

Engineering a Sustainable Future

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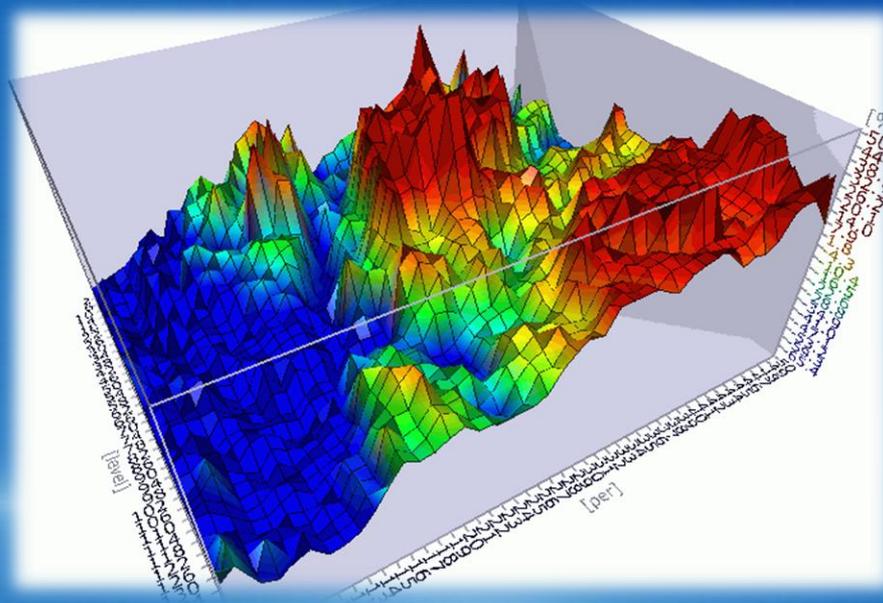


FLAGSHIP VENTURES

Flagship VentureLabs

- Flagship has assembled the various components of the innovation and entrepreneurial ecosystem —under one roof”
- Flagship VentureLabs team members are the entrepreneurs, conceiving and/or founding new ventures
- Key role in assembling world-class team of academic co-founders as well as early management team
- Applied to big ideas with broad, blocking-IP opportunity
- Technologies identified or invented to meet key understood market needs
- First-in-class, pioneering a category
- First-mover advantages and risks
- Capability to assemble best-in-class people and technologies
- Economies of scale through shared management resources, processes, early costs and broad experience
- Created 25 leading companies to date





The Role of Innovation

- Innovation involves new ways of doing something –when subjected to market selection it leads to better ways
- Innovations can be disruptive - disruptions tend to generate speculative excesses (aka bubbles) – collapses provide selections
- Innovation has been and will remain our national competitive advantage – we will innovate our way out
- Innovation adoption benefits from desperation – a willingness to take risks
- Enabling innovation vs. Essential innovation
- Startups can win when innovation matters

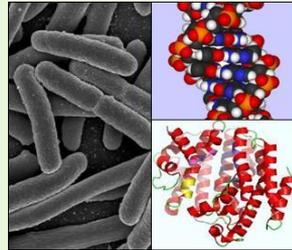
LS9: Building a better biofuel



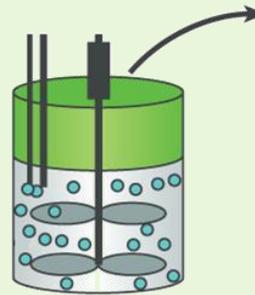
High-quality, low-cost drop-in fuels and sustainable chemicals for large and growing markets



