

Renewable Energy Clean Air Project



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President Bush's Call for Leadership

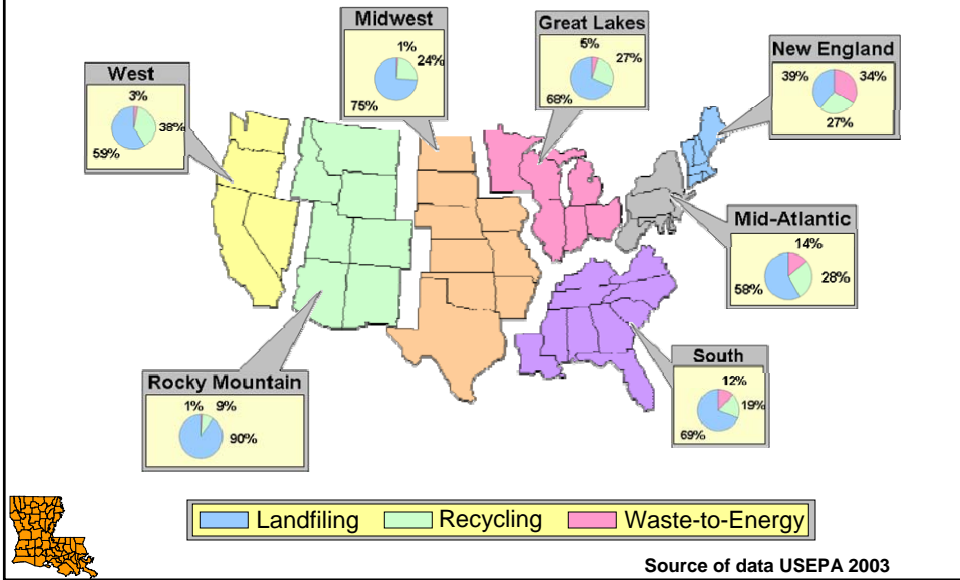


Keeping America competitive requires affordable energy. And here we have a serious problem: America is addicted to oil, which is often imported from unstable parts of the world. The best way to break this addiction is through technology.

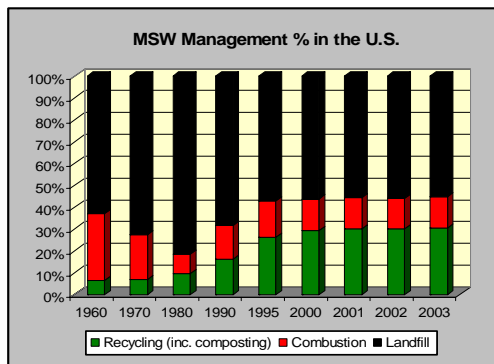


State of the Union Address 2006

United States Waste Profile



National Waste Profile

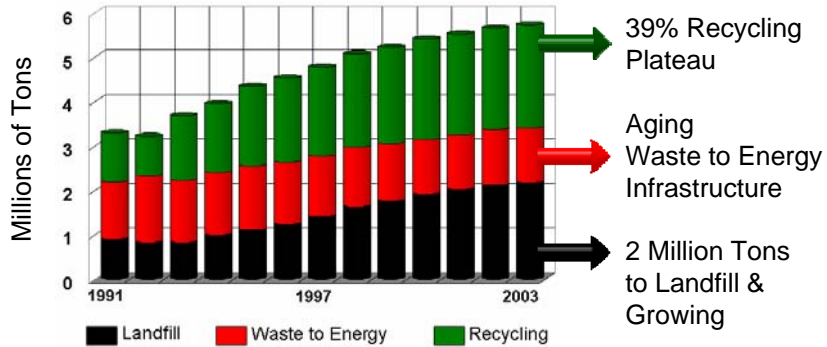


- Recycling nationally has plateau at 27%
- Today the U.S. landfills 60% of MSW
- 130 million tons of MSW goes to landfills



Source of data USEPA 2003

Minnesota Waste Profile



The old saying, "garbage in, garbage out" is obsolete. It's now "garbage in, something worthwhile out."

