EFFECTS OF THE PROPOSED ENERGY SUPPLY PROJECT ON AMBIENT AIR QUALITY, MERCURY AND GREENHOUSE GAS EMISSIONS

Presentation to the
Gainesville City Commission
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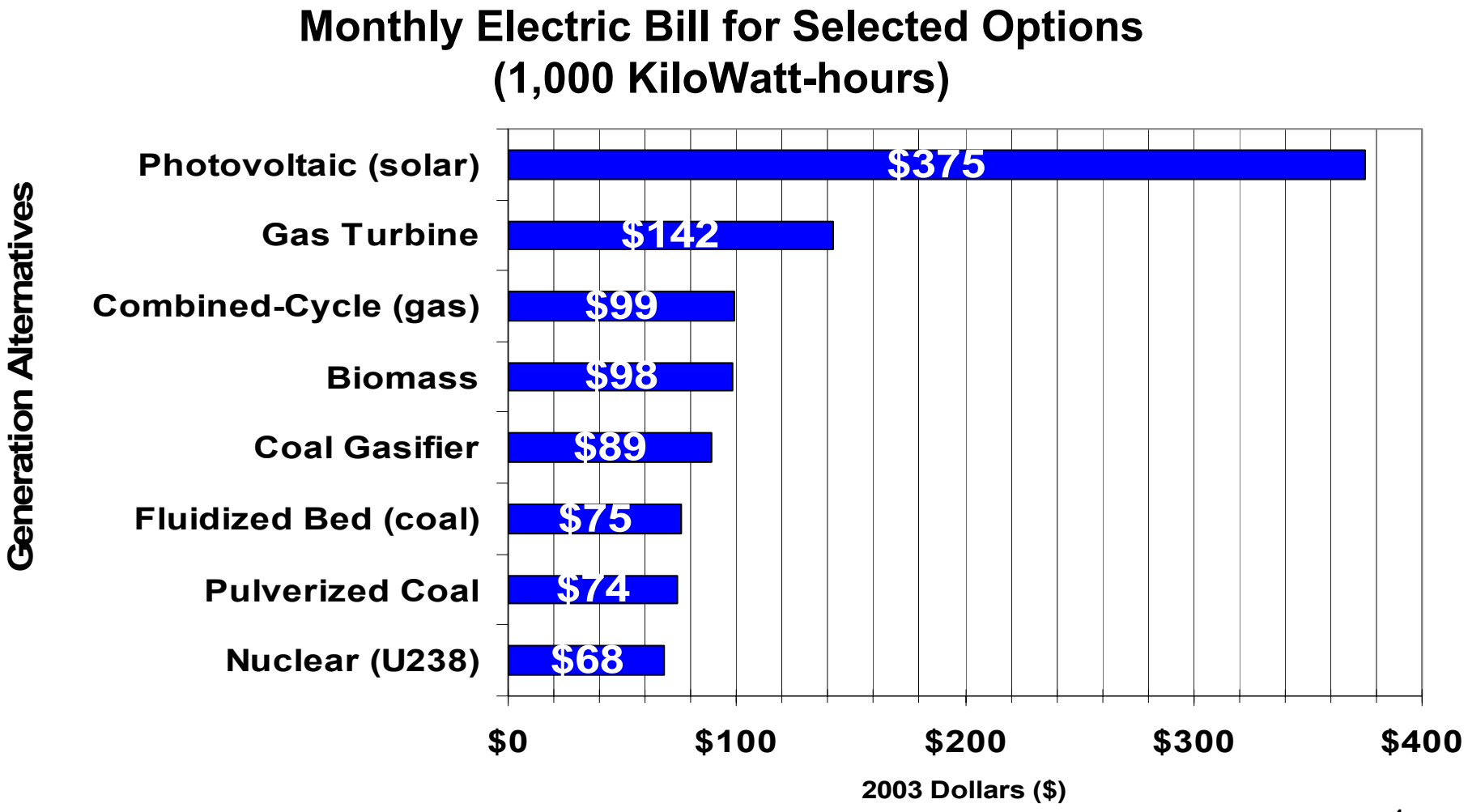
GRU
More than Energy

INTRODUCTION

Long Term Electrical Supply Plan Objectives

- Assure Reliable and Affordable Electrical Supplies
  - Fuel Diversity
- Conserve Natural Resources
  - Reduce Total Air Emissions
  - Use Reclaimed Water
  - Demand Response
  - Energy Conservation
  - Increase use of Carbon Intensity
- Enhance The Local Economy
- Address Community Issues and Concerns

We Evaluated Many Alternatives



Community Questions And Concerns

- What is the quality of the ambient air in Alachua County?
- How do GRU's power plants impact ambient air quality?
- How will the Proposed Project impact air quality?
- How will future environmental regulations affect GRU's existing facilities and Proposed Project?
- What are GRU's plans to deal with global climate change and CO_2 emissions?
- What impact does DH2 have on mercury deposition in the Santa Fe River Basin?
- Will mercury emissions increase as a result of using more coal?
- What effect does the Proposed Project have on fine particulate matter?

