

Recycling and Refinement of Plastics



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Regional Sales Manager

Starlinger recycling technology

Agenda



Starlinger key data



Starlinger's Polyolefin super cleaning for food-contact & odor reduction applications



Starlinger's technology for PET recycling for food-contact applications



Other examples of post-consumer recycling

Starlinger key data

Starlinger – Key Data



World market leader in the fields of **woven plastic packaging, PET recycling** and **refinement**



Founded 1835 in Vienna (headquarters)
Production sites in Weissenbach/Austria, St. Martin/Austria, Schwerin/Germany and Taicang/China

Sales & Service Centers in **11 countries**



Approx. **860 employees worldwide**
(710 in Austria)



Annual turnover 2024/25: approx. **EUR 356 mio**
Export quota: over 99%



Starlinger **customers in over 130 countries**
produce approx. 40 billion sacks per year
3,7 billion kg of recycling material per year

Company Structure - 3 main divisions:



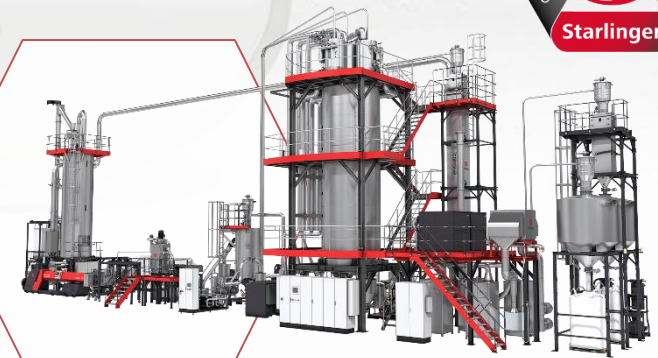
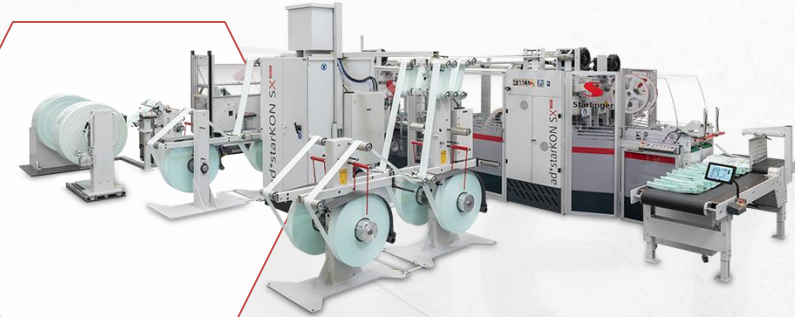
textile
packaging



recycling
technology



viscotec



Starlinger Branch Offices Worldwide

Austria:

- Vienna (Headquarters)
- Weissenbach (Office & Factories 1 & 2)
- St. Martin (Office & Factory)

Germany: Schwerin (Factory)

Russia: Moscow (Office)

Uzbekistan: Tashkent (Office)

India: New Delhi (Office)

China: Taicang (Office & Factory)

Thailand: Bangkok (Office)

Indonesia: Surabaya (Office)

South Africa: Johannesburg (Office)

Nigeria: Lagos (Office)

USA: Fountain Inn (Office/Showroom)

Mexico: Morelia (Office)

Brazil: Holambra (Office)



+ more than 40 agents worldwide

Why should I invest in high-end recycling?

Market drivers & trends for post-consumer recycling

- **Growing consumption** of plastic
- **Governmental goals & quotas, scrap plastic export regulations**
- **Demand from brand-owners** (i.e. food & drinks, household & bodycare)
- **TO EARN MONEY!**

Quality on the rise:

- **Food-contact quality** even for non-food-contact applications
- **Pellet odor reduction**

Increase quantity:

- **Develop circularity** i.e. PET btb; HDPE btb; HDPE ctc; Big Bag/FIBC recycling
- **Improve circularity** i.e. PET bottle collection - Deposit Return Schemes



Source: Plastic Bank (LinkedIn)

Application Portfolio recycling **technology**

post-industrial scrap

woven bags



film



post-consumer scrap

PET flakes



fibre & nonwovens



specialities



odor reduction



recoSTAR product line

recoSTAR direct



- for heavy regrind (> 300 g/l)

