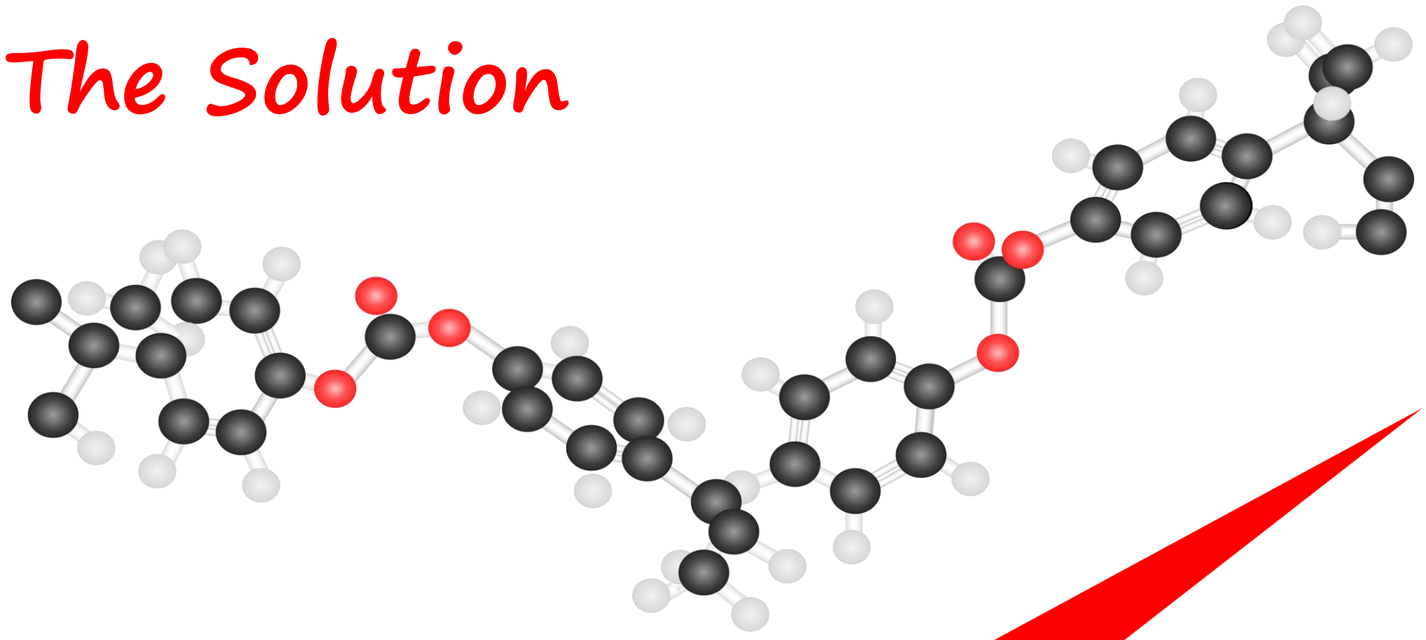
The Solution



TTL USA INC
TECHNOLOGY TRANSFER LABS

PLASTIFISSION

20 TMD REACTORS

Thermomolecular Decomposition Technology

Technology serving nature

ENERGY PRODUCTION FROM PLASTIC
20 Reactors
Electricity
123 500 MWh/y
& Heat Energy
666 500
GJ/y
POWER BY PLASTIFISSION TECHNOLOGY

TTL USA INC
TECHNOLOGY TRANSFER LABS

THE NEW SOLUTION

WOW

ENERGY PRODUCTION FROM PLASTIC
20 Reactors Electricity
123 500 MWh/y
& Heat Energy
666 500 GJ/y
POWER BY PLASTIFISSION TECHNOLOGY

WE GENERATE ELECTRICITY FROM NON-RECYCLABLE, END-OF-LIFE-CYCLE MIXED PLASTIC WASTE USING AN ENVIRONMENTALLY FRIENDLY AND UNIQUE RECYCLING, THERMO – MOLECULAR CONVERSION TECHNOLOGY

HEAT ENERGY
666 500 GJ/year

5% CARBON *
2 350 tons
* Incl. 0.5-1% other solid fraction

70% OIL
37 867 200 liter

47 thousand tons/year
Mixed Plastic Waste

TCC

25% GAS
11 760 000 m³

TCC

ELECTRICITY
500 MWh/year

OUR TECHNOLOGY

ENERGY PRODUCTION FROM PLASTIC

Energy production

20 reactors:
5,600 kg/h (12,346 lbs/h) capacity unit provides **50,000 homes (in the EU) with electricity (and heat) each year.**

Job creation

One waste treatment plant employs **32 people. Additional employment opportunities** include collection, selection, storage, and transportation of plastics.

