Calgren Renewable Fuels LLC
Biogas Recovery
Project
Summary

Calgren Overview

-Calgren Renewable Fuels LLC owns and operates a 50mgy ethanol plant in Tulare County, Pixley CA that started production in August 2008

-at full production, Calgren ethanol volumes at 10% blend rates equal roughly 3.5% of the States ethanol requirements and will be blended into 500mgy of CaRFG fuel.

-Calgren project represents over $120M in private investment with 40 full time jobs and is a contributor to the CA economy and tax revenues

-California ethanol plants are the lowest carbon facilities in the country producing fuel that's 15-20% less carbon intense than CARBOB even counting the indirect land use changes that CARB has adopted much to the chagrin of the ethanol industry

-Calgren in particular, compared to other plants in CA and around the country provides a low carbon fuel pathway due to process electricity and steam produced 100% by natural gas fired on site cogeneration, where most plants draw electricity from the grid and steam from industrial boilers

-Calgren requires up to 3,000 mmbtu/day or 3m cubic ft of natural gas per day to operate.

-Calgren has the opportunity to displace over 50% of it's natural gas requirements with renewable biogas recovered from over 50,000 milking dairy cows on over a dozen large dairy farms located within 10 miles of the plant (see exhibit A).

Biogas Production

-biogas would be produced from covered manure waste lagoons located at the dairy farms, with a potential of 1,500 mmbtu/day production as outlined below

Pixley area biogas production potential

Dairy Cows	50,000
Cubic ft gas/day	2,500,000
btu/cubft	600
mmbtu/day	1,500

Dairy Farm Lagoon Covers

-crude biogas, which is approximately 60% methane (CH_4) 40% carbon dioxide (CO_2), will be recovered from covered lagoon systems at the individual dairies

-lagoon cover do not disrupt or change current farm and manure management operations

-lagoon covers produce biogas through the natural anaerobic breakdown of bacteria feeding off the decomposing waste

-covering existing lagoons accelerates the natural digestion by keeping the oxygen out and the temperature up

-covering existing waste lagoons will have a positive environmental impact by sharply reducing farm GHG and odor emissions in the Southern San Joaquin Valley area

Calgren Project Components

Pipeline Collection System

-biogas to be collected at low pressure through a series of lateral pipelines connected to each covered lagoon that will feed into a main pipeline that will run along County road right of ways

-pipeline to be made of High Density Polyethylene (HDPE), and be designed for a capacity to transport up to three million cubic feet per day of biogas.

-main pipeline system could entail up to 15 miles of pipe running 10 miles east to west and 5 miles north to south

-anticipated standard gas treatment and transmission equipment will be required such as liquid vapor filters, compressors, and flares at each individual farm

Gas Processing

-crude biogas arrives at the cogeneration plant under low pressure and will contain approximately 60% methane, 40% CO2 and up to 2,500 ppm Hydrogen Sulfide (H2S)

-in order to integrate the gas into the cogeneration system, H2S must be removed and the gas compressed

Summary

-one of the most effective ways to lower the life cycle GHG emissions in CA fuels is to blend CaRFG with low carbon ethanol

-existing corn ethanol plants in CA are the lowest carbon plants in the country that produce ethanol with lower carbon intensity than CARBOB

