



CALPINE CORP.

CALIFORNIA POWER MARKET

RECYCLED WATER USAGE

METCALF ENERGY CENTER

LOS ESTEROS ENERGY CENTER

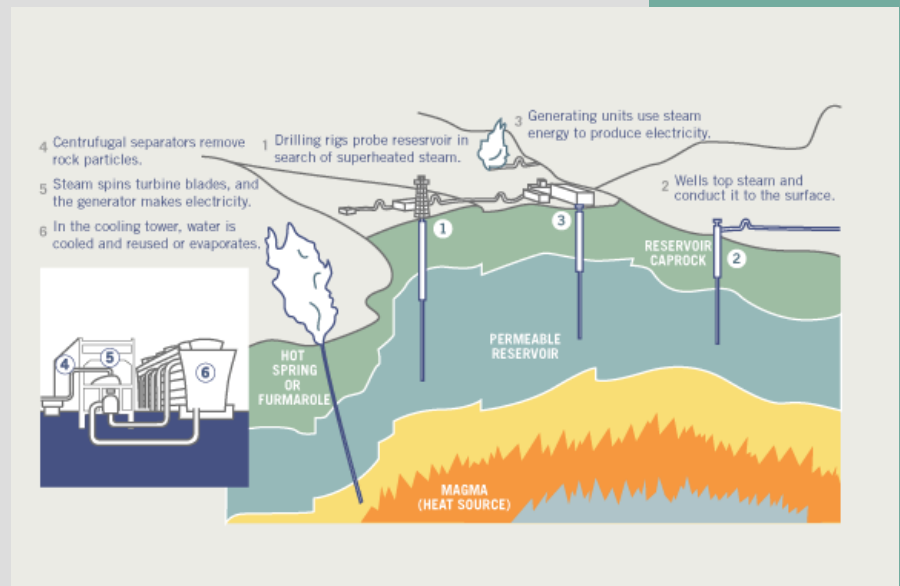
3/14/2017

# Calpine: America's largest independent power producer

- 80 power plants in operation or under construction
- 18 states and Canada (with retail, 25 states plus Mexico)
- Approximately 26,000 megawatts of capacity
- Clean emissions profile: Calpine's modern plants emit the fewest greenhouse gases (GHG) per megawatt hour (MWh) generated as compared to other fossil fuel plants

# The Geysers: World's Single Largest Geothermal Resource

- Located about 100 miles north of San Francisco, in the Mayacamas Mountains
- Able to generate up to 700 megawatts around the clock
- Provides 12% of California's renewable electric generation
- Provides 41% of U.S. geothermal generation



