A “bridge” strategy for management of residuals

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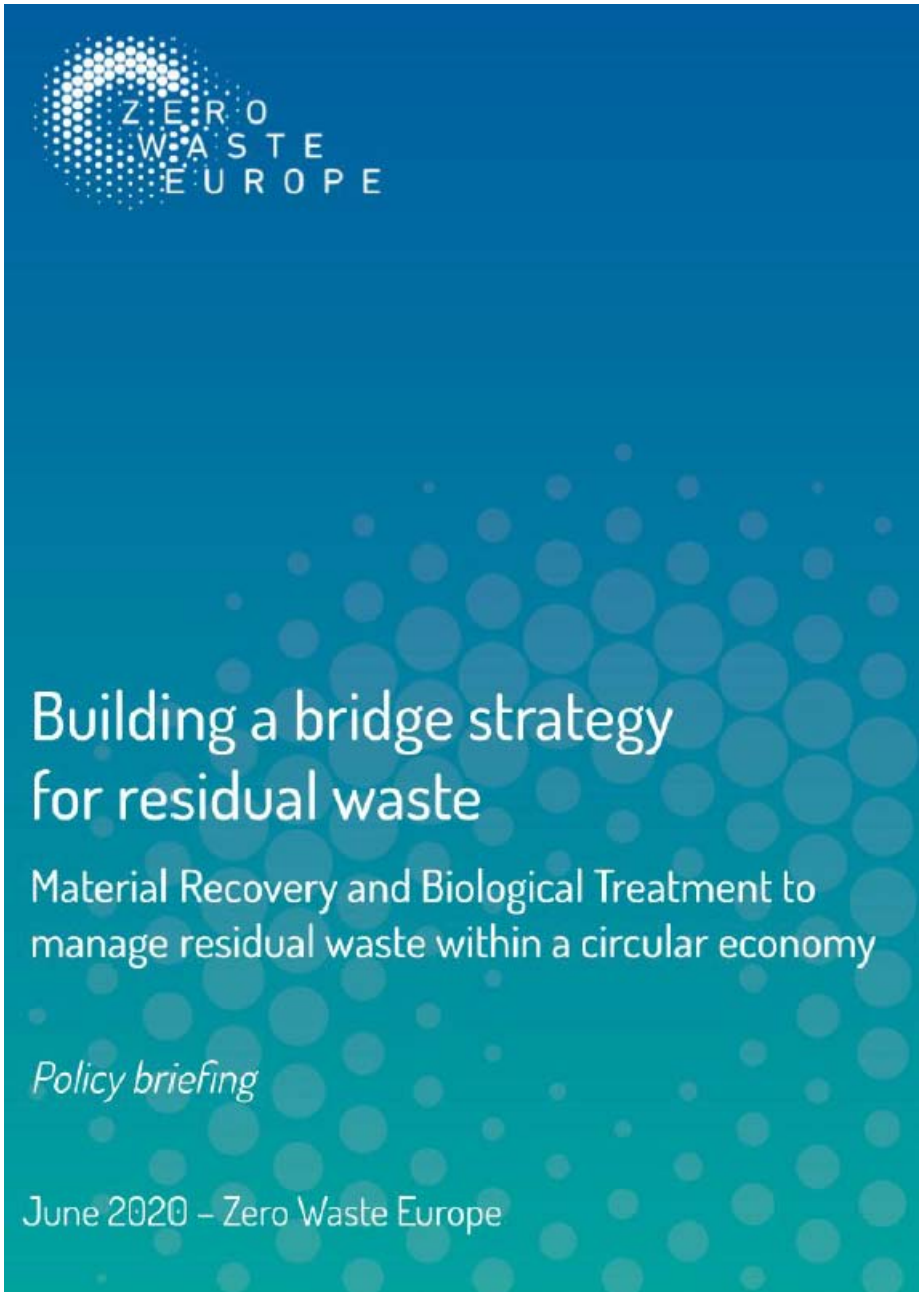

- Survey on (often, flawed) enforcement of the obligation stipulated by Dir 99/31
- Seek alignment between the CE agenda and management of residuals
- Define, accordingly, suitable operatonal approaches that
  - Ensure compliance
  - Keep the system flexible

