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NP2010 TEXAS GULF COAST NUCLEAR FEASIBILITY STUDY FINAL REPORT

Disclaimer: The opinions, findings, conclusions, or recommendations expressed in this material are those of the authors, and do not necessarily reflect the views of the Department of Energy.

PROJECT TEAMS

The work involved in the creation of this report was performed principally by EnergyPath Corporation (under contract with TIACT) and Sandia National Laboratories. Major EnergyPath project subcontractors included Dr. Geoff Rothwell, Value Analytix Limited, Black and Veatch Corporation, Morgan and Lewis LLP, and E&MC Group LLC.

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INTRODUCTION

PROJECT OBJECTIVE

The primary objective of this project was to ascertain the feasibility of siting and commissioning a nuclear plant to serve the future energy needs of Texas Gulf Coast end users.

An immediate goal is to enable Texas Gulf Coast petrochemical producers to offset the cost of increasingly expensive natural gas feedstock, thereby avoiding the progressive transfer of this industry to foreign shores. By adding abundant clean energy to the grid, a Gulf Coast nuclear plant would additionally support the goal of cleaner air in Texas, given that most regions of high population within the state are currently judged to be non-attainment areas.

A longer range project objective is initiation of a nationwide movement away from natural gas and toward nuclear energy for the generation of electricity, thereby both reducing carbon emissions and making reasonably priced natural gas available to residential and commercial users and to the U.S. chemical industry.

BACKGROUND

In 2001, the prospect of U.S. natural gas prices permanently exceeding $5/MBtu led members of the Texas Institute for Advancement of Chemical Technology (TIACT) to initiate this study. Recognizing that natural gas is used as both fuel and feedstock within the chemical industry, TIACT industry members found it difficult to profitably operate in a global market at high levels of volatile natural gas prices.

A major cause of the rise in U.S. natural gas prices is increased demand for natural gas in the generation of electricity. According to the Energy Information Administration (EIA), over 95% of all new power plants built over the last ten years use natural gas. Furthermore, EIA has projected that approximately 90% of all new power plants commissioned in the coming decades will use natural gas. This increase in electrical generation demand - coupled with a continued decline in U.S. natural gas well head output - is projected to drive natural gas prices ever higher for the foreseeable future.

PROJECT OUTLINE

By way of ascertaining economic and technical feasibility, this study provides a comprehensive roadmap for the financing and construction of a Gulf Coast nuclear plant. Roadmap scope includes potential auxiliary units to produce hydrogen, oxygen, and desalinated water. Development of the Gulf Coast nuclear plant roadmap is divided into the Tasks listed in the Table of Contents.

At the outset, it was envisioned that the majority of plant output would serve the Gulf Coast chemical industry with electricity and steam, with remaining output used to produce hydrogen, oxygen, and water - depending upon related economics. Any residual electrical output would be sold through deregulated wholesale and retail power markets.

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EXECUTIVE SUMMARY

INTRODUCTION

"Why are more nuclear power plants not being built?"

This was the question on everyone's mind at two meetings of large chemical manufacturers hosted by the Texas Institute for the Advancement of Chemical Technology (TIACT) in 2003.

Although everyone, including speakers from the nuclear industry and government, seemed to agree that building more nuclear power plants was a very good idea, no one could put their finger on exactly why none were.

For the chemical manufacturers located on the Texas Gulf Coast the lack of a ready answer spurred them into action.

Increasing natural gas prices is a very serious problem for chemical manufacturers. Natural gas is a feedstock in the production of industrial and everyday chemicals and it is the primary fuel in Texas (over 70%) for generating the electricity that chemical manufacturers use in large quantities. Higher natural gas prices represents a sea change, as one industry executive put it, that has resulted in lost business and plant closings throughout the industry.

The chemical manufacturers in Texas believe that the long-term solution is the construction of new nuclear plants as a way to lower electricity costs and to prevent further diversion of natural gas stocks to electrical power generation. They also believe that it is in their best interest to pro-actively support efforts to do so. Their support has been provided through TIACT who has partnered with the Department of Energy to undertake and co-fund this study to see if the nuclear generation option is a feasible business proposition in Texas.

OVERVIEW OF THE RESULTS

Construction of a new plant in Texas is not being hindered or delayed by a lack of:

- Ready customers willing to enter into long term power purchase agreements
- Good sites on which to locate one or two units
- Pre-licensed, advanced nuclear plant designs and qualified suppliers
- A manageable, although not fully tested, licensing process
- Companies ready to join an ownership consortium under the right conditions
- Recognition of the many "non-economic" benefits of nuclear power.

