

A satellite view of Earth from space, showing the Western Hemisphere. The left side of the image is dark, representing the night side of the planet with visible city lights. The right side is the sunlit side, showing the Americas, the Atlantic Ocean, and parts of Europe and Africa. A semi-transparent white rectangle is centered over the image, containing the report's title and other text.

**MATERIAL** ECONOMICS

# EUROPE'S MISSING PLASTICS

*Taking stock of European plastics circularity*

**MARCH 2022**

CONFIDENTIAL AND PROPRIETARY

This material should not be made accessible or provided to any third party without the written consent of Material Economics

# Summary



Europe generates about 45 million tonnes of plastics waste per year – 50% more than the 25–30 million tonnes assumed by policy-makers and industry.



The 15 million tonnes of ‘missing plastics’ means that just 15% of end-of-life plastics generated each year are recycled into new materials.



Incineration creates 70 million tonnes of CO<sub>2</sub> emissions – or 38 million tonnes net of displacing other fossil fuels



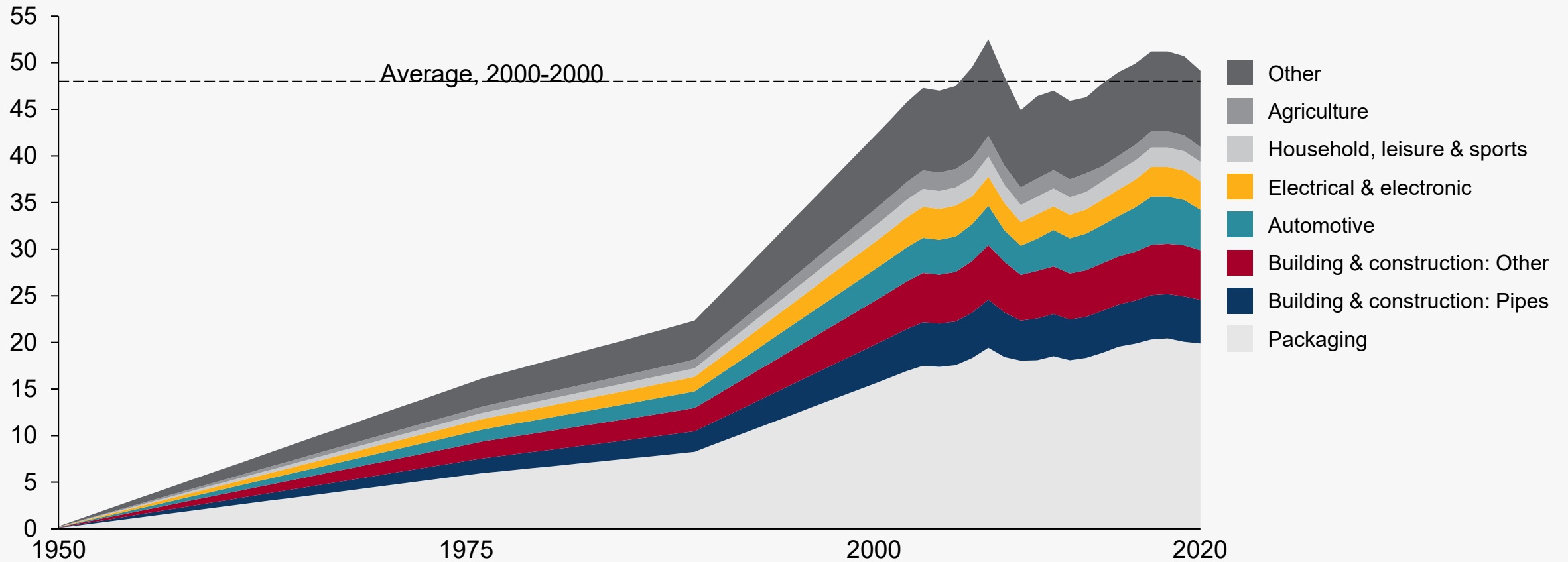
Increased circularity is urgent: without a change of course, CO<sub>2</sub> emissions would triple to 2050 as landfilling is phased out and the economy decarbonises



