Biopower Project Development in California

Field Trip to SPI Lincoln

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Tad Mason, CEO, TSS Consultants

What is Biomass?

- **Biomass** – any solid, nonhazardous, cellulosic material derived from: forest-related resources, solid wood wastes, agricultural wastes, and plants grown exclusively as a fuel.*

*based on the definition of biomass in the 2005 Energy Act

Woody Biomass Utilization

A variety of value-added end uses have evolved over time – Some are commercially proven and some are still in the RD & D Phases

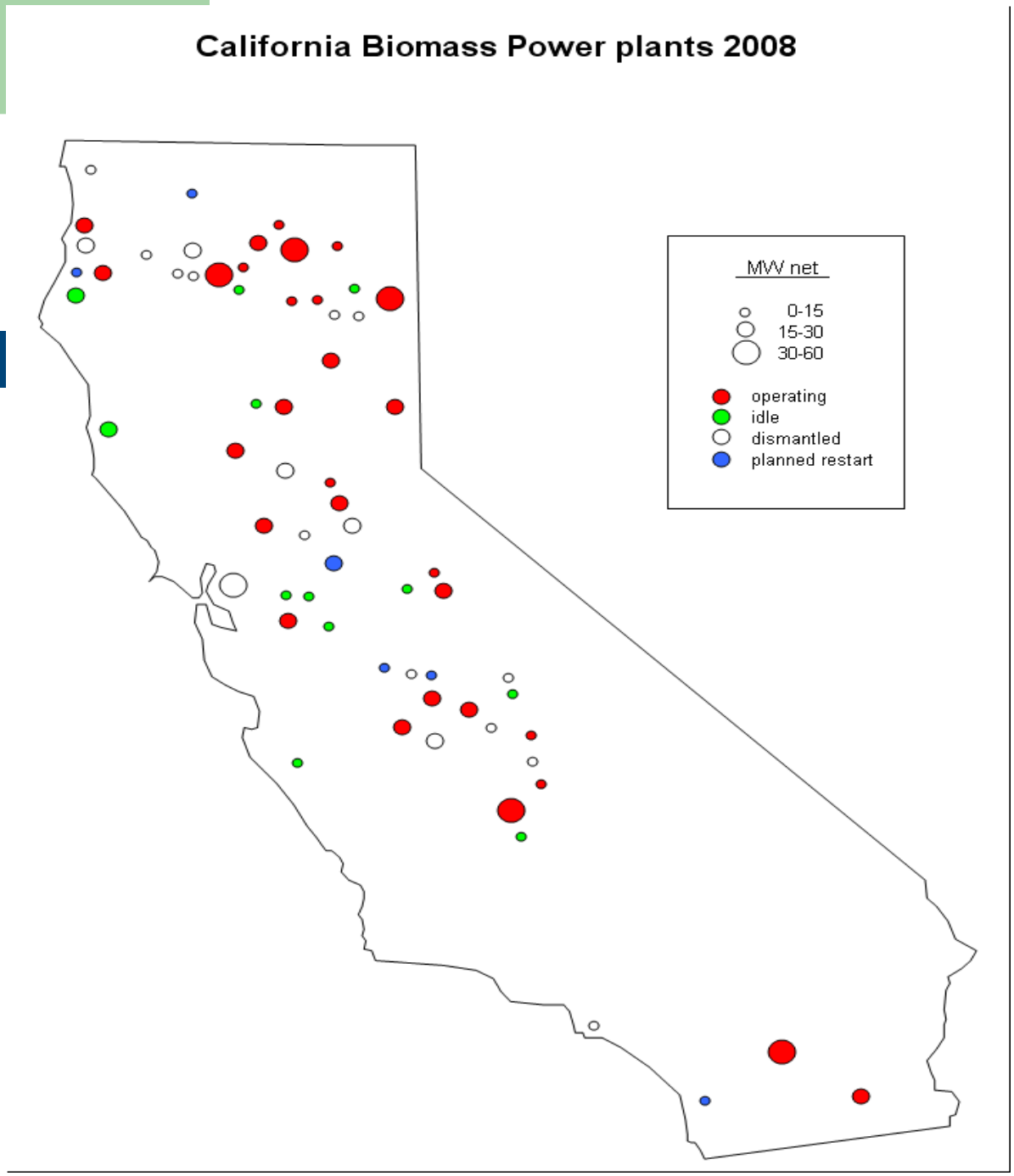
- Lumber products, composite panels, pulp
- Soil amendment/landscape cover
- Densified fuel pellets
- Post and Poles
- Animal Bedding
- Landfill cover
- Biomass power
- Liquid fuels (ethanol, syn-diesel)

