Welcome

to ARC

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Program

ARC and circular economy

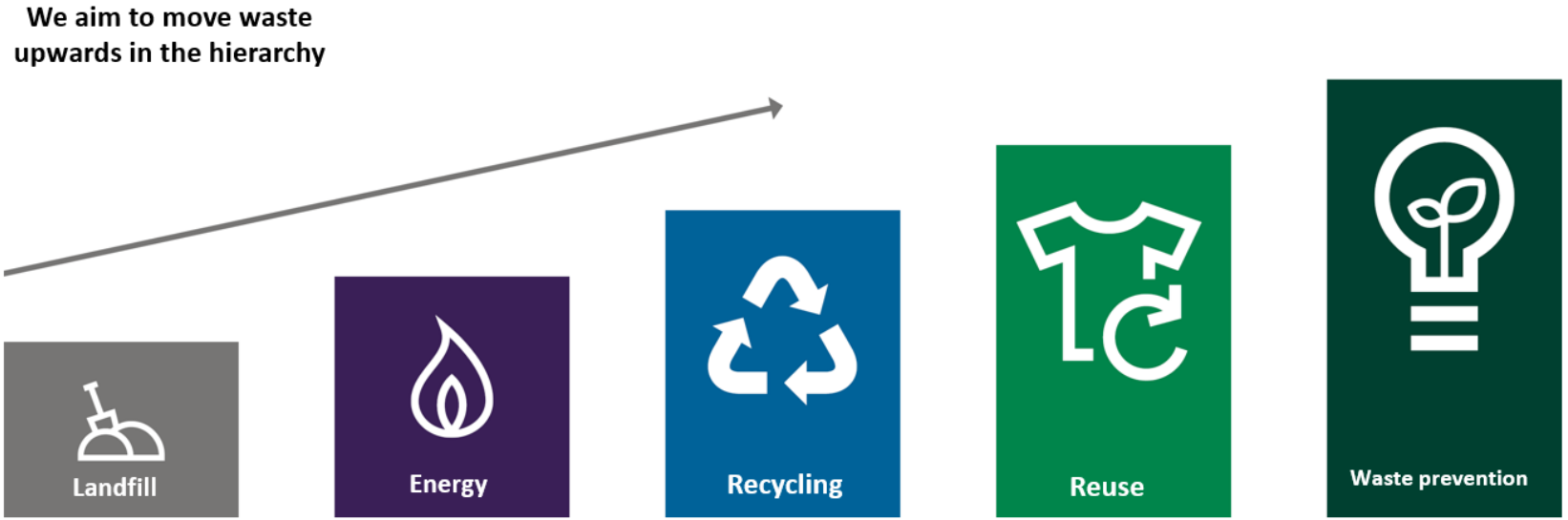
Development projects

Amager Bakke

ARC manages a societal problem

Danes produces 5 million tonnes of waste every year (= 860 kg/year/person)

The Waste Hierarchy



Ownership

- Dragør
- Frederiksberg
- Hvidovre
- Copenhagen
- Tårnby

Waste from:
645,000 citizens and 68,000 companies

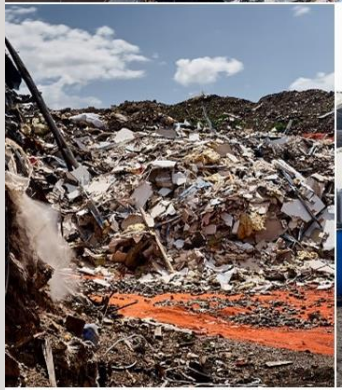
(1.1.2020)

All about waste

- Recycling centres
- Local recycling centres
- Transhipment
- Sorting plant
- SMOKA
- Safe landfill
- Waste collection
- Waste to energy







ARC in numbers

Revenue in 2020: **1,077,466,000 DKK** (144,790,000 €)

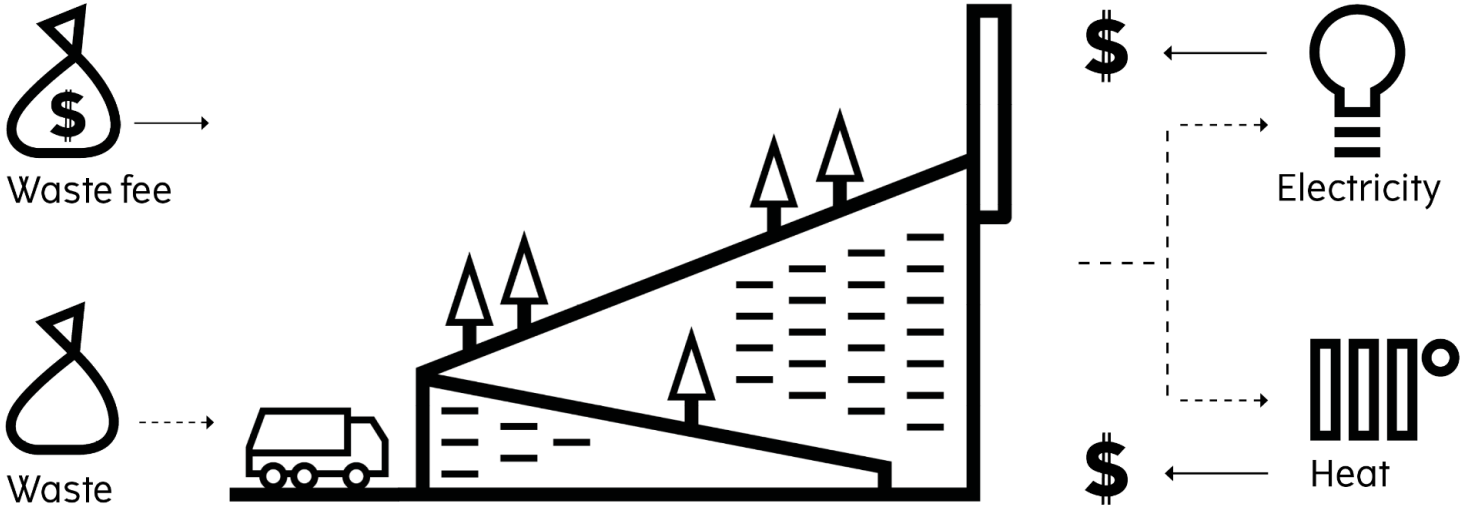
Waste quantities at recycling centres in 2020: **108,415 tonnes**

