

# THE OUTLOOK FOR U.S. NATURAL GAS SUPPLY AND DEMAND AND THE POTENTIAL ROLE FOR LIQUEFIED NATURAL GAS

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# FOLLOWING A DECADE OF LOW NATURAL GAS PRICES, GAS MARKETS SUFFERED A SEVERE SHOCK IN THE WINTER OF 2000/01

- Two Strong Perceptions Have Emerged from the Turmoil

Short Term Natural Gas Prices Are More Volatile Than We Had Previously Anticipated, And

The Complacency About the Ability of the Conventional North American Gas Resource Base to Carry Sharply Expanded Gas Demand Was Severely Tested

- Imported LNG and Arctic Gas Pipelines Are Now Back on the Table

# THIS IN TURN HAS FOCUSSED ATTENTION ON THE UNDERLYING DISCONNECT BETWEEN

- The Volatile Price Behavior of Short Term Commodity Markets, and
- The Need for Stable, Long Term Price Incentives Both to Stimulate the Necessary Levels of Drilling Activity and to Justify These Major New Long Term Supply Projects

- Just How Volatile Recent Price Changes Have Been - Both Up and Down - Can Be Seen from a Decade of Monthly "Bid Week" Spot Quotations for Henry Hub
- The December 2000 Quote Was Nearly Two and a Half Times the Previous January 1997 High
- It Was Also Far Higher Than the Average Price Levels that Most Forecasters - the EIA, the Canadian NEB, and the IEA - Were Anticipating at the Time for the Year 2020, Let Alone 2010
- And the EIA - In its Most Recent Annual Energy Outlook - Still Expects Wellhead Prices in 2020 to be 9% Lower Than Those Actually Experienced in 2000

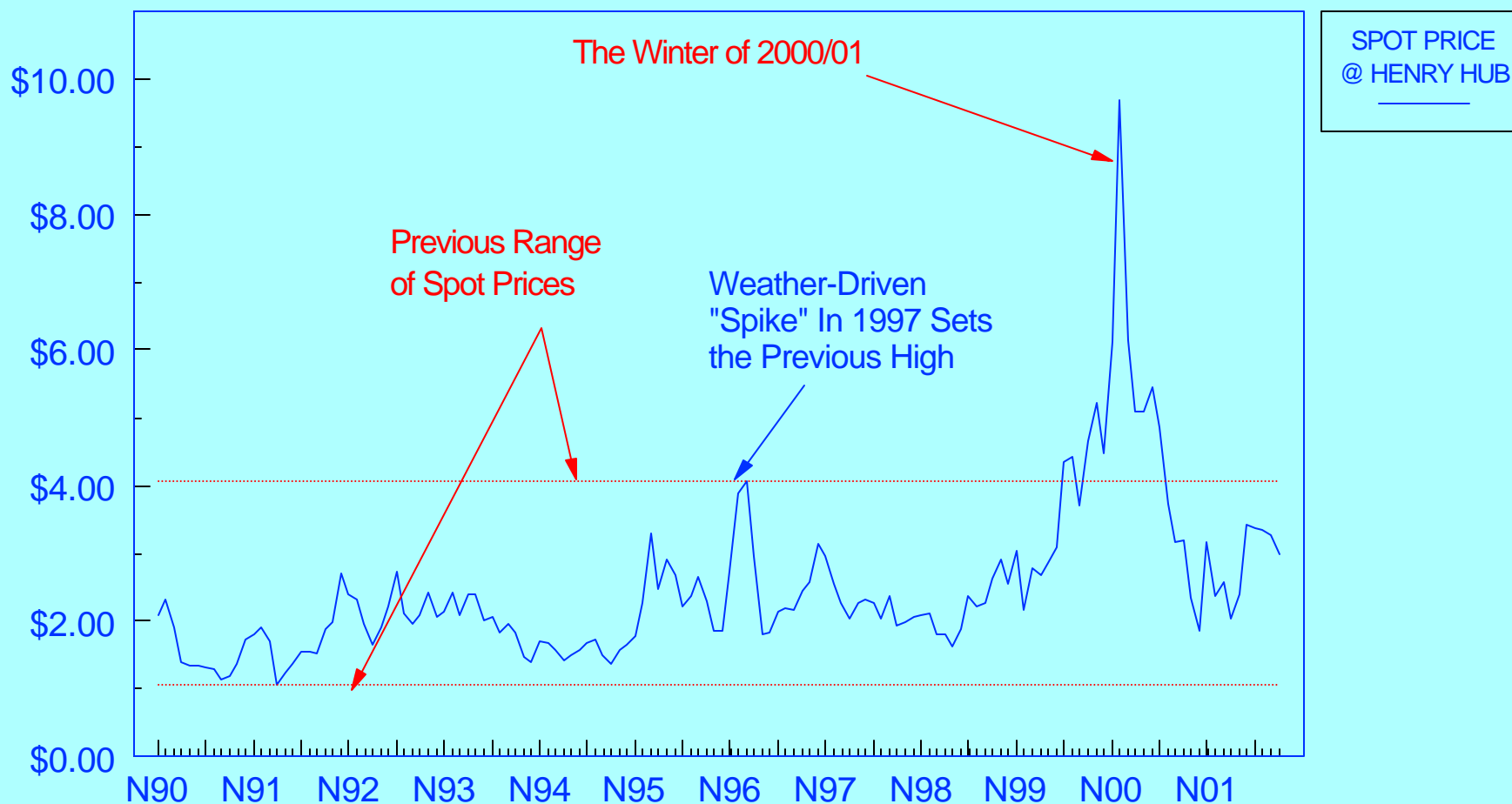
- While the Market's Response to the Price Shock Quickly Brought Supply and Demand Back Into Balance and Prices Back to Earlier Levels,
- Prices Remain Unusually High Given the Fact that Gas Storage Inventories Have Been Near Record Levels and Demand has Been Unusually Weak
- The Market Seems to be Waiting For Some Resolution of the Issue as to Whether a Return to Growing Demand Will Create More Problems for Conventional Gas Supply

# A GAS MARKET "WAKE UP CALL" FOR THE 2000/01 WINTER

## BID WEEK SPOT NATURAL GAS PRICES @ HENRY HUB, LOUISIANA

### MONTHLY DATA - \$/MMBTU

\$/MMBTU

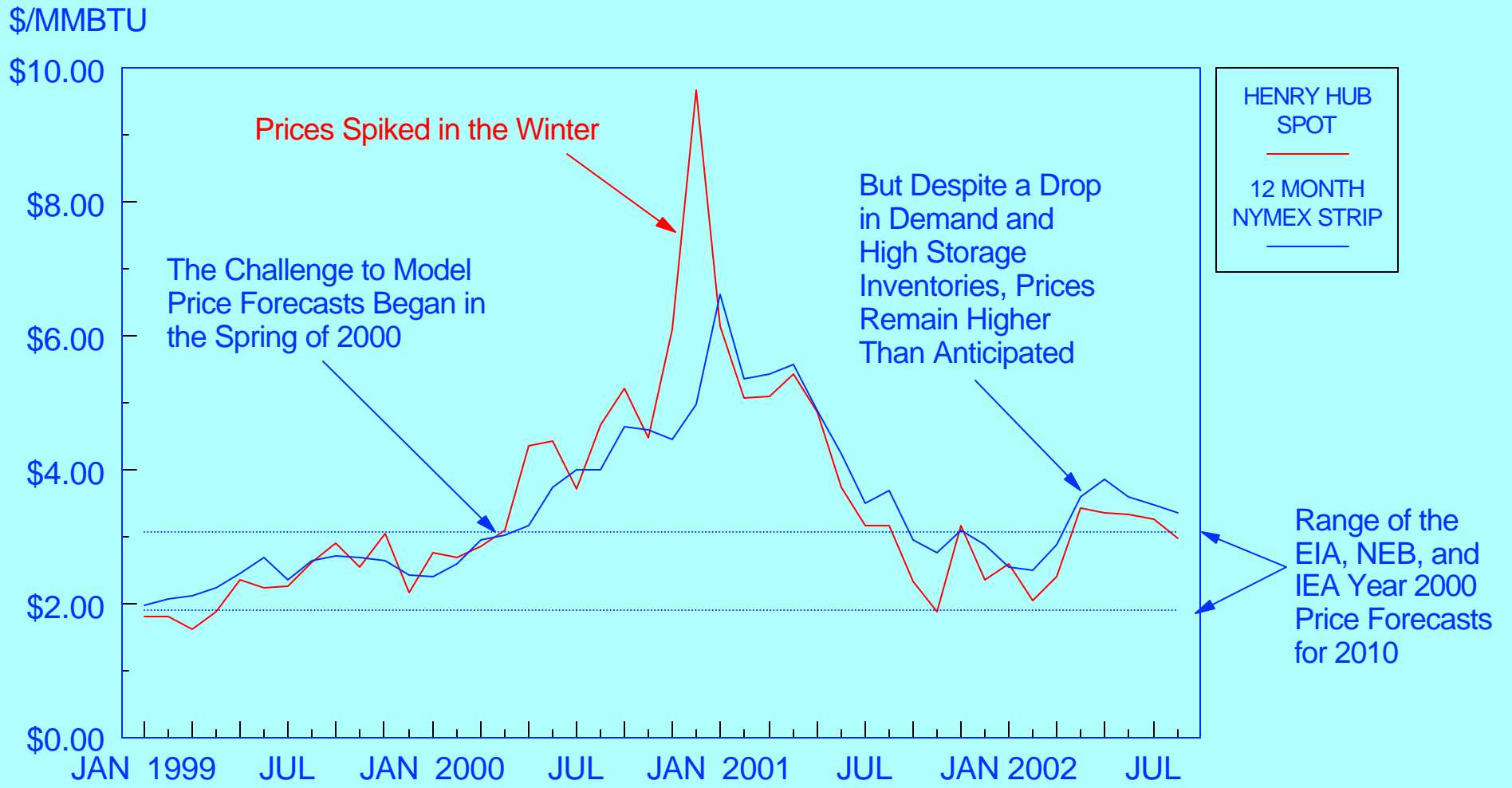


# GAS PRICES AND THE MAJOR GAS PRICE FORECASTS

## THE WINTER CHALLENGE AND THE SUMMER PRICE COLLAPSE

### BID WEEK NATURAL GAS PRICES [1] @ HENRY HUB, LOUISIANA

#### MONTHLY DATA - \$/MMBTU



[1] Including 12 Month NYMEX "Strip" (Average Forward 12 Month Futures Contract)

# THE GAS PRICE SHOCK HAS PROVIDED SOME VALUABLE INSIGHTS INTO NATURAL GAS PRICE BEHAVIOR AND THE WAY IN WHICH IT IS INFLUENCED BY OIL PRICES

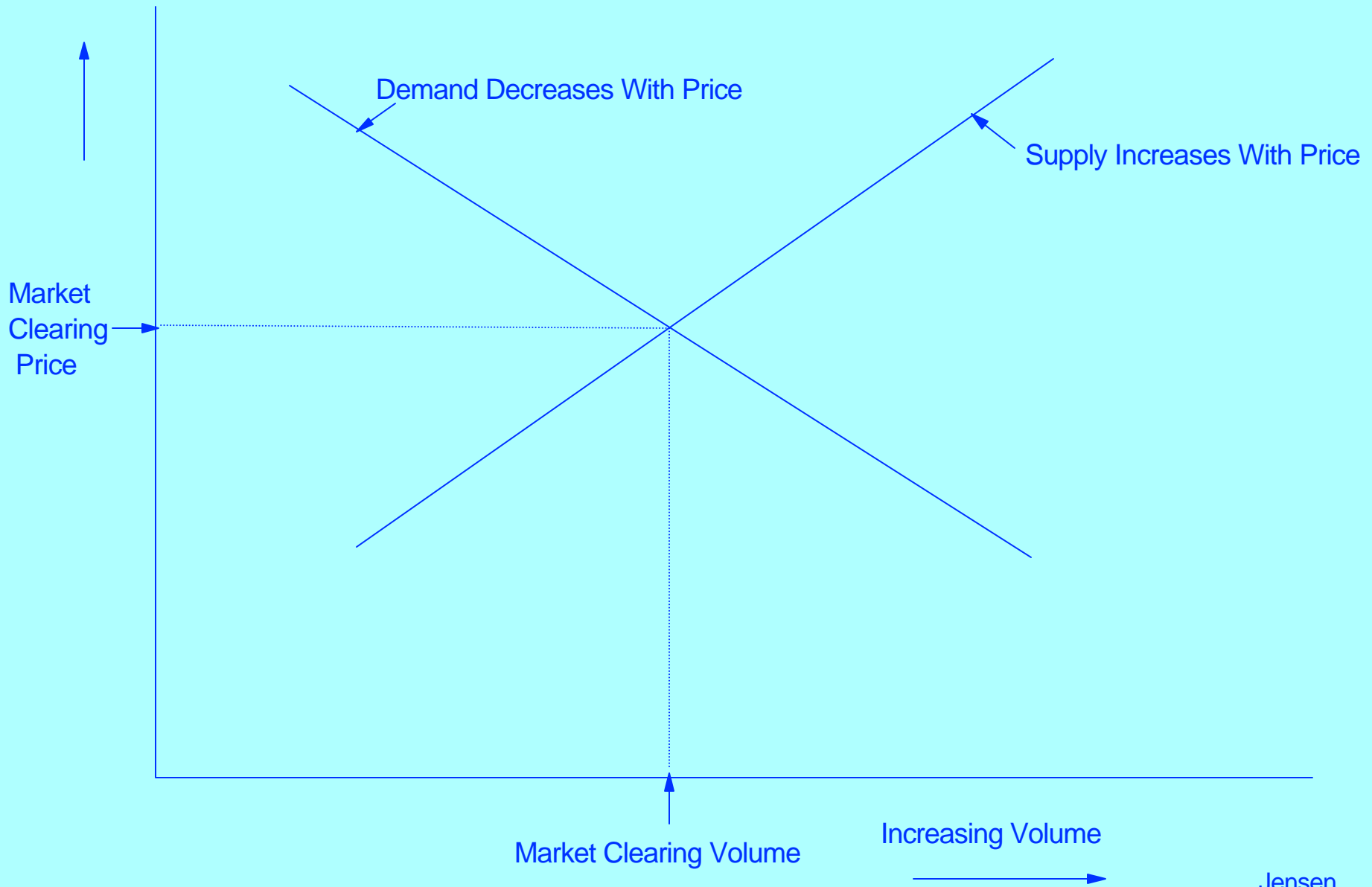
- The Shape of the Short Run Gas Supply/Demand Curve is More Complex than Those Found in the Economics Textbooks
- In Demand, What is Important is the Relationship Between Gas and Oil Prices, Rather Than the Absolute Price of Gas Itself



- Demand is Quite Inelastic In the Short Run, Both For Premium Uses and - Once The Market is Fully Satisfied - for New Loads Developed Through Price Discounting
- In Between is an Elastic "Bench" Where Rising Gas Prices Threaten Loss of Load to Fuel Oil in Dual-Fired Utility and Industrial Boilers
- Since Short Run Supply is Also Quite Inelastic, A Market In Surplus Will Be Decoupled From Oil Competition and "Gas-to-Gas" Competition - Sometimes Below Replacement Costs - Will Be the Result
- This Has Been the Predominant Pattern Over the Last Decade

# THE THEORETICAL BEHAVIOR OF SUPPLY, DEMAND AND PRICE ACCORDING TO "ECONOMICS 101"

Increasing Price



# A MORE REALISTIC SHORT TERM GAS SUPPLY/DEMAND CURVE

## A MARKET IN GAS-TO-GAS COMPETITION

Increasing Gas Price  
Relative to Oil Price  
(Gas as % of RAC)

In Surplus, Oil and Gas Prices  
Are Decoupled - Resulting in  
"Gas-to-Gas" Competition -  
Prices Are Volatile

