Algae: The New Green Crude

Green Crude - Image Courtesy of SapphireEnergy.com

Key US Energy Issues

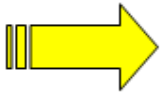
Need to:

- Get off foreign oil
- Become energy independent and self-sustainable
- Reduce CO_2 emissions
- Create new green jobs

Why Algae?

Comparison of Algae vs. other Feedstocks for Bio-Oil Production Per Acre

Feedstock	Gallons Per Acre
Soy	40-50 US gallons/acre
Canola/Rapeseed	120-150 US gallons/acre
Jatropha	175-250 US gallons/acre
Palm	650 US gallons/acre
Algae	2-5,000 US gallons/acre



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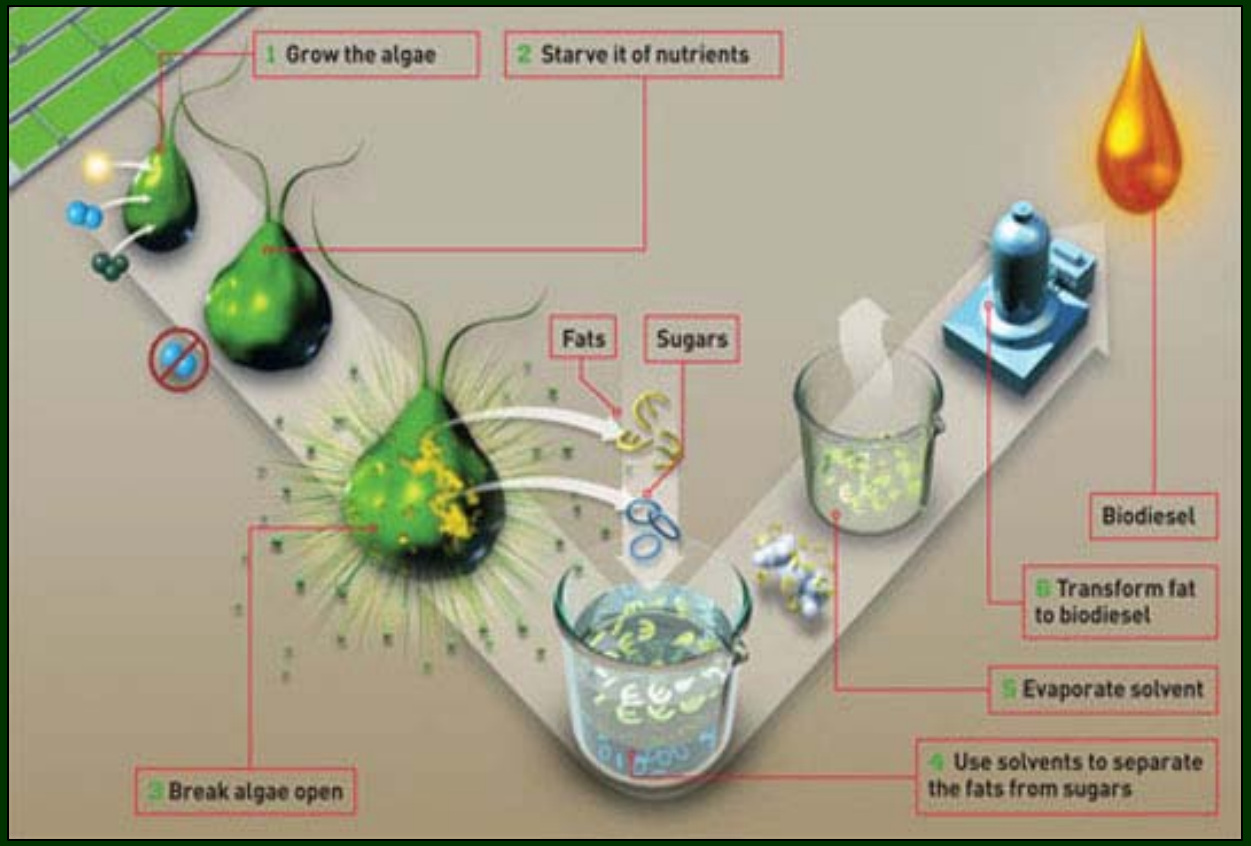
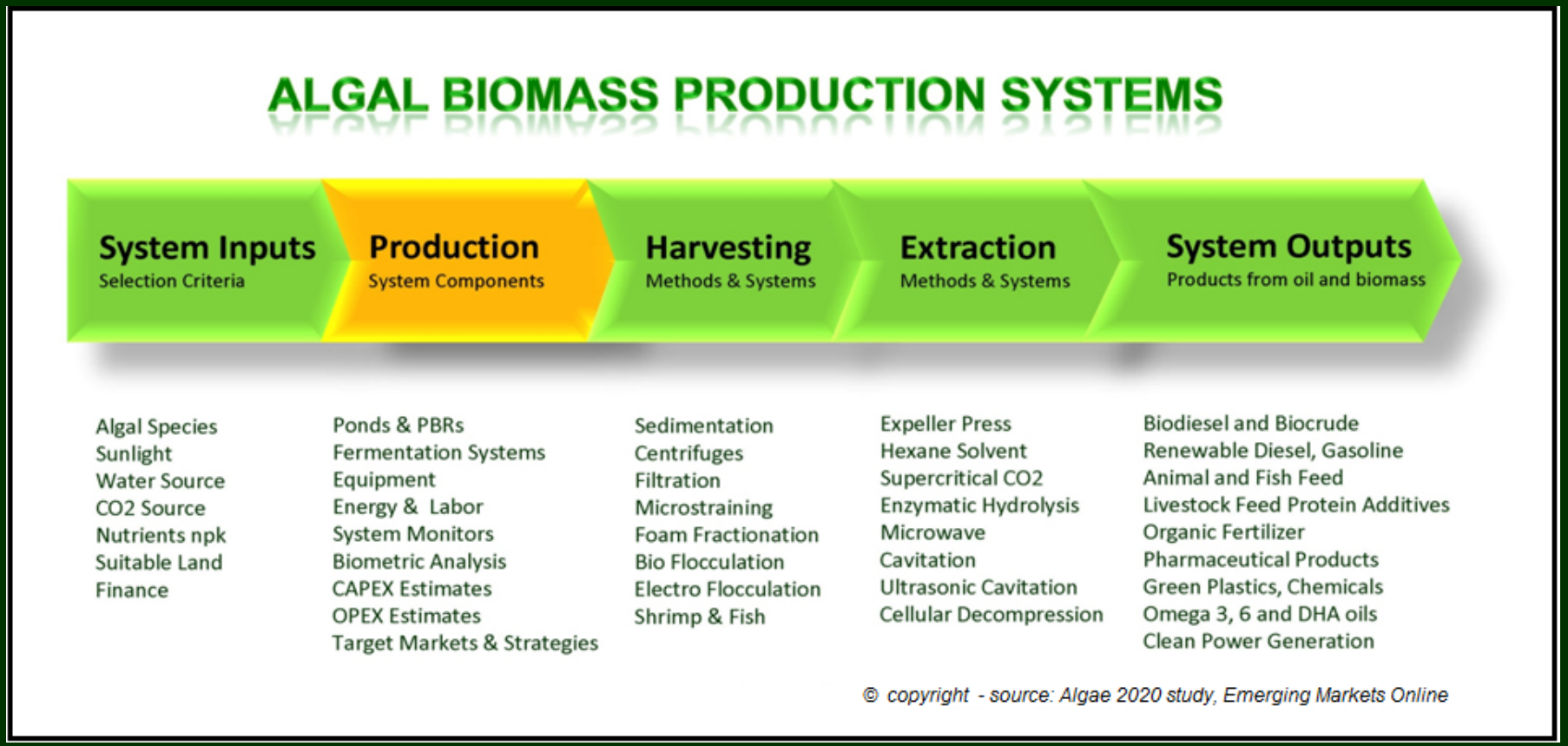
Algae Process



Various Methods of Growing Algae

Algae Biomass Production Steps, Methods & Technologies



The Traditional Method for 50+ Years

Raceway Ponds

5000 – 7000 gallons per acre per year

Algae Farming

Next Generation Algae Production Systems

Closed-Loop Photobioreactors (PBR's)

