

UFG in Distribution Network

The Gas Malaysia Experience

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GAS MALAYSIA BERHAD

Pipeline	: 1,864 km
Station	: 1,574 nos
No of Customer	: 32,225
▪ Industrial	: 704
Sales Volume	: 125 mil mmbtu
Sales Revenue	: RM 2 bil (US\$645 mil)
No of Employee	: 352

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1. OBJECTIVE

- **Detailing key issues and challenges**
- **Identify causes**
- **Monitoring and managing UFG**



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2. INTRODUCTION



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2.1 DEFINITION

- **Difference between gas entering distribution system at the point of custody transfer**
- **Can be measured and billed at all delivery points over a defined period of time**

2.2 GENERAL

- **Factors concerning UFG:**
 - **Revenue**
 - **Safety**
 - **Efficiency**

3. UNACCOUNTED FOR GAS (UFG)



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3.1 COMPONENTS

- i. Network operations**
- ii. Billing**
- iii. Metering**
- iv. Custody transfer**

i. Network operations

- a. Stock variation**
- b. Leakage – 3rd party damage**
- c. Permanent leaks**
- d. Planned purging**

ii. Billing

- a. Unauthorized consumption (gas theft)**
- b. Own gas use**
- c. Billing lag**
- d. Calculation**

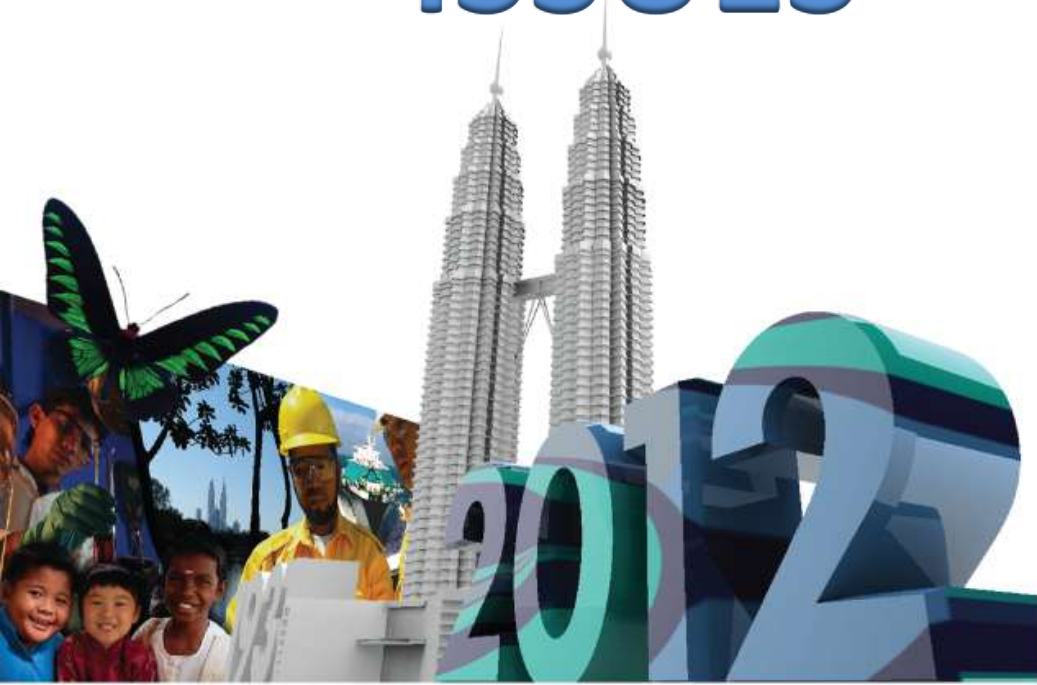
iii. Metering

- a. Meter inaccuracy**
- b. Temp/pressure compensation**
- c. Meter malfunction**
- d. Missing meter reading**
- e. Estimation methodology**
- f. Incorrect meter reading**

iv. Custody Transfer

- a. Custody transfer reconciliation**
 - Transmission and distribution operator**
 - Seller and Buyer**