Recycling centres: **10**

Local recycling centres: **7**

Employees in 2020: **255**

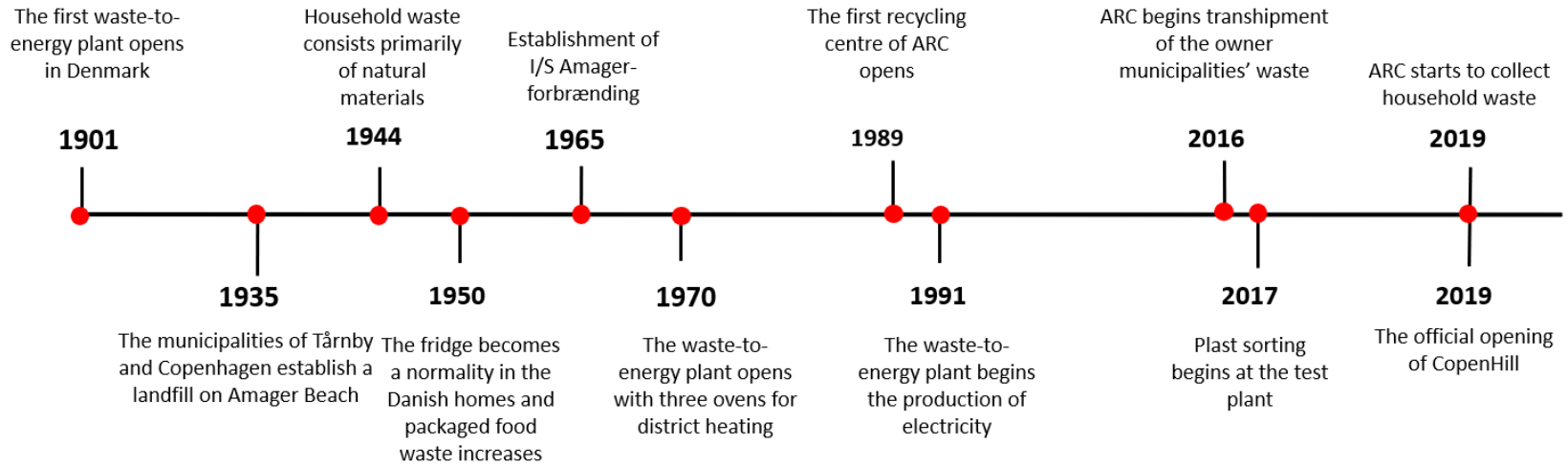
Energy production and waste fees



Supply and demand

When the price on electricity decreases, the municipalities have to increase the waste fees to secure a break-even.

From waste to resource



ARC collection

Collects waste in Dragør and Tårnby from 2019

Started collection of waste in Copenhagen from 2022

Recycling centres

- 1 million costumers every year
- 108,415 tonnes of waste
- Sorting in more than 35 fractions
- Increased focus on reuse

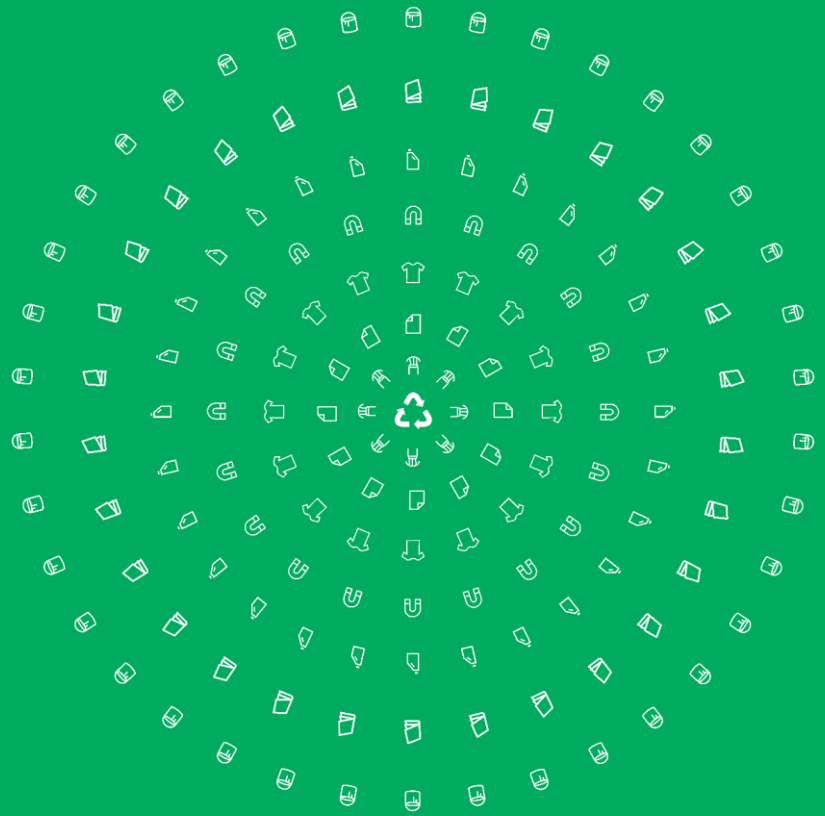
Sydhavn Recyling centre

- New concept with increased focus on reuse
- Constructed in recycled concrete
- Thrift shop
- TestLab and workshop

Everything to be sorted

Out phasing residual waste

- Less waste for incineration
- We still have something left; not everything can be sorted (rugs, diapers, pizza boxes, etc)



Transhipment

Tranships owner municipality waste for recycling. 11,250 tonnes every year

- Appliances
- Electronics
- Metal
- Glass
- Plastic

Sorting plant

Partnership for Circular Food Trays

- Seven tonnes of collected PET-plastic will be converted into 400,000 of new plastic trays
- Experiment to close the cycle of food trays
- Cooperation with partners from different parts of the recycling chain

Sorting plant

Holy Grail 2.0

- Digital water marks
- Ensures better recycling
- Producer responsibility on packaging from 2025

SMOKA

Handles 10,000 tonnes of hazardous waste every year from:

- 1.5 million citizens
- 90,000 companies

Types of hazardous waste:

- Chemicals
- Paint
- Batteries

AV Environment

Safe landfill with less environmental impact

- No organic materials
- Very little methane
- Membrane collecting 95% of the gasses
- Polluted concrete, soil, asbestos and other non-hazardous materials, that cannot be recycled or used for energy

2% of the waste ARC handles ends up at a landfill, until we can find safe measures to treat the waste