• Output 130 – 2.000 kg/h

recoSTAR dynamic



- for hygroscopic and humid materials

• Output 400 – 3.000 kg/h

recoSTAR universal



- for hard to grind and dry materials

• Output 150 – 850 kg/h

recoSTAR PET + SSP



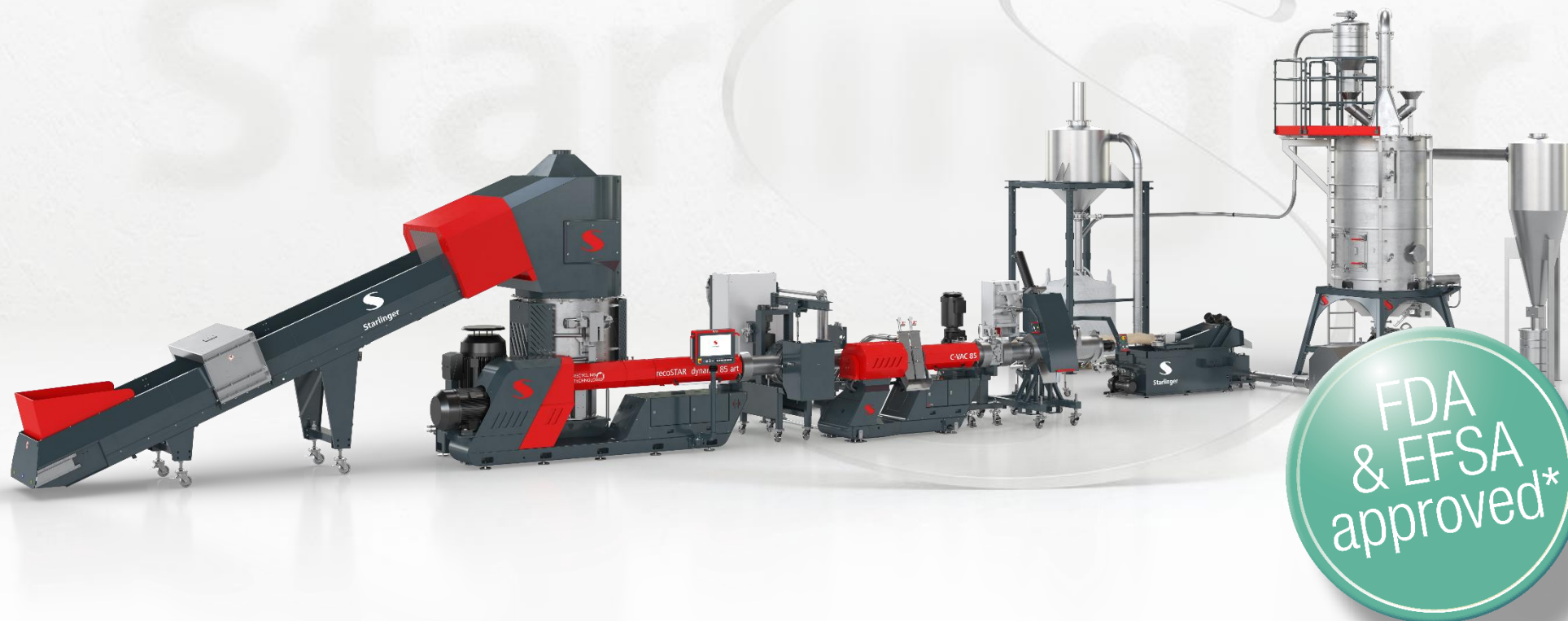
- for PET-flakes, for bottle-to-bottle and bottle-to fiber, IV-increase + decontamination ⇒ food contact approvals

• Output 1.000 – 4.500 kg/h

Starlinger's Polyolefin super cleaning for food-contact & odor reduction applications

- Odor reduction (non food-grade)
- Bottle-to-bottle (food-grade)
- Cap-to-cap (food-grade)

