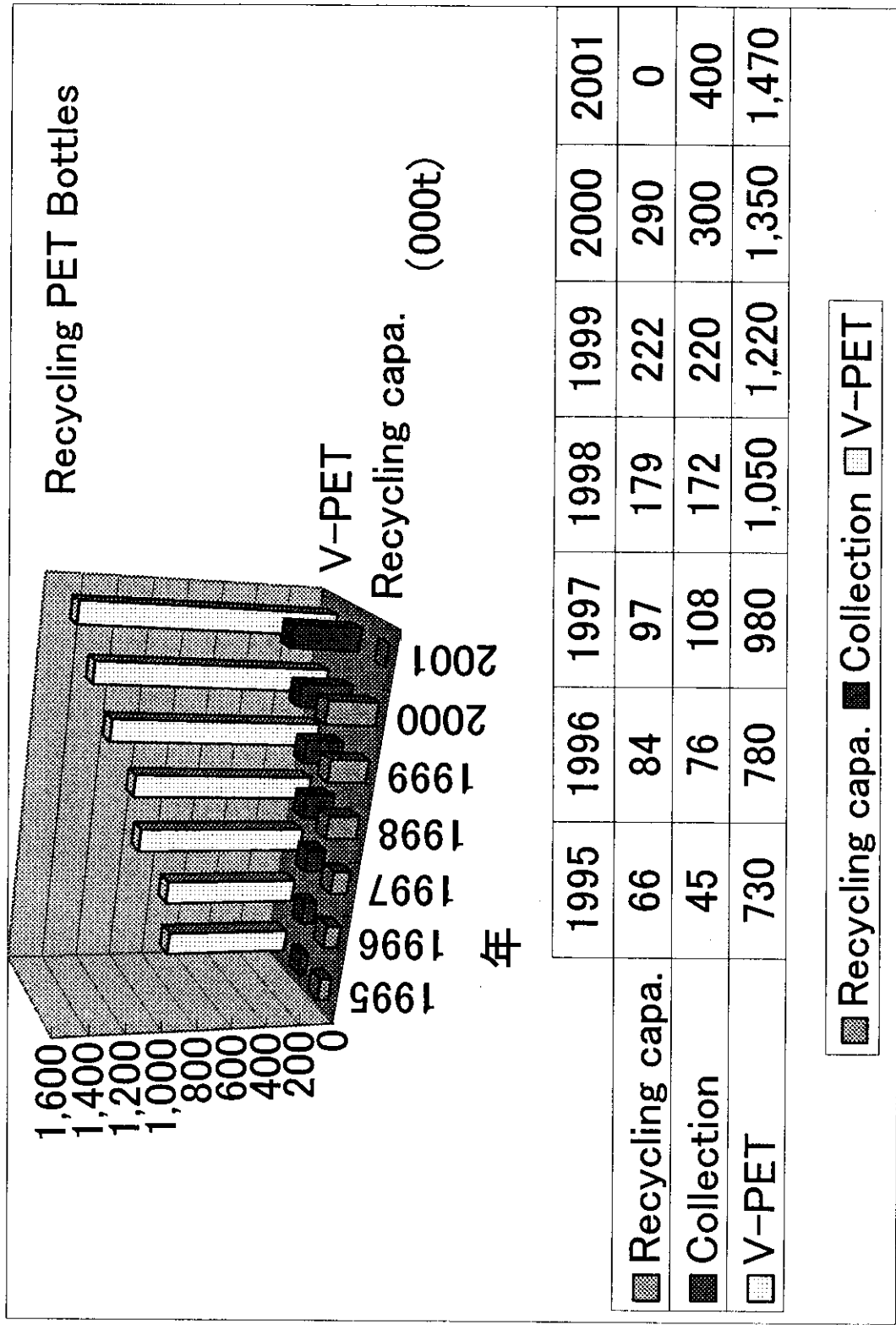
<R-PET market 2001>

End use markets (000t)	Total market siz	Market available
• Fibre-staple	850	300-350
• Food contact container	1,100	200-220
• Non Food contact con	200	150
• A-Sheet	215	150
• Strapping	50	30
• Inj. Moulding compounds	150	30-25
• White Goods	100	10
• Foodstock recycling	?	?
• Polyols	20	20