California Experience

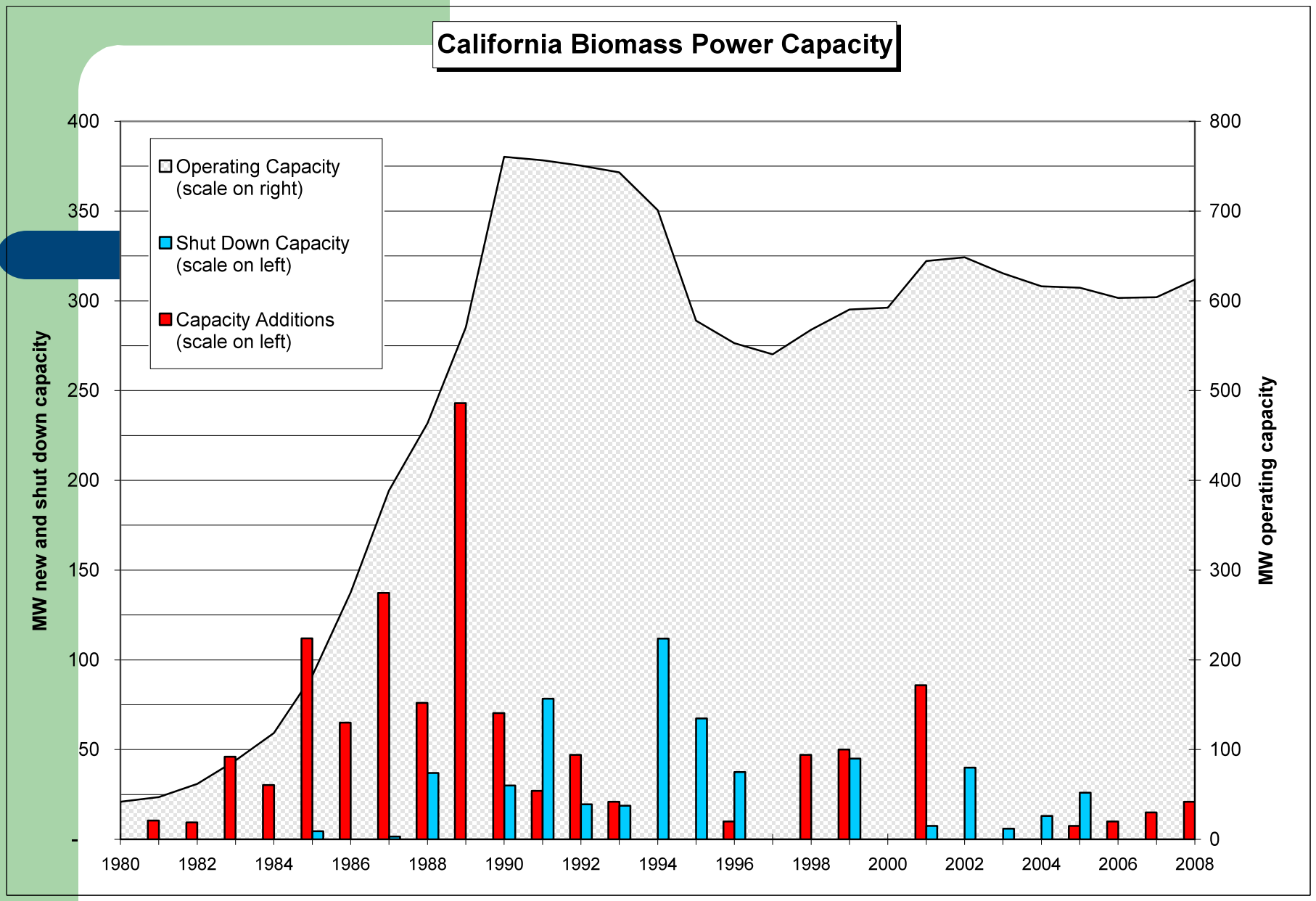
- Initial plants developed in response to air quality issues.
- Renewable energy incentives of 1970's and 1980's caused renewed interest and development:
  - PURPA
  - State and federal tax credits