30,000 – 500,000 gallons per acre per year

Industrial Use

***Can be skid mounted and portable**

Results from Growing Algae

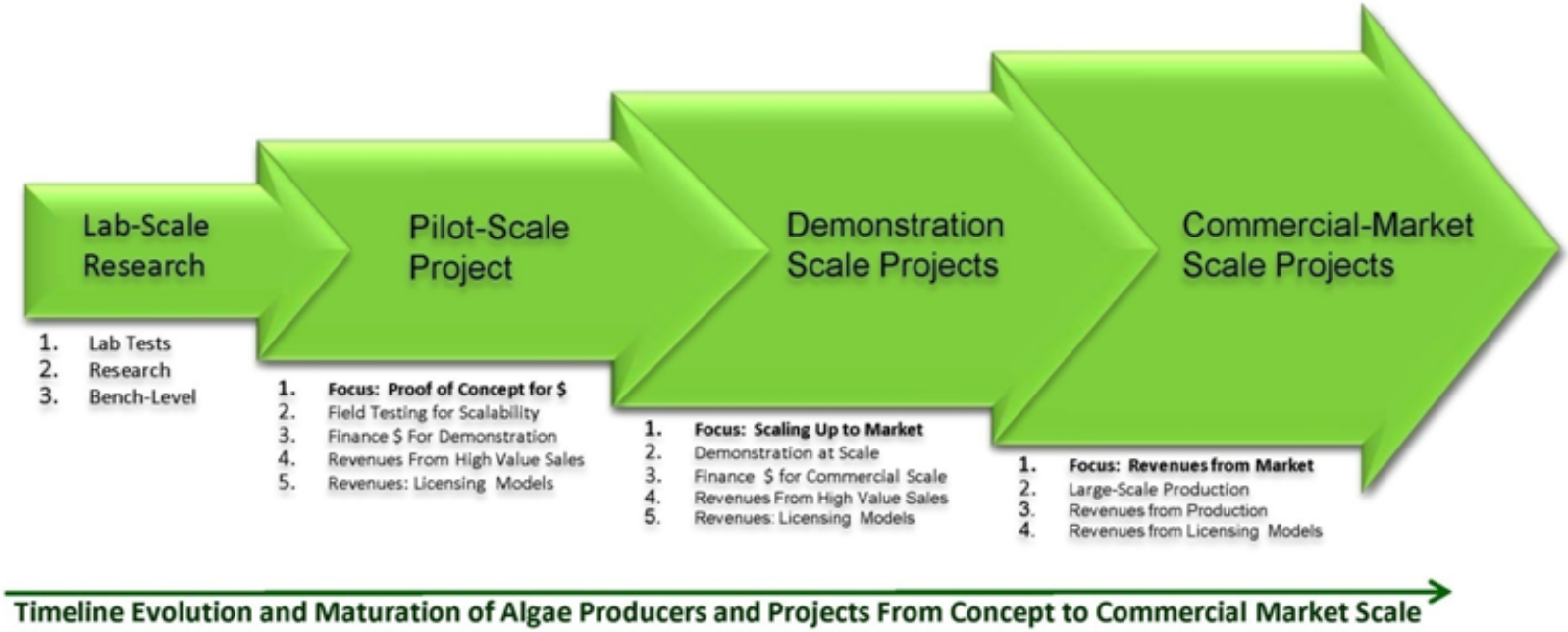
Algae Culture Grown In Water, Ready for Harvest (Green Kool-Aide)

Harvested Algae Product: Cake/Paste Containing Oil and Biomass Fractions

Potential Markets for Algae Oil and Biomass

- Jet Fuel
- Green Diesel
- Biodiesel
- Biogasoline
- Bioplastics
- Nutricutical
- Pharmaceutical
- Cosmetics
- Organic Fertilizer
- Livestock, Poultry and Fish Feed

Evolution of Algae Biomass Producers and Projects



Government & Private Sector interest in algae fuel development

Industries push for algae-based oil for airlines, trucking fleets, army,navy and air force.

