urban mining solutions

MESATEx

WEEE Urban Miners

Circular Technologies

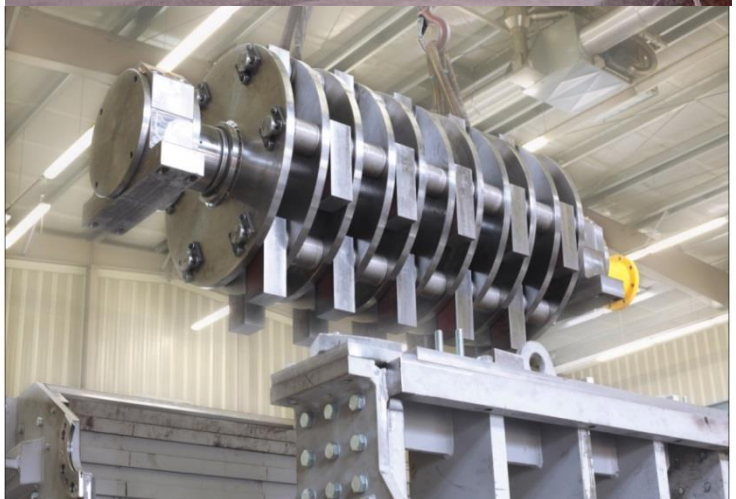
the RECENSO approach - our contribution to make circular economy real

