lng plant process flow diagram

lng plant process flow diagram: Understanding the intricate journey of natural gas from extraction to liquefied form is crucial for anyone involved in the energy sector, engineering, or investment. This article delves deep into the comprehensive lng plant process flow diagram, breaking down each stage with clarity and detail. We will explore the critical steps, the technologies involved, and the key considerations for efficient and safe LNG production. From pretreatment and liquefaction to storage and regasification, this guide aims to demystify the complex operations of an LNG facility, providing valuable insights for professionals and enthusiasts alike. Mastering the understanding of an lng plant process flow diagram is essential for optimizing operations, ensuring safety, and appreciating the global energy supply chain.

LNG Plant Process Flow Diagram: A Comprehensive Overview

The journey of natural gas to its liquefied state is a marvel of modern engineering, intricately detailed within an lng plant process flow diagram. This diagram serves as a blueprint, illustrating the sequence of operations and the interconnectedness of various units within a Liquefied Natural Gas (LNG) facility. Understanding this flow is paramount for efficient operation, safety protocols, and troubleshooting. The primary goal is to reduce the volume of natural gas significantly, making transportation and storage economically viable. This process involves a series of carefully controlled steps, each designed to remove impurities, lower the temperature, and prepare the gas for its journey to consumers worldwide. The lng plant process flow diagram is a visual representation of this complex transformation.

Pretreatment Stages: Preparing Natural Gas for Liquefaction

Before natural gas can be liquefied, it undergoes several crucial pretreatment steps. These stages are vital for removing components that could freeze, form hydrates, or cause corrosion at the extremely low temperatures required for liquefaction. The purity of the natural gas feed is a significant factor in the efficiency and longevity of the entire LNG plant. Each pretreatment unit plays a specific role in ensuring the gas meets stringent specifications before entering the liquefaction trains. The lng plant process flow diagram meticulously outlines these initial steps.

Acid Gas Removal

One of the first critical steps is the removal of acid gases, primarily carbon dioxide (CO2) and hydrogen sulfide (H2S). These components are acidic and can form solid hydrates at low temperatures, which can block pipelines and equipment. They also contribute to corrosion. Various methods, such as amine treating, are employed to selectively absorb these acid gases from the natural gas stream. The removed acid gases are then processed further, often for sulfur recovery.

Dehydration

Water vapor is another significant contaminant that must be removed. If left in the natural gas, water can freeze and form ice or hydrates at cryogenic temperatures, leading to blockages and operational issues. Dehydration units, typically using solid desiccants like molecular sieves or glycol dehydration, effectively reduce the water content to very low levels, often in parts per million (ppm).

Mercury Removal

Mercury is a highly corrosive element that can damage aluminum heat exchangers, which are commonly used in liquefaction processes. Specialized mercury removal units, often employing activated carbon or sulfur-impregnated adsorbents, are installed to capture even trace amounts of mercury from the natural gas stream. This step is crucial for protecting valuable equipment and ensuring the integrity of the LNG.

Liquefaction Processes: The Heart of the LNG Plant

The liquefaction stage is where the magic happens – transforming gaseous natural gas into liquid form by drastically reducing its temperature. This is the most energy-intensive part of the LNG plant process. Several different liquefaction technologies exist, each with its own advantages and specific application based on factors like scale, energy availability, and ambient conditions. The lng plant process flow diagram will show the specific technology employed.

Cryogenic Refrigeration Cycles

The most common liquefaction methods rely on cryogenic refrigeration cycles. These cycles use a series of compressors, heat exchangers, and expansion turbines to progressively cool the natural gas. Key technologies include:

- **Cascade Refrigeration:** This process uses multiple refrigerants at different temperature levels (e.g., propane, ethylene, methane) to achieve the target liquefaction temperature. Each refrigerant operates in its own closed loop, transferring cooling duty to the next stage.

- **Mixed Refrigerant (MR) Cycles:** In MR cycles, a blend of refrigerants is used. This allows for a more efficient heat transfer across a wider temperature range, often simplifying the equipment configuration compared to cascade systems.

- **Propane Pre-Cooled Mixed Refrigerant (C3MR) Process:** This is a widely adopted variation that combines the benefits of propane pre-cooling with a mixed refrigerant cycle, offering excellent efficiency for mid-to-large scale LNG plants.

