**EXHIBIT NO. ___(RG-6HC)**
**DOCKET NO. UE-07___/UG-07___**
**2007 PSE GENERAL RATE CASE**
**WITNESS: ROGER GARRATT**

**BEFORE THE**
**WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

| | |
|---|---|
| **WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,**<br><br>**Complainant,**<br><br>**v.**<br><br>**PUGET SOUND ENERGY, INC.,**<br><br>**Respondent.** | **Docket No. UE-07____**<br>**Docket No. UG-07____** |

# FIFTH EXHIBIT (HIGHLY CONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF ROGER GARRATT ON BEHALF OF PUGET SOUND ENERGY, INC.

**REDACTED VERSION**

**DECEMBER 3, 2007**

# Puget Sound Energy, Inc
# 2005 RFP Update

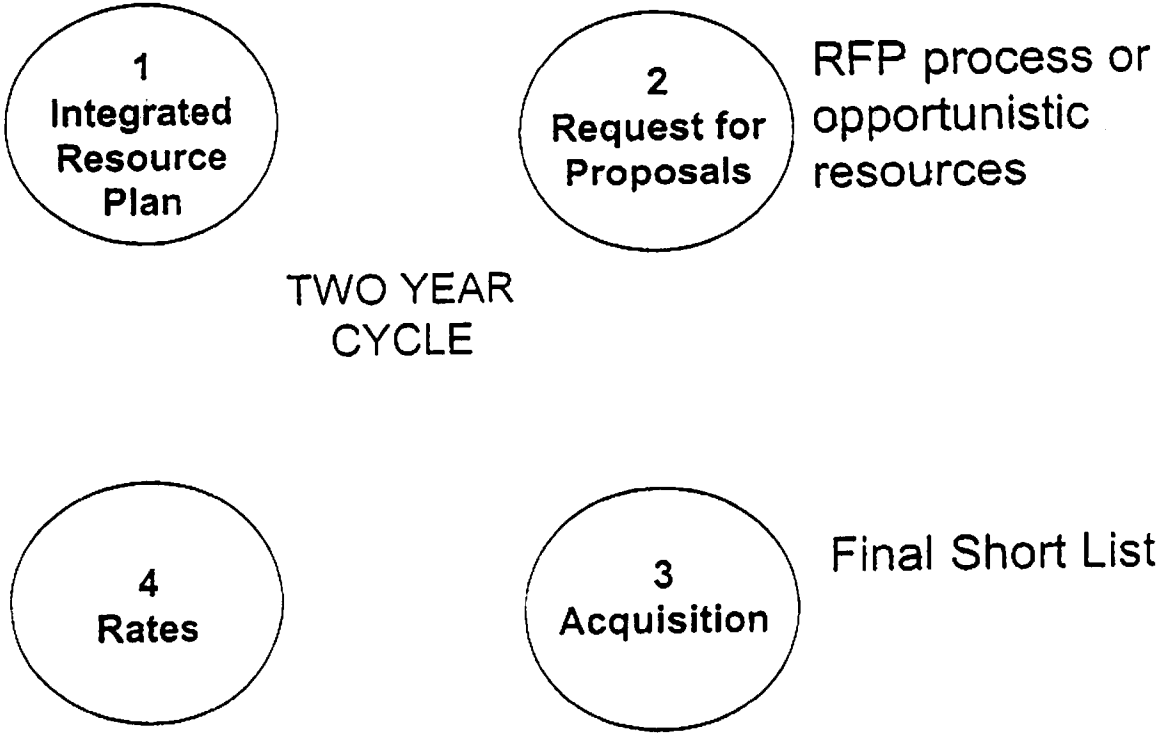
July 20, 2006

# Presentation Outline

- Resource Planning and Acquisition Process
- PSE's Resource Needs
- RFP Process
- Quantitative Evaluation
- Phase I Detail

# Resource Planning & Acquisition Process

2005 LCP identified need



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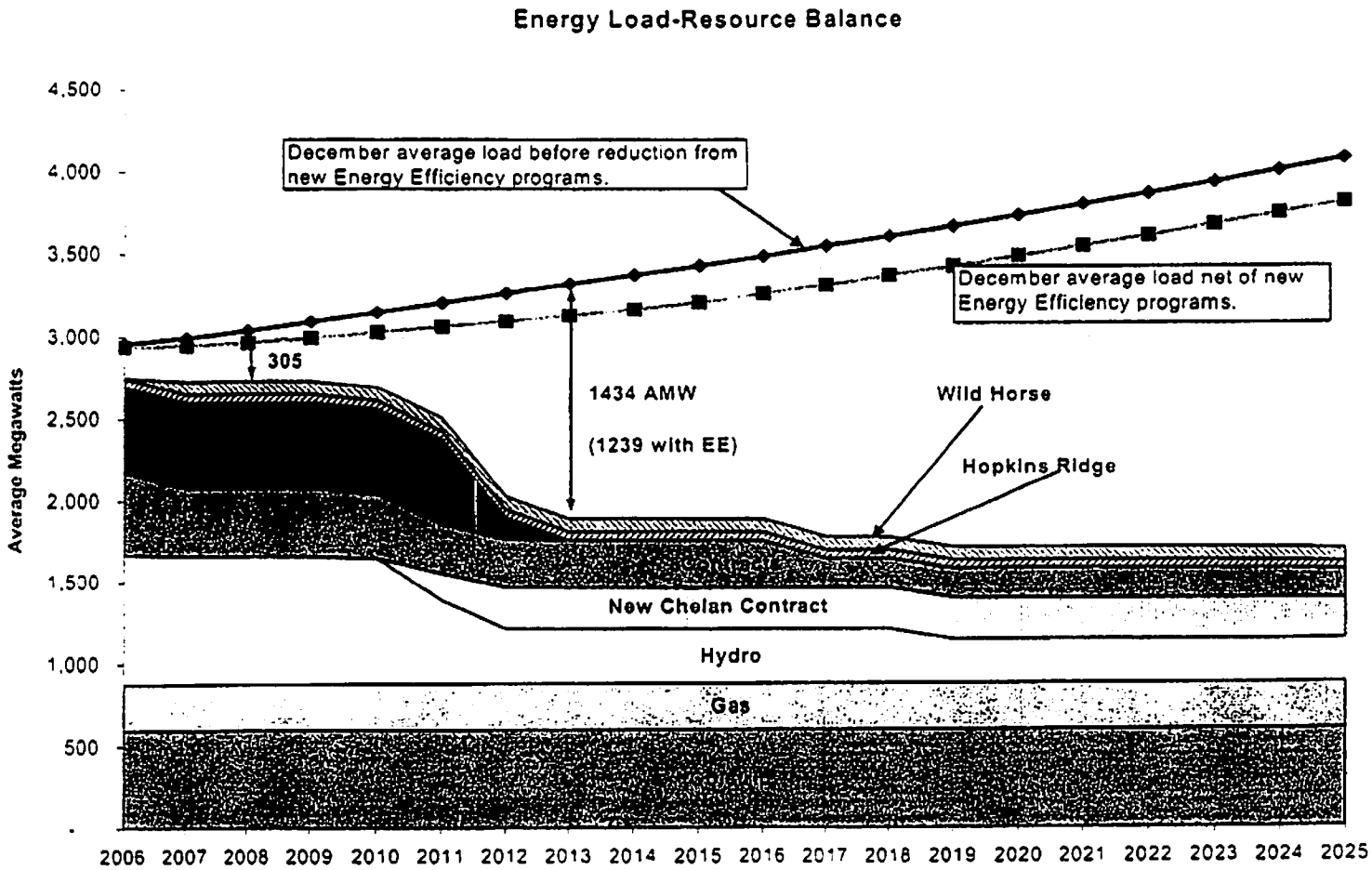
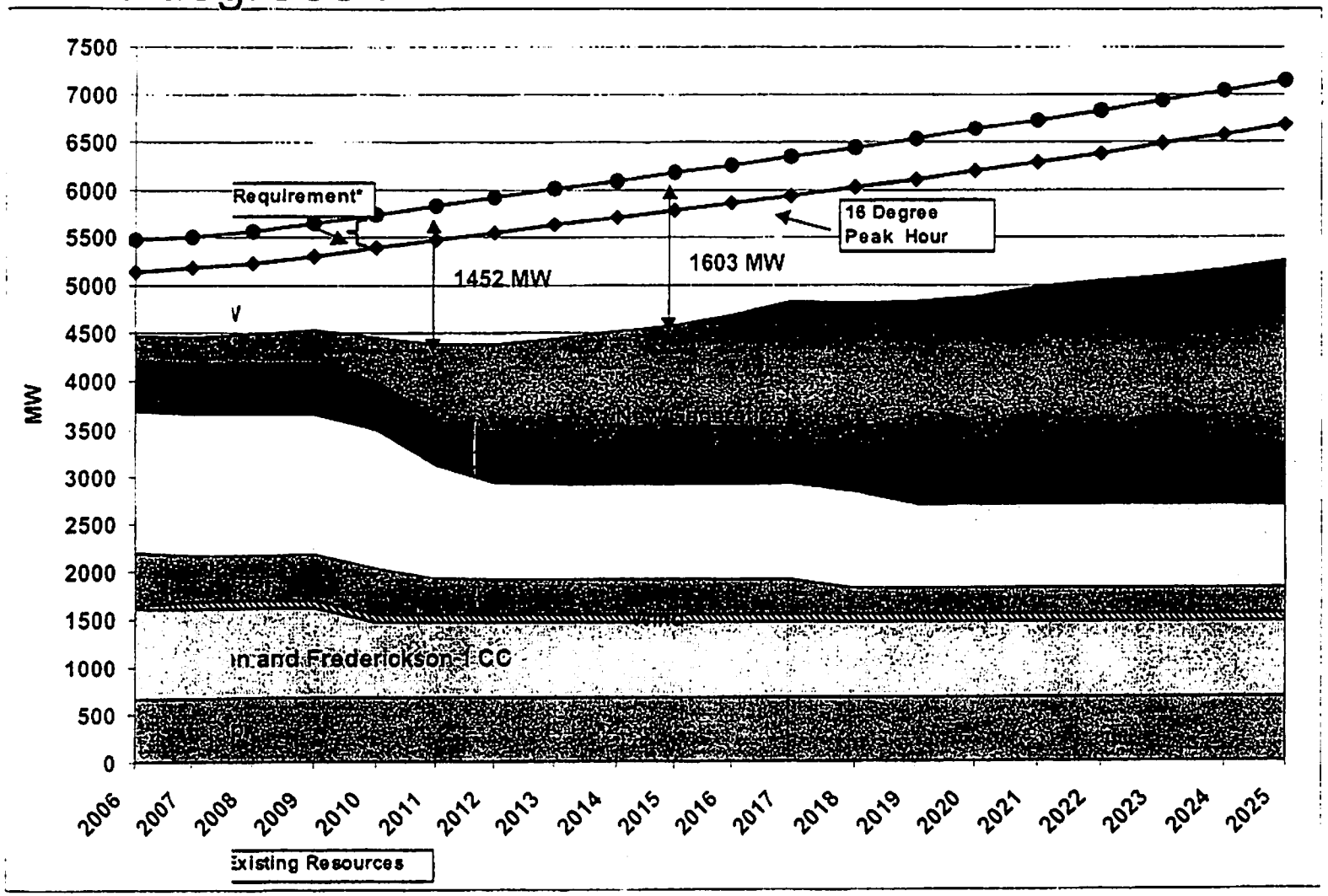
# PSE's energy need is significant = average load minus average generation based on highest deficit month