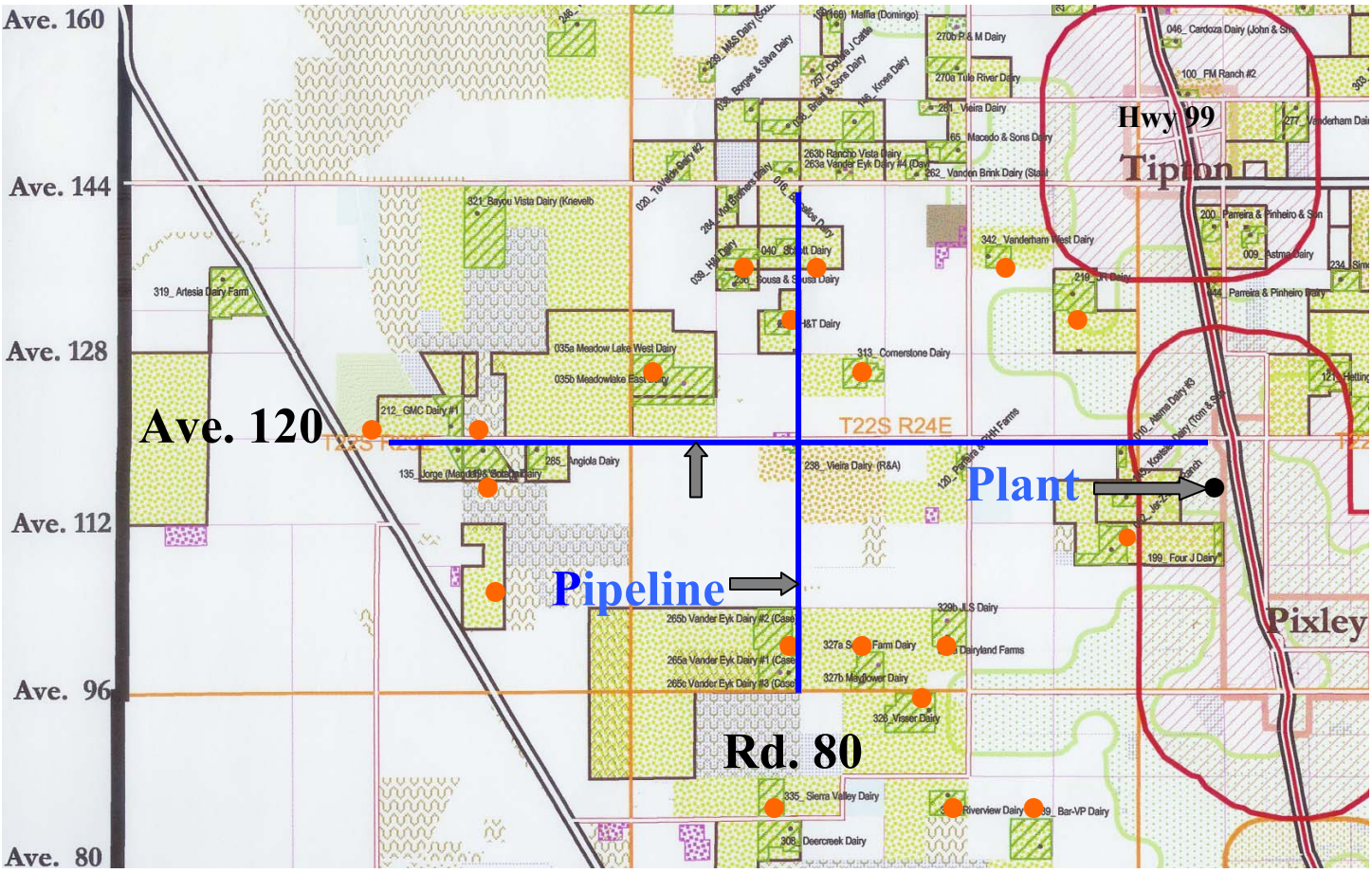
-modifying existing ethanol plants in CA to be more energy efficient and use renewable process energy will lower life cycle GHG emissions for CA fuels even further for the fuel produced at those facilities

-the Calgren dairy biogas project has the potential to replace 50% it's process energy with a renewable energy source that would produce an ethanol pathway with a life cycle GHG emissions rating below sugar cane ethanol imported from Brazil

-the Calgren biogas project is development ready, and requires only fully proven commercial technology

-excellent deployment of AB 118 investment funds that will support a project that uses commercial technology and existing facilities to lower life cycle GHG emissions in CA fuels

Exhibit A

Pixley Area Dairy Map

- **Future Lagoon Covers**