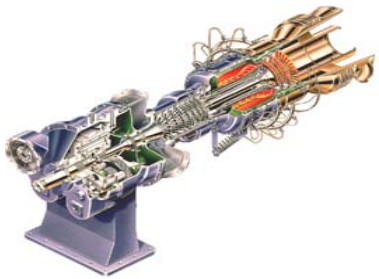
Solar Turbines
A Caterpillar Company

Combustion Turbines in CHP Applications

By
Chris Lyons
Phone: 1-858-694-6586
Email: clyons@solarturbines.com

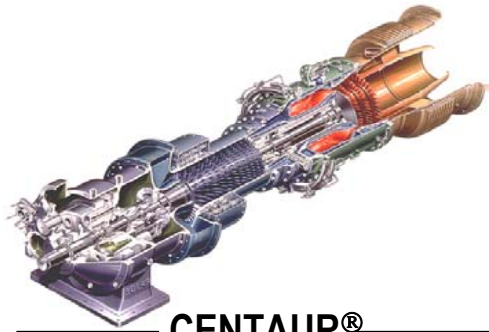
Solar Turbines
A Caterpillar Company

Gas Turbine-Generator Product Line



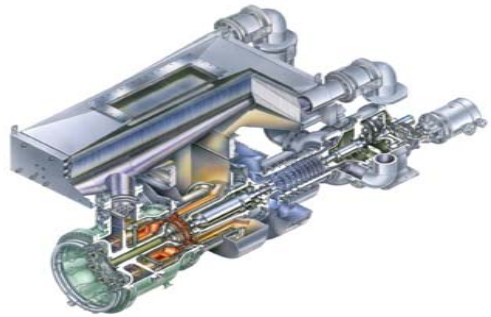
SATURN®

Saturn 20	1 210 kW



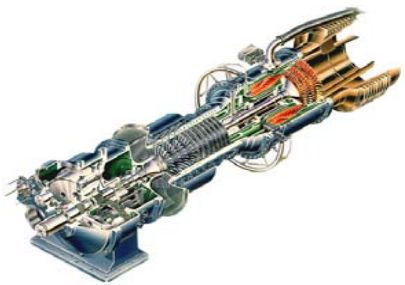
CENTAUR®

