

# Development of Biodegradable Bio-composite Materials from Agricultural wastes for Green Buildings and Packaging Applications in South Africa

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# MOTIVATION

- **Waste management in South Africa faces numerous challenges due to growing population and economy, leading to increased volumes of waste generated.**
- **This puts pressure on waste management facilities, which are already in short supply.**
- **Farmers also experience major challenges in handling agricultural wastes.**

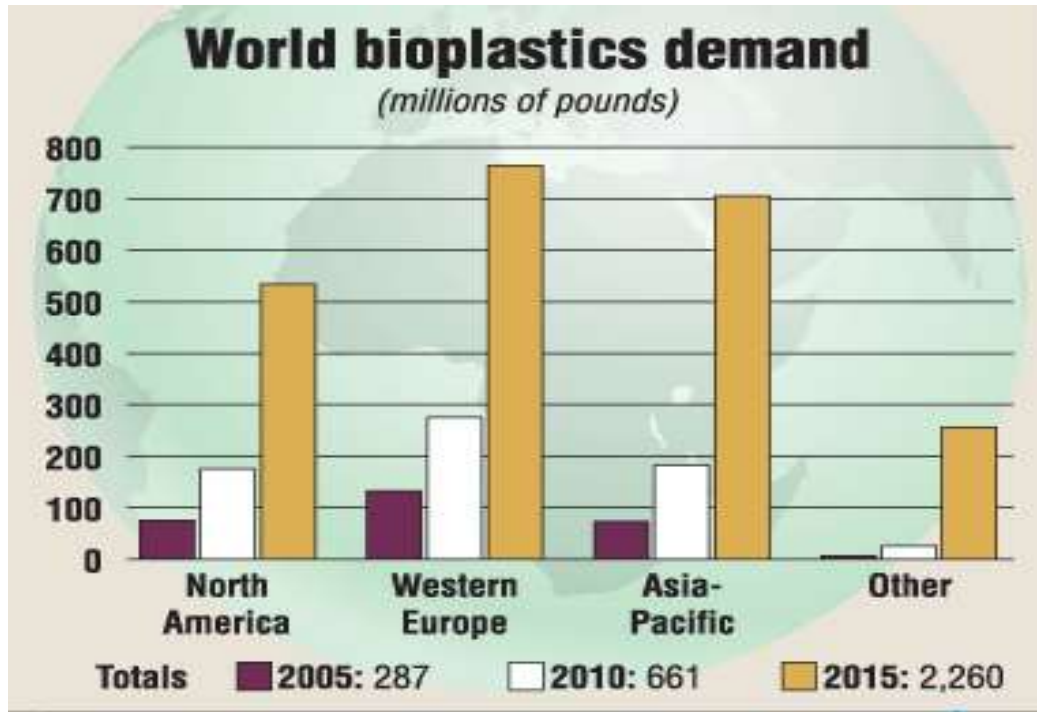


## BENEFITS:

- **Waste management strategy**
- **Environmental benefits (Low carbon economy)**
- **Creation of green jobs**