Any
renewable
feedstock



Most
efficient
conversion

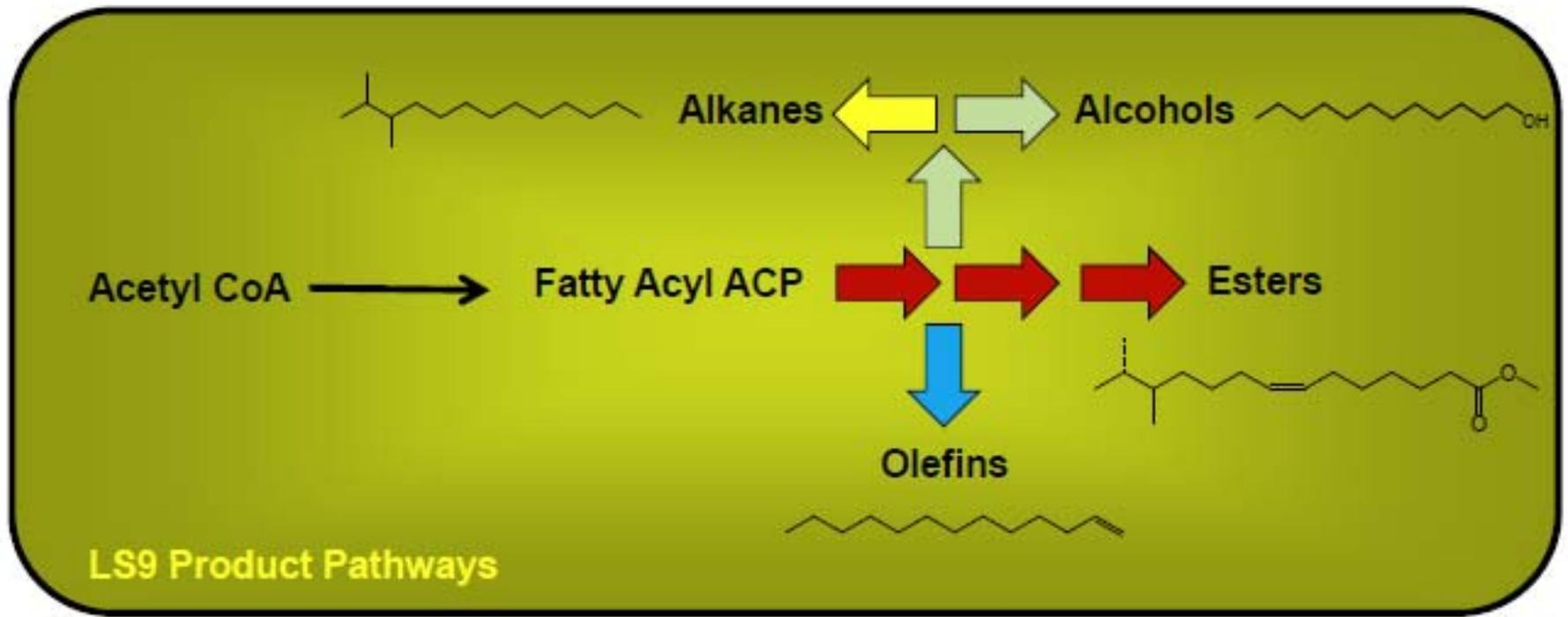


Unique
one-step
process

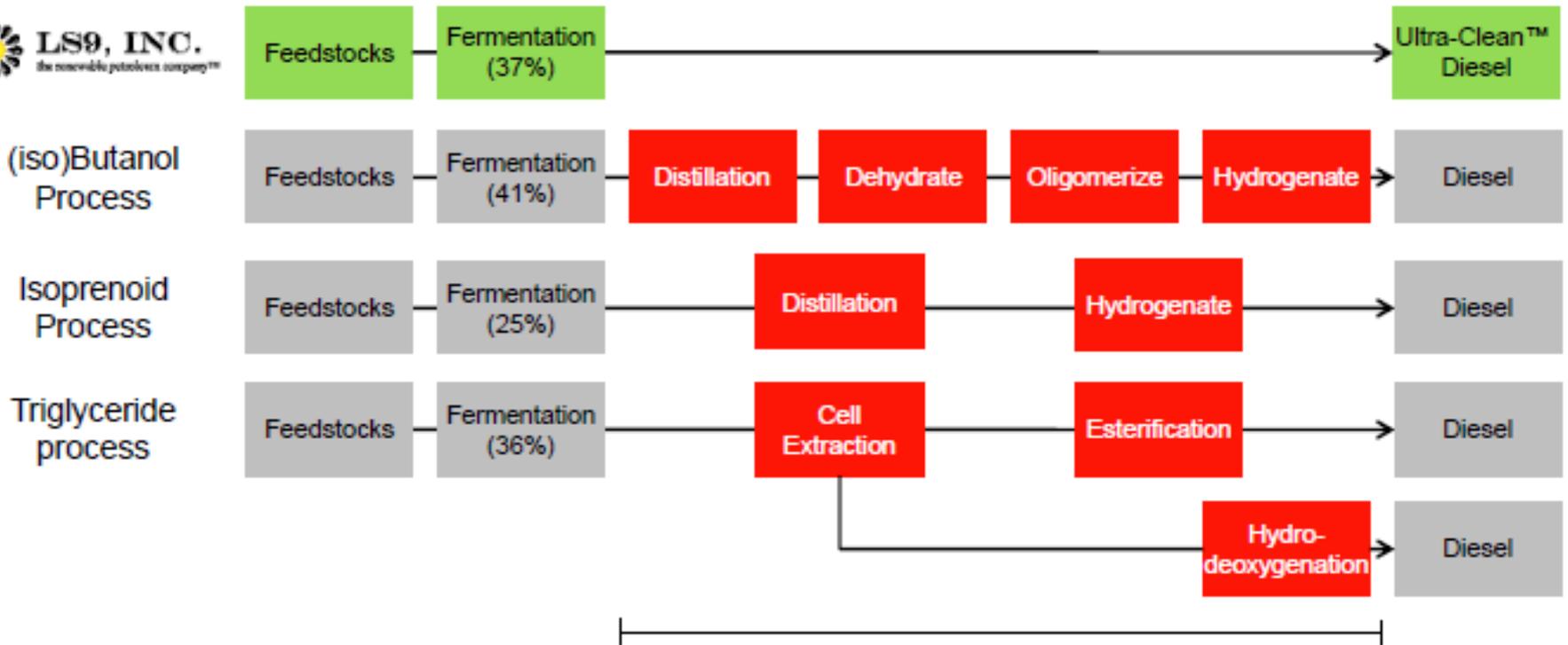


Drop-in
infrastructure
compatibility

Fatty Acid Biosynthesis: The Best Route to Hydrocarbons



