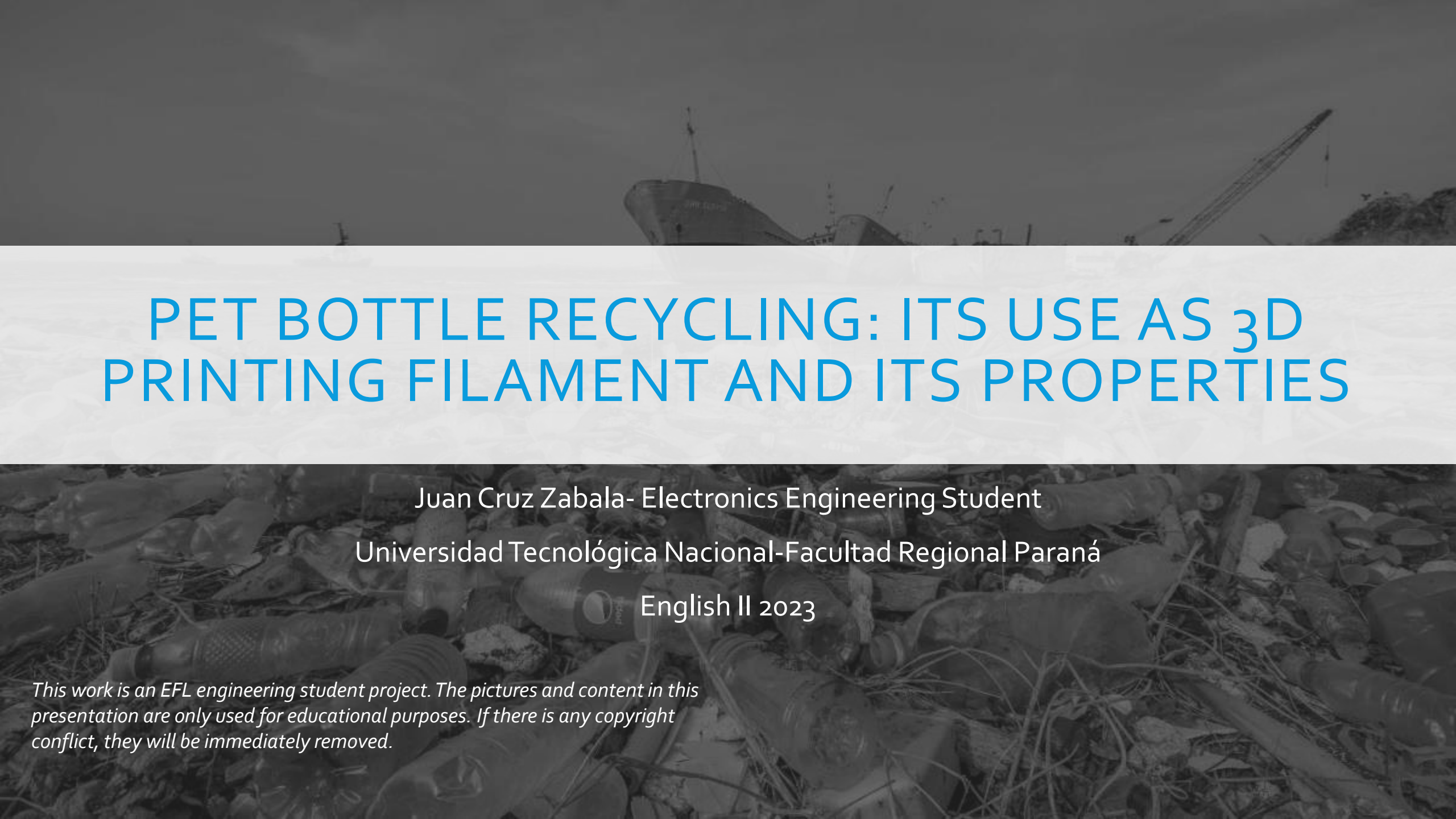

PET BOTTLE RECYCLING: ITS USE AS 3D PRINTING FILAMENT AND ITS PROPERTIES

Juan Cruz Zabala- Electronics Engineering Student

Universidad Tecnológica Nacional-Facultad Regional Paraná

English II 2023

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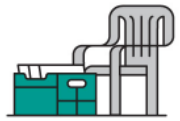
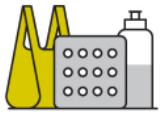
A LITTLE OVERVIEW

THE CHALLENGE OF RECYCLING

Globally, 18 percent of plastic is recycled, up from nearly zero in 1980. Plastic bottles are one of the most widely recycled products. But other items, such as drinking straws, are harder to recycle and often discarded.