Inelastic  
Premium  
Demand

Inelastic Short  
Term  
Supply

The "Cusp"  
Where Gas  
Prices Become  
Decoupled from  
Oil

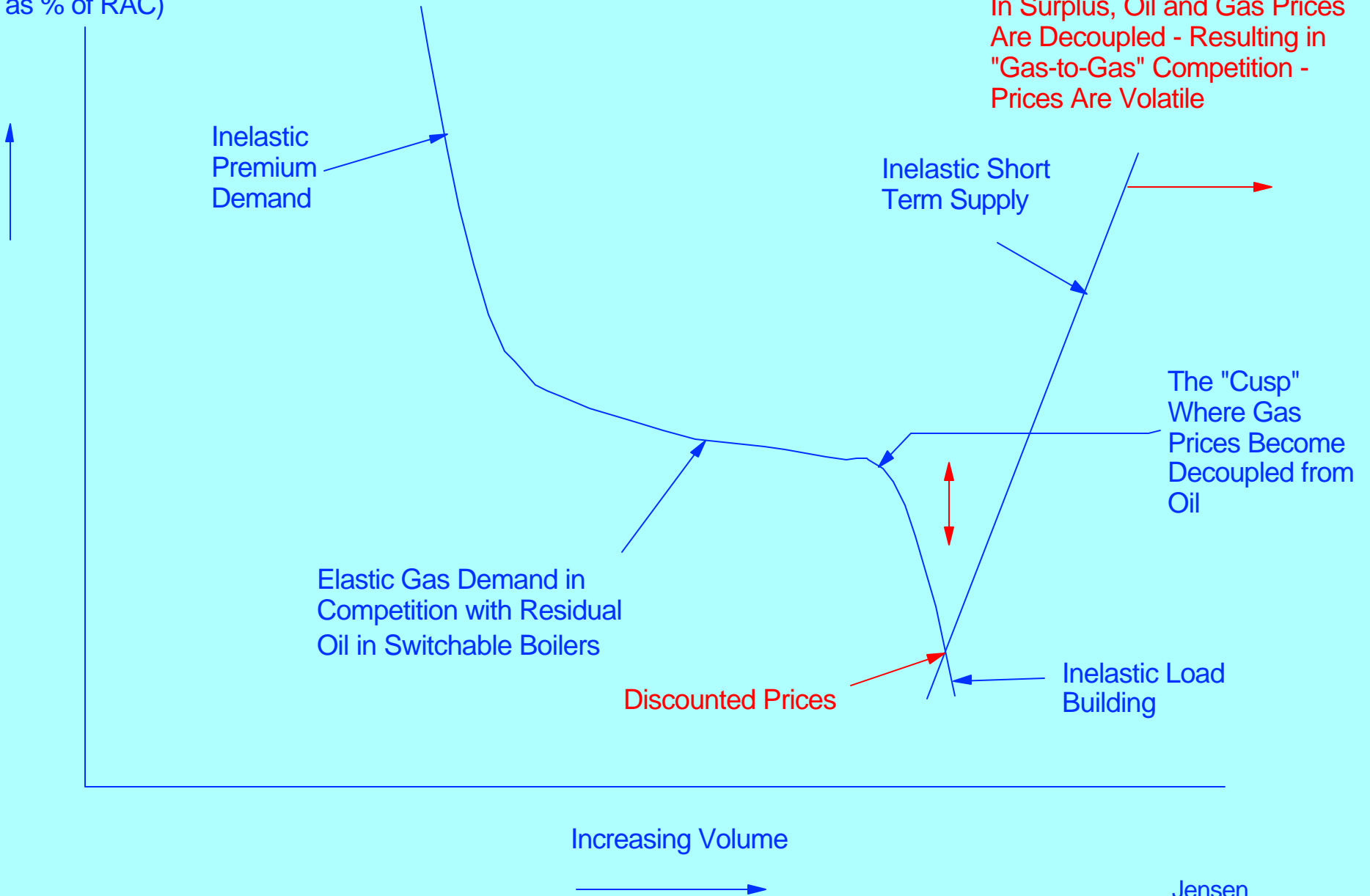
Elastic Gas Demand in  
Competition with Residual  
Oil in Switchable Boilers

Discounted Prices

Inelastic Load  
Building

Increasing Volume

Jensen

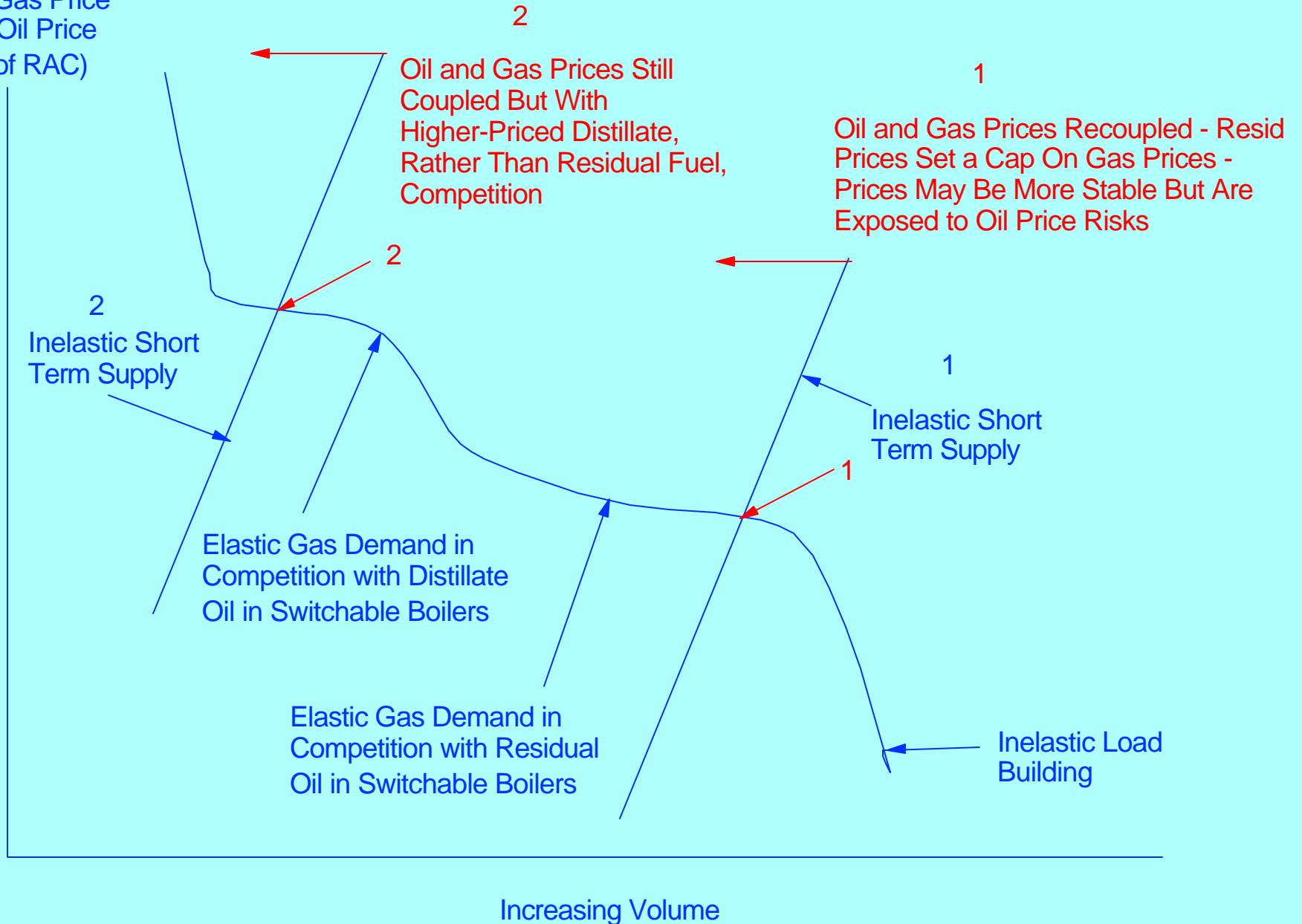


- But When Supply Tightens, Switching to Residual Fuel Oil Takes Place, Restoring Oil-to-Gas Competition With Residual Fuel Oil Setting a Cap on Gas Prices
- It Also Exposes Gas Prices to the Risk of a Collapse in Oil Prices - Another Element of Market Concern
- But If the Market is Tight Enough, Residual Fuel Oil Switching Capability (Perhaps 1,500-2,000 MMcfd, or 2.5% to 3% of Consumption) May Be Exhausted
- Then Switching May Move Into a New Region Where Gas Competes With the More Plentiful, But More Costly, Distillate Fuel Oil
- It Was This Competition With Distillate That Explained the High Prices of the 2000/01 Winter

# ANOTHER SHORT TERM GAS SUPPLY/DEMAND CURVE

## TWO MARKETS WITH OIL-TO-GAS COMPETITION RESTORED

Increasing Gas Price  
Relative to Oil Price  
(Gas as % of RAC)



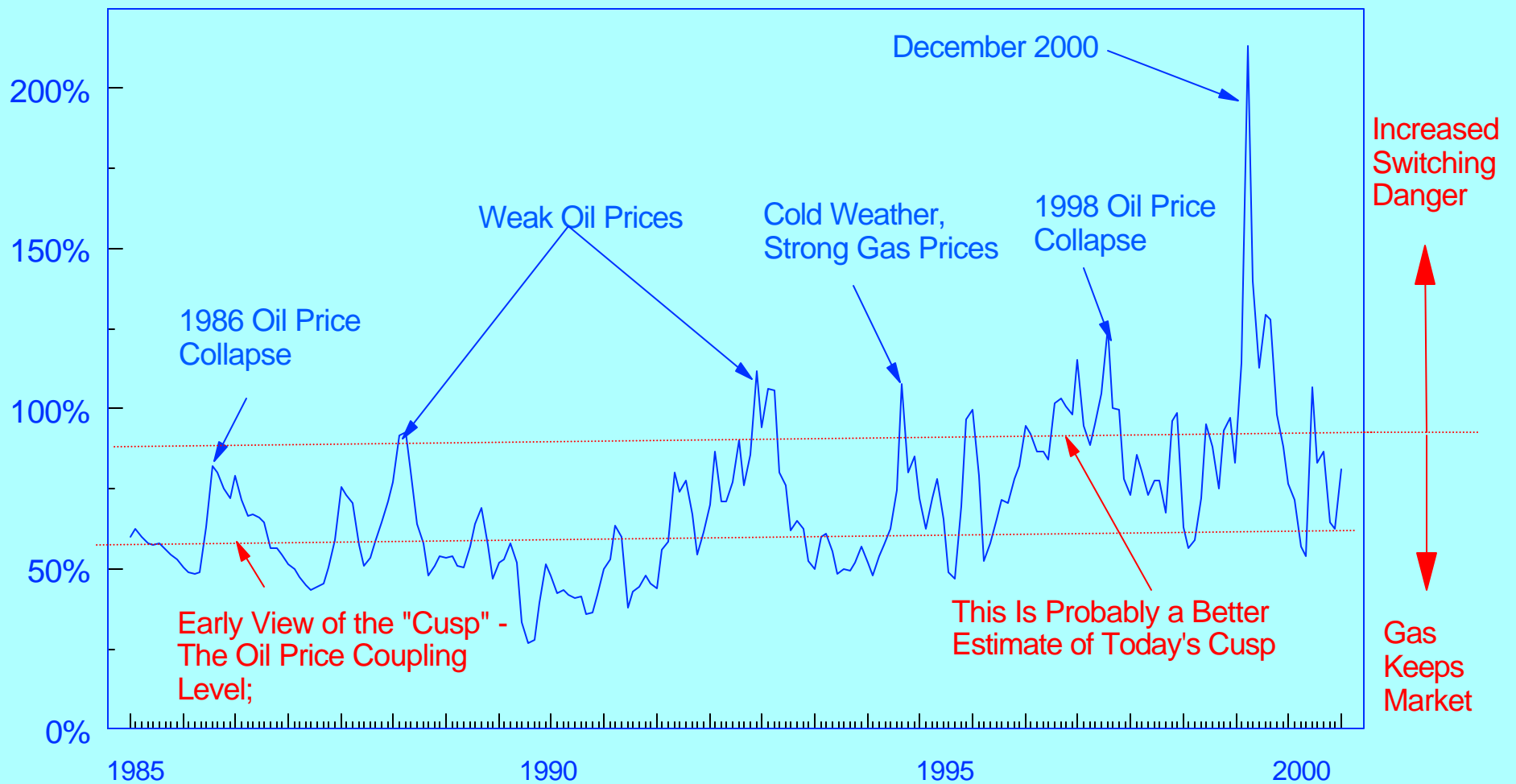
# BY EXAMINING EIA ELECTRIC UTILITY FUEL CONSUMPTION DATA, IT IS POSSIBLE TO DEVELOP AN ESTIMATE OF THE PRICE AT WHICH GAS AND OIL PRICES RECOUPLE

- Some Seasonal Switching to Oil For Customers on Interruptible Contracts is Normal, Particularly in the Northeast
- But Under Tight Supply Conditions or Unfavorable Gas/Oil Price Relationships, Price-Driven Abnormal Switching to Oil Takes Place, Largely in the Electric Utility Sector

- By Using EIA Data for Generating Fuels, Together with the Refiner's Acquisition Cost of Crude Oil (RAC) as a Measure of Oil Prices, It is Possible to Estimate Utility Switching During These Periods and Thus the "Cusp" Where Oil-to-Gas Competition Replaces Gas-to-Gas Competition as the Major Determinant of Gas Pricing
- In the 1980s the Data Seemed to Confirm an Industry Rule of Thumb that the Relationship Between Crude Oil and Gas Prices in a Price-Competitive Market Was "Ten to One" - That is \$25 Oil Was Equivalent to \$2.50 Gas
- My Estimates Are That the Linkage Now Occurs at About 90%% of RAC
- For \$25 Oil, That Implies a Gas Price of \$3.88
- Interestingly Enough, Gas Price Expectations Appear to Remain Linked to Oil Despite Weak Demand and High Storage Inventories

# HENRY HUB SPOT GAS PRICE AS A PERCENT OF REFINER ACQUISITION COST OF CRUDE OIL (BOTH IN \$/MMBTU)

HENRY HUB (\$/MMBTU) PERCENT OF RAC



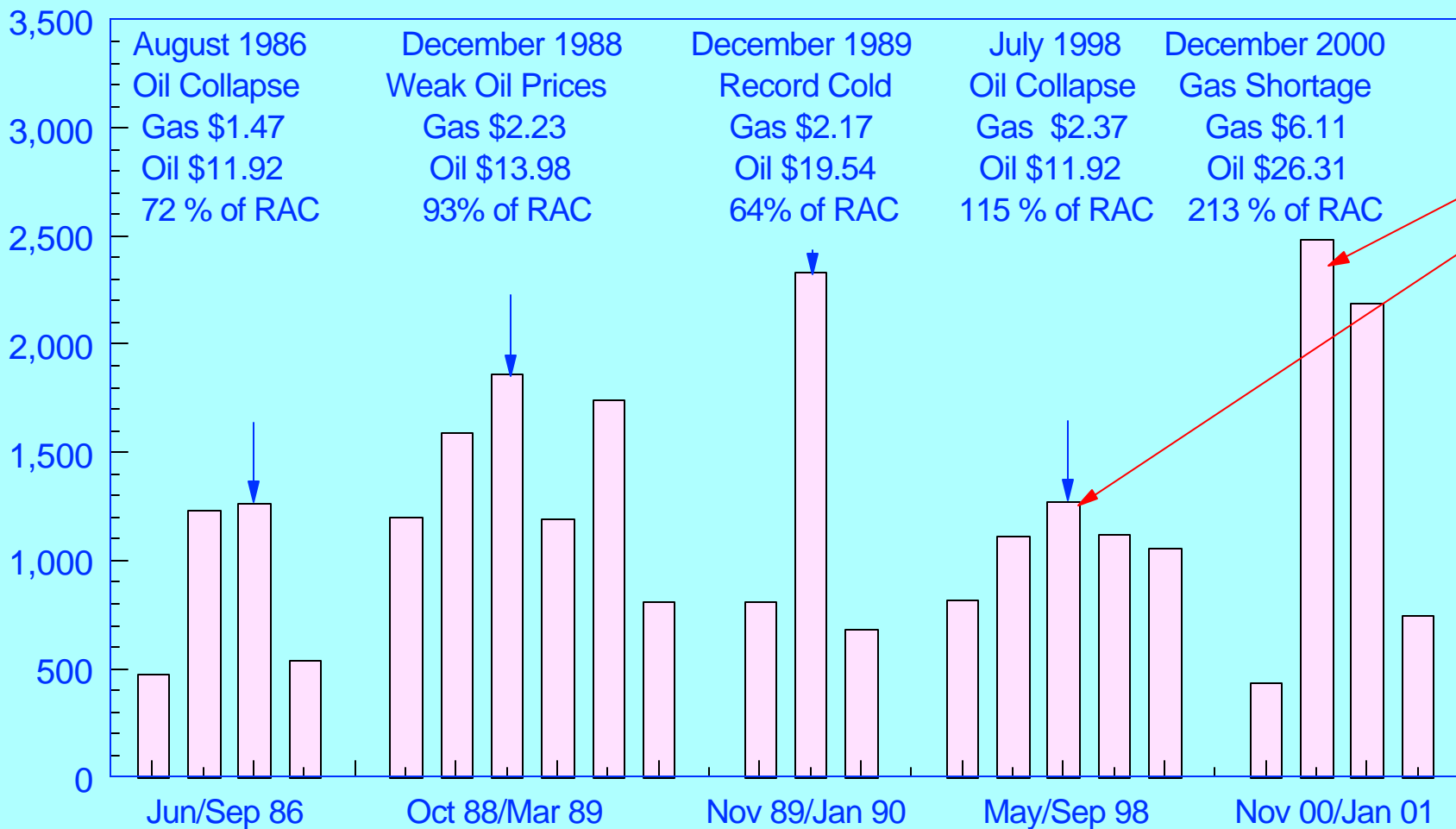


# ABNORMAL SWITCHING FROM GAS TO OIL BY U.S. ELECTRIC GENERATORS DURING SELECTED MONTHS WITH OIL/GAS PRICE COMPETITION

## MMCFD

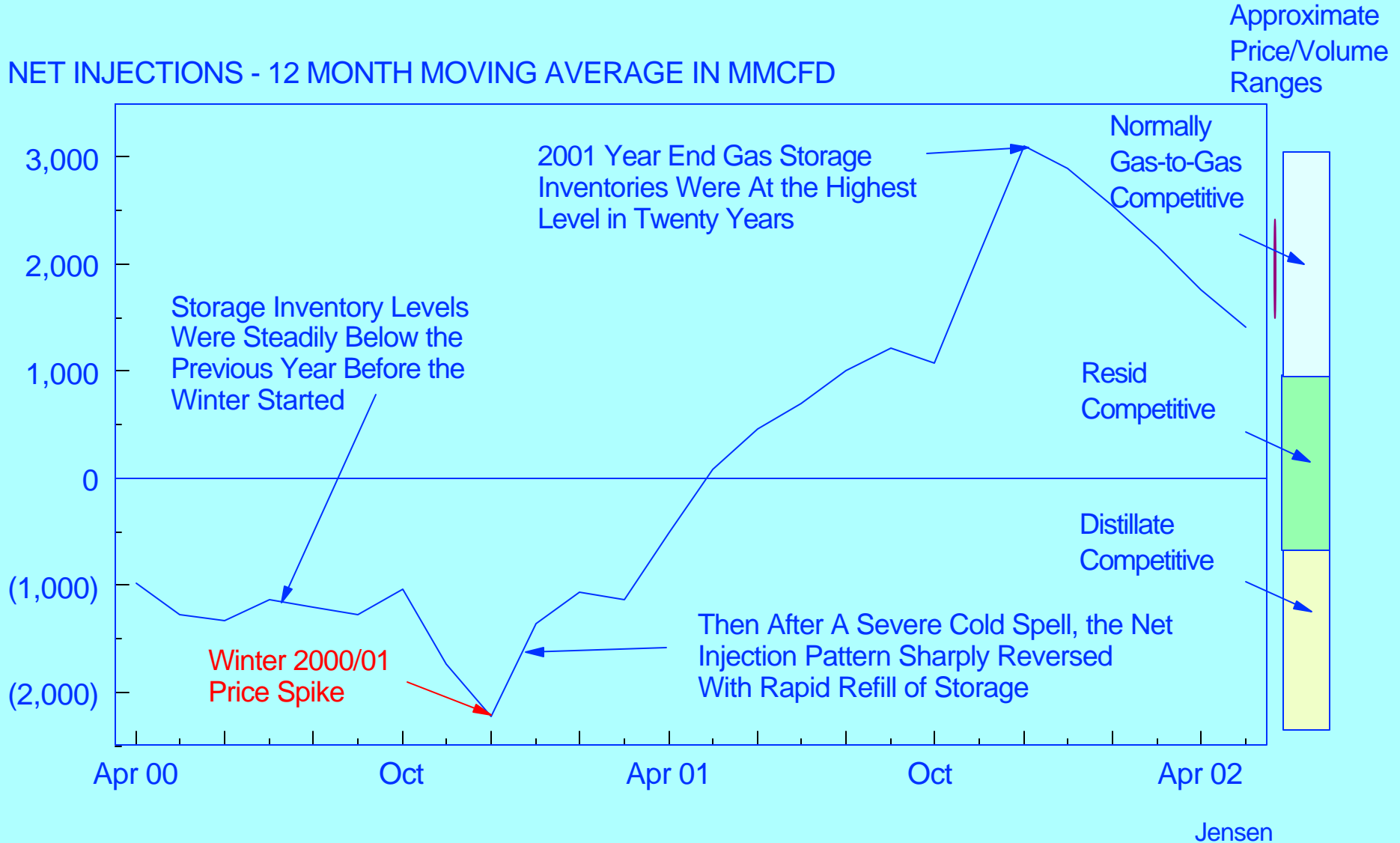
It Now Takes Higher Prices For Equivalent Levels of Switching