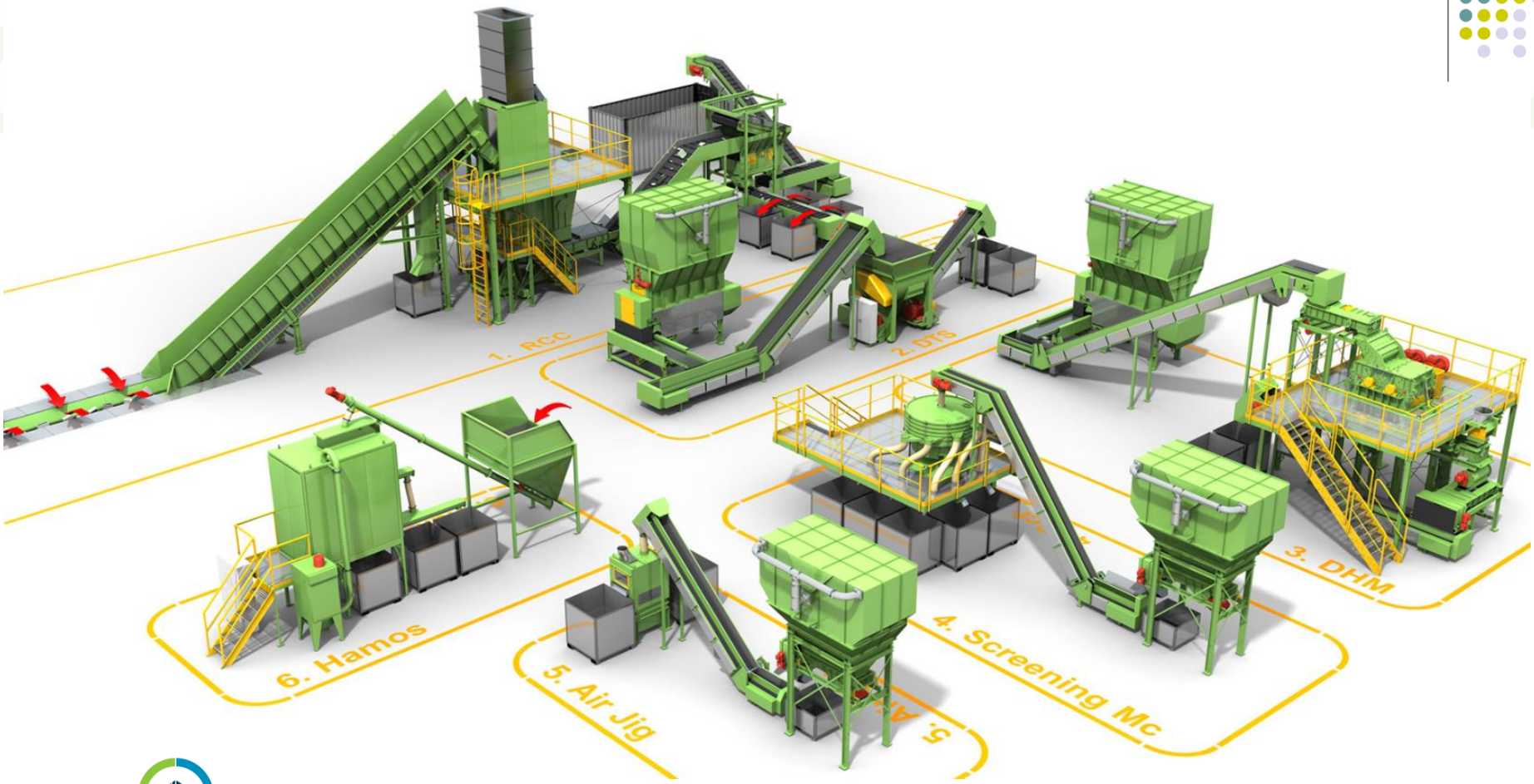
RECENSO
Recycling and Energy Solutions

Christian Haupts
Managing Partner with RECENSO GmbH

RECENSO
Recycling and Energy Solutions

- Founded in 2004
- Engineering Office in Remscheid, Germany
- current: 22 employees:
- Systems Engineering for Advanced Technologies
- Specialist in Direct Oiling Technology (CTC)
- Specialists in Urban Mining Applications





