CRYOGAS INDUSTRIES

Inauguration of India's first LCNG Station

At

LNG Express India Private Limited, Waghodia

31st March 2018

The morning of 31st March 2018 started with 'Ganesh Puja' followed by Katha and prayers.

Guests from many parts of India arrived to attend the inauguration of India's first LCNG station at LNG Express.

In the inaugural speech, Mr. Nayan Pandya, CMD of Cryogas Industries Group of Companies and Director at LNG Express India Pvt. Limited welcomed all the guests and dignitaries. He emphasised the importance of LCNG station for India.

He emphasised that:

- Gujarat has the largest network of gas pipeline, which was the result of long term vision of the Gujarat Government, headed by the current Prime Minister, Shri Narendra Modi.

- Gujarat has more than 17 Lakhs PNG connections & largest CNG dispensing stations
- Contribution of Natural Gas in successful industrial development of Gujarat is largely contributed to its large pipeline network.
- While the Indian Government is making enormous efforts to clone this gas based economy model by encouraging investments in Natural Gas import, re-gasification and pipeline network, it remains the fact that laying pipeline all over India will not happen immediately due to challenges associated with it.
- Conventional City Gas Distribution Model enables reaching the geographical area by laying pipeline and then starts making the connections to distribute Natural Gas.
- Mr. Pandya also gave an example of Amazon and its' Owner Mr. Jeff Bezos who is the richest man on earth today who always strives to reach all of his customers at the earliest. Recent announcement from Amazon confirms video link that the customers will receive their ordered items within 30 minutes with innovative packaging solution of LNG.
- Taking inspiration from this, Mr. Pandya emphasised the importance of reaching last mile customer with the help of Natural Gas.
- Even today with all the pipe network, Gujarat today covers only 36% of customers.
- The 3rd Generation LNG Hub & Spoke solution, conceptualized, designed, engineered, developed, manufactured and commissioned by Cryogas Equipment at its LCNG facility in Vadodara enables City Gas Distribution companies to reach their last mile customer faster & safer than ever, say @ 4G speed.
- Even in the conventional model, last mile customer comes last whereas in the 3rd Generation model, the last mile customer comes first. There is added advantage to the CNG companies. With hub & spoke system LNG based they can start deliveries, connect cluster of customers and then bring pipeline in most densely populated customer pockets and relocate 3rd Generation Portable Equipment to other upcoming markets for exponential growth.

- Popularly known as market seeding the 3rd Generation solution at 4G speed will enable City Gas Distribution Companies start making revenue by reaching the last mile customer from beginning day 1 without having to worry about all the troubles of laying pipeline.

Shri GSP Singh, Chief General Manager (Gas Marketing) of Indian Oil Corporation Limited, Shri Bhashit Dholakia, Senior Vice President (CGD) of Adani Gas Limited, Shri J. P. Mishra GM-IOCL and other members from Indian Oil, Adani Gas, Cryogas lighted the lamps and inaugurated the LCNG station.

Shri Bhashit Dholakiaji, the Chief Guest at the function extended Good Wishes and congratulated Cryogas and LNG Express Teams for the excellent initiative. Shri Dholakiaji also confirmed that such LNG based Hub & Spoke Model will definitely benefit CGD companies to grow faster, better and efficient while staying safe at all times.

Shri Dholakiaji also conveyed the Best Wishes to Cryogas Industries to deliver the benefits to the last mile customer. He emphasised that there are a lot of avenues where Adani Gas would like to bring this advantage of 3rd Generation solution. According to him, Natural Gas is already a very good business segment and this 3rd Generation model makes it even more attractive. Delivering NG-PNG-LNG-LCNG & Auto-LNG @ 4G Speed.

Shri GSP Singh of IOCL said he remains highly attached to this first LCNG Station professionally and emotionally knowing full fact that end user customers will benefit a lot.

Mr. Singh described IOCL's size and reach in the Oil and Gas market and was very happy to announce IOCL's partnership with Cryogas Group. Mr. Singh congratulated Cryogas Team for creating history and this land mark achievement today. Mr. Singh described LNG Hub and Spoke model and its importance in reaching last mile customer either through Cascades or LNG trucks or even by Mini & Micro-Bulk LNG Cryogenic Liquid Cylinders.

Mr. Singh also expressed the opportunity of supplying gas to the complete industrial estate through gas pipeline using the CGD platform of VGL – Vadodara Gas Limited. Mr. Singh explained that core value of IOCL is 'Care, Innovation, Passion and Trust' and Cryogas Group displayed their capabilities as a melting pot of all these core values where IOCL happily partners the revolution in the Natural Gas industry.

