ETH zürich

SusTec

Global Recycling Survey 2020 – Results

November 2020

Table of contents

Executive Summary

Over **150 companies** from **38 countries** participated in the **Global Recycling Survey 2020**, representing **10-15% of the global recycling capacity**

Future development and regulatory challenges

- Recyclers are demanding more legislative support and clarity to create the right framework conditions in terms of design for recycling, plastic/CO_2 tax and recyclate usage
- In the EU, recycled content targets seem achievable but respondents don't think the overall recycling quota will be fulfilled
- There is high skepticism as to if and which technological innovation could lead to a breakthrough in plastics recycling
- Respondents see every part of the value chain affected by the discussed drivers and innovations in the upcoming years, with brand owners dictating the way forward

Current state of the recycling industry

- The majority of participants processes several polymers through mechanical recycling, mostly Polyolefins and PET – focusing on high quality (and value) streams
- Most of the recyclate is sold directly to manufacturers and used in packaging, with 18% of the total volume being food-certified

Over 150 companies from 38 countries participated in the Global Recycling Survey 2020

Survey was sent to **companies and selected experts[1] in plastics recycling** business worldwide

62% of companies are **family businesses**

46% of companies have **1 recycling plant** and

40% of companies have **2 – 4 recycling plants**

87% of companies are only operating in **one country**

Responding companies cover around

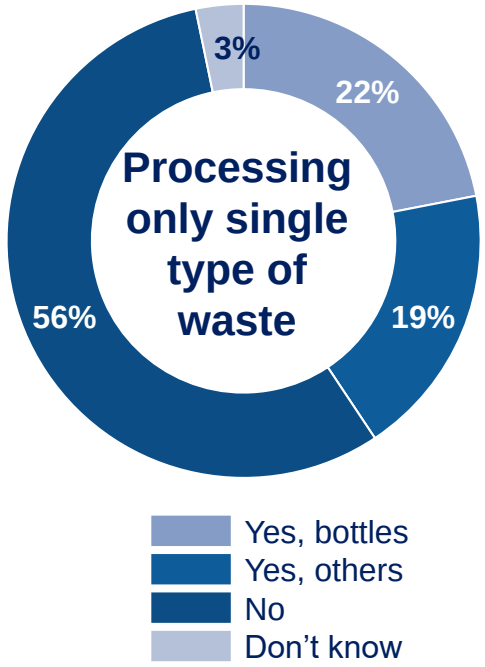
10-15% of global plastics recycling capacity

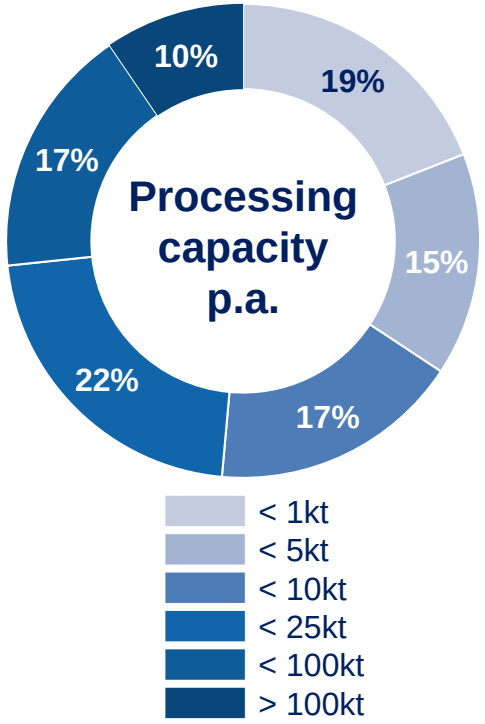
Most respondents recycle

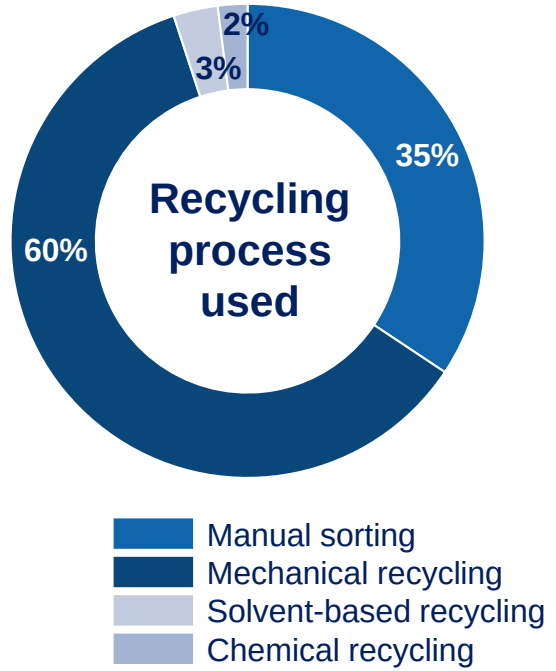
HDPE (66%), PP (63%) and PET (50%)

1. Individuals that do not work in a recycling company but have long-standing expertise in the field - those responses are excluded in the questions regarding the companies' recycling processes (part 3)

Our study covers all sizes of recycling plants with mechanical recycling being the dominant technology







