

# INFINITUM









# IMPORTANT QUESTIONS TO ASK

- What's the problem?
- What's the collection rate?
  - How to achieve highest possible collection rates?
- What's the yield in collection and recycling process?
  - How to achieve the highest environmental effect
- What's the cost per unit for the producer/consumer (EPR cost)?
  - How to achieve the lowest cost level?



# INFINITUM AS

100% collection and high-grade recycling

*Our intention:*

**We recycle for the future**

*Our ambition:*

**100%**

collection and high-grade recycling

*Our DNA:*

**THE WORLD'S BEST  
DEPOSIT SYSTEM**

*Our personality:*

Knowledgeable  
Environmentally committed  
Involving  
Bold  
Innovative

*Our promises:*

**Eternal life**

to every packaging that is in the deposit system

We should make it easier to deposit  
We guarantee 100% high-quality recycling  
We contribute to improved resource utilization



# INFINITUM AS

Private owned company 50/50 producer and retail

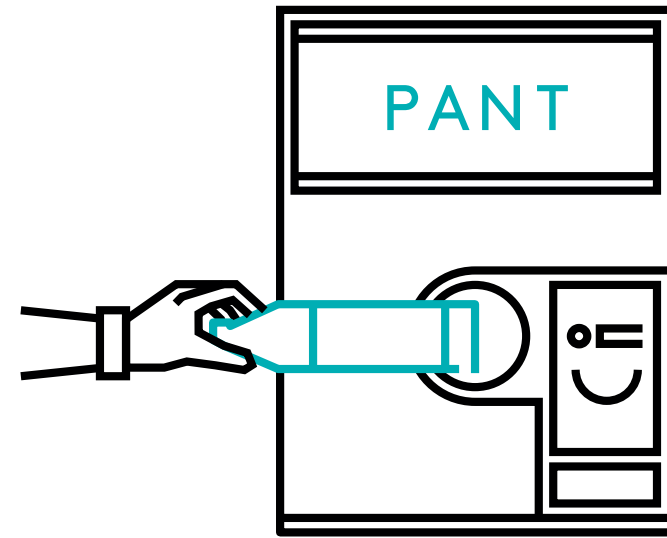
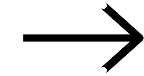
1.2 billion cans and bottles in 2017.

- 22 000 tonnes of PET
- 80% of recycled material in PET bottles is possible in Norway today
- 7 500 tonnes of aluminum
- Recovered by Hydro Holmestrand (Norway)

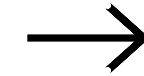
Shortest possible path between main task for the packaging material



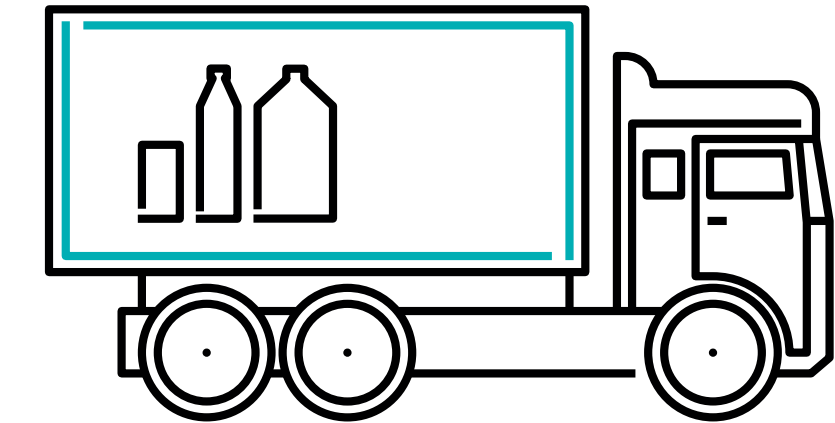
Happiness



Deposit



Made ready in the shop

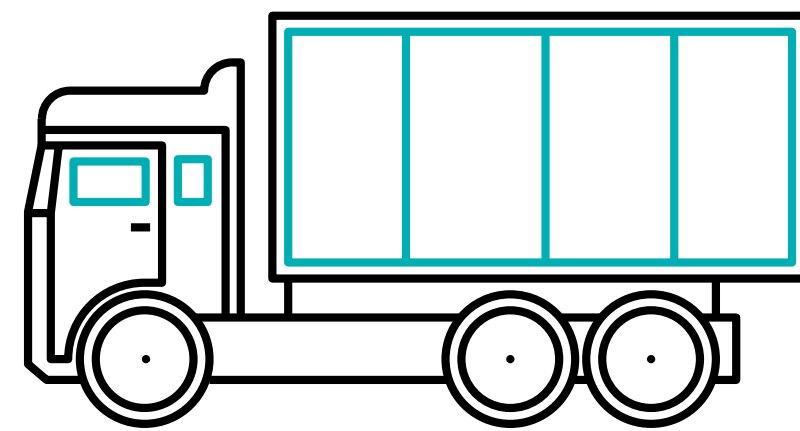


Pick up bottles and cans with deposit from the shop

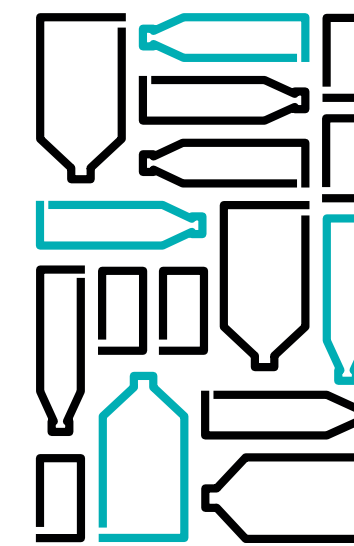
# 100% PRODUCER RESPONSIBILITY



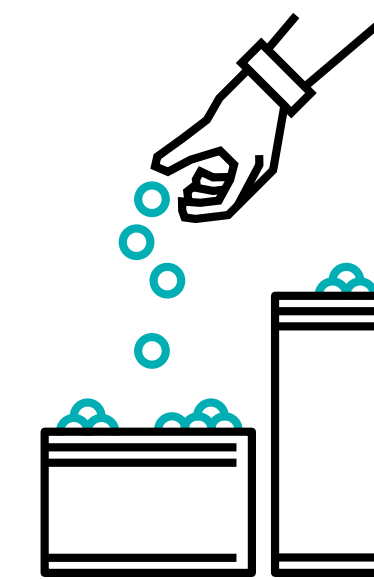
High-grade recycling



Transportation to the recyclers



Sorting and bailing



Transportation Hubs











# NORWEGIAN REGULATIONS AND MARKET

100% collection and high-grade recycling





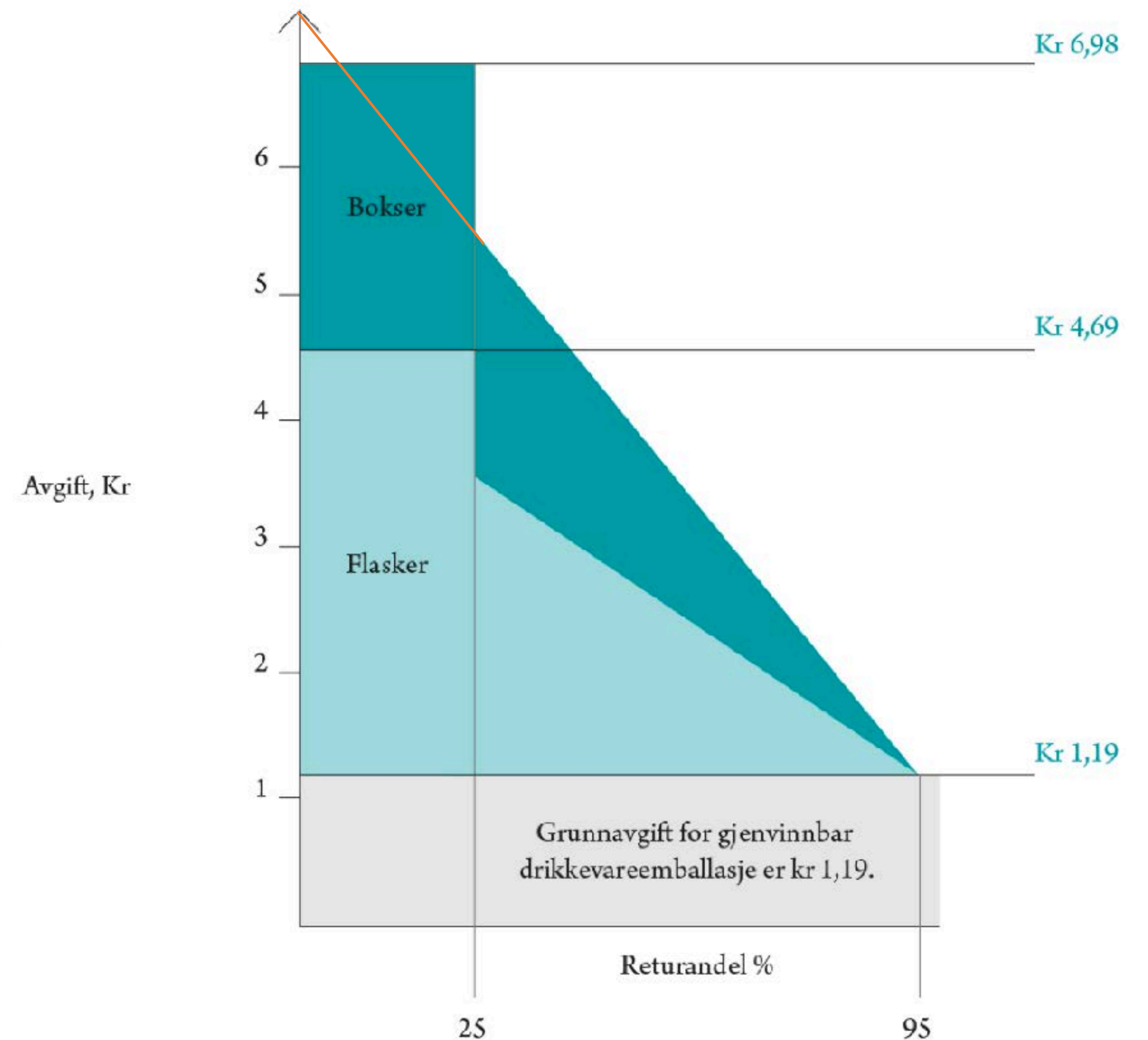
HET LEGER





# ENVIRONMENTAL FEE

- Anti litter fee!
- Base fee for all one way packaging:
  - kr. 1.19 - 0,13 EUR - 0,12 GBP
- The environmental fee is reduced with increasing collection rate
  - Cans: kr. 5.79 - 0,58 EUR - 0,45 GBR
  - Bottles: kr. 3.50 - 0,35 EUR - 0,34 GBR





# COLLECTION OF BEVERAGE CONTAINERS IN NORWAY



Curbside, one way glass and metal



Reusable Packaging  
(breweries and beverage association)



Plastic packaging, packaging cardboard  
and beverage cartons



Deposit systemet







"RIGID"  
APPROVAL  
SECURE  
HIGH-GRADE  
RECYCLING

DESIGN FOR RECYCLING  
SINCE 1999!

# PET BOTTLES

**NO**

**CAP**

Thermoset PS  
PVC  
Metal

**LINER MATERIAL  
AND ADDITIONAL  
SEALING**

PVC  
Metal  
Silicone

**BOTTLE**

Other than A-PET

**BARRIER**

Coating  
Scavengers  
Additives

**LABEL & GLUE**

PVC  
PET  
OPS  
Self-adhesives  
(under conditions)  
Hot-Melt  
Heavy metal inks

**YES**

**CAP**

HDPE  
PP

**LINER MATERIAL  
AND ADDITIONAL  
SEALING**

PE  
EVA

**BOTTLE**

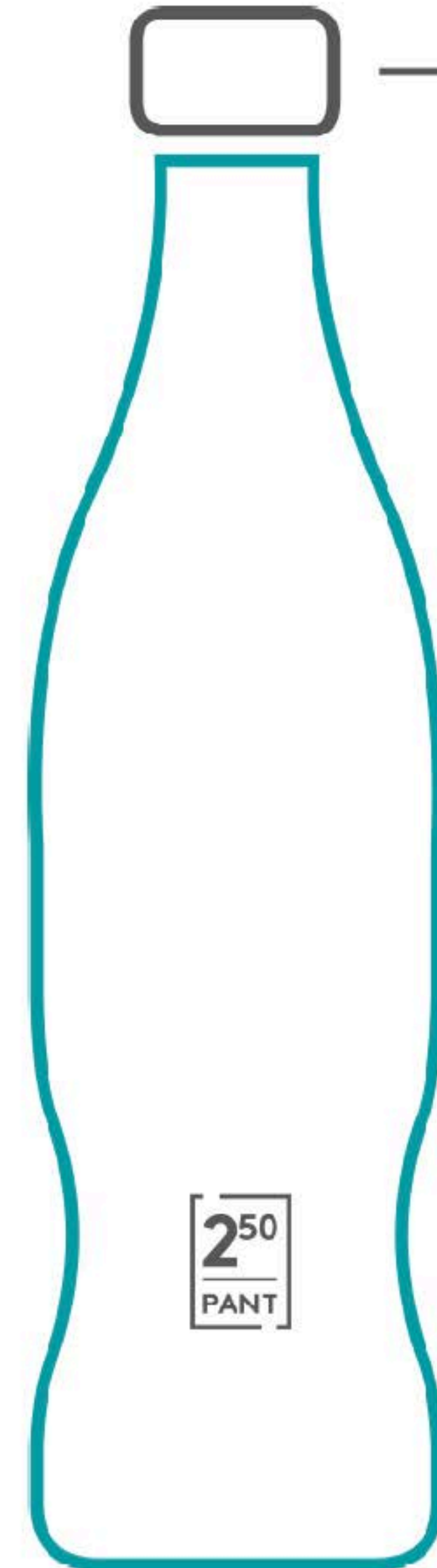
A-PET

**BARRIER**

Glaskin  
Bestpet

**LABEL & GLUE**

Paper  
OPP  
Density lower than 1  
Water solvent glue  
(60°C)  
Recyclable HotMelt





[HTTPS://LOVDATA.NO/DOKUMENT/SF/  
FORSKRIFT/2004-06-01-930/  
KAPITTEL\\_6#KAPITTEL\\_6](https://lovdata.no/dokument/sf/forskrift/2004-06-01-930/kapittel_6#kapittel_6)

Chapter 6-7. Return to points of sale of packaging included in a deposit scheme

Points of sale of beverages in packaging that is included in a deposit scheme have a duty to accept reasonable quantities of the empty packaging they themselves distribute and sell. Upon delivery of the packaging to a point of sale, the consumer can claim a cash refund of the deposit

Price plus deposit.

