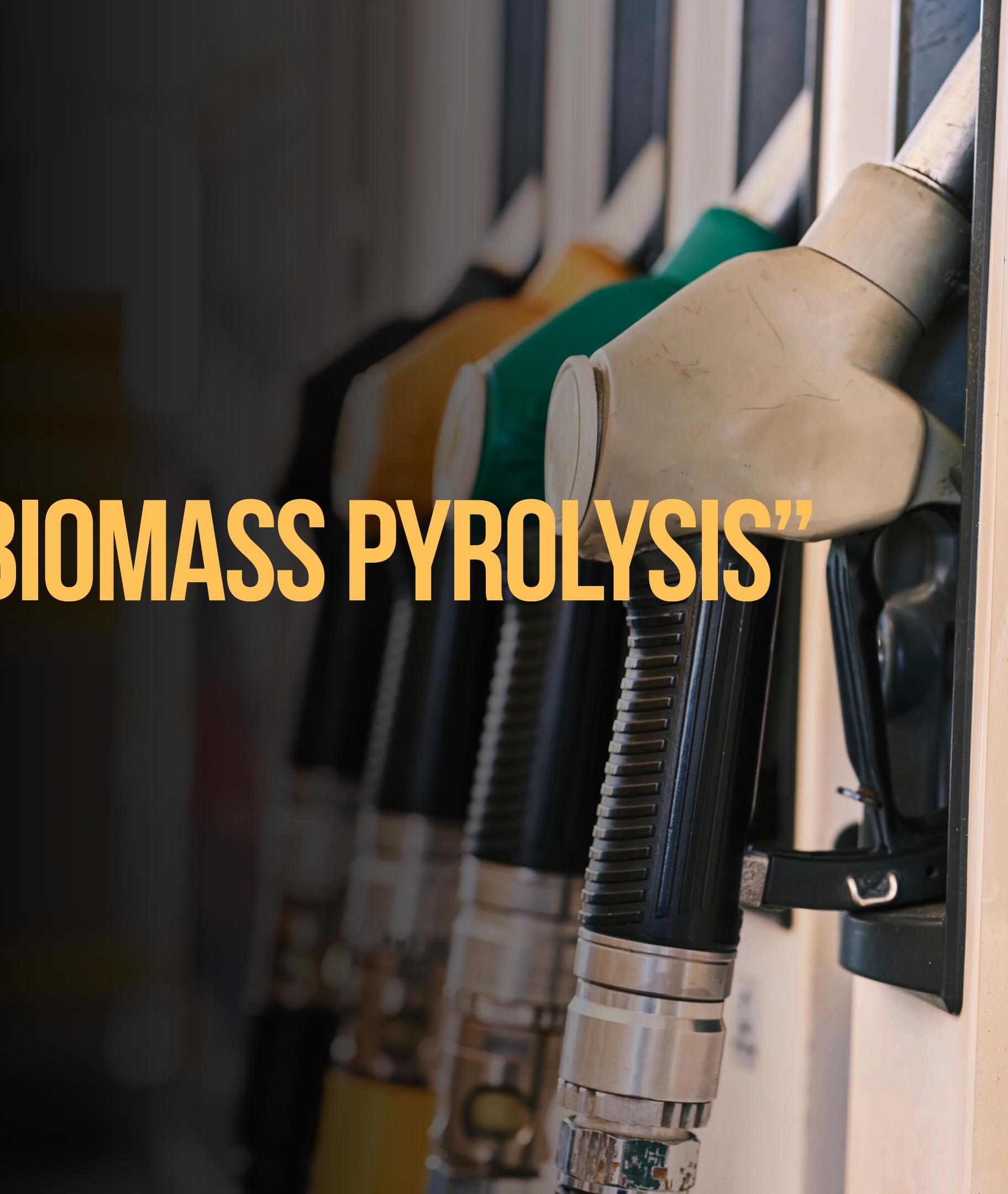




“BIO-OIL FROM BIOMASS PYROLYSIS”

— *A Renewable Alternative to Fossil Fuels*

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INTRODUCTION



Biomass pyrolysis is a thermochemical process where organic material is heated in the absence of oxygen to produce valuable energy products. Among the outputs—bio-oil, syngas, and char—bio-oil has gained special importance because it can be used as a renewable liquid fuel. This process offers a sustainable way to manage agricultural residues, forestry waste, and organic matter while reducing dependence on fossil fuels and lowering environmental impact.



