



What Goes Around, Comes Around

Johan Söderqvist, Celsa Nordic



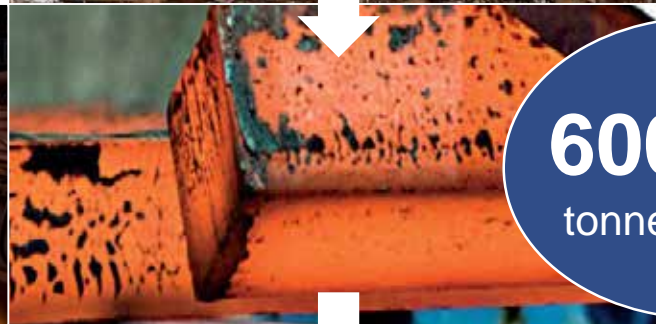
Conference on Circular Economy
Mo i Rana, May 10-11, 2017

1955

Norsk Jernverk established as the single largest industrial lift in the country



60% of
Norwegian steel
scrap



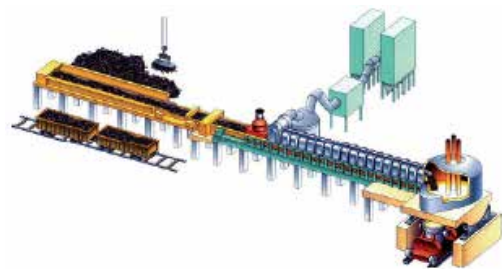
600 000
tonnes of steel



6 %
of Nordland exports

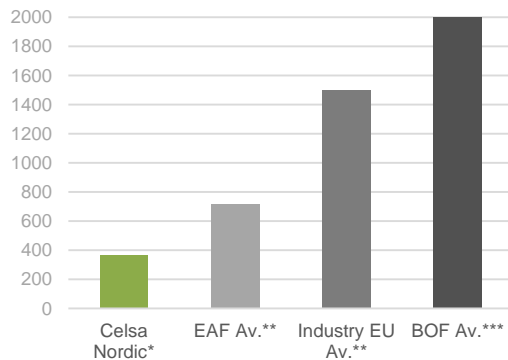
Today
Celsa Armeringsstål AS
is the **largest steel
recycling company** in
Norway

Our strenghts

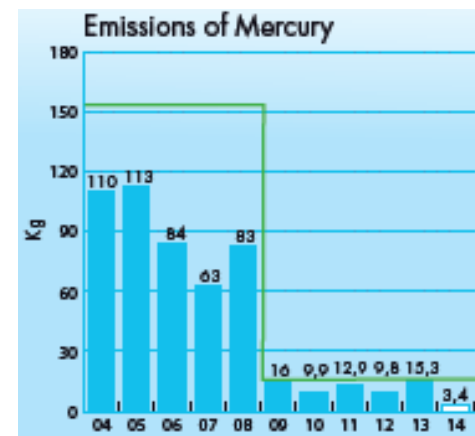
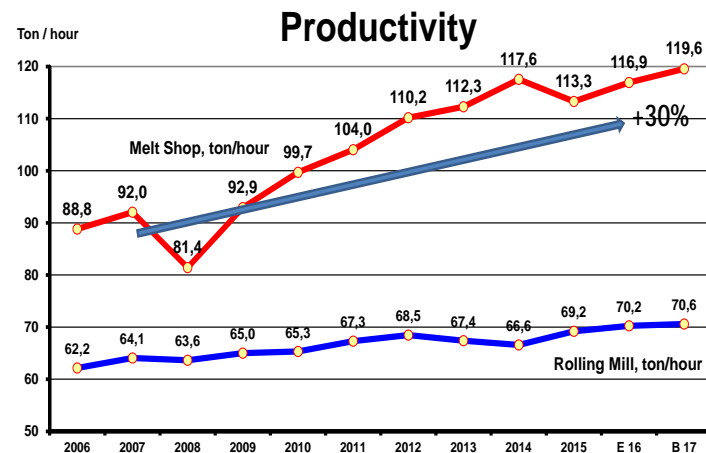


