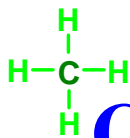
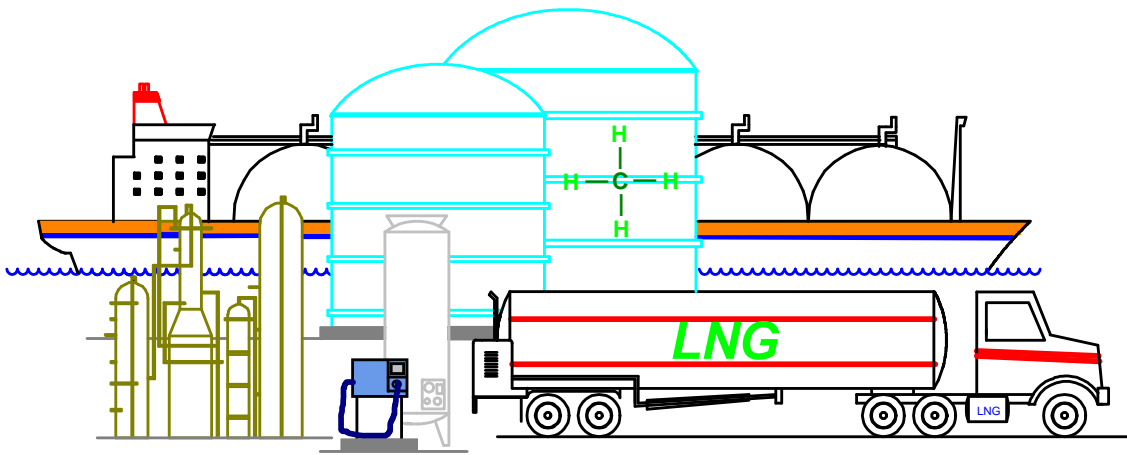


CORPORATE PROFILE



CH·IV International

The LNG Specialists

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Spring 2011



CORPORATE PROFILE

INTRODUCTION

This profile is intended to give an overview of the experience and expertise of the CH·IV International organization. In addition to this Introduction, the three remaining sections cover LNG Services (Page 2), Project Synopses (Page 4), and Publications and Presentations (Page 18).

WHO IS CH·IV INTERNATIONAL?

CH·IV International is a joint venture corporation between MPR Associates, Inc. of Alexandria, VA and CH·IV Corporation of Hanover, MD. MPR, founded in 1964, specializes in technical services for the development, design, construction and operation of power facilities and equipment for energy, industrial and government clients. CH·IV Corporation, founded in 1991 had been providing LNG engineering and consulting services to a wide base of clients ranging from international LNG trading to LNG vehicle fleets until the formation of CH·IV International in 2001.

CH·IV International builds on the “Owner’s Engineer” model applied by MPR in the power industry and transfers it to the LNG industry. In addition to the LNG expertise of CH·IV Corporation’s founder, Jeff Beale, CH·IV International’s senior staff has over 140 years of LNG industry experience. CH·IV is also able to draw from MPR’s diverse engineering staff and outside experts in the LNG field to support clients. The initial focus of CH·IV International is to support the worldwide expansion of LNG peakshaving, import and export activities from feasibility through facility start-up and operation.

CH·IV International provides consulting and engineering services in five overlapping areas:

- 1) Development;
- 2) Feasibility;
- 3) Front end engineering design (FEED) of LNG facilities (import, export and peakshaving);
- 4) Engineering oversight and consulting on all things LNG; and
- 5) Operational services relating to the training, commissioning, start-up and operations of LNG facilities.

Why **CH·IV**? . . . CH·IV is intended to be read as “C-H”- Roman numeral “4”; or simply **CH₄**, the chemical formula for methane (the primary natural gas constituent).

Additional information and pictures about CH·IV and LNG can be found at our Internet web-site: www.CH-IV.com.



CORPORATE PROFILE

LNG INDUSTRY SERVICES

LNG IMPORT, EXPORT AND PEAKSHAVING FACILITIES

Development –

Feasibility Studies – Conceptual Design – Cost Estimating – Shipping Logistics – Financing Strategies – LNG Sourcing / SPA Support – Secondary / Tertiary Justification – FEED/EPC Qualification / Selection / Negotiation – RFP Development – Design Alternatives – Siting Strategies / Selection – Public Outreach and Education (NIMBY, BANANA and NOPE Issues)