# Plastics use has been relatively flat at just under 50 Mt for the last two decades

## European plastics converter demand by segment

Million tonnes of plastics, EU28+NO/CH



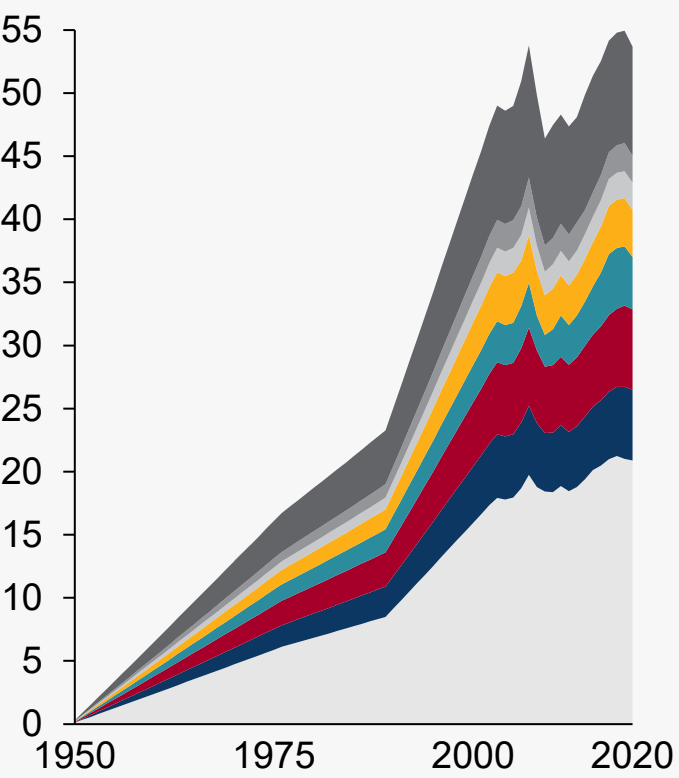
Notes: Includes thermoplastics, polyurethanes and other plastics. Does not include: adhesives, coatings, paints and varnishes, PET fibers, PA fibers, PP fibers and polyacryl-fibers, or rubber including tires. Data from 2003 are direct observations, earlier data inferred from production and other sources

# No plastics disappears: a dynamic material flow analysis gives an estimate of end-of-life flows

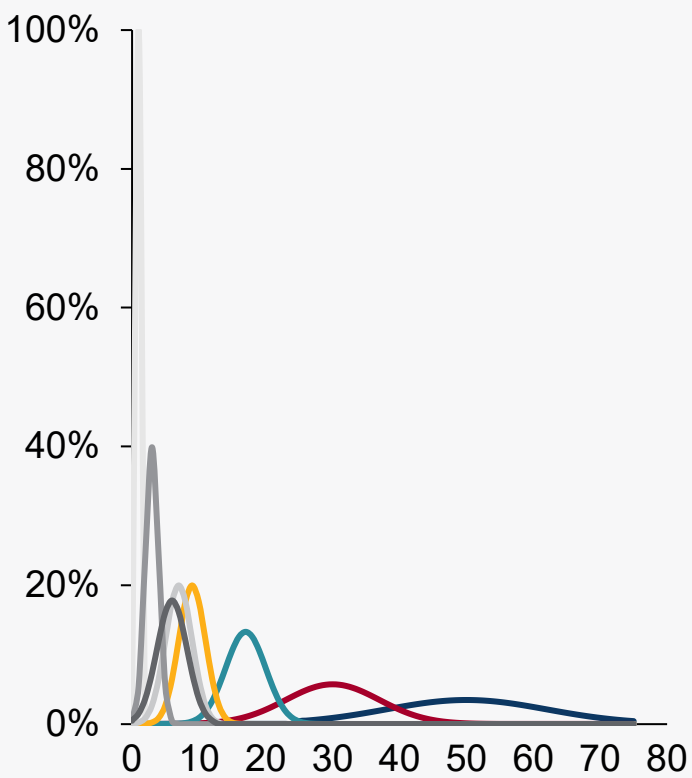
## Simplified overview of the material flow analysis

- Other
- Household
- Automotive
- Construction - Pipes
- Agriculture
- Electrical & electronic
- Construction - Other
- Packaging

