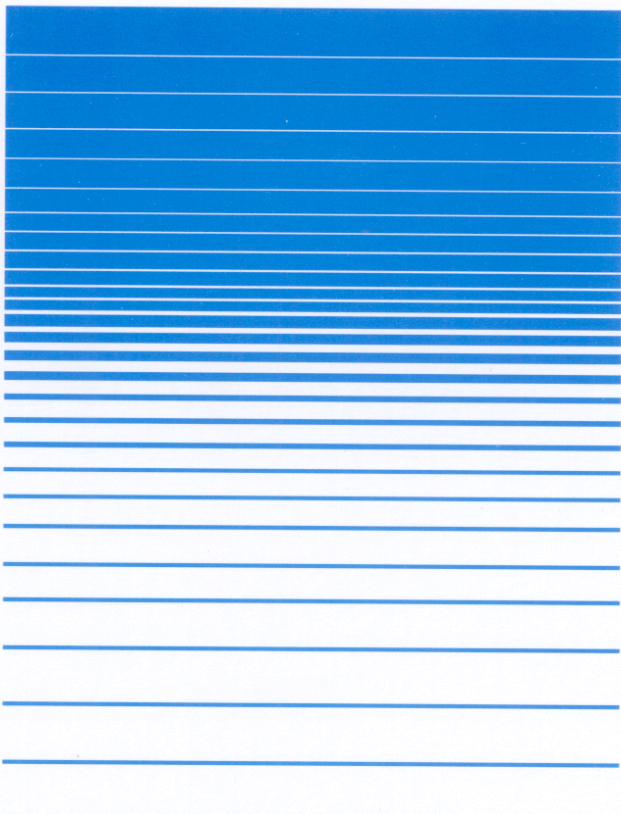


PROCEEDINGS
ANNUAL MEETING OF TIACT
Energy Sources and Power Generation, 2004-2025
and
Feasibility Study for the Construction of a
Nuclear Power Plant on the Texas Gulf Coast



THE TEXAS INSTITUTE
FOR ADVANCEMENT OF
CHEMICAL TECHNOLOGY

Hyatt Regency Houston Airport
April 6, 2004

PROCEEDINGS

**ANNUAL MEETING OF TIACT
Energy Sources and Power Generation, 2004-2025
and
Feasibility Study for the Construction of a
Nuclear Power Plant on the Texas Gulf Coast**

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PROCEEDINGS

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INTRODUCTION

Charles D. Holland

*President, Texas Institute for Advancement of Chemical Technology
Professor Emeritus of Chemical Engineering, Texas A&M University*

The overarching theme of this meeting is the decline in our natural gas supply and what can be done about it. The presentations dealing with our present and future supplies of natural gas and associated topics are followed by presentations on how our natural gas supply can be complemented.

To reduce the use of natural gas in the generation of electricity, nuclear energy could be used. In 2001, over 95% of all new power plants that went on line used natural gas, and this general trend has been projected to continue at a slightly lower level of around 90% by the Energy Information Administration (EIA). Because of our limited supply of natural gas, its price has increased to around \$5.50 per million Btu, the highest in the world. Since the chemical industry uses natural gas both as a fuel and as a feedstock, it has become difficult for the chemical industry to compete in the global market. Thus the replacement of natural gas by nuclear energy in the generation of electricity would make more natural gas available at an affordable price to the residential and commercial users and to the chemical industry.

To encourage the use of nuclear energy instead of natural gas in the generation of electricity, TIACT, EnergyPath, and Sandia National Laboratories applied to the Department of Energy for Financial Assistance to carry out a feasibility study on the construction of a nuclear power plant (with and without auxiliary units for desalination and hydrogen production) on the Texas Gulf Coast. This proposal was approved and the News Release describing it follows.

The “hands-on” effort of this feasibility study is to be led by Mr. John Redding (EnergyPath), and the scientific effort is to be led by Dr. Thomas Sanders (Sandia), as described in presentations that follow.

