



# The SlurryCarb™ Process

Renewable energy from biosolids

## Reviews of the SlurryCarb™ Process

*The SlurryCarb™ process is the next generation of waste-to-energy*

 *Mitsubishi Corporation*

*Slurry Carbonization is the key to turning [waste] into a high-energy fuel*

*Chemical Engineering Magazine*

*Both a product [clean fuel] and a service [waste disposal] ... that could provide a cost effective solution to a key environmentally-related problem*

*National Institute of Standards and Technology*

## What is the SlurryCarb™ Process?

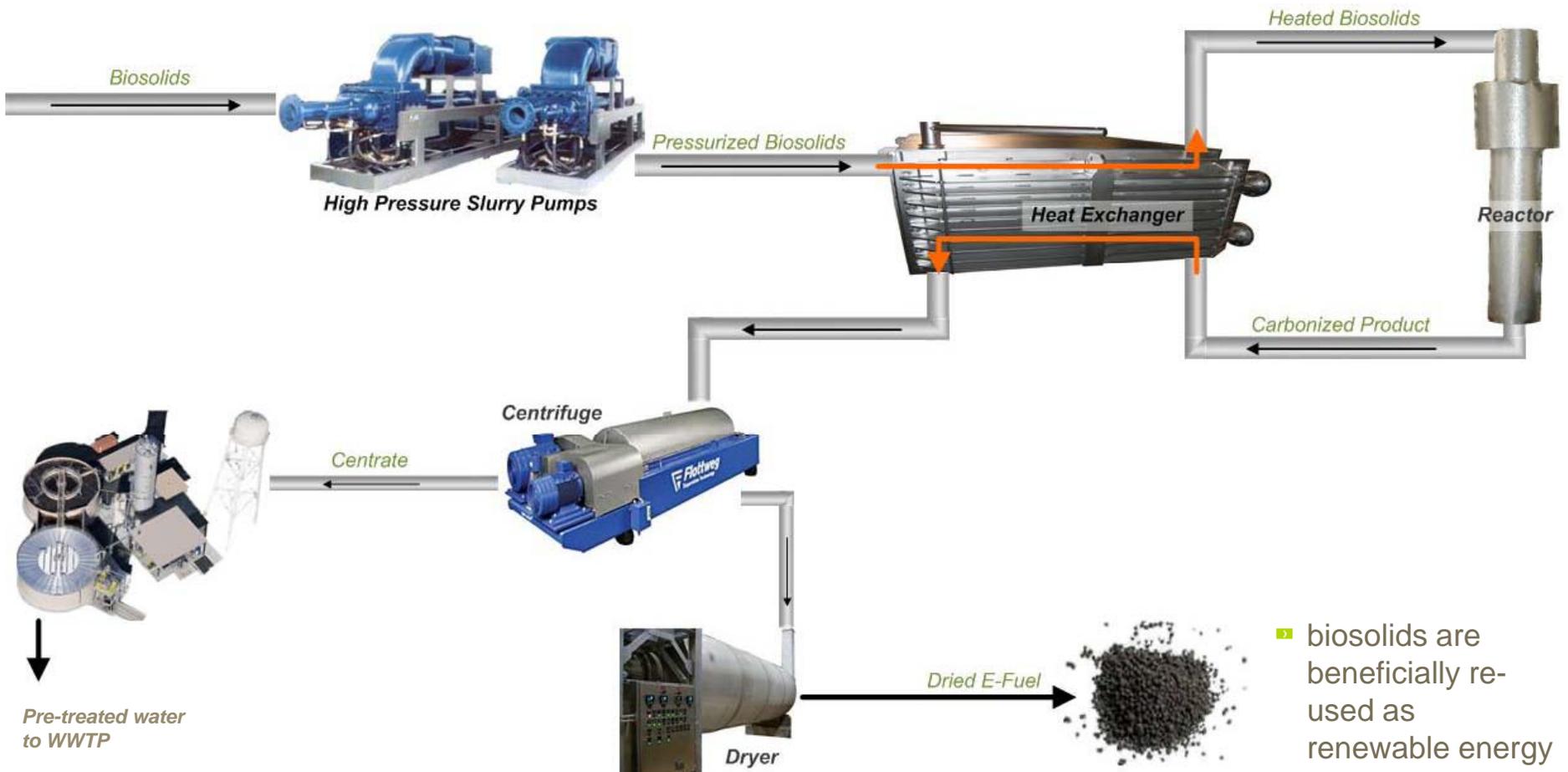
- ▶ The SlurryCarb™ process is a patented technology that converts biosolids (sewage sludge) and other high moisture organic feedstocks into a renewable fuel called E-Fuel
- ▶ The process provides a new option for biosolids management in three ways:
  1. recycling the energy content inherent in biosolids
  2. producing renewable energy
  3. Making possible 100% beneficial reuse of biosolids
- ▶ SlurryCarb™ is an efficient and environmentally sound alternative to current biosolids management options

