



**Sabah Energy
Corporation Sdn Bhd**
(No. 300950-11)

Strive to be a
Good Corporate Citizen



AN INNOVATIVE WAY OF GAS DISTRIBUTION IN THE ABSENCE OF PHYSICAL GAS PIPELINE





Content

- Summary
- Introduction to SEC
- Background
- Challenges
- Project Brief
- The Virtual Pipeline System
- The VPS Operations
- Current Development
- Way Forward
- Conclusion



Summary

- This paper presents the effort by Sabah Energy Corporation Sdn. Bhd. (SEC) to distribute natural gas to its potential customers in the absence of an extensive gas transmission pipeline network.
- The Compressed Natural Gas Virtual Pipeline System was chosen to overcome this limitation.

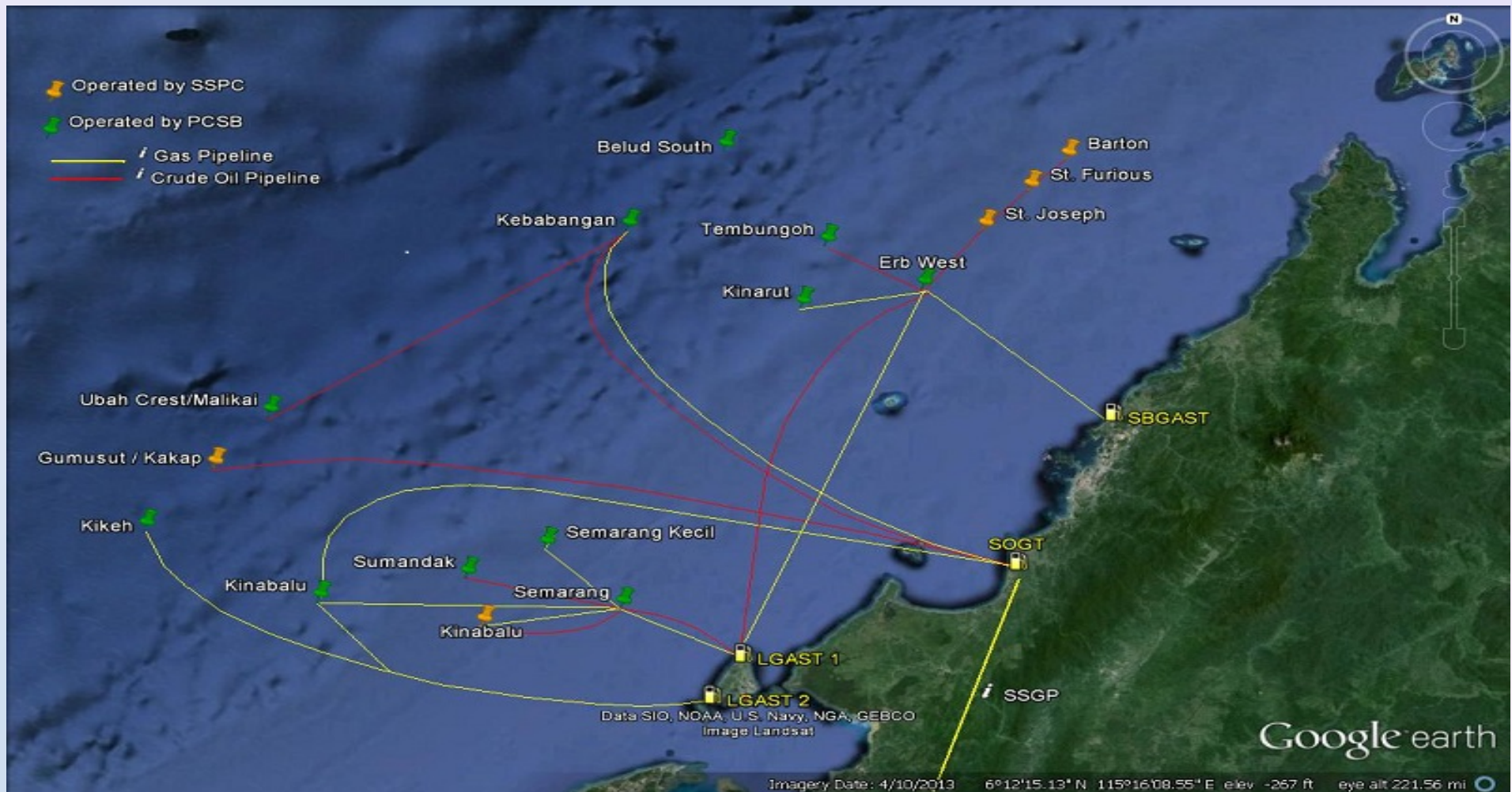


Introduction to SEC

- SEC is a company fully owned by the State Government of Sabah.
- Tasked with core function to supply natural gas in Sabah and Labuan FT.
- Licensed by Energy Commission in 1998 to distribute natural gas which is sourced from Petronas.
- Has been distributing natural gas for past 13 years through conventional underground pipelines.

Background

There is limited network of onshore gas transmission pipeline in Sabah.

