

5° AIEE Energy Symposium

Current and Future Challenges to Energy Security

The circular economy: an essential pillar to achieve the EU energy roadmap's goals to 2050



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Introduction

In a scenario where the process of transition to a sustainable zero-emission economy has an increasingly growing influence, a concrete use of the circularity's principles is needed to reduce and prevent waste from being dispersed into the environment or in landfills.

- **Circular economy** – It is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible and collect them locally and responsibly. In this way the life cycle of products is extended.
- **European Directive 2006/12 /CE** – Each European Member State is required to:



1. Consider waste as a raw material
2. Reach autonomy in eliminating waste
3. *Minimize waste transport*
4. *Minimize environmental impact .*

- **Cash From Trash** - Giving an intrinsic value to waste may turn into an incentive to manage it correctly and prevent its dispersion in the environment increasing the GDP and decreasing the dependence on foreign countries.

EU Green Deal - Rethinking energy markets

- **EU Green Deal** is a comprehensive roadmap announced by President Von der Leyen, seeking to make Europe the first climate-neutral continent in 2050 by cutting greenhouse gas emissions, improving the health and well-being of citizens and protecting the environment and wildlife.
- The roadmap covers all sectors of the economy, seeking to transform the economic model through a series of ambitious reforms, such as:

Sustainable industry

Building and renovating

Eliminating pollution

Clean energy

Implement circular economy

Sustainable mobility

From farm to fork

Biodiversity and ecosystems

Sustainable finance

- Only a new energy model will make EU system secure, competitive and sustainable in the long-term.

- The Green Deal is the main pillar for the Next Generation.
- The recovery and resilience plan is the driver element to recuperate and rebuild stimulating the abandonment of the traditional business model, which has aggravated inequalities worldwide.

2030 Key targets

Reduction of **55% of greenhouse gas emissions** (compared to 1990 levels)

A minimum of **32% of renewable energy**

An improvement of at least **32.5% in energy efficiency**

- EU has committed to step up its efforts in energy efficiency for the all energy chain, from energy generation to transmission, distribution and end-use.



To achieve energy efficiency's target it is fundamental to develop energy communities and smart infrastructures, phasing out of fossil fuels and decarbonising the power sector.

The new Circular Economy action plan

- EU purpose is to create new opportunities for sustainable growth by reducing dependence on energy importation and waste, in order to make energy economy more sustainable and independent.
- It provides an action plan to boost the efficient use of resources by moving to a clean and circular economy in order to restore biodiversity, cut pollution and reduce foreign dependence.

Make sustainable products the norm in the EU

Empower consumers and public buyers

Lead global efforts on circular economy

Ensure less waste

Integrate circularity within people, regions and cities

Minimise EU waste's exports and tackle illegal shipment

Circular Economy action plan
presents measures to:

The new Circular Economy action plan focuses on sectors that use the most resources and where the potential for circularity is high, such as:

Electronics— a 'Circular Electronics Initiative' to have longer product lifetimes, and improve the collection and treatment of waste.



Batteries and vehicles – new batteries' regulatory framework to enhance the sustainability and boost their circular potential.

Packaging – new mandatory requirements on what is allowed on the EU market, including the reduction of (over)packaging



Plastics – new mandatory requirements for recycled content and special attention on micro plastics as well as biodegradable plastics

Textiles – a new EU Textiles' Strategy to strengthen competitiveness and innovation in the sector and boost the market for textile reuse



Construction and buildings – a comprehensive strategy for a sustainably built Environment promoting circularity principles

Food – new legislative initiative on reuse to substitute single-use packaging, tableware and cutlery by reusable products in food services



- The transition towards a circular economy is already underway, with businesses, consumers and public authorities in Europe embracing this sustainable model.
- The European Commission will make sure that the circular economy transition delivers opportunities for all, leaving no one behind.

The circular economy will have net positive benefits in terms of GDP growth and jobs' creation.

