



**genomatica**  
sustainable chemicals

## BIO Pacific Rim Conference

December 9, 2013

Christophe H. Schilling, CEO

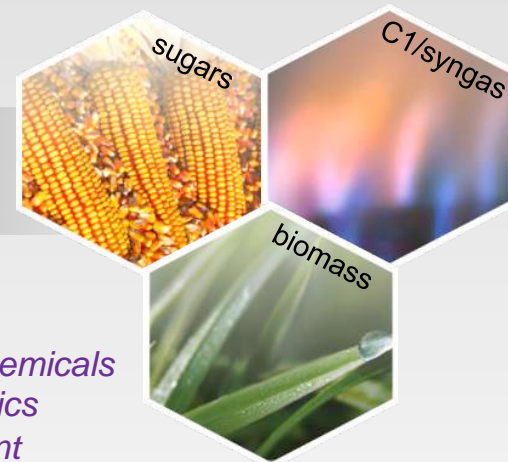
# Biotechnology leader for the chemical industry

enabling industry transformation to greater sustainability

from fossil fuels...



...to alternative feedstocks



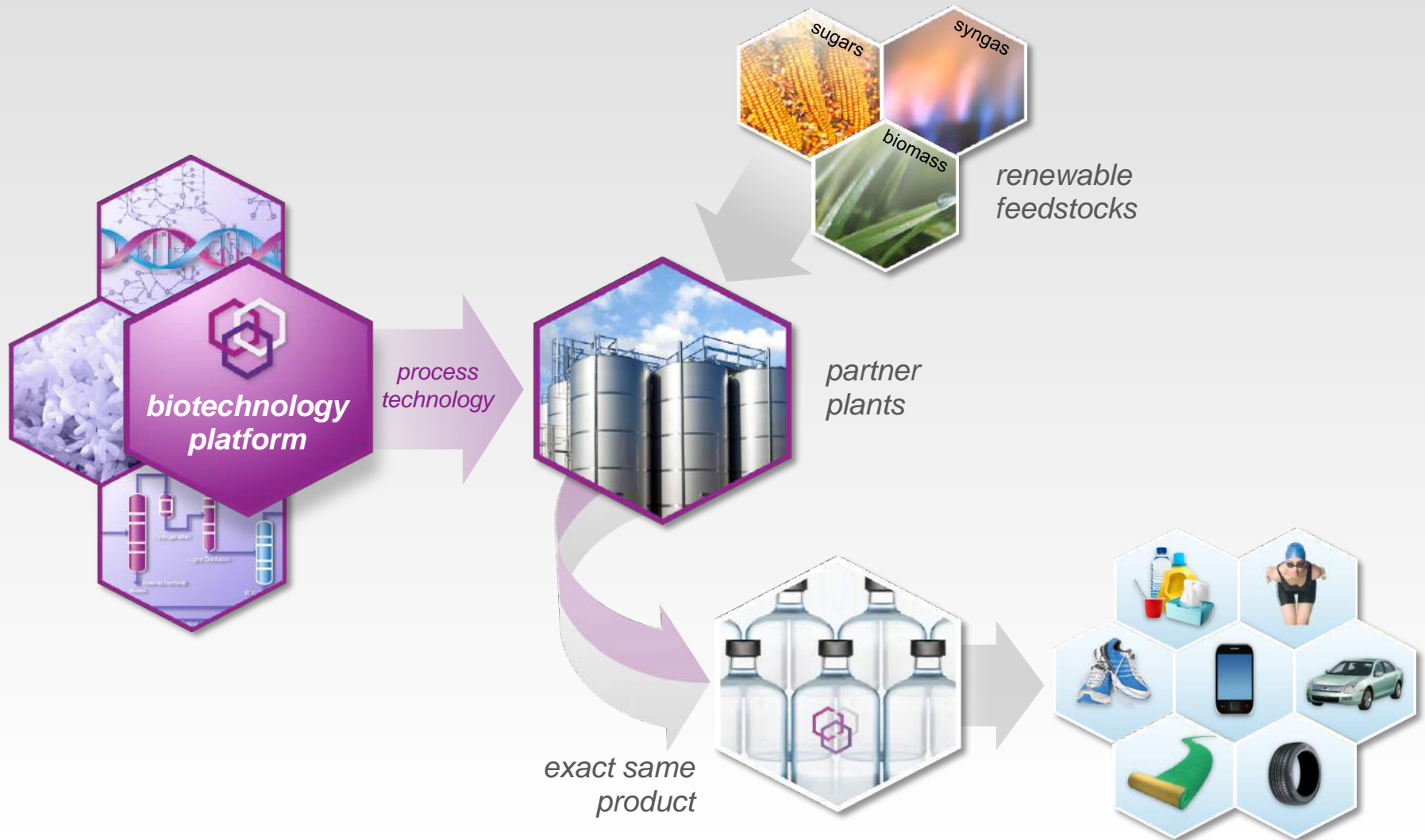
large existing markets

exact same chemicals  
better economics  
smaller footprint



# We develop processes technologies

partners license and produce - basic and intermediate chemicals



# First process, butanediol (BDO)

commercial, 5M lbs in 5 weeks, licensed to BASF, downstream usability



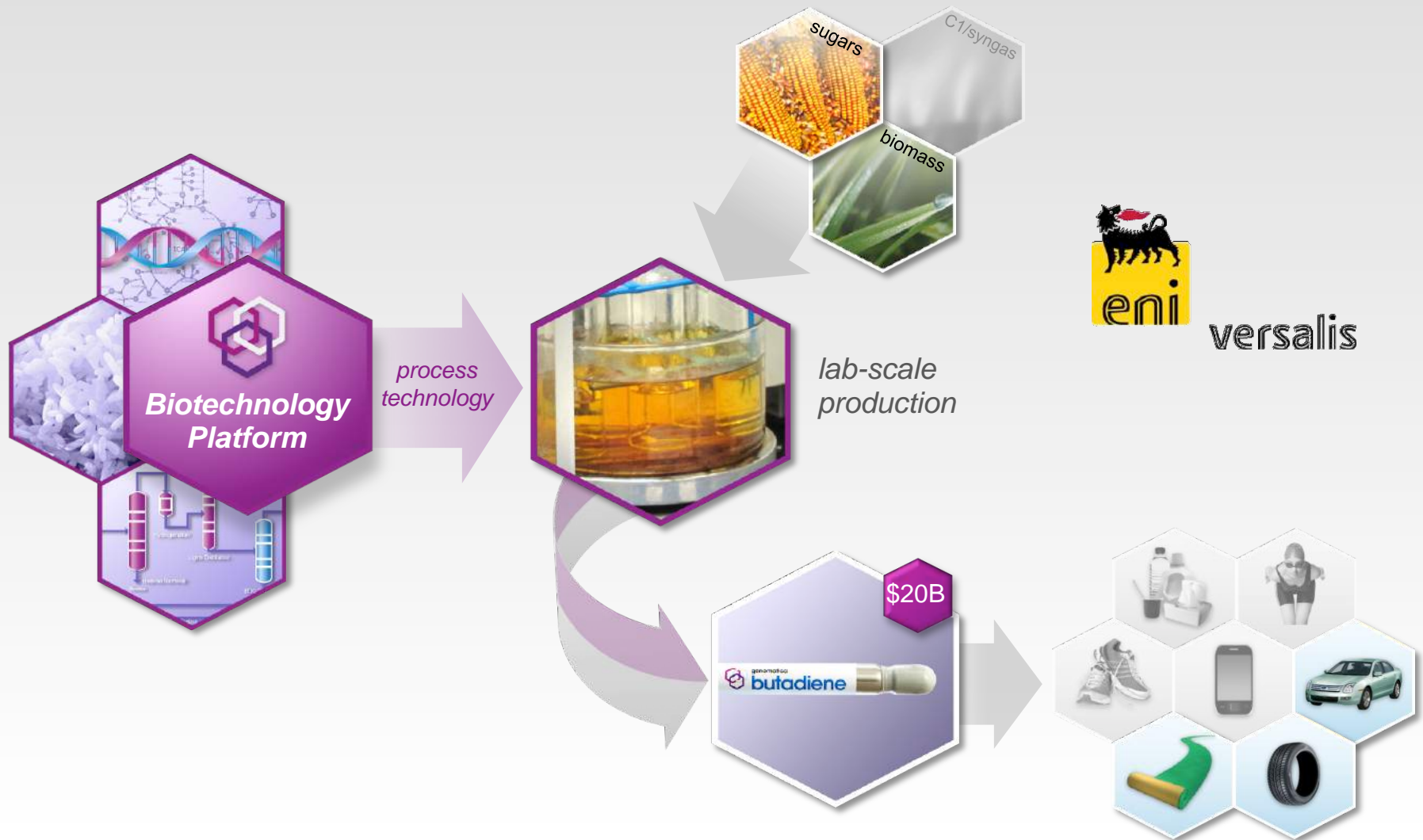
**BASF**  
The Chemical Company

