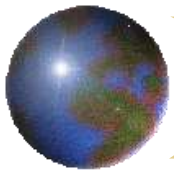


Circular Economy: basics and opportunities

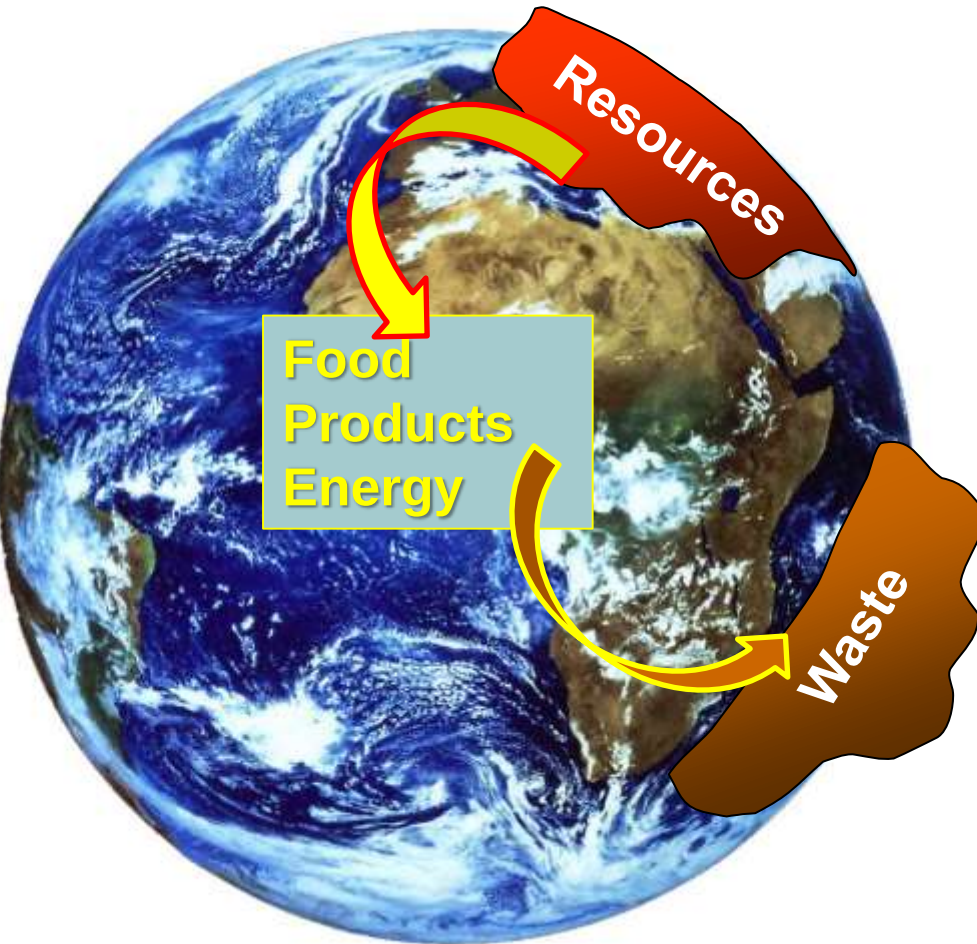
Fabio Fava

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Phone: 051 2090330

E-mail: fabio.fava@unibo.it; Skype name: fabio-fava



Space-ship Earth (a)



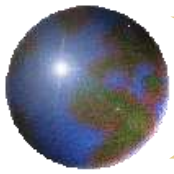
Passengers: 7.5 billions

but.....

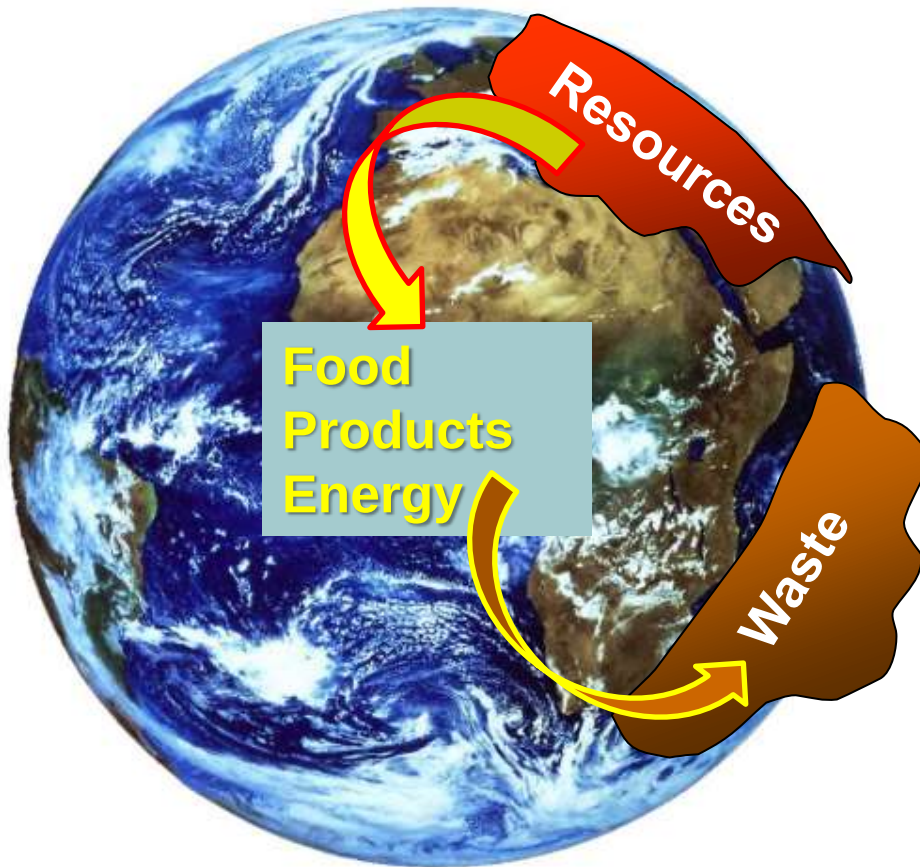
they will be 8 billions in 2025
and 9 billions in 2050

