

NAMES /DEP

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CONVERTING PLASTICS TO HYDROGEN



INTRODUCTION/BACKGROUND

PROBLEM STATEMENT

BUILDING A GASIFIER THAT WILL HAVE THE ABILITY TO PRODUCE SYNGAS WITH HIGH HYDROGEN CONTENT FROM PLASTIC WASTE AND BIOMASS AND TO SIMULATE A PROCESS AROUND THAT GASIFIER TO MAKE LARGE PRODUCTION OF PURE HYDROGEN.

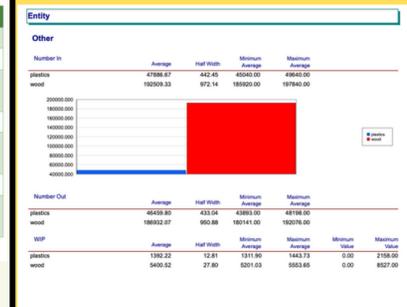
CONSTRAINTS

- SYNGAS COMPOSITION MAINTAINED AT 30-50% H₂
- TYPE OF HYDROGEN TO BE PRODUCED BY THE PROCESS
- FEED RATIO MAINTAINED AT 20% PLASTIC WASTE

SPECIFICATIONS

Table 1 (List of specifications values)

Metric	Unit	Accepted value
Syngas Composition	V% of H ₂	30%-50%
Temperature	°C	700-800 C
Feed Ratio	Plastic waste/ biomass weight	20%
Gasifier High (prototype)	cm	40 cm
Gasifier Dimeter (prototype)	cm	20 cm
Steam Velocity	m/s	1 m/s
Volume Of Gasifier (Prototype)	m ³	0.0125 m ³

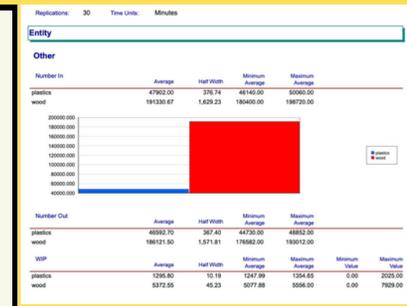


PROJECT IMPACT

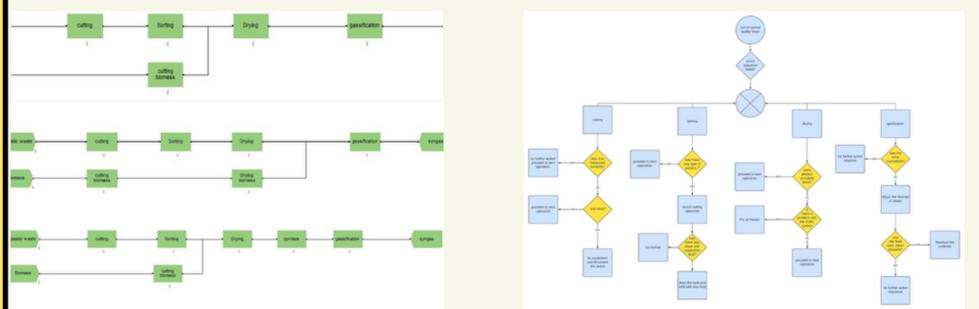
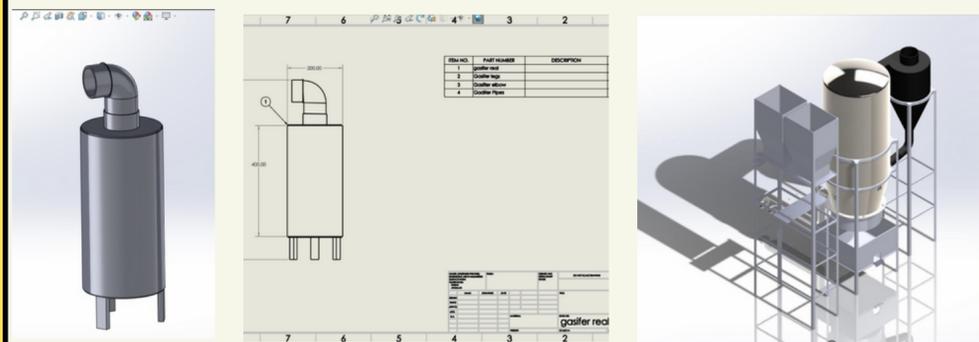
THE MANUFACTURING AND DISTRIBUTION OF HYDROGEN HAS THE POTENTIAL TO BOOST THE LOCAL AND REGIONAL ECONOMIES BY GENERATING NEW BUSINESS OPPORTUNITIES. THIS MAY DRAW INVESTMENTS AND ENCOURAGE INNOVATION BY ADVANCING THE WASTE MANAGEMENT AND ENERGY PRODUCTION INDUSTRIES.