Ease of recycling by type*

- Easy
- Manageable
- Difficult
- Very difficult

1	2	3	4	5	6	7
						
PET *Polyethylene terephthalate*	**HDPE** *High-density polyethylene*	**PVC** *Polyvinyl chloride*	**LDPE** *Low-density polyethylene*	**PP** *Polypropylene*	**PS** *Polystyrene*	**OTHER**
Beverage bottles, food jars, clothing and carpet fiber, some shampoo and mouthwash bottles	Detergent and bleach bottles, snack boxes, milk jugs, toys, buckets, crates, plant pots, garden furniture, trash bins	Credit cards, window and doorframes, gutters, pipes and fittings, wire and cable sheathing, synthetic leather	Packaging film, shopping bags, bubble wrap, flexible bottles, wire and cable insulation	Bottle tops, drinking straws, lunch boxes, insulated coolers, fabric and carpet fiber, tarps, diapers	Plastic-foam cups, egg boxes, meat trays, packing peanuts, coat hangers, yogurt containers, insulation, toys	Nylon fabrics, baby bottles, compact disks, medical storage containers, car parts, watercooler bottles
11%	**14%**	**5%**	**20%**	**19%**	**6%**	**24%**

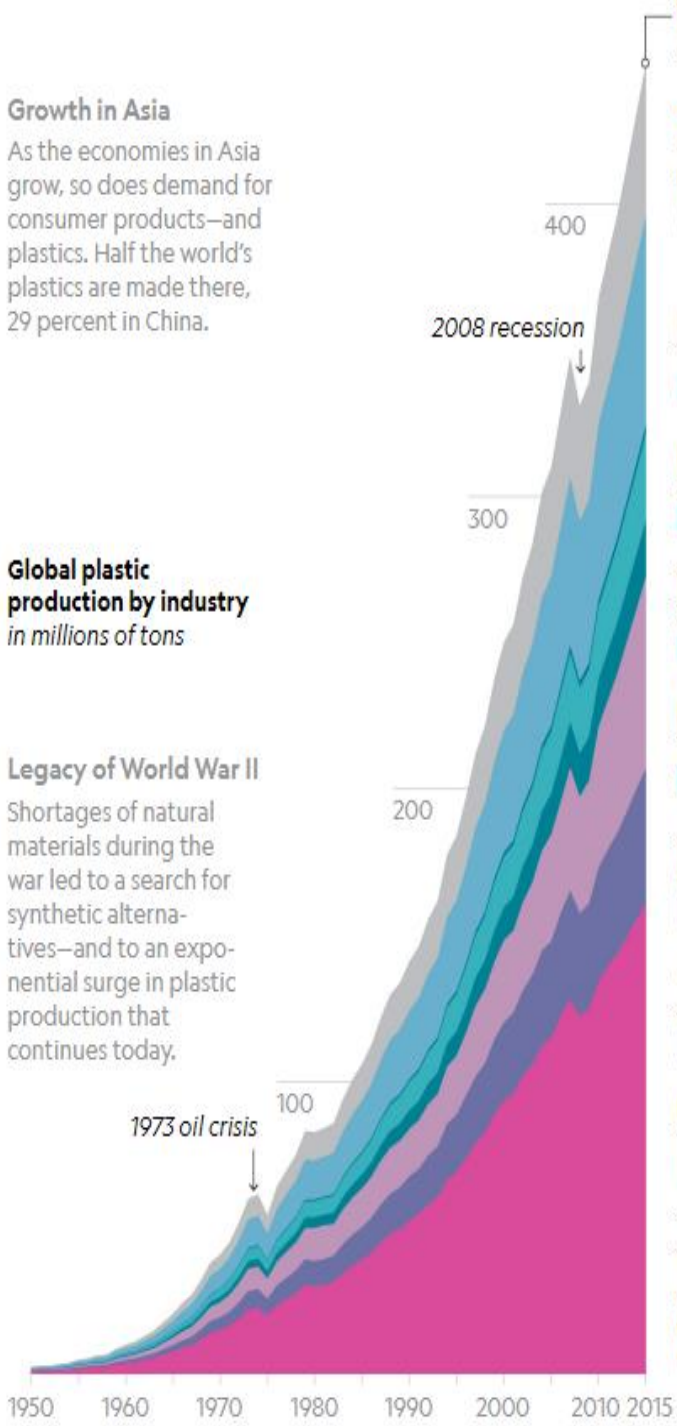
Growth in Asia

As the economies in Asia grow, so does demand for consumer products—and plastics. Half the world's plastics are made there, 29 percent in China.