Presentation Overview

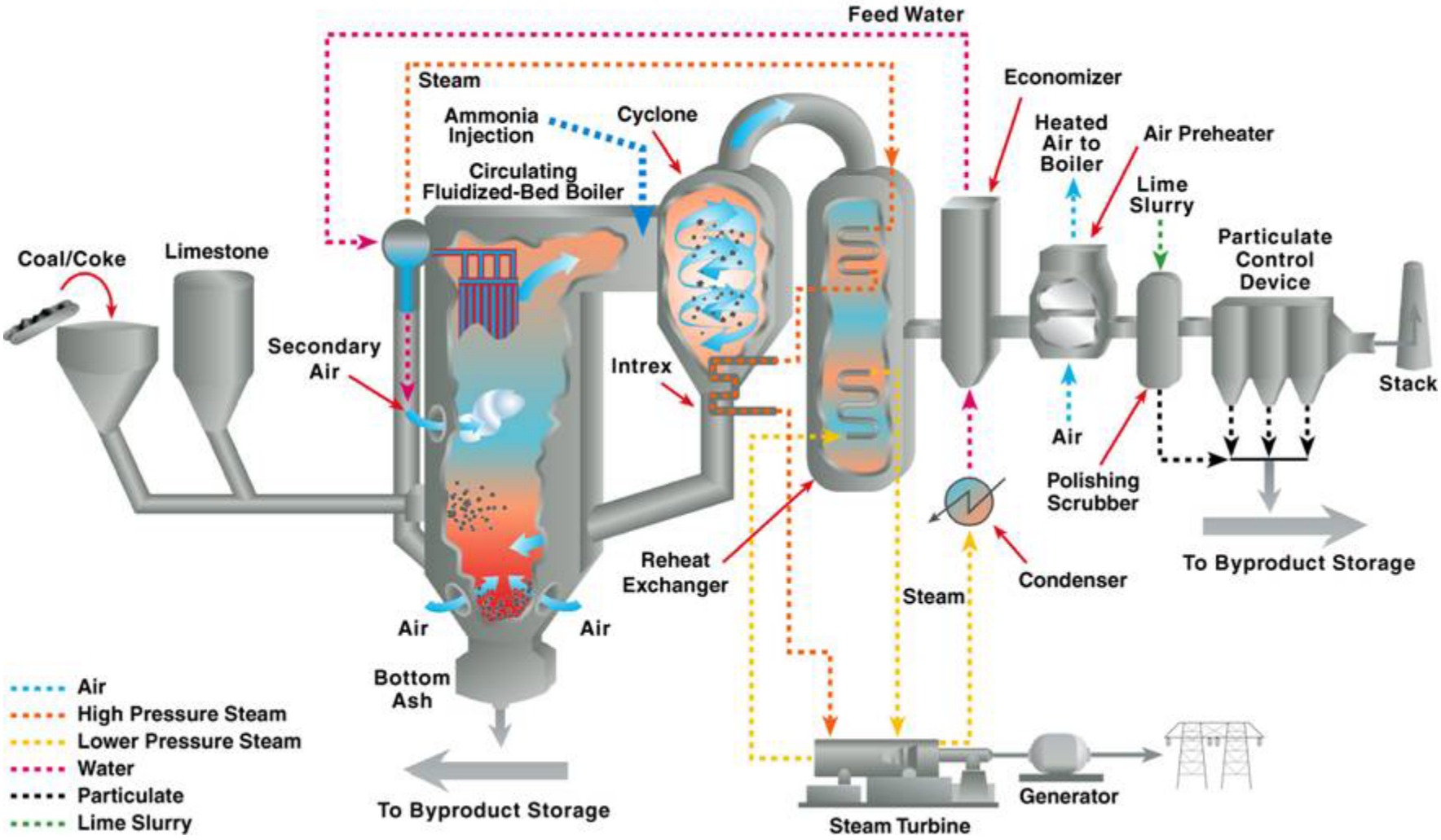
- The Proposed Project
- Air Quality In Alachua County
- Effects Of Existing And Proposed Power Plants
- Mercury Deposition
- Greenhouse Gases
- Future Regulations
- Conclusions

