



Innovative waste collection in Bergen

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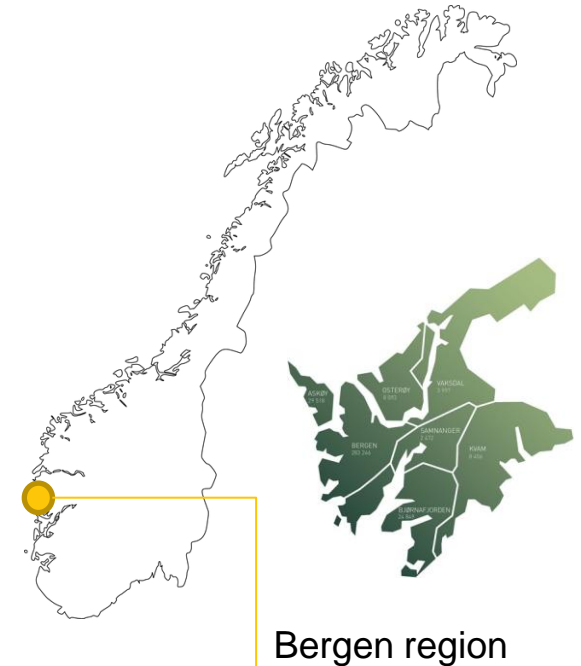
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**Waste Management Intelligent
Systems and Policies**

WINPOL Final Conference
25 May 2022

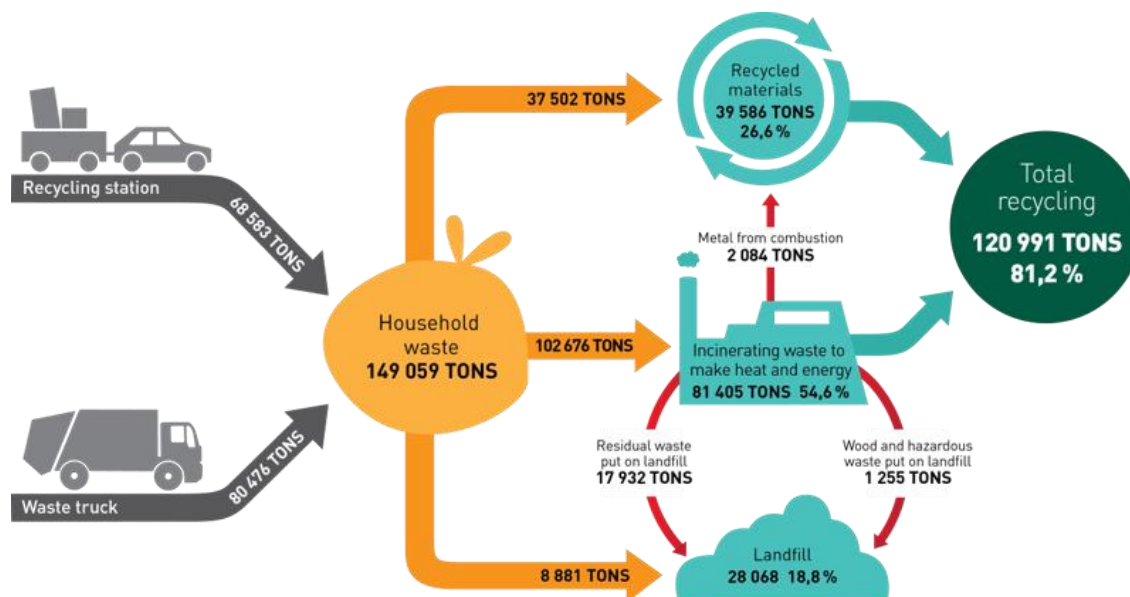
Bergen region

- Over 365 000 inhabitants
- Ca. 138 km²
- Both urban and rural areas, divided by mountains
- Known for rainy weather





- Waste management company
- Handling household and commercial waste



Development of waste collection infrastructure



Step-by-step development

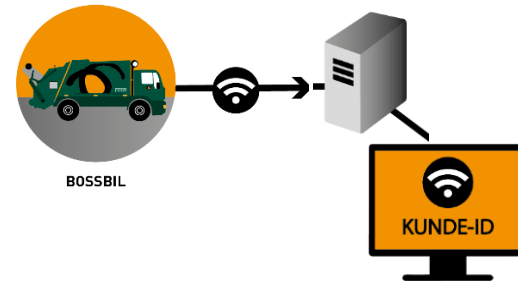
- Bins made «smart» with RFID-chips
- One of Europe's largest underground tube systems
- Underground Waste System