SWITCHING IN MMCFD

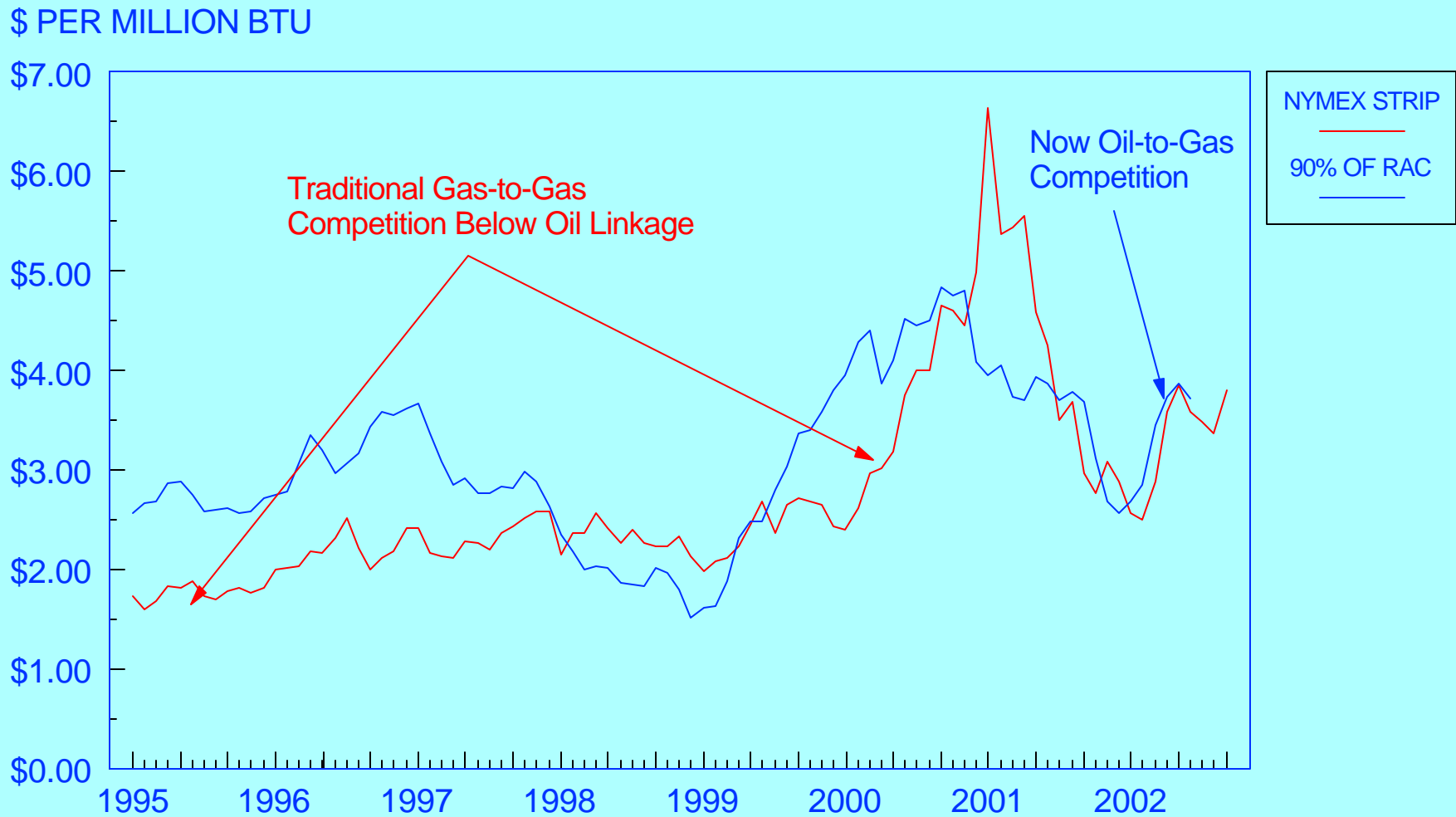


- But Actual Prices are Made by Traders Who Judge the Status of the Short Term Supply/Demand Balance by Monitoring the Weekly EIA Storage Reports
- And Storage - Which Was Dangerously Low at the Start of the 2000/01 Winter - Was Refilled Very Quickly During the Following Summer Suggesting a Return of Surpluses
- Hence the High Prices Could Not Hold
- Key Questions - "Where Did the Demand Go?", Why Did Prices Remain Linked to Oil in the Face of Surplus?, And, "Do the Investments in Long Term Supply That Looked So Attractive a Year and a Half Ago Still Make Sense?"

# YEAR-TO-YEAR CHANGES IN GAS STORAGE INVENTORIES AS MEASURED BY ANNUALIZED NET STORAGE INJECTIONS OVER THE YEAR SHOWING APPROXIMATE PRICE/VOLUME RANGES TWELVE MONTH MOVING AVERAGE IN MMCFD



SINCE THE PRICE SHOCK GAS PRICES HAVE BEEN LINKED TO OIL PRICES - GAS PRICE VOLATILITY REFLECTS OIL PRICE VOLATILITY  
\$/MMBTU



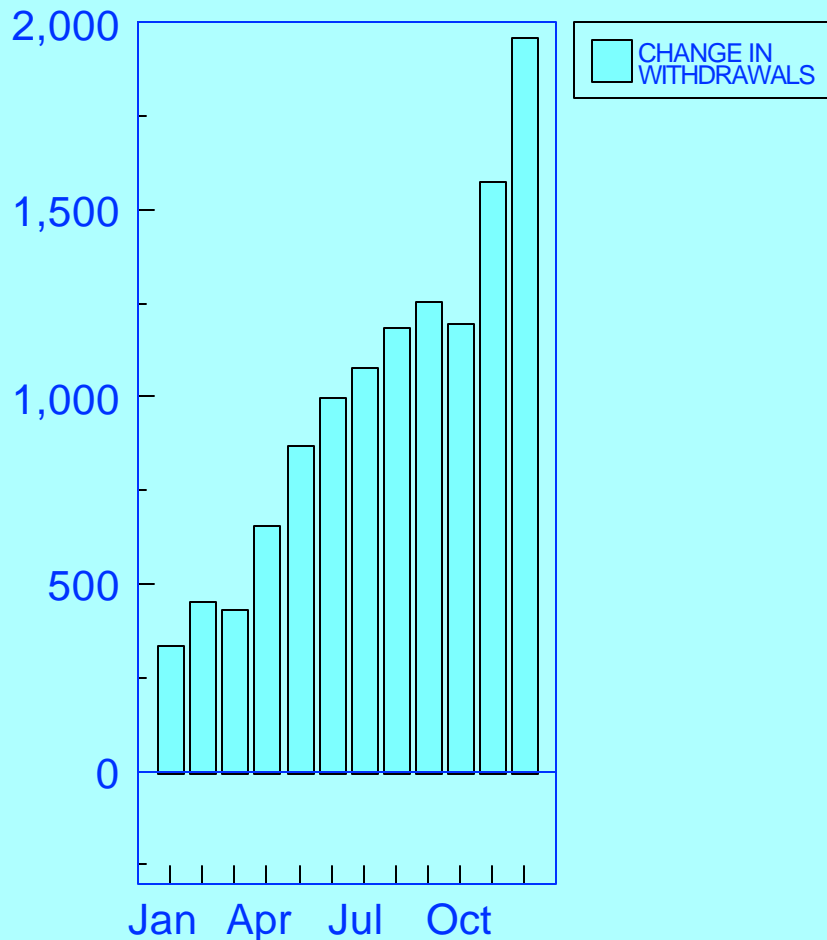
# THE DRAMATIC REVERSAL DURING 2001 FROM LOW STORAGE INVENTORIES TO A TWENTY-YEAR HIGH BY THE END OF THE YEAR IS LARGELY ATTRIBUTABLE TO DEMAND REDUCTION

- Consumption Levels Initially Increased, Largely Due to Weather Effects, But Then Declining Demand Accounted for 57% of the Total Storage Shift by the End of the Year
- The Production Figures Have Been Somewhat Disappointing Given the Much Higher Early Gas Rig Count And Are Thus the Major Source of Concern About Supply

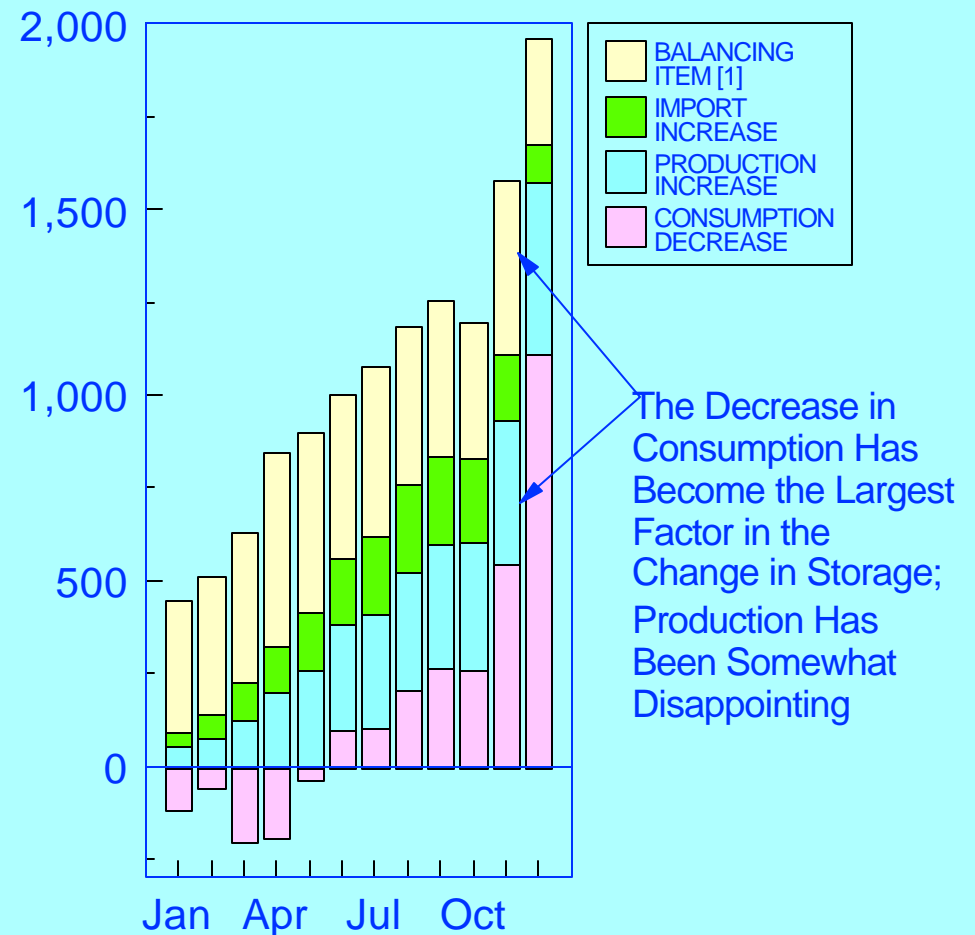
# YEAR TO YEAR CHANGES IN FACTORS CONTRIBUTING TO RAPID STORAGE REFILL DURING 2001

## CUMULATIVE CHANGES FROM PREVIOUS YEAR - BCF

INCREASE IN STORAGE OVER PREVIOUS YEAR BCF



FACTORS INCREASING STORAGE

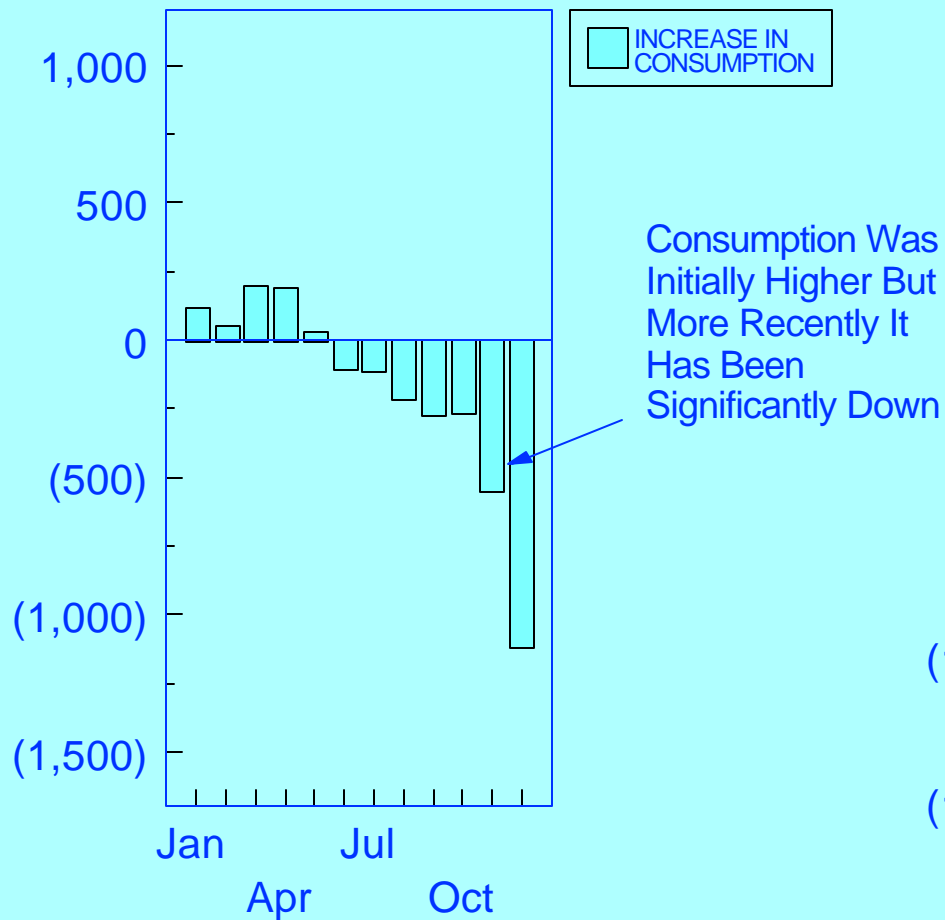


[1] The "Balancing Item" is a Statistical Difference Entry

- The EIA's Electric Utility Data Appear to Indicate that Reduced Utility Demand Was Responsible for a Significant Portion of the Decline in Consumption
- But the EIA Has Had a Data Problem Since it Began Treating Utility Plants Sold to Independent Operators (Such as in California) as Industrial Load
- An Adjustment to the Raw Gas Consumption Numbers to Account for Plants Transferred Out of the Utility Category Suggests that it Was Actually Reduced Demand In Industrial Heat and Process Applications (Excluding Industrial Cogeneration) That Has Been Primarily Responsible for the Decline