urban mining solutions

urban mining solutions

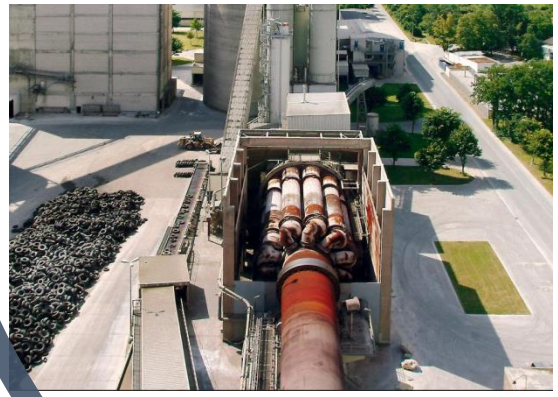
MESATEx

WEEE Urban Miners

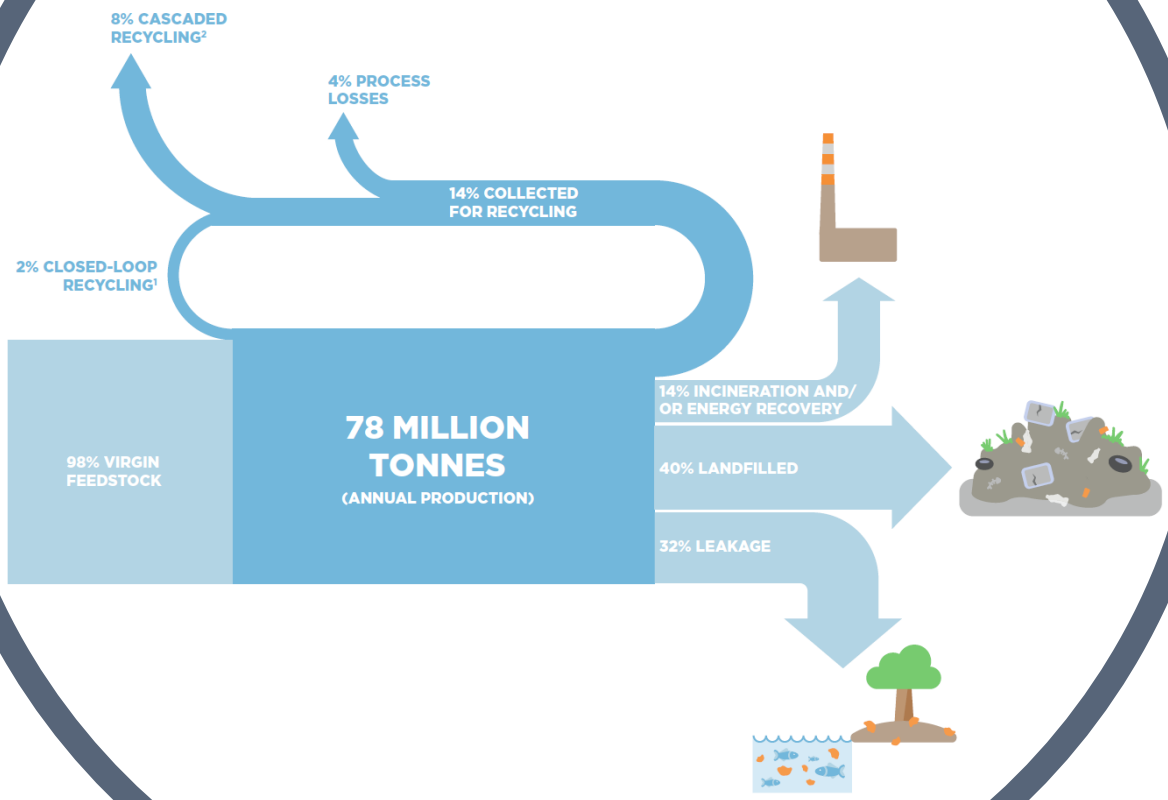
urban mining solutions

Burning Plastics instead of Fossil Fuels maybe an option – but it

is not Circular Economy

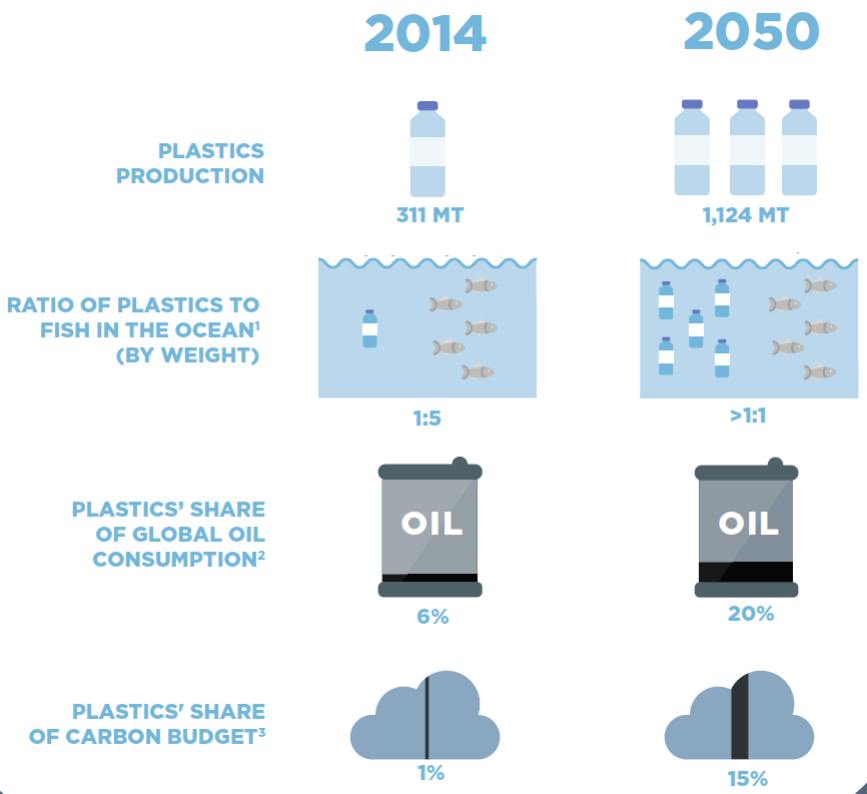


Fact: 86% of Plastic Waste is not recycled