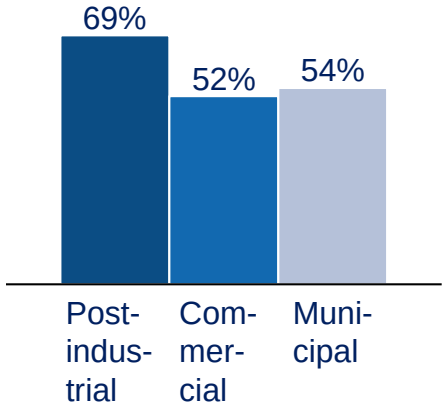
- **41% of respondents** process a single type of waste which requires a single stream or pre-sorting
- The median recycling plant has a **processing capacity of only 10k tons** per year (average 66k tons), with significantly larger plants in India, the U.S. and the European Union
- **Mechanical recycling** is by far the **most frequently used** process, followed by manual sorting (in developing countries) – newer technologies are still in their infancy

Recyclers currently use mostly high quality, pre-sorted material

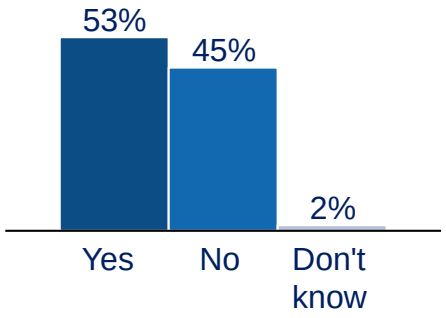
- The types of waste processed are evenly distributed, with **post industrial having a slightly larger share**
- 45% of recyclers do not receive their material input from a collection service, but rather through informal waste collection or traders
- The **average plastic bale travels more than 200km** to the recycling plant, which increases the transport emissions
- Almost all recyclers **receive presorted waste**, with more than half of them relying on **imports** (on average a quarter of total processed volume)

- ➢ Increasing recycling quotas in the near future seems challenging as the current focus of the industry is on high quality input material
- ➢ Processing the remaining material of mostly lower quality mixed (plastic) waste will require new investments

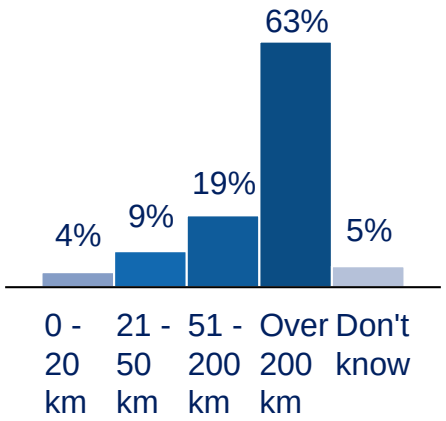
Types of waste processed[1]



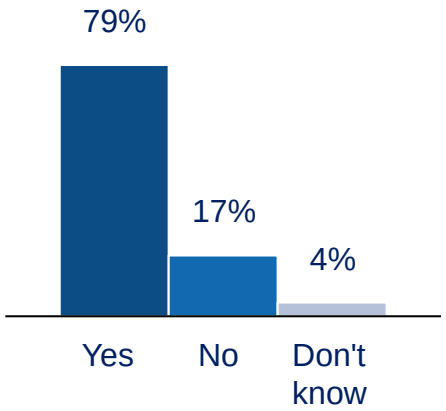
Received input material from a collection service



