

# Sustainability Driving Innovation

**K.E.Y.  
PLATFORM  
2014** April 23 – 24, 2014  
Conrad Seoul, Korea

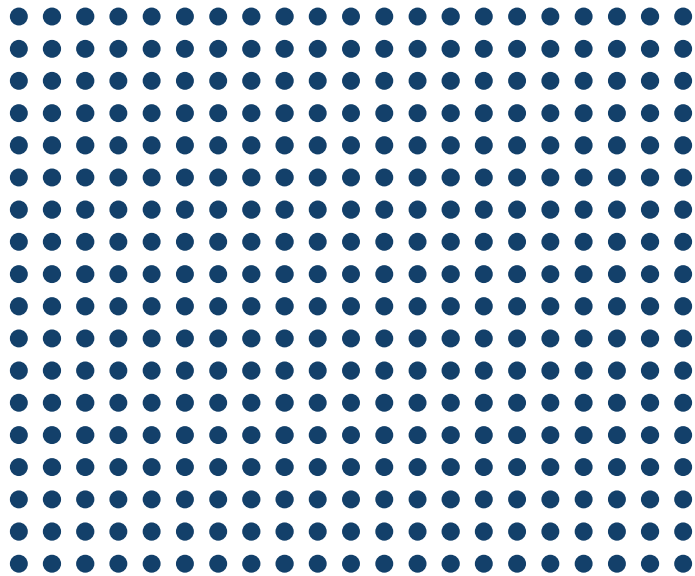
**DUNCAN CROSS**  
RENMATIX



# FOR THE 21<sup>ST</sup> CENTURY **SUGAR** IS THE NEW OIL

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## OIL REFINERIES

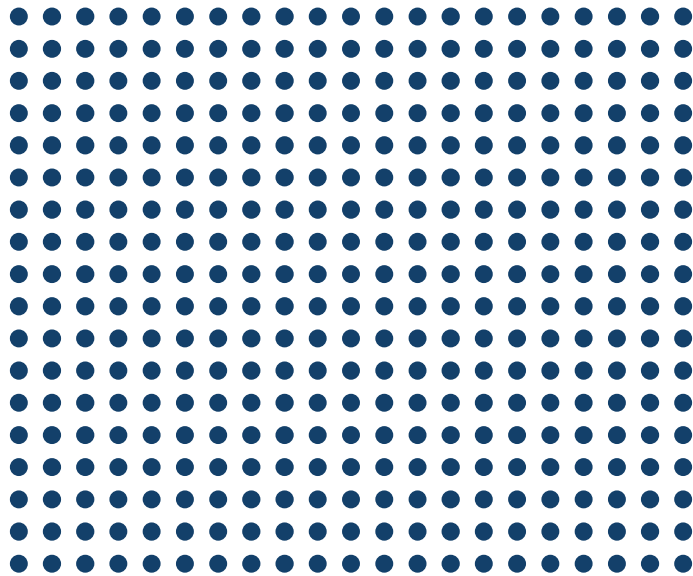


## BIOREFINERIES

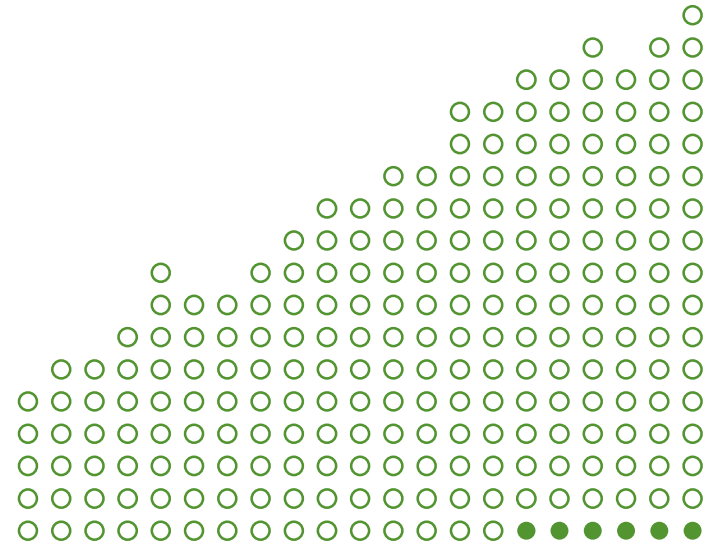


# AND IT WILL DRIVE THE BIOECONOMY

## OIL REFINERIES



## BIOREFINERIES



# INNOVATION: “THE NEW POSSIBLE”

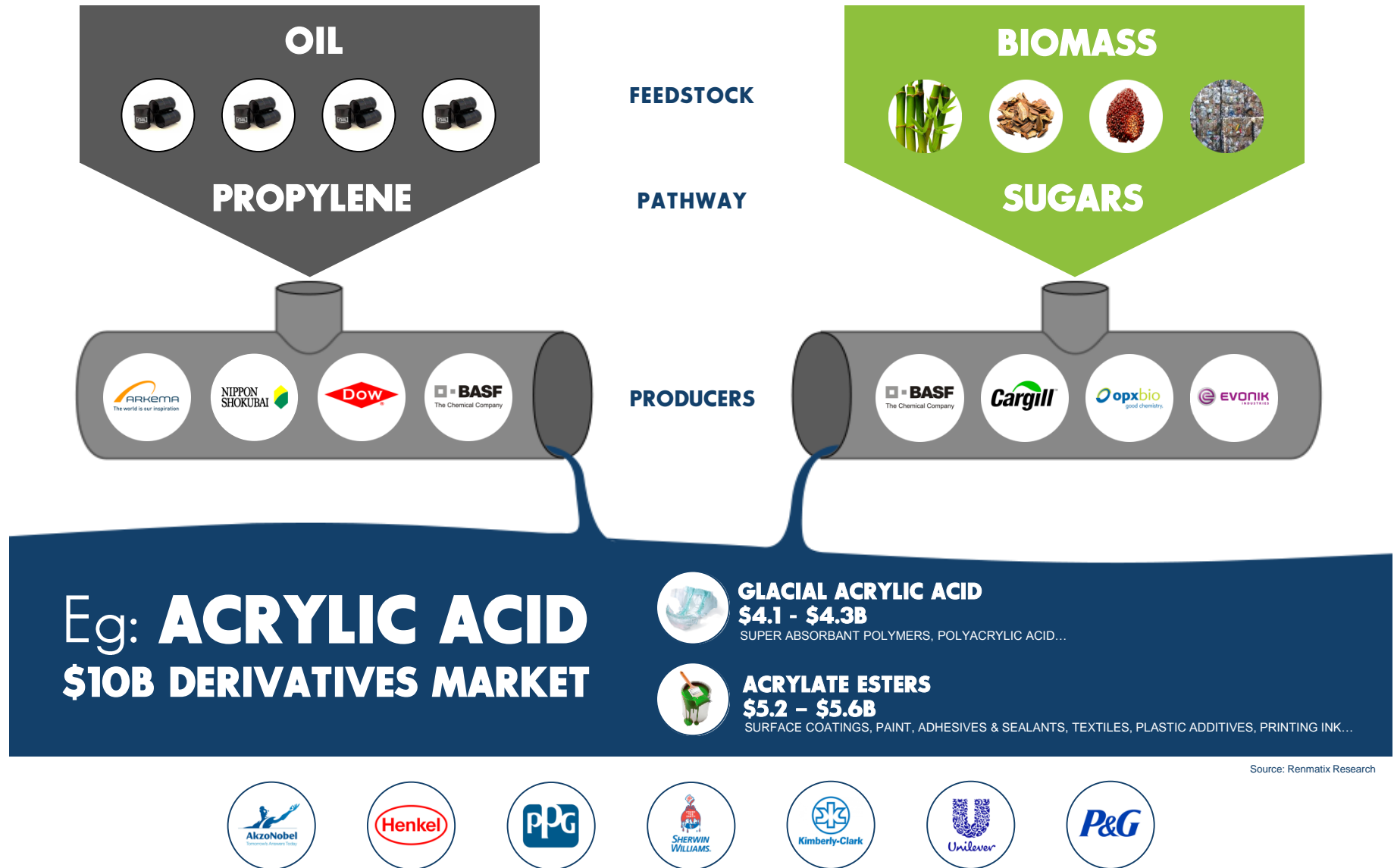
When advancement in technology  
gives rise to new markets

- *or new thinking gives rise to technological advancement*

...and can bring **real change**



# BIO-BASED PRODUCTS = DIFFERENT BEGINNING, SAME END POINT



Source: Renmatix Research





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# **BUILDING BLOCKS FOR BIOCHEMICALS**

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Renmatix™





*“A **grand challenge venture** is one where you imagine something (a technology) ...that would make a huge difference in the world. That’s something worth building a company around, a really big idea.”*