Heat Exchangers and Expansion Turbines

Essential components in liquefaction are the highly specialized heat exchangers, often of the plate-fin design, and the expansion turbines. Heat exchangers facilitate the transfer of heat from the natural gas to the refrigerants, cooling it down. Expansion turbines are used to extract energy as the refrigerant expands, which can then be used to drive compressors, improving the overall energy efficiency of the liquefaction process. The precise design and arrangement of these are critical elements detailed in the lng plant process flow diagram.

LNG Storage and Loading

Once liquefied, the LNG needs to be safely stored and then loaded onto specialized tankers for transportation. This stage requires robust infrastructure designed to maintain the cryogenic temperatures and handle the unique properties of LNG. The lng plant process flow diagram highlights these critical off-site facilities.

LNG Storage Tanks

LNG is stored in large, insulated tanks designed to maintain temperatures around -162 degrees Celsius (-260 degrees Fahrenheit). These tanks are typically double-walled, with the outer wall providing structural support and containment, and the inner wall holding the cryogenic liquid. The space between the walls is often a vacuum or filled with insulation to minimize heat ingress. Boil-off gas, which naturally evaporates from the stored LNG, is usually captured and either re-liquefied or used as fuel within the plant.

Loading Operations

Loading LNG onto ships is a complex operation requiring precise control and safety measures. Specialized loading arms and pipelines connect the storage tanks to the LNG carrier. The process involves purging the lines and tanks with inert gas to remove air and moisture, followed by controlled filling. During loading, personnel must monitor temperatures, pressures, and flow rates closely to prevent any safety incidents. The lng plant process flow diagram will show the interconnection between storage and loading facilities.

Regasification: Returning LNG to its Gaseous State

For consumers to utilize natural gas, the LNG must be converted back into its gaseous state. This occurs at regasification terminals, which are often located near major consumption centers. The lng plant process flow diagram for these terminals shares similarities with the liquefaction side but in reverse.

Regasification Technologies

Several technologies are used for regasification:

- **Open Rack Vaporizers (ORVs):** These are the most common type, where seawater is used as the heat source. LNG flows through tubes arranged in racks, and seawater is pumped over them, transferring heat to the LNG and causing it to vaporize.
- **Submerged Combustion Vaporizers (SCVs):** In SCVs, a burner inside a water-filled vessel heats the water, which in turn heats the LNG flowing through coils. This method is more energy-intensive but can be advantageous in colder climates or where large amounts of seawater are not available.
- **Intermediate Fluid Vaporizers (IFVs):** These use an intermediate fluid, such as propane or a glycol mixture, to transfer heat to the LNG. This can offer more controlled heating and is less reliant on direct seawater contact.

Environmental Considerations

The process of regasification using seawater has environmental considerations, such as the impact on marine life due to temperature changes in discharged water. Modern designs incorporate measures to minimize these impacts. The lng plant process flow diagram will implicitly show the scale of

these operations and their interaction with the environment.

Frequently Asked Questions

What are the key components typically shown in an LNG plant process flow diagram (PFD)?

A typical LNG plant PFD will highlight major equipment like liquefaction trains (mix-refrigerant cycles, cascade cycles), storage tanks, loading arms, vaporizers, compressors, heat exchangers (e.g., cryogenic heat exchangers), separators, and pumps. It also illustrates the main process streams, control loops, and essential safety systems.

How does a PFD illustrate the liquefaction process in an LNG plant?

The PFD shows the step-by-step cooling and condensation of natural gas. It details the refrigerant circuits (e.g., propane, ethylene, methane), the sequence of heat exchangers where the gas is progressively cooled, and the final liquefaction stage, often represented by a cryogenic heat exchanger and subsequent separators.

What is the significance of the different line types and symbols used in an LNG plant PFD?

Line types on a PFD indicate the state of the material (e.g., solid line for liquid, dashed line for gas, dotted line for mixed phase) and the type of stream (e.g., process stream, utility stream). Symbols represent specific equipment like pumps, compressors, valves, and heat exchangers, providing a standardized visual language for understanding the process.

How are safety features and emergency shutdown (ESD) systems represented on an LNG plant PFD?

While a PFD focuses on the main process, it often includes indications of critical safety loops and control systems. ESD systems might be shown as interconnected control loops that initiate a shutdown sequence for critical equipment in case of abnormal conditions, though more detailed safety information is usually found on Piping and Instrumentation Diagrams (P&IDs).

What are the primary differences between an LNG plant PFD and a P&ID?