AN OVERVIEW OF THE ENERGY SITUATION FOR TEXAS AND THE UNITED STATES

The Honorable Joe Barton

*U.S. Representative 6th District of Texas
Chairman, House Committee on Energy and Commerce
The United States House of Representatives*

Congressman Joe Barton was elected to represent the Sixth District of Texas in 1984, and was recently elected Chairman of the House Committee on Energy and Commerce. This far reaching committee has jurisdiction over a majority of issues considered by the House, and its only previous Texan Chairman was the honorable Sam Rayburn, who also served as Speaker of the House. Barton also serves as a member of the House Republican Steering Committee, a council which sets strategy for House Republicans.

"Well known for his work ethic and sincerity" (National Journal, 06/01), Barton is currently leading the House charge to pass a comprehensive national energy policy. His Chairmanship includes jurisdiction over a majority of the nation's energy and clean air concerns, and Barton has committed himself to passing legislation promoting an environment of high supply, low demand and consumer-friendly prices. This Congress the Subcommittee has held hearings on issues including nuclear energy, electricity deregulation, oil production, pipeline safety and renewable energy sources, and will next year open the Clean Air Act for reauthorization. Barton is also the author of both the first electricity deregulation legislation to pass a House Subcommittee, The Electricity Competition and Reliability Act of 1999, and the first comprehensive energy policy legislation to pass a House Committee in almost a decade, The Energy Advancement and Conservation Act.

In the last two Congresses, Barton has continued to work diligently to protect individual rights. As a founding member and Co-Chairman of the Congressional Privacy Caucus (CPC) he has worked with his colleagues to preserve Americans' financial and medical privacy, and has in particular used his role as one of Congress' "technology policy players" (Forrester Research, 03/01) to promote legislation and technology directed at protecting privacy on the internet. The founding Co-Chairman of Asthma Awareness Day on Capitol Hill, Barton has also consistently supported legislation to advance research and increase funding for diabetes, cancer and the issues of home, rural and mental health, and in 1997 was responsible for passing landmark legislation to reform the way the Food and Drug Administration (FDA) approves medical devices. One of Congress' leaders in the war on drugs, Barton was instrumental in obtaining the High Intensity Drug Trafficking Area (HIDTA) designation for Dallas/Fort Worth, and has utilized his position as Delegate to the Mexico-U.S. Interparliamentary Groups to strengthen the commitment between Mexican and American officials to fight drugs on our borders.

Previously best known for his authorship of the Tax Limitation Amendment, a constitutional amendment requiring a 2/3 vote of the House and Senate before raising taxes, Barton has remained committed to legislation promoting lower taxes and financial freedom. He has supported eliminating the marriage penalty and estate tax, reducing capital gains taxes, retiring the current tax code and reforming bankruptcy laws.

Barton continues to be successful in bringing home results for the Sixth Congressional District by consistently ensuring funding for local projects and bringing exposure to the superior communities, schools, industry and opportunities of the Dallas/Fort Worth area. He continues to hold regular town hall meetings for his constituents, as well as issue-oriented "advisory" meetings, which provide constituents with in-depth information and a chance to hear from experts in the relevant field. He also began a Sixth District Women's Focus Group during the 105th Congress, designed to provide an open, informal dialogue on issues important to the women of the Sixth District. He reaches out to local students by regularly visiting elementary and secondary schools throughout the district to participate in career days, anti-drug events and classroom discussions, and has served as a guest lecturer for the Texas Christian University course taught by former House Speaker Jim Wright, and as part of the Southern Methodist University Lecture Series. He was recently named a "key Texas lawmaker" by the Dallas Morning News (07/06/01).

Joe Barton's ancestors settled in Texas during the 1840's. He was born on September 15, 1949 in Waco, Texas, and is a graduate of Waco High School. He earned a four-year Gifford-Hill Opportunity Award scholarship to Texas A&M, where he was the outstanding industrial engineering student for the Class of 1972. After earning a Master's of Science degree in Industrial Administration from the Krannert School of Industrial Administration at Purdue University, he joined Ennis Business Forms in Ennis and Crockett, where he rose to the position of Assistant to the Vice President.