Radius of collection

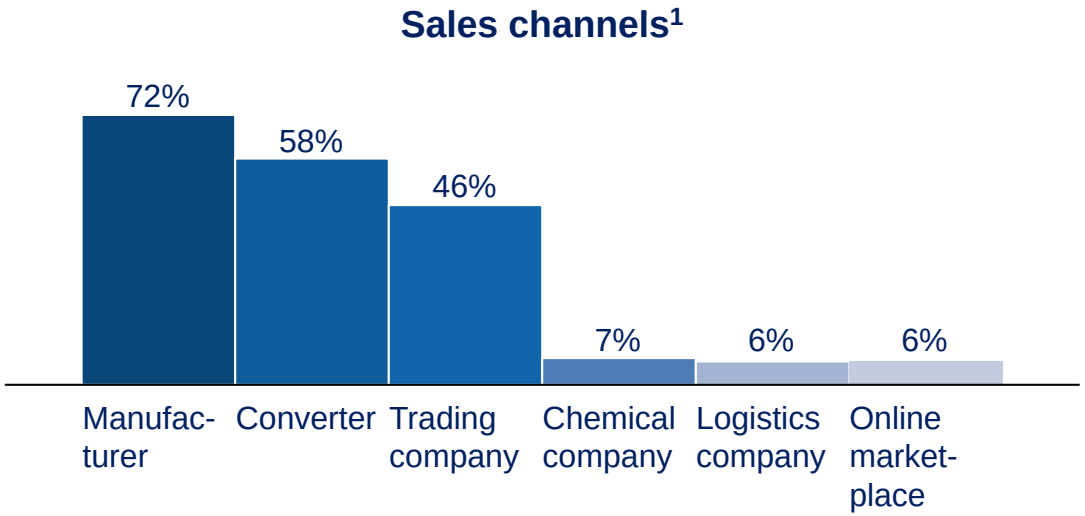


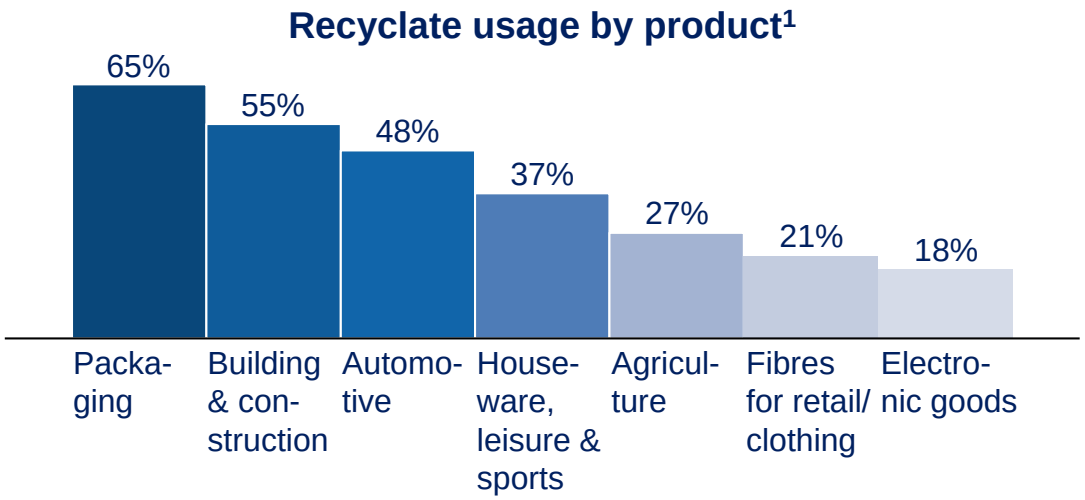
Waste presorted

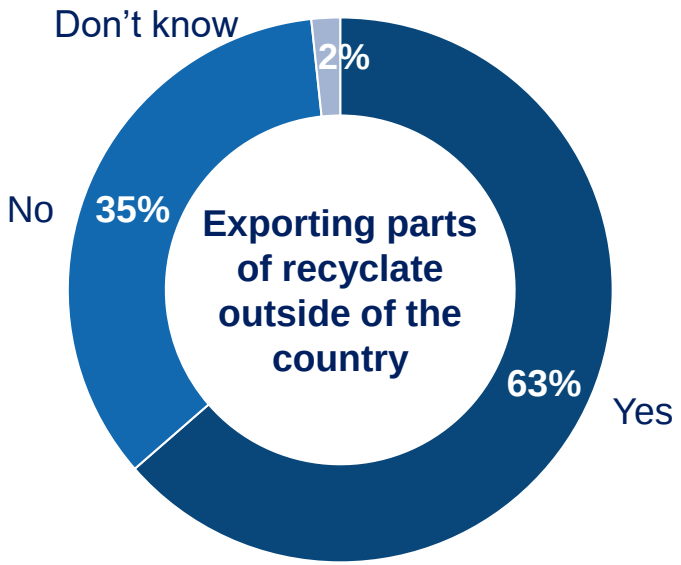


1. Post-industrial = scrap in polymer production e.g. at converter | Commercial = waste in the supply chain e.g. through secondary and tertiary packaging | Municipal = post-consumer household waste

The most recyclate is sold directly to manufacturers and used in packaging as well as building and construction







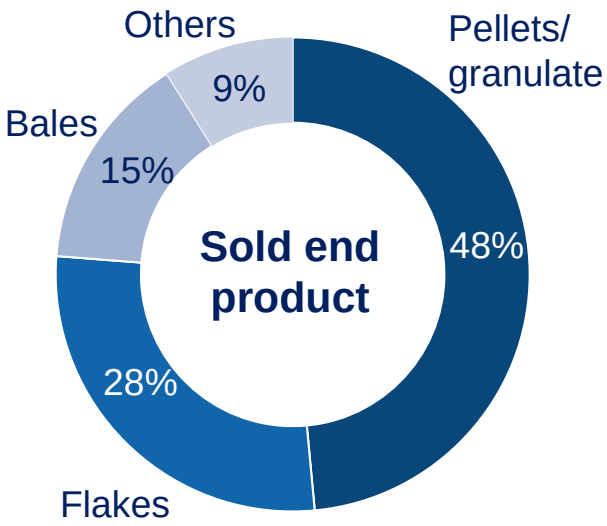
- Recyclers still have mostly **direct sales channels to manufacturers** (72%) and converters (58%), whereas trading companies (46%) and logistics companies / marketplaces (6% each) are used less frequently
- **Over 65%** of recyclers sell their recyclate for **usage in packaging** followed by 55% in building and construction materials – in particular for lower quality outputs
- **More than half** of the recyclers – especially from emerging markets – **export their recyclate** to other countries

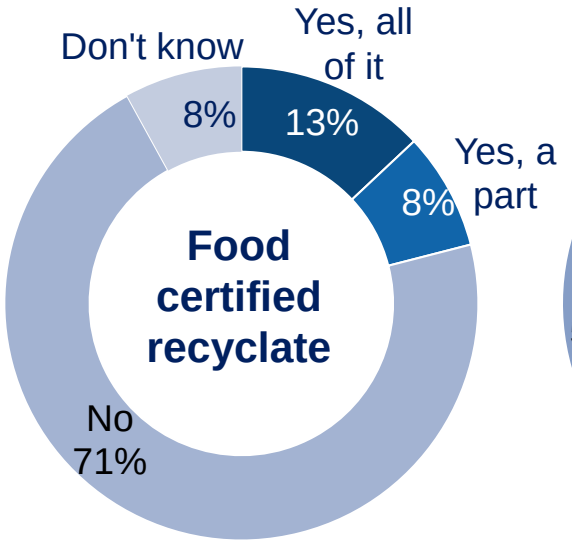
➢ Sales channels seem very established and less flexible due to lacking standardization of recyclate
➢ Markets for recyclate are very international and governed by price paradigm