~ Bill Joy

# SUGAR CLASSIFICATIONS

## FIRST GENERATION

### FOOD BASED



## SECOND GENERATION

### NON-FOOD SOURCE

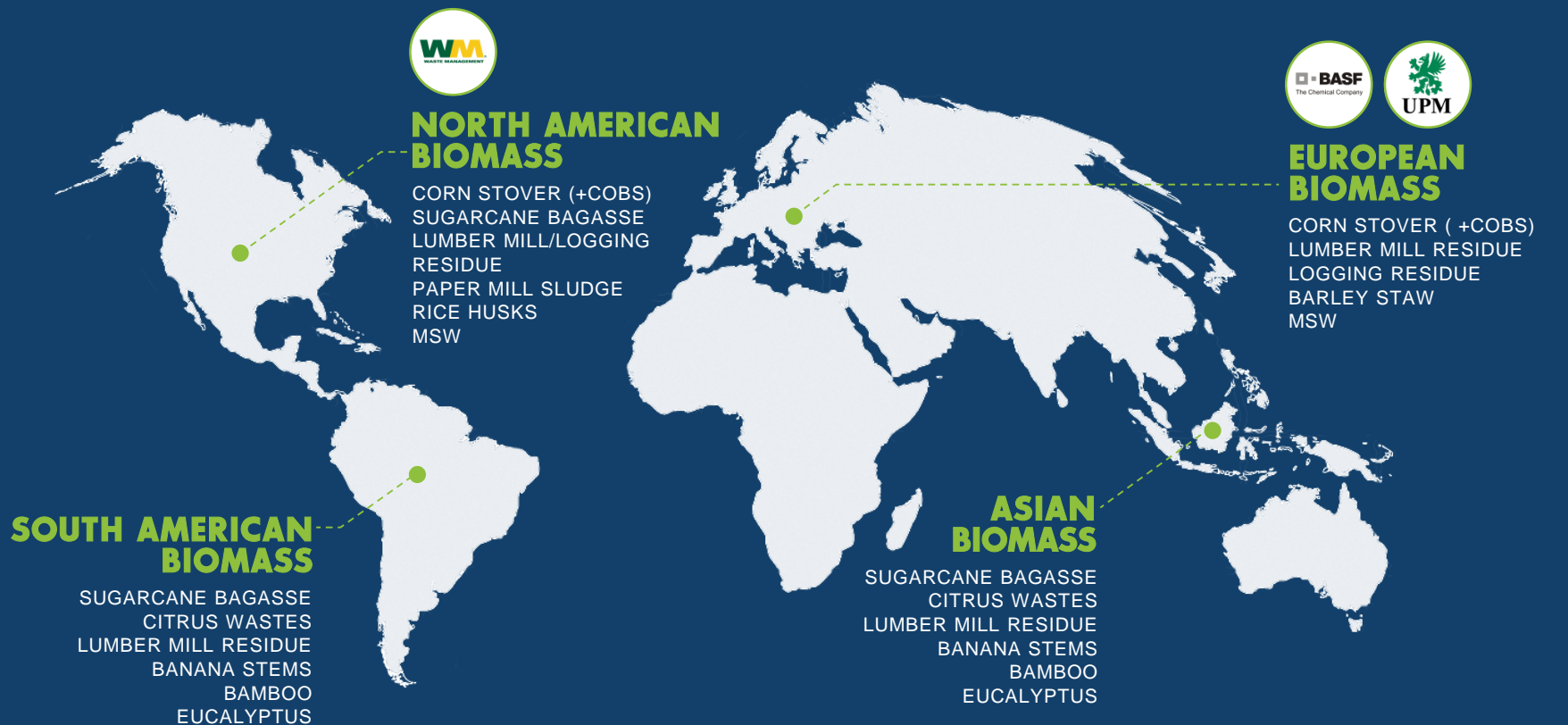


## CELLULOSIC SUGAR

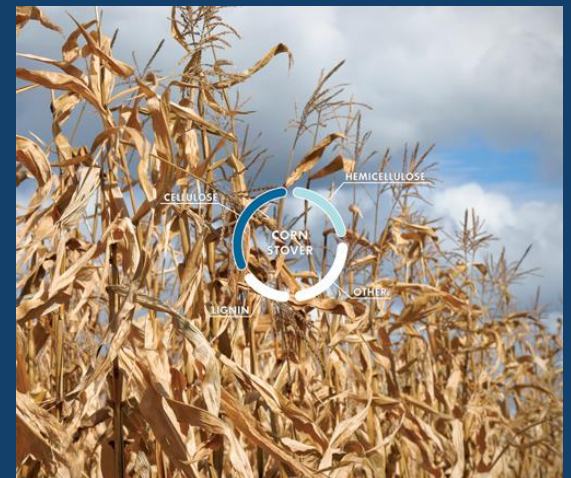
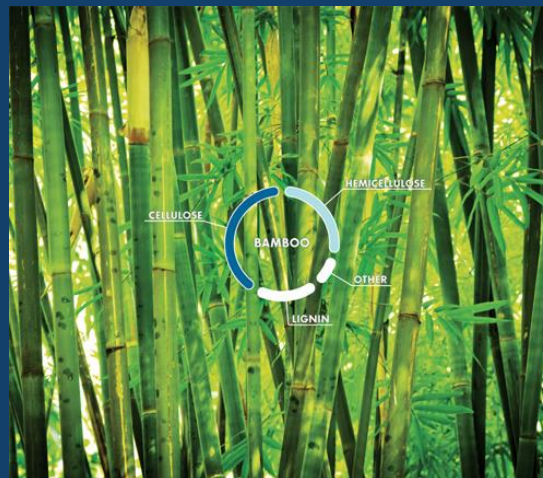
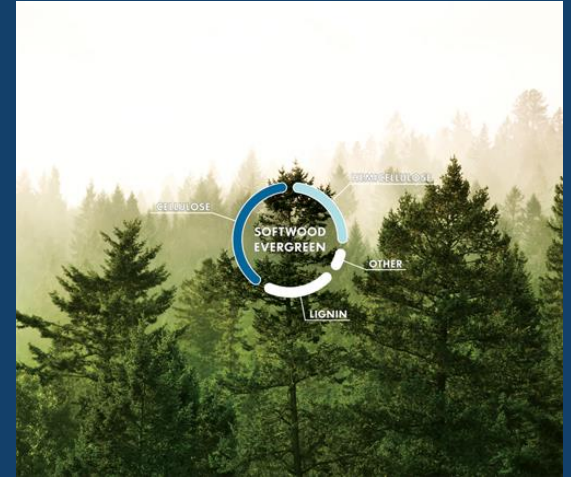
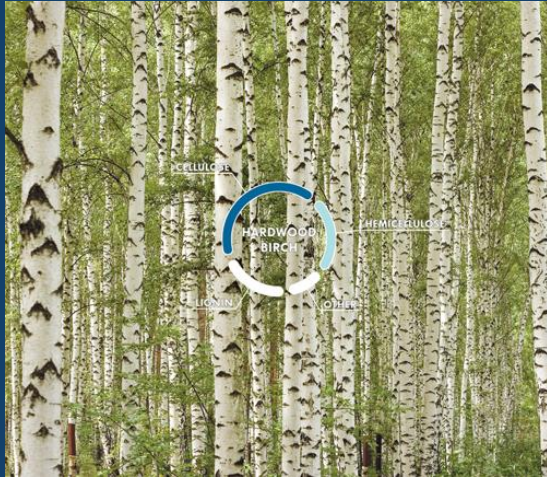


