

# Biofuels, Biochemicals and Renewable Sustainable Energy

Transforming Resources Into Value



# Delivering Alternative Energy Solutions

*The world is looking for reliable, clean, and sustainable energy sources and KBR strives to meet present and future challenges through innovative thinking.*

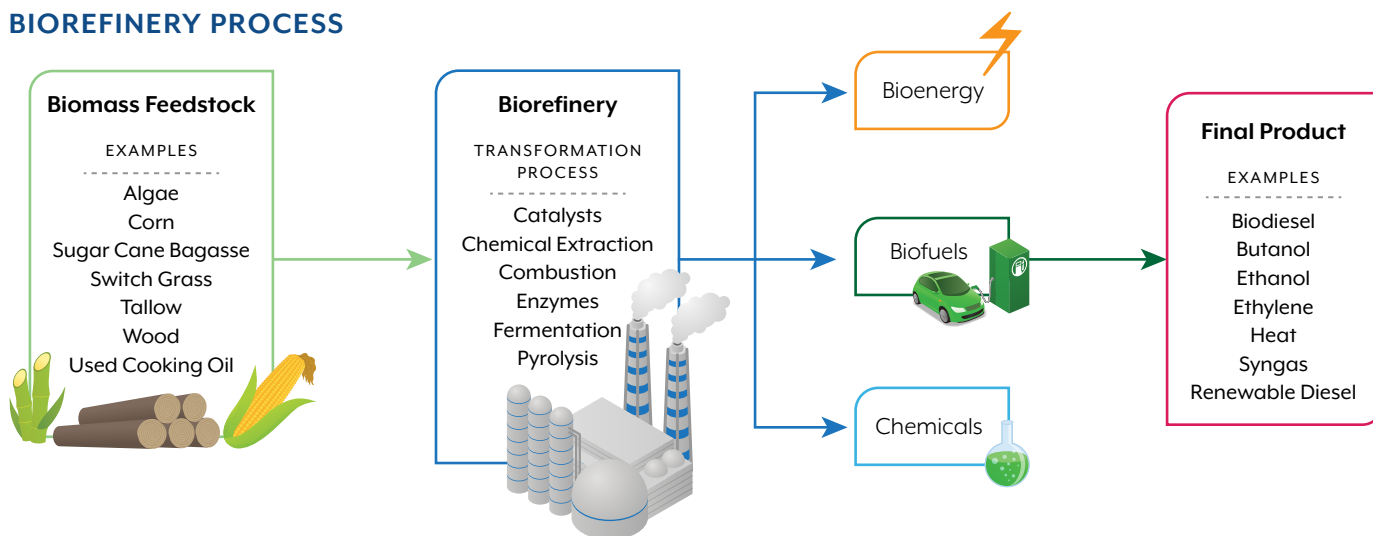
We work with technology developers and experts from the full range of biofuels and biomass feedstocks with breakthroughs in the development of clean, inexpensive, virtually inexhaustible sources of energy.

With over 100 years of know-how, KBR helps clients around the world increase value, lower costs and improve the profitability of their operations. KBR's experience spans the entire range of industries, including ammonia and syngas, fertilizers, LNG and GTL, oil refining, petrochemical and chemical, coal monetization and pulp and paper. KBR's scope of services range from standalone studies to Engineering, Procurement and Construction (EPC) to Commissioning and Start-up Services, We offer talent, resources and experience across the industrial and energy business to respond quickly and effectively to meet your project requirements.

## KBR'S EXPERTISE IN RENEWABLE AND BIO-BASED TECHNOLOGIES INCLUDES:

- Materials Handling, Receiving, Screening, Washing, Biomass Size Reduction, Drying, Pneumatic Conveying
- Biomass Hydrolysis/ Fermentation to Ethanol
- Thermochemical Conversion
- Gasification/Fermentation, and Gasification/Catalytic Conversion biofuels
- Product distillation
- Residue dewatering
- Environmental engineering and waste management
- Power generation from biomass
- Pyrolysis
- Hydroprocessing
- Bio-based oils
- Pulp and Paper plant repurposing
- Pelletizing of biomass
- Algae-based fuels
- Filtration
- Hydrolysis
- Lock Hopper Systems
- Biofuels and Chemical from Ethanol
- Hydrogenation (Upgrading) Vegetable Oil (HVO)
- Hydrothermal Liquifaction (HTL)