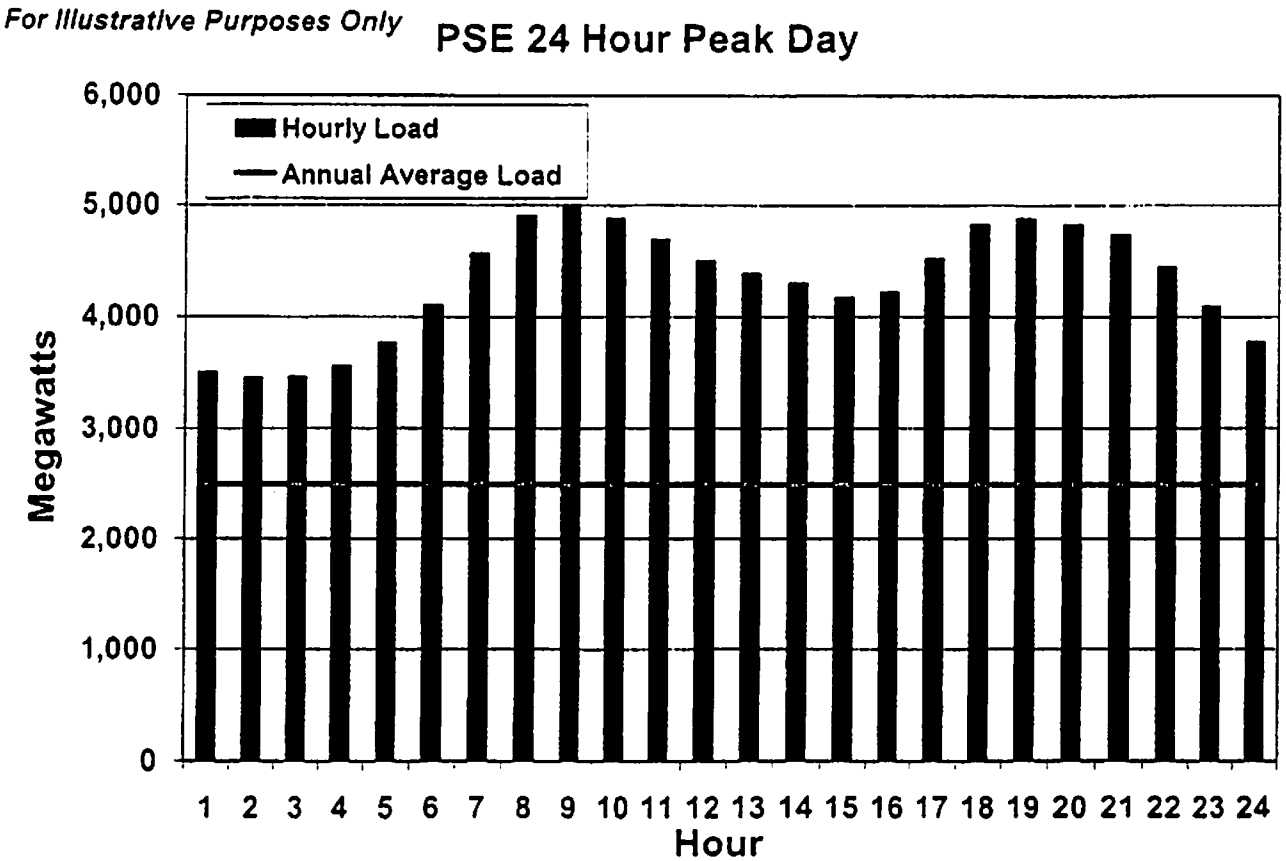


# PSE's capacity need is defined as the one hour peak at 16 degrees F



# PSE's intraday dual peak

*For Illustrative Purposes Only*




**PSE's load factor is 0.50**

# Presentation Outline

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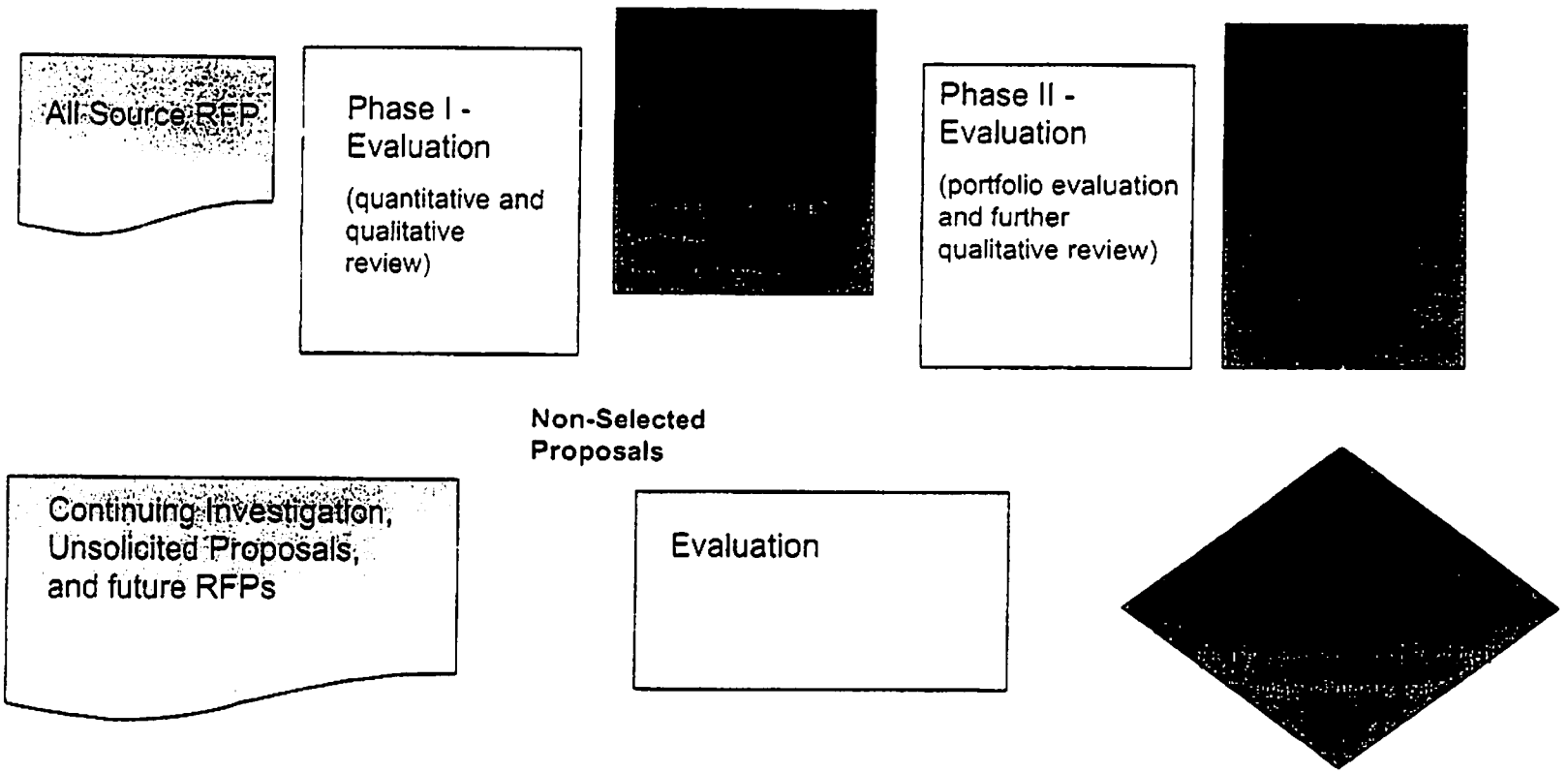
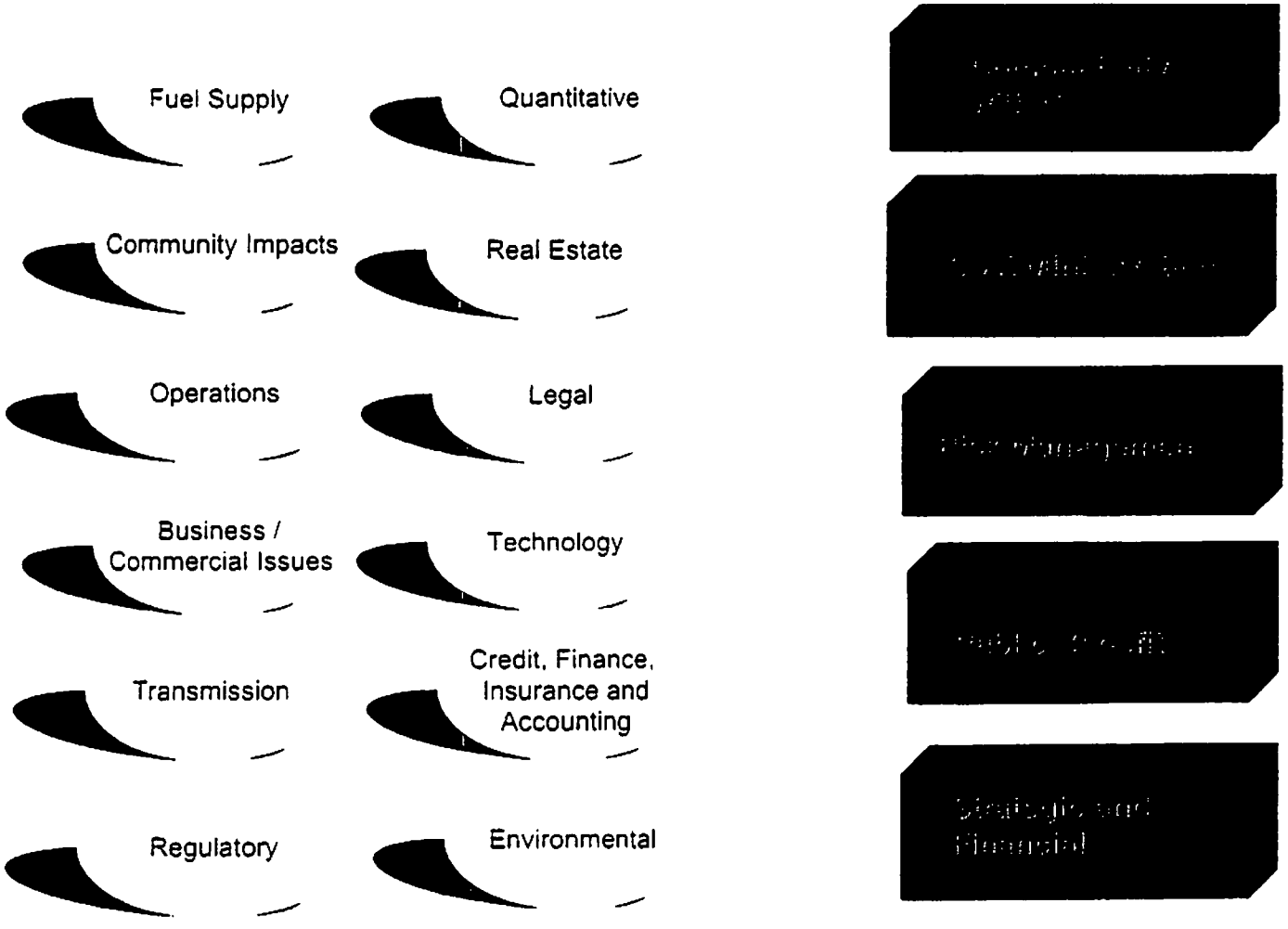
# 2005 RFP Evaluation Process



# RFP Evaluation Criteria

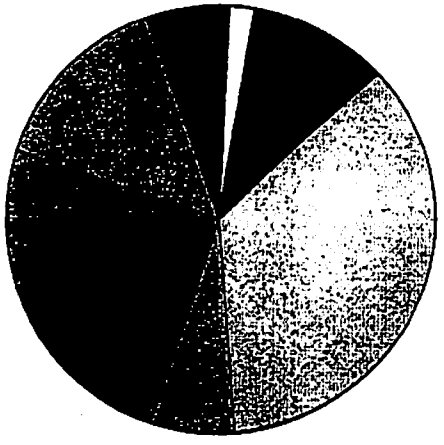
| | | | | |
|---|---|---|---|---|
| • Timing<br>• Resource match to monthly need<br>• Match to monthly need through contract<br>• Operational flexibility<br>• Performance within existing PSE generation portfolio<br>• Resource mix/diversity | • Resource cost including imputed debt and credit costs<br>• Transmission<br>• Portfolio cost impact (Phase II only) | •Status and schedule<br>•Price volatility<br>•Resource flexibility and stability<br>•Resource technology<br>•Long-term flexibility<br>•Project risk<br>•Impact on PSE's overall risk position<br>•Environmental and permitting risk<br>•Respondent risk<br>•Ability to deliver as proposed<br>•Status of trans-mission rights<br>•Managerial control<br>•Security and control<br>•Federal regulatory approvals | •Environmental impacts<br>• Resource location<br>• Community impacts | •Capital structure impacts<br>•Future exposure to environmental regulations and/or taxes including greenhouse gas emissions<br>•Guarantees and security |

# Evaluation Team

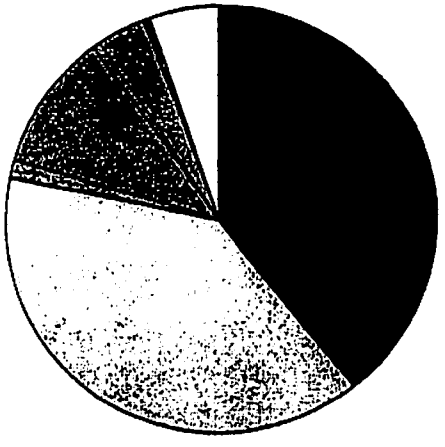


# 48 Respondent Proposals Received

## More coal, less wind in this RFP cycle



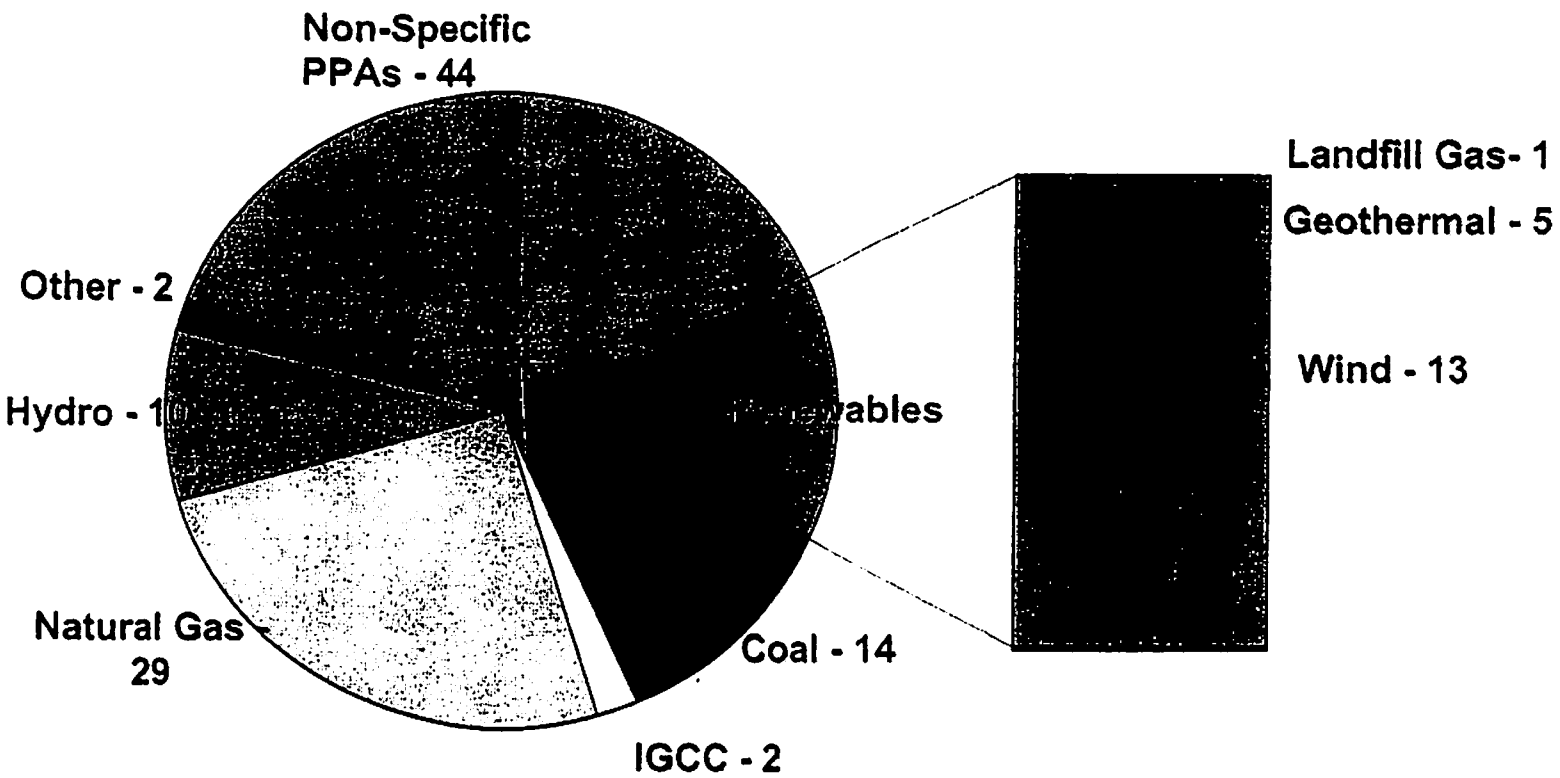
Proposals by Fuel Type



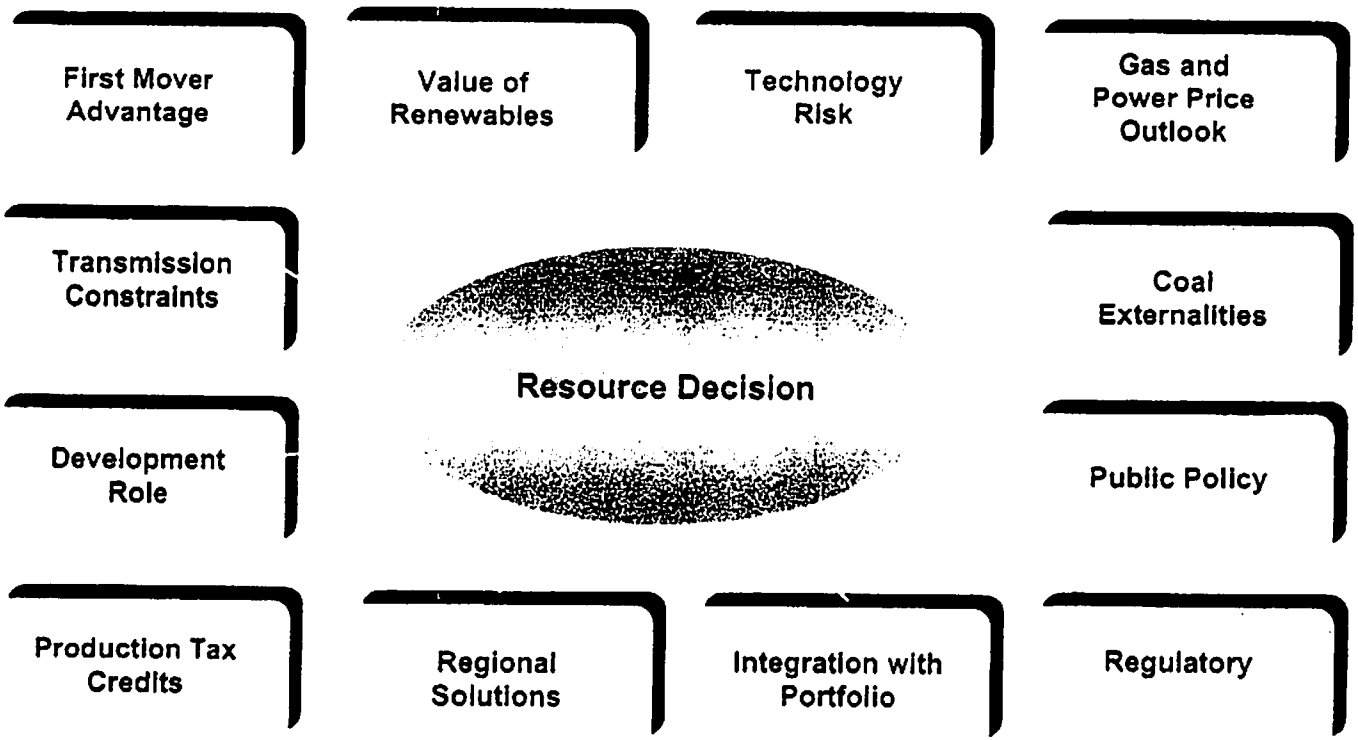
Megawatts by Fuel Type

| | | MWs |
|---|---|---|
| IGCC | 1 | 600 |
| Coal | 5 | 4,350 |
| Natural Gas | 17 | 4,307 |
| Hydro | 3 | 139 |
| Wind | 10 | 1,165 |
| Geothermal | 2 | 77 |
| Non-Specific PPAs | 7 | 400 |
| Other | 3 | 44 |
| | 48 | 11,082 |

