ALGENOL

The Global Leader in Climate Change Mitigation

ALGENOL

2015 U.S. – China Clean Coal Industry Forum

Billings, Montana Aug 29, 2015

I BET YOU'VE NEVER HEARD OF ALGENOL

Recent Recognition

- **1st Presidential Climate Change Award**
  Green Chemistry Challenge – July 2015
- **Global Industry Leadership Award**
  Biofuels - PLATTS 2014
- **Voted #1 Hottest Biofuels Company in the United States and #3 Worldwide**
  Biofuels Digest 2014

Recent Recognition

- Participant in first US Presidential Trade Mission to China with both DOE and DOC
- Game-changing group to promote clean power generation to reduce CO_2 emissions in China

The Algenol Advantage – Convert CO_2 into 4 fuels

High Yield, Low Cost, Scalable

ALGENOL
Harnessing the sun to fuel the world.®

4 most important fuels

OpEx ≤ **$1.30** per gallon each

Ethanol
Gasoline
Diesel
Jet

Productivity

Unique Platform Strain:

> 8,000 TGOLF[(1)]

per acre-year

Feedstock Conversion

1 tonne of CO_2 becomes 144 gallons of fuel:

- 125 gallons of ethanol
- 19 gallons of diesel, jet fuel, and gasoline

Comparison to Biofuels

- 420 corn ethanol
- 860 Brazil sugarcane
- < 500 cellulosic

Necessary Inputs Are Abundant:

- Sunshine
- CO_2 from industrial sources
- Saltwater
- Spent algae becomes diesel, jet fuel, and gasoline

Direct to Ethanol® Does Not Require:

- Farm land
- Food crops
- Fresh water
- Mandates

(1) Total Gallons of Liquid Fuel

Disruptive Core Technology

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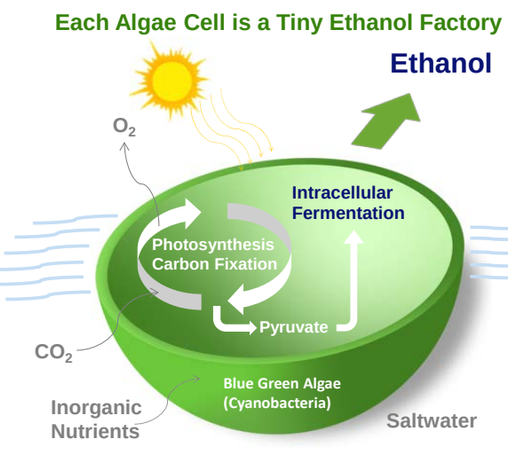
Algenol's Direct to Ethanol® process has three core components:

World's Most Productive Algae Platform



Proprietary enhanced algae make ethanol and biomass **directly** from CO_2, water, and sunlight

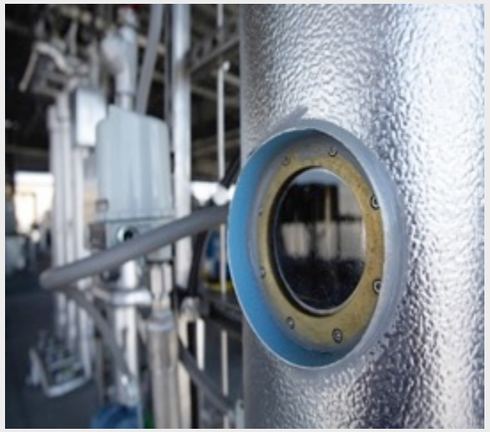
- **8,000 gallons per acre per year**
- 85% of the CO_2 is converted into products

Specialized VIPER™ Photobioreactors

Algae are grown in saltwater contained in proprietary PBRs that are exposed to the sun and are fed CO_2 and nutrients

- A production cycle runs 4 weeks
- Afterwards, the spent algae are separated from the water-ethanol mixture

Energy Efficient Downstream Processing



Water-ethanol mixture is sent to proprietary downstream processing equipment which separates and concentrates it into fuel grade ethanol

Spent algae are processed into a high grade green crude that can be refined into diesel, gasoline, and jet fuel