Flexible output materials

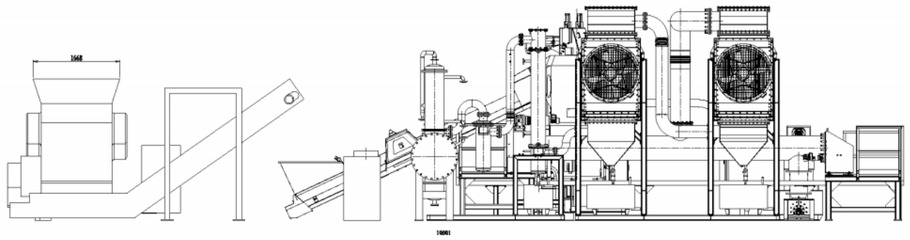
Scalable processing capacity
Adjustable power output
Stored energy
Distributed power generation
Modular design in mobile systems on **8,500 m²** (91,493 sq ft)

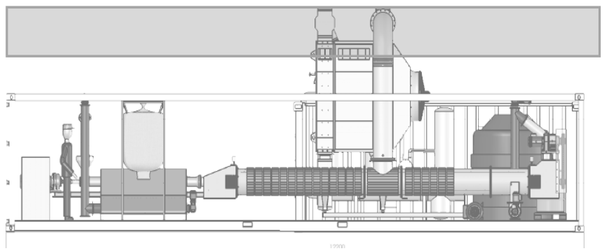
ADVANTAGE RECAP

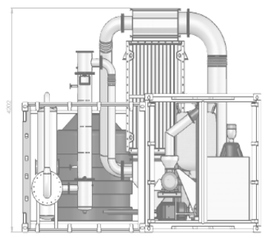
TÜVRheinland®
Precisely Right.

CE certified

Our technology does not require cleaned plastic and works as a closed system without harmful emissions.