Amager Bakke

One of the best waste-to-energy plants in the world

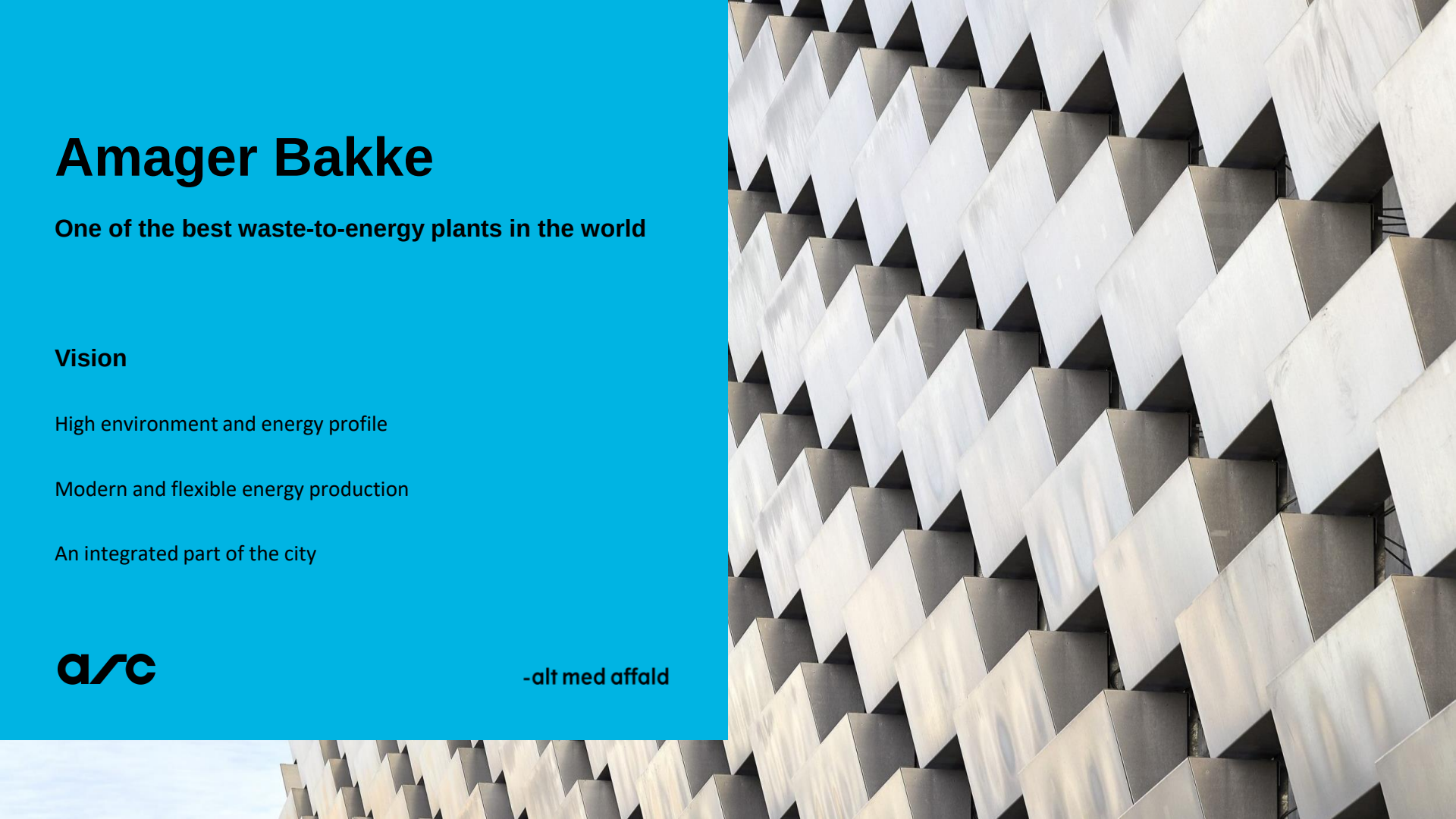
Vision

High environment and energy profile

Modern and flexible energy production

An integrated part of the city

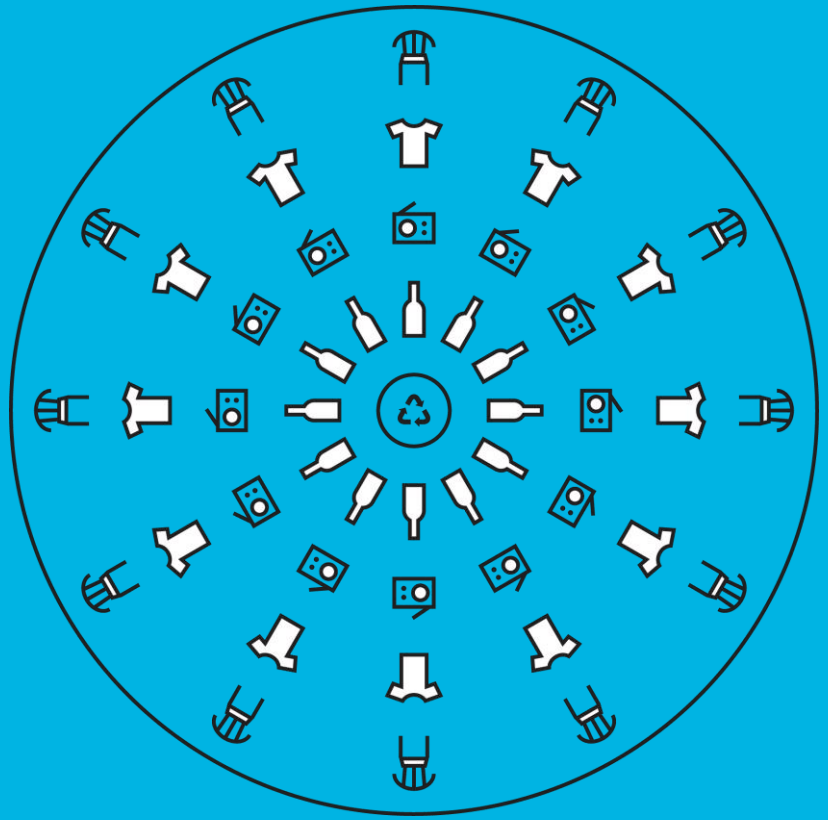
-alt med affald



Why do we talk about waste-to-energy in the circular economy?

The waste not suitable for reuse or recycling needs to end up somewhere

- We avoid big landfills and in terms of green house gas-emissions combustion is better than landfill
- Combustion is hygienic
- Diapers, waste from hospitals, cat litter and pizza trays cannot be recycled
- Produces electricity and heat
- **Replaces fossil fuels!**