Mr. Singh mentioned the enormous challenges that came across and how Mr. J.P. Mishra & IOCL team along with Cryogas team solved these hurdles. He also cited few instances like our first LCNG Regas Station had not faced any initial teething problems, unlike that of others.

Mr. Singh also mentioned that Cryogas entered into LNG industry in 2013 by installing India's first LNG Re-gas Station on Build Own Operate (BOO) basis for a company in Bhopal, Madhya Pradesh.

Very soon Cryogas Industries has conceptualized and commissioned a merchant LCNG station independently without even waiting for any contractual commitments for downstream distribution.

Mr. Singh appreciated the fact that in 2013, LNG Re-gas Station was installed by procuring Cryogenic storage and other equipment from companies around the world, but within four years Cryogas invested in State-of-Art manufacturing facility and started manufacturing LNG storage tanks, Cryogenic LNG tankers, complete LNG unloading Pump Skids, LCNG Manifolds, LNG Vaporizers, Switching Skids, PLC SCADA, LCNG, Cryogenic Mini and Micro-bulk System and full integration in order to master the entire value chain to provide one-stop solution to the demanding gas industry..

Mr. Singh emphasised on the importance of such Hub & Spoke LNG + LCNG Stations in order to reduce the amount of pollution and save the environment.

Mr. Singh made an interesting comment that this very city of Baroda was the first in India to use Natural Gas way back in 1972 when it was being flared in the refineries; eventually the State of Gujarat invested heavily into multiple LNG import and re-gasification stations as well as extensive network of Natural Gas pipelines and Mr. Singh was quick enough to correlate the fact that here comes another first in Gujarat in setting up a high end fully automated LCNG station once again showing and leading the way for the rest of India to follow.

Mr. Singh highlighted the fact that Cryogas Industries invested in and commissioned the first LCNG station of India without even a single contractual commitment from any of the customers and he also welcomed Mr.Bhashit Dholakia of Adani Gas, one of the CGD agencies in Gujarat to become the anchor customer for this facility.

LNG started coming to PLL's Dahej LNG terminal in 2004 and in 2007, just within three years, IOCL set up India's first LNG re-gas Station for a German company in Jambusar, Bharuch within Gujarat. This and such LNG Regas Stations were built for individual customers for their captive consumption. However, the LCNG facility like this with additional features, will cater to a large number of consumers, Mr. Singh specified.

Mr. Singh described IOCL's pioneering efforts in promoting LNG by road by giving 'LNG at Doorstep' as a vertical. He also said that BPCL, GAIL and other Maharatana companies now following the same model is a very welcome step in the Natural Gas industry. Mr. Singh informed the audience that in 2015, IOCL enabled the use of LNG in the transportation sector for running of LNG fuelled bus, which has now completed nearly 10000 kms, which has paved the way for new regulations, which are now already in place.

Mr. Singh also stated that our Honourable Minister of Petroleum, Shri Dharmendra Pradhan, who in an LNG conference on 28.03.2018 (just three days back) emphasised to all the Oil and Gas Companies like IOCL, BPCL, GAIL and others to go for such LNG based distribution models and announced full support from the Ministry.

Mr. Singh announced the upcoming LNG dispensing facility at Reliance for the mining sector where once again the complete facility is under manufacturing at Cryogas. At Reliance Sasan 3900 MW-UMPP plant use of LNG in high horse power-HHP, mining segment will reduce diesel consumption significantly by enabling use of dual fuel (LNG+Diesel). Mr. Singh happily announced partnership of IOCL with Cryogas in this venture and many more to come. The association of IOCL with Cryogas in the mining sector will also bring several environmental and economic benefits, by addressing the HHP requirement where heavy fuels need proven alternatives.

Mr. Singh also appreciated the R&D efforts to display LNG in micro bulk during the inaugural session upon one of the attendees' curious request. The Research & Development Arm of Cryogas successfully filled up extremely low pressure (below 1.45 bar/g) with LNG and used the small coil heat exchanger with regulator to prepare 'chai' to which he gave the name 'LNG CHAI'.

