



Eco-efficiency

Low or neutral footprint of materials and applications over their life cycle



Circular economy

Reduce use of resources
Replace scarce and toxic resources
Extend durability of products
Recover materials after (first) use



Safer ingredients

Elimination of substances of concern



Bio-based economy

Bio-sourced polymers able to perform in critical technical components

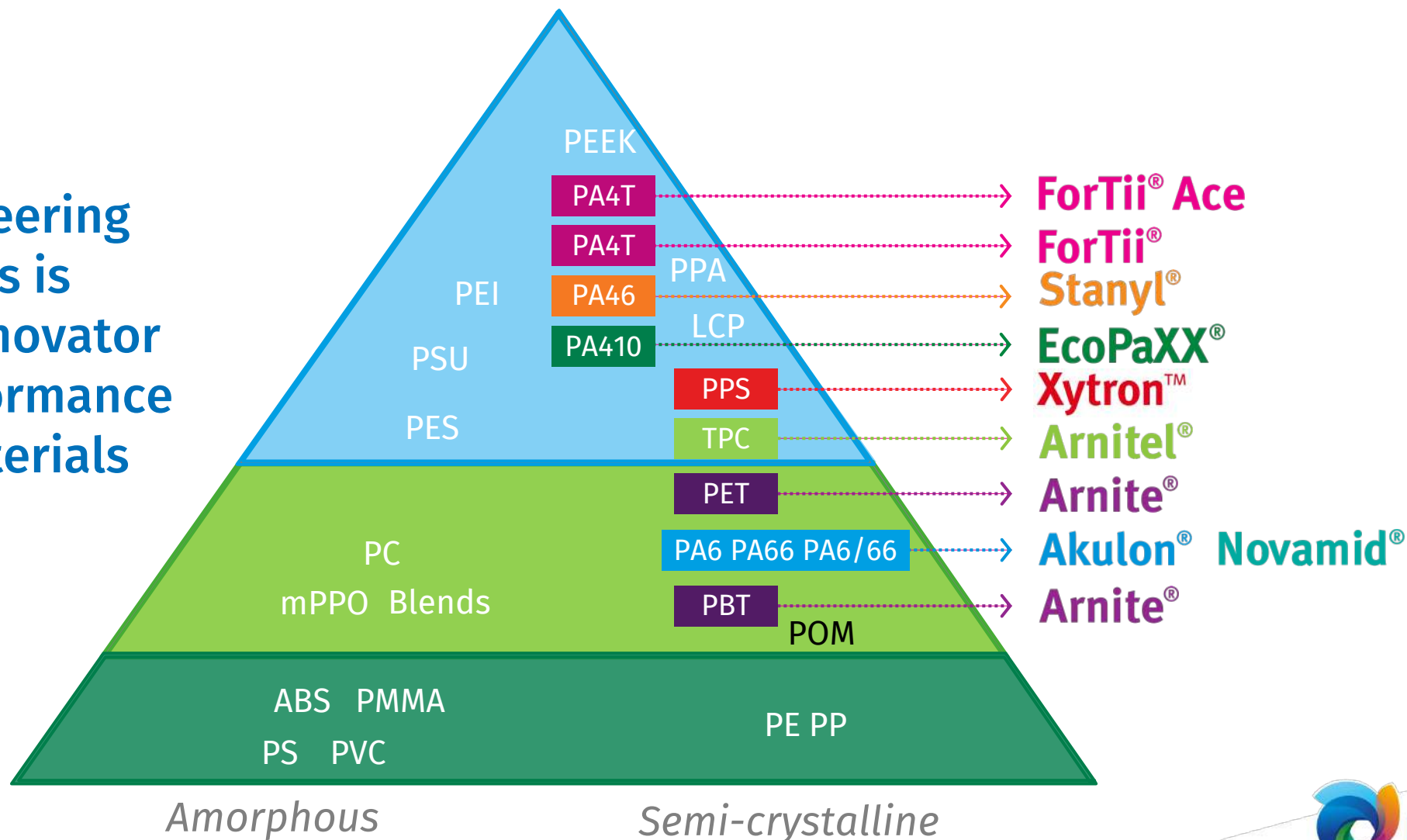
Sustainability and Circular Economy

DSM Engineering Materials – Latest Insights

DSM Engineering Materials

Bright Science in advanced materials

DSM Engineering Materials is a leading innovator in high-performance plastic materials



