BIODICO
SUSTAINABLE BIOREFINERIES

Making renewable fuel and power

Biodico's facilities are located at the National Environmental Technology Test Site (NETTS) at Naval Base Ventura County in Port Hueneme, CA. Biodico has a Cooperative Research and Development Agreement (CRADA) with the Naval Facilities Engineering Service Center (NAVFAC ESC) that began in May 2002. The purpose of the CRADA is to **demonstrate and validate sustainable fuel and power systems that can operate independently from the grid in a distributed neural network.**

Biodico is completing a 10 million gallon per year biorefinery at NETTS

Making Renewable Fuel & Power

Overview

The Navy is one of the largest consumers of diesel fuels in the world, and is vulnerable if foreign supplies are interrupted. Secretary of the Navy Ray Maybus has ordered that the Navy must reduce its use of petroleum by 50% by 2020.

NAVFAC ESC is the engineering group for Naval Facilities and is composed of over 500 engineers located at NBVC, 180 of which are dedicated to Energy and the Environment.

The objective of the Biodico CRADA with NAVFAC ESC is to **create distributed systems for the production of biofuel and bioenergy using local resources**.

California Energy Commission (CEC) Support

CEC Grant #1, 12/27/10 to 3/16/14. This is a pilot project to optimize and validate the integration of biodiesel production with anaerobic digestion, combined heat and power, and algaculture.

CEC Grant #2, 6/30/12 to 3/31/15, This project integrates several emerging technologies to produce **reliable on-demand primary renewable power** for a biodiesel production facility. These technologies include: (1) combined solar power and heat, (2) modular gasification to convert oil seed extraction solids (inedible castor and algae) into heat and power, and (3) anaerobic digestion (AD) to convert the liquid by-products of biodiesel production (raw glycerin and wash water) to produce heat and power.

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Distributed Solar Cogeneration

- ✓ *Biodico's first Process Demonstration Unit (1998) developed under a USDOE grant included solar thermal.*
- ✓ *In 2007 vacuum tube solar thermal was added to a feedstock processing unit at NBVC>*
- ✓ *In 2010 PV panel were added to an algae research greenhouse that supports all electrical needs (lights and pumps) using batteries for storage.*
- ✓ *In 2012 the "Integrated Energy System" is being installed involving solar cogeneration from Cogenra, gasification cogen from ALL Power Labs, and anaerobic digestion cogen from SeaHold. All California companies with 98% of operations located in CA (other 2% in AZ)*

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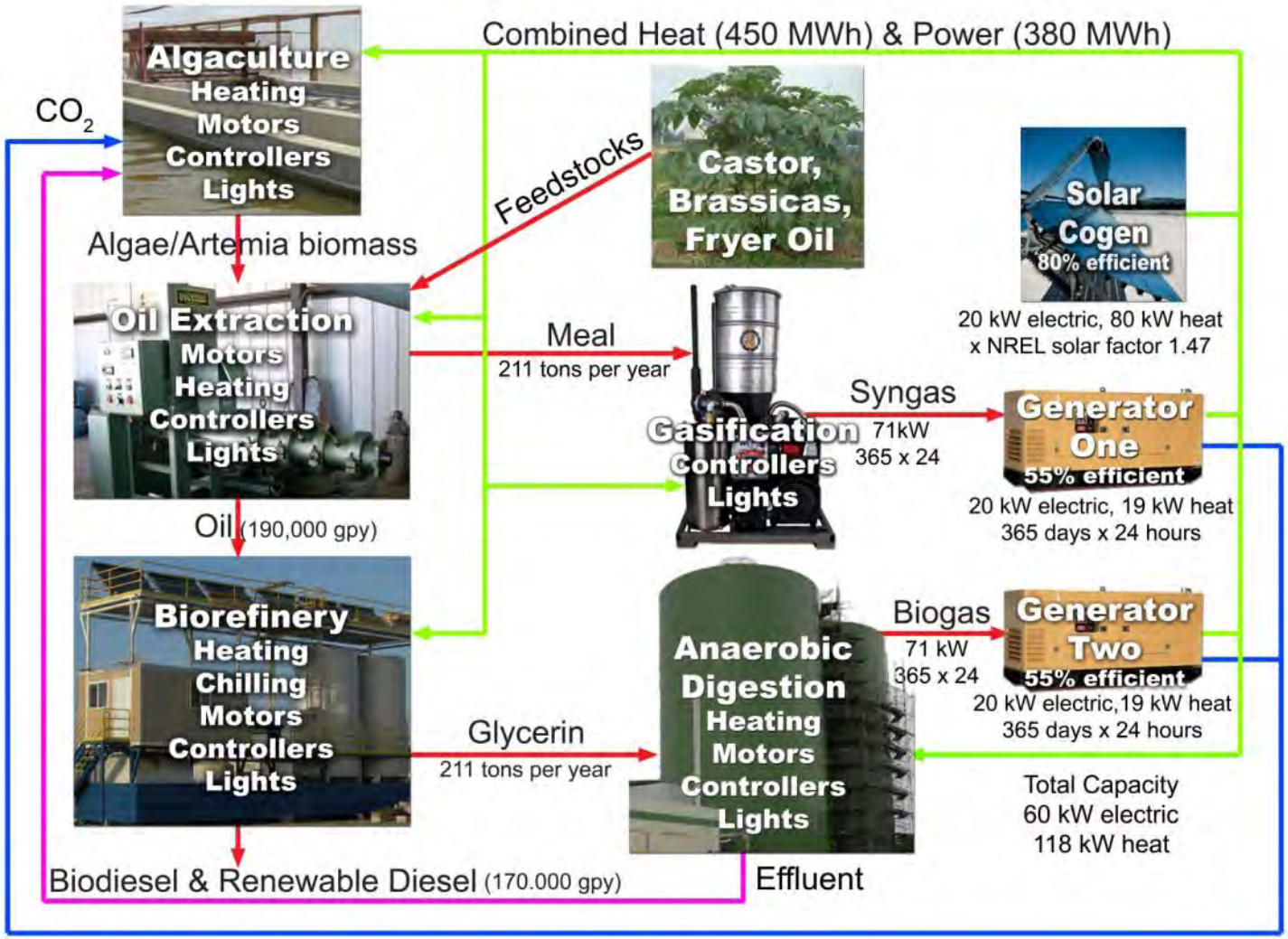
System Schematic