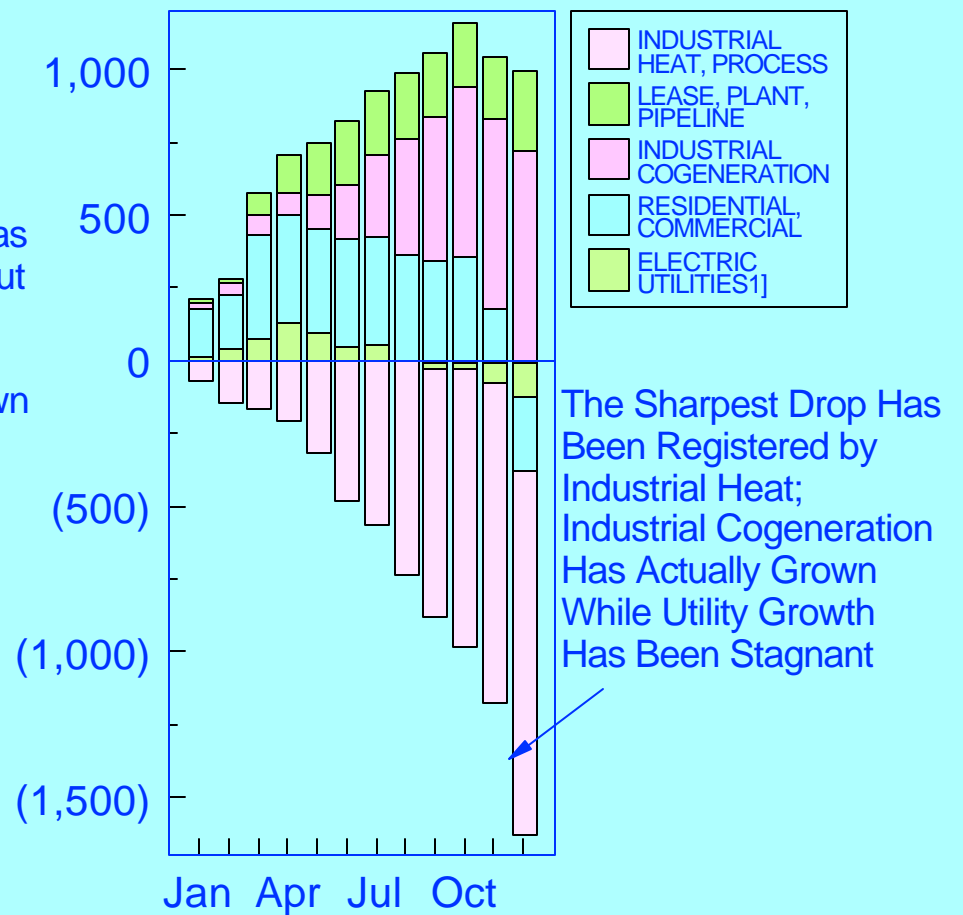
# YEAR TO YEAR CHANGES IN SECTORAL CONSUMPTION CONTRIBUTING TO RAPID 2001 STORAGE REFILL CUMULATIVE CHANGES FROM PREVIOUS YEAR - BCF

CHANGE FROM PREVIOUS YEAR BCF



[1] Adjusted to Include Transferred Plants

INCREASES OVER PREVIOUS YEAR



[1] Adjusted to Include Transferred Plants



# THE REVIVED INTEREST IN LNG AND ARCTIC GAS IS BEING DRIVEN BY THE EXPECTATION OF UNPRECEDENTED GROWTH IN GAS DEMAND COUPLED WITH NEW QUESTIONS ABOUT TRADITIONAL SOURCES OF SUPPLY

- Gas is Expected to Dominate the Markets for Stationary Energy, Largely Conceding the Transportation Market to Oil
- And It Has Become the Preferred Energy Source for the Growth of Electric Power Generation

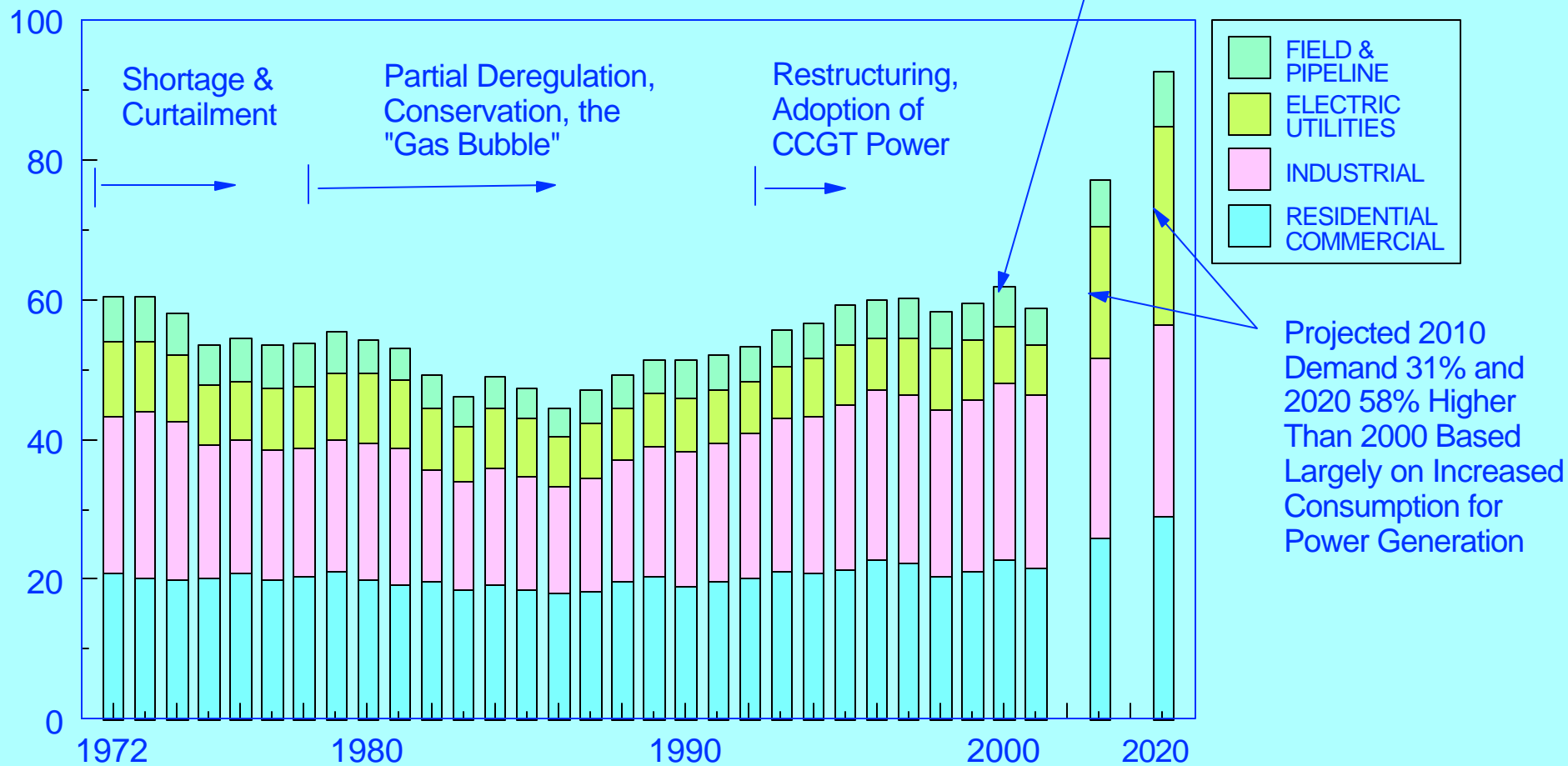
# U.S. NATURAL GAS DEMAND BY SECTOR

## HISTORY 1972/2001 AND EIA FORECAST 2010 & 2020

TCF

Demand in 2000 Exceeded That In 1972 for the First Time in 28 Years

BILLION CUBIC FEET PER DAY



# THIS IS EXPECTED TO REQUIRE A VERY SUBSTANTIAL INCREASE IN DOMESTIC GAS PRODUCTION AND PIPELINE IMPORTS FROM CANADA

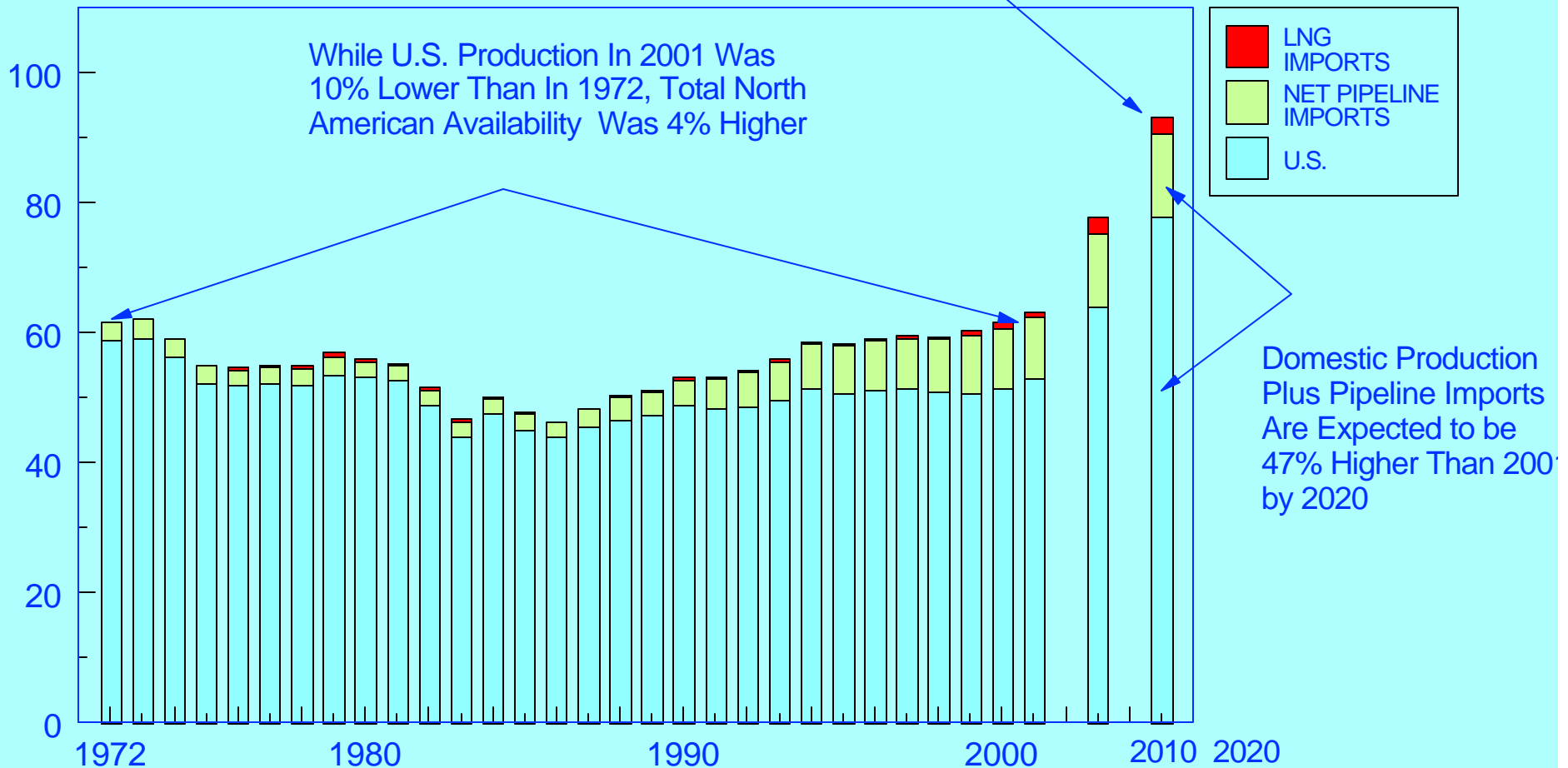
- And Despite the "Gas Price Shock" of the Winter of 2000/2001, the EIA's "Annual Energy Outlook 2002" Still Anticipates that North American Gas Will Carry the Lion's Share of the Increase in Demand
- The Role of Imported LNG, While Increasing is Still Projected to be Limited and the EIA Does Not Anticipate a Role for Alaska Before That Time

# U.S. NATURAL GAS SUPPLY HISTORY 1972/2001 AND EIA FORECAST 2010 & 2020

BCFD

LNG Accounts for Only 2.6% of Projected Supply; There is No Provision for the Alaska Pipeline

BILLION CUBIC FEET PER DAY

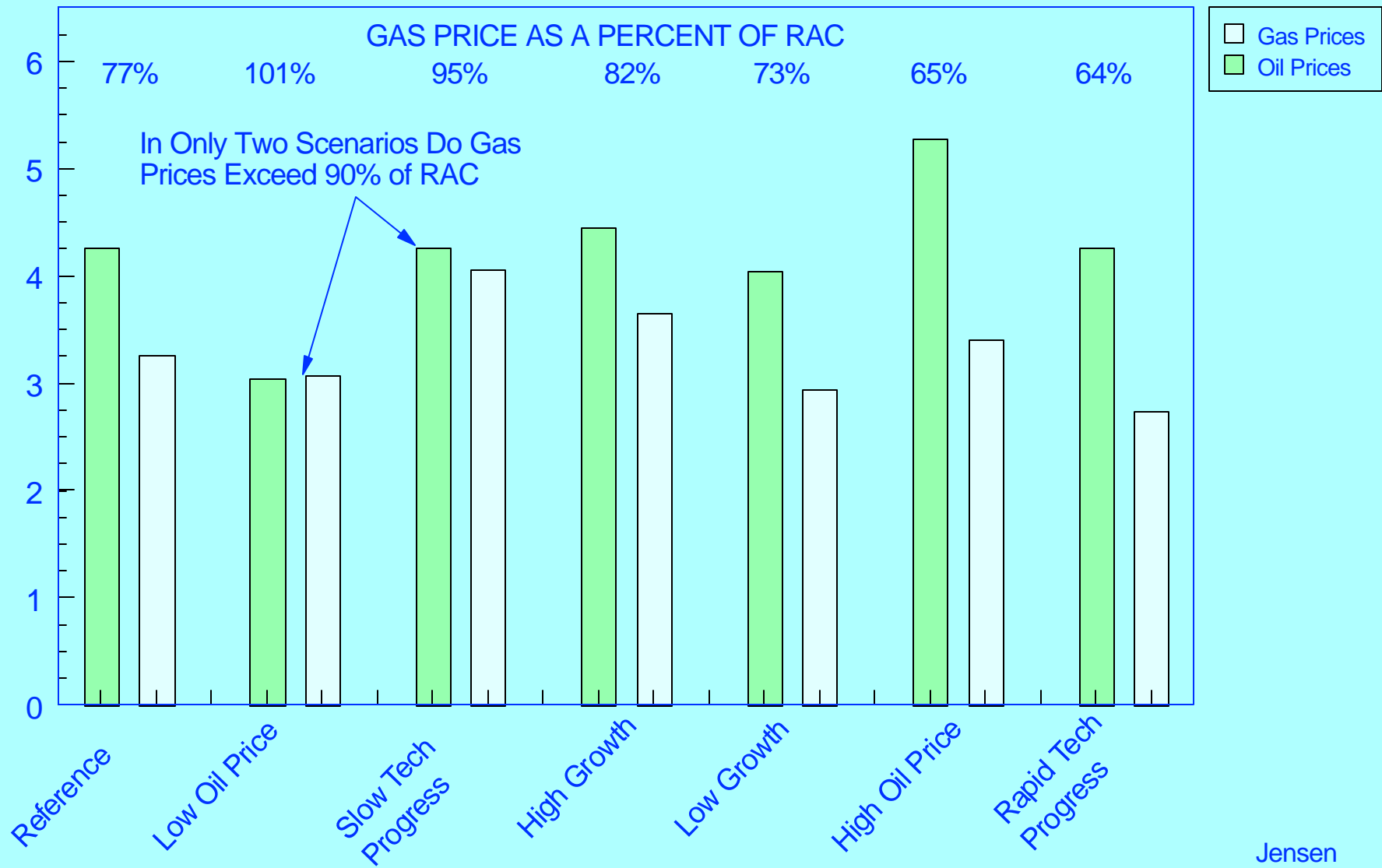


# THE EIA PROJECTIONS SUGGEST THAT IT REMAINS OPTIMISTIC ABOUT LONG RUN SUPPLY ELASTICITY AS WELL AS THE OUTLOOK FOR UNCONVENTIONAL GAS SOURCES, SUCH AS COALBED METHANE AND TIGHT GAS

- As a Result, the EIA's Price Projections Imply a Continuation of Gas-to-Gas Competition at Prices That May Challenge the Feasibility of Some of the Recent LNG Proposals and the Alaska Pipeline
- If the Definition of Gas-to-Gas Competition is a Gas Price Below 90% of the Refiner Acquisition Cost of Crude, Then in All But Two of Its Alternative Scenarios - The Low World Oil Price and Low Technological Progress Cases - the EIA Foresees Conditions That Rule Out a Return to Oil-to-Gas Competition

# PROJECTED OIL AND GAS PRICES FOR THE YEAR 2020 UNDER DIFFERENT SCENARIOS FROM EIA ANNUAL ENERGY OUTLOOK 2002

\$/MILLION BTU



THUS THE EIA PROJECTIONS TREAT THE GAS PRICE SHOCK OF THE 2000/01 WINTER AS AN ABERRATION AND CAST SUBSTANTIAL DOUBT ON THE PRICE SIGNALS THAT TRIGGERED MUCH OF THE INTEREST IN LNG AND ARCTIC PIPELINES

- But While the EIA Reference Case Does Project Significant Growth in LNG Imports From 0.6 Bcfd to 2.5 Bcfd by 2020, It Does Not Include the Alaskan Project
- And in a Series of Six Additional Scenarios in the Annual Energy Outlook 2002, EIA Did Not Foresee Any Additional LNG Contribution For the Year 2020 Over its Reference Case Estimate