recoSTAR dynamic **art** PCR with PCU**plus**

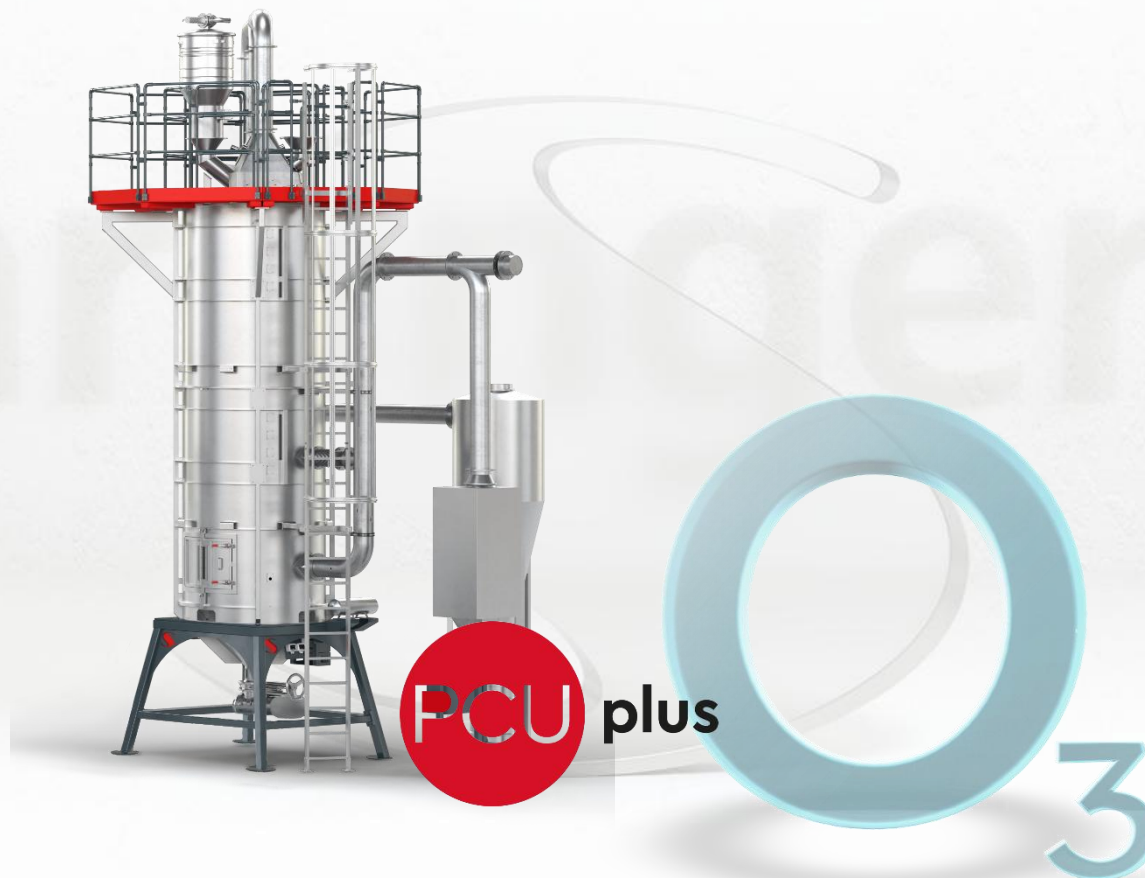


*Under Commission Regulation (EU) 2022/1616, Novel or Suitable technology for PET, HDPE, PP, PS.
Depending on process, input material and application.

