

AIChE Chicago Symposium 2007

September 25, 2007

WOWGen™ / WOWClean™
Waste Heat Recovery Power Plants

Daniel Stinger
Chairman

Mario Romero
President

Wow Energy, Inc

Texas Energy Center
1650 Hwy 6, Suite 300
Sugar Land, TX 77478
Tele: 281-340-6726

www.wowenergies.com

email: mromero@wowenergies.com



“MEETING THE WORLDS ENERGY & ENVIRONMENTAL CHALLENGES”

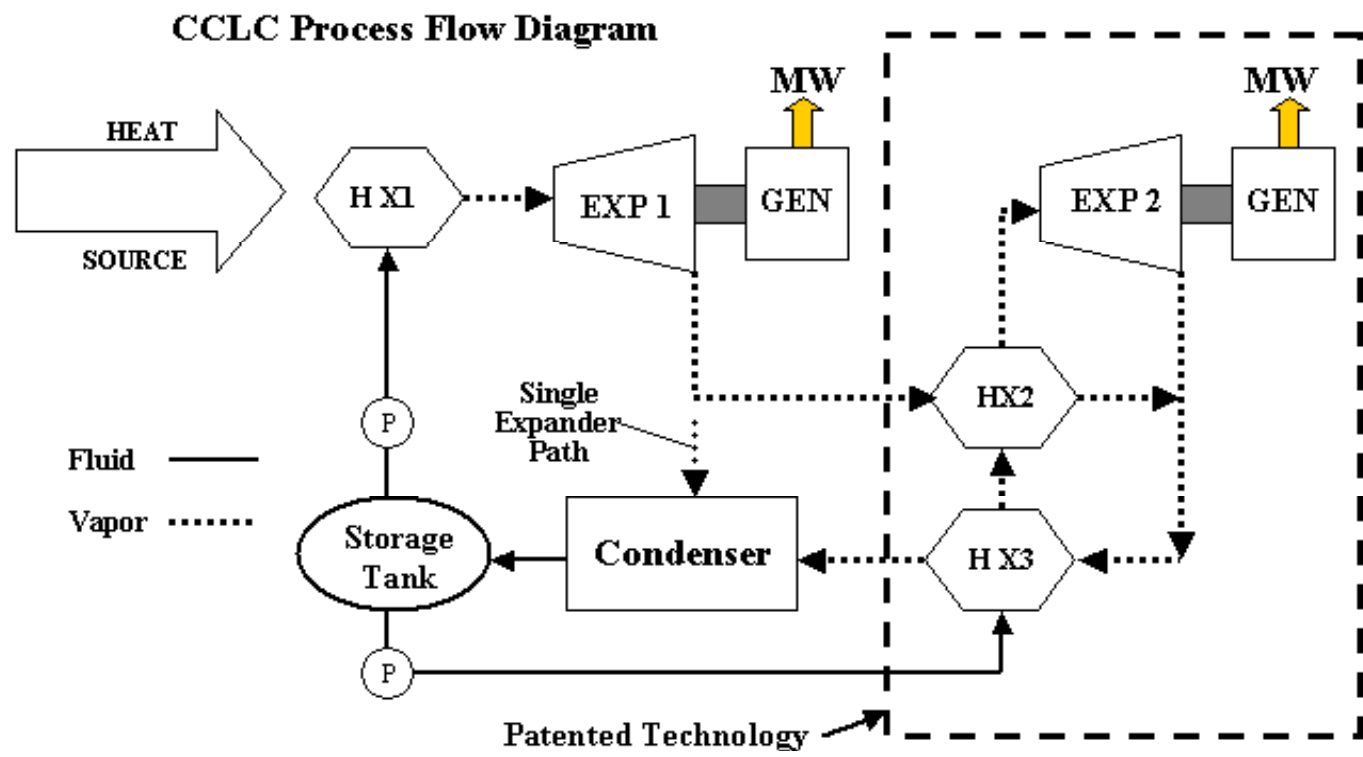


WOW Energy, Inc

BUSINESS MODEL

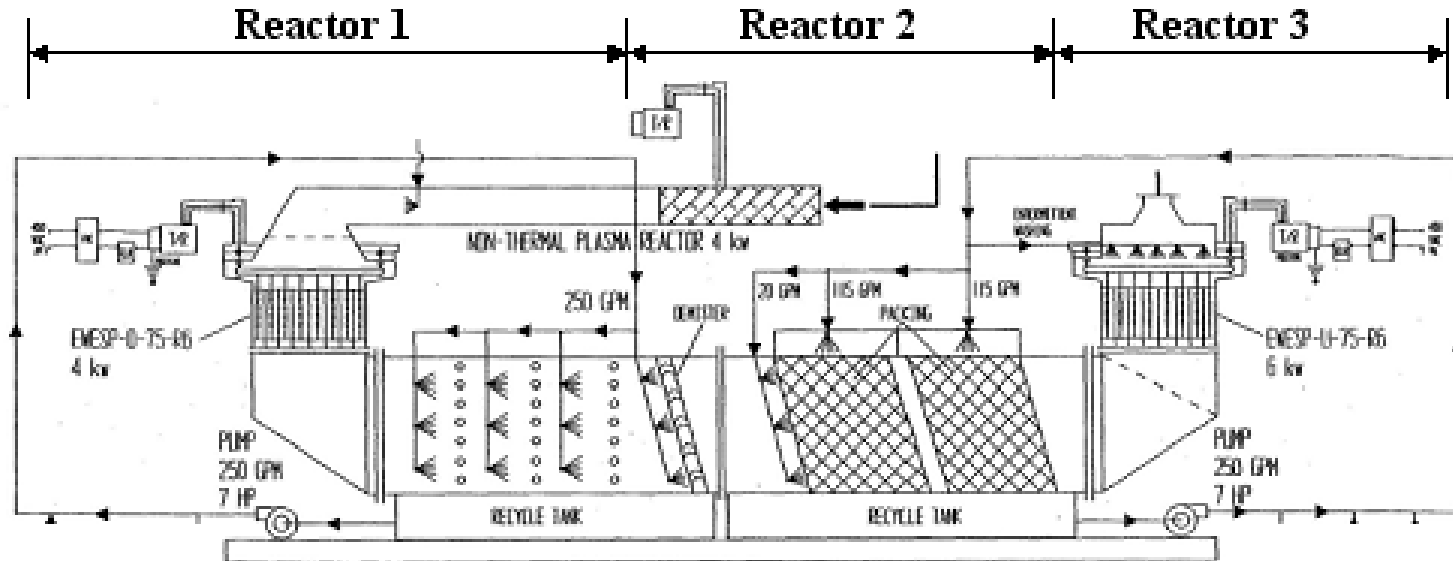
1. Develop technology to convert waste heat to electrical power
 - Technology did not exist to efficiently convert waste heat to power in the 300 F to 800 F temperature range
 - **WOWGen™** combined cycle turbo-expander system – 2 patents issued to date
 - Single stage turbo-expanders for low temperature heat
2. Develop efficient Renewable Energy power plants
 - Solar power plants - **WOWGen™**
 - Solar & Geothermal Energy (SAGE) - **WOWGen™**
 - Biomass power plants - **WOWGen™**
3. Develop multi-pollutant control technology to remove pollutants from flue gases
 - **WOWClean™**

