



- August 15-18, 2010 • Dallas, Texas •
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A Climate Neutral Case Study

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Outline

1. CNCI Project Description
2. MARFORRES New Orleans
3. Energy and GHG Analysis
4. Results
5. Next Steps & Opportunities

Acknowledgements

Col. William Davis - *Assistant Chief of Staff for Facilities*

Lt. Col. Stanley Sober - *Director, Real Property*

Alain Flexer - *Energy Manager*

Howard Myrick - *BRAC Project Manager*

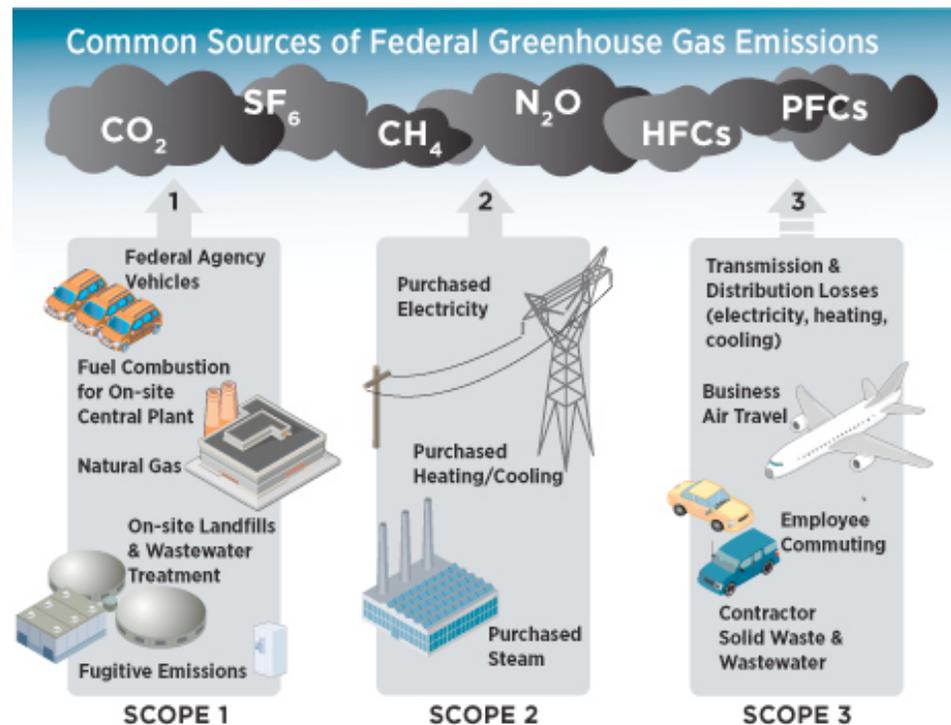
Amy Carbonette - *MARFORRES Facilities*



Climate Neutral Communities Initiative (CNCI)

CNCI applies a “GHG lens” to the NZEI systems approach to integrated decision-making and technology deployment.

A Climate Neutral Community is a campus that balances a measured amount of greenhouse gases released with an equivalent amount sequestered over the course of a year.



Encompasses scope 1, scope 2, and some scope 3 emissions.

Process Overview

The CNCI case studies will develop a cost-benefit analysis of different approaches that Federal campuses can take toward climate neutrality.

