

**‘Circulaire materialen zijn oneindig recyclebaar op een kosten effectieve wijze ’**

**‘Voorkomen van voedselverspilling vraagt effectieve materiaal oplossingen voor voedsel bereiding, conservering en transport’**

Maatschappelijke Uitdaging: ‘Circulaire Economie & Voeding’

Roadmap: ‘High Tech Materials’

## Topsector HTSM:

### - Roadmap High Tech Materials

## RM scope:

- Next generation engineering materials
- Design (functional) meta materials
- Materials for sustainable energy

# Circular & Voeding: maatschappelijke Uitdaging

“Earth overshoot day” 2016 = August 8<sup>th</sup> !!

- Growing population (2 bn growth in one generation)
- Growing average wealth
- Urbanisation => distribution challenge
- Big data supporting low impact/efficient agriculture
- Significant waste in food value chain
- Technical solutions often exist, but need to be made cost effective.

**The future is bright for research on circular materials?**

# More effective Nutrition



# Sustainable materials for food packaging

- ≡ Food packages made out of sustainable (bio)materials are quickly emerging
- ≡ Additional focus on “circular” packaging materials
  
- ≡ Two issues for sustainable bio-packages should be taken into account:
  1. Potential sourcing conflicts with agriculture
  2. Packaging lifetime must exceed shelf life of food content

# High Tech materials to reduce food waste

- ≡ Biodegradable bioplastics with nano-particles to decrease the gas and water permeability of food packages



# High Tech materials to reduce food waste

- ≡ New materials for sealing and closure of food packages to 100% overcome micro-leakages



# Protact ® Game changer for the packaging market



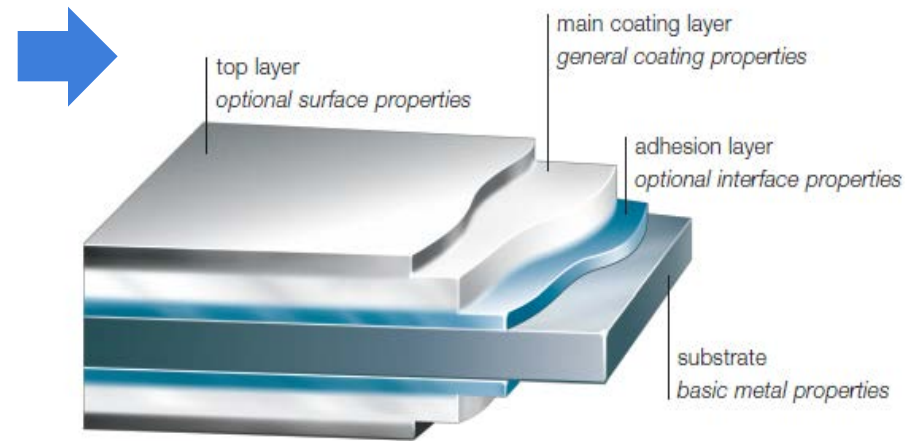


## Protact<sup>®</sup>

Combining the **robustness of steel** with the **versatility of plastic** providing an even **more efficient material solution** for the can

### Protact<sup>®</sup> - A single multi-layered polymer system for a variety of needs

- Up to three layers in a single structure with specifically tuned properties
- Highly flexible during forming compared to lacquered material
- Meets current and future food safety requirements
- Lower Capex for greenfield canmakers
- Enables canmaking at smaller volumes (emerging markets)



- Normally on ECSS substrate, new R&D development replaces this with Cr3 based coating



