Simulation and Optimization of TEALARC LNG Plant

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About Flowsheet:

Herein, process simulation is carried out for TEALARC LNG Plant in which liquefied natural gas (LNG) produced. The LNG was produced by use of refrigeration cycle which made up of four major components: compressor, evaporator, expansion valve and condenser. Basically, refrigeration system removes energy from a low-temperature region and transfer heat to a high-temperature region. Mainly there are two types of refrigeration cycle; here we considered vapor compression cycle.

In TEALARC LNG Plan there are two sections to be consider are:

- pre-cooling cycle
- liquefaction cycle

Pre-cooling cycle: This cycle primarily consists of propane and ethane gas which is cooled from a temperature of about 86°C to -64°C at a five pressure level. The cooling is achieved by the use of cooler and energy is recycled by use of thermal energy mixer which can give further energy to heater for heating purpose. Herein, flowsheet it noted with (PLNG100; PLNG101; PLNG102). The adiabatic compressor is used to compress the vapour to about 2260KPa at three pressure level. The compressed stream is further condensed and recycles back to cooler to continue he circulation.

Liquefaction cycle: The liquefaction cooling cycle consists two compressors and gas-liquid separator and there is also heating and cooling arrangement is controlled via use of thermal energy mixer which noted as (LNG100; LNG101; LNG102). In separator vapor and liquid fraction is spitted.

In process, treated natural gas is feed into heat-exchanger where, is cooled from 30°C to about -52°C while second outlet stream of exchanger is superheated from about -56°C to about -4°C. This stream is compressed by compressors (K102 and K101) and subsequently cooled and recycled to pre-cooling plant. The natural gas feed is further sub-cooled in cooler and partially liquefied. After that it further cooled and liquefied at it's at a temperature of -157°C, which is about the boiling point temperature of methane gas. The pressure of the natural gas stream is further reduced to the atmospheric pressure with the help of the expander there by reducing the temperature to about -163°C. Then, liquefied natural gas is flashed. From the simulation following results obtained:

LNG		
Molar Flow= 34652.687 kmol/h		
Components	Fraction	Temperature
Methane	0.90817845	-163.74811°C
Ethane	0.058245842	
Propane	0.019063444	
N-butane	0.0010590809	
Nitrogen	0.01345316	

Flowsheet references: http://www.chemsep.com/downloads