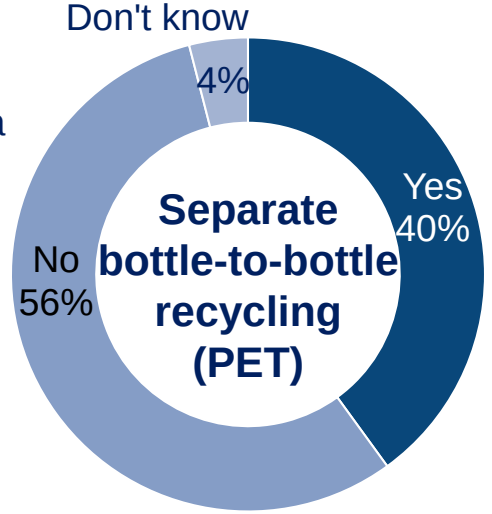
1. Only answers above 5% are displayed

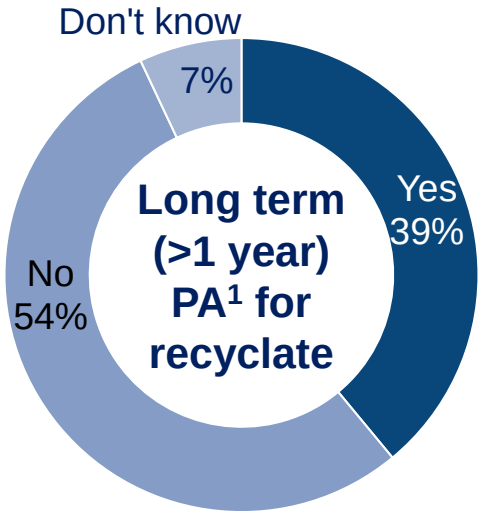
18% of the recyclers' total output capacity is food certified – with PET bottle-to-bottle being an important stream

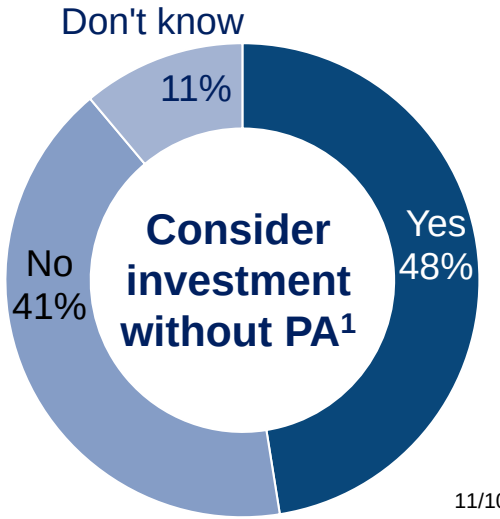
- Almost half **(48%)** of the respondents sell **pellets/granulate**
- 21% of respondents have (some) food certification for their recyclate
- **40%** of recyclers have a **separate bottle-to-bottle line**, whereas the rest recycles PET bottles together with other (PET) waste
- **39%** of recyclers have a long-term **purchase agreements** (PA)
- Half (48%) of all recyclers are committed to **increase their capacity** even **without a PA**







