

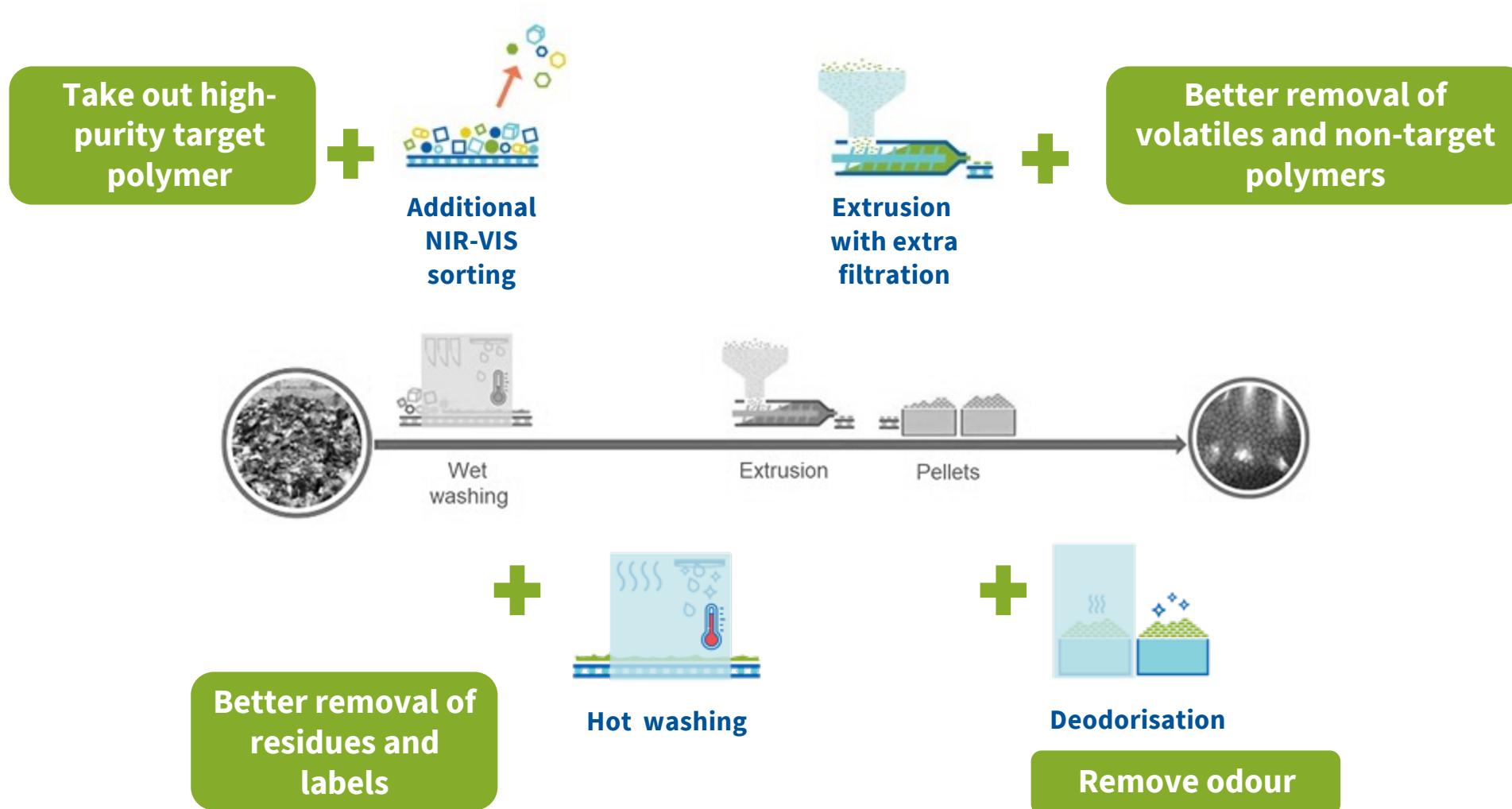
A **Q**uality **R**ecycling **P**rocess for household flexible plastic waste