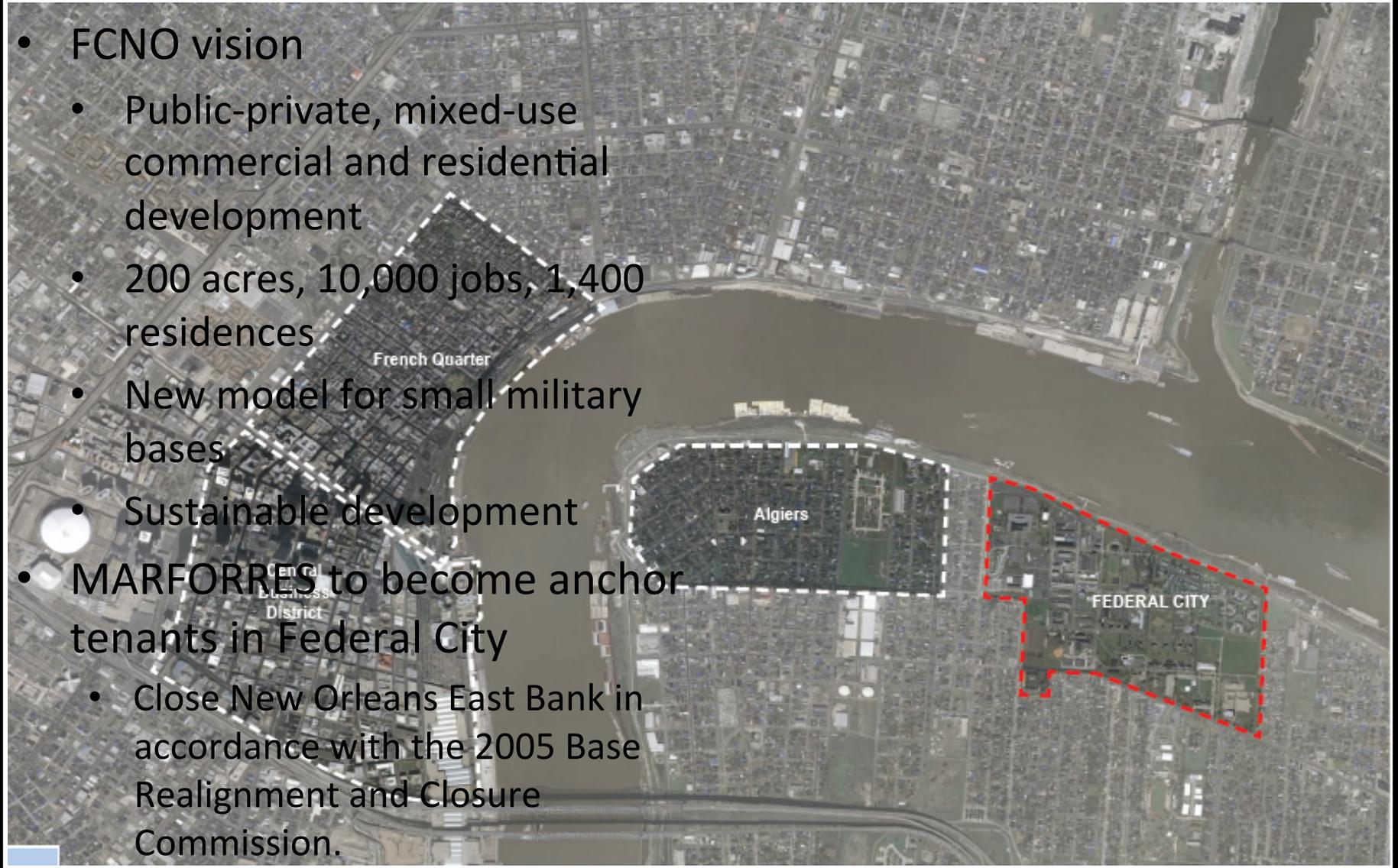
1. Establish Energy/GHG Baseline
2. Energy Efficiency Assessment
3. Renewable Energy & Load Reduction Assessment
4. Transportation Assessment
5. Electrical Systems Assessment (microgrid)



Recommendations and next steps

Background: Federal City New Orleans

- FCNO vision
 - Public-private, mixed-use commercial and residential development
 - 200 acres, 10,000 jobs, 1,400 residences
 - New model for small military bases
 - Sustainable development
- MARFORRES to become anchor tenants in Federal City
 - Close New Orleans East Bank in accordance with the 2005 Base Realignment and Closure Commission.



Project Site

The focus of CNCI case study is the 29-acre MARFORRES Center secure compound.



-  Secure compound
-  Mixed-use campus
-  Coast Guard

Organizational Boundaries

The CNCI analysis includes the following facilities:

- MARFORRES Headquarters Building (under construction)
- Existing Buildings (not operated by MARFORRES)
 - H-100 (Herbert Building): mixed use offices, commissary, apartments
 - H-101: Warehouse
 - H-102: Central plant
- Quarters A (historic residence being transferred to MARFORRES)



Photo credit: Megan van Wieren, EMC Engineers

MARFORRES HQ Building

The MARFORRES HQ building comprises the largest component of the CNCI analysis.