What is preventing a new plant from being built is the lack of a business model that can overcome the formidable financial risks confronting the would-be owners, especially for a plant that is to be located in the deregulated ERCOT (Electric Reliability Council of Texas) market. These risks appear daunting and are no doubt one of the chief reasons that no nuclear plants are being built in Texas or elsewhere in the U.S. However, an important finding of this study is that these risks should not inhibit a management team from proceeding with project development. By employing an option or a tollgate approach, as described below, the project developer has the ability to delay or abandon the project at any time prior to construction. The investment of development capital, which by design will be small when risks are highest, would be lost but a far greater loss would be avoided. This management flexibility is not taken into account when using standard capital budgeting tools and erroneously leads to a net present value (NPV) of negative $100 million and therefore, the project would not be undertaken. However, when this management flexibility is taken into account then the results are entirely different, leading to a strategic net present value of $100 million, and justifies immediate execution of the project. The difference between the two is that management can avoid further investments leading up to construction if they appear to be uneconomic, and standard capital budgeting tools do not recognize this.

This is one of the studies principal findings. It is a particularly important one given that the purpose of the study was to develop an approach that would initiate a construction project. This is not a study to identify policy options that would make nuclear construction more likely. There are already many such studies available.

The most recent study is *The Economic Future of Nuclear Power* (the University of Chicago, December 2004). It is upbeat about the long-term prospects but concludes that nuclear electricity is not now competitive with either combined cycle or coal. This near term condition can be overcome with a combination of limited and short-term federal financial incentives to help surmount the unique financial hurdles associated with building the first few new nuclear plant designs (first time costs, e.g.). Their conclusion is: “After engineering costs are paid and construction of the first few nuclear plants has been completed, there is a good prospect that lower nuclear LCOEs[1] can be achieved and that these lower costs would allow nuclear energy to be competitive in the marketplace.” This is an upbeat but not a definitive assessment.

The authors of *The Future of Nuclear Power* (Massachusetts Institute of Technology (MIT), 2003) reached a similar but not identical conclusion. New nuclear plants are not now competitive but can be made so by decreasing total overnight capital costs from $2,000/kW to $1,500/kW, reducing Operation and Maintenance (O&M) costs further, shortening the schedule and so on, presumably as prerequisites for (rather than as the result of) building the first few units.[2]

We agree with these studies in that it will be difficult for the first one or two units to be competitive with currently applied coal and combined cycle technologies. Where we differ is what to do about it. The Chicago and MIT studies make reasonable recommendations including reducing plant capital costs and creating tax incentives. However, these solutions require others to act (plant suppliers and Congress, for example) and are therefore outside the direct control of project developers.

1 Levelized Cost of Electricity

2 The total overnight capital cost includes: Engineering, Procurement and Construction (EPC) cost, Owners cost and contingency. It does not include project financing costs.

This study, on the other hand, concludes that there is a reasonable strategy to move a nuclear plant project forward by addressing the issues of uncertainty and risk that are within the ability of project developers to influence. We do believe that there is a case to be made for government assistance which would quite clearly change the economics of initial units. Our analysis concluded that government debt guarantees would have the most impact on the overall appeal of the project to lenders. In this context the guarantees are not subsidies, as some critics believe, but rather a government vote of confidence in the future of nuclear power, something that most investors feel is absent today.

THE KEY RESULT–A NEW BUSINESS MODEL

The key result of this study is the creation of a new business model that can help overcome the current paralysis by breaking the project financially into manageable stages. At each stage the need for development capital is appropriately matched to the level of risk. This approach differs from others that we have seen because it does not require a one-time, irreversible decision for investors to commit to the multi-billion dollar investment needed to build a new unit. These results are derived from an advanced economic and financial analysis that recognizes the shortcomings of the traditional capital budgeting approach and suggests an entirely new roadmap for constructing a nuclear plant.

This new business model also uses an entirely new risk management strategy, one that attempts to reduce the most important risks very early in the development of the project when capital outlays are smallest. To quantify the benefit of these actions required the application of a financial evaluation derived from financial options theory. Real options analysis recognizes that nearly all investment decisions, in reality, have options embedded within them (which go unrevealed in a standard NPV analysis), and that the value of these options may give rise to decisions completely at odds with those of a standard NPV analysis.

In this case, it counsels that the project developers should begin funding activities to eliminate uncertainties that could render the plant uneconomic. It also specifies how much spending is justified. Furthermore, our analysis reveals there is enough "option value" to justify moving forward immediately with the first phase of this project.