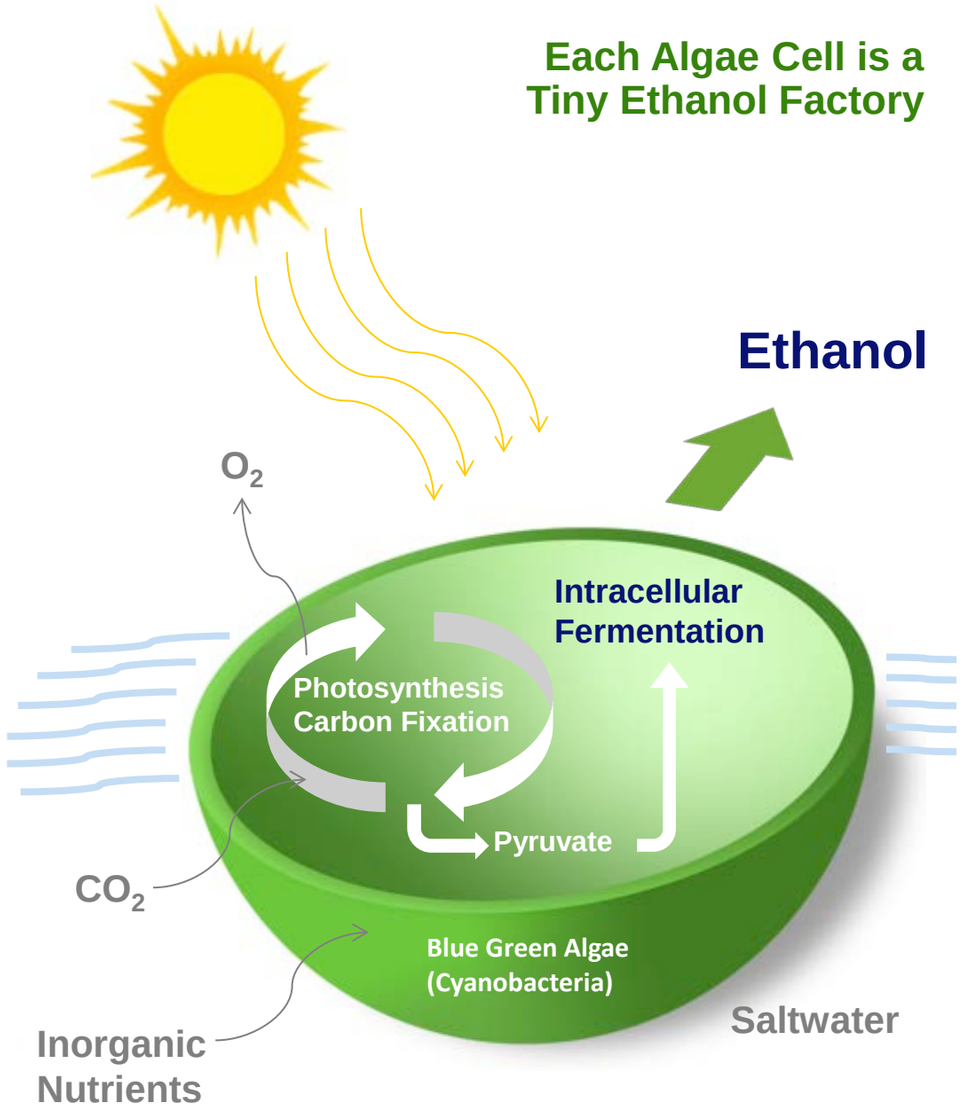
World's Most Productive Algae Platform

Picture: Berlin Lab

Best-in-Class Enhanced Algae

The central component of Algenol's Direct to Ethanol® process is a proprietary, hybrid blue-green algae

- Algenol scientists have enhanced the natural ability of the algae to produce ethanol by optimizing the key fermentation pathways
- Our algae produce ethanol and crude oil at rates 20 times that of corn ethanol (9,100 compared to 420 g/a/y)
- Ethanol produced by the cell will diffuse out of the cell into the culture medium where it can be collected
- Non-toxic, non-invasive, and not a plant pest
- Patented
- Platform capable of directly making many products and green chemicals
  - Ethanol
  - 1,2 Propanediol
  - 1,3 Propanediol
  - Plastics monomers from green crude



Specialized VIPER™ Photobioreactors

Picture: IBR, Fort Myers, Florida

Specialized, Scalable Photobioreactors

ALGENOL
Harnessing the sun to fuel the world.®

Easy to deploy in American and China

Plastic bags hold algae in saltwater culture, and distribute light to maximum number of cells

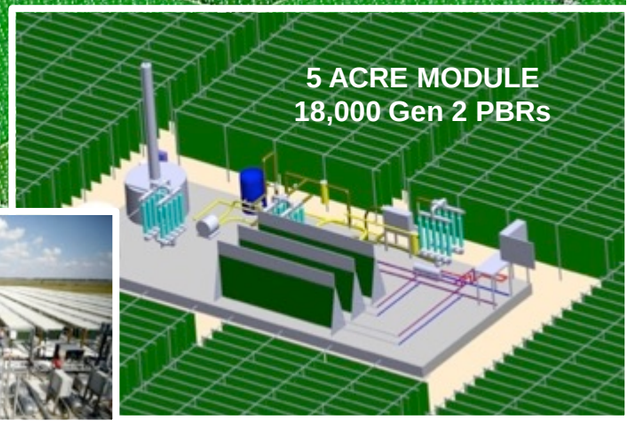
Takes up 95% LESS land than corn ethanol 8000 vs 420 gallons per acre

Takes up 99% LESS land than cellulosic ethanol 8000 vs 70 gallons per acre

Scalability Through Modularity

Algenol's modular design greatly simplifies industrial deployment

- The first of these modules is currently operating in Fort Myers
- Algenol will scale up its industrial roll-out by co-locating repetitive commercial modules