California Experience - More

- Approximately 32 plants operational.
- Produce almost 550 MW.
- Consume around 10,000,000 GT/year:
  - 20% forest biomass
  - 30% agricultural biomass
  - 40% urban biomass
  - 10% forest products manufacturing residuals
- Generate revenue based upon a variety of power sales agreements.



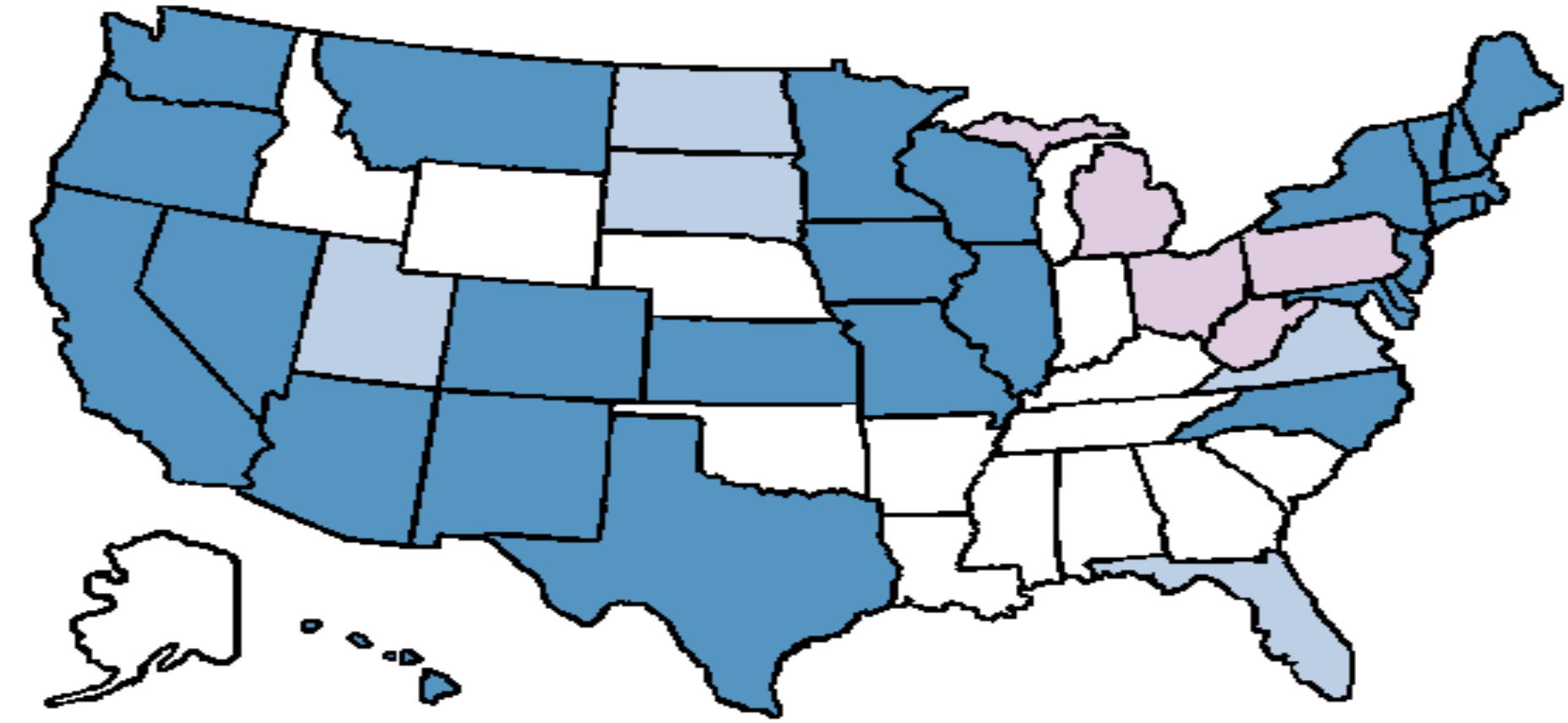
Map Provided by Green Power Institute



Data Provided by Green Power Institute


FIRE THREAT
Extreme
Very High
High
Moderate
Non-fuel
Not Mapped
FAIRHAVEN
SCOTIA
ANDERSON
SUSANVILLE
CHESTER
WENDEL
WESTWOOD
QUINCY
OROVILLE
LOYALTON
WILLIAMS
LINCOLN
WOODLAND
ROCKLIN
STOCKTON
TRACY
SONORA
CHINESE STATION
EL NIDO
CHOWCHILLA
MADERA
FRESNO
MENDOTA
DINUBA
TERRA BELLA
DELANO
MECCA
CALIFORNIA BIOMASS ENERGY FACILITIES
TOTAL 31 561.5
Source: State of California, FRAP (Map); California Forestry Association (Dec. 2005)

Renewable Portfolio Standards



Advantages of Biomass When Compared to Wind and Solar Energy

- Provides baseload renewable energy (24/7) on a cost effective basis.
- Has numerous societal benefits:
  - Supports hazardous fuels reduction and healthy forests
  - Provides employment (4.9 jobs/MW)
  - Greenhouse gas reduction displacing fossil fuels
  - Reduces waste material destined for landfills
  - Net improvement in air quality