**MITSUBISHI CHEMICAL**

**Novamont**

# Second process, butadiene (BDE)

fast start, \$100M in industry support, commercialization intent





# Introducing a “better way” to make chemicals

critical enablers, independent of geography

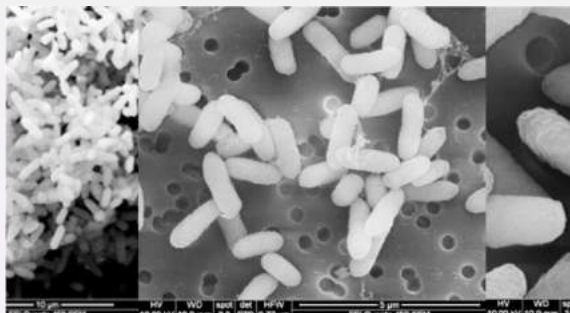


- ✓ **advantaged approach for large markets**
  - economic/cost
  - quality/performance
  - environmental
- ✓ **full value chain engaged**
  - feedstock providers, producers, downstream users
  - all embrace the advantages
  - understand how they each benefit
- ✓ **partnerships to drive commercialization**
  - leverage organizational strengths
  - feedstock, technology, chemicals, markets
  - public-private partnerships

# GENO BDO™ Process Commercialization Journey

5 years from concept to commercial production

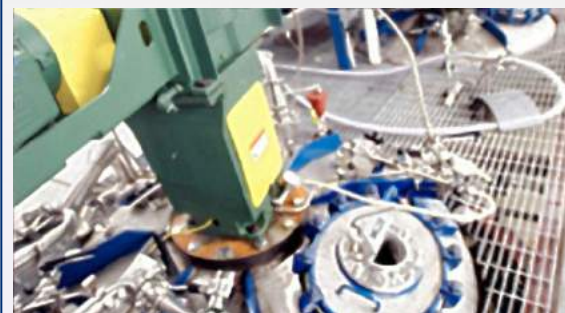