# ...Over 120 Offers Evaluated



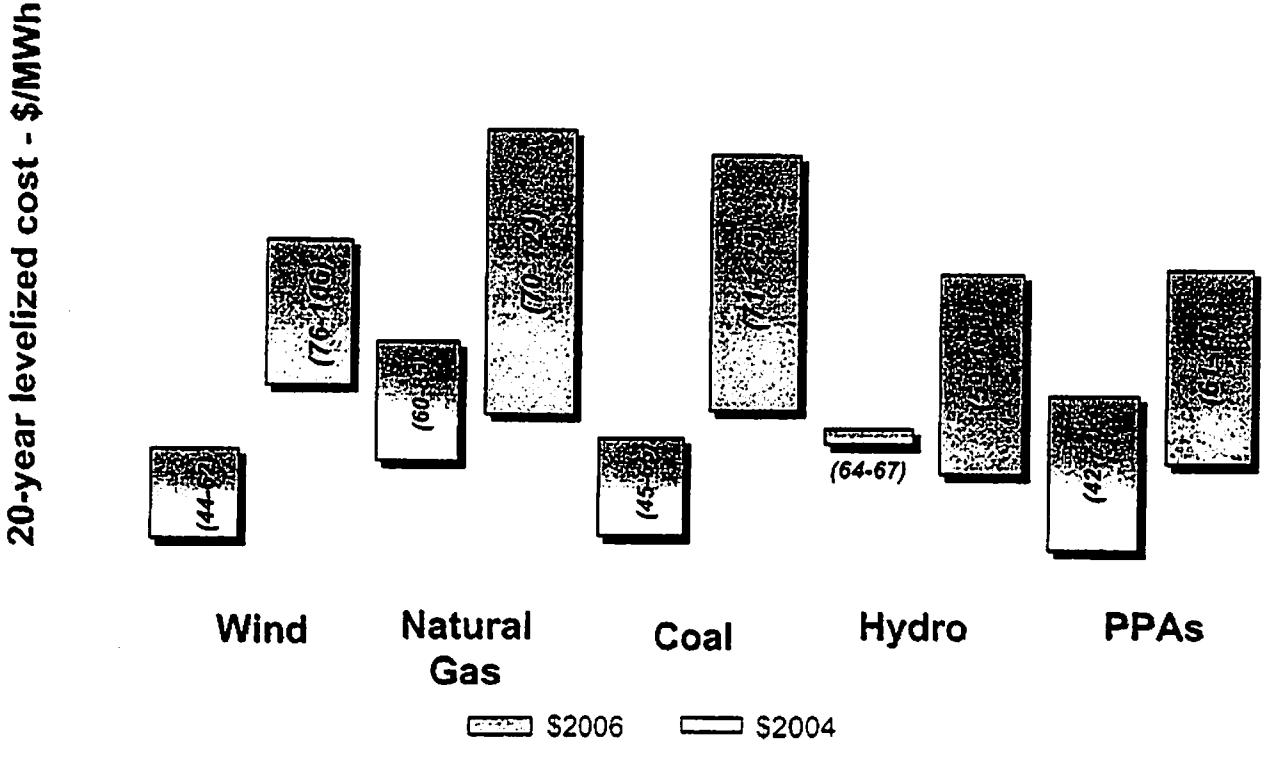
# In addition to the RFP criteria, all factors that could reasonably affect the decision are considered



# Market Observations

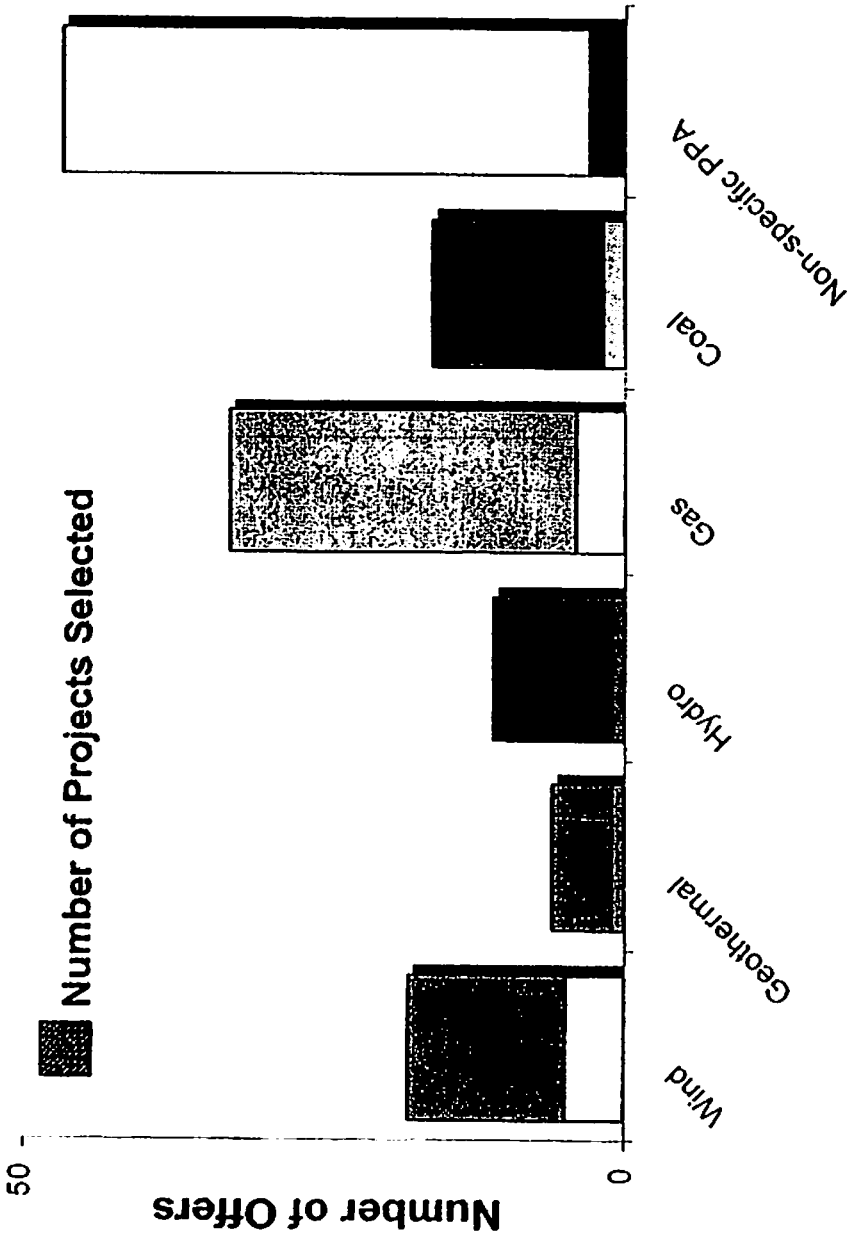
- Resource costs are higher
- Limited number of 2007 wind projects
  - Wind turbine manufacturers sold out for 2007
  - Only half of proposed projects have turbines
- Evaluation of new generation technology
  - IGCC, GE simple cycle LMS 100's
- Transmission will continue to be challenging
- Increasing environmental regulation
  - Potential RPS by the end of this year
  - Increasing likelihood of GHG regulation

# Resource costs have increased significantly since 2004 RFP




1. *PPA range represents fixed price offers only and is inclusive of imputed debt and exclusive of credit*
2. *2004 levelized costs do not include transmission from Mid-C to PSE's system*

# Candidate Short List



# Candidate Short List - 13 projects/3 PPAs

| Fuel | Project/Offer | Owner /Developer | MW | Benefit Ratio[1] | Levelized Cost $/MWh | Portfolio Benefit $000 | Comments |
|---|---|---|---|---|---|---|---|
| G | | | | 0.07 | | 9,121 | |
| H | | | | 0.31 | | 145,414 | |
| W | | | | 0.17 | | 42,744 | |
| W | | | | 0.12 | | 20,991 | |
| W | | | | 0.10 | | 24,447 | |
| W | | | | 0.06 | | 16,443 | |
| NG | | | | 0.26 | | 237,558 | |
| NG | Goldendale | Calpine | 272 | 0.25 | | 241,097 | Attractive gas plant, potential to redirect; participation in bankruptcy auction process required |
| NG | | | | 0.24 | | 198,188 | |
| NG | | | | 0.24 | | 171,629 | |
| NG | | | | 0.04 | | 621 | |
| C | | | | 0.14 | | 217,528 | |
| C | | | | 0.07 | | 41,986 | |
| PPA | | | | 0.50-0.30 | | [2] | |
| PPA | | | | 0.17-0.22 | | [2] | |
| PPA | | | | 0.14 | | [2] | |

[1] Benefit ration is the primary quantiative selection metric.
[2] These are short term offers ranging from 3-5 year terms and were evaluated using both KWI and PSM; portfolio benefit is determined by strategic fit, impact to EPS, portfolio exposure

**Redacted**

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Per WAC 480-07-160

Exhibit No. ___(RG-6HC)
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# Presentation Outline

- Resource Planning and Acquisition Process
- PSE's Resource Needs
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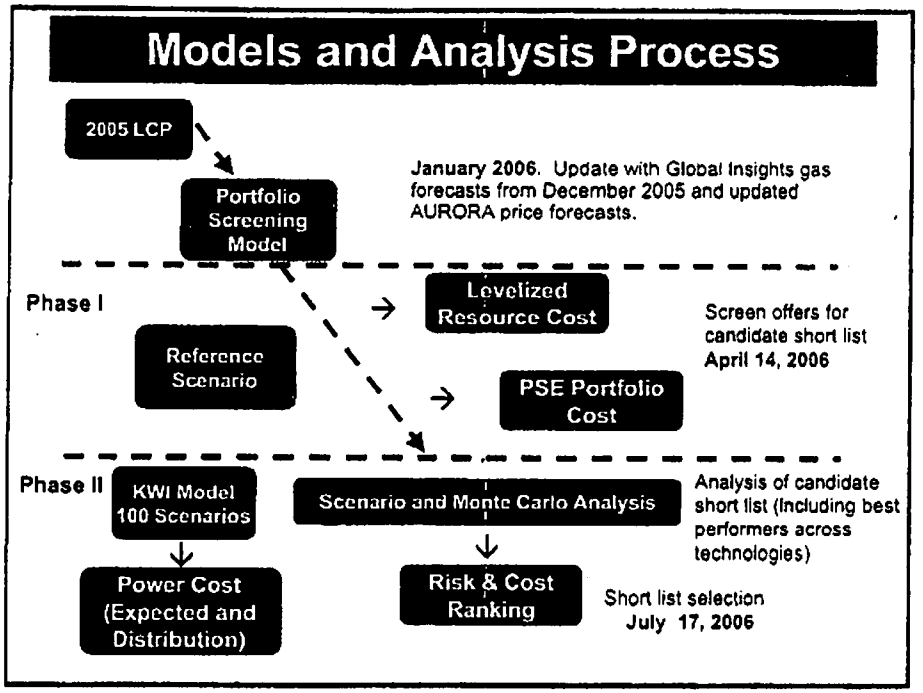
# Quantitative Analysis Process




**Phase I – Screening of 120+ different alternative bids through Portfolio Screening Model reference scenario.**

**Phase II – Evaluation of Candidate Short List resources through PSM. Anticipate several combination portfolios.**

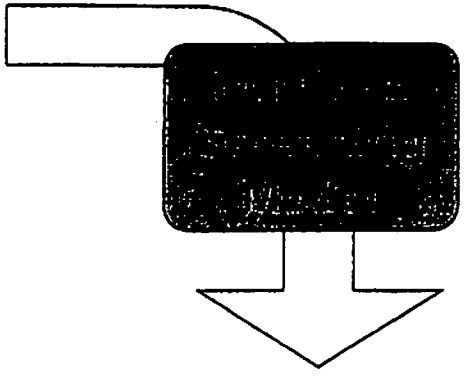
**Some Changes to Anticipated Analysis Process:**

- Dates: Phase I completed 4-25-06, and Phase II date is similarly delayed
- KWI Model was used in Phase I for testing of PPA contribution to portfolio benefit and risk reduction through 2008

# Portfolio Screening Model-
## Phase I and II

### Key Inputs

- Capital Costs
- Fixed & Variable O&M
- Fuel Cost
- Fuel Transportation
- Transmission & Integration
- Plant Heat Rate
- Plant Availability
- PPA Price & Terms
- Asset Book & Tax Life
- Global Insights Gas Price Forecast
- Aurora Power Prices
- Imputed Debt Percent
- Emissions Rate ($CO_2$, NOx, $SO_2$)



- 20-year
- Hourly Dispatch
- PSE Portfolio
- End Effects

### Key Outputs

- Levelized Cost of Acquisition or PPA
- 20-Year NPV Portfolio Revenue Requirement
- Portfolio Market Purchases and Sales
- Emissions Output