Global plastic production by industry
in millions of tons

Legacy of World War II

Shortages of natural materials during the war led to a search for synthetic alternatives—and to an exponential surge in plastic production that continues today.



Total
448 million tons produced in 2015

Other
52 million
includes health care and agriculture
5 years ◀ The average time plastics are used before they're discarded.

Building and construction
72 million
35 years

Industrial machinery
3 million
20 years

Transportation
30 million
13 years

Electrical
19 million
8 years

Textiles
65 million
5 years

Consumer products
46 million
3 years

Packaging
161 million
Less than six months

The largest market for plastics today is for packaging materials. That trash now accounts for nearly half of all plastic waste generated globally; most of it never gets recycled or incinerated.

MAP OF THE PRESENTATION

I. Pollution made by PET Bottles

- Current State of PET Recycling
- Challenges in PET Recycling
- Future Projections of PET Recycling

Recycled PET for 3D Printing filament

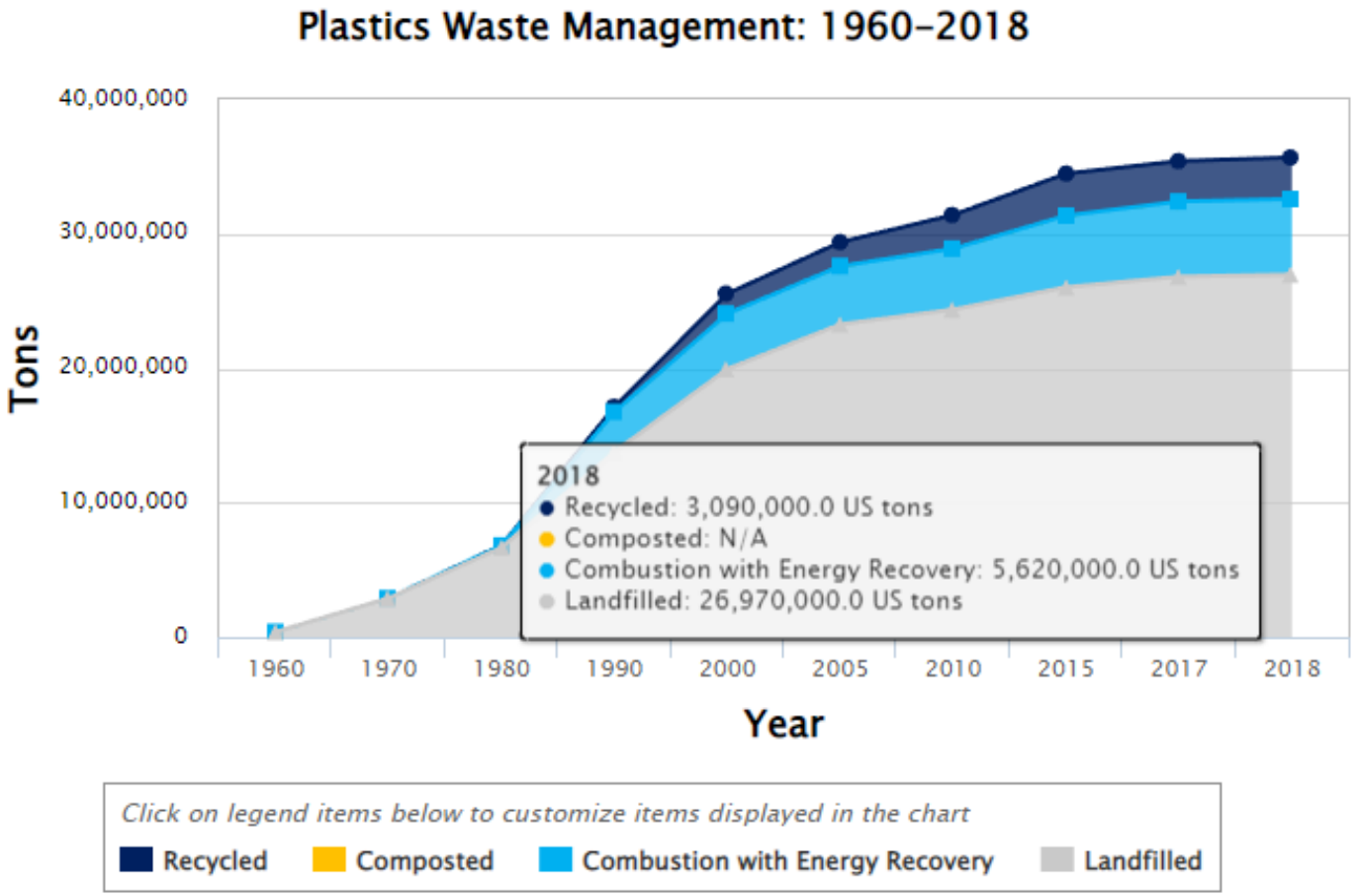
- Preparing the PET Bottles
- Dehumidifying the Small Pieces of PET
- Loading and Melting the PET Pieces into the Extruder
- Extruding the Plastic
- Cooling and Winding the Filament onto a Spool