# WHAT IS HAPPENING WITH THE CALIFORNIA POWER MARKET?

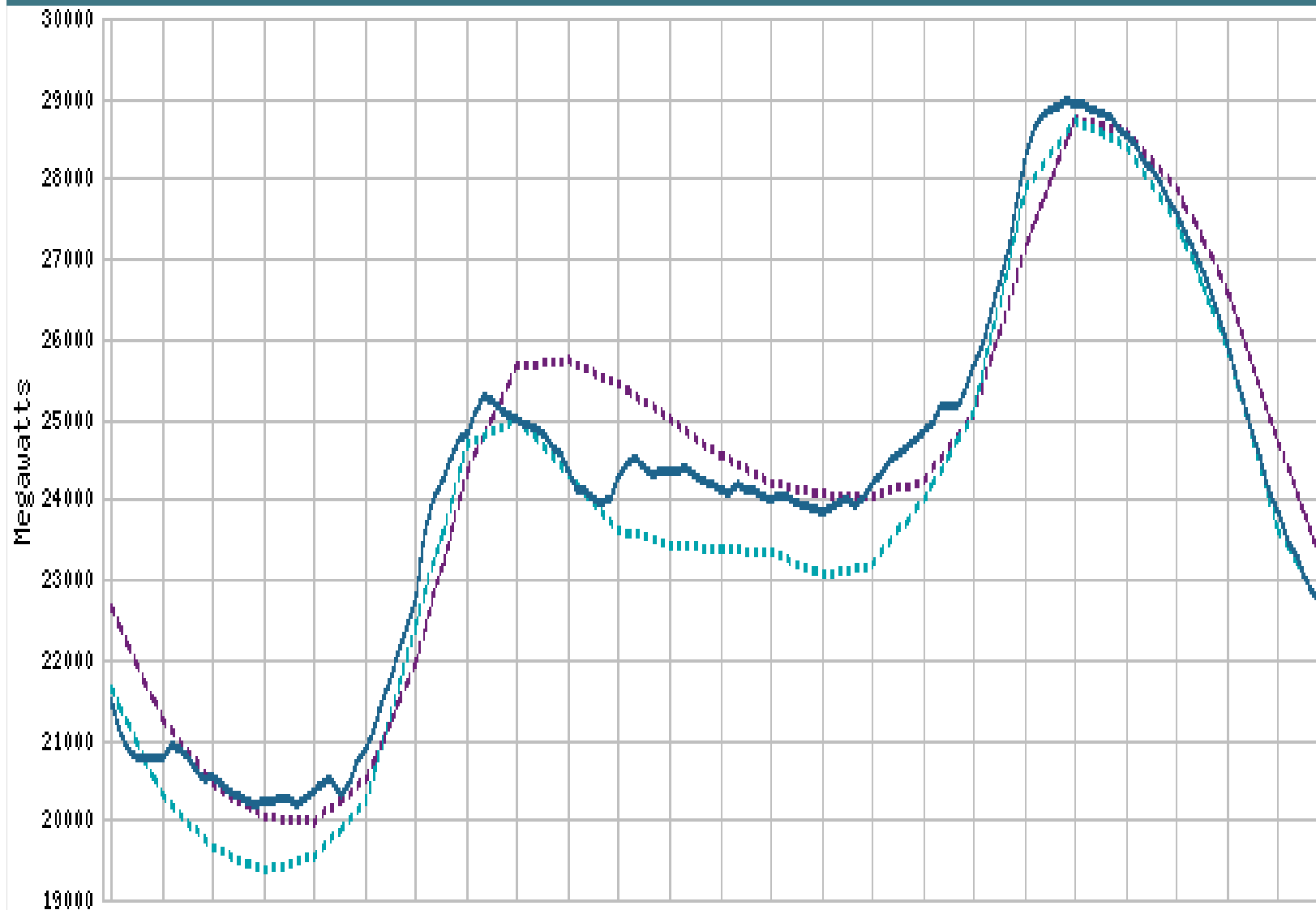


## California ISO Peak Load History 1998 through 2015

Year	Megawatts at Peak Load*	Date	Time
1998	44,659	August 12	14:30
1999	45,884	July 12	16:52
2000	43,784	August 16	15:17
2001	41,419	August 7	16:17
2002	42,441	July 10	15:01
2003	42,689	July 17	15:22
2004	45,597	September 8	16:00
2005	45,431	July 20	15:22
2006	50,270	July 24	14:44
2007	48,615	August 31	15:27
2008	46,897	June 20	16:21
2009	46,042	September 3	16:17
2010	47,350	August 25	16:20
2011	45,545	September 7	16:30
2012	46,846	August 13	15:53
2013	45,097	June 28	16:54
2014	45,089	September 15	16:53
2015	47,358	September 10	16:53