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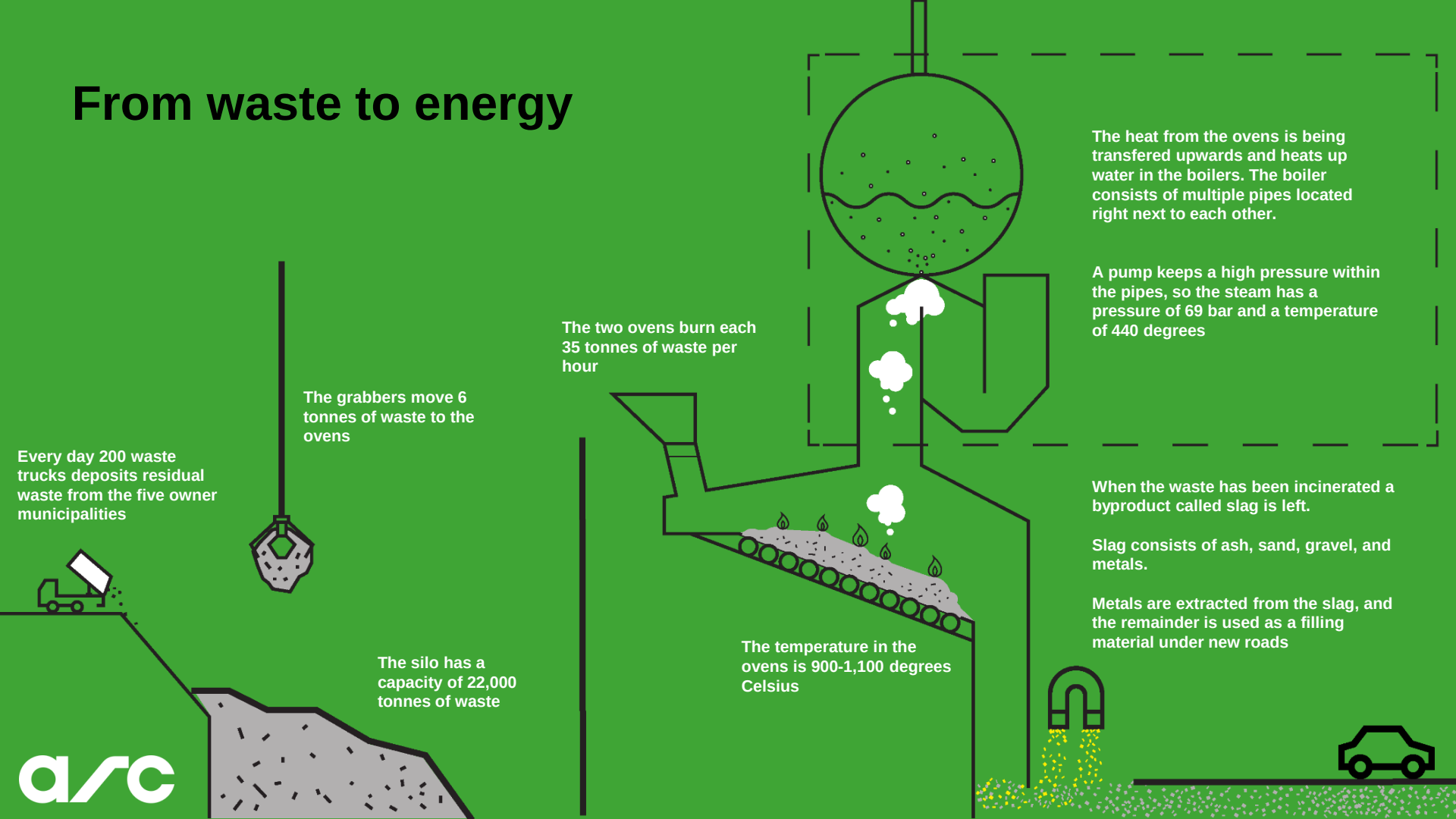
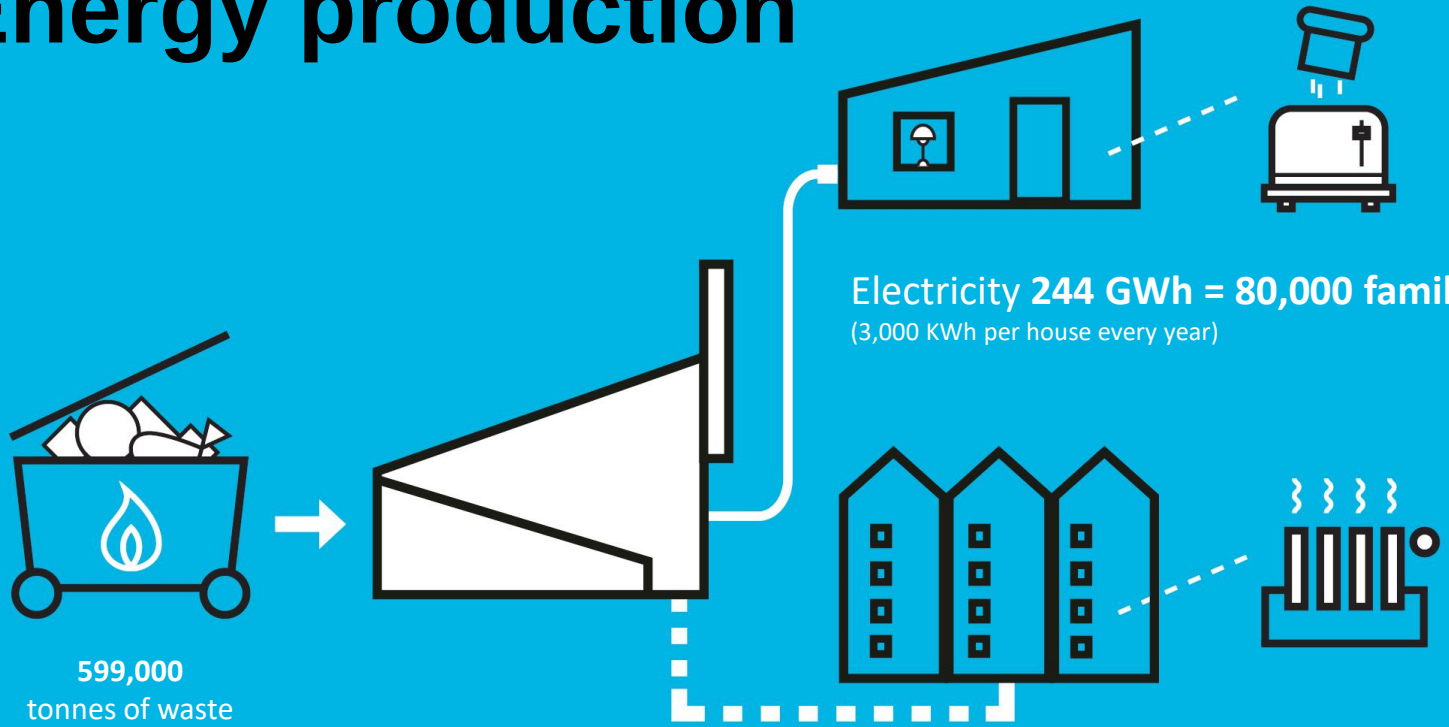
From waste to energy



Energy production



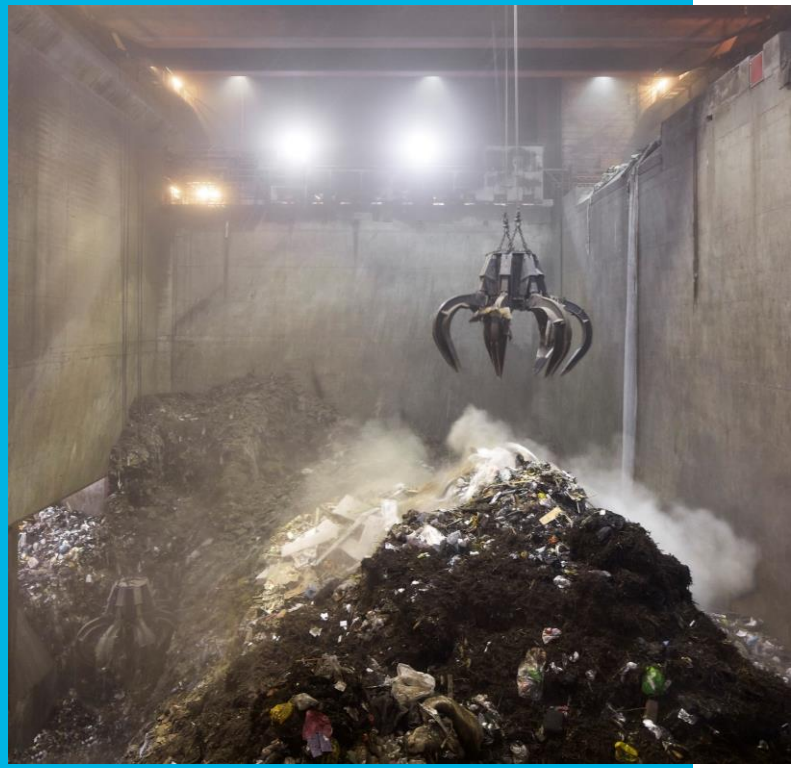
599,000
tonnes of waste

Electricity **244 GWh = 80,000 families**
(3,000 KWh per house every year)