THE PROPOSED PROJECT

The Proposed Project

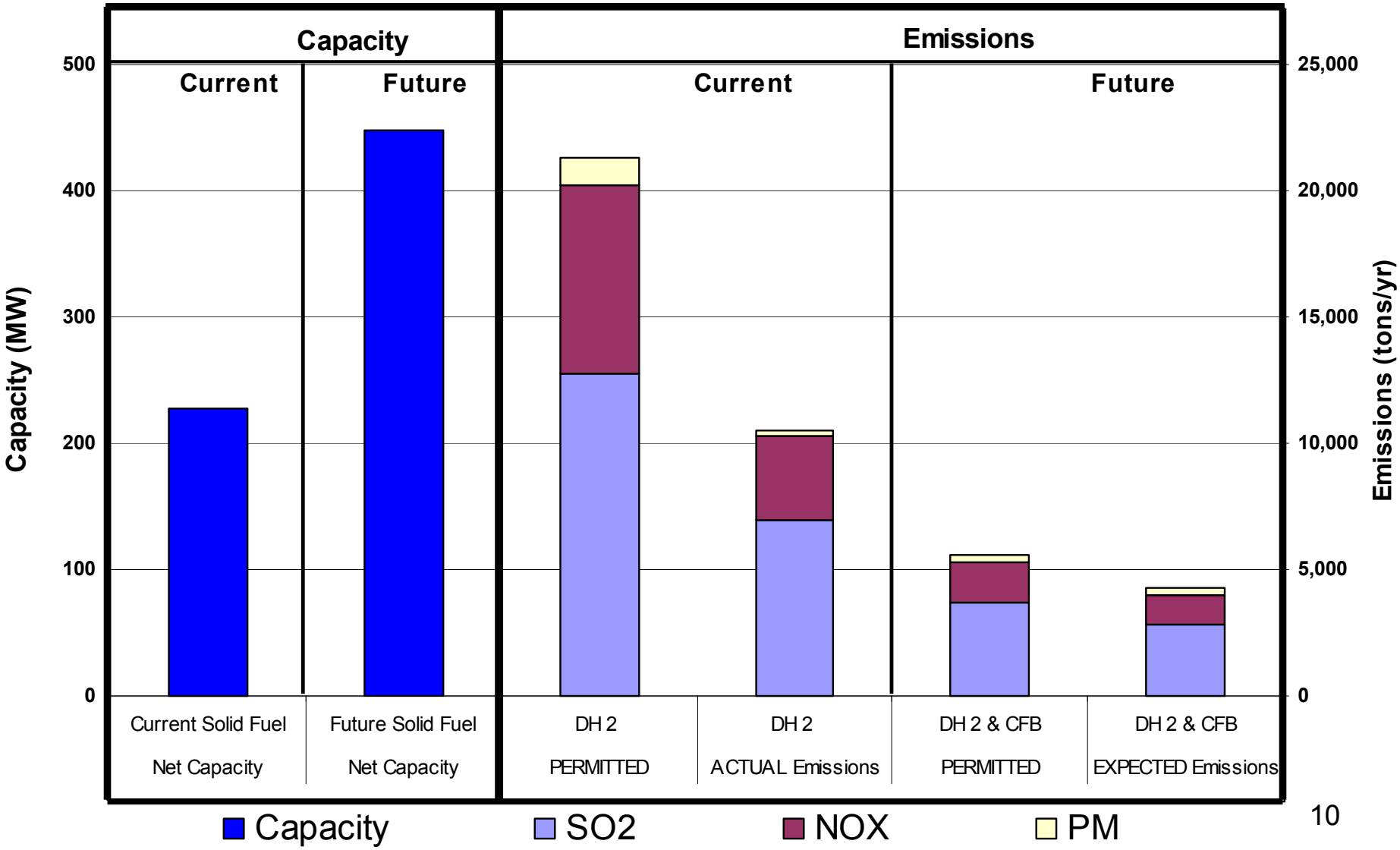
- Retrofit Deerhaven 2 (228 net MW) with Emission Controls
  - Selective Catalytic Reduction (SCR)
  - Flue Gas Desulfurization (FGD or “Scrubber”)
  - Fabric Filter (FF or “Baghouse”)
- Additional Solid Fuel Capacity
  - Circulating Fluidized Bed (CFB) 220 MW net
  - Fuel Flexibility
    - Waste Wood (up to 30 MW)
    - Coal
    - Petroleum Coke
  - Low Emissions
    - Process
    - Emission Controls
      - Polishing Scrubber
      - Fabric Filter
      - Selective Non-Catalytic Reduction (SNCR) Capability

CFB: Proven, Efficient and Flexible
(Circulating Fluidized Bed)



