Managing Biosolids and Generating Green Energy

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LMOP California Landfill Gas Energy Workshop - May 16, 2011

Take-Aways

- Introduction to VRSD
- The challenge and our solution
- Project highlights and benefits
- Technology overview
- Virtual facility tour

Who is VRSD?

- Enterprise public agency
- Organized in 1970
- Eight charter cities and eight special districts
- Serves sanitation needs of 600,000 people:
  - Solid waste disposal / landfill management
  - Wastewater collection and treatment
  - Recycled and potable water service
- Nine-member Board, 65 employees

What are Biosolids?

- Organic materials resulting from highly processed WWTP operations
- Ventura County produces 8,000 tons every month
- Prior to this project, 90% were exported out of Ventura County

The Challenge

- Restrictions limiting export options
  - Measure E in Kern County
- Increasing costs
- Need for a local solution

The Solution

- Regional facility to process biosolids
- Powered by landfill gas
- Batch drying – 160 tons/day
- Multi-use end product
- Green energy – self-sustained system
- Additional electricity exported to grid

Project Location

Toland Road Landfill

Project Highlights

- 2.2-acre facility in a 343-acre landfill site
- Two 80-ton-per-day Fenton batch dryers
- Nine 250 kW Ingersoll Rand microturbines
- Green energy (no power from grid)
- AB 939 recyclable material
- Competitive & stable costs
- Local solution with local public governance

Project Cost - $19M

Permits, engineering, project management	$1.0M
Site Work	$7.0M
Dryers (2)	$5.4M
Trailers (11)	.5M
Microturbines (9)	$2.8M
Gas conveyance system	$2.0M