Filing/Permitting –

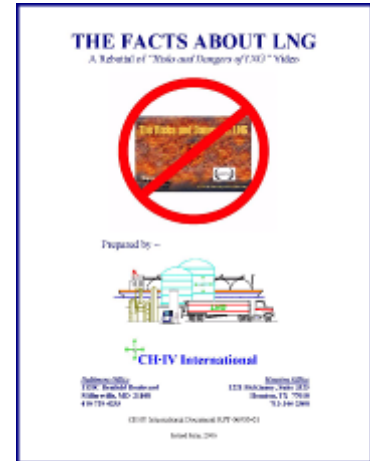
Pre-Permit Design – EIA/EA Studies – Documentation Preparation – Local Issue Resolution – Regulatory Testimony – Technical Representation – Vendor Identification / Qualification – FERC / DWPA – CRE / SEMARNET – FERC Resource Report No. 13 Preparation

Design/Construction –

FEED (Front End Engineering Design) – Preliminary Design – Operating Philosophy – Project Management – Hazard Prevention / Detection / Mitigation – HazOp – EPC (Engineering, Procurement, Construction) Contractor Pre-Qualification, Bid Preparation, Selection, Negotiation and Project Management

Start-Up/Operation –

Operator / Technician Training – Commissioning Procedures – Dry-Out / Cooldown / Start-Up Procedures – Operations Manual Development – Emergency Response Manuals – Port Security Manual – Terminal Interface Coordination – Start-Up Crews



OWNER'S/LENDER'S/REGULATOR'S ENGINEERING SUPPORT

Due Diligence – Design Review – Siting Strategies – HazOp Reviews – Quality Assurance – Project Management – Procurement Support – FEED / EPC Contractor Selection and Negotiation – Regulatory Hearing Support – Feasibility and Cost Study Review – Operability and Maintainability Reviews – Construction Management and Oversight – Review/Critique Regulatory Filing Documentation

TECHNICAL SUPPORT

LNG Shipping Trade Simulations – Pretreatment and Cold Box Optimization Analysis – Plant Life Expectancy and Due Diligence Studies – Non-Traditional LNG Production Concepts – LPG/Ethane Extraction – Liquefaction Cycle Design or Selection – Waste Heat/Waste Cold Utilization – Equipment Condition Evaluation – LNG Tank Sizing Calculations – Vapor Handling Evaluations – Design Oversight and Review – Feasibility Studies – FPSO Concepts





CORPORATE PROFILE

LNG SERVICES

CONTRACT ENGINEERING SERVICES

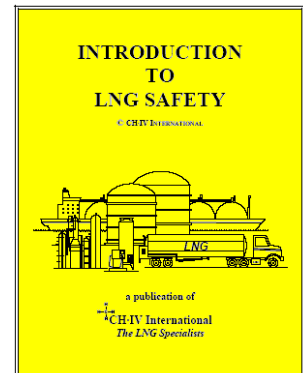
Optimization/Revitalization Teams – Owner’s/Lender’s Representation – Commissioning Teams – Start-Up and Operations Teams

REGULATORY, SAFETY AND HAZARD MINIMIZATION SUPPORT

HazOp Studies – Expert Testimony – Safety Procedures and Training – LNG Safety/PR Presentations – Incident Investigations – Regulatory Compliance Assistance (CFR 49, Part 193; NFPA 59A; EN 1473; BS-7777; NFPA 57, CFR 33, Part 127; NOM-013-SECRE-2004, CSA-Z276) – LNG Vapor Dispersion/Fire Radiation Studies; Permit Application Preparation – FERC / DWPA

OPERATIONS SUPPORT

Operations, Maintenance and Emergency Response Manual Development – Training (Operations, Safety, LNG Tanker Overview, “LNG Basics”) – “*Introduction to LNG Safety*” – Commissioning/Start-Up Teams – Debottlenecking Studies – Plant Material Balances – Operating Procedure Development – Troubleshooting – Cold Box Optimization



SELECTED COMPUTER APPLICATIONS

Pro/II®

Process simulation software customized by CH-IV specifically for natural gas and LNG/LPG applications. Suited for conceptual design studies as well as verifying detailed work performed by others.

Natural Gas Interchangeability

Internally developed program based on A.G.A. Bulletin 36. Suitable for determining blending, injection and/or extraction requirements for imported LNG.

BREEZE® Modeling Software

Predicts LNG vapor dispersion from LNG spills, thermal radiation flux from LNG fires and numerous other impacts of air emissions, fires and explosions.