# Renewable Energy From Biosolids

## *How does the SlurryCarb™ process work?*

- ▶ Biosolids are subjected to pressure and heat
- ▶ Upon reaching the desired reaction temperature, the biosolids break down into carbon and light gases
- ▶ The result is a slurry with molecules that are much smaller than the original biosolids and very high in energy
- ▶ Excess moisture is then extracted from the slurry
- ▶ The end product, a renewable fuel called E-Fuel, is an alternative to fossil fuels

# The SlurryCarb™ Process



- biosolids are beneficially re-used as renewable energy

## SlurryCarb™ Process Performance

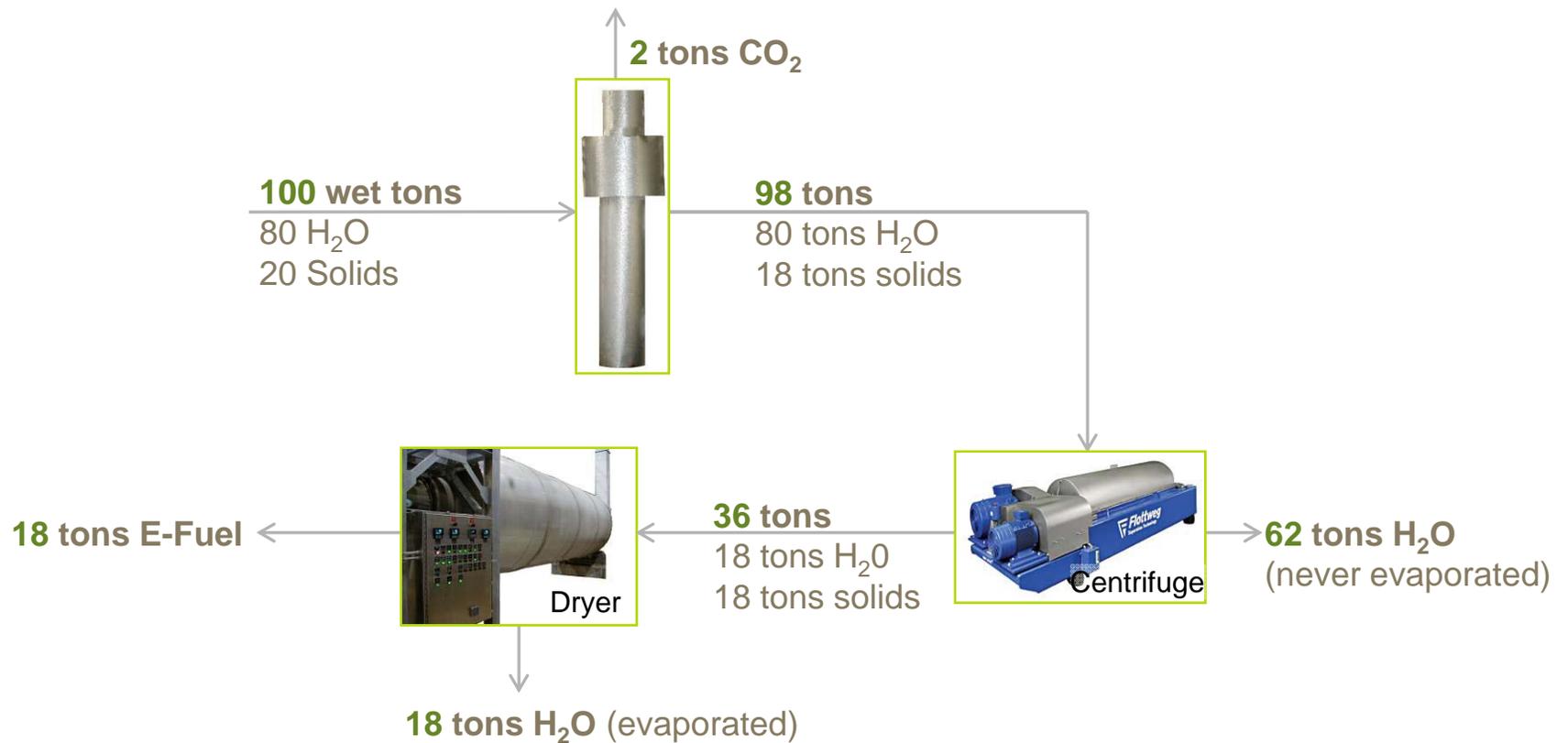
- ▶ A SlurryCarb™ facility can receive biosolids at 15 to 30 percent solids
- ▶ Process reaction time is approximately 10 minutes
- ▶ Reacted product is mechanically dewatered to greater than 50% solids
- ▶ Using biosolids, the process produces a 6,500-8,000 Btu/lb E-Fuel
- ▶ E-Fuel has combustion characteristics similar to coal
- ▶ Process produces more energy than it consumes