Culture
TQM
Safety
Continuous improvement

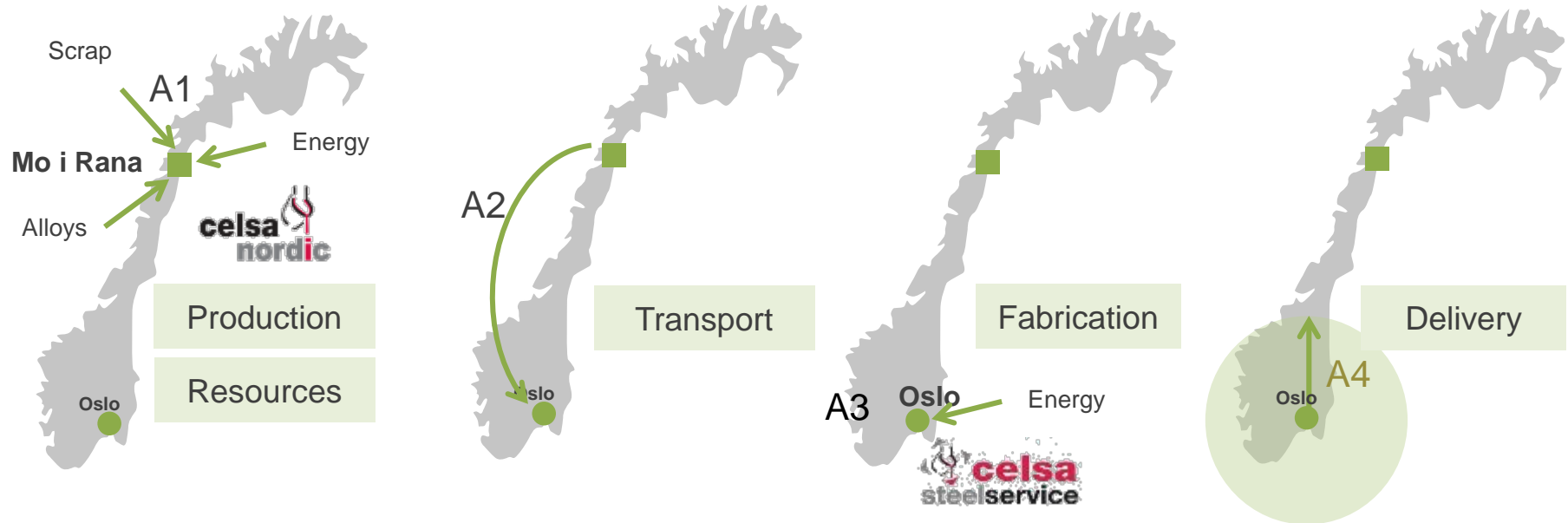
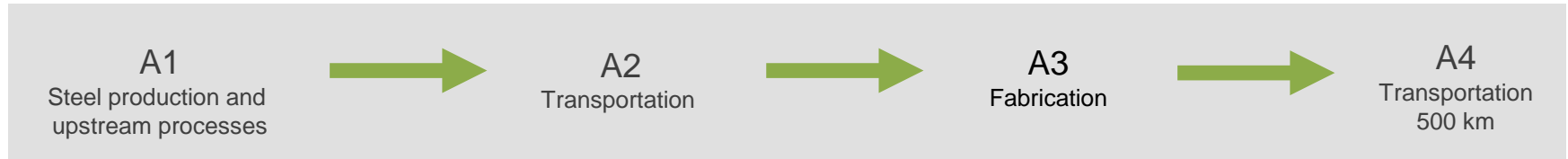
Innovation
New products
New technology
New factories