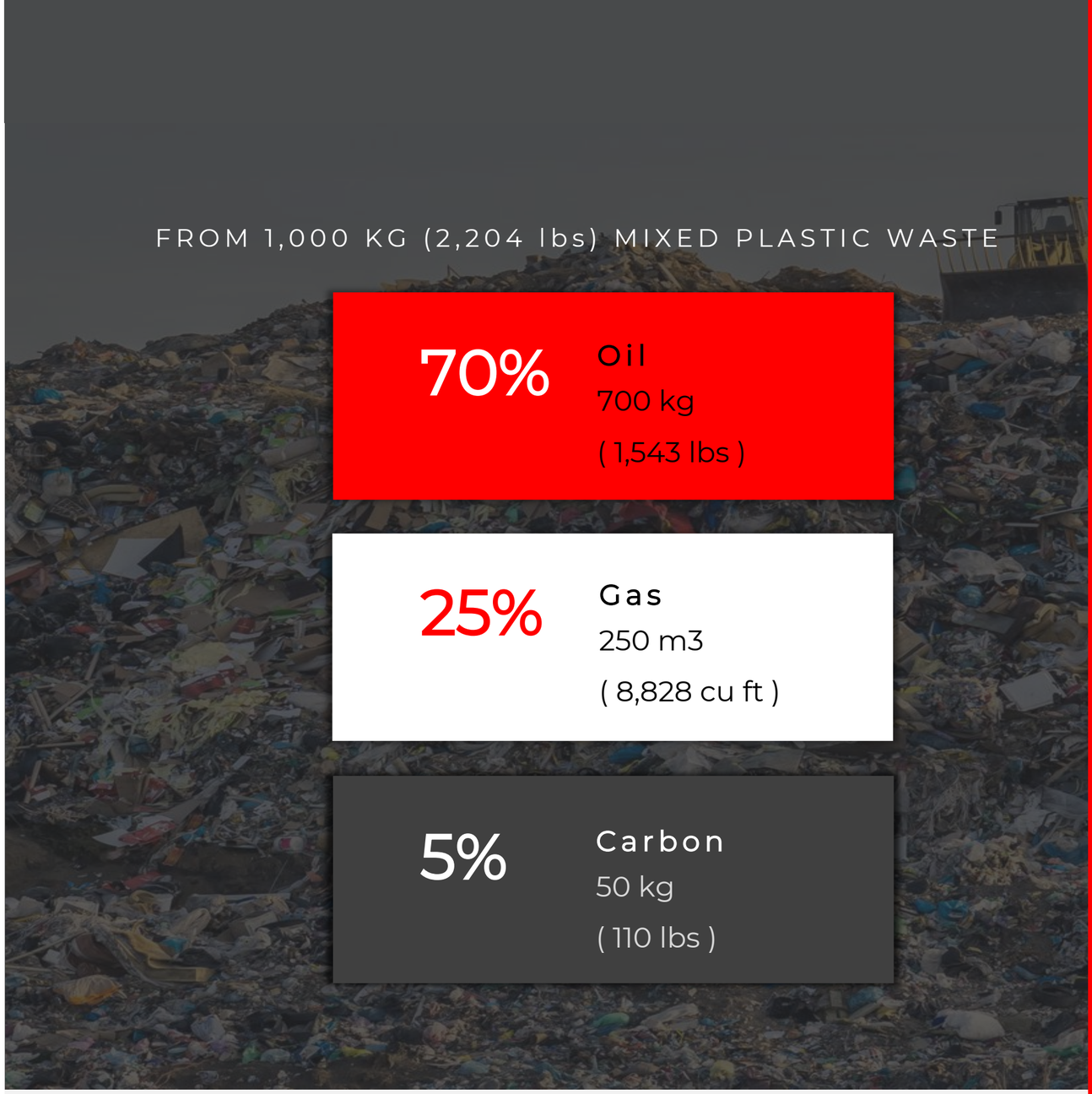
OUR TECHNOLOGY

ENERGY PRODUCTION FROM PLASTIC

In terms of energy, the highest efficiency is achieved with mixed plastic waste input where the yield is:

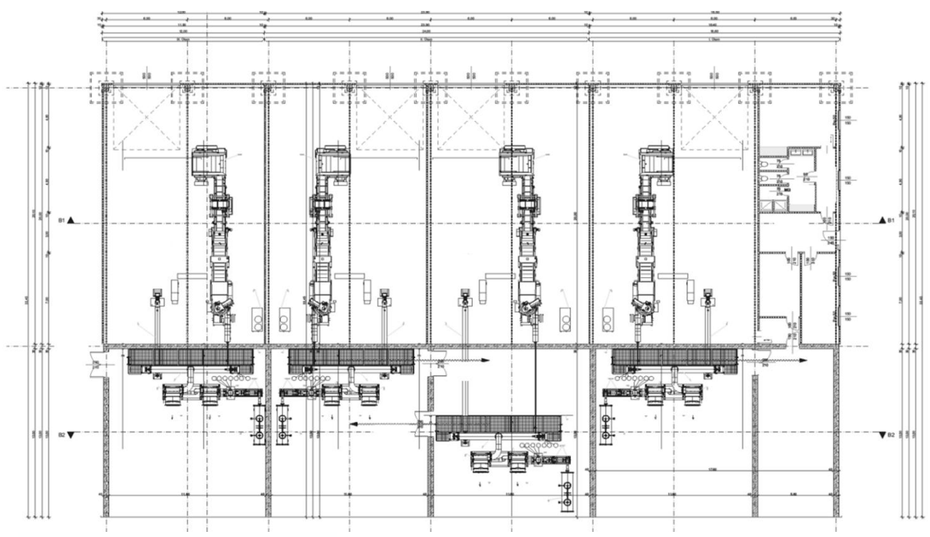
Oil	70%
Gas	25%
Carbon	5%

During heat decomposition, the input waste breaks down to elementary pieces and thereafter the heat builds chemical bonds and transforms the waste to oil, gas and carbon in solid phase respectively.



OUR PORTFOLIO

SCHEMATIC DIAGRAM OF PLASTIFISSION



TÜVRheinland®
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ENERGY PRODUCTION FROM PLASTIC
20 Reactors Electricity
123 500 MWh/y
& Heat Energy
666 500 GJ/y
POWER BY PLASTIFISSION TECHNOLOGY

TTL-TMD 300

A schematic diagram of
1 block (4 reactors),
5 blocks (20 reactors)

01.	Raw material conveyor belt
02.	Raw material storage silos
03.	Thermomolecular reactor
04.	Solid fraction quenching
05.	Solid fraction quenching pipe
06.	Partial condensers
07.	Gas chillers
08.	Drop separators
09.	Common gas cleaner
10.	Electric heating element
11.	Electricity generating units