A systems approach to hydrocarbons

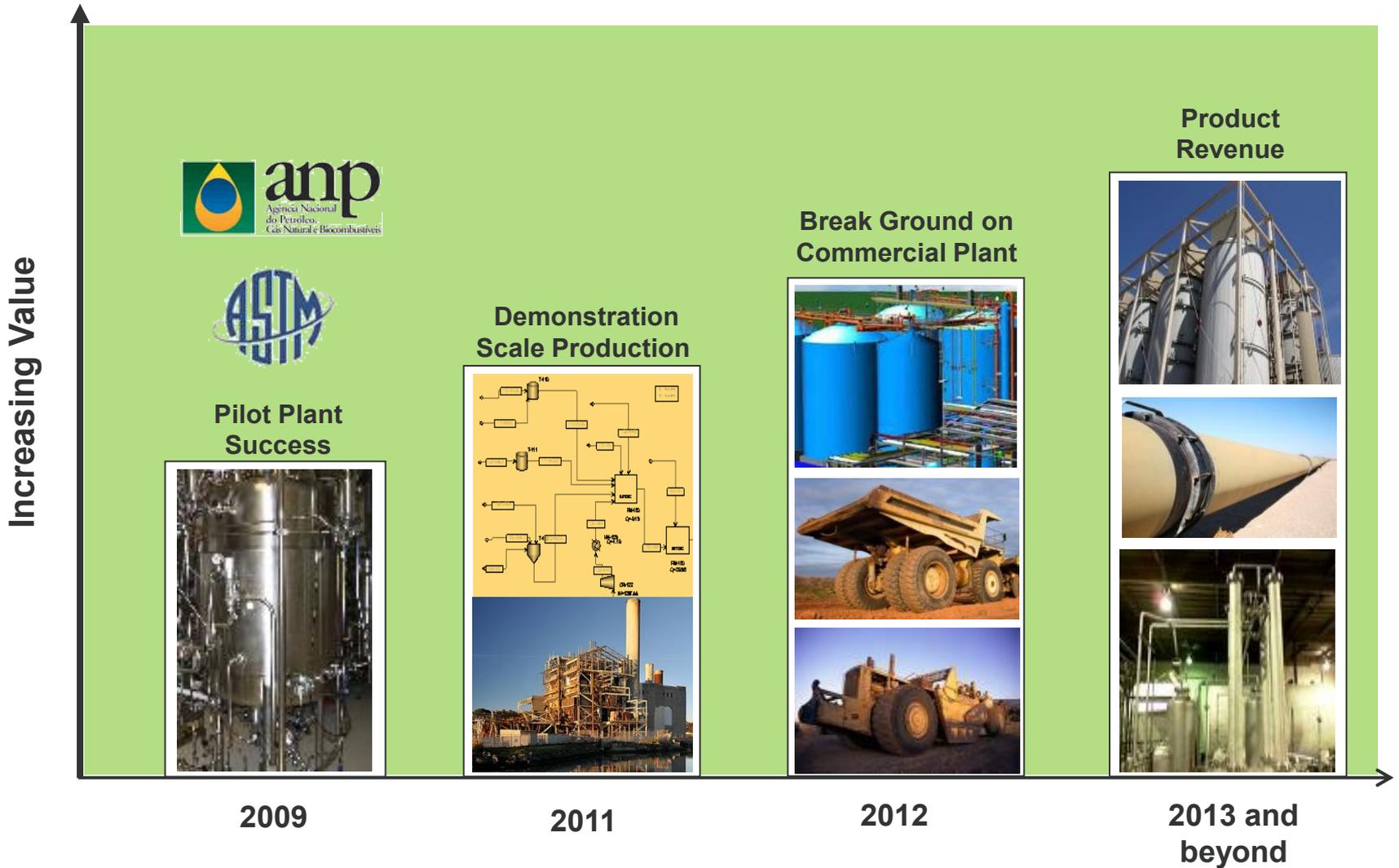


Additional Unit Operations:
Higher capital, lower yield

- Highest yield
- Simplest process
- Lowest Cost

No requirement for clean sugars, heavy metals, hydrogen, or elevated temperatures and pressures