And it doesn't end there.

As validated by the study's outside financial consultant, the management structure of the team most likely to be successful with this new business model looks more like that of a Silicon Valley entrepreneurial group than an electric utility. This team will view the nuclear plant as an option to be exercised when and if conditions are right, and must be able to communicate this information to potential investors and owners.

SUMMARY DISCUSSION OF THE BUSINESS MODEL

The business model has the following key elements:

- **Close relationship with end users.**

End users are important because they will buy electricity directly from the owners via Power Purchase Agreements (PPAs), or own part of the plant itself. It is, therefore, important to understand their business and energy needs well, in order to fashion PPAs or an ownership stake with enough appeal that they would make commitments in advance. This enables the project developer to secure the needed financing on reasonable terms. A reasonably thorough understanding of end user needs was developed by using Six Sigma methods and conducting a significant number of meetings with chemical manufacturers. The results are discussed in the Task 1 report.

- **A non-traditional ownership structure**

The nature of the ownership arrangement is shaped by the location of the proposed plant in the deregulated ERCOT market and the involvement of end users. The first consideration rules out ownership by a regulated utility with recourse to a customer base and the opportunity to recover costs through a rate base. Because a true merchant plant of any kind, let alone a nuclear one, would find it difficult to obtain financing, it is necessary to have a significant amount of the plant's output under contract before construction begins.

The solution recommended here is to create an ownership structure that is something of a cross between that used successfully by Teollisuuden Voima Oy, a Finnish utility, and by the owners of South Texas Project (STP). This concept is illustrated in the following table.

Owner	Share	MWs
Industrial end users	15%	210
Municipal utilities	50%	700
Investor owned utilities	10%	140
Private Investor Groups	15%	210
Nuclear Industry companies	10%	140
TOTAL	100%	1400

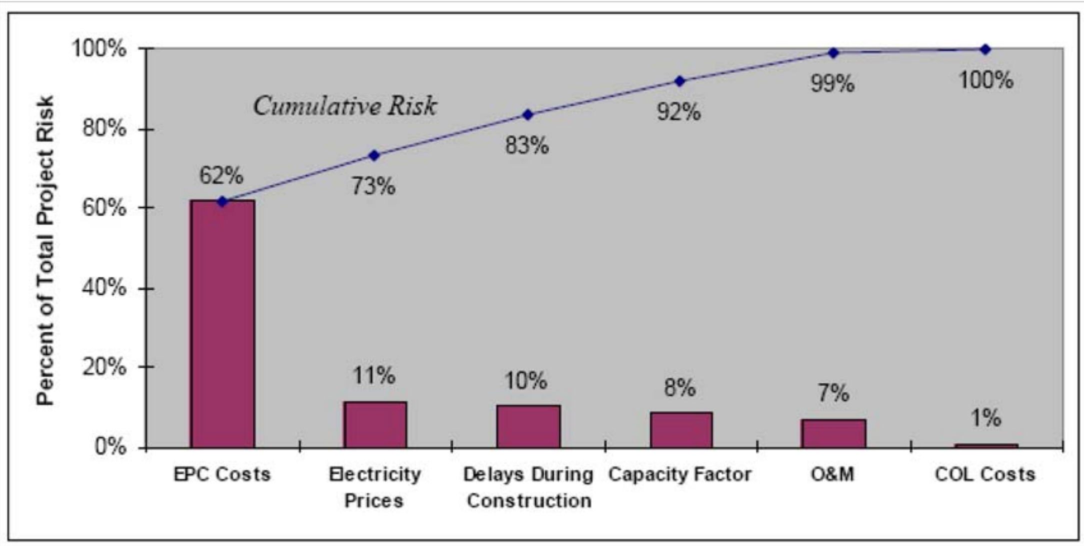
As the Task 5 report details, the participation of those organizations listed in an ownership consortium is quite plausible. The industrial companies would consume their share of the electricity. The municipal and investor owned utilities would distribute the electricity to their core customers and use it to compete for new customers. The electricity owned by the private investor groups and nuclear industry companies would be marketed by themselves or through Load Serving Entities (retail marketers, for example). If subscriptions turn out to be less than 100%, the remaining output would be sold by the consortium itself through a portfolio of short, medium and long-term Power Purchase Agreements with chemical manufacturers who have not opted for an ownership stake. The steps needed to form a consortium, launch the startup activities and the associated costs are discussed in the Task 5 report.

- **An innovative risk management strategy**

A principal finding of this study is that new nuclear plants are not being ordered and constructed because potential owners and investors are waiting for uncertainties to be resolved with the passage of time (e.g., environmental legislation) and the creation of U.S. energy policy favorable to nuclear development.