# RENEWABLE MATERIALS ARE A GLOBAL BUSINESS:

## LOTS OF BIOMASS IN LOTS OF PLACES – THIS IS WHY A BIOMASS AGNOSTIC SOLUTION IS IMPORTANT



# THIS IS BIOMASS AGNOSTIC





# UNLOCKING CELLULOSIC SUGARS ECONOMICALLY: THE **BRIDGE** TO RENEWABLE CHEMICALS & FUELS



# ROUTES TO CELLULOSIC SUGAR

## CONVENTIONAL

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**ACID  
HYDROLYSIS**

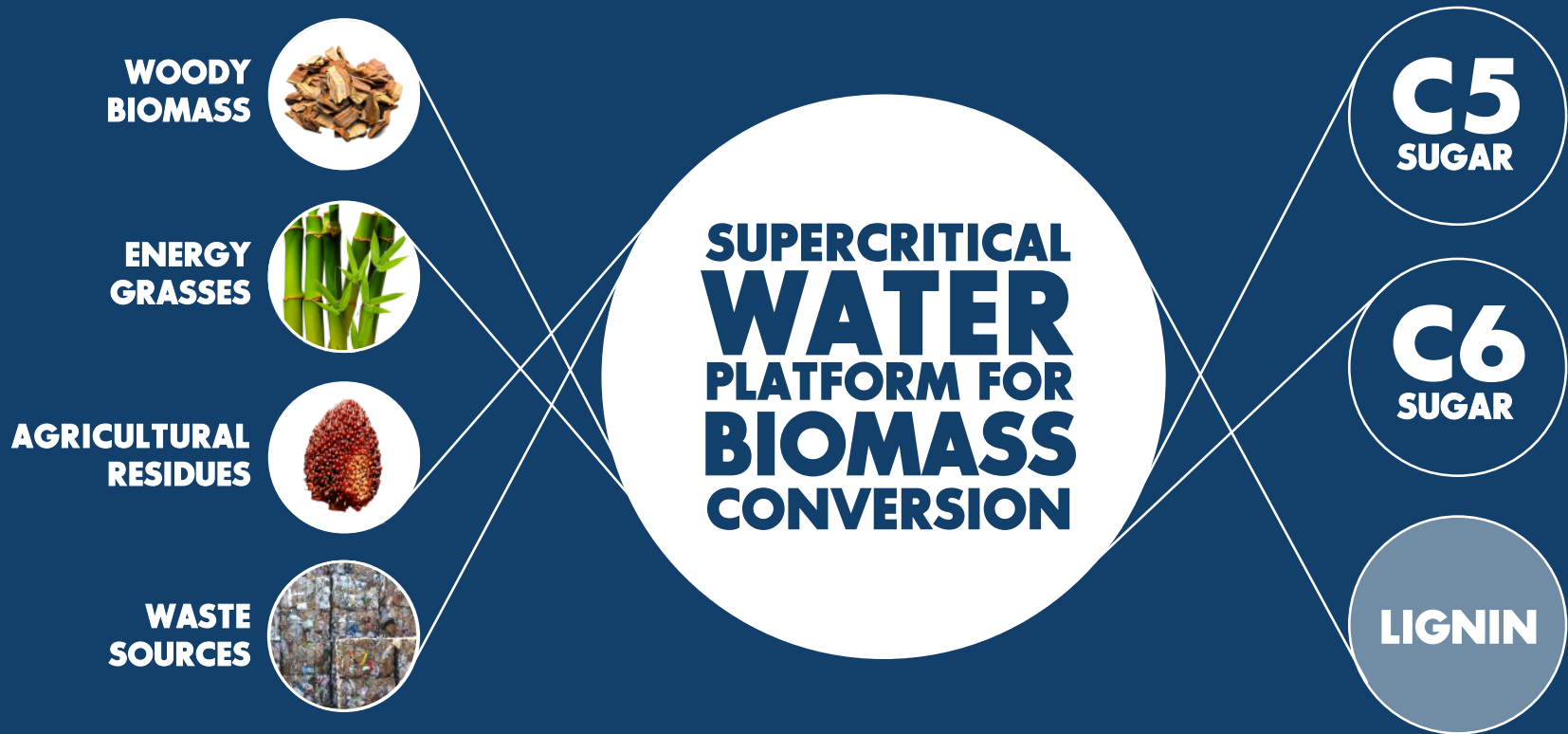
**ENZYMATIC  
HYDROLYSIS**

## MODERN

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**SUPERCRITICAL  
HYDROLYSIS**