MPCA Commissioner Sheryl Corrigan



Minnesota 2006 Bonding Results



Grants to Political Subdivisions Koochiching: Renewable Energy Clean Air Project

Project Narrative

2006 STATE APPROPRIATION REQUEST: \$10,000,000

AGENCY PROJECT PRIORITY: 1 of 1 (Koochiching County)

PROJECT LOCATION: International Falls (Koochiching county)

Project At A Glance

Renewable Energy Clean Air Project (RECAP): Koochiching County is requesting \$10 million to design, construct, and equip a new Plasma Torch Gasification facility in International Falls for the purpose of converting municipal solid wastes (MSW) that would otherwise go to landfills into energy.

Project Description

Koochiching County is requesting \$10 million in state funding to design, construct and equip a new Plasma Torch Gasification facility to be located in International Falls for the purpose of converting municipal solid wastes (MSW) that would otherwise go to landfills into energy in the form of steam or electricity and a non-leachable slag to be used for road aggregate, tile or rock wool. This waste-to-energy conversion process has far fewer environmental consequences than either landfilling or incineration.

Even though Minnesota is one of the leading states in recycling its MSW, the state is still dumping over two million tons a year of MSW into landfills throughout Minnesota, Iowa, and Wisconsin. The rate of recycling appears to have reached a plateau in the range of 45 to 50% of Minnesota's total MSW. The percentage of the total MSW going into landfills has increased from 18% 10 years ago to 36% today. This cannot be sustained. Landfills will reach capacity and any new ones will be opposed due to increasing stress on the existing landfill infrastructure throughout the state.

A solution is needed to eliminate MSW from going into landfills while using the MSW for a productive, economic purpose without harming the environment. The solution is Plasma Torch technology. This technology will

eliminate the MSW that is not recycled and turn this renewable resource ("Urban Gold") into energy.

By subjecting MSW to the Plasma Torch, a heat source that is hotter than the surface of the sun, the organic materials in the MSW gasify into basic gases such as hydrogen and carbon monoxide, and the inorganic materials in the MSW are vitrified into a molten slag or igneous rock. The gas can be used to produce steam or electricity and the molten slag can produce products such as road aggregate, tile, road pavers, or rock wool.

The key to the technology is the Plasma Torch. The torch produces controlled lightning. Lightning is a form of plasma found in nature. When MSW is exposed to temperatures above 7,000 C° it quickly gasifies or produces a vitrified material. This process all occurs within an oxygen-deprived environment that there is no burn simple fact provides processes. In the dioxins produced. If low temperature the result of the elevated are formed. The res landfill, and energy is

Plasma Torch facilities The facilities are modest. The footprint of feet. The total site acres.

The project in Kooch MSW per day. The seven days per week projected to be between 150 to 200 pounds of the steam will be used net five MSW of elect

2006-2011 Minnesota Capital Budget

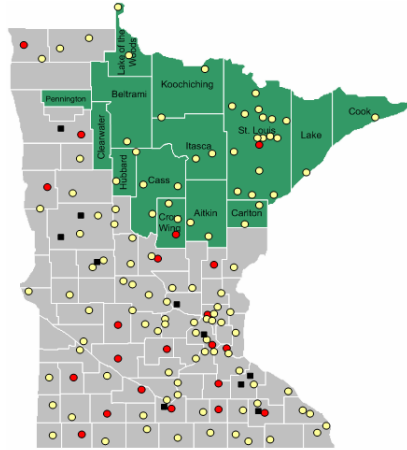
Presented by
Governor Tim Pawlenty
to the 84th Legislature