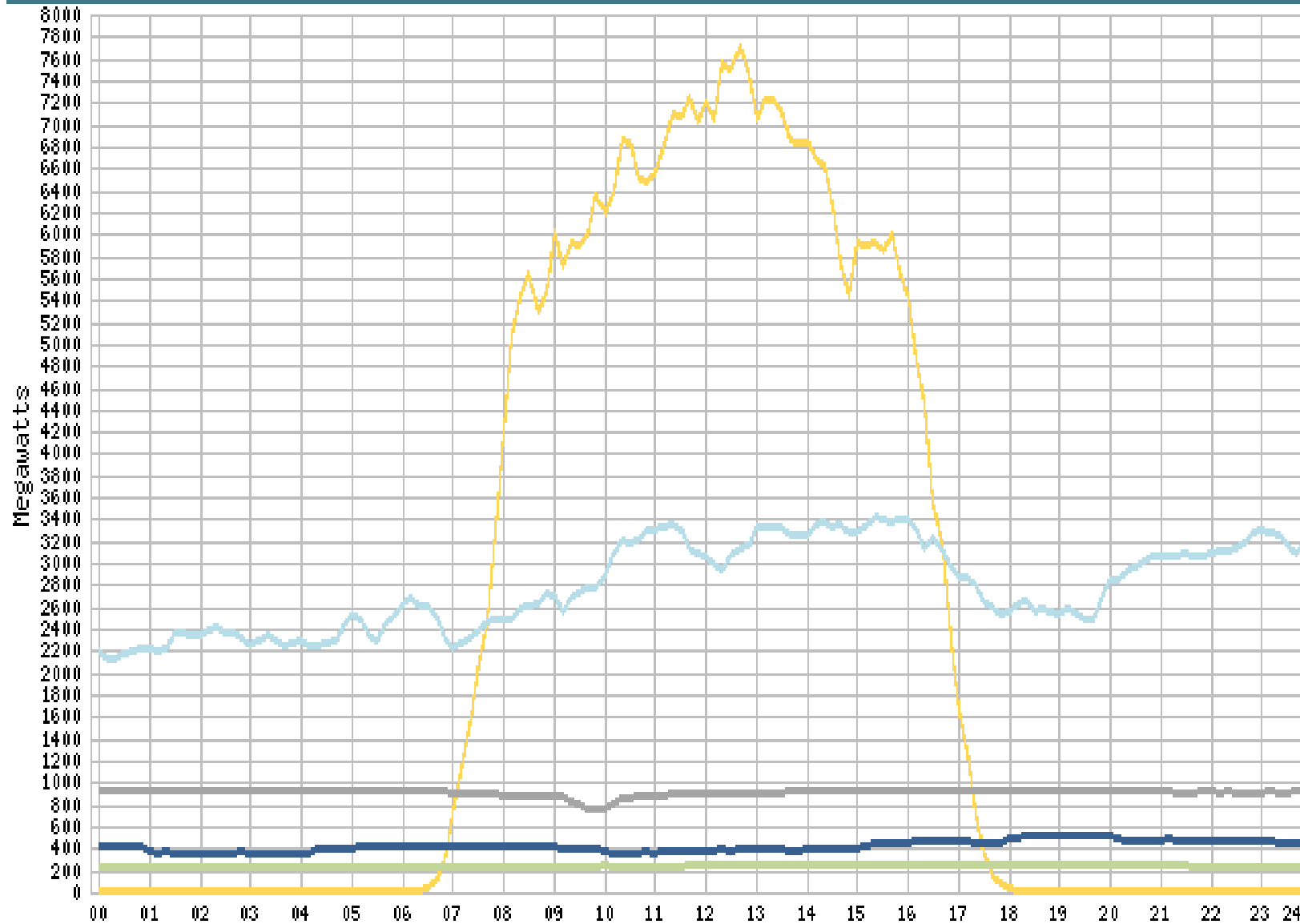


# Total California Generation 02/22/17



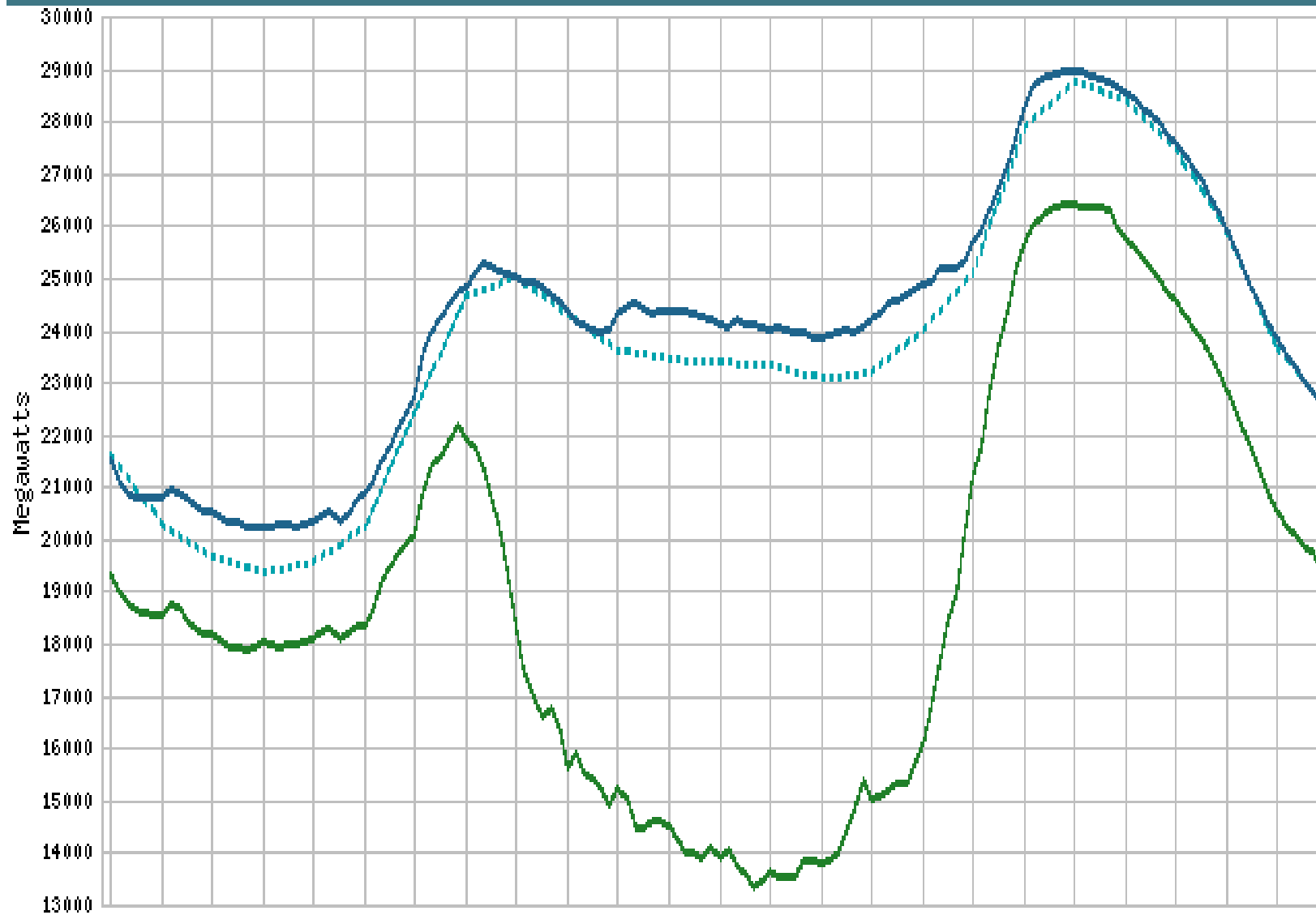
# California Renewable Power 02/22/17

Yellow-Solar, Blue-Wind, Grey-Geothermal, Dark Blue-Small Hydro



# California Duck 02/22/17

Blue-Total Load, Green- Net generation minus Variable renewables (Wind and Solar)





Fuel Type	California In-State Generation (GWh)	Percent of California In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	California Power Mix (GWh)	Percent California Power Mix
Coal	538	0.30%	294	16,903	17,735	6.00%
Large Hydro	11,569	5.90%	2,235	2,144	15,948	5.40%
Natural Gas	117,490	59.90%	49	12,211	129,750	44.00%
Nuclear	18,525	9.40%	0	8,726	27,251	9.20%
Oil	54	0.00%	0	0	54	0.00%
Other	14	0.00%	0	0	14	0.00%
Renewables	48,005	24.50%	12,321	4,455	64,781	21.90%
Biomass	6,362	3.20%	1,143	42	7,546	2.60%
Geothermal	11,994	6.10%	132	757	12,883	4.40%
Small Hydro	2,423	1.20%	191	2	2,616	0.90%
Solar	15,046	7.70%	0	2,583	17,629	6.00%
Wind	12,180	6.20%	10,855	1,072	24,107	8.20%
Unspecified Sources of Power	N/A	N/A	20,901	18,972	39,873	13.50%
Total	196,195	100.0%	35,800	63,410	295,405	100.0%



# METCALF ENERGY CENTER

3/14/2017

# ACROSS FROM PG&E SUBSTATION





# METCALF - PRIOR USE OF LAND — A JUNKYARD



# Metcalf



## METCALF ENERGY CENTER — QUICK FACTS

- 600-mw Natural Gas-Fired Combined-Cycle Power Plant (two 185mw CTs and one 230mw ST)
- 11 Acres Usable Space Within 20-Acre Site
- Meets Electrical Needs of Up to 600,000 Households