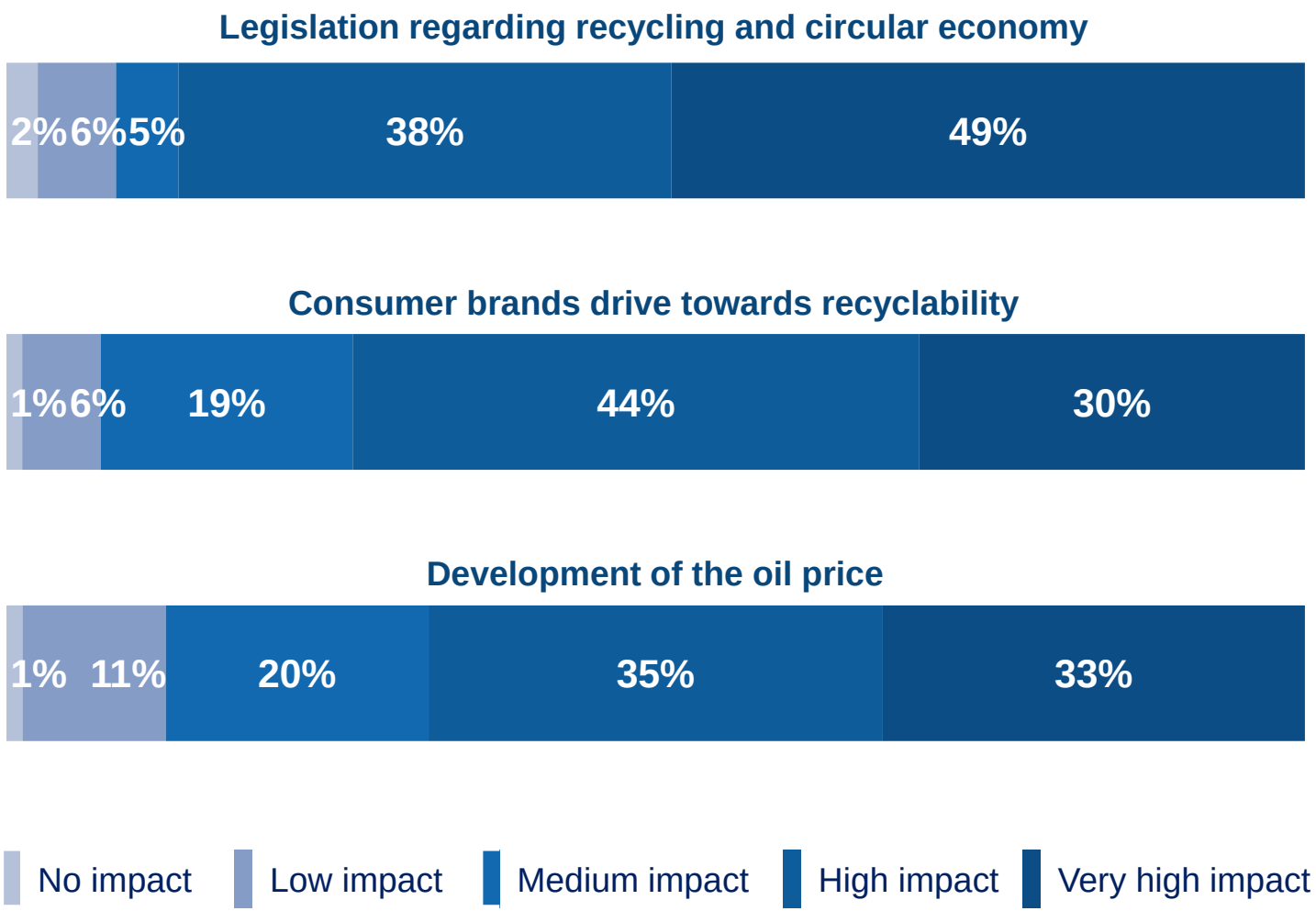




- The high share of recyclers considering investments without a PA suggests that the industry is assuming a rising demand in the years to come
- Investment opportunities seem to exist e.g., for processes that allow for food certification i.e. separate bottle-to-bottle lines

1. Purchase agreement

Legislation is expected to have a decisive impact on the plastics recycling industry in the next 5 years



- The impact of **legislation was ranked highest among all drivers**, concrete examples provided are a plastic tax, export ban and binding targets for recycling and recycle usage
- A **decisive role** is also expected to be played by the **consumer brands' sustainability efforts** and oil price development
- The **direction of the impact** could be either way

Respondents push for stronger regulation and standardization

"A voluntary self-commitment of the packaging industry is not enough - legal framework conditions are necessary" - Germany

"Voluntariness in industry never works. The price of oil will be so low for years to come that a recycling industry will never be competitive with a linear economy." - Switzerland

"The framework conditions must urgently be put in place so that the circular economy can exist even in difficult economic phases! At present, all the foundations for this are lacking - except for the PET beverage bottle." - Austria

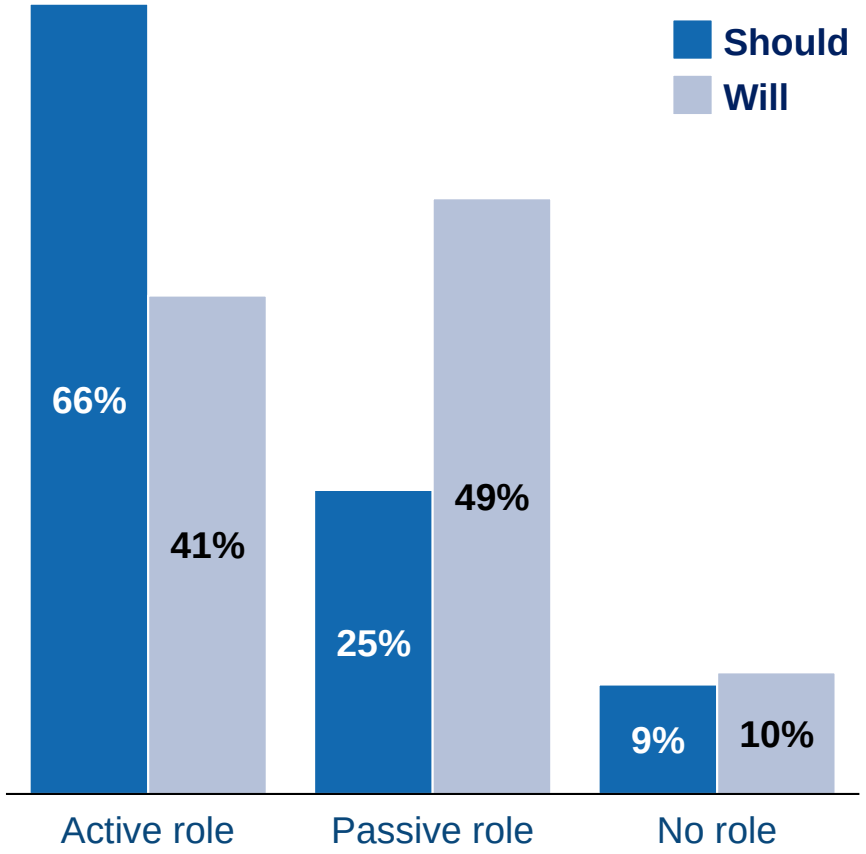
"We must not demonize plastic, it's an infinitely recyclable material. The day we see a bottle with its own legs going to the sea, we'll have to worry. Until then we have to standardize the treatment of plastic waste as a resource across the planet" - Italy

