BD Group Industries, LLC., is a worldwide energy solutions provider to the petrochemical, refinery and oil & gas industries delivering a diverse array of worldwide products and services through its subsidiaries, BD Heat Recovery Division, BD Energy Systems and BD Environmental Services.

BD Heat Recovery Division, Inc., ("BD Heat") specializes in energy and efficiency improvements of Air Preheaters and Selective Catalytic Reduction (SCR) applications. BD Heat offers engineering services, patented recuperative plate heat exchangers, SCR's and an integrated high efficiency heat exchanger system forming the BD Heat Compact DeNOx system.

BD Energy Systems, LLC., ("BDE") is a world leading furnace engineering company specializing in: Design, Revamps, Relocation of Furnaces, Furnace Efficiency and Capacity Increase studies, NOx Reduction, Retrofit projects, In-House or On-Site operator Training, and Capital supply of Furnace packages, including Construction and Commissioning services.

BD Environmental Solutions, LLC., ("BDen") is a leading manufacturer of flares, thermal oxidizers (TO), regenerative thermal oxidizers (RTO) and sulfur recovery units. BDen specializes in the petrochemical, refinery and environmental technologies. Our Mission is to meet the continuous development and growing demand of environmental protection.
BD Energy Systems provides services for efficiency improvement and enhancing energy reduction and recovery, including the following:

- Full process and thermal efficiency review of existing installation towards achieving
  - Radiant Efficiency gain of 5-7%
  - Reduced fuel cost of >$1,000,000/year
  - Improved Convection Section Performance

- Conversion of natural draft systems to forced draft preheated combustion air systems

- Complete overview of equipment metallurgy and operating design parameters

- Increase production capacity

- Emission reduction

- Compact, high efficiency, preheated combustion air solutions

With a combined experience of over 60 years, our process engineers are skilled in the detailed design of every type of petrochemical, refinery and fertilizer application and service. Using industry recognized furnace and process simulation tools they work towards developing the highest efficiency and energy driven designs whilst optimizing them for minimal cost impact solutions. Typical simulation tools used extend to:

- FRNC 5 for thermal rating of furnaces
- Internal proprietary software
- HeaterSim 560
- Reform 3 for furnace rating, design of firebox section and optimization
Structural Design

Having greater than 30 years of experience in the design of reformers, ethylene crackers, fired heaters and other fired equipment installations, our structural design specialists are fully conversant with the compliance requirements of all Worldwide structural, building and environmental codes. This knowledge is fully utilized in the review of revamps, expansions and new build construction.

Codes:
- AISC
- ASME STS-1
- ICC-IBC-2012

Softwares:
- Piping Flexibility
- STAAD Pro V8.0

Mechanical Design

Our mechanical engineers have vast experience in heat transfer equipment, fired equipment, and rotating equipment all necessary for successful execution of a project. With professional certified engineers we are able to certify designs in house. The mechanical design software and codes we use are:

Codes:
- ASME Div.VIII & Div.I
- Piping B31.3 & B31.1
- API 530
- DIN
- TUV and other international Codes

Softwares:
- CAESAR II for stress and vibration analysis of furnace tubes/coils
**Execution**

**Project Management / Execution**

Timely execution of projects and delivery of equipment in line with start up and commissioning activities is a key element to ensuring a client’s overall objectives are achieved. BD Energy Systems prides itself on our attention towards total project management and the success in achieving and correctly managing all of our clients requirements including:

- Timely and precise kick off for the project start date
- Correct document control, submittal and expediting
- Accurate budget control
- Timely and correct close out of project final documentation
- Detailed and accurate schedule control, including:
  - Maintaining or improving key project milestones
  - Timely and precise submittal of documentation
  - Timely and accurate progress reporting
  - Expediting of sub-vendors and client

**Procurement**

The experience of our procurement team and integration of their role into the total project management that BD Energy Systems implements, has enabled the successful management of project budgets allowing BD Energy Systems to ensure that every risk of a cost overrun for our clients is minimized. With a combined experience of more than 40 years, this allows our procurement team to hold the complete responsibility of equipment and materials from requesting inquiries through delivery including:

- To set in place pre-agreed terms and conditions
- To set in place pre-agreed pricing on qualifying materials
- Materials pricing / approved shop loading analysis
- Materials management
- Expediting
- Logistics & timely delivery
- Full budget control
- Qualifying vendors/shops verifying their quantity, capabilities & loading capacities time to time to mitigate risk
Revamps

Furnace Relocation & Construction Management

With an extensive experience in design and construction of large variety of furnace designs, BD Energy Systems are enthusiastic to provide Worldwide technical support services to our clients to ensure smooth transition of the following:

- Complete furnace relocation including, demolition, detailed design, and construction
- Cost analysis, feasibility planning and budget execution control
- Turn around planning
- Supervision of start up & commissioning into service
- Construction management of new build, re-build and in-kind replacement.
**Products**

**Scope Of Products**

BD Energy is a complete resource for all customer’s furnace needs from individual heaters, steam methane reformers, Ethylene crackers to air preheaters and SCR Systems including construction management commissioning and start-up to carry out a complete turn-key project.
Products