A PFD provides a high-level overview of the process flow, focusing on major equipment and the overall sequence of operations. A P&ID (Piping and

Instrumentation Diagram) is much more detailed, showing all piping, instrumentation (sensors, controllers, actuators), valves, and interlocks, offering a granular view for engineering, construction, and maintenance.

Additional Resources

Here are 9 book titles related to LNG plant process flow diagrams, with short descriptions:

1. *LNG Plant PFD Fundamentals: A Practical Guide*
This book delves into the foundational principles behind the creation and interpretation of LNG plant process flow diagrams (PFDs). It covers essential symbols, naming conventions, and the logical flow of materials and energy within a typical liquefied natural gas facility. Readers will gain a solid understanding of how PFDs represent the entire production process, from feedstock intake to liquefaction and storage.

2. *Decoding LNG P&IDs: From Basic Concepts to Advanced Applications*
While PFDs offer a high-level view, this book focuses on the more detailed Piping and Instrumentation Diagrams (P&IDs) relevant to LNG plants. It bridges the gap between PFDs and P&IDs, explaining how the latter provides crucial information about equipment, piping, valves, and control systems. The text offers practical examples and case studies to illustrate how P&IDs are used for design, operation, and troubleshooting.

3. *Process Simulation for LNG Facilities: Visualizing Flow with PFDs*
This title explores the critical role of process simulation software in developing and analyzing LNG plant operations, with a strong emphasis on how these simulations translate into PFDs. It explains how to model different liquefaction cycles, heat exchangers, and separation units, and how the resulting diagrams visually represent the simulated process. The book is ideal for engineers who need to optimize plant performance and predict behavior using flow diagrams.

4. *Safety in LNG Operations: PFDs as Risk Management Tools*
This book highlights the indispensable role of PFDs in ensuring the safety of LNG plants. It demonstrates how PFDs are used to identify potential hazards, define safety interlocks, and plan emergency shutdown procedures. The text provides insights into how safety considerations are integrated into the design and understanding of process flow diagrams, making them vital for risk assessment and mitigation.

5. *LNG Process Design and Optimization: A PFD-Centric Approach*
This comprehensive guide emphasizes a PFD-centric methodology for designing and optimizing LNG facilities. It walks readers through the stages of process development, illustrating how PFDs are used to define mass and energy balances, select appropriate equipment, and evaluate different process configurations. The book aims to equip engineers with the skills to create efficient and cost-effective LNG plant designs through effective use of flow diagrams.

6. *Troubleshooting LNG Plants: Interpreting PFDs for Problem Solving*
When operational issues arise in an LNG plant, understanding the process flow diagram is paramount for effective troubleshooting. This book provides a systematic approach to diagnosing problems by analyzing PFDs, identifying deviations from normal operation, and pinpointing potential root causes. It uses real-world scenarios to show how PFDs serve as a critical diagnostic tool for plant engineers and operators.

7. *LNG Train Design: From Conceptual PFD to Detailed Engineering*
This book takes a deep dive into the design of individual LNG process trains, starting with the conceptual PFD and progressing to more detailed engineering aspects. It covers the selection and sizing of major equipment, the layout of process lines, and the integration of control systems as reflected in the flow diagrams. The text offers valuable insights for engineers involved in the greenfield development or expansion of LNG facilities.

8. *Advanced LNG Process Technologies: Visualizing Complex Flowsheets*
This title explores the process flow diagrams associated with more complex and advanced LNG liquefaction technologies. It delves into the intricacies of cryogenics, refrigeration cycles, and separation techniques used in modern LNG plants, and how these are visually represented on PFDs. The book is suited for experienced engineers looking to understand the nuances of cutting-edge LNG processing and their associated diagrams.

9. *LNG Plant Operations and Maintenance: The PFD as a Working Document*
This book emphasizes the PFD as a vital, living document for the day-to-day operations and ongoing maintenance of an LNG plant. It explains how operators use PFDs to understand unit operations, monitor process parameters, and implement planned maintenance activities. The text highlights the importance of keeping PFDs up-to-date to reflect actual plant conditions and ensure safe and efficient production.

Lng Plant Process Flow Diagram

LNG Plant Process Flow Diagram: Mastering the Cryogenic Chain

Unravel the complexities of liquefied natural gas (LNG) production. Are you struggling to

understand the intricate process behind LNG plants? Do you need a clear, concise guide to navigate the numerous stages, from gas receiving to final product delivery? Are you overwhelmed by technical jargon and complex schematics? This ebook provides the clarity and understanding you need to confidently grasp the entire LNG process.