The risk management plan recommended here can accelerate the resolution of some of these uncertainties, including some of the key uncertainties, such as Engineering, Procurement, and Construction (EPC) costs. This will permit the project to move forward quite a bit sooner-in particular in time to meet the DOE's NP2010 program goals.

The key risks confronting the project development team at the outset of the project are shown below.



A few of the elements of the recommended risk management strategy are delineated below. These are to be pursued in the first phase of project development that would seem out of order if a more traditional approach were to be taken.

In Phase 1 of the project:

1. *Secure binding committments for plant capital costs*. Request bids and enter into an exclusive arrangement with a supplier that 1) commits the consortium to ordering the plant from the supplier when the Nuclear Regulatory Commission (NRC) approves the combined construction and license permit (COL) and financing is approved and 2) commits the supplier to build the plant at the price agreed to. In order to encourage as many bidders as possible to participate fully, our plan calls for partial funding of the bidders proposal costs by the consortium.

2. *Undertake an early community outreach program.* The following scenario is familiar to nuclear industry veterans: an organization ideologically opposed to nuclear power adroitly exploits the

legal system to halt or delay construction in the absence of seemingly compelling legal reasons to do so. The outreach program would not only marshal local support for the project, which is known to exist, but would help to neutralize or blunt some of the opposition to the project, especially that which is likely to come from nationally based organizations opposed to nuclear power. There are examples of this approach being successful with the permitting of combined cycle plants at controversial locations.

As explained in the report on Task 8, these action plans will mitigate two of the most important risks, the capital cost of the plant and the potential for delays during construction. The remaining project risks and related risk reductions actions are also discussed.

- **A Tollgate Approach to Investing**

In order to attract the development capital needed to proceed with this project, a tollgate approach was developed. This approach deconstructs the risks to investors so that they can be addressed in a stepwise manner that makes financial sense. Risk and investment are appropriately matched. At the first tollgate where risk is high, a small investment of development capital is called for. It is likely that an investor with an appetite for such risk can be found, provided there is a significant upside (as there is in this case.) At the last tollgate, when risks have been reduced to a level acceptable to a much broader group of investors, an investment of the size needed to construct a nuclear power plant, can be more readily obtained at reasonable terms.

There are three tollgates for the Texas Gulf Coast Nuclear Project as show in the table.

The Roadmap to Constructing a Nuclear Plant

The Tollgate	The Toll	Before Passing Through the Tollgate (Bridging Criteria)	Information to be Acquired or Actions to be Taken After Passing Tollgate
#1	$10 to $25M	• Raise development capital for purposes of paying the toll. • Assemble a project development team, including supporting legal, engineering and public relations firms. • Develop a strategic plan for for the project, extending the work in this study further. • Create an ownership consortium	• Enter into an Agreement in Principle for host site • Prepare a set of technical bid specifications based upon the Electric Power Research Institute (EPRI) requirements, updated and customized for this project • Request and evaluate bids for total plant supply. • Negotiate Engineering Procurement and Construction (EPC) contract with plant supply team • Initiate the community outreach program • Make initial contacts with lending sources to identify cost of funds and likely obstacles. • Hire a leading environmental firm to prepare and defend the Environmental Impact Statement.
#2	$30-60M	• Raise development capital for purposes of paying the toll • Have in hand a binding commitment to an EPC cost that yields a total overnight capital cost of no more than $1500/kW[3] • Finalize the site Agreement. • Develop a plan for preparing and supporting the COL Application.	• Obtain PPAs for balance of plant output not committed to the owners. • Prepare and submit the COL application for NRC approval. • Develop a legal strategy to combat delays during construction. • Develop a strategy to obtain construction funding. • Obtain debt financing at least on a tentative basis.
#3	$2.5 to 3.0B	• NRC approval of COL • Obtain construction funding • Permanent financing obtained • Finalize ownership structures	• Construct the plant • Put in place plant management team either by outsourcing or by recruitment. • Load fuel and begin startup • Refinance and adjust to permanent capital structure

The key benefit of this approach is that it allows for uncertainties to be resolved when capital outlays are lowest, providing the opportunity to forego the remaining investment if uncertainties are resolved unsatisfactorily. It is obvious that the initial capital outlays involve a significant risk and this in turn requires investors with a concomitant appetite for such risks. However, such financing can also be provided by those who would benefit greatly from knowing the terms, conditions and prices negotiated with nuclear suppliers with the latest generation of advanced nuclear plants. The same can be said of the capital outlays for the COL process-where the new licensing process put into place by the NRC would be tested for the very first time. There is significant value in both of these activities.

