# Appendix 6.A

## Appendix 6.A.1: Technology Cost Data Inputs (Templates) Utilized in Integrated Resource Analysis

## Appendix 6.A.2: Integrated Analysis Technology Cost Development Background Data

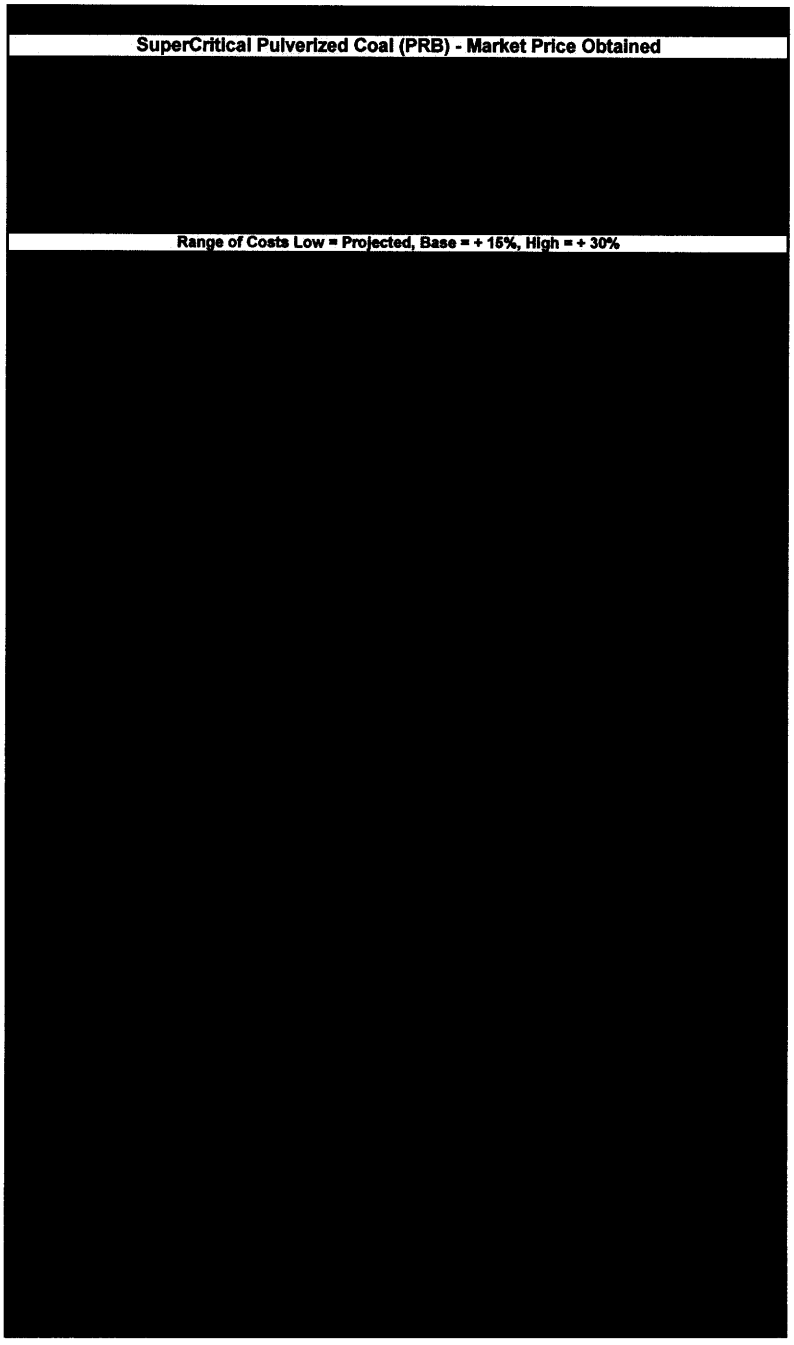
Cost data for key technologies moved to Integrated Resource Analysis were updated from the original costs utilized in pre-screening. Details of the basis for the updated cost projections are included in Appendix 6.A.2 as listed below:

SCPC Cost Development

Nuclear Cost Data

# APPENDIX 6.A.1: TECHNOLOGY COST DATA INPUTS (TEMPLATES) UTILIZED IN INTEGRATED RESOURCE ANALYSIS

## Base Load: Super Critical Pulverized Coal ** Highly Confidential **

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# Base Load: Super Critical Pulverized Coal w/CCS **

## Highly Confidential

SuperCritical Pulverized Coal /w CO2 Capture (Bituminous)