- 400,000 sq ft facility (4 floors)
- Command center (top 2 floors) requires 24/7 up-time
- 5,855 sqft Data center
- Designed to LEED be certifiable
- Designed/constructed using state funding; building will be transferred to MARFORRES operation upon completion.
- Projected completion date: June, 2011



*Rendering courtesy of Federal City New Orleans
(www.nolafederalcity.com)*



Progress as of April 12, 2010

MARFORRES HQ Building

Incorporates a variety of energy efficient measures:

- Heat recovery and desiccant dehumidification
- Improved building envelope
- Economizer controls
- Lighting and VAV Occupancy Sensors
- White Roof
- Low-flow Water Fixtures

As-designed:

- EUI 56kBtu/sqft/yr
- 35% more efficient than standard office bldg¹



Rendering courtesy of Federal City New Orleans
(www.nolafederalcity.com)



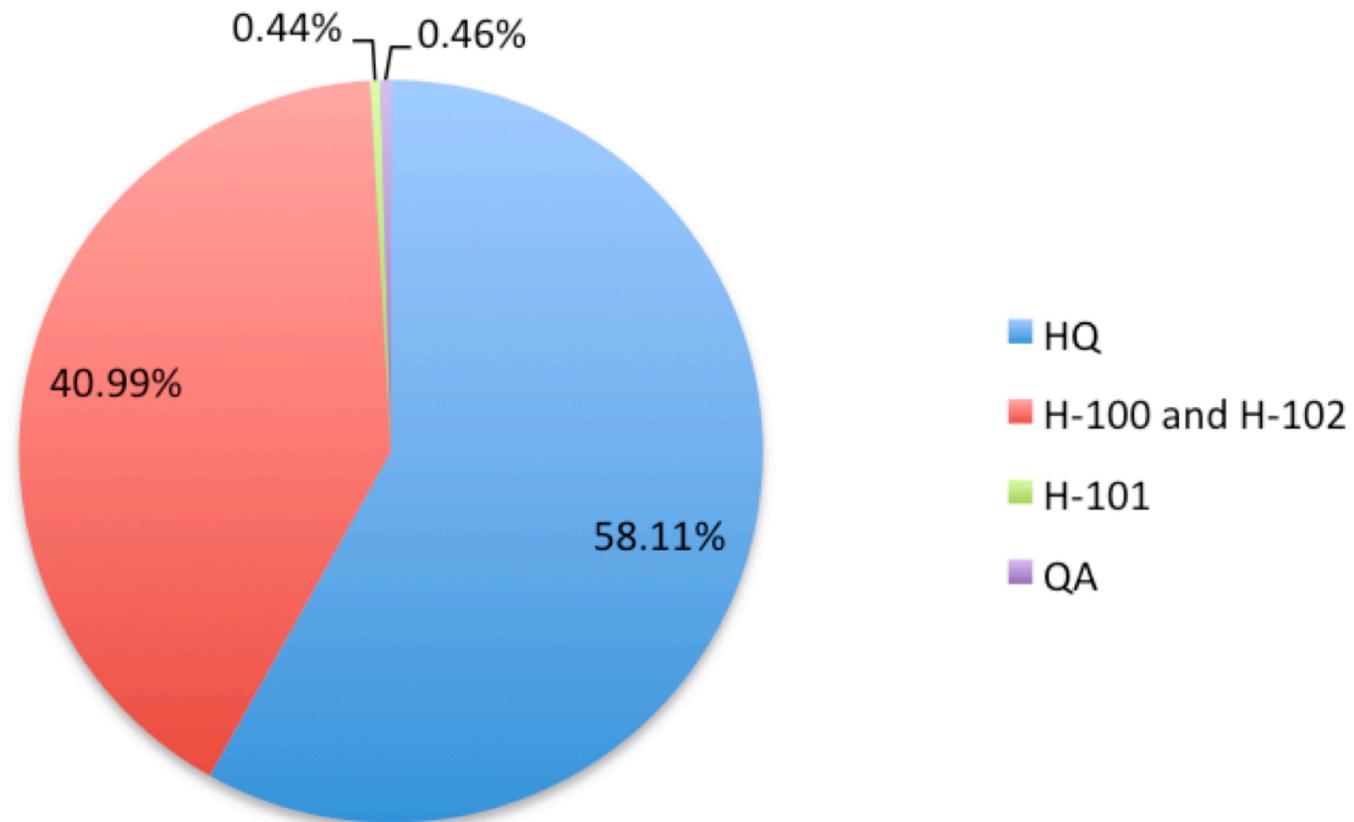
Progress as of April 12, 2010

Site Baselines

- HQ results estimated from eQUEST energy models.
- Herbert buildings estimated from CBECS data for warehouse, office, and lodging
- Quarters A estimates from utility bills

Baseline Results			
Building	Energy Consumption (MMBtu)	GHG Emissions (MT)	Costs (\$)
Headquarters	21,559.92	2933.73	\$596,325
H-100/102	19,011.24	2,069.50	\$404,903.59
H-101	246.62	22.10	\$4,316.07
Quarters A	172.02	23.41	\$4,586.40
Site Total	40,989.80	5,048.73	\$1,010,130.85