Klosek-McKinley Density

Calculates the total energy of LNG cargoes. *Enhanced by CH-IV.*

LNGSIM™

LNG shipping / rail trade simulator (used for fleet, tank, and end-use and vaporization sizing calculations). *Developed by CH-IV.*

Hub & Spoke Model™

Computer model of “grass roots” LNG program based on new natural gas liquefaction plant(s), LNG trucking / barging-based distribution and multiple end-use applications (power plant, industrial, vehicular, local gas distribution, etc.). *Developed by CH-IV.*



CORPORATE PROFILE

PROJECT SYNOPSES

A quick review of the list that follows will show that CH·IV International is and has been involved in a number of active, major LNG projects as well as other projects supporting the claim of “*The LNG Specialists.*” This list of current activities includes providing the FEED (Front End Engineering and Design) to six North American and one Central America LNG import projects, one LNG peakshaver and the balance of plant for a world class liquefaction plant. CH·IV also acted as the Regulatory Engineer for the State of Connecticut in oversight of the Waterbury LNG peakshaving project and the LNG Technical Advisor for the Government of Jamaica. CH·IV also successfully supported the permitting process of three new import terminals (Cameron, Louisiana and two Baja, Mexico projects) and provided project management of a California offshore LNG import terminal for Crystal Energy. CH·IV was very actively involved in supporting the reactivation and expansion of the fourth U.S. LNG import terminal in Cove Point, Maryland.

It should be noted at the time of this document release that CH·IV had provided the FEEDs for the last three U.S. import terminals (Downeast, AES Sparrows Point and Oregon LNG); all three are well into the FERC permitting process.

USA, TX - Freeport LNG

Freeport LNG Liquefaction

CH·IV is providing the Front End Engineering (FEED) for the NEPA process (Federal Operations Application) for Freeport LNG (FLNG) for its 8 MTPA Liquefaction Facility.



USA, AK

Polar LNG - Golden Valley Electric Association

Provided Owner’s Engineering and LNG technical services to GVEA to review and evaluate a Pre-FEED engineering and design package to install LNG liquefaction, storage and truck loading facilities at one location and LNG truck unloading, storage and regasification facilities at another to supply natural gas for a GVEA gas turbine electric generator near Fairbanks. LNG would be moved by tractor-trailer between the two locations. Additional Owner’s Engineering services are on-going.

Cameron LNG - USA

Cameron LNG Terminal

CH·IV provided O&M services to prepare the terminal Emergency Response Plan and also to perform a Health and Safety audit for the facility owner, Sempra Energy. CH·IV is currently providing engineering services to Cameron LNG to perform flammable vapor dispersion exclusion analysis modeling to satisfy DOT and FERC requirements associated with its Phase II Expansion Project.



Kenya – Mott MacDonald

Kenya LNG Import Terminal

CH·IV is providing the conceptual design for a greenfield, onshore LNG import terminal in Kenya, East Africa.



CORPORATE PROFILE

PROJECT SYNOPSES

USA, VT – LNG Peakshaver

Confidential

CH·IV provided LNG technical support to a study that compared natural gas supply pipeline installation with LNG satellite and peakshaving supply options for a gas utility to extend its supply area to include two additional remote municipalities. Various size and location options were provided along with CapEx & OpEx estimates for the LNG facilities.

Malaysia – Integrated Petroleum Services

Sabah LNG Facility

CH·IV provided the Pre-FEED study for a modular eLNG Facility, (all electrical driven liquefaction facility) for 1 MTPA liquefaction capacity. The liquefaction trains consisting of two 0.5 MTPA trains **with associated Pretreatment facilities LNG storage and Jetty with LNG ship loading dock.**



Indonesia – Energy World Corporation

PT South Sulawesi LNG Facility

CH·IV is providing the front end engineering design (FEED) for the balance of plant for this 2.0 (expandable to 5.0) MTPA natural gas liquefaction and marine export plant.



Jamaica – Petroleum Corporation of Jamaica (PCJ)

Port Esquivel Offshore FRSU

CH·IV is serving as the Government of Jamaica's Technical Advisor in the development of a 1.5 MTPA floating offshore LNG storage and regasification system (FRSU) and natural gas distribution network.

Pakistan - Mashal LNG Holding B.V.

Phased LNG Importation Facility

CH·IV is providing the Front End Engineering Design (FEED) for the process portion of an expedited, phased LNG import terminal utilizing an LNG storage ship, vaporization & power barge and permanent marine facility. The facility will eventually include onshore LNG storage.



USA – Freeport LNG

Import to Export Modification

CH·IV provided pre-FEED services investigating the design and regulatory requirements for converting the existing LNG import terminal to world class LNG production and export facility.





CORPORATE PROFILE

PROJECT SYNOPSES

USA – EcoElectrica L.P. (Puerto Rico)

EcoElectrica LNG Terminal

Provided and providing a wide range of services including:

- LNG facility RAM study
- Perlite® intrusion investigation
- LNG transfer line damage root cause analysis and replacement
- BOG blower failure investigation
- Revised and updated all LNG terminal standard operating procedures, operator training
- Prepared FEED for facility expansion, preparation of equipment specifications for procurement of major equipment associated with the facility expansion project, prepared EPC contractor scope of work included in an RFP for the expansion project and evaluated all bids
- NFPA 59A fire protection evaluation and preparation of action plans, regulatory support.