Centaur 40	3 515 kW
Centaur 50	4 600 kW



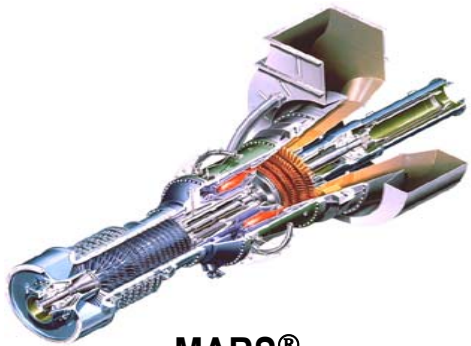
MERCURY™

Mercury 50	4 600 kW



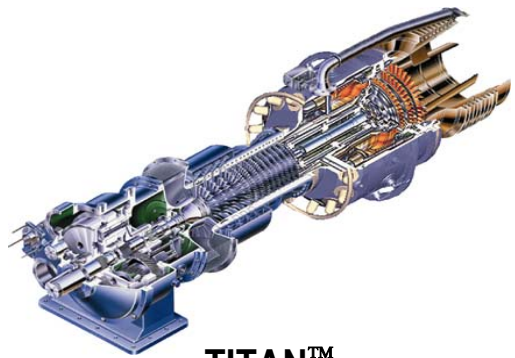
TAURUS™

Taurus 60	5 500 kW
Taurus 65	6 300 kW
Taurus 70	7 520 kW



MARS®

Mars 90	9 450 kW
Mars 100	10 690 kW



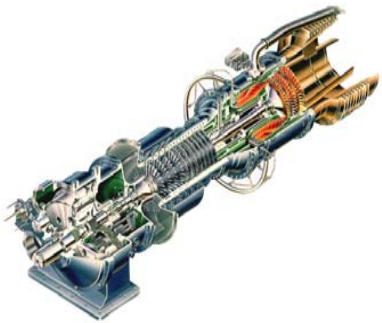
TITAN™

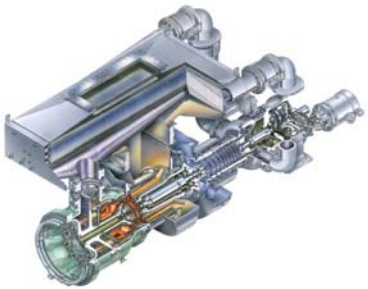
Titan 130	15 000 kW

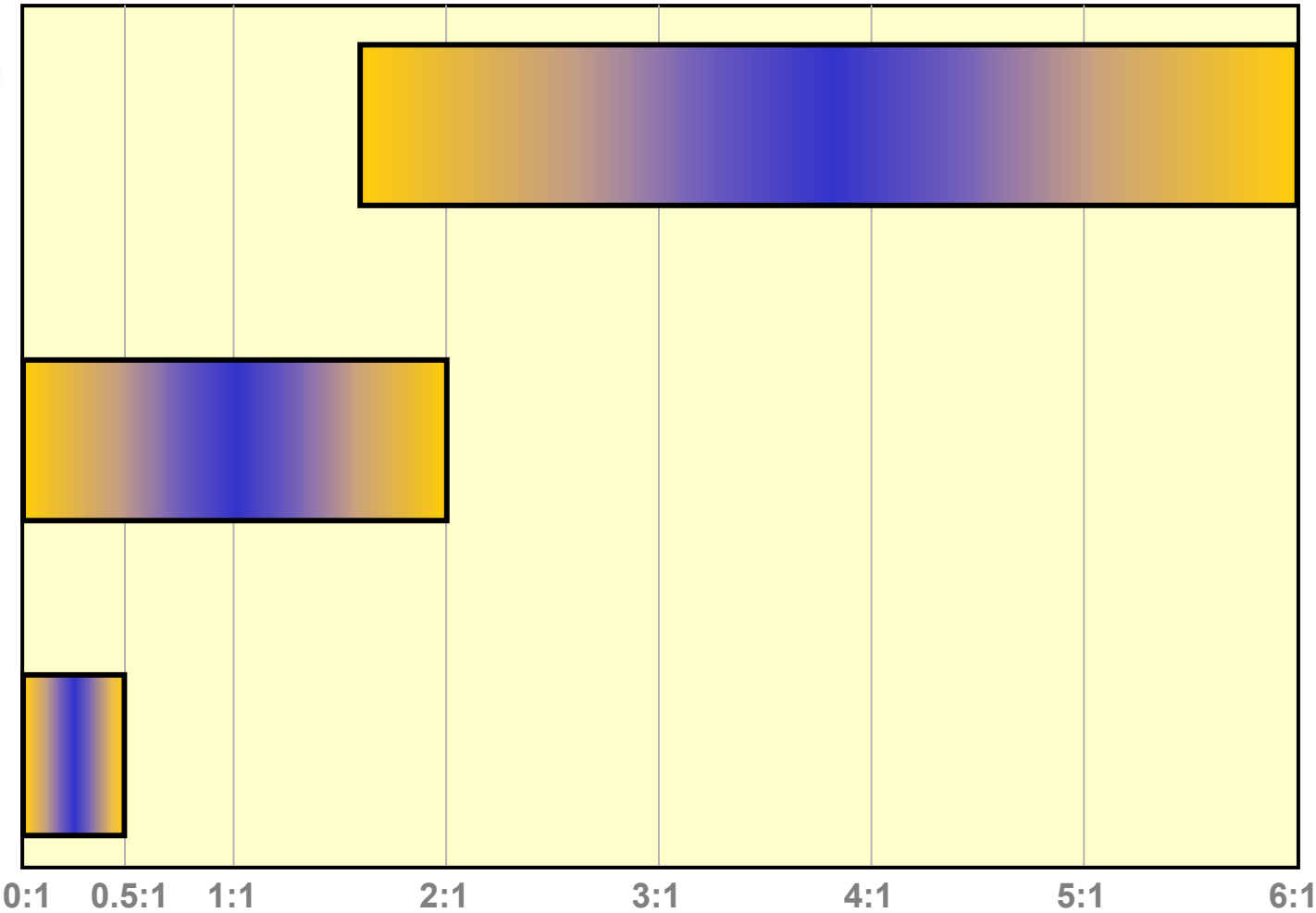