Range of Costs Low = Projected, Base = + 15%, High = + 30%

**

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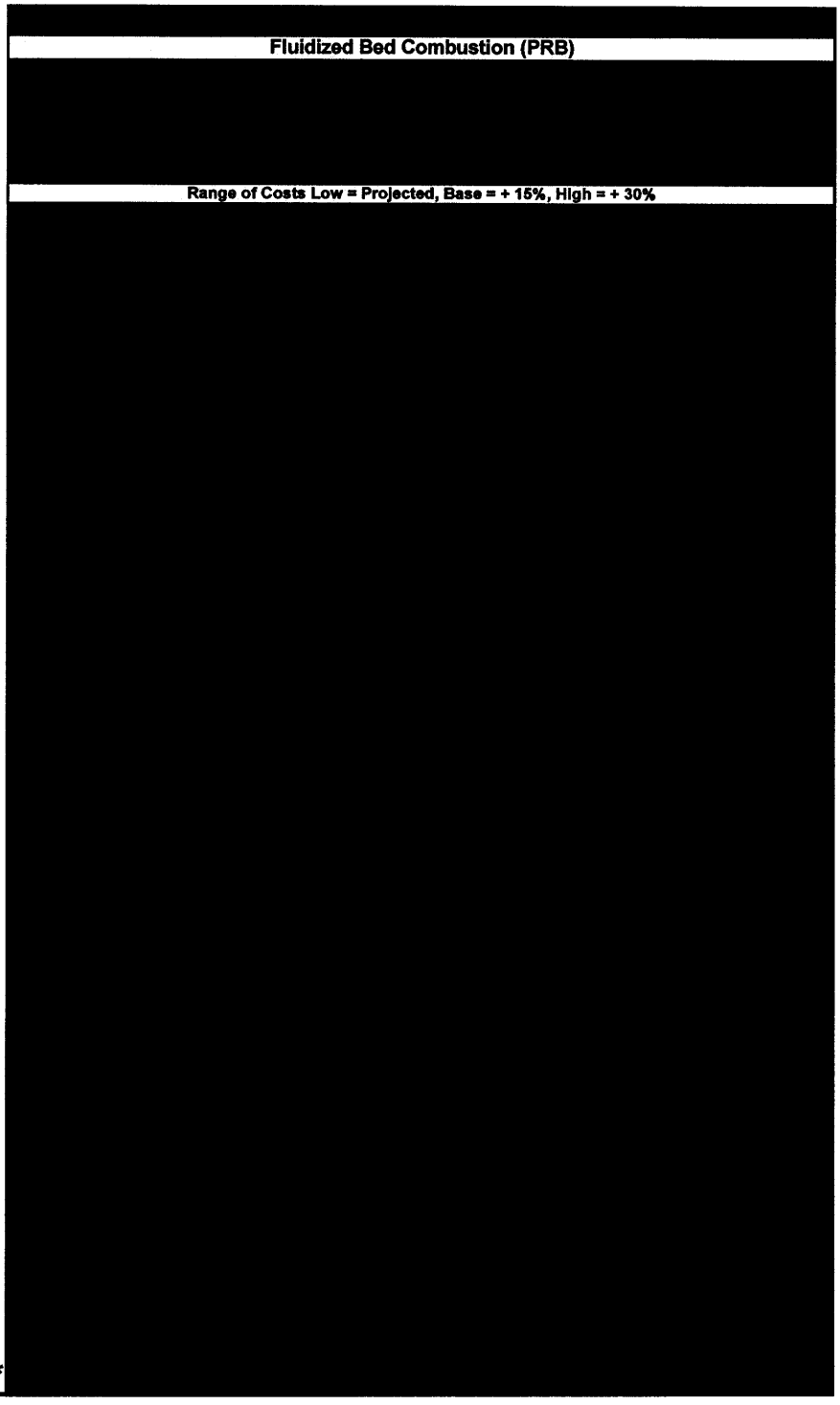
# Base Load: Fluidized Bed Combustion ** Highly Confidential

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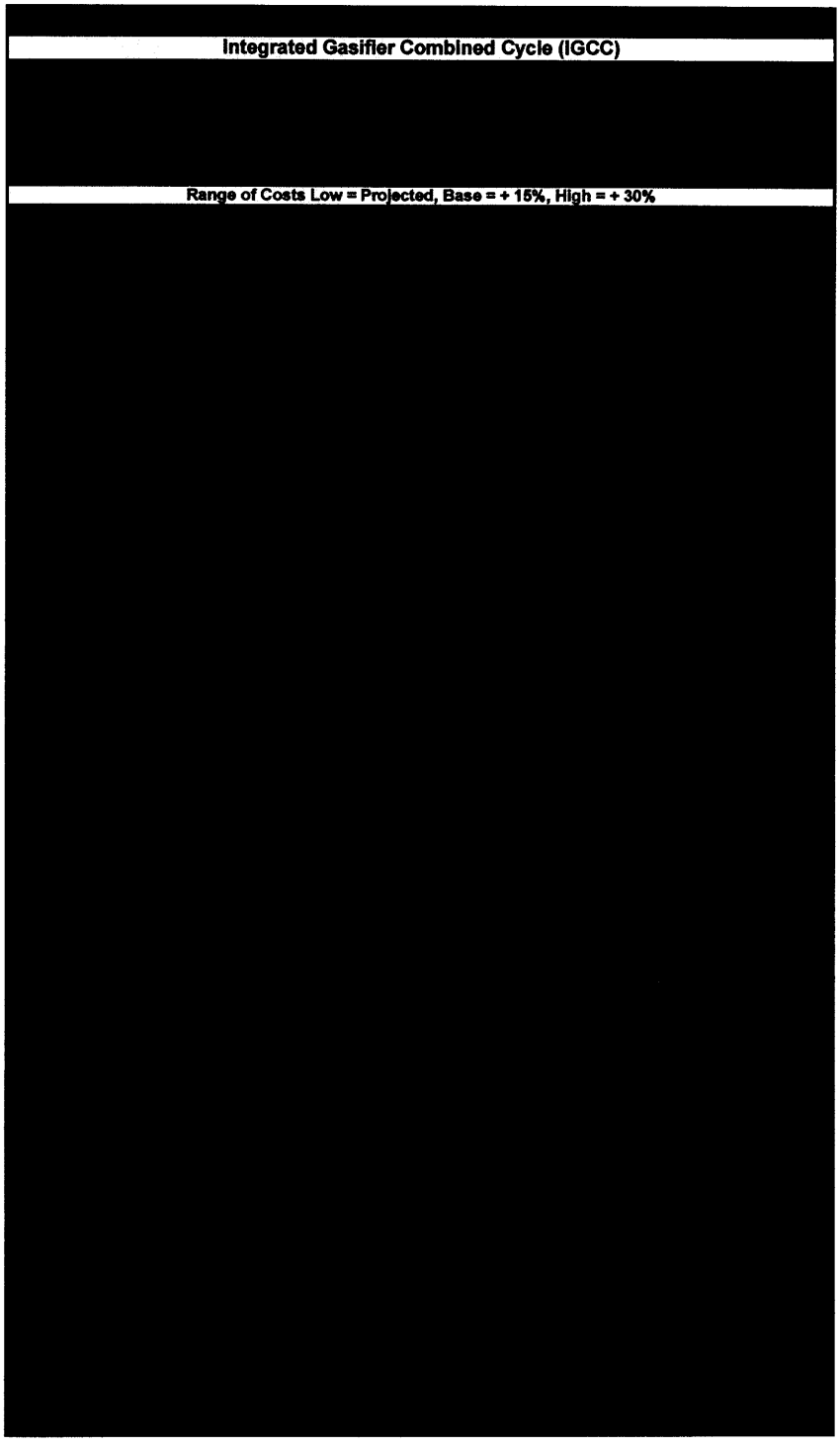
# Base Load: Integrated Gasification Combined Cycle **