Preliminary statements

- Overarching goal: maximise recycling/composting/reuse and minimise residuals over time
  - This requires flexibility
  - Avoid lock-in
- Separate collection is the priority
  - Management of residuals just aimed at improving overall env performances

A Changing Climate for WtE

- Amounts of residual waste dwindling
- EC Communication of January 2017
  - Exposes the lock-in
  - Calls for defunding incineration
- Regional funds, RED II
  - EIB/Belgrade case
- C footprint of E production lower and lower
  - Incineration becoming an outlayer
- → *#ageofdecommissioning*

Tema Nord (2019)

it is clear from the analysis of existing policies and historic performance against key indicators, set against the requirements of the revised EU waste directives, that very significant change will be required in every nation of the Nordic region. The clearest area of required change will be a significant shift away from incineration (and in Iceland, landfilling) towards recycling.

Denmark without waste

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The government wants the CO2 bill for waste down

Plastic waste must come out of the incineration plants, and the Danes must sort waste to a much greater extent. The government is proposing a series of initiatives to reduce the climate footprint of our waste.

Published May 18, 2020

A shampoo bottle, a meat tray or a freezer bag smokes in the rubbish bin and into the

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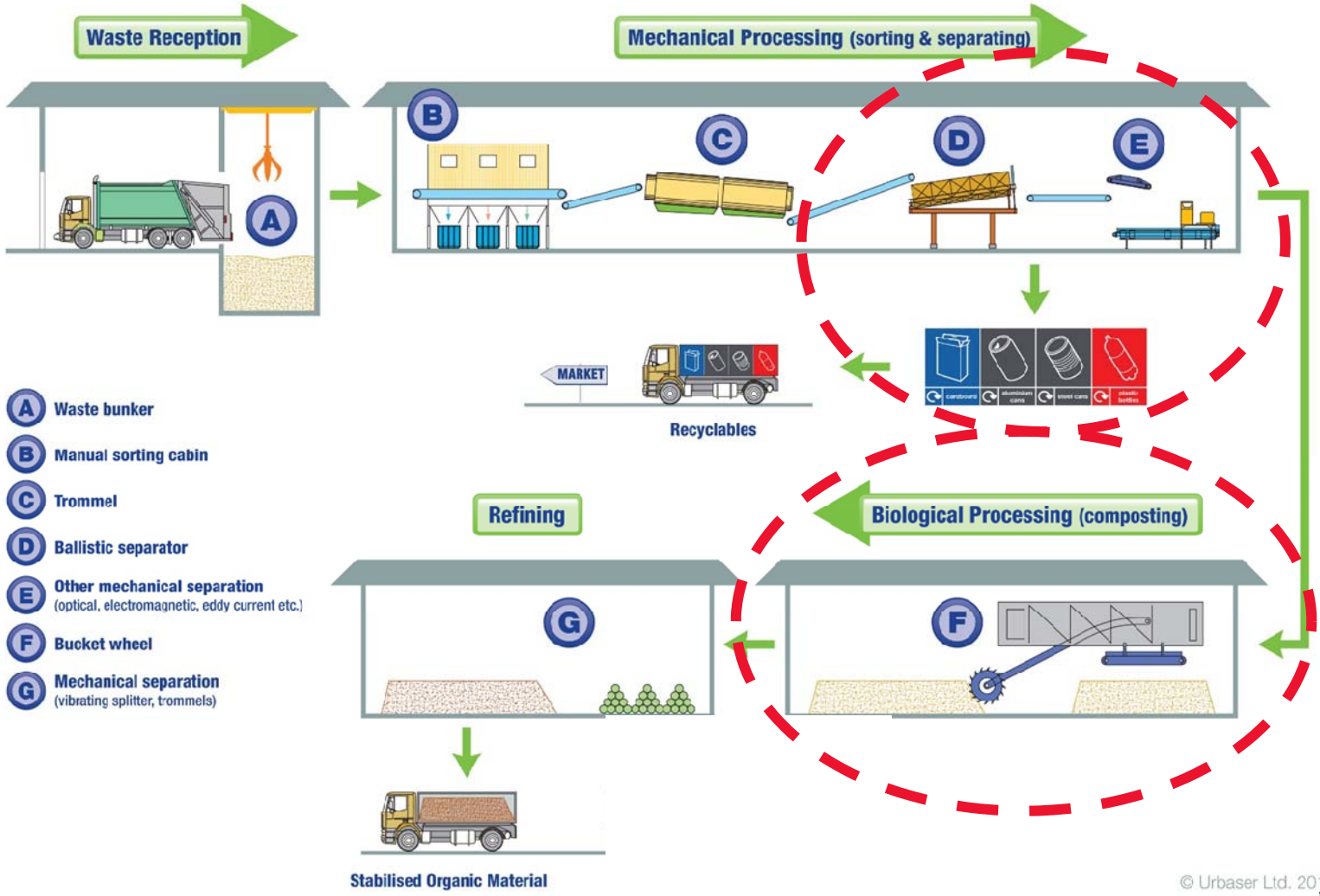
MATERIAL	MILAN (Average 2019)
WEEE, HHW	0.1%
Paper and cardboard	29.3%
Other paper	3%
Plastic tableware	1.1%
Plastic packaging	13.1%
Other plastic	2.2%
Textiles, leather & rubber	6.6%
Iron	3.6%
Aluminum	0.8%
Multi-layer	1.1%
Bio waste	11.1%
Glass	5.8%
Nappies	6%
Fines <20	13.1%
Garden waste	3.1%
Total	100%