## BIOREFINERY PROCESS



# EXPERTISE

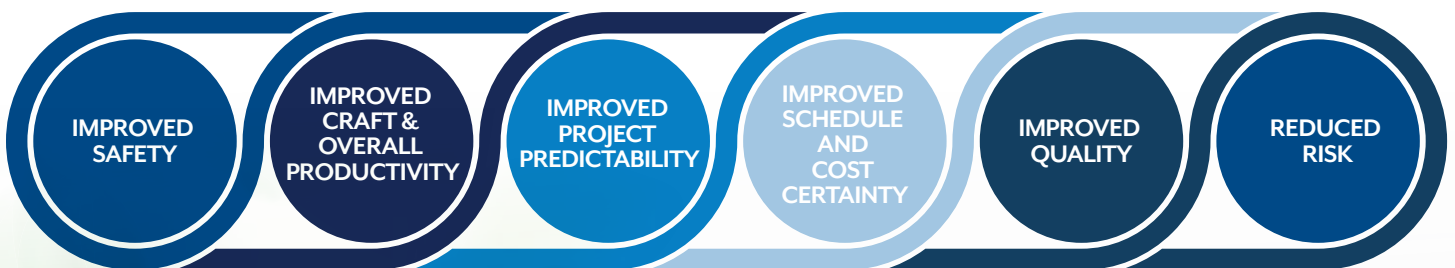
## KBR CAN ASSIST CLIENTS WITH RENEWABLE PROJECTS WITH THE FOLLOWING EXPERTISE:

- Evaluate greenfield vs. integration opportunities to leverage assets and reduce CAPEX.
- Engineering partnerships with Technology providers to scale-up pilot plants to commercial designs.
- KBR as Owners Engineer to evaluate technologies and support project development.
- Review client compliance objectives with respect to biofuels regulations such as RFS-2(US) & RED-2(EU).
- Evaluate exiting facilities toward repurposing to produce renewable products.
- OneKBR approach to project execution. Leverage KBR's global presence for local office execution and site support.
- Utilize KBR's High Value Engineering Offices to reduce project costs.

## ADVANCED WORK PACKAGING (AWP)

AWP is a planned, executable process that encompasses the work on an EPC project, beginning within initial planning and continuing through detailed design and construction execution.

### WHY AWP?



## KBR MODULARIZATION EXPERTISE

For biofuels projects, modularization expertise is critical to enable cost effective designs and installations in remote areas with close proximity to the available biomass.

### ADVANTAGES:

- Design Once Build Many
- Accelerated parallel Engineering
- Advance procurement/ volume discounts