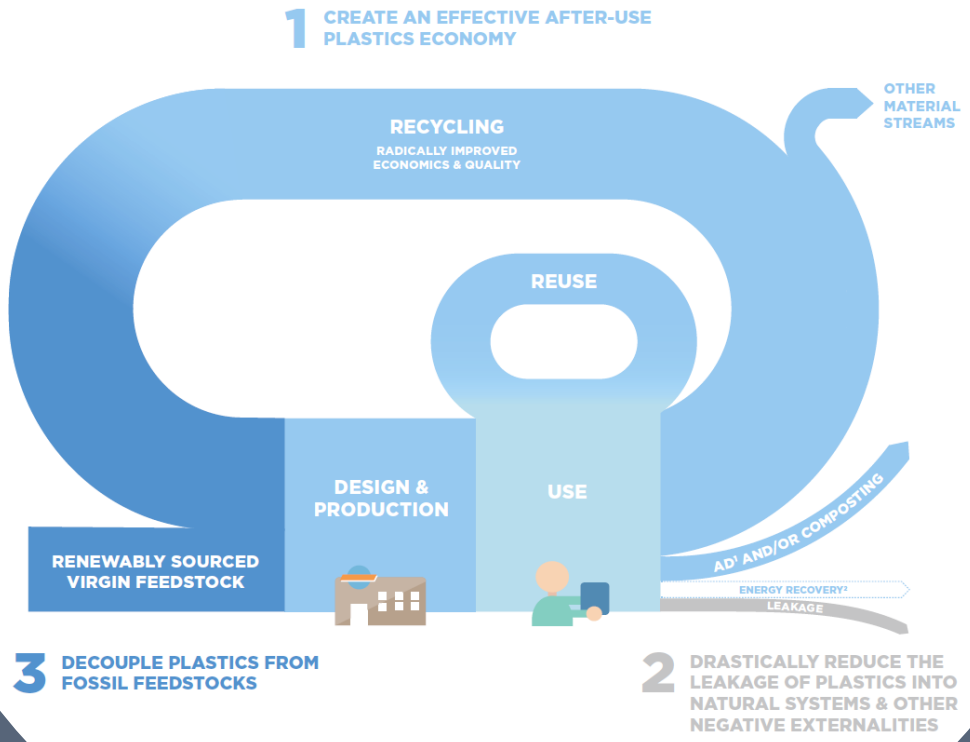
Adapted from: World Economic Forum/Ellen MacArthur Foundation, 2016, The New Plastics Economy: Rethinking the future of plastics

Forecast on Plastics Volume Growth



Adapted from: World Economic Forum/Ellen MacArthur Foundation, 2016, The New Plastics Economy: Rethinking the future of plastics

