

Waste Management as a catalyst towards the Circular Economy

How to "walk the talk"? Sharing Dutch vision and best practices

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Introducing The Netherlands

Limited Space & Resources: a living lab for the Circular Economy

Population 17 mln.



GDP 866 B USD IMF (18th)



High Population Density NL without flood protection



- Water Management created our collaborative DNA
- Low groundwater table, urbanised society & an agricultural superpower forced us to solve environmental issues early on
- Global Innovation Index 2015: 4th
- Amsterdam: Innovation Capital 2016



A resource dependent country



With limited space & natural resources it makes sense to find local, scalable solutions to close resource cycles

UPSCALING OF WASTE MANAGEMENT OVER TIME

Both in policies and waste markets





CRITICAL SUCCESS FACTORS FOR WASTE MANAGEMENT

Content:

- Waste hierarchy (since 1979)
- Extended Producer responsibility
- Minimum standards
- Landfill tax
- Separate collection of waste streams

System:

- Adequate planning system
- Cooperation between government authorities
- Involvement of waste management industry
- Consensus on data
- Monitoring system





THE DUTCH ARE AMONG THE BEST IN CLASS

Municipal waste treatment in 2015 EU 28 + Switzerland, Norway and Iceland

Graph by CEWEP, Source: EUROSTAT 2017





GOVERNMENT THINKS & PLANS BEYOND WASTE MANAGEMENT

From linear to circular

- National Dutch Programme on Circular Economy
- Objectives of the Dutch government
 - A circular economy by 2050
 - 50% reduction in use of raw materials by 2030



Ambitions of the Dutch waste to resource program

- Residual waste: from 10 to 5 M in 10 years
- 75% separation of MSW in 2020 finally 100%, zero waste



BUSINESS AS USUAL: NOT AN OPTION FOR WASTE MANAGEMENT

Recycling & Recovery is the last step in a CE MAKE AND USE PRODUCTS SMARTER

TRADITIONAL 3-Rs REDUCE RE-USE RECYCLE



| WARLAND USL FRODUCTS SWAI | |
|------------------------------|------|
| REFUSE | |
| RETHINK | |
| REDUCE | |
| PRODUCT AND PARTS LIFE EXTEN | SION |
| RE-USE | |
| REPAIR | |
| REFURBISH | |
| REMANUFACTURE | T |
| REPURPOSE | |
| VALORISATION OF MATERIALS | |
| RECYCLE | |
| RECOVER | |
| | |



CIRCULAR TRENDS IN COLLECTION

- More efficiency & greener collection
 - Fuels, engines
 - Other modalities
 - IT-tools & training staff
 - Maybe sharing the last mile in city centres
- Source separation (& some "aftersorting of mixed waste")
 - Focus on collection of recyclables
 - Anticipate shifts (ownership, waste disposal)
 - New "value" flows/services
- New incentives for and insights in citizens and companies
- Social inclusion work spaces





FLEXIBLE RECYCLING CENTRES FOR MUNICIPALITIES

Future perspective: from an environmental station to an upcycle center?

Dutch waste streams to be sorted:

- a. WEEE;
- b. Asbestos;
- c. A-wood & B-wood;
- d. C-wood;
- e. Soil, separated following legal classifications;
- f. Gas tanks, fire extinguishers, pressure equipment;
- g. Car tires;
- h. Roof waste;
- i. Expanded polystyrene foam;
- j. Mixed stone material, not being asphalt or gypsum;
- k. Gypsum;
- I. Gross garden waste;
- m. Hard plastics;
- n. Mattresses;
- o. Metals;
- p. Paper and cardboard;
- q. Textiles, not being carpet;
- r. Flat glass
- s/z.?









COLLECTION EXAMPLES





One Stop Shop & alternative fuel/mobility for McDonalds: *Sustainable & Efficient*



Green Logistics (Paris) Fully Electric Waste Collection truck



Green Logistics: On-board computer Saving fuel & optimizing back office



Green Logistics (Emmen) Waste Collection truck on Natural Gas



Green Logistics



Underground Pneumatic Waste Transportation System (Envatec OAT Arnhem)



COLLECTION EXAMPLES





Waste Management as part of a service concept with in office waste separation systems



Citizen involvement: Return Premium / Incentive for inhabitants to bring recyclables to environmental centre



Future: joint last mile logistics for sustainable urban solutions?

Transporters-Waste Managers-City?

Sustainable City distribution



Inverse collection / Service concepts

Alternative for "pay-as-you-throw"

Facilitating intensified collection of recyclables and inhabitant self-service (bringing) of the declining residual waste fraction



Citizen involvement: 100-100-100 initiative. 100 households try for 100 days to be 100% waste less. Now active in 80 Dutch Cities.



ZOOMING IN ON ERP FLOWS

The polluter pays principle: extended producer responsibility

- Recycling and collection targets
- Create a stable collection system
- Create awareness and environmentally responsible behavior
- Contribute to "design for recycling" and "ecodesign"
- Prevent illegal trade and export



on and recycling performance Environment EPR regulation and control Batteries WEEE Packaging Car tires ELV Window Panes

Ministry of



EPR FOR END OF LIFE VEHICLES

ARN Recovers 98,7% of a car (Recycling 88,9% Energy recovery 9,8%)





EVOLUTION FROM EPR ELV TO CIRCULAR BUSINESS MODELS

Renault: the case of Choisy-le-Roi

The savings:

- 80% less energy
- 88% less water
- 92% less chemical products
- 70% less waster production

No waste to landfill

- 43% of the carcasses are re-usable
- 48% are recycled in the company's foundries
- 9% remaining is valorised in treatment centres







CIRCULAR SOLUTIONS FOR END OF LIFE TIRES

New technology on the market to regain "precious" Carbon Black

End-of-Life Tires

- Every year, more than 1.5 billion tires are removed from vehicles creating around 13.5 million tons of solid waste.
- Current recycling is limited to material and energy recovery or landfilling
- ~ 5million tons of reusable carbon black is wasted per year

WASTE TYRES

- Black Bear's process uses end-of-life tyres as a feedstock to produce consistent, high quality carbon blacks.
- This circular economy approach not only solves an important waste management problem but also massively reduces CO₂ emissions.