DSM Engineering Materials

Strong commitment toward **Climate & Energy, Resources & Circularity**

Sustainable solutions



Enabling our customers to design and manufacture sustainable solutions

- Cleaner and safer cars
- Safer ingredients in electronics
- Food waste reduction

Bio-based products



Castor-oil based

EcoPaXX[®]

ForTii[®] Eco

Rapeseed-oil Based

Arnitel[®] Eco

Recycled-based products



Fishing nets: recycled-resources based

Akulon[®] RePurposed

Safer ingredients in our products



Halogen-free flame-retardant grades in PA, PBT, HPM
PVC or PFC-free alternatives

Arnitel XG[®]

Arnitel VT[®]

Renewable electricity in our operations



63% purchased renewable electricity

Pune (India) operations powered by own solar field

Geleen (Netherlands) operations by wind energy

DSM EM 2030 CE ambition:

Offering bio- and/or recycled-based alternatives for our entire portfolio

At least 25% recycled and/or bio-based content by weight in the final product

PA410
EcoPaXX®

TPE
Arnitel®

PA6, PA66
Akulon®

PA46
Stanyl®

PPA (PA4T)
ForTii®

PPS
Xytron®

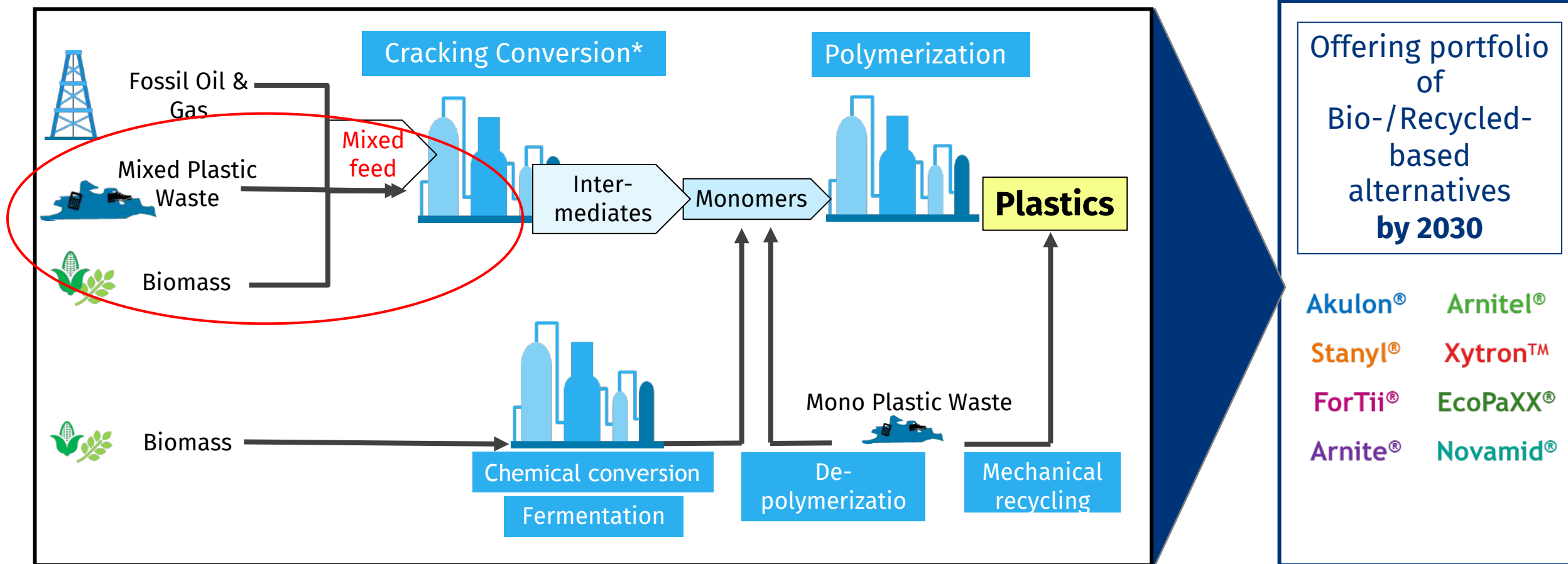
Specialty PA6,
PA66, PA6/66
Novamid®

PBT, PET
Arnite®

- Same functionality as conventional portfolio
- No requalification needed
- ISCC Plus certified