Deposit without VAT





## Administrative fee

- The problem of acceptance of packaging for which the corresponding amount of (national) deposit and/or administrative fee have not been paid (*free riding*).
- Compared to the other six countries, Croatia has a lower cost of placing PET and glass packaging on the market (paid as an administrative fee) than Finland, Lithuania, and Germany and Sweden (in these two countries only for PET since glass packaging is not included in the deposit system in Sweden), and the higher put to market fee for cans compared to Norway, Finland, Sweden and Estonia.

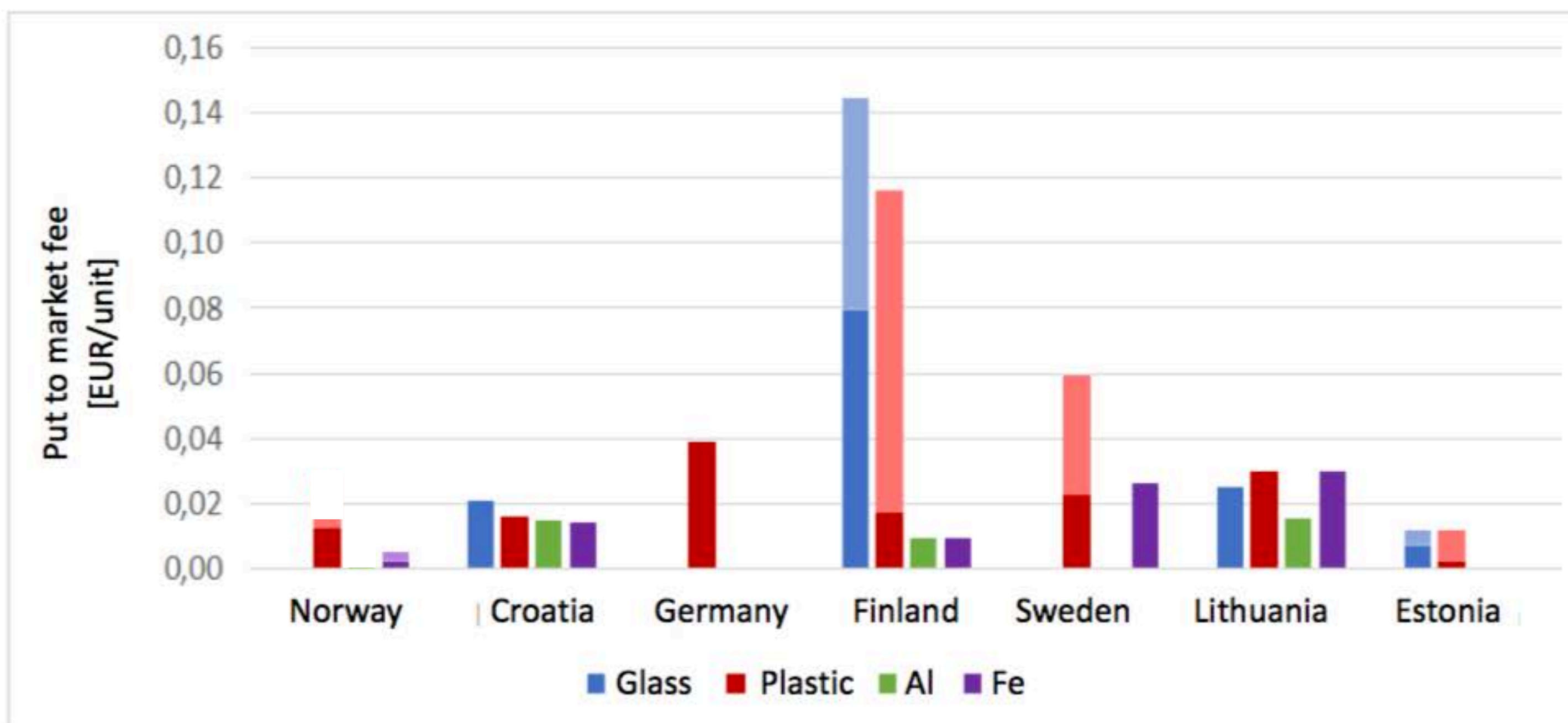


Figure 7. Put to market fees in deposit systems (EUR/unit)

The darker hue on the graph indicates the minimum fee (for national barcodes) and lighter hue for international barcodes (which also includes differences in administrative costs related to material and volume of packaging as well as sorting costs).





# EPR COST, PRODUCER/IMPORTER

| <b>01.02.2016</b>                                     | <b>Can aluminium</b> | <b>Can steel</b> | <b>Bottles PET</b> | <b>Bottles HDPE</b> |
|---|----------------------|------------------|--------------------|---------------------|
| <b>Base fee</b>                                       | <b>NOK 0,00</b>      | <b>NOK 0,21</b>  | <b>NOK 0,18</b>    | <b>NOK 0,18</b>     |
| <b>Additional fee for standard barcode</b>            | <b>NOK 0,03</b>      | <b>NOK 0,03</b>  | <b>NOK 0,03</b>    | <b>NOK 0,03</b>     |
| <b>Additional fee for light blue PET</b>              |                      |                  | <b>NOK 0,08</b>    | <b>NOK 0,08</b>     |
| <b>Additional fee for colored or sleeve &gt; 75 %</b> |                      |                  | <b>NOK 0,15</b>    | <b>NOK 0,15</b>     |
| <b>Sleeve or label on can</b>                         | <b>NOK 0,03</b>      | <b>NOK 0,03</b>  |                    |                     |



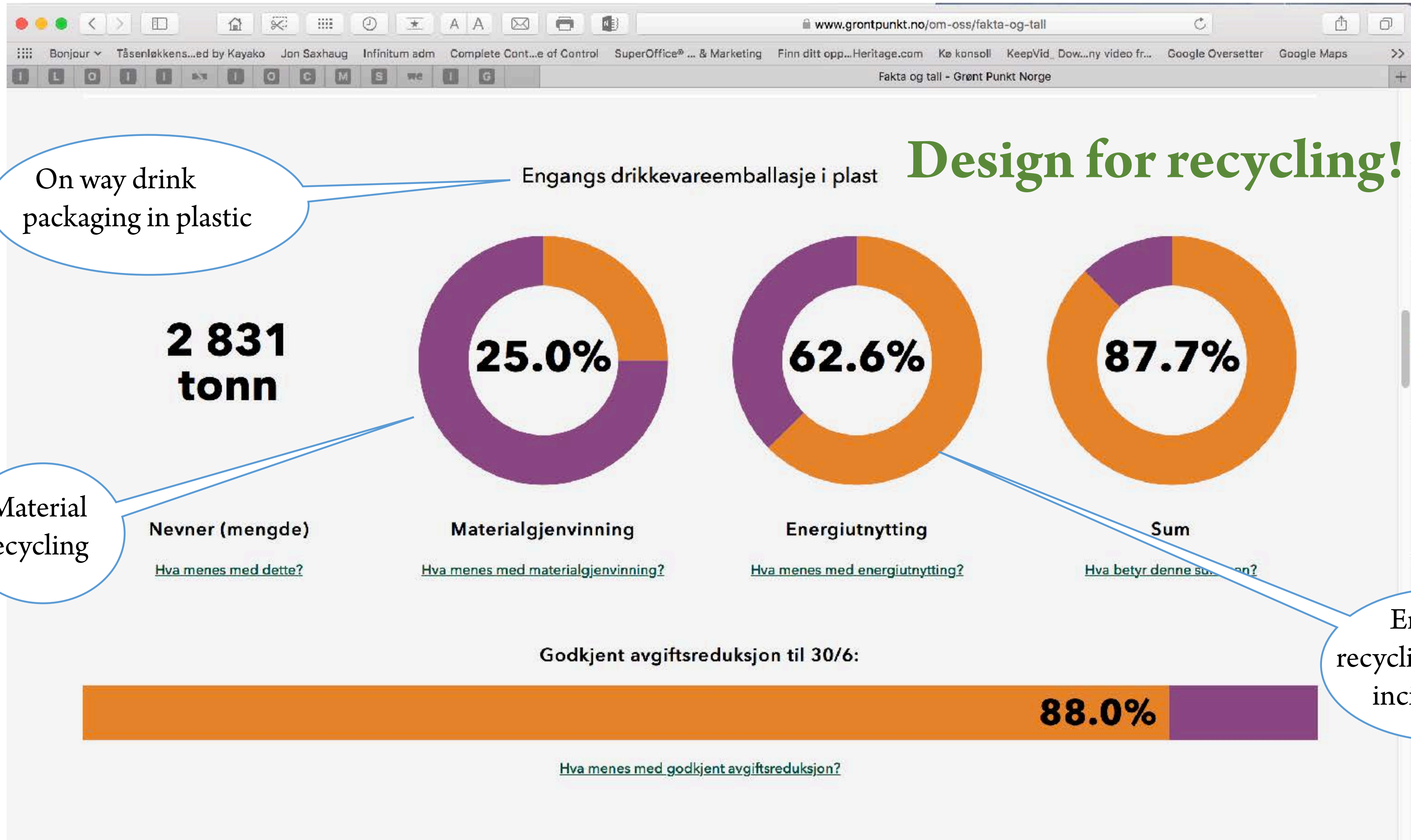


# HANDLING FEE

| <b>01.02.2016</b>  | <b><i>can aluminium</i></b> | <b><i>Bottles PET</i></b> | <b><i>Bottles HDPE</i></b> |
|--|-----------------------------|---------------------------|----------------------------|
| <b><i>RVM with compaction</i></b>                          | <b><i>NOK 0,20</i></b>      | <b><i>NOK 0,25</i></b>    | <b><i>NOK 0,25</i></b>     |
| <b><i>RVM without compression and manual receiving</i></b> | <b><i>NOK 0,05</i></b>      | <b><i>NOK 0,10</i></b>    | <b><i>NOK 0,10</i></b>     |



# RECYCLING RATES GREEN DOT 2016







En husholdning på to personer kaster i gjennomsnitt 50 kroner pant rett i restavfallet hvert år.

Det ekstra volumet fører til at vi hvert år tømmer ca. 40 000 beholdere helt unødvendig.

Grovt anslått går det 5 millioner tapte kroner gjennom sorteringsanlegget til ROAF hvert år.





# KEY FIGURES 2017

| VARESTRØM                           | ANTALL BOKS        | TONN BOKS    | % AV TILFØRT  | ANTALL PET         | TONN PET      | % AV TILFØRT  |
|-------------------------------------|--------------------|--------------|---------------|--------------------|---------------|---------------|
| Totalt salg                         | 614 503 691        | 9 525        |               | 622 628 246        | 22 477        |               |
| Verdikjedelager                     | -                  | 12 100 000 - |               | 800 000 -          | 66            |               |
| Tilført (Salg + verdikjedelager)    | 602 403 691        | 9 337        | 100 %         | 621 828 246        | 22 412        | 100 %         |
| <b>Totalt pantet i automat</b>      | <b>508 096 599</b> | <b>7 875</b> | <b>84,3 %</b> | <b>535 687 113</b> | <b>19 679</b> | <b>87,8 %</b> |
| Ut fra sentral sortering            | 7 245 399          | 112          | 1,2 %         | 1 008 428          | 37            | 0,2 % *       |
| Ut fra slaggsortering               | 53 355 898         | 827          | 8,9 %         |                    |               | *             |
| Ut fra kildesortert materiale       | 7 528 793          | 116,7        | 1,2 %         | 1 507 612          | 55            | 0,2 % *       |
| Energiutnyttet                      | 11 535 377         | 178,8        | 1,9 %         | 53 138 582         | 1 929         | 8,6 %         |
| <b>Totalt gjenvunnet fra avfall</b> | <b>79 665 467</b>  | <b>1 235</b> | <b>13,2 %</b> | <b>55 654 621</b>  | <b>2 020</b>  | <b>9,0 %</b>  |
| <b>Totalt gjenvunnet</b>            | <b>587 762 066</b> | <b>9 110</b> | <b>97,6 %</b> | <b>591 341 734</b> | <b>21 699</b> | <b>96,8 %</b> |
| Rest i bunnaske                     | 11 357 138         | 176          | 1,9 %         |                    |               |               |
| Tap energiutnyttelse                | 2 191 631          | 34,0         | 0,4 %         | 10 016 399         | 364           | 1,6 %         |
| Ukjent disponering                  | 1 092 856          | 16,9         | 0,2 %         | 20 470 113         | 349           | 1,6 % **      |
| Totalt ikke pantet                  | 94 307 092         | 1 462        | 15,7 %        | 86 141 133         | 2 733         | 12,2 %        |
| <b>Totalt</b>                       | <b>602 403 691</b> | <b>9 337</b> | <b>100 %</b>  | <b>621 828 246</b> | <b>22 412</b> | <b>100 %</b>  |
| <b>Utenlandske enheter</b>          | <b>28 084 111</b>  |              |               | <b>4 732 225</b>   |               |               |