District heating **1,363 GWh = 90,000 apartments**
(75 m2 apartment with a yearly use of 15 MWh)

Production and energy sale in 2020

- Weighed amount: **599,000 tonnes**
- **20%** increase compared to 2019
- Number of waste trucks: **67,000**
- Total energy production: **1,607 (GWh)**



Slag

17-20% of waste cannot burn

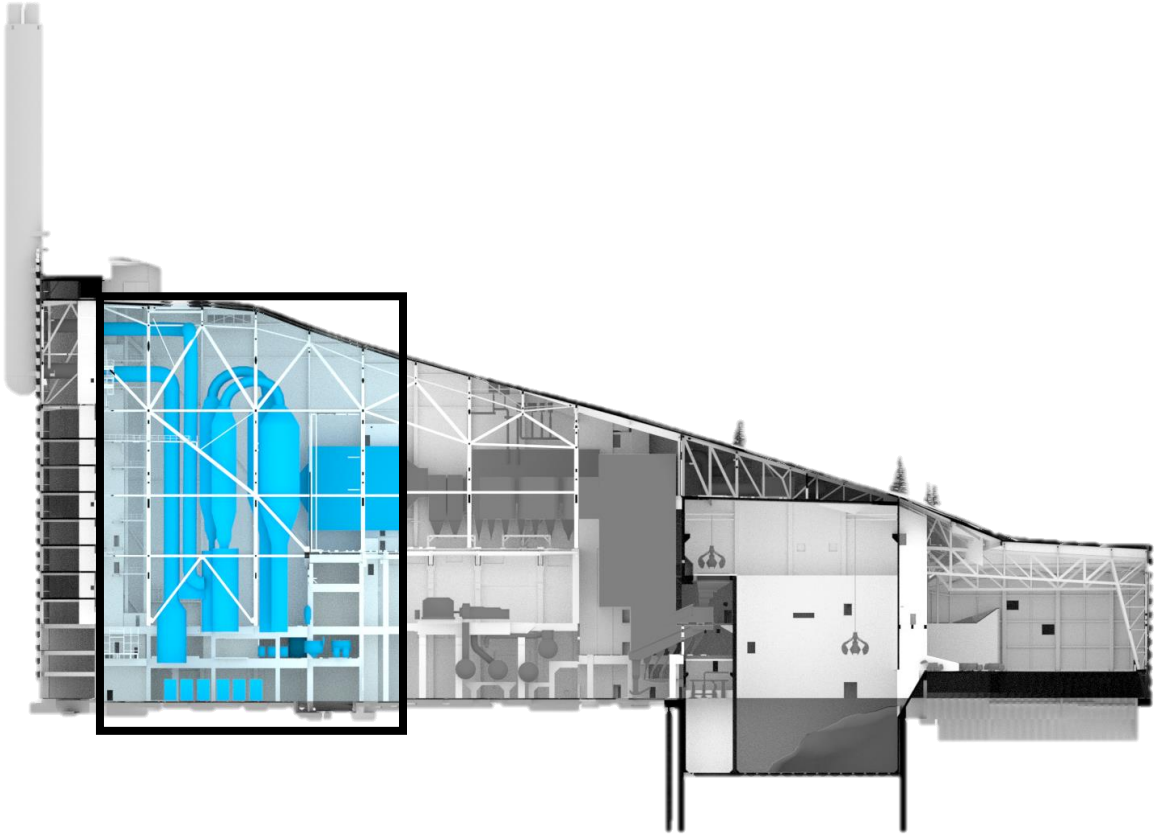
This amounts to 80,000 tonnes of slag each year

5,500 tonnes of metal is extracted every year

27 kg of gold every year

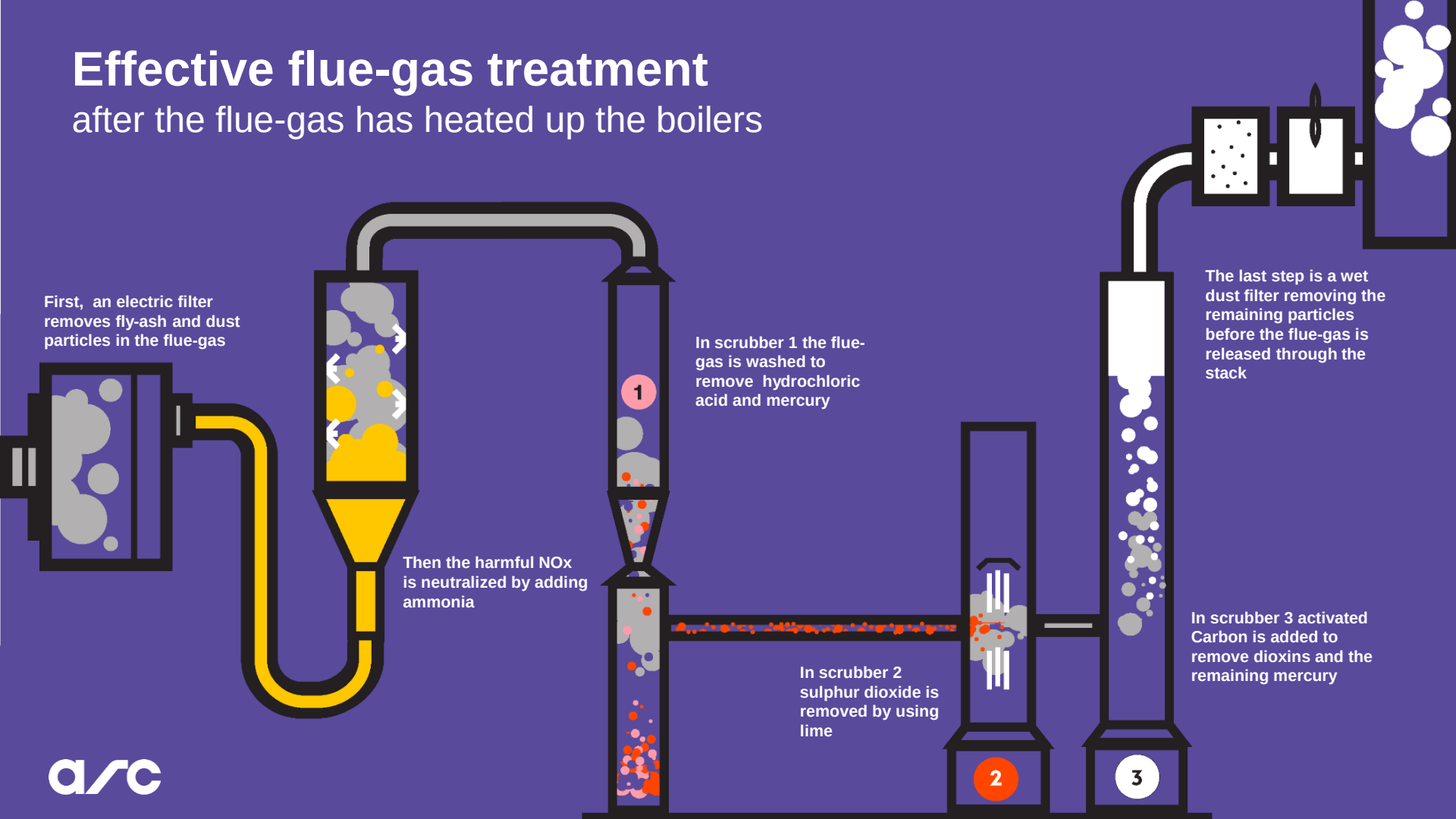
The rest of the slag is left for treatment and is used for road filling underneath asphalt