This comprehensive guide, "LNG Plant Process Flow Diagram: A Practical Guide," breaks down the seemingly impenetrable world of LNG production into manageable, easy-to-understand segments. Whether you're a student, engineer, investor, or simply curious about this vital energy sector, this ebook will provide you with the knowledge and visual tools to succeed.

Author: Dr. Anya Sharma (Fictional Expert)

Contents:

LNG Plant Process Flow Diagram: A Practical Guide

Chapter 1: Introduction to LNG and its Importance

Liquefied Natural Gas (LNG) is natural gas that has been cooled to a temperature of approximately -162°C (-260°F), reducing its volume by about 600 times. This dramatic reduction in volume makes LNG significantly easier and more cost-effective to transport over long distances, opening up global access to this valuable energy source. The global importance of LNG cannot be overstated. It serves as a crucial component in the global energy mix, providing a cleaner-burning alternative to other fossil fuels and playing a critical role in energy security for many nations. This chapter will explore the fundamental aspects of LNG, its significance in the global energy market, and the environmental considerations associated with its production and use. We'll also briefly discuss the history of LNG and its evolution into the critical energy resource it is today.

Chapter 2: Upstream Processes: Gas Receiving and Pre-treatment

Before the gas can be liquefied, it undergoes several critical pre-treatment steps. This stage, often referred to as the "upstream" process, focuses on ensuring that the natural gas is of sufficient purity and quality to withstand the demanding liquefaction process. These steps include:

Gas Gathering and Compression: Natural gas is gathered from various sources, often through extensive pipeline networks. Compression increases the gas pressure to facilitate efficient processing and transportation within the plant.
Dehydration: Water is a significant impurity that can freeze within the liquefaction process, causing blockages and equipment damage. Dehydration uses various techniques like glycol dehydration to remove water vapor.
Acid Gas Removal: Acidic components like hydrogen sulfide (H_2S) and carbon dioxide (CO_2) must be removed. These components are corrosive and can negatively impact the efficiency and longevity of the equipment. Common removal methods include amine treating and Claus processes.
Hydrocarbon Dew Point Control: The removal of heavier hydrocarbons is essential to prevent clogging and ensure the smooth flow of gas during the liquefaction process. This process improves the quality of the gas and makes it suitable for liquefaction.

Chapter 3: Liquefaction Process: The Heart of the LNG Plant

The liquefaction process is the core of any LNG plant, transforming gaseous natural gas into its liquid form. Several technologies are employed, each with its advantages and disadvantages:

Cascade Process: This traditional method uses a series of refrigeration cycles, with each stage cooling the gas further until it reaches its liquefaction point. While simpler in design, it's less energy-efficient than newer technologies.
Mixed Refrigerant Process (MRP): This advanced process uses a mixture of refrigerants to achieve a more efficient and compact liquefaction system. It offers superior energy efficiency and reduced capital costs compared to the cascade process.
Other Technologies: Other emerging technologies, such as APCI (Air Products Cold Box) and other proprietary designs, are continuously being developed to enhance efficiency, reduce emissions and optimize operational costs.

Chapter 4: Storage and Loading: Preparing LNG for Transport

Once liquefied, the LNG needs to be stored and then loaded onto specialized cryogenic tankers for transport. This involves:

LNG Storage Tanks: These large, double-walled tanks are designed to maintain the extremely low temperature of the LNG, preventing boil-off and ensuring product quality. They are often constructed using advanced materials like 9% Nickel steel to withstand the cryogenic conditions.
Vaporization Systems: A small amount of boil-off gas (BOG) is inevitable. Vaporization systems efficiently handle this BOG, utilizing it either as fuel for the plant or feeding it back into the gas grid.
Loading Procedures: The loading process requires precise control to prevent spills and maintain the quality of the LNG. This involves careful monitoring of temperatures, pressures, and flow rates.

Chapter 5: Downstream Processes: Regasification and Delivery

At the receiving end, the LNG needs to be regasified back into its gaseous state for distribution. This involves:

Regasification Plants: These facilities utilize various methods, such as open-rack vaporizers, submerged combustion vaporizers, or direct injection vaporizers, to heat the LNG and return it to a gaseous state.
Gas Transmission and Distribution: The regasified natural gas is then transported through pipelines to consumers, powering homes, businesses, and industries.