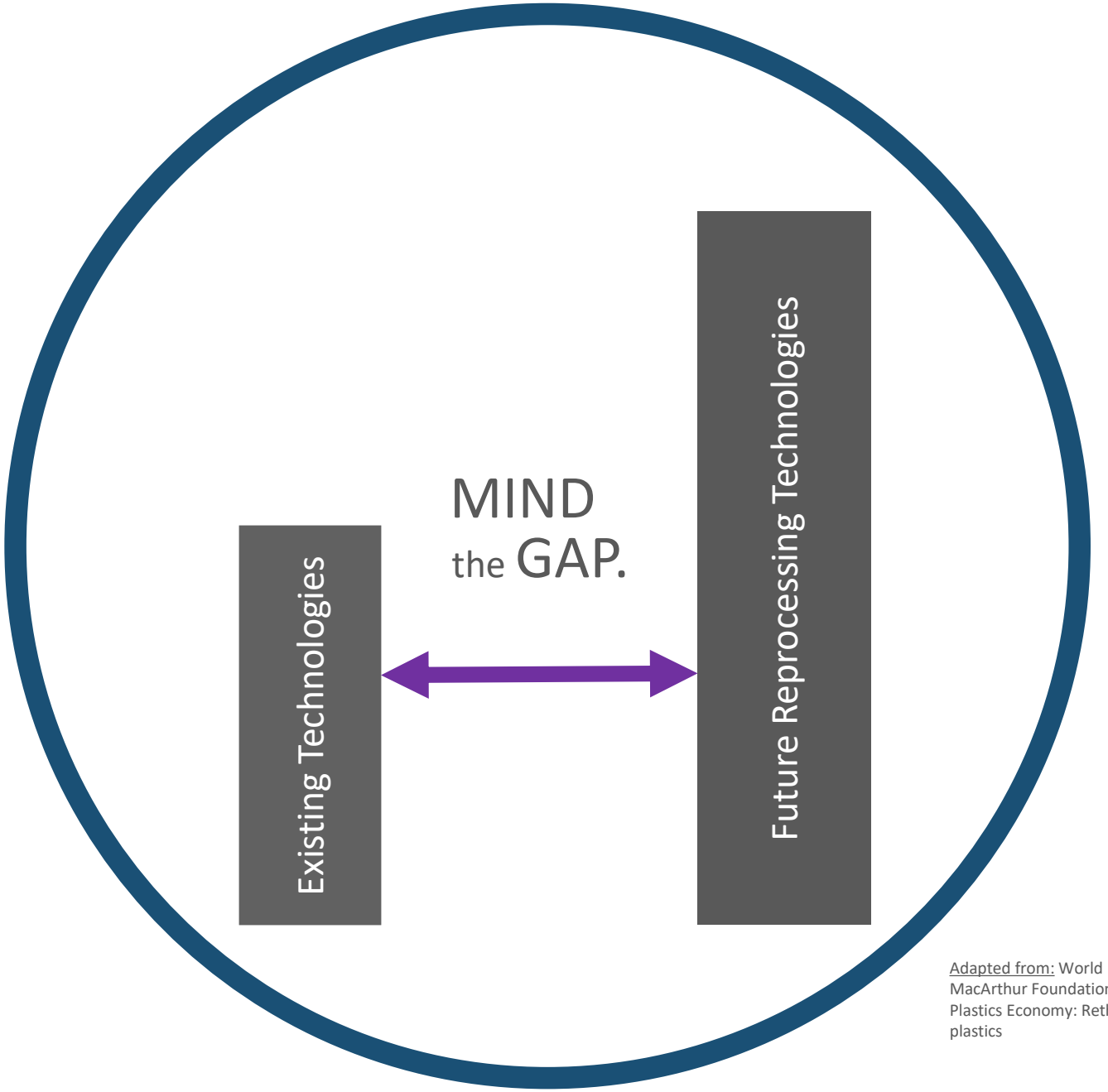
There is No Alternative to a Circular Economy



Adapted from: World Economic Forum/Ellen MacArthur Foundation, 2016, The New Plastics Economy: Rethinking the future of plastics

The concept of **Circular Economy**

- goes beyond recycling
- is based around restorative industrial systems
- gears towards designing out waste
- controls use of finite materials
- enhances natural resources
- reduces supply risks
- needs new technologies



Adapted from: World Economic Forum/Ellen MacArthur Foundation, 2016, The New Plastics Economy: Rethinking the future of plastics

BRIDGING GAPS
sometimes needs
CHANGING PARADIGMS

one key for
Circular
Economy
is closing the
CARBOLOOP

look at
HydroCarbon
as a Resource !