4. GAS MALAYSIA UFG ISSUES



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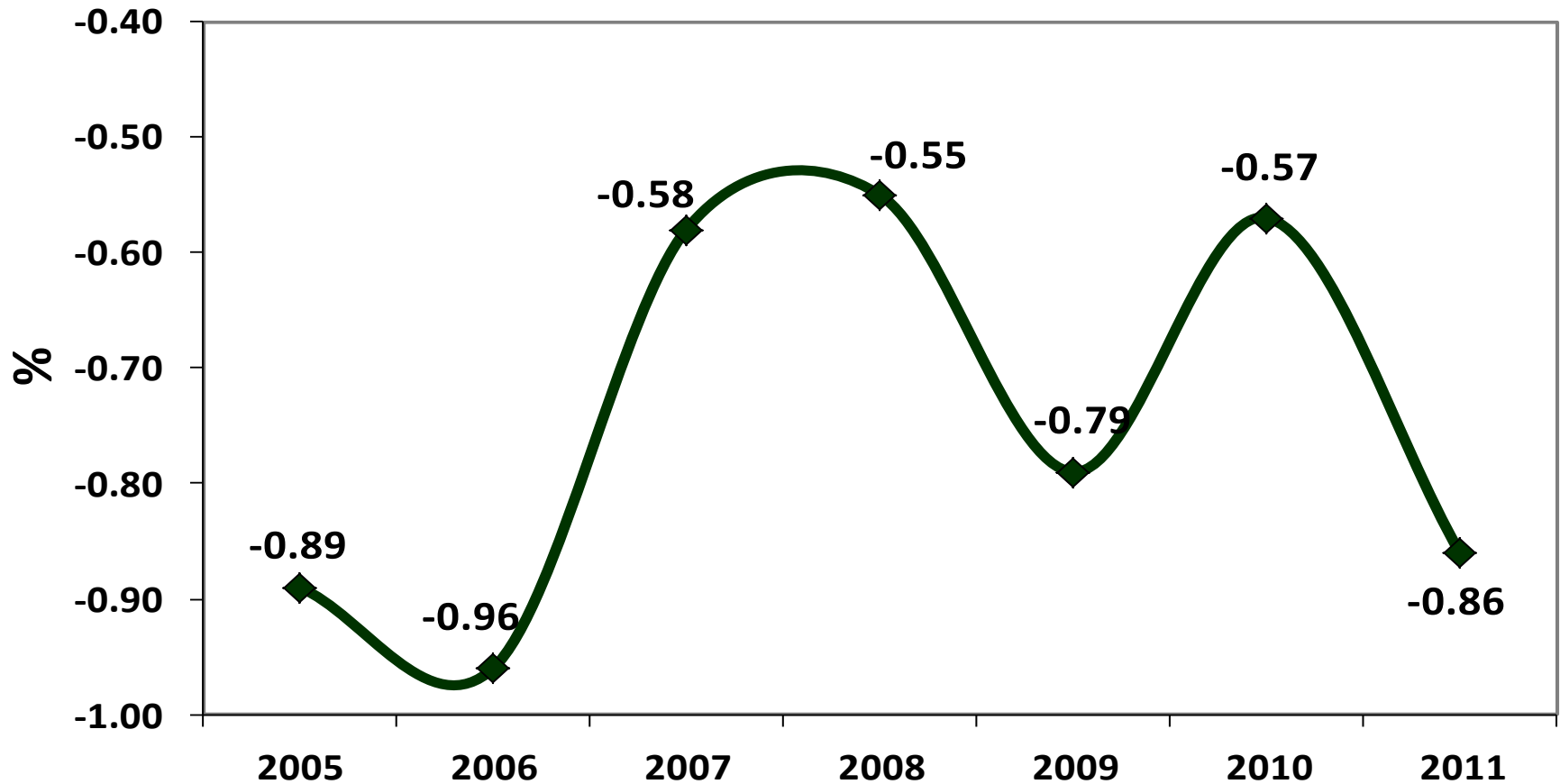
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4.1 PERFORMANCE



4.2 ISSUES

- i. Unauthorised consumption**
- ii. Billing and metering**
- iii. Billing by gas supplier**
- iv. Network operations**