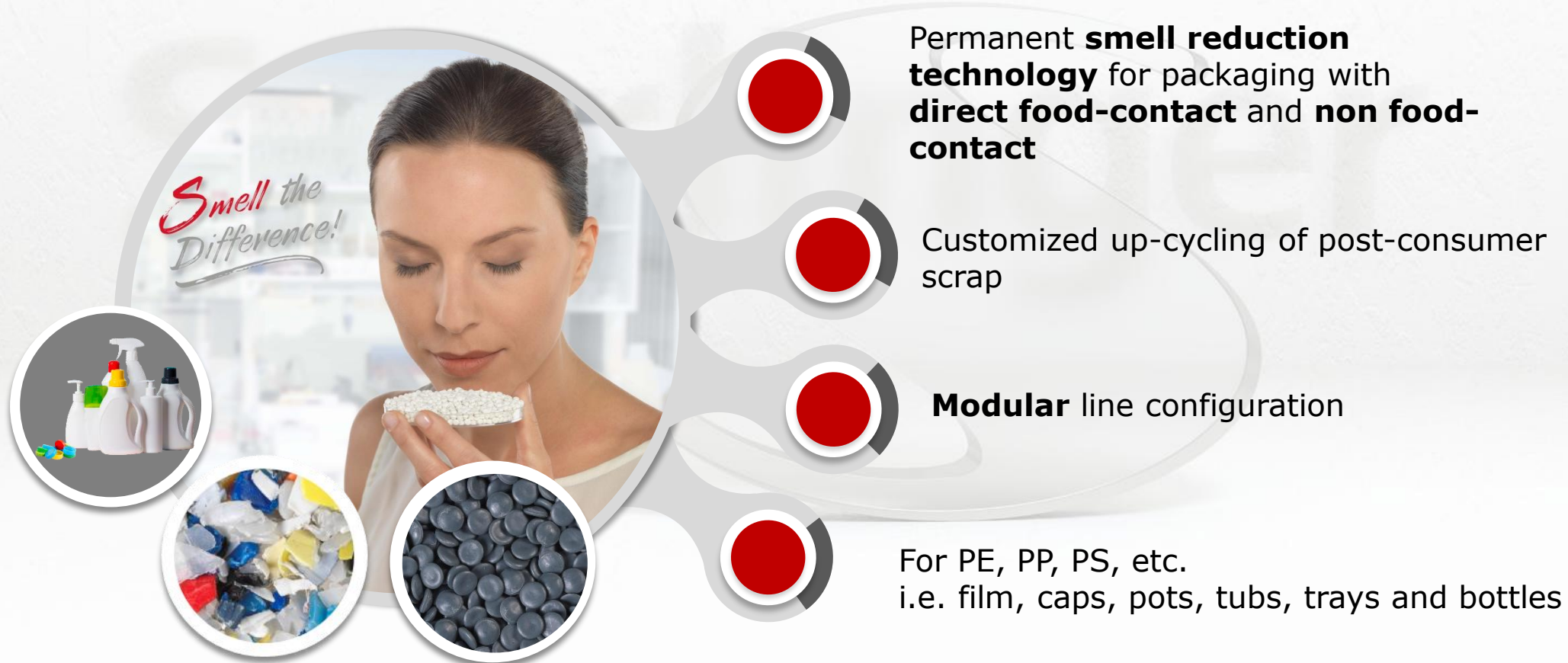
PCU**plus**

(Pellet Conditioning Unit**plus**)

- + **plus** efficiency
- + **plus** deodorizing
- + **plus** supercleaning
- + **plus** capacity

