



The Solutions Network

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Rochester, New York

**Lessons Learned: Comparing Options for Energy Assurance**

# ***Cogeneration & Refrigeration Plant Modernization***

**Presented by:**

**U.S. General Services Administration  
Heating Operation & Transmission District**

# Lessons Learned: Comparing Options for Energy Assurance

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**U.S. General Services Administration**

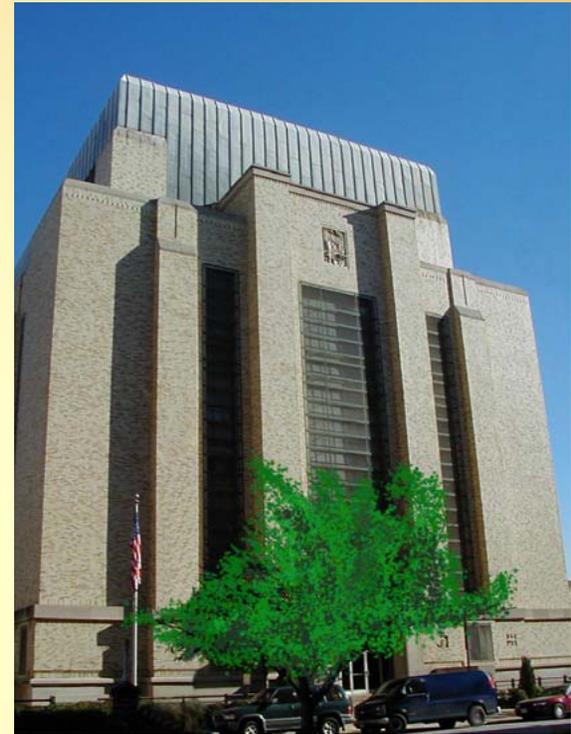
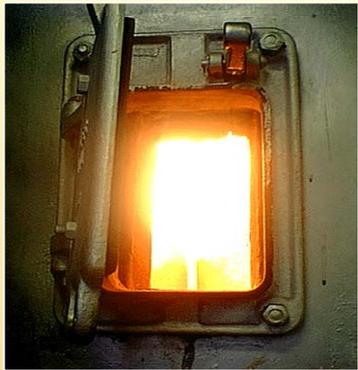