"Create clear conditions with foresight and enough realism to avoid possible recycling bottlenecks beforehand" - Germany

"Activate existing laws on environmental management and most importantly, engage and encourage businesses that are into the system of recycling" - Ghana

Respondents hope for an active engagement of the policy maker but have low expectations

Role of regulatory system



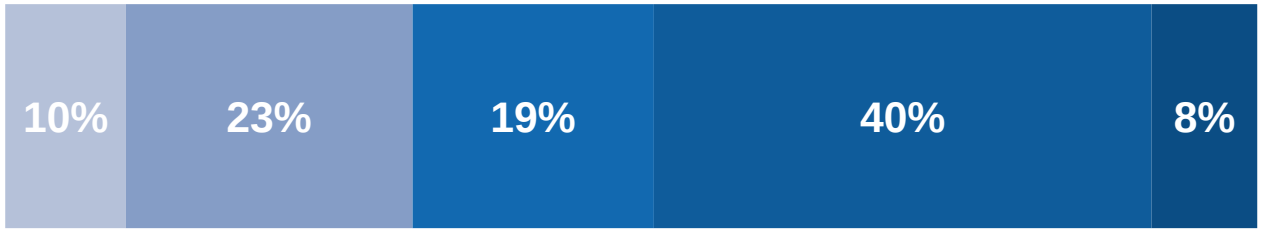
- 66% of recyclers (esp. in Europe) would hope for an active role of the regulatory system, but **only 41% believe this will happen**
- A minority **wants and expects policy to remain silent** – this contradicts our report from 2018 in cooperation with CEFLEX[1], where stakeholders along the value chain advocated a policy of non-interference

➢ Interventions deemed positive are, e.g. monetary incentives for recycling, control and enforcement of regulations in place, carbon tax and recycling quotas

1. "Closing the loop for multilayer flexible packaging - barrier analysis" - the report can be found on the CEFLEX website

Deep dive EU[1]: While bottle recycled content targets seem achievable, respondents don't think the overall recycling quota will be fulfilled

Achievement of recycled content target in plastic bottles in the EU (25% in 2025, 30% in 2030)



Achievement of recycling quota of plastics packaging in the EU (50% in 2025, 55% in 2030)

Very unlikely | Unlikely | Neutral | Likely | Very Likely

- **48% of recyclers believe** that the targets for the content of recycled material in plastic bottles **are achievable**
- In contrast, **only 17% believe** that the recycling rates for **plastic packaging will be achieved** - and 59% expect them to fail

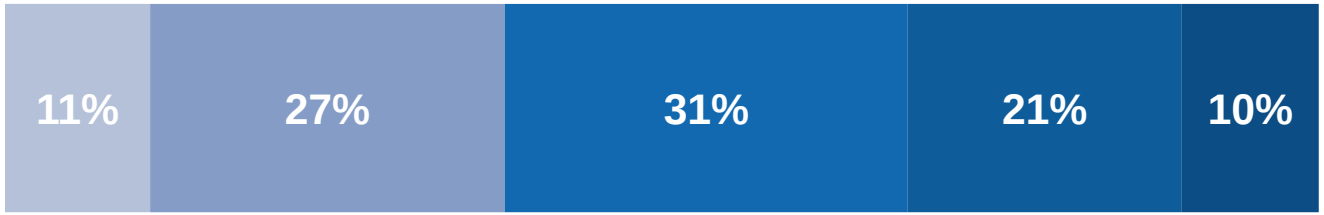
➢ This highlights **the need for an active role** of the regulators to accomplish the set targets and an **improvement of collection and sorting**, which are often the bottleneck processes

1. This part was shown only to respondents from the European Union.

Increasingly critical public perception and COVID-19 measures are expected to have no decisive impact of future industry developments