Effective flue-gas treatment

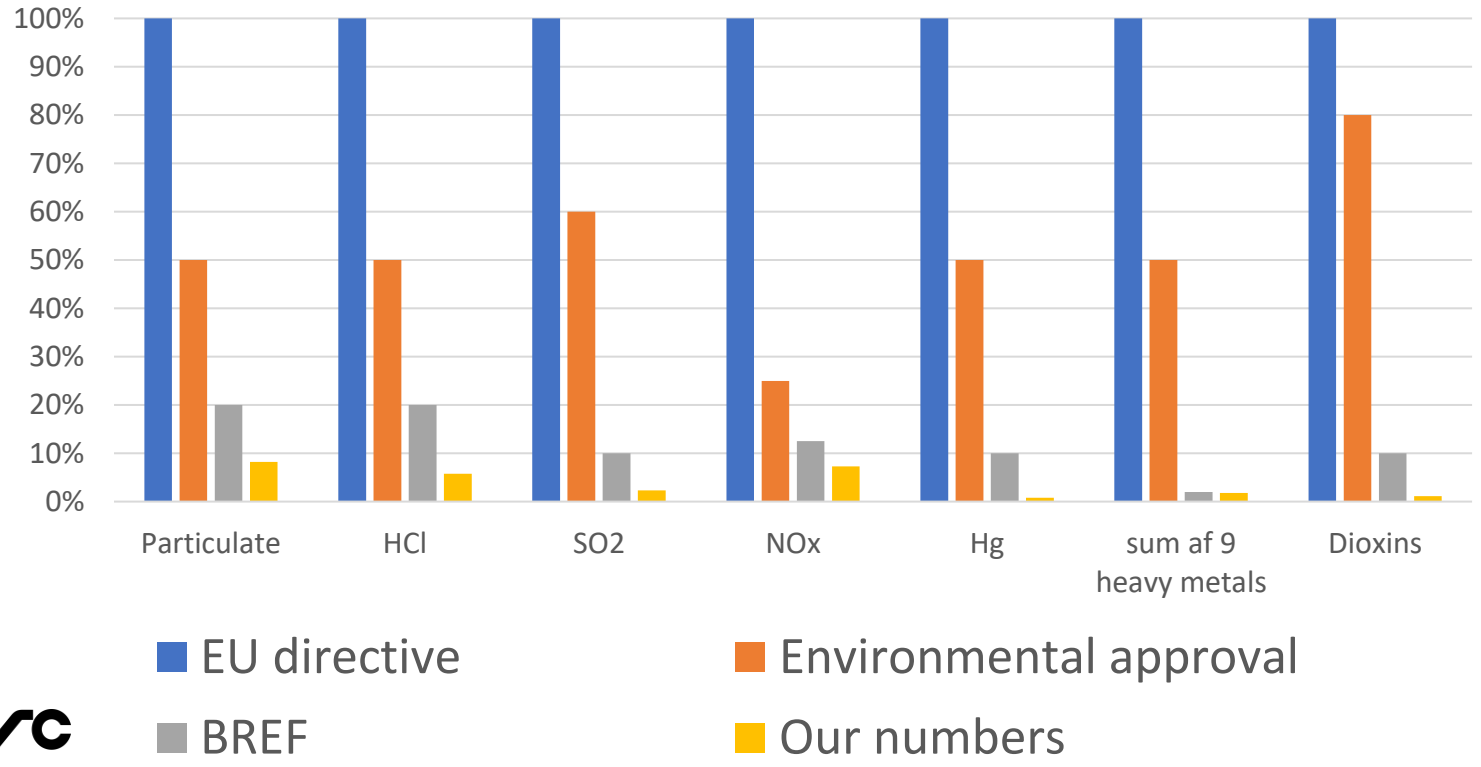


Effective flue-gas treatment

after the flue-gas has heated up the boilers



Effective flue-gas treatment



Emissions from the stag

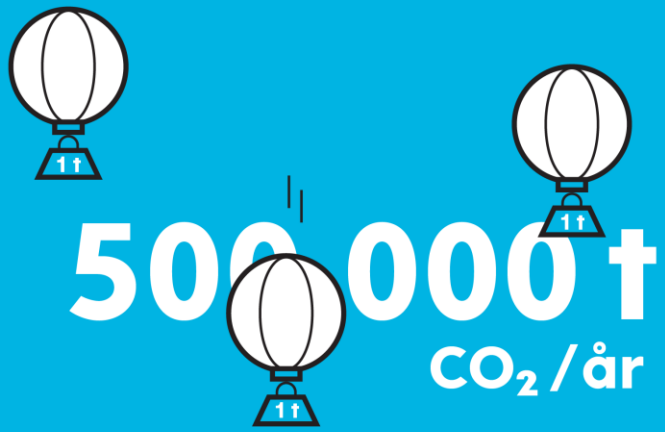
Parameter	Unit	EU Directive	Environmental approval	BREF-dokument	Our numbers
Dust particles	mg/m^3	10	5	2-5	0.82
Hydrochloric acid (HCl)	mg/m^3	10	5	2-6	0.58
Sulfur dioxide (SO_2)	mg/m^3	50	30	5-20	1.16
NOx	mg/m^3	400	100	50-120	14.65
Mercury (Hg)	mg/m^3	0.05	0.025	0.005-0.020	0.0004
Sum of 9 metals	mg/m^3	0.5	0.25	0.01-0.03	0.009
Dioxins	ng/m^3	0.1	0.08	0.01-0.06	0.0015