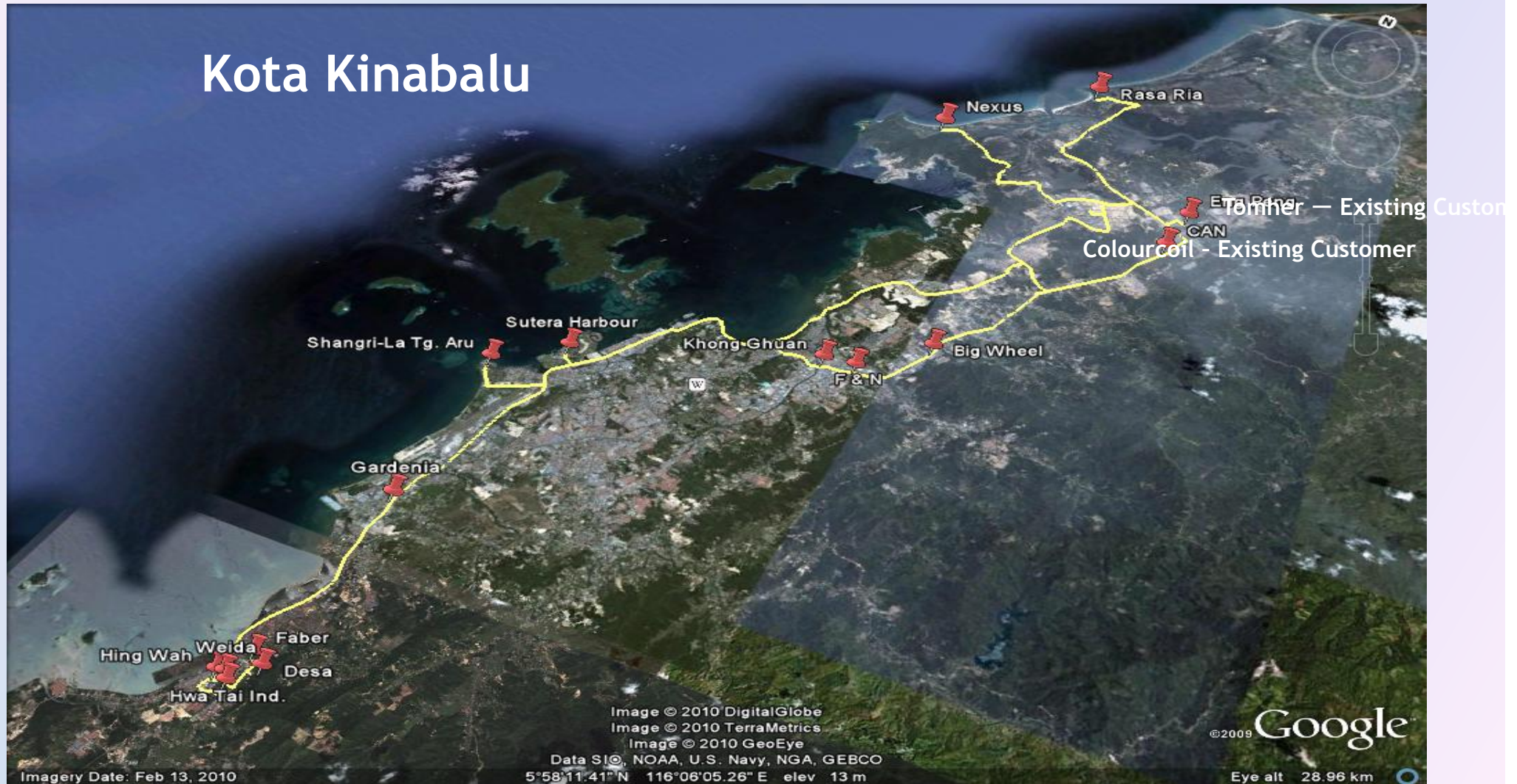




Challenges

- Benefits of cleaner and cheaper natural gas by pipelines limited to the vicinity of current natural gas reticulation pipelines in the Kota Kinabalu Industrial Park (KKIP).
- The industrial growth i.e. for energy intensive industry as well as the manufacturing industry had been slow for Sabah.
- Challenge is to make available cleaner and cheaper natural gas to a wider spectrum of consumers to spur industrial growth in view of the high cost of laying/constructing gas pipeline; an alternative way to distribute gas is necessary.

Challenges (continue)



The locations of the potential customers are sparsely distributed making the effort to supply via pipelines an expensive option.