Common digital platform and payment model

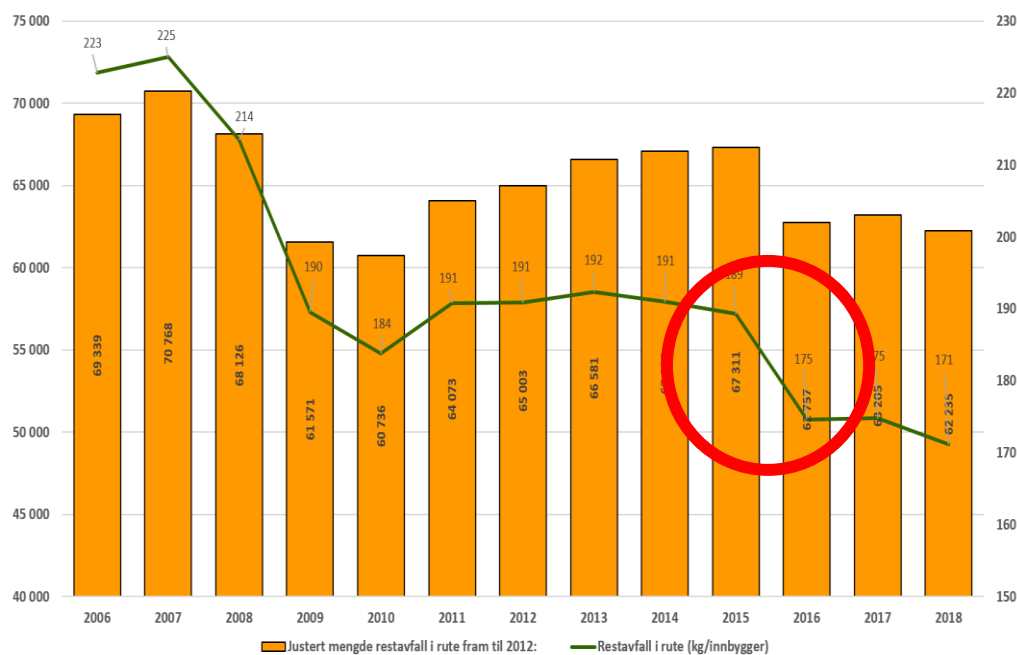
- Structured data collection
- Business intelligence

RFID registration on trucks

- The RFID registration system is designed to be integrated in existing lifting systems on waste trucks etc.
- The system is used for documenting whether a specific waste container has been emptied or not.



PAYT, incentive model and effects



Fixed fee + variable fee for residual waste (a minimum amount included in the fixed fee)

Pricing the volume of residual waste – and sorted waste “free of charge”

Drop of 8 % residual waste as city of Bergen was implemented

PAYT and nudging needs more research!



- Non-digitalized traditional shared waste infrastructure. Challenge: Can't measure individually
- Opportunity for research!
 - What is really the effect of PAYT?
 - How does it work compared with a moral appeal - Nudging?
 - And how to develop it further(!)
- Live lab for research – collaboration with The Norwegian school of Economics (NHH) – Results in 2023