Chapter 6: Process Flow Diagram Analysis: A Step-by-Step Guide

This chapter provides a comprehensive guide on interpreting and understanding LNG plant process flow diagrams (PFDs). It will cover:

Understanding PFD Symbols: Decoding the standard symbols used in process flow diagrams to represent various equipment and processes.
Tracing the Flow of Gas: Step-by-step analysis of the LNG process, from gas receiving to final delivery, using the PFD as a visual aid.
Identifying Key Process Parameters: Understanding the critical parameters like temperature, pressure, and flow rates at different stages of the process.

Chapter 7: Safety and Environmental Considerations

The LNG industry is heavily regulated due to the inherent risks and potential environmental impacts associated with its operations. This chapter will cover:

Safety Procedures and Protocols: Addressing the safety measures in place to mitigate potential risks, including fire prevention, leak detection, and emergency response.
Environmental Impact Mitigation: Discussing the strategies employed to minimize the environmental footprint of LNG production, including reducing emissions and managing waste.
Regulatory Compliance: Overview of the regulations and standards governing LNG plant operations.

Chapter 8: Future Trends and Innovations in LNG Technology

The LNG industry is constantly evolving, with new technologies and innovations aimed at improving efficiency, reducing emissions, and enhancing safety. This chapter will explore:

Advancements in Liquefaction Technologies: Discussion of emerging technologies that aim to improve the efficiency and reduce the cost of liquefaction.
Sustainable LNG Production: Focus on methods to reduce the environmental impact of LNG production and improve sustainability.
LNG as a Bridge Fuel: Its role in the transition to a cleaner energy future.

Chapter 9: Conclusion: Mastering the LNG Value Chain

This concluding chapter will summarize the key takeaways from the book, emphasizing the importance of understanding the entire LNG value chain. It will also provide insights into future prospects and challenges facing the LNG industry.

FAQs

1. What are the main components of an LNG plant? An LNG plant typically consists of gas receiving and pretreatment units, liquefaction units, storage tanks, loading facilities, and sometimes, regasification units.

2. What are the different liquefaction technologies used in LNG plants? Common liquefaction technologies include cascade, mixed refrigerant, and APCI processes.

3. What is boil-off gas (BOG), and how is it managed? BOG is the gas that evaporates from LNG storage tanks. It's managed through vaporization systems, often used as fuel or fed back into the gas grid.

4. What are the environmental concerns related to LNG production and transport? Environmental concerns include methane emissions, air pollution from combustion, and potential spills during transport.

5. What safety measures are implemented in LNG plants? Safety measures include fire protection systems, leak detection systems, emergency shutdown systems, and rigorous training for personnel.

6. How is LNG transported? LNG is transported in specialized cryogenic tankers designed to maintain the extremely low temperature required to keep it in liquid form.

7. What are the future trends in LNG technology? Future trends include developing more efficient liquefaction technologies, reducing methane emissions, and exploring the use of LNG as a fuel for transportation.

8. What is the role of LNG in the global energy mix? LNG plays a vital role in providing a cleaner-burning alternative to other fossil fuels and ensuring energy security for many nations.

9. How does an LNG plant process flow diagram help in understanding the process? A PFD provides a visual representation of the entire process, showing the flow of gas and the various equipment involved, making it easier to understand the complexities of the LNG production process.

Related Articles:

1. Types of LNG Tankers: A Comprehensive Overview: Details the various types of LNG carriers, their design, and operational characteristics.

2. Methane Emissions in the LNG Industry: Mitigation Strategies: Focuses on the environmental impact of methane leaks and discusses strategies for reduction.

3. LNG Regasification Technologies: A Comparative Analysis: Compares different regasification technologies and their applications.

4. The Economics of LNG: Global Market Analysis: Provides a detailed analysis of the global LNG market, including pricing, supply, and demand.

5. Safety and Risk Management in LNG Terminals: Explores safety regulations and risk management strategies for LNG terminals.

6. LNG and the Transition to Renewable Energy: Discusses the role of LNG as a transition fuel in the shift to renewable energy sources.

7. The Future of LNG: Technological Advancements and Market Trends: Explores emerging technologies and future market projections for the LNG industry.

8. Case Studies of Major LNG Projects: Provides real-world examples of successful LNG projects and analyzes their key aspects.