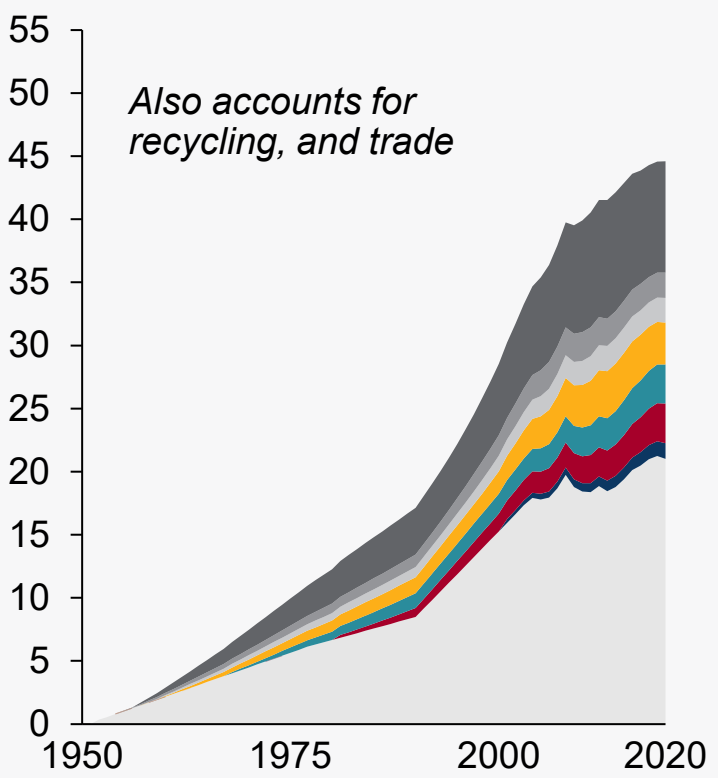
Plastics added to the economy



Lifetime of plastic products



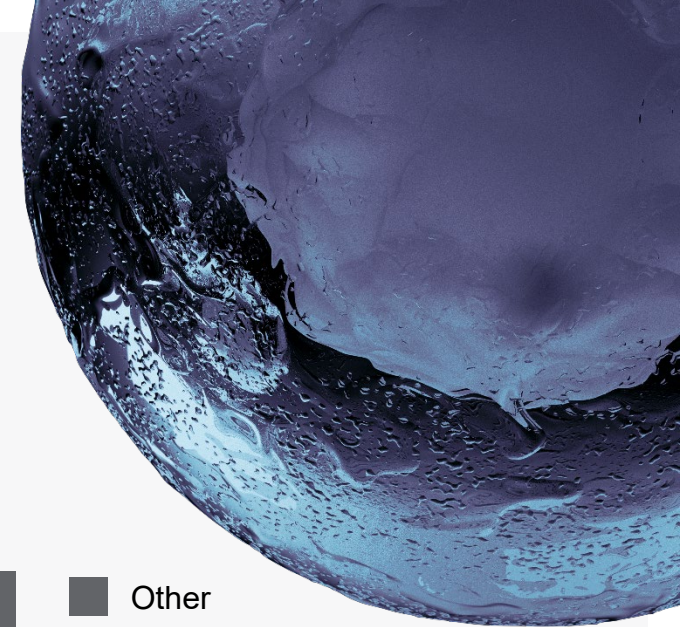
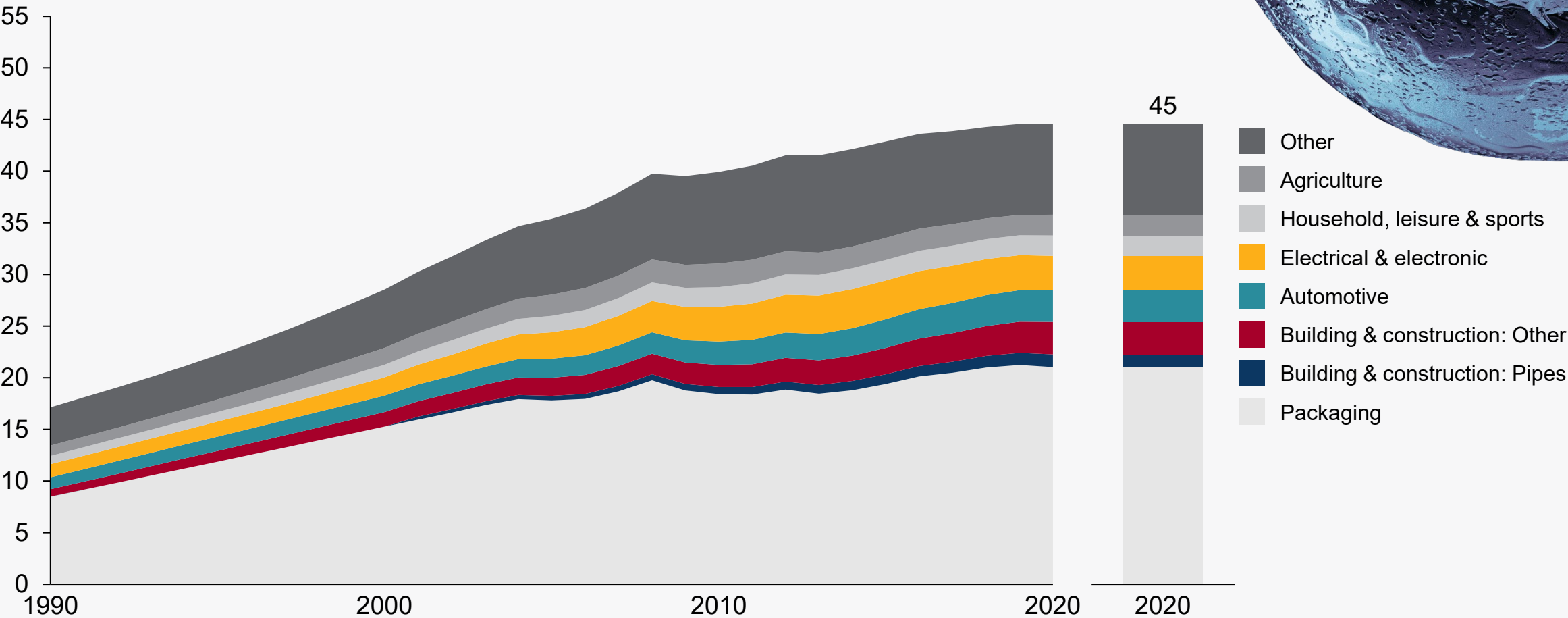
End-of-life plastics flows