WOWGen™ Cascading Closed Loop Cycle - CCLC



- Combined cycle “dual” turbo-expander system
- Off-the-shelf-components
- Converts heat from the combustion of any fuel
- Converts waste heat to power
- Converts renewable energy to power

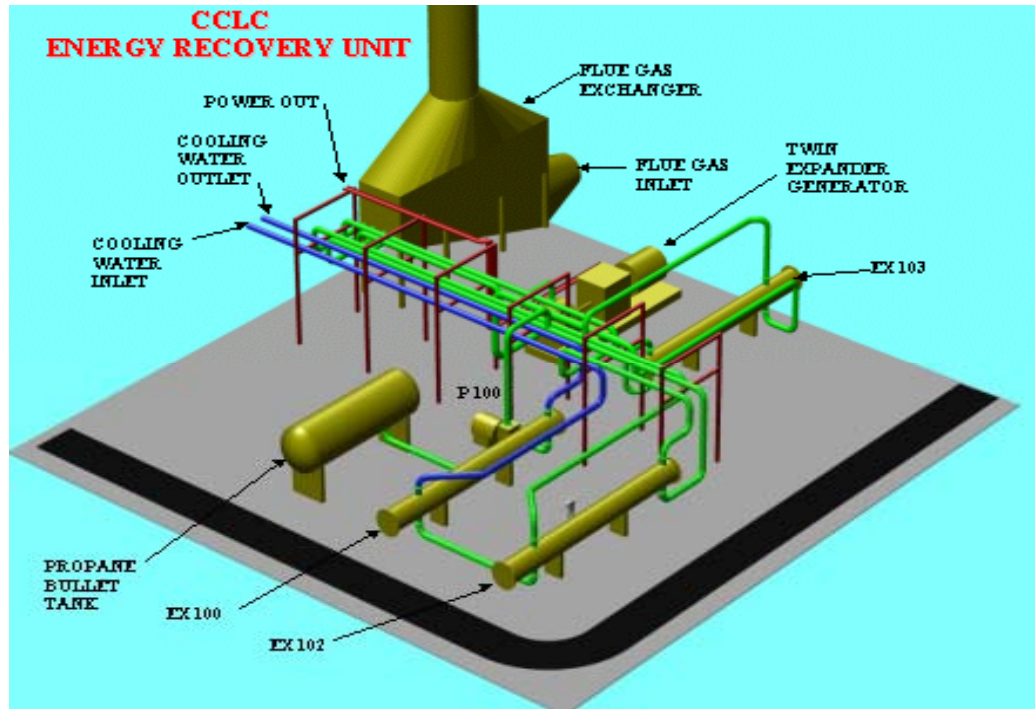
WOWClean™ Features



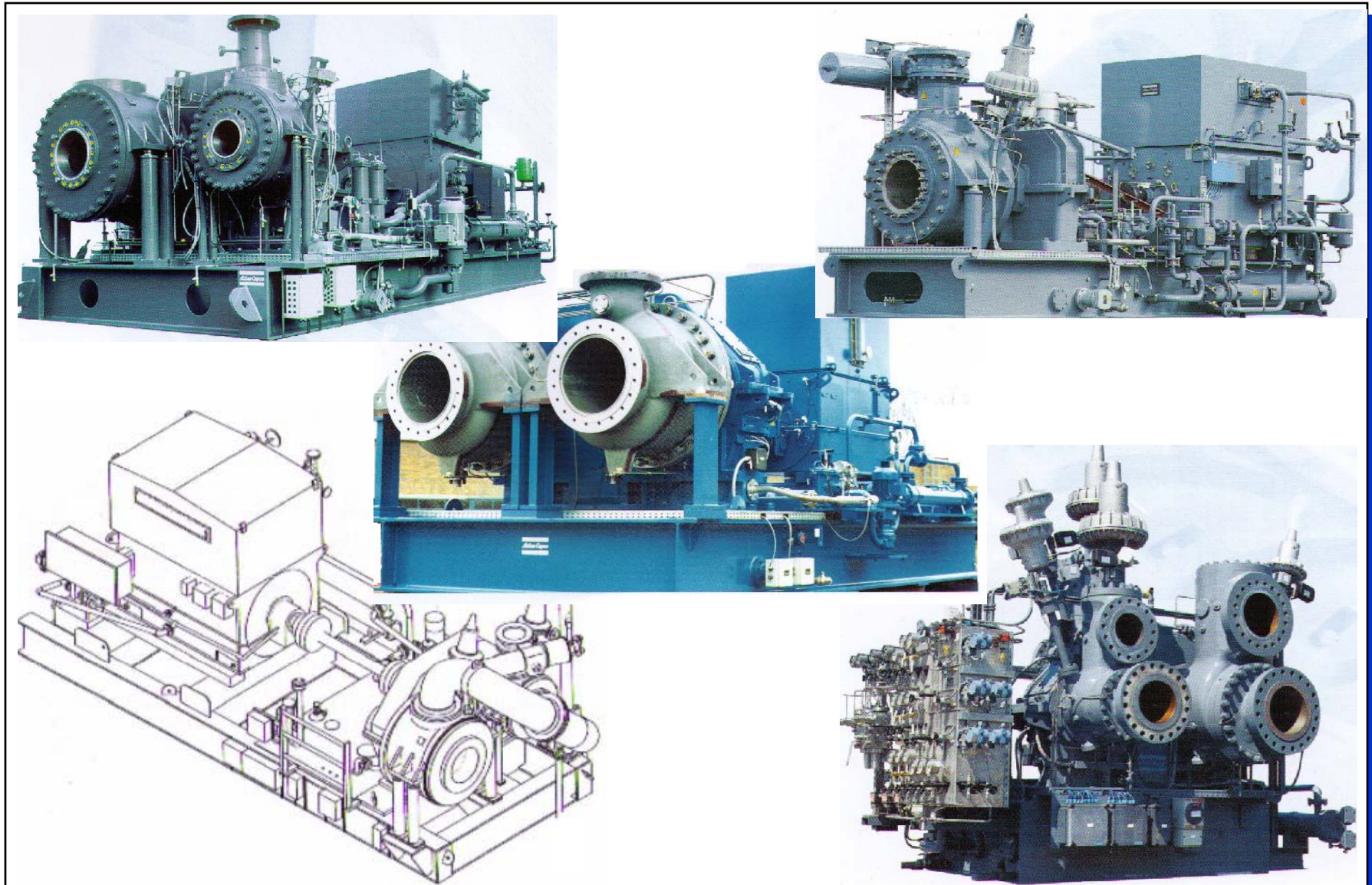
- **95% NO_x & SO_x (tested 100% removal)**
- **85% Mercury**
- **90% Vaporized heavy metals**
- **99.5% Particulate removal**
- **25% CO₂ (tested 85% removal)**