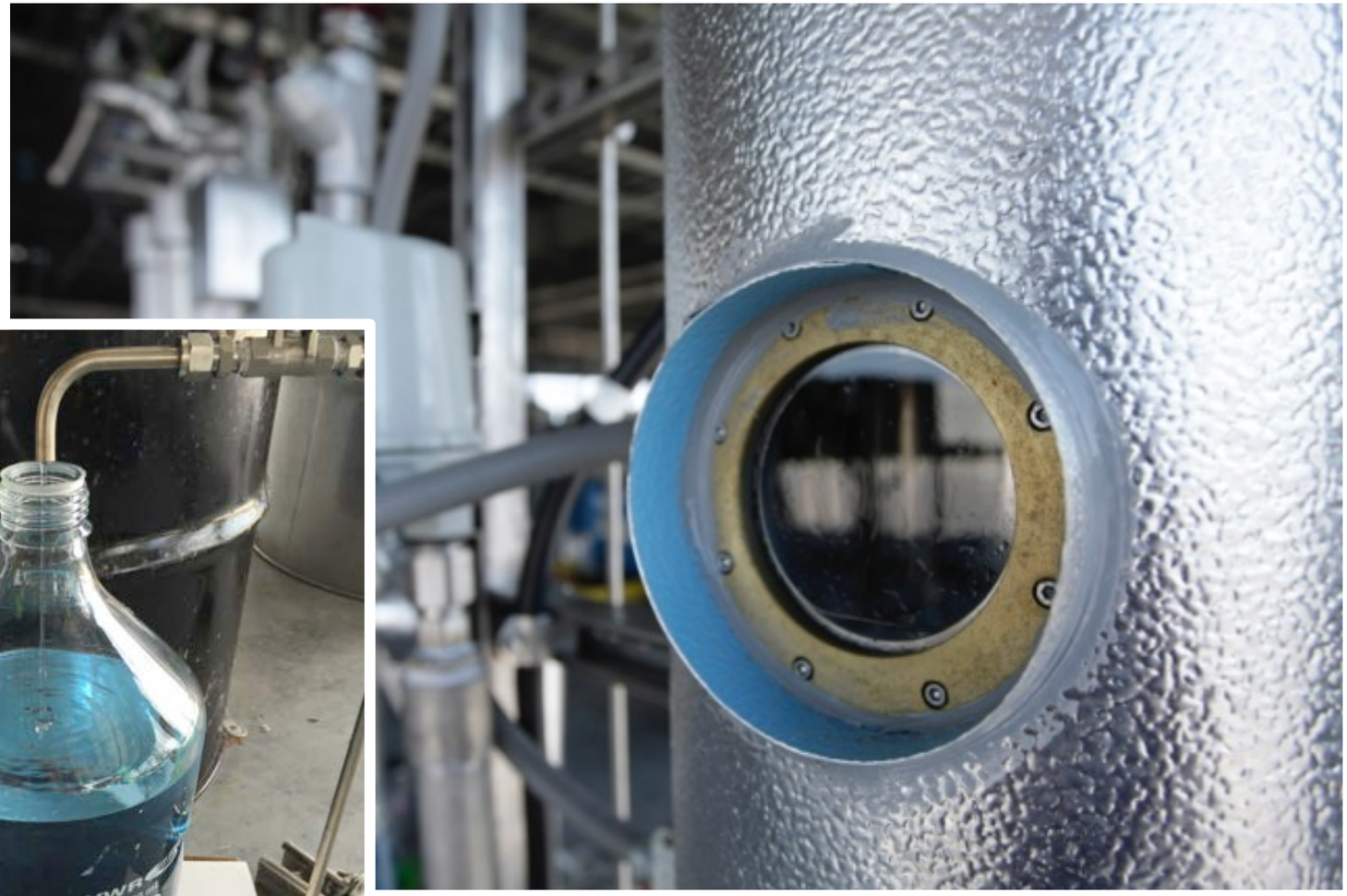


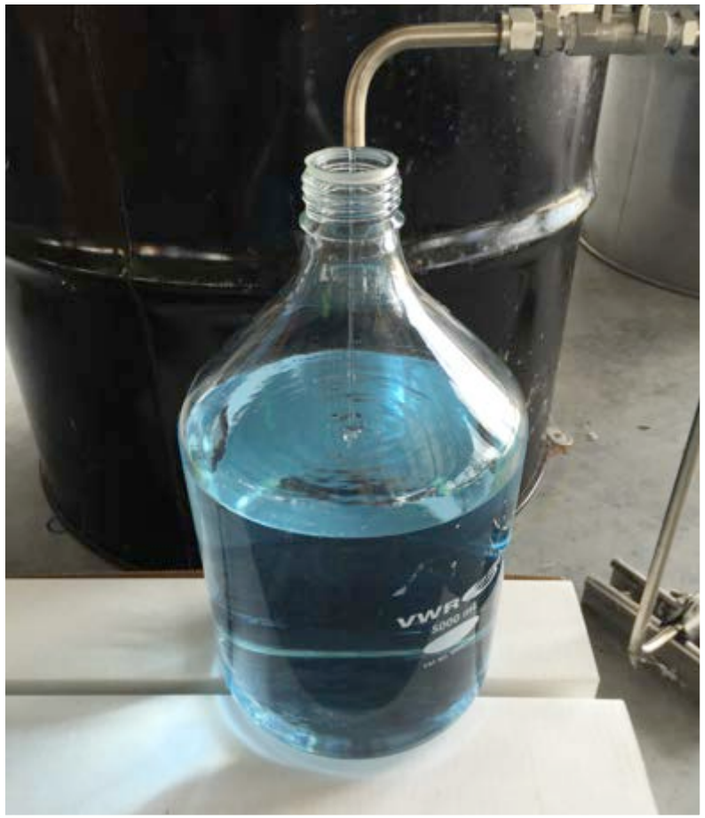
Proprietary, Scalable Industrial Technology

200 dedicated people
100 scientists
44 patents
9 buildings
9 years

First operating commercial IBR converting CO2 into fuels

Fuel Production Has Begun in 2015





Received ASTM certification


ALGENOL
CO_2
Algenol will buy your Coal Flue Gas

Growing Concern for CO_2 Emissions

National Oceanic and Atmospheric Administration reports in March 2015, the global monthly average for CO_2 hit 400.83 parts per million, reaching levels that have not been seen in about 2 million years

Global Action

- US President Obama and Chinese President Xi announced an historic agreement in November 2014 to reduce carbon emissions. China, in particular, intends to cap CO2 emissions by 2030
- In June 2015, chief executives of Shell, BP, Total and 3 others call for a price on carbon in a letter to United Nations
- US Environmental Protection Agency (EPA) finalizes Clean Power Rules in 2015 after US Supreme Court ruled in *Utility Air Regulatory Group* case that EPA can regulate carbon emissions from existing power plants
- **EPA allows for adoption of carbon utilization in final Clean Power Rule**

Algenol's Feedstock Advantage

Flue Gas CO_2 , Saltwater, Sunshine

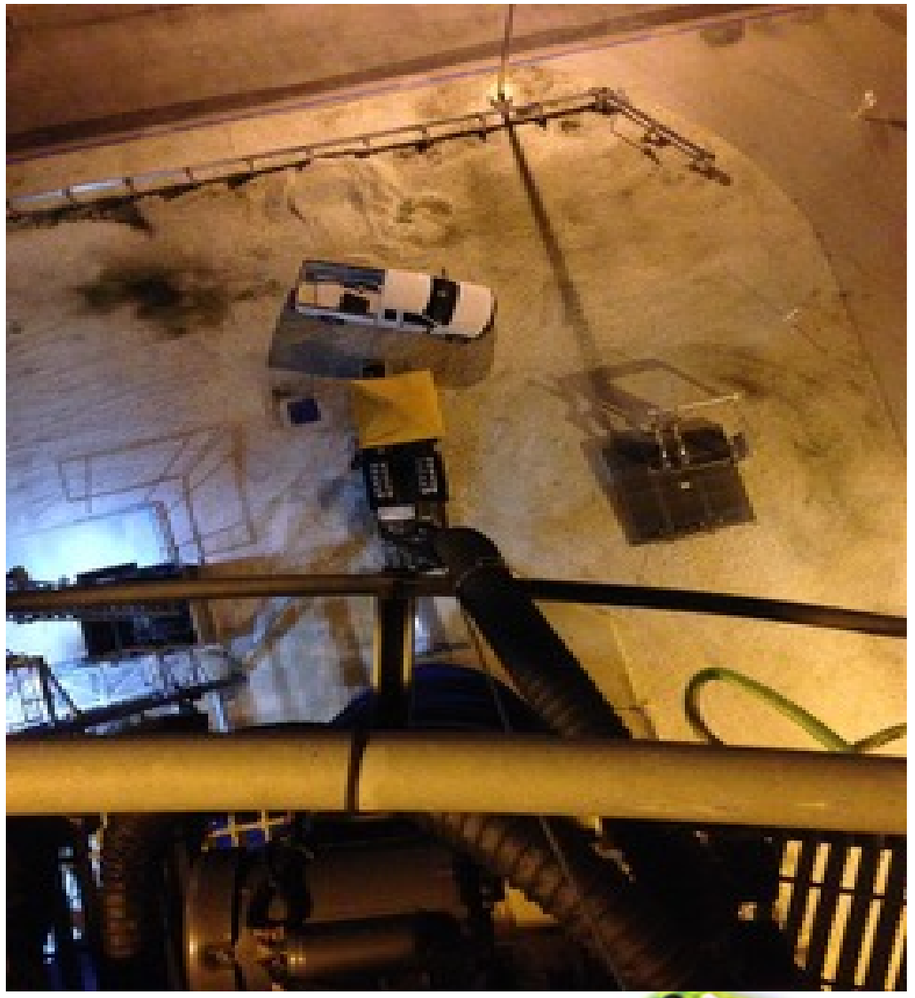


- Algenol is the only demonstrated process that monetizes CO_2 to produce useful products
- Direct use of flue gas without chemical carbon capture and compression
- Utilizing CO_2 as the primary feedstock reduces commodity risk and turns a liability into a revenue generating asset
- Carbon converted to fuels from flue gas at a profit could become the norm for CO_2 emitters
- Combination of profit plus real carbon reductions provides a strong incentive for broad, early market adoption
- Saltwater is not scarce, only by-product is fresh water, we can make more fresh water than fuels
- Sunshine is abundant across the temperate zones of the globe