Project Brief

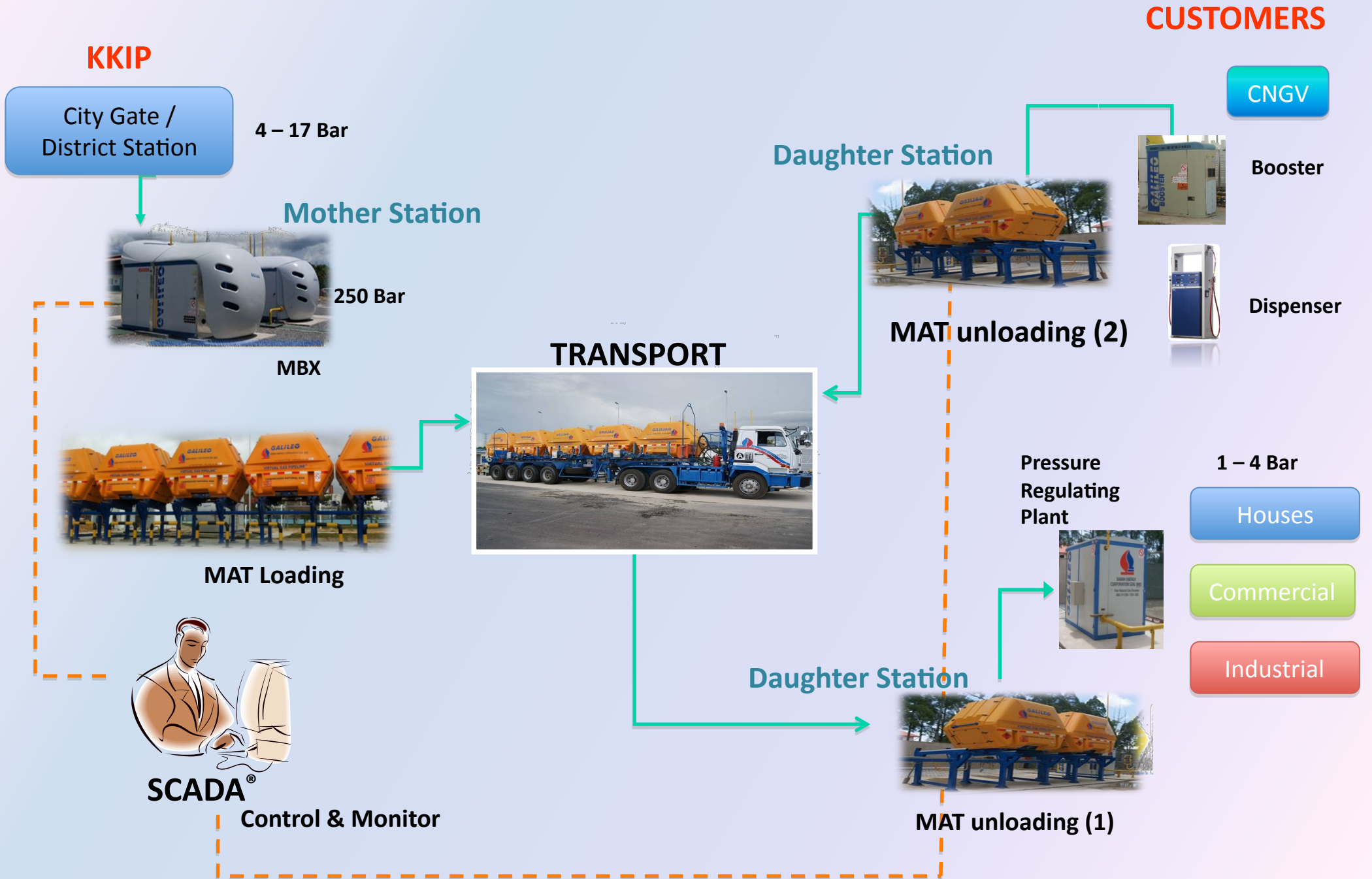
In order to overcome the supply restriction due to the absence of an extensive physical gas pipeline infrastructure SEC has adopted a VIRTUAL GAS PIPELINE SYSTEM (VPS) for the supply of COMPRESSED NATURAL GAS (CNG) to its potential customers who are located at a distance away from its existing gas pipeline infrastructure.



The Virtual Pipeline System

- The VPS is basically a natural gas mother – daughter station concept whereby gas is supplied to the daughter station from the mother station by the use of an array of gas storage cylinders fit into containers called MAT by truck trailers.
- At the mother station natural gas is compressed into containers in the MATs to a pressure of up to 250 bars by the use of either a gas engine driven or electric driven compressor.
- At the daughter station the CNG is depressurised to 1.4 bar for use by the customer as fuel for their operation.
- The continuity of gas supply to the customer i.e. the daughter station is ensured by timely replenishment of fully charged MATs and the removal of depleted MATs from the daughter station.