Local & long-term approach
Employees
Community
Environment

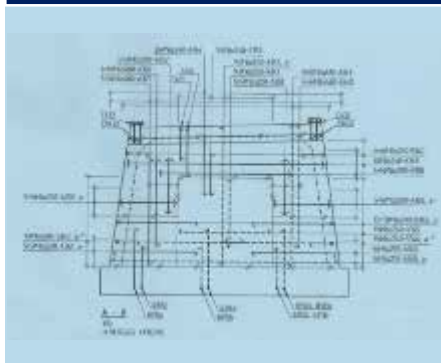


Material flows

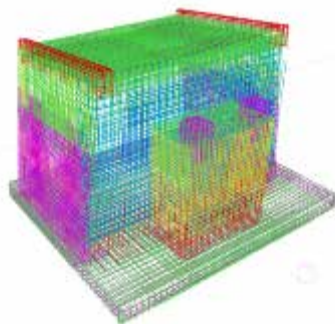


Our downstream processes

Engineering



Accurate specifications



Finding solutions

Fabrication



Unlimited possibilities

Logistics



Customized deliveries

Clear issues for energy-intensive industry

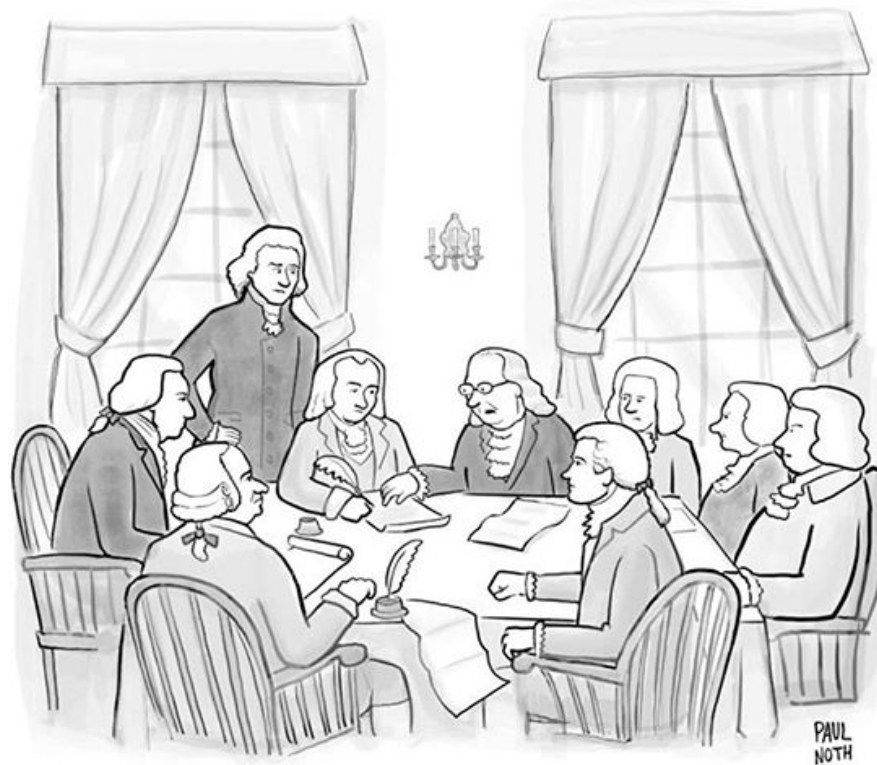
The biggest challenges are

- **Reducing carbon dioxide** emissions from industrial processes to low levels
- **Replacing fossil fuels** with renewable energy sources
- **Increasing the recycling** of materials.



Sustainability

2035? 2050? 2100?



*“But what if a tyrant comes to power
and no one’s able to stop him because the
whole thing’s kind of funny?”*

Clearly circular industry



Scrap quality vs additional alloys

Alternative fuels (CO-gas, offshore oil)