In 1981, he was selected for the prestigious White House Fellows Program and served as an aide to then- Department of Energy Secretary James B. Edwards. In 1982, he returned to Texas as a natural gas decontrol consultant for Atlantic Richfield Oil and Gas Company, before being elected to Congress.

Barton is a member of the First United Methodist Church in Ennis, Texas. He is the proud father of three children, and grandfather to two grandchildren.

NATURAL GAS SHORTAGE AND POWER GENERATION 2004-2010

Charles D. Holland

*President, Texas Institute for Advancement of Chemical Technology and
Professor Emeritus, Texas A&M University*

Charles D. Holland received a B.S. Degree from North Carolina State University in 1943, and an M.S. in 1949 and a Ph.D. in 1953 from Texas A&M University, all in Chemical Engineering. He served on a destroyer in the Pacific Theater during World War II. He began his career in education as an Instructor in Chemical Engineering at Texas A&M in 1952 and moved through the ranks. He was named Professor and Head of the Department of Chemical Engineering in 1964 and served in that capacity until his retirement in 1987. Dr. Holland formed the Texas Institute for Advancement of Chemical Technology (TIACT) in 1986 and serves as President. He continued to teach (50% time) in Chemical Engineering at Texas A&M as a Professor Emeritus until Spring 2003. He has written 7 textbooks and over 100 technical papers. He was named "Fellow" of the American Institute of Chemists in 1975, the American Institute of Chemical Engineers in 1977, and "Council of Fellows" of Texas and Academic Authors. He was awarded the inaugural "Engineering Program Lifetime Achievement Award" by the College of Engineering, Texas A&M University in 2000. In 2004, the "Career Academic Achievement Award" was presented to him by the South Texas Section of the American Institute of Chemical Engineers for his lifetime contributions in modeling distillation processes.

As President of the Texas Institute for Advancement of Chemical Technology (TIACT), Dr. Holland has made over 570 presentations to the general public and technical groups on the more than 20 studies carried out by TIACT. These studies were on topics that impacted both the public and industry.

ABSTRACT

The study, *Alternate Energy Sources - Solution of Major Problems*, shows that of the alternate energy sources, only nuclear has the capacity for providing the huge amounts of energy needed to solve the major problems facing us while reducing emissions. Three of the major problems facing the U.S. are:

- ! The demand for electricity is projected to increase approximately 1.8% per year or 1.8 million GWh/year over the 2000-2025 period, according to the Edison Electric Institute. (This increase corresponds to the output of 194 power plants each having a power output of 1000 MW);
- ! The buildup of greenhouse gases resulting from the use of fossil fuels;

- ! The almost exclusive use of natural gas in the new power plants. (In 2001, over 95% of all new power plants used natural gas as a fuel.)

The higher cost of natural gas in the United States than in any other nation is beginning to drive our chemical industry off-shore. Electricity produced by nuclear energy power plants is now competitive in price with that from fossil fuel plants. The use of nuclear fuel in all new power plants and in the replacement of decommissioned coal plants would reduce CO₂ and other greenhouse gas to well below the Kyoto Accords by 2020. Also, the progressive transition to nuclear power plants would make natural gas more available for the residential, commercial, and industrial sectors of our society.

NATURAL GAS SHORTAGE AND POWER GENERATION 2011-2025

Amy MacEwen
Energy Global Business Analysis
The Dow Chemical Company

Amy MacEwen is the Energy Global Business Analyst for The Dow Chemical Company. In this position, she has completed extensive studies on U.S. natural gas and power markets as well as studies on energy trends around the world. She graduated from Louisiana State University with Bachelor of Science Degree in Chemical Engineering and worked in Dow's manufacturing area for several years before taking on her current role. She also holds a Master of Business Administration Degree from the University of Houston-Clear Lake.

ABSTRACT

Consumption of natural gas in the residential and commercial sectors has been flat since 1973. Industrial demand varied over this period, peaking in the mid 1990's then declining to the current level of ~8 Tcf/yr. The demand for gas into electricity was relatively flat in the 1970's and 1980's but has boomed with gas consumption in this sector increasing almost 60% since 1990.