*Conceptual Diagram

Twice the Solid Fuel Capacity with Less than Half the Emissions

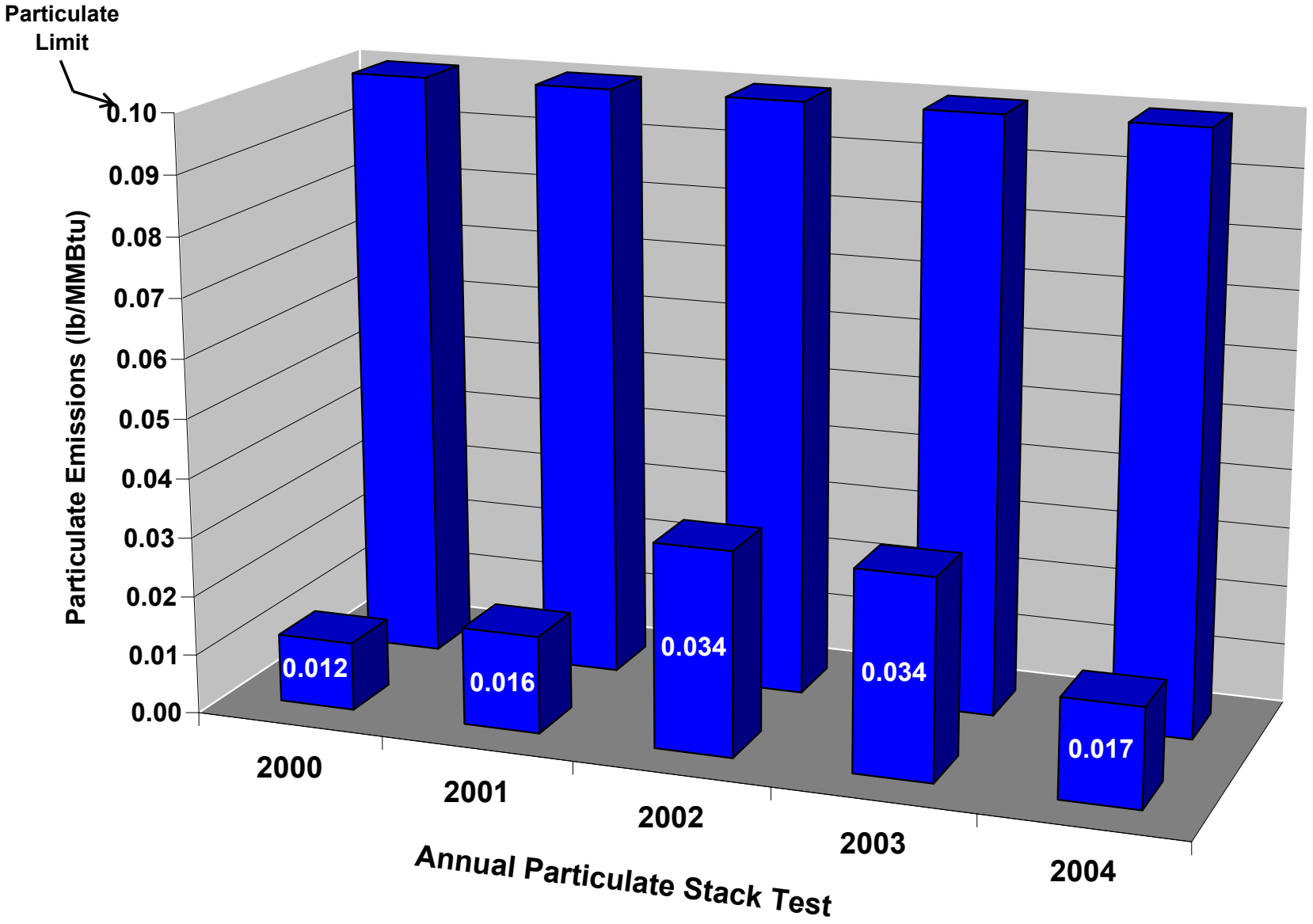


Emissions Would Be Reduced – Even With Higher Sulfur Fuels

	CURRENT - Deerhaven 2		FUTURE - Deerhaven 2 & CFB	
Parameter	Permitted (tons/yr)	Actual (tons/yr)	Permitted (tons/yr)	Expected (tons/yr)
SO_2	12,761.6	6,992.6	3,707.5	2,800.4
NO_X	7,444.2	3,316.5	1,580.3	1,215.7
PM	1,063.5	162.9	296.3	227.9
Hg	N/A	71 lbs/yr	N/A	20 lbs/yr

Note: Ambient air quality concentrations are not linearly related to mass reductions in emissions