## BENEFITS OF METCALF ENERGY CENTER

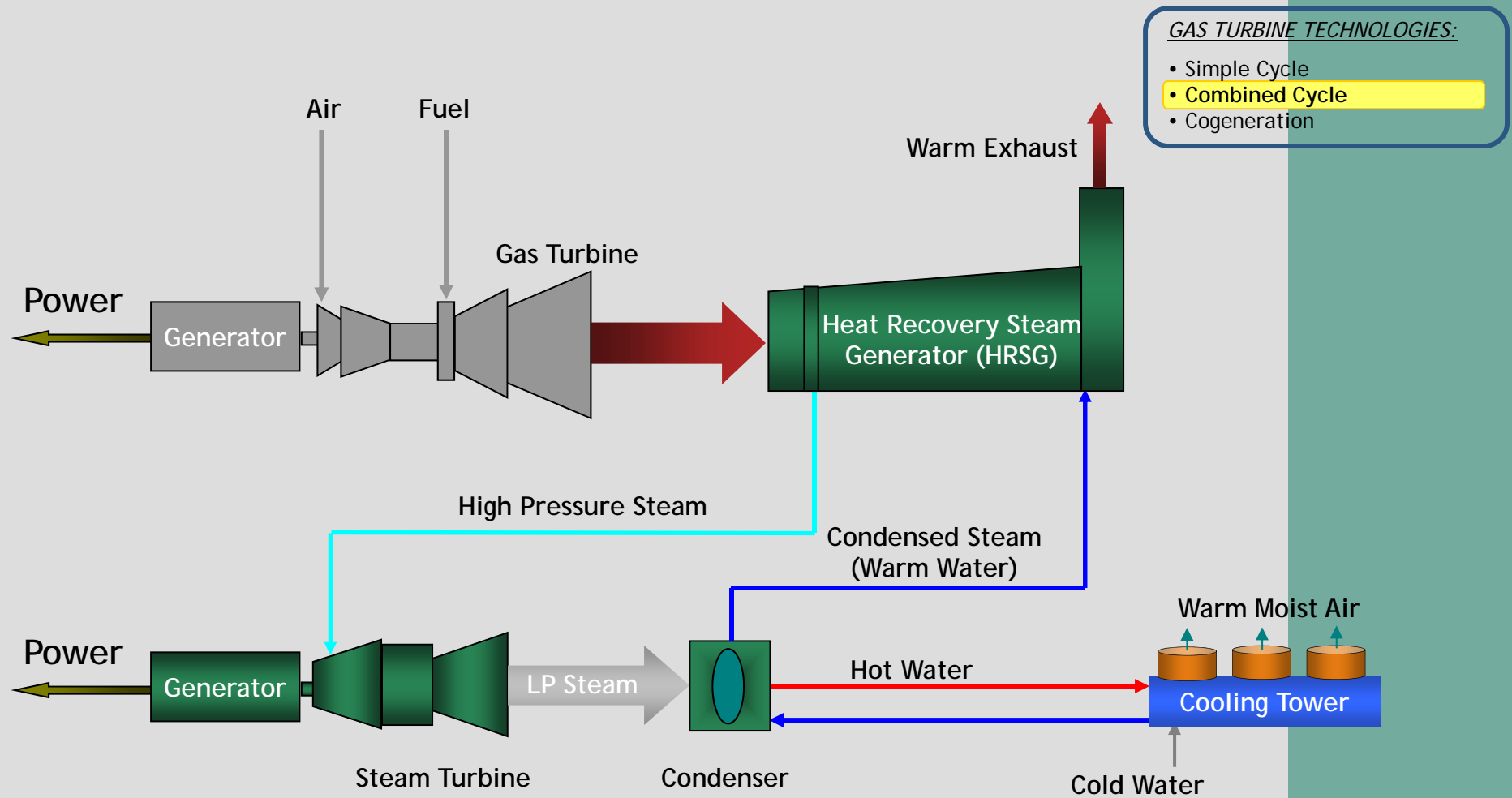
- **Uses Approximately 2.5 Million Gallons Per Day of City's Recycled Water**

## RESPONDED TO COMMUNITY CONCERNS

- **Reduced Emissions to Lowest Levels in Bay Area**
- **Architecturally Designed Plant to Resemble Office Building, to be Compatible With Future Coyote Valley Development**