(UN World Food Programme, 2012)

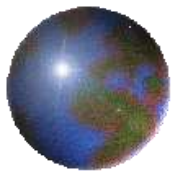
After Vincenzo Balzani, 2016



Space-ship Earth (b)



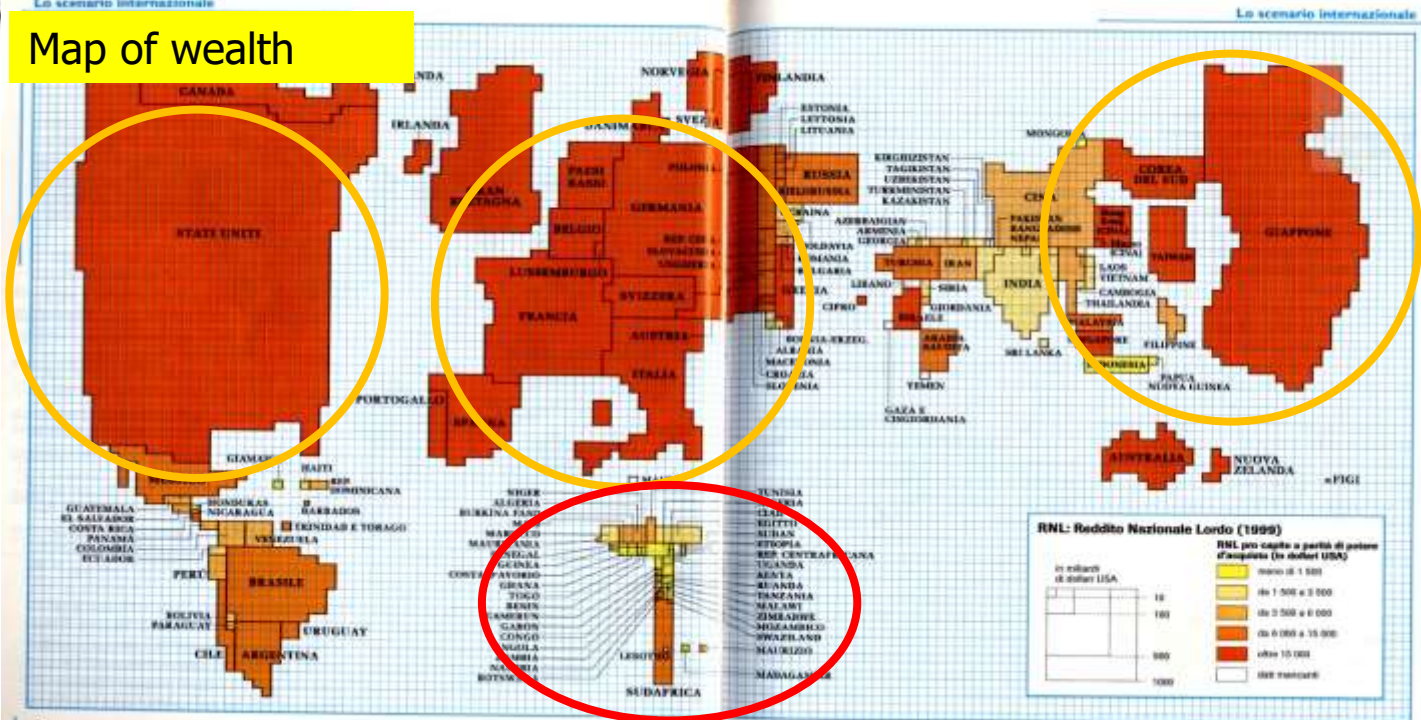
The Earth is only one and has a finite amount of resources and a confined space for storing waste.....