## Highly Confidential **

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# Base Load: Integrated Gasification Combined Cycle w/CCS ** Highly Confidential **

IGCC w/ CO2 Capture

Range of Costs Low = Projected, Base = + 15%, High = + 30%

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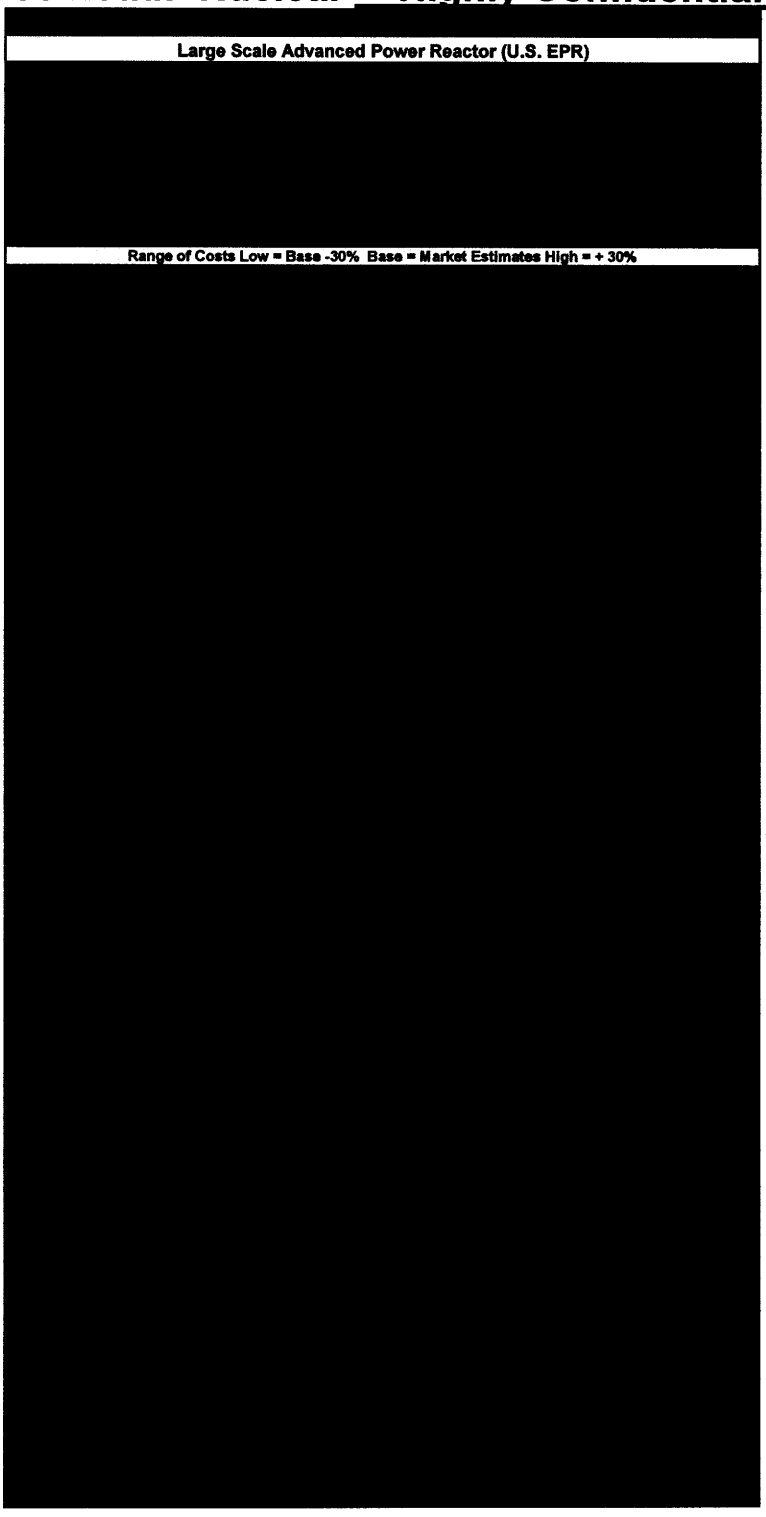
# Base Load: Nuclear ** Highly Confidential **