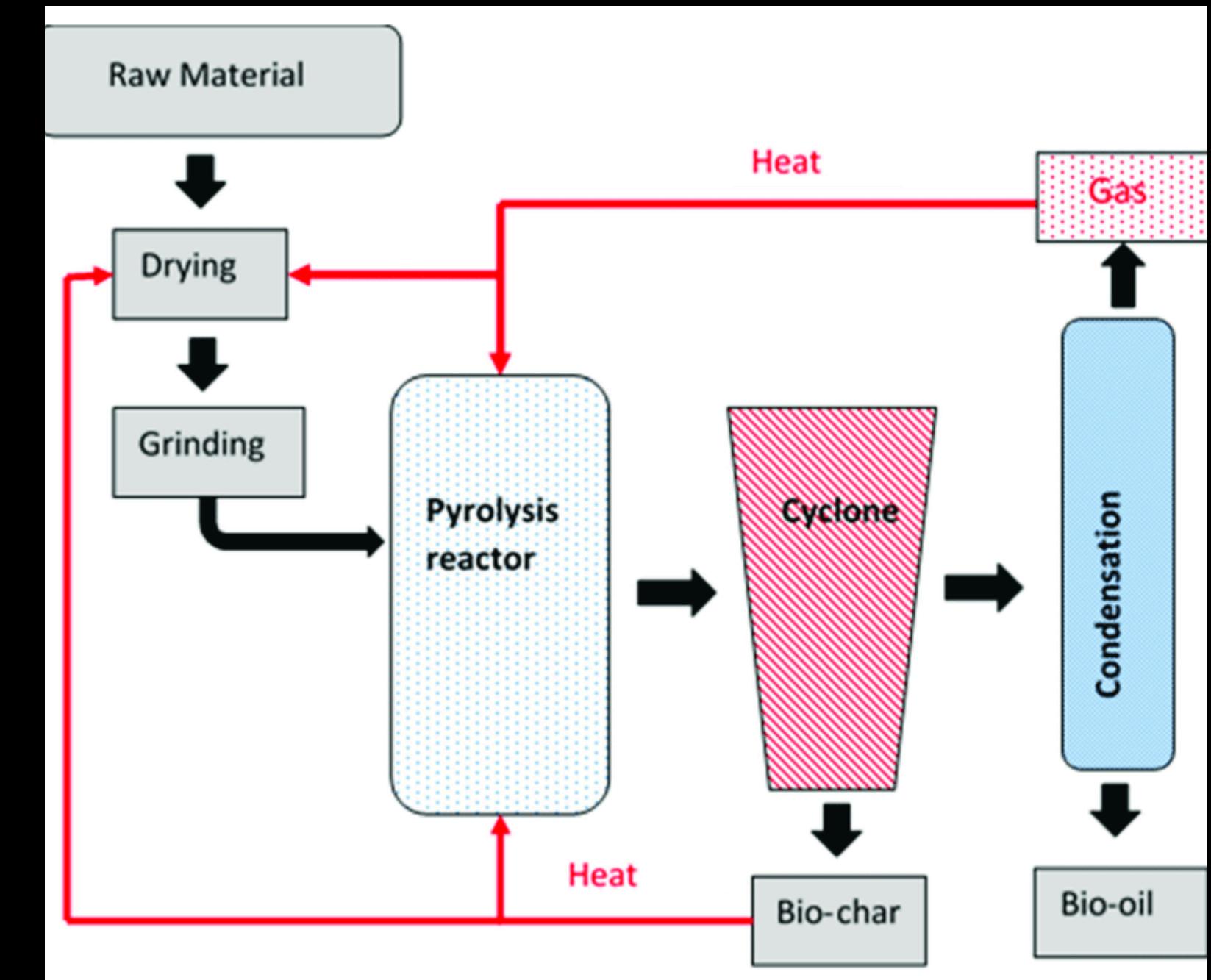
WHAT IS BIO-OIL? →

- *A dark brown, viscous liquid obtained from pyrolysis of biomass.*
- *Can be upgraded to resemble petroleum fuels.*
- *Used for power generation, heating, and as a chemical feedstock.*

- Step 1: Biomass feedstock preparation (drying, size reduction).
- Step 2: Heating biomass at 300–700°C without oxygen.
- Step 3: Products formed → Bio-oil, Syngas, Char.
- Step 4: Collection and storage of bio-oil.