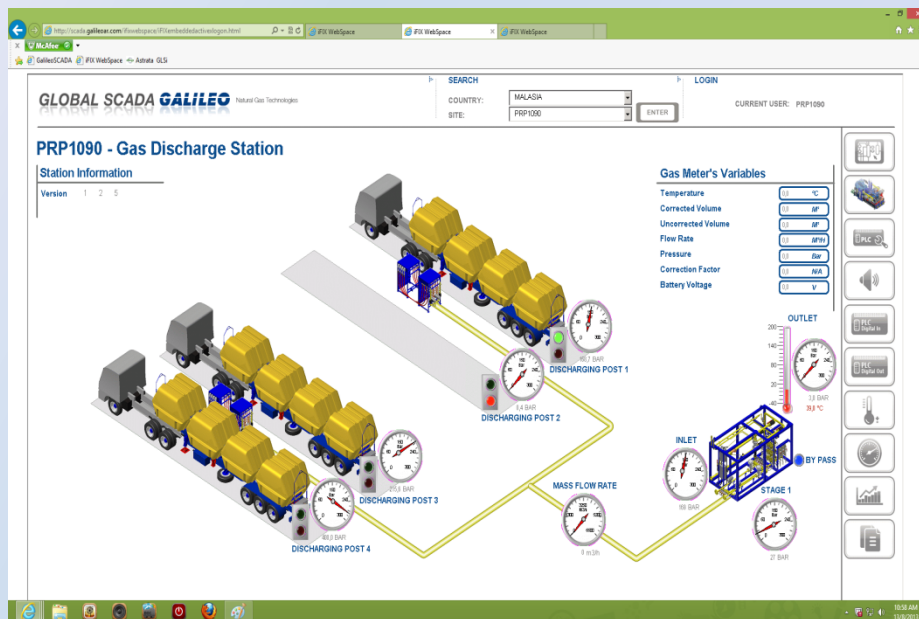
Virtual Pipeline Concept





The VPS Operations

- A SCADA system monitors the stock of gas in the MAT at the Daughter Stations.
- When volumes fall below a predetermined level, data is sent to the Mother Station. Replenished MAT are sent out and the empty MAT returned to base for replenishment.



Supply of CNG

Supply of CNG via Virtual Pipeline System



- Currently SEC is supplying CNG to 2 customers with the completion of the mother station and 2 daughter stations in June, 2013.
- SEC has also signed up with another 5 new CNG customers and is in the process of finalising supply agreements with a number of other customers.

SEC Mother Station Facilities



SEC Typical Daughter Station





Current Development

- The current mode of development of the VPS for the supply of CNG is through the provision of a dedicated daughter station to each customer.
- For reasons of economics and ease of operations SEC is looking into optimizing the use of its asset(s) i.e. by providing daughter station(s) for a cluster of localised customers who would receive their CNG supply from a common daughter station via a distribution/reticulation pipeline system.