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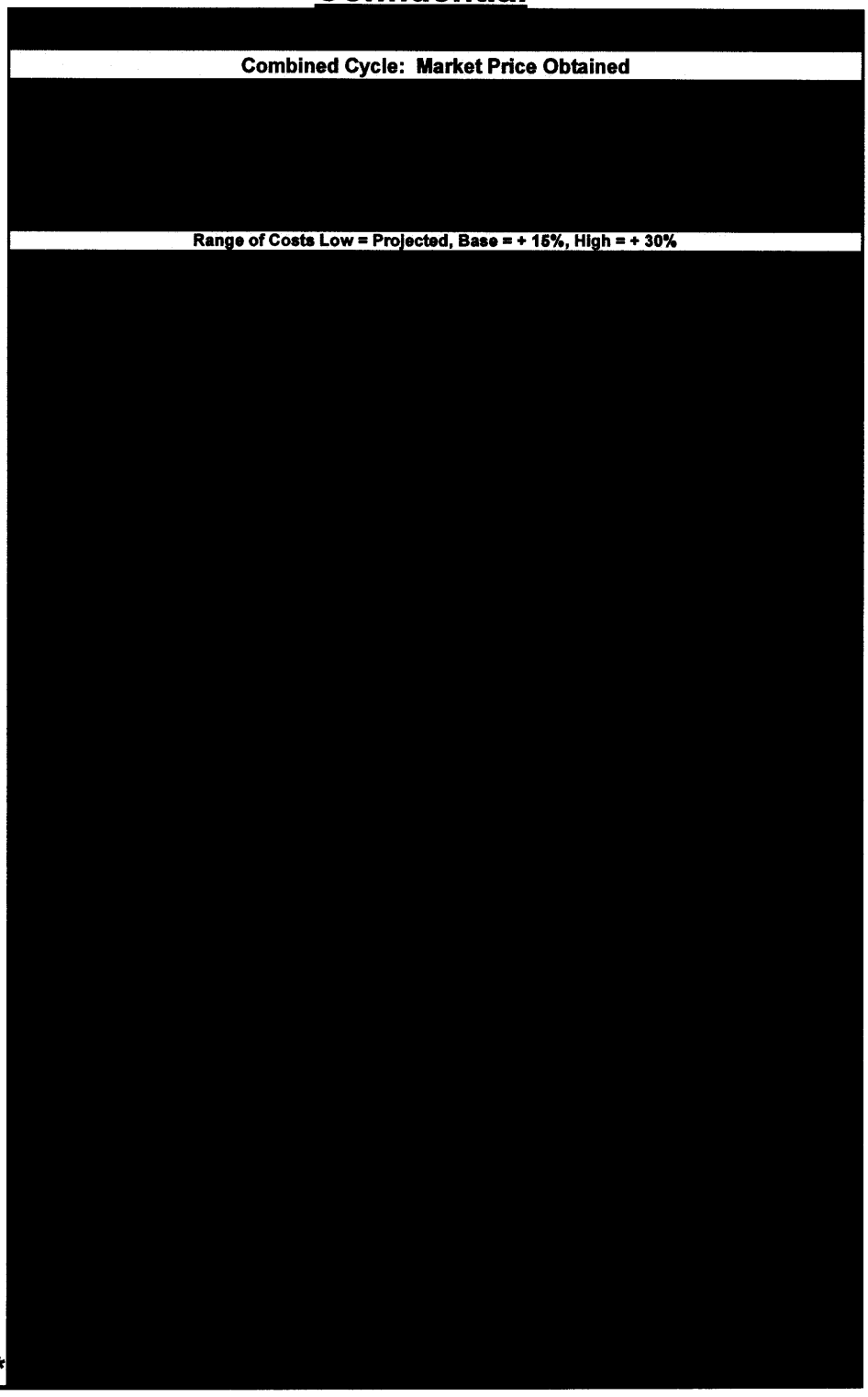
# Intermediate Load: Combined Cycle ** Highly Confidential




**

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# Intermediate Load: Compressed Air Energy Storage **
## Highly Confidential

[redacted]

Compressed Air Energy Storage (CAES)

[redacted]

Range of Costs Low = Projected, Base = + 15%, High = + 30%

[redacted]