USA – LNG Development Company

Oregon LNG Terminal

Prepared the Front End Engineering Design (FEED) for a proposed greenfield 1.0 BSCFD LNG import terminal near Astoria, Oregon. The FEED was included in a permit application to construct the terminal (including preparation of the FERC Resource Reports 1, 10, 11 and 13) and is being prepared in accordance with 18 CFR 380.12c, 49 CFR Part 193, NFPA 59A and 33 CFR Part 127. Project was formally submitted to the FERC in October 2008.



Italy – Confidential

Offshore LNG Terminal

Provided commissioning, cooldown start-up advisory services, including development of maintenance isolation procedures and auditing of other start-up and operating procedures.



USA – Baltimore Gas & Electric

Spring Gardens LNG Peakshaving Facility

Providing on-site engineering support ranging from oversight of cold box replacement start-up, operating procedure updating, hazard mitigation studies and hazard exclusion zone calculations.



CORPORATE PROFILE

PROJECT SYNOPSES

India – Petronet LNG Limited

Dahej Jetty Expansion Project

Working with a marine structures design firm, CH·IV developed a detailed feasibility study and cost estimate for an expansion project to accommodate increased terminal capacity from 5 MTPA to more than 10 MTPA. This was followed by preparation of topsides FEED, a comprehensive bid package and RFP to allow Petronet to award contracts to carry out the detailed design, construction and startup of the expanded facilities.



USA – Confidential

Floating Liquefaction Technology

Provided owner's engineering services associated with floating and other offshore LNG applications

Mexico – Black & Veatch

Energía Costa Azul LNG Terminal (Sempra)

CH·IV assisted in managing various commissioning tasks including directing the repair of hundreds of cryogenic valves. CH·IV wrote the procedure for and directed the facility dry out. CH·IV also provided oversight of the cooldown of the LNG tanks, assisted in directing the preliminary and final terminal cooldown and start-up.



New Zealand – GasBridge

LNG Import Terminal

Providing Owner's Engineer and LNG technical advisor support for the LNG Import and Regasification Terminal Consenting Application. Phase 1 involved Pre-FEED conceptual design and engineering to allow application for consenting and environmental review. Phase 2 will involve a more formal FEED package and RFP documents to allow for EPC bids once the consenting is approved.

USA – Freeport LNG

Freeport LNG Terminal

CH·IV provided independent validation of novel NGL extraction process to be incorporated with the existing LNG vaporization process.

USA – Confidential

East Coast LNG Peakshaving Facility

Providing conceptual design and feasibility study on greenfield satellite LNG peakshaving facility.

USA – ConocoPhillips

Kenai LNG Facility

Supported compliance of FERC request for development of equivalent of Resource Report 13.



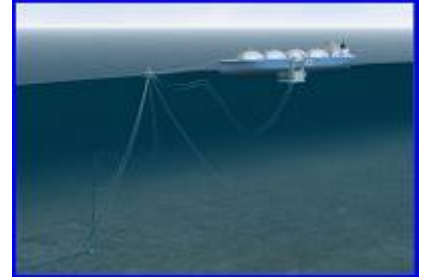
CORPORATE PROFILE

PROJECT SYNOPSES

USA – Esperanza Energy

Esperanza Energy, LLC

Provided Owners Engineering services during the design phase of the deepwater terminal and will lead the deepwater port application development with the United States Coast Guard. For a floating LNG receiving terminal 10 miles off the Port of Long Beach, California.



USA – Piedmont Natural Gas

Robeson County LNG Facility

Acted as Owner's Engineering Advisor; starting in the early phases of the project to assist with development of the Design Basis, site layout and EPC contract for going to the next phase for detailed design and construction. Project is currently on hold pending re-evaluation of the system needs.

Chile – GNL Quintero

Fast Track LNG Import Terminal

Review design basis for the terminal, P&IDs, and technical parts of EPC contract,. Onsite visit to verify compliance with NFPA 59A requirements. Review operational and design documentation to determined readiness for start up. Preparation of report, which included details of noncompliance, best practices and design basis.



USA – Consolidated Edison

Astoria Peakshaving Plant

CH·IV vetted technical bids for a replacement liquefaction plant, which included process simulations of completing bidders' designs.

Europe – Confidential

Medium Scale Offshore Liquefaction

In depth study of the availability of medium scale offshore liquefaction systems, process plant including pretreatment design, NGL fractionation, power requirement utilities and weight and footprint development. The maritanization analysis of the evaluated components, units and equipment played a crucial role in this study. In the order of 20 different offshore liquefaction systems were analyzed and ranked using an evaluation matrix developed by CH·IV International.