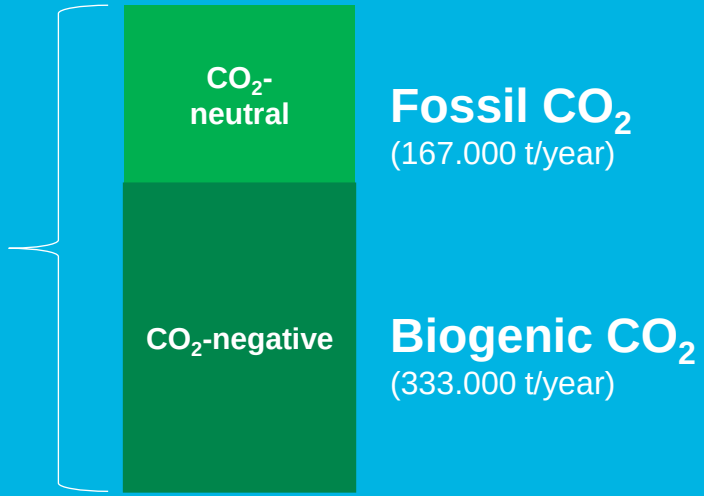
Carbon Capture at Amager Bakke

Carbon Capture at Amager Bakke

- Carbon capture is crucial to accomplish national and international goals
- Financing: High CO_2-fee and/or support
- Possibility of success in Denmark
  - Research and innovation
  - Green initiatives
  - CO_2 reductions

The potential of carbon capture

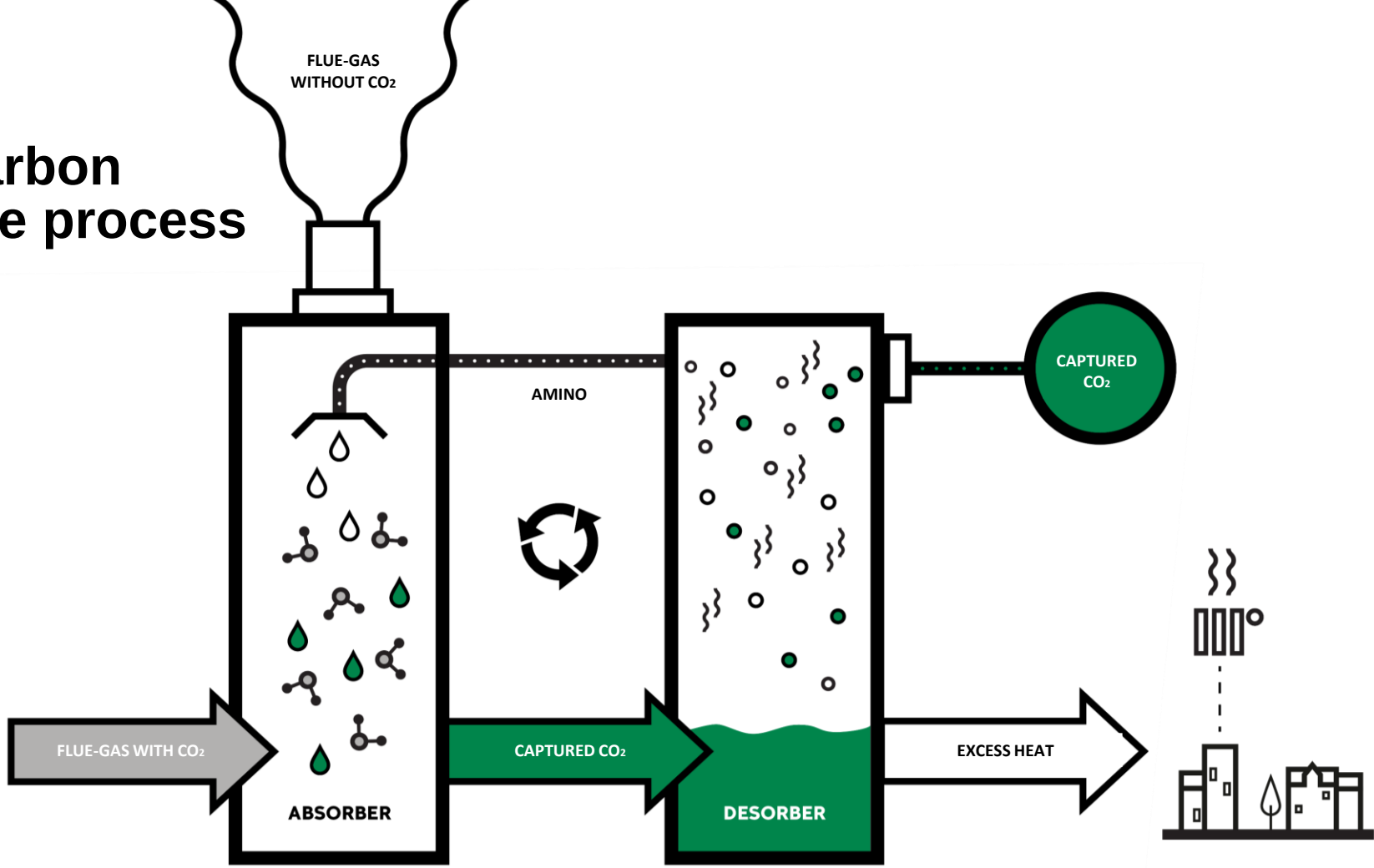




Fossil CO_2
(167.000 t/year)

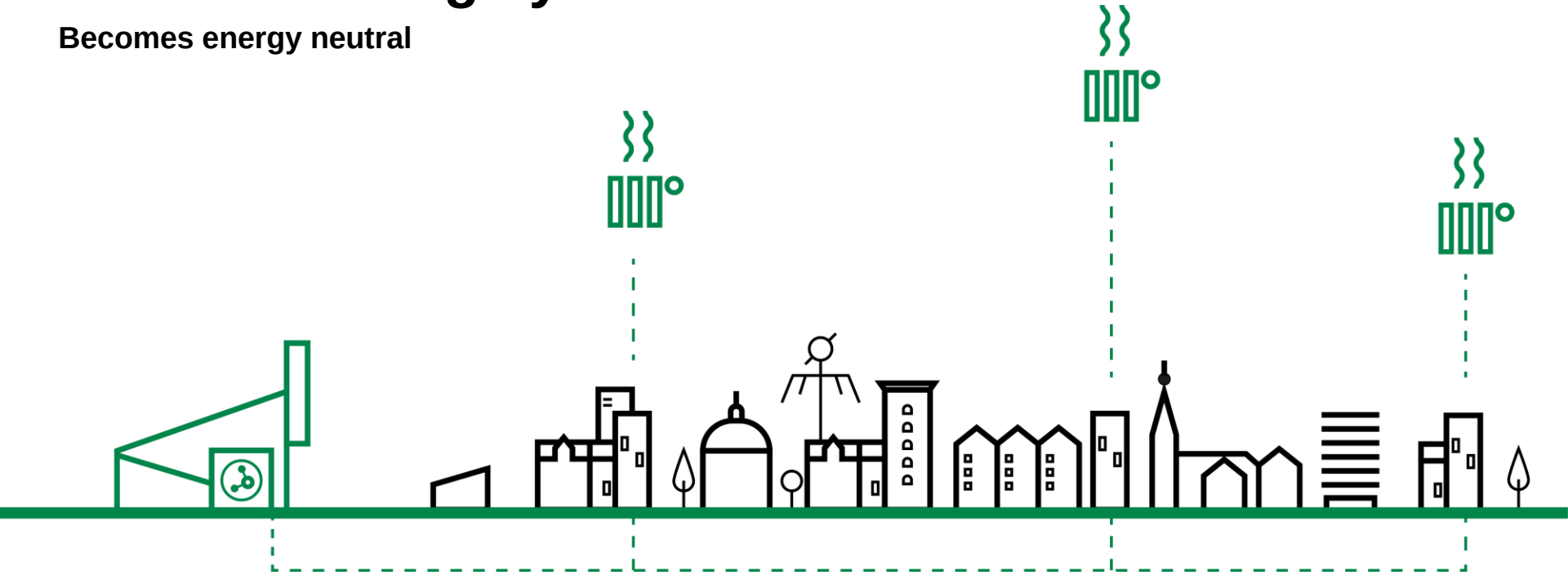
Biogenic CO_2
(333.000 t/year)