**

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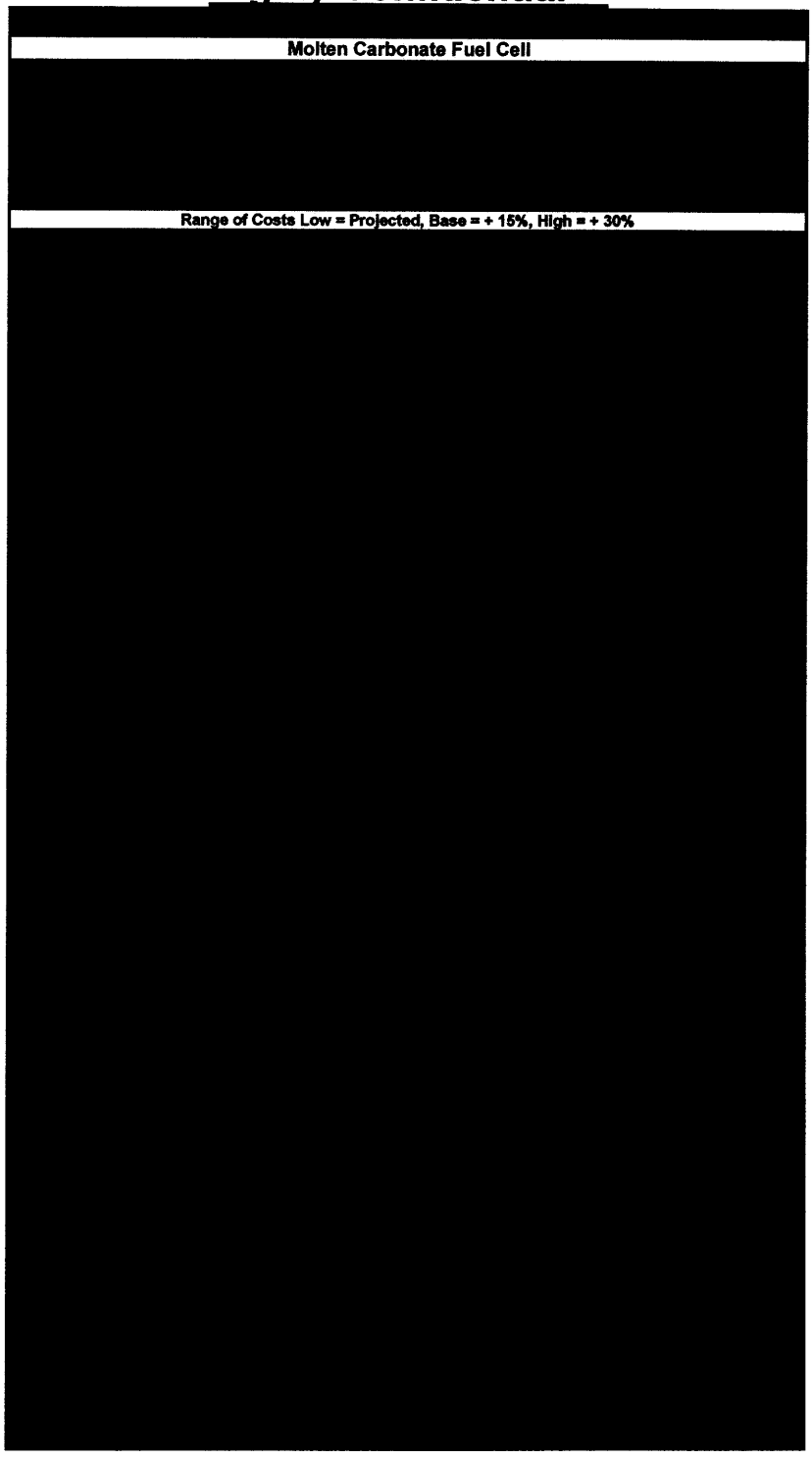
# Intermediate Load: Molten Carbonate Fuel Cells **
# Highly Confidential **

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# Peaking Load: Combustion Turbine ** Highly Confidential **

Combustion Turbine - GE 7121EA - Market Price Obtained

[redacted]

Range of Costs Low = Projected, Base = + 15%, High = + 30%

[redacted]