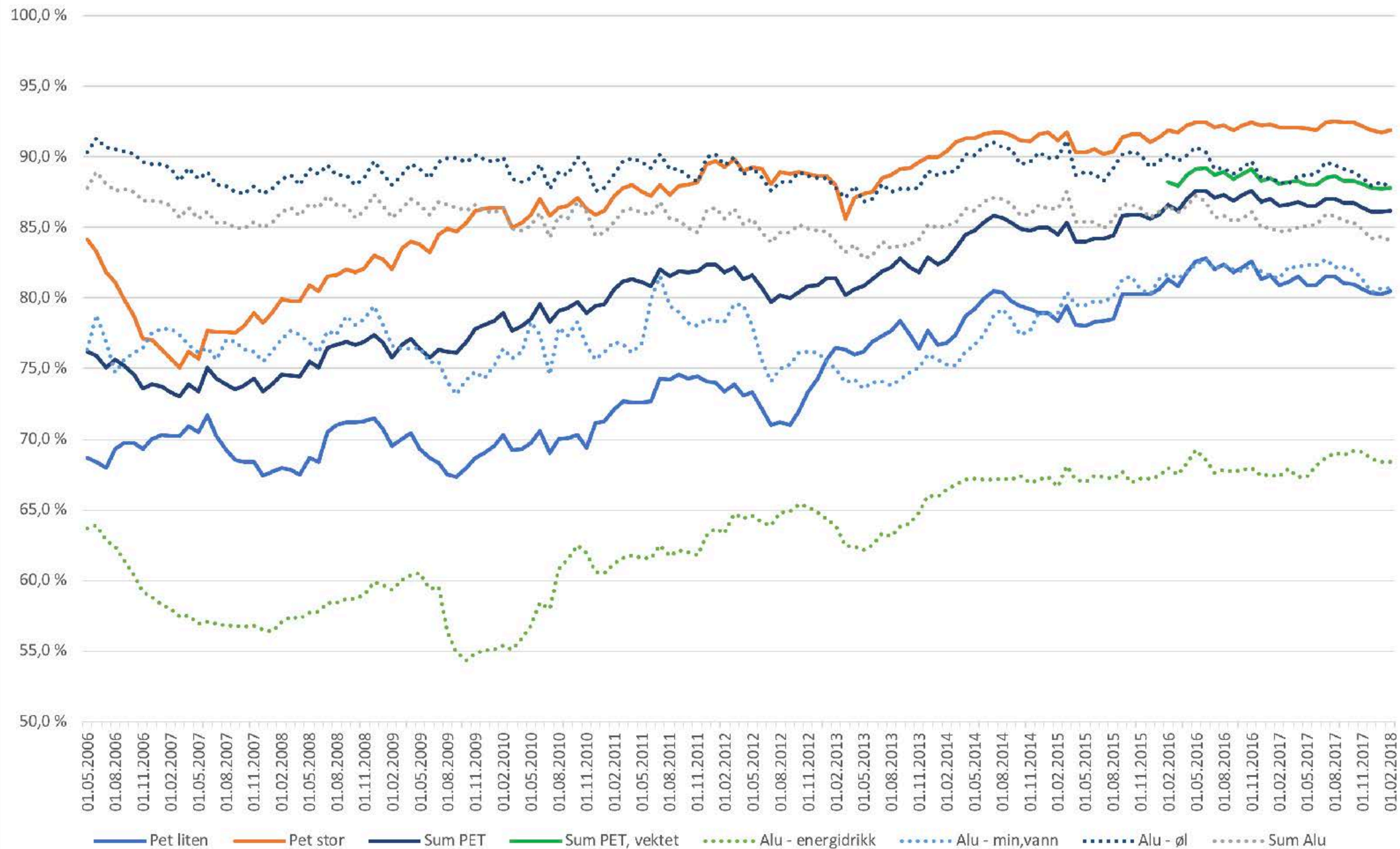
\* Materialgjenvinning

\*\* Representerer også usikkerhet i analysen

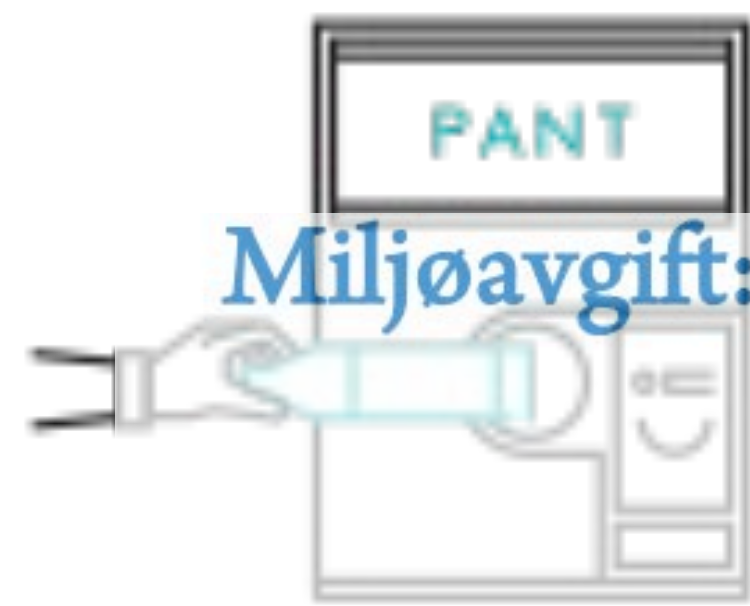




# Innsamlingsgrad NR modell



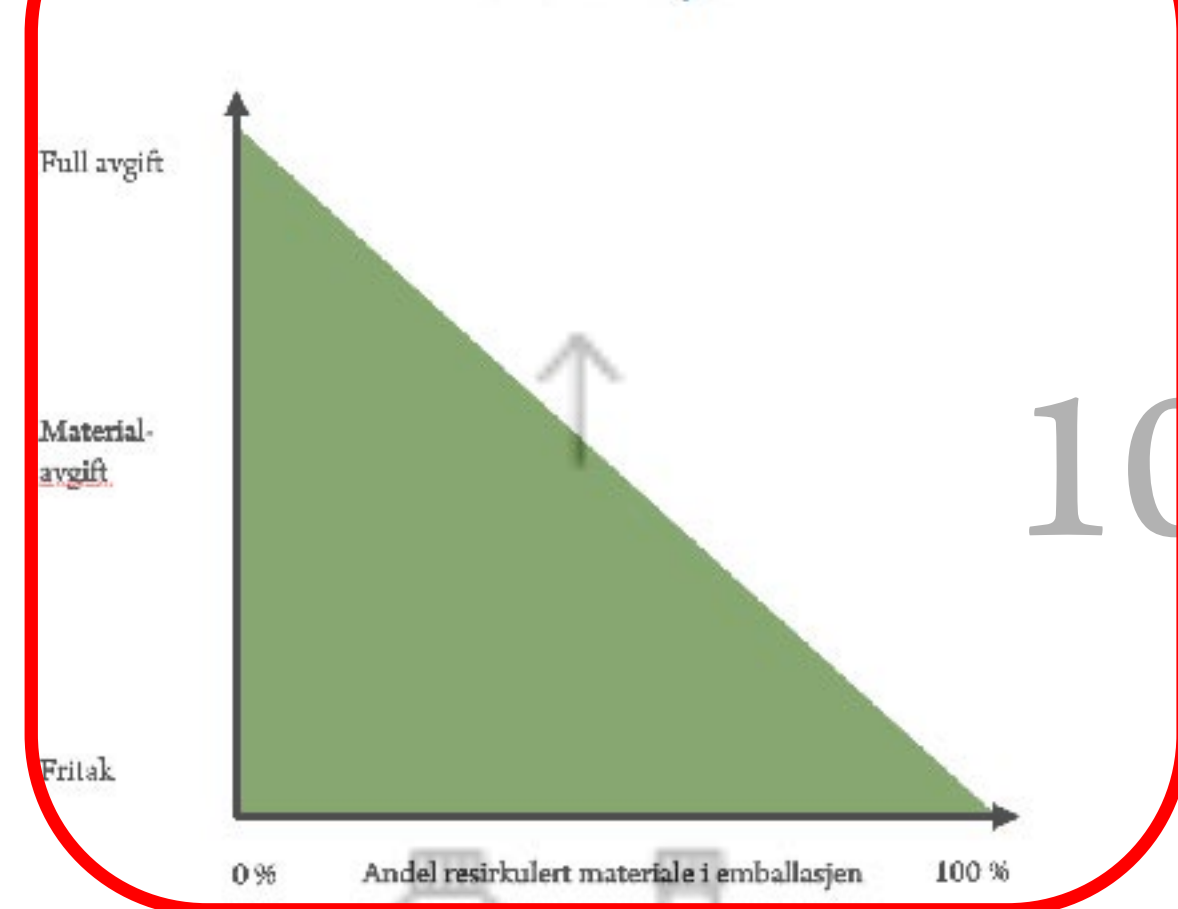




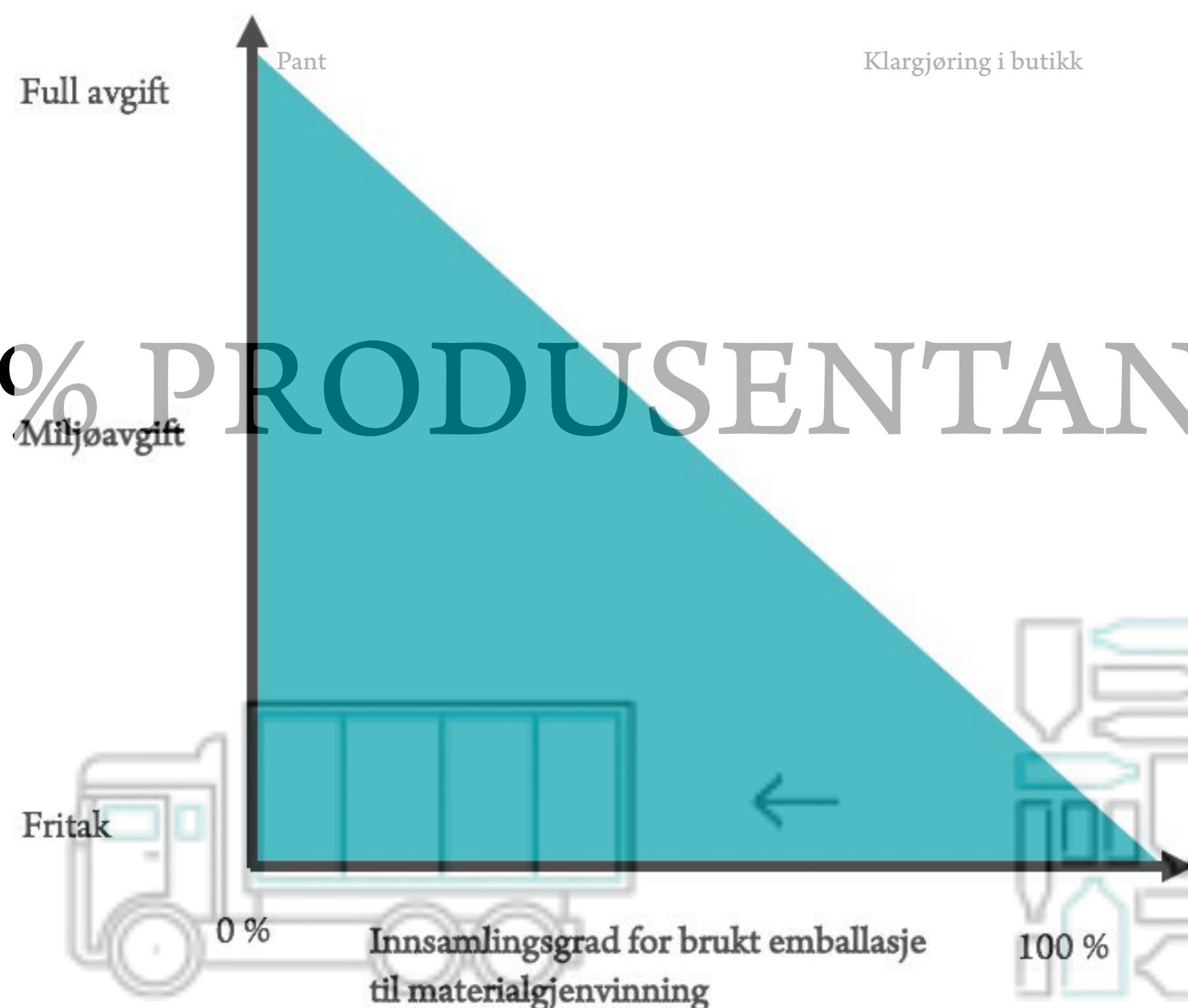
Miljøavgift: Innsamlingsgrad til materialgjenvinning



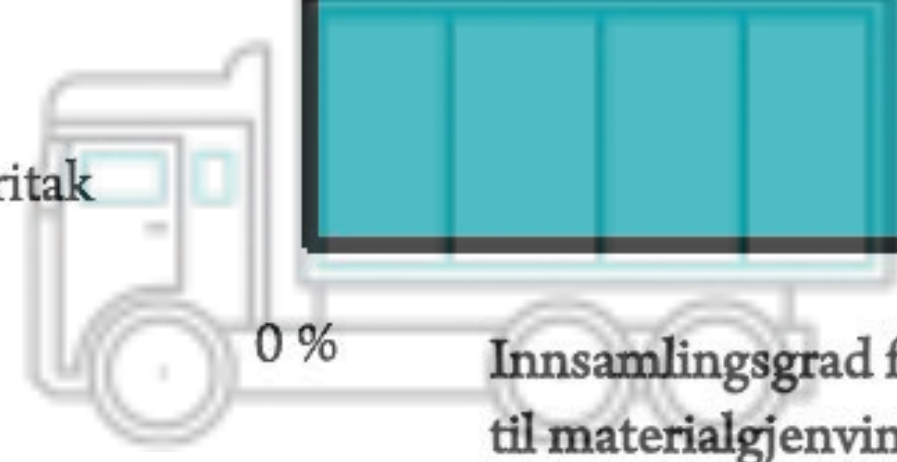
Materialavgift: Andel resirkulert materiale i emballasjen