Deerhaven 2 Particulate Matter Emissions Leave Little Room for Improvements

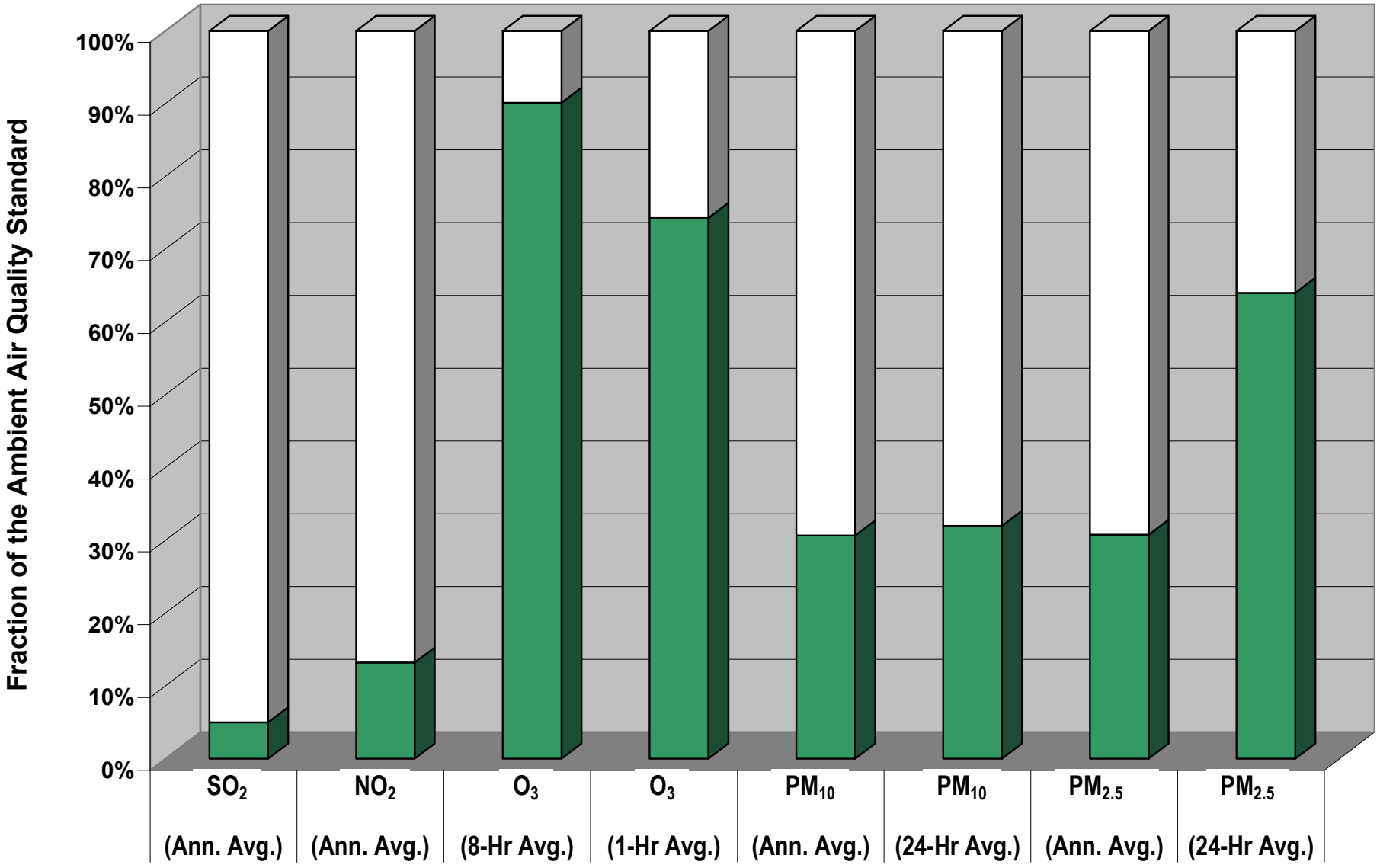


Remember…

- Studies were based on conceptual project assumptions
- Assumptions will likely change in design phase
- Final studies will have to be performed for permitting purposes
- We wanted to give you an early look at the expected impacts of the Proposed Project because we know this is an important issue for the community.

AIR QUALITY
IN ALACHUA COUNTY

Alachua County Ambient Air Quality Is Good



Air Quality Is Influenced By:

- Local, Regional, and Global Sources
  - Note that Ozone is naturally high in North Central Florida
  - Most Particulate Matter in Alachua County is not associated with Power Plants
- Chemical Reactions in the Atmosphere
  - Secondary Particulate Formation ($PM_{2.5}$)
  - Formation of Ozone
- Weather Conditions

EFFECTS OF EXISTING AND PROPOSED POWER PLANTS ON AMBIENT AIR QUALITY

How We Evaluate The Effects Of Power Plants

- Ambient Air Monitoring
- Dispersion Models Based On:
  - Emissions From Operating Scenarios
  - Stack Parameters
  - Weather
  - Terrain And Building
  - Chemical Reactions ($PM_{2.5}$)
- Different Averaging Periods (Consistent With Ambient Air Quality Standards)

EPA Air Dispersion Models Used

- ISCST3
  - SO_2, NO_X, PM/PM_{10}
- CALPUFF
  - $PM_{2.5}$
    - Primary: those portions of directly emitted PM whose median diameters are less than or equal to 2.5 microns.
    - Secondary: those pollutants that chemically transform in the atmosphere to become fine particles
      - $NO_x \rightarrow$ nitrates
      - $SO_2 \rightarrow$ sulfates

Scenarios Modeled

- Facilities
  - Deerhaven
  - J.R. Kelly
- Base Emissions Cases
  - Permitted Emission Rates
  - Actual 2003 Annual Emission Rates
- Future Emissions with 220 MW (net) CFB Cases
  - Expected Permitted Emission Rates
  - Expected Actual Annual Emission Rates

Ambient Air Quality Would Improve

2003 Actual Compared to Future Expected Operating Scenarios (µg/m3)[1]

Parameter	FAAQS[2]	2003 Actual Contributions[3]	Future Expected Contributions[3]
NO_X - Annual Average	100.0	0.60	0.37
SO_2 - Annual Average	60.0	1.27	0.79
PM/PM_{10} - Annual Average	50.0	0.05	0.07
$PM_{2.5}$ - Annual Average	15.0	0.038	0.031