**BDO Producing Organisms – 2008**



**Purified BDO – 2009**



**3,000 Liter Piloting – 2010**



**Integrated Demo Plant – 2011**



**Shipping Tons at a Time – 2011**



**Commercialization – 2012**



# GENO BDO™ Process - Kirkpatrick award

symbolic of biotechnology's potential to enable industry transformation



**“the most noteworthy chemical engineering technology commercialized in the world in the past two years”**

- 80 years of winners have shaped major parts of the chemical industry
- Validates Genomatica's process engineering excellence, as important as the science

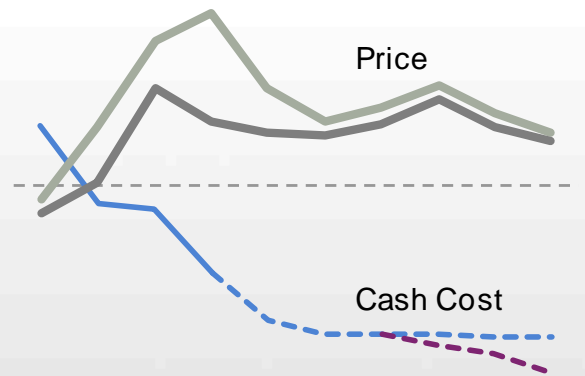


# Advantaged Process Technology - BDO

cost competitive; capital efficient; enhanced sustainability attributes

## Cost Competitive Today Robust Improvement Path

(\$/lb)