# 100% PRODUSENTANSVAR



Høyverdig gjenvinning



Transport til gjenvinner



Sortering og bailing



Transportknutepunkter



Henting av flasker og bokser hos pantemottaket

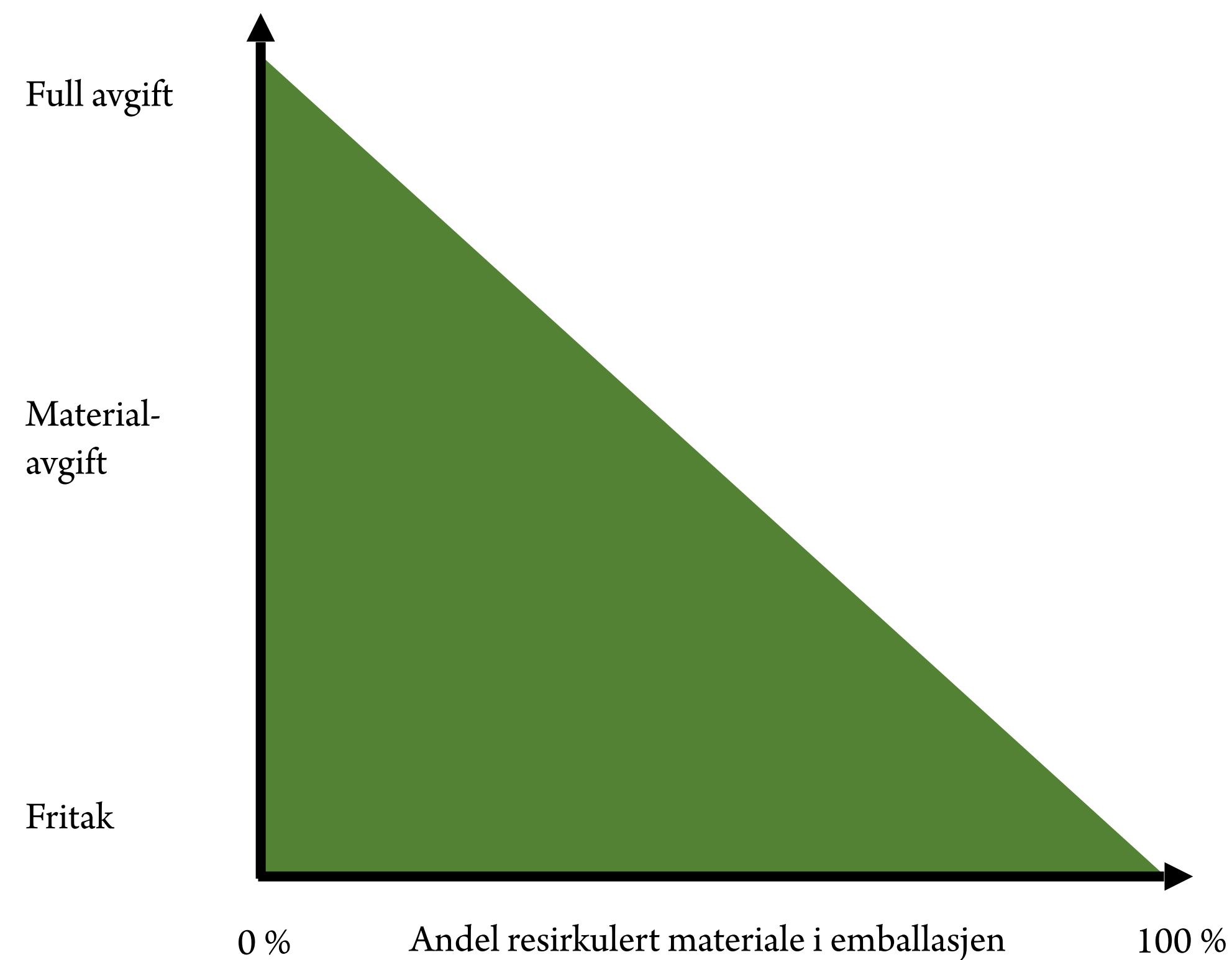
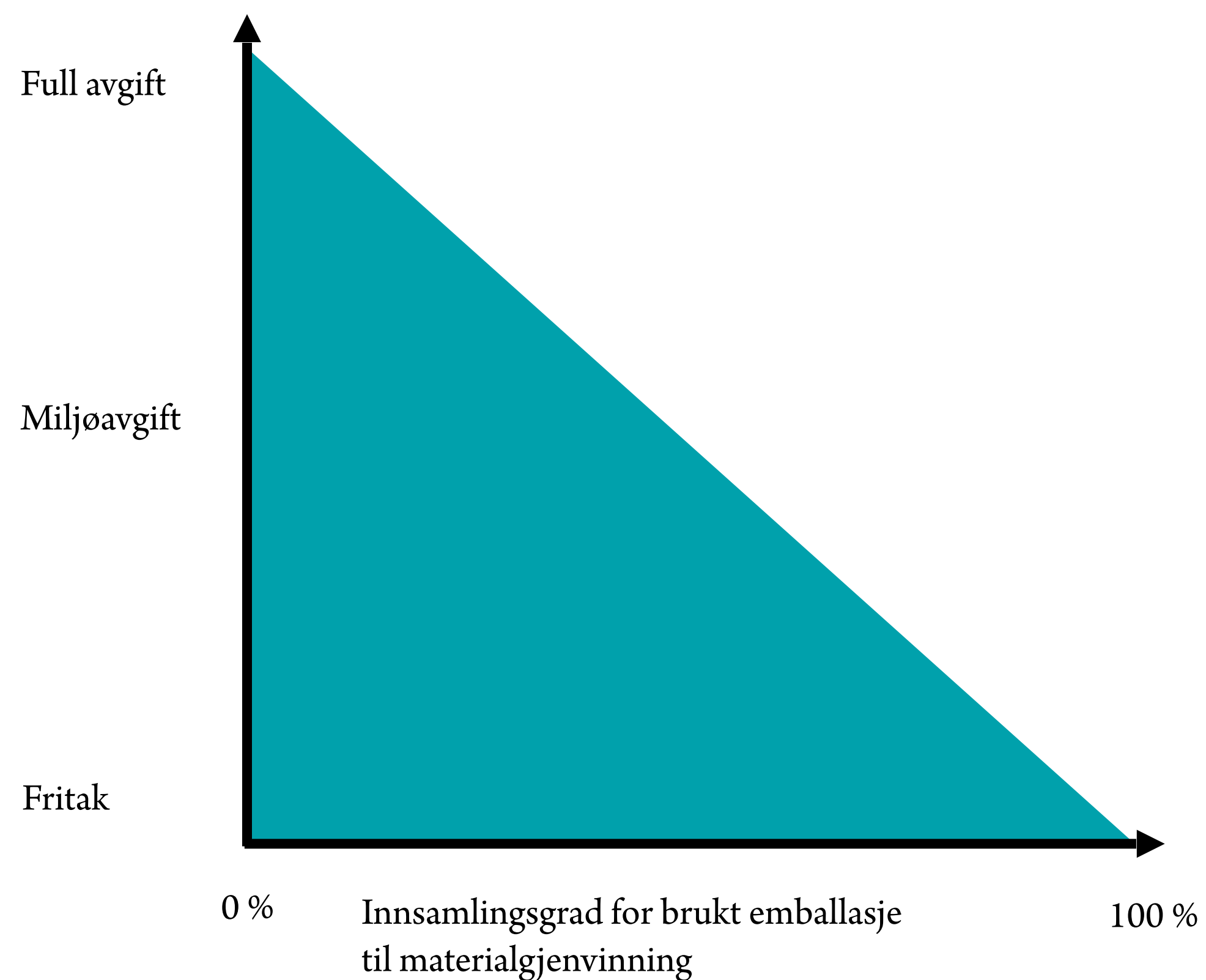




# TWO FEES FOR CIRCULAR ECONOMIE

Environmental fee: Anti littering

Material fee: Recycling





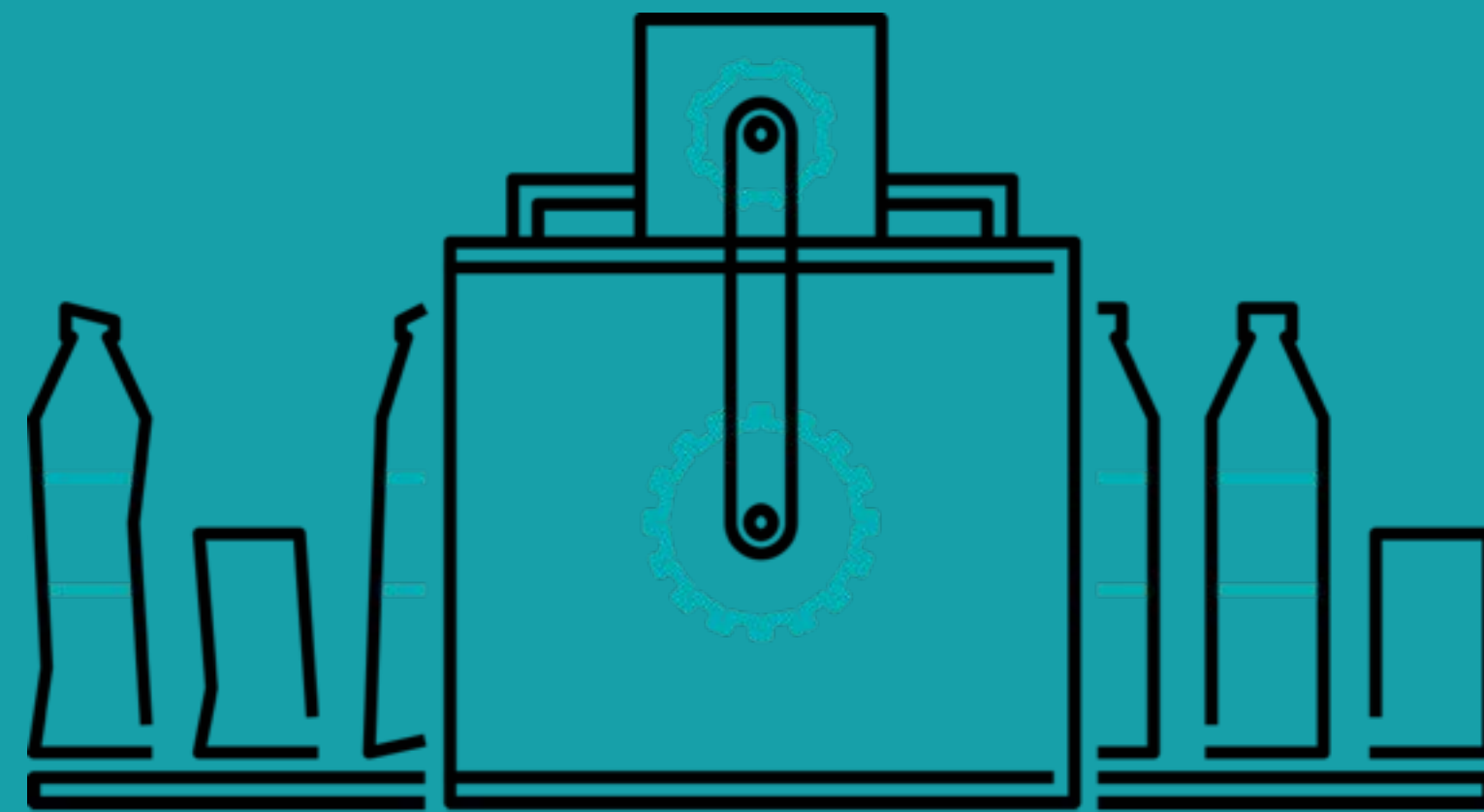
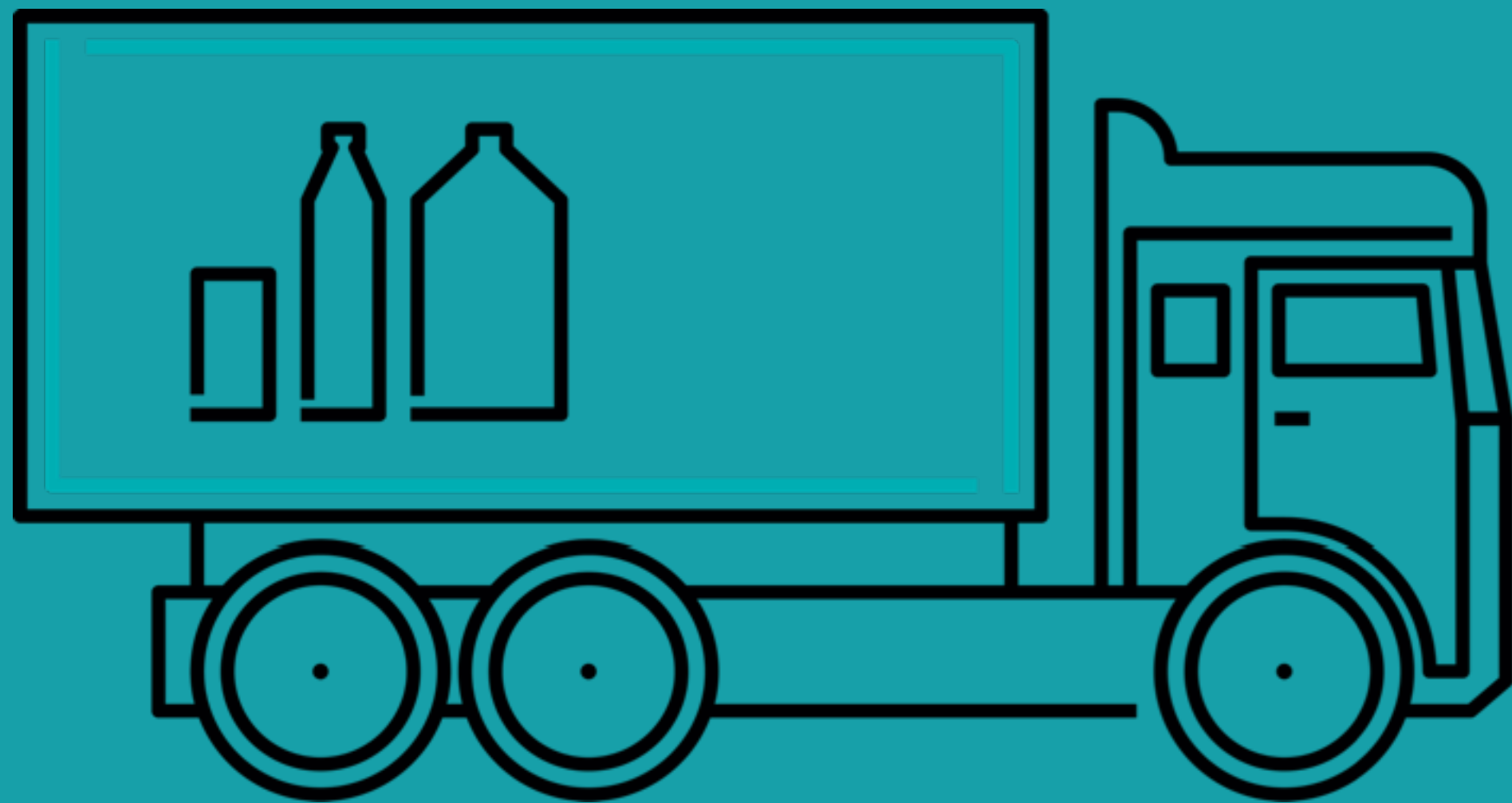
7 OUT OF 8 BOTTLES