# Headline result: 2020 end-of-life flows estimated at 45 million tonnes per year

## European plastics converter demand (virgin) by segment

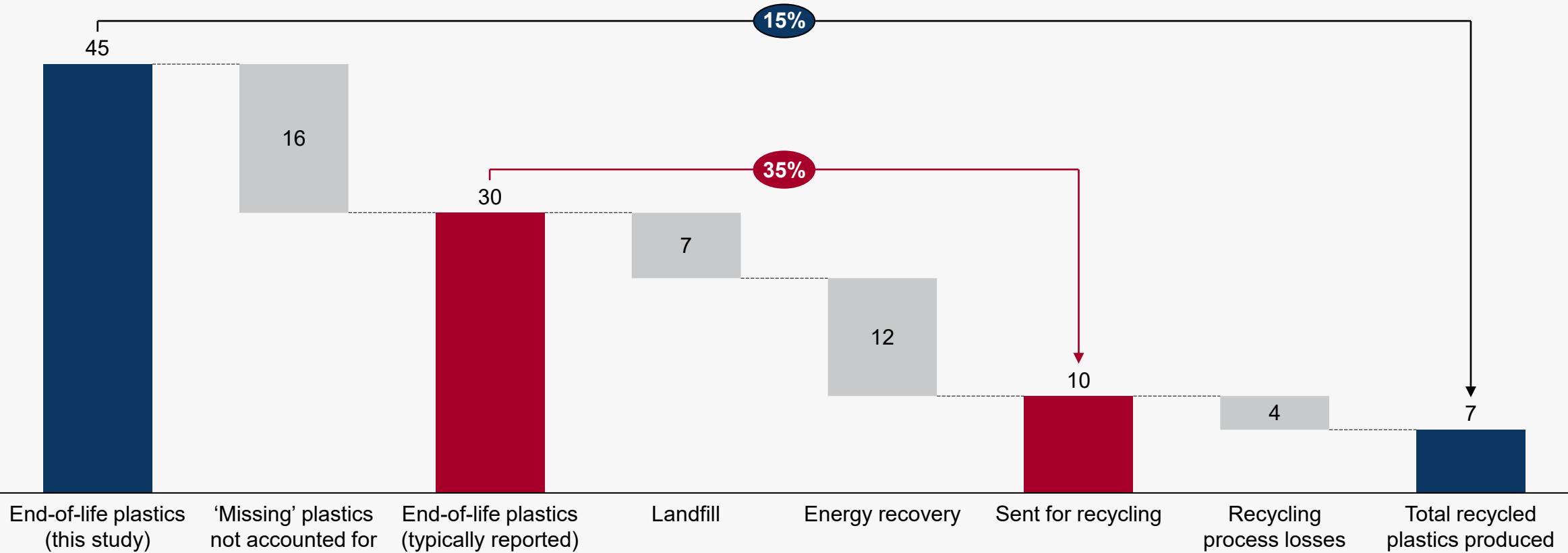
Million tonnes of plastics, EU28+NO/CH



# Key implication: the effective recycling rate of European plastics is just 15%

## Treatment of end-of-life plastics in Europe, 2020

Million tonnes of plastics, EU28+NO/CH



\* Includes end-of-life plastics leaked to the environment (including plastic pipes not in use but left in the ground), plastic products illegally exported, illegal waste treatment of waste (e.g., end-of-life vehicles), or plastics part of mixed waste streams that are not reported as collected plastics.