MIXED PLASTIC WASTE

ABS

Acrylonitrile butadiene styrene

PA

Polyamide

PC

Polycarbonate

P E

Polyethylene

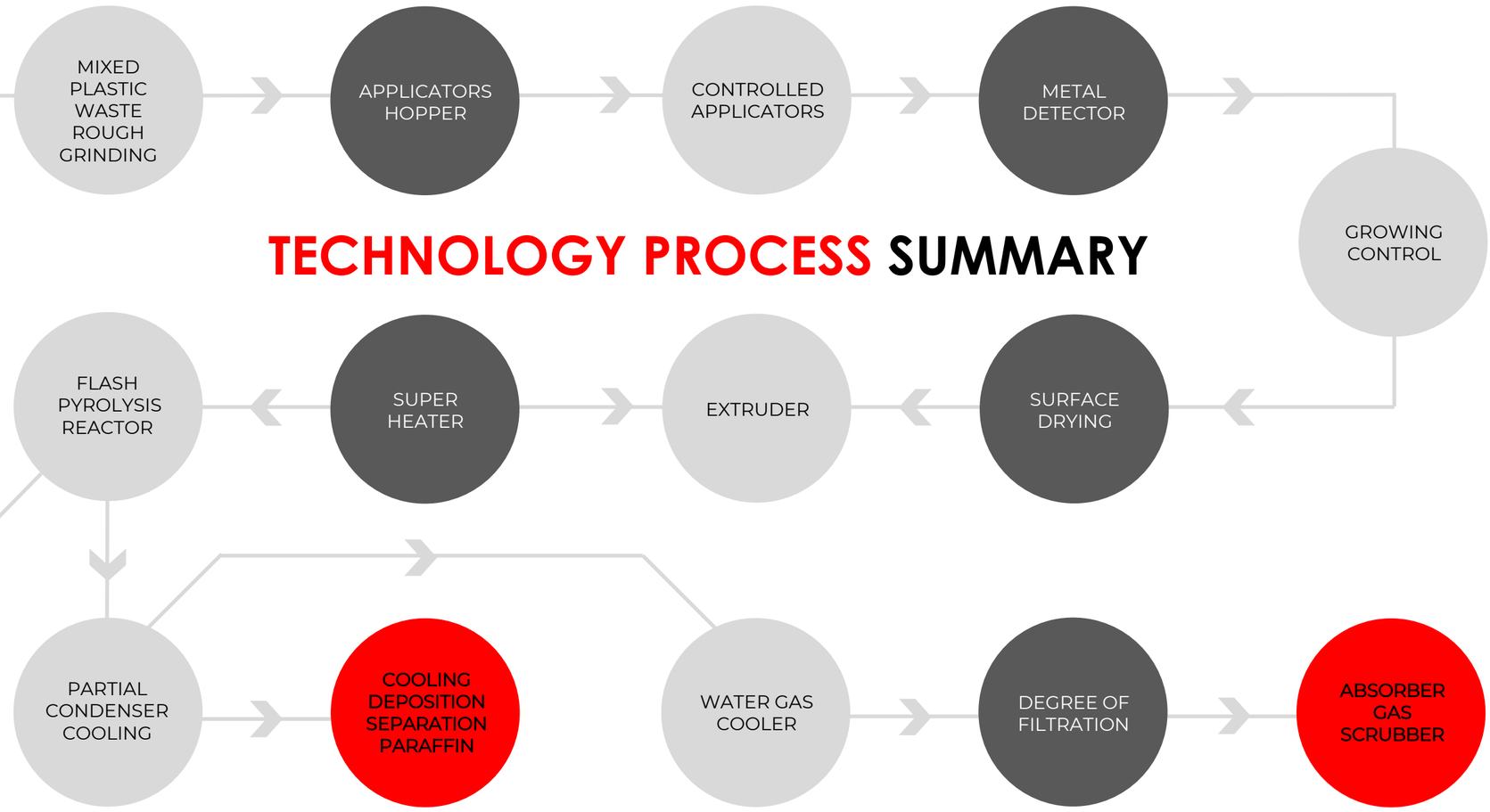
P P

Polypropylene

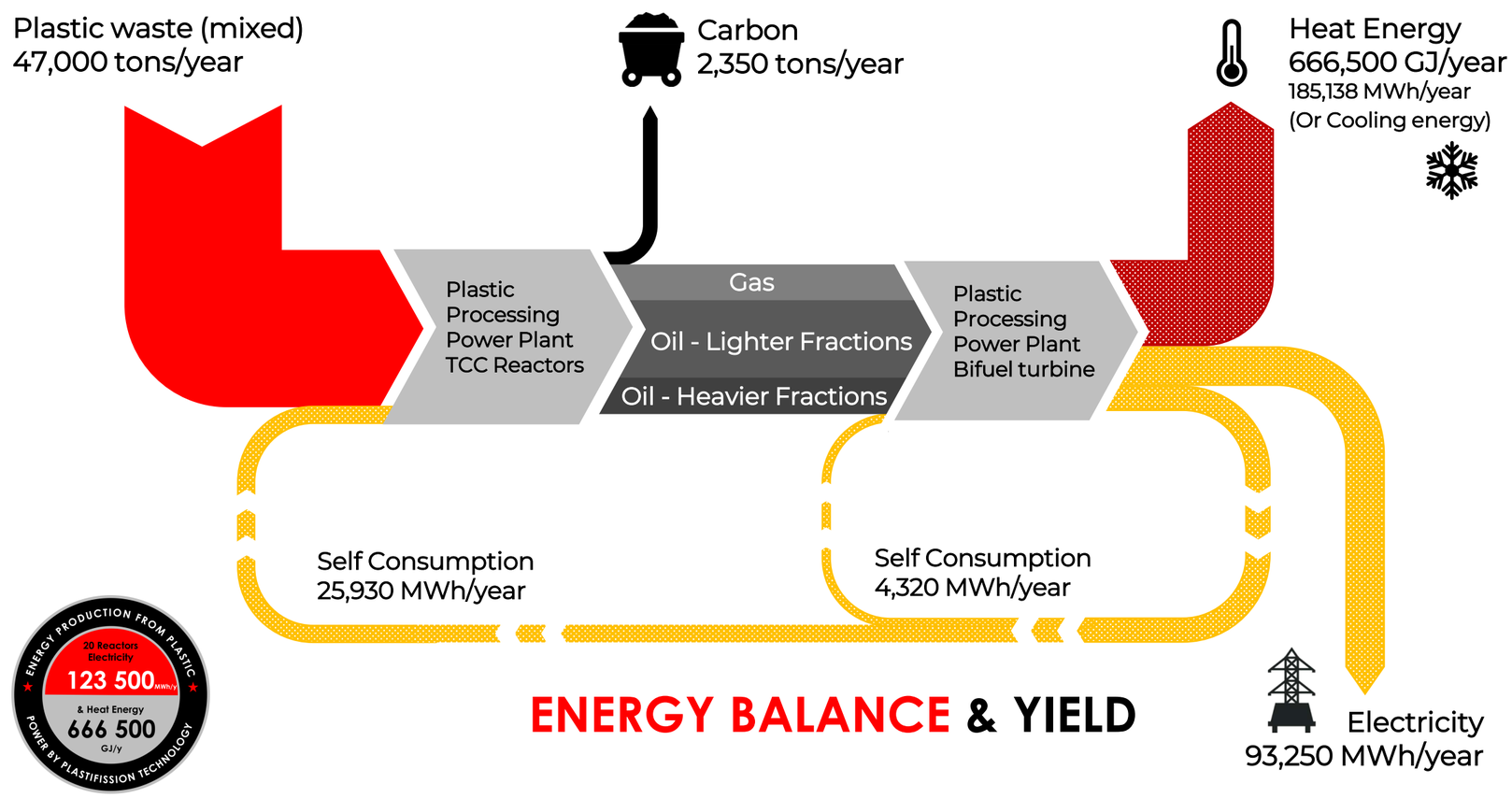
PS

Polystyrene

DOUBLE EXTRUDER SLAG (CARBON) REMOVAL



TECHNOLOGY PROCESS SUMMARY



ENERGY BALANCE & YIELD

TECHNOLOGY

USE
OF HEAT BYPRODUCT

20 TMD REACTORS

THERMAL ENERGY UTILIZATION: SELECTED POSSIBILITIES

- **District heating**
- Chemical industry
- Grain drying
- Pharmaceutical industry