Steam Methane Reformers

Application: Ammonia, Methanol, Syngas, Hydrogen
- Complete primary reformer revamp and modernization to current industry codes
- Supply of new primary reformer packages
- Convection section replacement
- Catalyst tube replacement
- Relocation of reformer units
- Capacity increase studies & project implementation
- Process studies
- Energy and efficiency improvement studies
- Construction management
- Harp Balancing
- On site field & technical supervision services
- Emissions reduction

Ethylene Crackers

Application: Liquid, Naphtha, Natural Gas, and Propane Cracking
- Complete cracking unit revamp and modernization
- Relocation of cracking units
- Convection section replacement
- Tube replacement
- Capacity increase studies and implementation
- Process Studies
- Energy and efficiency improvement studies
- Construction management
- On site field & technical supervision services
Products

Fired Heaters

Application: CCR Platforming Units, Propane Dehydrogenation Unit (PDH), Delayed Coker Units, Crude Distillation Unit (CDU heater)
- Supply of new furnaces
- Complete revamp and modernization
- Convection section replacement
- Radiant section modifications / burner replacement
- Capacity increase studies & implementation
- Process / engineering studies
- Energy and efficiency improvement studies
- Construction management
- On site field & technical supervision services

Selective Catalyst Reduction Units (SCR)

Application: Steam Methane Reformers, Ethylene Crackers, FCCU Units, Fired Heaters
- Supply of new and replacement SCR units
- Emission studies
- Construction management
- On site field supervision and technical services
This BD Energy Systems advanced training course is directed toward improving the level of understanding among plant management, engineers, operators, maintenance, and HSE personnel. This course will assist all of your stakeholders to more effectively apply this knowledge to make better decisions on how to deal with specific operating and maintenance issues that plant personnel face on a daily basis, how to coordinate their efforts to achieve the best long-term performance, and to identify opportunities for improvement.

**Objective**
This BD Energy Systems advanced training course is directed toward improving the level of understanding among plant management, engineers, operators, maintenance, and HSE personnel. This course will assist all of your stakeholders to more effectively apply this knowledge to make better decisions on how to deal with specific operating and maintenance issues that plant personnel face on a daily basis, how to coordinate their efforts to achieve the best long-term performance, and to identify opportunities for improvement.

**Target Group**
Plant Management, Engineering, Operations, Maintenance, and Health, Safety & Environmental personnel in Ammonia, Methanol, Hydrogen, GTL, and Ore Reduction plants that require Steam Reformer furnaces for generation of hydrogen, synthesis gas, or reducing gas.

**In This Course**
The course starts with the basic fundamentals of Steam Reformer design, includes an overview of the historical evolution of various reformer designs, and the impact of operating parameters on Steam Reformer reliability. The course progresses to an interactive discussion during which operating and maintenance issues will be introduced and comments from attendees will be addressed in a problem-solution format. BD Energy Systems instructors will also involve an expert group of suppliers of key components, equipment, and services for Steam Reformers during the interactive session to provide thorough analysis and discussion of each topic.

**Instructors**
As a company, BD Energy Systems brings together some of the most widely recognized and respected individuals in the Steam Reforming Industry.

- Dan Barnett
- Greg Cargle
- Al Faller
- Joe Price
- Roger Lee
- Dr. Olivier Brasseur

Together these instructors offer an unrivaled resume of over 200 years experience in the design, supply, construction and operation of Steam Methane reformers for Ammonia, Methanol, Hydrogen, and Syngas Plants
Study Requirements

Required Data for a Study / Revamp of Furnace

Definition of Physical Condition
- Original design drawings
- Photos, maintenance / inspection reports to define condition of reformer
- Original datasheets of the furnace - burners, ID/FD fans, combustion air preheater and any other related equipment
- Updated drawings, datasheets, performance curves to understand any design changes made to the original design of furnace and related equipment

Definition of Operational Condition
General - Natural, forced or induced draft design, preheated combustion air or ambient, excess air level, fuel flow rate and gas pressure, temperature & composition, site altitude, any other specific information available.

Fired Heaters / Steam Methane Reformer / Ethylene Cracker
(Additional Info Required)
- Process feed flow rate and gas composition
- Radiant coil outlet conditions
  - Reformers - Radiant coil outlet temperature / pressure / methanol slip
  - Ethylene Crackers - Conversion / target ethylene yield
- Process air flow rate - HP steam generation information - BFW flow economizer coil, saturated HP steam flow, steam drum to superheat coil, desuperheater (attemperator) BFW flow, steam drum blowdown flow
- Fuel flow rate and gas composition for each firing location
- Coil (tube side) operating temperatures and pressures
  - All process coil inlet and outlet conditions (Radiant coil / Convectoin Coils)
  - All utility coil inlet and outlet conditions (economizer coil, HP steam coils, including inlet and outlet of desuperheater, if so equipped)
- Flue gas temperature, pressure, O2 and NOx measurement profile conditions
- Combustion air temperature and pressure profile conditions

Revamp / Study Objectives
- Efficiency Improvements
- Capacity Improvements
- Emission Reduction
- Reliability Improvements
- Burner Replacement
- Convection Section De-Bottleneck
- Addition of Feed Gas or Saturater Coil
- Addition Of SCR
- Combustion Air Preheat Addition