

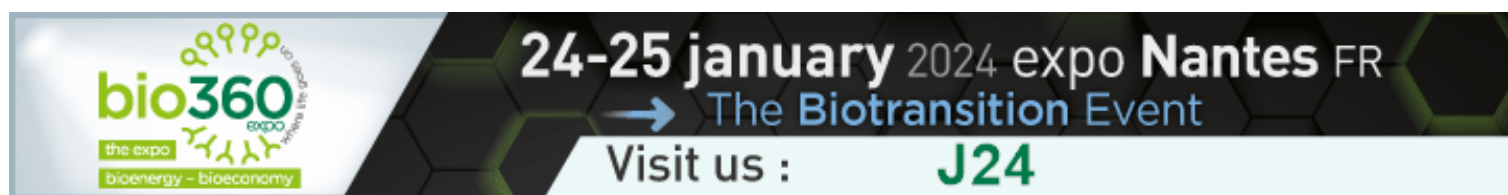


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101036401



# SteamBioAfrica

## A Novel Approach to Torrefaction



# Overview



## Context

Our Technology

Prior Work

SteamBioAfrica

## What we are doing (The project plan)

Technology (& Challenges)

Material Supply

Social Impact

Market Opportunities

Ecology & the Environment

## Next Steps



# Superheated Steam Processing

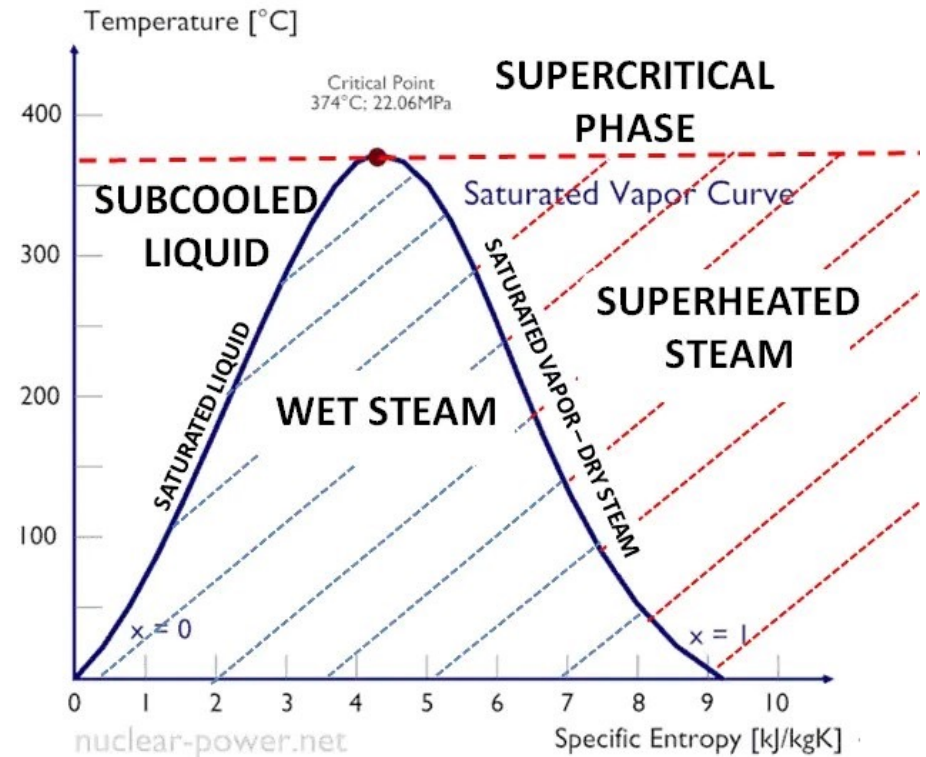


Superheated steam has excellent thermophysical properties. This facilitates its use as a drying technology. For instance, in lumber mills in 1906 Pacific North-West.

Higher heat capacity and thermal conductivity than air enables efficient heat transfer.