Incentives and encouragements by various government agencies, e.g., DOE, NREL, NETL, USDA,

Why so much interest in Algae?

Algae is renewable

Does not compete with the food channel

Consumes CO2

So, what's wrong with that?

Commercial Developments

- All of “Big Oil” is now invested in algae.
- Recent Exxon and Bill Gates investments in algae.
- Algaepreneurs are building out commercial-scale algae production plants on acreage.
- Favorable PR and comments in the press about algae.
- Farmers are introducing algae into crop rotation.
- New government grants, tax incentives becoming available.

National Algae Association

NAA is the first algae trade association
in the US whose purpose
is advocacy for
the algae production industry

National Algae Association

Mission

Goal: To promote algae oil and biomass production for economic and environmental development pathways to market commercialization.

Mission: Our mission is to advocate and communicate a positive environmental vision for the commercialization of the algae industry.

Methods: Collaboration, innovation and commercialization are the foundations and motivating factors of the National Algae Association.

Members: The NAA is technology-neutral and supports algae producers in raceway ponds, closed-loop photobioreactors (PBR's) and fermentation projects.

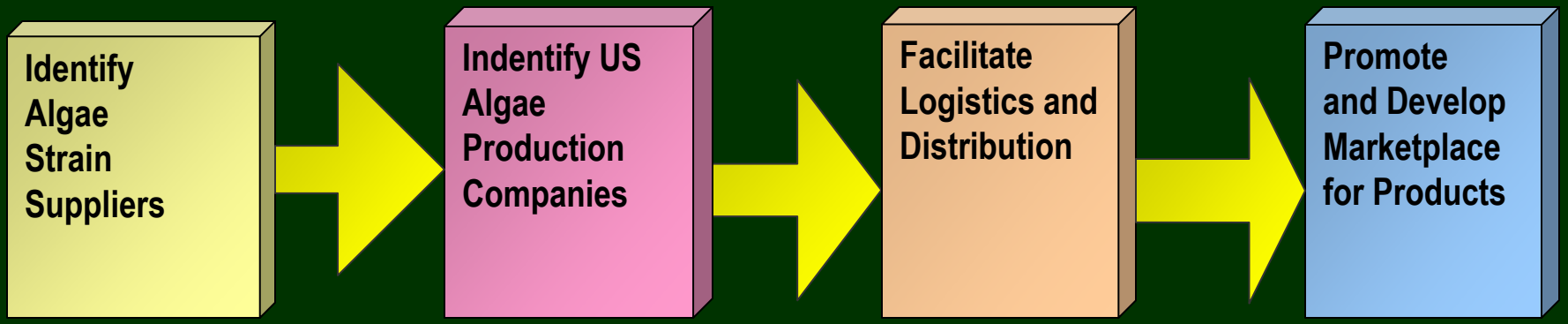
Activities of NAA

- Play a leadership role in facilitating commercial algae production solutions
- Educate the general public and media about the benefits of algae as a feedstock
- Educate about algae selection, oil content, growing, harvesting and extraction methods for commercial scale production.
- Educate army, navy, air force, commercial airlines, trucking fleets, biodiesel, ethanol, plastics industries as well as nutraceutical, pharmaceutical, cosmetic, and organic fertilizer industries about the benefits of algae.
- Educate potential investors, lenders and investment bankers.
- Offer an interactive forum for debating “good science vs. bad science”

NAA Goals: Collaboration + Innovation = Fast Track Commercialization

- NAA quarterly conferences and workshops highlight the latest trends in algae production and research
- Open avenues of communication between algae researchers and producers
- Identify the best technologies for Raceway Ponds, Closed-Loop Photobioreactors (PBR's), Fermentation systems and advanced microbial biotech applications.
- Work to sustain a consistent network and supply of algae oil and biomass.

NAA challenges and opportunities in creating the new algae production industry



NAA Industry Focused Activities

- Established algae guidelines to assist companies in benchmarking & verifying their production by independent outside third parties.
- Established NAA Algae Production Certification Program for algae producers and algaepreneurs.
- Facilitate communications and quarterly forums throughout the US.

Thank You!

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