- This localized distribution/reticulation pipeline system could in the future be connected to transmission or feeder pipelines that would pass through the area.
- With this, smaller customers can also benefit from the availability of cheaper CNG.



Way Forward

- SEC is currently evaluating alternative methods of supplying CNG to smaller customers especially those in the commercial sector. One way is as described earlier i.e. use of cluster development.
- Another method is by the use of fixed mini-MATs at the customers premises which could be recharged with CNG.
- The recharging of the depleted mini-MATs is done by a specially designed MAT which is equipped with a booster compressor (called MAT B), an electronic management system which automates all the compression and filling operation as well as a mass flow meter which allows accurate measurement of gas supplied to the customer.
- The mini-MAT are designed to store natural gas at high pressures of 200 bar and dispense the gas at the pressure range of 20mbar to 5bar.



MAT B & Mini MAT

→ ST-3: comprised of one MAT-B and two (2) MAT



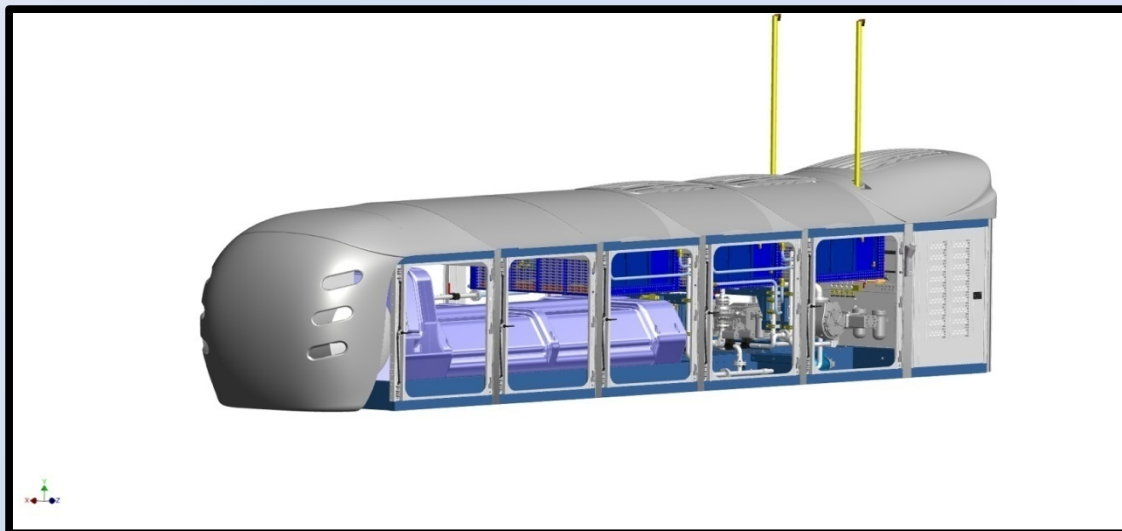
The ST-3 has one MAT-B of 3920 liters and two (2) MAT of 5000 liters each. The sum of the three containers adds up to about 14000 liters averaging about 3900 m³ at 250bar.