The carbon capture process



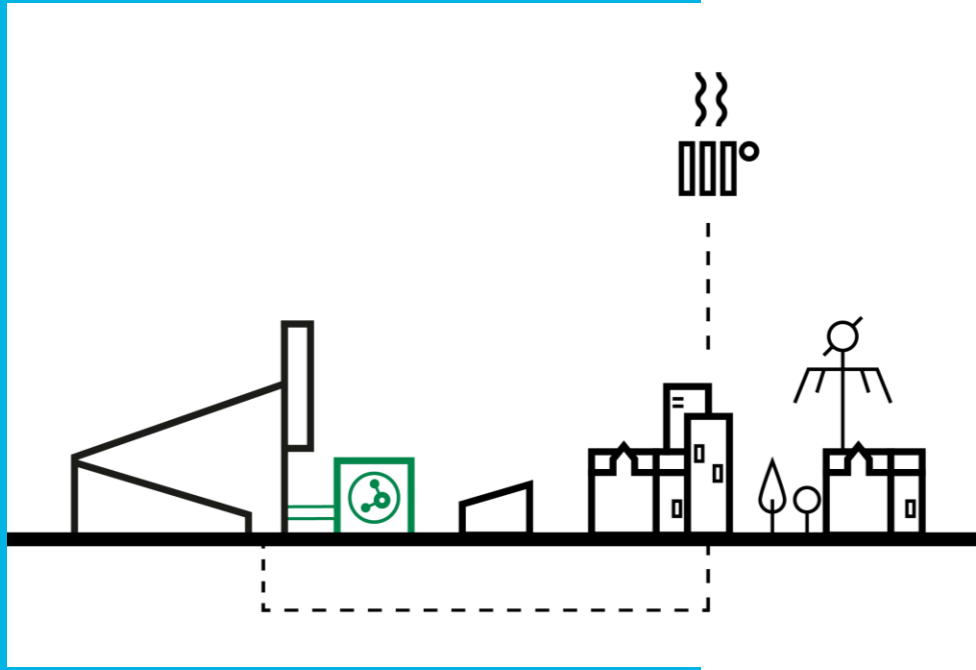
Excess heating used in the district heating system

Becomes energy neutral

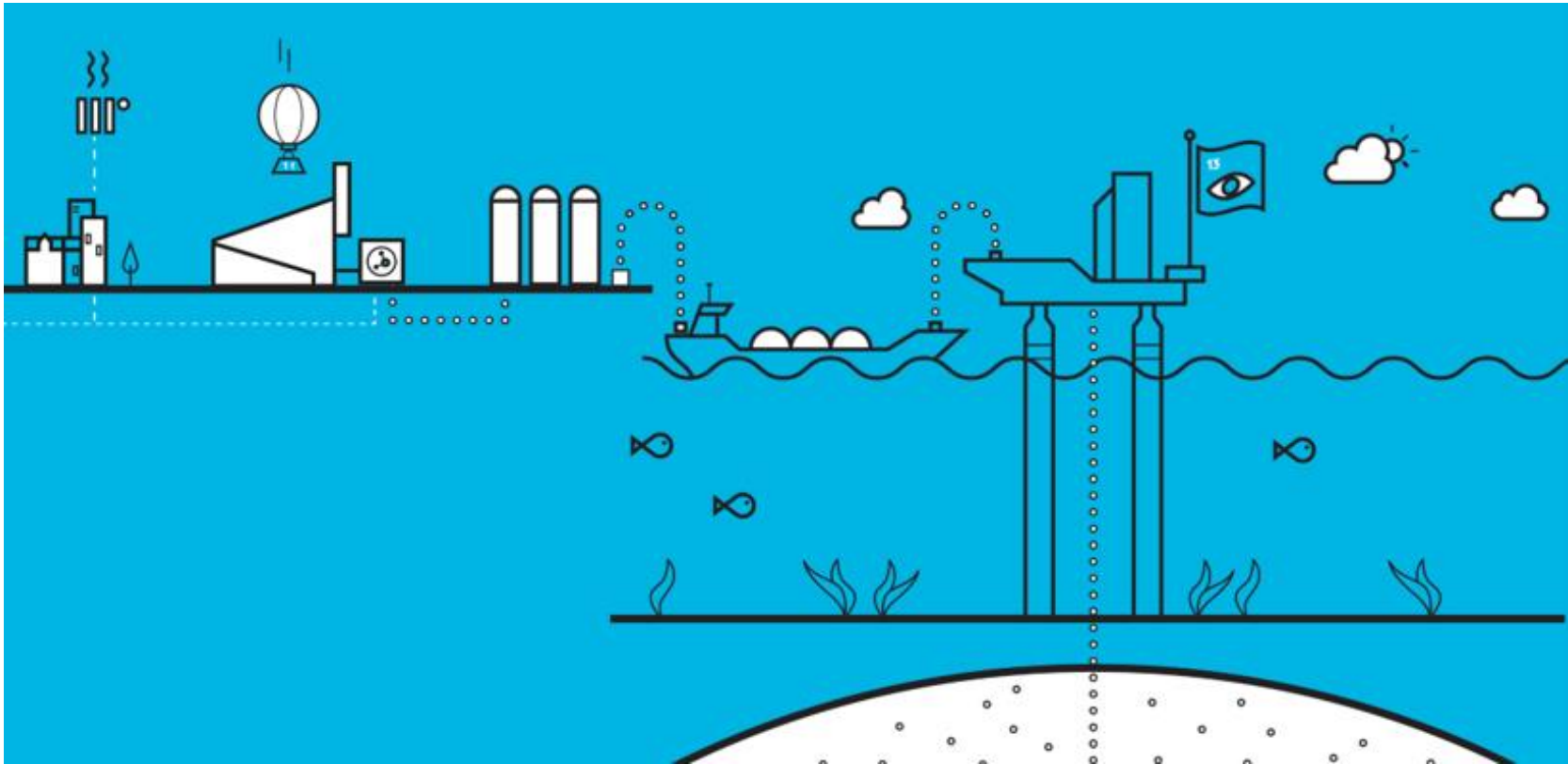


500,000 tonnes of CO_2

with the full scale plant



The value chain



Thank you for your attention!

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