A new approach to emerging market demands

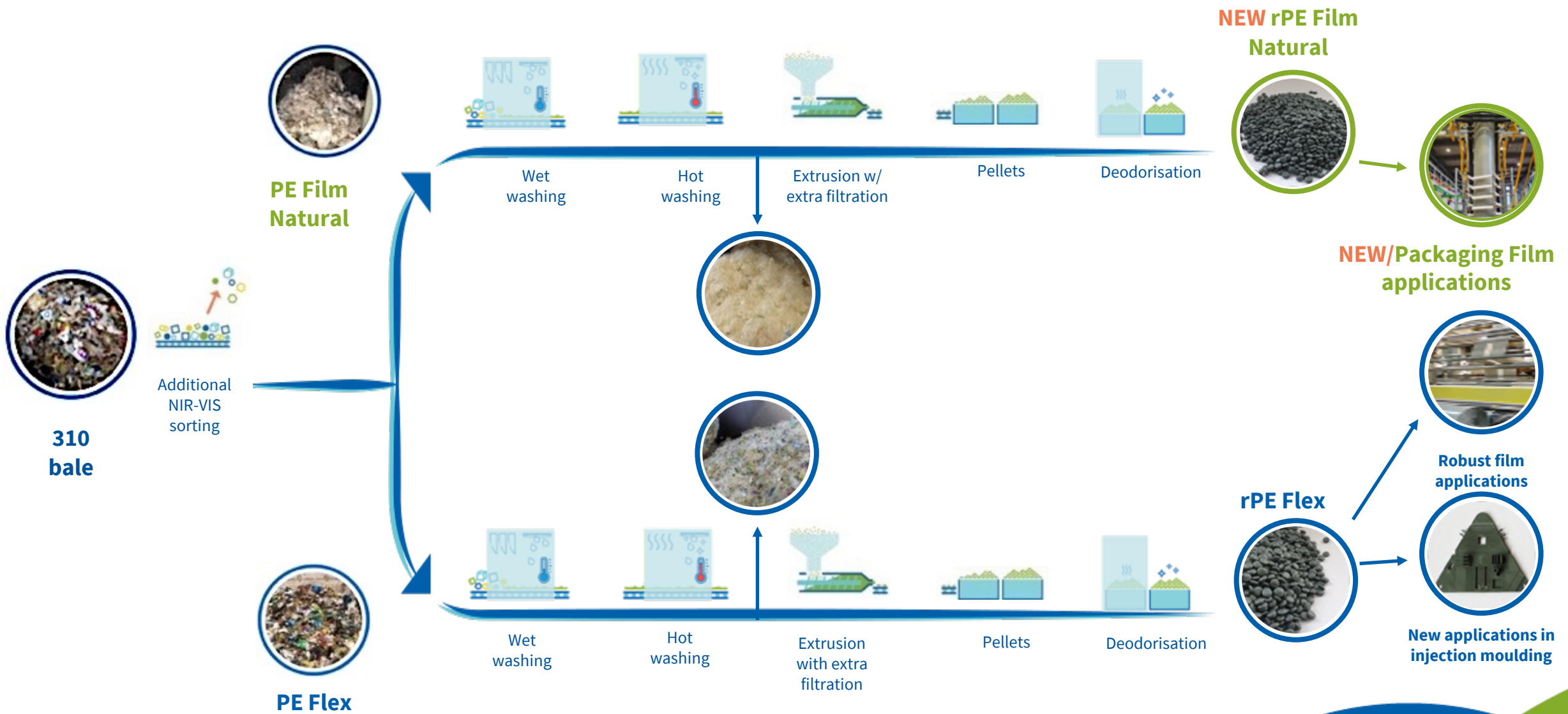
Focus on end applications

QRP: Increasing quality with 4 extra steps

Each step is implemented at min. one plant in EU but the 4 are not yet all implemented at the same plant



Quality Recycling Process –310 Tier 1



QRP makes resulting **rPE Film Natural** fit for demanding film applications

Benchmark (value 1) = commercial **virgin PE film grade**

rPE Film Natural:

- Improves on current **rPE 310** on key properties, so that it can be used in more demanding film applications
- Approaches much better the properties of **rPE from C&I**



Sources:

- Virgin and C&I: commercial TDS values
- rPE Film Natural: lab testing UGent (2021) on semi-industrial (10T, Q2 '21)
- rPE310: CEFLEX test reports 2019