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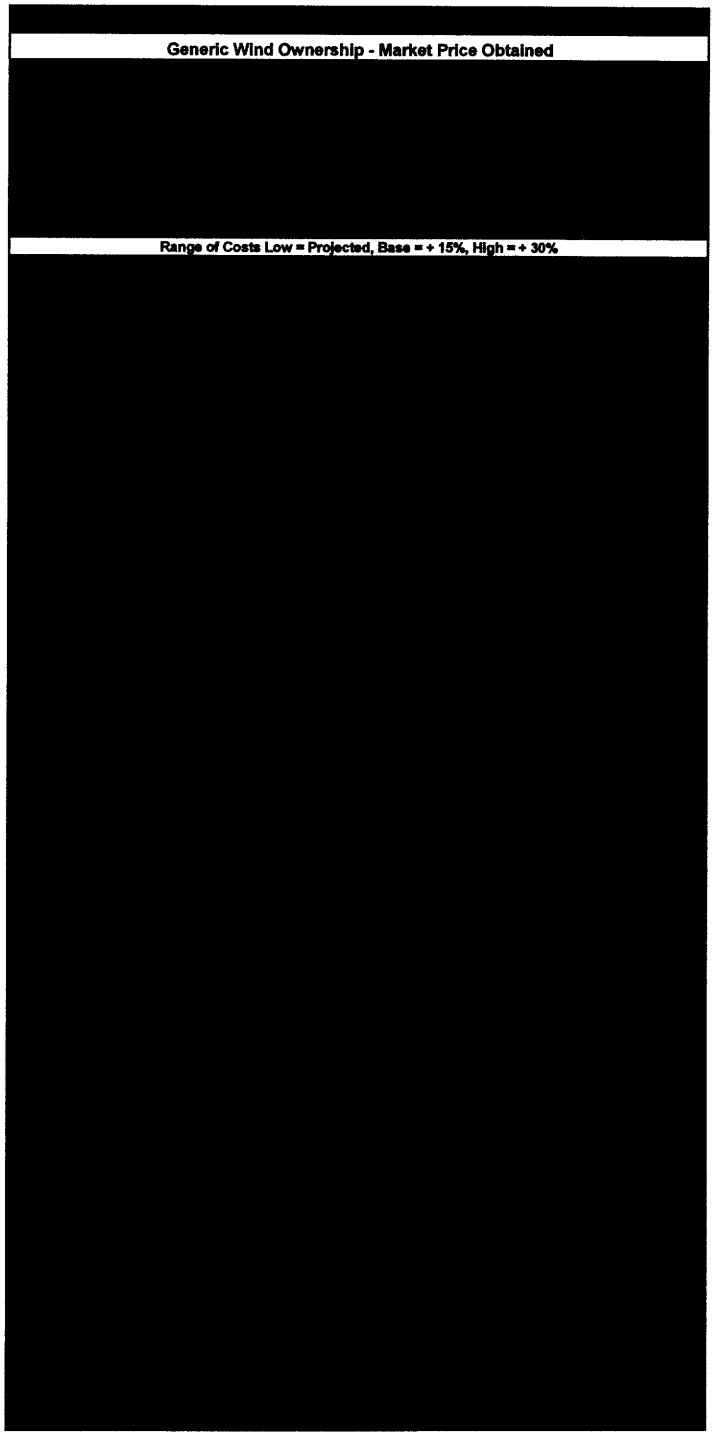
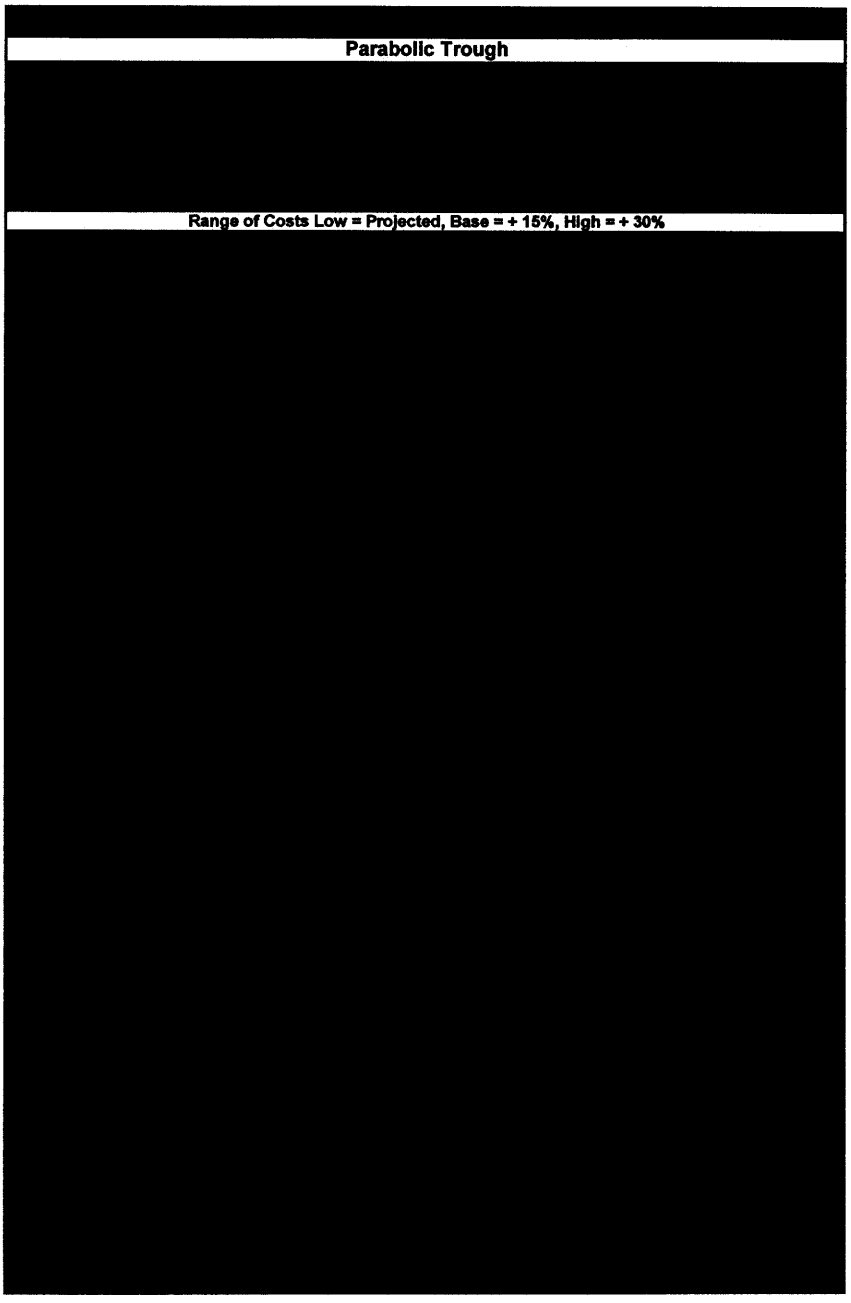
# Renewable: Wind ** Highly Confidential **