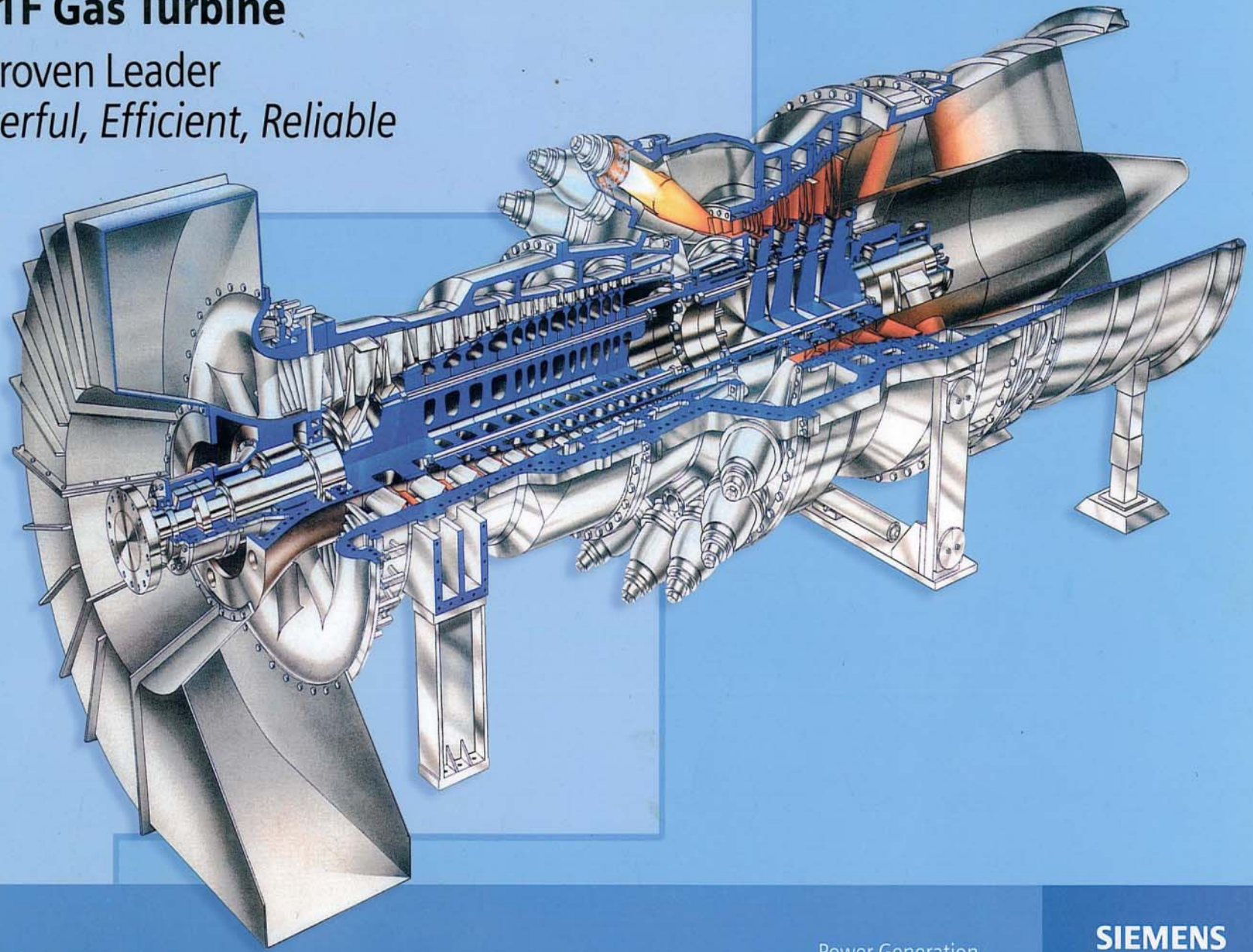


# Combined Cycle Plant



# W501F Gas Turbine

The Proven Leader  
- *Powerful, Efficient, Reliable*



Power Generation

**SIEMENS**  
Westinghouse







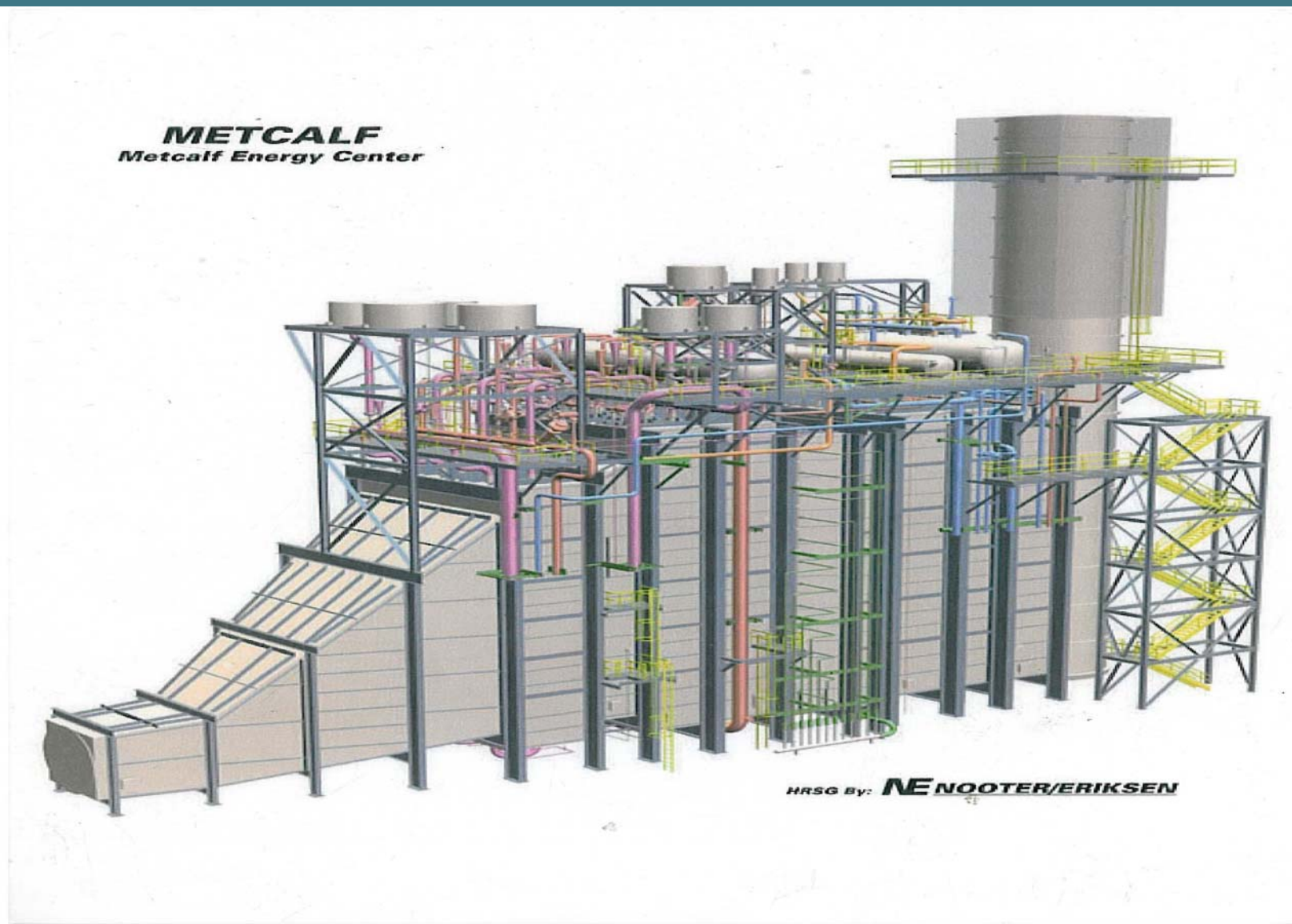


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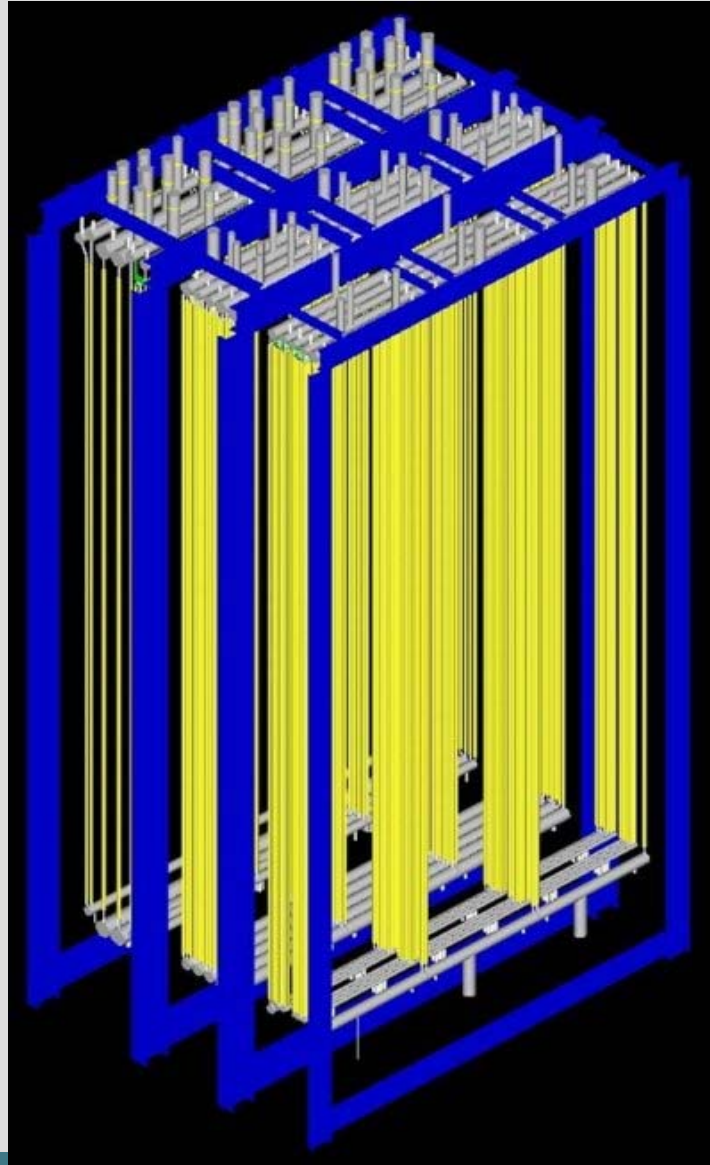
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# Heat Recovery Steam Generators (HRSGs)



# HRSG







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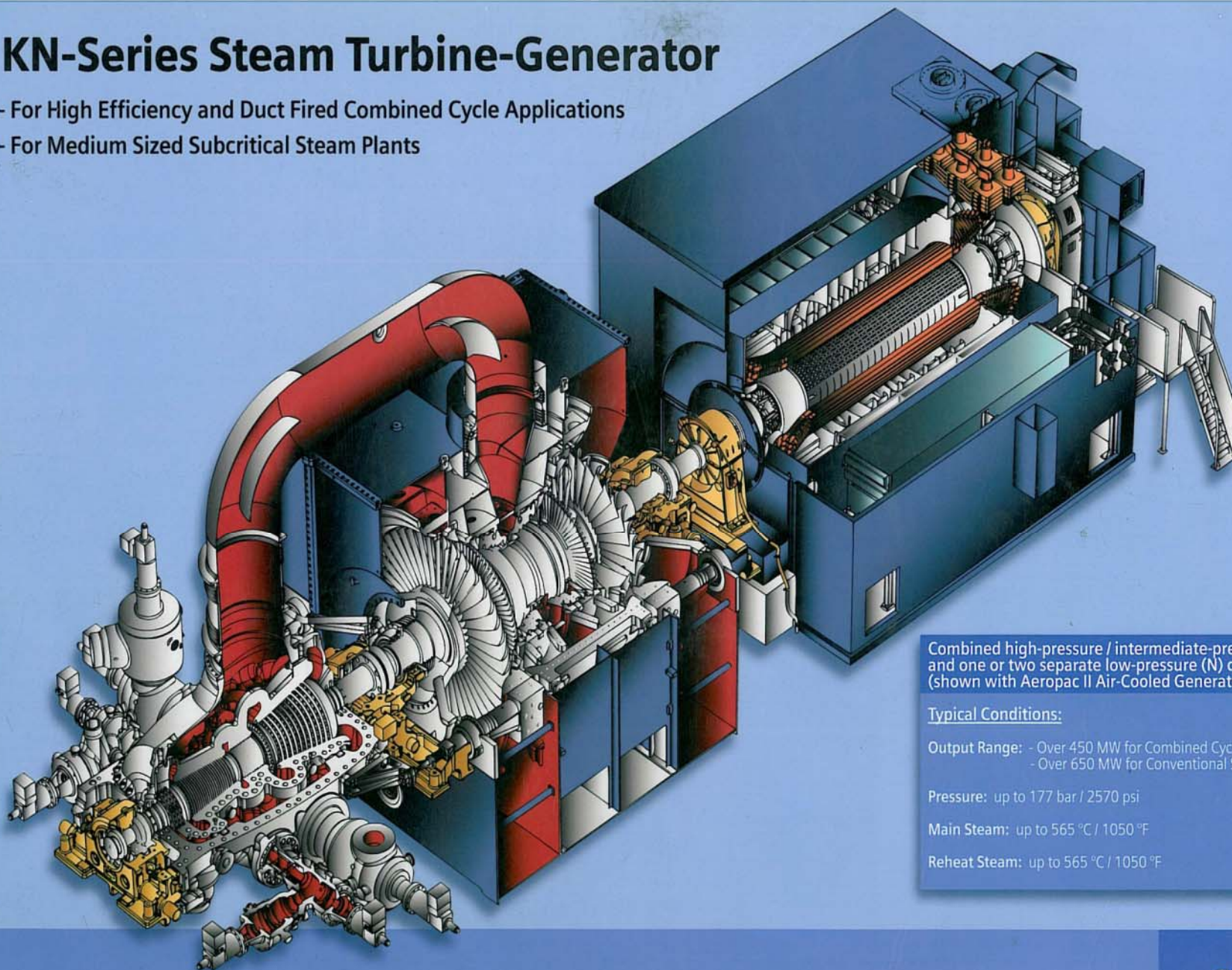






# KN-Series Steam Turbine-Generator

- For High Efficiency and Duct Fired Combined Cycle Applications
- For Medium Sized Subcritical Steam Plants



Combined high-pressure / intermediate-pressure (K) cylinder and one or two separate low-pressure (N) cylinders (shown with Aeropac II Air-Cooled Generator)

#### Typical Conditions:

Output Range: - Over 450 MW for Combined Cycle Applications  
- Over 650 MW for Conventional Steam Applications