Internal recycling of refractories

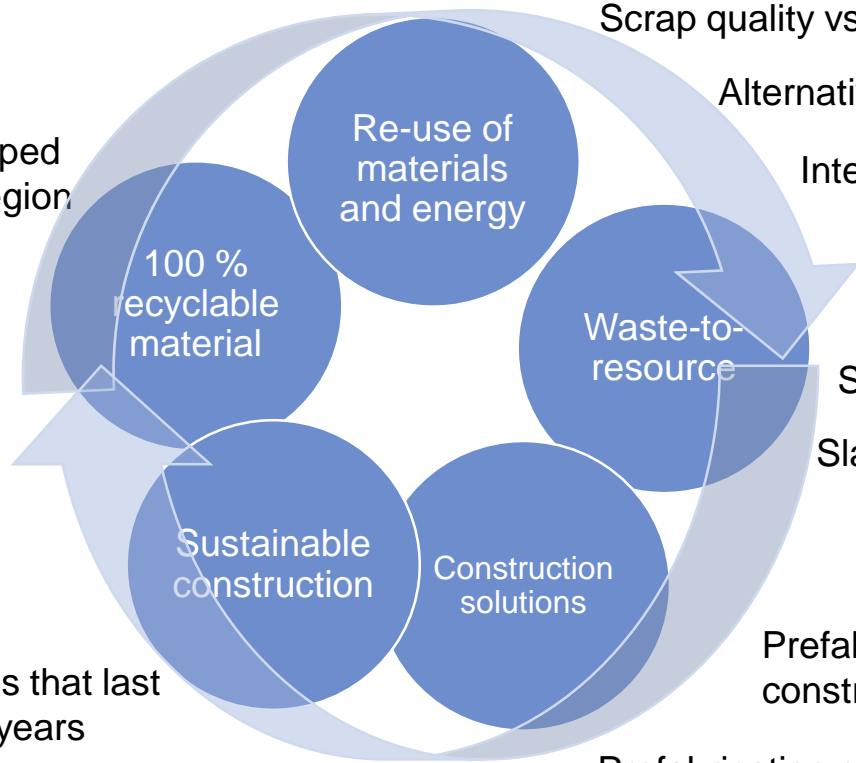
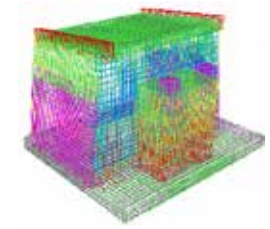
Slag for cement production

Slag road production



Prefabrication to avoid wastes at construction site

Prefabrication of components directly at the steel mill



Scrap shipped from the region



Buildings that last for 100 years



Is it really ever waste?

Type	Share (%)
EAF slag	64%
LF slag	10%
Red dust	10%
Mill Scale	10%
Refractory	1%
Scrap Bay Sweepings	5%



- Business opportunities
- Long transports + costs
- Increase recycling locally?
- Regulations and legislation?

- Reuse materials?
- Substitute materials?
- Develop new materials or products?
- Use other materials and products?

Examples

RECYCLING OF REFRACTORY – new local business opportunities

- Refractory materials are used as linings in EAF furnace, ladles and tundishes.
- Spent refractory material that contains CaO and MgO are used as substitution for lime and dolomite as slag former.
- Other types of spent refractory material are processed to produce fillers and repair material for the EAF.

**100 prosent
RESIRKULERING**

Norwegian Refractory Company AS tar imot brukte ildfastmaterialer fra industrien og gjenvinner det til nye produkter.