Clear Path to Commercialization



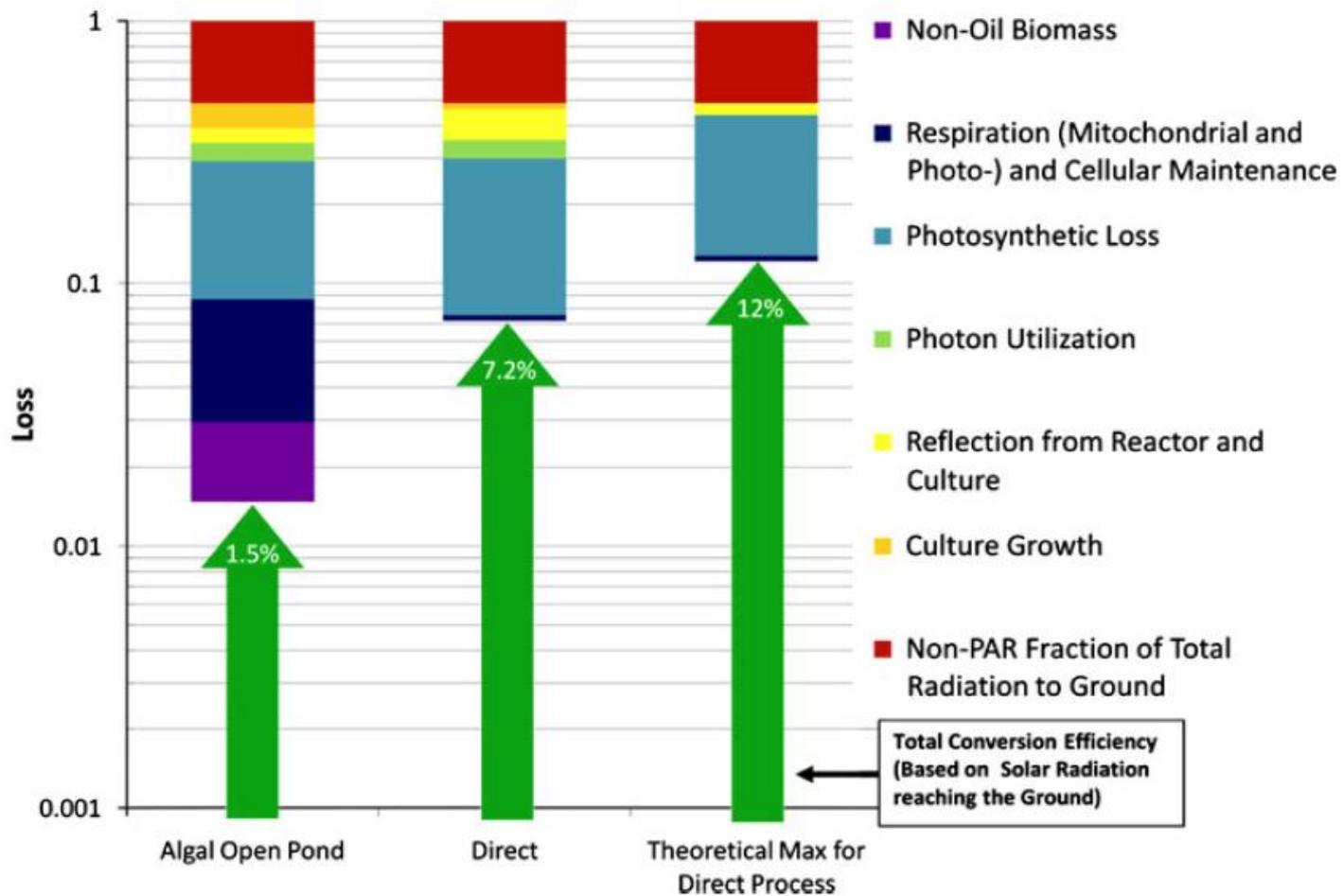
Joule Unlimited™



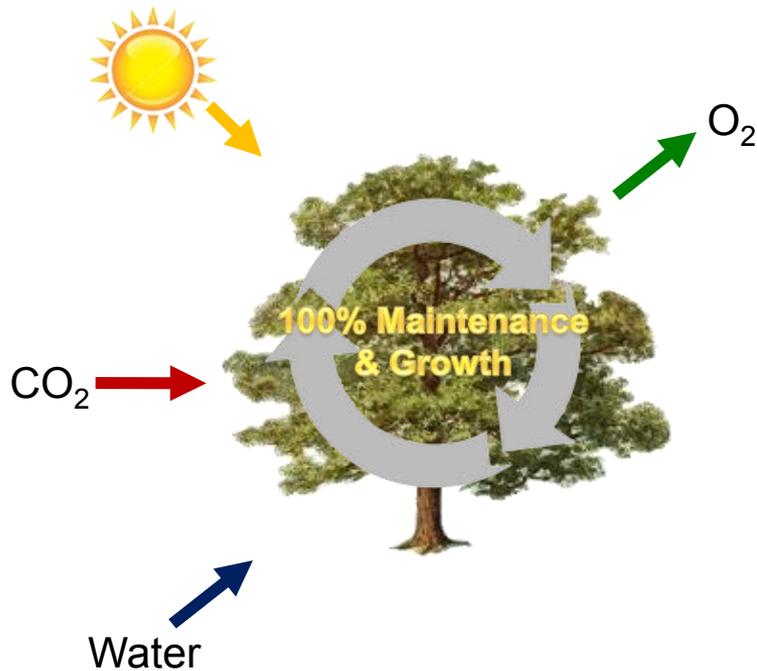