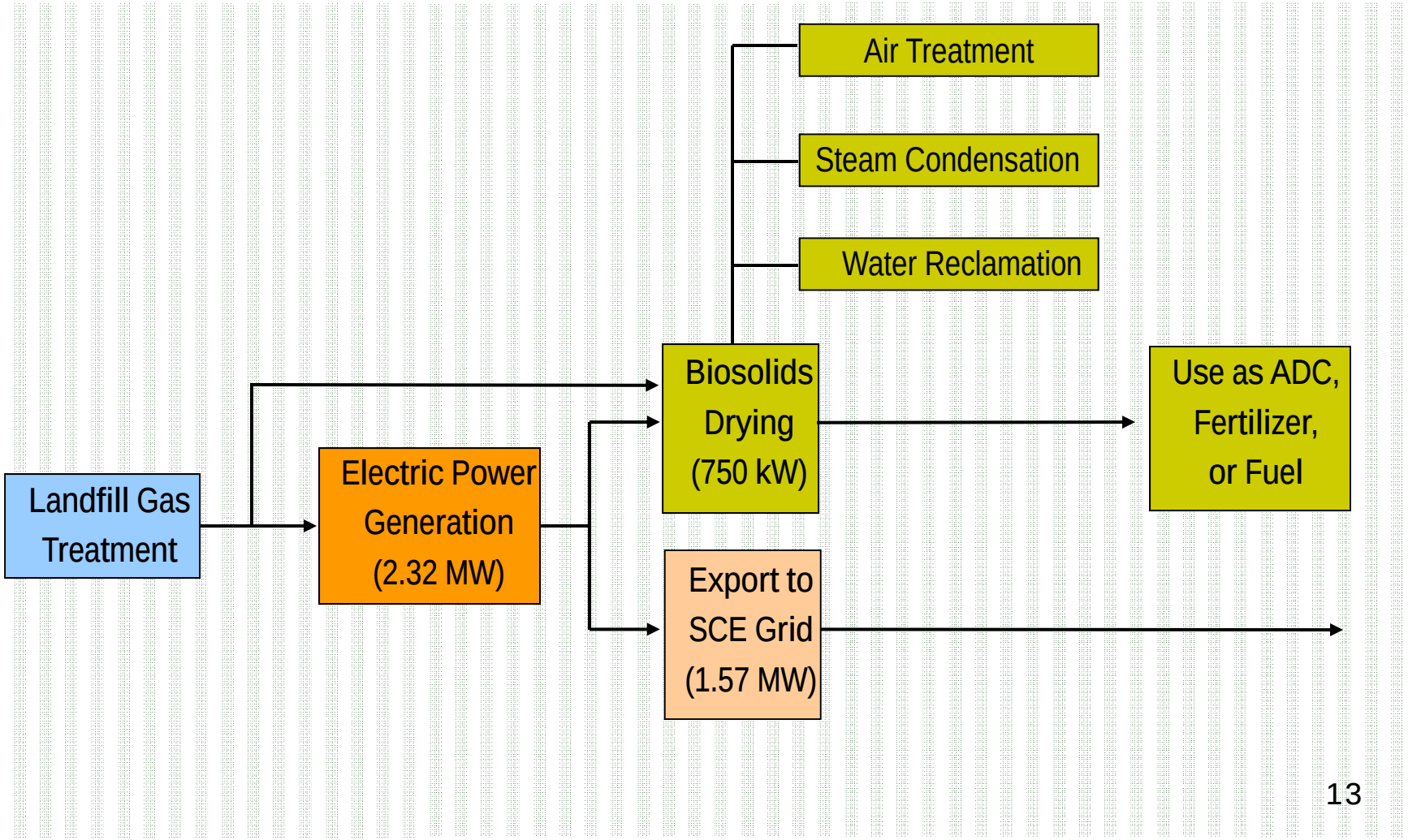
Funding

- Capital
  - Combination cash & debt
  - $1 million SGIP grant
- Operations: $42/ton
  - 10-year contracts with cities of Fillmore, Oxnard, Ventura, and Thousand Oaks
    - Trucking costs add approximately $10/ton
- Rate factors:
  - 3.5% annual increase first five years
  - 10-year SCE contract for energy sales ($.10 per kWh)

Environmental Benefits

- Pathogen Destruction (pasteurization)
- Air Quality
  - Reduced truck traffic (est. 1 million miles per year)
  - 1,800 ton / yr. CO_2 reduction
- Recycling
  - Dried solids (ADC, fertilizer, fuel)
  - Reclaimed water (dust control)
  - Renewable power from landfill gas
  - No energy from grid – added power *for the grid*