# Phase II Evaluation

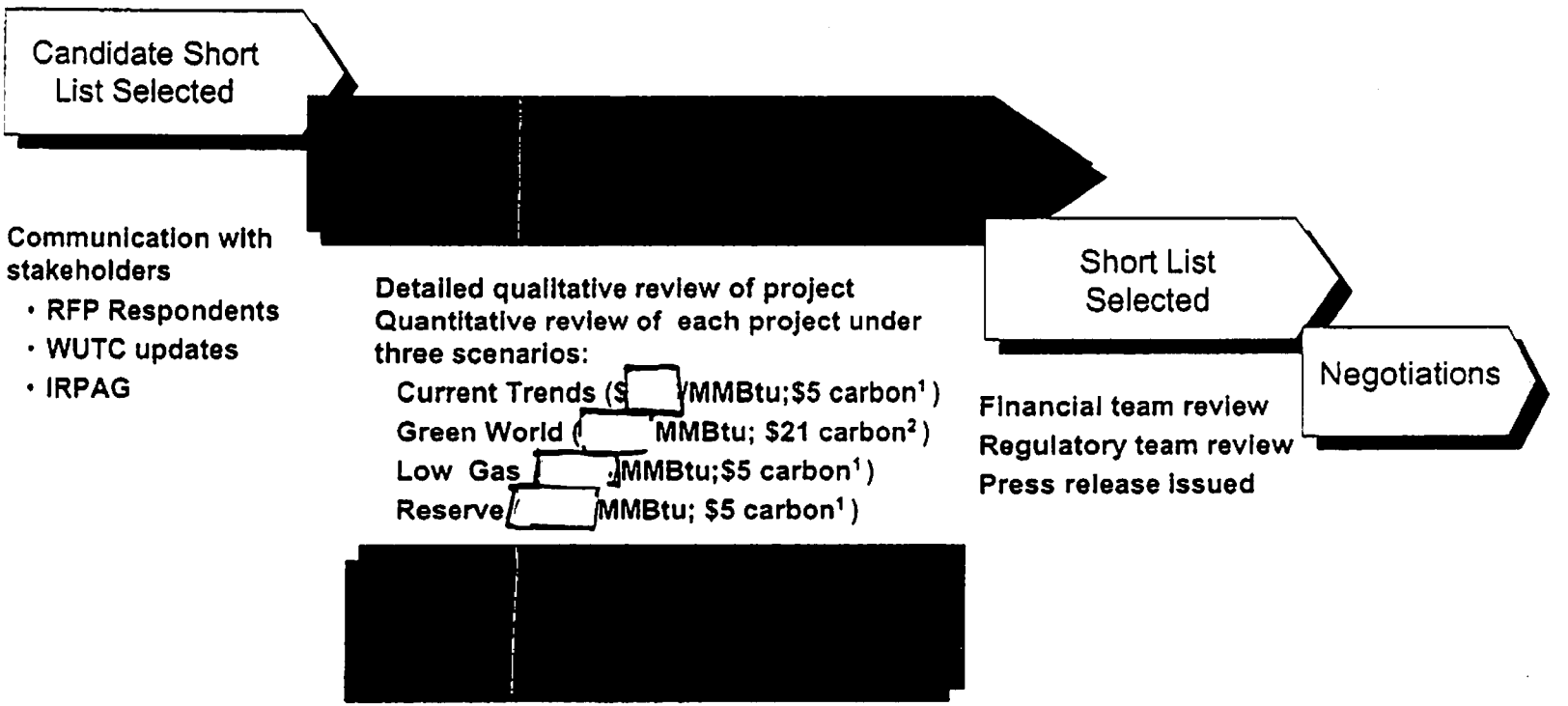



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Exhibit No. ___(RG-6HC)
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# Four Scenarios

| Scenario | Reference Current Trends | Reserve/ Overbuild | High Price/Green World | Low Gas Price | Notes |
|---|---|---|---|---|---|
| WECC Demand (AURORA) | Reference (from EPIS) WECC Average Growth Rate 1.8% | Reference (from EPIS) WECC Average Growth Rate 1.8% | Low WECC Average Growth Rate 1.1% | Reference WECC Average Growth Rate 1.8% | Low Growth Rate is 60% of Reference Growth Rate for each area |
| Gas Price (Nominal $ Levelized for 2007-2026) | Global Insights Reference; Levelized, plus Kioderx forwards 2007 – 2010 [redacted] /MMBTU | Global Insights Reference; Levelized, plus Kioderx forwards 2007 – 2010 [redacted] /MMBTU | Global Insights High Price; Levelized, plus Kiodex forwards 2007 – 2010 [redacted] /MMBTU | Global Insights Low Economic Growth; Levelized; Kiodex forwards 2007 – 2008 [redacted] /MMBTU | Global Insights (12/05) and Kiodex forwards (2007-2010) as of 12/19/2005 |
| PSE Demand (PSM) | Reference | Reference | Low | Reference | Most recent PSE load forecast. |
| Carbon Costs (AURORA) | NCEP Nominal $/ton by year: 2010: $5.00 2015: $6.38 2020: $8.14 | NCEP Nominal $/ton by year: 2010: $5.00 2015: $6.38 2020: $8.14 | Clean Power (Jeffords) Nominal $/ton by year: 2010: $21.00 2015: $31.17 2020: $45.35 | NCEP Nominal $/ton by year: 2010: $5.00 2015: $6.38 2020: $8.14 | NCEP increases 2.5% real per year. Clean Power increases about 4% per year real over 20 years |
| Overbuild | No | Net Additions are approx. 30% greater in 2015 and 10% greater in 2025 | No | No | |

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Exhibit No. ___(RG-6HC)
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# Phase II – variety of portfolios tested under 4 scenarios

**Candidate Short List Identified**

**Portfolios Tested Against Different Risk Scenarios**

**Monte Carlo Simulation Evaluates Cost and Risk of Each Candidate and Several Combinations**

**Short-Listed Respondents Will Be Thoroughly Evaluated**

**Candidate Short List**

- Projects
- Contracts
- Emergent Opportunities

**Portfolios, Existing Plant plus**

- All Generic
- Individual resource
- Combination of candidates

**PSE Current Trends Scenario**

- Expected resource additions to WECC over next 20 year horizon

**PSE Green World Scenario**

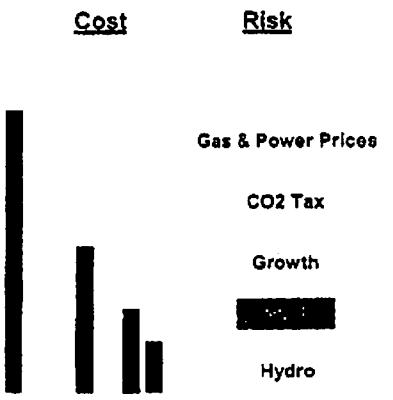
- Expected resource additions over next 20 year horizon if all policy directives continue to favor renewables and penalize coal

**PSE Low Gas Price Scenario**

- Expected resource additions over next 20 year horizon if low gas prices emerge

**PSE Reserve Price Scenario**

- Expected resource additions are 10% greater than Current Trends in 2025.




Risk

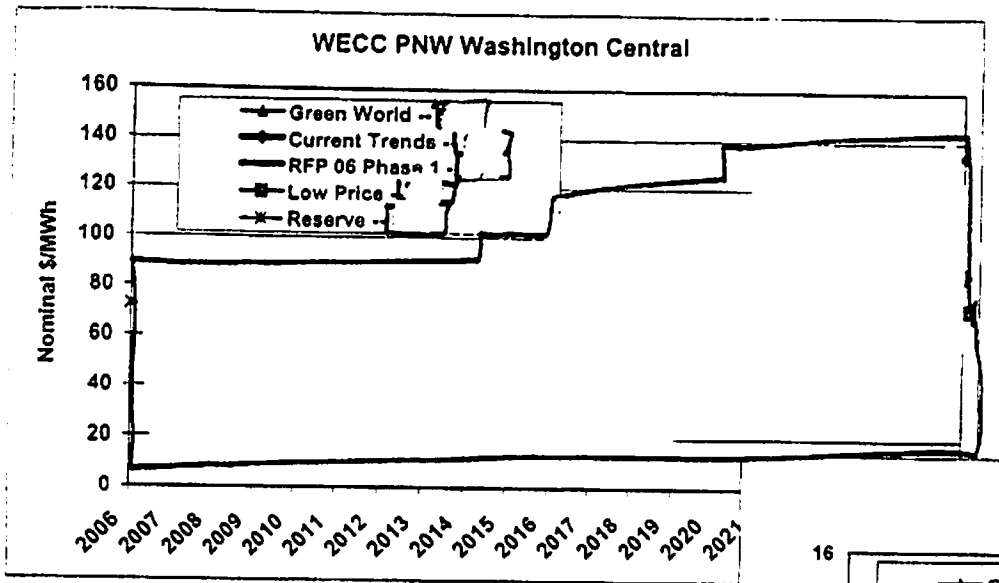
Cost

**Candidates by Scenario**

- Portfolio Benefit
- Benefit Ratio
- Levelized Cost

**Detailed Qualitative Review**

# Scenario Power and Gas Prices




AURORA model power prices forecasts

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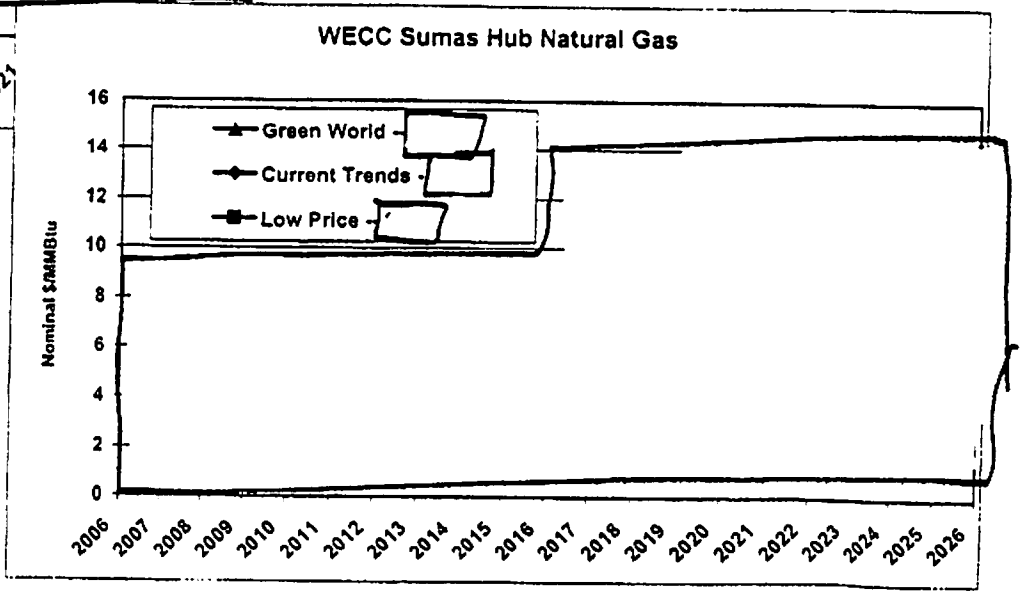


Global Insights Gas (12/05): Reference, High and Low for 2011 - 2026

Kiodex forwards 2007 – 2010, except through 2008 for Low Gas

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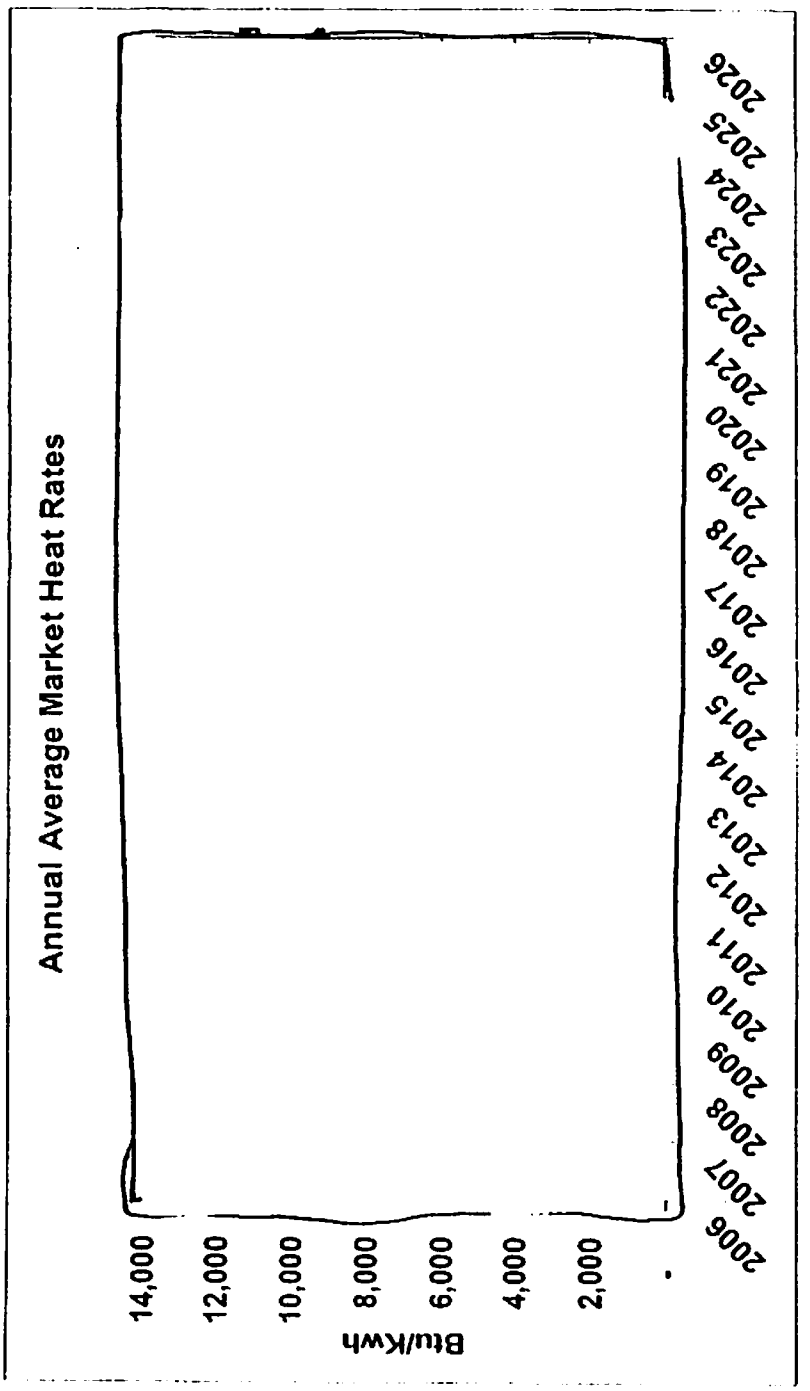
# Scenario Heat Rates

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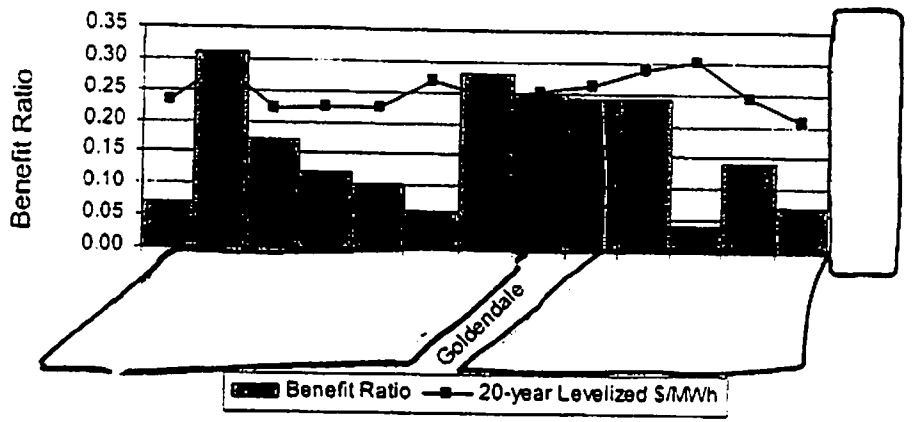
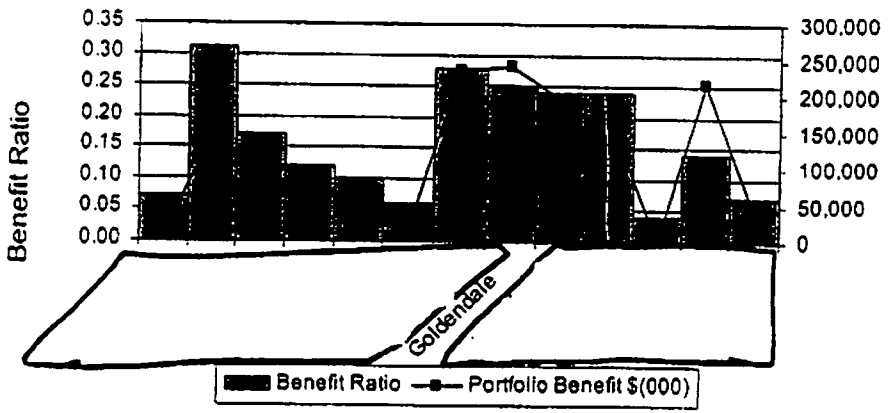
# Quantitative selection metrics: levelized cost, portfolio benefit, and portfolio benefit ratio




***Levelized cost*** is the average annual cost per MWh produced during a 20-year period for each project.

***Portfolio benefit*** is the 20-year present value of all portfolio benefits derived from each project in comparison to the 2005 LCP generic portfolio.

