



Valley Fig Growers



Ingersoll Rand Dual Fuel
MT 70 Microturbine for
Valley Fig Growers
Digester Gas
Fresno, California

6th Annual Microturbine Applications Workshop

January 19, 2006

Mike Emigh, President



California Fig Industry

- Approximately 100 growers
- Growing 14,000 tons Annually
- Within 60 miles of Fresno



Valley Fig Growers

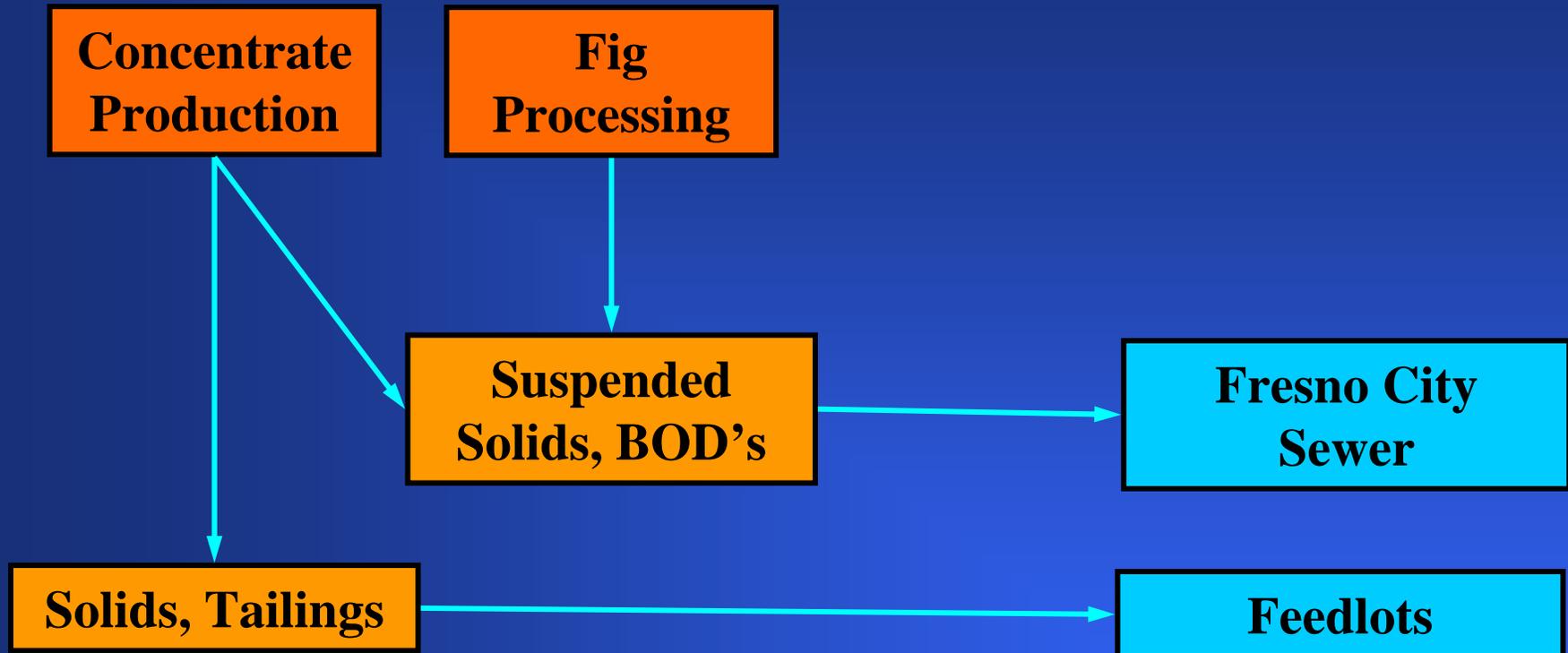
- Established in 1959
- Grower owned Marketing Co-operative, operating worldwide
- 35 growers, 50% of the industry tonnage



Valley Fig Growers

- **Production Processes**
 - **Cleaning and Re-hydration of Dried Figs**
 - **Custom Production of Fruit Concentrates**
 - Raisin
 - Fig
 - Date
 - Prune