WOWGen™ HEAT RECOVERY SYSTEM

Flue Gas Heat Exchanger (EX101)

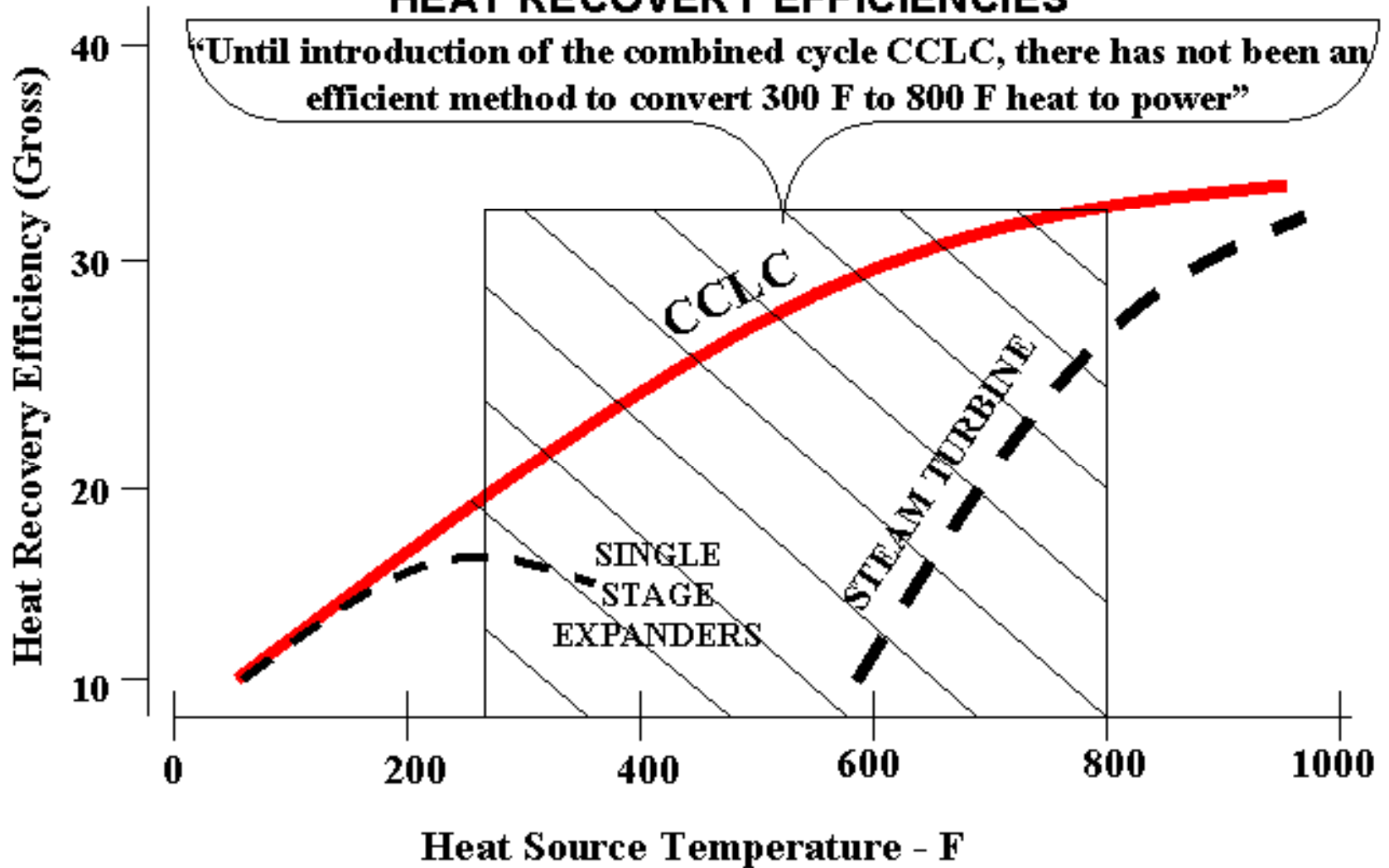


WOWGen™ SINGLE & COMBINED CYCLE TURBO-EXPANDER GENERATOR SKID



WOWGen™ Generates Electricity From Any Heat Source

HEAT RECOVERY EFFICIENCIES



WASTE HEAT SOURCES

Cement Plant



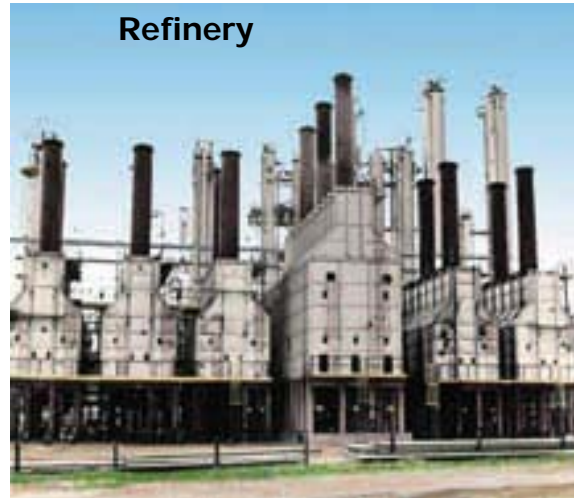
Petrochemical Plant



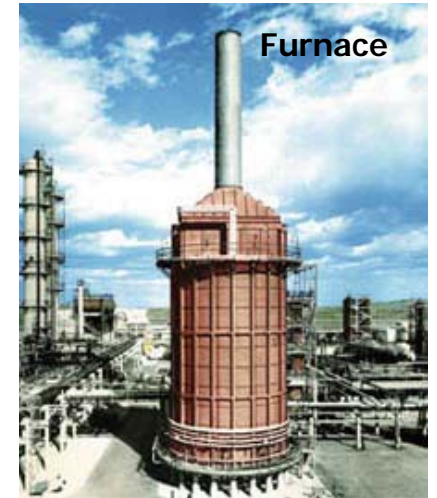
Coal Fired Power Plant



Refinery



Furnace



WOWGen™ Generates Electricity From Any Heat Source

Typical Industries Generating Waste Heat