Solar Fuels and Chemicals Without Limits™



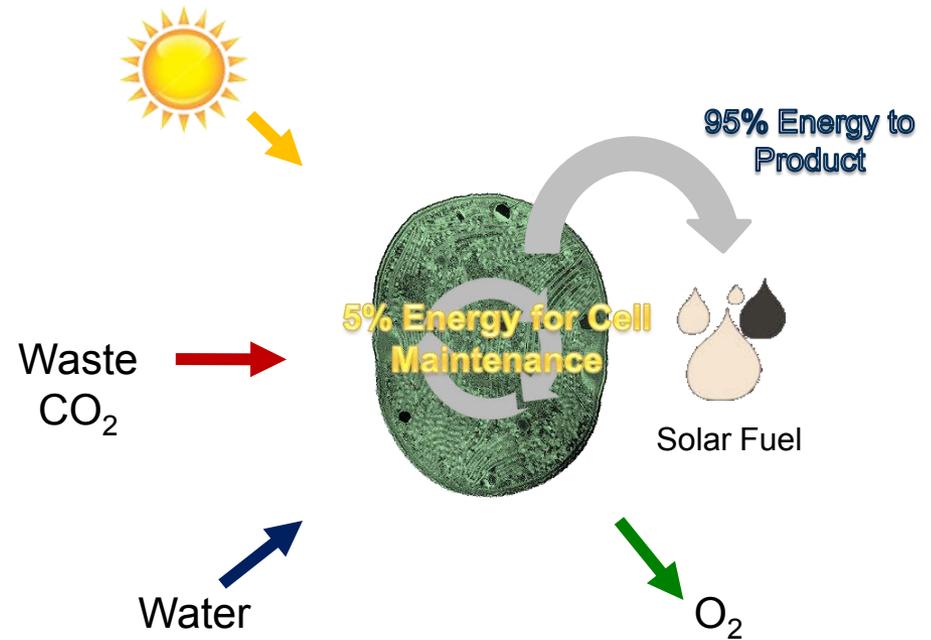
Designing an efficient photosynthetic system