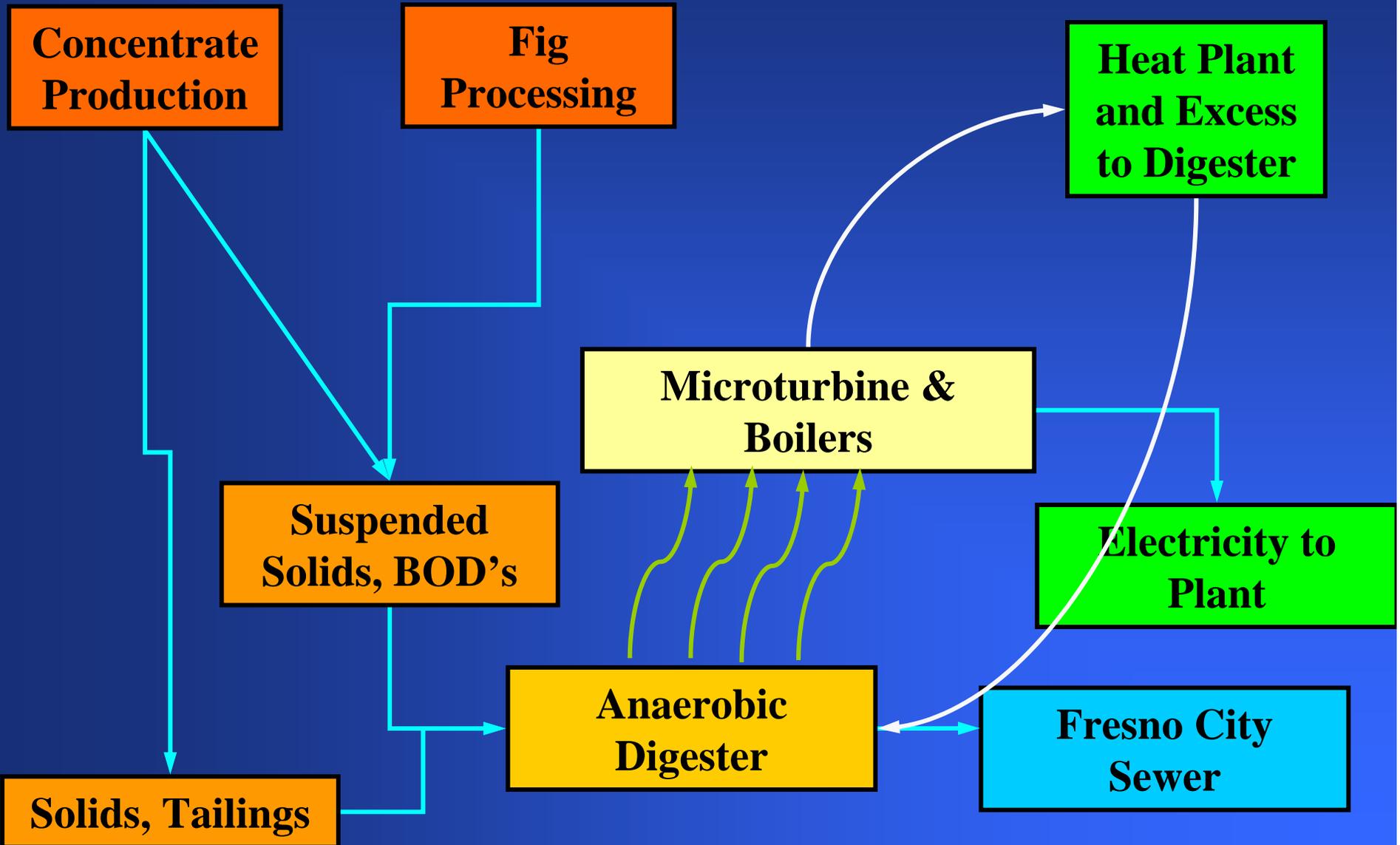
Process Flow Chart



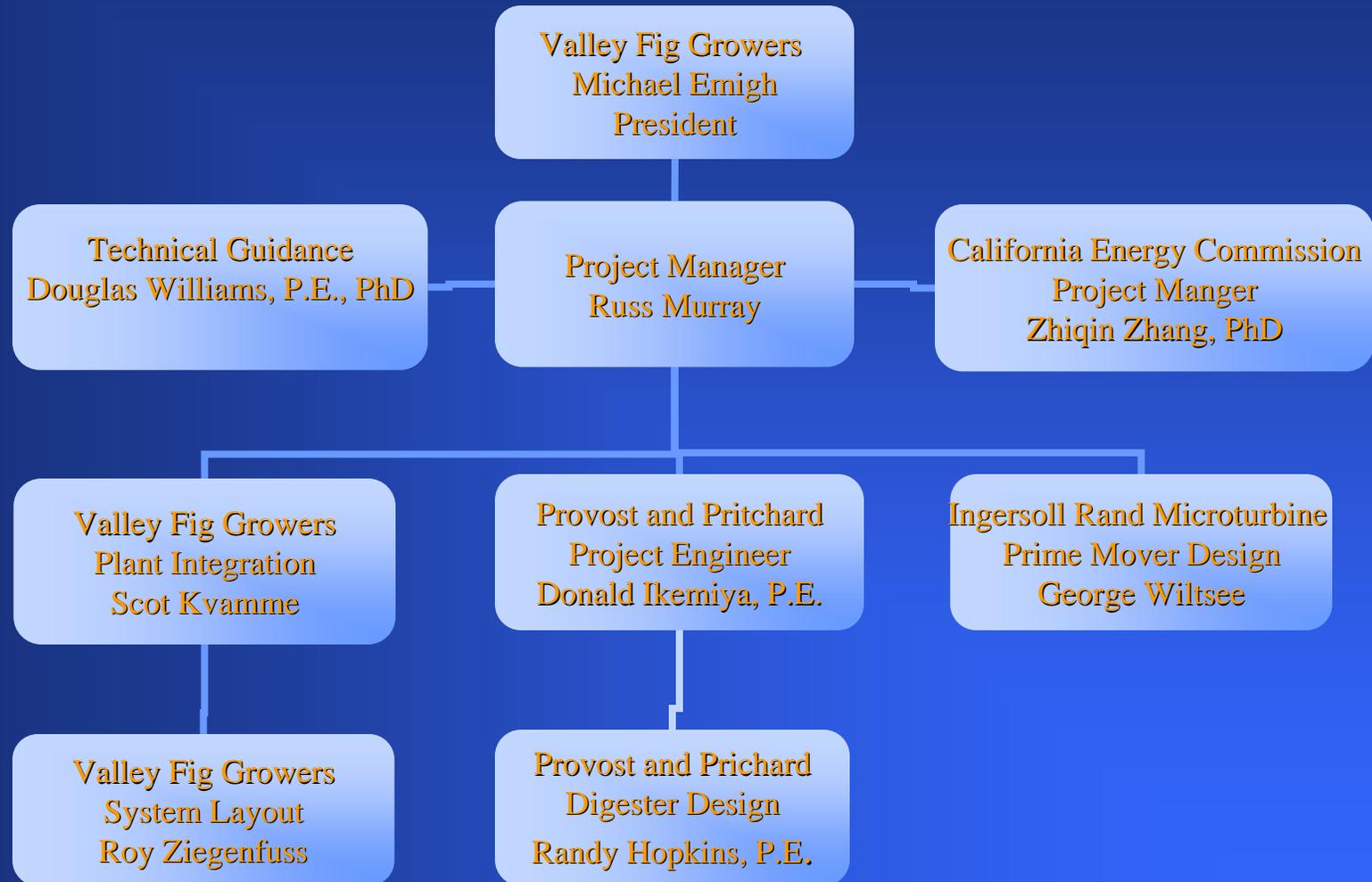
Anaerobic Digester Project Goals

1. Reduce City Sewer Fees
2. Capture and Use Methane
3. Generate Electricity
4. Capture and Use Waste Heat

Process Flow Chart



Project Team



Microturbine Purchase Decision

1. State of California, Energy Commission, Public Interest Energy Research (PIER) Grant funded by Utility Bills
2. Grant Proposal based on the marriage of **old** and **new** technology, anaerobic digestion and microturbine generators.
3. One of three grants awarded in 2002.