- Power and Utility Industries
- Heavy Industries: Steel, Aluminum, Copper, Cement, Pulp & Paper, Glass, Soda Ash and Waste Recycle
- Refinery, Petrochemical and Gasification plants
- Chlor-Alkali & Vinyl plants
- Incinerators, Waste to Energy

Typical Waste Heat Sources

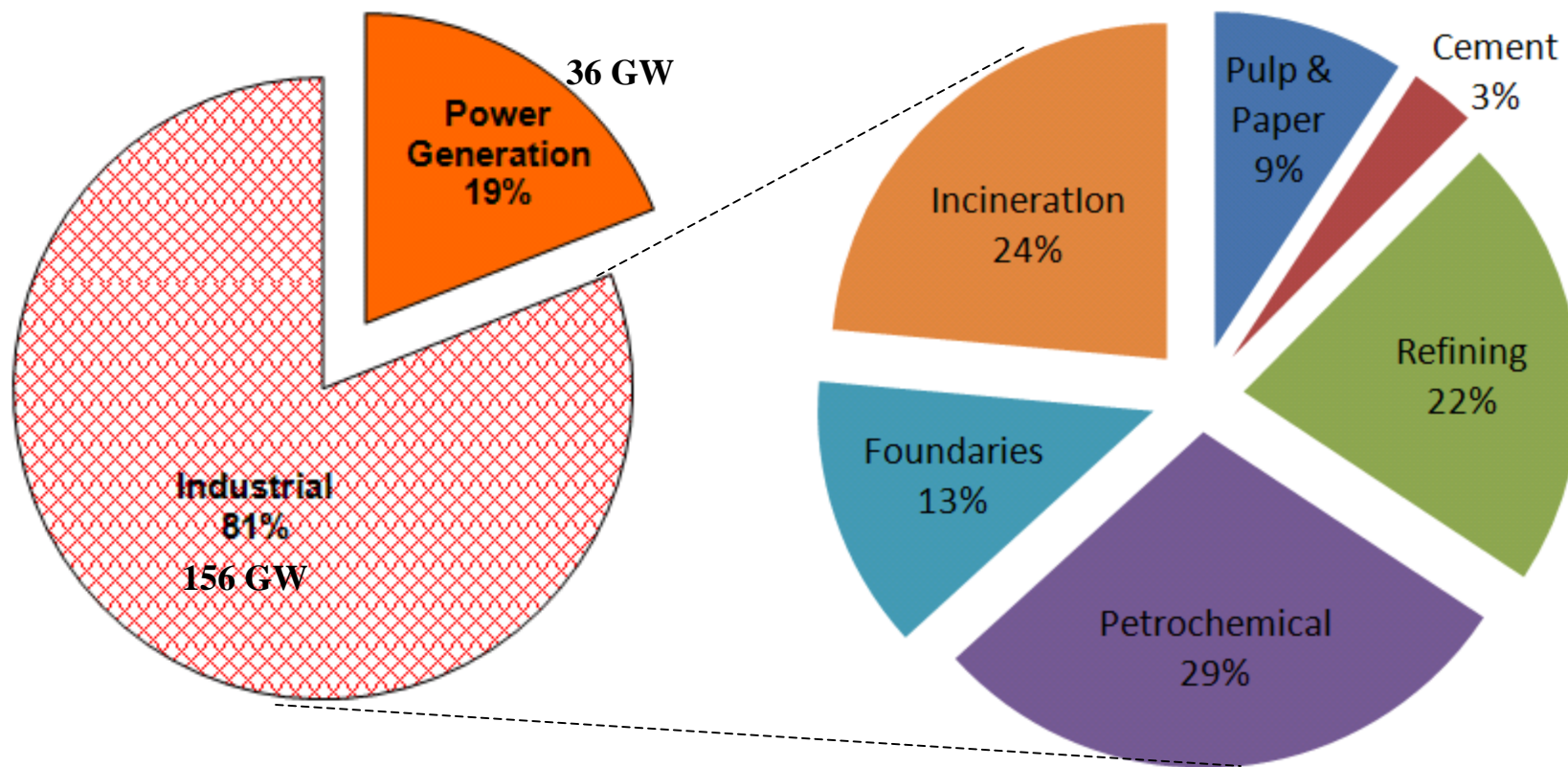
- Fired boilers, gasifiers, heaters/furnaces (gas, diesel, coal, nuclear, refuse, pet coke)
- Gas turbine exhaust - continuous, standby, peaking, combined cycle units
- Steam turbine exhaust: and vented steam
- Internal Combustion (IC) engine exhaust