Good performance on shrink films

30% rPE content as tested



Converters: Plastotechnica, RKW; 500kg rPE for each trial; Q3-4 2019

Mono-material sealable pouches rPE film natural - 30% rPE content



QRP expects **rPE Flex to remain** fit for robust film applications and provides an optional outlet for surplus tonnages to flexible injection moulding

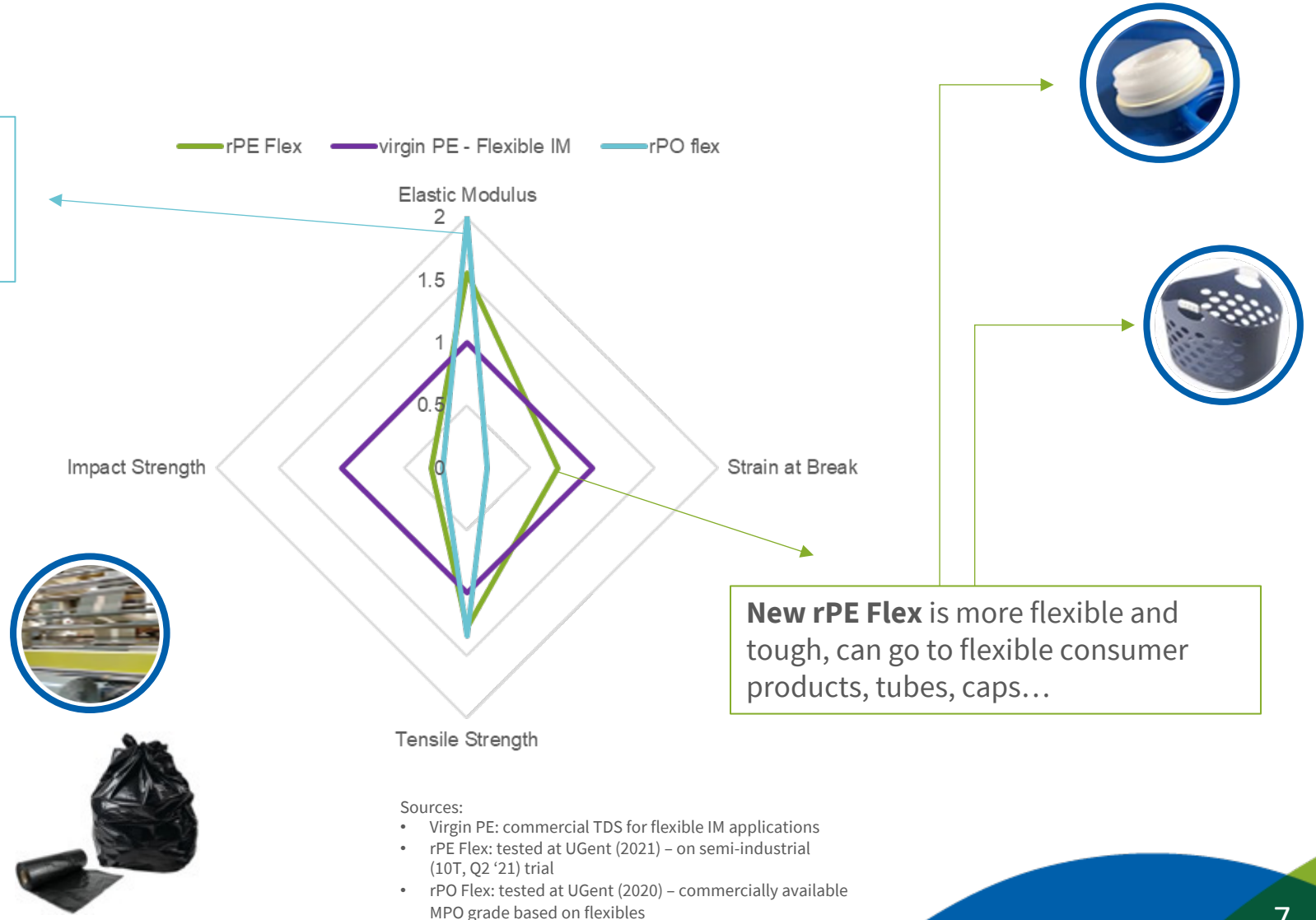
Existing rPO Flex

- Adequate for robust recycling (e.g. street benches); **saturated market**
- Typically too rigid and brittle for flexible IM



rPE Flex

- Can be blown to film (proven in lab and industrial trial)
- Next: can it be used (blended up) for robust film applications the same as current-day rPE 310?