OUTPUT

Heat Energy

666,500

GJ/year

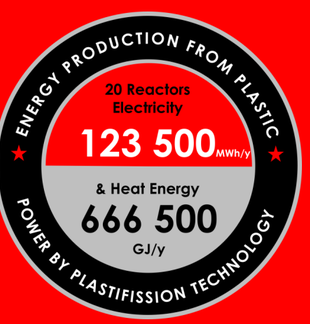
TECHNOLOGY

USE
OF CARBON BYPRODUCT

CARBON UTILIZATION: SELECTED POSSIBILITIES

- **Carbon**

- Metallurgy: steel production
- Industrial and commercial waste water treatment
- Pharmaceutical and chemical purification
- Water filtration
- Air filtration
- Food refinery: cane and corn sugar
- Skin Care



C

2,350

tons/year

CARBON

KEY EXPERTISE

BUSINESS POSSIBILITY - PLASTIFISSION 20 REACTORS

Mixed plastic waste processing capacity: **47,000** tons/year (5,600 kg/h or 12,346 lbs/h) **Operating time: 8,400** hours/year.

CHEMICAL THERMAL DECOMPOSITION

OIL 70%

37,867,200

liter per year

10,003,460 gal per year

High quality oil (**38 MJ/kg**). We can generate **123,500 MWh/year** of electricity from chemically processing **47,000** tons of mixed plastic waste using an environmentally friendly technology.

GAS 25%

11,760,000

m^3 per year

415,300,000 cu ft per year

High quality gas (**52-56 MJ/kg**). Provides the **electricity required for the operation** of the Plastic Processing Power Plant.

CARBON 5%

2,350

tons per year

High quality carbon powder. Metallurgical raw material, World market price: **750 EUR/tons.** We can make **activated carbon.** **(WMP: 2,300 – 2,500 EUR/tons).**

* Unit provides **50,000 homes** (in the EU) with electricity (and heat) each year.

Electricity capacity of power plant/year:

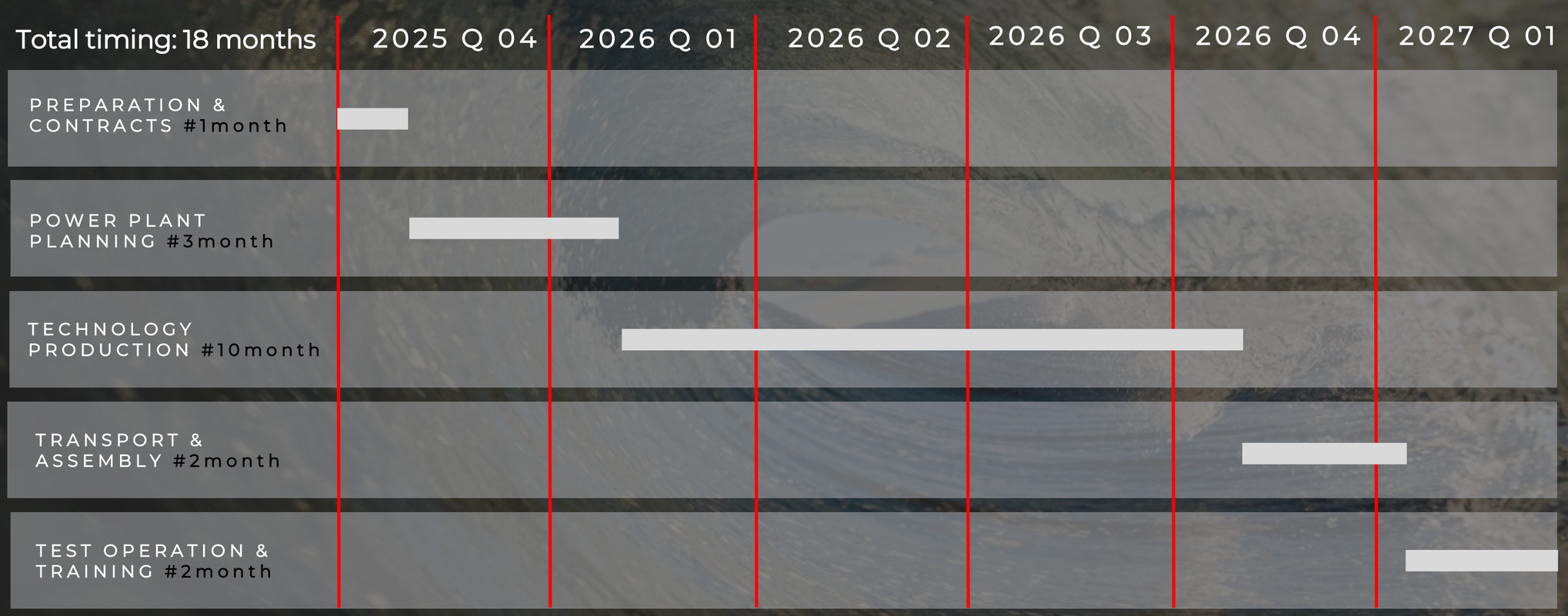
123,500 MWh *

Heat Energy

666,500 GJ/year

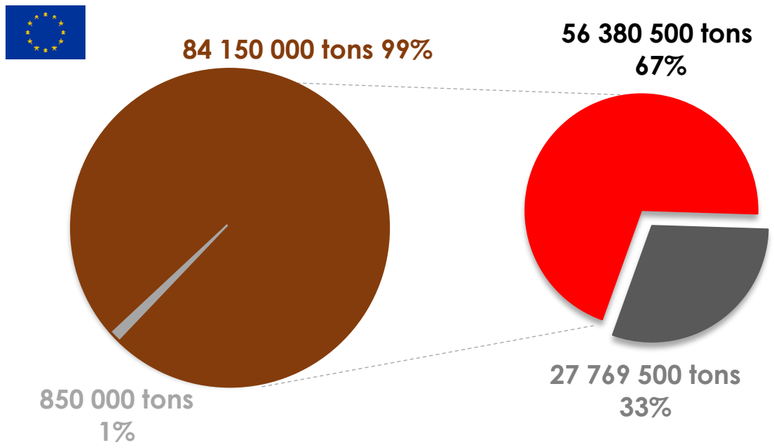
SCHEDULE

PROJECT TIMELINE



STATISTICS

PLASTIC WASTE
IN EU PER YEAR



Metal and textile pollution in EU/year

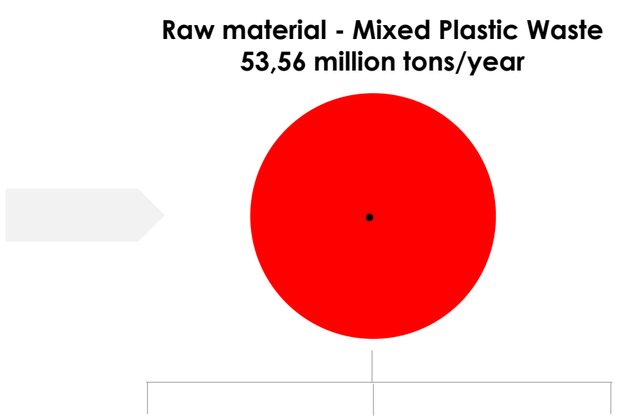
Mixed plastic waste depoed in EU/year

Mixed plastic waste in EU/year

Mixed plastic waste material recycled

EUROPEAN COMMISSION

Source: EUROPEAN COMMISSION {SWD(2018) 16 final}



2 350 tons CARBON

11 760 000 m³ 415 300 000 cu ft GAS + 37 867 200 l 10 003 460 gal OIL

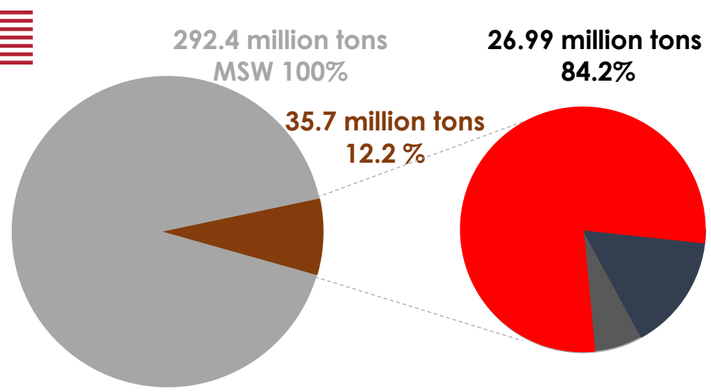
ENERGY PRODUCTION FROM PLASTIC
20 Reactors Electricity
123 500 MWh/y
& Heat Energy
666 500 GJ/y
POWER BY PLASTIFISSION TECHNOLOGY