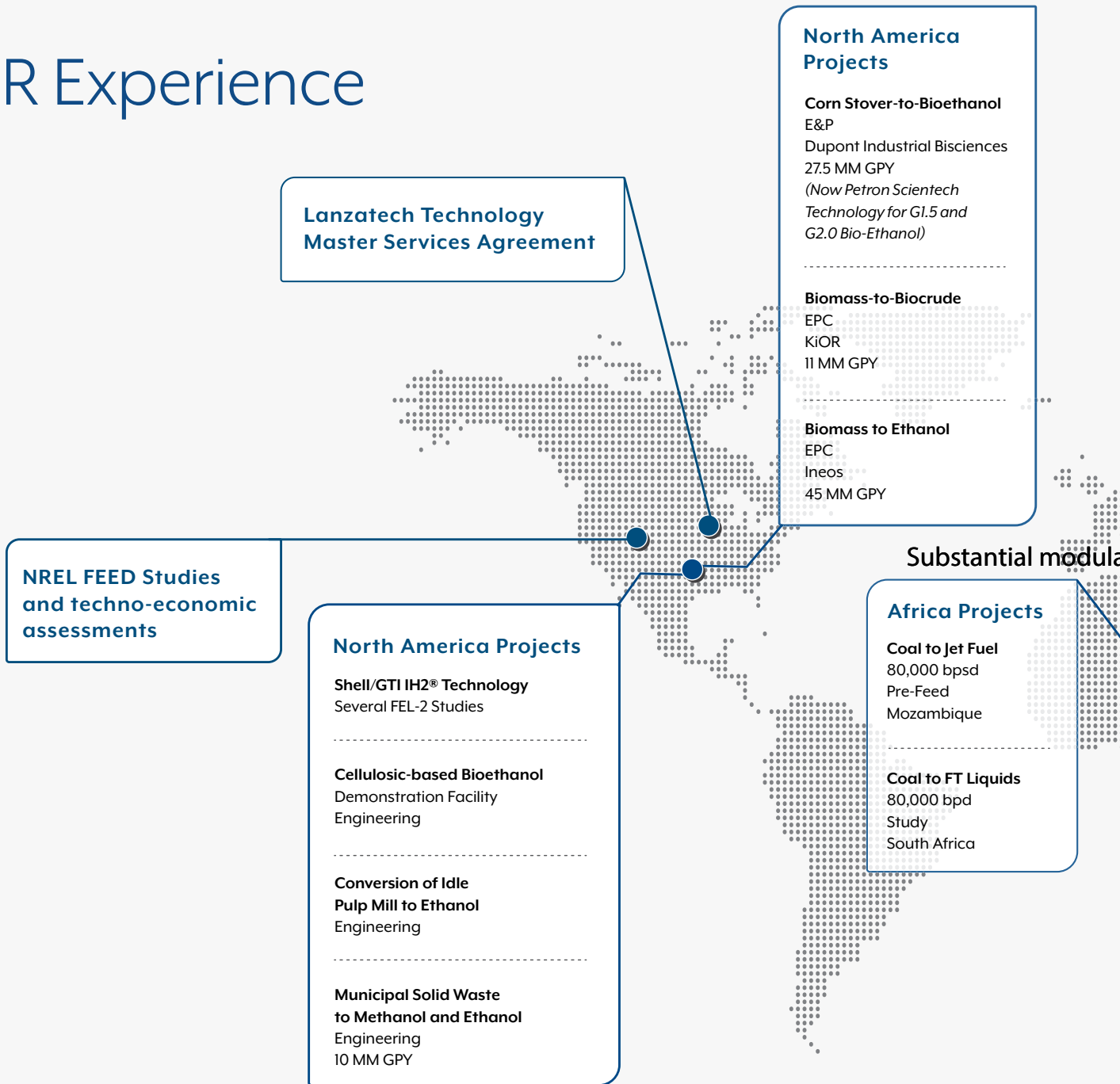
### Learning Curves in:

- Fabrication
- Module Installation/ Site Construction
- Commissioning and Start Up

## KBR SOLUTIONS DIFFERENTIATORS

- Technology development and assessment
- Basic Engineering/ FEED Package Development
- Pilot to Commercial Design Scale-Up
- Materials Handling Expertise
- Environmental engineering
- Digitalization