***Portfolio benefit ratio*** is the present value of portfolio benefits divided by the present value of the project revenue requirements

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# Size and Heat Rate Impacts

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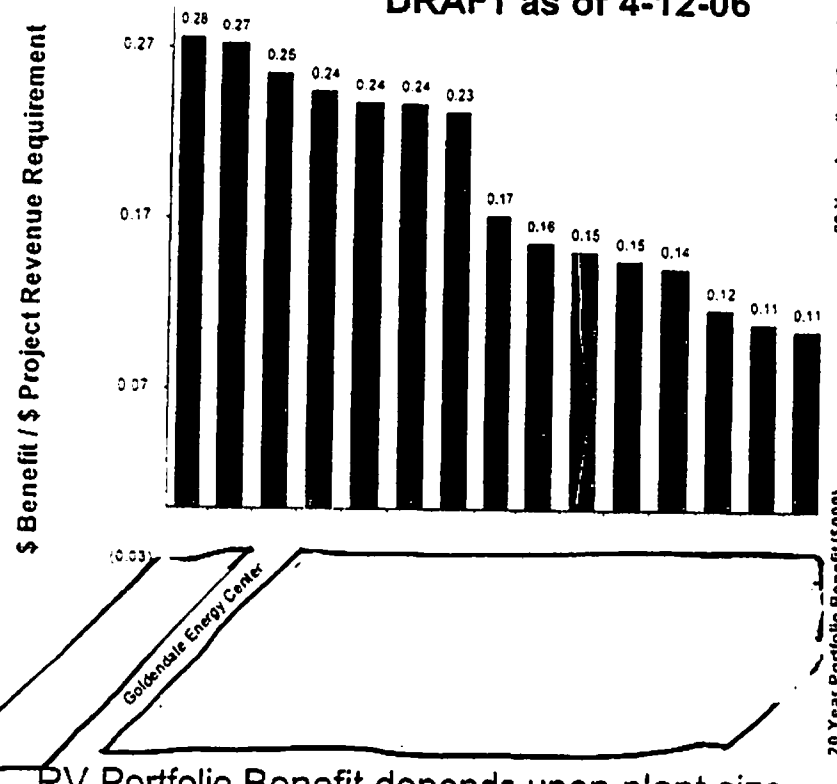
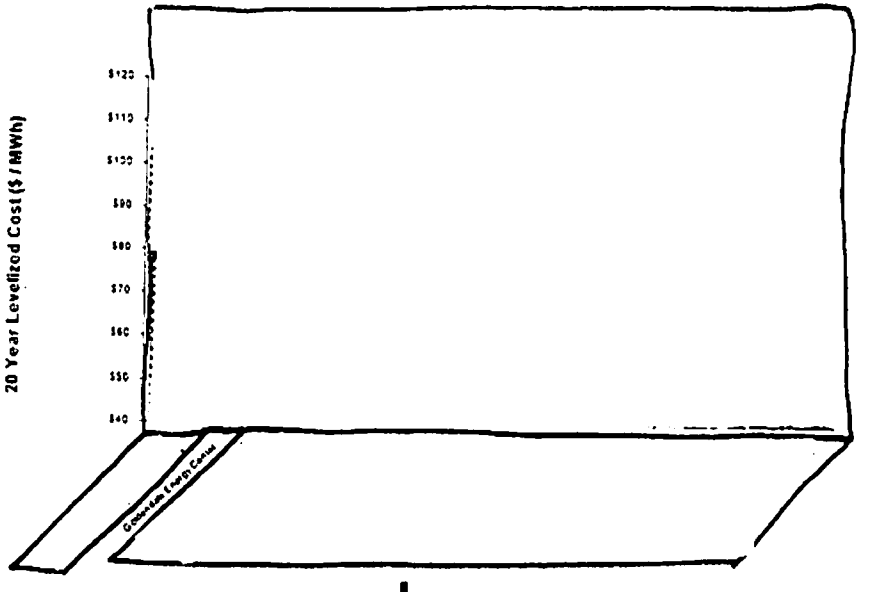
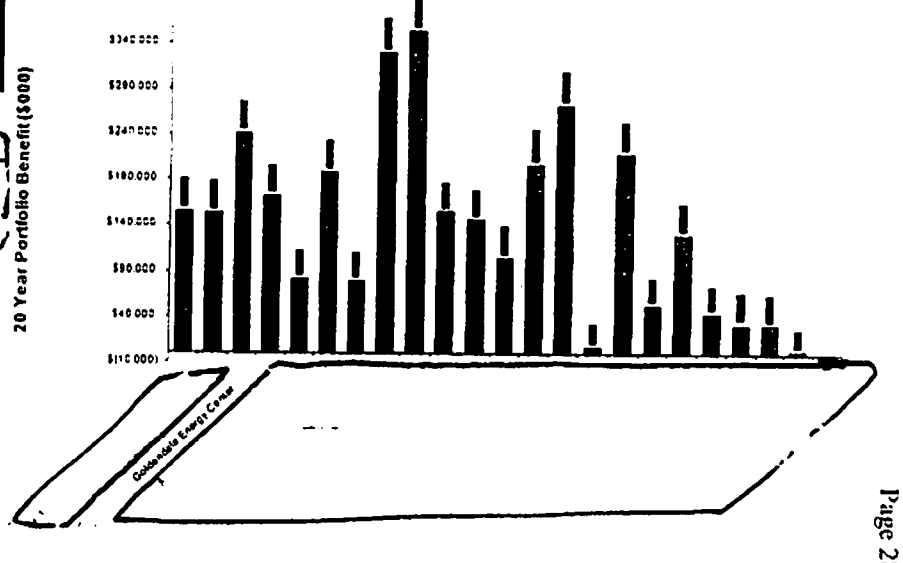
Levelized Cost lower if CF higher →

**DRAFT as of 4-12-06**




PV Portfolio Benefit depends upon plant size, start year, and heat rate →

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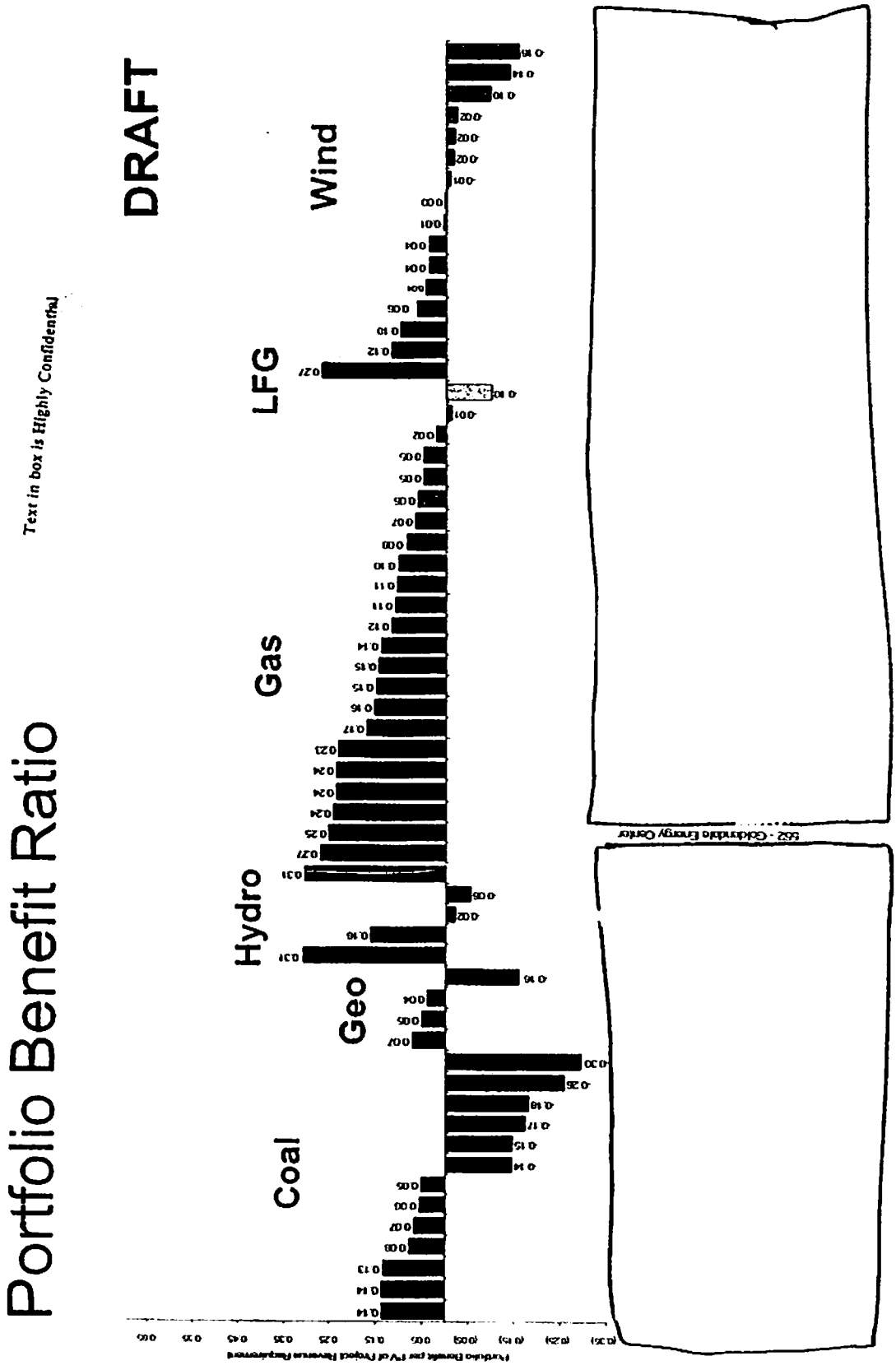
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Portfolio Benefit Ratio
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Wind
LFG
Gas
Hydro
Geo
Coal
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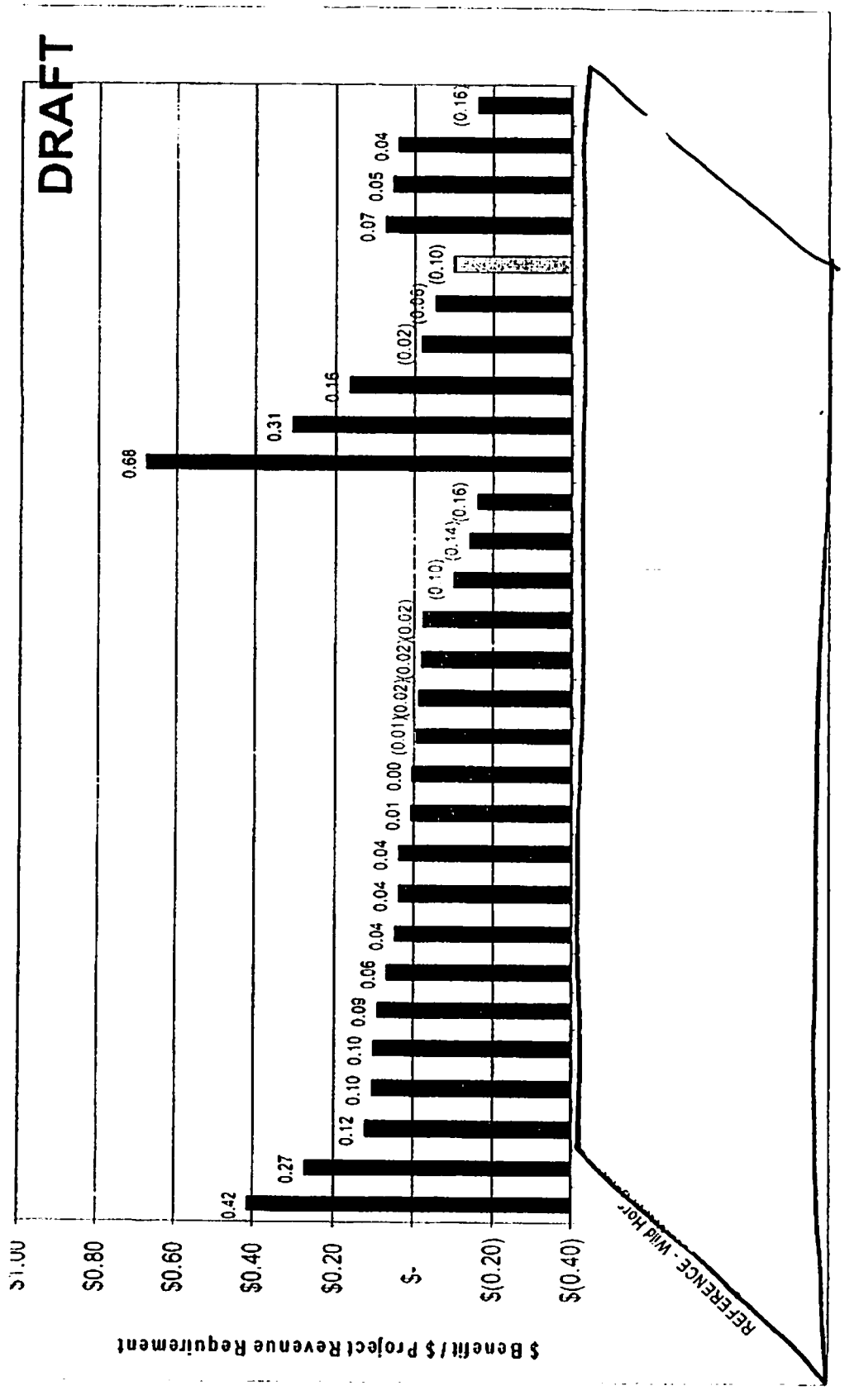
# Renewable Projects – Portfolio Benefit Ratio

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# Renewable Projects – Levelized Cost