Executive Summary

January 17, 2006



Potential Municipal Solid Waste Feedstock



■ Incineration ● Closed ● Open

County	Tonnage	Recycle	Expire
Aitkin	7,300.00	37.7%	
Beltrami*	6,200.00	27.8%	2010
Carlton	11,900.00	38.4%	
Cass	16,200.00	44.5%	2010
Clearwater	4,300.00	28.0%	2008
Cook	3,600.00	38.9%	
Hubbard	12,900.00	43.7%	2006
Itasca*	4,200.00	39.4%	2010
Koochiching	8,000.00	31.8%	2010
Lake	5,300.00	26.6%	
Lake of the Woods	2,600.00	38.8%	2008
Pennington	12,779.00	19.9%	2010
St. Louis*	10,000.00	58.7%	
U.S. Total	102,679.00		



Koochiching County Proposed Project Sites



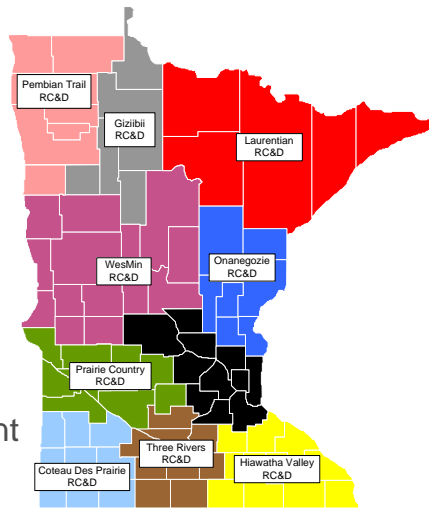
City of International Falls Minnesota



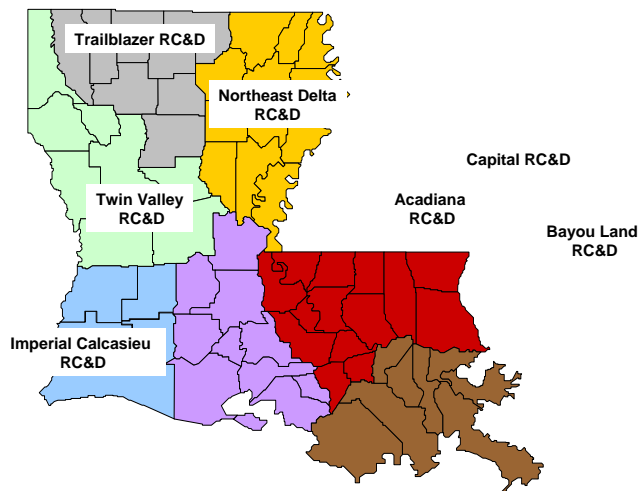
Minnesota R C & D Role and Footprint



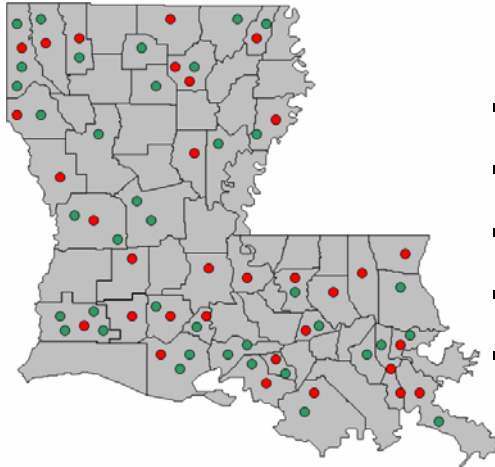
- Non-profit, independent of any government agency.
- Locally elected officials from Laurentian area.
- Directs coordinator's activities via projects.
- Partnership development and facilitator.