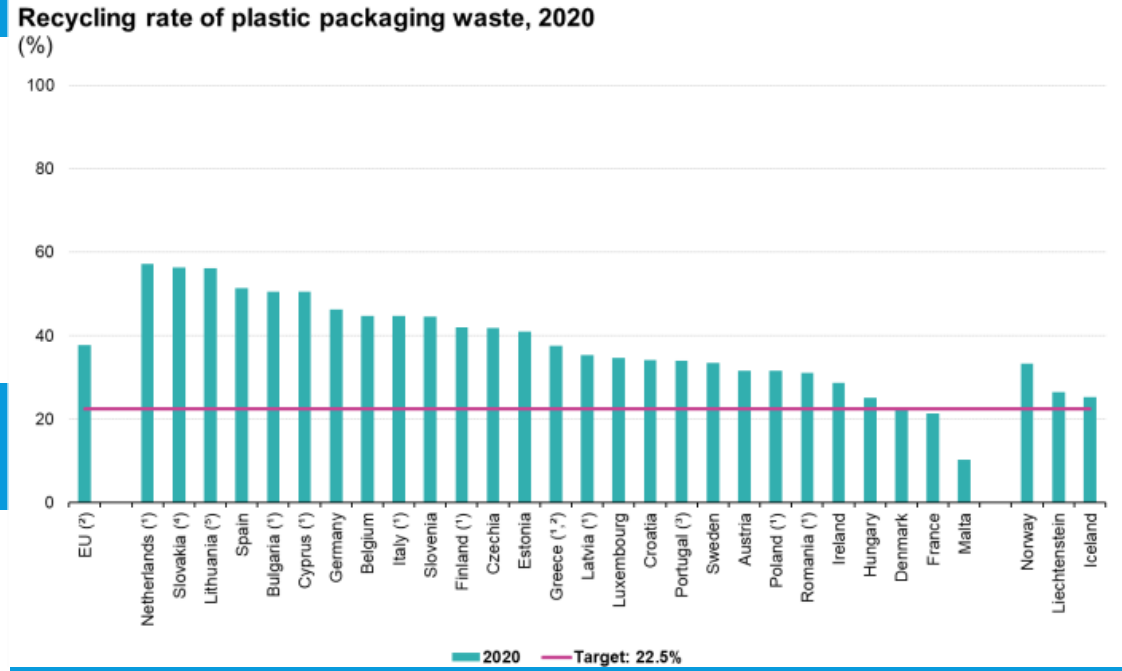
Properties of Recycled PET for 3D Printing filament

- Tensile strength
- Flexibility
- Heat resistance
- Water resistance
- UV resistance
- Printability