Baseline GHG Emissions by Building



Energy Conservation Measures

Composed of a variety of measures:

- HVAC
 - More efficient heating and cooling units
 - Occupancy controls
- Lighting and Plug loads
 - Re-lamping
 - Increased use of day lighting
- Motor Conservation
 - V-belts



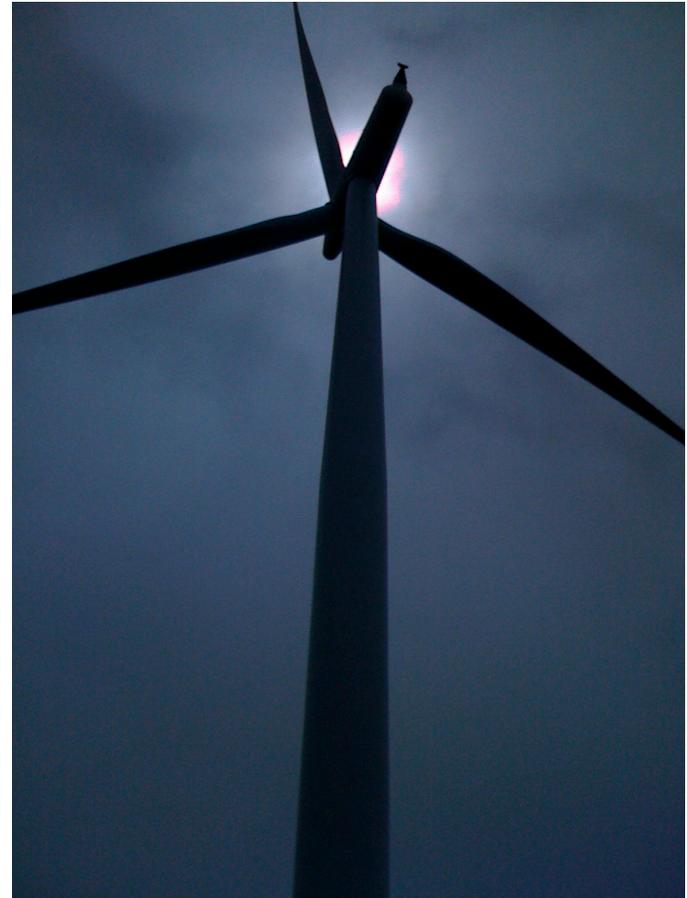
Energy Conservation Measures

Baseline Results including ECMs			
Building	Energy Consumption (MMBtu)	GHG Emissions (MT)	Costs (\$)
Headquarters	19,459.28	2,647.89	\$538,223.20
H-100/102	14,128.95	1,394.82	\$272,691.73
H-101	246.01	12.84	\$4,078.19
Quarters A	115.59	20.64	\$3,672.00
Reductions and savings	7,039.80	972.73	\$191,465.85
New Site Total	33,950	4,076	\$818,665
Percent Reduction	17.17	19.26	18.95

Renewable Energy

TWO GOALS:

1. Net-Zero Energy HQ Building
Generate enough energy onsite to offset grid purchases
2. Micro-grid Analysis
Extend runtime of critical load backup power supplies