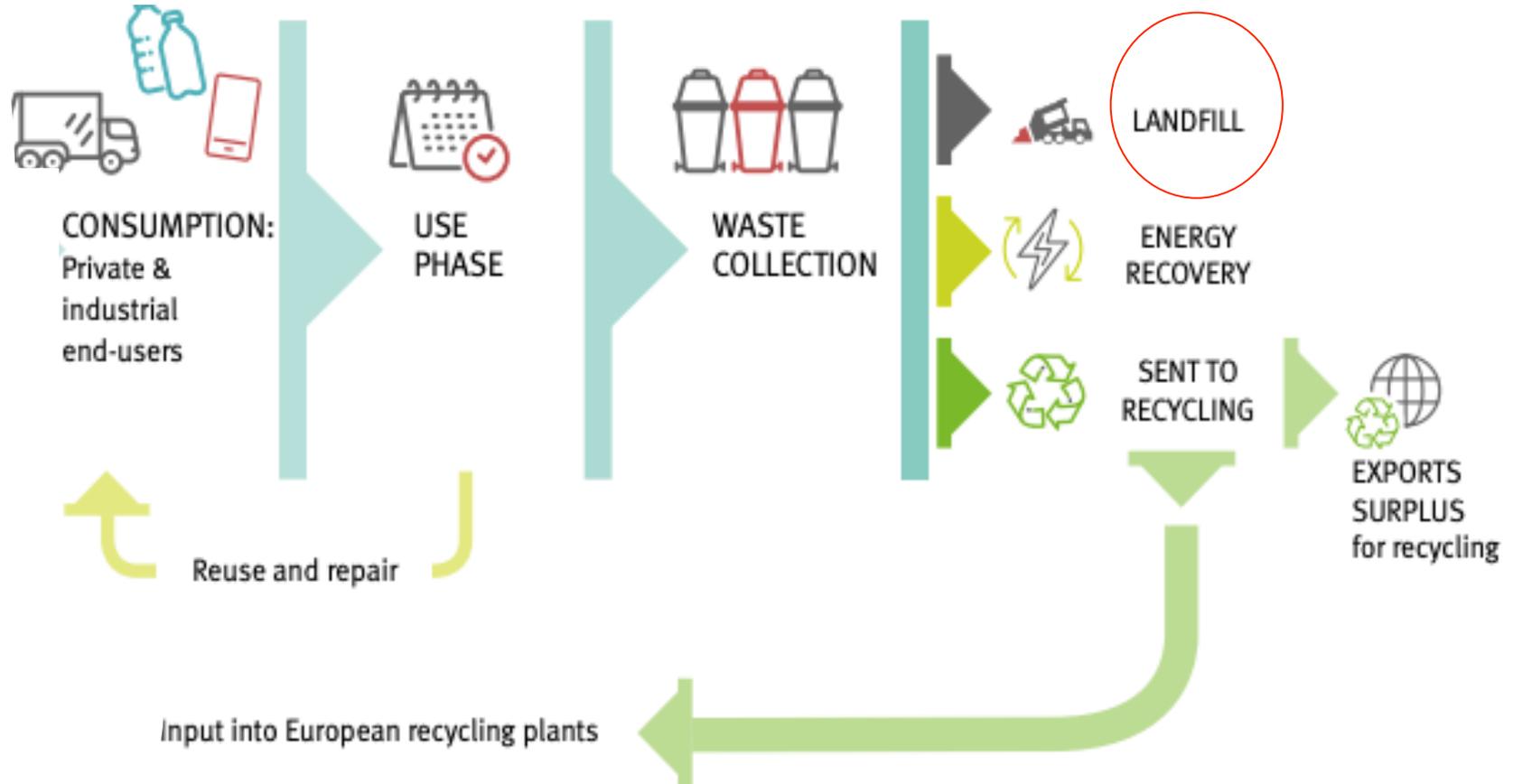
Applying these ambitious measures Europe, by 2030, can :