POLLUTION MADE BY PET BOTTLES

Current State of PET Recycling





POLLUTION MADE BY PET BOTTLES

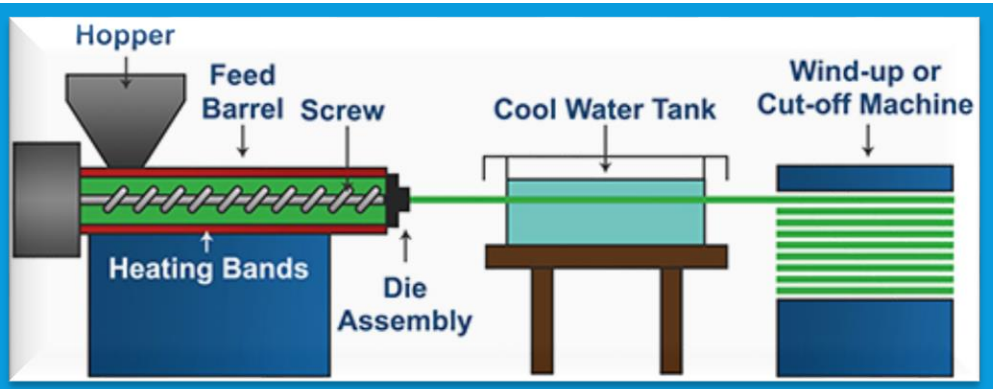
Challenges in PET Recycling

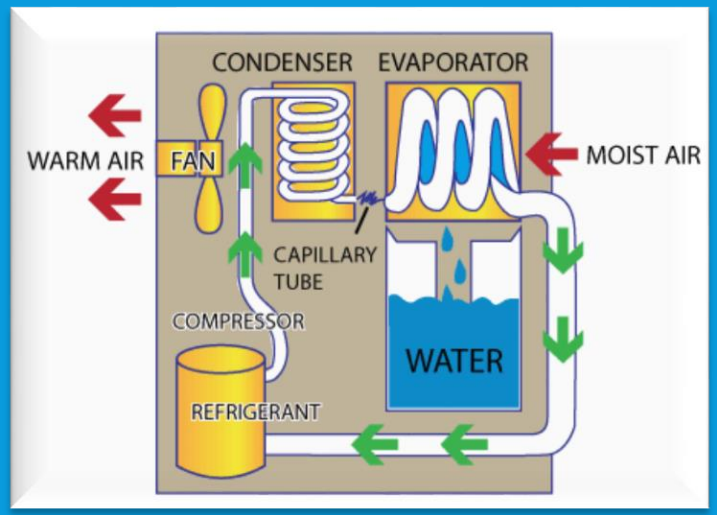
POLLUTION MADE BY PET BOTTLES

Future Projections of PET Recycling

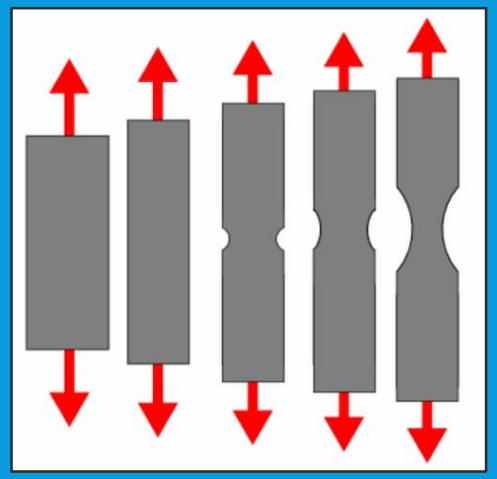
- **2020**
  - Recycle 38% of all plastic packaging
- **2025**
  - Recycle 65% of all plastic packaging
- **2030**
  - Recycle 70% of all plastic packaging

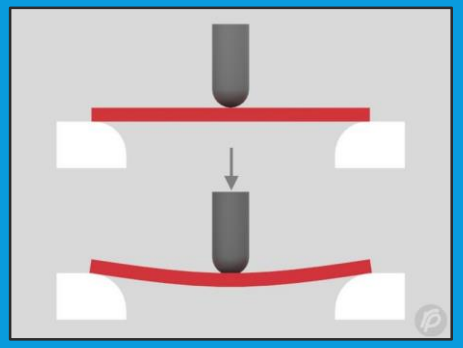
RECYCLED PET FOR 3D PRINTING FILAMENT

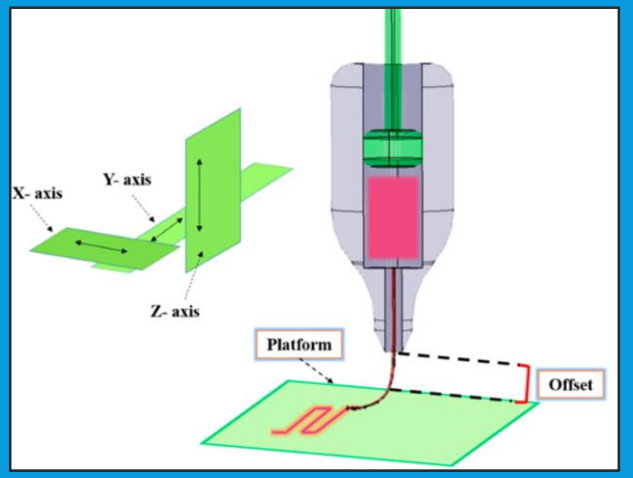




PROPERTIES OF RECYCLED PET FOR 3D PRINTING FILAMENT







CONCLUSION

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THANK YOU!!!