(Commercial & industrial use of LNG cylinder is under approval with PESO office)

Apart from chai, a couple of enthusiastic R&D engineers also baked brownie cake at the inaugural session. Next to that was fresh ice cream making station using Liquid Nitrogen straight from the Milk and Mango. On the top LNG baked brownie, Nitrogen cooled ice cream,

the Head of the Service and Engineering Team sprinkled Liquid Nitrogen soaked fresh rose petals.




The team of R&D engineers were extremely pleased to receive compliments from all the guests and dignitaries.


Finally, Mr. Singh conveyed his professional, and emotional attachment with this facility and he confirmed to provide all moral support in order to ensure that the benefits go to the entire society in all directions to reach the **LAST MILE CUSTOMER**.

As a mark of our appreciation and love, mementos were presented to the dignitaries on the dais –

- By Shri Pankaj Bhatt to Shri Bhashit Dholakiaji of Adani Gas Limited
- By Shri Amrish Patel, Vice President – Marketing to Shri GSP Singh of IOCL
- By Shri Vikas Patel to Shri J.P. Mishraji of IOCL



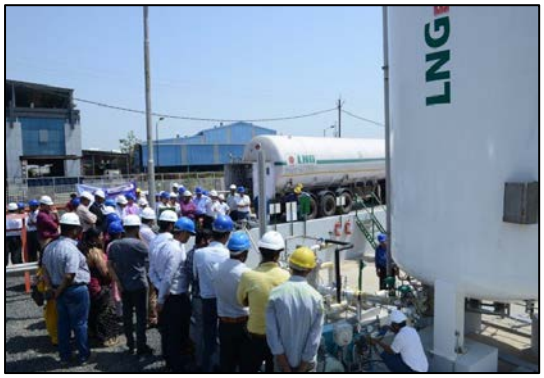



- By Shri Vinod Mewada to Shri Pawan Sinhaji of IOCL
- And finally the first Welder who has joined Cryogas Group way back in 1988 presented memento to Shri Dhirendra Mishra, Director, AG&P Karaikal LNG.

During industrial tour, Mr. GSP Singh, Chief General Manager – Gas Marketing of IOCL along with the entire IOCL team announced opening of the LNG Unloading Pump Skid by cutting the ribbon.

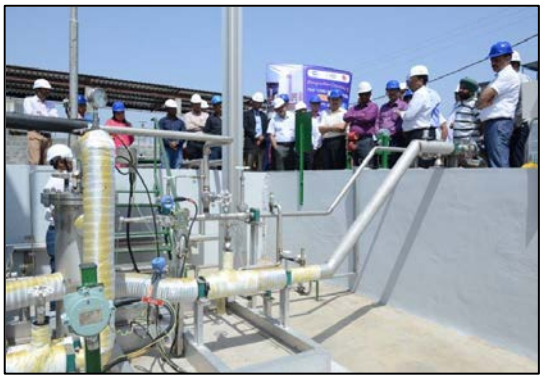


Mr. Nayan Pandya explained in detail the design features part by part to all the guests and dignitaries highlighting following main features:



- LNG Unloading Pump Skid uses submerged LNG pump, which is extremely safe
- LNG Unloading Pump Skid has been designed for the first time in India to carry out multipurpose activity of unloading LNG from tanker to the storage tank and
- By reversing, the flow of LNG from storage tank to the Pump Skid, deliver LNG to micro bulk refilling facility and LNG dispensing upon obtaining further approvals from statutory authorities. For this cryogas demonstrated its high vacuum multi-layer super insulated cryogenic pipeline which ensure LNG transfer without any boil-off of LNG.
- LNG Unloading skid has several salient features with extremely efficient multi-layer super insulation under high vacuum sump which houses submerged pump to hold cryogenic liquid LNG and facilitate LNG unloading and reloading. This complex skid designed and commissioned for first time in India saves on space, duplication of pumping, reduction in power and facilitating the use of the pump all around the day after unloading operation is already carried out.

- The complex skid was fully designed and developed by Cryogas Engineering team in India and commissioned first using Liquid Nitrogen after getting PESO approval and licence for several times before commissioning with LNG to ensure vent-free unloading.



- Cryogas manufactured LNG storage tank with safe multipurpose ports, safety features, ESD valves, auto safety engagements, which were described to the esteemed visitors.
- Advantages of high pressure LNG reciprocating pump were described and finally after the commissioning of the PLC SCADA control room demonstrated live performance to the visitors by starting the reciprocating pump from the control room to fill up India's first batch of cascades provided by Adani Gas Limited with LCNG.