Solar Turbines
A Caterpillar Company

Turbines for Thermal and Cooling Requirements

We Can Serve Your Application Requirements





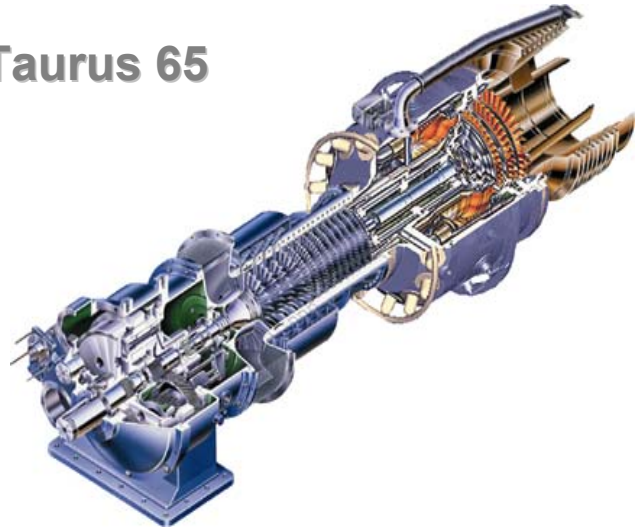


STOC03ML-3

Solar Turbines
A Caterpillar Company

Turbines Provide More Thermal Heat

Taurus 65



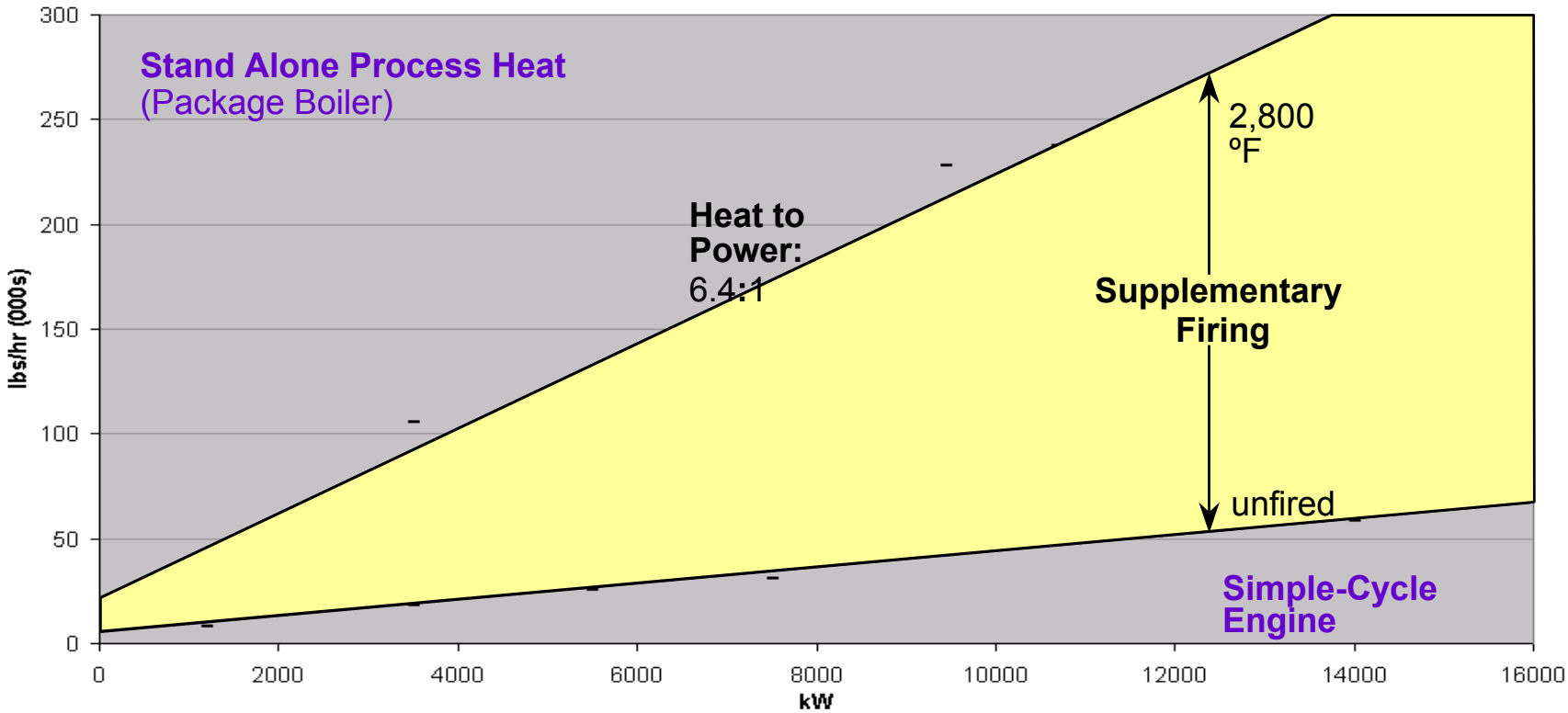
Output:	6,300 kW
Thermal:	33,230 lbs/hr @ 80 psig up to 125,000 lbs/hr
Elect Eff'y:	31.6%
Cycle Eff'y:	84.0 to 92,1%