HC

# Renewable: Parabolic Trough (Solar) ** Highly Confidential **

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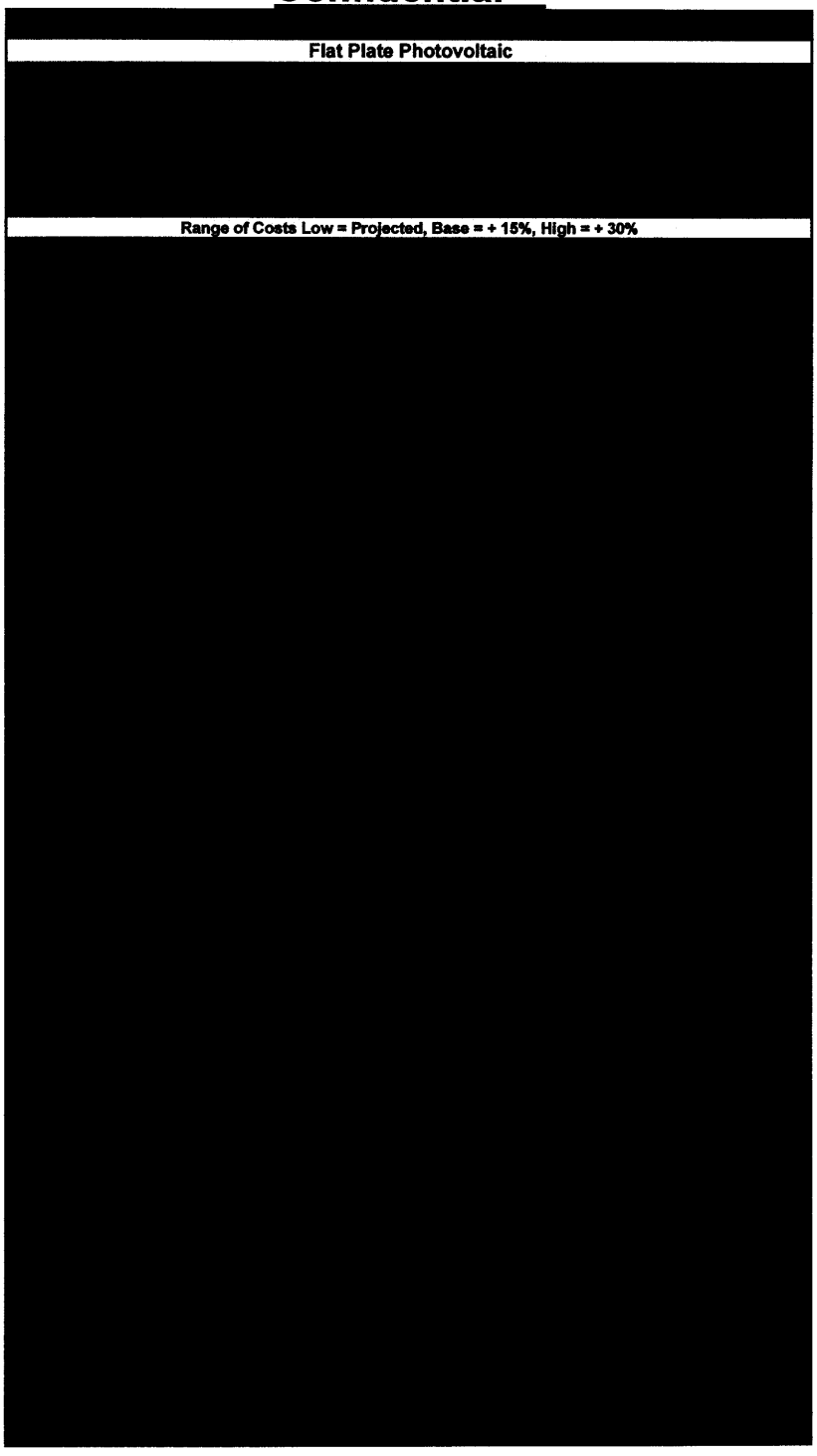
# Renewable: Photovoltaic Flat Plate (Solar) ** Highly Confidential **

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# Renewable: 10% Biomass Co-Fire ** Highly Confidential **

[redacted]

10% Biomass Co-Firing at Montrose Station - all 3 units

[redacted]

Range of Costs Low = Projected, Base = + 15%, High = + 30%

[redacted]

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# APPENDIX 6.A.2: INTEGRATED ANALYSIS TECHNOLOGY COST DEVELOPMENT BACKGROUND DATA ** HIGHLY CONFIDENTIAL **

## SCPC COST DEVELOPMENT

**Based on latan-2 cost data presented to the Joint Owners Meeting May, 2008:**

**SCPC w/CCS Cost Development – Based on latan-2 cost data presented to the Joint Owners Meeting May, 2008 and EPRI TAG estimation for CCS.**

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**NUCLEAR COST DATA**

**Wall Street Journal, May 12, 2008:**

# New Wave of Nuclear Plants Faces High Costs

By **REBECCA SMITH**
May 12, 2008; Page B1

A new generation of nuclear power plants is on the drawing boards in the U.S., but the projected cost is causing some sticker shock: $5 billion to $12 billion a plant, double to quadruple earlier rough estimates. Nuclear power is regaining favor as an alternative to other sources of power generation, such as coal-fired plants, which have fallen out of favor because they are major polluters. But the high cost could lead to sharply higher electricity bills for consumers and inevitably reignite debate about the nuclear industry's suitability to meet growing energy needs.