The growth in gas consumption in the electric sector is driven by both growth in power demand and changes in the methods of power production used in the U.S. The National Petroleum Council (NPC) projects electricity demand growth of 1.7% to 1.9% per year through 2025. However, these projections contain expected gains in energy efficiency which are optimistic considering electricity demand has grown at an average rate of 2.5% per year since 1973. According to the NPC projections, the U.S. will require ~5.6 million gigawatt hours of electricity in 2025.

In addition to the overall growth in power demand, it is expected that the percentage of power generated with gas will increase. The U.S. has long been coal based in its power production with nuclear second in importance. However, 90% of capacity added since 1995 is gas based with this trend expected to continue through 2025. The existing coal and nuclear generation assets are aging as well without planned replacement capacity. By 2010, natural gas is expected to exceed nuclear in share of electricity production. The Edison Electric Institute (EEI) projects that 29% of the electricity produced in the U.S. in 2025 will come from natural gas.

By 2025, demand for gas in the electric power sector will have increased by ~16 bcf/day. There is little hope that domestic production will increase, but Arctic gas and additional LNG imports are expected. Bringing this gas to market will require significant investment and there is tremendous uncertainty on how much gas will come and when it will finally be available. If current projections are met, the U.S. will be receiving an additional 6 bcf/day of Arctic gas and 10 bcf/day of LNG. This

will be just enough to meet the demand growth from the electric sector provided there is no growth in gas demand from other sectors.

The tight supply/demand balance is likely to cause continued volatility in the gas market. Reducing the anticipated gas demand growth from the electric sector will be necessary to avoid gas shortages. To do this, the U.S. must avoid policies that rely on a single fuel and produce more power from cleaner coal, nuclear, and renewables as well as improving energy efficiency whenever possible.

INTEGRATION OF FUTURE POWER PLANTS AND CHEMICAL PLANTS

Ron A. Walter
Executive Vice President, Development
Calpine Corporation

Ron Walter is a recognized leader in the North American power industry. He serves as Executive Vice President-Corporate Development of Calpine Corporation, the nation's premier independent power company. Calpine also is the world's largest producer of renewable geothermal energy; Ron was responsible for the acquisition of these valuable assets. Mr. Walter began his career with Calpine in 1984 as a founding member. He is responsible for business development in North America, including corporate mergers and acquisitions, strategic planning and new technology development, and Regulatory and Market Policy coordination. Under Ron's direction, Calpine has launched the largest power plant development program in the history of the power industry. Today, Calpine operating portfolio includes 90 facilities that generate more than 20,000 megawatts of electricity. The company also has over 10 facilities in construction that will add more than 8,300 megawatts of capacity." Forbes Platinum 400 recently ranked Calpine #1 in its industry.

Ron's 24-year tenure in the energy industry includes various management, technical and technology development positions. Ron's experience encompasses financing, economic evaluation, marketing, design, construction, startup, operation, and management.

Ron received his Bachelor of Science Degree in Mechanical Engineering from the University of Nebraska and his Masters Degree in Mechanical Engineering from Oregon State University.

ABSTRACT

Celebrating 20 years in business this year, Calpine Corporation is the largest Independent Power Company in North America. The company currently has over 23,000 megawatts in operation and will grow to over 30,000 megawatts in 2006. Almost all of this power is generated from natural gas fired power plants. Calpine believes that sufficient natural gas reserves are available at reasonable prices such that natural gas will continue to be the fuel of choice for power generation for years to come. However, it is clear to Calpine that the long term choice for power generation is nuclear power. Nuclear power generation has numerous advantages, including a proven technology, safe and economical operations, high reliability, and benign environmental impact. The major disadvantage is the general lack of public acceptance. The needed strategy is one in which the country continues

to focus on natural gas in the near term, while building public acceptance for nuclear power as the long term solution to power supply.

DEPARTMENT OF ENERGY'S 2010 NUCLEAR PROGRAM

Thomas P. Miller
*Acting Associate Director, Nuclear Power Systems
Office of Nuclear Energy, Science, and Technology
United States Department of Energy*

Mr. Miller is currently the Associate Director for Nuclear Power Systems within the Department of Energy's Office of Nuclear Energy, Science and Technology. He has been with the Department since 1999 and is responsible for several key research programs involving existing nuclear plants, deployment of new nuclear plants and support for university nuclear engineering programs.