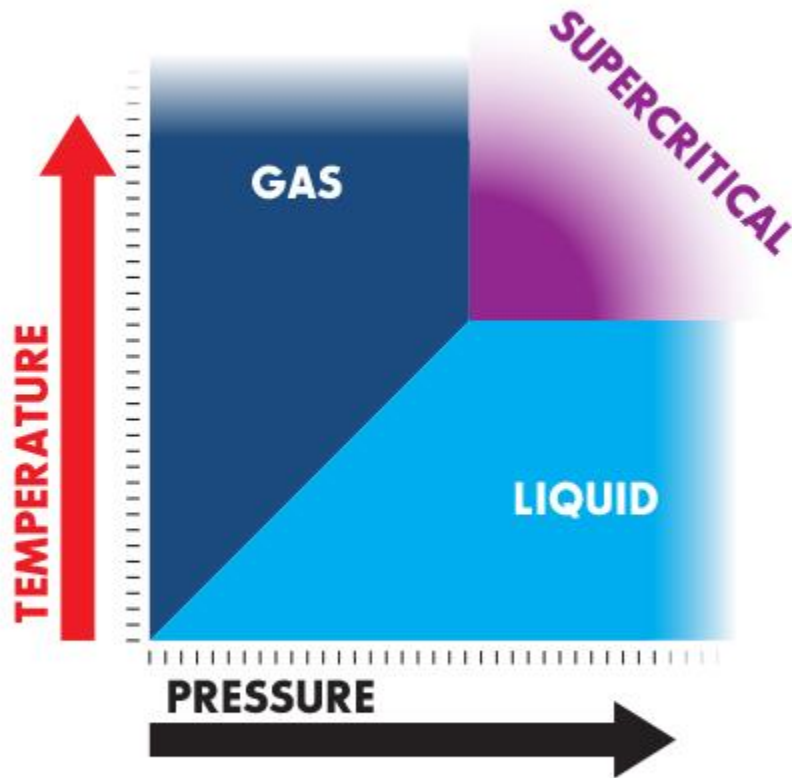
# PLANTROSE™ PROCESS: A FLEXIBLE PLATFORM



**ADDRESSABLE MARKET INCLUDES A WIDE VARIETY OF BIOMASS TYPES & DOWNSTREAM USES FOR SUGAR**

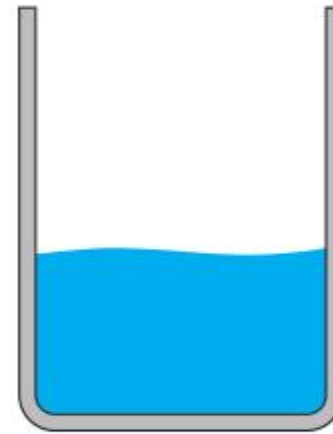
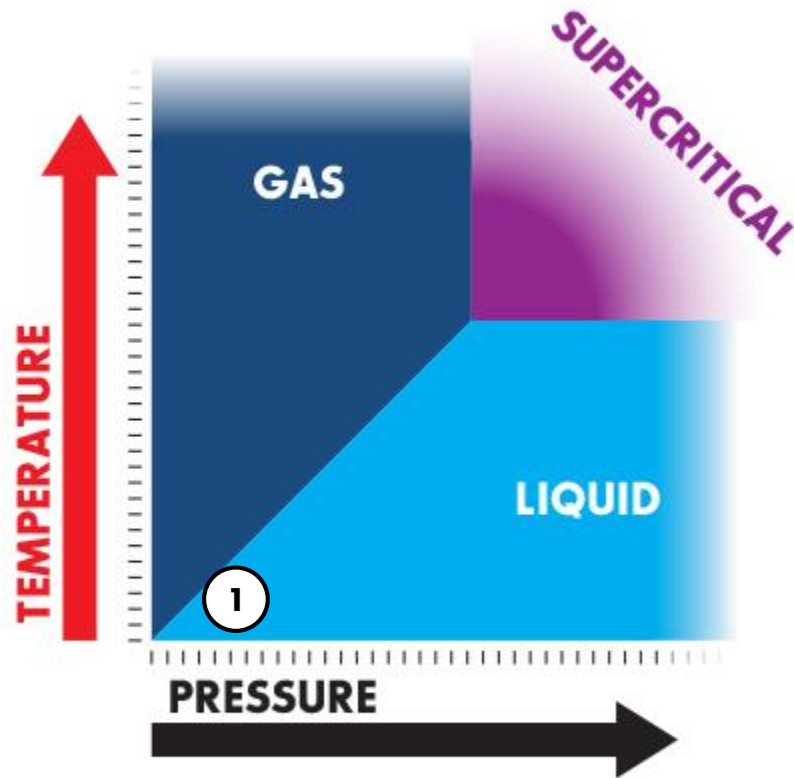
C5 = 5 carbon sugar, eg. Xylose    C6 = 6 carbon sugar, eg. Glucose

# SUPERCRITICAL WATER



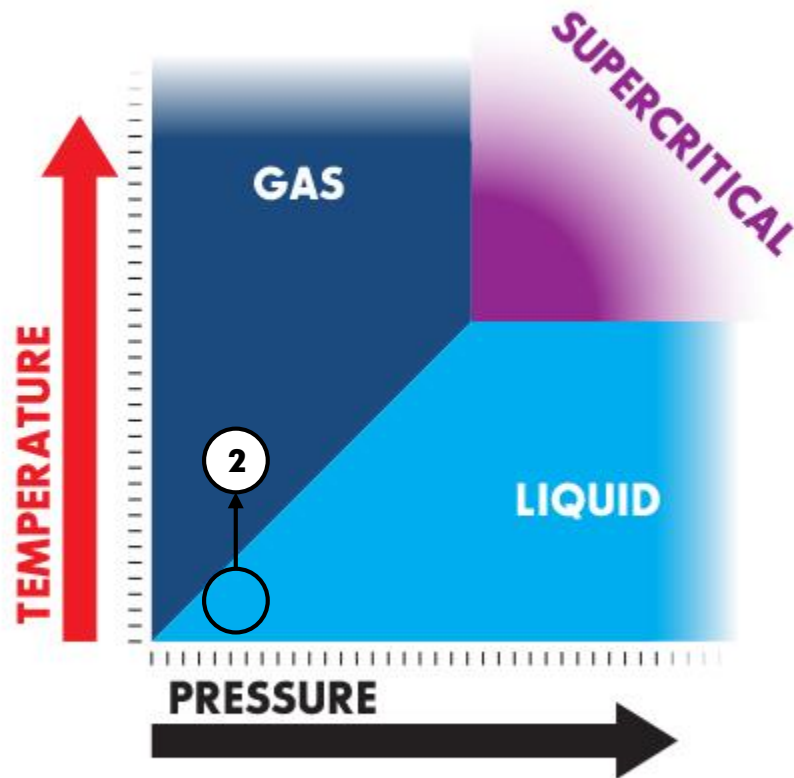
The unique state of matter reached with extremely high pressure and high temperature