Nuclear plants haven't been built in meaningful numbers in the U.S. since the 1980s. Part of the cost escalation is bad luck. Plants are being proposed in a period of skyrocketing costs for commodities such as cement, steel and copper; amid a growing shortage of skilled labor; and against the backdrop of a shrunken supplier network for the industry.

The price escalation is sobering because the industry and regulators have worked hard to make development more efficient, in hopes of eliminating problems that in the past produced harrowing cost overruns. The Nuclear Regulatory Commission, for example, has created a streamlined licensing process to make timelier, more comprehensive decisions about proposals. Nuclear vendors have developed standardized designs for plants to reduce construction and operating costs. And utility executives, with years of operating experience behind them, are more astute buyers.

• **The News:** Estimated costs to build the next generation of nuclear power plants have soared to $5 billion to $12 billion a plant.

• **The Debate:** Questions are emerging over the affordability of nuclear power, despite its popularity as an alternative to polluting coal-fired plants.

• **What to Watch:** If Congress taxes greenhouse-gas emissions, nuclear plants, which aren't emitters, will become more attractive. But if coal and natural-gas prices decline, nuclear-plant economics will get worse.

**Nuclear Cost – Wall Street Journal, May 12, 2008 (continued):**

Now, 104 nuclear reactors are operating in the U.S. Most are highly profitable but that was not the case until fairly recently. For the 75 units built between 1966 and 1986, the average cost was $3 billion or triple early estimates, according to the Congressional Budget Office. Many plants operate profitably now because they were sold to current operators for less than their actual cost.

The latest projections follow months of tough negotiations between utility companies and key suppliers, and suggest efforts to control costs are proving elusive. Estimates released in recent weeks by experienced nuclear operators -- NRG Energy Inc., Progress Energy Inc., Exelon Corp., Southern Co. and FPL Group Inc. -- "have blown by our highest estimate" of costs computed just eight months ago, said Jim Hempstead, a senior credit officer at Moody's Investors Service credit-rating agency in New York.

Care to test your memory of recent news events in WSJ.com's weekly Newshound Quiz? Sign up for the quiz, and then look for the latest installments in your inbox on Fridays. Be the first to reply with all your answers correct, and you can declare yourself Top Dog!

Moody's worries that continued cost increases, even if partially offset by billions of dollars worth of federal subsidies, could weaken companies and expose consumers to high energy costs.

**On May 7, Georgia Power Co., a unit of Atlanta-based Southern, said it expects to spend $6.4 billion for a 45.7% interest in two new reactors proposed for the** Vogtle nuclear plant site near Augusta, Ga. Utility officials declined to disclose total costs. A typical Georgia Power household could expect to see its power bill go up by $144 annually to pay for the plants after 2018, the utility said.

Bill Edge, spokesman for the Georgia Public Service Commission, said Georgia "will look at what's best for ratepayers" and could pull support if costs balloon to frightening heights. The existing Vogtle plant, put into service in the late 1980s, cost more than 10 times its original estimate, roughly $4.5 billion for each of two reactors.

**FPL Group, Juno Beach, Fla., estimates it will cost $6 billion to $9 billion to build each of two reactors at its Turkey Point nuclear site in southeast Florida. It has** picked a reactor design by Westinghouse Electric Co., a unit of Toshiba Corp., after concluding it could cost as much as $12 billion to build plants with reactors designed by General Electric Co. The joint venture GE Hitachi Nuclear Energy said it hasn't seen FPL's calculations but is confident its units "are cost-competitive compared with other nuclear designs."

**Nuclear Cost – Wall Street Journal, May 12, 2008 (continued):**

**Exelon, the nation's biggest nuclear operator, is considering building two reactors on an undeveloped site in Texas, and said the cost could be $5 billion to $6.5 billion each. The plants would be operated as "merchant" plants and thus would not have utility customers on the hook to pay for them, as is the case in both Florida** and Georgia. Instead, they would have to cover expenses through wholesale power sales.

Several things could derail new development plans. Excessive cost is one. A second is the development of rival technologies that could again make nuclear plants look like white elephants. A drop in prices for coal and natural gas, now very expensive, also could make nuclear plants less attractive. On the other hand, if Congress decides to tax greenhouse-gas emissions, that could make electricity from nuclear plants more attractive by raising costs for generators that burn fossil fuels. Nuclear plants wouldn't have to pay the charges because they aren't emitters.

Some states are clearing a path for nuclear-power development, even before costs are fully known. They are inspired by a growing fear of climate change. "The overwhelming feeling in Florida is that nuclear power is popular and that's why it's going to go ahead," said J.R. Kelly, head of the Office of Public Counsel in Tallahassee, which represents consumers. "Our main concern is the tremendous cost."

In Florida, state officials are allowing utilities to collect money from customers to cover development and construction costs. In the past, regulators typically required utilities to bear the costs until plants were finished.

Many utilities said they are watching with interest. Ralph Izzo, chief executive of Public Service Enterprise Group Inc. in New Jersey, said his company may not be big enough to build a nuclear plant, even though it is a nuclear operator. "We're concerned by the rise in construction costs," he said.

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