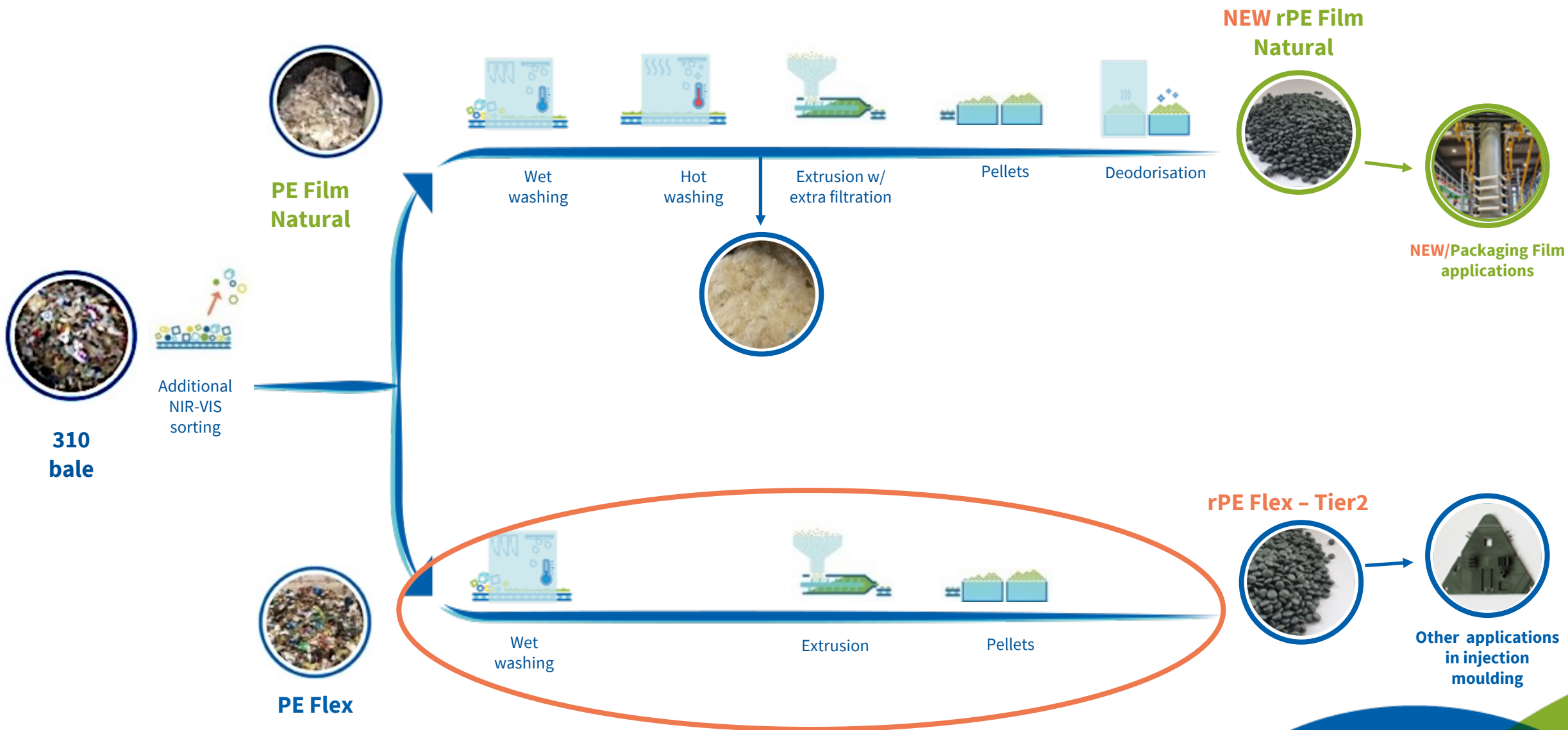


Garbage bags 100% rPE Flex

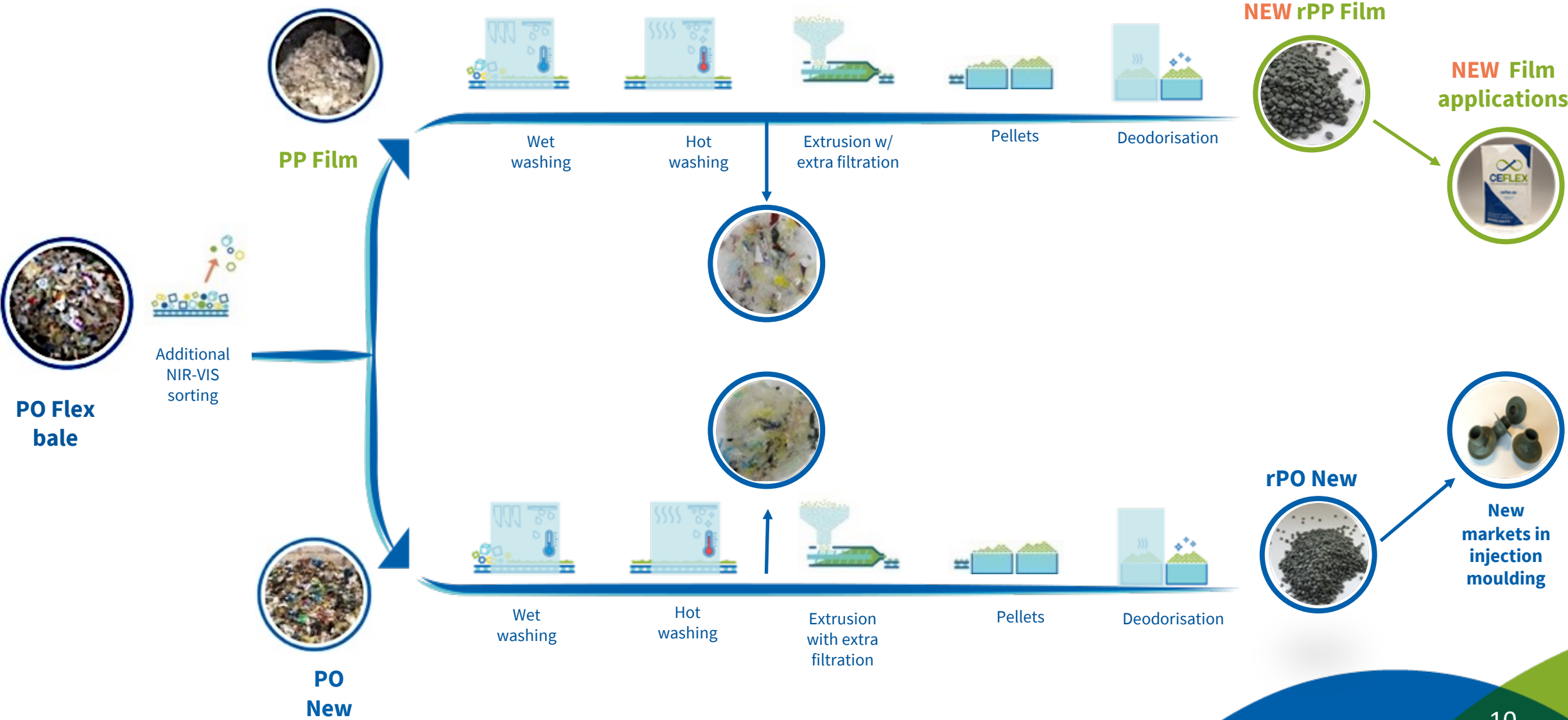


**Converter test –
industrial scale, 100 kg
rPE Flex, Q2-3 2021**

Quality Recycling Process –310 Tier 2 approach



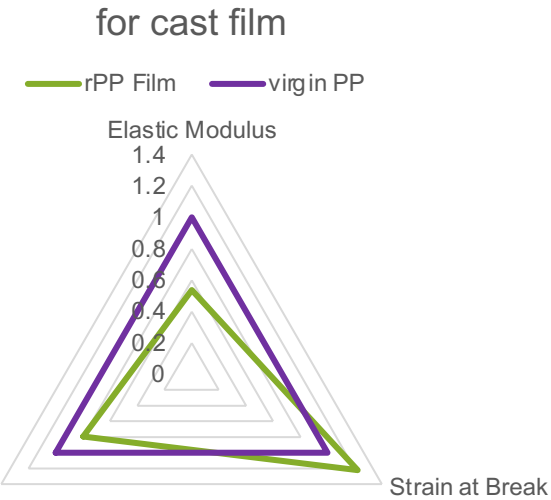
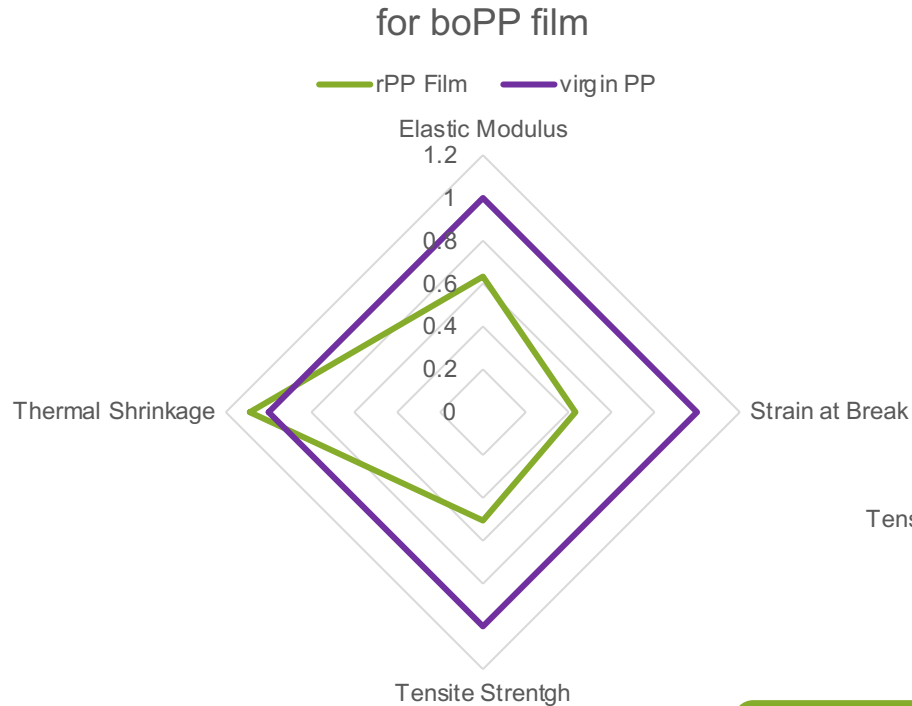
Quality Recycling Process – PO Flex Tier 1



QRP makes resulting **rPP Film** fit for demanding film applications



Taghleef Industries /
SIT trials



Brückner trials

rPP Film opens new quality end markets
for recyclates from the PO Flex bale

Sources:

- Virgin: commercial TDS values
- rPP Film Ceflex Test Reports, 10T, Q3 2020

Mono-material PP standing pouch

23% rPP content



STRUCTURE	
	STRUCTURE
	BOPP coex 20 µm
	Ink
	Adhesive
	rPP white voided 40 µm

Converter Taghleef Industries: BOPP with rPP
 Converter SIT: pouch
 800kg rPP, Q3-4 2019

Wrap Around Labels – 32% rPP



Converter Taghleeef Industries: BOPP with rPP
800kg rPP, Q3-4 2019
Converter EMSUR: labels
Q2 2021

[Packaging Europe Webinar](#)