9. LNG Transportation and Logistics: Challenges and Solutions: Addresses the challenges of transporting LNG globally and explores solutions for efficient and safe transport.

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edition includes both discussion questions and exercises designed to reinforce important concepts, making this book suitable as a textbook in upper-level or graduate engineering courses.

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lng plant process flow diagram: Natural Gas Processing from Midstream to Downstream Nimir O. Elbashir, Mahmoud M. El-Halwagi, Ioannis G. Economou, Kenneth R. Hall, 2019-02-04 A comprehensive review of the current status and challenges for natural gas and shale gas production, treatment and monetization technologies Natural Gas Processing from Midstream to Downstream presents an international perspective on the production and monetization of shale gas and natural gas. The authors review techno-economic assessments of the midstream and downstream natural gas processing technologies. Comprehensive in scope, the text offers insight into the current status and the challenges facing the advancement of the midstream natural gas treatments. Treatments covered include gas sweeting processes, sulfur recovery units, gas dehydration and natural gas pipeline transportation. The authors highlight the downstream processes including physical treatment and chemical conversion of both direct and indirect conversion. The book also contains an

important overview of natural gas monetization processes and the potential for shale gas to play a role in the future of the energy market, specifically for the production of ultra-clean fuels and value-added chemicals. This vital resource: Provides fundamental chemical engineering aspects of natural gas technologies Covers topics related to upstream, midstream and downstream natural gas treatment and processing Contains well-integrated coverage of several technologies and processes for treatment and production of natural gas Highlights the economic factors and risks facing the monetization technologies Discusses supply chain, environmental and safety issues associated with the emerging shale gas industry Identifies future trends in educational and research opportunities, directions and emerging opportunities in natural gas monetization Includes contributions from leading researchers in academia and industry Written for Industrial scientists, academic researchers and government agencies working on developing and sustaining state-of-the-art technologies in gas and fuels production and processing, Natural Gas Processing from Midstream to Downstream provides a broad overview of the current status and challenges for natural gas production, treatment and monetization technologies.

lng plant process flow diagram: Natural Gas Sreenath Gupta, 2012-10-31 Natural gas has traditionally been used as a feedstock for the chemical industry, and as a fuel for process and space heating. Recent advances in exploration, drilling techniques and hydraulic fracturing have made it possible for natural gas to become available in abundance (as of 2012). As natural gas displaces traditional petroleum use in various sectors, a certain amount of disruption is likely. In such a changing landscape, this book tries to chronicle the state-of-the-art in various aspects of natural gas: exploration, drilling, gas processing, storage, distribution, end use and finally the impact on financial markets. Review articles as well as research papers contributed by leading authorities around the world comprise individual chapters of this book. Modeling approaches, as well as, recent advances in specific natural gas technologies are covered in detail.

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how to lay out process plants and run piping correctly in the oil and gas industry. Starting with basic terms, codes and basis for selection, the book focuses on each piece of equipment, such as pumps, towers, underground piping, pipe sizes and supports, then goes on to cover piping stress analysis and the daily needed calculations to use on the job. - Delivers a practical guide to pipe supports, structures and hangers available in one go-to source - Includes information on stress analysis basics, quick checks, pipe sizing and pressure drop - Ensures compliance with the latest piping and plant layout codes and complies with worldwide risk management legislation and HSE - Focuses on each piece of equipment, such as pumps, towers, underground piping, pipe sizes and supports - Covers piping stress analysis and the daily needed calculations to use on the job

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lng plant process flow diagram: Advanced Natural Gas Engineering Xiuli Wang, Michael Economides, 2013-11-25 Natural gas is playing an increasing role in meeting world energy demands because of its abundance, versatility, and its clean burning nature. As a result, lots of new gas exploration, field development and production activities are under way, especially in places where natural gas until recently was labeled as stranded. Because a significant portion of natural gas reserves worldwide are located across bodies of water, gas transportation in the form of LNG or CNG becomes an issue as well. Finally natural gas is viewed in comparison to the recently touted alternatives. Therefore, there is a need to have a book covering all the unique aspects and challenges related to natural gas from the upstream to midstream and downstream. All these new issues have not been addressed in depth in any existing book. To bridge the gap, Xiuli Wang and Michael Economides have written a new book called Advanced Natural Gas Engineering. This book will serve as a reference for all engineers and professionals in the energy business. It can also be a textbook for students in petroleum and chemical engineering curricula and in training departments for a large group of companies.

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