MIXED PLASTIC WASTE
47 000 tons /year

123 500
MWh /year
ELECTRICITY

666 500
GJ /year
HEAT ENERGY

PLASTIC WASTE
IN USA PER YEAR



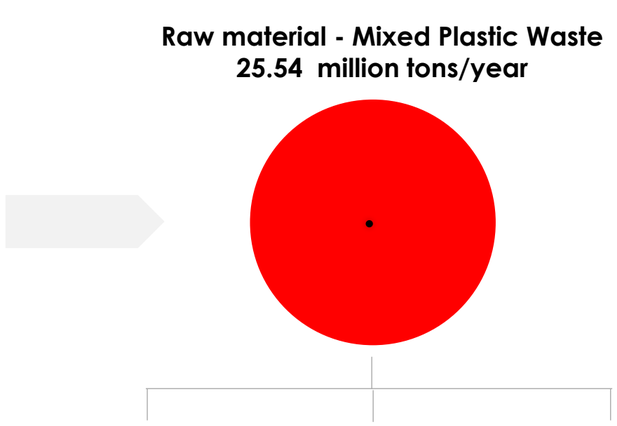
Municipal solid waste (MSW) in USA/year

Mixed plastic waste depoed in USA/year

Mixed plastic waste in USA/year

Plastic waste material recycled & combusted in USA/year

Source (2018): United States Environmental Protection Agency, American Chemistry Council



2,350 tons CARBON

11,760,000 m³ 415,300,000 cu ft GAS + 37,867,200 l 10,003,460 gal OIL

ENERGY PRODUCTION FROM PLASTIC
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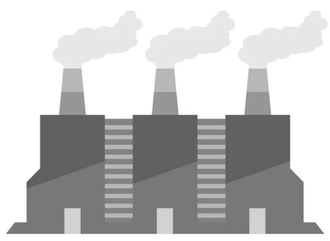
POWER BY PLASTIFISSION TECHNOLOGY

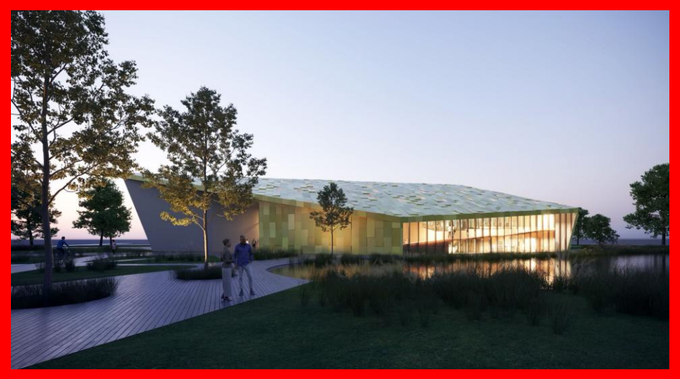
MIXED PLASTIC WASTE
47,000 tons /year

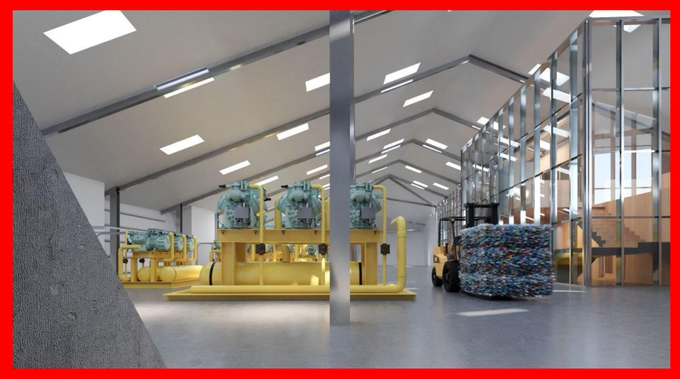
123,500
MWh /year
ELECTRICITY

666,500
GJ /year
HEAT ENERGY

CARBON FOOTPRINT	Technology used and details	Raw material processed per year	Volume produced per year	Carbon footprint per year
ENERGY PRODUCTION FROM PLASTIC — 20 Reactors Electricity 123 500 MWh/y & Heat Energy 666 500 GJ/y — POWER BY PLASTIFISSION TECHNOLOGY	PLASTIFISSION	**47 000** tons of mixed plastic waste	**123 500** MWh Eletricity and **666 500** GJ Heat energy	**35 015** tons CO_2 ▼
	Oil extraction, and Refining	**47 000** tons Oil (crude oil)	**123 500** MWh Eletricity and **666 000** GJ Heat energy	▲ **109 420** tons CO_2
	Waste Incineration Plant	**47 000** tons of mixed plastic waste	**54 175** MWh Eletricity and **390 100** GJ Heat energy	▲▲ **134 690** tons CO_2

PlastiFission Demonstration Visitor and Research Center





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