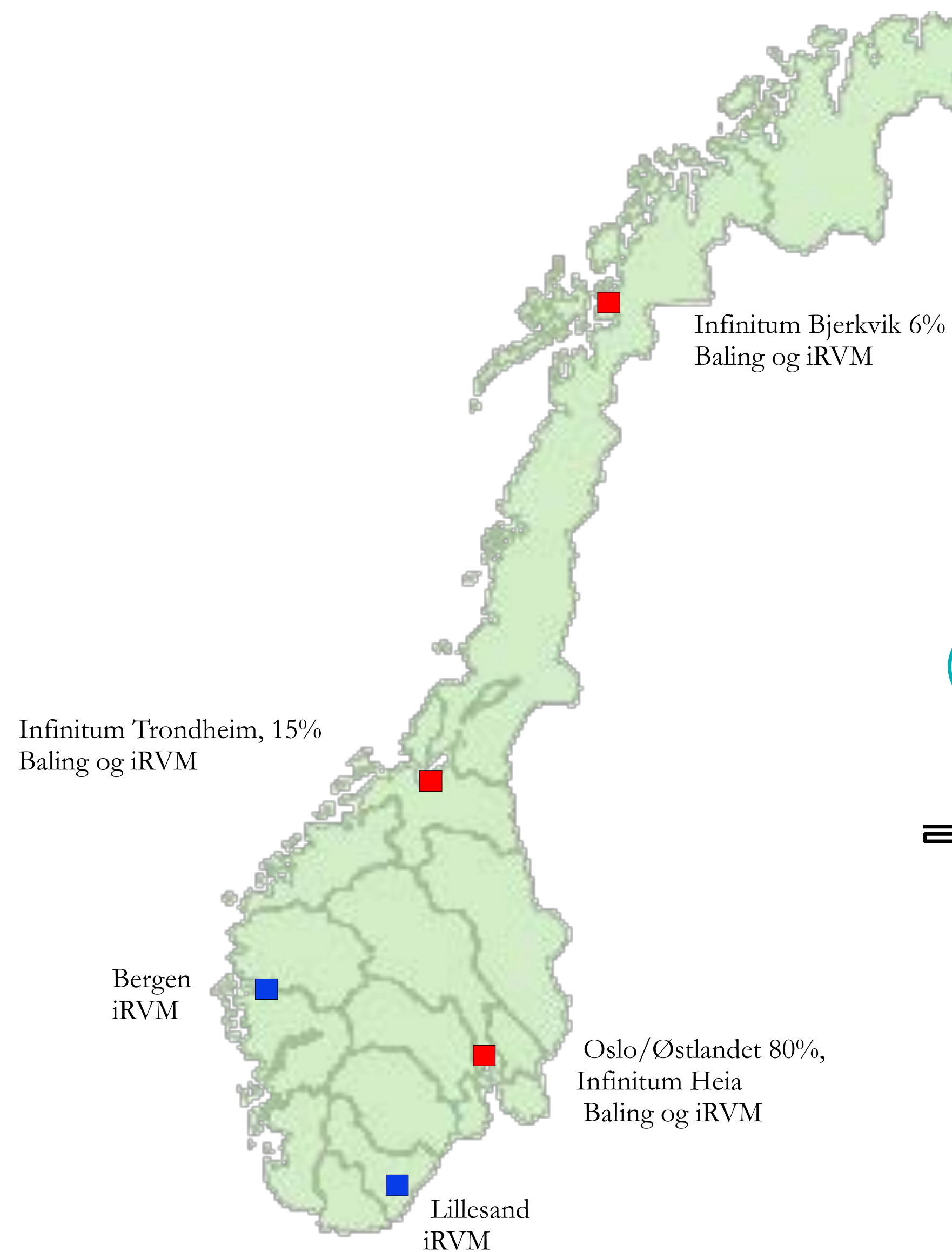


# PRODUCTION AND LOGISTICS





# PRODUCTION FACILITIES



Norway:  
5,5 mill people  
11 300 manual return points  
3 700 shops with RVM  
35 logistic hubs  
3+2 production facilities





# EFFICIENT LOGISTICS

93% collected through 3500 RVM in grocery stores

7% from 11 500 pick up points without RVM

<1 % Company's with internet sales of grocery og beverage



According to the regulations - all outlets selling beverage with deposit is obliged to accept deposit bottles/cans and disburse deposit as cash!

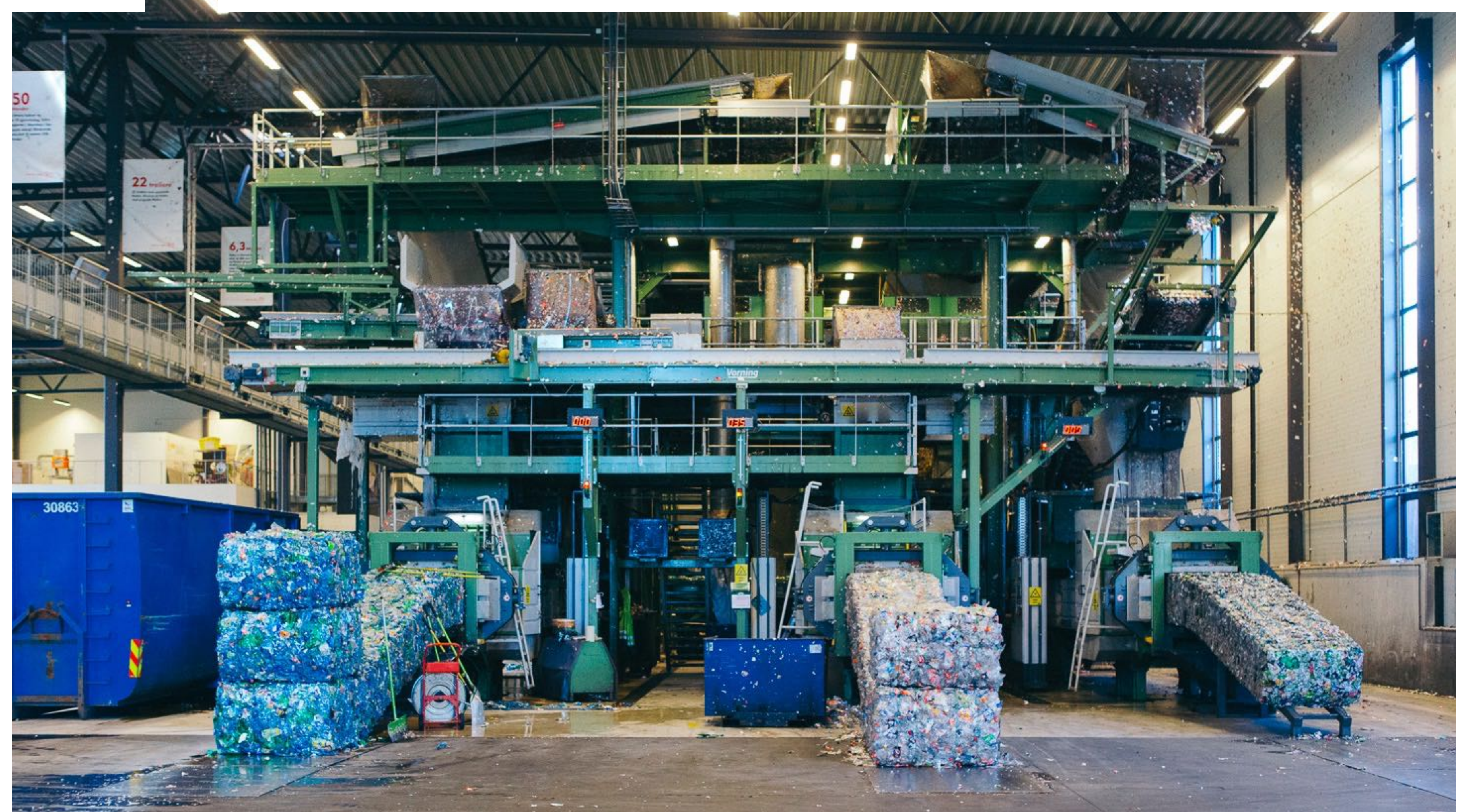




# ON THE GO











COST EFFICIENT COLLECTION  
LOWEST CARBON FOOTPRINT  
HIGHEST REUSE CAPABILITY

100% collection and high-grade recycling







If you invest 1,5 - you'll get 142 back!

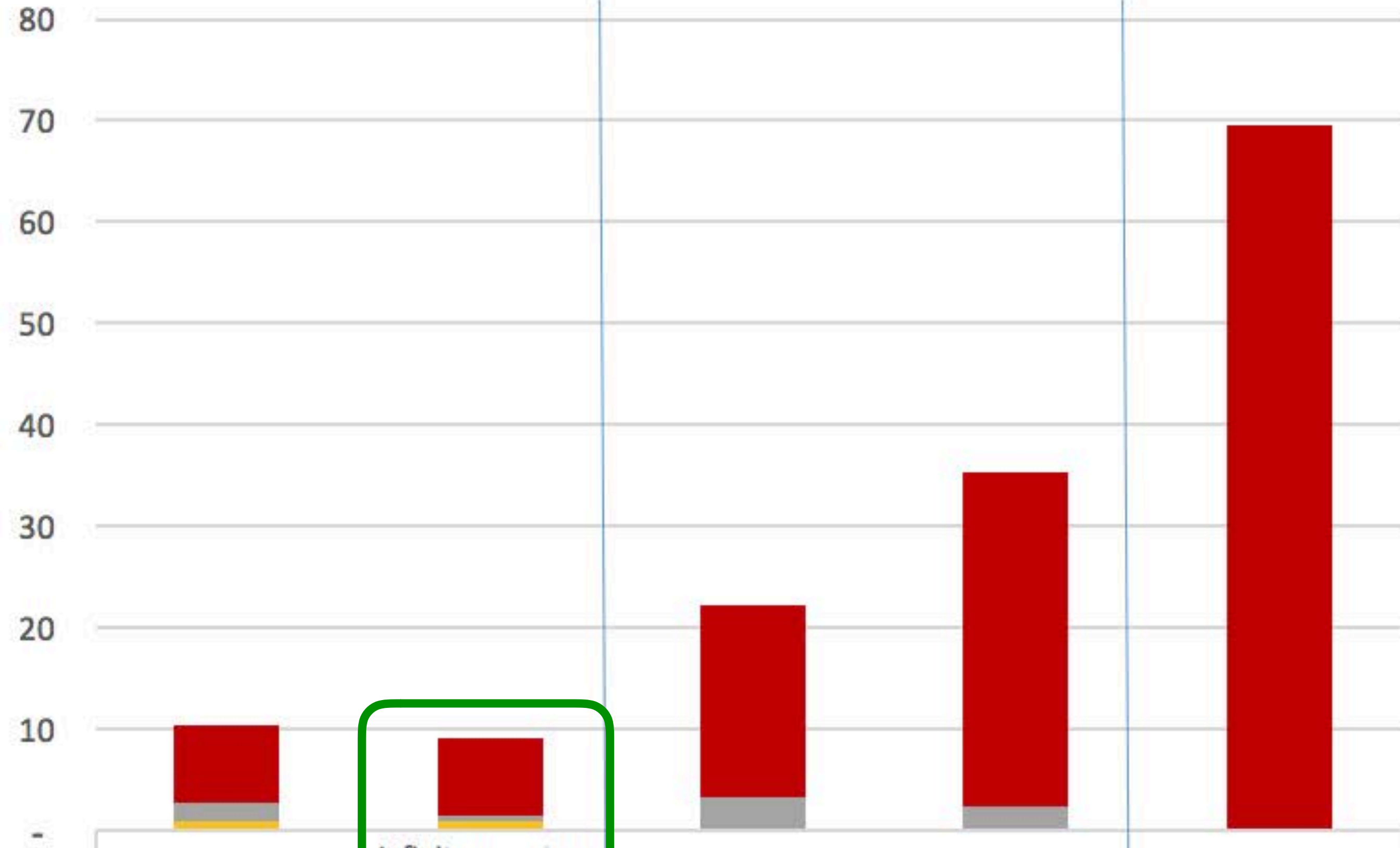
Good deal?

Environmental pay of 9 467%





kg CO<sub>2</sub>-eq/functional unit



|   | Infinitum system,<br>Main transport<br>model (86 %<br>collection rate) | Infinitum system,<br>Infinitum's<br>transport model<br>(86 % collection<br>rate) | GPN system (70 %<br>collection rate) | GPN system (50 %<br>collection rate) | Incineration<br>scenario (93 %<br>incineration) |
|---|--|--|--------------------------------------|--------------------------------------|---|
| ■ Incineration (incl. Transport)        | 7,70   | 7,70   | 18,83                                | 32,98                                | 69,47   |
| ■ Transport from consumers to recycling | 1,81   | 0,59   | 3,38                                 | 2,42                                 | 0,00  |
| ■ Reverse vending machine               | 0,94   | 0,94   | 0,00                                 | 0,00                                 | 0,00  |
| Total                                   | 10,45  | 9,23   | 22,21                                | 35,39                                | 69,47   |