- Small user- Commercial
- Pressure at 200Bar. Capacity at 65 m³.
- Weight : 350kg
- Dimension: 770x400x1890 (mm)



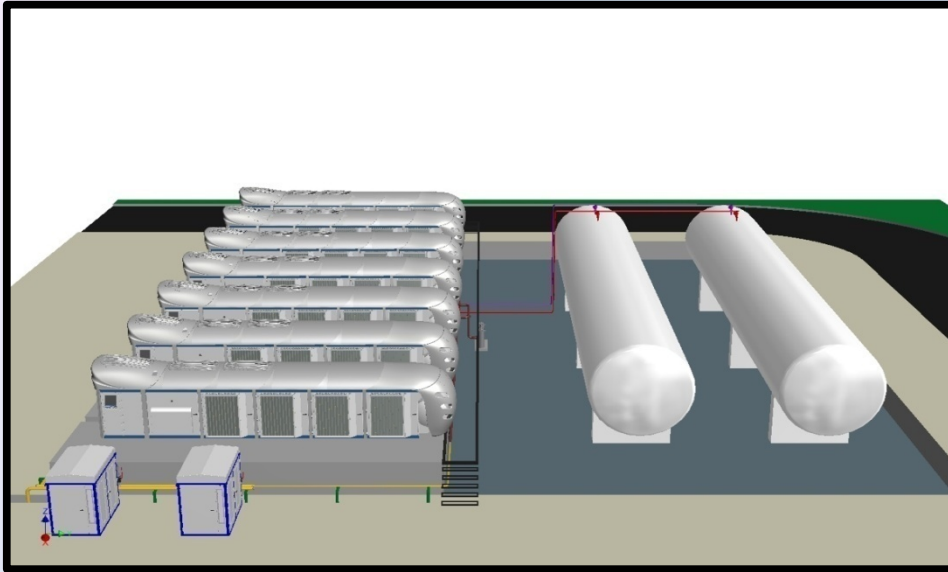
Way Forward (Continue)

- Another option of delivering natural gas to larger customers is to liquify the gas into liquified natural gas (**LNG**).
- SEC is currently looking at the Nano LNG Station which is capable of producing 12 Tonne LNG/day per Train.



- Capable of producing CNG and LNG at one time.
- Multi-Stage Compression processes incl. Boil-off recovery.
- Propane loop cooling with coolbox.

Way Forward (Continue)



LNG Facilities

- Fully Modular and Scalable
- Long Distance Delivery
- Medium and Large Customers





Conclusion

- SEC has now gone beyond the traditional way of gas distribution by physical pipelines.
- Currently, our VPS is providing CNG to Small to Medium sized industries.
- Supply to Smaller commercial consumers and the Larger Industries will be addressed as we move forward.
- We believe that the availability of cleaner & cheaper CNG over a wider geographical area will further enhance the industrial growth of Sabah.



SEC - Your Natural Gas Provider

THANK YOU