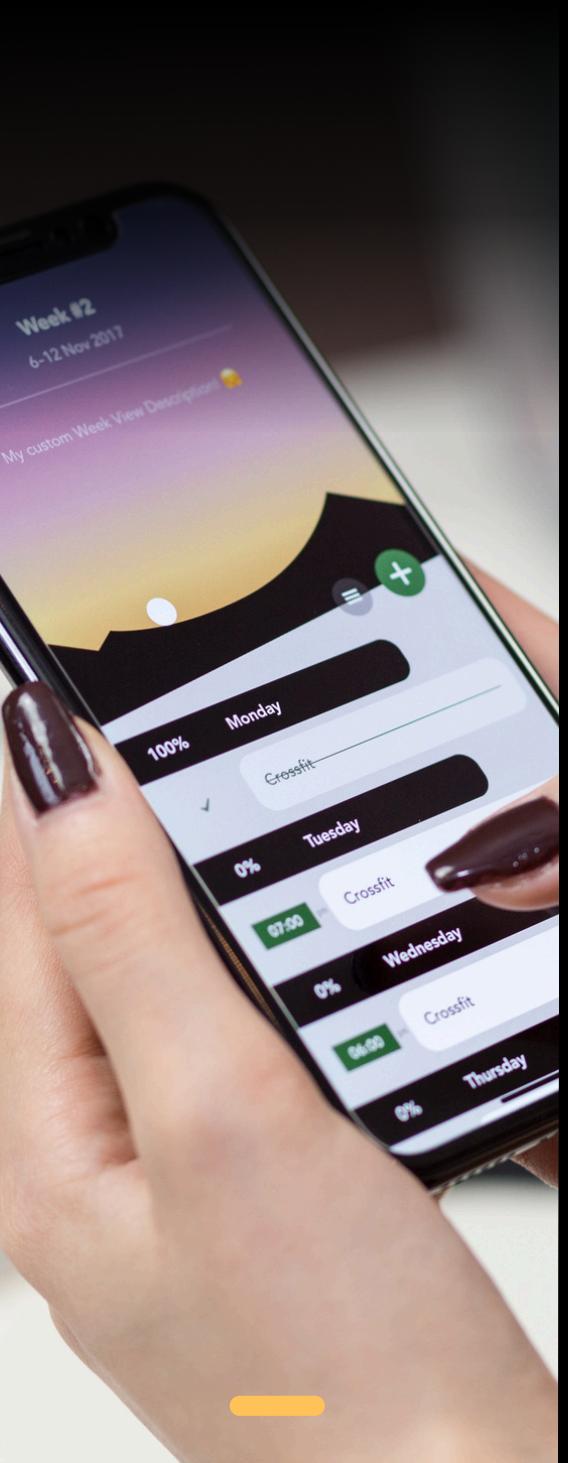
PYROLYSIS PROCESS OVERVIEW



TYPES OF PYROLYSIS



- *Slow Pyrolysis → more char, less oil.*
- *Fast Pyrolysis → higher bio-oil yield (up to 70%).*
- *Flash Pyrolysis → very rapid heating, efficient oil production.*



- *Energy content: ~17–18 MJ/kg (lower than diesel but usable).*
- *Contains oxygenated compounds.*
- *Liquid at room temperature, easy to transport & store.*
- *Needs upgrading before use in engines.*

PROPERTIES OF BIO-OIL



ADVANTAGES OF BIO-OIL



- *Renewable and sustainable.*
- *Can replace fossil fuels in heating and power generation.*
- *Reduces greenhouse gas emissions.*
- *Utilizes agricultural & forestry waste effectively.*



LIMITATIONS OF BIO-OIL



LOWER ENERGY
DENSITY
COMPARED TO
PETROLEUM
FUELS.



CHEMICALLY
UNSTABLE
(DEGRADES
OVER TIME).



REQUIRES
UPGRADING/REFINING
FOR USE IN
TRANSPORT FUELS.



CORROSIVE
NATURE DUE TO
OXYGEN
CONTENT.



 Giggling Platypus Co.