2009 2012 2015 2018

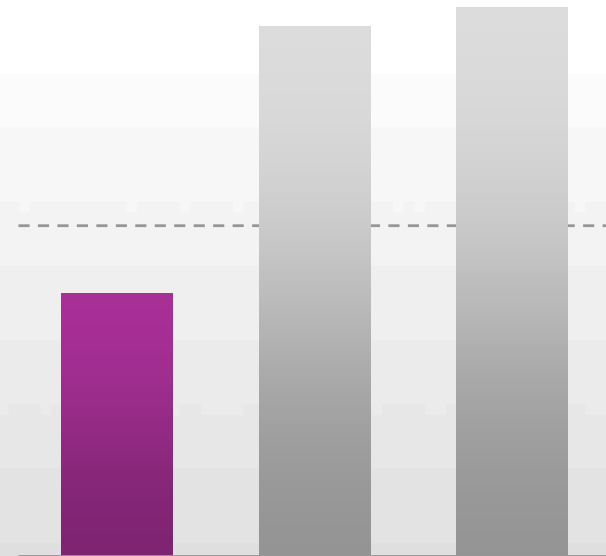


**BDO Price**

- Historical
- Base Case Projection
- Upside Case Projection
- North America
- Europe

## Lower Capital per Ton

(\$/Ton, 50KT Capacity)



Leading Petro Technology  
Indirect Bio-BDO Technology

# Validation across numerous value chains

proven quality, usability for large existing and eco-advantaged applications


**TORAY**  
Innovation by Chemistry

PBT, Molded engineering




**LANXESS**  
Energizing Chemistry

World-scale plant; customers using it




**遠東新世紀**  
FAR EASTERN NEW CENTURY

New apparel



**DSM**  
BRIGHT SCIENCE. BRIGHTER LIVING.

COPE, plastics



... and more

# Global Partnerships to Drive Commercialization

validates strong early demand for Genomatica process technology



# Commercially Available, Comparable Quality

BDO from GENO BDO™ Process commercially available through BASF



Trade Press Release – November 27, 2013

## BASF produces first commercial volumes of butanediol from renewable raw material

2013-11-27  
P-13-538

BASF has produced its first commercial volumes of 1,4-butanediol (BDO) from renewable raw material, and is offering this product to customers for testing and commercial use. The production process relies on a patented fermentation technology from Genomatica, based in California. The fermentation process uses dextrose as a renewable feedstock. The quality of BDO based on renewable raw material is comparable to petrochemical-based BDO. BASF plans to expand its portfolio with selected BDO derivatives based on renewable feedstock, including Polytetrahydrofuran (PolyTHF®).

BDO and its derivatives are used for producing plastics, solvents, electronic chemicals and elastic fibers for the packaging, automotive, textile, and sports and leisure industries, among others. The starting materials for the production of conventional BDO are natural gas, butane, butadiene and propylene. BASF currently produces BDO and BDO equivalents at its sites in Ludwigshafen, Germany; Geismar, Louisiana; Chiba, Japan; Kuantan, Malaysia; and Caojing, China. In July BASF announced to increase its global capacities for BDO to 650,000 metric tons and for PolyTHF to 350,000 metric tons within the coming two years.