RECOVERY OF ZINK FROM RED DUST – New sources for materials

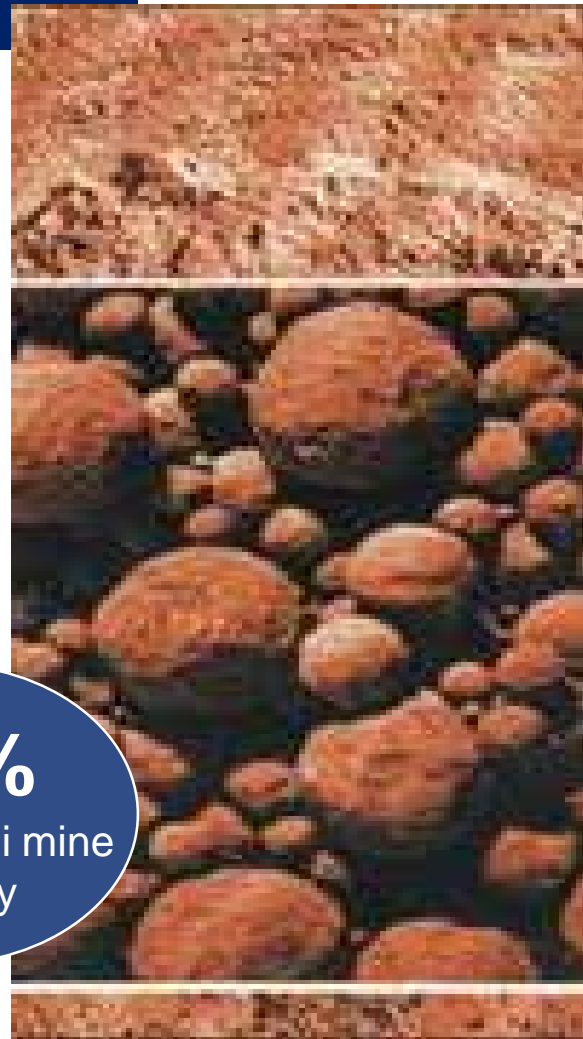
- Miljøteknikk Terrateam collects the dust from Celsa
- The dust is pelletized and analyzed for Zn-content.
- Contains between 30-40 % of zinc.
- Sent to Germany for recovery of the zinc.



wiseGEEK



Celsa
50 %
of Bleikvassli mine
capacity



POLYMER INJECTION TECHNOLOGY – a better use of materials

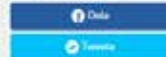
- Technology developed at the University of New South Wales, Australia.
- Substitution of part of the anthracite with rubber from recycled tires.
- Key factor for implementation of this technology was that recycled tires were given end-of-waste status and hence ceased to be waste.



Konstgräs stor källa till mikroplaster

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Lärnet om att konstgräs-planer kan vara en betydande källa till mikroplaster i naturen ger många kommuner bekymmer. I Göteborg har politikerarna följande nya planer med mikroplast-fyllning och ledet en jukt på de små gummikorn, eller 'granulater', som ofta vara borta i dräner.

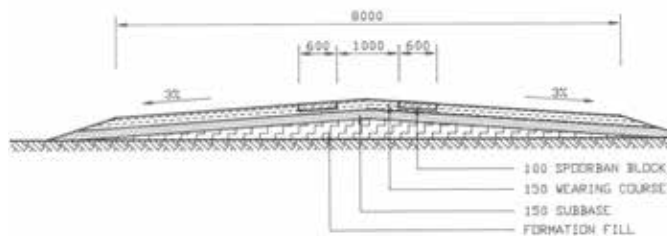


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Benefits: Enhanced foaming slag properties leading to reduced energy consumption in the EAF. Use of recovered tires as substitute for anthracite.

SLAG FROM THE EAF PROCESS – a better use of materials

- Celsa Armeringstål produces around 80 000 tons of EAF slag per year.
- EAF slag is processed and sold for construction purposes as filler.
- Use of EAF slag saves natural raw material