The Task 6 report goes into considerably more detail and includes a brief discussion of the analytical tools[4] needed to quantify the value of this tollgate approach.

3 In the analytical results discussed in Task 6, this is the total overnight capital cost for which the NPV is zero or slightly positive, assuming the median electricity price forecast.

4 This study's quantitative analysis is based upon "real options" theory for which there is a significant body of work upon which to draw.

- **A Financing Plan that Builds upon the New Business Model**

Given the barriers to building a new nuclear power plant in the United States, any plant up and running before 2020 is more likely to be developed by a new company driven by entrepreneurs, created specifically for the task of building this plant. Further, for any group to succeed in breaking the nuclear logjam they will have to behave more like Silicon Valley entrepreneurs than big corporate entities and that will include a recognition that they will have multiple rounds of financing. As each tollgate is passed the value of the plant will increase thus offering a potentially large capital gain for investors willing to assume the risk involved.

THE PROJECT FUNDAMENTALS

In addition to creating the business model described above, this study carefully reviewed the project fundamentals to ensure that they meet the expectations of both end users and investors. These expectations were captured in a set of CTQs[5] for each group developed through interviews and discussion with various parties. This study finds that project has with one exception strong fundamentals. The exception is plant capital costs.

- *Offtake Agreements*. There is reason to believe that long-term offtake agreements for most of the plant's output can be found and generate predictable revenues for the life of the loans (twenty years.) This is conditioned upon completing the first phases of project development and having a supplier under contract to deliver a plant for under $1500/kW (total overnight capital cost) or possibly less if forecasted electricity prices should fall below expected levels. The functional ERCOT market is a strong enabling factor.

- *Available Sites*. The existing nuclear plant sites in Texas score high in terms of being able to host one or two additional units. This conclusion was reached after performing the screening analysis laid out in the EPRI Siting Guide.[6] These sites were found to be environmentally superior on the basis of an evaluation done by engineers of the Black & Veatch Corporation. This evaluation was based upon a review of the sites against a selected number of safety and environmental criteria also found in EPRI's siting guide. This is discussed in great detail in the Task 2 report.[7]

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5 CTQ is Six Sigma terminology for those features that are "Critical to the Quality" of the product or service as seen through the eyes of the customer. CTQs are stated in measurable terms and are assigned weighing factors by customers.

6 "Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application", EPRI Technical Report 1006878, March 2002. It is used here by permission of the Electric Power Research Institute. TIACT and EnergyPath are very grateful to EPRI for their close cooperation and support of this study.

7 Black & Veatch performed this evaluation and other related work pro bono. TIACT and EnergyPath are extremely grateful for their support and expertise.

- *Competitive, Dependable Plant Designs*. Nine advanced designs were evaluated against a complement of end user and investor CTQs. The information needed for this evaluation was obtained with the cooperation of the various suppliers who provided significant evaluation documentation and discussed their offerings with a team of industry experts at separate half-day meetings. All designs represent impressive advances in nuclear plant technology and design. However, the ABWR (both GE and Toshiba) offers a slightly better fit to the unique CTQs for the TIACT study. Four other designs, the AP1000, ESBWR, ACR700, and the EPR, are compelling alternatives each of which could, with appropriate contractual terms, fulfill most of the project unique CTQs. In this study significant values were assigned to licensing and final design engineering status. The detailed assessment of these and other plant designs is the focus of the Task 3 report.

  This study finds that these plants, from a technical and performance standpoint, are acceptable and indeed exceed basic requirements. However, without the risk mitigation actions outlined above, there exists too much uncertainty over the true capital cost of these offerings. There is more confidence in the construction schedules, which range between 45 and 51 months for the designs noted above, as measured from first concrete to commercial operation.