Increasingly critical public perception of plastics in society

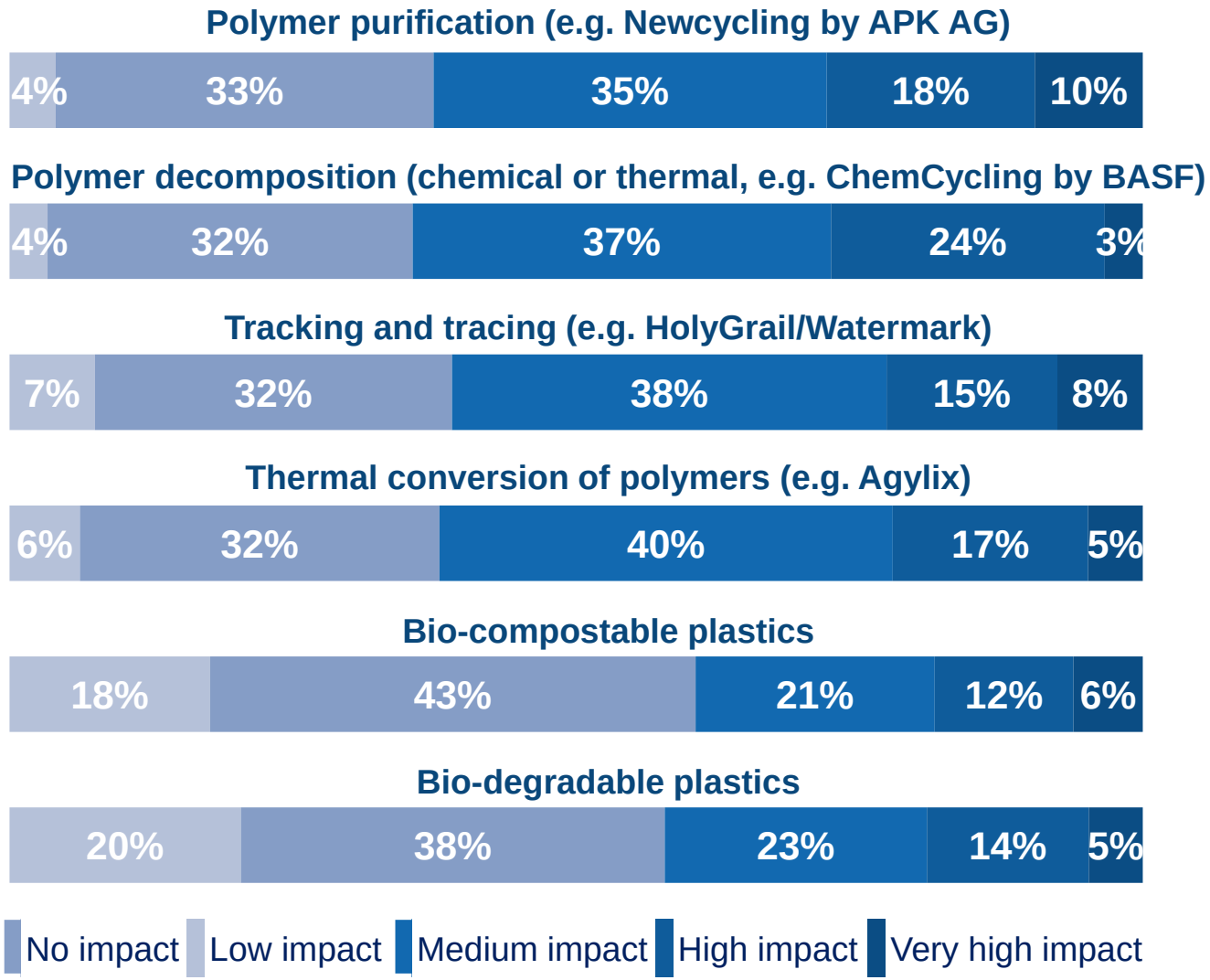
Direction of recovery funds and financial stimulus packages after the pandemic



No impact | Low impact | Medium impact | High impact | Very high impact

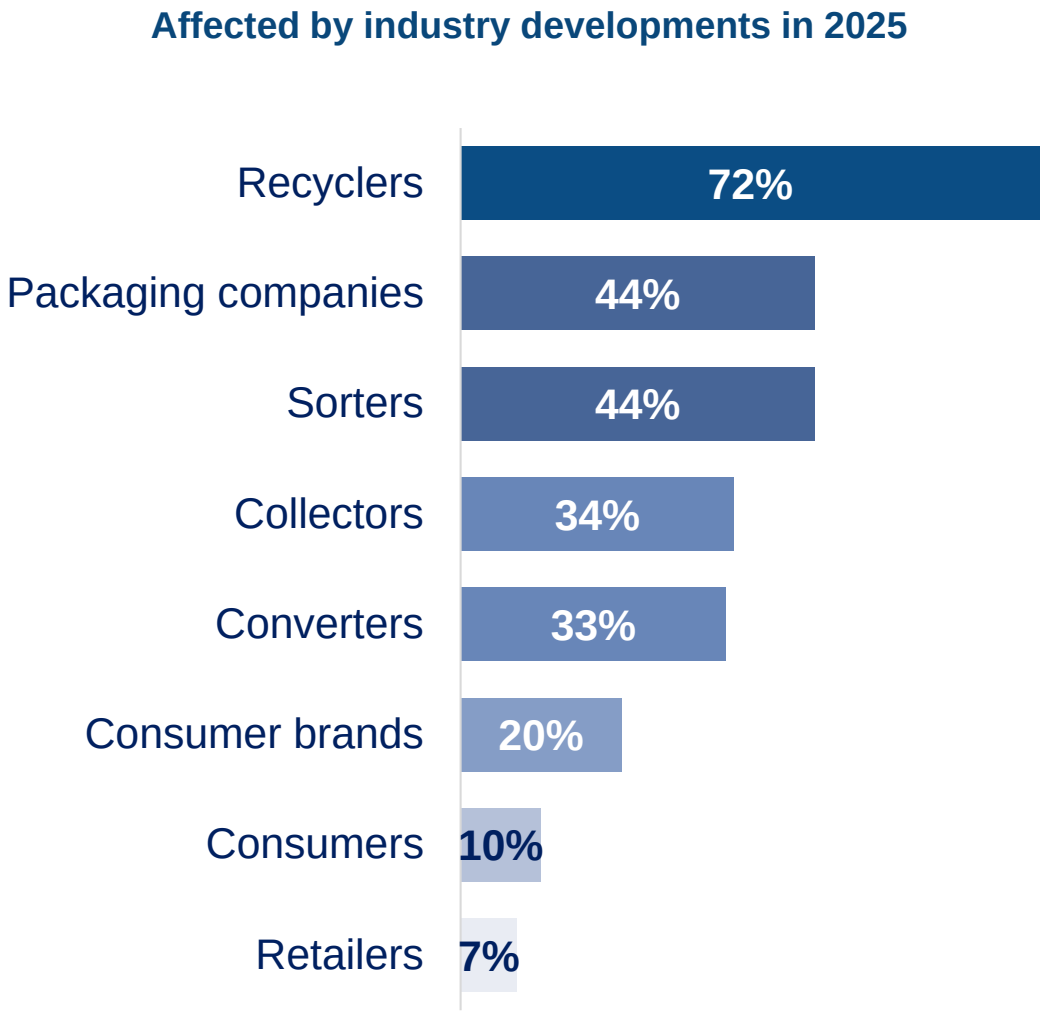
- Although the demonizing of plastic packaging is lamented, the **broader public is expected** to have a **lower impact** than other drivers
- There is not much hope that the recovery funds will have a high impact on the industry development, as many recyclers have **felt left behind in the crisis**