The Process at a Glance



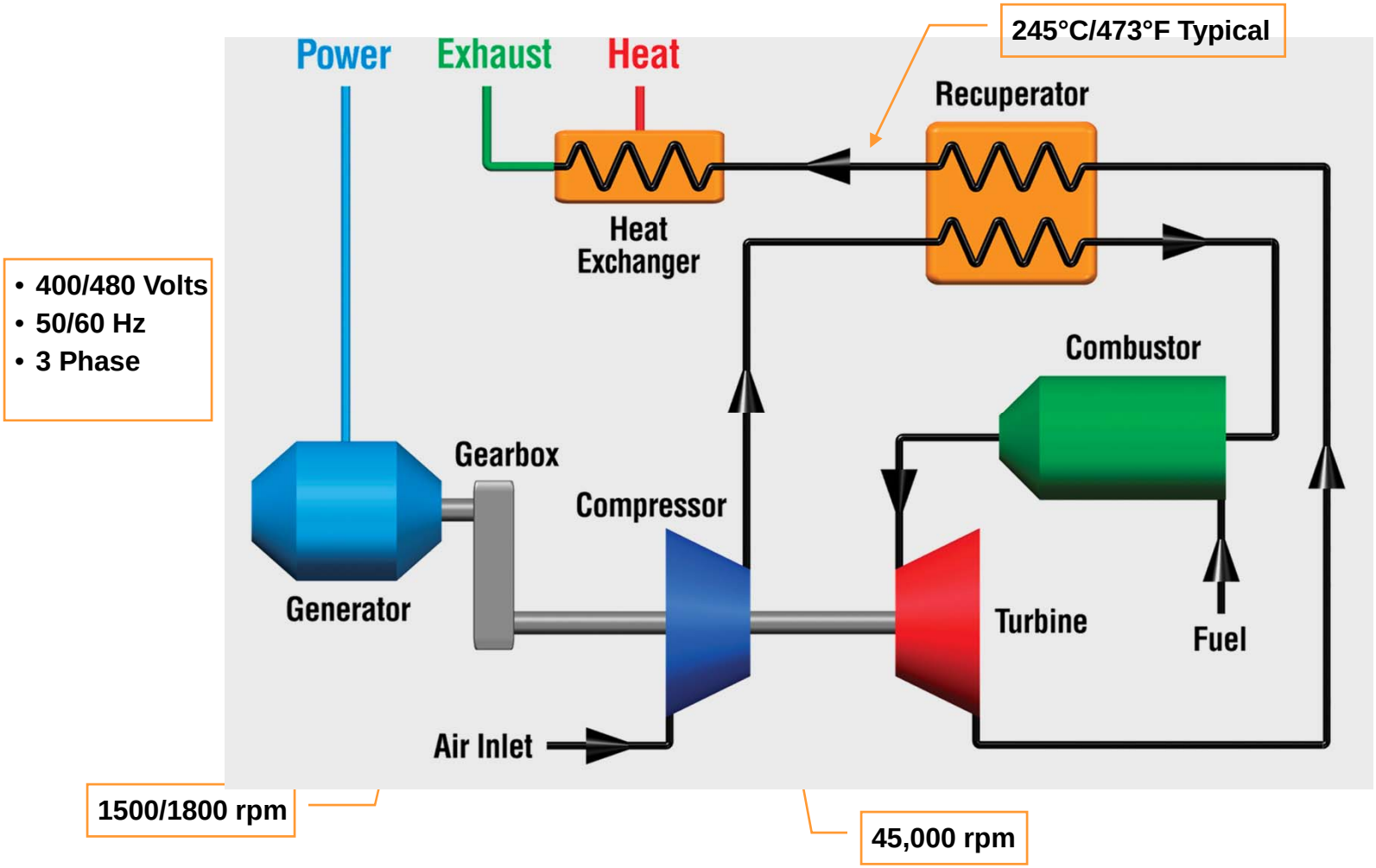
LANDFILL GAS TREATMENT

Liquid Removal → **Sulfur Reduction** → **Siloxane Removal** → **Dew point Suppression**

Dew point Suppression → **Compression** → **To Process Heaters and Microturbines**

