



# AAVANTIKA GAS LIMITED

A Joint Venture Company of GAIL



& HPCL



**Different Perspective**

**on**

**Gas Loss Assessment & Monitoring**





# OBJECTIVE

*“To establish a standard gas loss monitoring & assessment methodology for benchmarking and comparative analysis of Gas Loss among CGD’s for PNG and CNG segment”*



# OBSERVATIONS

- ▶ Gas Loss calculated as a percentage of the total gas procured as;  $\frac{(P-C)}{P} \%$   
*Where P: gas procured      C: gas sold/consumed*
- ▶ Gas Loss among CGD's may vary from 0.65% to 4.5%
- ▶ Quantum of gas lost i.e. (P-C) is not bench marked
- ▶ % gas loss will vary with quantity of gas procured even if (P-C) remains same
- ▶ Need to relook at the factors which cause gas loss separately for PNG & CNG segment



# PNG SEGMENT -Factors

- ▶ Factors which impact gas loss in MDPE network are;
  - ▶ Leakage from underground MDPE fittings like;
    - ▶ saddles, couplers, transition fittings etc.
  - ▶ Leakage from underground MDPE pipes due to rat bites
  - ▶ Leakage from above ground GI network
  - ▶ Leakage from underground MDPE pipes due to damage by third party agencies due to;
    - ▶ Open cut excavation
    - ▶ HDD for laying the utility service like water, sewage, communication lines etc.
  - ▶ Loss due to metering errors
  - ▶ Pilferage/ tampering by customers



# PNG SEGMENT -Factor Impact

- ▶ All factors impacting gas loss due to leakage in MDPE network are;
  - ▶ Independent on the quantity of gas sold
  - ▶ Depend on the length of the network; larger the network larger is the probability of such leakages and TP damages
- ▶ Loss due to metering errors is dependent on the quantity sold however;
  - ▶ Such errors for several meters will be both +/- & likely to negate each other;
  - ▶ Such errors can be effectively managed by periodic;
    - ▶ maintenance of metering skids
    - ▶ regular calibration of the meters, pressure and temperature transmitters etc.
- ▶ Pilferage/ tampering by customers ?



# PNG SEGMENT -Loss Assessment

- ▶ Quantity of Gas lost ( $Q_{leak}$ ) from any leakage of an aperture of cross sectional area A from a MDPE pipe of any size is directly proportional to;

- ▶ Velocity of flow at aperture: V: Area of aperture: A & Time of leakage: t

i.e.  $Q_{leak} \propto VAt$  which is independent of the size of the MDPE pipe

- ▶ Gas Loss Factor for a network of length L km can thus be assessed as;

{(Total Gas input for PNG segment) - (Gas sold / consumed in PNG segment)} ÷ (Network Length)

i.e.  $\{(P-Q-F)-(Png+S)\} \div L$  in SCM/km/month

*Where:- P: Total Gas input / Purchased by the CGD during a particular month in SCM; Png: Total PNG sales as per gas meters during the month in SCM; Q: Total gas input for CNG stations (for online / mother stations from compressor intake mass flow meter (MFM/s) during the month in SCM; F: Total gas used as Fuel for CNG compressors during the month S: Gas used as stock for network commissioning during the month in SCM; L: Total cumulative length of MDPE network of various sizes in km.*



# PNG SEGMENT -Template

## SCM/km/month

Total Gas Purchase Monthly (P)	Total CNG Input & Fuel (Q+F)	Total PNG Input P1= (P-Q-F)	Total PNG Sales (Png)	Line Commissioning Stock for the month (S)	PNG segment Gas Loss Gpng = P1-(Png+S)	MDPE Network Length (L)	Monthly Gas Loss factor F= Gpng/L
SCM	SCM	SCM	SCM	SCM	SCM	Km	SCM/Km

*Note: Accuracy of the daily gas loss accounting is also dependent on the daily assessment of the domestic consumption. In order to accurately assess such daily consumption 'daily average consumption factor per customer' can be calculated each year and the same to be applied for such month during the succeeding years to take into account the seasonal variations in consumption pattern. Once the actual gas consumption data as per the actual domestic PNG quantity billed is available gas loss data as per the calculated daily consumption factors for such months to be analysed to assess the variations, if any.*



# CNG SEGMENT

- ▶ Factors which impact the losses in CNG segment are;
  - ▶ Losses due to compressor operation:
    - ▶ Gas losses are dependent on compressor operating hours on account of packing losses & venting losses
  - ▶ Leakages in LCV cascades during movement on the road
  - ▶ Losses due to LCV operation on account of connection and disconnection of CNG hose pipe
  - ▶ Losses during CNG dispenser operation like draining oil from the strainers etc. which are dependent on the extent of CNG compressor operating hours
  - ▶ Inaccuracy in the metering between MFM and Mother Board installed in dispensers
  - ▶ Conversion factor from Kg to SCM conversion
  - ▶ Mother Board tampering by dealers/ operators



# CNG SEGMENT

- ▶ Gas loss due to the above listed factors are dependent primarily on the extent of the operating hours and thus dependent on the total sales. Accordingly the loss in the CNG segment to be calculated as % loss as per the following expression and template:

i.e.  $\{Q-(Cng +F)\} \div Q$  in %

Total CNG input as per MFM (Q)	Total CNG Sales (Cng)	Total PNG used as Fuel (F)	Cascade Commissioning Stock for the month (S)	CNG segment Gas Loss Gcng= Q-(Cng+F+S)	Monthly Gas Loss % = Gcng/Q %
SCM	SCM	SCM	SCM	SCM	%

**Note:** In order to have accurate and factual data, kg to SCM conversion factor to be calculated on a daily basis as per the specific gravity of the gas received and MFM's to be periodically checked with a calibrated CNG prover, apart from sealing the dispensing unit body and its mother board with numbered seals to avoid any possible tampering



# SUMMARY

- ▶ *For benchmarking and comparative analysis among CGD's & Effective monitoring & assessment of gas loss of a given CGD;*
- ▶ *Total gas loss quantity  $G = (G_{png} + G_{cng})$  needs to be monitored wrt;*
  - ▶ *PNG losses; on the basis of 'PNG gas loss factor' as SCM per km per month basis &*
  - ▶ *CNG losses; on the basis of '% gas loss' as a percentage of total CNG input.*



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*गैस सिलिंडर की क्या चिंता,  
जब साथ में है अवंतिका*

THANK YOU