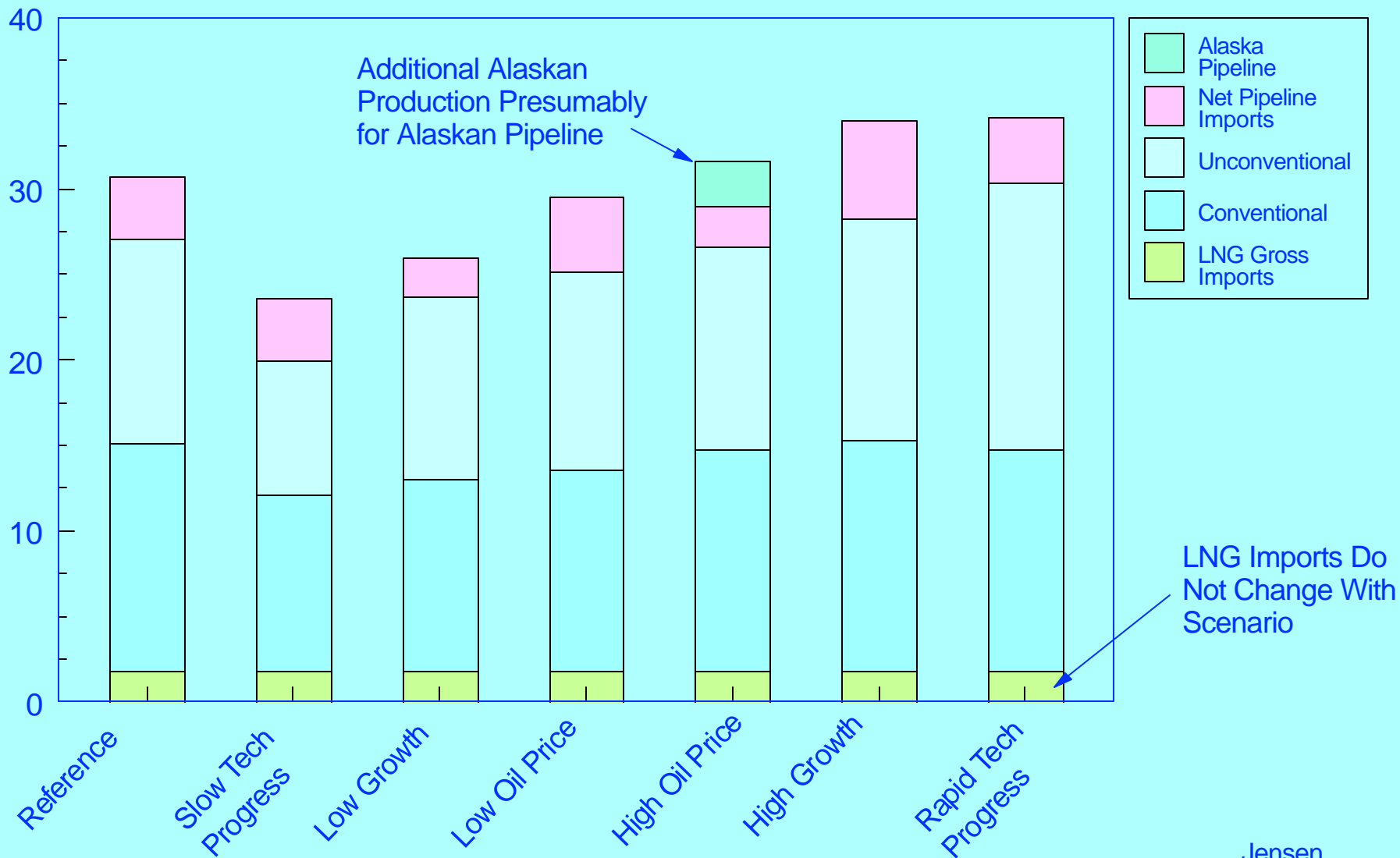
- However, In a Subsequent Report, "Natural Gas Markets: Mid-Term Prospects for Natural Gas Supply", EIA Did Provide Several Additional Scenarios, Two of Which - "CO2 Limits" and "Low LNG Costs" Did Foresee LNG Increases
- In One Annual Energy Outlook Scenario, a "High Priced Oil Case" it Increased Alaskan Production (Presumably for the Pipeline) by 2.6 Bcfd, While the Current Company Proposals Envision 4.5 Bcfd Project



# PROJECTED LOWER 48 GAS SUPPLY UNDER DIFFERENT ECONOMIC AND TECHNICAL SCENARIOS

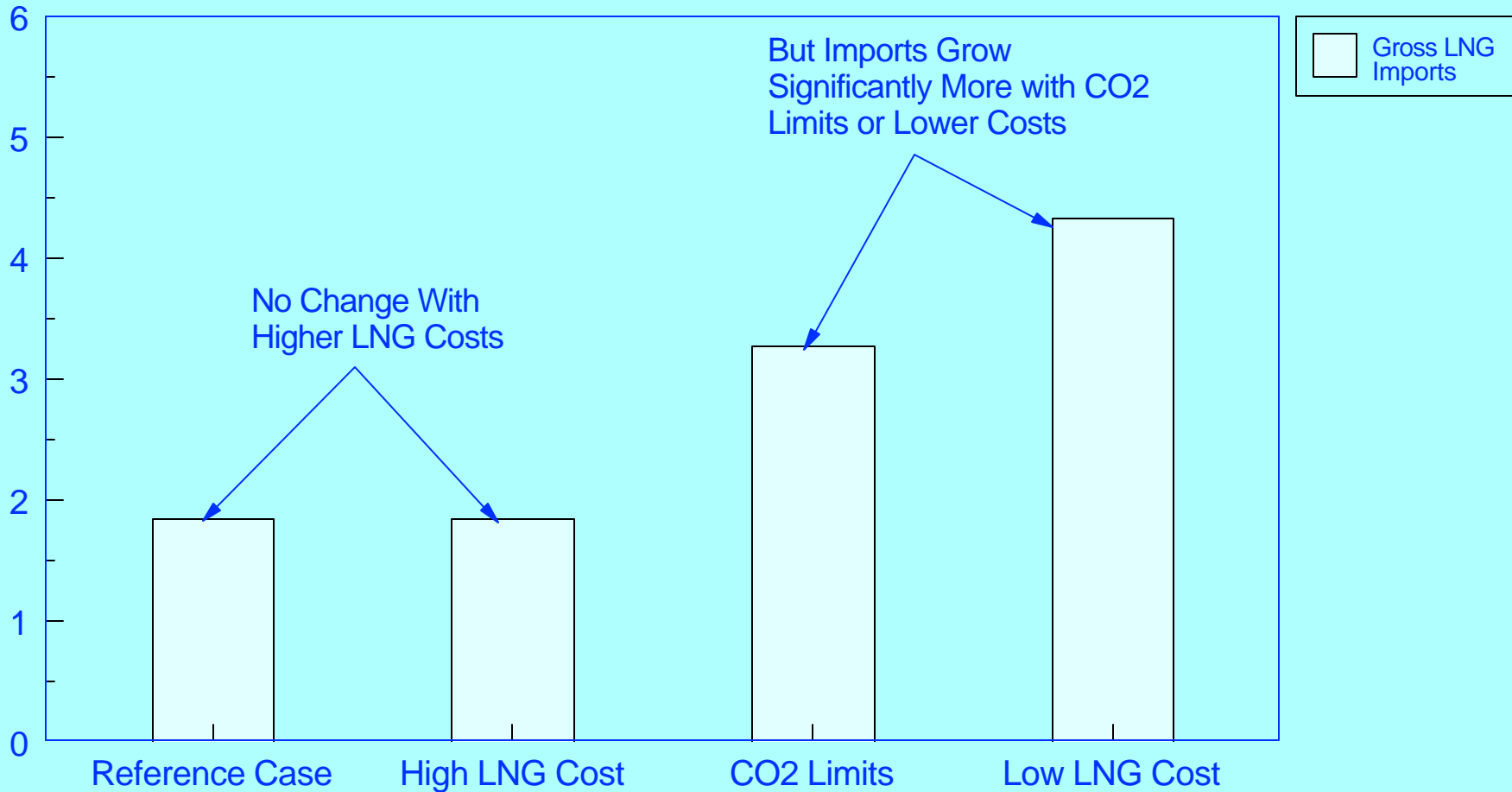
## FROM EIA ANNUAL ENERGY OUTLOOK 2002

BCFD



# THE GROWTH OF GROSS LNG IMPORTS BETWEEN 2000 AND 2020 UNDER VARIOUS LNG SENSITIVITY SCENARIOS FROM EIA MIDTERM PROSPECTS REPORT DECEMBER 2001

BILLION CUBIC FEET PER DAY

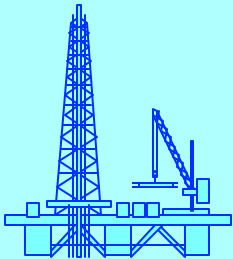


BUT LNG - LIKE GAS FROM ARCTIC  
PIPELINES - IS DIFFICULT TO DEAL WITH IN  
COMPUTER MODELS SINCE IT REQUIRES  
JUDGMENTS AS TO WHETHER OR NOT  
INDIVIDUAL PROJECT DEVELOPERS WILL  
PROVE SUCCESSFUL

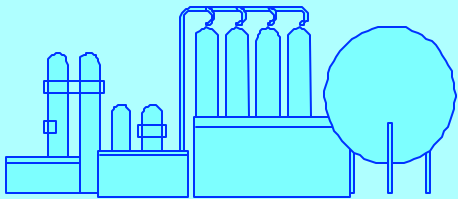
- The Judgments Are Heavily Dependent on an Understanding of the Potential Economics of the Project Within the Market Environment that the Model Envisions
- And LNG Projects Are Not Only Highly Capital Intensive But Involve Significant Geopolitical Considerations as Well
- On a Full Cycle Basis, LNG Projects are Multi Billion Dollar Efforts in Which the Receipt and Regasification Terminal is Usually a Relatively Small Part

# ELEMENTS OF AN LNG DELIVERY SYSTEM

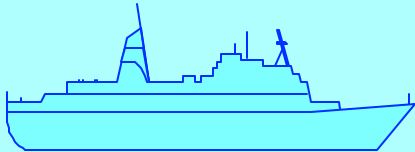
BASIS: TWO 4 MMT TRAINS - 5,900 NAUTICAL MILES  
(APPROXIMATE DISTANCE FROM NIGERIA TO THE U.S. GULF)  
REQUIRES ABOUT 12.8 TCF OF RESERVES TO SUPPORT  
20 YEARS OF FULL DELIVERABILITY



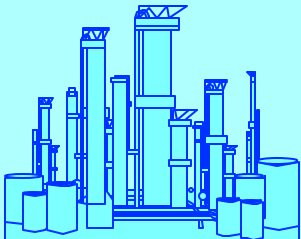
	CAPEX	MARGIN
Field Development (Varies)	\$1.6 Bn	\$0.80



Liquefaction	\$1.9 Bn	\$1.02
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Tankers (11 @\$180 Mn)	\$2.0 Bn	\$0.91
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Regasification (Varies)	<u>\$0.6 Bn</u>	<u>\$0.33</u>
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Total	\$6.1 Bn	\$3.05
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# THE INDUSTRY'S INTEREST IN LNG HAS DEVELOPED NOT ONLY BECAUSE OF THE RECENT GAS PRICE SHOCK

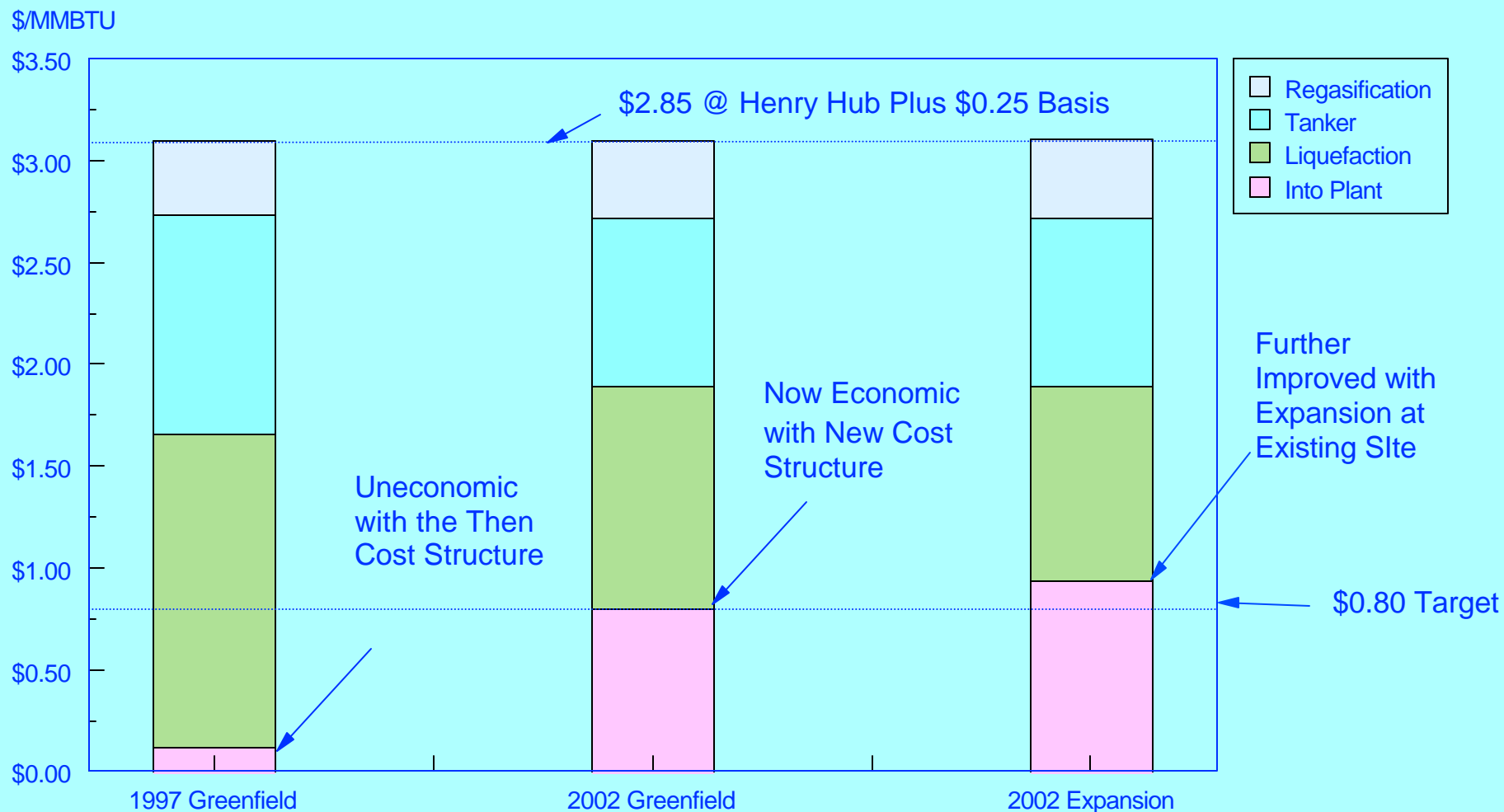
- Technology Has Provided a Substantial Reduction in Costs in Recent Years, Reviving Interest in Projects That Were Previously Viewed as Uneconomic
- The Growth in the Spot and Short Term LNG Market Has Made it Possible to Arbitrage International Markets and Import Cargoes from Previously Unthinkable Sources
- And the Growing Emphasis on "Monetizing Gas Discoveries" Has Focussed the Industry's Attention on LNG

# A HYPOTHETICAL COMPARISON OF NIGERIAN LNG PROJECT ECONOMICS USING TODAY'S COSTS AND THOSE OF FIVE YEAR'S AGO ILLUSTRATES HOW MUCH COSTS HAVE COME DOWN

- Then, a New Greenfield Project Could Not Return a Target Netback (Assumed to be \$0.80) to the Plant Gate
- With Today's Reduced Costs, a Greenfield Project Delivering to the Northeast Is Now Economic (Assuming \$2.85 Gas at Henry Hub and a \$0.25 Basis Differential)
- Expansion Economics Are Even Better

# THE IMPROVEMENT IN U.S. EAST COAST LNG NETBACKS OVER THE PAST FIVE YEARS - A NIGERIAN EXAMPLE

## ECONOMICS OF A HYPOTHETICAL 1997 GREENFIELD PROJECT COMPARED TO CURRENT GREENFIELD AND CURRENT EXPANSION PROJECTS [1]



[1] Assuming \$2.85 Gas, a \$0.25 Basis Differential and a Target Netback of \$0.80 Into Plant

- The Reduction in Liquefaction Costs is Largely Attributable to Improved Gas Turbine Technology That Has Permitted Larger Train Sizes With Attendant Economies of Scale
- The Reduction in Tanker Costs Is Partially Due to Increased Sizes, But Also Reflects Greater Competition from Shipyards, a Saving That Might Not Last With a Surge in Tanker Orders
- And New Designs for Small Terminals, Such as the One That Has Been Built in Puerto Rico, Has Enabled the Industry to Access Smaller Markets Economically