IT CONTRIBUTES TO A CLEANER AND HEALTHIER ENVIRONMENT BY REDUCING THE HARM THAT PLASTIC POLLUTION CAUSES TO THE ENVIRONMENT BY TURNING PLASTIC WASTE INTO HYDROGEN. IT HAS THE POTENTIAL TO INSPIRE PEOPLE AND GROUPS TO TAKE PART IN RECYCLING PROGRAMS AND EMBRACE ECO-FRIENDLY BEHAVIOURS. IT ASSISTS IN REDUCING HAZARDS LIKE POLLUTION AND THE DISCHARGE OF DANGEROUS MATERIALS INTO THE ENVIRONMENT.

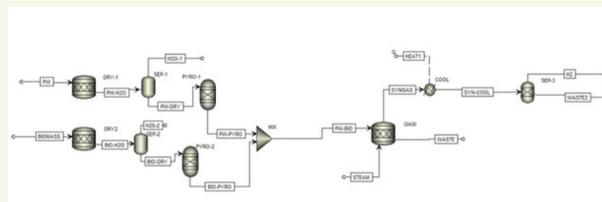
THE PROJECT OFFERS A SOLUTION FOR THE ENVIRONMENTAL ISSUE OF THE ACCUMULATION OF PLASTIC WASTE. IT LESSENS THE POLLUTION THAT PLASTIC WASTE CAUSES AND HELPS STOP PLASTICS FROM BEING RELEASED INTO THE ENVIRONMENT BY TURNING IT INTO HYDROGEN. IT ENCOURAGES RESOURCE EFFICIENCY AND FACILITATES THE SHIFT TO A CIRCULAR AND MORE SUSTAINABLE ECONOMY.



PRTOTYPE DESIGN



TESTING/VALIDATION



Units	SYNGAS	Units	H ₂
Mass Enthalpy	cal/gm 685.405	Mass Enthalpy	cal/gm 687.865
Mass Density	gm/cc 4.34866e-05	Mass Density	gm/cc 4.33614e-05
Enthalpy Flow	cal/sec 3660.37	Enthalpy Flow	cal/sec 1840.27
Mass Fractions	kg/hr 19.2256	Mass Fractions	kg/hr 7.46168
H ₂	0.503909	H ₂	7.26598
CO	0.21971	CO	0.0988173
O ₂	0	O ₂	0
CO ₂	0.103343	CO ₂	0.0968797
H ₂ O	0.0644105	H ₂ O	0
CH ₄	0.0994369	CH ₄	0
C ₂ H ₄	0	C ₂ H ₄	0
N ₂	0	N ₂	0
CL ₂	0	CL ₂	0
HCL	0	HCL	0
S	0.00719048	S	0
C	0	C	0
BIOMASS	0	BIOMASS	0
ASH	0	ASH	0
PP	0	PP	0
HDPE	0	HDPE	0
LDPE	0	LDPE	0
Volume Flow	l/min 7368.41		

CONCLUSIONS

IN CONCLUSION, ESTABLISHING A PLASTIC RECYCLING PLANT THAT CONVERTS PLASTIC WASTE INTO HYDROGEN FUEL OFFERS NUMEROUS BENEFITS. NOT ONLY DOES IT HELP ADDRESS THE PRESSING ISSUE OF PLASTIC POLLUTION BY DIVERTING WASTE FROM LANDFILL SAND OCEANS, BUT IT ALSO PROMOTES SUSTAINABILITY BY PROVIDING A CLEAN AND RENEWABLE ENERGY SOURCE. ADDITIONALLY, THIS INNOVATIVE APPROACH CONTRIBUTES TO REDUCING GREENHOUSE GAS EMISSIONS AND DEPENDENCE ON FOSSIL FUELS, THUS MITIGATING CLIMATE CHANGE. BY CONVERTING PLASTIC WASTE INTO VALUABLE HYDROGEN FUEL, SUCH A PLANT CAN CREATE ECONOMIC OPPORTUNITIES, FOSTER TECHNOLOGICAL ADVANCEMENT, AND ULTIMATELY CONTRIBUTE TO A MORE SUSTAINABLE AND ENVIRONMENTALLY FRIENDLY FUTURE.