# The treatment of end-of-life plastics imply larger landfill and incineration volumes

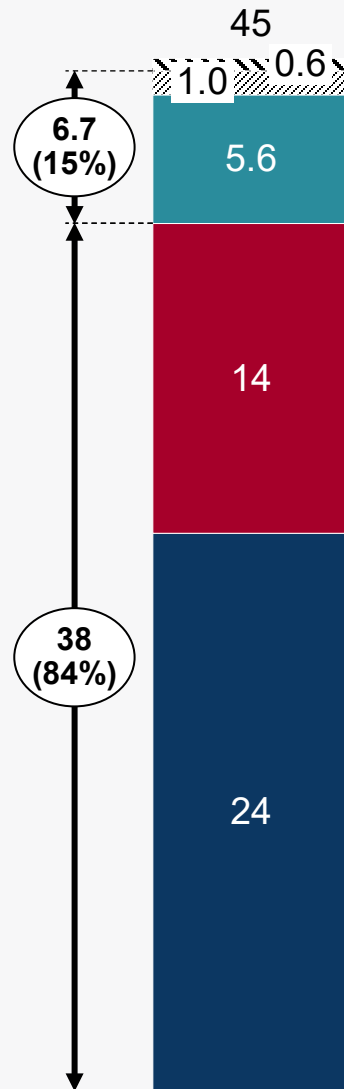
## Treatment of European end-of-life plastics, 2020

Million tonnes



Total recycling rate, Europe and overseas.

Landfilled or incinerated for energy recovery. Exact split not known.



**4%** exported from Europe

1.6 million tonnes exported, up to 1 million tonnes recycled



**12%** recycled in Europe



**30%** landfilled in Europe



**54%** incinerated/energy recovery in Europe

Consistent with European Environment Agency estimates that 20–30 million tonnes of plastics are burnt each year

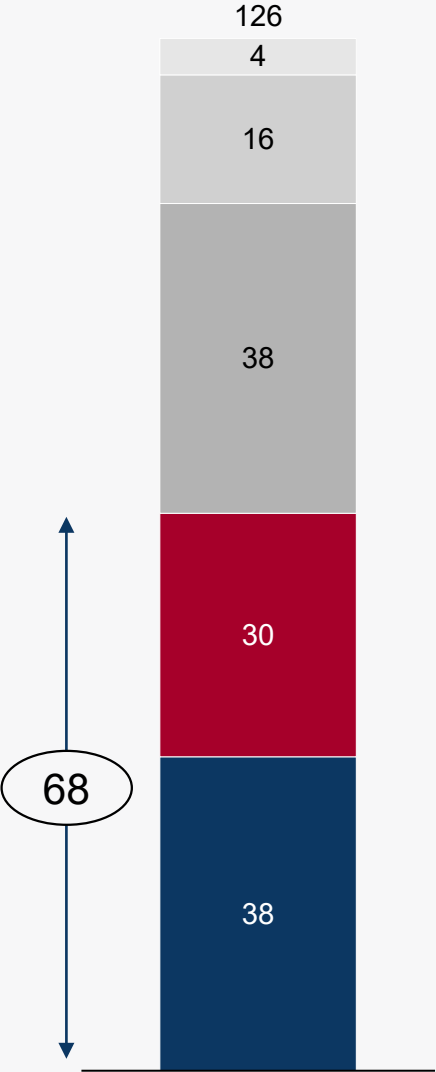
# Incineration results in ~70 Mt of CO2 emissions (38 Mt net)