16GCM34

Output:	5,900 kW
Thermal:	7,000 lbs/hr @ 80 psig
Elect Eff'y:	43.1%
Cycle Eff'y:	58.1%

Turbines Provide Supplemental Firing for More Thermal Output Flexibility

Solar Turbines - Heat: Power Ratios for CHP



Solar Turbines
A Caterpillar Company

CHP System Performance

Product	Power, MWe	Exhaust Energy, GJ/hr	Steam Flow Unfired		Steam Fired to 871ºC	
			Flow, tph X 1000	System Eff, %	Flow, tph X 1000	System Eff, %
Saturn 20	1.2	9.6	4.0	77	8.4	89
Centaur 40	3.4	23.0	8.9	76	24.2	87
Centaur 50	4.5	28.1	11.5	80	24.0	88
Mercury 50	4.5	16.8	6.3	74	22.4	85
Taurus 60	5.5	32.2	13.5	83	28.1	90
Taurus 65	6.1	34.4	14.7	84	27.3	90
Taurus 70	7.4	34.4	15.6	84	34.5	90
Mars 100	10.4	51.8	23.5	82	53.3	90
Titan 130	14.6	70.7	29.3	82	64.1	90

ISO Conditions: 59°F; 75mm. Inlet, 254mm Exhaust Losses;
Sea Level; Saturated Steam @ 10.3 barg