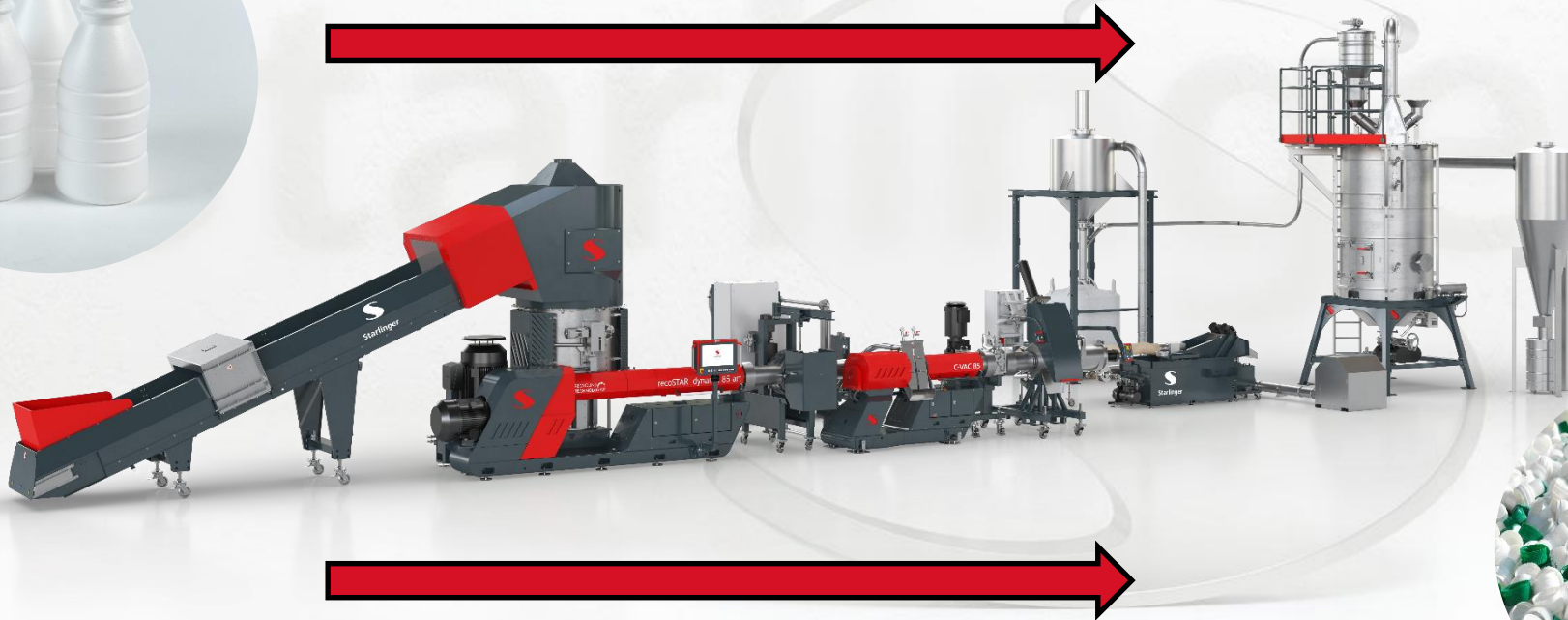


Odor reduction



Polyolefin food-contact applications

HDPE 100% bottle-to-bottle



HDPE & PP 100% cap-to-cap



and other applications

Starlinger's technology for PET recycling for food-contact applications

- Bottle-to-bottle



Starlinger



Starlinger PET bottle-to-bottle: recoSTAR PET art

- Market launch: K-show 2022
- Sold capacity to date: 2,713,750 tpa
- US FDA LNO: 2023
(before operated with LNO from 2010)
- Approved by major brand owners
- Technology approval for recoSTAR PET art (Sept 2023)

output

+15%

energy

-25%

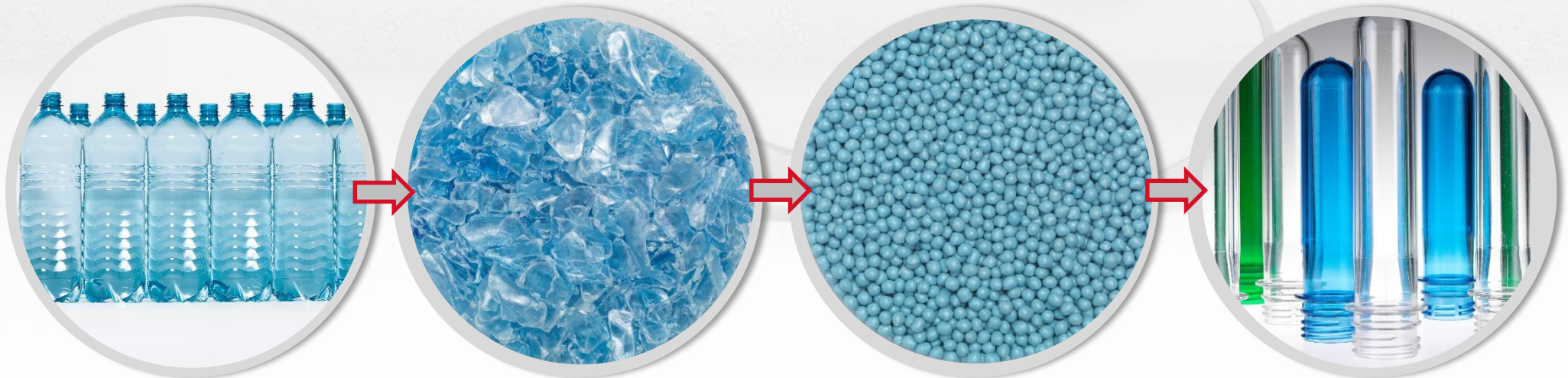
maintenance
-46%

footprint

-21%

PET bottle-to-bottle recycling

- Outstanding **food-contact decontamination**
- **Adjustable iV increase**
- **Low energy consumption**
- Small foodprint
- Convenient operation & maintenance



- Since the **beginning of 2020**, all **PET bottles** have been produced from **100% recycled bottles**
- **By 2025**, all **foils and labels** will be made from **100% recycled material**
- **In the future**, **beverage crates** will also **go through a recycling cycle**



Amandina Bumi Nusantara (ID)