Channeling the Power of Photosynthesis to Produce Fuels



Nature's Way
Sunlight, CO_2 , and water make trees grow and produce O_2

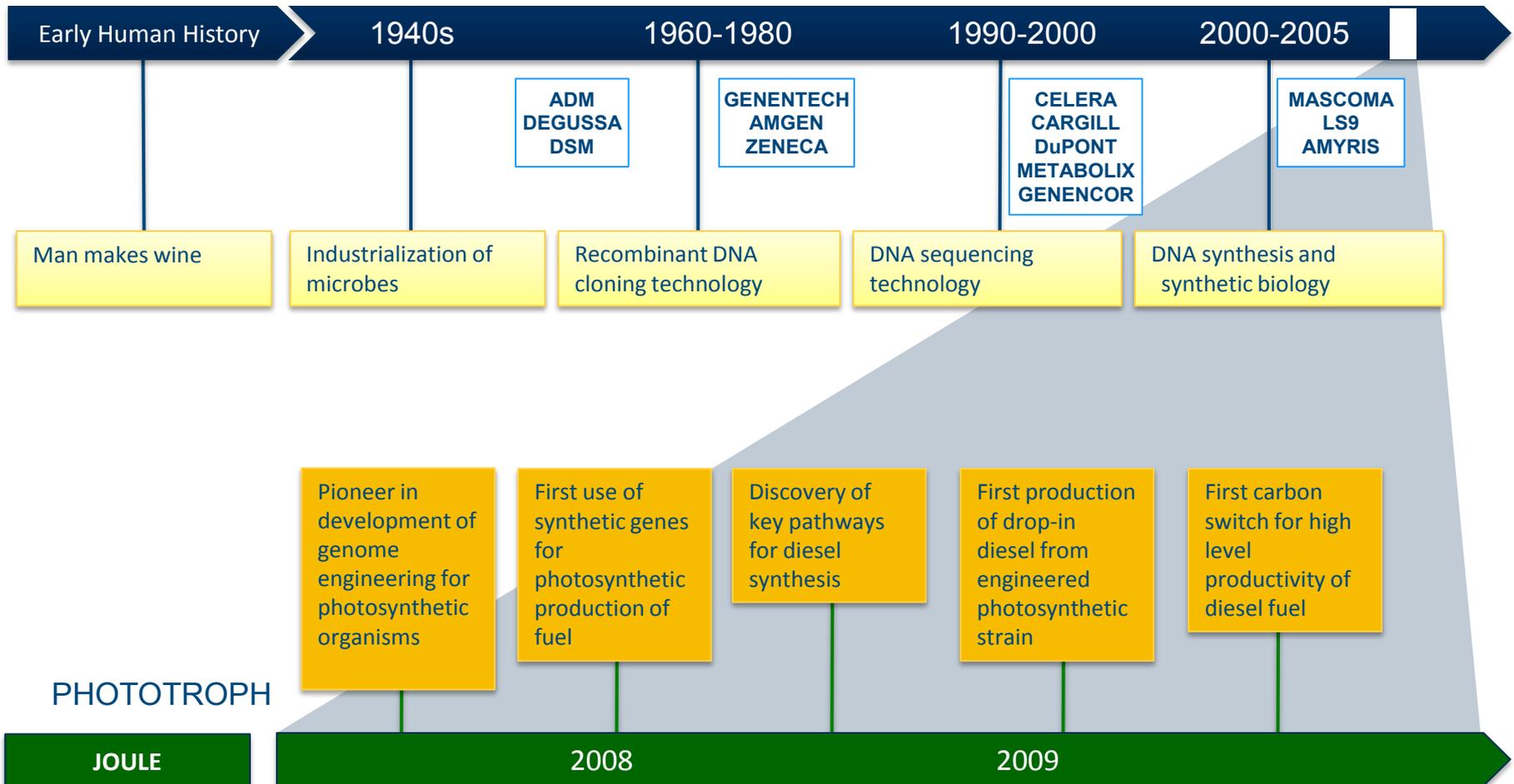


Joule's Way
Harnessing nature to produce fuels

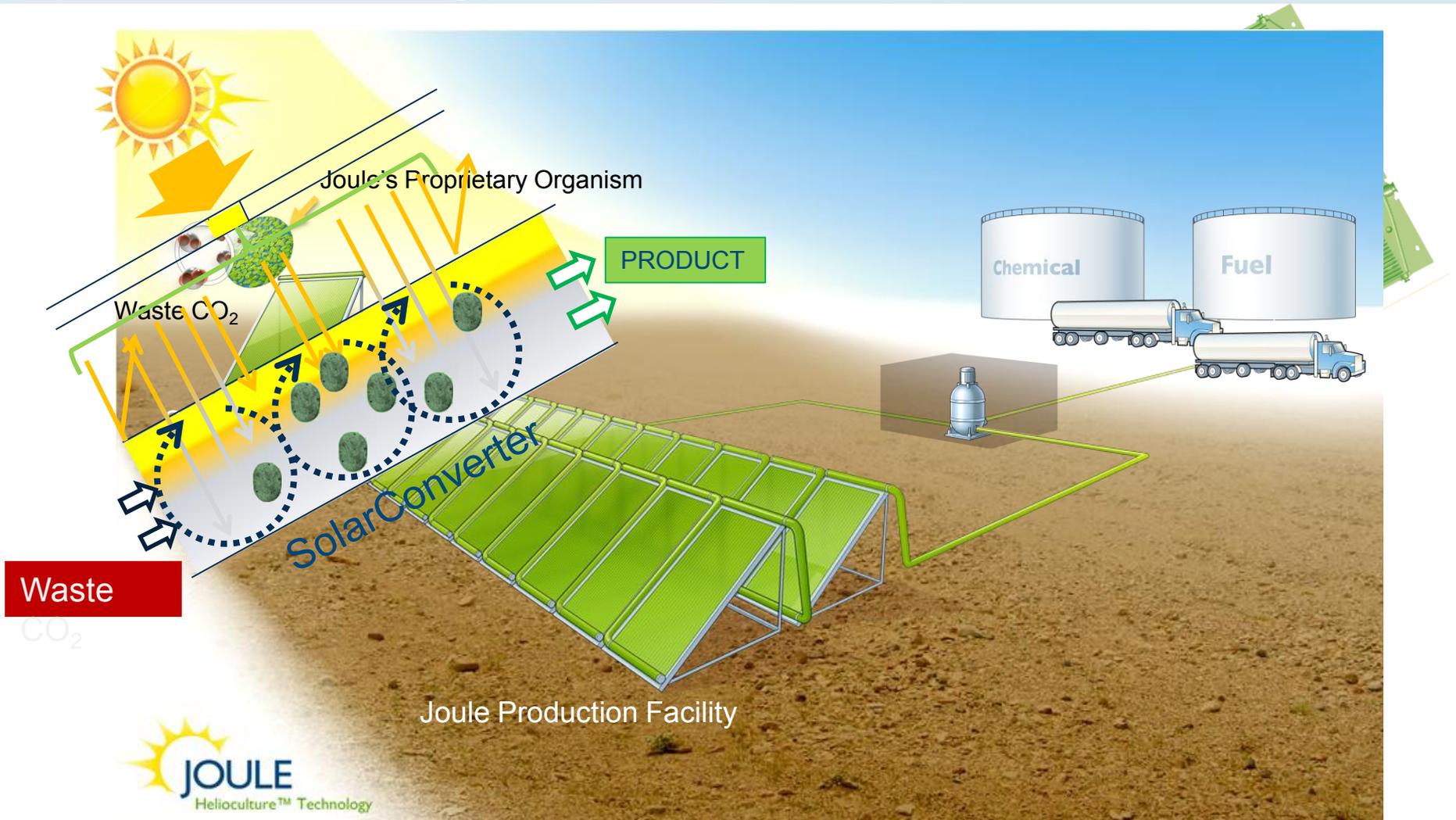
Genome Engineering:

Leveraging synthetic biology to capture 70 years of metabolic engineering

HETEROTROPHS



Integrating Synthetic Biology with Bioreactor Design



Waste
CO₂

Solar Converter

PRODUCT

Chemical

Fuel

Joule Production Facility

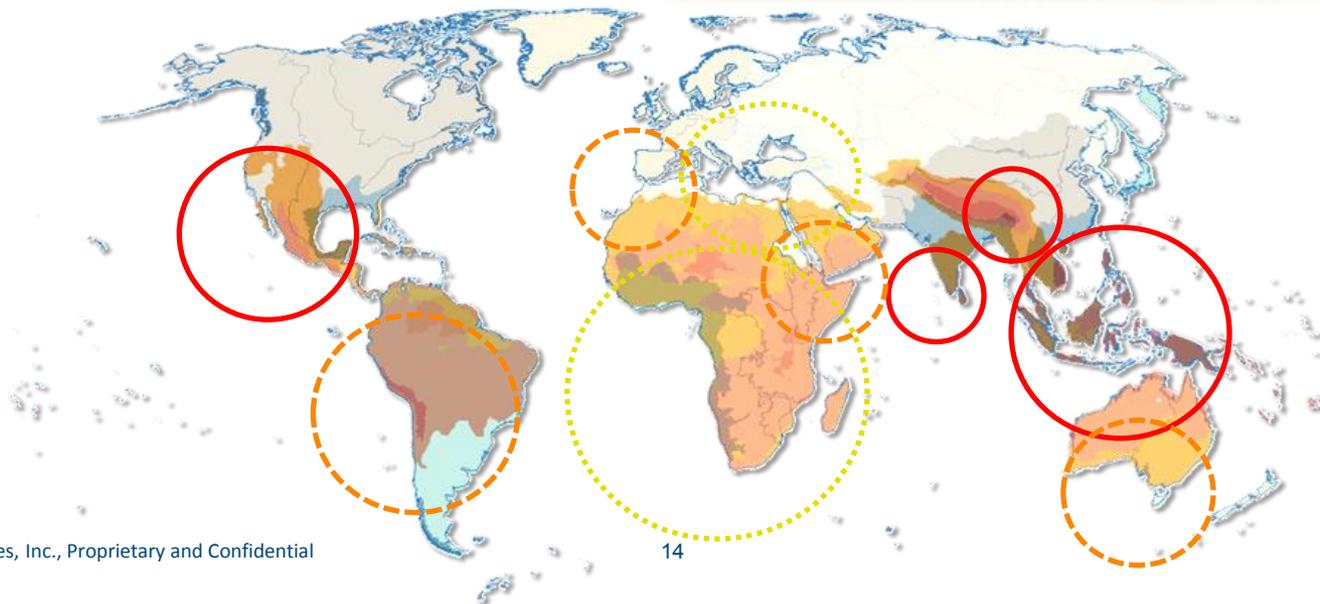
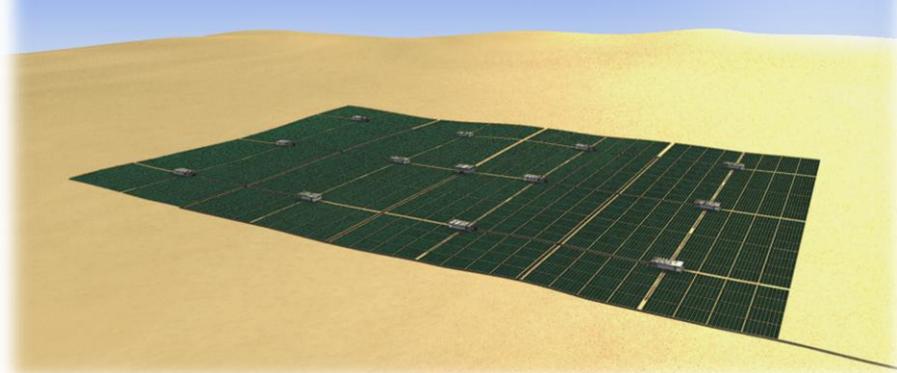


Towards Future of Unlimited Reserves

Joule's current Pilot Plant, Leander, TX



Joule's New Mexico 1000 Acre SunSprings Diesel Plant (in process)



Re-defining the innovation ecosystem

- Constraint free
- Rapid iteration and a willingness to be wrong
- Solution driven—not technology driven—approaches

The logo for essentient features the word "essentient" in a green, lowercase, sans-serif font. A small, stylized sunburst icon is positioned above the letter 't'.

The logo for JOULE consists of a stylized sun icon with yellow rays to the left of the word "JOULE" in a blue, uppercase, sans-serif font.

The logo for oasys water features a blue water droplet icon with a grid pattern inside, followed by the word "oasys" in a blue, lowercase, sans-serif font and "water" in a smaller, blue, lowercase, sans-serif font below it.

The logo for NOVOMER includes a green, stylized molecular or network icon to the left of the word "NOVOMER" in a green, uppercase, sans-serif font.

The logo for Midori features a green and yellow circular icon with a stylized leaf or drop shape, followed by the word "Midori" in a green, lowercase, sans-serif font.

The logo for ze·gen consists of the word "ze·gen" in a blue, lowercase, sans-serif font, with a small green and blue swirl icon to the right.

The logo for LS9 features a stylized flower or sunburst icon with a yellow center and black petals, followed by the letters "LS9" in a black, uppercase, sans-serif font.

The logo for ELEVEN BIOTHERAPEUTICS includes a stylized orange and blue icon consisting of three parallel lines, followed by the word "ELEVEN" in a blue, uppercase, sans-serif font and "BIOTHERAPEUTICS" in a smaller, blue, uppercase, sans-serif font below it.

The logo for MASCOMA features a green, stylized sunburst or flower icon to the left of the word "MASCOMA" in a black, uppercase, sans-serif font.

Thank you!