## SlurryCarb™ Advantages

- ▶ Long-term, predictable cost
- ▶ Reclaim land utilized for biosolids disposal
- ▶ Reduced chemical costs
- ▶ Reduced operating costs
- ▶ Reduced energy costs
- ▶ Regional facilities reduce trucking costs

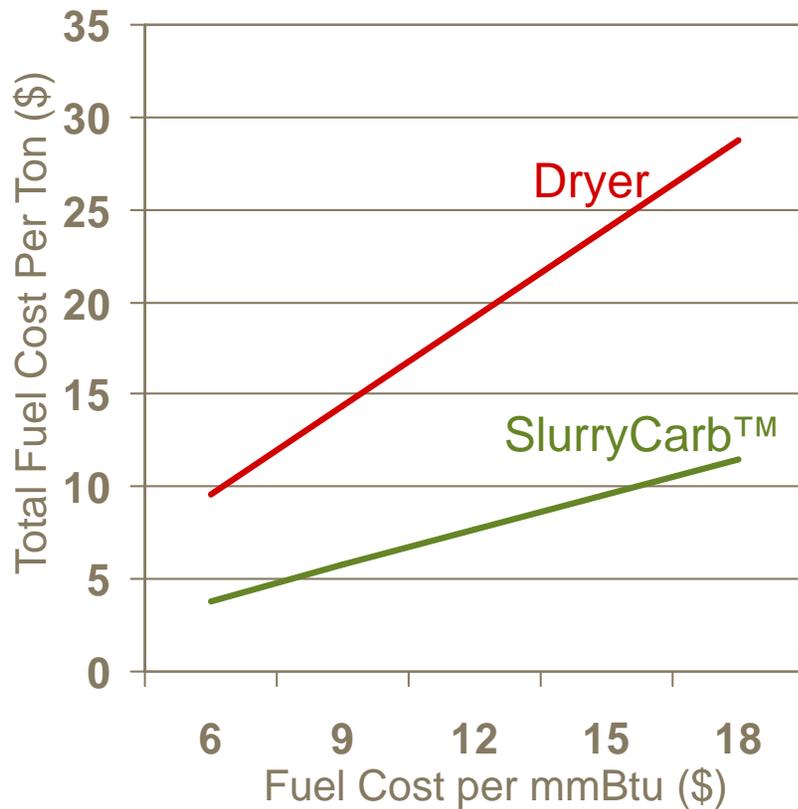
# Simple Mass Balance for SlurryCarb™

*SlurryCarb™ consumes approximately two thirds less energy than drying*



# Hedge Against Fuel Cost Risk

SlurryCarb™ Fuel Cost Savings



Assumes 80% H<sub>2</sub>O biosolids

Energy Consumption: SlurryCarb™ vs. Drying

	H <sub>2</sub> O Evaporated	Total Energy
Drying	80 tons	160,000,000 Btu
SlurryCarb	18 tons	64,000,000 Btu