Mercury 50 Low Emissions, High Efficiency

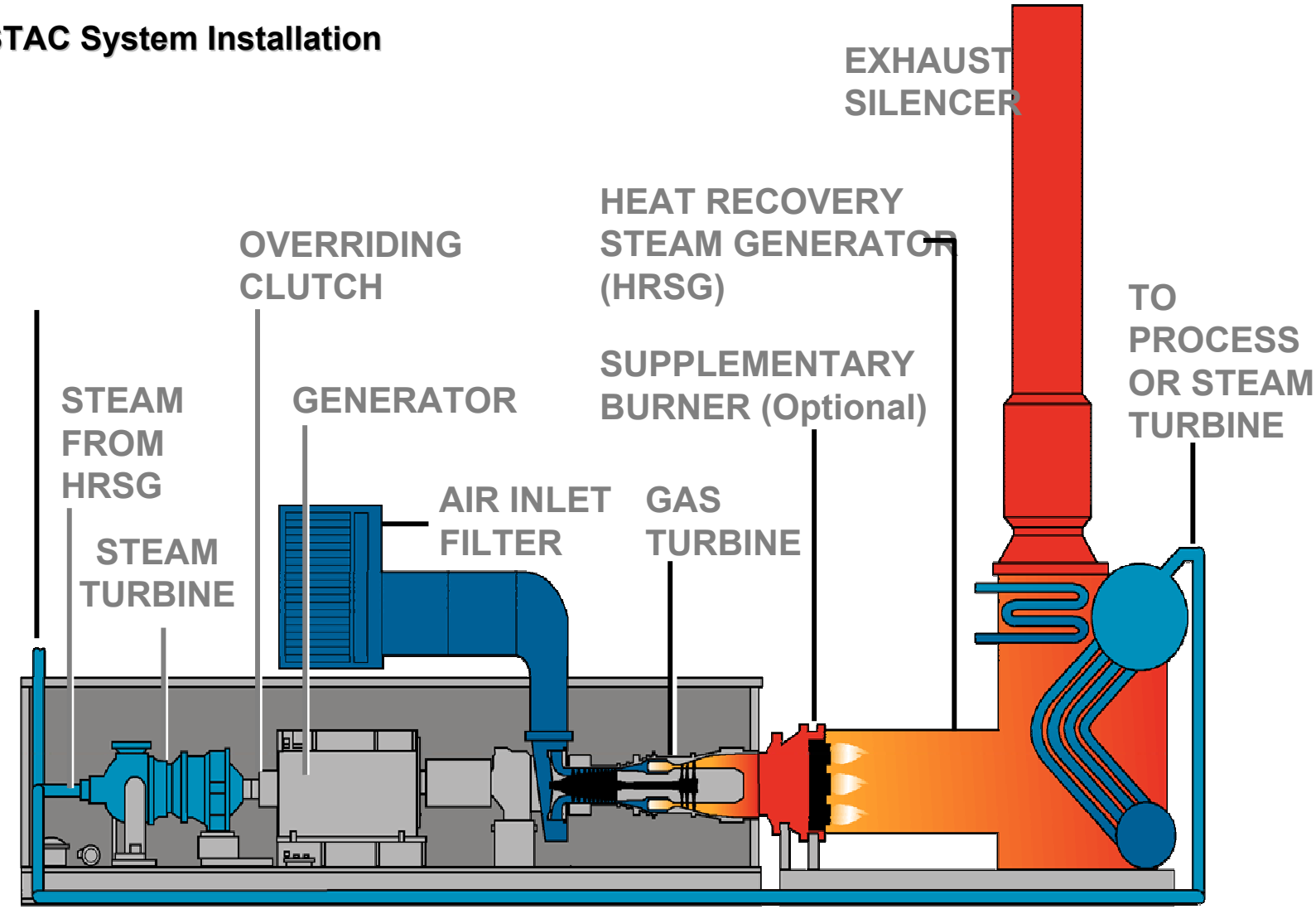
M50 Plant in Operation at VA Hospital

Veterans Administration Hospital
San Diego, California

Solar Turbines
A Caterpillar Company

Steam Turbine Assisted Co-generation

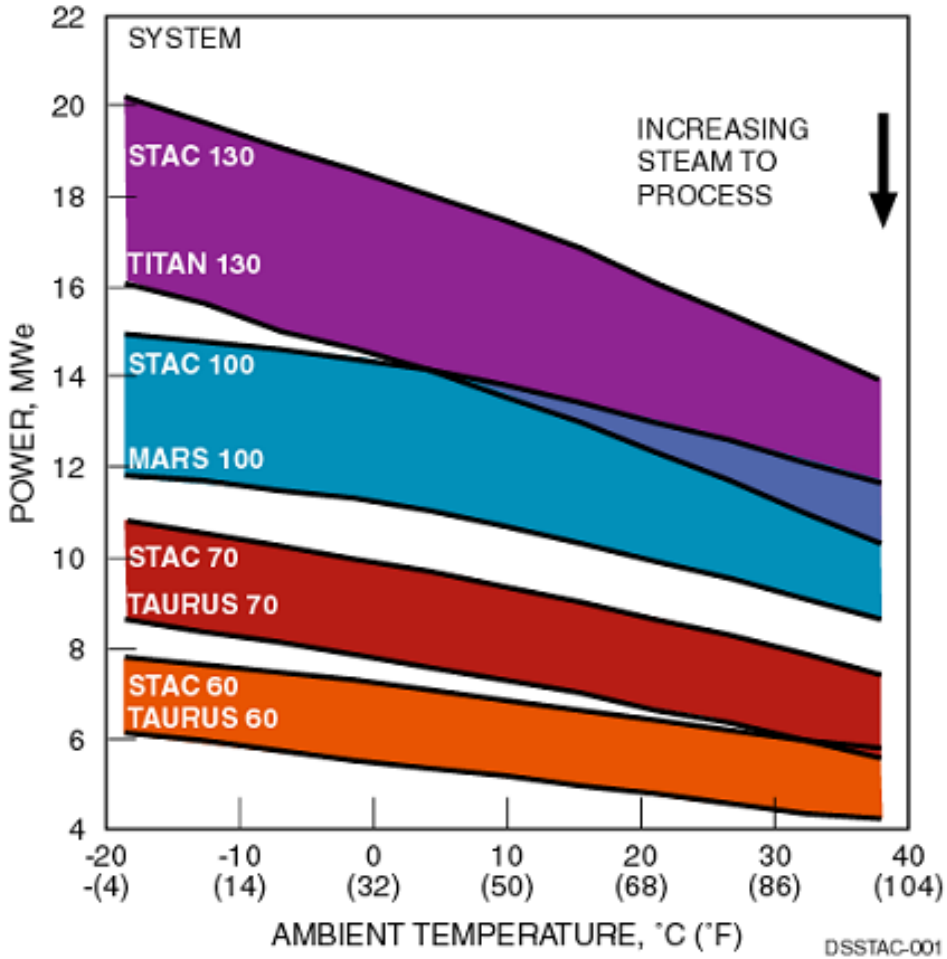
STAC System Installation



VPCOGEN(98)-019

Solar Turbines
A Caterpillar Company

STAC Performance Coverage



Solar Turbines
A Caterpillar Company

STAC at Rice University

7 MWe Combined Cycle Plant

Solar Turbines
A Caterpillar Company

4500 kWe with 2500 Tons of Chilling

Solar Turbines
A Caterpillar Company

Government / Military Turbine Installations

Lackland AFB, San Antonio, TX	10 MW
29 Palms Marine Base, California	7 MW
Veterans Hospital San Diego, CA.	5 MW
Ft. Bragg Army Base North Carolina	5 MW
Veterans Hospital North Chicago	12 MW
Veterans Hospital West Chicago	5 MW
GSA, Washington DC	10 MW
Groton Navy Yard, Groton, CT	5 MW
Valcartier AFB, Quebec City	3 MW
Portsmouth Navy Yard, Portsmouth, NH	5 MW
Social Security Administration	28 MW
Balboa Naval Hospital, San Diego	9 MW
U.S. Coast Guard, Kodiak, AK	6 MW
National Animal Research Center, Ames, IA	1 MW
Avenal State Prison, Avenal, CA	7 MW
Hunterdon State Prison, Clinton, NJ	4 MW
Otay State Prison, San Diego	3 MW
Satellite Center, Sunnyvale, CA	12 MW
Wisconsin State Prison, Waupun, WI	1 MW