Increase the GDP by an additional 0.5%



Create around **700,000 new jobs**

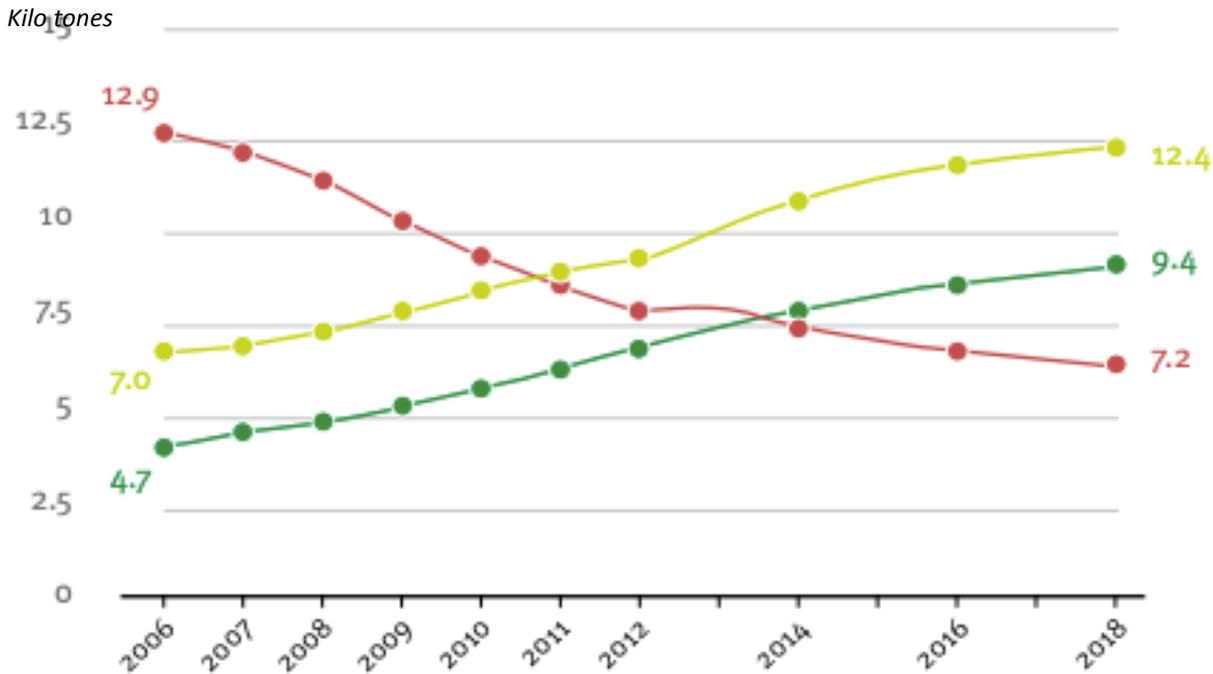
The circularity process



ZERO LANDFILLING IS NEEDED TO ACHIEVE THE CIRCULAR ECONOMY TARGETS

- Since 2006 the amount of EU plastic waste sent to recycling has doubled.
- 25% of plastic post-consumer waste was still sent to landfill in 2018.

2006-2018 evolution of plastic post-consumer waste treatment



Percentage change
2018/2006 :