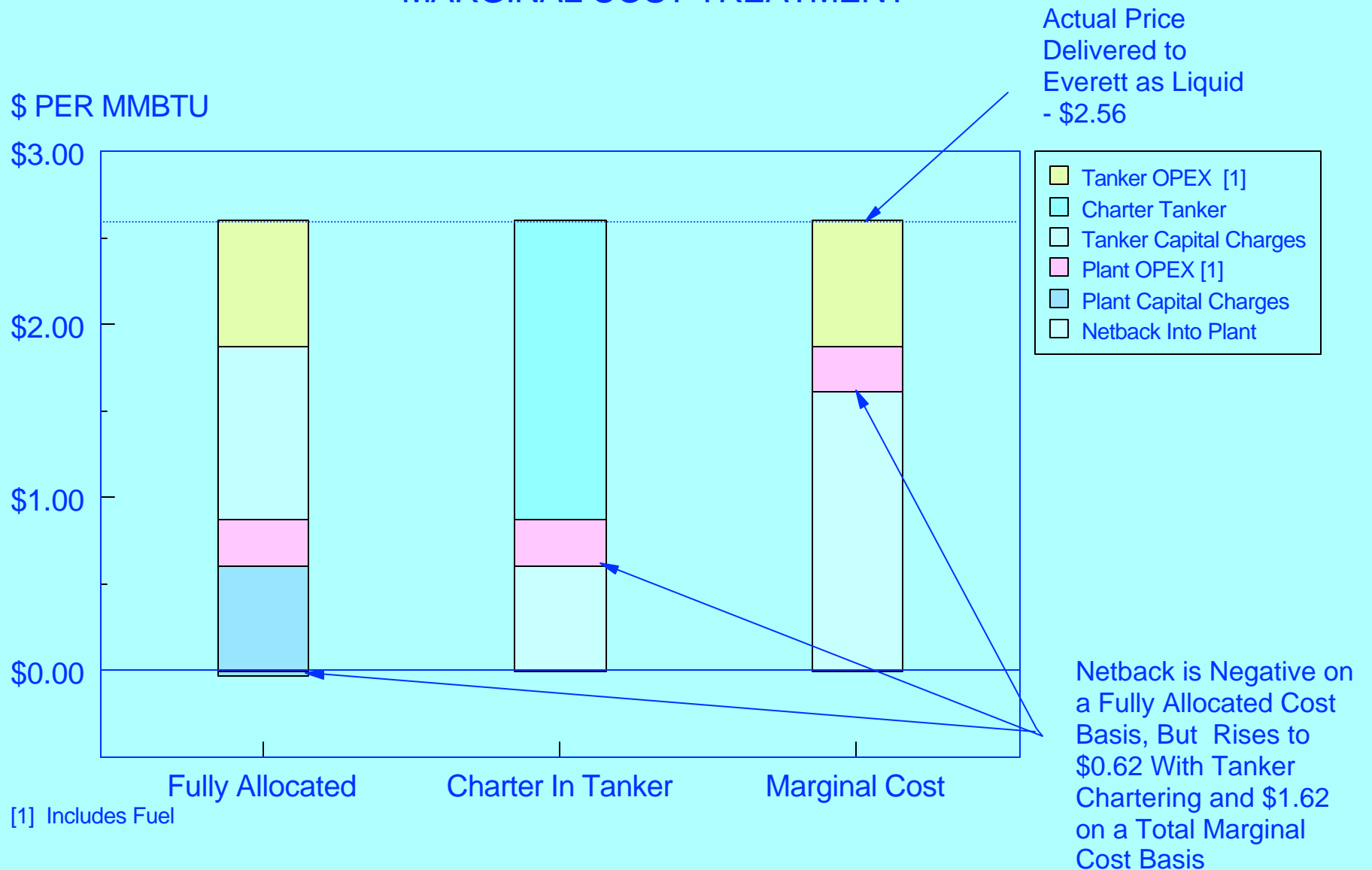


- Other New Technologies on the Drawing Boards Include Shell's Proposal for a Floating Production, Storage and Offtake Plant (FPSO) for the Sunrise Field in the Timor Sea And El Paso's Proposal to Install Regasification on Tankers (The El Paso "Energy Bridge") to Eliminate the Need for Regasification Terminals Altogether
- In Both Cases the Proposals Represent The Combination Of Previously Independent Functions in the LNG Chain- Production and Liquefaction in One Case and Tanker Transportation and Terminalling in the Other - to Achieve Integrated Savings in Selected Project Situations

# THE SURGE OF IMPORTS INTO THE U.S. IS LARGELY DRIVEN BY SPOT VOLUMES

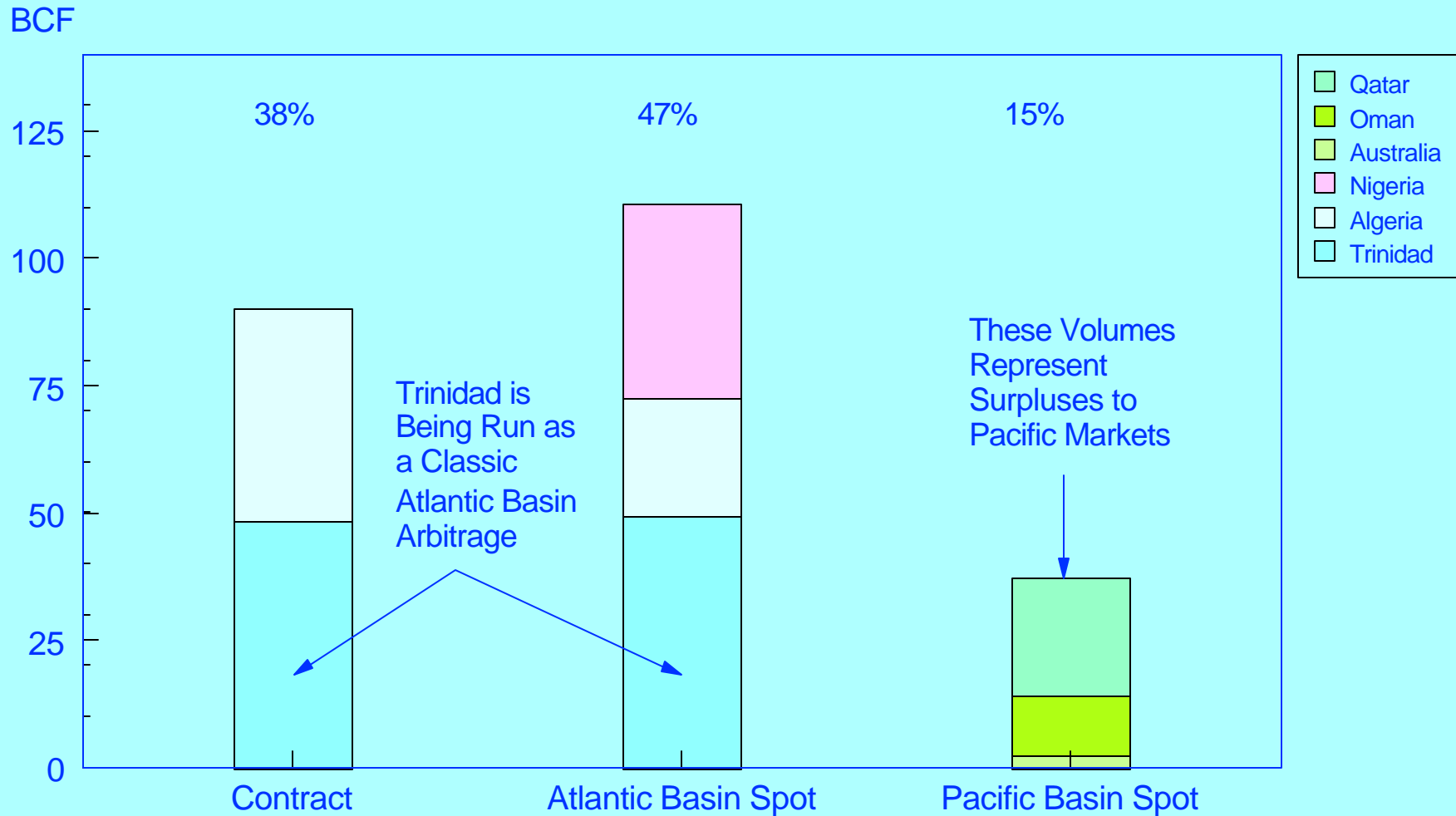
- However, Some of These Shipments, Such as Those Diverted from Australia and the Middle East, Take Advantage of Marginal Cost Pricing in the Presence of Surplus Plant and Tanker Capacity and Thus Do Not Reflect the Recovery of Full Return on Investment
- A Shipment from Western Australia to Boston in 1997 Illustrates the Economics
- But Others Reflect the Emergence of the Interaction Between the U.S. and European Markets With the Potential for Market Arbitrage

# ILLUSTRATIVE NETBACK TO THE FIELD IN WESTERN AUSTRALIA FROM A 1997 SHIPMENT TO EVERETT, MASSACHUSETTS COMPARING FULLY ALLOCATED COST, TANKER CHARTERING AND COMPLETE MARGINAL COST TREATMENT



# LNG IMPORTS INTO THE U.S. IN 2001 ILLUSTRATE THE IMPORTANCE OF SPOT VOLUMES IN THE U.S. MIX

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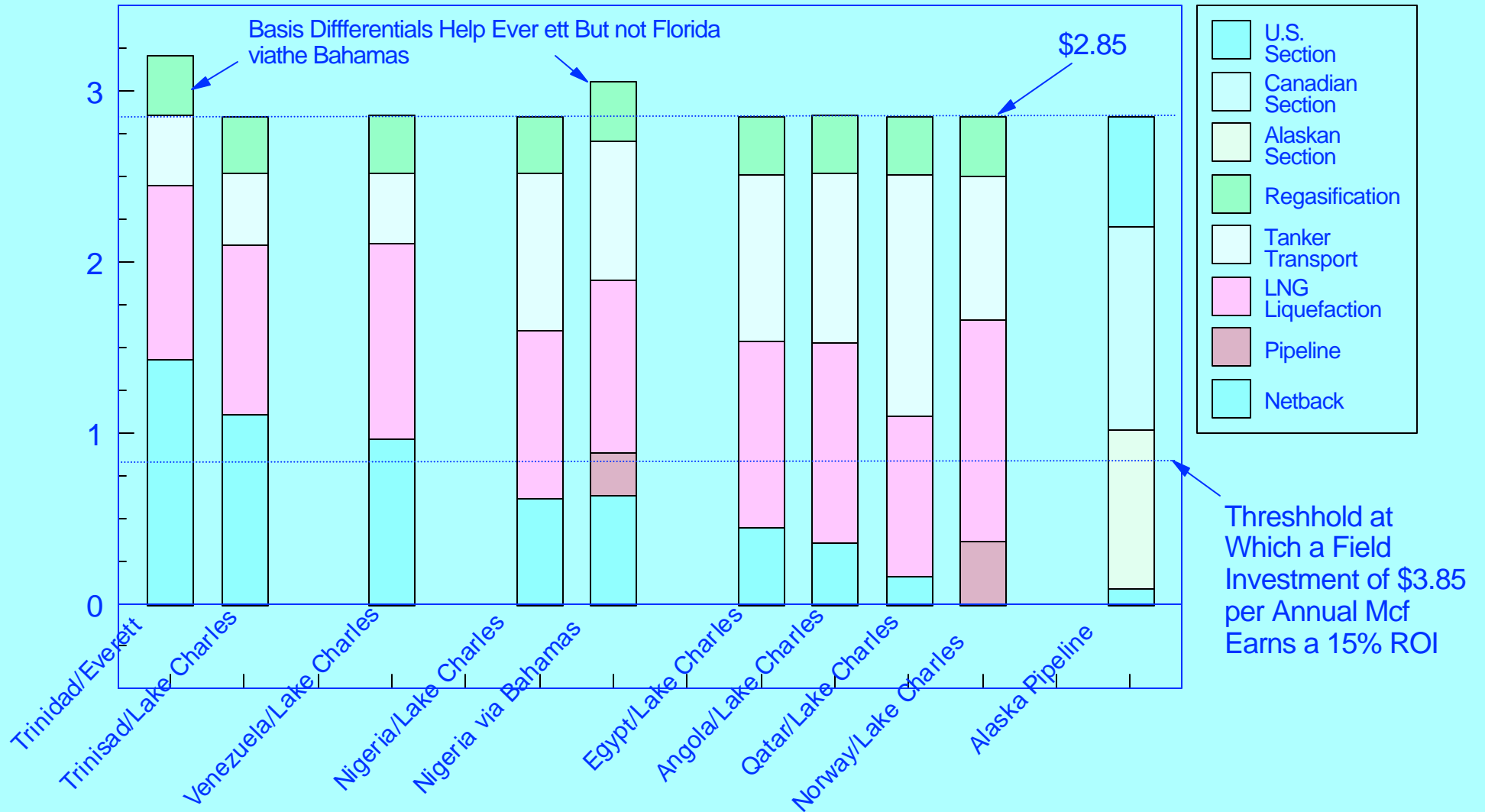


WHICH OF THE TWO VIEWS PREVAILS - THE  
EIA'S EXPECTATION OF CONTINUING  
GAS-TO-GAS COMPETITION OR THE  
MARKET'S TENTATIVE EXPECTATION THAT  
HIGHER PRICES MAY HAVE RETURNED -  
WILL GO A LONG WAY TOWARDS  
DETERMINING HOW OPTIMISTIC TO BE  
ABOUT LNG

- Some LNG Projects, Such as the Trinidad and Nigerian Expansions, and Possibly a Greenfield Project in Venezuela, are Economic Even at Comparatively Pessimistic Price Expectations (Nigerian Economics Are Helped by the Pressure to Reduce Flaring) and Hence Form the Basis for Expected Growth
- But Some of the Others Look Comparatively Unattractive as U.S.-Dedicated Projects at the EIA's Anticipated 2010 Prices, Although Some May Be More Feasible as Part of Combined Europe/U.S. Expansions

# A RELATIVELY PESSIMISTIC SCENARIO FOR ATLANTIC BASIN LNG ILLUSTRATIVE LNG NETBACKS FROM HENRY HUB TO THE OUTLET OF THE GAS GATHERING SYSTEM ASSUMING THE EIA'S 2010 PRICE FORECAST FOR U.S. WELLHEAD

\$/MMBTU



- But if One Assumes a Return to Tighter Markets and Oil-to-Gas Competition With Stable Oil Prices, - a Pricing Structure Based on 90% of the EIA's 2010 Oil Price - It Makes Most of the Projects Much More Interesting
- Similarly, West Coast Projects (Probably Based on Mexican Delivery) Look Unattractive at the EIA's 2010 Gas Price But Improve Substantially if Oil-to-Gas Price Levels are Reached
- The West Coast Also Introduces a Significant Element of Basis Risk (A Collapse of Prices Below Henry Hub Levels as a Result of Overloading the Market) as the Experience of Pacific Gas Transmission's 1994 Expansion in California Illustrates