Building Blocks of Life:

96% off all living matter consists of:

- Carbon (C)
- Oxygen (O)
- Hydrogen (H)
- Nitrogen (N)

Carbon is the most rare element in earth crust:

O: 50,5%

Si: 27,5%

Al: 7,3%

Fe: 3,4%

H: 1,0%

N: 0,3%

C: 0,1%

Carbon is the most rare element in earth atmosphere:

N: 78,08%

0_2: 20,95%

Ar: 0,93%

CO_2: 0,04%

Carbon is one of the key elements contributing to green-house-gas emissions:

H_2O: 36-72%

CO_2: 9-26%

CH_4: 4- 9%

Bulletin of the American Meteorological Society 78 (2): 197–208.

LOOP #1

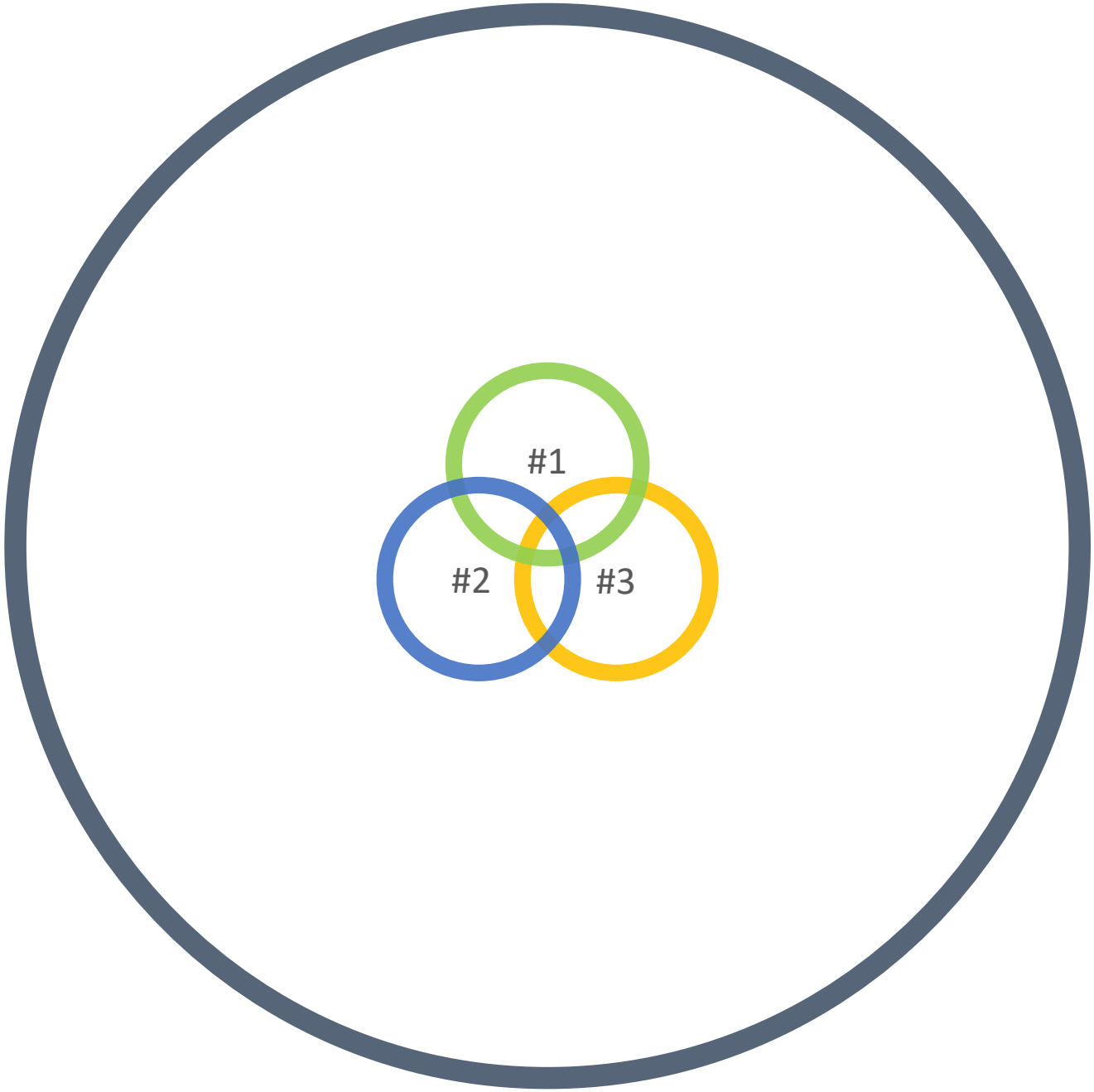
The Biosphere Loop: Photosynthesis generates Hydrocarbons from Sunlight-Energy, CO_2 and H_2O (carbohydrate anabolism); Cell respiration generates Energy from Hydrocarbons and O_2 (carbohydrate catabolism); this life sustaining Loop is threatened by the pollution of land, air and sea. **Securing the Biosphere Loop means closing the Loops on Energy and Polymers**.