Improving Air Quality

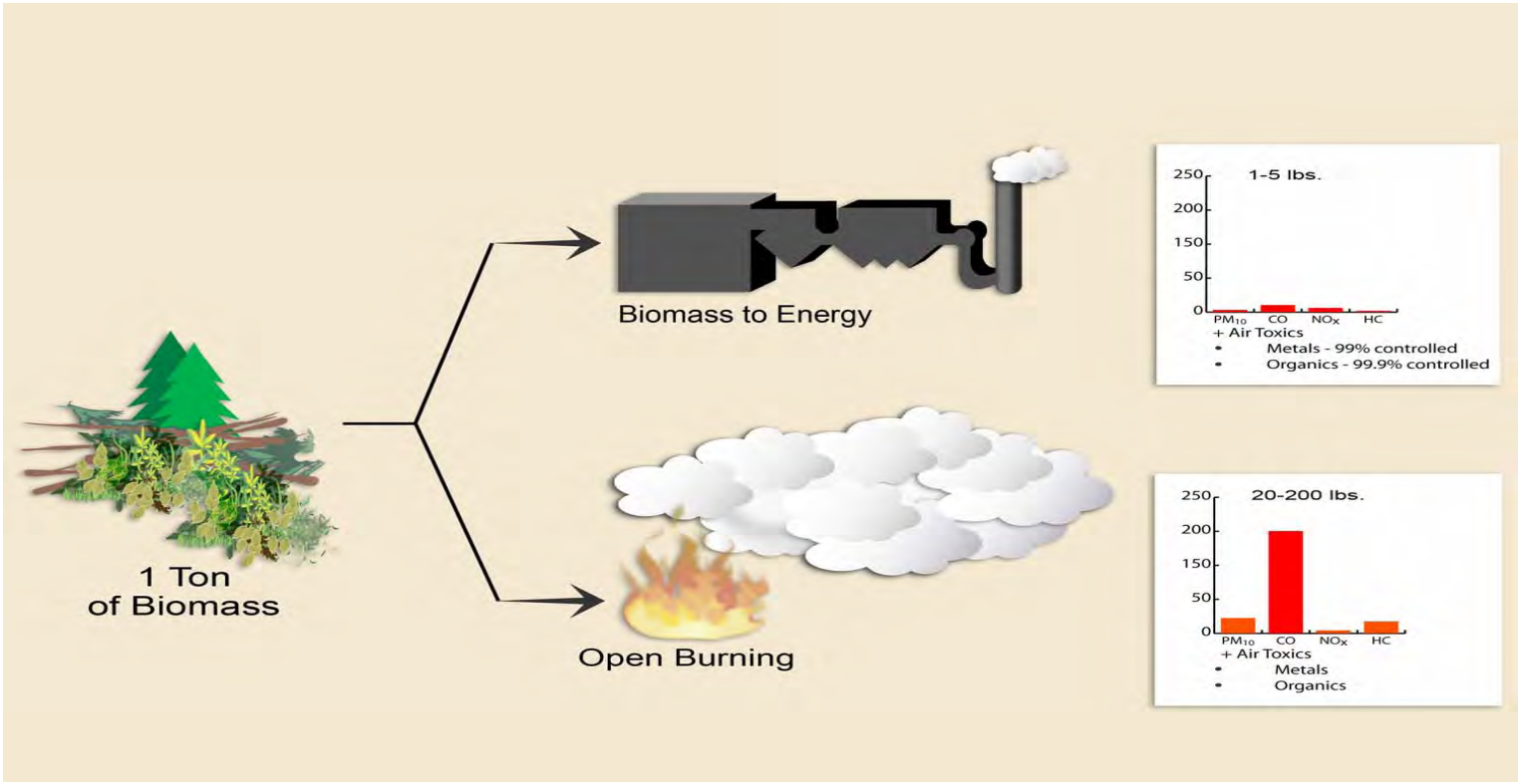
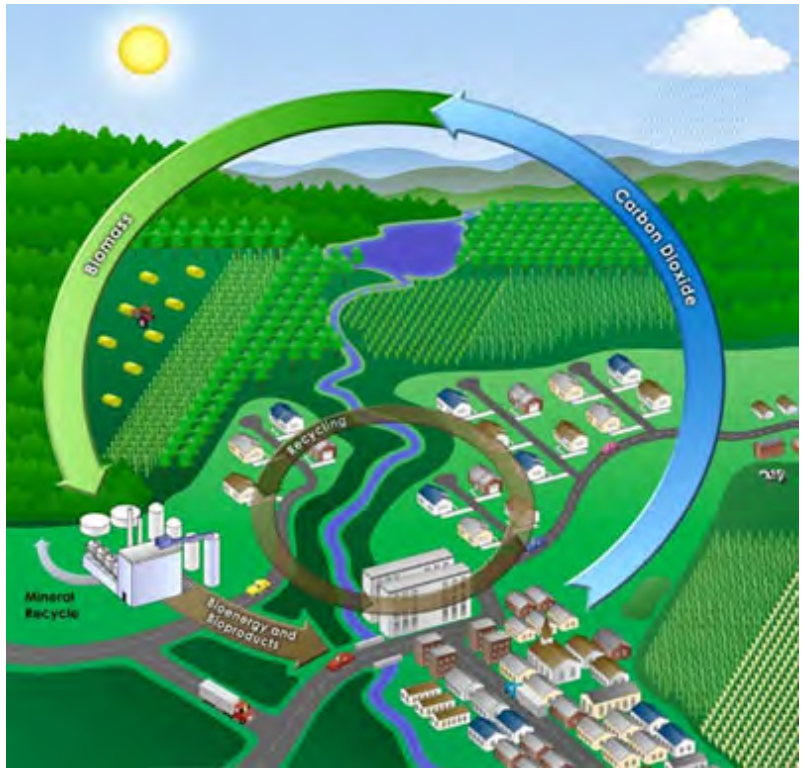


Diagram courtesy of Placer County Air Pollution Control District

Carbon “Neutral”

- Biomass absorbs carbon dioxide during growth of wood and green materials, and emits it during conversion
- It recycles the carbon and does not add to the greenhouse effect
- It displaces fossil fuel



New Influencing Factors Effecting Biomass Plants (existing+planned)

- Growing waste disposal issues/opportunities.
- Renewable energy gov't mandates/incentives.
- New financial and owner groups looking for renewable energy business deals.
- Fossil fuel pricing – abrupt current and future price increases.
- Acceleration in the development of new biomass to energy conversion technologies.
- Greenhouse gas reduction opportunities.

Tad Mason, CEO
TSS Consultants
2724 Kilgore Road
Rancho Cordova, CA 95670
916.638.8811 x 112
tmason@tssconsultants.com
www.tssconsultants.com