# MOTIVATION

## Global production capacities of bioplastics by market segment



### BIOPLASTIC DEMAND

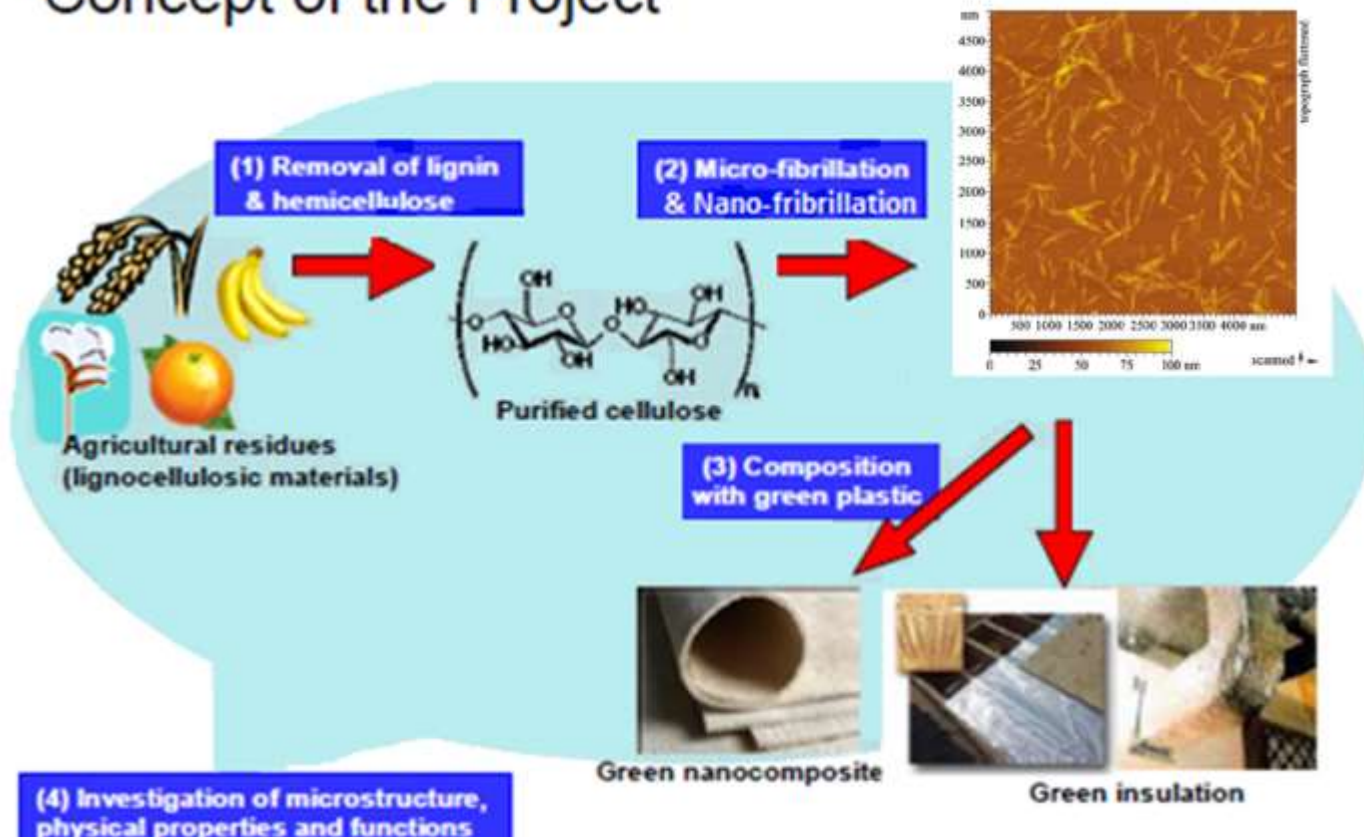
- Global composite material market shows a high growth potential.
- Composite industry is sustainable with over 30, 000 known applications.
- Strong growth is also expected in the foreseeable future.

# OBJECTIVES

- **IDENTIFY GAPS IN THE PLASTIC MARKET TO MEET THE LOCAL PLASTIC DEMANDS**
- **TO PERFORM TECHNO-ECONOMIC STUDY IN COLLABORATION WITH CSIR-ECD (ENTERPRICE CREATION DEVELOPMENT) TO DEVELOP THE MANUFACTURING INDUSTRY**
- **TO HAVE IMPACT TO COMMUNITIES**
- **CREATE GREEN JOBS**
- **“TO TURN WASTE INTO PROFIT”**

