Our technology and expertise are ready to work toward your LNG future today

It’s not just what we do. It’s how we do it.

As worldwide energy demand continues to grow, the ConocoPhillips Optimized Cascade® process is well positioned to be your gas liquefaction technology of choice. With more than five decades of proven LNG technology as its foundation, ConocoPhillips has licensed its innovative Optimized Cascade® process for use in 25 LNG trains around the world. By 2020, LNG plants utilizing the Optimized Cascade process expect to have a total global installed production capacity in excess of 100 MTPA, making ConocoPhillips one of the world’s largest LNG liquefaction process technology providers.

Our Technology
The ConocoPhillips Optimized Cascade process includes proprietary technology necessary to efficiently and effectively liquefy natural gas, while recovering heavier hydrocarbons as a separate product (prevents freezing), and removing nitrogen, if required. The methods we use to integrate the technologies result in a reduction of cost and maximize efficiency of the overall LNG plant.

The Optimized Cascade process is based on three multi-staged, cascading refrigerant circuits using pure refrigerants, brazed aluminum heat exchangers and insulated cold box modules. ConocoPhillips has optimized the heat integration to closely approach the natural gas and refrigerant cooling curves, resulting in a highly efficient process. Pure refrigerants of propane (or propylene), ethylene and methane are utilized, since their physical properties are ideal for heat integration. The refrigerant properties are also well known and predictable, contributing to unrivaled operating ease and flexibility.

Brazed aluminum heat exchangers and cold box modules allow for highly efficient heat transfer and can be designed to accommodate a wide range of LNG plant sizes. Depending on the natural gas feed stream characteristics, the LNG train can be designed with a customized and integrated heavies removal unit (HRU) and/or nitrogen rejection unit (NRU) to achieve optimal LNG plant performance and maximize the net present value of the facility.

To ensure superior reliability and availability, the process is typically configured in a proven “two trains-in-one” arrangement. This approach, now widely accepted within the LNG industry as a design that provides the highest plant availability, was pioneered by ConocoPhillips, where one train of highly reliable heat exchangers and other process equipment is served by parallel refrigeration turbine/compressor sets.

As an owner and operator of the Optimized Cascade technology, ConocoPhillips provides a unique technical expertise and depth in understanding the operation of an LNG plant.

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How the Optimized Cascade Process Works
The schematic below illustrates how the Optimized Cascade process produces LNG. The raw gas is first treated to remove carbon dioxide (CO₂), Hydrogen Sulfide (H₂S) and other sulfur compounds, water (H₂O), organometallic mercury compounds, particulates, and other contaminants before it is routed to the liquefaction section of the plant. The treated gas is then chilled and condensed to approximately -162°C in successively colder heat exchangers, using pure propane (or propylene), ethylene, and methane as refrigerants. The LNG product is then pumped into insulated storage tanks where it remains until shipment. Boil-off gas and ship return vapors are captured and recycled through the Optimized Cascade process for efficient re-liquefaction.

The Optimized Cascade Process

Subject matter experts in every critical discipline required to design, operate, and maintain liquefaction facilities are readily available to Optimized Cascade process licensees.

The Optimized Cascade Process

*See Cautionary Statement on page 8.*
ConocoPhillips Optimized Cascade® Process

Optimized Cascade Process — Train Size Progression

ConocoPhillips and Bechtel’s Global LNG Collaboration

Background
ConocoPhillips and Marathon Oil contracted with Bechtel to construct the first natural gas liquefaction plant based on a new and innovative liquefaction process, the ConocoPhillips Optimized Cascade process. The result was the Kenai, Alaska LNG facility, which began operation in 1969.

ConocoPhillips’ initial intent was to use the technology exclusively on its own equity projects. However, in the mid-1990s, Atlantic LNG sought to build a low-cost, yet reliable, single train LNG facility. After completing a competitively bid front-end engineering design (FEED), with ConocoPhillips’ support, Bechtel won the engineering, procurement and construction (EPC) contract, resulting in the first externally licensed application of the Optimized Cascade process and the next opportunity for ConocoPhillips and Bechtel to work together in the field of natural gas liquefaction.

As a result of this achievement, ConocoPhillips and Bechtel formed a Global LNG Collaboration (the “Collaboration”) in 1998 to capitalize on ConocoPhillips’ LNG technology and operations expertise and Bechtel’s world-class design and project execution know-how of LNG facilities. Since then, the Collaboration has become a leading player in the LNG industry with a reputation for building efficient LNG plants on schedule and at a competitive cost.

Bechtel’s Extraordinary Capabilities
When innovative design solutions, execution excellence, and superior value in all phases of a gas project are needed, the industry looks to Bechtel to achieve these goals. Whether building complex projects in remote locations under difficult conditions, supporting customers in arranging international financing, or tackling complicated logistics, Bechtel provides customers with cost and schedule savings breakthroughs. Bechtel is unique among EPC contractors because of its vast ability to design and direct construct multiple LNG projects simultaneously. This is most recently demonstrated by concurrently executing six LNG mega-projects:
- two-train Queensland Curtis LNG project (Queensland, Australia)
- two-train Gladstone LNG project (Queensland, Australia)
- two-train Australia Pacific LNG project (Queensland, Australia)
- two-train Wheatstone LNG project (Western Australia)
- five-train Sabine Pass Liquefaction project (U.S. Gulf Coast)
- two-train Corpus Christi Liquefaction project (U.S. Gulf Coast)

Most Bechtel LNG projects are constructed under lump sum turnkey contracts. Bechtel’s unique approach to modularization, combined with its unprecedented worldwide resources to support construction, facilitates predictable outcomes. Project owners know they can depend on Bechtel to deliver.