Moisture is drawn out of substrate with no crust formation leads to quicker more uniform drying.

Superheated Steam presents a relatively inert atmosphere. This avoids oxidative or combustion reactions with substrates.



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# Our Innovative Technology



## Our Approach:

Steam released from substrate, once steam saturated drying stops, we continually remove moisture to maintain superheated state, enabling continuous process.

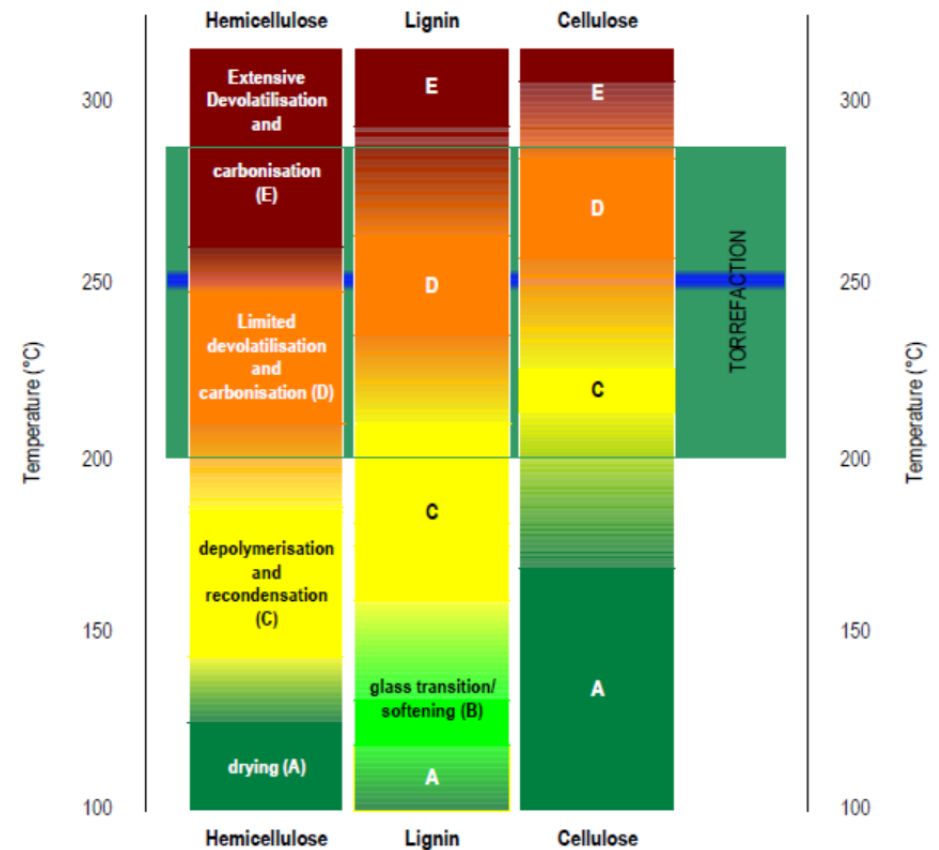
## Our Innovations:

Raising process temperature up to 260°C

Clean and stable torrefaction conditions.

We can control outputs; clean burning fuels and biochemicals in removed condensate

**This is all novel.**



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# Previous Work



SteamBio project  
2014-2017 Grant No: 636865

Following pilot scale tests, technology demonstrated in rural Spain: hard and soft woods, vineyard and olive prunings.

Mild torrefaction at 220°C-230°C.

Produced clean burning fuel with coal like properties and biochemical rich condensate.

Initial business case prepared.