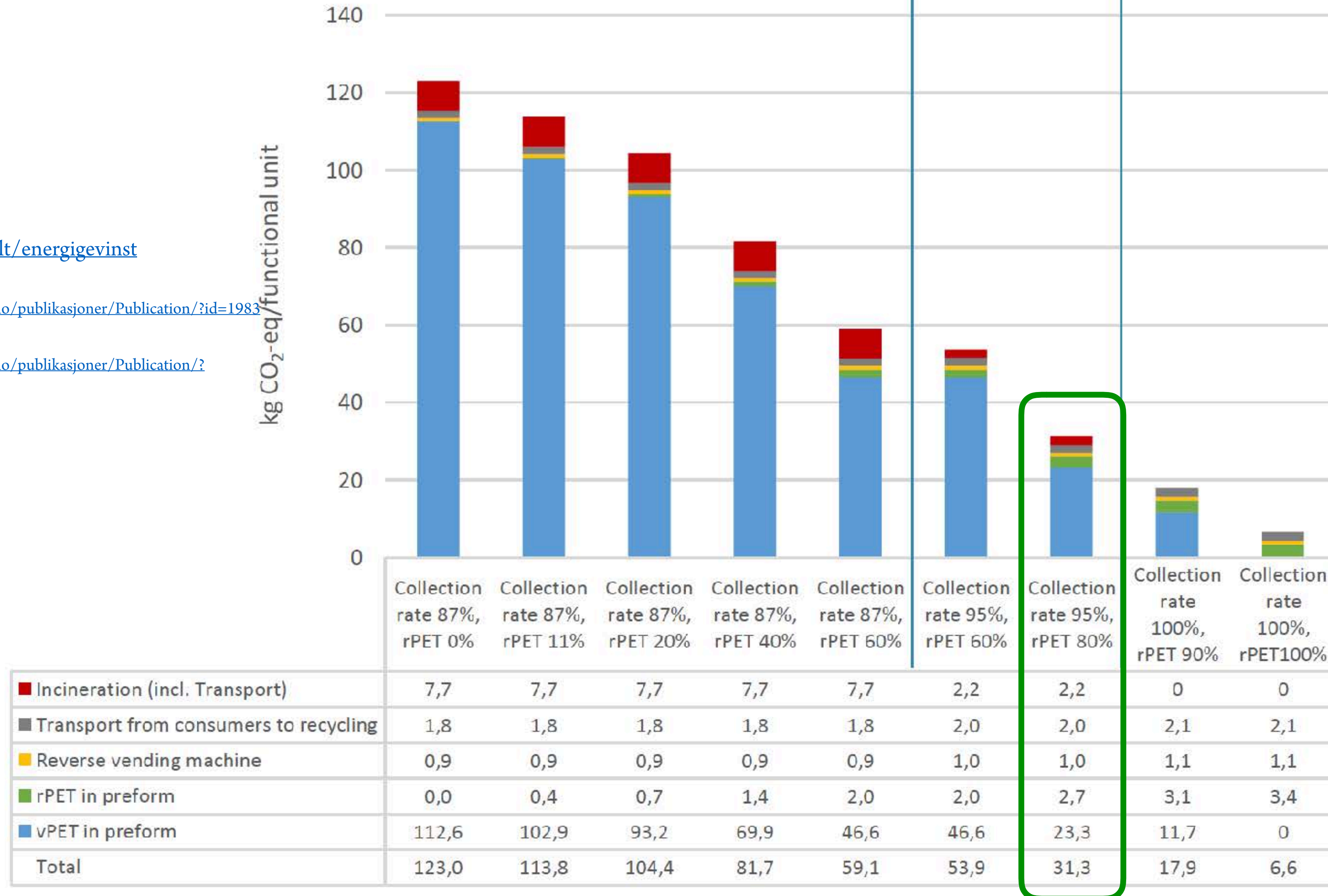




<http://ininitum.no/aktuelt/energigevinst>

<https://www.ostfoldforskning.no/no/publikasjoner/Publication/?id=1983>

<https://www.ostfoldforskning.no/no/publikasjoner/Publication/?id=2031>

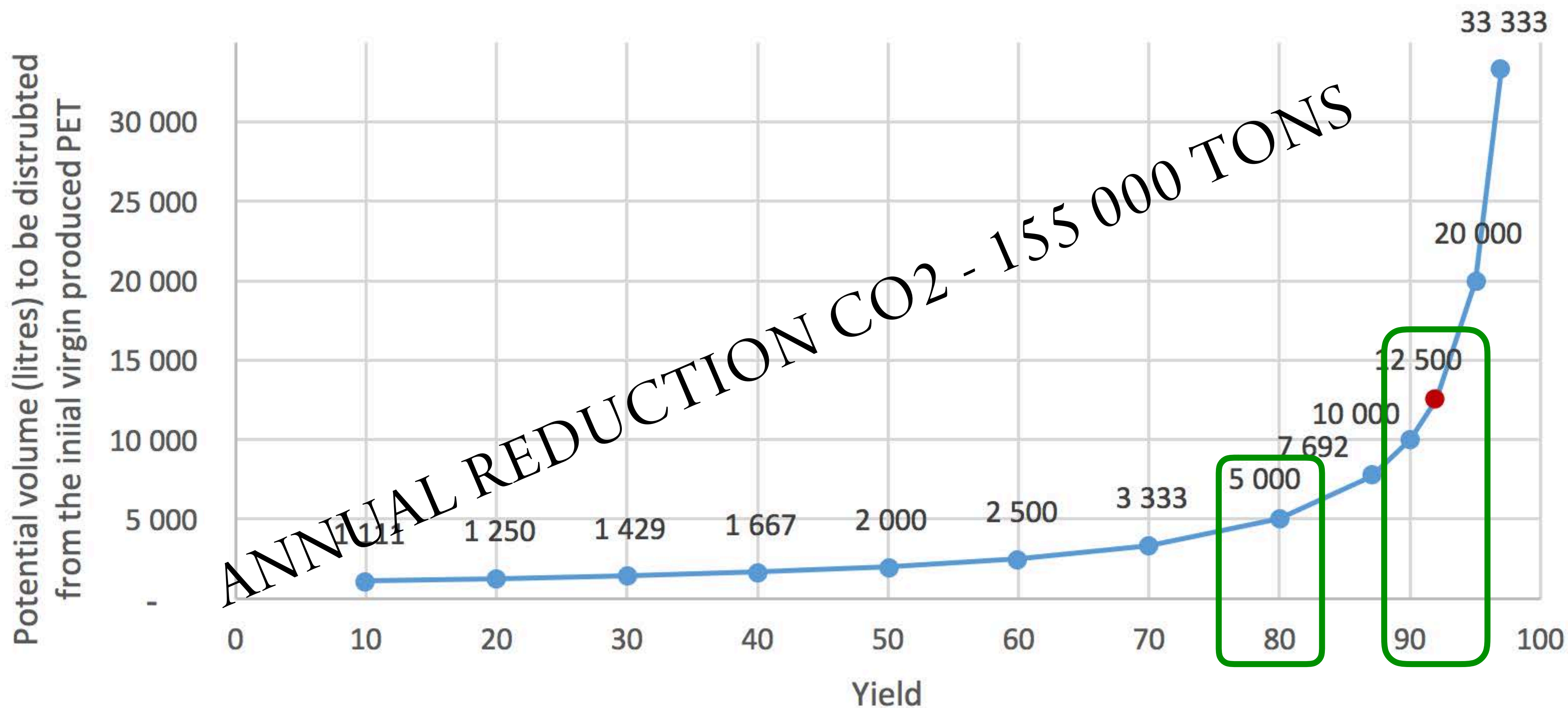


**Figur 4: Klimagassutslipp per funksjonell enhet (produksjon, innsamling og behandling av PET flasker benyttet til distribusjon av 1000 liter drikkevarer) for optimaliserte scenarier for Innitums system for PET- flasker.**





# DEPOSIT AGAIN AND AGAIN AND AGAIN AND ... !

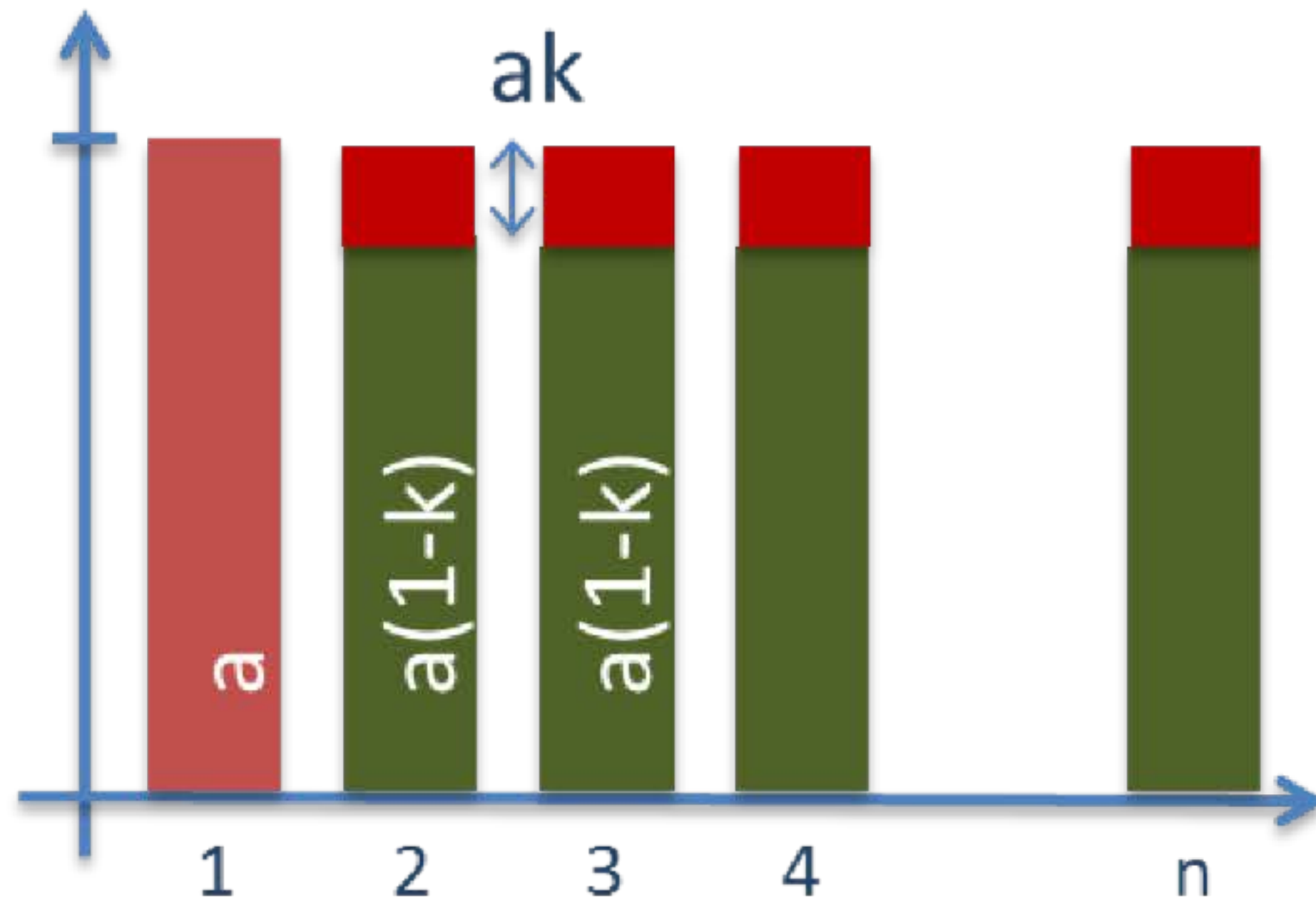


**Figure 2.** Potential delivered volume of beverage from the initial virgin produced PET material for distributing 1 000 litres according to recycling yield. Data for yield 92% shown by red point.

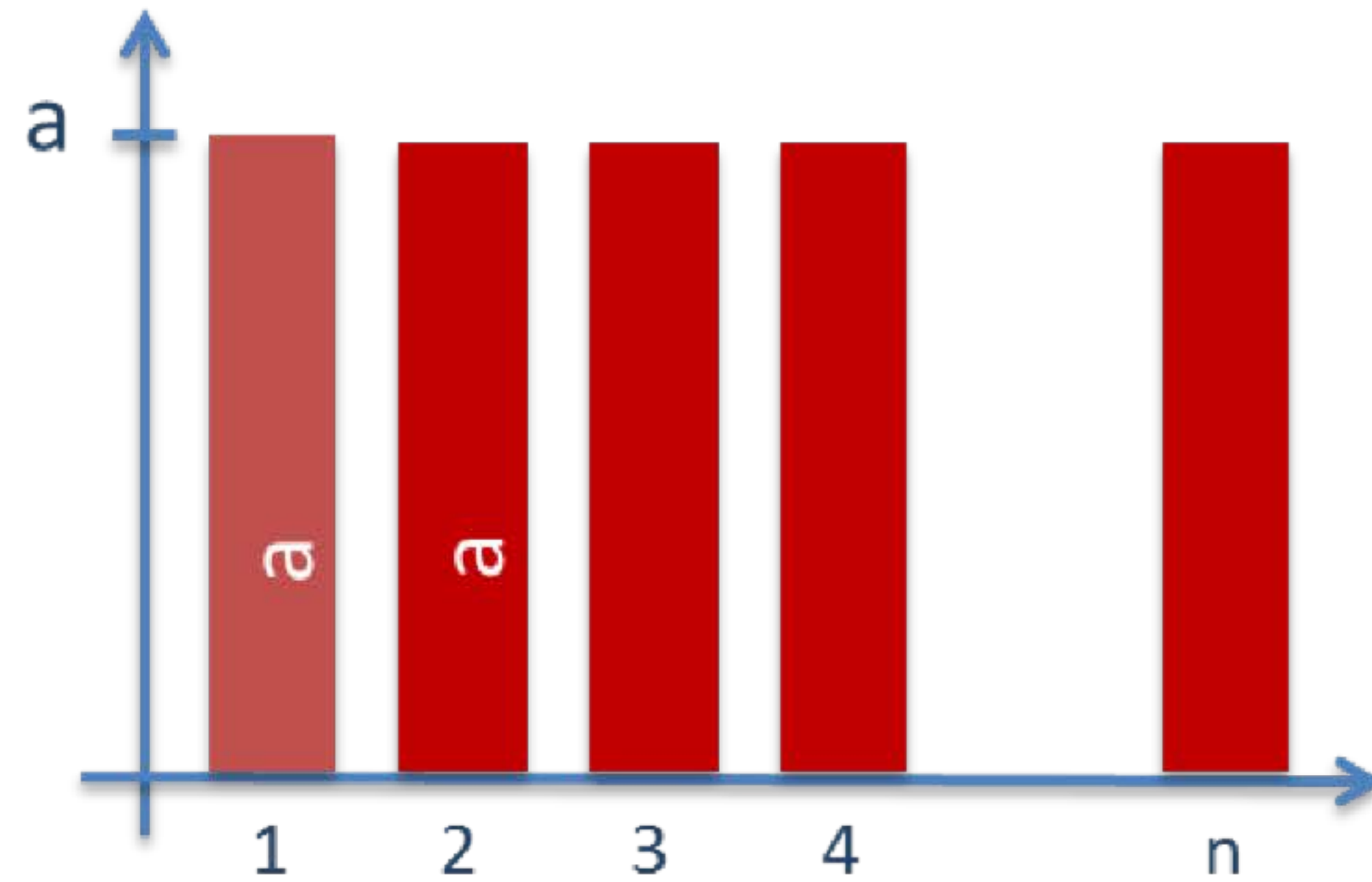




# SIRKULÆR ØKONOMI OG NORSKE ARBEIDSPLASSE



Recycling (virgin production and incineration of loss)