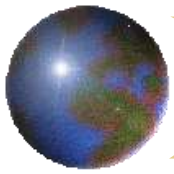


Space-ship Earth (c)



Map of wealth





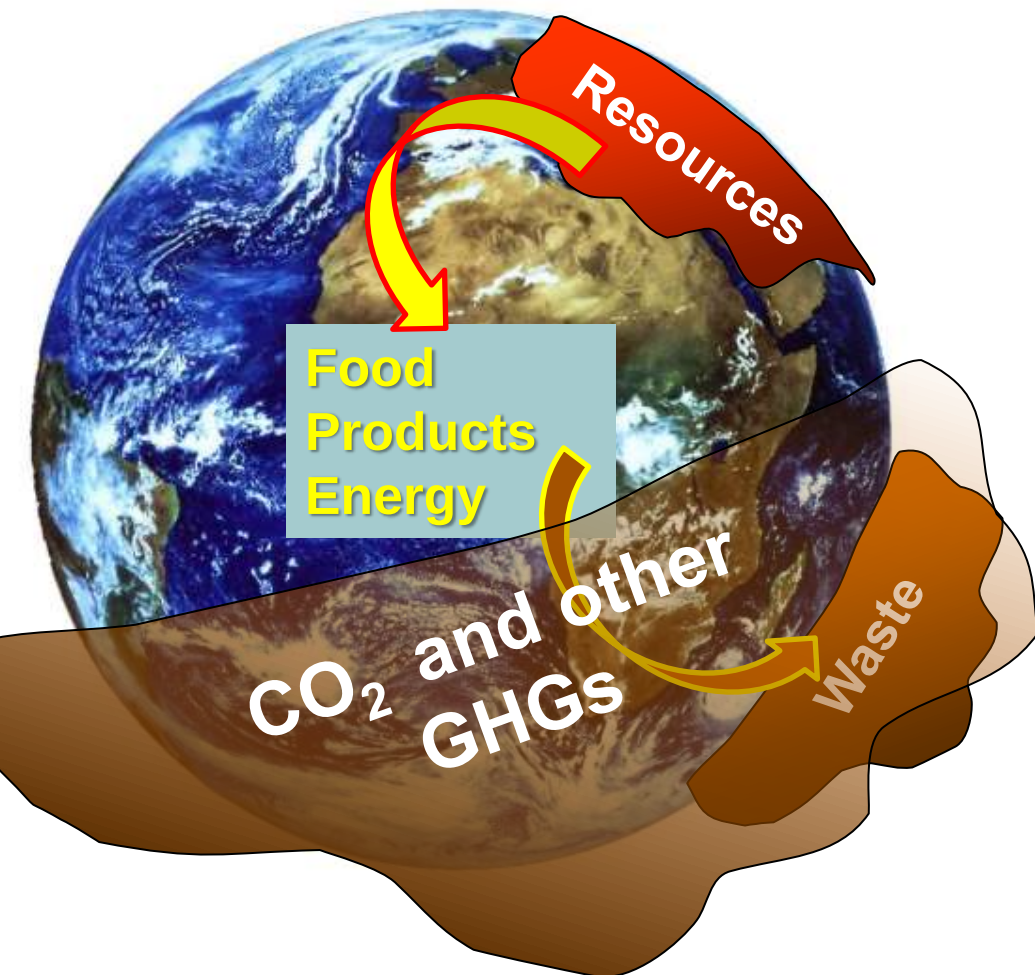
Space-ship Earth (d)



Dump site/waste discharges *After Vincenzo Balzani, 2016*



Space-ship Earth (e)