Mr. Miller has been involved with the commercial nuclear industry since 1973. He has served in a wide variety of engineering, supervisory and management positions with utilities, engineering and consulting firms as well as the federal government. He is currently responsible for research programs involving advanced reactor technology, nuclear fuel, and related fundamental sciences.

Mr. Miller received his bachelor's degree in nuclear science from the State University of New York in 1973.

ABSTRACT

The use of nuclear power is very important to the energy diversity and security of the United States, and therefore plays an important role in the economic condition of the nation. The 103 operating nuclear power plants provide one-fifth of all electricity produced in this country. Utilities have improved the operational performance of nuclear plants to record levels with average capacity factors above 90% and plant safety at their highest levels. Nuclear energy is also being increasingly recognized as one of the solutions to clean air and green house gas emissions. Despite this performance, no new orders for nuclear power plants have occurred since 1973. With such an important energy source available, why aren't more nuclear plants being built?

There are many issues affecting a utility's decision to build new nuclear power plants. Electricity demand has significantly decreased as a result of economic conditions in this. While there is limited demand in some parts of the country right now, utilities are forecasting the need for base load generating capability around 2010. Deregulation, the California energy crisis and the credit lapses of major power companies have contributed to creating a business environment that makes capital

investment decisions very difficult. There are also a number of nuclear energy specific barriers to be addressed. The Department of Energy recently completed two studies identifying common barriers affecting utility decision on nuclear plants, disposal of nuclear waste, accident indemnification, commissioning uncertainty, high initial capital investment and economic competitiveness.

The *National Energy Policy* calls for the expansion of nuclear energy as part of the Nation's energy portfolio. With regard to nuclear waste, the President signed legislation allowing the Department of Energy's Office of Civilian Radioactive Waste to proceed with the license for Yucca Mountain as the Nation's spent fuel repository. The President also recently signed a bill authorizing a short-term extension of the Price-Anderson Act providing accident indemnification for nuclear power plants. The Department of Energy also launched the *Nuclear Power 2010 (NP2010)* program in 2002 to address several of the other barriers affecting building new nuclear power plants, namely commissioning uncertainty, high initial capital investment and economic competitiveness.

The outlook for new nuclear power plants is good despite the barriers. Both the Administration and Congress support nuclear energy. Development of advanced reactor designs and implementation of the new licensing processes governing new nuclear plants are progressing. New conditions need to be established to reduce or eliminate the financial risks of building new nuclear power plants. Utilities and vendors need to form new partnerships to share risk. The environmental benefits of nuclear power need to be recognized and monetized, and new financial risk mitigation options need to be implemented. Lastly, nuclear industry leaders need to communicate the importance of nuclear power and work with their State and Federal governments to develop the conditions necessary for nuclear energy to thrive in this country.

GENERAL DESCRIPTION OF ENERGYPATH'S ROLE IN THE FEASIBILITY STUDY FOR THE CONSTRUCTION OF A NUCLEAR PLANT IN TEXAS

John R. Redding
Director of Marketing
EnergyPath Corporation

Mr. Redding has 28 years of experience in the power generation industry and is an expert in the development of new nuclear plant projects. Prior to joining EnergyPath, he was responsible for the marketing activities at GE Nuclear Energy. During that time, he was the senior executive responsible for initiating and driving GE's new plant marketing efforts that included nuclear projects for major utilities in Japan, Taiwan, Finland, South Korea, China, Indonesia, Mexico and most recently in the U.S. He was a member of the original team that developed and successfully commercialized the ABWR nuclear plant.

Mr. Redding is considered to be a leading expert in the nuclear industry. He has written numerous papers, including recent articles published in Nuclear News ("The Business Case for Building a New Nuclear Plant in the U.S."), Nuclear Engineering International and World Generation magazines. He was an original member of the Nuclear Energy Institute's "Executive Task Force for New Plants" and a frequently invited speaker at major nuclear and power generation conferences.