Louisiana RC&D Footprint



Potential Municipal Solid Waste Feedstock

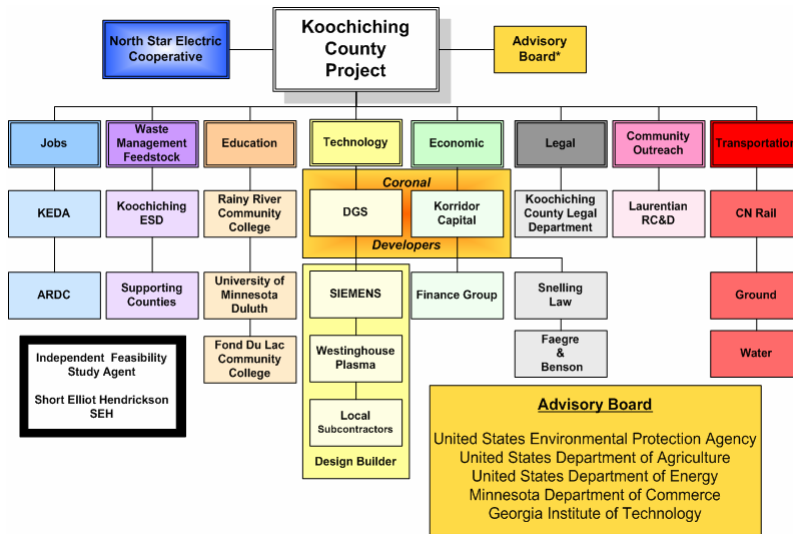


- 4.5lbs per person per day
- ~3.5 million tons per year
- ~20 % recycling rate
- ~2.8 million is landfilled
- Hurricane Debris



● Type I & II Landfill ● Type III Landfill

Team Structure



Plasma Torch



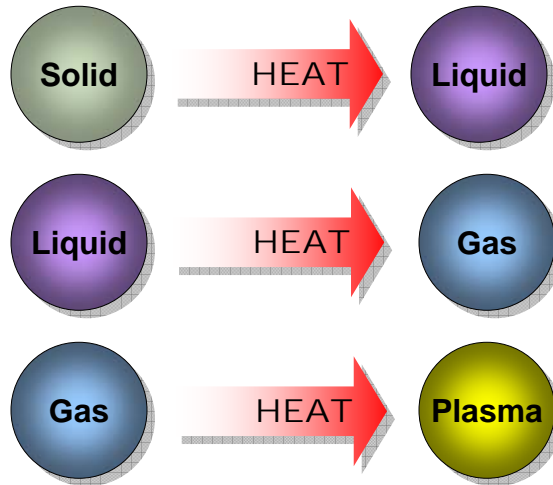
What is PLASMA ?



- The fourth state of matter.
- Ionized gas at high temperature capable of conducting an electrical current.
- Lighting is an example from nature.



How Plasma Conversion Works



Material Conversion Utilization



United States	
Alabama	Catalytic converter destruction
Hawaii	Medical waste destruction
Montana	Military munitions destruction
Ohio	Asbestos destruction
U.S. Navy	Shipboard waste destruction
Virginia	Medical waste destruction
International	
Canada	Medical waste destruction
France, Japan	Melting of incinerator ash
Japan	MSW to Energy Clean Center
Taiwan	PCB destruction
Norway	Melting of incinerator ash



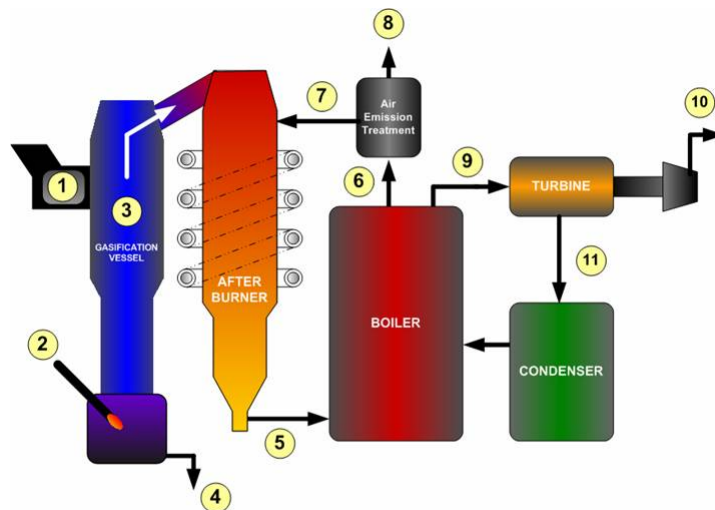
Hitachi Metals/Westinghouse Plasma Utashinai, Japan Facility



- Commercial 200 ton/day processing capacity.
- Designed for Municipal Solid Waste (MSW).
- Meets all Japanese environmental standards.
- The facility generates 7.9 MW of electricity and was commissioned 04 / 2003.
- Could supply ~ 7000 U.S. households with electricity.