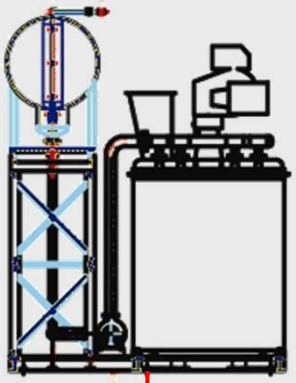
ELECTRIC POWER GENERATION

IR 250kW System Cycle Diagram



BIOSOLIDS DRYING

LANDFILL GAS



THERMAL FLUID HEATER

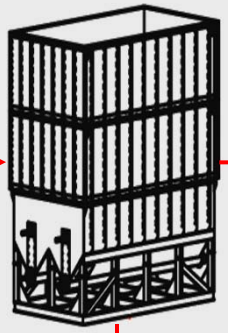
HOT OIL

RECEIVING HOPPER

INCOMING BIOSOLIDS

WET BIOSOLIDS

STORAGE HOPPER



WET BIOSOLIDS

BATCH DRYER

STEAM EXHAUST

ODORS

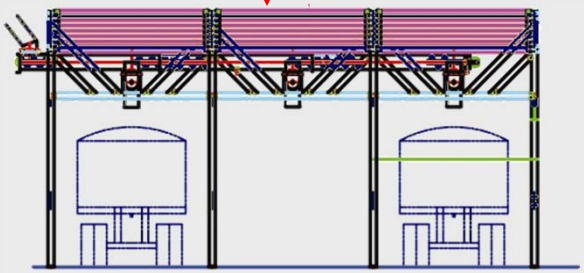
DRIED BIOSOLIDS

AUXILIARY CARBON FILTER

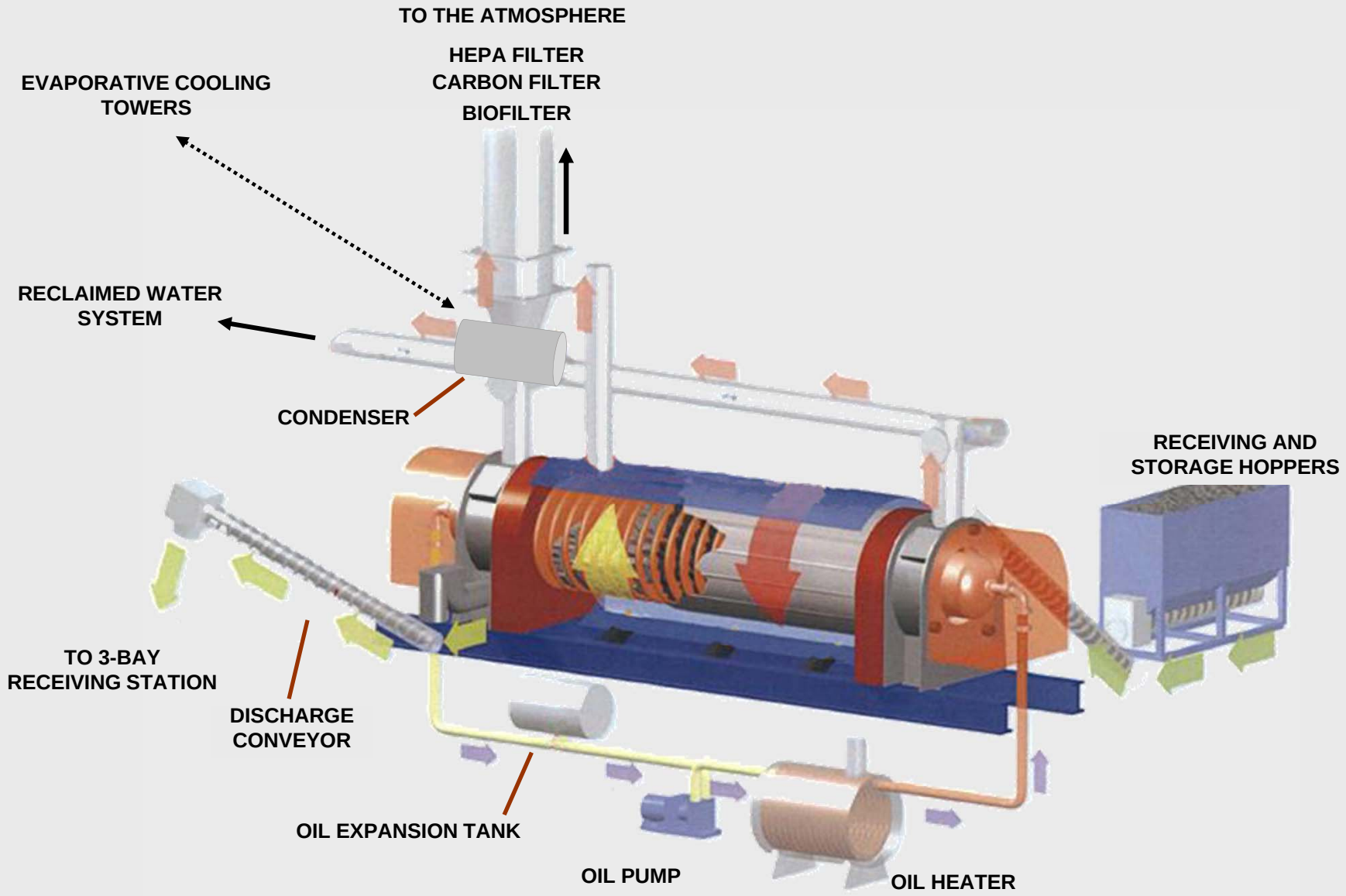
ODORS

CLEAN AIR

TO ATMOSPHERE

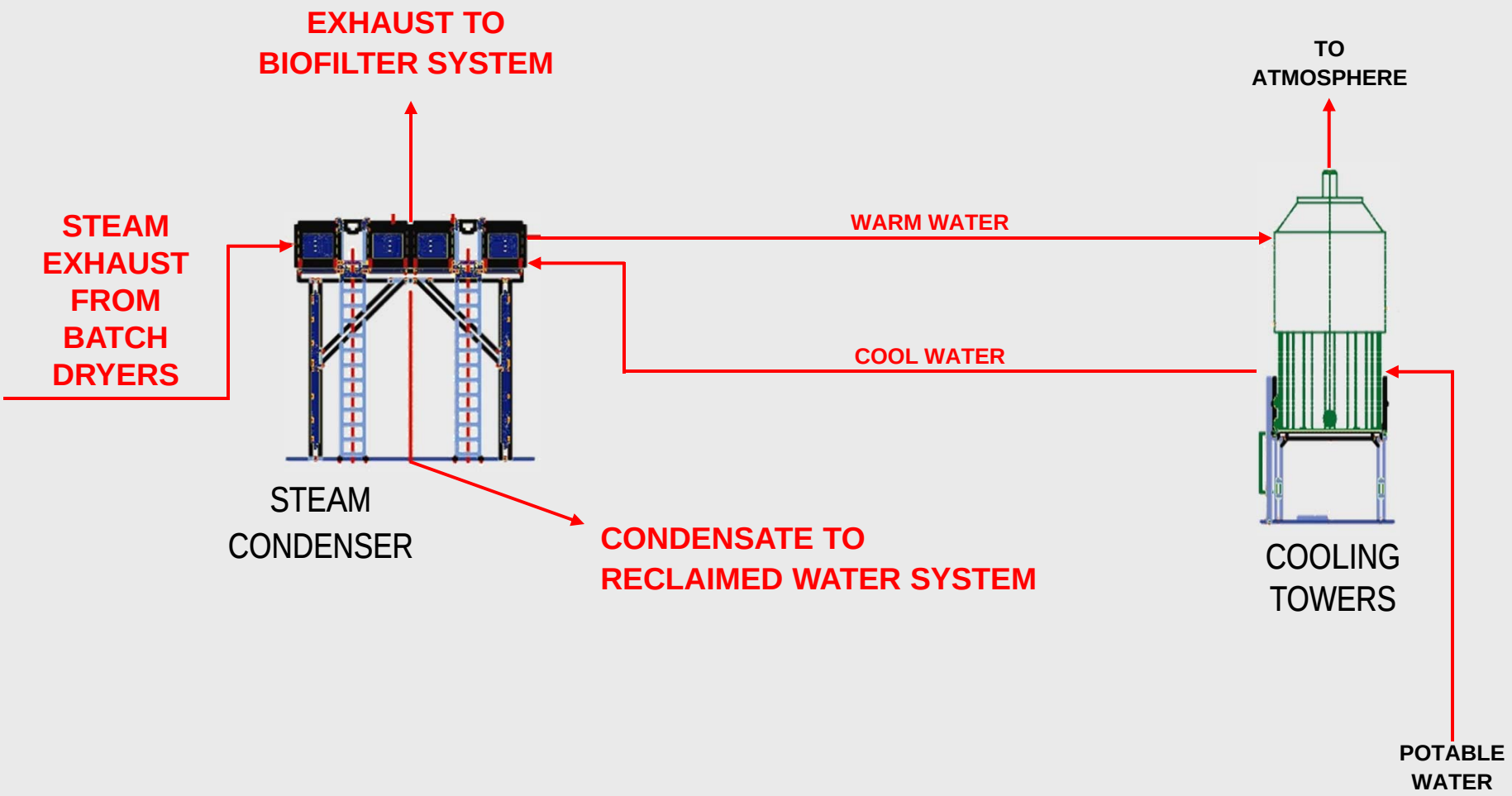


3-BAY TRUCK LOADING AREA