Mr. Redding's expertise also includes media relations and public affairs. He was the GE's corporate spokesperson for nuclear matters and oversaw community relations for GE's nuclear business.

Since the beginning of the California energy crisis in 2000, Mr. Redding has become active in end-user issues. He has chaired the Energy Committee of the Silicon Valley Manufacturing Group, an association of 180 mainly high tech companies representing 225,000 employees. Some of the most highly respected companies in the world are members, including Cisco, Intel, Applied Materials, Apple, IBM, Cargill, Roche BioSciences, Oracle, Sun Microsystems, the University of California and several hospitals. In this role, he worked to support the efforts of the Calpine Corporation to permit the much-needed Metcalf combined cycle power plant in South San Jose, an effort for which the SVMG Board of Directors honored him with their highest award.

Recently he chaired the energy legislative committee to represent end user needs in the ongoing debate in California over the future of de-regulation. Under his leadership, the SVMG has become the most influential business group in Sacramento. Mr. Redding recently stepped down from these committees but was retained by member companies to continue his

involvement as a paid energy consultant where he will work on direct access, electricity rates, the development of new generation and transmission infrastructure, distributed generation, and the future of energy markets in California.

*Also focusing on end-user issues, Mr. Redding is a member of the Board of Directors of CalRadForum, an association of **public and private institutions and corporations that use radioactive materials and generate low-level radioactive waste in the four-state Southwestern Low-Level Waste Disposal Compact region.***

Mr. Redding earned a Master of Science degree in Nuclear Engineering from Purdue University and a MBA from Santa Clara University. His corporate training includes Six Sigma (greenbelt level), media relations and marketing communications.

ABSTRACT

The objective of the *Texas Gulf Coast Nuclear Plant Feasibility Study* is to prepare a compelling business case for the deployment of a new nuclear plant in Texas. The output of this power plant would directly serve the energy needs of industrial consumers and indirectly serve the needs of all consumers, including residential and commercial, by decreasing the demand for natural gas and the buildup of CO₂ and other air emissions.

In addition to the business case, the study will prepare a roadmap that can be used by industrial end-users to set in motion the licensing, construction and operation of a new nuclear plant. Both the business case and the roadmap will be prepared with the CTQs of the end users in mind. CTQs in this case are the important factors that industrial end users consider when procuring their energy needs.

The results will also be used to prepare a “prospectus”, loosely defined, for use with those firms who have an interest in owning or investing in the new plant. As part of this study, those firms will be canvassed to understand under what conditions they would be willing to make such an investment. With this information in hand, the business model will be tailored to create those conditions, to the extent that it is possible to do so.

Because there are concerns about the availability for fresh water in the Southwest, the study will evaluate the use of nuclear plant output to provide fresh water by desalination. The study will likewise look at plant operating strategies that involve the production of hydrogen by electrolysis for sale to those petrochemical companies that use hydrogen in their manufacturing process and with an eye to the future of the hydrogen economy.

The development of the business case, roadmap and “prospectus” is broken down into these specific tasks

1. Develop End User Requirements
2. Assess Potential Sites
3. Assess Available Technologies (nuclear, desalination, hydrogen production)
4. Develop Licensing and Permitting Plan and Schedule
5. Establish Ownership Structure Options
6. Establish Project Pro Forma Financials
7. Develop Project Financing Strategy
8. Establish Project Risk Profile Summarize Findings
9. Establish Recommendations & Action Plan

This study will be mindful of other developments in the nuclear industry and the need for quick action (and creative marketing of the power as well) to help the petrochemical industry manage their energy costs.

NEW NUCLEAR - ROADMAP TO THE FUTURE

Dan R. Keuter
Vice President, Nuclear Business Development
Entergy Nuclear

Dan joined Entergy in 1995 as the General Manager of Waterford 3 nuclear plant just west of New Orleans. Because of his broad background in plant operations, corporate support and oversight, Dan was asked in 1996 to help lead the implementation of Entergy's non-regulated nuclear growth strategy.