USA – Confidential

Small to Medium Scale Offshore Liquefaction

Bank due diligence report based on the review of the design concept for a small to medium scale offshore liquefaction vessel. .



CORPORATE PROFILE

PROJECT SYNOPSES

USA – Dominion Cove Point

Cove Point LNG Terminal

CH·IV provided the following LNG specific consulting services with the completion of construction of a major expansion of the Terminal:

- Perform engineering walkdowns of equipment and systems for the owner as part of the mechanical completion process
- Review EPC contractor prepared commissioning procedures
- Review EPC contractor prepared operating and maintenance procedures
- Prepare and deliver commissioning training to owners operating and maintenance team
- Direct purge, dryout and cooldown activities for the owner
- Prepare schedules for startup and “tuning” of equipment



USA – Energy East Corporation

LNG Peak Shavers – Milford and Rocky Hill

Prepared technical report that quantified the impact of possible changing feed gas quality due to imported LNG on the existing liquefaction plants. Using CH·IV-proprietary optimization software developed 15 high-fidelity simulation models to predict the maximum performance for both facilities. The report identified equipment, system bottlenecks and probable Cold Box replacement points and recommended modifications and retrofits.



USA – Chart Energy & Chemicals

Wescott Plant Peak Shaving Facility

Performed a diagnostic performance analysis of the Wescott liquefaction system. Using CH·IV-proprietary optimization software, developed 15 high-fidelity simulation models to analyze the existing liquefaction process, check the operation of the mixed refrigerant loop and troubleshoot the lack of performance of the main liquefaction exchanger. Developed process simulation models to perform data reconciliation and compare the actual performance against the expected. Performed “what if” diagnostics and sensitivity tests to pinpoint the root-cause of degraded performance. CH·IV recommendations resulted in re-establishing design performance levels.

Norway – Flex LNG

Small to Medium Scale Offshore Liquefaction

Prepared a due diligence report based on the review of the design concept for a small to medium scale offshore liquefaction vessel. The study entailed the review on the chosen liquefaction system as well as the different pretreatment options and their placement on the given vessel surface.





CORPORATE PROFILE

PROJECT SYNOPSES

USA – State of Connecticut, DPUC

Yankee Gas' Waterbury LNG Peakshaving Facility

Provided regulatory oversight for the State of Connecticut, including regulatory compliance, RFP development, detailed design review, on-sight construction inspection oversight services and various engineering inspection services.



USA –Confidential

LNG Peak Shaving Facility

Assisting client's zoning studies by performing exclusion zone calculations for an existing LNG peak shaving facility located adjacent to a rapidly developing commercial and residential area. Analyzed options for tank and berm modifications to reduce thermal radiation and vapor dispersion exclusion zone radii, and prepared cost estimates for modifications. Provided cost estimate for a new comparable Greenfield facility.

USA – U.S. Pipeline

Cove Point LNG Terminal

Prepared de-inventory/warm-up and cooldown/start-up procedures supporting the maintenance turnaround and expansion project tie-ins for the terminal in 2007. Directed implementation of procedures.



Jamaica – Government of Jamaica

Port Esquivel - LNG Import Terminal, Regasification and Distribution Project

Provided technical oversight in the development of a greenfield 1.6 MTPA LNG import facility and developed the RFP for FEED phase. Contracted as Technical Advisor to the Project Joint Development Team (JDT) for FEED oversight, Regulatory support and EPC project management. Additionally, CH-IV International is providing technical support to the JDT in its consideration of developing a Floating LNG Storage and Regasification Unit (FSRU) as an interim / permanent alternative to a land based LNG import terminal.

USA – AES Corporation

AES Sparrows Point

Prepared the Front End Engineering Design (FEED) for a proposed brownfield 1.5 BSCFD LNG import terminal near Baltimore, Maryland. The FEED was included in a permit application to construct the terminal (including preparation of the FERC Resource Reports 1, 10, 11 and 13) and was prepared in accordance with 18 CFR 380.12c, 49 CFR Part 193, NFPA 59A and 33 CFR Part 127. Project was formally submitted to the FERC in January 2007.





CORPORATE PROFILE

PROJECT SYNOPSES

USA – Crystal Energy

Crystal Clearwater Port

Provided overall project management, public outreach, preliminary design and permit application development for Crystal Energy's offshore LNG regasification facility located on Platform Grace.



USA – Suez Energy

Port Everglades, FL - Calypso LNG

Prepared draft Operations Manual (technical, port security and management) for DWPA filing.

Oman – Pyramid Consulting Engineering Pvt. Ltd.