## Treatment of European end-of-life plastics, 2020

Million tonnes CO<sub>2</sub> equivalents



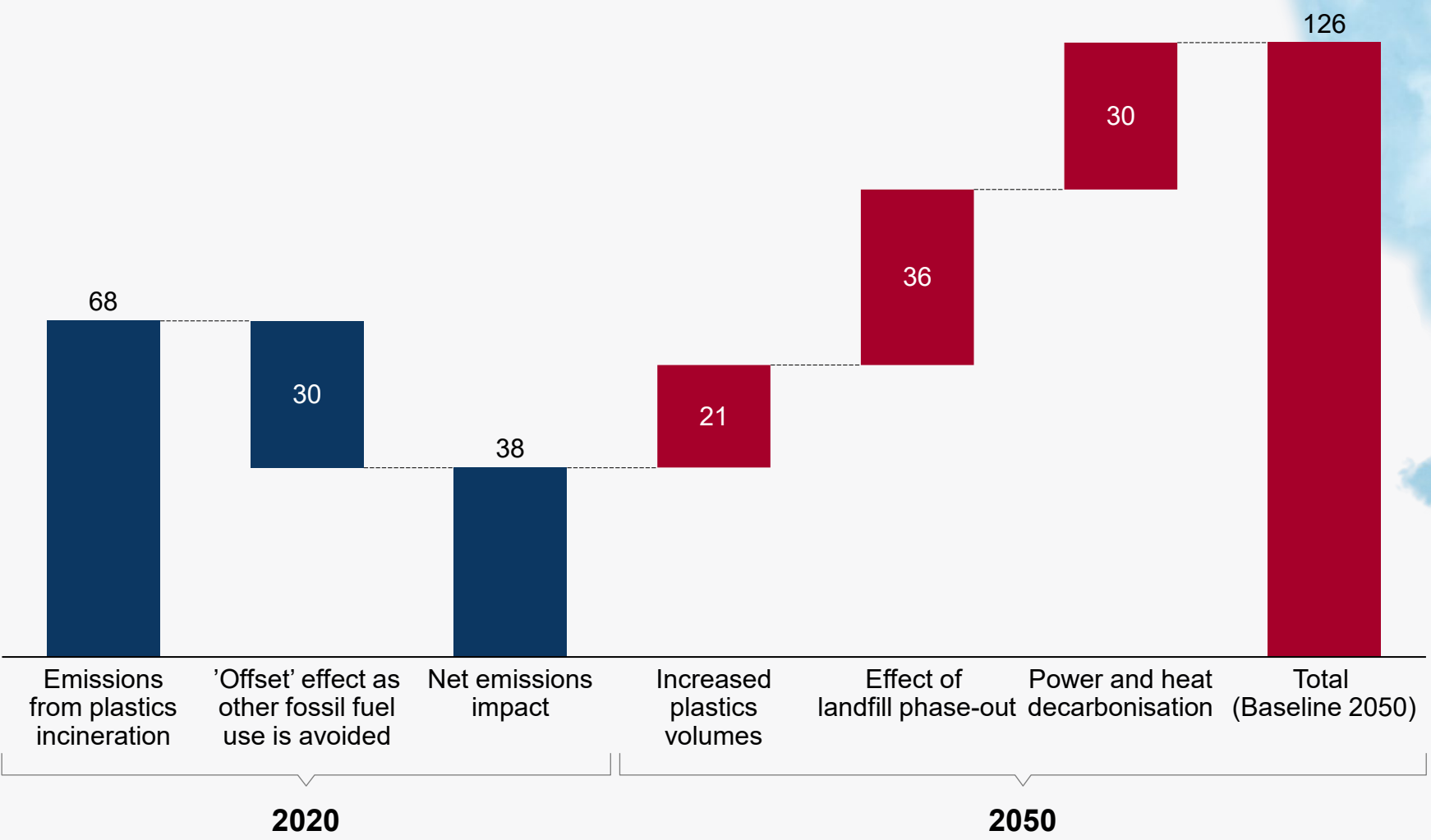
Total emissions from incineration of waste plastics