Renewable Energy Heat Sources

- Solar energy
- Geothermal steam
- Biomass combustion
- Syngases

ELECTRICAL POWER GENERATION POTENTIAL FROM WASTE HEAT RECOVERY

Ref; EIA 2007 Annual Energy Outlook

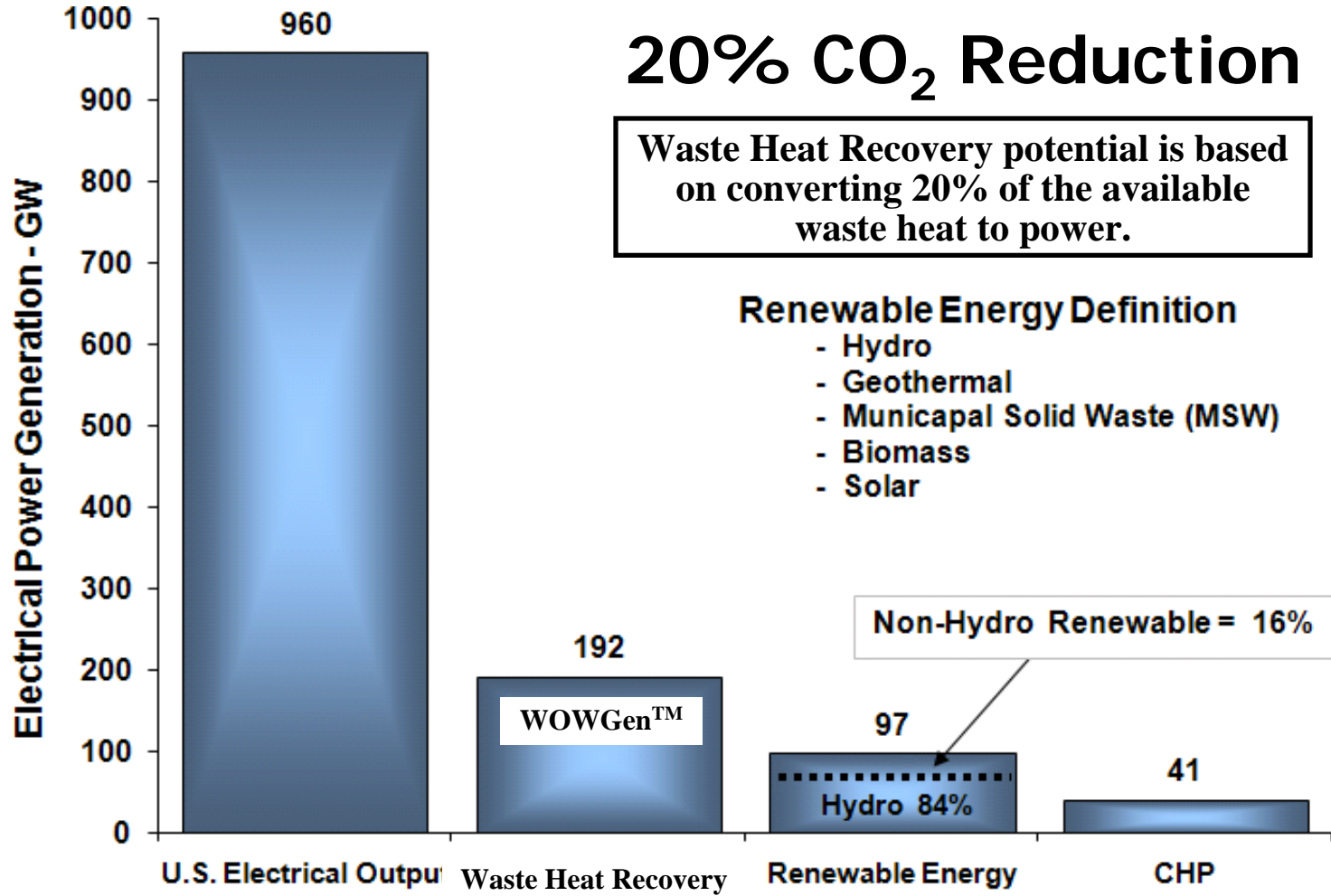


Waste Heat Recovery Potential = 192 GW

Industrial Waste Heat Potential = 156 GW

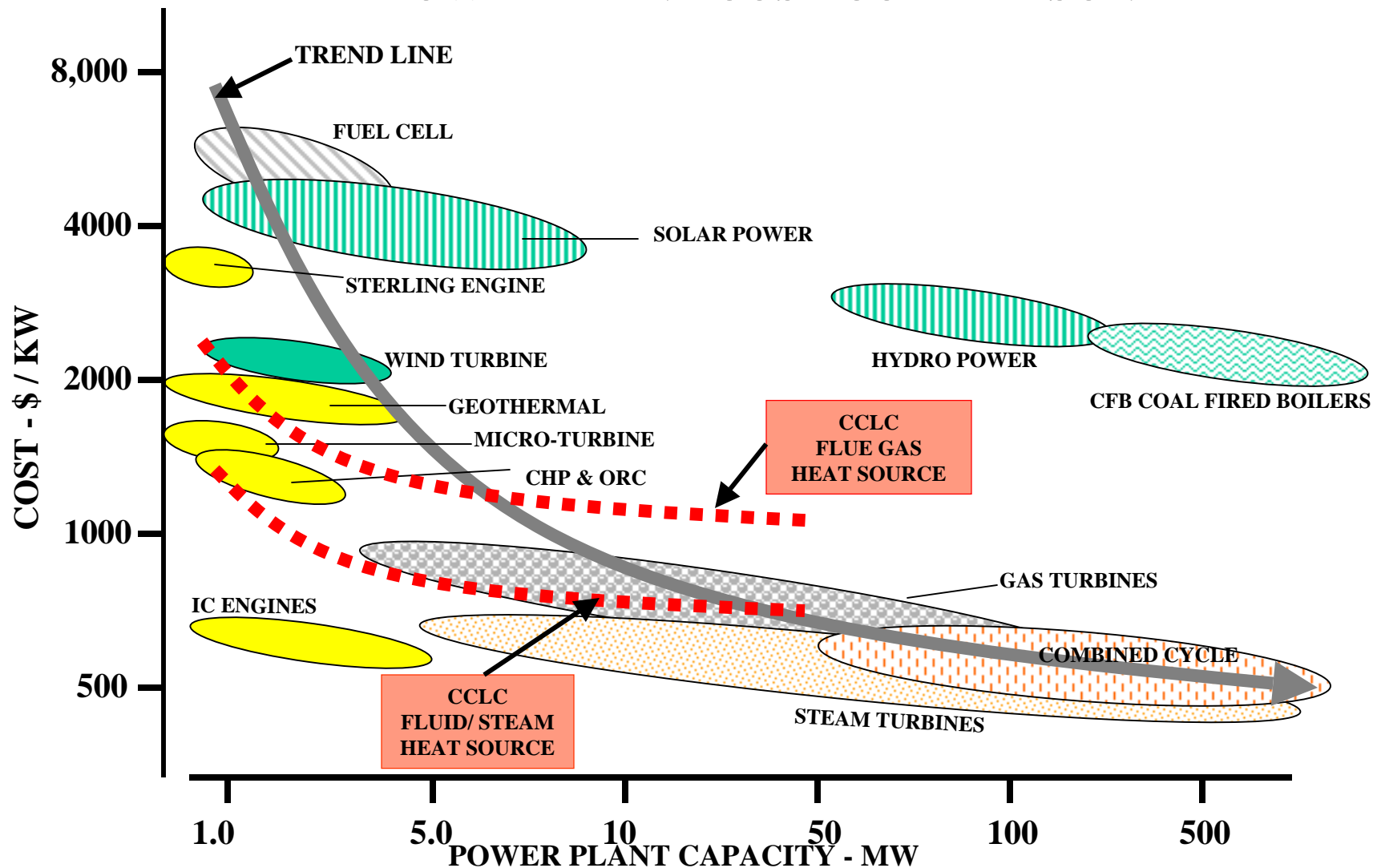
ELECTRICAL POWER GENERATION POTENTIAL FROM WASTE HEAT RECOVERY

Ref: EIA 2007 Annual Energy Outlook



WOWGen™ Capital Investment is Competitive

POWER PLANT COST COMPARISON



RENEWABLE / REUSABLE/RECYCLED ENERGY

TYPE	ENERGY SOURCE AVAILABILITY	CONVERSION EFFICIENCY	GENERATES EMISSIONS	CAPITAL COST PER KW	CAPITAL COST ADJUSTED FOR AVAILABILITY	TAX CREDITS
RENEWABLE ENERGY:						
SOLAR (CSP) (1)	25%	25% to 35%	NO	\$3,000 to \$6,000	\$12,000 to \$24,000	YES
WIND (1)	25%	25% to 35%	NO	\$1,500 to \$2,500	\$6,000 to \$10,000	YES
GEOTHERMAL	100%	5% to 15%	NO	\$2,000 to \$3,000	\$2,000 to \$3,000	YES
HYDRO (SMALL)	100%	25% to 35%	NO	\$1,500 to \$2,500	\$1,500 to \$2,500	YES
BIOMASS (2)	100%	25% to 35%	YES	\$1,500 to \$2,500	\$1,500 to \$2,500	YES