**Washington Gas**

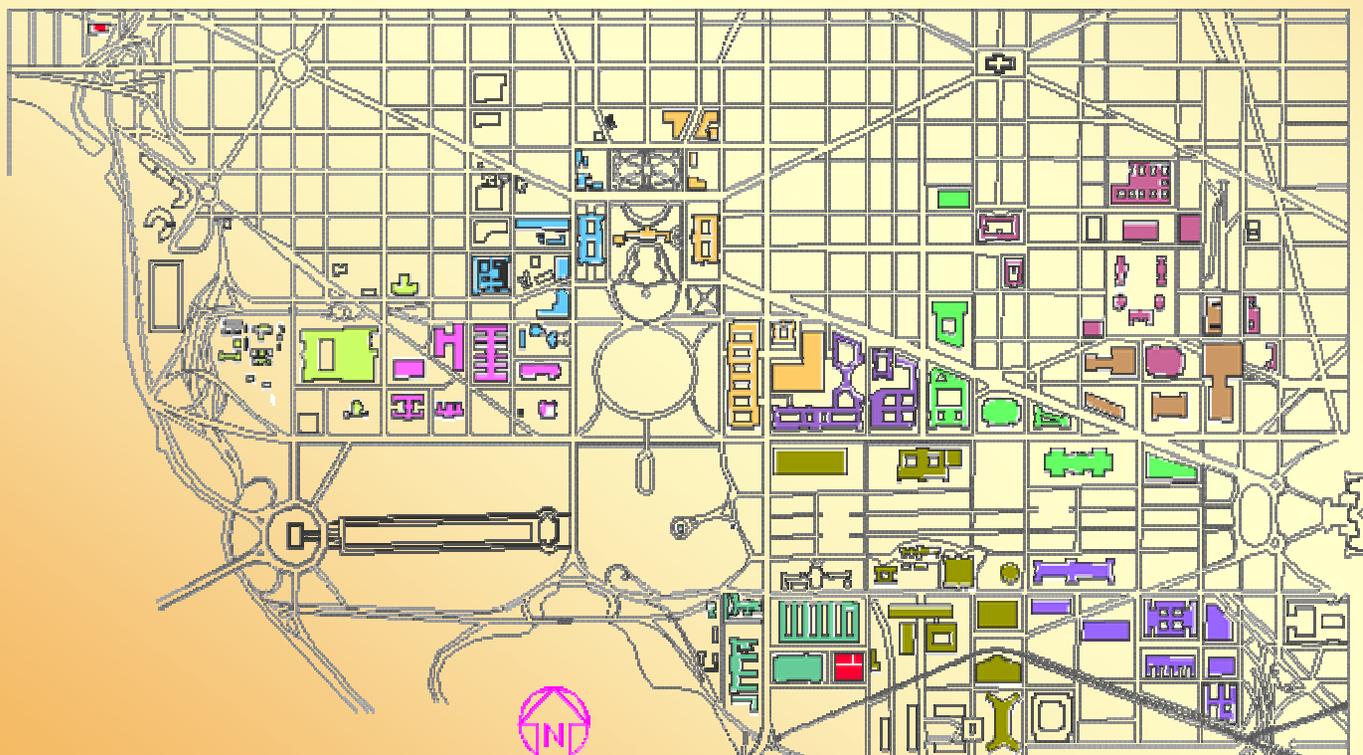


**Smithsonian Institution**

# GSA Heating Operation & Transmission District Energy Services Since 1933



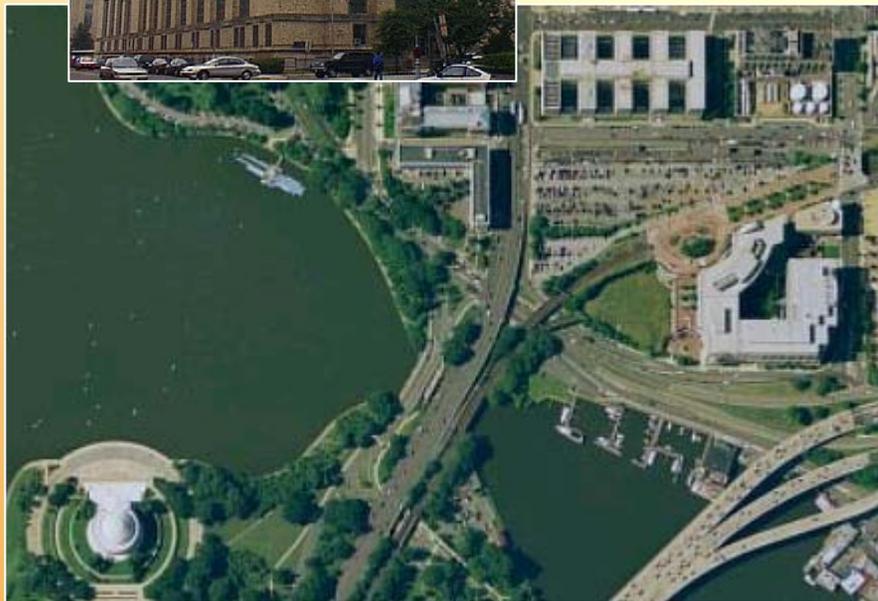
# GSA Heating Operation & Transmission District Serving the Nation's Capital



GSA - NATIONAL CAPITAL REGION STEAM DISTRIBUTION SYSTEM

SCALE: 1" = 200'-0"