# High Tech materials to reduce food waste

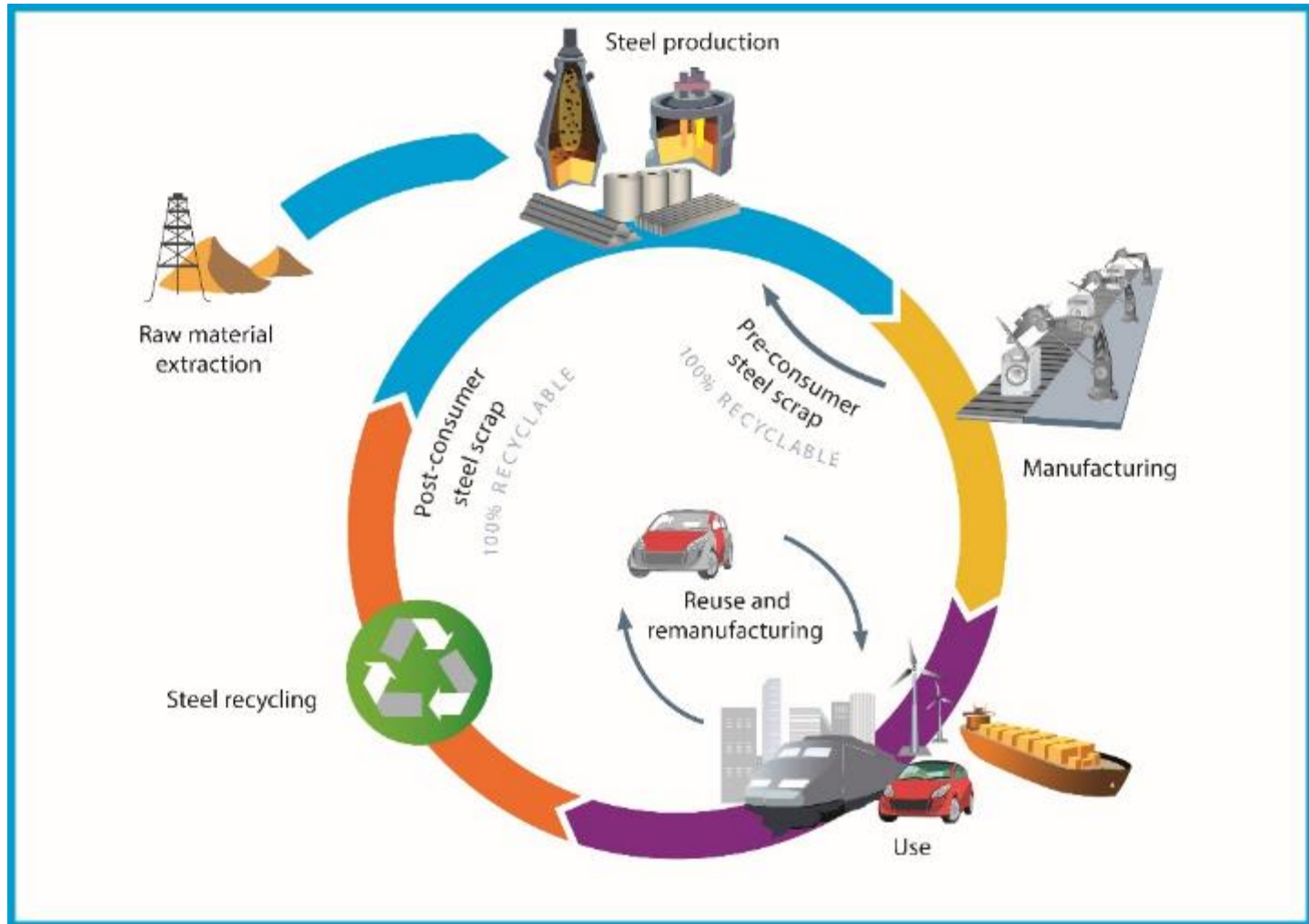
- ≡ Low cost printable optical sensors for food packaging (temperature tracking, freshness monitoring) and scavengers for controlled release of chemicals to enhance freshness and/or shelf life