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# SteamBioAfrica: the Rationale & the Opportunity

Encroachment & invasives degrade land across  
Southern Africa and elsewhere  
Over 45 million ha of land degraded just in Namibia  
Over 120 million ha across Southern Africa

Assume 10 tonnes biomass per ha  
450 million tonnes of unused biomass in Namibia  
Over 1200 million tonnes across Southern Africa

Global wood pellet market is 55 million tonnes pa  
Global coal market is 7000 tonnes pa

Need to create value from this unwanted biomass  
Turn it into a valued resource  
This will stimulate its sustainable harvesting



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# SteamBioAfrica: Project Focus

## Where we are now?

Energy insecurity

Climate impacts

Encroachment

Rural Unemployment

Gender inequality

Social exclusion

**No technology  
addressing these  
issues on a large scale**



## Where do we want to be?

Clean, secure, and  
affordable energy

Rural Employment

Land Restoration

Gender & Social Inclusion

Local Manufacturing

Local Wealth Creation

**Large Scale Impact**





# SteamBioAfrica: Project Scope



Advance on the original SteamBio project:  
Turn this unwanted woody biomass into clean  
burning fuel with coal like handling and  
combustion properties.

Affordable and usable by industry and  
household consumers: No loss in performance  
or need for capital investment.

Holistic reach  
Robust design  
Techno-economic viability  
Enable scale up and replication  
Address social and climate change impacts



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# SteamBioAfrica Work Plan



## Work Package 1 Management

Coordination / Project Management / Risk Management / Gender, Equality & Social Inclusion / EU Communication

**Work Package 2**  
Design & Construction

**Work Package 3**  
Installation & Commissioning

**Work Package 4**  
Plant Operation

**Work Package 6**  
Commercial Manufacturing  
Pathway  
Establish delivery post project of  
commercial industrial scale processes

**Work Package 5**  
Process  
Optimisation

**Work Package 9 Market Assessment**  
Determine market potential of the solid biofuel with  
domestic consumers

**Work Package 10**  
Value Chain Development  
Building capacity to enable post project roll out in the  
market across Botswana, Namibia and South Africa

**Work Package 7**  
Logistics & Land Management  
Ensuring long term sustainable supply of biomass to  
produce clean burning fuel

**Work Package 8 Ecosystem Services**  
Creating long term approach to ensure improved  
ecosystem when harvesting bush and invasive woody  
biomass

**Work Package**  
**11**  
Life Cycle  
Studies  
Assess the  
sustainability from  
a life cycle  
perspective

## Technology

Work Package 2– 6

**Land & Ecosystems**

Work Package 7 & 8

**Market & Value Chain**

Work Package 9 & 10

**Life Cycle Studies**

Work Package 11

**Project Impact**

Work Package 12 & 13

## Work Package 12 Project Impact (Exploitation & Dissemination)

Enabling large scale post project replication and scale up of the project results to deliver significant positive economic, social and environmental change across Southern Africa

## Work Package 13 Ethics

Verify ethical compliance of project work and impacts, the participation of humans, data protection, health & safety, environmental compliance, and benefit sharing between EU and non-EU countries



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# Demonstration Unit at Cheetah Conservation Fund in Namibia



# Project Ambition: Progress to Date



**Build  
on prior  
work**

**Design  
Robust & Resilient  
Temperature up  
to 260°C**

**Process being  
optimised to  
feedstocks  
and market  
demand**

## **Confirming Benefits For Africa & In Africa**

**Profit & Value**  
Clean burning high value fuel  
Industry & households  
**Social & environmental sustaining**  
Stimulate bush clearance  
Soil restoration  
Optimising logistics  
Job creating

**Preparing &  
progressing  
post project  
Planning**





# What Next?



## **Operation & Optimisation:**

Processing 250kg/hour  
24/7 Operation  
Producing over 500 tonnes of torrefied clean burning fuel from bush

## **Demonstrating & Validating:**

Technology & economics  
Market acceptance  
Sustainable impact

## **Developing Plans for Large Scale Post-Project Roll-Out**

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15 partners  
2 continents  
8 countries  
Researchers & Academia  
Industry & Entrepreneurs



STEAM  
BIO  
AFRICA



carbon capital



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# Any questions: visit us here today:



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