Conversion Process (Utashinai & Yoshi)



1-Feed Stock	2-Plasma Torch	3-Syn-Gas	4-Vitrified Slag	5-Cooled Syn-Gas
6-Boiler Exhaust	7-Sulfur	8-Exhaust	9-High Steam	10-Electricity
				11-Low Steam



Emission Performance



Air Emissions

Emission Element	Gasification	Incineration
Metals		
Antimony (mg/dscm)	0.02 - 0.05	0.5 - 2.6
Cadmium (mg/dscm)	0.004 - 0.03	0.06 - 0.9
Chromium (mg/dscm)	0.02 - 0.08	0.03 - 0.1
Lead (mg/dscm)	0.2 - 0.6	8.4 - 15
Mercury (mg/dscm)	ND* - 0.02	0.5 - 0.9
Nickel (mg/dscm)	0.02 - 0.08	0.2 - 0.5
ACID GASES		
NOx (ppm)	30 - 50	169 - 246
SO ₂ (ppm)	10 - 20	128 - 225
PARTICULATES		
mg/dscm	2.4 - 9.9	167 - 247

Solids By-products

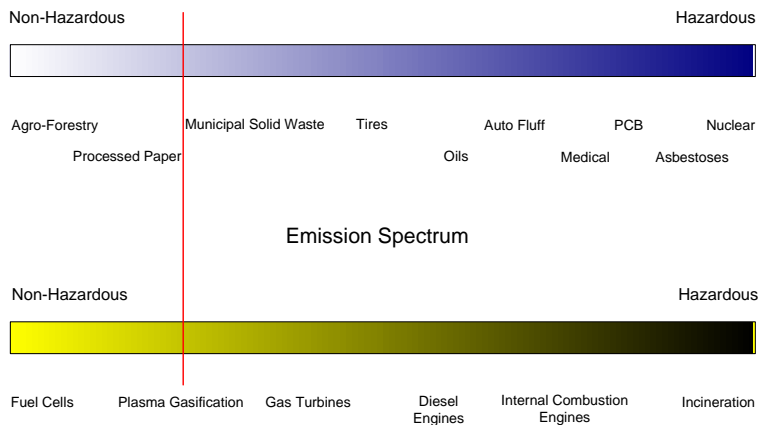
Leachate Element	Gasification	Incineration
Metals		
Antimony (mg/l)	0.02 - 0.05	0.5 - 2.6
Arsenic	ND* - 0.1	5.0
Barium (mg/l)	0.03 - 0.1	55.0 - 100.0
Cadmium (mg/l)	0.004 - 0.02	0.2 - 0.5
Chromium (mg/l)	0.05 - 0.2	3.3 - 5.0
Copper (mg/l)	0.02 - 0.08	0.03 - 0.1
Lead (mg/l)	0.01 - 0.02	2.5 - 5.0
Mercury (mg/l)	ND*	0.05 - 0.1



ND* - Not Detectable

Data Source: Plasma Gasification of MSW, Carter Report

Waste / Emission Spectrum



Environmental Benefits of Plasma Gasification



- Methane Displacement
- Receive Green Credits
- Reduce Emissions
- Electronic Waste
- Reduce Mercury
- Rail Road Ties
- Bio-Fuels
- Reduce CO₂