LOOP #2

The Energy Loop: Burning fossil fuels generate an access of CO_2 and cause global warming; Energy from Biomass based fuels are “regenerative” as the Biosphere Loop generates new biomass from the CO_2; **Closing the Energy Loop means focusing on biomass to be converted into storable, high efficient fuels**.

LOOP #3

The Polymer Loop: industrial processing of fossil fuels and producing polymers drives big industries and consumption. Recycling of Polymers is needed but limited. Polymer waste littering threatens land and see-life. **Closing the Polymer Loop means focusing on converting waste plastics into storable, multi use resources.**


#1
#2
#3


CARBOLOOP
TRANSFERRING the
IDEA of THINKING CIRCULAR to
our HYDROCARBON RESOURCES

CARBOLOOP

combines a NEW

IDEA of THINKING

CIRCULAR and a NEW

TECHNOLOGY.

Catalytic Tribochemical Conversion (CTC) contributes to

- **Close the Energy Loop**
- **Close the Polymer Loop**
- **Link both Loops to the Biosphere Loop**

CTC Technology

CTC is a single stage catalytic liquefaction process characterized

- by its applicability on a variety of feedstocks (biomass as well as polymers – even as mixed materials)
- by temperatures of less than 400 °C
- by atmospheric pressure
- by friction as the only source of energy
- by use of catalyst as a consumable

CTC is unique in combining three mechanisms of actions cracking the hydrocarbon structures