Key Project Dates

- **Search for Wastewater Solutions, 2000 to 2002**
- **PIER Grant Proposal Submitted, May 2002**
- **PIER Grant Awarded, September 2002**
- **Microturbine Order Date, November 2003**
- **Microturbine Arrived, December 2003**

Key Project Dates

- **Microturbine Returned to IR for Refitting, July 2004**
- **Ground Breaking, August 2004**
- **Microturbine Second Receipt, January 2005**
- **Interconnection Completed, February 2005**
- **Microturbine Start Date, May 2, 2005**
- **Facility Dedication, October 2005**

Anaerobic Digester



- Reduce Wastewater BOD's and Suspended Solids by 70-80%.
- Pond System with Cover
- Simple, Forgiving, and Uncomplicated Operation

Anaerobic Digester



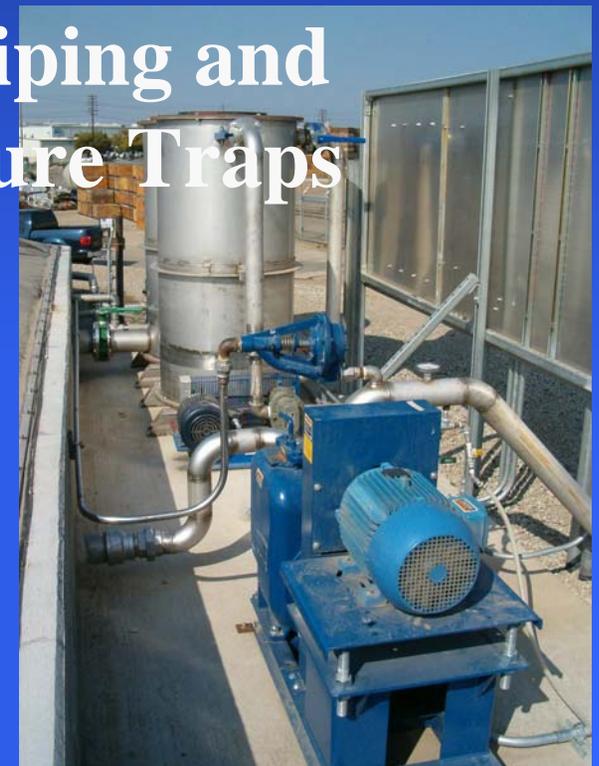
- Groundbreaking
- Earthwork



Anaerobic Digester



- Liner Installed
- Cover Attached
- Gas Piping and Moisture Traps



Microturbine



Microturbine



Microturbine



Microturbine



Microturbine



Microturbine Costs

70 kW Microturbine	\$ 163,000
Engineering and Commissioning	13,000
Freight and Sales Tax	18,000
Total Cost	\$ 194,000
PG&E Rebate	(70,000)
Net Cost	\$ 124,000
Electrical and Gas Plumbing was all part of the overall project and not split out	Estimated to be about \$ 100,000
Maintenance Contract – 3 years	\$ 38,600

Permitting

- **San Joaquin Valley Air Pollution Control District, Permit to Operate**
 - **Emission Requirements**

Operational Issues

- **Originally, a separate fuel conditioner skid was spec'd by IR that added \$20,000 in cost.**
- **IR took the machine back and modified the internal conditioner to work with our biogas.**

Operational Issues

- **Initially, we had many flame out shut downs.**
- **Our biogas was better quality than most land fill gases, and a program modification corrected the problem.**