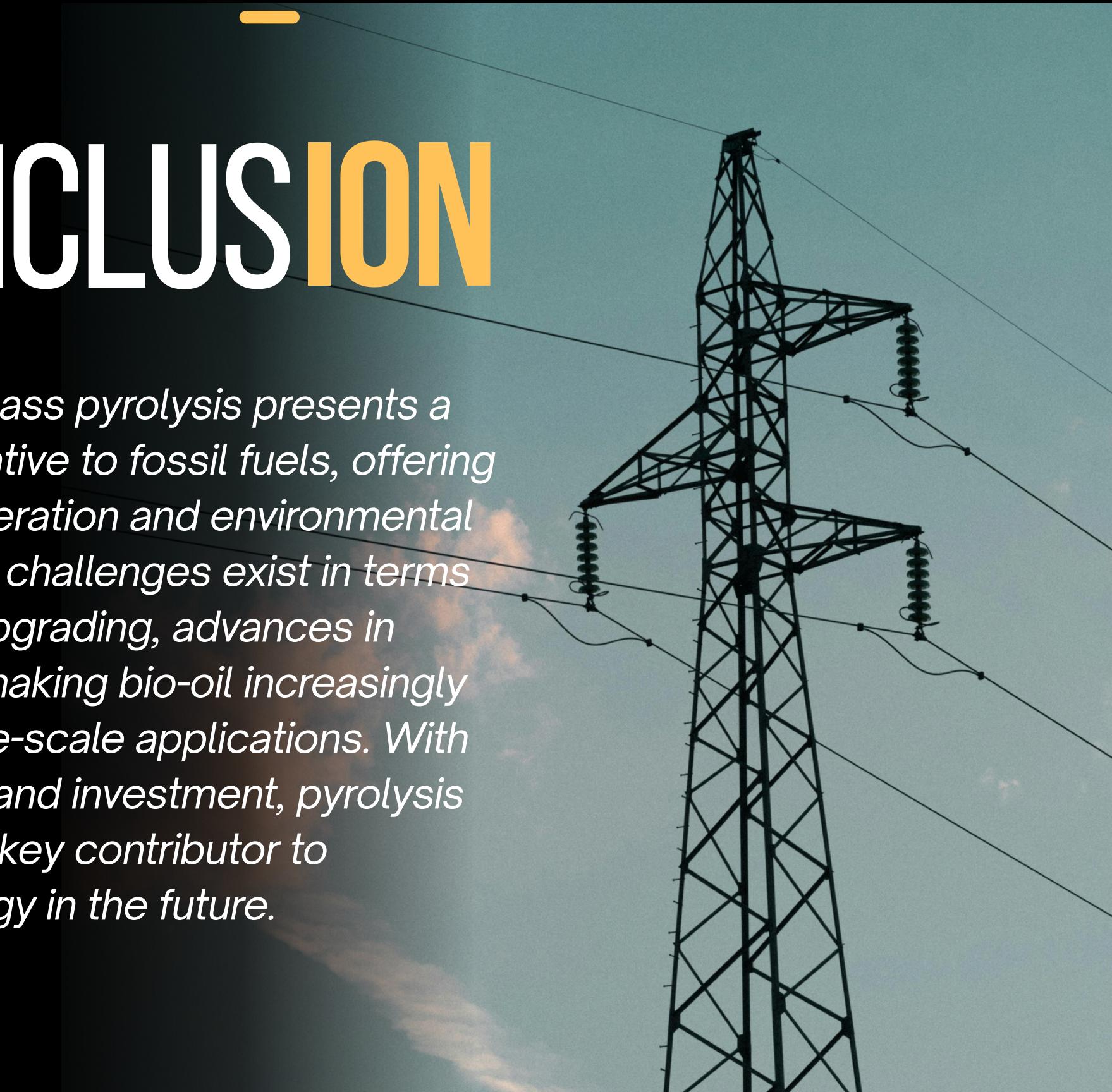
APPLICATIONS OF BIO-OIL

- *Chemical industry (resins, adhesives, flavoring compounds).*
- *Power generation in boilers and turbines.*
- *Transport fuel (after upgrading).*
- *Heating fuel in industries and households.*



CONCLUSION

Bio-oil from biomass pyrolysis presents a promising alternative to fossil fuels, offering both energy generation and environmental benefits. Though challenges exist in terms of stability and upgrading, advances in technology are making bio-oil increasingly practical for large-scale applications. With further research and investment, pyrolysis could become a key contributor to sustainable energy in the future.





THANK YOU