Pressure: up to 177 bar / 2570 psi

Main Steam: up to 565 °C / 1050 °F

Reheat Steam: up to 565 °C / 1050 °F

Power Generation

**SIEMENS**  
Westinghouse



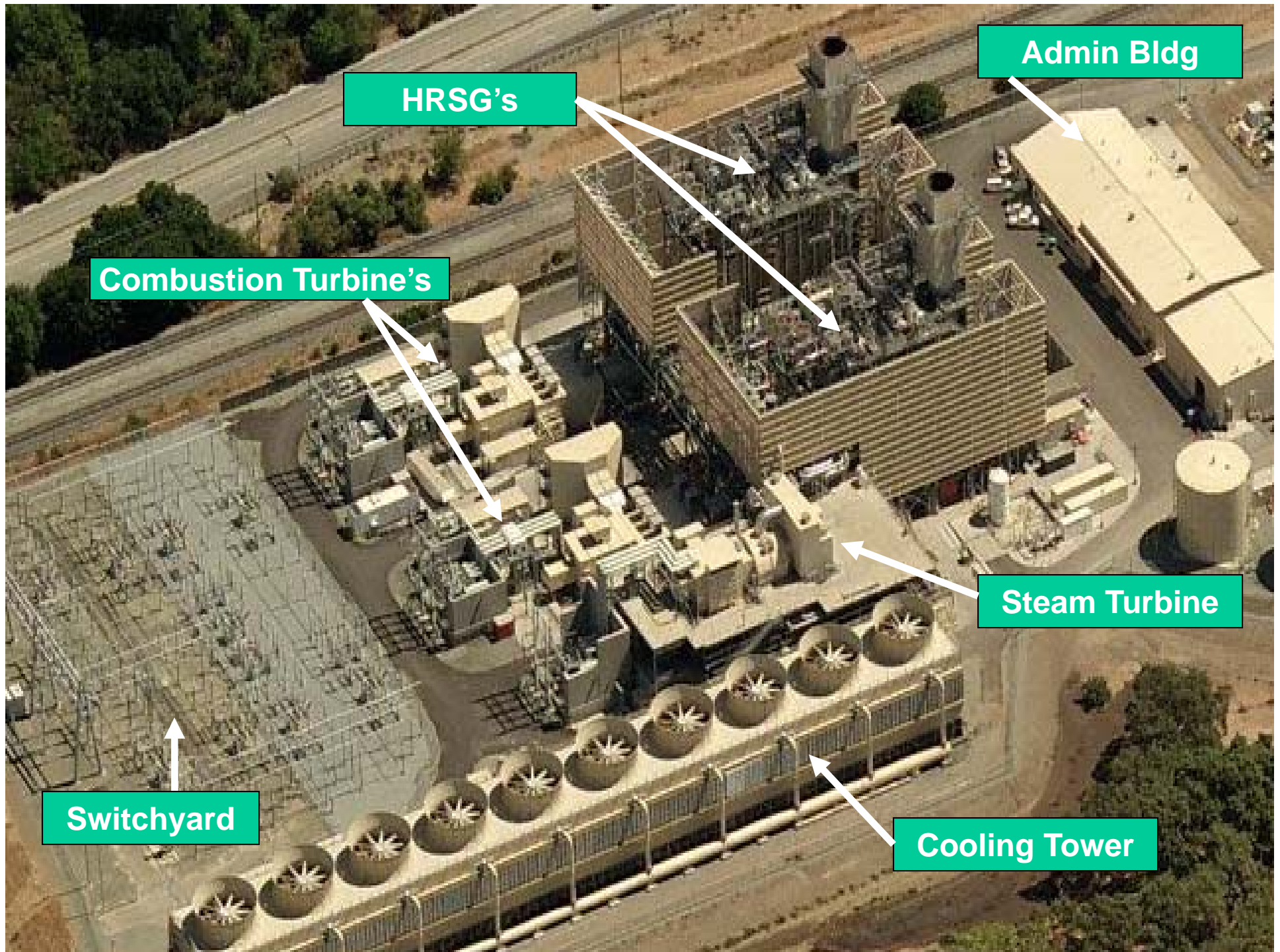




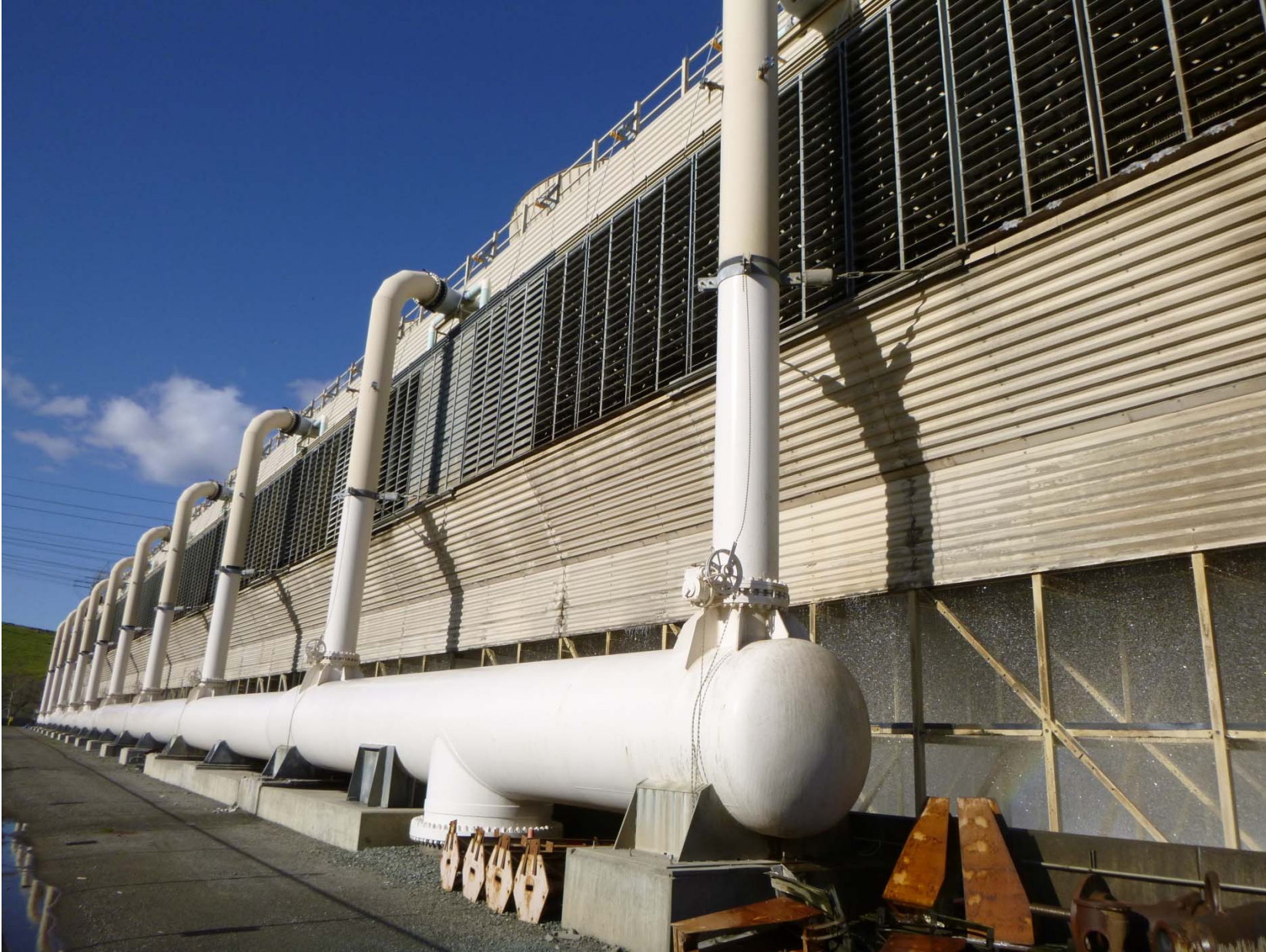