# OVERVIEW OF R&D INITIATIVE

## Concept of the Project



# OVERVIEW OF R&D INITIATIVE



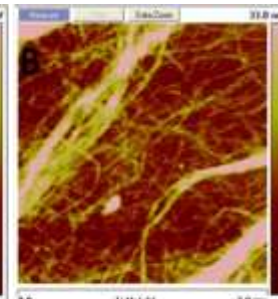
South Africa exports most fruits



CELLULOSE PULP



CNWs



CNFs

# OVERVIEW OF R&D INITIATIVE



**MAIZE STALK RESIDUES: BIODEGRADABLE FRUIT CRATES FOR Q-MOULDING**

**CSIR PATENT: POLYMERIZATION OF FURFURYL ALCOHOL (FA) TO DEVELOP SUSTAINABLE MATERIALS**

**WAYFORWARD: UPSCALE THE PRODUCTION OF PFA TO INDUSTRIAL SCALE  
COMMERCIALIZATION  
EXTRACT FA FROM SUGARCANE BAGASSE**

# REQUIREMENT: SOUTH AFRICAN POINT OF VIEW

## A STEERING COMMITTEE

**MEETINGS:** BRING TOGETHER HIGH LEVEL RESEARCH SCIENTISTS, TOP GOVERNMENT AND INDUSTRY (STAKEHOLDER) EXECUTIVES, EXPERTS TO IDENTIFY INFORMATION GAPS AND TECHNICAL BARRIERS DELAYING THE COMMERCIALIZATION OF SUSTAINABLE MATERIALS