GLASS: A PERFECT PERMANENT LOOP MATERIAL

Cullet can replace up to 90% virgin material, saving energy & throughput time for glass industry

Maltha makes glass endless



COOLREC IS RECOVERING METALS & COMPONENTS FROM WEEE

EPR SCHEMES INCREASINGLY CLOSING THE LOOP

Afval bestaat niet. Coolrec 🔮

Afval bootaat niet. Coolree 🕄











TECHNOLOGY IMPROVES EFFECTIVENESS OF PACKAGING LOOP

EPR schemes increasingly closing the loop (now 70,5 % recycled)



Images: SUEZ/basfoto.nl Plastic sorting centre Rotterdam



The results of collecting, sorting and recycling of plastic packages are impressive but come with a hefty price tag



CLOSING THE LOOP WITH RECYCLING

- Control the value chain.....but focus!
 - Scale, trading, compliance, partnering, "glocal"
 - Remember: recycling often is an artificial market (value-chain deficit)
- Quality, quantity, consistency and continuity
 - Product quality....at virgin material market price.
 - Waste, End-of-Waste, By-products, REACH......
 - Harmonised quality standards & certification
 - Co-creation with clients or suppliers => new skills & expertise
- Find niches with value & new materials
 - Dedicated attention for producer responsibility
- Continuous exploration of new technological possibilities
 - Example: from mechanical to chemical recycling (depolymerisation)
 - Social inclusion work spaces





NEW CIRCULAR RECYCLING





Plastic Sorting Centre Rotterdam

- 90% Material Recycled Plastic Packages
- >50 % of separately collected household plastic packaging in the
 Netherlands
- Design4Recycling: on-site testing



QUALITY CIRCULAR POLYMERS

Parnerships: QCP is producing high quality PE and PP compounds from post-consumer and post-industrial waste.







Social inclusive labor activities for repair & upcycling & ...more?



Partnerships beyond car recycling: from producer responsibility to "closing the loop"





Partnerships: the production of Carbon Black from End of Life Tires



NEW CIRCULAR RECYCLING







Chemical Leasing (TaBaChem)



Recycling of new flows: artificial grass , textile, diapers, ..









Aligning regulatory interpretations of EoW, shipment & enforcement over the border



Future flows: composite recycling, photovoltaic recycling?

ORGANIC WASTE TREATMENT

- Large component of waste: trend: more valorisation of organics
 - Compost as a product
 - With harmonised quality standards & certification
 - Digestion + composting of digistate
 - Waste, End-of-Waste, Animal By-products, Fertiliser/S regulation
- New Circular Developments
 - Global attention to food spillage [30-40%]
 - Crete added value products: Fuel / food / chemicals
 - Urban Farming with: compost & city farming loop?
 - Solve market confusion bio-degradables







ORGANIC WASTE BEYOND COMPOSTING & DIGESTION









Phosphates recovery from sewage sludge



Proteins from maggots



Closing the loop for green gas, including quality, permits, sales, feeding in network



(Organic) waste2aromatics

Urban Farming, local (closed loop) food movements

BioFuels? Fibers for Textiles? BioPlastics Proteins?



ENERGY FROM WASTE

Public opinion: "the Devil burns and God recycles" EfW is 20% of Dutch Renewable Energy



- Evolution from burning --> Energy-from-waste (EfW) --> Eco-Parc / Energy-valley
- Less burnable waste for EfW
 - Expect a ban on incineration of recyclable waste
 - Pre-sorting & material recovery
 - Changes in residual waste composition
 - Caloric value management
- Closing the loop for all flows
 - (Bottom) ash treatment/ valorisation
 - Fly ash recovery
- Closing loops locally: heat networks
 - Residential area's, Industry, Green Houses
- But also: a growing (cross border) market for high quality solid fuels for co-incineration
 - The world needs energy and waste is partly renewable





The Amsterdam WtE AEB company is a partner in solving waste problems in a responsible manner by recovering more and more raw materials and generating the maximum amount of energy from the remaining waste.



EXAMPLES ENERGY-FROM-WASTE



"Eco-parc/ residual heat optimisation: modern EfW (ReEnergy Roosendaal), with 40C Climate grid, connection to green houses and dung-drying



Inashco bottom-ash valorization. Amongst other recovery of non ferrous from bottom-ashes



Closing the loop for green gas, including quality, permits, sales, feeding in network





LANDFILLING, NEEDED AS A LAST RESORT

- Disincentive landfills
- Make sure the existing land fills are in conformity
 - The "last resort" option will keep a place
 - Volumes will decrease
- Bio-reactor: accelerated processing for sites with organics?
- Landfill mining or mine-field?? Do we know what we will find?
 - Storage concepts
 - Eco-parcs
- Future innovations: capping with photo-voltaic cells!







WASTE MANAGERS CAN'T DO IT ALONE

Closing the loop asks for actions all over the value chain

- 1) Conservation of natural capital and sustainable sourcing of raw materials
- 2) More sustainable products on the market
- Eco-design
- Sustainable procurement
- 3) Sustainable consumption
- New business models
- Information for consumers

4) Re-use, refurbish, remanufacturing, recycling,







THE DUTCH GLADLY OFFER THEIR HELP!

Thank you for your attention! More info: freek.vaneijk@acceleratio.eu

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