REUSABLE ENERGY:						
WASTE HEAT RECOVERY (3)	100%	25% to 35%	NO (4)	\$ 600 to \$1,800	\$ 600 to \$1,800	NO

- (1) Limited geographically
- (2) Dependant on fuel source
- (3) Dependant on heat source & power plant size
- (4) Can reduce existing emissions

WHY NOT CLASSIFY “REUSABLE/RECYCLED” ENERGY “RENEWABLE ENERGY”?

Potential Tax Credits, Emission Credits & Incentives

\$200/KW Production Tax Credit

- Max size = 2,000 kw WOWGen™ power plant (\$400,000/plant)
- Reduces income tax by \$80,000/yr for 5 years
- Must be installed by 12/31/07

NO_x/SO_x/Particulate Emission Credits/Offsets

Provides Ability to Meet CO₂ Commitments

- Generate power with zero Greenhouse Gases
- Generate power with zero emissions

Power Generated Applies to Renewable Portfolio Standards (RPS)

- Percentage of utility output must come from renewable energy or utility pays fee of cents/kw-hr
- States can qualify waste heat recovery as applicable

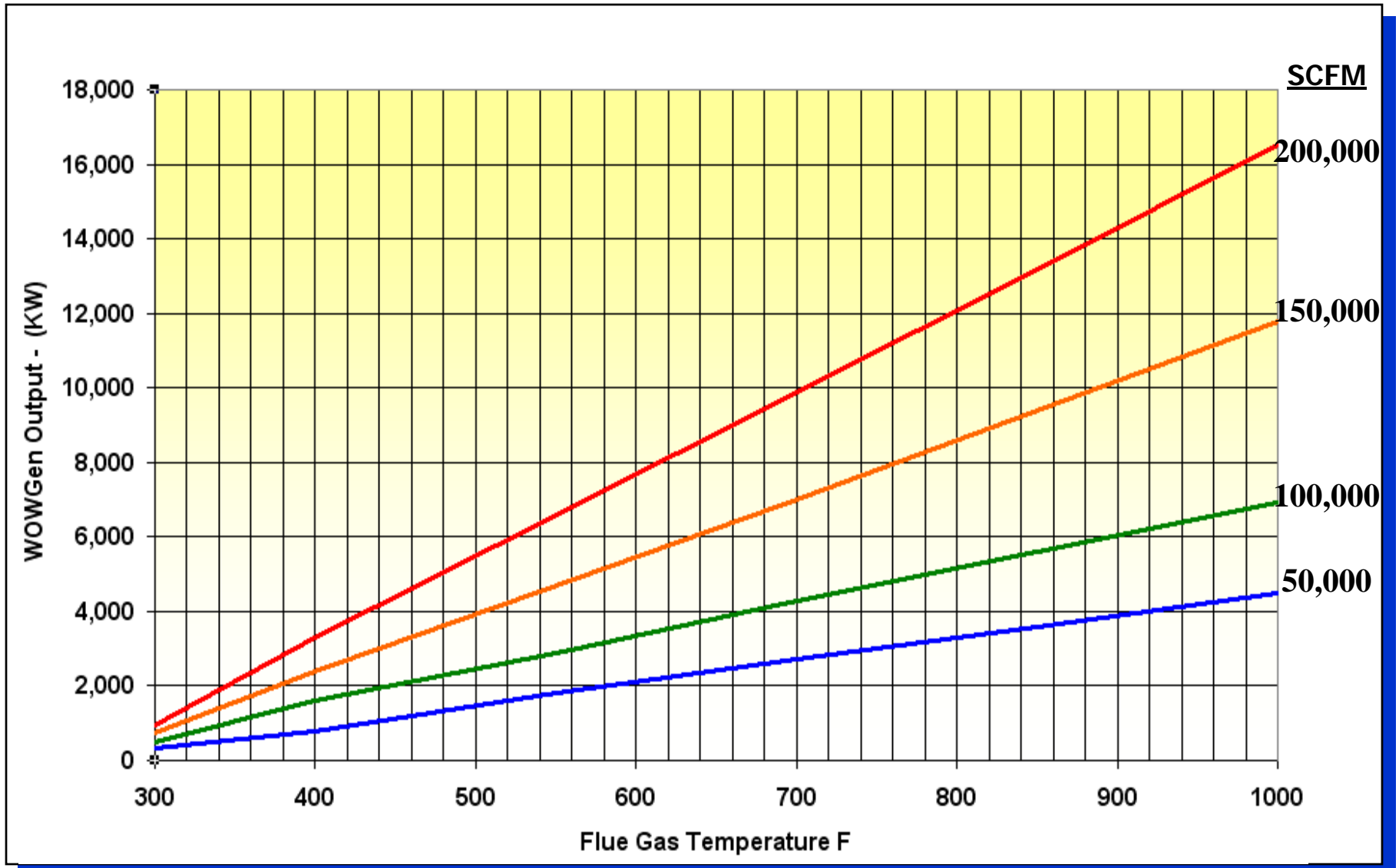
Renewable Energy Credits

- Applies to biomass fuel
- \$0.9 to 1.9 cents/kw-hr (open vs closed loop)