**DEEPER UNDERSTANDING OF SOUTH AFRICAN POLICIES:** STRATEGIC DIRECTION AND GUIDANCE

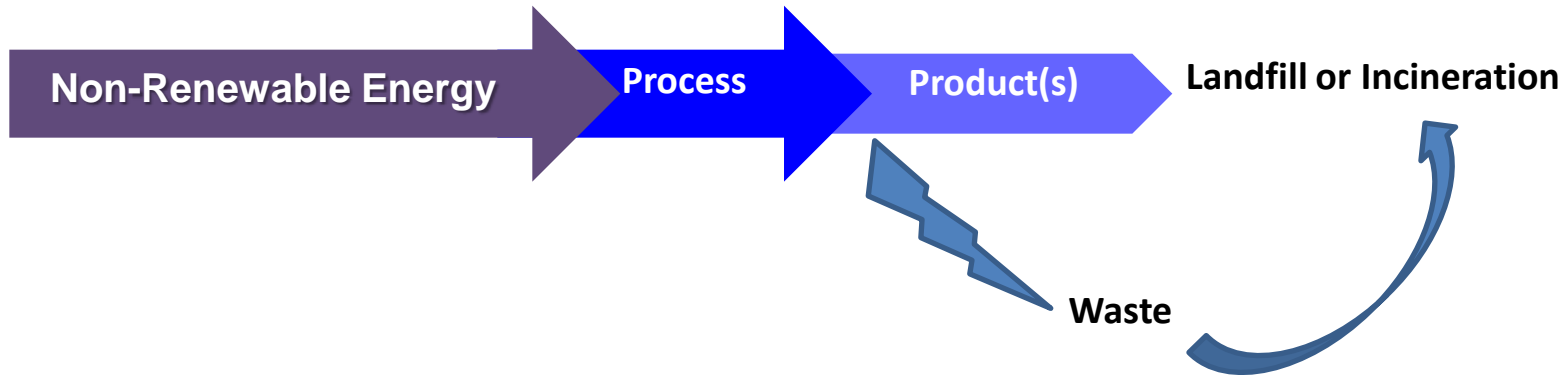




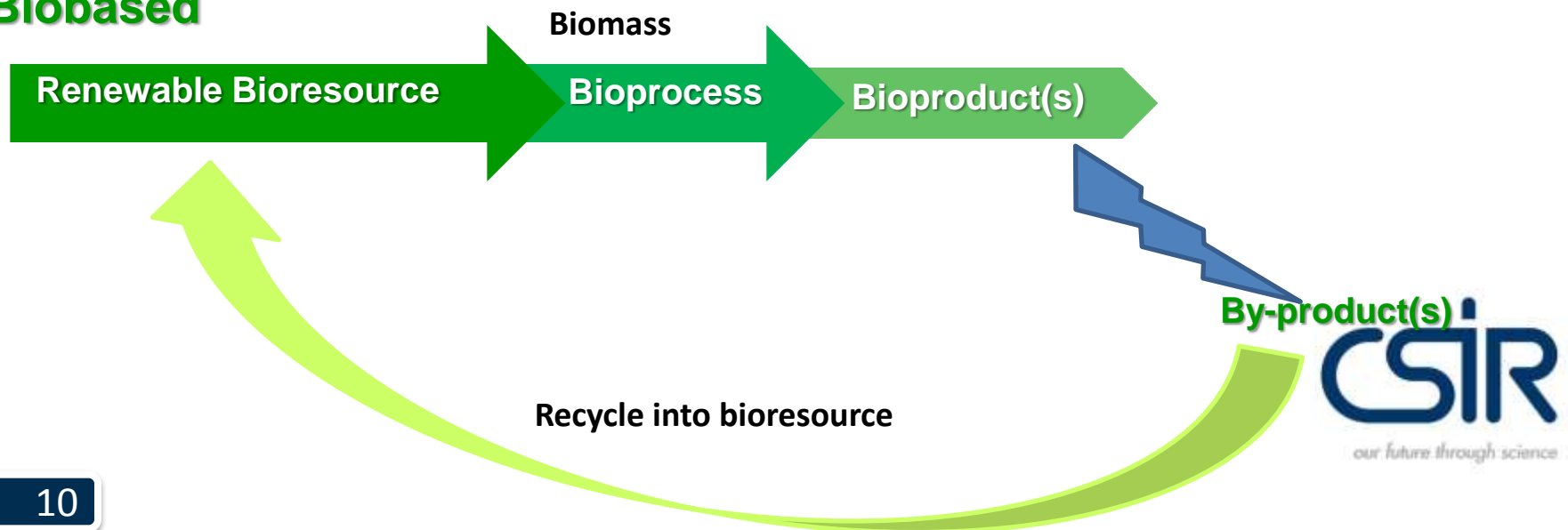
# BIOPLASTICS

# WHY BIOPLASTICS

## Conventional



## Biobased



# “WASTES” OR UNDERVALUED RAW MATERIALS FOR DEVELOPING BIOPLASTICS

## Natural Fibres from Agricultural feed stock



Jute fibre



Flax fibre



Hemp fibre



Prepared kenaf fibre



Switchgrass

## By-products and Co-products from Biofuel industry



DDGS

(Corn Ethanol Industry)



Canola Meal

(Canola Oil Industry)



Jatropha Meal

(Jatropha Oil Industry)



Lignin

(Bioethanol Industry)



Lignin

(Paper Industry)