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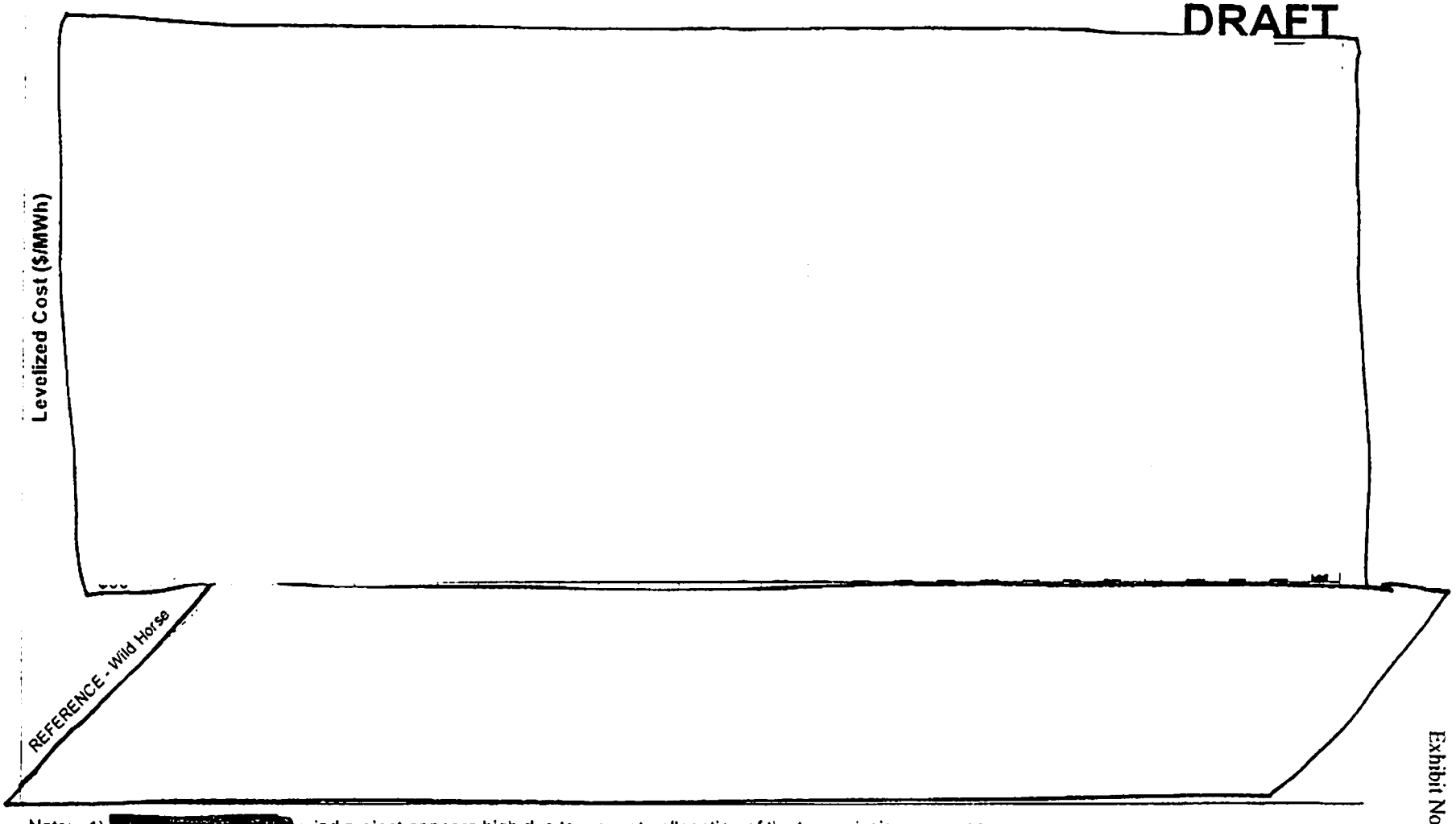


Note: 1) [redacted] wind project appears high due to a prorata allocation of the transmission expense for the HVDC line; PTC value is reduced to [redacted] which is current expected case.

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# Natural Gas Plants – Portfolio Benefit Ratio

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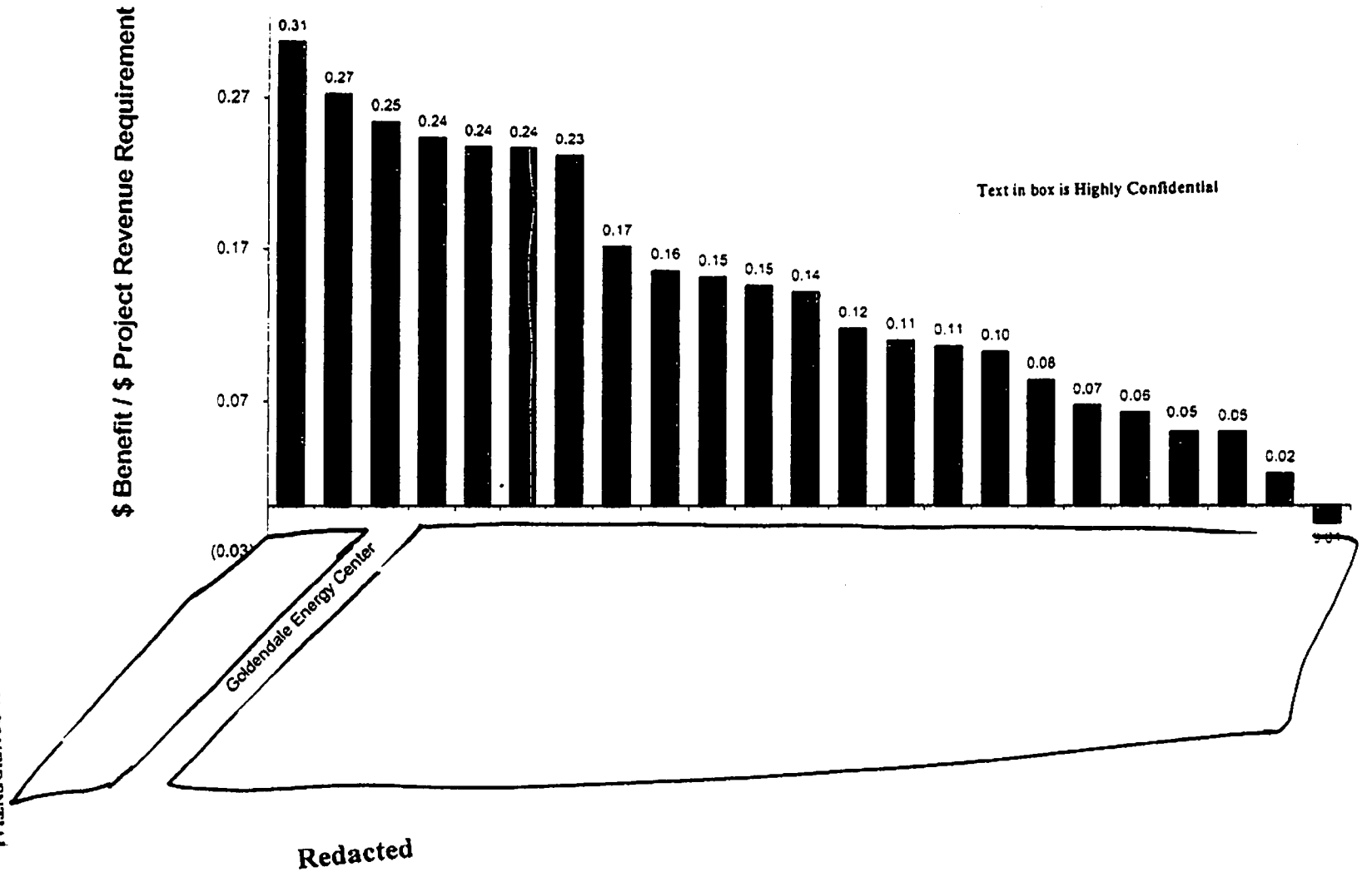


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# Natural Gas Plants - Levelized Cost

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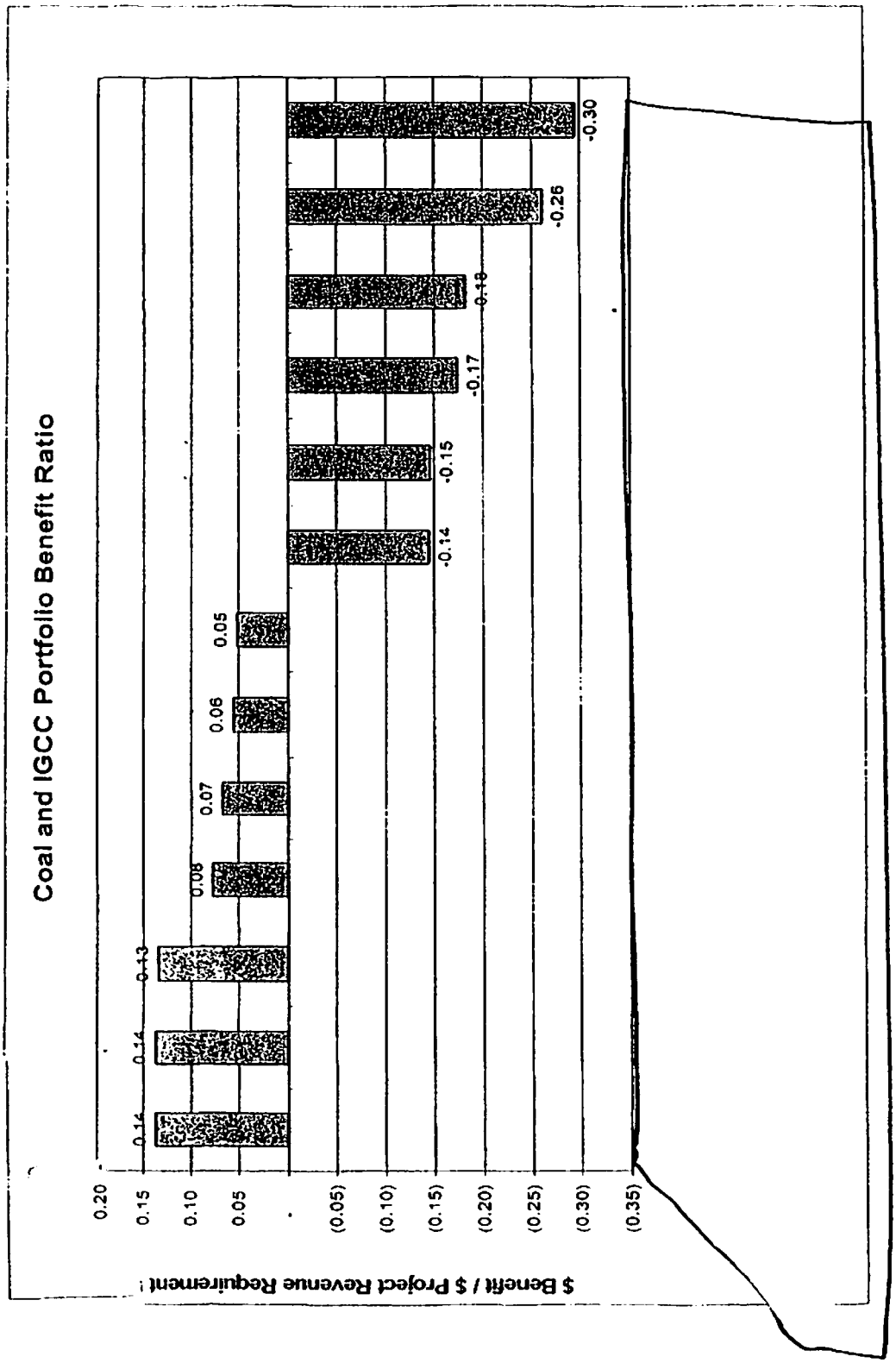
# Coal / IGCC – Portfolio Benefit Ratio

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# Size and Heat Rate Impacts

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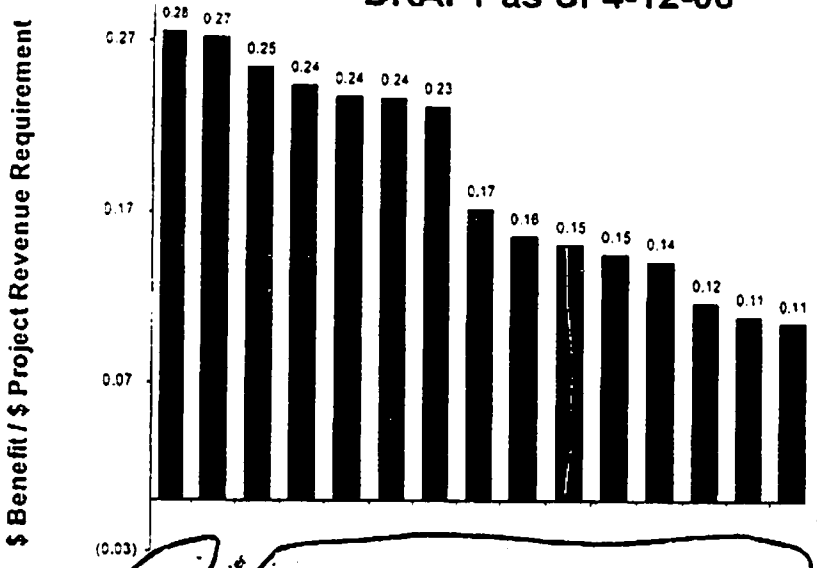
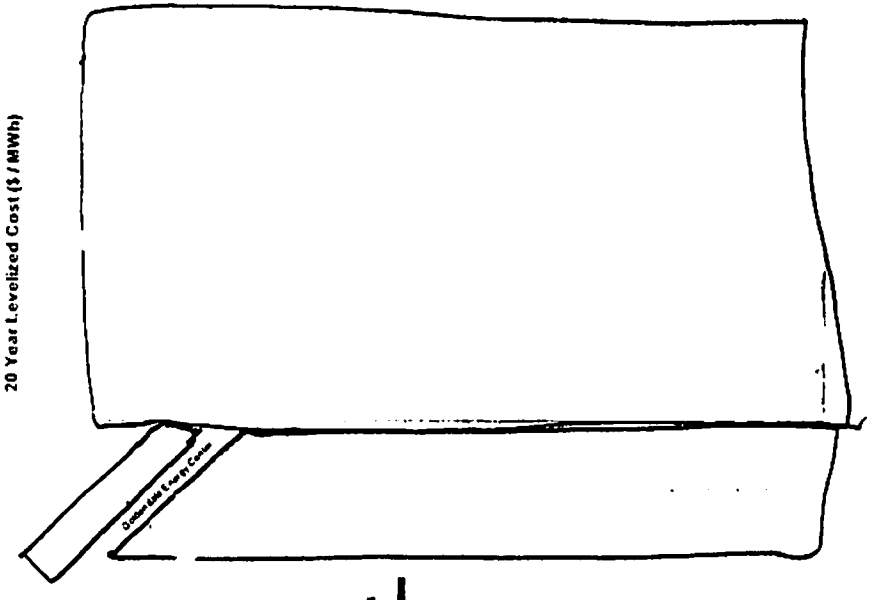
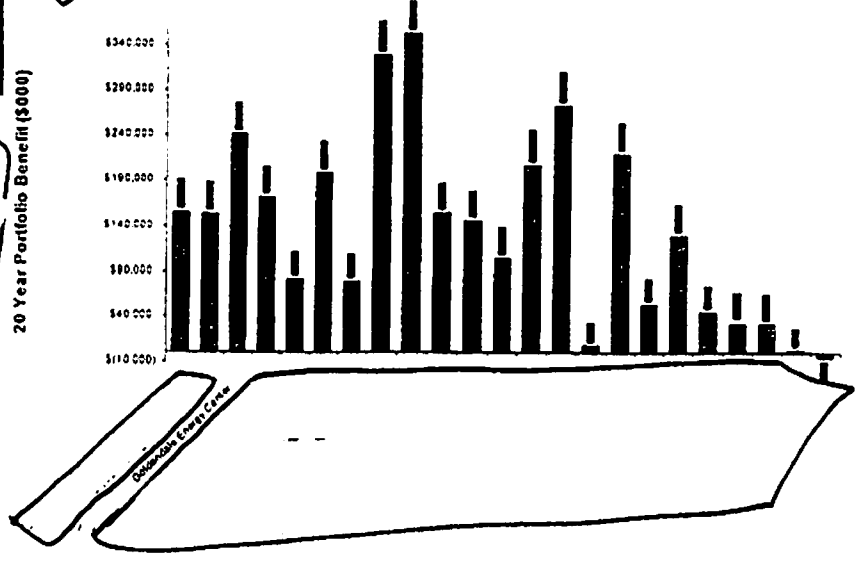
Levelized Cost lower if CF higher →