In February 2000 Dan was named Vice President of Nuclear Business Development. Since that time, Entergy has doubled the size of its nuclear plant fleet by acquiring five additional units, \$1 billion in new annual revenue, \$150 million in annual earnings, 3,500 employees and a \$250 million pay roll in the Northeast. The five nuclear units that Dan helped to purchase in the Northeast provide enough power to serve 4 million people and about 20 percent of the power demand in the New York City metro area.

Prior to joining Entergy, Dan was the Vice President of nuclear operations support at the Tennessee Valley Authority and Chief Nuclear Officer of the Sacramento Municipal Utility District's Rancho Seco nuclear plant in California.

He began his nuclear power career at Portland General's Trojan nuclear plant in Oregon after getting his nuclear engineering degree from Oregon State. He is a registered Professional Engineer and held a Senior Reactor Operator's License for 10 years.

He is an active member of the Nuclear Energy Institute, the Institute of Nuclear Power Operations, The American Nuclear Society, and the Electric Power Research Institute's Nuclear Steam Supply Systems Owners Group. Dan is also Chairman of the Utility Advisory Board to General Atomics Corp. on the development of an advanced gas turbine reactor which promises to be meltdown-proof, terrorist-proof and a low-cost source of hydrogen fuel.

ABSTRACT

In his talk, New Nuclear - Roadmap to the Future, Dan describes the impressive improved performance record of the nuclear power industry, the environmental and health value of today's 103 nuclear plants and the pressing need for new nuclear plants as the only way to generate large amounts of power consistently without polluting the air. He will also describe how nuclear power will likely

lead the shift to a new hydrogen economy. He feels nuclear energy is the key to re-establishing America's energy independence to continue our quality of life.

ROLE OF SANDIA NATIONAL LABORATORIES IN THE FEASIBILITY STUDY

John E. Kelly

*Deputy Director, Advanced Nuclear Energy Programs,
Sandia National Laboratories*

John leads Sandia's efforts to develop advanced concepts for space nuclear power, Generation IV reactors, nuclear-assisted hydrogen generation, proliferation-resistant fuel cycles, and fusion materials. During his 24 years at Sandia, he has been engaged in a broad spectrum of reactor safety research and national security programs for DOE and NRC. In the reactor safety field, his main interests have been in thermal hydraulics, severe accidents, and probabilistic risk assessment. He has authored or co-authored over 30 articles and reports in the reactor safety field. In the national security arena, he contributed to national efforts to assess the safety and technical viability of tritium production technologies. He also managed the development of advanced modeling and simulation tools and high-performance computing systems. He is an active member of the American Nuclear Society.

ABSTRACT

This presentation recaps the key energy-related drivers that are adversely impacting the chemical industry in Texas. The presentation then outlines the elements of the feasibility study emphasizing the work on electricity production, hydrogen production, and desalination technologies.

**ANNUAL MEETING ATTENDEES APRIL 6, 2004
HYATT REGENCY HOUSTON AIRPORT**

Amer Ahkras, Praxair

Lavon Anderson

Stan Anderson

Dave Baldwin, General Atomics

Tom Ballou, Sherwin Alumina

Bert Bean, Praxair

Bob Bernstein

Mike D. Bourgeois, Entergy Nuclear Inc.

Brad Burnett, Brazos River Authority

Art Colwell, BASF

Larry Drbel, Black & Veatch

Dr. Ray Finch

Steve Garrett, TAMRF

Rob Graber, Energy Path

John Griffin, Energy Path

Charles Holland, TIACT

Tom Horvath, Solvay Solexis

Bill Jewell, Dow Chemical

John Keehnan

George E. Kehler, Dow Chemical

John E. Kelly, Sandia

Dan Keuter, Entergy Nuclear Inc.