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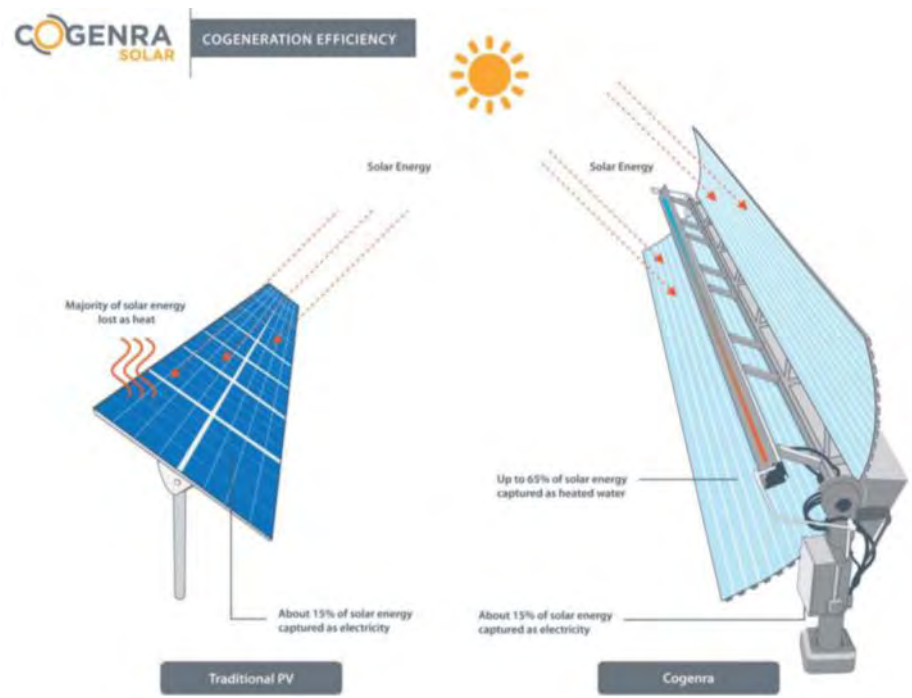
Objectives

- ✓ *Generate all of the heat and power needs for a 10 mgy biodiesel production facility.*
- ✓ *Distribute excess power locally.*
- ✓ *Reduce the Carbon Intensity of biodiesel under the Low Carbon Fuel Standard.*
- ✓ *Produce Fuel and Power that are cost competitive.*
- ✓ *Provide jobs and create markets for CA technologies.*
- ✓ *Enhance the reliability and security of energy production and use.*
- ✓ *Create a test bed for future technologies*



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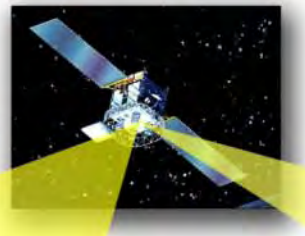
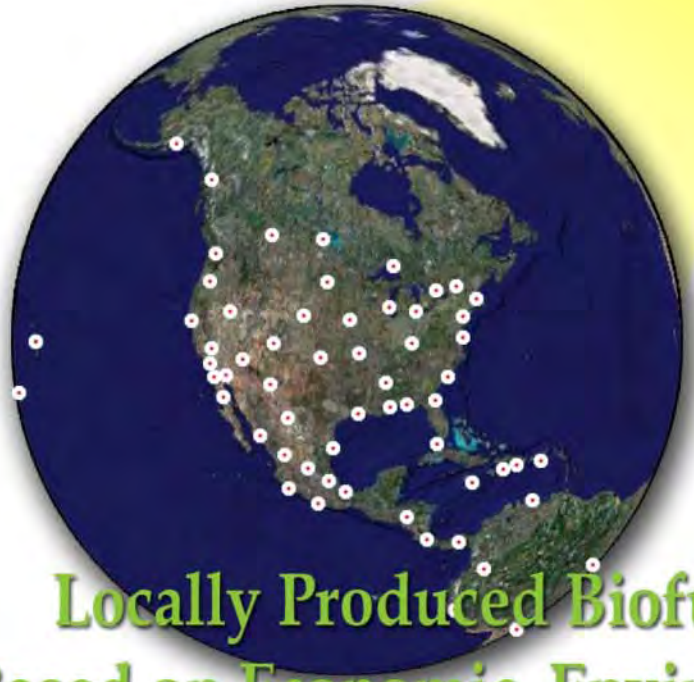
The Global Network

TRANSFORMING THE WAY THE WORLD WORKS



INTELLIGENT NEURAL NETWORK
OF GLOBALLY DISTRIBUTED
FACILITIES



CENTRALIZED COMMAND & CONTROL
TECHNICAL SUPPORT & TRAINING
MANAGEMENT & ACCOUNTING
PURCHASING & MARKETING

Locally Produced Biofuel, Bioenergy & Biochemicals
Based on Economic, Environmental & Social Sustainability