CO_2 Mitigation through Utilization

ALGENOL
Harnessing the sun to fuel the world.®

Monetize CO_2 feedstock from NG Flue Gas



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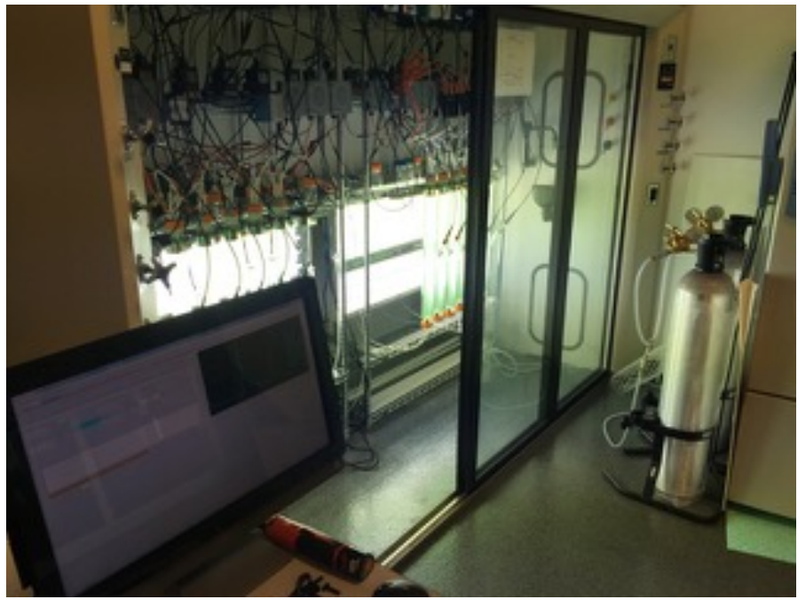

CO_2 Mitigation through Utilization

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Monetize CO_2 feedstock from NG Flue Gas

At the end of the test, the algae growth and fuel production exceeded medical grade CO_2

(We ran the test 6 times)

CO_2 Mitigation through Utilization

ALGENOL
Harnessing the sun to fuel the world.®

Monetize CO_2 feedstock from Coal Flue Gas

Direct flue gas from stack without additional filtration or treatment

CO_2 Mitigation through Utilization

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Monetize CO_2 feedstock from Coal Flue Gas

CO_2 Mitigation through Utilization

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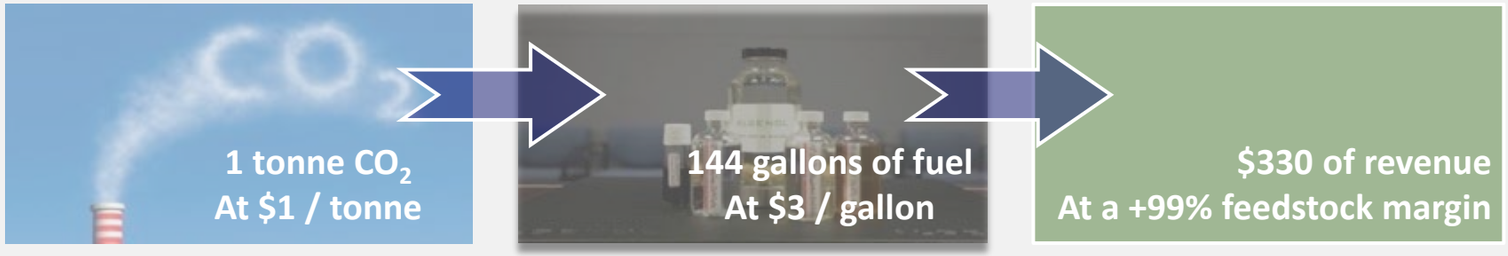
Monetize CO_2 feedstock from Coal Flue Gas

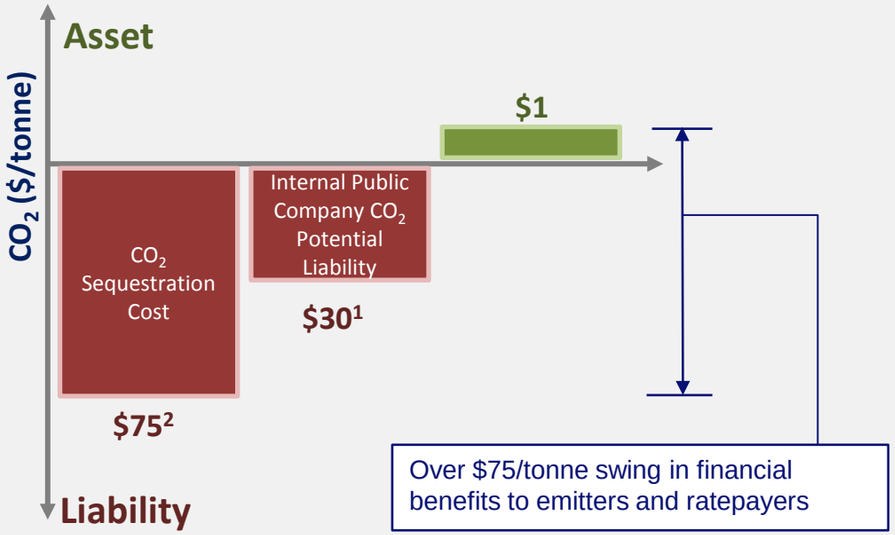
At the end of the test, the algae growth and fuel production exceeded medical grade CO_2

(this is the first test but will be repeated several times)

Algenol's $1 a Tonne Paradigm Shift – CO_2 Monetization

Algenol is the only solution that monetizes CO_2 through utilization, drastically altering the current paradigm by turning a liability into a revenue generating asset