Project Financing Model



Public Sector Model



FEMA Model

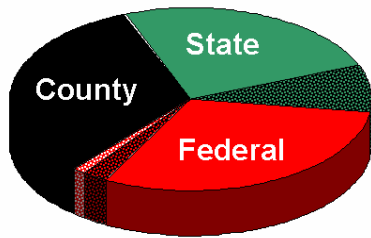


Public Private Partnership Model



■ County / Parish ■ State ■ Federal ■ Private

Project Financing



Total Program Cost
\$30,300,000

US. Federal Government Investment

1%	USDA REDG Program	\$300,000
2%	USDA REDL Program	\$740,000
31%	Other Federal Programs	\$9,260,000

Minnesota State Investment

8%	2006 State Bonding Bill	\$2,500,000
25%	2007 State Bonding Bill	\$7,500,000

Koochiching County Investment

33%	2006 CREB Bonding	\$9,950,000
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Project Finance – Federal Monies



◆ US Federal Sources

- ⊙ USDA 9008 Renewable Energy
- ⊙ USDA Rural Development Loan & Grants
- ⊙ USDA Rural Utility Services Loans
- ⊙ DOE Biomass Research Grants
- ⊙ DOE Hydrogen Production Grants
- ⊙ EPA Environmental Impact Grants
- ⊙ FEMA



Project Finance – State Monies



- ◆ Louisiana Funding Sources
 - LA Department of Economic Development (DED)
 - LA Department of Environmental Quality (DEQ)
 - LA Recovery Authority
 - LA Disaster Recovery Foundation



Project Finance – Parish Monies



- ◆ Government Bonds
- ◆ Municipal Leases
- ◆ Financial Concerns
- ◆ Need for Public-Private Partnership



Municipal Lease Financing



- ◆ Installment Purchase Contract
- ◆ Tax-Exempt Interest Rate
- ◆ Annual Appropriations During Lease
- ◆ Lease Term (10-20 years)
- ◆ Parish Has Title
- ◆ Lease Buyout \$1