Pressure Sensitive Labels – 32% rPP



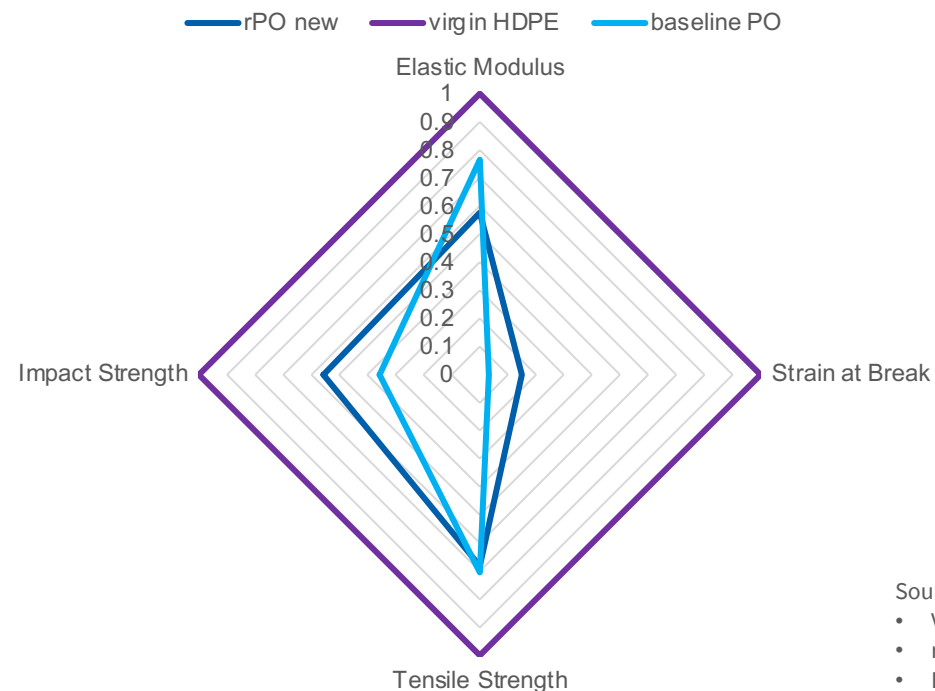
Converter Taghleef Industries: BOPP with rPP
800kg rPP, Q3-4 2019
Converters labels: Avery Dennison & CCL
Q2 2021

End markets for **rPO New** under development...



Injection moulding applications

rPO New is remarkably more tough than existing 'MPO'
→ exploring end markets in injection moulding trials in 2021, several proofs-of-concept



UGent trials



Pezy/Omega Green trials

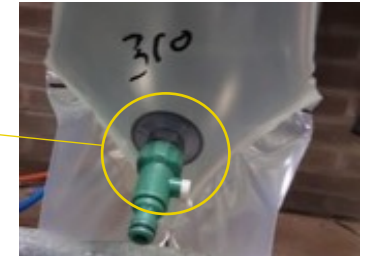
Sources:

- Virgin HDPE: commercial TDS for rigid IM applications
- rPO New: tested at UGent (2021) – 10T semi-industrial trials, Q2 '21
- Baseline PO Flex: tested at UGent (2020) – commercially available MPO grade based on rigids

Injection molding –rPE Flex and rPO New

Proven trials for Greenroof tile, cups, finned tube, threaded connector

(validated in functional environment)



Upcoming trials to identified markets...