# GSA Heating Operation & Transmission District Serving the Nation's Capital



# GSA Heating Operation & Transmission District 21st Century District Energy Services



# GSA Heating Operation & Transmission District Cogeneration & Refrigeration Plant Modernization



# Outline of Presentation



Concept



Financing



Design



Permitting

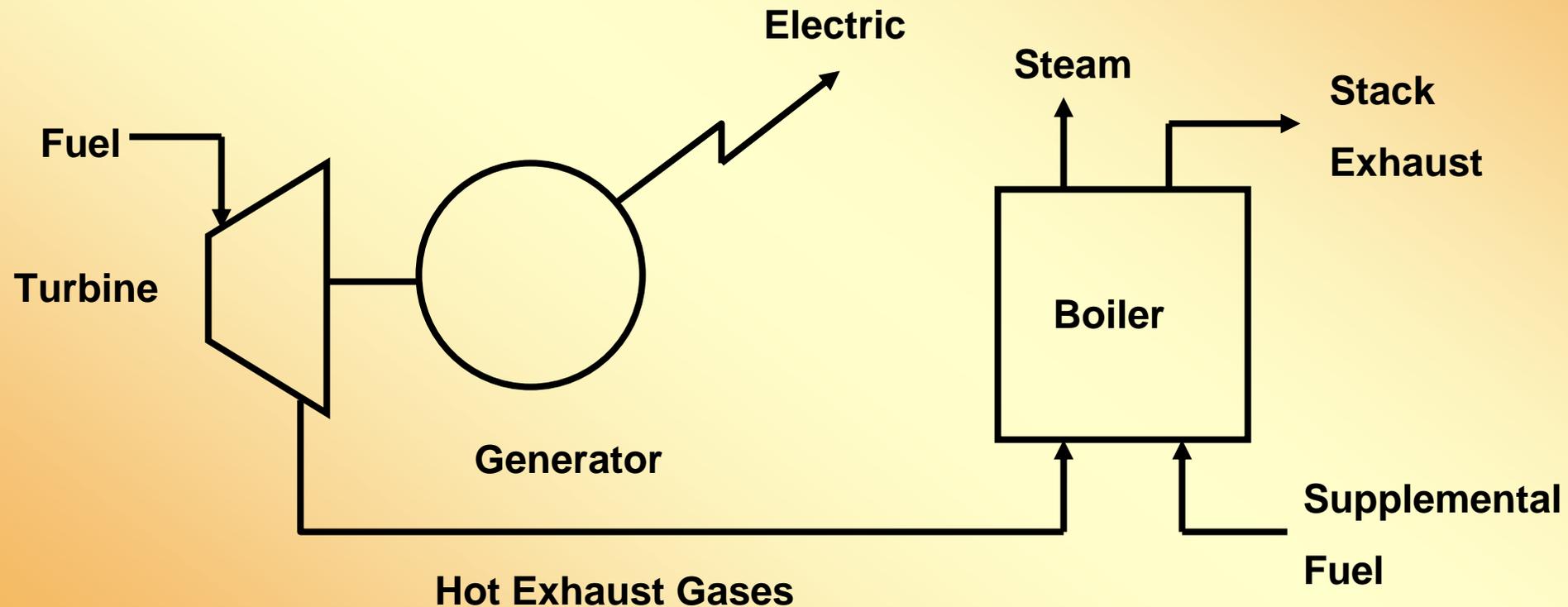


Construction & Operation

# Project Concept: Stay Flexible



# Project Concept: Stay Flexible

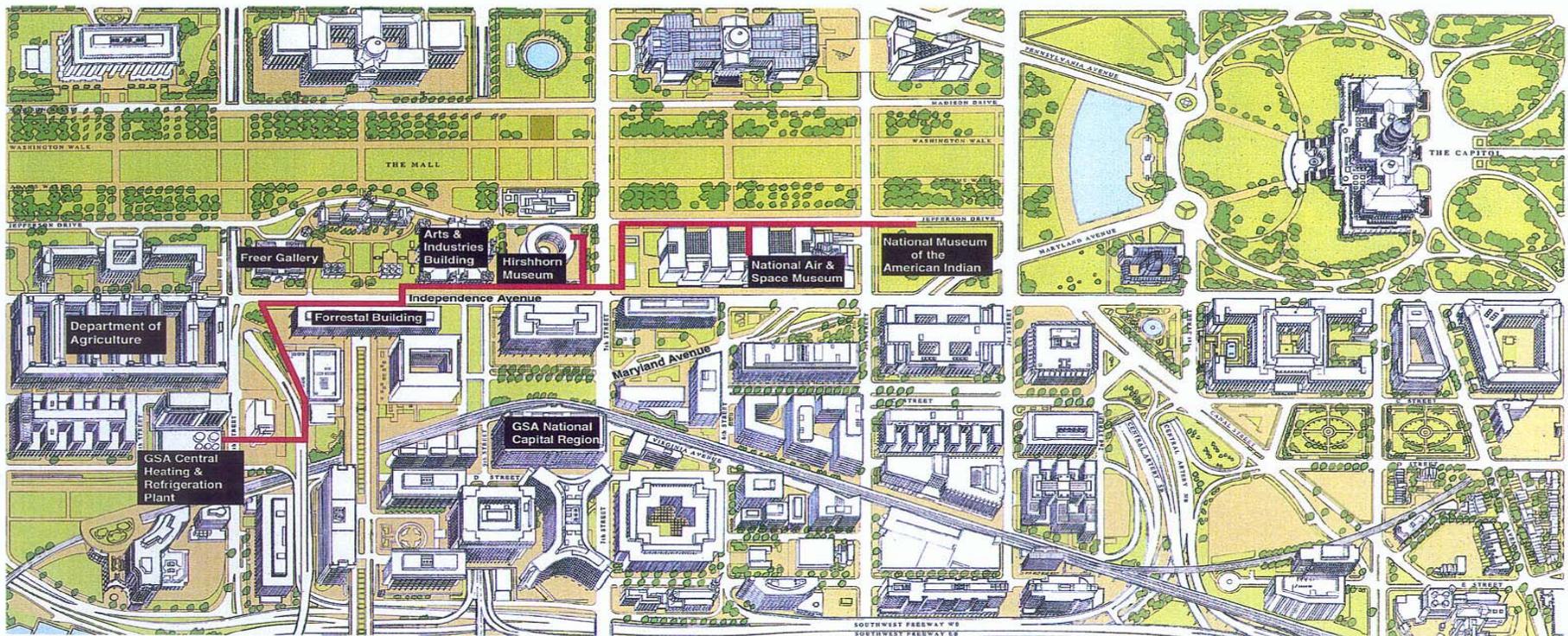


# Project Concept: Stay Flexible



GSA

U.S. General Services Administration  
National Capital Region



Joseph Passonneau & Partners  
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Chilled Water Distribution System  
GSA Cogeneration and Chiller Plant Expansion Project

Chilled water distribution lines

# Project Concept: Stay Flexible



# Project Concept: Stay Flexible

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- Two 5MW gas turbines & gas compressors
- Re-engineered an existing boiler into a waste-heat boiler
- 17,000 tons of cooling equipment including two steam-driven chillers
- New cooling towers & auxiliary equipment
- Automated plant control system
- New electrical switch gear
- 1 mile of underground distribution piping serving 8 Smithsonian buildings

# Project Concept: Stay Flexible



# Project Financing: Getting a Guarantee



|   | <b>ESPC</b>                            | <b>Utility Contracts</b>  |
|---|--|---|
| <b>Authorization</b>                                | EPAct<br>42 USC 8287<br>10 CFR 436     | EPAct, 42 USC 8256<br>10 USC 2865<br>48 CFR 41; 48 CFR 16   |
| <b>Guaranteed Performance</b>                       | Guaranteed performance required        | Guaranteed performance not required, but negotiable   |
| <b>Term</b>   | 25 year maximum                        | 10 year maximum   |
| <b>Measurement &amp; Verification</b>               | M & V and annual energy audit required | M & V and annual energy audit negotiable  |
| <b>Operation &amp; Maintenance</b>                  | O & M typically included               | O & M negotiable  |
| <b>Contracting Time &amp; Resources Requirement</b> | Time and resource intense process      | Reduced time & resources needed for selection process (close scrutiny of terms and technical issues required) |