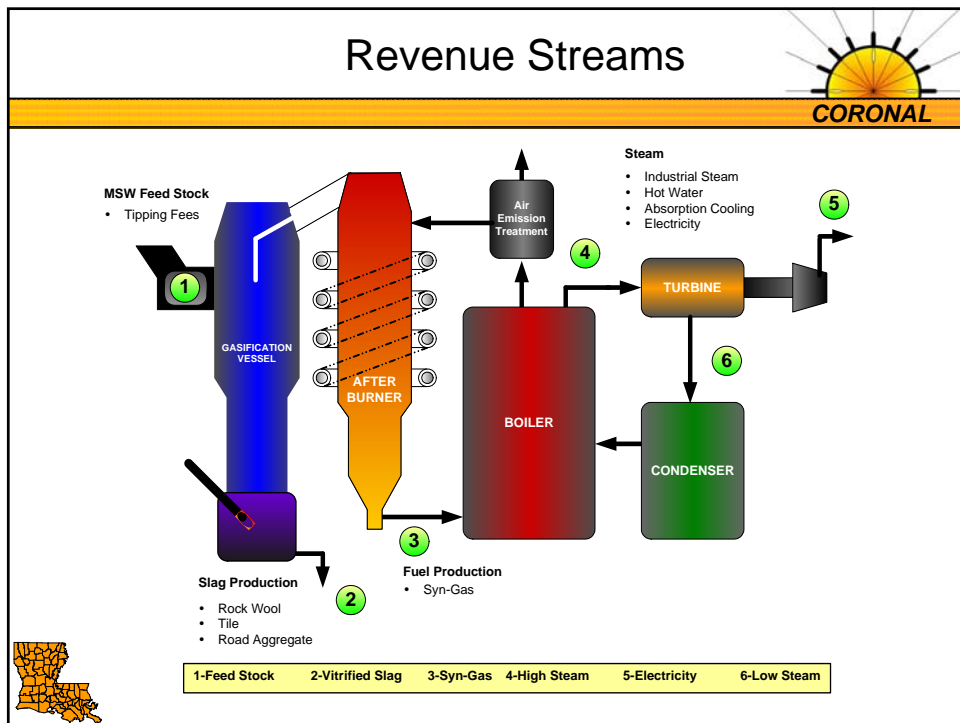
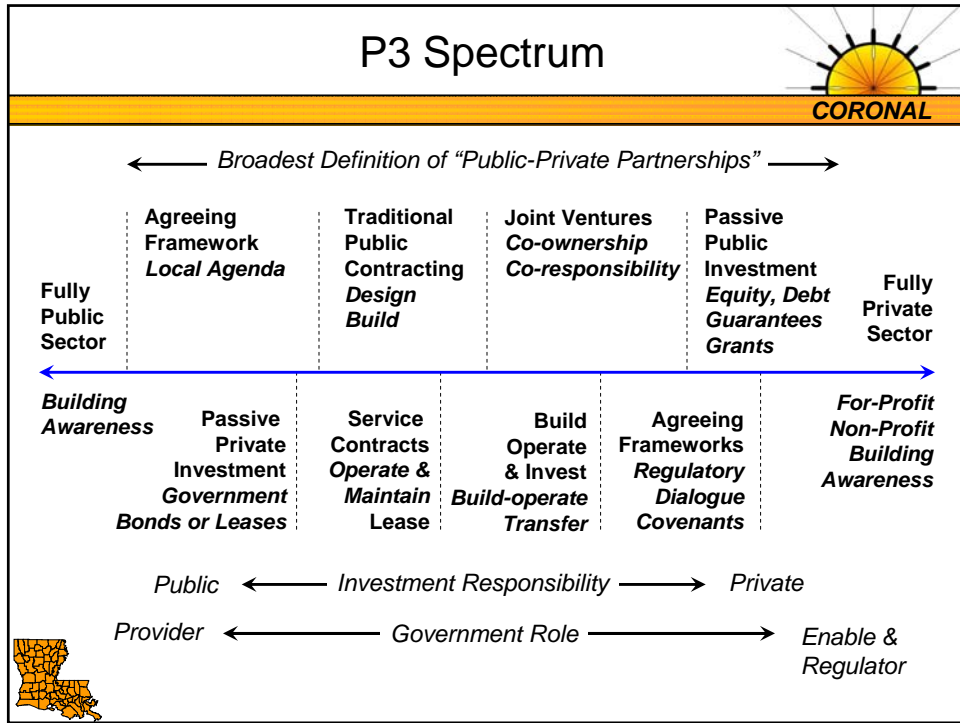


Public-Private-Partnerships – P3s

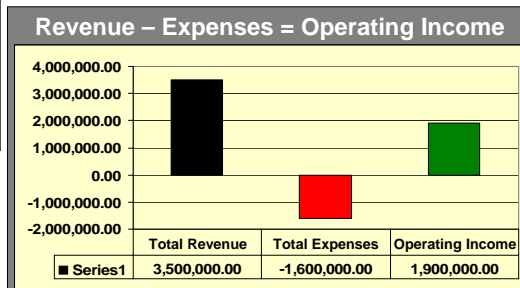
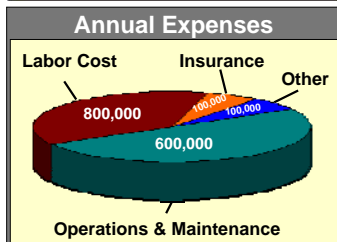


- ◆ Arrangements between government and private sector allocating investment, risk responsibility and award
- ◆ Types
 - Only O & M by private sector
 - Turnkey by private sector to public entity
 - Lease – purchase
 - Lease – develop – operate
 - Build – transfer – operate
 - Build – own – operate – transfer
 - Build – own - operate





Revenue and Expense Model



Conclusion



- Governments worldwide are investing in waste-to-energy gasification solutions.
- Markets exist for the by-products from the conversion process.
- 130 million tons of US. waste (feedstock) annually is unused for energy conversion.
- Plasma gasification is now a cost competitive conversion solution.
- Environmentally plasma gasification is a cleaner conversion technology.