Our Team
The Collaboration offers customers a world renowned team of skilled professionals. We have integrated teams of LNG technology and EPC experts who are devoted solely to the development of the design and optimization of LNG projects using...
Reducing Risk:
Total Life Cycle Focus

Front-End Optimization
The concept is simple: decisions made and activities undertaken in the early stages of a project have the greatest impact on risks, cost and schedule. By involving the Collaboration early in the decision-making process, our customers benefit from the consistent application of our front-end optimization in all phases of a project. The Collaboration has decades of experience in a wide variety of LNG projects, from the study phase through construction and operations.

Sustainable Development
At ConocoPhillips and Bechtel, sustainable development is about conducting our business to promote economic growth, healthy environments and vibrant communities, now and into the future. We recognize that significant advantages of LNG include that it connects natural gas producers and end users on multiple sides of the world, brings the benefits of natural gas to more end users, and spurs economic growth in producing and consuming regions. ConocoPhillips and Bechtel work closely with customers and contractors to ensure the Optimized Cascade process maximizes each LNG plant’s efficiency and economics, while at the same time minimizes the LNG plant’s environmental footprint.

Advantages of the Optimized Cascade Process Technology

<table>
<thead>
<tr>
<th>High availability</th>
<th>“Two-trains-in-one” configuration yields approximately 95% plant availability, with high efficiency during turndown</th>
</tr>
</thead>
</table>
| Proven technology | • More than 45 years of operation  
|                   | • 25 trains licensed at 12 plants, in excess of 100 MTPA of capacity  
|                   | • Designed and built plants with broad range of ambient temperatures and feed compositions |
| Flexible operations | • Easy to start up, shut down, operate and maintain, with fast startup cycles and wide operating range  
|                   | • Cold boxes retain cold temperatures during extended outages, which greatly facilitate faster startup cycles  
|                   | • Highest plant turndown capability  
|                   | • Rebalancing between refrigeration circuits allows for quick response to changes in operating conditions |
| Integrated design options | • Use of brazed aluminum heat exchangers, aero-derivative gas turbines, and waste heat recovery integration, yields up to 96% LNG-facility thermal efficiency and lower emissions  
|                   | • Refrigerants retained in process and not flared during shutdowns  
|                   | • Increase LNG production and efficiency with:  
|                   | – Combined cycle/cogeneration  
|                   | – Gas turbine power augmentation  
|                   | – Gas and flashing liquid expanders |

Advantages of the Global LNG Collaboration

| Reputable licensor and EPC contractor — “One Team” | ConocoPhillips as an owner, licensor and operator of LNG facilities, and Bechtel as a world class EPC contractor offer:  
|                                                      | – consistent development and application of best practices for more than 20 years  
|                                                      | – credibility to LNG developers and their financial institutions |
| Predictable outcomes | Bechtel’s unparalleled track record of constructing successful projects on time and within budget  
|                      | Together, ConocoPhillips and Bechtel provide a performance guarantee for LNG production |
| Owner’s perspective | As an owner and operator of multiple LNG facilities, ConocoPhillips has broad experience in all aspects of the LNG value chain and shares valuable design and operational insight with licensees |
| Services and support expertise | The Collaboration provides experienced subject matter experts to:  
|                                 | – contribute in all project phases  
|                                 | – provide quality assurance of key equipment  
|                                 | – ensure safe, successful commissioning and startups  
|                                 | – train operators and provide post startup operational support |
### Optimized Cascade Process reference list

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Train Count</th>
<th>Capacity (MTPA)</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
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<td>Kenai, Alaska, USA</td>
</tr>
<tr>
<td>Atlantic LNG</td>
<td>4</td>
<td>14.8</td>
<td>Point Fortin, Trinidad and Tobago</td>
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<td>Darwin LNG</td>
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<td>3.7</td>
<td>Darwin, Australia</td>
</tr>
<tr>
<td>Equatorial Guinea LNG</td>
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<td>Malabo, Equatorial Guinea</td>
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<td>Angola LNG</td>
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<td>Queensland Curtis LNG</td>
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<td>Cameron Parish, Louisiana, USA</td>
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<td>Wheatstone LNG</td>
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<td>Ashburton North, Australia</td>
</tr>
<tr>
<td>Corpus Christi Liquefaction</td>
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<td>9.0</td>
<td>San Patricio County, Texas, USA</td>
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</table>

**TOTAL**                      | 25          | 101.8           |                               |

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1. Optimized Cascade® is a registered trademark of ConocoPhillips Company in the United States and certain other countries.

**CAUTIONARY STATEMENT**

These materials contain forward-looking statements. We based the forward-looking statements on our current expectations, estimates and projections about ourselves and the industries in which we operate in general. We caution you these statements are not guarantees of future performance as they involve assumptions that, while made in good faith, may prove to be incorrect, and involve risks and uncertainties we cannot predict. In addition, we based the forward-looking statements on assumptions about future events that may prove to be inaccurate. Our actual outcomes and results may differ materially from what we have expressed or forecast in the forward-looking statements. Economic, business, competitive and regulatory factors that may affect ConocoPhillips’ business are set forth in ConocoPhillips’ filings with the Securities and Exchange Commission, which may be accessed at the SEC’s website at www.sec.gov.