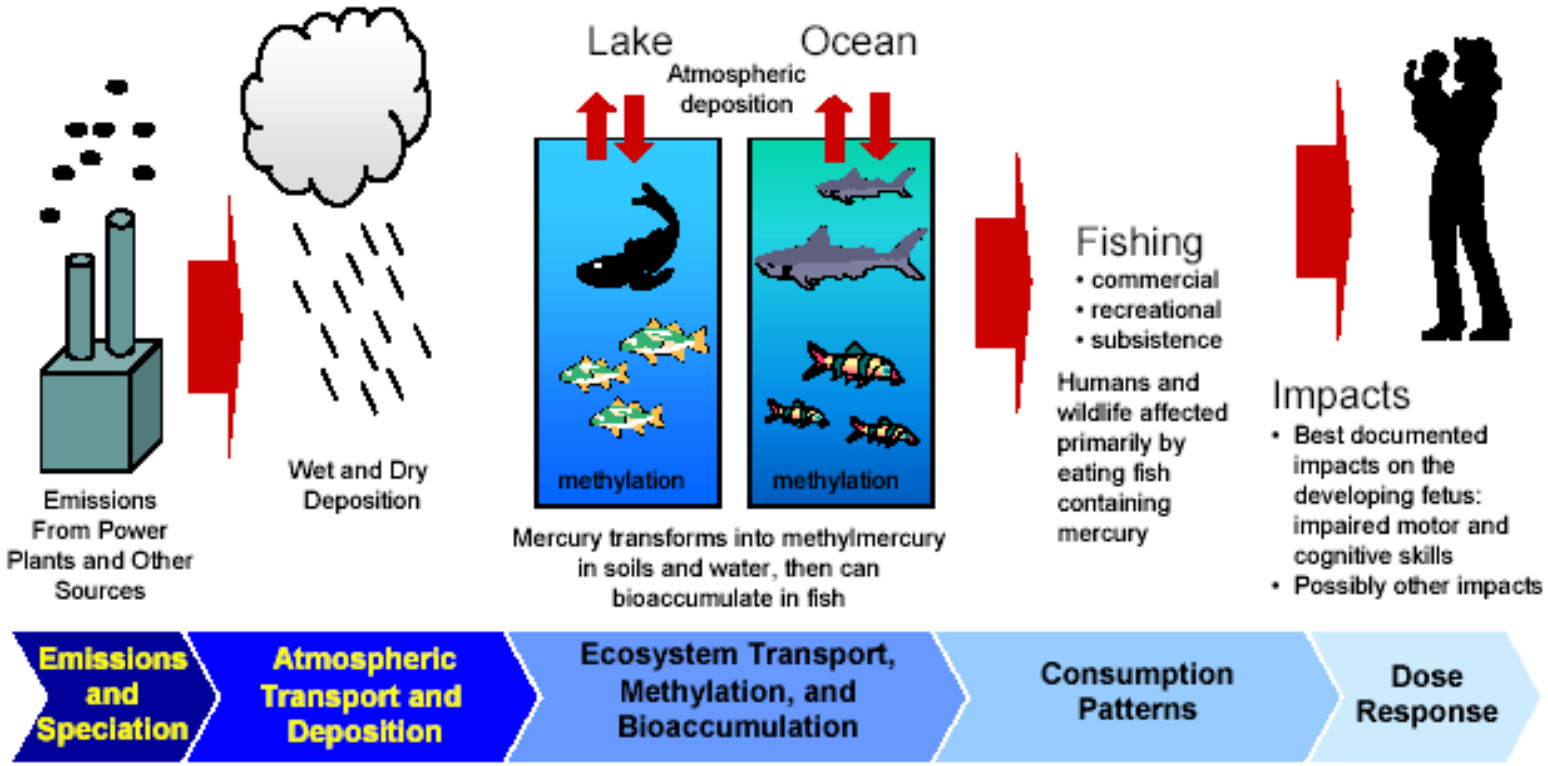
1 Highest point of concentration in Alachua County
2 FAAQS - Florida Ambient Air Quality Standards
3 Both plants