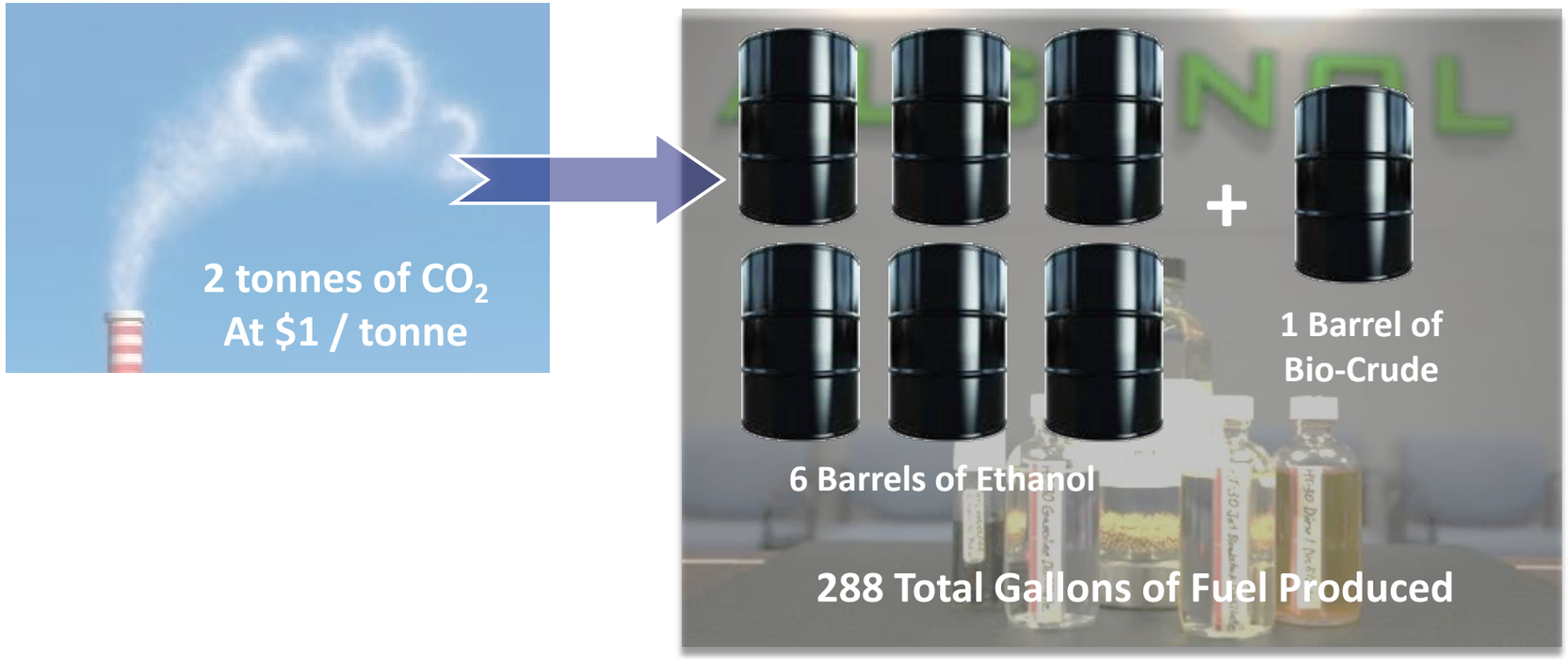


Current CO_2 Paradigm vs. Algenol's Solution

- **Algenol pays emitters $1 a ton for industrial CO_2, utilizing it as a revenue generating feedstock**
- Current CCS plans could cost electric customers more than $50 billion per year
- Displaces fossil fuels, providing real CO_2 reduction
- Policymakers achieve climate goals, consumers avoid $0.04 per kW increase on their bill
- EOR with captured CO_2 could struggle with cheap oil prices

(1) Carbon Disclosure Project: Use of internal carbon price by companies as incentive or strategic planning tool
(2) McKenzie & Company: Pathways to a Low-Carbon Economy

Algenol's $1 a Tonne Paradigm Shift – CO_2 Monetization



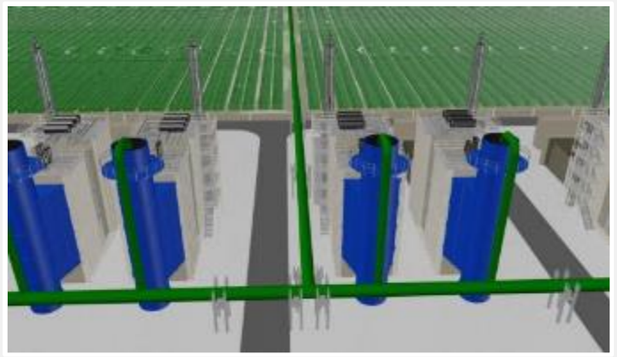
Algenol makes 7 barrels of fuel from $2 of CO_2

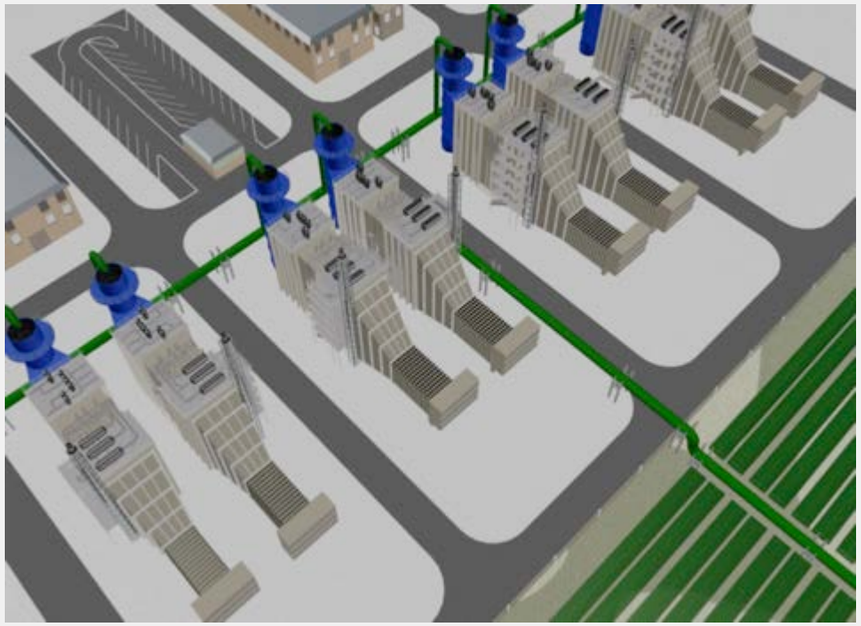
Policymakers achieve climate goals, consumers avoid charges, Algenol produces a valuable product

Simple CO_2 Sourcing Process

Algenol's process to source CO_2 from emitters is simple and rapidly deployable.