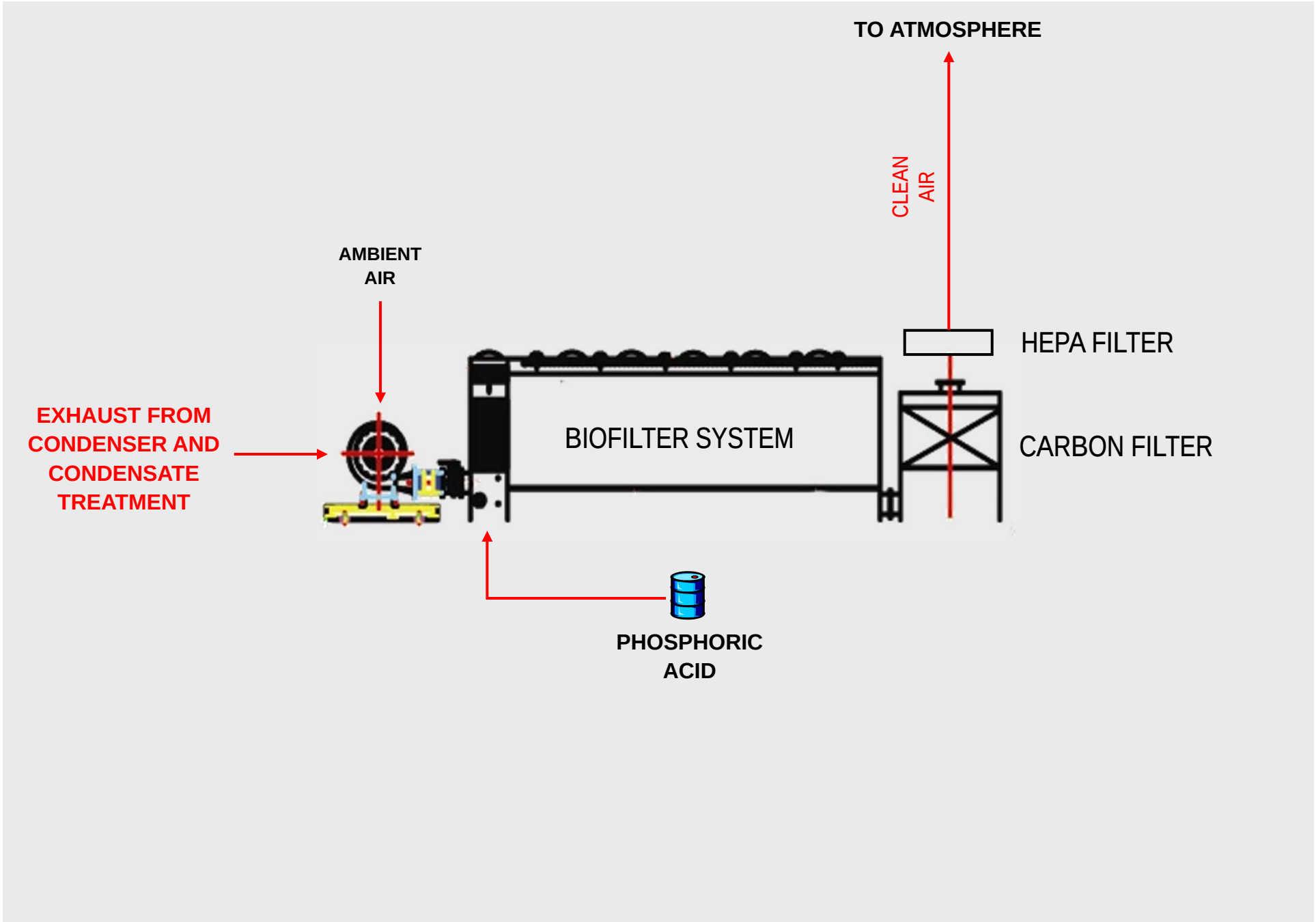


Dryer Operation

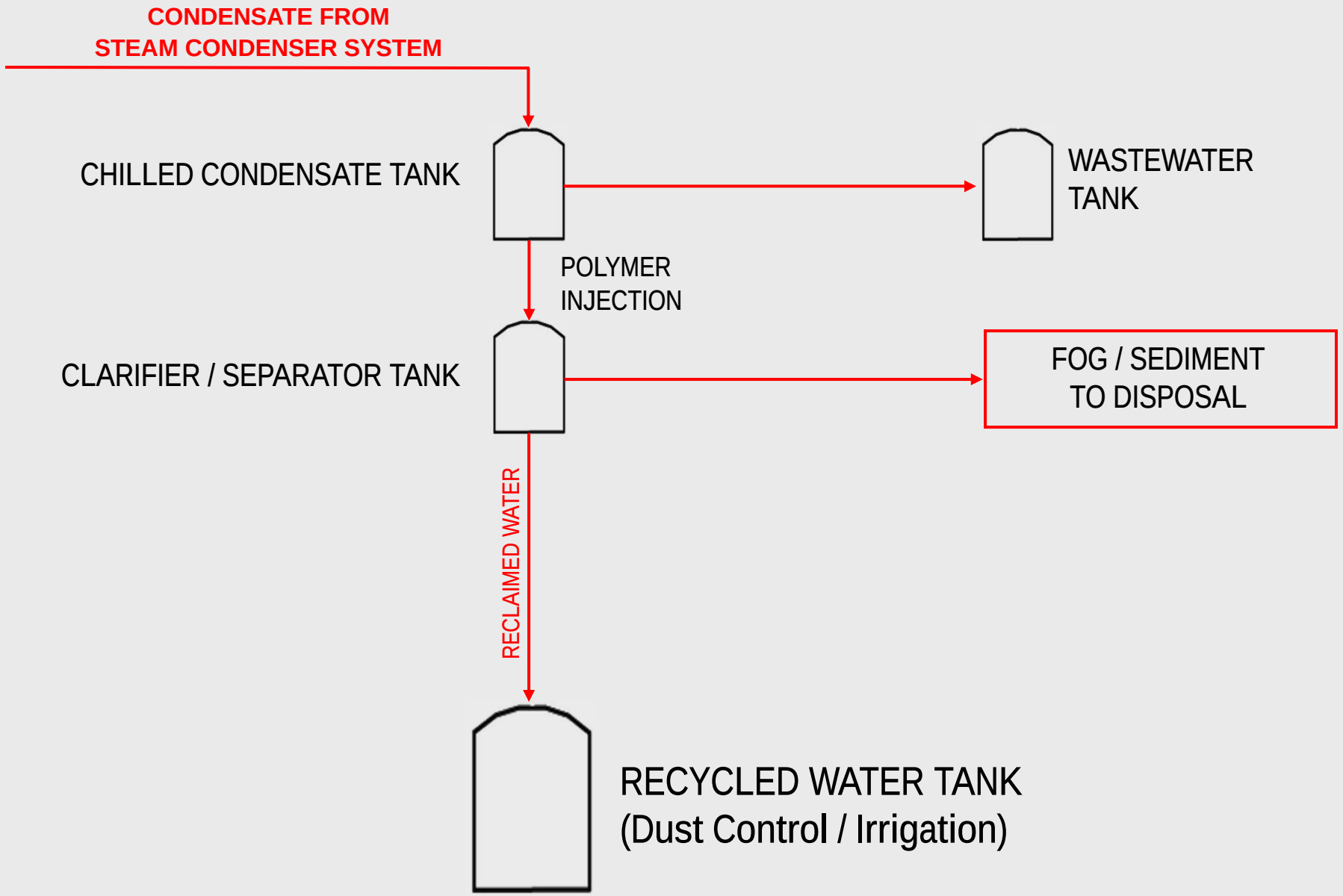
STEAM CONDENSATION



AIR TREATMENT



WATER RECLAMATION



Landfill Gas Treatment

Biosolids Drying

Steam Condensation

Water Reclamation

Air Treatment

Electric Power Generation

Virtual Tour


Site Work


Project Area


Cleared Site


Landslide Removal and Slope Grading


Benching and Filling


Completed Facility

Landfill Gas Treatment


LFG Liquid Removal


Sulfur Removal System


Blower Unit (incl. moisture & siloxane removal)


Compressor Unit (incl. moisture & siloxane removal)