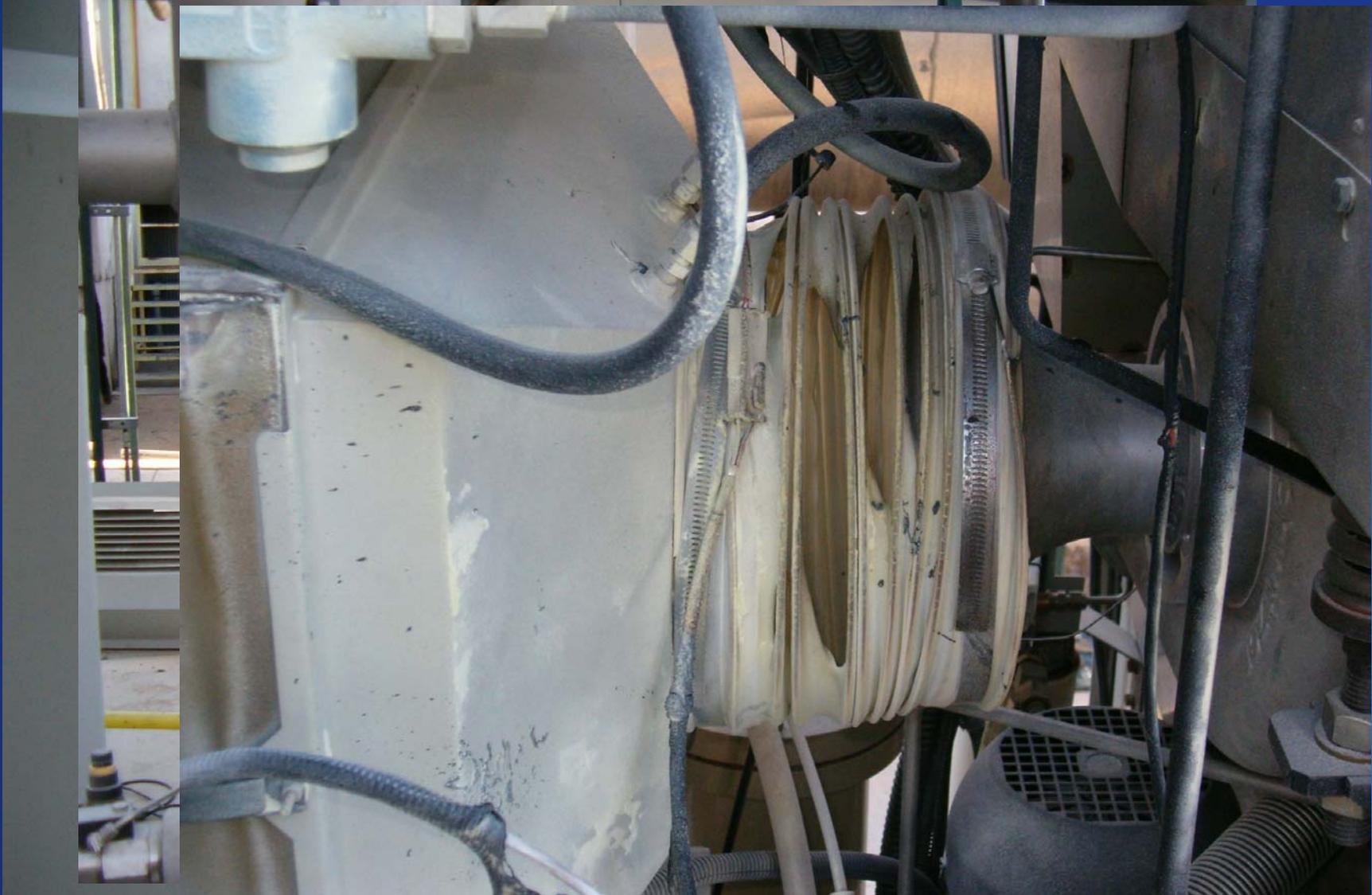
Operational Issues

- **An incorrect O ring installation resulted in failure of the O ring and a severe oil leak developed.**
- **IR technician replaced the defective O ring.**

Operational Issues

- Side panels were removed due to what was thought to be overheating.
- An improperly placed gas line regulator vented and was ignited by a spark from the turbine electrical causing a fire. IR repaired.