MATERIAL	LJUBLJANA (average 2017)
WEEE, HHW	0.87
Paper and cardboard	21.5%
Other paper	3.88%
Plastic (LD-PE, PP.PET,HD-PE)	10.08%
Other plastic	11.79%
Textiles, leather & rubber	7.67%
Iron	2.53%
Other metals	2,31%
Biowaste	10.91%
Glass	2.29%
Nappies	10.34%
Fines <20	10.91%
Treated wood	1.83%
Other waste (bones, ceramics, stones...)	2.11%
Tetrapak	0.99%
Total	100%

Basic operational lay-out



TYPE OF DIVERSION / TARGETED MATERIAL	POTENTIAL DIVERSION[39]	AFFECTING FACTORS (IN ORDER OF IMPORTANCE)
Process losses from biological stabilisation	10 20%	Dependant on: 1. Percentage of organics in residual waste 2. Duration of stabilisation (usually the best trade-off between length and costs of the process and achieved stability is met around 4-5 weeks; this may ensure some 40-50% mass loss from stabilised materials, depending also on the degree of moisture)
Metals (Fe and non-Fe)	2-6%	Dependant on percentage of metals and whether separation targets ferrous, non-ferrous or both
Plastics	5-25%	Dependant on: 1. Percentage of plastics in residual waste 2. Number of optical sorters 3. Adoption of extrusion to maximise recovery 4. Adoption of hand-sorting for 2D plastics (films)
Fibers (paper, cardboard)	5-15%	Dependant on: 1. Percentage of fibers in residual waste 2. Percentage of organics in residual waste (affects practicability of recovery operations) 3. Number of optical sorters 4. Adoption of hand-sorting for e.g. cardboard

Mass balances – a few remarks

- Recovery of materials already diffused at many residual waste sites (and incinerators!)
  - From easiest/least recovery (typically, metals) to more ambitious ones (metals, plastics, paper)
  - Drainage of organics through sep collection discloses opportunities
- Stabilised organics NOT a compost
- Amount of rejects still remarkable (50-60%)
  - (this is why we prioritise separate collection...)
  - Waste to landfills is stabilised!
  - We landfill tonnages, not percentages