# SUPERCRITICAL WATER



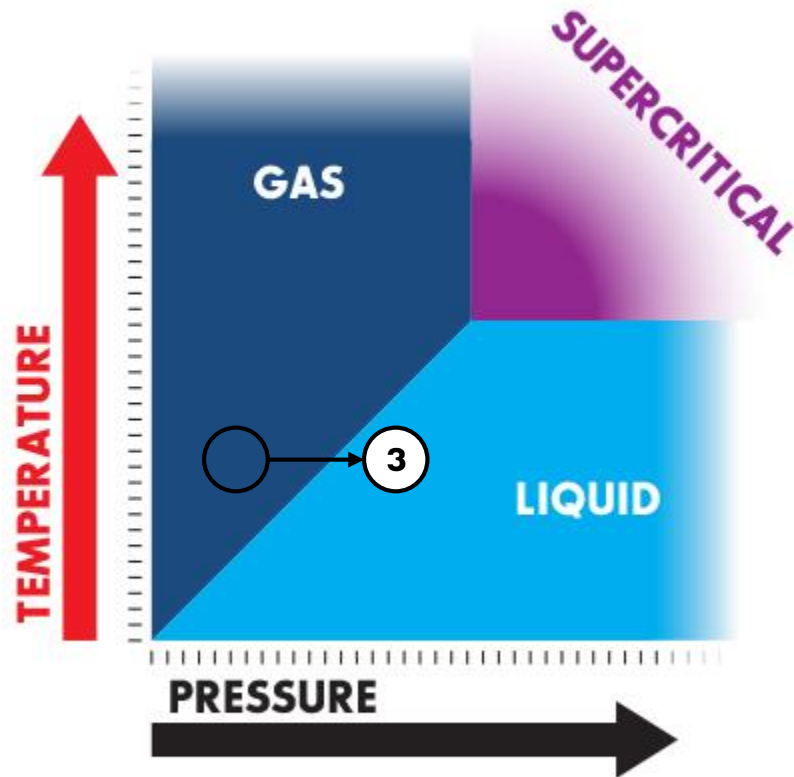
**1. GLASS OF WATER**

# SUPERCRITICAL WATER

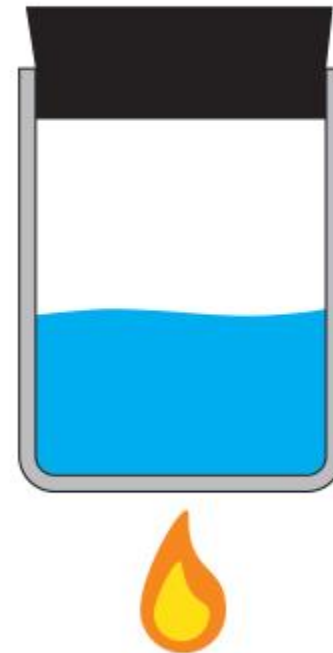


**2. ADD HEAT**