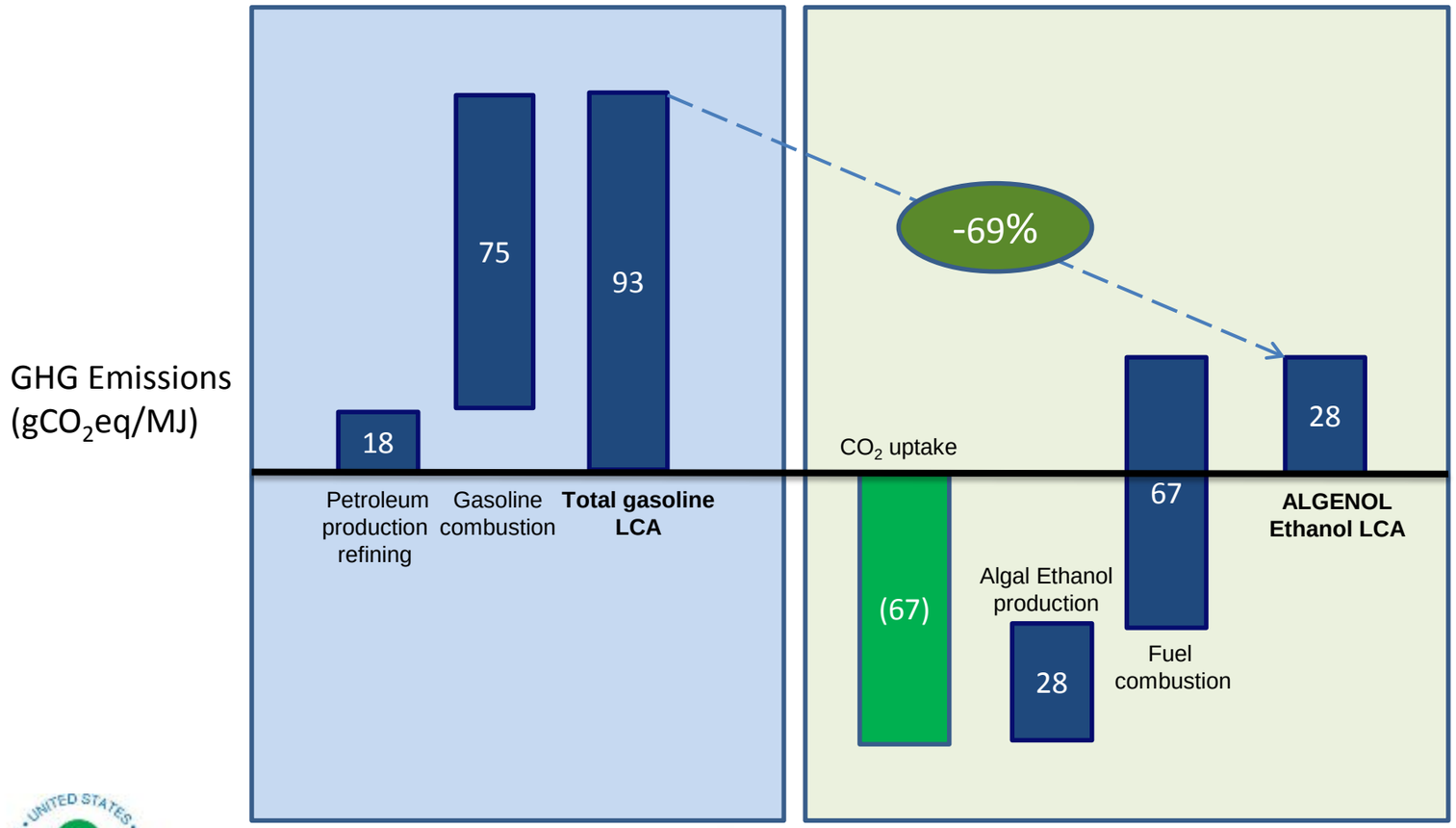
- Algenol's technology is designed to be co-located next to an emissions source
- Acquiring CO_2 from the emitter is straightforward and rapidly deployable process requiring minimal capital expense
- Process effectively boils down to "sticking a straw into the emissions stack"
- Over 85% of CO_2 is converted into fuel products





Algenol Life Cycle Benefits

Algenol's pathway reduces Green House Gas (GHG) emissions by 69% compared to gasoline, according to the official EPA pathway approval

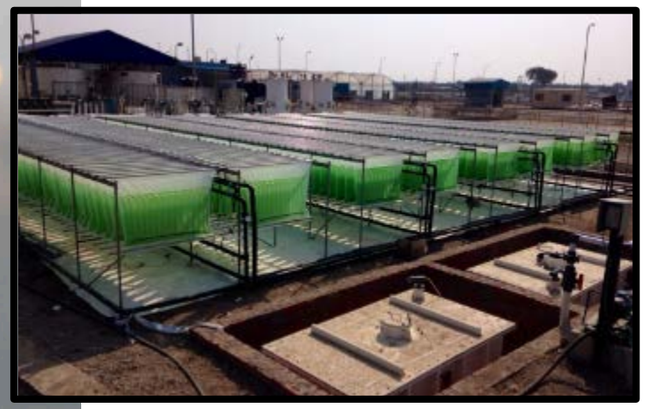


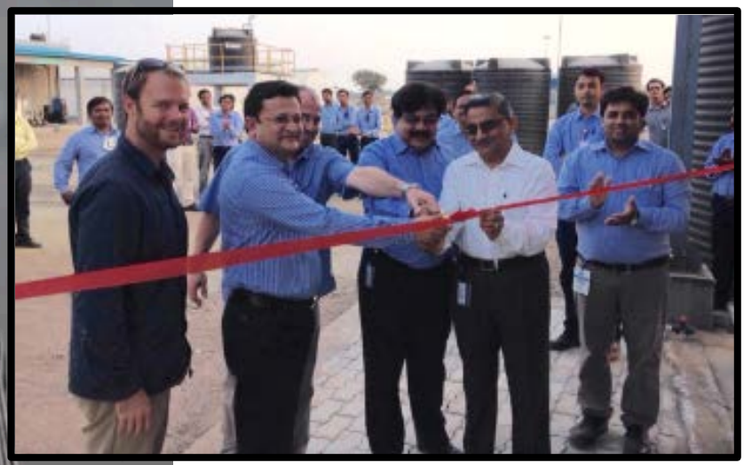
Official EPA approved pathway results

A 2,000 acre Algenol facility is equal to planting more than 40,000,000 trees

- Equivalent to 125,000 acres of average US forest
- 1.2 tonnes of CO_2 per acre-year consumed by these trees. Algenol consumes 75 tonnes/ac-yr
- Based on EPA Estimates