Electric Power Generation


Microturbines

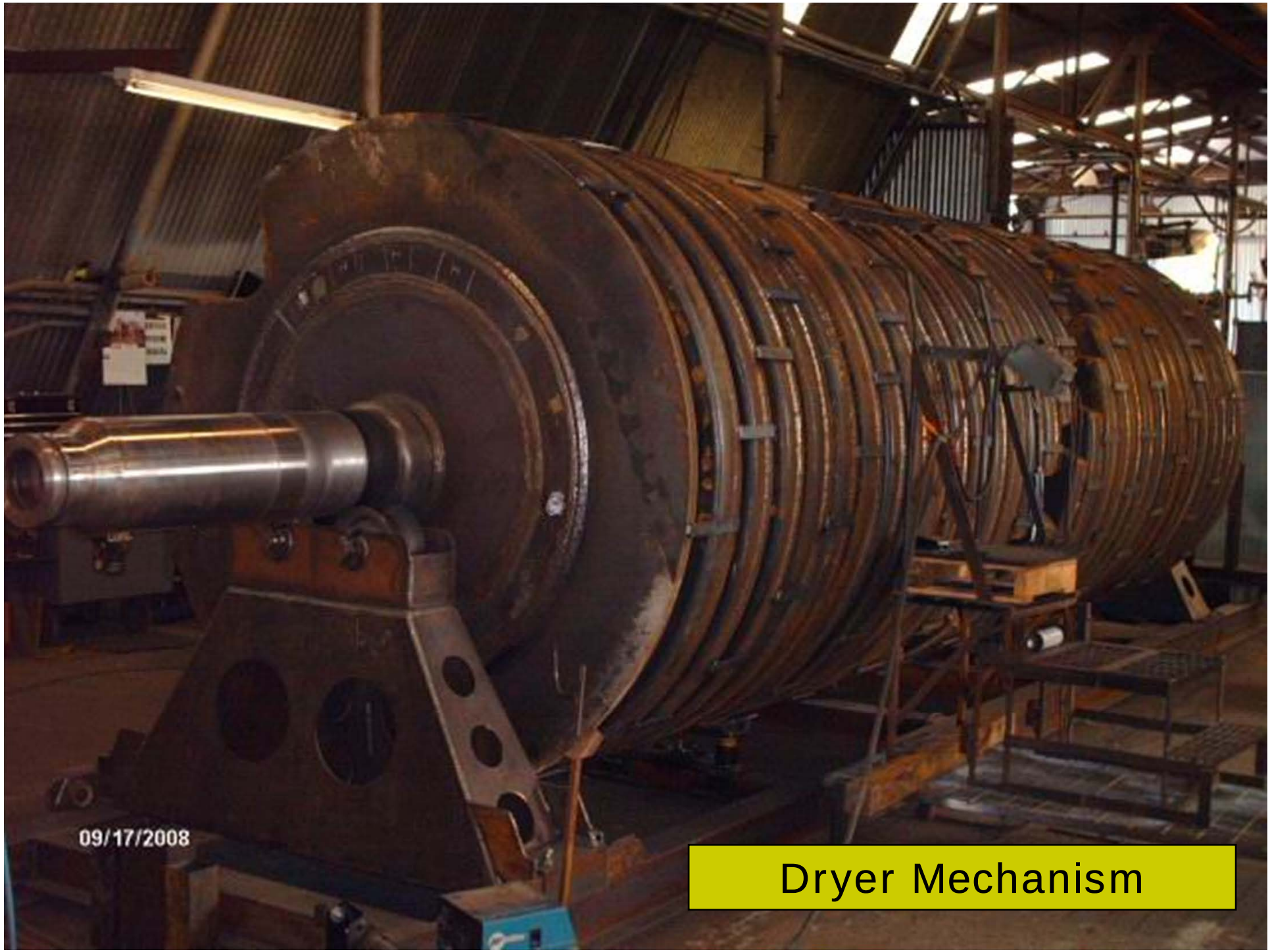

Microturbines

Biosolids Drying


Receiving Hopper


Process Heaters


Batch Dryer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Dryer Mechanism

Air Treatment
Steam Condensation
Water Reclamation


Biofilter System


Cooling Towers


Reclaimed Water Tanks


Dried Product Receiving Station

Dried Biosolids

Start-Up Issues - Biosolids

- Air pollution permitting – modifications to standard burners caused problems:
  - High heat caused refractory/insulation burn-through
  - Multiple retrofits required
- Biofilter for air treatment – sensitive to:
  - Temperature
  - Air velocity over filter media
  - Food mass ratio
- Remedial measures in place

Start-Up Issues - Microturbines

- Unanticipated siloxane-related fouling
- Power spikes from Southern California Edison
- Uptime has exceeded 85%

Project Notables

- Biosolids: 160 tons per day; expandable to 320
- 9 microturbines (2.32 MW) - expandable to 15 (3.75 MW)
- Green, sustainable, low-emission power
- Major cooperative effort between member cities and county
- Regional biosolids drying solution – first in the nation
- Awards:
  - Technological Innovation – California Association of Sanitation Agencies
  - Gold Award for Landfill Gas Utilization – Solid Waste Association of North America
  - Project of the Year – American Public Works Association (Ventura County)
  - Project of the Year – American Society of Civil Engineers (Santa Barbara/Ventura)
  - Project of the Year – American Council of Engineering Companies California

Q & A

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