# Project Financing: Getting a Guarantee



## ***Guaranteed Savings vs. Government-Operations***

# Project Financing: Getting a Guarantee



***Guaranteed Performance = Guaranteed Savings***

# Project Design



1999

2000

2001

2002

2003

2004

Chiller/Cogen Project Feasibility

National Capital Planning Commission

Memorandum of Agreement GSA & Smithsonian

GSA/ Washington Gas Chiller/Cogen Project Contract

South Side Chiller Plant On- line

North Side Chiller Plant Construction Complete

Cogeneration Plant Construction Complete

## Project Milestones

# Project Design



1999

2000

2001

2002

2003

2004

Chiller/Cogen Project Feasibility

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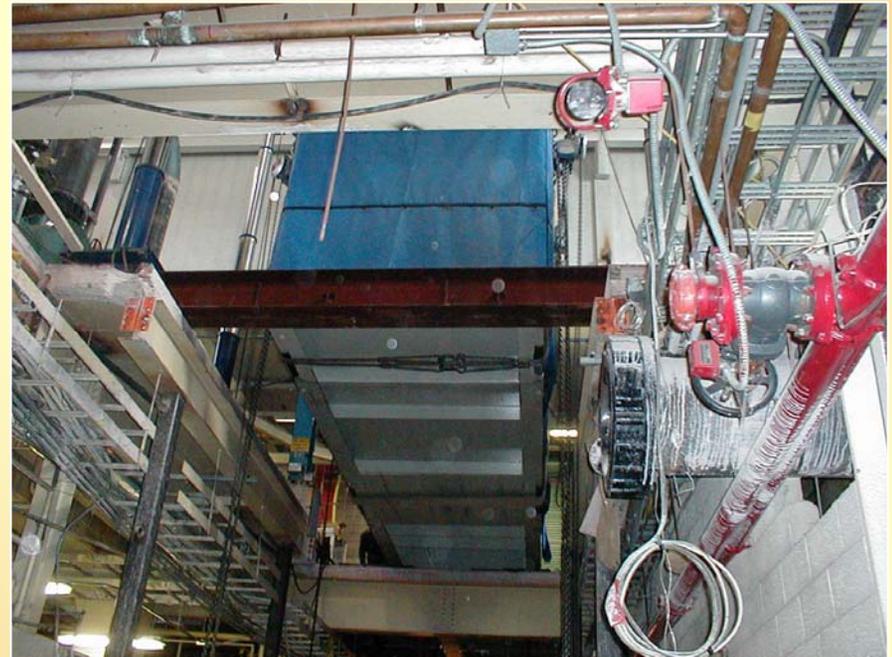
South Side Chiller Plant On- line

North Side Chiller Plant Construction Complete

Cogeneration Plant Construction Complete

## Project Milestones

# Project Design: Design/Build or Build/Design



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# Project Design: Design/Build or Build/Design



# Project Permitting: Watch your Schedule

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# Project Permitting: Watch your Schedule



# Project Permitting: Watch your Schedule



# Construction & Operation: Group Synergy



# Conclusion



- Concept started as a capital chiller replacement project
- Project lost capital funding
- Chiller replacement did not have a 10 year payback
- Chiller replacement with cogeneration had a 7 year payback
- Added Smithsonian chilled water service



Concept



Energy Managers – Keep an open mind when developing your energy project

# Conclusion



- Develop Life Cycle Costing and M & V Plan (see NIST Handbook 135 & Energy Pricing Supplement and FEMP M&V Guidelines for Federal Energy Projects)
- Learn your Agency guidance (consultants may not be much help here)
- Financing mechanisms complicate contracting process (3<sup>rd</sup> party financier, cost evaluation, negotiation, subcontracting plan review, etc)



Financing



Energy Managers – Learn the details of alternate financing mechanisms.

# Conclusion



- Design-Build process can speed up system delivery but has limitations
- Allowance / contingency funds provide an opportunity to meet unanticipated requirements but might reduce contractor accountability
- Pay special attention to systems that include new and existing equipment



Design



Energy Managers – Recognize trade-offs of Design Build process.

# Conclusion



- Environmental Permitting
  - Took over three years
  - Ended up purchasing emission reduction credits from a neighboring state
- Electrical Permitting
  - Multiple levels of study
  - Written agreements between PJM and Pepco
  - Complicated technical evaluation
  - Ended up installing Current Limiting Protective (CLiP) Device



Permitting



Energy Managers – Hire an subject matter expert to guide you through the permitting process.

# Conclusion



- Pitched project to all levels of personnel (from senior level directors, to front line operators and customers)
- Created project team to manage construction, training, and operation
- Incorporated all staff into design review process



Construction & Operation



Energy Mangers – Engagement and dedication of project team determines success of project



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Rochester, New York

***Cogeneration & Refrigeration  
Plant Modernization***

**Thank You!**

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