DRAFT as of 4-12-06




PV Portfolio Benefit depends upon plant size, start year, and heat rate →

**Redacted**

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Per WAC 480-07-160

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# Coal / IGCC – Levelized Cost

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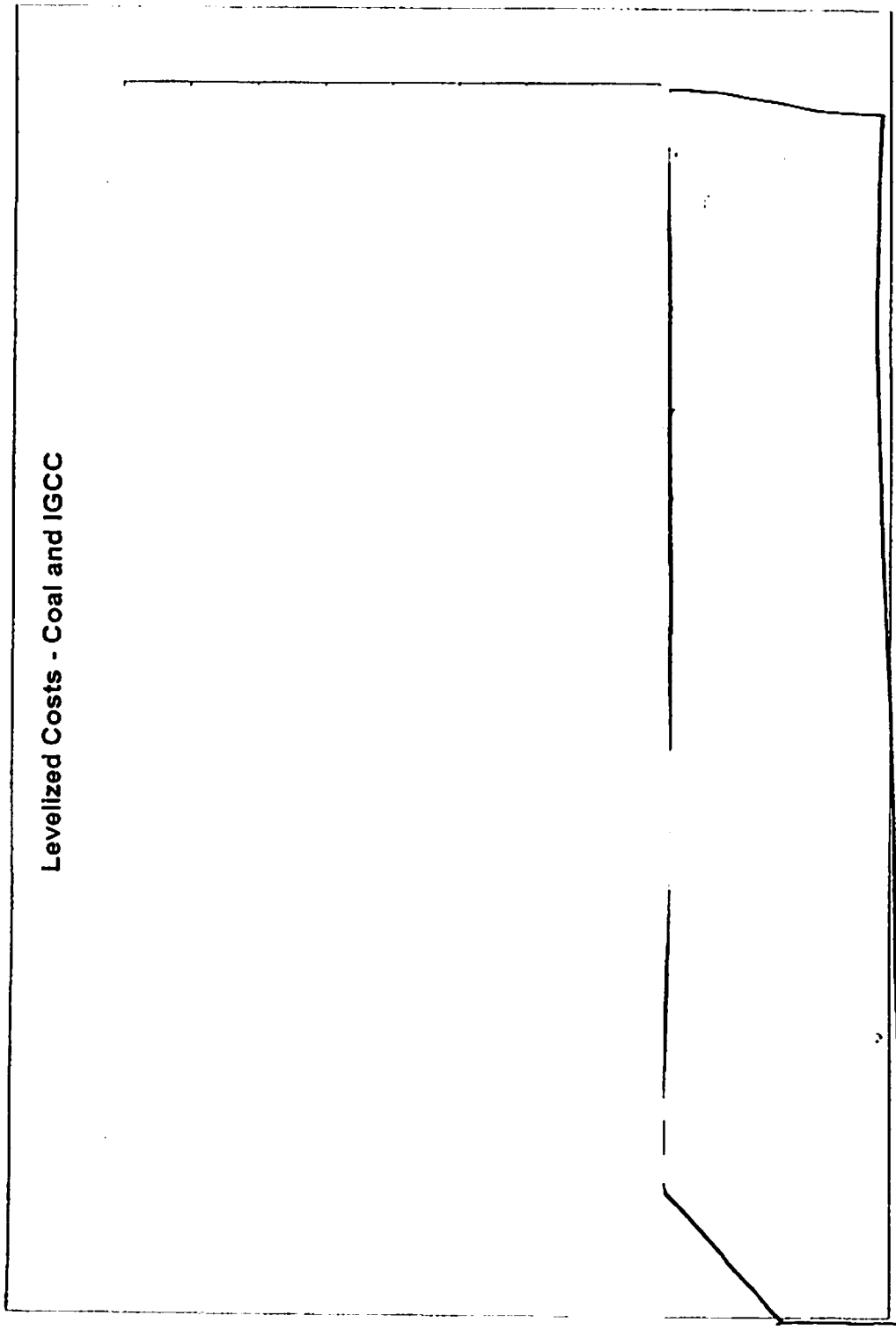
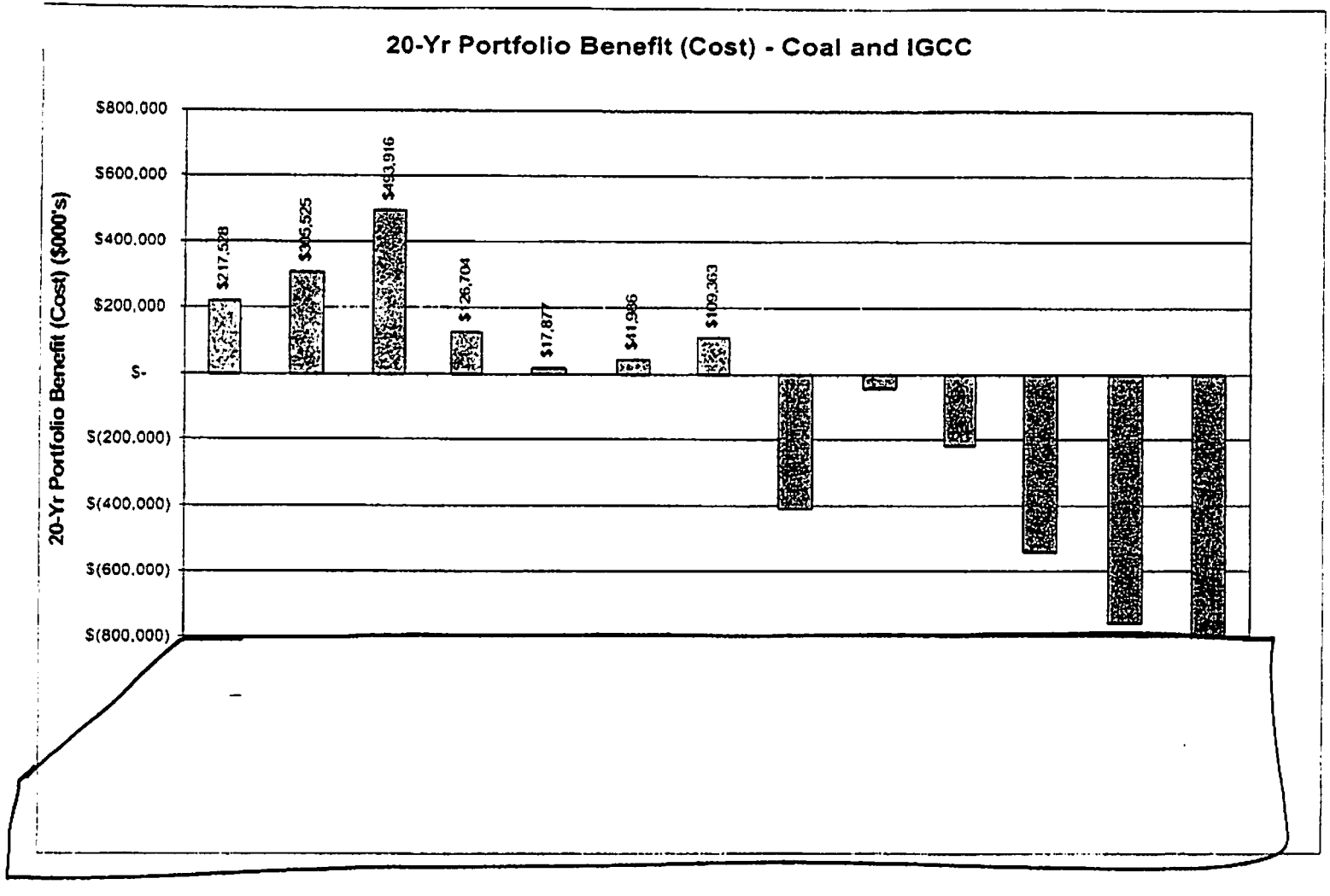


# Coal / IGCC - Portfolio Benefit (Absolute)

Text in box is Highly Confidential

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Per WAC 480-07-160

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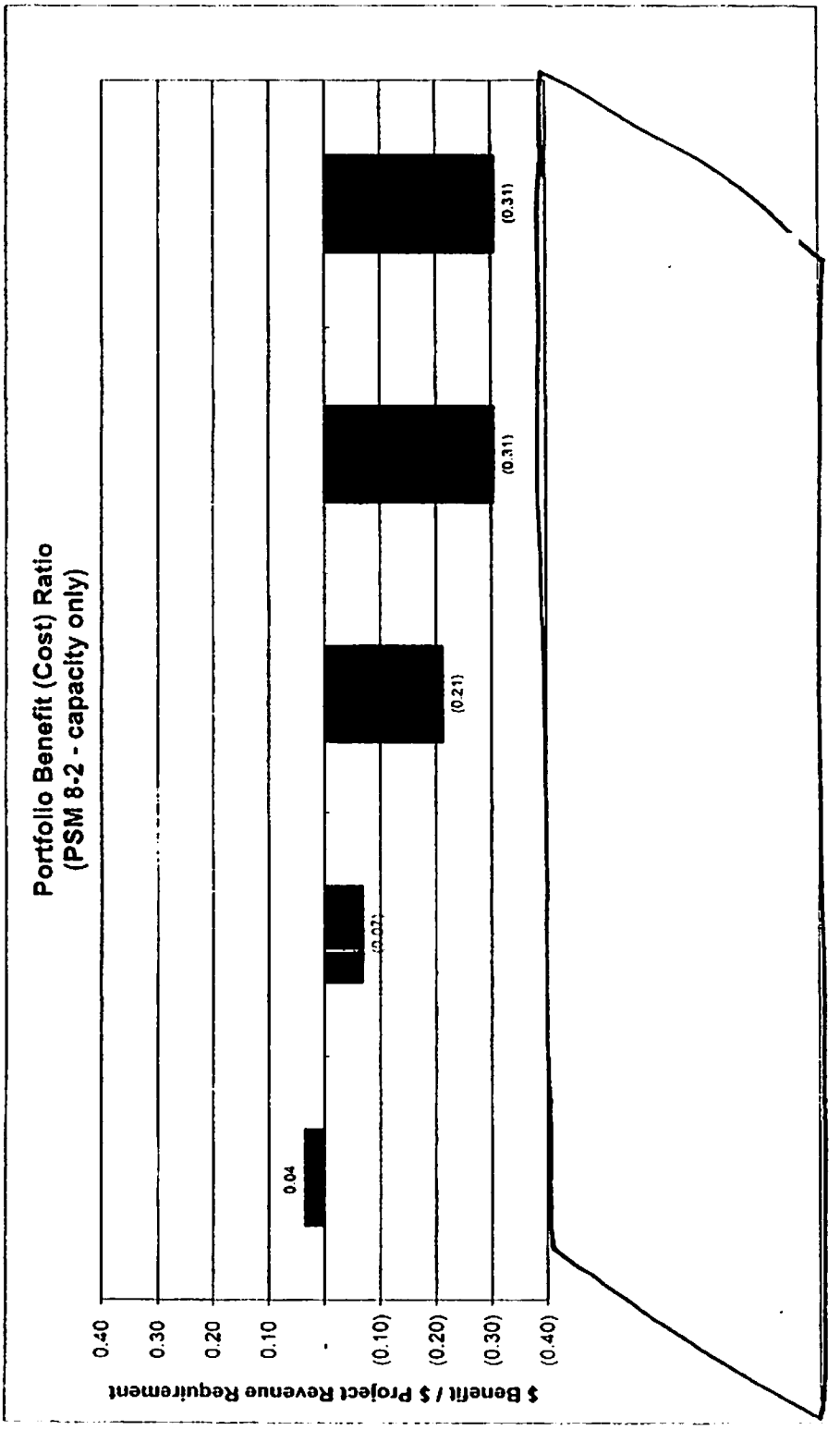
# Capacity Projects/PPAs – Portfolio Benefit Ratio

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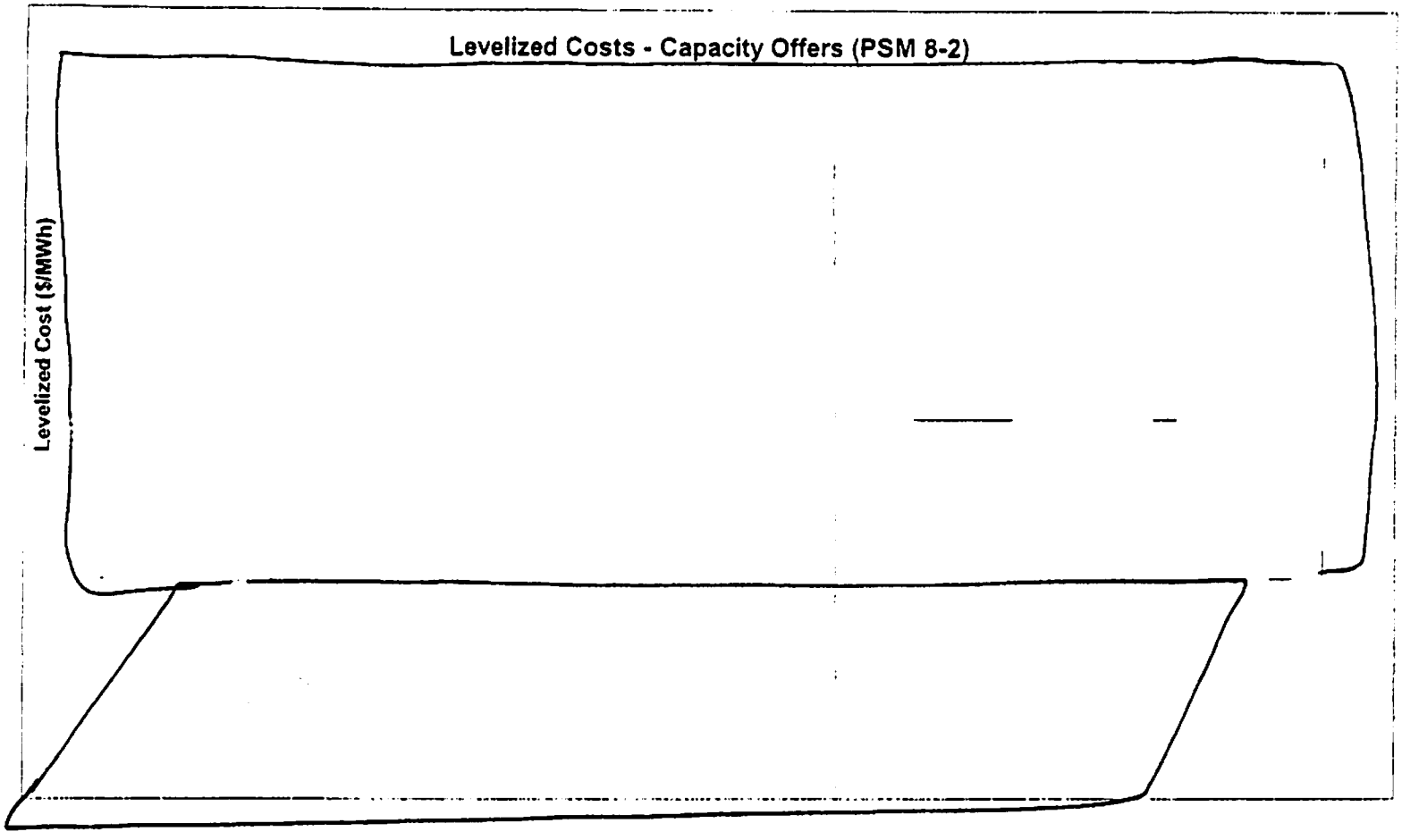
# Capacity Projects/PPAs – Levelized Cost