+100% Recycling

+77% Energy Recovery

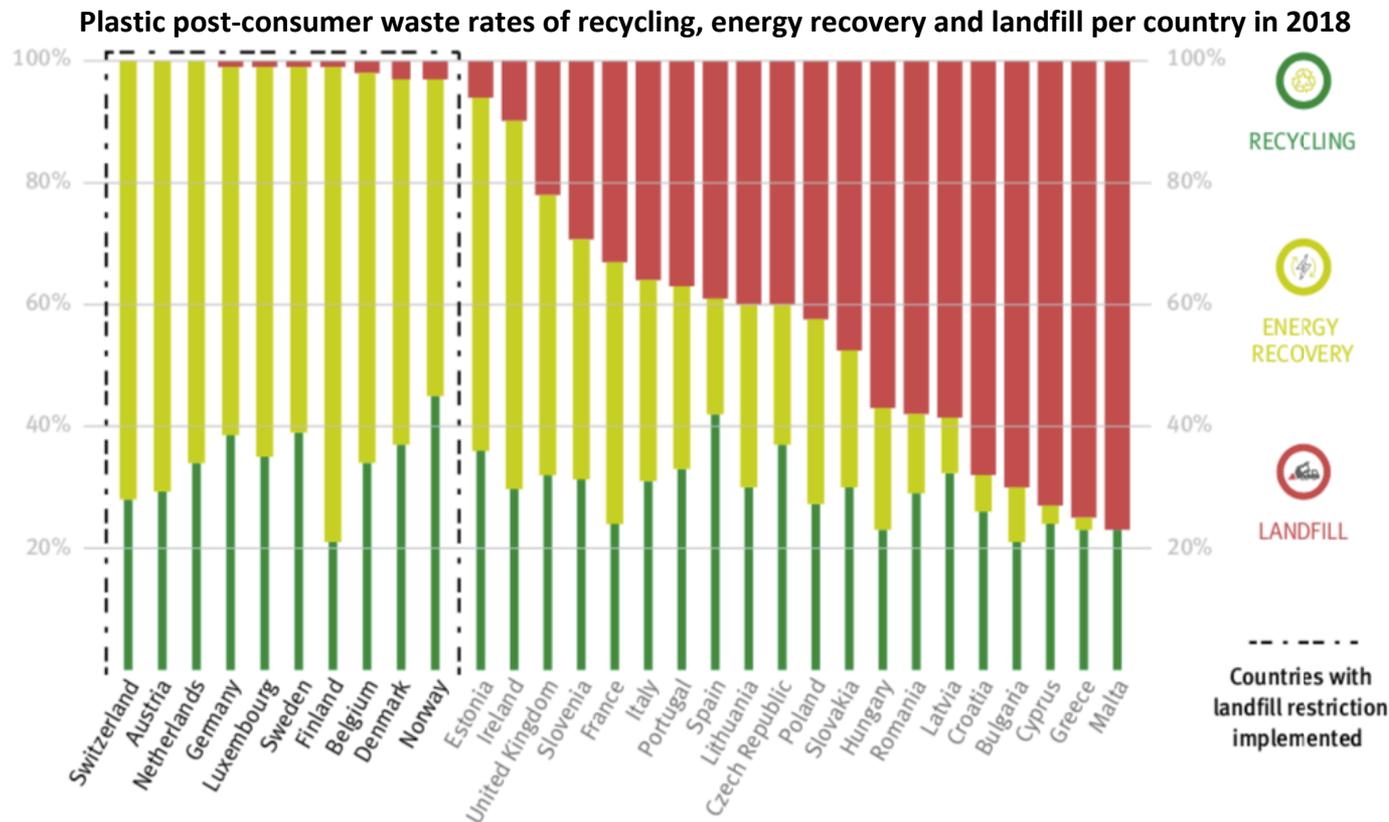
-44% Landfill

Source : Plastics the facts 2020



+19% Collected Plastic Post consumer waste 2006-2018

Countries with landfill restrictions of recyclable and recoverable waste have higher recycling rates of plastic post-consumer waste