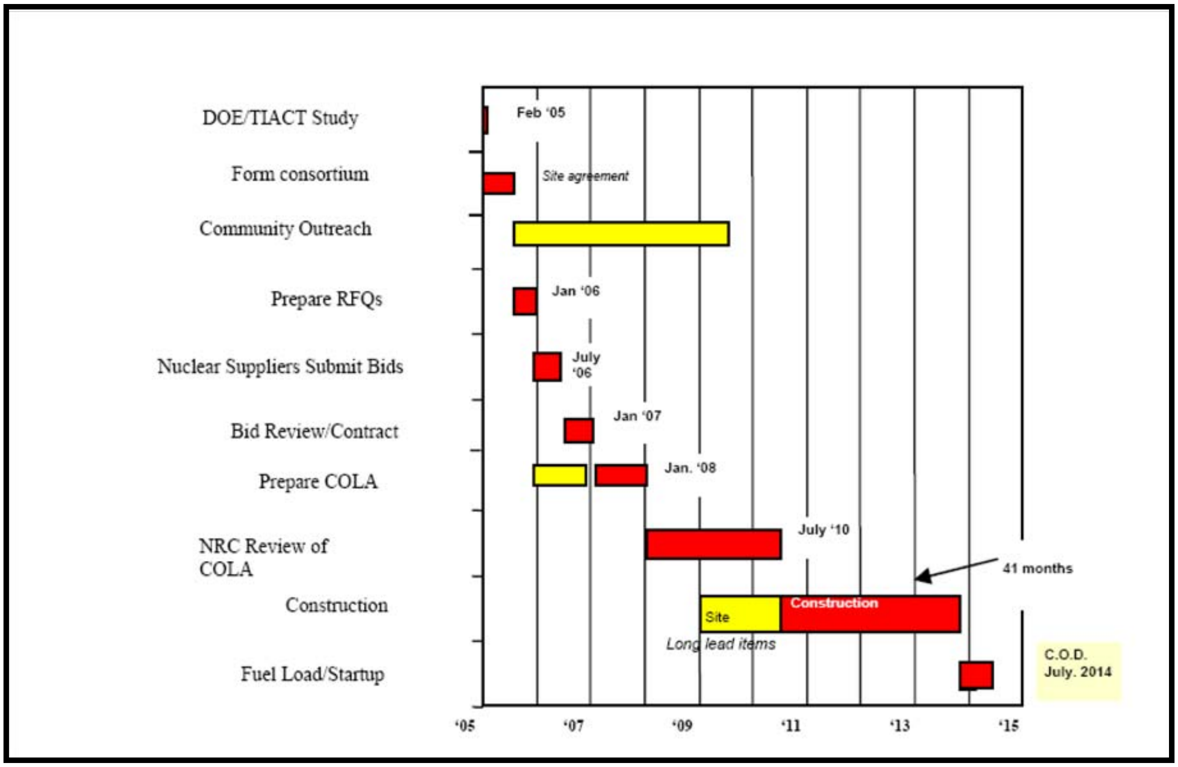
- *Manageable Licensing Process*. The legal firm of Morgan Lewis, the recognized expert with respect to NRC licensing, reviewed the applicable regulations as they pertain to a Texas project. Based upon that review and with consideration for end user and investor CTQs, this study recommends that the COL application reference an existing certified design (currently ABWR with addition of the AP1000 expected by the end of 2005) or a design for which a Design Certification application has been submitted (multiple designs expected to meet this criteria in the near term) and should include the site safety and environmental analyses. An Early Site Permit program is not recommended.

There are actually two licensing processes. The first is the COL review by the NRC that is likely to take three years or perhaps less for an applicant fully intent upon building a plant. The risk associated with the COL review was evaluated to be quite small and the analytical results in Task 8 show clearly that it contributes little to the overall project risk. The other licensing process is that which occurs after the start of construction, the part of the project that for the owners is the most anxiety ridden. Any schedule delay caused by legal or regulatory action (or inaction) can have huge financial consequences. Indeed it is the second highest contributor to overall risk and the one cited most commonly as the CEO's worst nightmare. Examination of the risks associated with this stage of licensing shows, however, that these risk are not as large as commonly thought and can be pro-actively managed, as the Task 8 report describes.

PROJECT SCHEDULE

The CTQs of the chemical manufacturers interviewed for this study suggests that there is a growing sense of urgency with respect to building more nuclear capacity.

Because of the relatively long time period required to construct a nuclear facility, a certain amount of aggressiveness is required to prepare a schedule that responds to this need for quick action. This is done by analyzing the schedule for opportunities to advance key milestones by taking a small amount of risk (for example, by ordering long lead items for the reactor vessel prior to NRC approval of the COL). On the other hand, one must account for certain realities. A project schedule reasonably balanced between aggressive and realistic estimates of the length of various activities is shown in the figure below. If project development work begins in 2005, then we project that construction would begin in 2010. This presupposes that with a relatively small degree of risk taking, the long lead items are ordered and site preparation is begun a year and half earlier, at the beginning of 2009. Estimates of how long it will take for the NRC to approve a COL application range from 2 to 3 years as noted above, with the former thought possible for an applicant who is committed to construction. We used 2 ½ years as the basis for our analysis. Also, we use 48 months for the construction schedule (first concrete to commercial operation) including 7 months for startup and commissioning. These are the average values of the schedule information provided by the plant suppliers (Task 3).