SO_x, Hg and Heavy Metals Removal Allows Burning Lower Cost High Sulfur/High Heavy Metals Coal and/or Petcoke

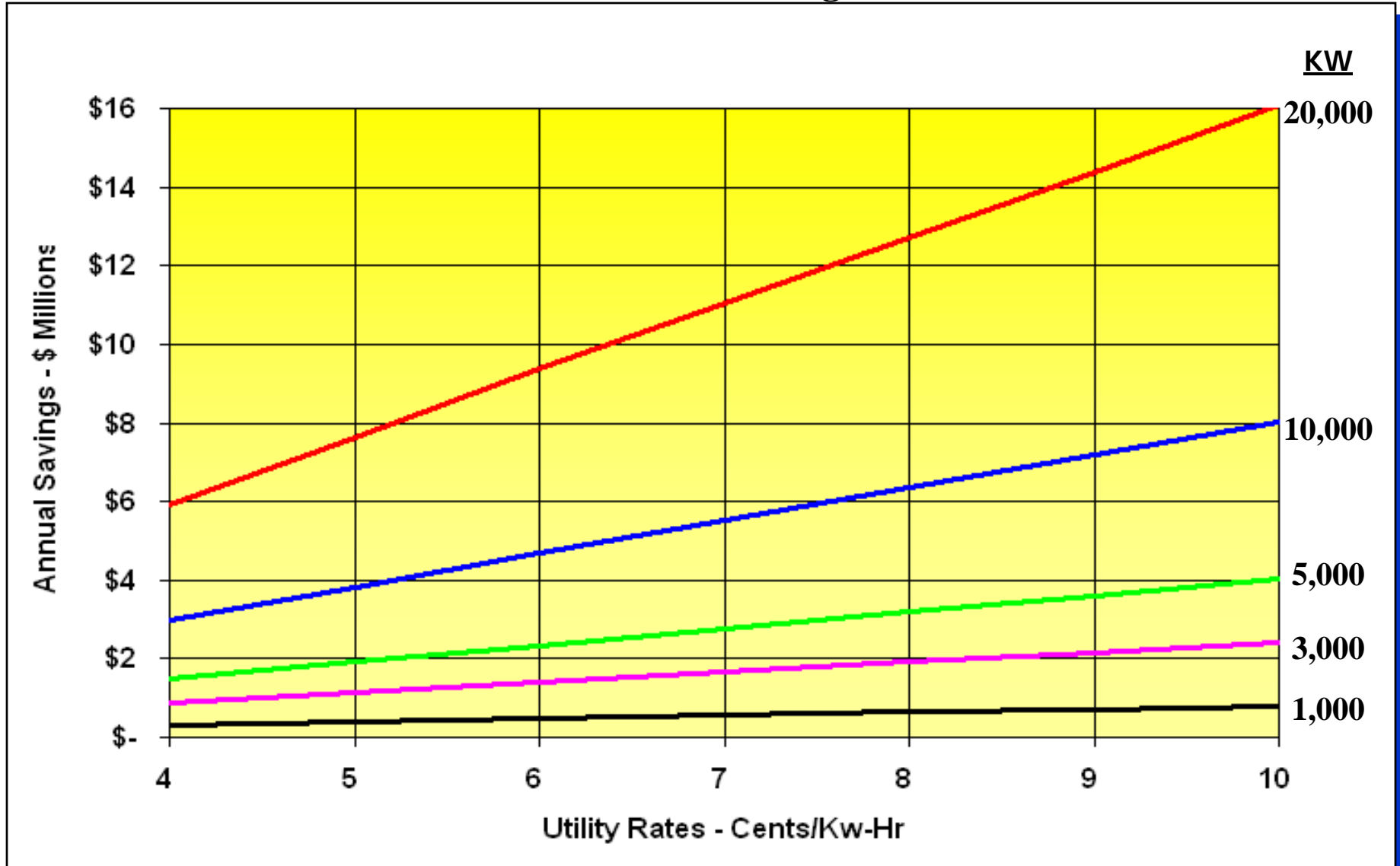
WOWGen™

Net Output vs Flue Gas Temperature & Flow



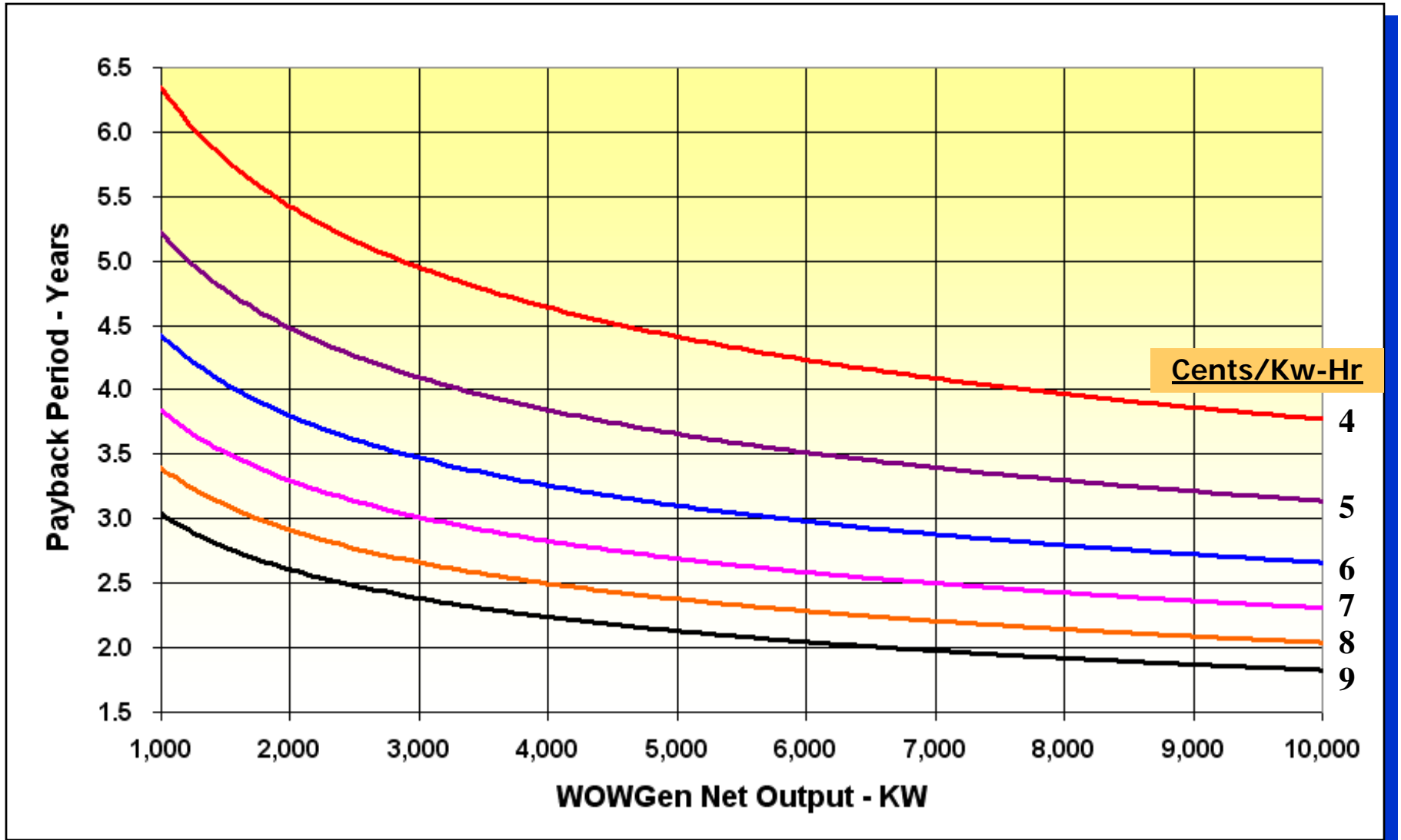
WOWGen™

Net Annual Power Savings - Millions



WOWGen™

Simple Payback Period - Years



WOWGen™ and WOWClean™ are a Reality

- MSW Waste to Energy Gasification Project
 - 8 MW Power Generation
 - Off electrical grid power plant
 - Divert 250 tons/day MSW from landfill
- Other Waste Heat to Power Funded Projects
 - Lime plant 4 MW
 - Pulp/paper plant 3 MW
 - Gas plant 15 MW
 - Steel plant(s) 9 MW/13MW
 - Diesel engine, Palm Oil Fueled 2.5 MW
- Projects under consideration
 - Glass, Mining, Lime, Cement, Steel, Biomass, Solar, Reciprocating Engines, Gas Pipeline, Landfill Gas, Geothermal

Project: Steel Reheat Furnace

❑ Project Description

- Capture heat from the discharge of reheat furnace and convert to electrical power
 - Flue Gas Temp = 900 F
 - Flue Gas Flow Rate = 745,000 lb/hr
 - WOWGen™ Output = 12.9 MW

❑ Project Investment and Returns

- Total Installed Cost = \$ 18 Million
- Avoided cost of power = \$ 0.095/kwh
- After Tax IRR = >20% (unleveraged)
To 80% Equity Partner

Project: Autoclave

❑ Project Description

- Capture heat from the discharge of the autoclave scrubber system and convert it to electrical power.

– Flue Gas Temp	=	200 F
– Flue Gas Flow Rate	=	180,000 lb/hr
– WOWGen™ Output	=	8.5 MW

❑ Project Investment and Returns

▪ Total Installed Cost	=	\$ 16.7 Million
▪ Avoided cost of power	=	\$ 5.0 MM @ \$ 0.06/kwh
▪ Simple Payback	=	3.3 Years
▪ After Tax IRR	=	24.6% (unleveraged)

Project: Lime Kiln

□ Project Description

- Capture heat from the discharge of lime kiln and convert to electrical power.
 - Flue Gas Temp = 475 F
 - Flue Gas Flow Rate = 250,000 lbs/hr
 - WOWGen™ Output = 1.6 MW

□ Project Investment and Returns

- Total Installed Cost = \$ 4.0 Million