Oiltanking Odfjell Terminals & Company, LLC LPG Facility

Provided engineering consulting services in support of a FEED for the project. The scope of work included a review of documentation associated with development of the plot plan, review of the design basis, and commentary on the heat and material balances, process flow diagrams and major equipment data sheets. Participated in HazOp and review of the report issued to the Client prior to release of the FEED documents.

UK – Dragon LNG

LNG Import Terminal

Prepared contractual and technical audit for the 6 bcm Dragon LNG import terminal in Wales. The project includes two 154,000 m³ full containment LNG storage tanks, LNG regasification plant, send out capabilities and marine docking and offloading facilities for use by LNG Carriers.



USA – Downeast LNG

LNG Import Terminal

Prepared the Front End Engineering Design (FEED) for a proposed greenfield 0.5 BSCFD LNG Import Terminal near Robbinston, Maine. The FEED was included in a permit application to construct the terminal (including the preparation of FERC Resource Reports 1, 10, 11 and 13) and was prepared in accordance with 18 CFR 380.12c, 49 CFR Part 193, NFPA 59A and 33 CFR Part 127. Project was formally submitted to the FERC in December 2006.





CORPORATE PROFILE

PROJECT SYNOPSES

USA – Atlantic Sea Island Group

Safe Harbor Port

Prepared all process design support required to submit an application to the U.S. Coast Guard under a Deep Water Ports Act (DWPA) filing for a greenfield 2.0 BSCFD LNG import terminal that will be built on a man-made island along the U.S East Coast.



Indonesia – Pacific Oil & Gas

LNG Export Facility

Provided a “Dock Occupancy Study” using CH-IV proprietary ship simulation software to determine if existing marine infrastructure was adequate to meet needs of potential expansion of LNG production.

USA – Gulf Coast LNG Partners, L.P.

Calhoun LNG

Provided a thermal flux analysis for proposed LNG receiving terminal in Port Lavaca-Point Comfort, Texas.

El Salvador – Cutuco Energy

La Unión Energy Center

Provided all non-marine engineering, including design, cost estimating and schedule development required to submit a regulatory application to the El Salvador government for a greenfield LNG import facility-powered 550 MW combined cycle power plant.



West Coast Africa – Confidential

Mid Scale Offshore Liquefaction Plant

Performed feasibility study focusing on the gas pretreatment and liquefaction technology supporting the development of a floating 1 to 2 MTPA natural gas liquefaction, storage and offloading facility. Identified qualified liquefaction technology providers by comparing efficiency parameters, equipment layouts and equipment loads best suited for topside mounting on suitable floating vessel designs. Identified outstanding technology issues, provided input to development of the marine equipment and developed cost information for topside equipment as part of the total concept.

Mexico – Sonora Terminal GNL de Sonora, S. de R.L. de C.V.

Sonora, Mexico - Terminal GNL de Sonora

Prepared all non-marine FEED, including cost estimating and schedule development required to submit an application to the Mexican regulatory agencies for a 2.0 BSCFD, greenfield LNG import terminal near Puerto Libertad.



CORPORATE PROFILE

PROJECT SYNOPSES

Chile – GASCO S.A

Bahia Quintero, Chile - LNG Import Terminal Project

Prepared an economic feasibility study for a proposed 2.7 MTPA LNG import terminal to be located at Bahia Quintero in Chile. Assisted GASCO S.A. responded to a tender issued by a “pool” of customers for the sale of natural gas to the pool located in Chile. Prepared a tolling based tariff for the sale of natural gas to the pool, which included a calculation of the regasification fee and the development of technical and economic reports associated with the design, operation and maintenance of the facility.

USA – TORP, Inc.

Terminal Offshore Regasification Plant

Provided technical and engineering services for Project Development/Management and Deepwater Port Act permit preparation for a Deepwater Port in the Gulf of Mexico. FEED, permit application development, and extensive interaction with various US federal agencies (including United States Coast Guard) and other stakeholders in the development of this Gulf of Mexico LNG regasification project.



Nova Scotia – Anadarko Petroleum Corporation

Bear Head LNG Import Terminal

Served as Owner’s Engineer. Provided bidder evaluation of LNG tank contractors. Providing design review of FEED prior to incorporation in EPC RFP. Provided process optimization studies. Developed EPC RFP and the O&M Mobilization Plan.



The Bahamas – Blue Marlin

South Riding Point LNG Import Terminal

Acted as Owner’s Engineer. Provided pre-RFP preliminary design package, design studies and evaluations of current design package.

USA – Sempra Energy International

Port Arthur LNG Facility

Acted as Owner’s Engineer for Sempra during pre-FERC application phase on this import and regasification terminal project.