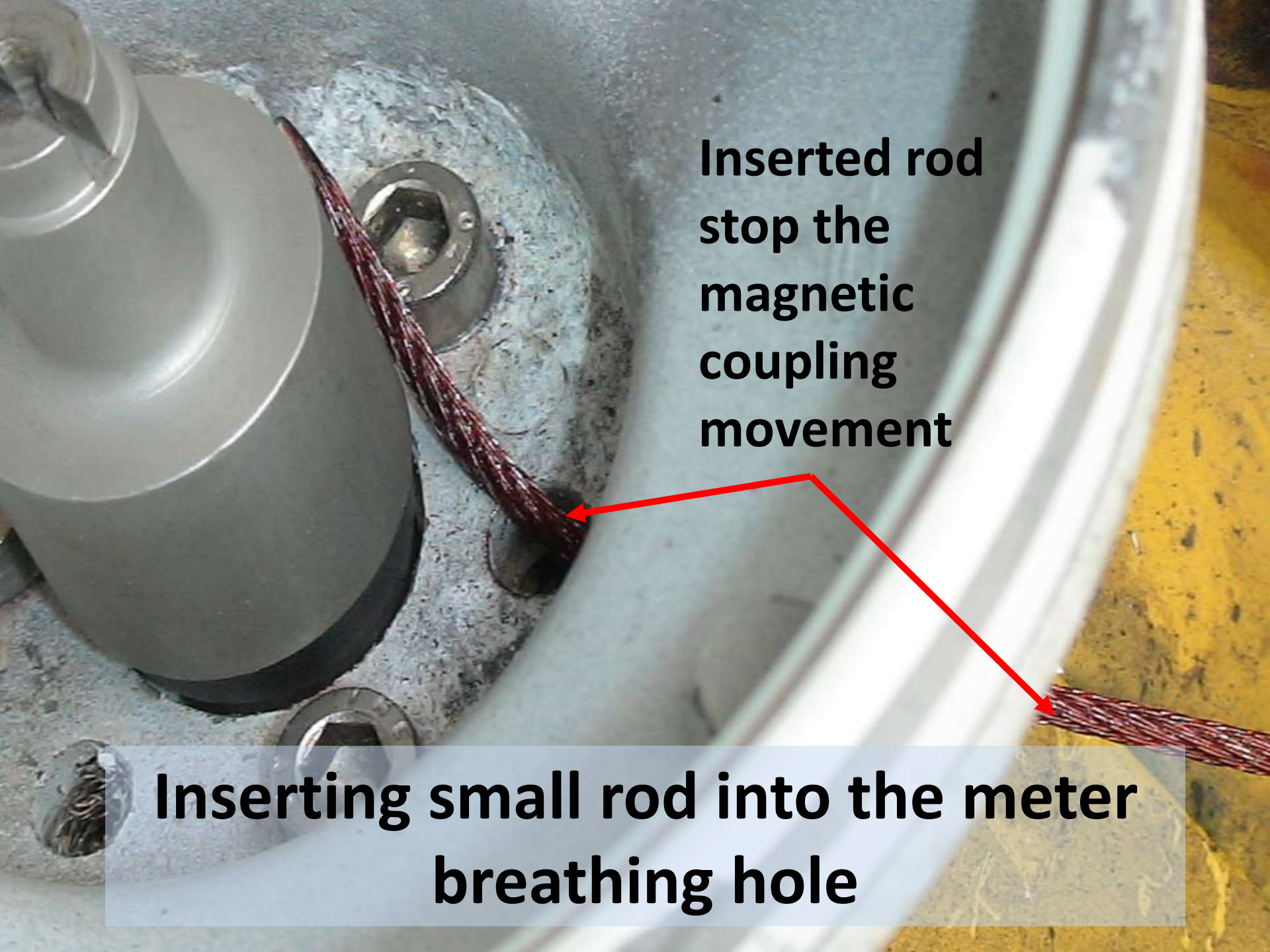
i. **Unauthorised Consumption**

- **Discovered at various customers within the network**
- **Cause unsafe situation**
- **Loss of revenue**

- **Methods:**
 - **Tampering of gas meter and associated equipment**
 - **Opening of meter bypass line**
 - **Illegal connection**
 - **Abnormal flow**