Containers, Boxes, Pallets

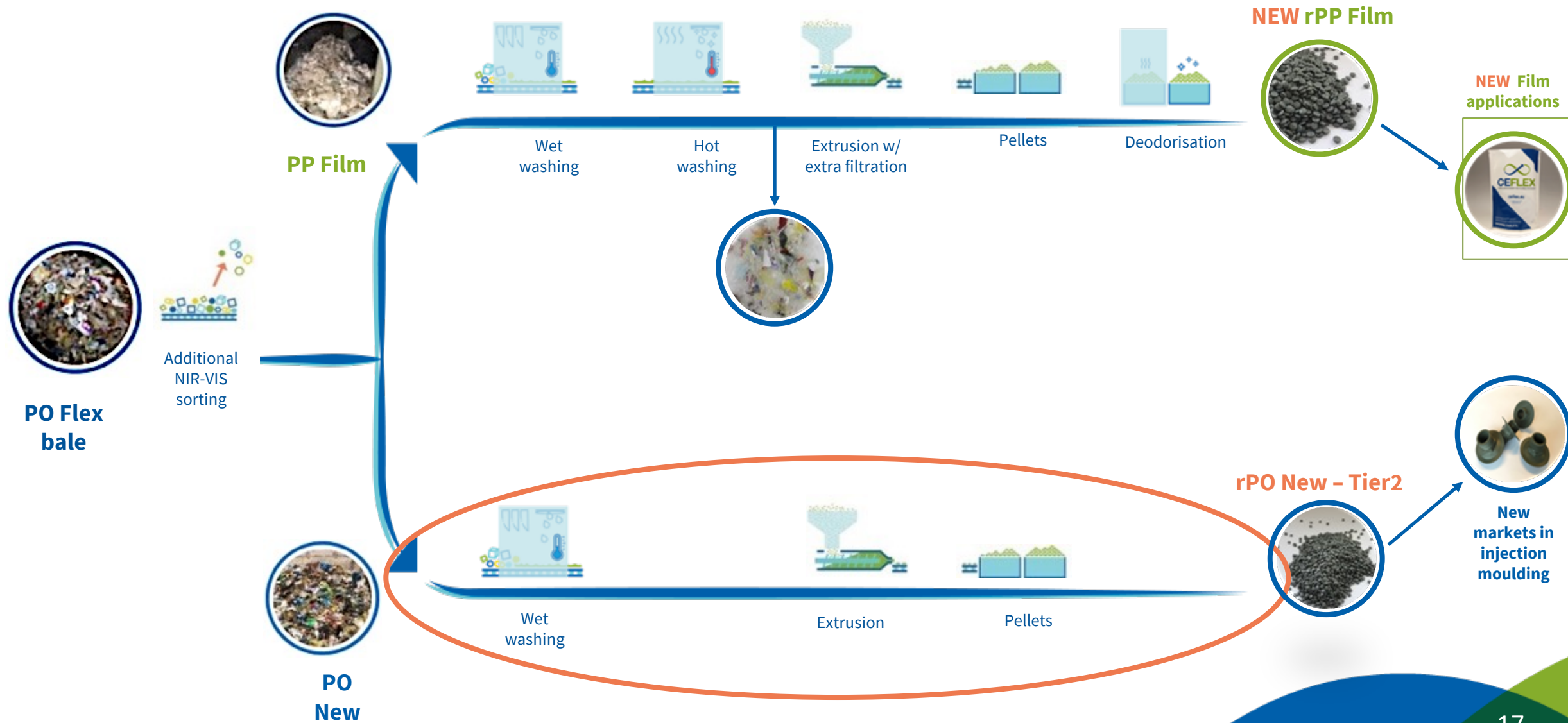


Irrigation Pipes



Home and Gardening

Quality Recycling Process – PO Flex Tier 2 approach



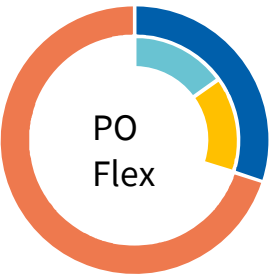
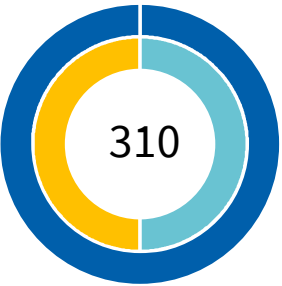
With QRP: flexible plastics reach higher recycling rates and suit higher value applications



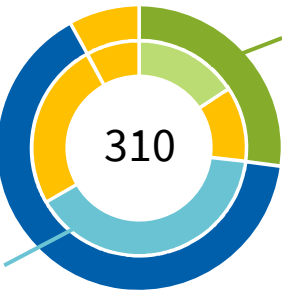
Greater than or equal to recycling rates today

New cleaner, higher quality fractions
fit for purpose into higher value applications

Current situation



QRP



Residues QRP < residues baseline

Residues QRP < exports baseline

- Bales to high quality recycling
- Bales to robust recycling
- Bales to export

- Plastics to high quality recycling
- Plastics to robust recycling
- Residues to EfW

New: rPE film natural



New: rPP film



New: rPE Flex
rPO New



For Current Situation - Source:
CEFLEX stakeholders insight
and country specific data

For QRP - Source:
NTCP Semi-industrial sorting trials – 10T /specification; Q1-2 2021 (Meilo feedstock)
CEFLEX Trials Reports Washing and Extrusion (experimental and semi-industrial scale, 2019-2021)



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