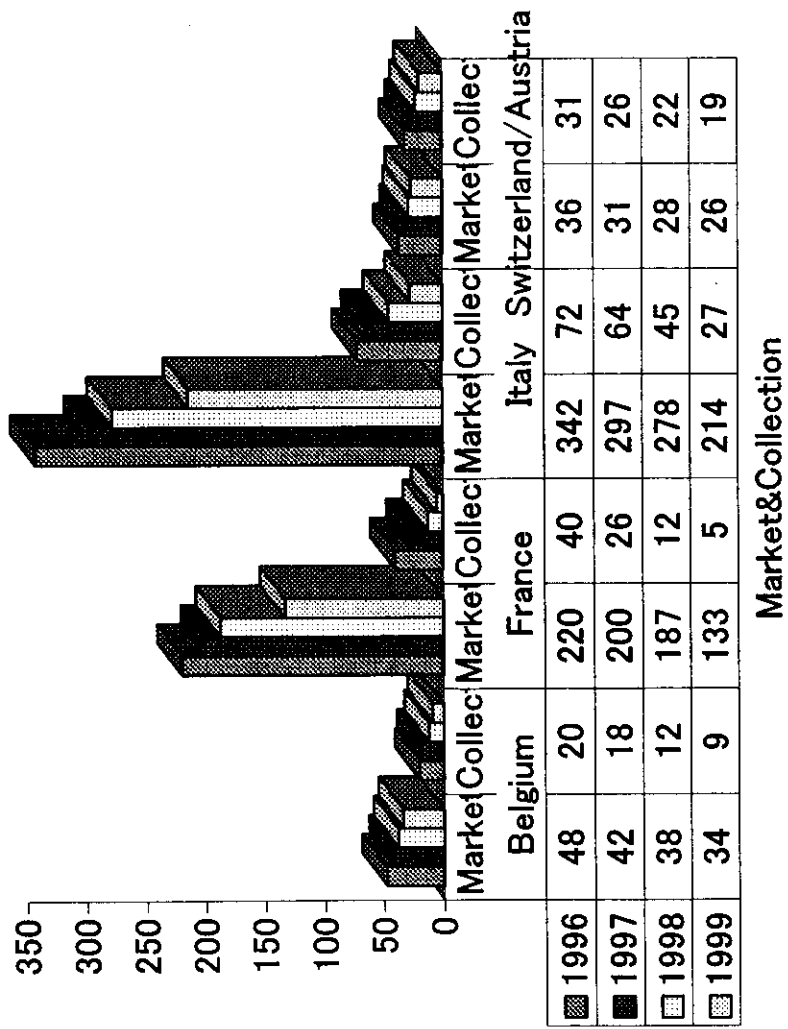
〈Bottles/typical outlets〉

Bottle material	Contents	Outlets	Recycling process
Clear pure PET	Soft drinks Water	Fibers Sheet	Mechanical recycling
Clear pure PET	Oil Vinigar	Fibers Sheet	Mechanical recycling
Light blue pure PET	Water	Fibers Sheet Polyols Compounds	Mechanical recycling Chemical recycling
Green pure PET	Water Soft drinks	Strapping	Mechanical recycling
Coloured Opaque White Other pure PET	Detergents Perfumes Milk etc	Polyols Compounds	Chemical recycling (Mechanical recycling)
Coloured barrier bottl PA EVOH PEN coated	Beer Fruit juices etc	Bottles Compounds	Chemical recycling (Mechanical recycling)

4.1 添付資料-14



Country overview (ooot)



Legend: 1996 (diagonal lines), 1997 (solid black), 1998 (white), 1999 (checkered)

4.1 添付資料-16

〈PET bottles collection〉

(Unit: t)

Jan-00

(Country)	1995	1996	1997	1998	1999	2000
Austria	3,200	4,240	4,800	6,000	9,000	12,000
Belgium	1,000	9,000	12,000	18,000	20,000	22,000
Denmark	100	300	100	200	250	300
Eire	200	200	200	200	300	500
Finland	500	500	600	2,000	2,000	2,000
France	2,800	5,100	12,200	25,882	39,500	55,500
Germany(refills)	3,000	3,500	6,500	10,000	20,000	30,000
Germany(DSD)	0	0	0	8,000	10,000	12,000
Deposit returns	0	0	0	4,000	5,000	6,000
Greece	0	300	100	100	200	1,100
Iceland	900	1,000	1,000	1,000	1,000	1,000
Italy	11,000	27,000	45,000	64,000	72,000	100,000
Netherlands	4,000	3,300	2,700	3,000	1,500	1,500
Norway	200	500	200	900	1,200	1,500
Portugal	0	100	150	230	760	1,500
Spain	300	400	450	1,500	3,000	8,900
Sweden	3,000	3,500	4,200	5,300	6,000	7,000
Switzerland	13,200	14,500	17,500	20,000	23,000	24,000
UK	1,500	2,200	2,800	4,500	4,500	7,000
Total(Input to recycle)	44,900	75,640	110,500	174,812	219,210	293,800

4.1 添付資料-17

〈West Europe PET bottles consumption〉

Jan-00
(Unit: t)

(Country)	1997	1998	1999	2000	2001	2004	2007
Austria	25.0	28.0	31.0	34.0	37.0	47.0	59.5
Belgium	60.0	66.6	73.7	80.9	88.3	112.8	139.0
Denmark	3.6	4.1	4.5	5.2	5.9	8.3	10.9
Eire	8.0	9.3	10.0	10.8	11.5	14.0	17.5
Finland	7.0	7.4	7.7	8.1	8.5	9.7	10.7
France	179.0	204.0	227.0	254.0	285.2	386.0	506.0
Germany	60.0	70.0	80.0	100.0	120.0	158.0	203.0
Greece	26.0	29.0	31.5	34.5	37.5	47.5	62.0
Iceland	0.7	0.8	1.0	1.0	1.1	1.2	1.4
Italy	328.0	361.5	393.3	426.3	459.8	561.2	674.1
Netherlands	50.0	55.0	61.0	67.0	73.4	97.5	123.0
Norway	4.4	4.5	4.6	4.8	5.1	5.7	6.1
Portugal	24.0	27.0	29.5	32.0	34.5	43.5	53.0
Spain	115.0	129.0	143.0	159.0	173.0	224.0	280.0
Sweden	16.3	17.2	18.2	19.4	20.4	23.6	26.9
Switzerland	17.0	19.0	21.0	24.0	26.0	33.0	40.0
UK	172.0	188.2	207.0	227.5	249.0	321.5	399.0
Total	1,096.0	1,220.6	1,344.0	1,488.5	1,636.2	2,094.5	2,612.1

〈West Europe consumption by end-use〉

CSD Bottle	444.4	485.8	531.3	580.8	631.2	792.5	975.2
Mineral water	360.6	424.5	469.4	526.2	585.4	751.8	947.6
Others bottles & containers	210.3	222.8	248.1	277.3	306.3	408.6	516.8
Packaging sheet	80.7	87.5	95.2	104.2	113.3	141.6	172.5
Total	1,096.0	1,220.6	1,344.0	1,488.5	1,636.2	2,094.5	2,612.1