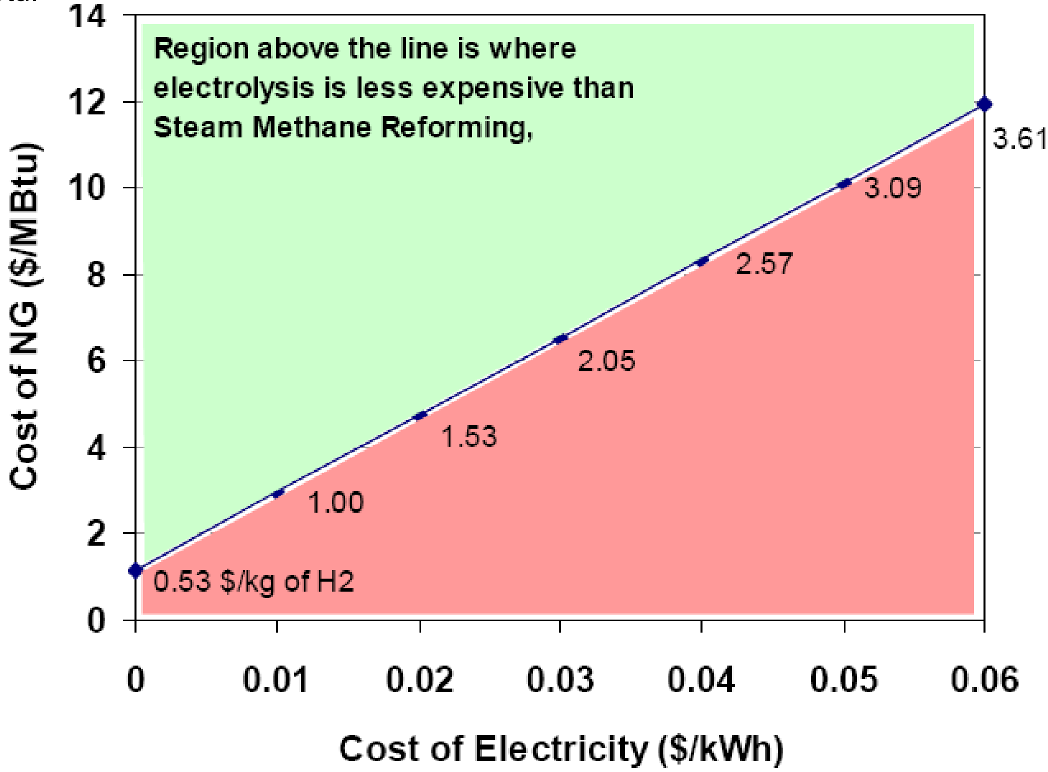


SPECIAL STUDIES

As part of the Task 3 technology assessment effort, a review of current and future hydrogen generation and desalination technologies was completed by our technology evaluation partner, Sandia National Laboratories. This analysis concluded that the reviewed hydrogen generation and desalination technology options do not have a significant impact on the selection of a nuclear generation technology for the Texas Gulf Coast Nuclear (TGCN) plant. They may, however, offer economic opportunities. Brief summaries of these two technology assessments follow and with more detailed results found in the Task 3 report and corresponding appendices.

HYDROGEN

An analysis of cost of hydrogen production by the present method of steam-methane reforming (SMR) was compared with the cost of producing hydrogen by conventional electrolysis. The graph, below, prepared as described on page 3-13, Appendix 3, relates the cost of natural gas and the cost of electricity at which hydrogen produced by electrolysis is equal to the cost of hydrogen produced by steam-methane reforming (SMR). For example, if electricity costs $0.02/kWh, hydrogen by electrolysis costs less than hydrogen by SMR, if the cost of natural gas is greater than $4.50/MBtu.



Cost of Natural Gas Vs. Cost of Electricity Where Electrolysis Becomes Competitive with Steam Methane Reforming

Thus, since the cost of production of hydrogen by electrolysis is competitive with the cost of hydrogen produced by natural gas, at many combinations of natural gas prices and electricity costs as shown in the figure above, the production of hydrogen by electrolysis represents a realistic market for some of the electricity produced by a Texas Gulf Coast Nuclear Plant. This proposition rests on the assumption that the price of natural gas will remain relatively high. Other than EIA, there are several who believe that natural gas prices will remain relatively high, including Sempra (The Wall Street Journal, December 27, 2004) and experts from the John F. Kennedy School of Government (Dow Jones Newswire, January 7, 2005). The present hydrogen pipeline located along a portion of the Texas Gulf Coast would provide an outlet for hydrogen and its use in the petrochemical industry. The availability of an electrolysis unit and a hydrogen pipeline would also permit the production of hydrogen as a device for leveling the electrical loads.