- Emissions shifted overseas as plastics are exported for recycling
- CO<sub>2</sub> emissions avoided through recycling in Europe
- Carbon stored in landfilled plastics
- CO<sub>2</sub> emissions offset through avoided use of other fossil fuels
- Net CO<sub>2</sub> emissions from end-of-life plastics

# Why more circularity is needed: net emissions would triple as landfill is phased out and the economy decarbonises

MILLION TONNES OF CO<sub>2</sub> PER YEAR





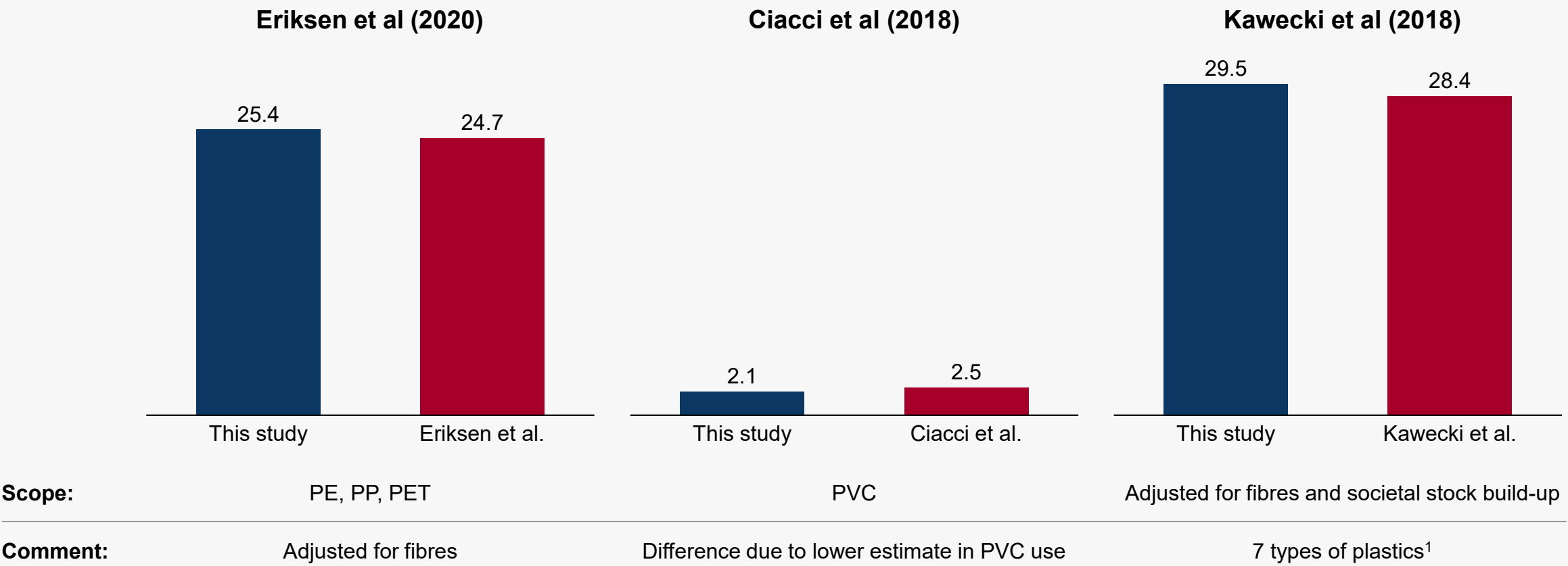
# MATERIAL ECONOMICS

*Material Economics Sverige AB [www.materialeconomics.com](http://www.materialeconomics.com) [info@materialeconomics.com](mailto:info@materialeconomics.com)*

# Other emerging studies come to similar conclusions

## Comparison of end-of-life plastics estimates from different studies

Million tonnes of plastics, Year and scope vary



<sup>1</sup> Low-density polyethylene (LDPE), high-density polyethylene (HDPE), polypropylene (PP), polystyrene (PS), expanded polystyrene (EPS), polyvinyl chloride (PVC), and polyethylene terephthalate (PET)