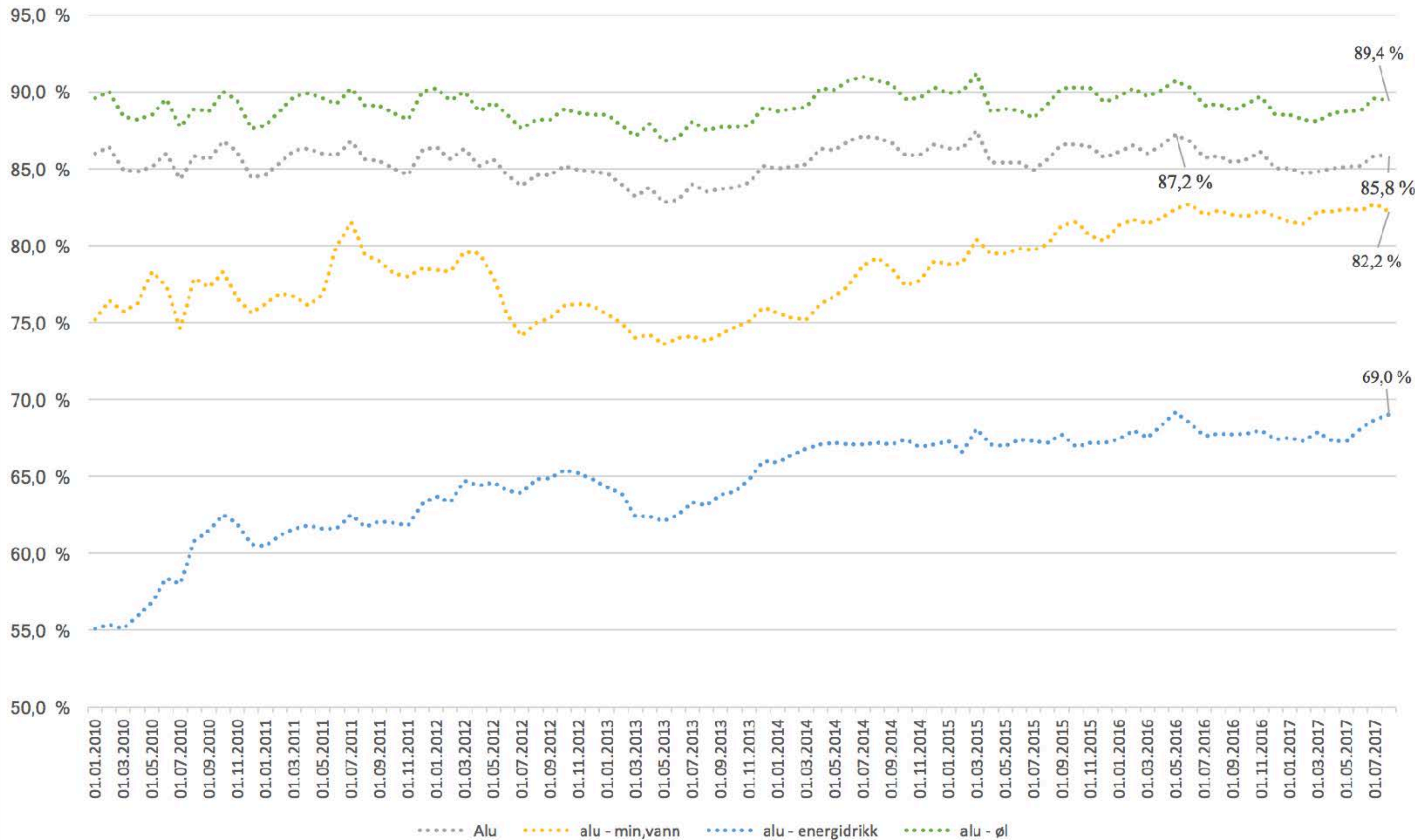


Virgin production and incineration

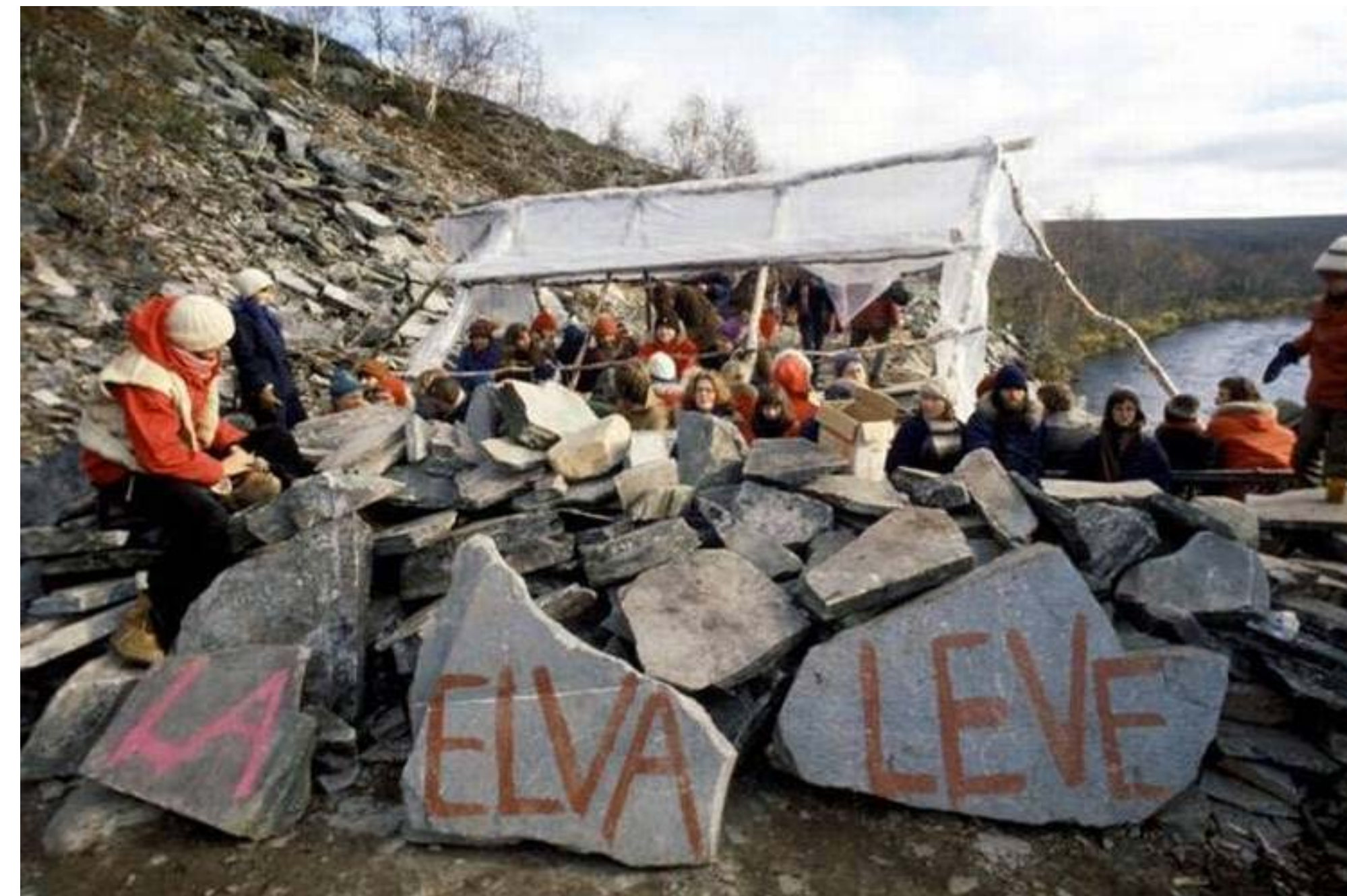
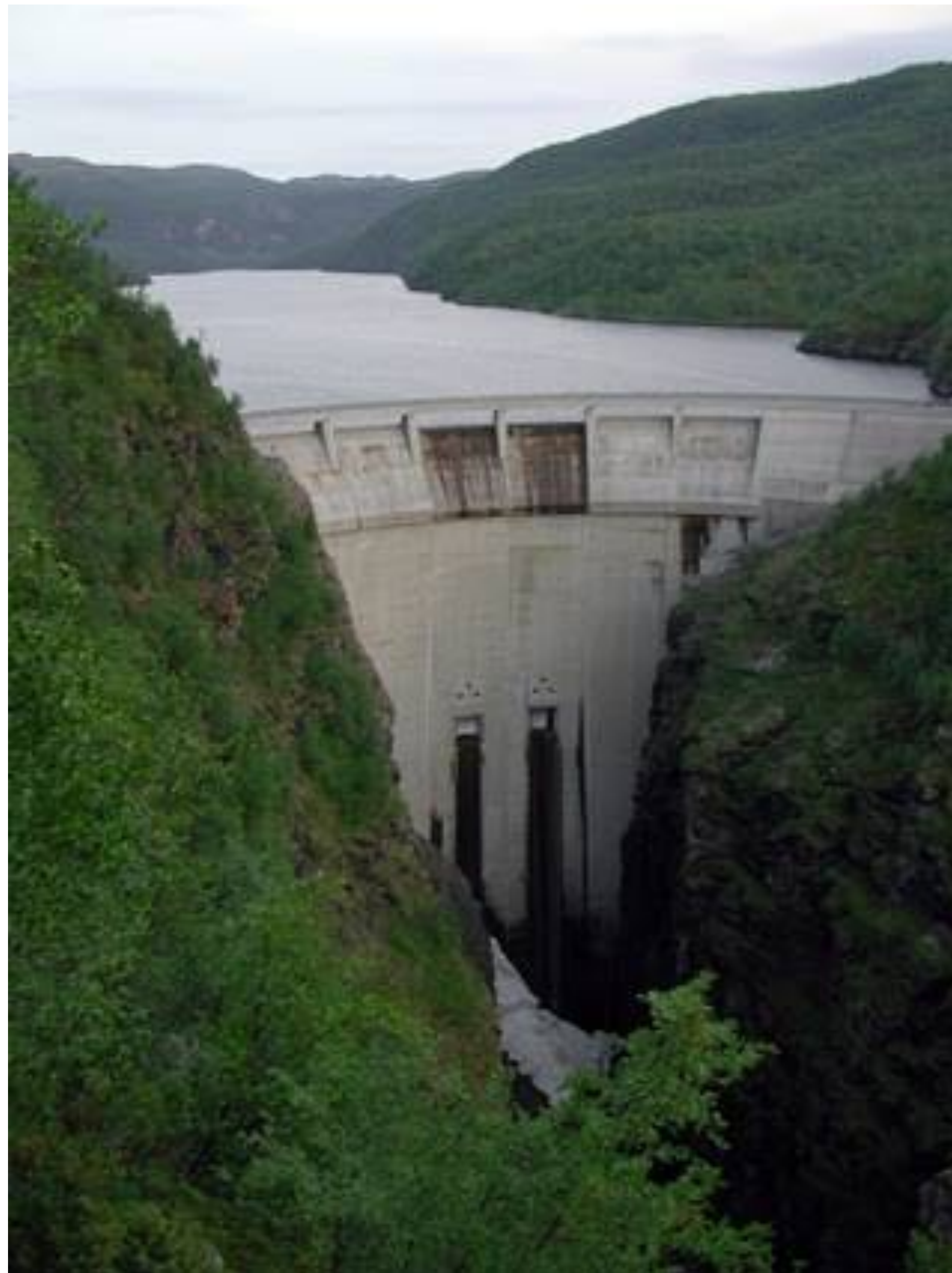




# Innsamlingsgrad NR modell







Grunnlag: man sparer **2 640 GWh** årlig dersom man bruker plastflasker i stedet for glassflasker. Gevinst ved gjenvinning for begge er da regnet med. Bygger på LCA rapporter for Infinitum og Vinmonopolet.

Det er 9,1 kWh i 1 liter råolje. Den årlige besparelsen tilsvarer energien i overkant av **1,1 døgns oljeproduksjon på norsk sokkel.**

En norsk husholdning bruker 20 000 kWh årlig i boligen (oppvarming, apparater etc - alle energibærere). Den årlige besparelsen tilsvarer energiforbruket til **132 000 husholdninger. Det tilsvarer alle husholdninger i Bergen!**





# KLIMAGASSUTSLIPP FOR DRIKKEVAREEMBALLASJE, CO<sub>2</sub>-EKVIVALENTER I KILO PER 1000 LITER DRIKKE DISTRIBUERT:

## **Vinmonopolet:**

Glassflasker (0,75L): 875 kg

Plastflaske (0,75L): 266 kg

Bag-in-box (3L): 159 kg

Pappkartong (1L): 138 kg

## **Plastflasker med pant:**

(av gjennomsnittlig størrelse ca 1 L, etter andel resirkulert plast i brukt i produksjon)

0% resirkulert plast: 123 kg

100% resirkulert plast: 6,6 kg

## **Bokser med pant:**

(av gjennomsnittlig størrelse 0,45 L etter andel resirkulert aluminium)

100% resirkulert alu: 100,8 kg

20% resirkulert alu: 800,4 kg





# ENERGIFORBRUK GLASS VERSUS PET OG BOKS

| <b>På årsbasis, energi gevinst</b> | <b>Boks</b>   |   | <b>PET</b>    |          |
|------------------------------------|---------------|---|---------------|----------|
| Liter distribuert per år:          | 260 000 000   |   | 600 000 000   | 1        |
| Antall FU per år:                  | 260 000       |   | 600 000       | FU       |
| Glass 0,75 liters MJ per FU        | 11 646        |   | 11 646        | MJ/FU    |
| Infinitum, MJ per FU               | 1 237         | 9 | 336           | 35 MJ/FU |
| Gevinst Infinitum MJ:              | 2 706 340 000 |   | 6 786 000 000 |          |
|                                    |               |   | 9 492 340 000 | MJ       |
|                                    |               |   | 2 638 870 520 | kWh      |
| Et Alta-kraftver er, i GWh:        | 655           |   | 2 638,9       | GWh      |
| <b>Antall Alta-kraftverk ...</b>   | <b>4,0</b>    |   |               |          |

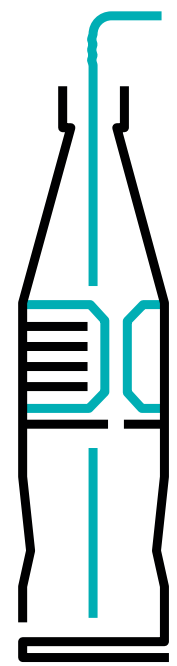
Hvis alle plastflasker og bokser erstattes med glassflasker så gir det en økningen i energiforbruk tilsvarende 4 Alta kraftverk