WATER

An extensive study of water desalination was carried out. Reverse Osmosis was found to be the most widely used as well as the most economical with the projected cost of water at $0.29/m^3. The basis for this cost was a production rate of 100,000 m^3/day, plant life of 25 years, 7% interest rate and an electricity cost presumed to be $0.06/kWh (as taken from the grid, not the proposed nuclear plant). This price, $0.29/m^3, assumes low salinity brackish groundwater is treated by reverse osmosis. At a higher salt content, the cost of water is projected to be $0.73/m^3. Typical costs of water in Texas currently can be as little as $0.08/m^3 for fresh ground water or as much as $0.67/m^3 for fresh surface water. A majority of the cost of water is due to the initial capital costs of a plant. Therefore, running such a desalination plant only during off-peak hours leads to less production and higher overall costs. As is evident from the prices stated above, there is a demand in many areas of Texas for water produced by reverse osmosis and with it a set of potential customers of nuclear electricity not fully exposed.

Since the cost of water produced by Reverse Osmosis is in the competitive range of fresh surface water, there are many areas in Texas that would be in the market for this product. For example, the City of San Antonio (a fast growing area) is actively engaged in arranging for its future water supply. Also, the fast growing area of South and Southwest of Houston are expected to have future water needs. The marketing plan for the electricity produced by the TGCN plant should consider these potential markets.

SUMMARY

- With timely action in 2005, the project schedule can meet the goals of NP2010.
- There is indeed a business case to be made for a privately financed new nuclear plant, provided the business model put in place by the owners recognizes the risks and uncertainties that inhibit the financing of the project. In support of this business case are many strong project fundamentals.
- The economics of the project are determined by uncertainties and risks that can be quantified and actively addressed by the project development team using a “tollgate” approach that keeps development costs to a minimum.
- The tollgate approach is itself the roadmap.
- An Immediate action for early 2005 is to raise the capital needed to fund the activities of a core project development group that will begin to marshal the interest that many parties have for proceeding with a new plant. In particular, the project development team will create the legal framework for the creation of a new consortium and recruit interested parties.

CONCLUSIONS

The chemical manufacturers that make up the membership of TIACT continue to be strong advocates of nuclear power. Likewise, members of Texas civic groups such as Rotary Clubs commonly ask: Why aren't new nuclear power plants being built? These samplings suggest significant and widespread support by other large end users in the industrial, private and public sectors. Recent developments such as the continued rise of natural gas prices, forecasts that show surplus capacity in ERCOT disappearing more rapidly than previously expected, and the prospects of environmental restrictions on the use of fossil fuels serve only to reinforce TIACT's belief that additional nuclear generating capacity is needed.

A year ago the path that led to the construction of a new nuclear plant could not be discerned. Now with the results of this study in hand, TIACT has a roadmap that points the way forward. In particular, the study has described a business model that can effectively grapple with the technical, financial, and risk issues that make project development of a nuclear plant in the de-regulated ERCOT market uniquely challenging.

It is the intention of TIACT to use the findings and conclusions of this study as the means for marshalling the interest that many parties in Texas have expressed for moving forward with a nuclear project. Indeed, one of the most important and encouraging findings of this study is that such interest is both significant and widespread. It includes the interests of large end users in the chemical industry, other large end users in the private and public sectors, ERCOT market participants, and non-traditional outside investors. The fictional consortium "Texas Gulf Coast Nuclear, Inc. (TGCN)" represents a potential focal point for this widespread interest. If made into a reality, this consortium would be the entity to which TIACT could make a "handoff" so that the momentum created by this study would continue to grow. It is important that this handoff take place in 2005. The most immediate challenge is to raise the development capital needed to form the Texas Gulf Nuclear consortium, which would then initiate the tollgate process described in this study.

TIACT and its members recognize the importance of adding new nuclear capacity in Texas. The benefits of nuclear energy extend well beyond ensuring that key businesses and employers in Texas remain healthy and competitive. TIACT believes that the citizens of Texas will also be the beneficiaries of a source of electricity that emits no chemicals and greenhouse gases to the air, provides energy security and diversity, and will help put downward pressure on electricity bills.

Now is the time to move forward.