- LNG is pressurized using cryogenic reciprocating pump up to 255 Bar pressure and this high pressure LNG is then vaporized in stainless steel lined high pressure cryogenic atmospheric vaporizers & gets converted into high pressure LCNG for filling the cascades, & dispensing of LCNG.
- One of the flagship Companies in Cryogas Industries Group, namely, IWI Cryogenic Vaporization Systems (India) Pvt. Limited has been providing such extremely high flow high pressure vaporizers to the customers in India and also exporting to the world market from its SEZ facility located in ASPEN Infrastructure SEZ, provided these LNG-LCNG Vaporizers, as well as BOG vaporizers.
- The stainless steel lined cryogenic vaporizers do not need any external energy even during winters and have demonstrated their nonstop performance at more than 50000 customer sites by Cryogas Group in the last twenty years.
- Several safety features and interlocking logics were explained along with transmitters, ESD valves and emergency systems, logic interfaces.

- Shri Bhashit Dholakia of Adani Gas inaugurated the completely independent PLC SCADA control room. The PLC SCADA system is indigenously developed by Cryogas Group, which takes care of the complete operation, safety, emergency categorization and logic based handling sequences.
- Our bright engineer Mr. Vikas Patel explained the control room and salient features of the facility.


- After inauguration of the control room, LCNG system operation was started and LNG was pressurized with which LCNG cascade refilling operation was announced as opened and acclaimed.




- All the dignitaries and visitors then witnessed the extremely efficient LNG pressure boosting system and also witnessed the re-gasification process on lined high pressure vaporizers.

- The efficient use of atmospheric energy, which is available during the day and night (unlike solar, which is not available at night) was witnessed by the audience.


- Upon demonstration of filling of the LCNG cascade, the entire Adani Gas team headed


by Shri Bhashit Dholakia flagged off the LCNG cascade, saluted by the human chain of Cryogas team.


- Finally, LCNG produced a few minutes back was also filled up into newly bought CNG-enabled high end cars of LNG Express India Pvt. Ltd for its captive use. Once LCNG was charged in these cars, Mr. GSP Singh along with Mr. J.P. Mishra and Mr. Pawan Sinha and Mr. Nayan Pandya took a trip for a few kilometres and witnessed the efficiency of highly clean LCNG.

- As compared to CNG, which is compressed from the pipeline, which, by default, bringing molecules of Sulphur, Moisture, Carbon Dioxide and other impurities, topped up by the oil being used for the compression, LNG provides highest quality and purity of LCNG. Mainly because, before liquefaction of Natural Gas, Sulphur, higher Hydrocarbons, moisture, CO2, etc. are completely removed to facilitate liquefaction process.
- Also, during LNG compression oil is not required at cryogenic temperature. Therefore, there is no iota of oil in LCNG composition. In the coming months, LNG Express will categorically analyse the advantage of LCNG over piped CNG in terms of efficiency, mileage, riding smoothness and economics with calorific value.
- Major benefit of LCNG from LNG is reduction in power from 250 KW to 30 KW for likewise compression requirement on hourly basis, for 1200 m3/hour capacity.
- Further the cost of routine and regular maintenance is reduced by almost 1/50th or even less, while improving the reliability of operations.

The ceremony came to an end with guests and dignitaries enjoying LNG cooked brownie, LNG chai and fresh Liquid Nitrogen ice cream and a huge round of applause.

All expert invitees uttered and congratulated LNG Express & Cryogas Industries team for their '3rd Generation solution at 4G speed' concept, getting commercialized to the benefits of the Society at large.

Finally, LNG Express expressed its desire to provide Natural Gas to hundreds of customers in the vicinity through Vadodara gas Limited(VGL), which is authorised as CGD entity by PNGRB. While Vadodara Gas Limited is expanding its piped gas network extensively in the city, LNG Express assistance can very well expedite reaching the further last mile customers beyond the city limit, into villages, into Talukas and several industrial estates where pipeline is planned but yet to arrive, which means the first City gas Distribution Company in India will benefit from the first 3rd Generation LNG Hub & Spoke Station to deliver PNG, LCNG, LNG to VGL's last mile customers in packaging of choice befitting to the customer's daily consumption.

Upcoming attractions

Cryogas along with LNG Express is in the final stage of providing several other solutions, which will be displayed in the next upcoming functions.

- Facility for repacking / trans filling mini and micro bulk LNG Liquid Cylinders upon receiving PESO approval
- City Gas pipeline pressure boosting system with the help of LNG
- LNG fuel tanks for smaller commercial vehicles