USA – PSE&G

Burlington LNG Peakshaving Plant

Provided code compliance audit relative to recent adoption by DOT 49 CFR Part 193 of the 2001 edition of NFPA-59A.



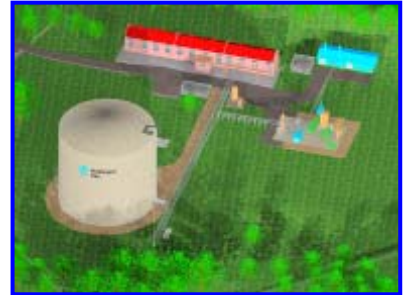
CORPORATE PROFILE

PROJECT SYNOPSES

USA – Washington Gas

Chillum (MD) LNG Peakshaving Facility

- Provided engineering oversight of EPC activities. Provided preliminary engineering, regulatory permit application development and EPC qualification and RFP development. Provided expert testimony on the safety of LNG before the Prince Georges County Zoning Hearing Examiner.
- Provided the engineering and environmental support to bring the selected alternative to the permit submission stage.
- Provided conceptualization and preliminary engineering for additional on-system peak shaving capacity, which may include on/off system storage, propane-air expansion/new construction and/or LNG production and storage.



Canada – Confidential

Maritime Province LNG Import Terminal

Provided “Fatal Flaw” analysis of greenfield location. Provided conceptual design and feasibility study for 1.5 BSCFD LNG import terminal. Prepared preliminary engineering and regulatory permit application development.

Mexico – Sempra Energy International

Costa Azul LNG Facility

Acted as Owner’s Engineer for Sempra during FEED phase for their Baja, Mexico import and regasification terminal project.



USA – Philadelphia Gas Works

Richmond LNG Facility

Provided supplemental LNG supply study. Study included qualitative and quantitative analysis of a variety of natural gas liquefaction processes, as well as potential modifications to existing liquefaction plant.

Equatorial Guinea – Marathon Oil Company

Bioko Island LNG Facility

Supported Marathon as Owner’s Engineer during the FEED of this greenfield 3.7 MTPA baseload LNG export project including liquefaction technology assessment.

USA – Sempra Energy International

Cameron LNG Facility

Provided technical due diligence prior to Sempra’s acquisition of this Louisiana LNG import and regasification terminal project. Currently acting as Owner’s Engineer during FEED phase.





CORPORATE PROFILE

PROJECT SYNOPSES

India – SBI Banking Consortia

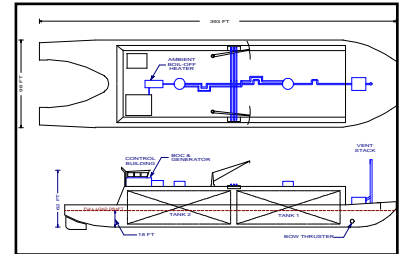
Dahej LNG Import Facility

Provided Lender’s Engineering and technical support to an assessment and evaluation of the Petronet LNG import terminal and regasification facilities project in Dahej, Gujarat, India. The 5.0 MTPA capacity plant has been in operation since December 2003.

Europe – Confidential

LNG Barging Study

Provided feasibility studies, cost estimating, marine transport logistics and siting strategies for an LNG barge-based trade in a Mediterranean location.



USA – Chesapeake LNG (NiSource)

Chesapeake LNG Facility

Evaluated a proposed plant design modification and recommended alternative solutions.

USA – City of Phoenix (AZ)

Vehicular LNG Fuel Supply Study

Completed study to determine future vehicular LNG demand and evaluate alternative supplies, including local production. CH-IV provided a technical and economic feasibility study supporting local LNG production.

USA – Marathon Oil Company

TREC LNG Receiving Terminal

Providing Owner’s Engineering support during permitting phase with Mexican authorities and on all work being performed by FEED contractor. Provided Design Basis Package for new import facility including technical description, plant operations narrative, PFD, plot plans, schedule, costs, environmental considerations and alternative designs.

USA – Trunkline LNG Company (previously CMS Energy)

Lake Charles (LA) LNG Receiving Terminal

Providing Owner’s Engineering support on all aspects of the activities associated with expansion of the Lake Charles LNG Receiving Terminal. Assisted in submission of FERC Resource Report 13.

USA – City of Phoenix (AZ)

North Phoenix Transit Bus LNG Fueling Station

Provided Engineering design package and well as construction, commissioning and start-up oversight for multi-dispenser, heavy-duty LNG and LCNG fueling station.



Bahamas – Confidential

Bahamas LNG Receiving Terminal and Pipeline

Provided due diligence on potential acquisition of Enron Global LNG assets for client.