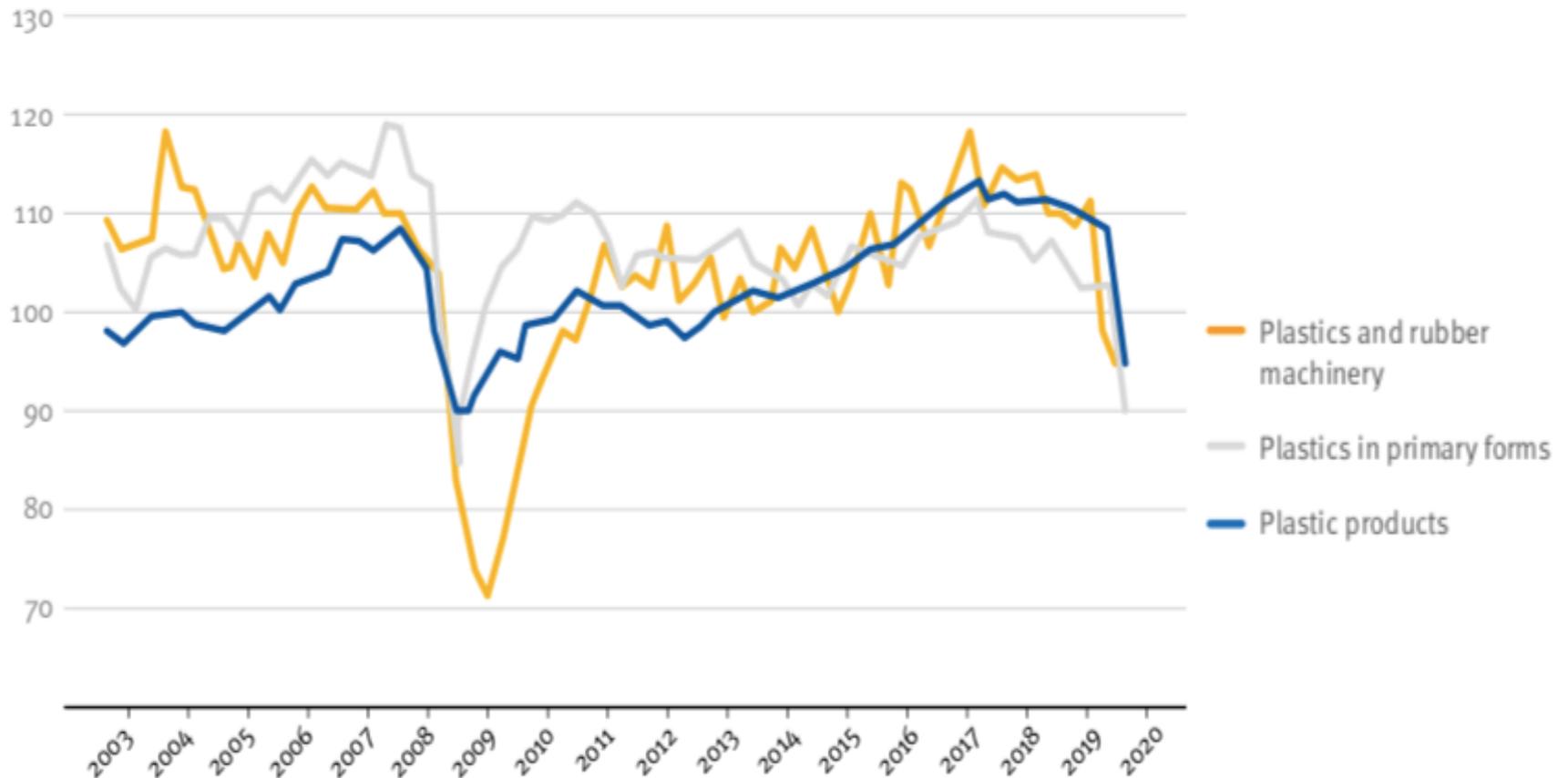
Source : Plastics the facts 2020

- Although the total EU situation is improving, **in many countries, landfill is still the first or second option** of treatment for plastic post-consumer waste (such as Italy, Greece and Malta) .
- **Using plastic waste destined for landfills to recycling or energy recovery**, would reduce the environmental problem giving an intrinsic value to the waste itself (**Cash from trash**).

- Since 2018 it is possible to observe a decline of the European plastics industry production

The COVID-19 pandemic has clearly intensified this decline

Plastics industry production in EU27 (index 2015=100, seasonally adjusted data)



Production of plastic in primary forms, EU 27



Source : Plastics the facts 2020

- After a sharp drop in production due to COVID-19 in the first six months of the year 2020, production has started to recover again in the second half of the year (it will continue in 2021).
- **The speed of recovery depends on the impact of the pandemic and on the demand for plastics from important customer industries** like automotive and construction sectors.
- The production level before the COVID-19 will not be reached before 2022.
- This reduction could **stimulate** the use of **biodegradable plastic** derived from biological substances rather than petroleum.