# Circular Economy



# From value chain to value cycle: Emerging challenges and opportunities

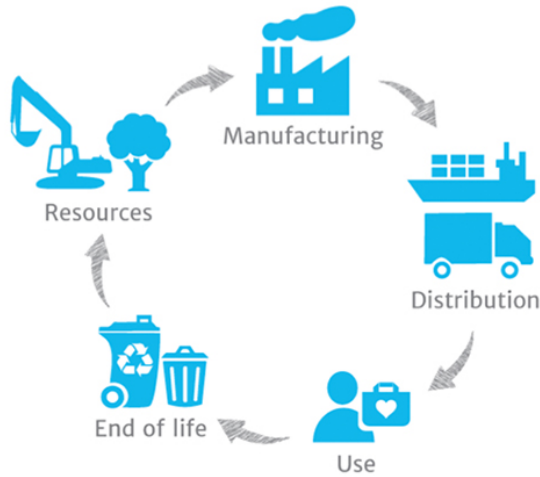


# X-sector opportunities for circularity

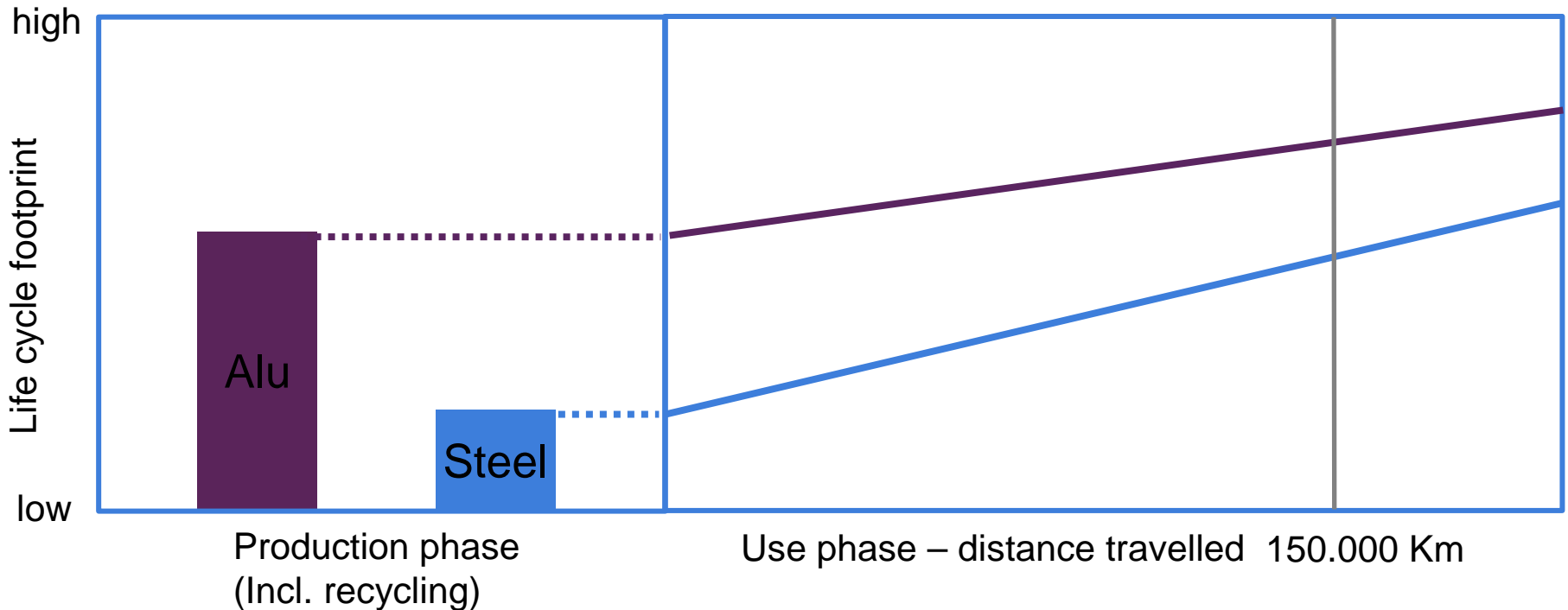
≡ CO<sub>2</sub> => chemical building blocks

Enablers:

- ≡ Sustainable energy (electricity/heat)
- ≡ Conversion technologies (dependent on e.g. materials)
- ≡ Storage materials
- ≡ Transport, enabled by materials



Decision making based on LCA:  
 Life cycle analysis informs on responsible consumption => Advanced Ultra High Strength steel grades to enable lowest life cycle footprint



# Thank you





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