After Vincenzo Balzani, 2016

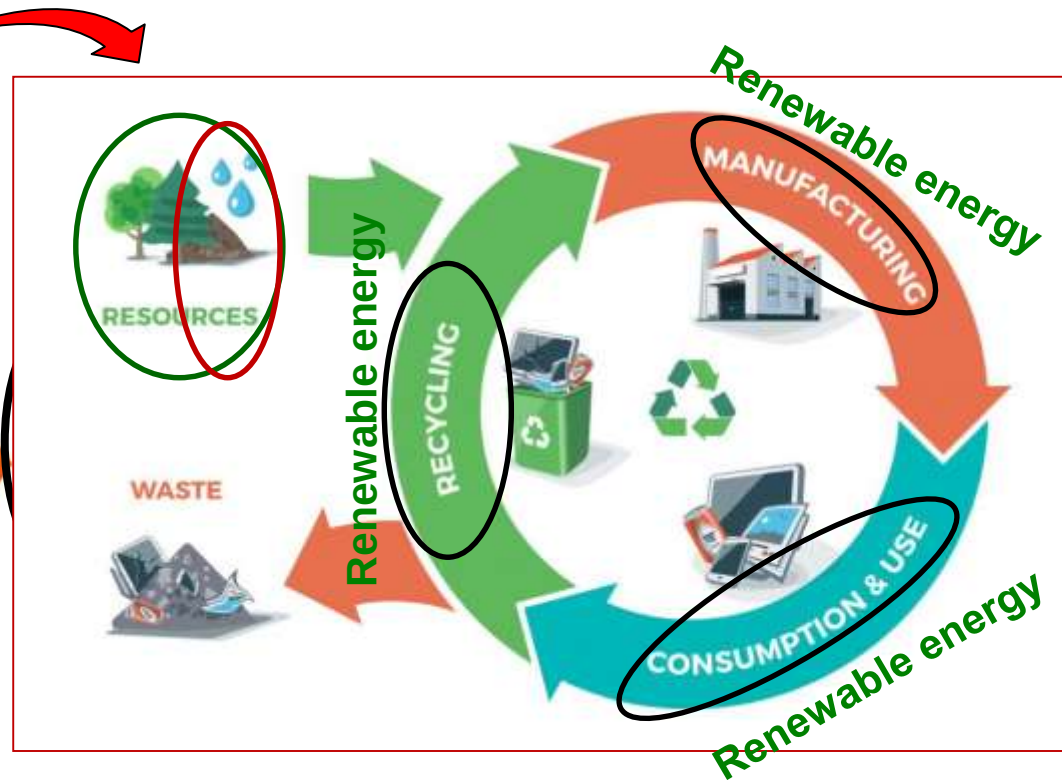


Possible solutions

Increase the production and use renewable raw materials and energy, and the use/valorization of waste → implement Circular Economy