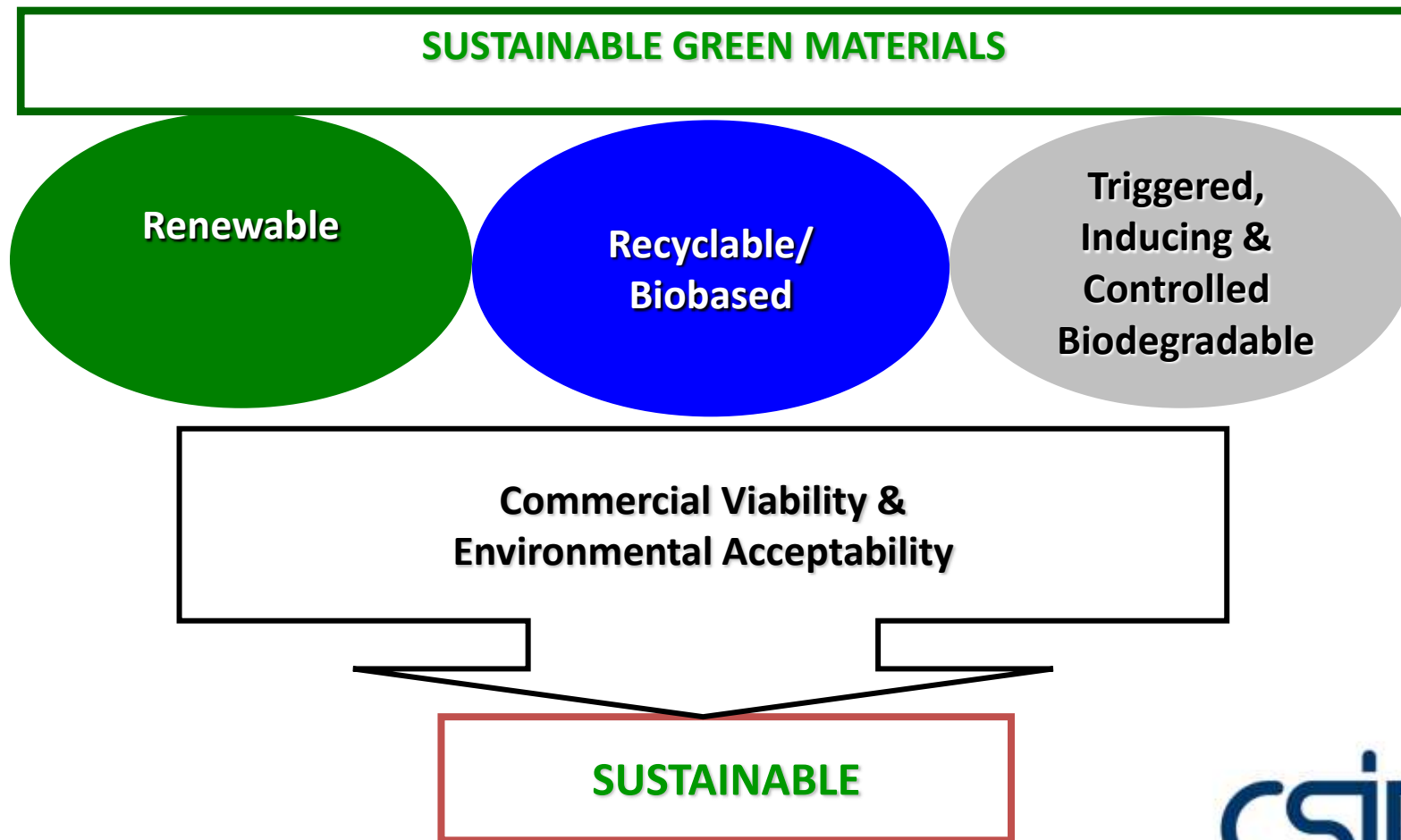


Crude Glycerol

(Biodiesel Industry)