- Thermal forces
- Catalytic forces
- Physical forces

DIESELWEST

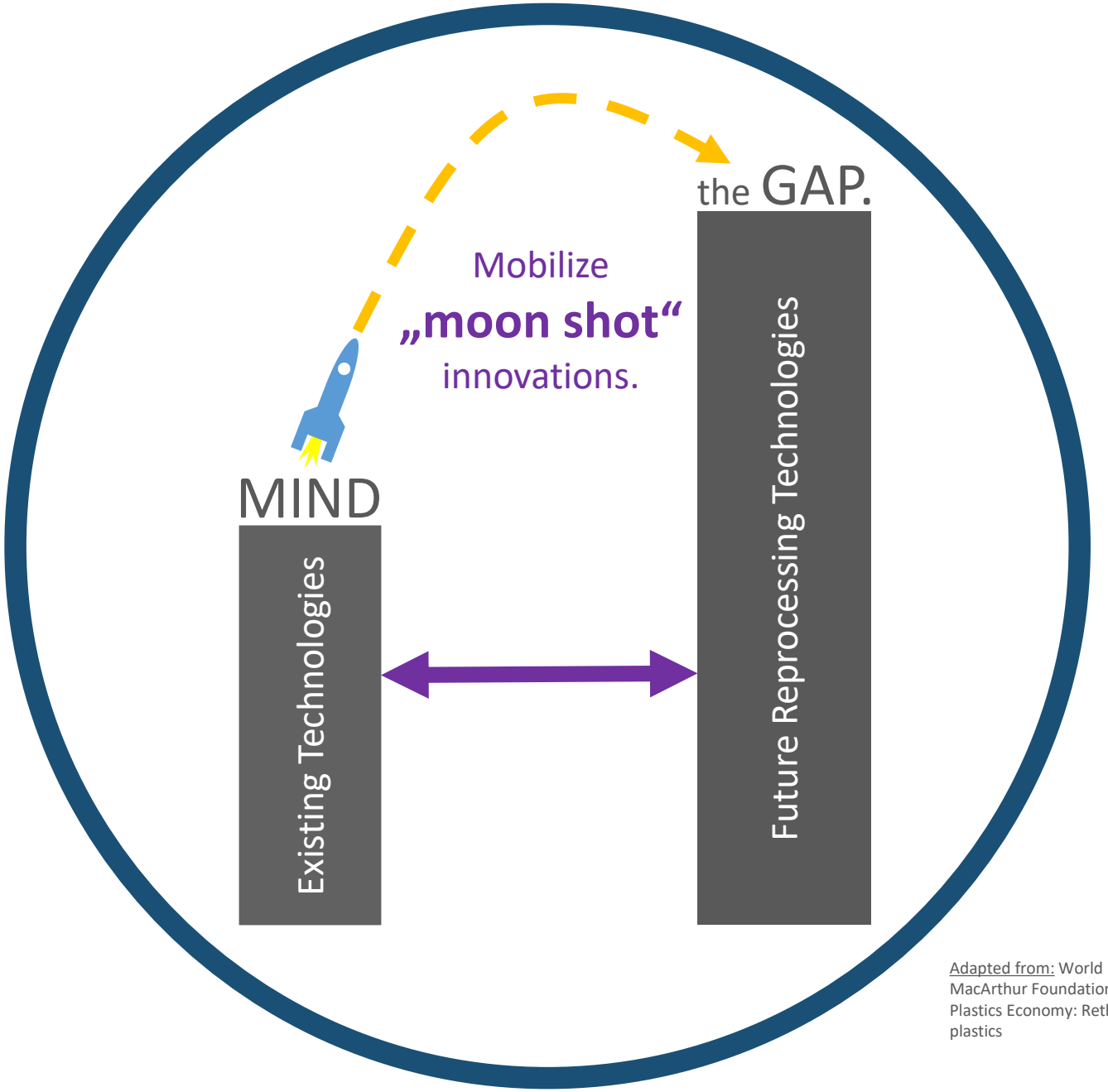
Industrial-Pilot for Oiling of RDF

STAGE I

- Adding Value to Standard RDF
- Full private investment
- 2011/2012: Feedstock Tests
- 2012/2013: Proof of Concept

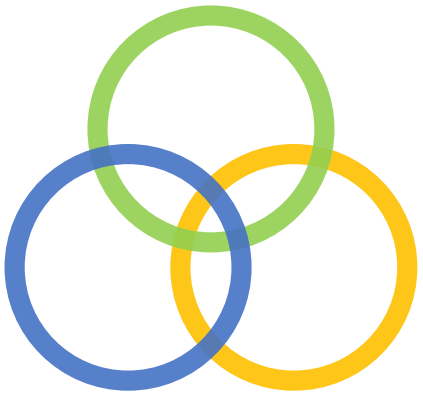
STAGE II

- 2014/2015: operation in 24/7 mode
- 2015: Proof of Quality
- 2016: Mass- and Energy Balancing
- Target 2017: Proof of Economics



Adapted from: World Economic Forum/Ellen MacArthur Foundation, 2016, The New Plastics Economy: Rethinking the future of plastics

MIND the GAP and close the LOOP(s).



CTC contributes to close the Loops for Energy and Polymers and secure the Biosphere loop

CARBOLOOP

Become a LEADING
PARTNER of
THINKING CIRCULAR.

Thank You for Your Attention and Support