Tom Locke, ARDT

John Lycan, BASF Port Arthur

Mike McCall, Conversion Gas

Amy McEwen, Dow Chemical

Artie McFerrin, KMCO

Bryan McKercher, AECL

Jim Mathis, TIACT Board

Alan Mikus, STP

Tom Miller, DOE

Mike Okeefe, Akzo Nobel

Darrell Piwonka, KMCO

Michel Promel, BP Solvay

John Redding, Energy Path

Daryl B. Reifel, Basell

Tom Retson, Energy Path

Layla Sandell, EPRI

Ruediger Schmidt, Bayer Polymers

BP Singh, DOE

Ravi Singhania, TIACT Board

Carla Smith, TIACT

Micheal Smith, TIACT

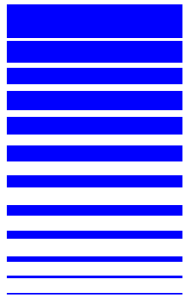
Mark Smock, TAMRF

Ray Stroud, Eastman Chemical

Ron Walter, Calpine

Claude White, Lyondell

Raleigh White, Brazos River Authority



**The Texas Institute for
Advancement of Chemical Technology**

FOR IMMEDIATE RELEASE

March 10, 2004

Study to Evaluate Nuclear Power as Alternative to Natural Gas Receives DOE Financial Assistance

College Station, TX -- Responding to high and increasingly volatile natural gas prices that have created economic turmoil and led to plant closings in the United States petrochemical industry, the Texas Institute for the Advancement of Chemical Technology (TIACT) announced today that it will receive financial assistance from the U.S. Department of Energy (DOE) in the form of a cost-shared cooperative agreement to investigate the feasibility of meeting the energy needs of industrial end users by the use of nuclear power.

“The production of basic chemical commodities such as ethylene requires the use of significant amounts of natural gas and electricity,” said Dr. Charles Holland, president of TIACT and emeritus professor of chemical engineering at Texas A&M University. “Manufacturers are getting whipsawed by high natural gas prices.”

Natural gas is an essential feedstock for petrochemical manufacturing. Because there is no alternative raw material that is equivalent to natural gas, higher prices for this feedstock make it more costly to produce everyday chemical commodities. The cost of electricity, the other key ingredient in the production of chemicals, is also affected by high natural gas prices because almost all of the new power plants built in recent years burn natural gas. Faced with global competition, chemical companies have been unable to offset these higher costs and the unfortunate result is that production is moving offshore.

Holland says that nuclear power is seen as a possible long-term solution to these problems.

“With DOE’s financial assistance and with contributions from TIACT members, we will be able to study the feasibility of building a nuclear plant to serve the needs of the petrochemical industry in a way that makes environmental as well as economic sense.”

Holland also cites the growing need in the arid regions of the Southwest for fresh water and the needs of the chemical industry for hydrogen stocks as issues to be addressed in the study.

“We are fortunate to have the collaboration of experts from Sandia National Laboratories to evaluate the different technologies available and determine the economic and environmental advantages of each.”

William D. Magwood, IV, Director of DOE’s Office of Nuclear Energy, Science and Technology expressed satisfaction with the approach envisioned by the TIACT study. "The TIACT proposal demonstrates the type of proactive consortia approach that will be necessary to develop nuclear energy for the cogeneration of electricity, hydrogen, and process heat," said Magwood.

The TIACT study will prepare the business and technical case for constructing a privately financed nuclear power plant to serve the needs of the general public and the chemical industry in particular.

EnergyPath Corp., a leading energy consulting firm, will prepare the technical and business case under Dr. Holland's direction. EnergyPath will study and evaluate issues related to the siting, licensing, financing, and construction of a new nuclear plant. EnergyPath has assembled a strong team that includes Dr. John Wile of Economic and Management Consultants (E&MC), developer of the Electric Power Market Model; Dr. Geoff Rothwell of Stanford University, a recognized expert on the economics of nuclear power; and Value Analytix, developers of the world's most sophisticated financial and valuation software.

EnergyPath spokesman John Redding says, “The key to making the business case for a nuclear plant is constructing a balanced evaluation all the uncertainties...costs, market prices, the licensing process and so on...and still be able to confidently project a high rate of return. There are two parts to this study that are really fascinating. The first is the active involvement of end users and how that might influence potential owners and investors. The other is strengthening the business case by using some of the plant’s output to make fresh water and hydrogen, in effect making the nuclear plant a co-generator.”

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