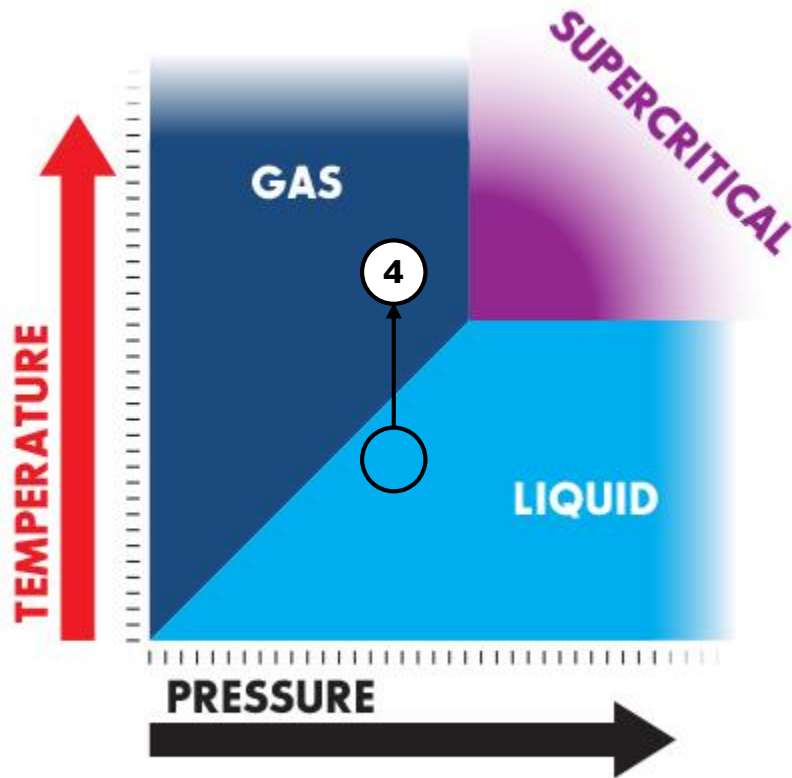
# SUPERCRITICAL WATER



## 3. ADD PRESSURE



# SUPERCRITICAL WATER

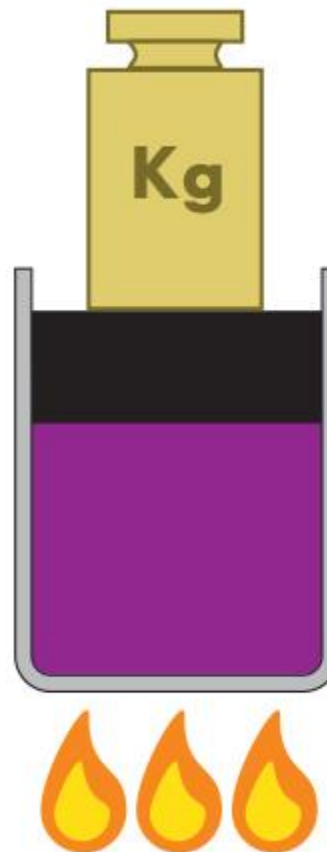
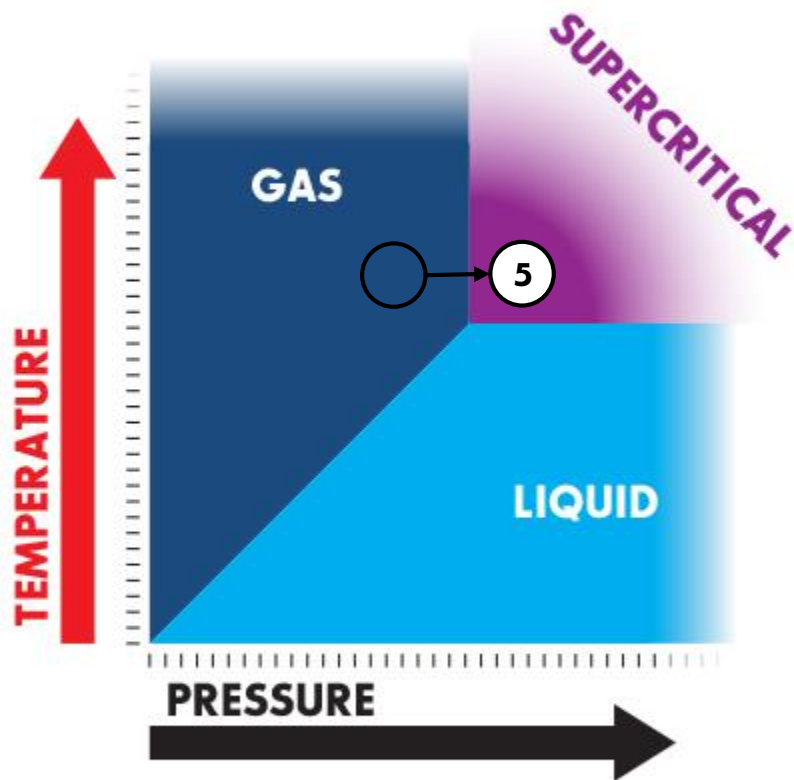