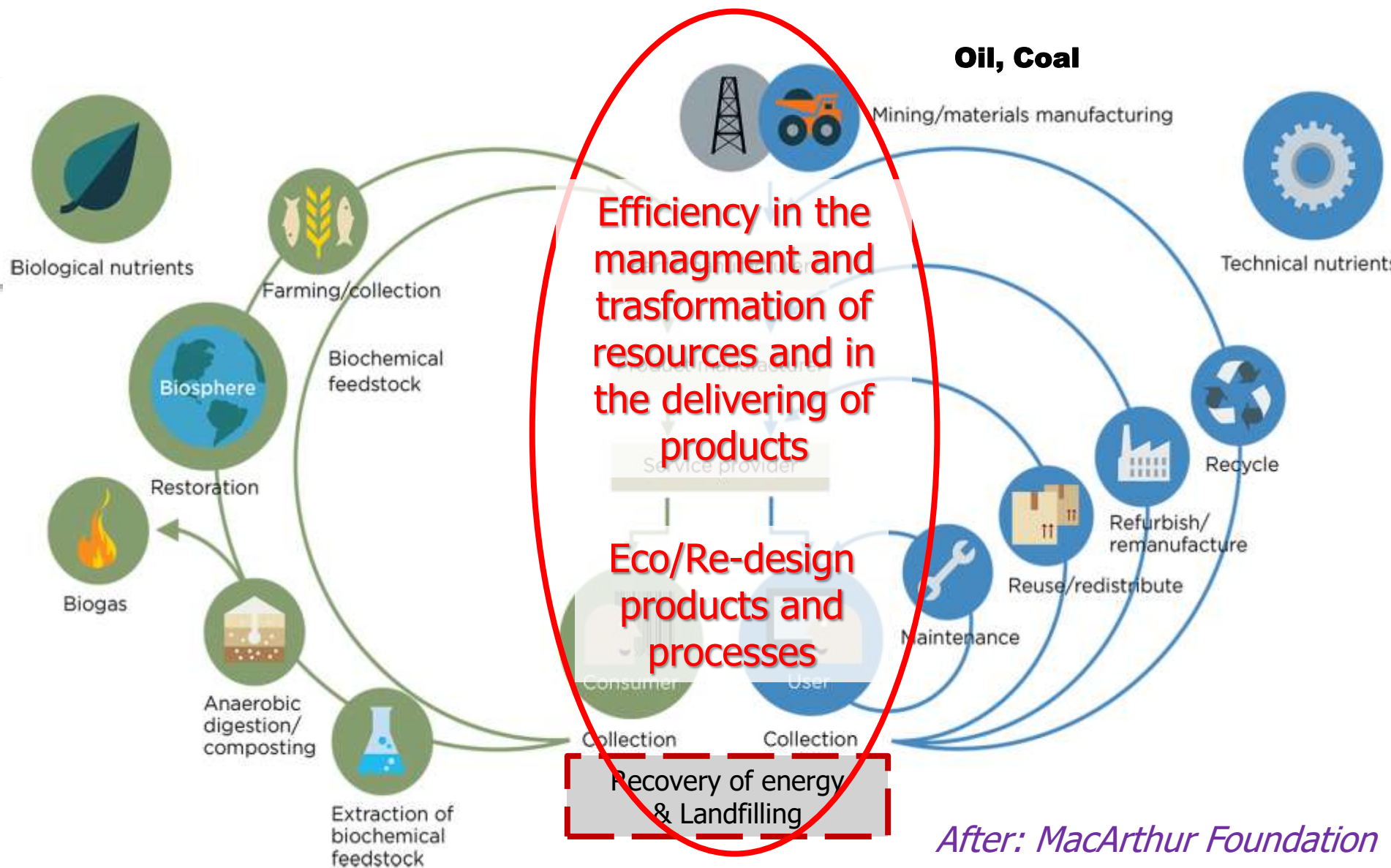
LINEAR ECONOMY



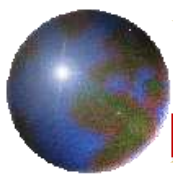
CIRCULAR ECONOMY



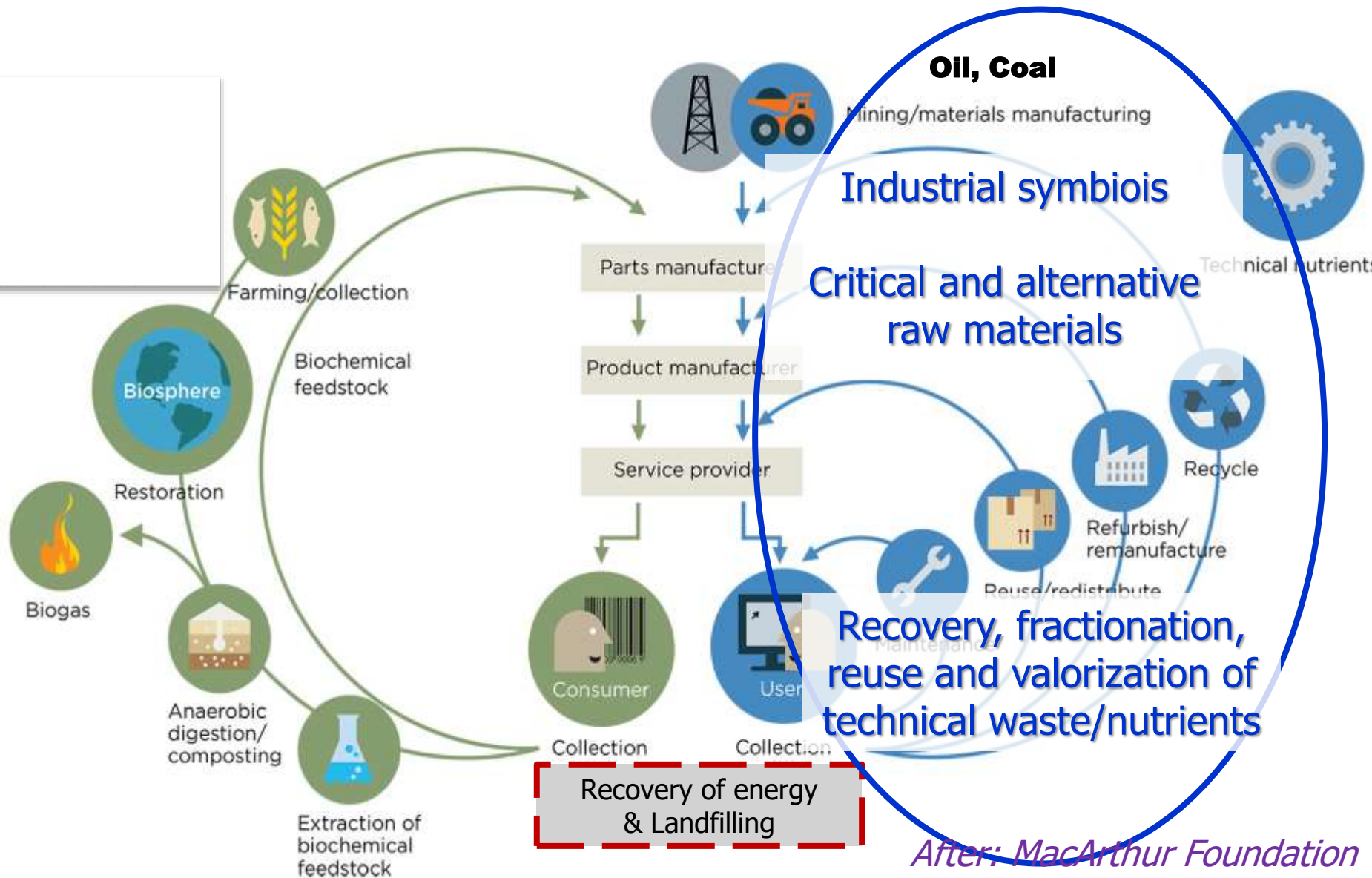
Circular Economy: efficiency



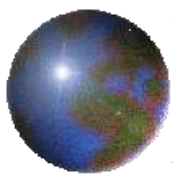
After: MacArthur Foundation



Circular Economy: technical waste/nutrients management and exploitation

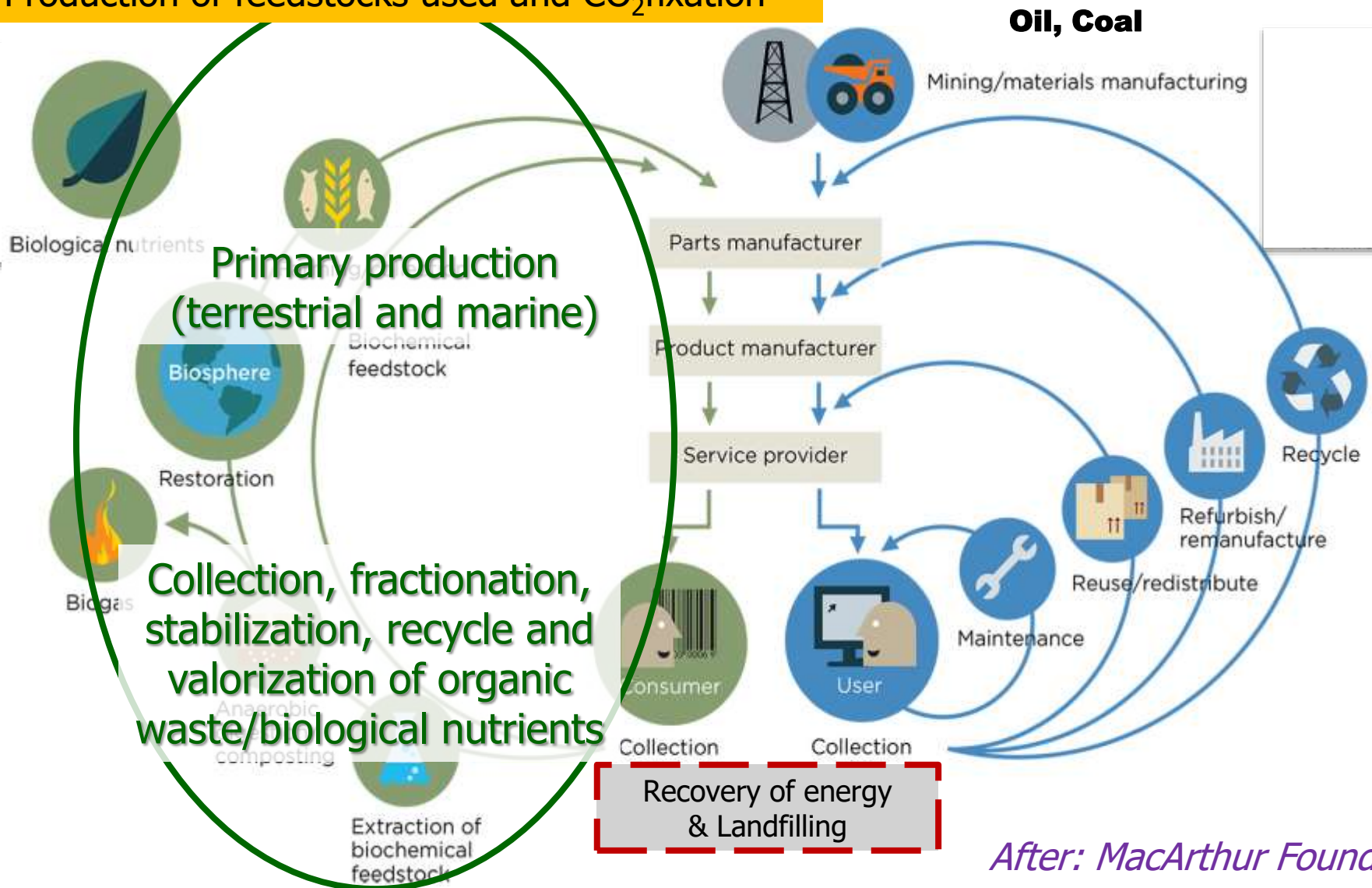


After: MacArthur Foundation



Circular Economy: biological waste/nutrients management and exploitation

Production of feedstocks used and CO₂fixation