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A comparison

777 kgs/person.yr

↓

52% incinerated
= 405 kgs/person.yr

↓

25% slags/ashes
= 101 kgs/person.yr

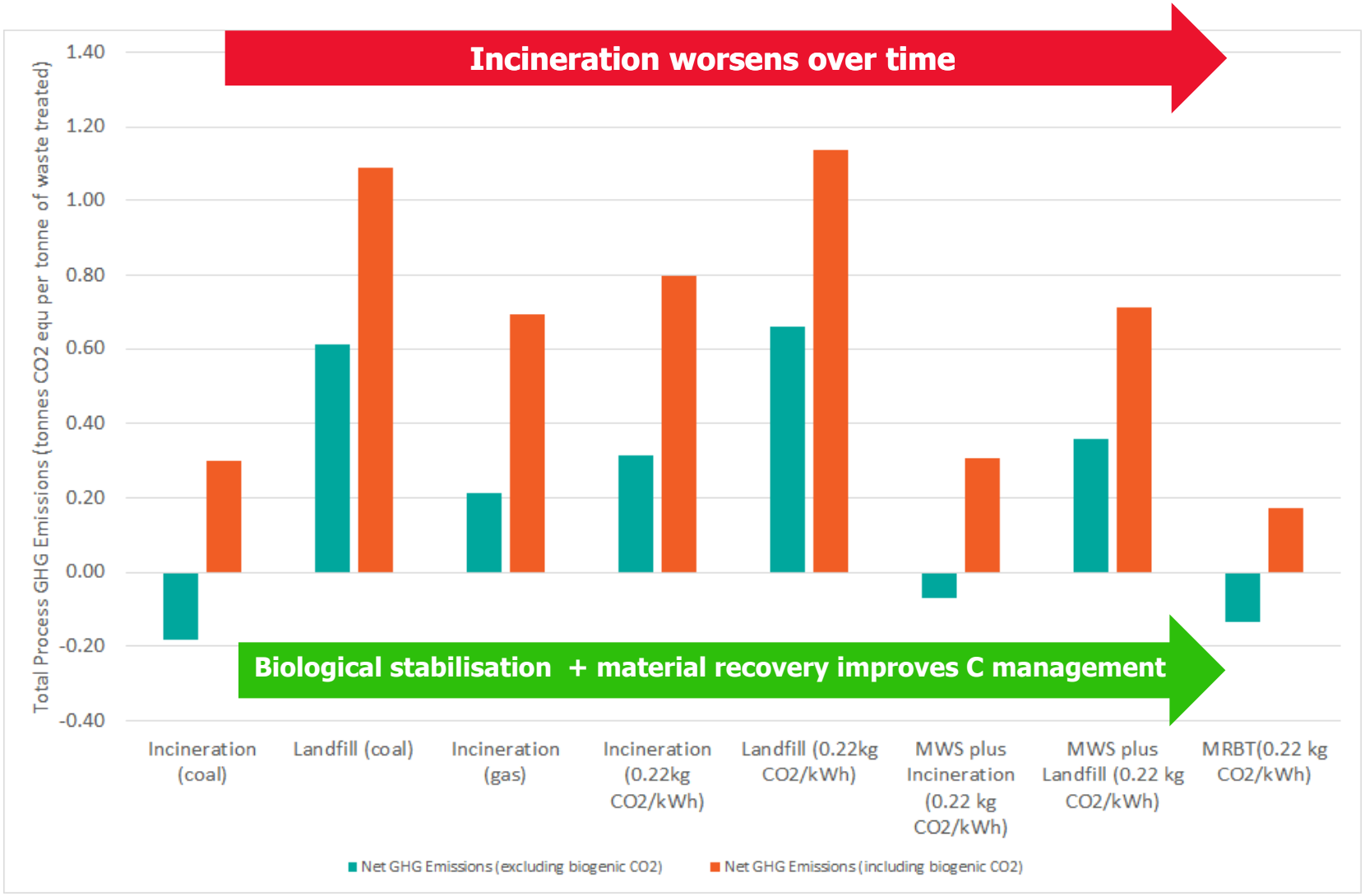
350 kgs/person.yr

↓

85% recycled
Residual waste = 50 kgs/person.yr

↓

Committed to reduce residuals
by a further 80%
= 10 kgs/person.yr
(before processing)


Incineration worsens over time
Biological stabilisation + material recovery improves C management
Total Process GHG Emissions (tonnes CO2 equ per tonne of waste treated)
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-0.20
-0.40
Incineration (coal)
Landfill (coal)
Incineration (gas)
Incineration (0.22kg CO2/kWh)
Landfill (0.22kg CO2/kWh)
MWS plus Incineration (0.22 kg CO2/kWh)
MWS plus Landfill (0.22 kg CO2/kWh)
MRBT(0.22 kg CO2/kWh)
Net GHG Emissions (excluding biogenic CO2)
Net GHG Emissions (including biogenic CO2)

Takeouts

- We landfill tonnes not percentages
- Flexibility is becoming a key tool
  - Mass balances not the key aspect;
  - More important the tonnage they apply to!
- Climate benefits connected to stabilisation of biodegradables + recovery (or sequestration) of fossil materials
- Timelines do matter!
  - Biological stabilisation faster to implement

Thanks for your attention

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