**4. INCREASE HEAT**

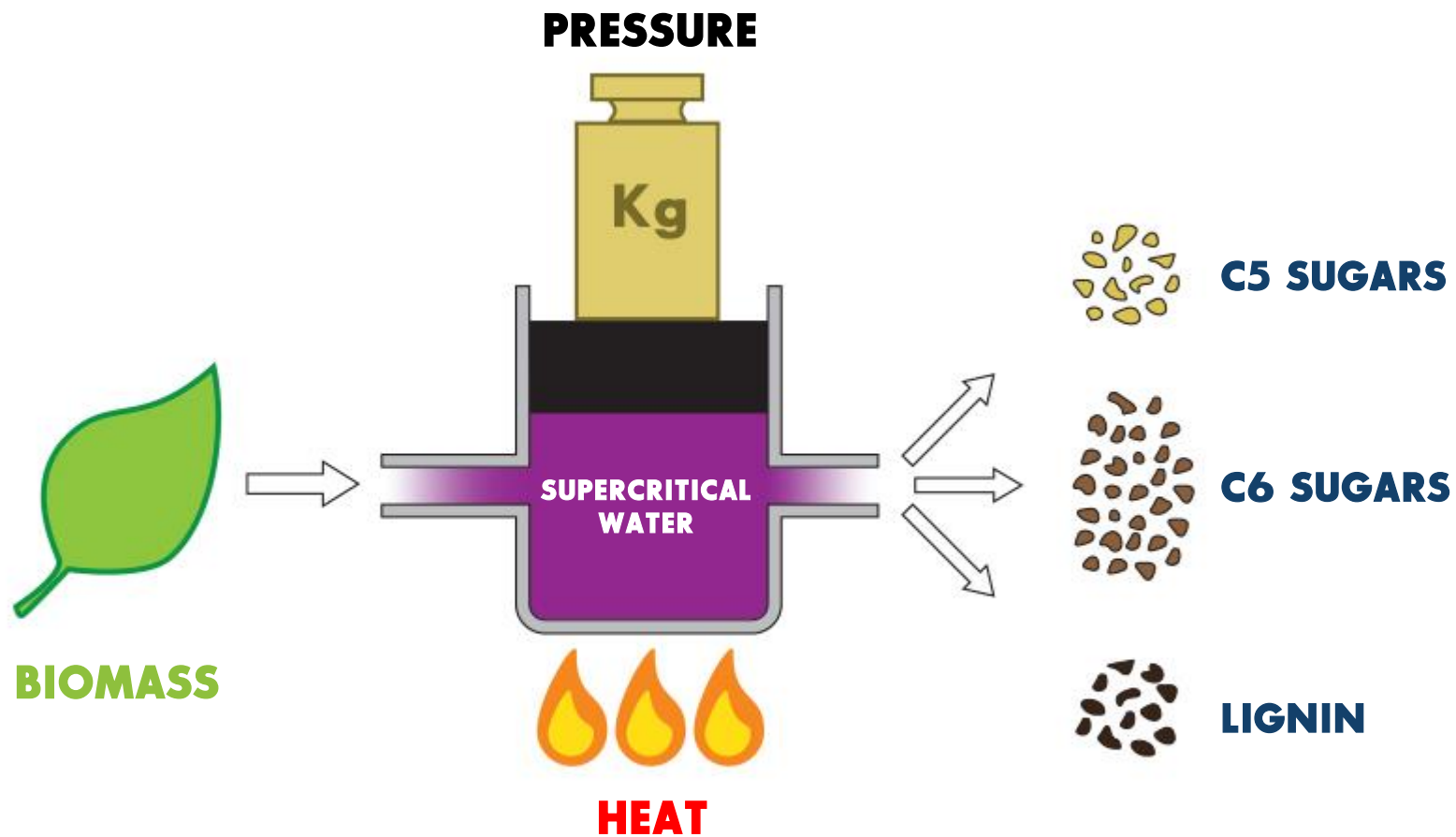


# SUPERCRITICAL WATER

## 5. INCREASE PRESSURE



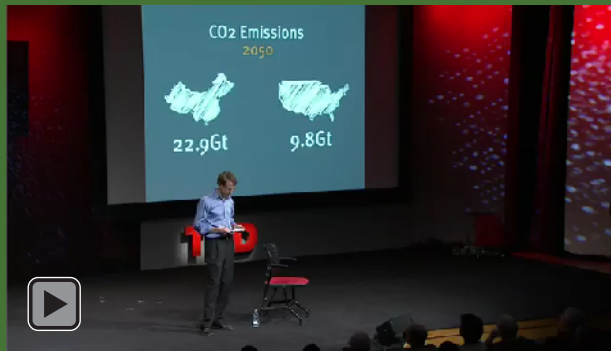
# SUPERCritical WATER



# NOT R&D FOR TOMORROW



# RENMATIX IS PRODUCING TODAY



*“Green technologies – going green –  
could be the biggest economic opportunity  
of the 21<sup>st</sup> century.”*

~ John Doerr

# WHAT IS 'SUSTAINABLE DEVELOPMENT'?

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

~ Brundtland Report, 1987

# SECRET TO SUCCESS IN SUSTAINABILITY...

## ...PROFITABILITY

Guiding principals from inception:

- Economics had to be the driver
- Viable technology needs competitive costs
- Novel & new, yet impractical, doesn't really matter

**CARE ABOUT \$\$, NOT JUST ENVIRONMENTAL BENEFITS**

**In biochemicals, disruptive 'sugar economics' is the key to achieving market transformation & expansion**

# SUSTAINABILITY IS NOT JUST A CONSUMER PREFERENCE, BIG PRODUCERS ARE DRIVING SUPPLY

## PROMINENT B2C LEADERS



## FORWARD THINKING B2B LEADERS



# BIOINDUSTRIALS ARE BUILDING MOMENTUM



PLANTRO<sup>®</sup>  
CHEMICALS



**PETROCHEMICAL  
BIO-EQUIVALENTS**



# REAL CHALLENGES FOR A NEW BRAND

## COMMUNICATING DESPITE COMPLEXITY

Not just a new segment, for all intents and purposes a new category (outside of a focused scientific community)

## LIFE AS AN INTERMEDIARY

Can't see us, can't touch us, it's like we were never even there

## DEMAND OUTWEIGHS CAPACITY TO SERVE

Equivalent to being out of stock; cant change the industry until sufficient volumes & supply

## INSURGENT TECHNOLOGY, TOO GOOD TO BE TRUE?

Meet the burden of proof, provide reasons to believe

## BUILDING A YOUNG INDUSTRIAL LICENSOR...

Not like adding servers with a few programmers in pajamas drinking Red Bull in the Valley

# JDA PARTNERS VALIDATE LICENSING MODEL



## KEY INFLUENCER RECOGNITION



# PAVING THE ROAD FOR AN EXPANDED BIOECONOMY

- Leverage megatrends (good business, fits consumer appetite)
- Monetize Momentum: have a strategy to make \$\$

## ADAPTABILITY

- Integrated companies; can't do it all
- Build production facilities; not practical for scaling
- License the technology; critical nature of partnerships  
= Success in specialization

## NEXT STEPS

- What does the future look like?



Renmatix™