# KBR Experience



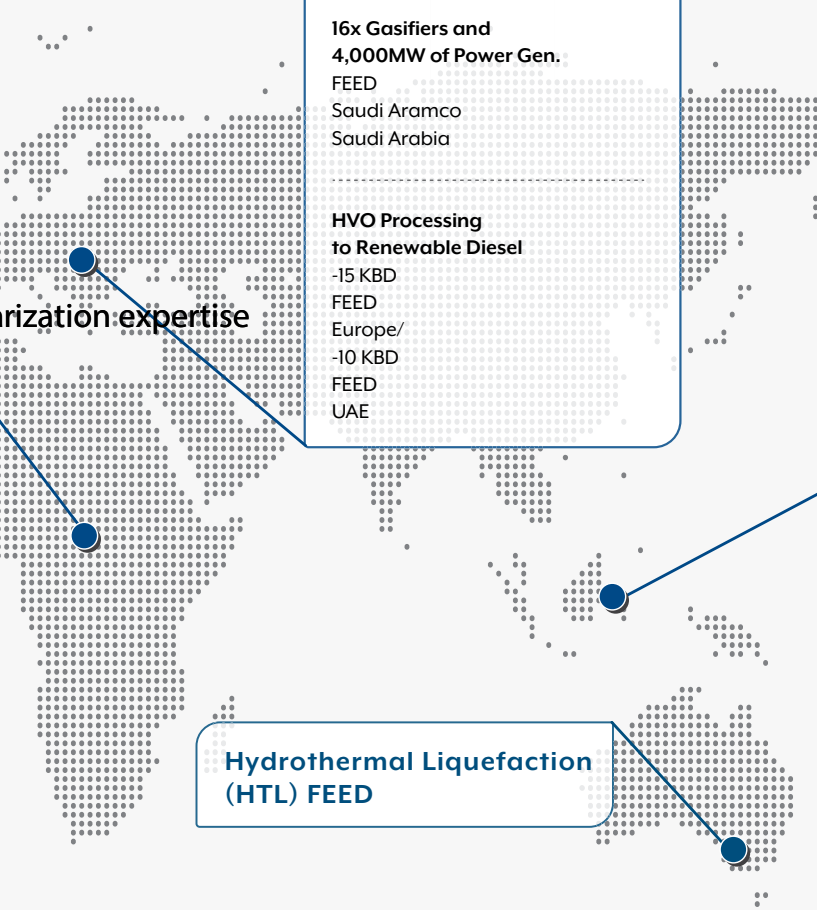
## MUNICIPAL SOLID WASTE

KBR has recent experience with material handling, storage, sorting and conveying of MSW. Our solids handling experts understand how to specify, install and optimize MSW facilities.



## IH2+ BIOMASS TO FUEL FACILITY RENDERING

KBR has extensive experience with the design and commercialization of this GTI/Shell biomass to fuels facility which utilizes Hydrolysis and Hydrotreating Reactors to convert many types of biomass to gasoline, diesel, and sustainable aviation fuels.



### Europe/Middle East Projects

Shell/GTI IH2® technology  
Several FEED Studies

Biomass to Ethanol  
EPC  
Ineos  
45 MM GPY

16x Gasifiers and  
4,000MW of Power Gen.  
FEED  
Saudi Aramco  
Saudi Arabia

HVO Processing  
to Renewable Diesel  
-15 KBD  
FEED  
Europe/  
-10 KBD  
FEED  
UAE

### Asian Pacific Projects

Shell/GTI IH2® Technology  
Several FEED Studies

Coal to Methanol  
3000 TPD  
Study  
Anglo Coal  
China

CO2 Storage Options Study  
Santos  
Australia

Brown Coal Gasification  
to Hydrocarbon Study  
Pre-FEED  
Monash Energy Holdings  
Australia

### Hydrothermal Liquefaction (HTL) FEED



#### BIOMASS HANDLING

Biomass receipt, handling, processing and storage systems are expertise that KBR will provide to your Biofuels projects. KBR has experience with most forms of biomass including sugar cane/bagasse handling systems.

# Building the Future Together

*Building sustainability through a global marketplace*

**No matter the location or work performed, we aim to build a better future by leaving a positive legacy at each project site around the world.**

KBR is committed to sustainability and recognizes that our long term competitive success depends on being trusted to meet society's expectations. Our goal is to become a better company by looking at every facet of our business – from services we offer our clients to the communities in which we live and work – through the lens of our global impact.

Sustainability demands an enduring, balanced approach to economic activity, environmental

responsibility and social progress. Our environmental commitment is to reduce the impact of our services and operations, enabling us to operate more resourcefully through improved health, education and environment.

KBR delivers a sustainable future through innovative work processes and technologies that help customers maximize their resources efficiently, at less cost to the environment and with fewer risks. Our people are the impetus to launching creative, sustainable ideas that improve not only KBR and our customers' projects, but also the world we live in.





**ENVIRONMENTAL  
IMPACT**



**ZERO HARM**  
COURAGE TO CARE

**SOCIAL IMPACT**



# KBR BIOFUELS EXPERIENCE

Decades of experience in biofuels and a global presence to optimize local execution and site support

Licensed, designed and/or built facilities from pilot scale to 2000 TPD biomass feed

Extensive biomass handling experience utilizing a wide variety of feeds

Technology experience

Reliable execution

Substantial modularization expertise

## SAMPLE KBR CLIENT RELATIONSHIPS



## About KBR, Inc.

We deliver science, technology and engineering solutions to governments and companies around the world. KBR employs approximately 28,000 people worldwide with customers in more than 80 countries and operations in 40 countries.

KBR is proud to work with its customers across the globe to provide technology, value-added services, and long-term operations and maintenance services to ensure consistent delivery with predictable results.



Scan for more information about  
KBR Biofuels and Renewable Energy.

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[kbr.com](http://kbr.com)

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**28,000+**

EMPLOYEES

**80+**

COUNTRIES WHERE WE  
HAVE ACTIVE PROJECTS

**40+**

GLOBAL OFFICE  
LOCATIONS