Assumes 100 tons of biosolids at 80% H<sub>2</sub>O

# SlurryCarb™ Facilities



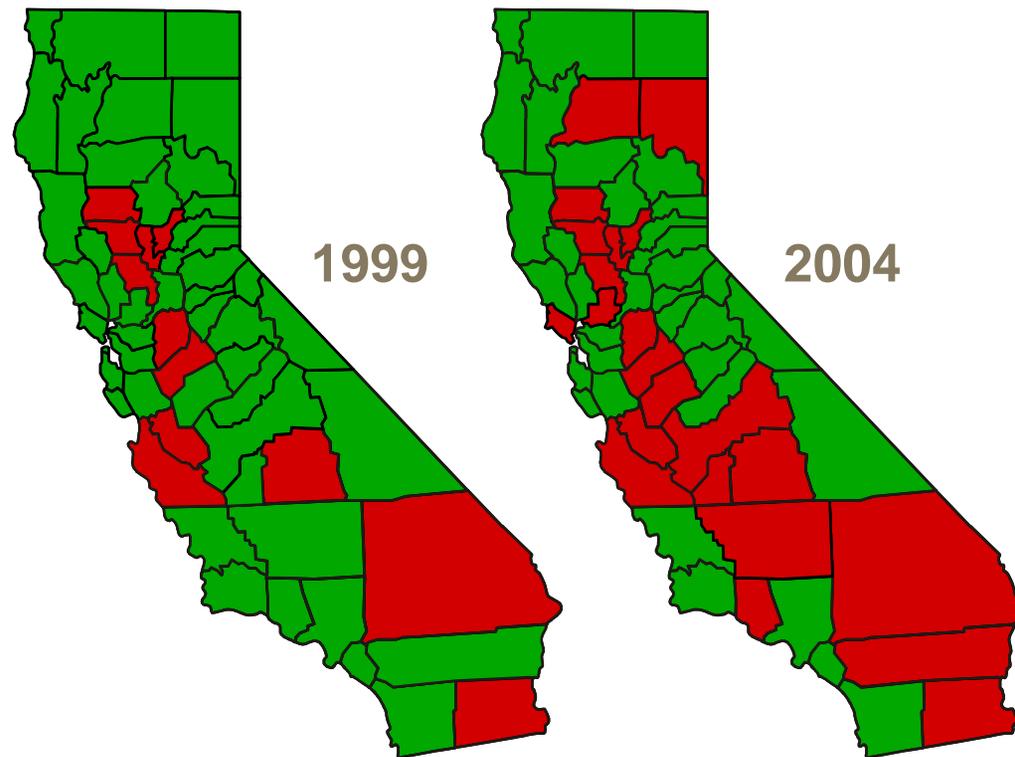
## Summary:

### *Why the SlurryCarb™ Process?*

- ▶ Process is a net energy producer (**Environmentally friendly**)
- ▶ Provides a sustainable biosolids management solution (**Cost-effective**)
- ▶ Converts organic material into carbon by accelerating Mother Nature's method (**Proven**)
- ▶ Produces renewable energy from biosolids (**A green technology**)
- ▶ Most major equipment is off-the-shelf (**Simple**)
- ▶ Design complete (**Ready to go**)
- ▶ Extensively patented (**Innovative technology**)

## *Diminishing Capacity*

*California Land Application: county bans are spreading*



Source: OCSD

## E-Fuel: *the product*

- ▶ E-Fuel has 6,500-8,000 Btu/lb in dry form
- ▶ Suitable for gasification, co-firing, use in cement kilns or utilization in industrial and utility boilers
- ▶ Produces approximately 1 MWH per ton
- ▶ Minimizes fossil fuel consumption
- ▶ Produces essentially zero net greenhouse gas emissions



**E-Fuel**

## E-Fuel vs. Fossil Fuels

Fossil Fuels	E-Fuel
Burning fossil fuels releases ancient carbon that has been sequestered in the earth for millions of years	E-Fuel utilizes carbon that is sequestered by living plants and human-generated waste, and is part of the recent Carbon Cycle
Use of fossil fuels depletes natural resources that take thousands of years to replenish	Waste is a readily renewable resource, resulting in an endless supply of E-Fuel
Fossil fuel use causes a rise in greenhouse gas emissions and contributes to global warming	E-Fuel recycles CO <sub>2</sub> and produces essentially zero net greenhouse gas emissions

## Renewable Standard



E-Fuel is certified as a renewable fuel in the State of California.

*EnerTech Environmental, Inc.*