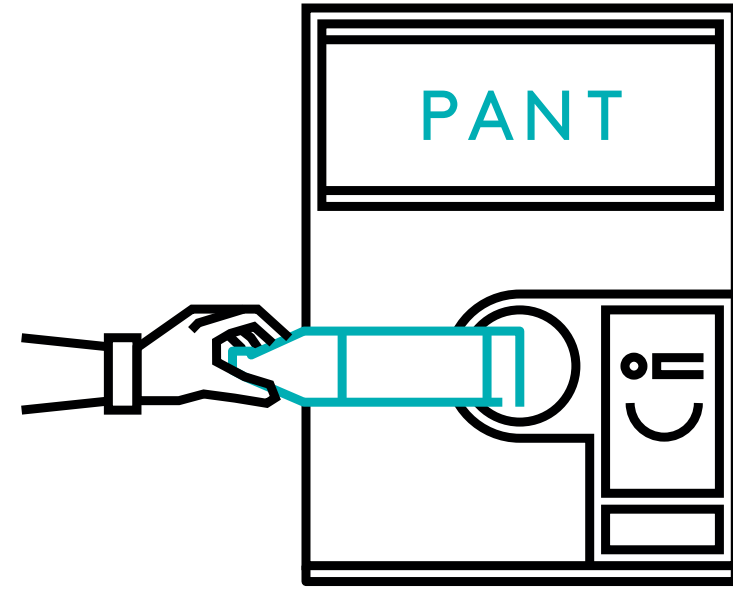
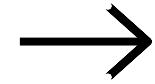


- NO LITTERING
- LOWEST COLLECTION COST
- BASE FOR RECYCLING BUSINESS
- REDUCED COST FOR MUNICIPALITIES
- REDUCES NEED FOR OIL TO PLASTIC WITH 80 %
- REDUCED MARIN LITTERING

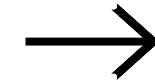




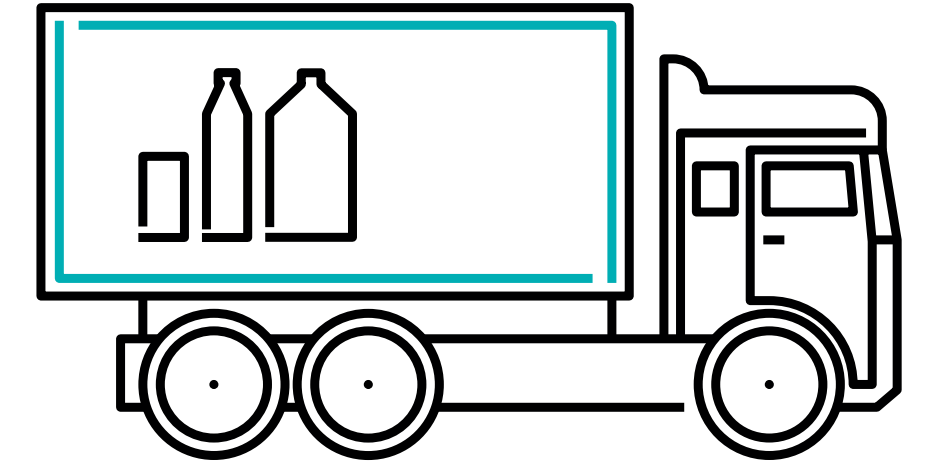
Happiness



Pant



Preparation



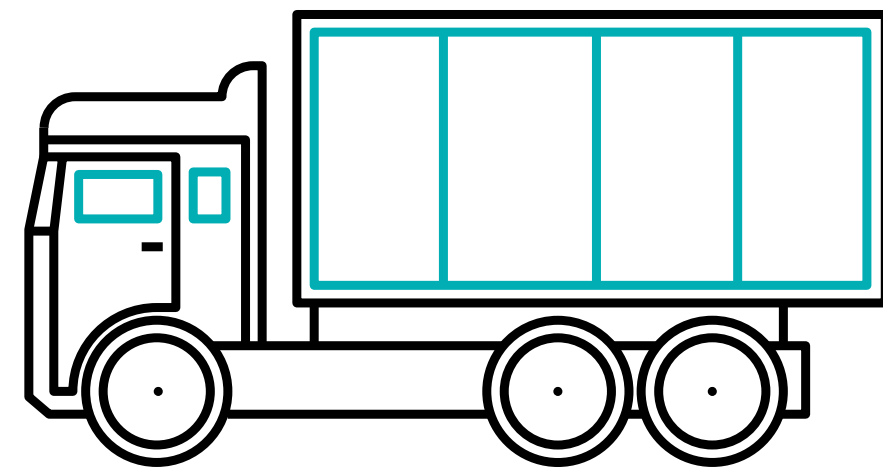
Pick up



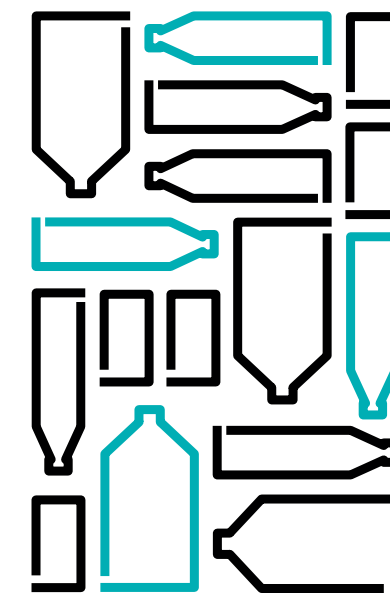
# INFINITUM



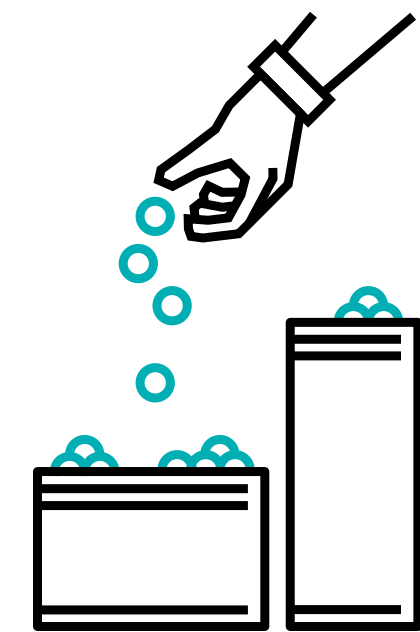
High grade recycling



Transport



Sorting and bailing



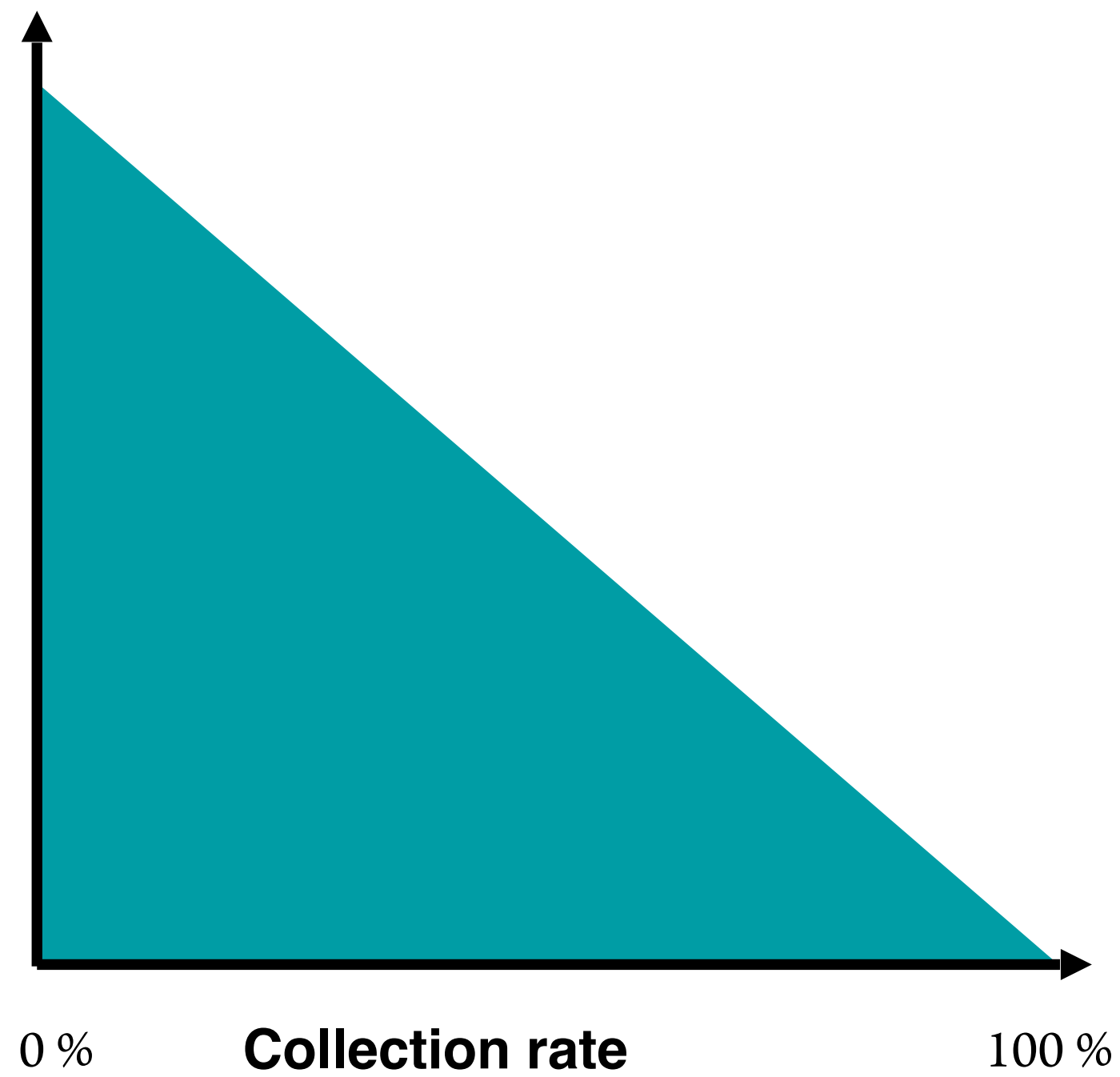
Transport



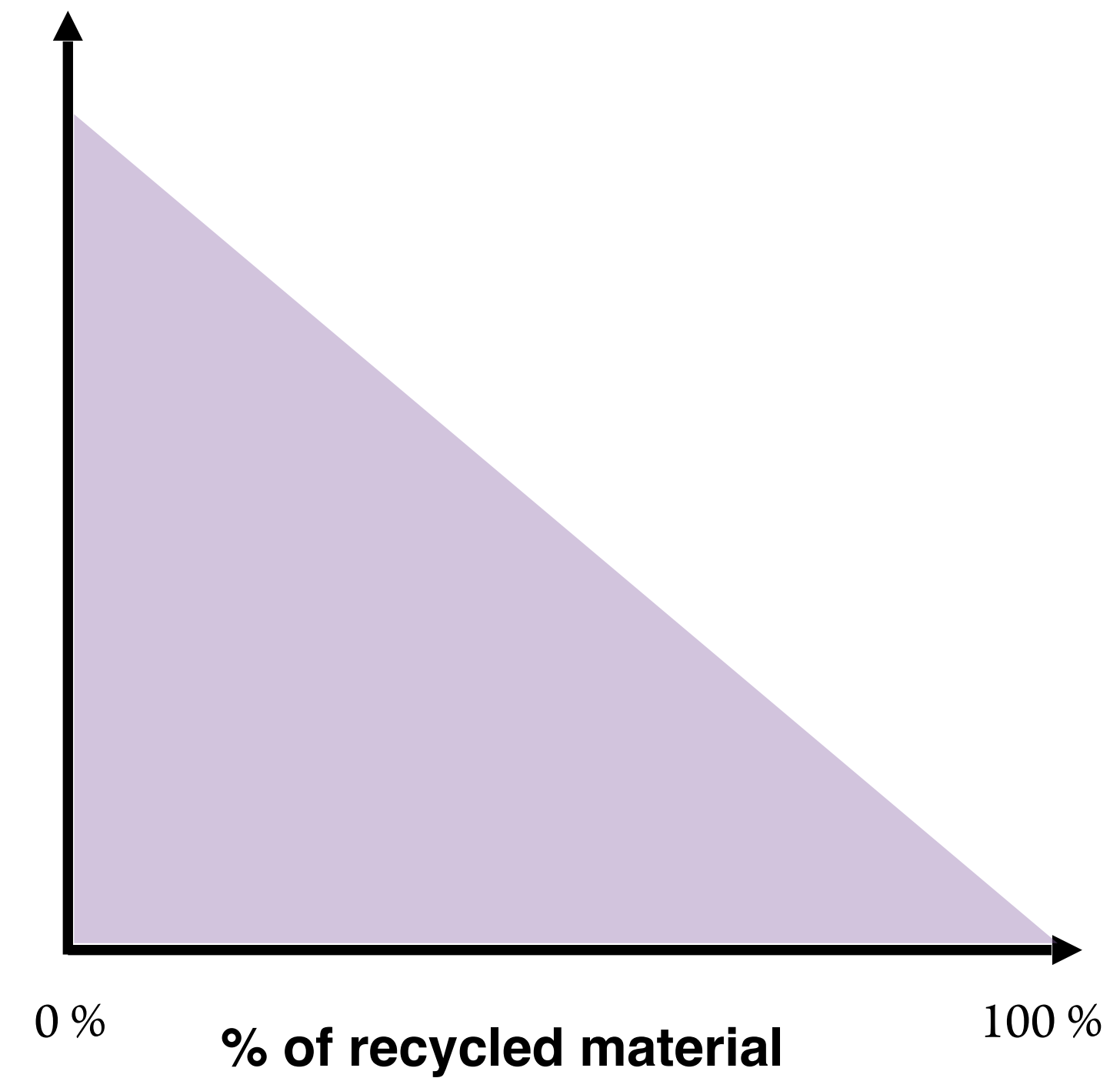


# NO LITTERING AND HIGH GRADE RECYCLING

**Environment fee:** anti littering



**Material fee:** use of collected material







**PET - 4 000 TONN CO<sub>2</sub>**  
**BOKS - 2 500 TONN CO<sub>2</sub>**

Miljøgevinstene ved økt innsamling til materialgjenvinning, i stedet for til energigjenvinning, er store.

1 %-poeng økning i innsamlingsgrad for plastflasker i pantestystemet, reduserer årlig CO<sub>2</sub> utslipp med 990 tonn

sammenlignet med om flasken ble kastet i restavfallet og gikk til energigjenvinning.

For boks er besparelsen 620 tonn CO<sub>2</sub> for hvert %-poeng økning.