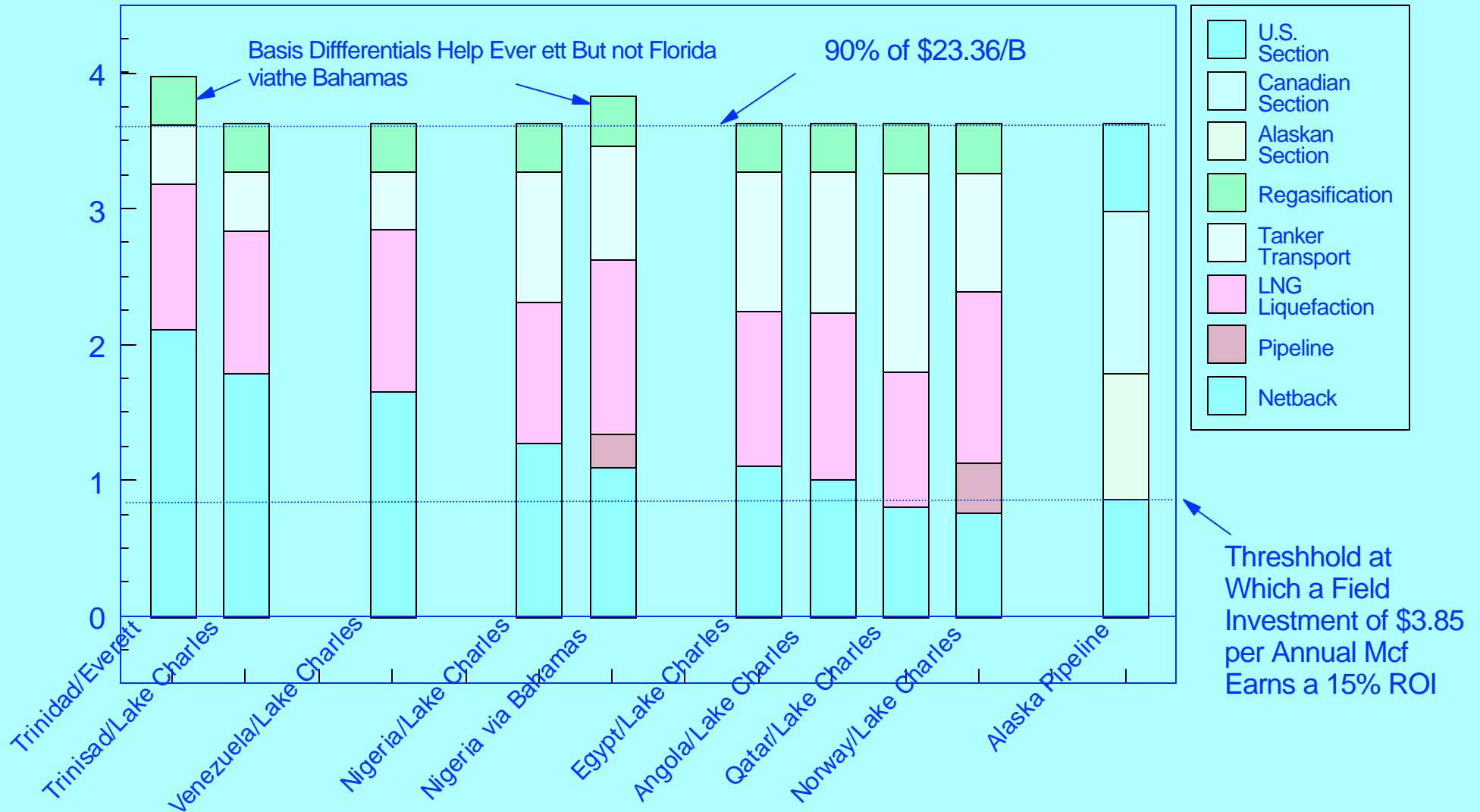
# A MORE OPTIMISTIC SCENARIO FOR ATLANTIC BASIN LNG

## ILLUSTRATIVE LNG NETBACKS FROM HENRY HUB TO THE POINT OF DELIVERY

### FROM THE GAS GATHERING SYSTEM

#### ASSUMING 90% OF THE EIA'S 2010 OIL PRICE FORECAST

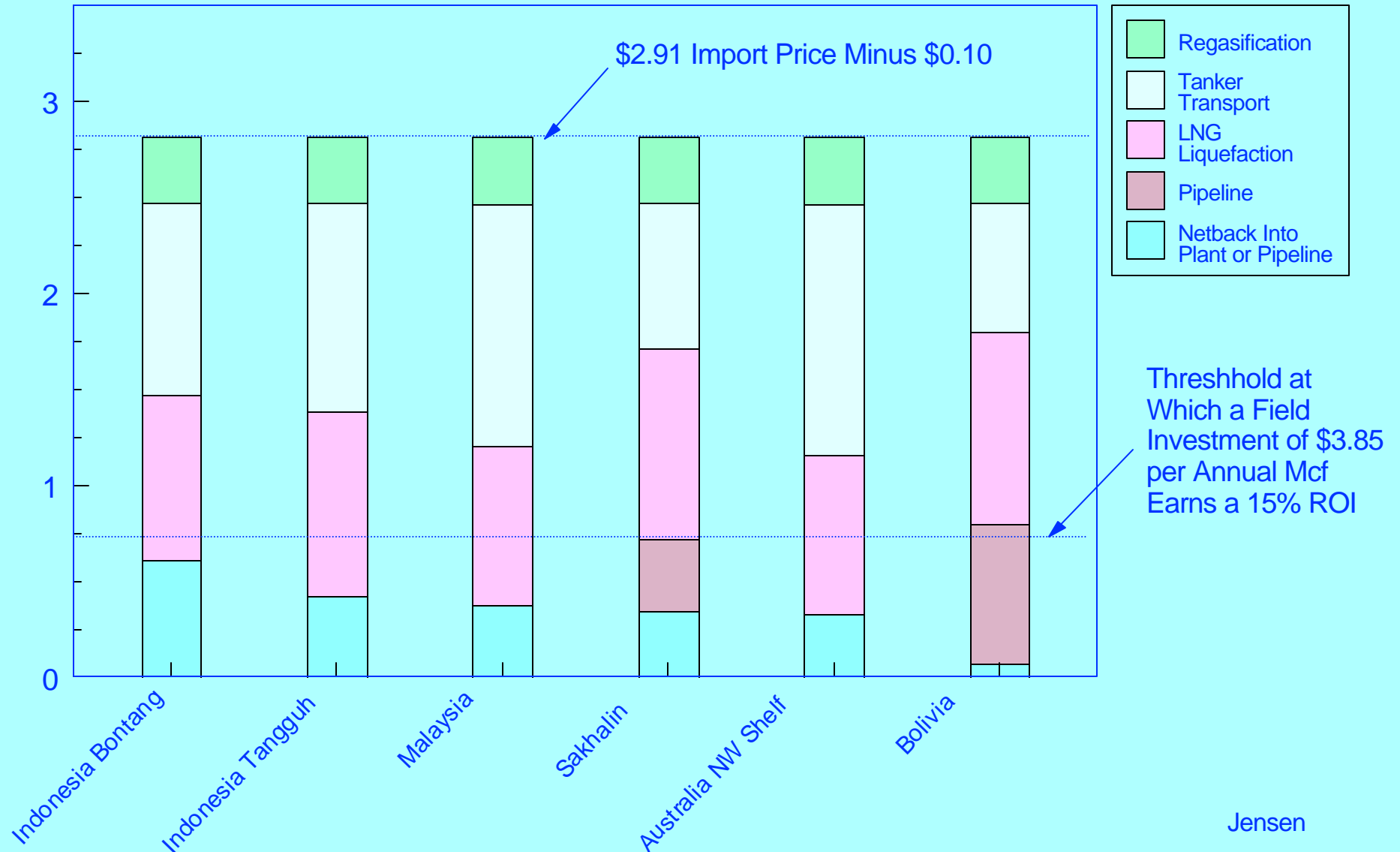
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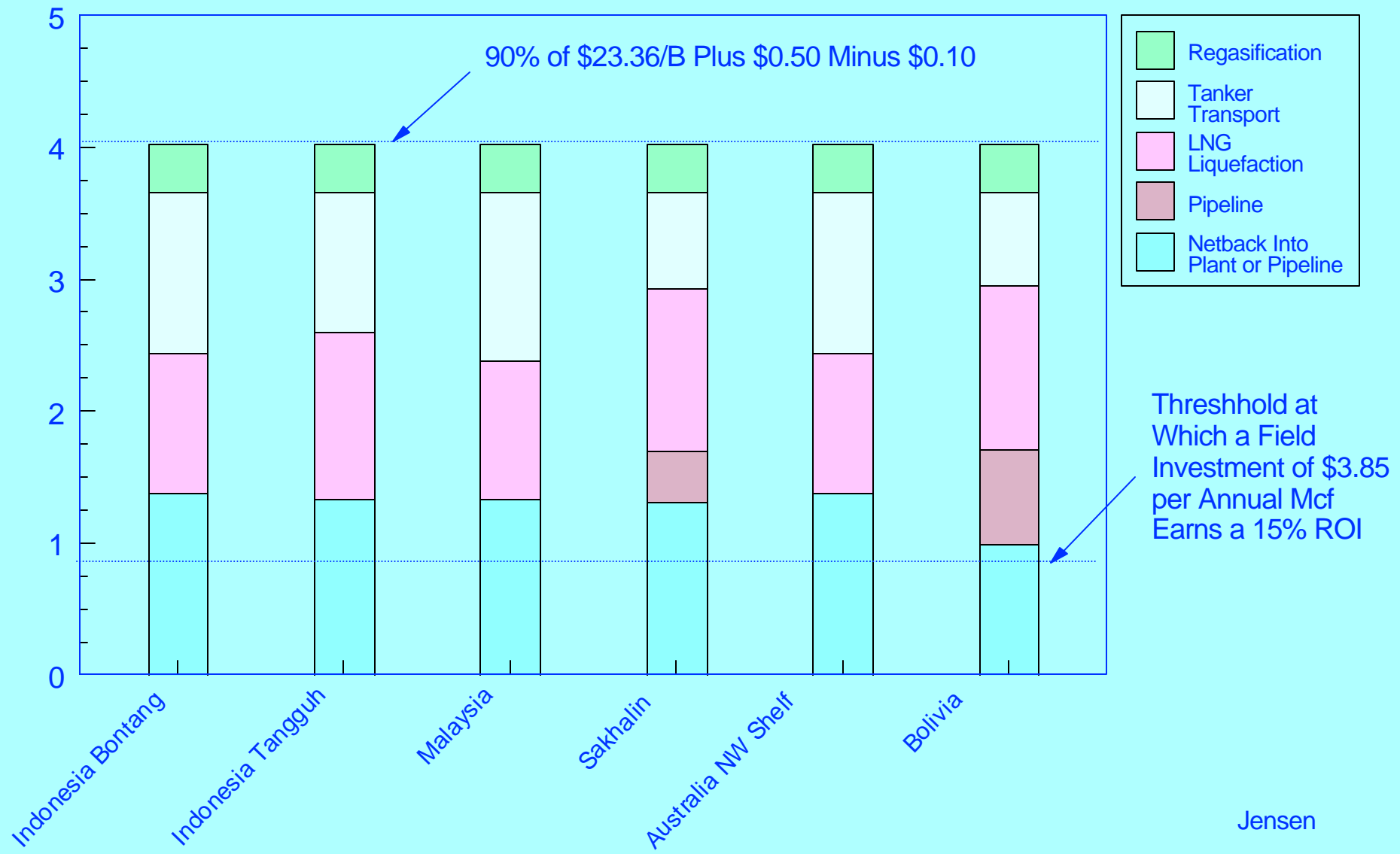
**A PESSIMISTIC SCENARIO FOR CALIFORNIA LNG**  
**ILLUSTRATIVE LNG NETBACKS FROM SAN DIEGO TO THE OUTLET**  
**OF THE GAS GATHERING SYSTEM VIA A MEXICAN TERMINAL**  
**ASSUMING THE EIA'S 2010 PRICE FORECAST, NO BASIS DIFFERENTIAL TO**  
**CALIFORNIA AND A \$0.10 TRANSIT FEE FROM BAJA CALIFORNIA**

\$/MMBTU



**A MORE OPTIMISTIC SCENARIO FOR CALIFORNIA LNG  
 ILLUSTRATIVE LNG NETBACKS FROM SAN DIEGO TO THE OUTLET  
 OF THE GAS GATHERING SYSTEM VIA A MEXICAN TERMINAL  
 ASSUMING 90% OF THE 2010 OIL PRICE FORECAST, A \$0.50 BASIS  
 DIFFERENTIAL AND A \$0.10 TRANSIT FEE FROM BAJA CALIFORNIA**

\$/MMBTU

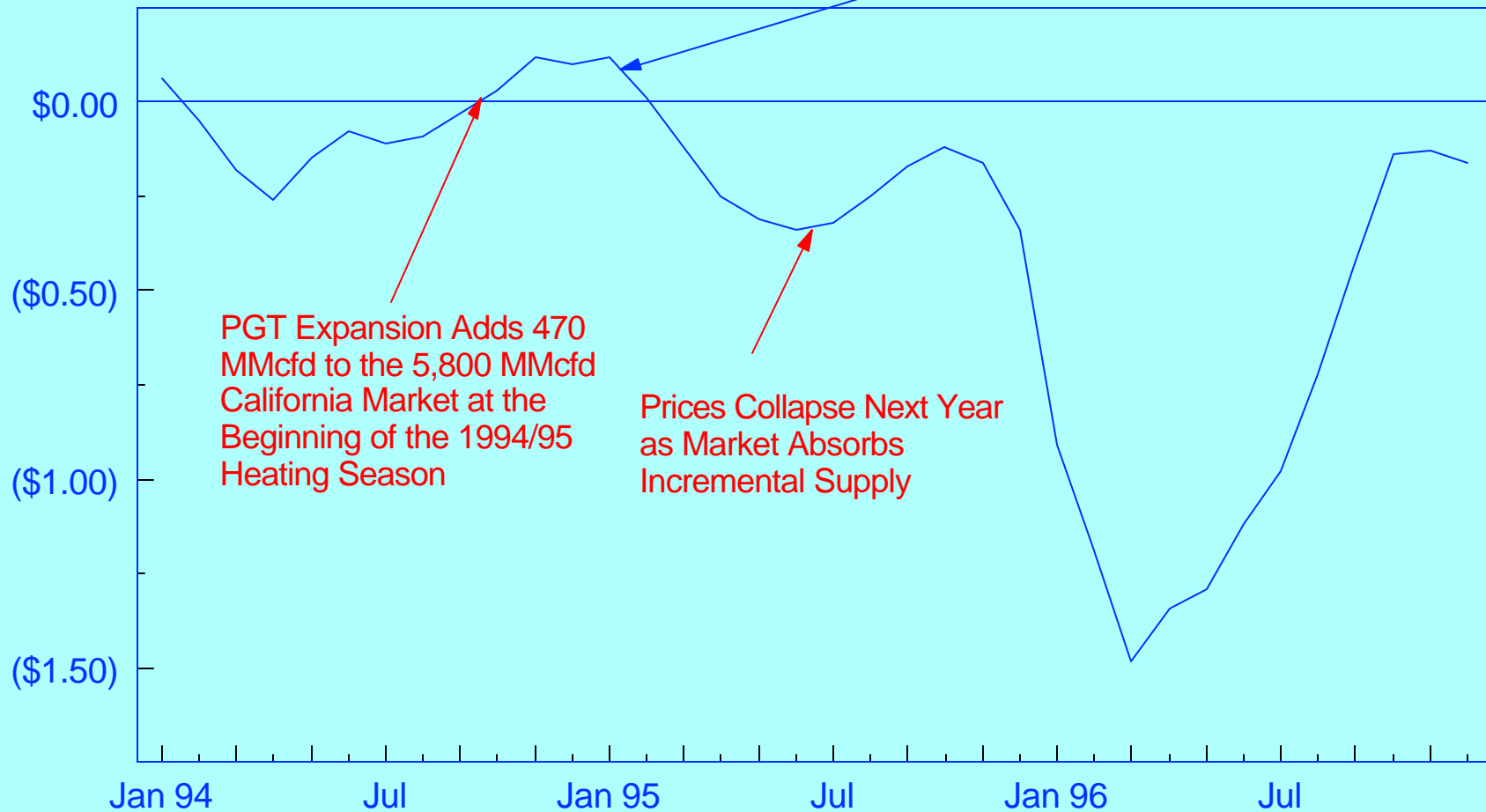


# "BASIS RISK" - COLLAPSE OF THE BASIS DIFFERENTIAL BETWEEN THE CALIFORNIA BORDER AND HENRY HUB FOLLOWING THE 1994 EXPANSION OF PACIFIC GAS TRANSMISSION FROM ALBERTA

## THREE MONTH MOVING AVERAGE

Ordinarily, Gas Prices at the California Border Should Be Higher Than Those In Louisiana (A Positive Basis Differential)

BASIS - CALIFORNIA BORDER MINUS HENRY HUB



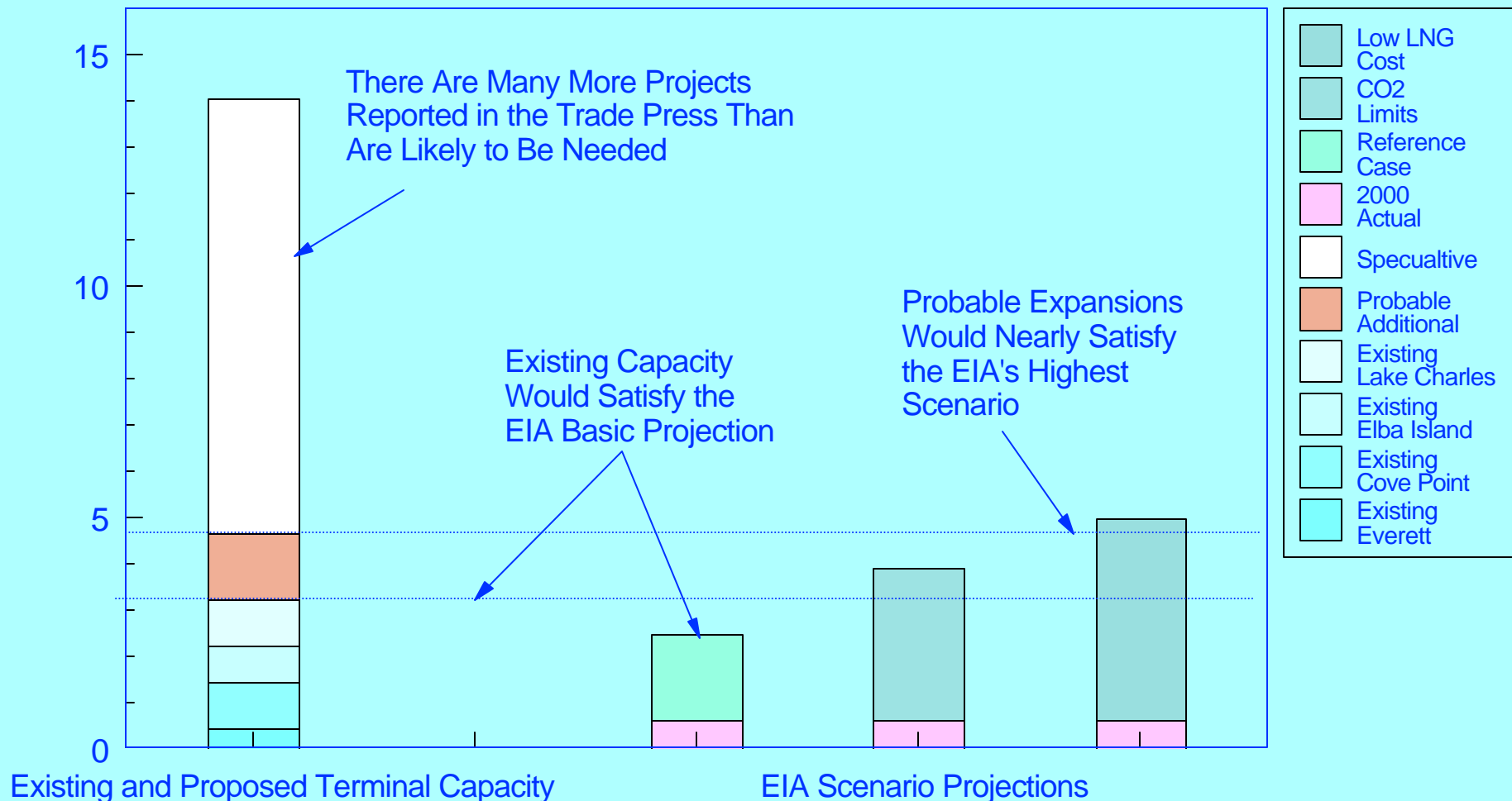
# THE EIA'S CONSERVATIVE PRICING OUTLOOK ALSO AFFECTS THE 17 DIFFERENT PROPOSALS FOR NEW OR EXPANDED LNG RECEIPT TERMINAL CAPACITY INVOLVING NEARLY 11 BCFD TO SERVE U.S. MARKETS