India Deploys Algenol's Technology

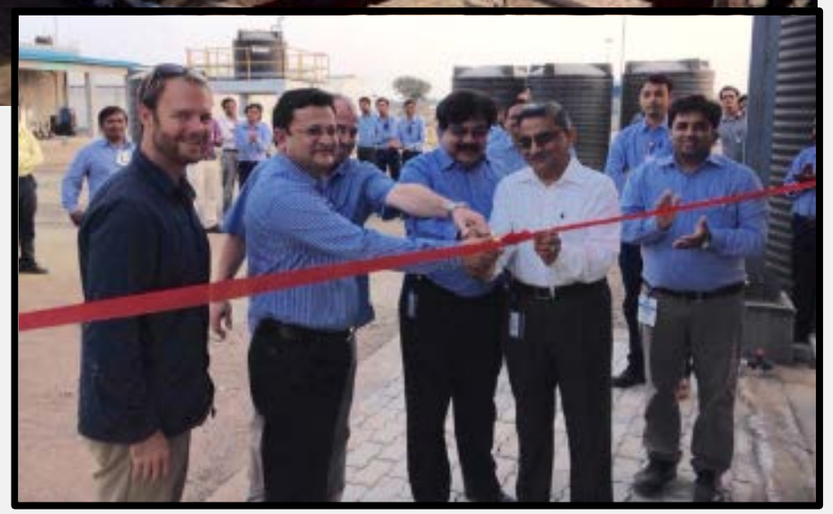




India Module – Reliance Industries

With collaboration of our partner Reliance Industries, we have constructed a module in Gagva, India and inoculated with a commercial organism in November 2014.

- Achieved biomass growth as predicted.
- Outperforms Florida by >10%
- Second India federal import permit allows for full fuel producing organism
- In discussions for building next generation IBR
- Algenol designed, procurred, built, and trained Reliance people how to operate the system 8850 miles away



Existing Global Reach

Ideal growing conditions in these parts of the world

- Grows very well at high temperatures and intense sunlight
- High salinity tolerance
- 3–45˚C temperature range
- Marginal land ideal, not farm land
- Vertical VIPER™ PBRs allow deployment on uneven terrain with minimal land movement cost

U.S. DEPARTMENT OF ENERGY

Lee County, Florida

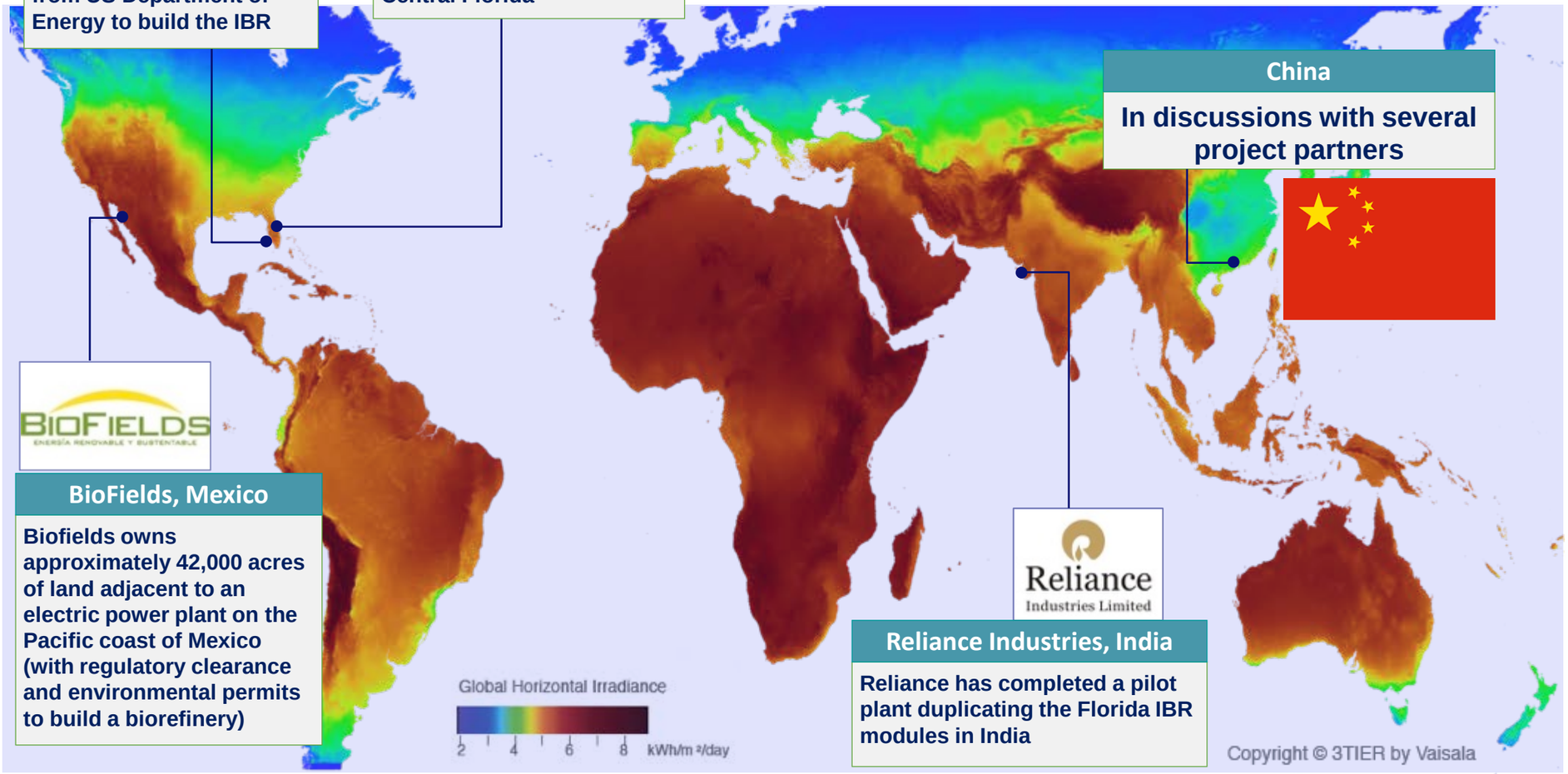
Algenol shareholders have invested over $225 million Plus $10 million from Lee County, and $25 million from US Department of Energy to build the IBR

Central Florida

Algenol is in advanced discussions with two large CO_2 emitters in Florida to co-locate Phases 1 thru 4 of commercial facilities in Central Florida

China

In discussions with several project partners



BIOFIELDS
ENERGÍA RENOVABLE Y SUSTENTABLE

BioFields, Mexico

Biofields owns approximately 42,000 acres of land adjacent to an electric power plant on the Pacific coast of Mexico (with regulatory clearance and environmental permits to build a biorefinery)

Reliance Industries Limited

Reliance Industries, India

Reliance has completed a pilot plant duplicating the Florida IBR modules in India

COST, can we be HONEST about $$$

CCS is a cost disaster – Kemper is over-budget $4 billion

CCS – Chemical CO_2 capture is very expensive

- Kemper is 3 times its original budget
  - Ratepayers or shareholders will be at risk
- Summit is going to have a very hard time operating with current oil prices
- Underground storage has many issues
  - High cost of $60/tonne + parasitic load on plant
  - Who wants the liability or monitoring costs

Algenol is more cost effective, by far

2000 acres is $220 million

- **$45 equity, $175 debt**
- **150,000 tons of CO_2 captured/yr**
- **16 million gallons of fuels**
- **25 million gallons of fresh water**
- **Clean air**
- **Lower electric bills to customers**

ClimateWire

THE POLITICS AND BUSINESS OF CLIMATE CHANGE

SEARCH: enter keyword go!