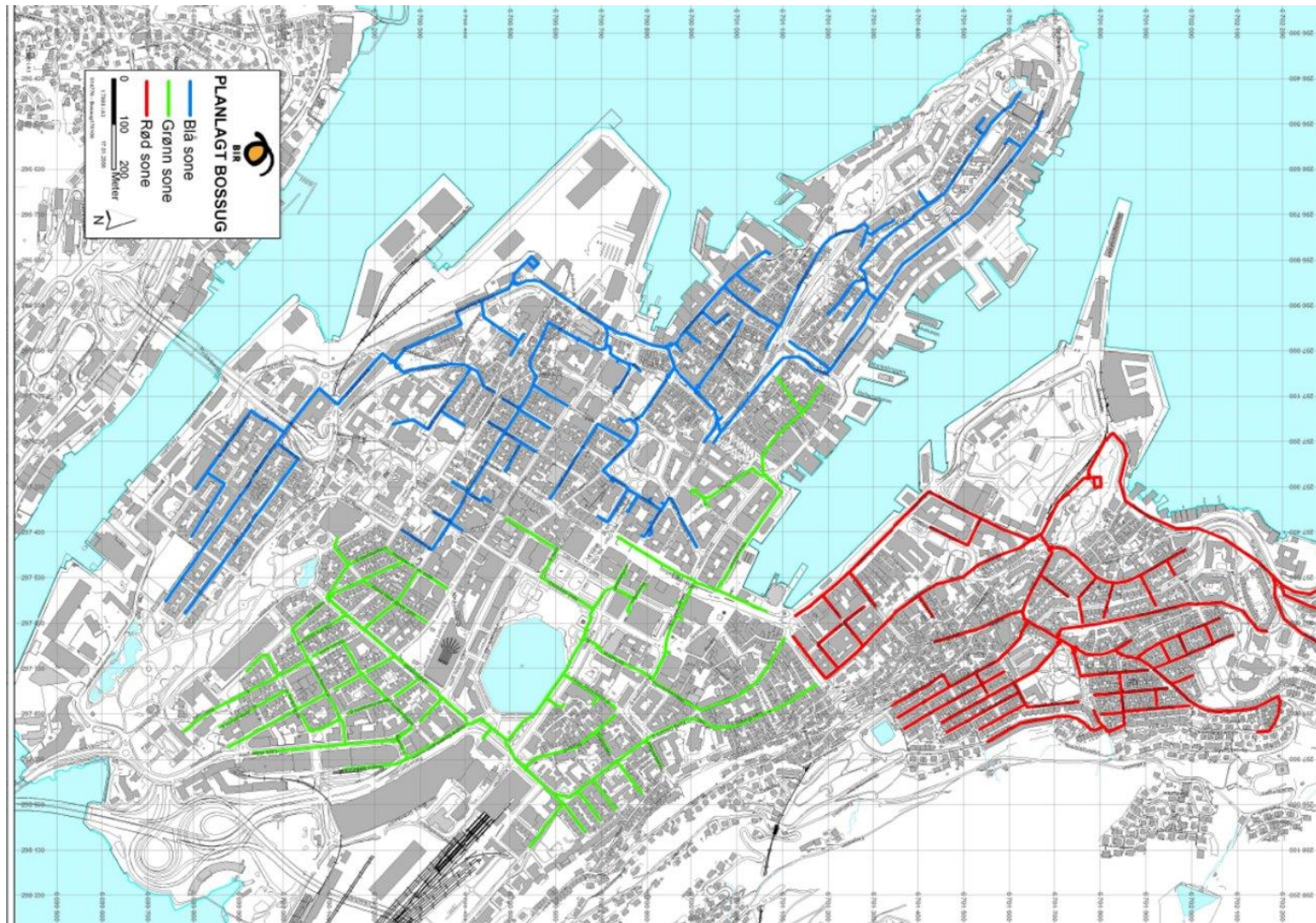
Collection in city senter



Underground tube system

- Socio-economic gains
- Cleaner and safer city
- Less heavy traffic





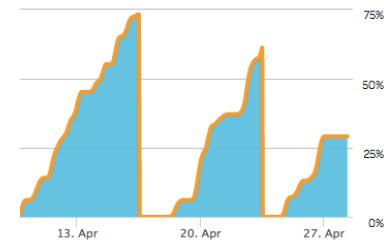
Level measurement

Data is collected and analysed:

- Present level
- Average fill level
- Fill time
- Calculated fill date
- All collections, focus on last

Advantages for operations:

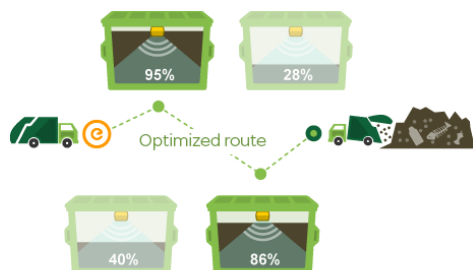
- Full control of **when** and **where** containers are full
- Understanding historic patterns and how much waste is generated.
- Control of service according to plan, and warnings about irregularities (theft, vandalism etc)
- Same places = 30% less km
- Same vehicle fleet = handle 43% more pickup points



On demand routes - Experience

Great success

- On ground containers
- Glass igloes – Collection points
- Under ground containers
- Residual waste and glass



What do we gain?

- Full overview and control of all numbers / collections
- Avoid overfilled containers / complaints
- Reduce cost (20-50 %) and CO₂ emission
- Estimate real resource use
- Sensor based warning for unnormal events





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European Union
European Regional
Development Fund

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