CORPORATE PROFILE

PROJECT SYNOPSES

USA – Dominion Resources (previously Williams)

Cove Point (MD) LNG Receiving Terminal

Prepared/presented 3-week “LNG Basics” Technician Training for reactivation of the Cove Point LNG Terminal. Training included 2-binder supporting textbook. Prepared and supported 2-week “Operations” training. Prepared procedures and directed facility dryout. Prepared 130-page “Pre-Cool Procedure” for testing integrity of LNG transfer system. Prepared 150-page “Reactivation/Start-Up Manual” which led to the first unloading of an LNG tanker at Cove Point in over 20 years.



USA – U.S. Coast Guard

Introduction to LNG Training

Provided two-day training session to Savannah Marine Safety Office (MSO) prior to reactivation of Elba Island LNG Terminal.

North America – Confidential (multiple clients)

Potential LNG Receiving Terminals

Providing or have provided client review of EPC-supplied design and feasibility studies for the siting of various LNG import terminals for various clients in North America (U.S.A., Canada and Mexico).

International – Confidential

Marine Transport Study

Provided analysis of various techniques involving marine transport of natural gas including LNG, CNG and gas-to-liquids (GTL).

USA – Williams Energy

Cove Point (MD) LNG Receiving Terminal

Provided Owner’s Engineering support for the restart of the largest LNG receiving terminal in the U.S. at that time. This support included review and critique of the documentation required for the FERC filing for reactivation along with providing preliminary designs of vapor handling and LNG blending systems.

USA – Gas Technology Institute

“Preparation of LNG Vehicle Nozzle and Receptacle Test Program”

Provided an investigative program to determine the current state-of-the-art of design, manufacture and operation of LNG fueling nozzles. Provided a comprehensive testing program and budget cost estimate for appropriately identified test candidates.



USA – East Coast

LNG Facility Retrofit

Provided conceptual design for converting existing LNG facility to accept marine cargoes of LNG.



CORPORATE PROFILE

PROJECT SYNOPSES

USA – Fleet Bank Leasing Group

Natural Gas Liquefaction Plant Evaluation

As Lender’s Engineer, provided an evaluation of the condition of the Lynn, Massachusetts peakshaving facility.

South Korea – Korea Gas and Mobil

LNG Training Program

Provided training to 30 KoGas staff and management on design, operations, and safety of LNG import facilities.

USA – ICF Consultants

Philadelphia Gas Works, Richmond LNG Facility

Performed liquefaction plant replacement study. Performed liquefaction compressor replacement study. Provided equipment and system operability study, including recommendations for future reliability enhancements.

USA – Cabot LNG Corporation

Hampton Satellite LNG Facility

Provided owner’s engineering support including an independent NFPA 59A design audit and “Operability Review.” Developed “*Emergency Manual*” for facility. Provided LNG safety training to 50 personnel including emergency responders, plant owner, operations and maintenance personnel.

USA – Rocky Mountain Natural Gas

Satellite LNG Gas Plant

Designed, integrated and managed the installation of a temporary satellite LNG facility that was placed in service 44 days after “go-ahead” from client.





CORPORATE PROFILE

PUBLICATIONS AND PRESENTATIONS

CH·IV staff has authored over fifty papers, articles and presentations and presented testimony on all things LNG over the past 10 years. In addition, Jeff Beale, CH·IV's president was a columnist, *The Cold Corner*, for "Natural Gas Fuels Magazine" for three years. Below lists some of the more recent activities. A complete list of papers and presentations can be found at our web site at the "download" location including *The Cold Corner* articles authored by Jeff Beale.



Reverse Chronology

"To Distribute or Not to Distribute: LNG Facilities Dilemma"

Downstream LNG Markets & Distribution
Houston, TX January 2011

"The Cool-Down Gap"

AGA Biennial Operations Conference
Pittsburgh, PA May 2009

"Optimizing LNG Peakshaver Cold Box Operations"

AGA Biennial Operations Conference
Pittsburgh, PA May 2009

"Safety History of International LNG Operations"

CH·IV International Publication (See cover at right)
Living documents

"LNG Terminal Cooldown Issues"

LNG Facility Commissioning and Startup - Navigating the Critical Path
Houston, TX February 2007

"The Facts About the Safety of LNG, with a Focus on LNG Ships"

CH·IV International Publication (See cover at right)
June 2006

"LNG Technology, Safety and Gas Quality"

Gulf Coast Power Association Spring 2006 Conference
Houston, TX April 2006

"LNG Safety Testimony"

Prince Georges County Zoning Hearing
Upper Marlboro, MD January 2006

"LNG Import Terminal Training, Commissioning and Start-Up"

Burckhardt LNG Symposium
Houston, TX November 2005

"Liquefied Natural Gas – An Introduction"

Gulf Coast Power Conference
Houston, TX April 2004