High skepticism with regard to break-through technological innovations in the next 5 years through innovations



- Participants are sceptical as **to what extent different upcoming technologies will impact** the industry, e.g., while chemical recycling is much discussed throughout the packaging value chain, recyclers are **uncertain about its potential**
- Almost «equal hope» is put on tracking, thermal conversion, decomposition and purification
- **More than half** of the respondents don't believe that the industry will change much due to **innovation in the realm of bio-degradable and bio-compostable plastics**

Recyclers see themselves most affected by the foreseen industry developments in the upcoming years, with consumer brands off the hook



- The **entire industry** is **likely to be affected** by the anticipated developments in the next years
- **Recyclers** assume they will be **impacted the most** (72%), with sorters and packaging companies coming in second place (44% each)
- Retail and consumers are declared the least affected, although they have an important role when it comes to **acceptance and adaption of behavior**

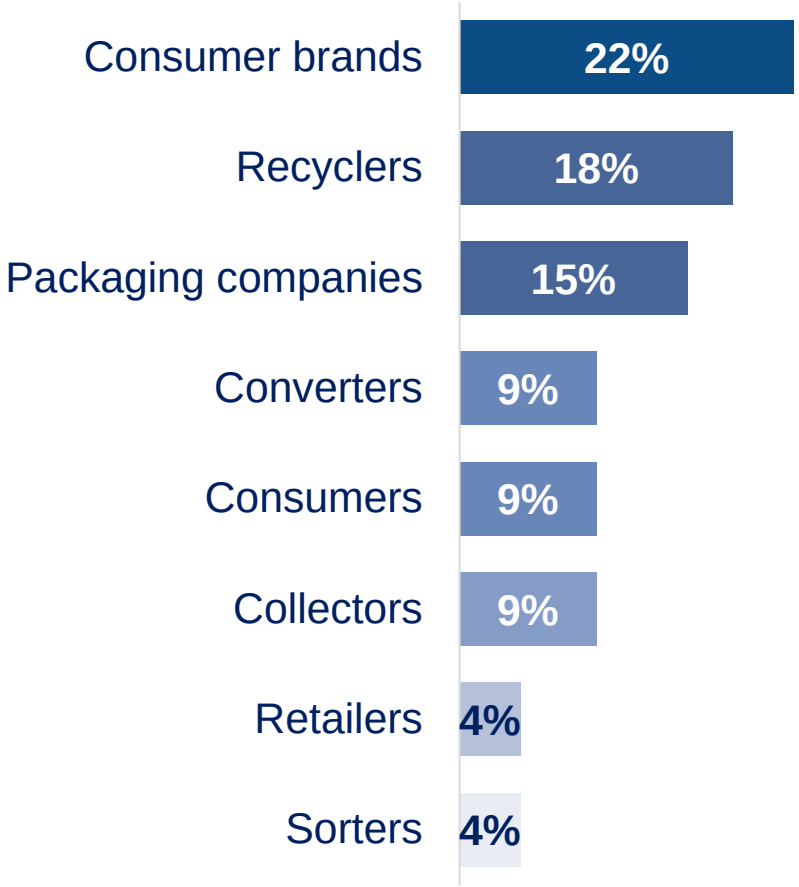
"If the export ban comes, we will be flooded with waste (as we don't have the capacity for it)"

"Design for recycling has to be valued higher than cost"

"Collection & sorting are critical to achieve high value material"

However, brand owners and recyclers have the biggest lever to achieve circular plastics in the next 5 years

Biggest lever for circular plastics in the next 5 years (single-choice)



- **Brand owners have the most power** to drive change by demanding sustainable packaging for their products – and they can benefit from a greener image
- In turn, **investments in new recycling technology** can reduce the loss of material of existing packaging

> ***"The consumer brands can set recycling quotas in the product for their suppliers"***
>
> ***"Consumer brands set consumer's expectations and create demand. With the proper demand, manufacturing capabilities and capacities will be added."***

Sebastian Kahlert **Dr. Catharina Bening** **Prof. Volker Hoffmann**

Group for Sustainability and Technology

plastics-recycling@ethz.ch

ETH Zurich
D-MTEC
Weinbergstraße 56/58
8992 Zurich, Switzerland
www.sustec.ethz.ch