<< Back to ClimateWire index page.

CARBON CAPTURE:

Electric power association pulls out of deal with flagship Southern Co. coal project

Daniel Cusick, E&E reporter

Published: Friday, May 22, 2015

Article updated at 4:12 p.m. EDT.

AA RESIZE TEXT EMAIL PRINT

An agreement by Mississippi electric power cooperatives to cost-share 15 percent of Mississippi Power Co.'s $6.2 billion "clean" coal plant in Kemper County has been scuttled after the cooperatives' power purchasing entity decided the power to be delivered from the Kemper plant would be too costly.

Cost overruns for the Kemper County Energy Facility, which will use integrated gasification combined cycle technology to convert coal to gas while also capturing a portion of the plant's carbon dioxide emissions, have become a deep thorn for Mississippi Power and its parent, Atlanta-based Southern Co., which has heavily promoted the technology.

The current $6.2 billion price tag for the plant is approaching three times what the plant was initially projected to cost, and Southern has absorbed several billion dollars on its balance sheet to keep the project on t
United States to captur

Advertisement

E&E's POWER PLAN HUB

Southern Co.: Vogtle And Kemper Updates

May 11, 2015 8:19 AM ET | 20 comments | About: Southern Company (SO)

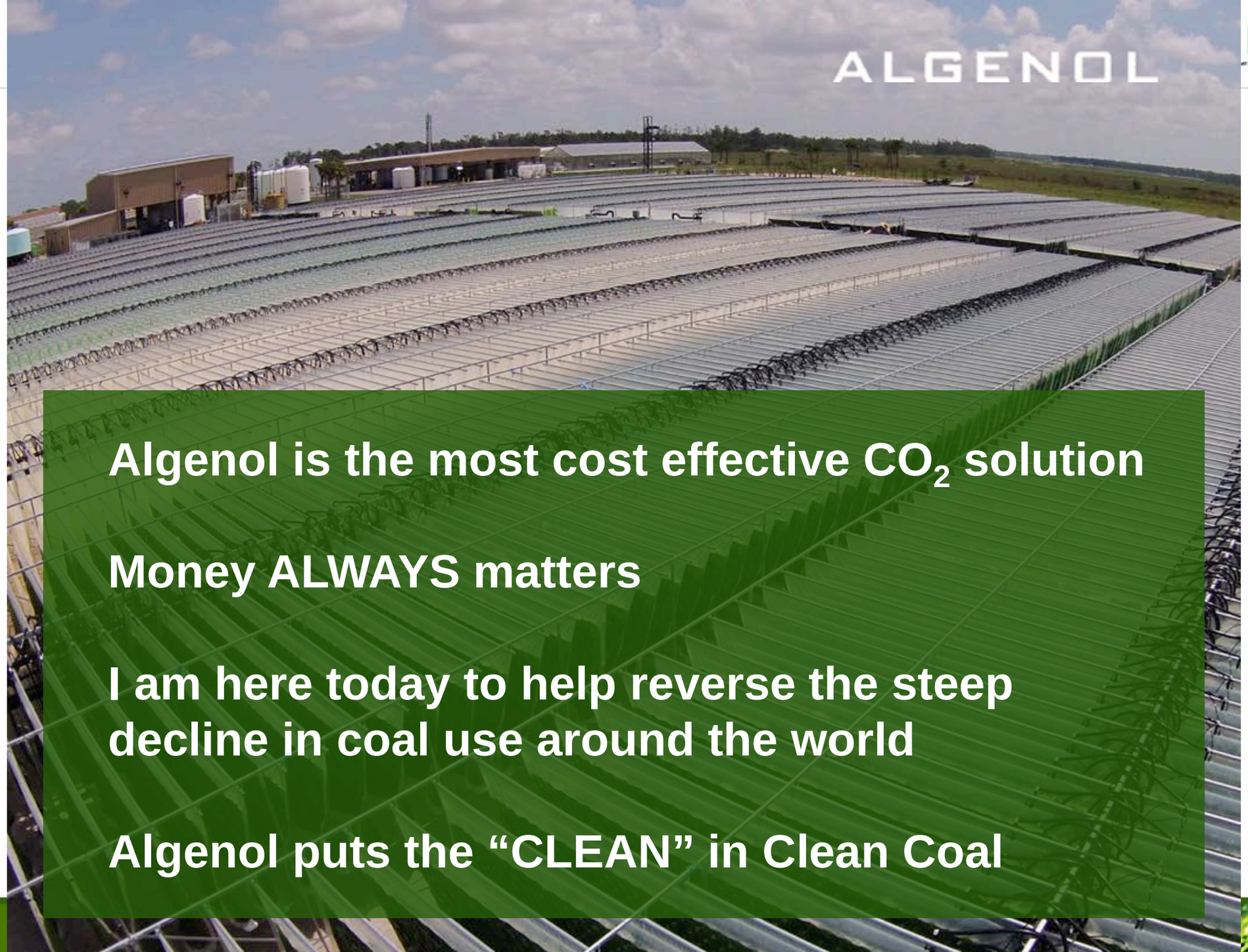
Disclosure: The author is long SO. **(More...)**

Summary

- Vogtle and Kemper cost overruns have long been a drag on Southern's share prices.
- The market, as often happens with difficult to analyze situations, did not read between the lines and realize that the construction risk has largely subsided.
- Southern's downside risk is extremely limited and currently makes for a good long-term buy and hold.

Executive Summary:

The uncertainty of the cost overruns on Southern Company's (NYSE:SO) construction of Vogtle, two nuclear power plants with a gross generation capacity of 1,250 MW each, and Kemper, an IGCC facility with TRIG technology that captures 3.5 Mt of carbon dioxide for enhanced oil production and produces 524MW with syngas feedstock and 582MW with natural gas peaker feedstock, has long been a drag on the company's share prices. The market,



Algenol is the most cost effective CO_2 solution

Money ALWAYS matters

I am here today to help reverse the steep decline in coal use around the world

Algenol puts the “CLEAN” in Clean Coal

Seeing is believing

Come see it yourself – it’s real, today