Unconventional Gas LNG for Tokyo Gas

Atsushi Saiganji
Tokyo Gas Co., Ltd.
April 19th, 2013
TG Welcomes Unconventional Gas Development

Development of unconventional gas enables:

- Growth and diversification of supply
- Relaxation of demand and supply balance
- Improved supply security
- Lower rate affordable for the customer
- Enhanced utilization of natural gas, which leads to cleaner environment and all the related parties will be benefited from
TG’s Gas Production Process

Process flow:
- Liquid-Line
- Gas Line
- LPG

- Unloading Arm
- LNG Carrier
- LPG Carrier
- LNG Tank
- LPG Tank
- Primary Pump
- Secondary Pump
- Air Separation
- TGBP Sodegaura 100MW
- Land Trunk Line
- City Gas Submarine Trunk Line
- TEPCO Sodegaura 3,600MW Fuel For Generator
- TEPCO Anegasakai 3,600MW
- TEPCO Goli 1,866MW
- Local city gas suppliers, Tank Truck Shipments
- Domestic LNG tankers

Boil-Off Gas Compressor
Return Gas Blower
**Adjusting Heating Value**

- Japanese gas consumers wish to use the energy at higher efficiency and lower environmental impact.
  - Industrial and commercial gas appliances including gas engines & turbines are adjusted to achieve high efficiency at stable heating values.
  - Allowance range to achieve high efficiency: +/-1MJ/m³

- The heating value is adjusted to match the imported LNG with the highest heating value.
  - 45 +/- 1 MJ/m³ in case of Tokyo

45MJ/m³ (app. 1,200 Btu/scf)

40MJ/m³ (app. 1,075 Btu/scf)
Advanced mixed LNG storage technology

- Facilities for excluding rollover risk
  - Facilities to prevent stratification
    - Top / Bottom filling nozzle
  - Facilities to prevent rollover
    - Jet mixing nozzle
    - Density monitor

B : Bottom filling nozzle
T : Top filling nozzle
J : Jet mixing nozzle
D : Density monitor
TG’s Operation and Management of Lean LNG

- LNG importers should increase the flexibility of their LNG terminal to make the most of opportunities recently appearing in LNG industries.

- The LNG terminals of Tokyo Gas have flexibility for lean LNG due to
  - Experience in more-than-40-years of LNG handling (including Alaska LNG)
  - Development of mixed LNG storage technology

- Services including feasibility study, designing, engineering consulting, construction supervision relating to city gas, LNG and LPG receiving terminals is available.
Recent Announcement from Tokyo Gas

- Participation in the shale gas development joint venture in US Barnett basin (Mar 29, 2013)
  - Seller: Quicksilver Resources Inc.
  - Buyer: TG Barnett Resources LP
  - Object: 25% of the working interests of the shale gas business in the US Barnett basin, Texas, owned by Quicksilver Resources Inc.

- Tokyo Gas and Sumitomo Corporation to enter into Heads of Agreement for Sale and Purchase with Cove Point LNG (Apr 2, 2013)
  - Term: Approximately 20 years from the Project start date
  - LNG Quantity: 1,400,000 tons per annum
  - Contract Price: Henry Hub index linked formula
  - Delivery Terms: Free on Board
Conclusion

Tokyo Gas, in its long-term corporate strategy “Challenge 2020 Vision,” is exploring the diversification and expansion of raw materials procurement, including unconventional LNG, across the globe as well as expanding its overseas LNG value chain initiatives to reduce the cost of raw materials.

Tokyo Gas will endeavor to achieve a higher level of transparency of LNG pricing, and stability of supply of LNG, by leveraging its vast experience gained over the years, through procurement of LNG from a multitude of projects and through LNG terminal operations.
Thank you!

Wishing all of us the best for the prospective future!!