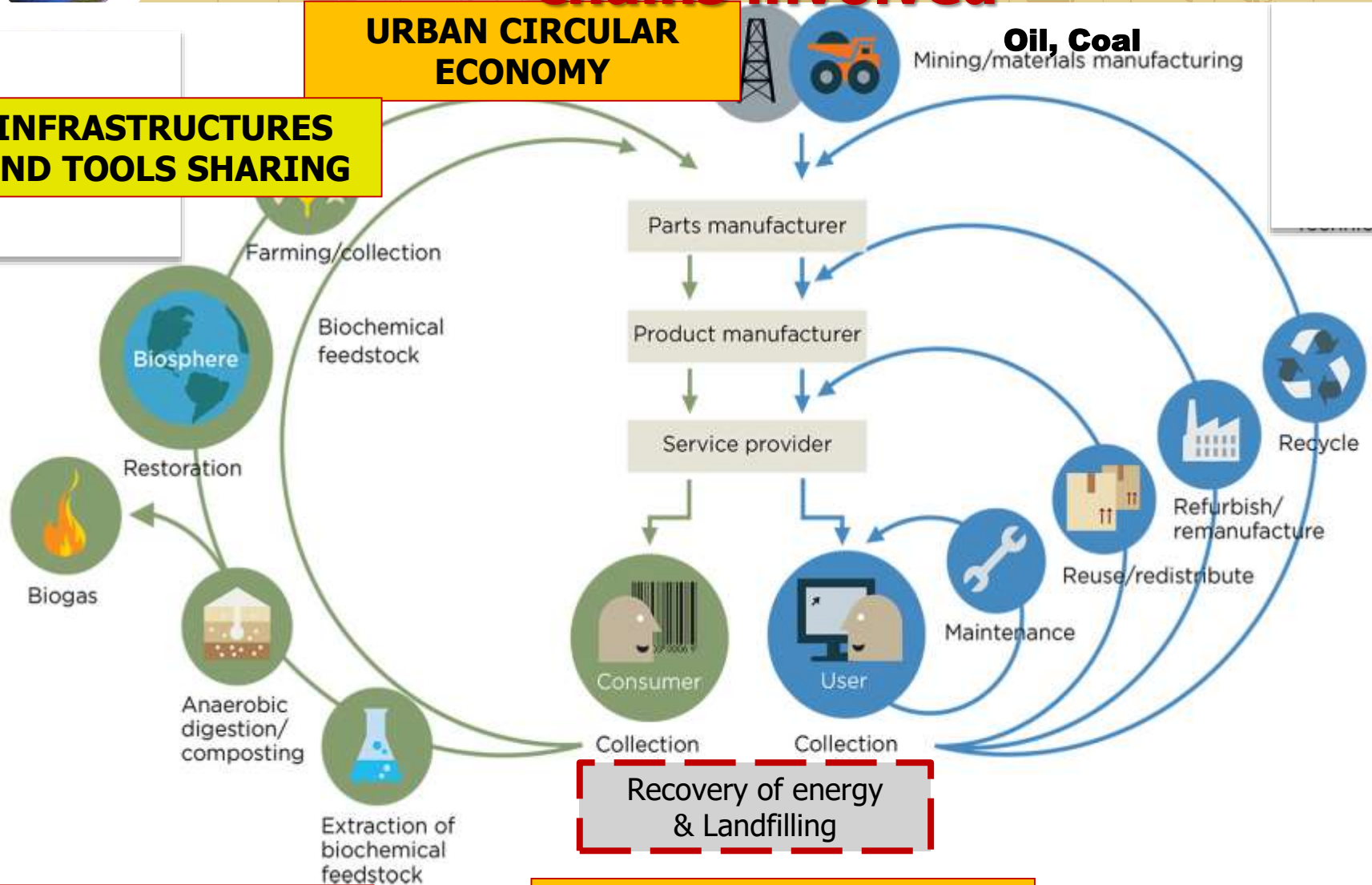
After: MacArthur Foundation



Circular Economy: actors, sectors and value chains involved

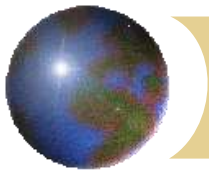
URBAN CIRCULAR ECONOMY

INFRASTRUCTURES AND TOOLS SHARING



WASTE WATER MANAGEMENT AND EXPLOITATION

SITE REMEDIATION AND REQUALIFICATION (terrestrial & marine)



EU Circular Economy: Legislation

Parliament Resolution; EU adoption of the Circular Economy package: Dec 2, 2015

https://ec.europa.eu/commission/priorities/jobs-growth-and-investment/towards-circular-economy_en

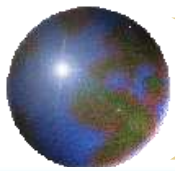
2018 EU adoption of the Circular Economy package: July 4, 2018
European Circular Economy Package ("CEP")

http://ec.europa.eu/environment/circular-economy/index_en.htm

Legislation revision:

- A common EU **target for recycling 60% of municipal waste** by 2030;
- A common EU **target for recycling 70% of packaging waste** by 2030;
- A **reduction of landfill to maximum of 10%** of all waste by 2030.