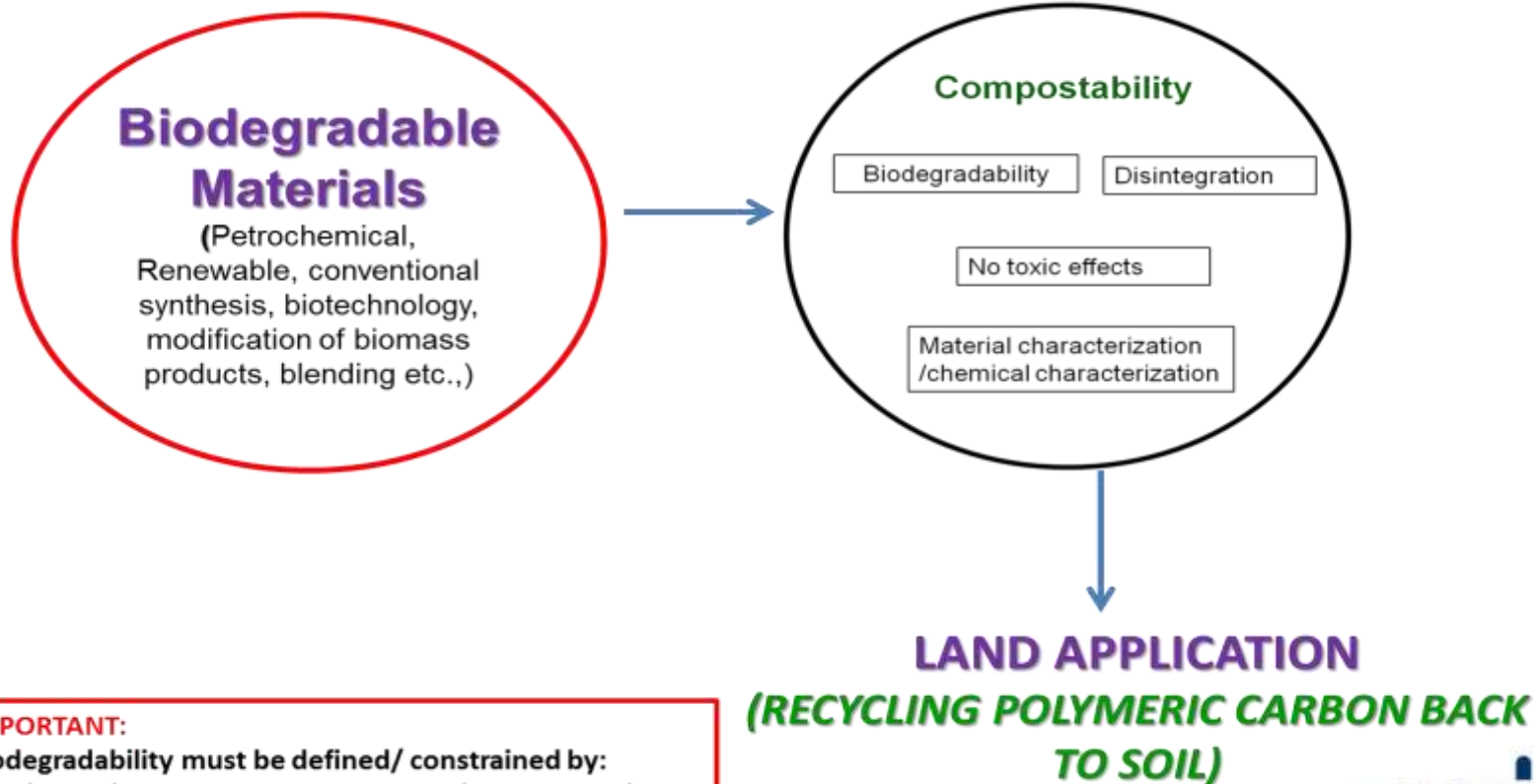
**Value-added uses: Economic Benefit + Replacement for Petro-based Products + Reduced GHG Emission**

# OUR APPROACH: IDENTIFY AN OPPORTUNITY



# DEVELOPMENT OF STANDARDS AND NORMS FOR COMPOSTABLE PLASTICS IN SOUTH AFRICA

TEST METHOD : ASTM D5338; ISO14855 1 & 2  
SPECIFICATIONS : ASTM D6400; EN 13432: ISO 17088



**IMPORTANT:**

**Biodegradability must be defined/ constrained by:**  
The disposal system – composting, aerobic or anaerobic digester  
Time – 180 days (must satisfy test standards)

# COMPOSTIBILITY AND BIODEGRADATION TESTING FACILITY



# ACKNOWLEDGEMENTS

- DEPARTMENT OF ENVIRONMENTAL AFFAIRS, DBSA
- DST – BCoC
- CSIR



# Thank you



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