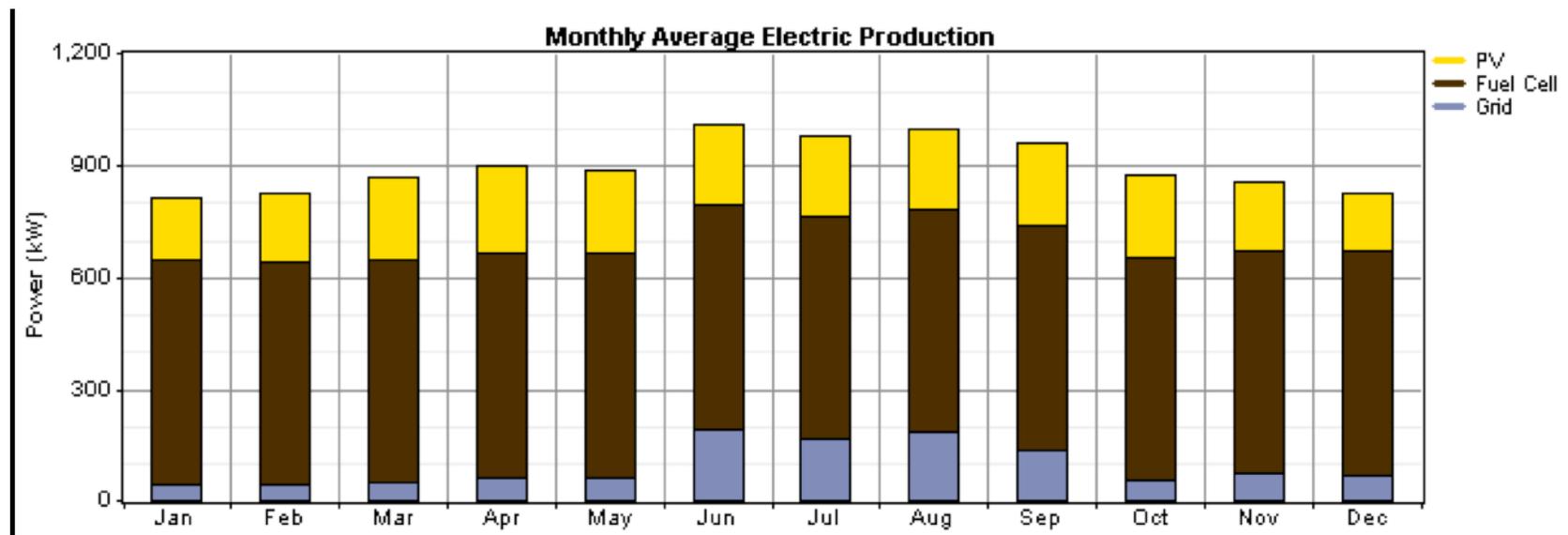
Goal 1: Net-Zero Energy Building

Component	Size
Photovoltaic array size	1,097 kW
Fuel cell	600 kW
Levelized Cost of Energy	\$0.162/kWh*

Production	kWh/yr	%		Consumption	kWh/yr	%
PV Array	1,798,448	23		AC Primary Load	6,373,995	81
Fuel Cell	5,256,000	67		Grid Sales	1,508,669	19
Grid Purchases	828,214	10				
Total	7,882,662	100		Total	7,882,662	100

Goal 1: Net-Zero Energy Building

- 30% reduction in GHG emissions using natural gas
- Net-zero carbon if using biogas



Goal 2: Microgrid

TWO SCENARIOS:

1. PV and Fuel Cell

Expand size of fuel cell from NZEB analysis

2. PV and Diesel Generators

Combine PV with existing generators



Photo credit: National Renewable Energy Laboratory

Microgrid Scenario 1

Component	Size
Photovoltaic array size	1,097 kW
Fuel cell	1800 kW
Levelized Cost of Energy	\$0.518/kWh

Production	kWh/yr	%	Consumption	kWh/yr	%
PV Array	1,798,448	34	AC Primary Load	4,914,019	100
Fuel Cell	3,438,294	66	Grid Sales	-	-
Grid Purchases	-	-			
Total	5,236,742	100	Total	4,914,019	100

Microgrid Scenario 2

Component	Size
Photovoltaic array size	1,097 kW
Diesel Generator	2500 kW
Levelized Cost of Energy	\$1.087/kWh

Production	kWh/yr	%	Consumption	kWh/yr	%
PV Array	1,798,448	22	AC Primary Load	4,914,019	100
Diesel	6,412,323	78	Grid Sales	-	-
Grid Purchases	-	-			
Total	8,210,771	100	Total	4,914,019	100

Lessons Learned

1. Leases should be flexible enough to accommodate the energy needs of an entire site.

Lease with Navy does not allow use of existing central plant infrastructure for HQ building needs.

- *HQ must use electric heating and cooling: less energy efficient, and more expensive than using existing infrastructure.*
- *Electric heating and cooling contribute to critical load that must be maintained in the event of grid failure.*

2. Energy efficiency and climate neutrality must be designed. They cannot be achieved as retrofits.

Further Study

More data...

After completion of HQ building and staff move-in:

- Collect operational data on HQ building
- Business air and vehicle travel
- Employee commuting and transportation
- Fleet vehicle emissions
- Emissions from military and civilian staff relocations
- Emissions from waste water and municipal solid waste

Further Study

Hydrokinetic energy...



...tapping the Mississippi?



GovEnergy 2010

Questions?

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FEMP Greenhouse Gas Program



Mission: “Facilitate the Federal Government's implementation of sound, cost-effective energy management and investment practices to enhance the nation's energy security and environmental stewardship.”

- Public Sector Greenhouse Gas Accounting and Reporting Protocol
- Recommendations for Federal GHG inventories
- Climate Neutral Communities Initiative