Operational Issues



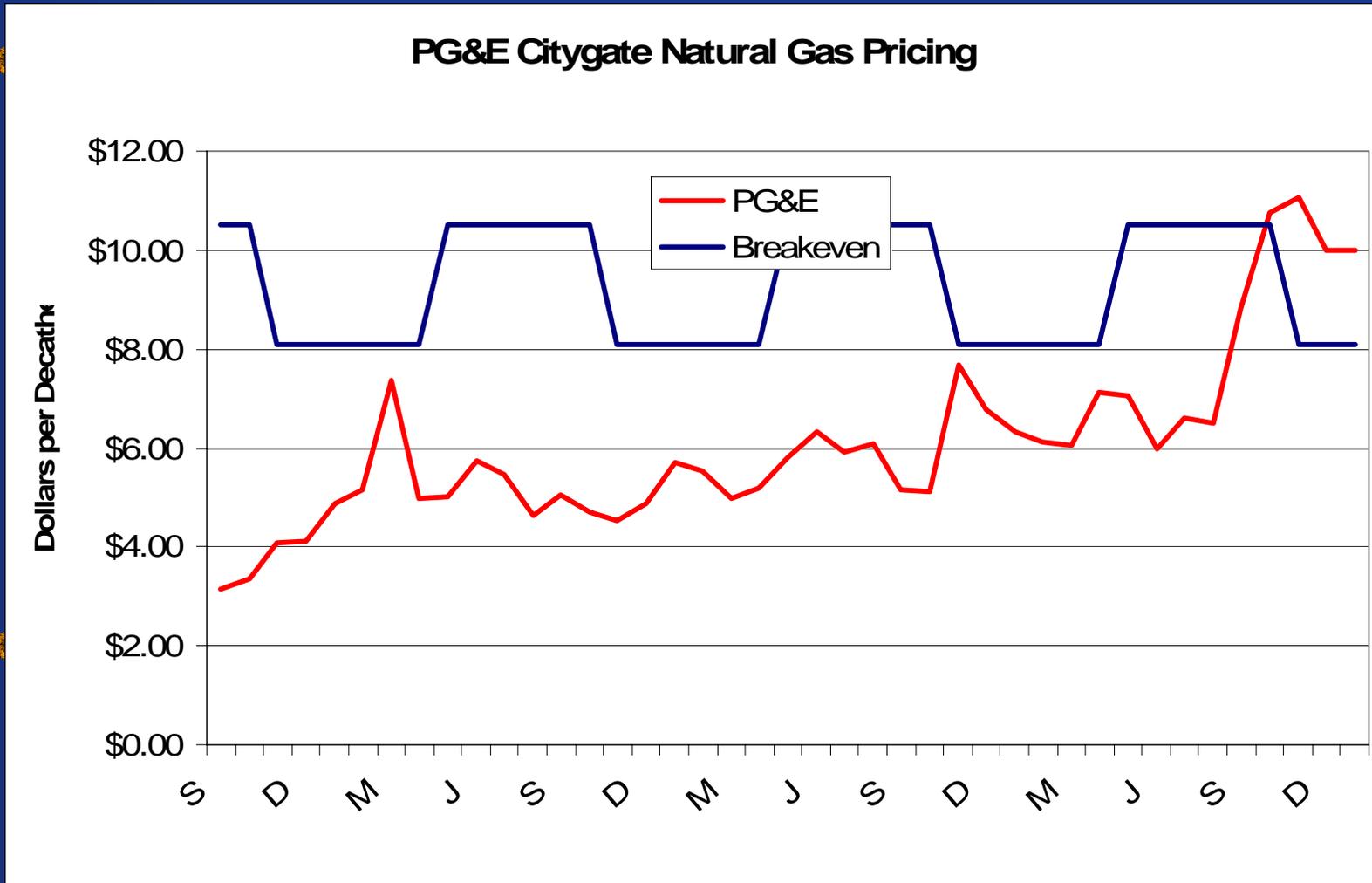
Operational Issues

- A speed sensor on the turbine vanes has been a restart issue when the turbine stops and the sensor is looking in between vanes.
- IR is looking for a solution.

Operational Issues

- **City permitting was an issue because the city inspectors had never seen a microturbine and did not know how to inspect.**

Operational Issues



Operational Issues

- **We commend IR on their Customer Service.**
 - **John Richardson, the IR regional technician is very responsive to our needs.**
 - **Exceptional Service...**

Questions?