Italian Strategies: PNIEC

PNIEC: NATIONAL INTEGRATED PLAN FOR ENERGY AND CLIMATE

THE PLAN IS STRUCTURED ON **5 INTERVENTION LINES**, THAT WILL BE DEVELOPED IN AN INTEGRATED MANNER



Decarbonisation



Efficiency



Energy
security

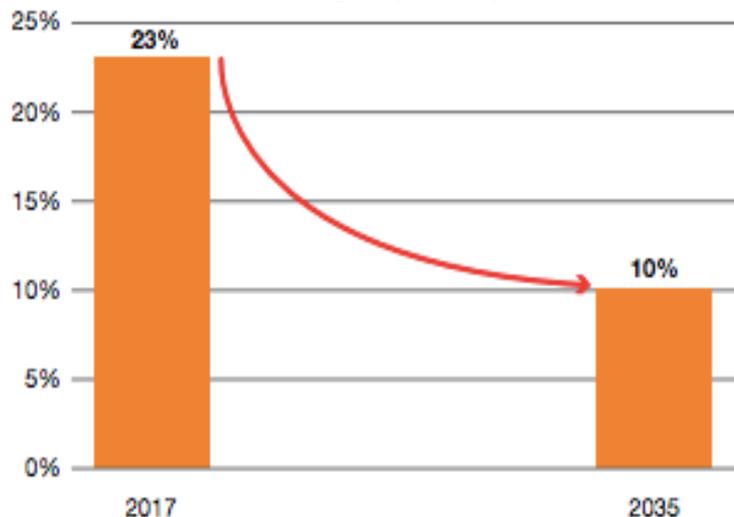


Market
development indoor



Search, innovation,
competitiveness

Percentage of Landfills

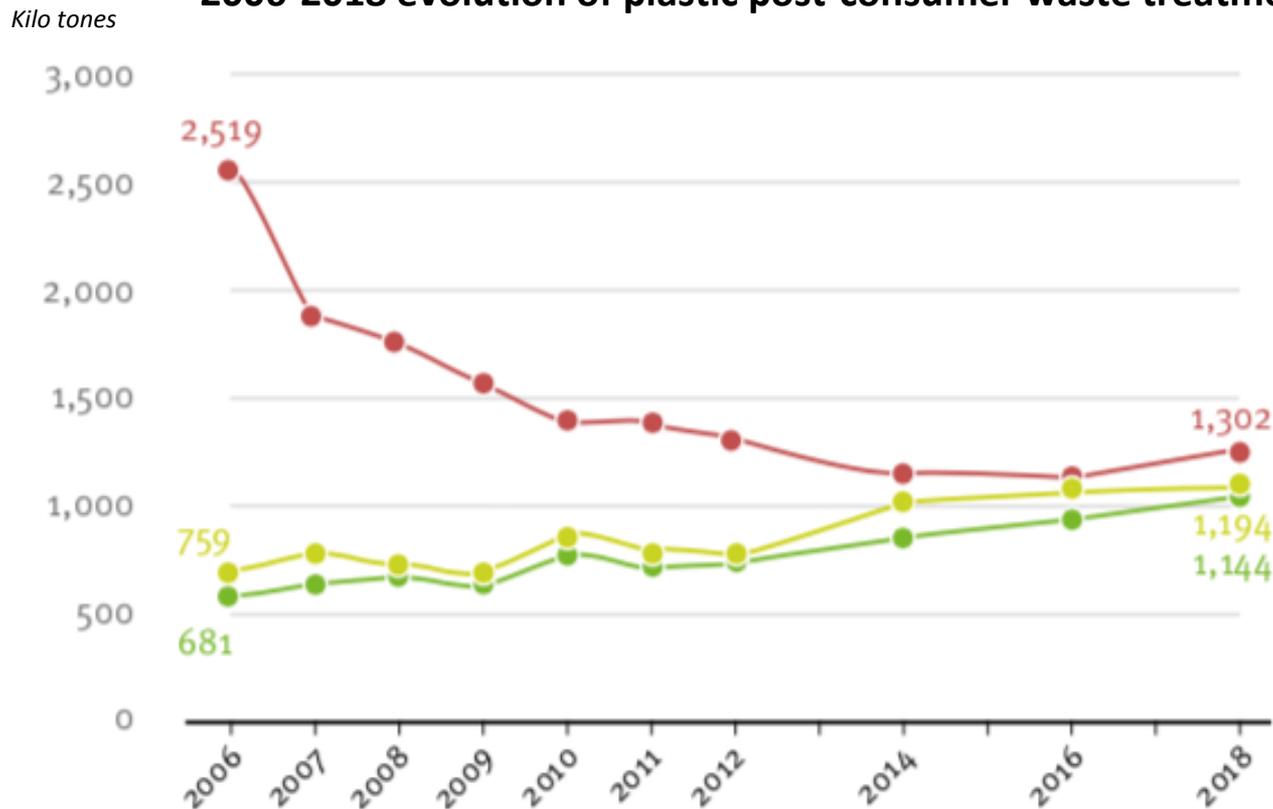


To build a path consistent with "circularity", the reduction of emissions in the waste sector is mainly linked to:

- the reduction of **landfills (10% in 2035)**
- **increasing separate waste collection** and the consequent **recycling**
- the **energy recovery**

Italian Plastic waste treatment

2006-2018 evolution of plastic post-consumer waste treatment



Percentage change
2018/2006 :