The responsibility of the producers on the achievement of the recycling standards of the products they are producing has been introduced.



Waste management in Europe (EC data)

Overview **recycling rates** of different waste streams

All waste excluding
major mineral waste

55%
Recycled

Municipal waste

46%
Recycled

Overall packaging

66%
Recycled

Plastic packaging

40%
Recycled

E-waste

32%
Recycled

Construction and
Demolition Waste

88%
Recovered

ITALY (data 2016)

Packaging: ~67%

Wood: 61%

Iron: 77%

Aluminium 73%

Glass 71%

Paper 80%

Plastics 41%

**Electric/Electronic
waste: ~37% (expl. 85%)**

**Construction/demolition:
≈ 60%**

ITALY (data 2016)

HOUSEHOLD: 29 MT, disposal 8%; turnover €10 Bln;

COMMERCE&INDUSTRY 130 MT, disposal 21%; turnover €23 Bln

OVERALL: 10,500 companies; 135,000 jobs

OVERALL (CURRENT DATA): 88 bln/y ; 575,000 jobs



EU Circular Economy: Monitoring

Circular economy monitoring framework

1 EU self-sufficiency for raw materials

The share of a selection of key materials (including critical raw materials) used in the EU that are produced within the EU

2 Green public procurement

The share of major public procurements in the EU that include environmental requirements

3a-c Waste generation

Generation of municipal waste per capita; total waste generation (excluding major mineral waste) per GDP unit and in relation to domestic material consumption

4 Food waste

Amount of food waste generated

7a-b Contribution of recycled materials to raw materials demand

Secondary raw materials' share of overall materials demand - for specific materials and for the whole economy

8 Trade in recyclable raw materials

Imports and exports of selected recyclable raw materials



5a-b Overall recycling rates

Recycling rate of municipal waste and of all waste except major mineral waste

6a-f Recycling rates for specific waste streams

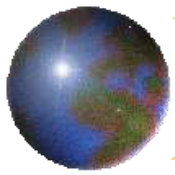
Recycling rate of overall packaging waste, plastic packaging, wood packaging, waste electrical and electronic equipment, recycled biowaste per capita and recovery rate of construction and demolition waste

9a-c Private investments, jobs and gross value added

Private investments, number of persons employed and gross value added in the circular economy sectors

10 Patents

Number of patents related to waste management and recycling



EU actions delivered: investments in R&I

Horizon2020, the EU Commission R&I funding programme
(~79 Billion, 2014-2020) (www.ec.europa/research/horizon2020)

Excellent Science

- **European Research Council**
- **Future and Emerging Technologies**
- **Marie Curie Actions**
- **Research Infrastructure**

Industrial Leadership

- **Leadership in enabling and industrial technologies (NMPB)**
- **Access to risk finance**
- **Innovation in SMEs**

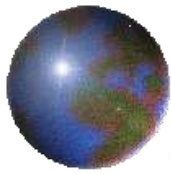
Societal Challenges

- 1. Health, demographic change and wellbeing**
- 2. Food security, sustainable agriculture, marine and maritime research & bioeconomy**
- 3. Secure, clean and efficient energy**
- 4. Smart, green and integrated transport**
- 5. Climate action, resource efficiency and raw materials**
- 6. Inclusive, innovative and reflecting societies**
- 7. Secure societies**

~ € 1000 Millions (2016-2020) via Horizon2020
(incl. SMEs instrument)

€ 500 Millions via PPPs "Factories of the Future",
"Sustainable Process Industries" and "Bio-based
Industries", **LIFE projects etc.**

€ 5.5 Billion via structural funds (2014-2020)



Other EU actions delivered/in progress

PRODUCTION: Ecodesign working plan for 2016-2019 with tailored standards. Best available techniques reference docs.

MARKET FOR SECONDARY RAW MATERIALS: development of **quality standards for secondary raw materials** to increase the confidence of operators/consumers. A **revised Regulation on fertilisers**.

CONSUMPTION: labelling of products, guidance on unfair commercial practices and Green Public Procurements.

SECTORIAL ACTIONS

- 1) Stakeholders platform on food waste, new legislation waste, food, feed;**
- 2) recycling protocol for construction and demolition waste;**
- 3) strategy on plastics, and target for significantly reducing marine litter;**
- 4) actions on waste water reuse and exploitation.**

Commission communication on WASTE-TO-ENERGY in Circular Economy
Launch of a CIRCULAR ECONOMY FINANCE SUPPORT PLATFORM and of a
EUROPEAN CIRCULAR ECONOMY STAKEHOLDER PLATFORM

http://europa.eu/rapid/press-release_IP-17-104_en.htm

http://ec.europa.eu/environment/circular-economy/index_en.htm

**By 2030 (in EU): about -30% resource use; -50% CO₂;
+5% annual turnover; +1 M jobs**