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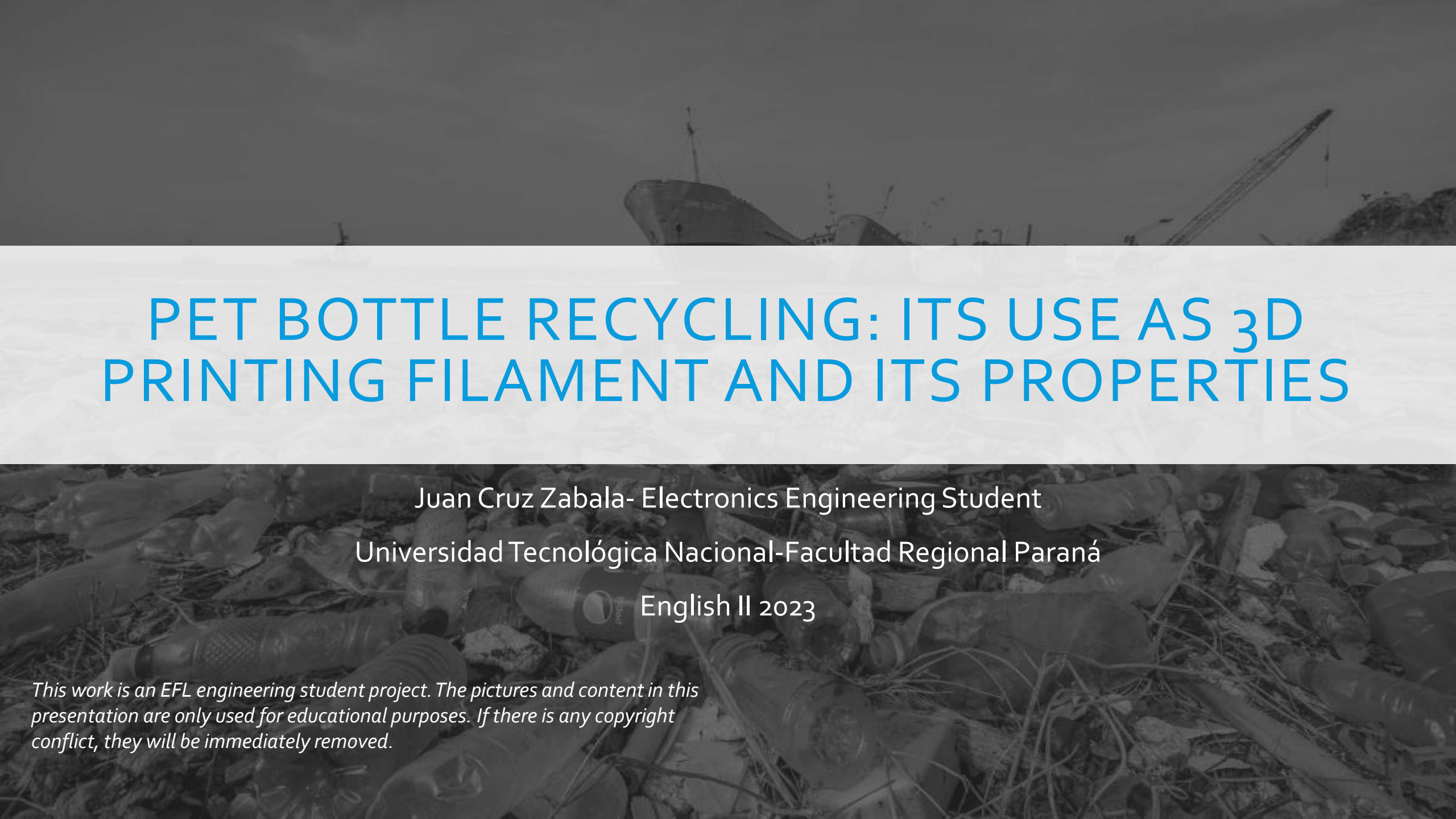

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