# Factors of Importance to Large Producers

ICIS-Genomatica Sustainability Survey, January 2013

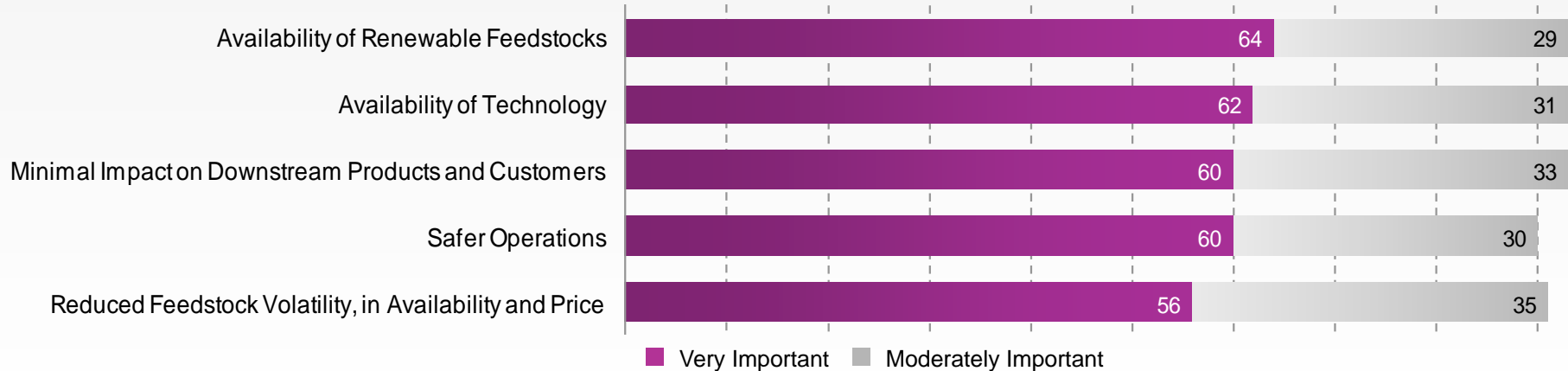


SPECIAL REPORT SUSTAINABILITY SURVEY

## Green concepts take firm root

Sustainability ideas are much more deeply entrenched among chemical producers, both large and small, than they were just a few years ago, reveals a recent reader survey carried out by *ICIS Chemical Business* in association with Genomatica

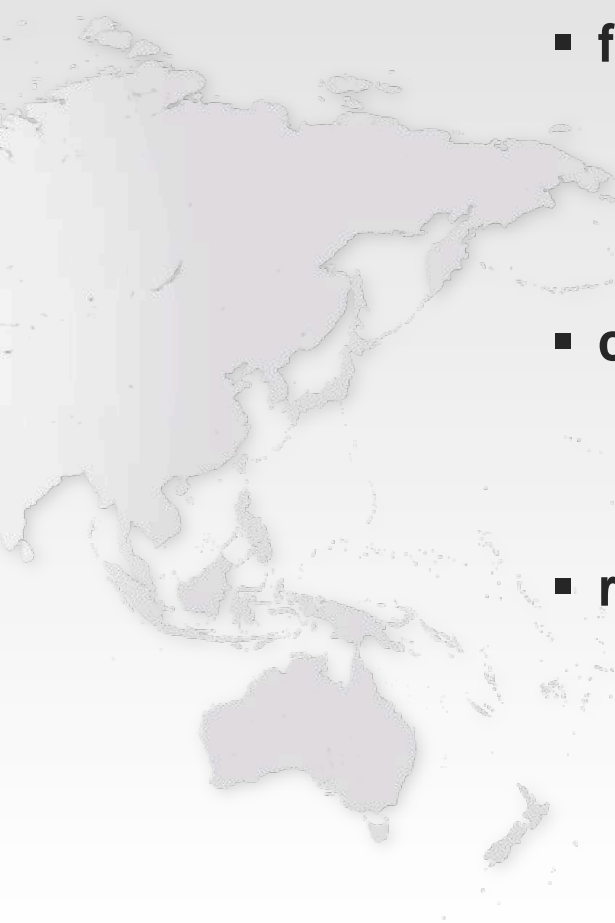
### Importance of Factors When Considering Renewable-Based Production – Large Producers





# Key Topics - Renewable Chemicals in Asia/PacRim

Accelerating Adoption in the World's Largest Chemical Market



- **forces driving renewables interest in Asia**
  - need for alternative feedstocks
  - consumer demand
  - climate change concerns
  
- **connecting agricultural and chemicals value chains**
  - new relationships
  - business models and cultural considerations
  
- **renewable feedstocks availability**
  - supply chain still emerging
  - feedstocks in the south, markets in the north
  - Infrastructure, political climate, policy