- **100% rPET bottles** (cap bottle and label excluded) **premiere in Indonesia, launched in June 2023** for
 - **Coca-Cola, Fanta, Sprite size 390ml**
 - **Sprite Waterlymon size 425ml**
- **Coca-Cola Europacific Partners Indonesia aim to collect 100%** of their plastic bottle packaging **by 2030, 100% of their packaging are recyclable by 2025, eliminate virgin plastic in plastic bottles by 2030**
- These goals align with the **Indonesia's commitment to reduce waste by 30% and reduce marine waste by 70% by 2025** in **addressing plastic pollution**



Foto: Courtesy Amandina ID

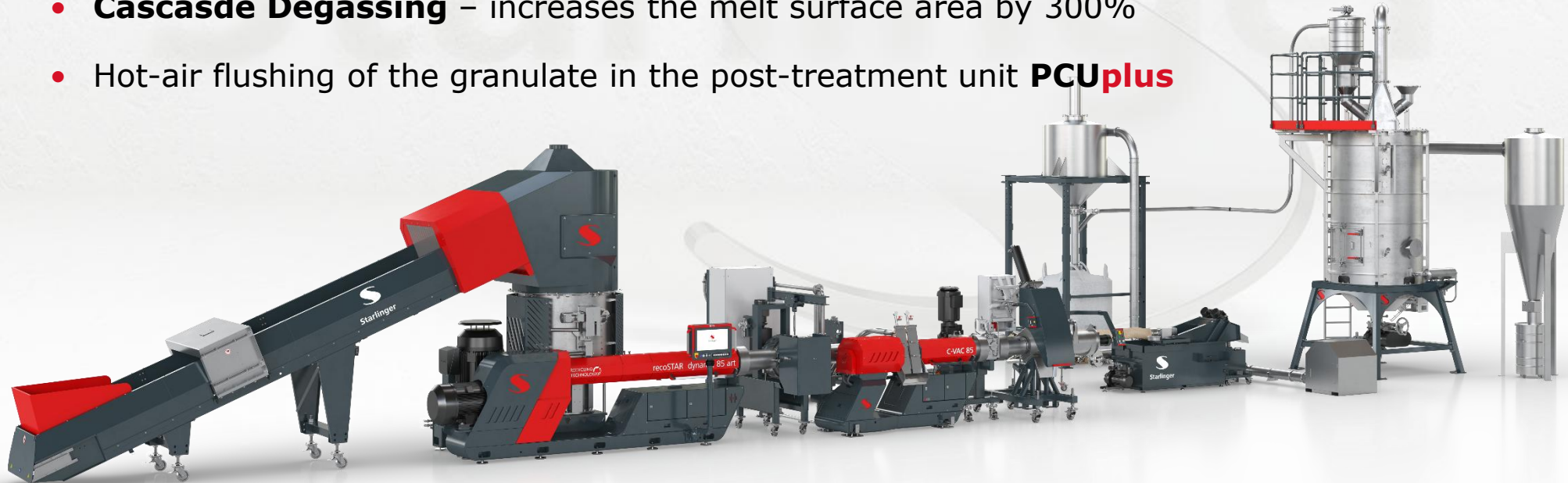


Foto: Courtesy Amandina ID

Other examples of post-consumer recycling

recoSTAR dynamic **art** PCR with PCU**plus**

- SMART Feeder with **Dynamic Automation Packageplus** and Spin Feed Technology
- Positioning of the **melt filter upstream** of the **degassing unit**
- Melt filter for the continuous removal of solid impurities
- **Cascade Degassing** – increases the melt surface area by 300%
- Hot-air flushing of the granulate in the post-treatment unit **PCUplus**



HDPE detergent bottles recycling

- **Challenges** due to **high contamination, mixed polymers/colors** and **smell**
- Permanently **smell improved** pellets **without additives**
- **HDPE detergent bottle made from 100% odorless pellets**



recoSTAR dynamic **art** for PES fibre applications



- **Smart Feeder** with **dry air purging**
- Optional side feeder for PET bottle flakes
- **High-vacuum degassing**
- **Cascade filtration** with piston filter or sleeve filter
- Underwater or strand **pelletizing**
- **Optional viscosity increase**

rPET bottle flakes in fibre applications

Repreve®: High-quality, recycled fibers are made from 100% recycled materials, including post-consumer PET bottle flakes and textile production waste.

**The eco-friendly option:
conserving virgin material, water and energy, reduction of CO₂ footprint**



Starlinger recycling technology

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Thank you!!!