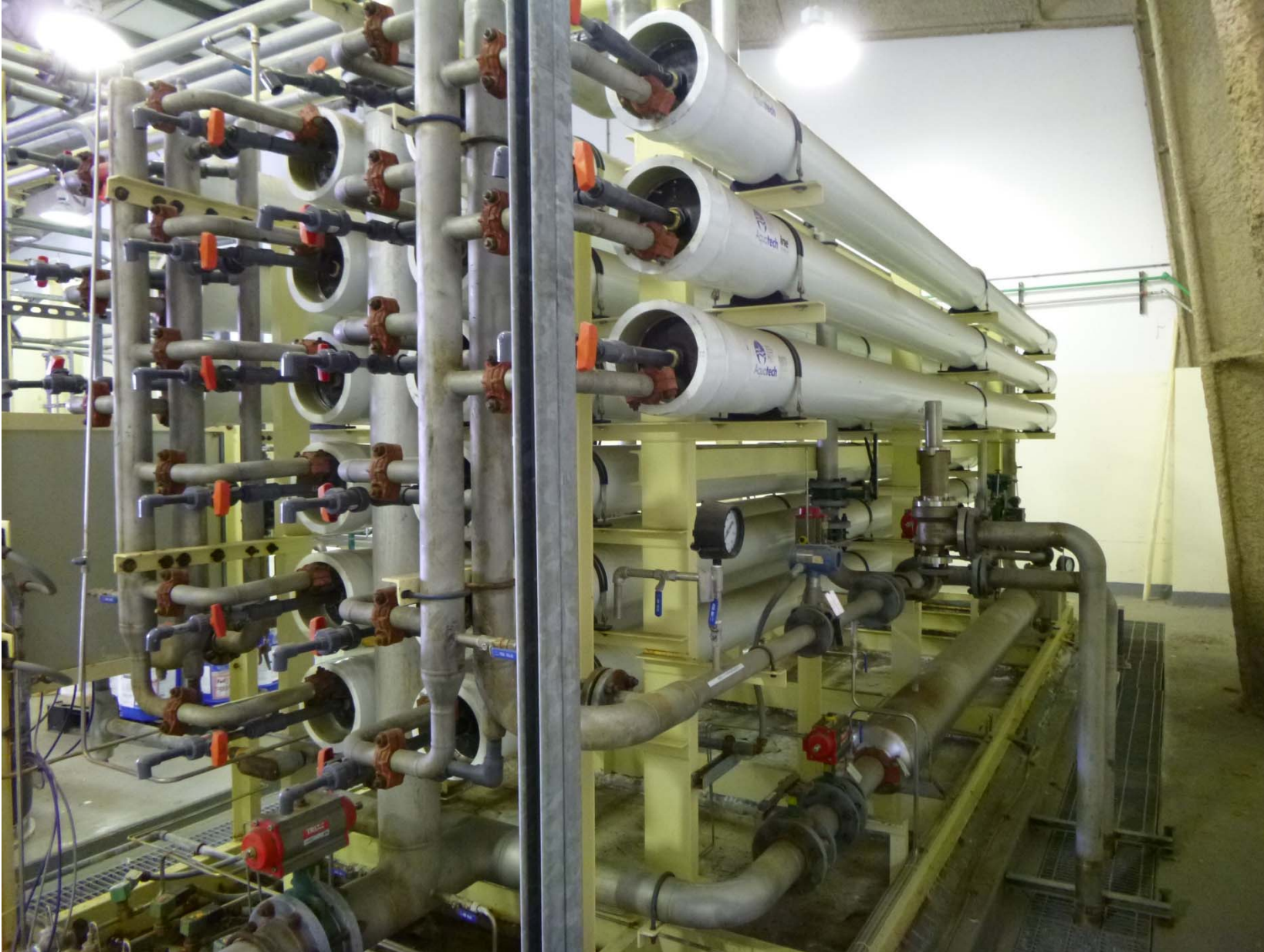


















## LECEF — QUICK FACTS

- **310-mw Natural Gas-Fired Combined-Cycle Power Plant**
- **Four GE LM6000 CTs (49mw) and one Mitsubishi ST (120mw)**
- **Meets Electrical Needs of Up to 300,000 Households**







# LM6000





# LECEF (Combined Cycle)