- Avoided cost of power = \$0.086 /kwh
- Simple Payback = 3.6 Years
- After Tax IRR = 19% (unleveraged)
- After Tax IRR = 20% (unleveraged with microturbine tax credits)

Project: Pipeline Compressor Station

❑ Project Description

- Capture heat from the discharge of several gas turbines at pipeline compressor stations
 - Flue Gas Temp = 900 F
 - Flue Gas Flow Rate = 600,000 lb/hr
 - WOWGen™ Output = 9 MW

❑ Project Investment and Returns

- Total Installed Cost = \$ 16.7 Million
- Avoided cost of power = \$ 0.065/kwh
- Simple Payback = 4.5 Years
- After Tax IRR = 14% (unleveraged)

Project: Base Load Diesel Engines

❑ Project Description

▪ Capture waste heat from 9 base loaded diesel engines

- Flue Gas Temp = 750 F
- Flue Gas Flow Rate = 2,500,000 lb/hr
- WOWGen™ Output = 21 MW

❑ Project Investment and Returns

- Total Installed Cost = \$ 55 Million
- Avoided cost of power = \$ 0.100/kwh
- Simple Payback = 2.5 Years
- After Tax IRR = 28% (unleveraged)

WOWGen™ Advantages

- **Efficient Power From Flue Gas, Steam, Hot Water/Fluids**
- **Saves Valuable Water Resources**
- **High Internal Rates of Return**
- **Supports Distributed Generation**
- **Economical for 1 MW to 25 MW Power Plants**
- **Solar, Biomass & Geothermal Standalone Power Plants**
- **Power Generated with Zero Emissions**
- **Combined Cycle Diesel Engine Power Plants**
- **Renewable Energy Credits**
- **Each MW of Power Generation (compared to coal fired plant) Eliminates**
 - **21 Tons NO_x**
 - **59 Tons SO_x**
 - **8615 Tons of CO₂**

WOWClean™ Advantages

- **Integrated Multi-Pollutant Reduction System**
 - **95% NO_x & SO_x (tested 100% removal)**
 - **85% Mercury**
 - **90% Vaporized heavy metals**
 - **99.5% Particulate removal**
 - **25% CO₂ (tested 85% removal)**
- **Low Temperature “end-of-the-line” System**
- **Standalone or Integrated with WOWGen™**
- **Zero Emission Power Plants**
- **Provides Emission Credits**