Ambient Air Quality Modeling Results

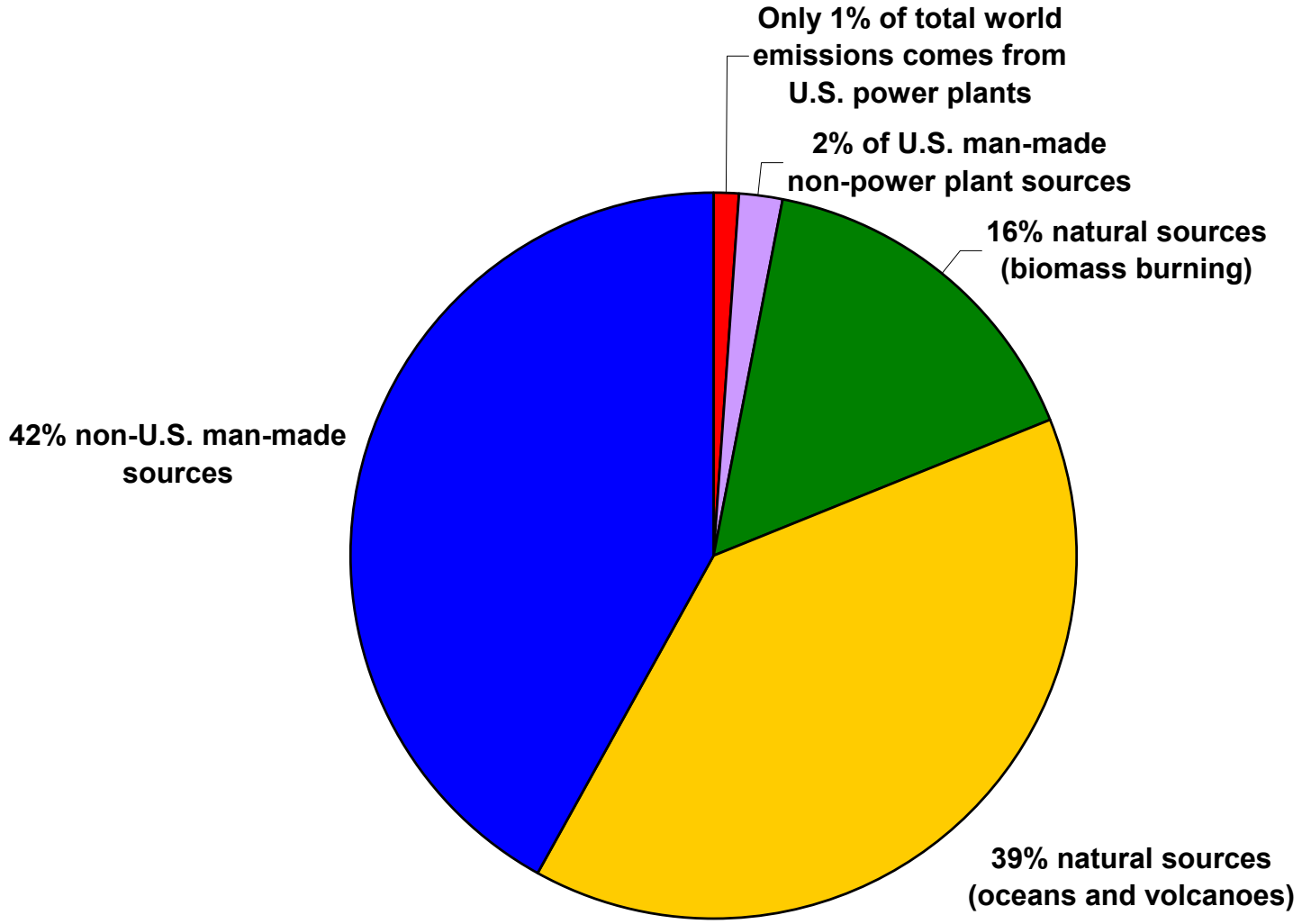
- Alachua County has good air quality.
- GRU's contribution to ambient levels of NO_X, SO_2, PM_{10} and $PM_{2.5}$ is small and are below the level of detectable health effects.
- The Proposed Project would improve ambient levels of NO_X, SO_2, and $PM_{2.5}$.