Text in box is Highly Confidential

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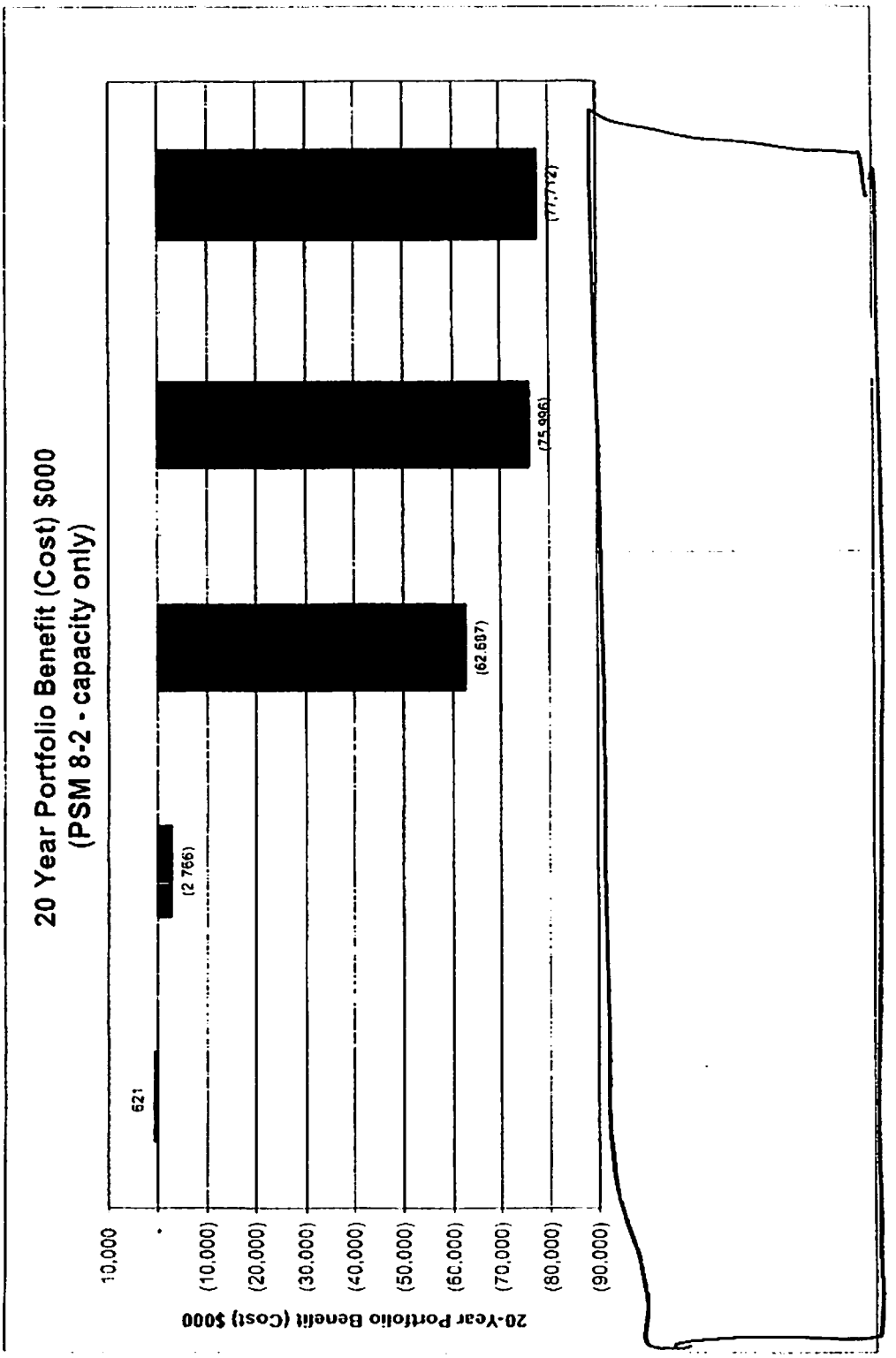
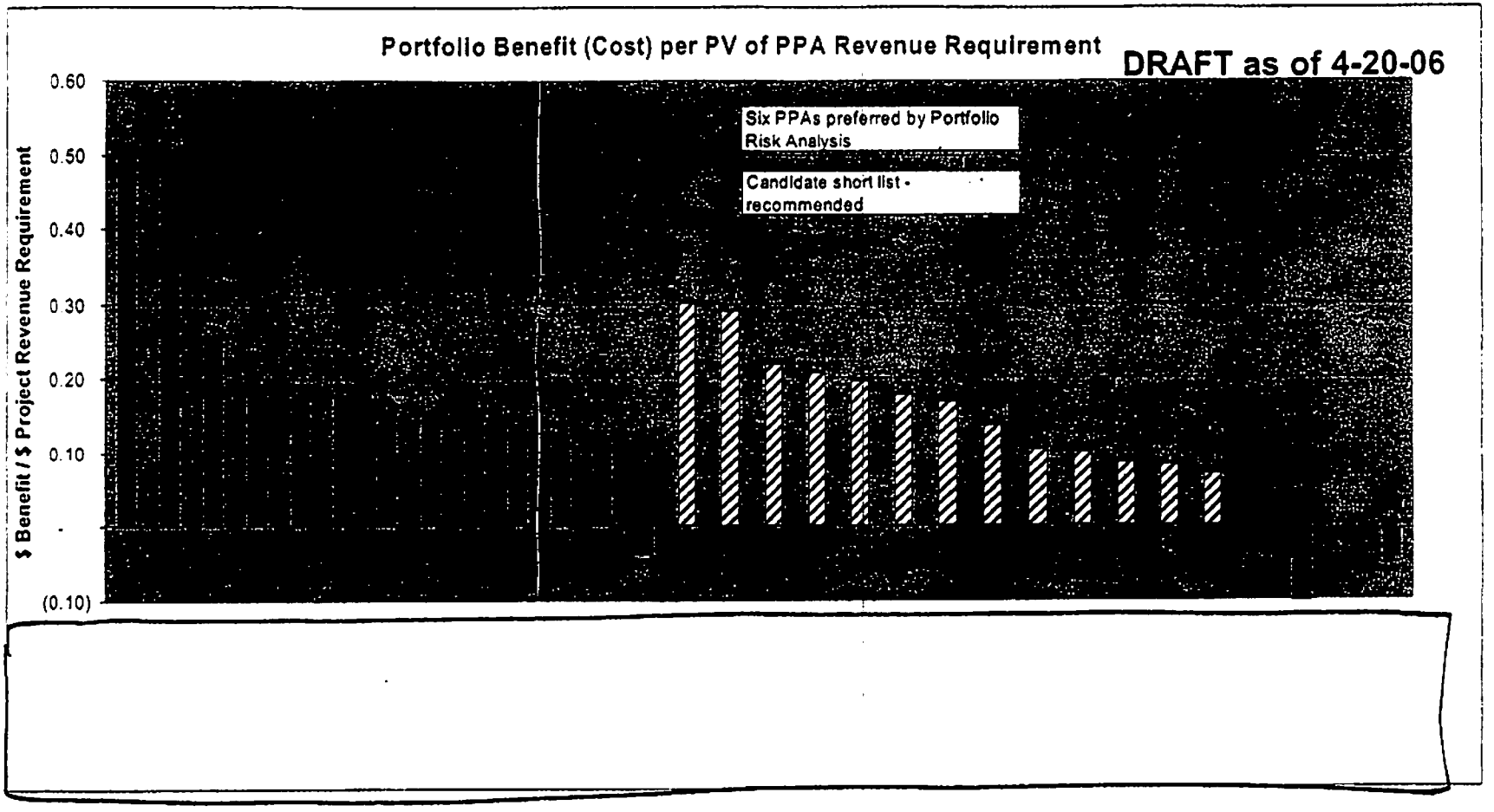
# Capacity Projects/PPAs - Portfolio Benefit (Absolute)



# PPAs - Portfolio Benefit Ratio

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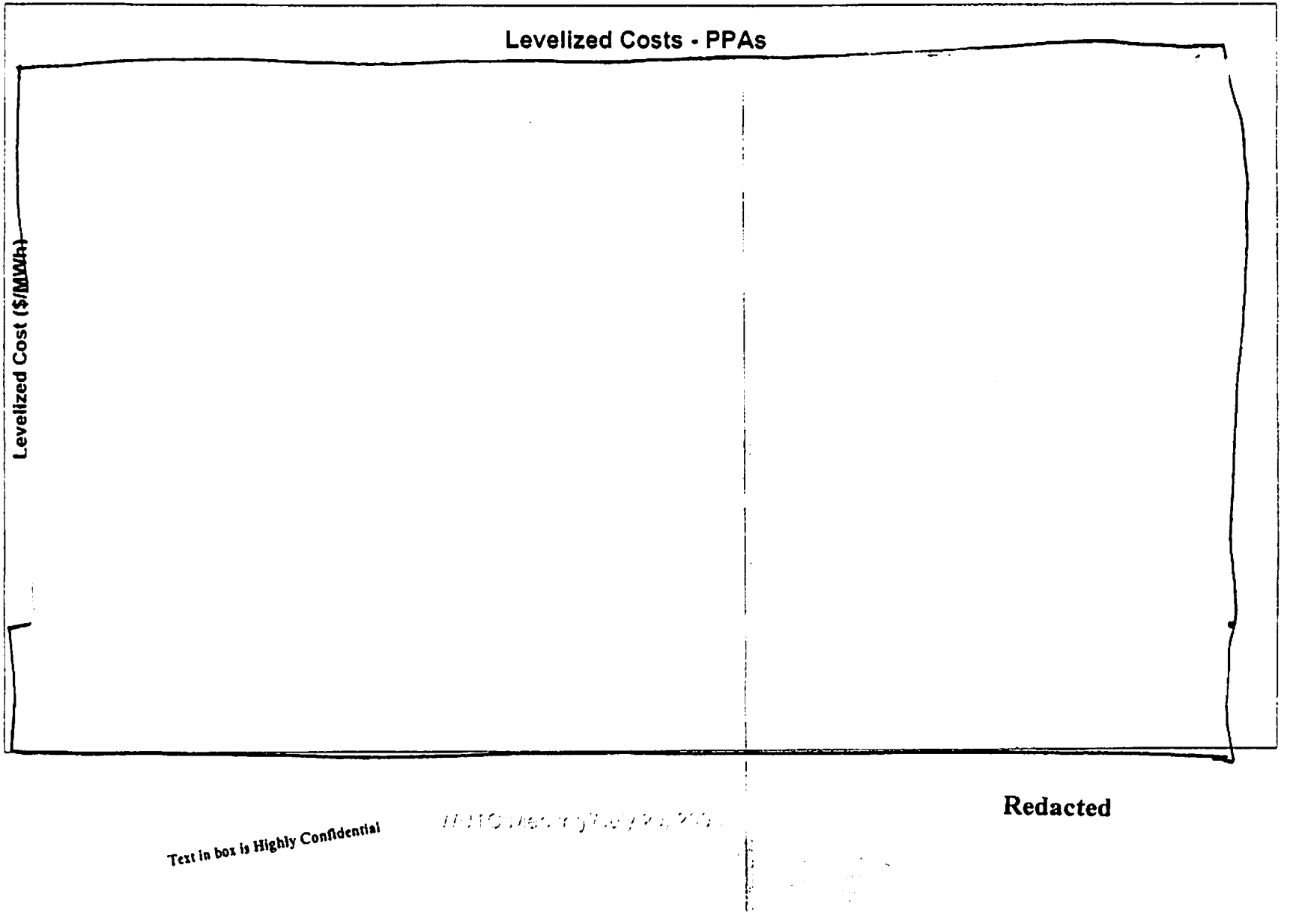
# PPAs - Levelized Cost

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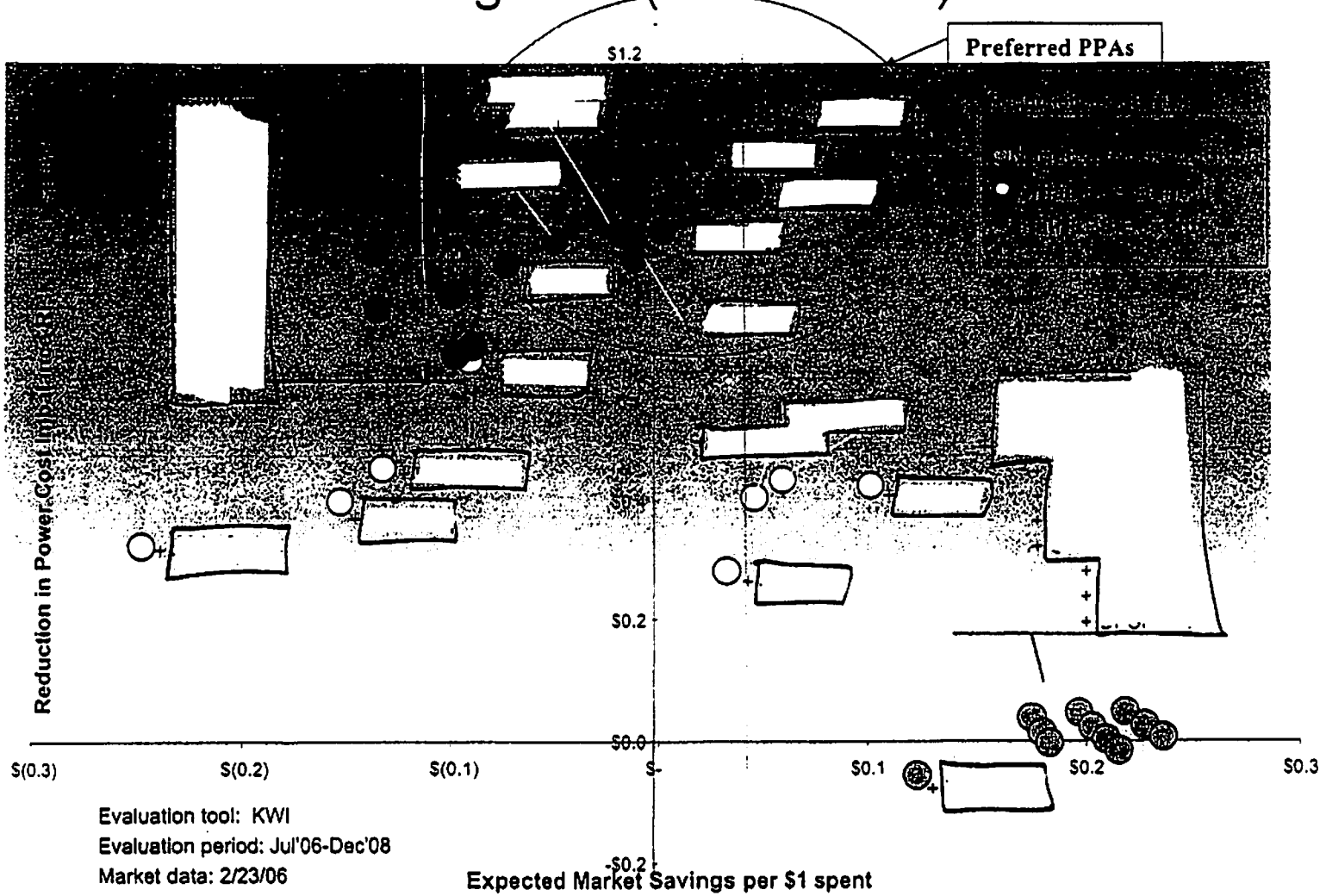
# PPA Evaluation using KWI (2006-2008)




Evaluation tool: KWI
Evaluation period: Jul'06-Dec'08
Market data: 2/23/06

Text in box is Highly Confidential

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# Questions?

# Next Steps

- Schedule Periodic Updates?
- Point of Contact?
- Other Areas of Interest?