+68% Recycling

+57% Energy Recovery

-48% Landfill

In Italy Landfill is still the most used plastic waste treatment

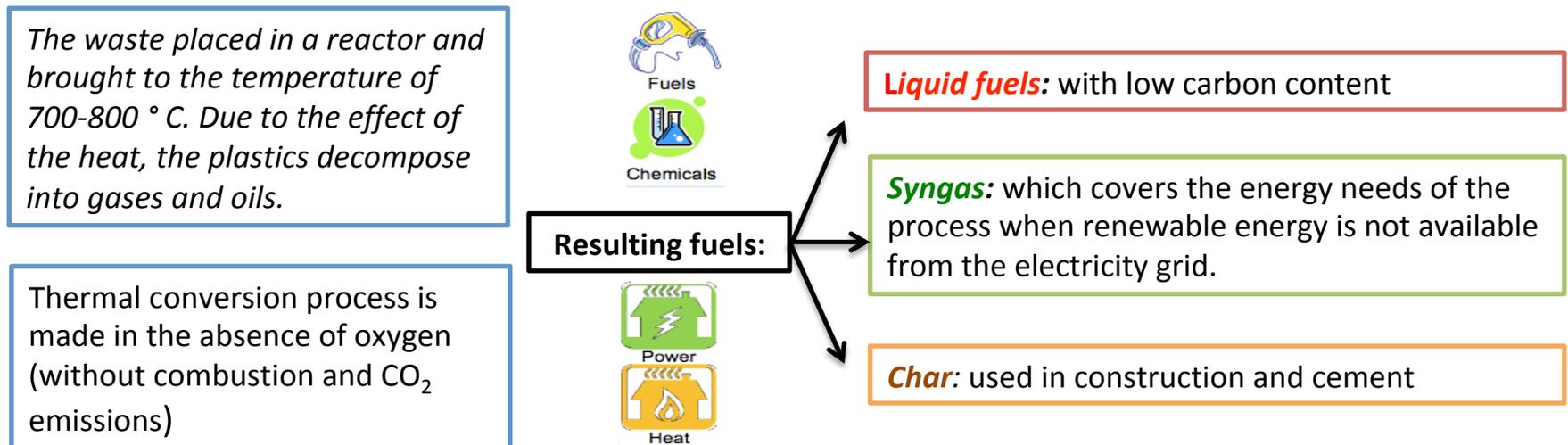
Source : Plastics the facts 2020

- In 2018, 3.6 million tonnes of plastic post-consumer waste were collected through official schemes in order to be treated.
- From 2016 to 2018, the recycling volumes increased by 7,4%, energy recovery increased by 1,5% and landfill increased by 1,1%.

Energy recovery and Pyrolysis

- The Energy recovery process is the conversion of non-recyclable waste materials into useable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolysis, anaerobic digestion, and landfill gas (LFG) recovery.
- It reduces carbon emissions by decreasing the need for fossil fuel-based energy sources and also reduces methane emissions generated by landfills respecting the circular economy principles.

Pyrolysis: How does it work?



Thermal Incinerator VS Pyrolysis

❖ *Similarities:*

- They can convert plastic waste into valuable energy.
- Both technologies have a similar cost.

◆ *Differences:* they are two completely different processes, which are mainly reflected in the following aspects:

Thermal Incinerator

- It is an exothermic process.
- It produces energy from the combustion of waste; transforming thermal energy into electricity.
- Thanks to a filtration system it is capable to reduce the dispersion of harmful materials.
- 70% of the ash and harmful dust are filtered, 30% of the carcinogenic nanoparticles, are however released into the atmosphere.
- It exploits the scale effect of the market: large plants are not very adaptable to small businesses

Pyrolysis

- It is an endothermic process
- Pyrolysis provide more flexible ways of storing energy than incineration
- It transforms, in the absence of oxygen, waste into solid, liquid or gaseous products without emitting dioxin or CO₂.
- It does not emit any harmful materials dangerous for the human health.
- The amount of waste is minimal, which can prevent landfill pollution.
- It works great even in **small system**, it is perfect to achieve the goal of Smart Cities and **Energy Communities**.

Conclusion

- The circular economy is an important driving force for reducing greenhouse gas emissions, respecting the planet's limits and achieving the **United Nations Sustainable Development Goals**.
- It aims to **promote circularity** at a systemic level **in all the value chain**.
- To promote the circular economy and more sustainable production and consumption models, and to improve waste management, it is necessary to **encourage** the use of **economic instruments** such as **environmental taxation**, green tax reforms and an extended producer responsibility.
- The transition to the circular economy will be **systemic**, deep and **transformative**. It will require an alignment and cooperation of all stakeholders at all levels – EU, national, regional, local, and international.
- Therefore, the EU Commission in order to achieve the 2050 energy goals proposed by the roadmap, invites institutions and bodies to endorse the Circular Economy Action Plan and actively contribute to its implementation, **encouraging Member States to adopt** or update their **national circular economy strategies**, plans and measures.

“Peace, development and environmental protection are interdependent and indissoluble”

Rio Declaration on Environment and Development, 1992



*Thank You
for Your attention!*

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