MERCURY DEPOSITION

Mercury Exposure

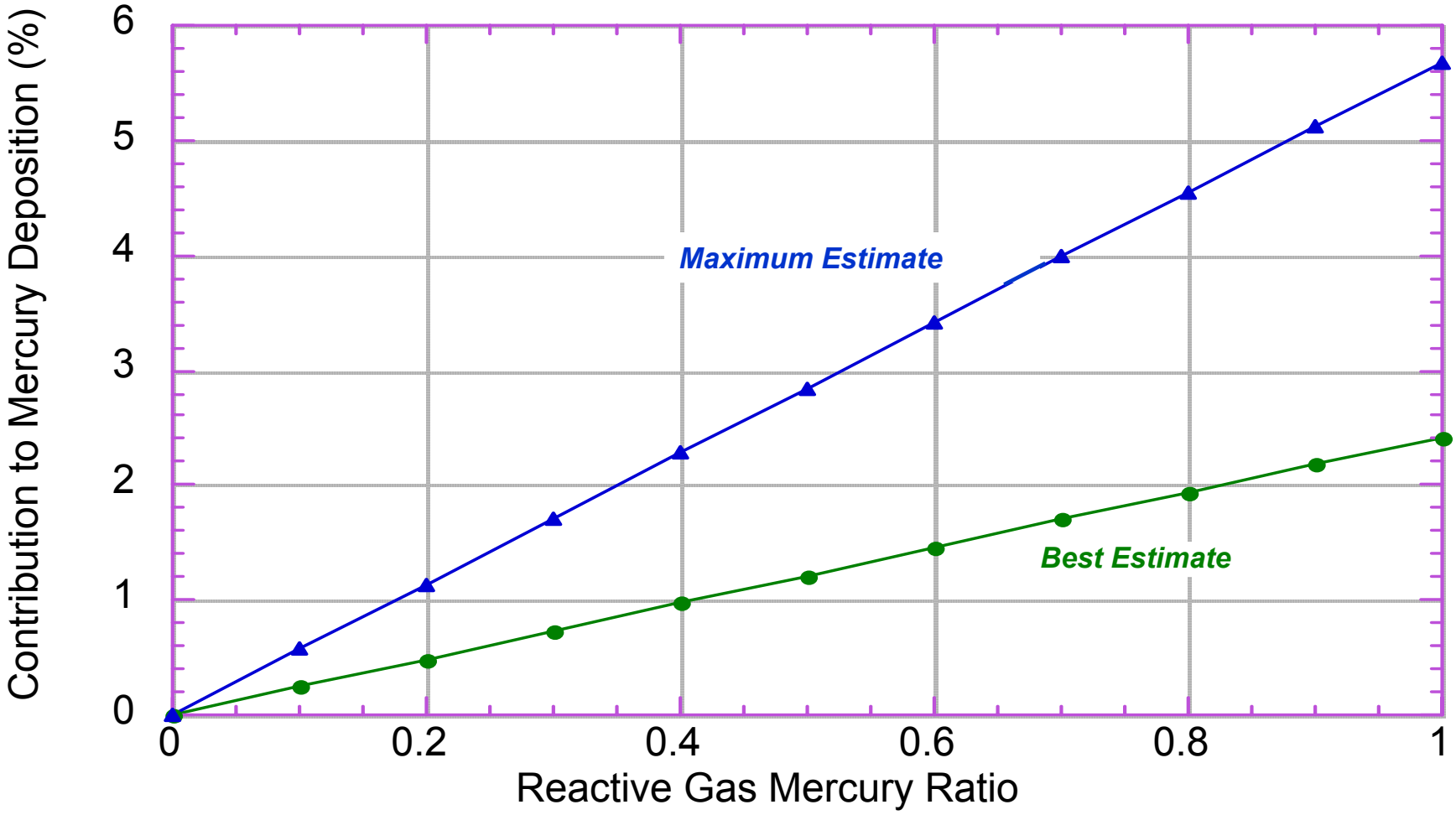


Emissions of mercury from U.S. coal-fired power plants are small compared to global emissions sources



Atmosphereic Environment, Volume 37:253-267, 2003

Results from GEAC Recommended Santa Fe River Mercury Deposition Study



Source: Potential Rates of Deerhaven 2 Mercury Deposition in the Santa Fe River Basin of North Central Florida, C. Pollman, Tetra Tech, Inc., October 22, 2003

Mercury Deposition Study Conclusion

- Current Operations at Deerhaven contribute only 1.2% to 2.8% of the mercury deposition in the Santa Fe River Basin[1].
- Anticipated 72% reduction of mercury emissions from the Proposed Project would result in substantial reductions of this already slight contribution.

1. Assumes 50% Reactive

GREENHOUSE GASES

Our Voluntary Strategies To Reduce CO_2 Intensity
(lbs CO_2/MWh)

- Energy Efficiency
  - Demand Side Management
  - Generation Efficiency Improvements
- Renewable Energy
  - Solar
  - Biomass
  - Methane Utilization
- Carbon Sequestration (Removal and Storage)
  - Forest Protection

Substantial Savings from Energy Conservation Initiatives

MWh/Year (added to slide for clarification)

Kelly CC-1[1]	90,730
Conservation Programs	70,000
Landfill Gas to Energy[2]	10,775
Systems Control Center Solar	11
Customer Owned Solar	6
Solar at the Schools	5

1 2002 CC1 steam turbine generation
2 Assumes two units operating at a 75% capacity factor.

GRU CO_2 Offsets
(tons/yr)

CURRENT		
Kelly CC1 Repowering[1]		90,524
Demand-Side Management		74,000
Landfill Gas to Energy Project[2]		57,120
Forest Protection (10,000 acres)[3]		33,917
Systems Control Center Solar		12
Solar in Schools		5
	SUBTOTAL	255,578
PROPOSED		
Waste Wood Fuel[4]		271,776
Solar at the Airport		16
	SUBTOTAL	271,792
	TOTAL	527,370

1 Assumes avoidance of DH2 coal-fired generation by 2002 CC1 steam turbine generation efficiency gains.

2 Assumes two units operating at a 75% capacity factor. Adjusted for methane reduction credit using 2001 IPPC Global Warming Potentials.

3 Assumes average 3.39 tons CO_2/acre/yr

4 30 MW of DH3

Overall CO_2 Intensity Would Be Reduced By 14%

Year	Without CO_2 Reduction Projects (lb-CO_2/Gross MWh)	With CO_2 Reduction Projects (lb-CO_2/Gross MWh)
2003	1,997.9	1,820.4
2012	1,959.7	1,720.9

FUTURE REGULATIONS

Proposed Regulations

- CAIR – Clean Air Interstate Rule
  - Cap and Trade Program
  - Phase I - 50% SO_2, NO_X Reduction
  - Phase II - 70% SO_2, NO_X Reduction
- MERCURY
  - Either Cap and Trade Program or Unit Specific Limits
  - Phase I - 29% Reduction
  - Phase II - 70% Reduction
- REGIONAL HAZE/BART

Conclusions About Future Regulations

- Existing generation facilities will not comply with proposed regulations without substantial modifications.
- The Proposed Project would allow GRU's generation facilities to comply with Phase I of the proposed regulations and probably Phase II as well, pending final rules.

IN SUMMARY…

Key Findings

- Alachua County has Good Air Quality
- GRU's contributions to ambient SO_2, NO_X, and PM are slight
- Emissions will be Reduced:
  - SO_2 - 60%
  - NO_X - 63%
  - Mercury - 72%
  - Slight increase in PM/PM_{10}
- SO_2 and NO_X Emission Reductions will result in less ambient $PM_{2.5}$
- CO_2 intensity would be reduced 14%

Other Benefits

- Increased Use of Renewable Energy
- Fuel Flexibility
- Price Stability
- Compliance with Proposed Regulations