DSM EM 2030 CIRCULAR ECONOMY AMBITION - TECHNOLOGY ROADMAP



Mass Balancing approach is linked to the Mixed Feed into the crackers

Chemical recycling denotes mainly the conversion of mixed plastic waste via Pyrolysis – this **pyrolysis oil** is then fed into the cracker system as part of the mixed feed

Intermediates = Aromatics BTX + Olefins EPB

ISCC plus update

Still various roadblocks ahead

ISCC policy stipulates that **stand-alone warehouses** need to become ISCC+ certified as well ... relevant to us in case we produce in one region and send it over to a warehouse in another region

ISCC policy stipulates that **Distributors and Molders** need to become ISCC+ certified as well ... relevant to us since we deal with >7000 sold to parties

ISCC and RedCert still not exchangeable ... relevant to us in case one of our Intermediate or monomer Suppliers is only RedCert

ISCC uses also **own definitions** for Biobased, Circular and Renewable

ISCC+ Status at DSM

- Various plants and suppliers already ISCC+ certified
- DSM serves already over 7000 sold-to-parties and over 70 distributors
- Certain suppliers are only Red Certified
- Other parties use different definitions

Re-Branding or Re-Coding as way out?

Simplification vs huge additional extra costs



News Release

P254/19e
July 9, 2019

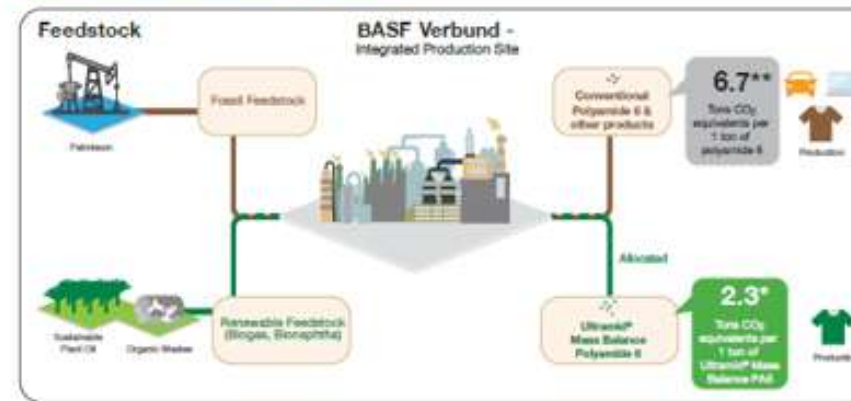
**K 2019 – New products from plastic waste:
BASF customers showcase prototypes made from chemically recycled material**

- BASF's partners in the ChemCycling project: Jaguar Land Rover, Storopack, Südpack and Schneider Electric
- Promising pilot phase, but continued technological and economic challenges as well as need for regulatory development

More and more companies from the plastics industry are working on improving the recyclability of plastics and thus helping to create a circular economy. One way that BASF is contributing is the ChemCycling project: At the end of 2018, the company first used pilot volumes of a pyrolysis oil derived from plastic waste as a feedstock in its own production. At a press conference in advance of K 2019, the world's

Jaguar Land Rover (JLR), a leading automotive manufacturer, developed a plastic front-end carrier prototype for its first electric SUV, the I-Pace, out of Ultramid® B3WG6 Cycled Black 00564. "As part of our commitment to accelerate closed loop manufacturing across our operations, we are always looking for advances in technology that will help to reduce waste," said Craig Woodburn, Global Environmental Compliance Manager at JLR. "The ability to convert consumer waste into safe, quality parts for premium products through the ChemCycling process is an important step in advancing our ambition to deliver a zero-waste future."

BASF Mass Balance approach



Ultramid® Mass Balance
High performance polyamide derived from renewable raw materials

Considerations

- Re-branding/re-coding could avoid the difficulties in implementation towards multitude of distributors and/or molders ???
- Re-branding/re-coding however implies huge additional costs as related to:
 - Stock keeping practices
 - UL Listings
- Re-branding/re-coding also implies lengthy discussions automotive OEMs as related to yes/no re-qualification

BRIGHT SCIENCE. BRIGHTER LIVING.™