- The EIA's Base Projection of LNG Demand for the Year 2020 Could Readily Be Accommodated by Capacity Already in Place at the Four Existing Terminals
- And Even to Cover its Highest Scenario Case Would Require Only Limited Capacity Additions Over and Above What Seems Most Likely to Be Built Anyway
- Obviously, if the EIA Projections are Correct, Most of the Proposed Terminals Will Never See the Light of Day

# COMPARISON OF EIA'S LNG PROJECTIONS FOR GROSS LNG IMPORTS WITH EXISTING, PROBABLE [1] AND SPECULATIVE [1] TERMINAL CAPACITY ADDITIONS

## INCLUDING MEXICAN AND BAHAMIAN CAPACITY FOR U.S. MARKET

BILLION CUBIC FEET PER DAY



[1] Jensen Estimates Based on Trade Press Reports

# THE U.S. PIONEERED THE RESTRUCTURING OF THE GAS INDUSTRY AND THUS IT IS LOGICAL THAT THE ULTIMATE TEST OF HOW LNG MARKETS RESPOND TO THE NEW ORDER SHOULD TAKE PLACE HERE

- The Advantages of the Restructuring Particularly, Through the Development of Spot Markets, Are Very Apparent
- They Include:
  - Greater Efficiencies Through Price Competition
  - The Ability to Tailor Offtake Agreements to the Needs of the Buyer
  - Hence, Buyer Flexibility to Meet Variations in Demand
  - More Efficient Utilization of Plant and Tanker Capacity
  - Greater Flexibility to Balance Supplies to Regional Markets

# BUT JUST LNG'S RESTRUCTURING PROVIDES DISTINCT ADVANTAGES, THERE MAY BE SOME SUBTLE DISADVANTAGES THAT SUCCESSFUL PROJECT DEVELOPERS MUST IDENTIFY AND ADDRESS

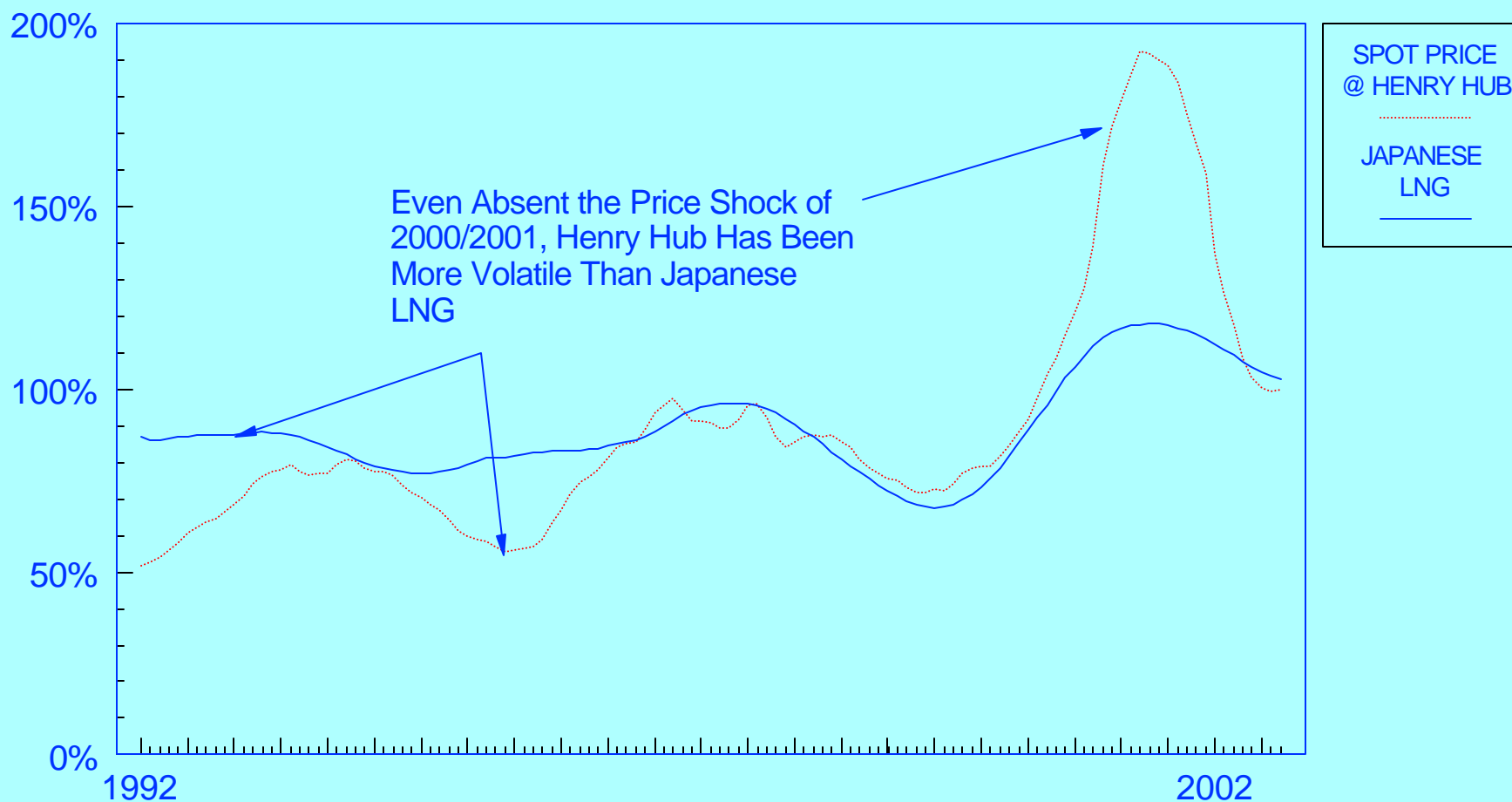
- The Industry Has Traditionally Been Based on Fairly Rigid Long Term Contracting Between Buyer and Seller
- The Fact That the Buyer Assumed the Volume Risk Through Take-or-Pay Provisions and the Seller Assumed the Price Risk Through Price Escalation Clauses Assured the Financial Community of Reliable Project Cash Flow
- The Assurance of Debt Service Coverage Thus Permitted High Debt/Equity Ratio Financing and Reduced the Cost of Capital

- Such Contracting Does Not Work Very Well in a Gas-to-Gas Competitive Market Since Buyers Are No Longer Guaranteed That Their Regulated Utility Customers Will Cover Their Mistakes
- But If the Pricing Clauses Are Tied Directly to the U.S. Spot Market, the Buyer Has Effectively Opted Out of His Volume Responsibility (He Can Always Resell at the Market Price), Thereby Shifting Project Risk Essentially to the Seller
- Thus One Test of the New System Will Be to See if the Pressures are to Move Towards Higher Levels of Equity Financing, Implying Higher Project Hurdle Rates
- The Evidence That the U.S. Spot Market is Inherently More Volatile Than the Traditional Pacific Basin System is Shown by Comparing Japanese LNG Pricing With Henry Hub



# A COMPARISON OF PRICE VOLATILITY JAPANESE IMPORTED LNG VERSUS HENRY HUB SPOT AS A PERCENT OF THE TEN YEAR AVERAGE 12 MONTH MOVING AVERAGE TO ELIMINATE SEASONALITY - \$/MMBTU

PERCENT OF TEN YEAR AVERAGE

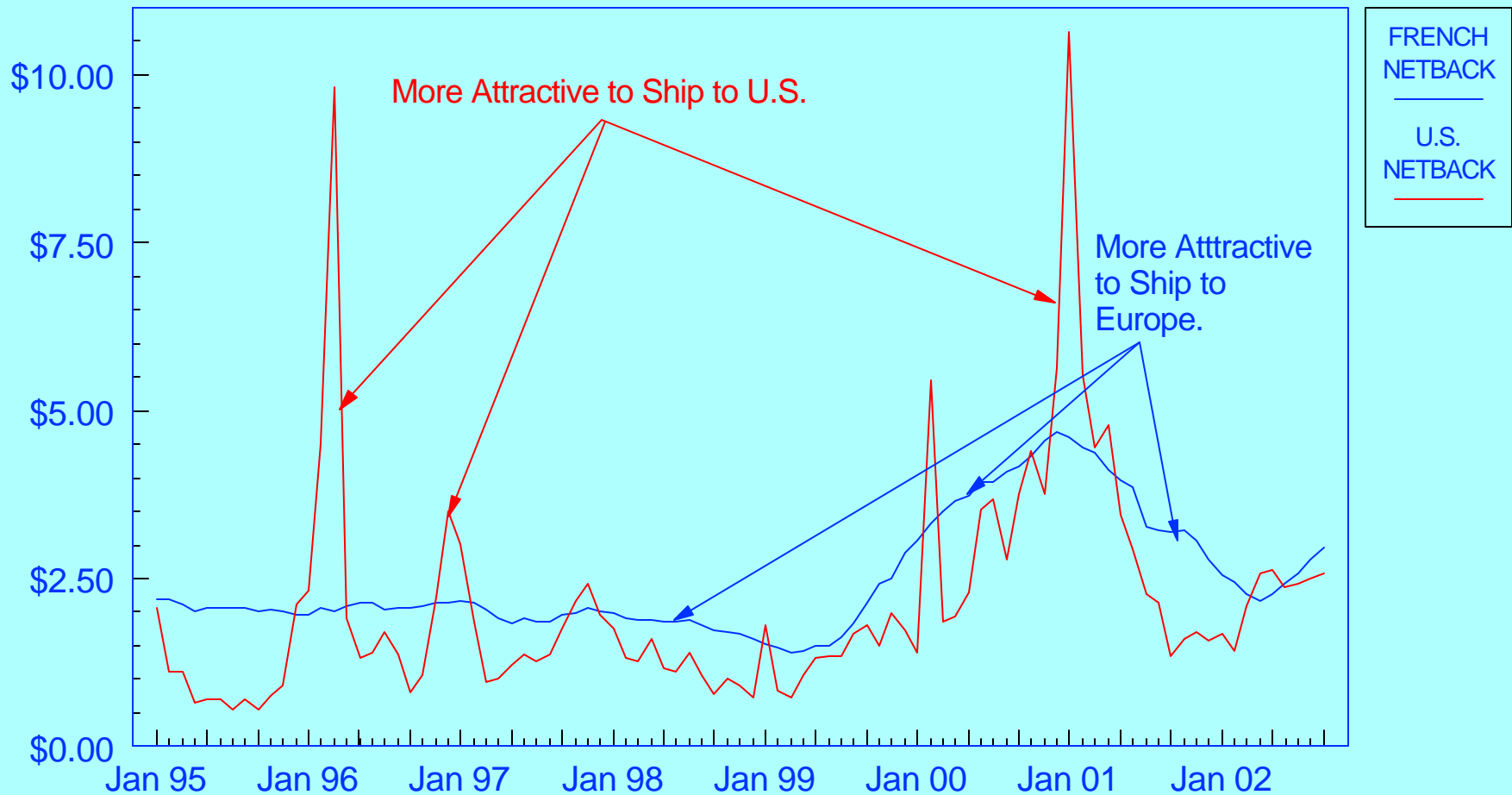


# THE ABILITY TO ARBITRAGE EUROPEAN AND POSSIBLY PACIFIC LNG MARKETS AGAINST THE U.S. MARKET OFFERS THE POTENTIAL FOR HIGHER CAPACITY UTILIZATION IN PLANTS AND TANKERS

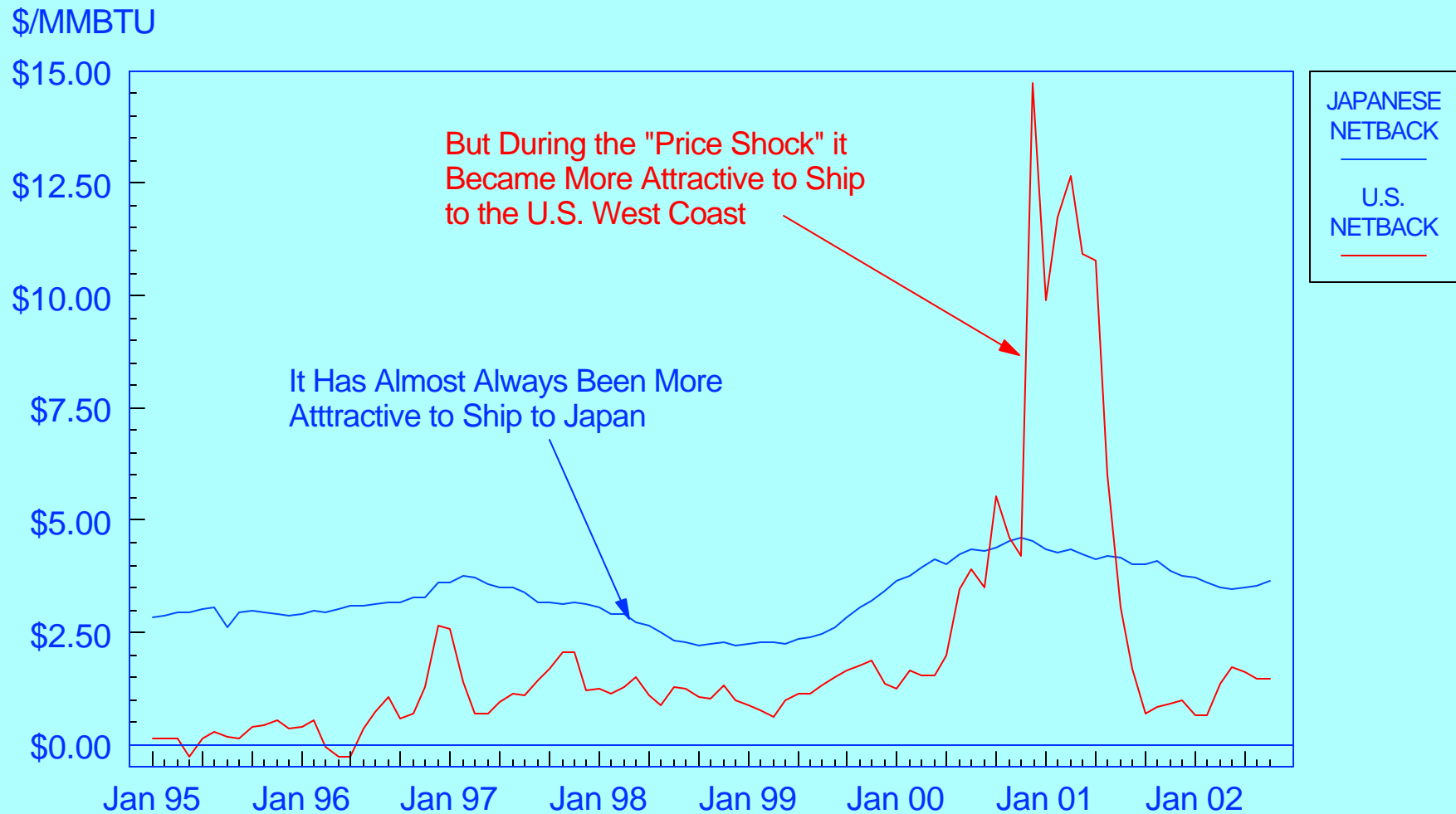
- But It May Come at the Cost of Less Efficient Utilization of Receipt Terminals as Shippers, Seeking Higher Netbacks, Periodically Divert Cargoes to Other Markets
- The Following Two Figures Compare Hypothetical Netbacks to Shipping Ports in Nigeria and Indonesia That Would Have Prevailed Over the Past Decade Had The Arbitrage Possibility Existed

# A HYPOTHETICAL COMPARISON OF THE NETBACKS TO THE LOADING PORT THAT A NIGERIAN SHIPPER WOULD HAVE REALIZED IN SHIPPING TO THE U.S. EAST COAST OR TO FRANCE ASSUMING FULLY ALLOCATED TANKER COSTS

\$/MMBTU



# A HYPOTHETICAL COMPARISON OF THE NETBACKS TO THE LOADING PORT THAT AN INDONESIAN (BONTANG) SHIPPER WOULD HAVE REALIZED SHIPPING TO THE U.S. WEST COAST OR TO JAPAN ASSUMING FULLY ALLOCATED TANKER COSTS



# UNDENIABLY, THE NEWLY RESTRUCTURED LNG INDUSTRY OFFERS SUBSTANTIAL PROFIT OPPORTUNITIES

- But It Also Provides a Riskier Environment
- Large Companies With Diversified Portfolios of LNG Supplies, Flexible Tanker Capacity and Access to Terminals in Multiple Markets Will Be in a Position to Diversify Risks and Take Advantage of Opportunities as They Arise
- But Other Companies With Less Diversification Will Need Develop Strategies That Fit Their Own Individual Positions If They are to Benefit

## TO CONCLUDE

- The Gas Price Shock of the 2000/2001 Winter Has Raised Questions About How Robust Traditional North American Supply Will Be in the Face of the Anticipated High Growth in Demand
- This In Turn Has Stimulated Interest in Supplemental Sources Such as LNG
- The EIA's Forecast is Predicated on a Continuation of Gas-to-Gas Competition at Price Levels That May Make Some of These Projects Uneconomic
- But Even the EIA's Conservative Views on LNG Still See Significant Growth - a 7% Growth Rate in Gross LNG Imports by 2020

- However, the Recent Optimism About the Many Opportunities for New LNG Import Terminal Capacity and the Growth of a Significant Import Capacity on the West Coast are Probably Predicated on Higher Price Levels than Those that the EIA Foresees
- Whichever View Prevails - That the Gas Price Shock Was a Temporary Aberration or a Foretaste of New, Higher Price Gas Levels - Will Go a Long Way Towards Defining the Future Outlook for U.S. LNG