TYPICAL SECTION OF
SPOORBAN STRIP ROAD
1:50

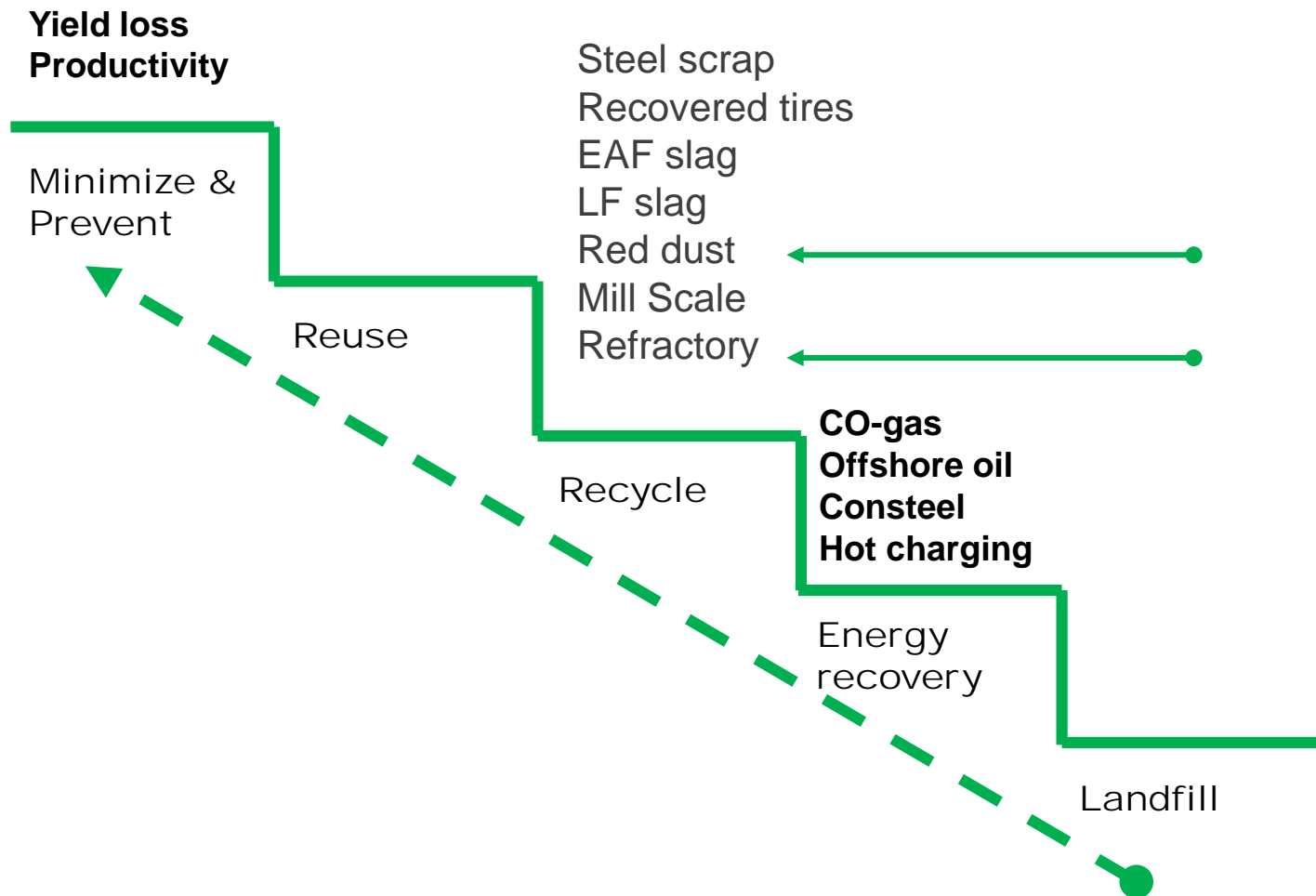


ELECTRIFIED CRANES AT THE SCRAPYARD – A partnering project of the future

- Reduction of diesel consumption by around 350 000 liter/year, corresponds to approximately to the yearly consumption of 400 cars.
- Reduction in power consumption by around 2500 MWh, corresponds to the electrical consumption of 125 houses.
- Reduced emissions of CO₂ and NO_x as a consequence



Waste hierarchy – tool to be competitive



Zero waste

Type	What is done	Share (%)	Recycled (%)
EAF slag	Sold locally for construction purposes.	64%	100%
LF slag	Currently stored awaiting other industrial use	10%	0%
Red dust	Exported to Germany.	10%	100%
Mill Scale	Exported to Iceland.	10%	100%
Refractory	Internal recycling.	1%	100%
Scrap Bay Sweepings	Exported to Spain.	5%	50%

- We are on track
- BUT
- Areas to develop more
 - More cooperation in the future



Circular economy



“When will someone teach us how to share?”