Solar Turbines
A Caterpillar Company

5 MW CHP at Ft. Bragg Army Base

Solar Turbines
A Caterpillar Company

Lackland AFB, San Antonio, Texas

10 MW Combined Heat and Power Plant

Solar Turbines
A Caterpillar Company

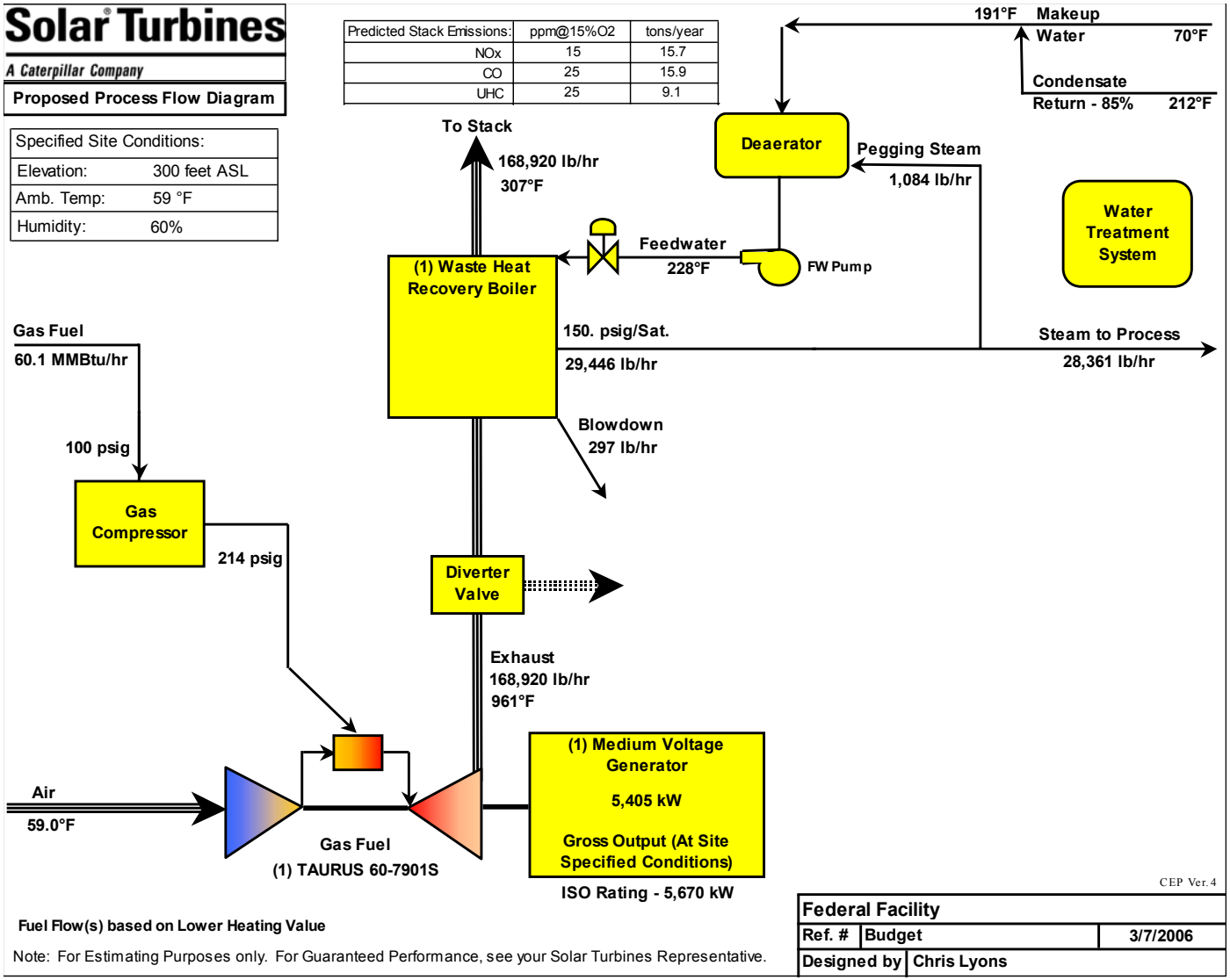
Mobile Power for Quick Response Requirements

- 5 and 14 MW Configurations
- Easy to Install and Relocate
  - No concrete foundation
- Easy to Permit
  - 25 ppmv (gas fired)
  - Sound attenuated package
- Designed for Remote Operation

- Highest Power Density Available
  - Ideal for urban installations, or
  - Voltage support at substations
- Flexible Ownership Terms
  - Rental
  - Purchase
  - Lease

Solar Turbines
A Caterpillar Company

5 MW CHP Plant Installed for $997/kW



Solar Turbines
A Caterpillar Company

Typical Project Economics for 5 MW CHP

Installed Capital Cost $5,653,700

15 year Lease Payment $693,348/year

Standby Power = $192,268/year

Fuel and Maintenance Cost for CHP = $ 4,817,469/year

Purchased Electricity @ $0.105/kWh = $4,766,645

Boiler Fuel = $2,474,020

Net Savings = $2,230,914 (before capital amortization)

ROI = 2.53 Years

Or

$1,537,566 Savings after Capital Recovery