

Zurich, Switzerland  
February 13th - 14th, 2023

This training seminar is intended to provide an overview of the techno-economic aspects of turbomachinery used in the LNG lifecycle, from liquefaction to shipping and all the way to gasification.



## Workshop Speakers



**Matt Taher**  
Bechtel Energy  
Principal Engineer (LNG Technology)



**Prof. Reza Abhari**  
ETH Zurich  
Professor, Strategic Advisor

## PROVISIONAL PROGRAM

### Module 1: February 13th, 1:30 pm - 6:00 pm Overview of the Technical & Commercial Investment in the LNG Sector

#### Economic Aspects

- LNG Market (Supply and Demand Forecasts by 2050)
- Liquefaction, Shipping, and Gasification (A brief review of different process licenses, LNG plant layout and major equipment, real estate and plot plan, modularization)
- Engineering, Procurement and Construction Activities (an overview of major activities in an EPC project for LNG plants from a conceptual design to commissioning and start-up)
- Environmental issues, GHG emissions and government tax
- Carbon Capture in LNG plants
- Main equipment manufacturers and supply chains
- Life Cycle Costs (CAPEX / OPEX), Reliability and Availability, Insurance
- Safety and risk analysis (HAZAN, HAZID and HAZOP)
- Human factors engineering

### Module 2: February 14th, 9:00 am - 6:00 pm Technical Aspects of LNG: Liquefaction Plants, Shipping, Gasification Plants

#### LNG Liquefaction Plants

- Thermodynamics of LNG Liquefaction Process
- An overview of liquefaction licenses, plant layout, process units, and main equipment
- Turbomachinery in LNG liquefaction plants (Gas Turbines, Compressors, Pumps, Gas Expanders, Liquid Expanders)
- Different arrangements of refrigeration compressors in the liquefaction unit (footprint, maintenance, performance, modularization, ...)
- Matching of a refrigeration compressor with its driver
- Industrial- versus aeroderivative gas turbines as mechanical drives in LNG liquefaction plants
- Electrification of LNG liquefaction plants: large motors versus gas turbines
- Performance evaluation and testing of turbomachinery based on API standard requirements

- Engineering Codes and Standards (API 616, API 617, API 610, API 684, API 614, API 682, API 692, ASME PTC-10)
- CO2 emissions and Carbon Capture in LNG plants

#### LNG shipping

- An overview of LNG shipping
- GHG emissions
- Boil-off gas management

#### LNG Gasification Plants

- Thermodynamics of LNG Gasification Process
- Plant Layout and main equipment
- Energy recovery and expander-generators
- Codes and standards for expander-generators in LNG gasification plants