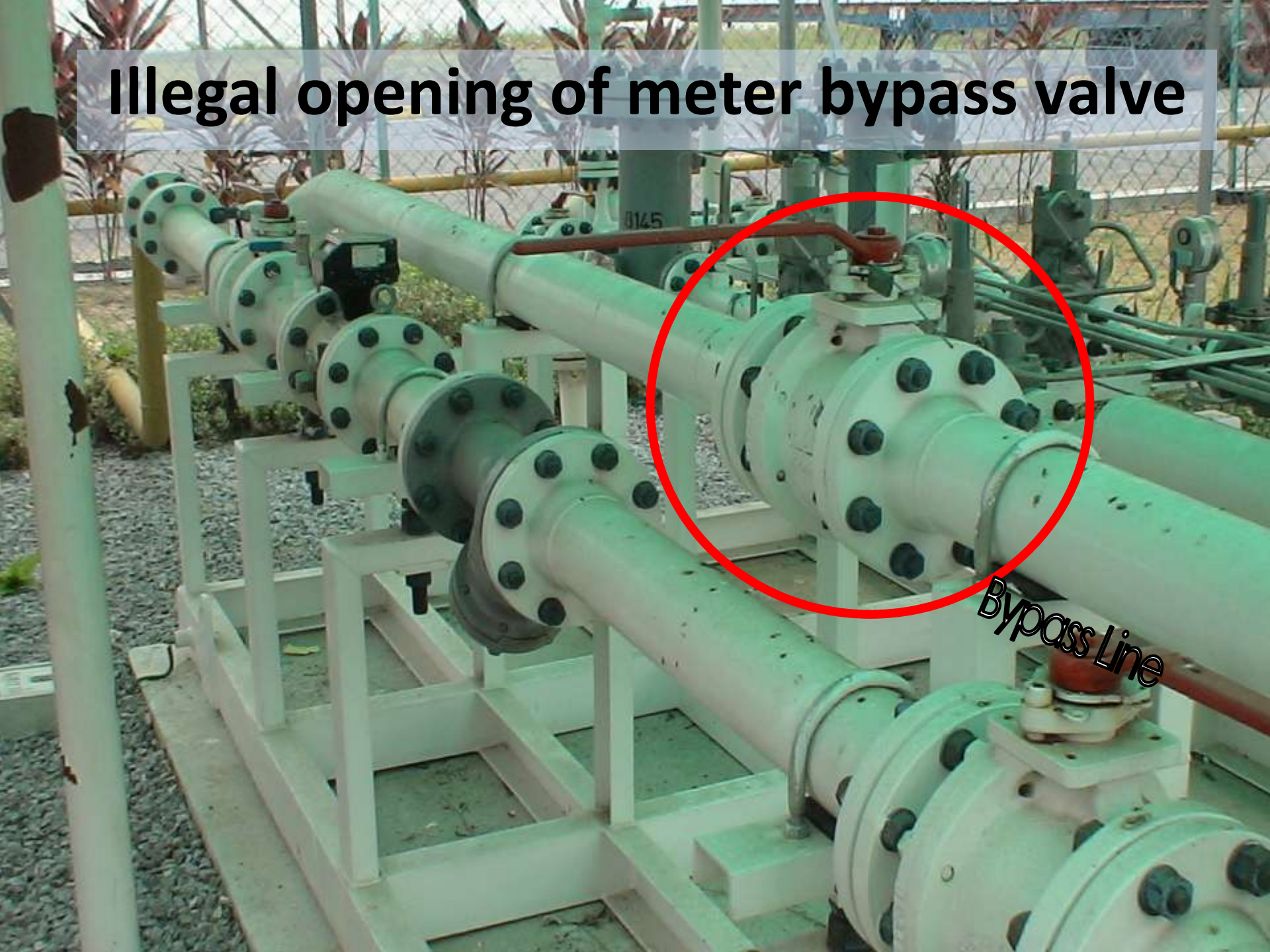
**Dismantling index head to stop
the index movement**



**Inserted rod
stop the
magnetic
coupling
movement**

**Inserting small rod into the meter
breathing hole**

Illegal opening of meter bypass valve



Bypass Line

- **Detection:**
 - **Physical inspection of facilities
i.e. metering facilities, station**
 - **Consumption monitoring**

Fencing damage



Traces of cut

Tampering of security seal



Broken security seal

Scratch and paint peeled-off on the meter allen screw

Instromet®

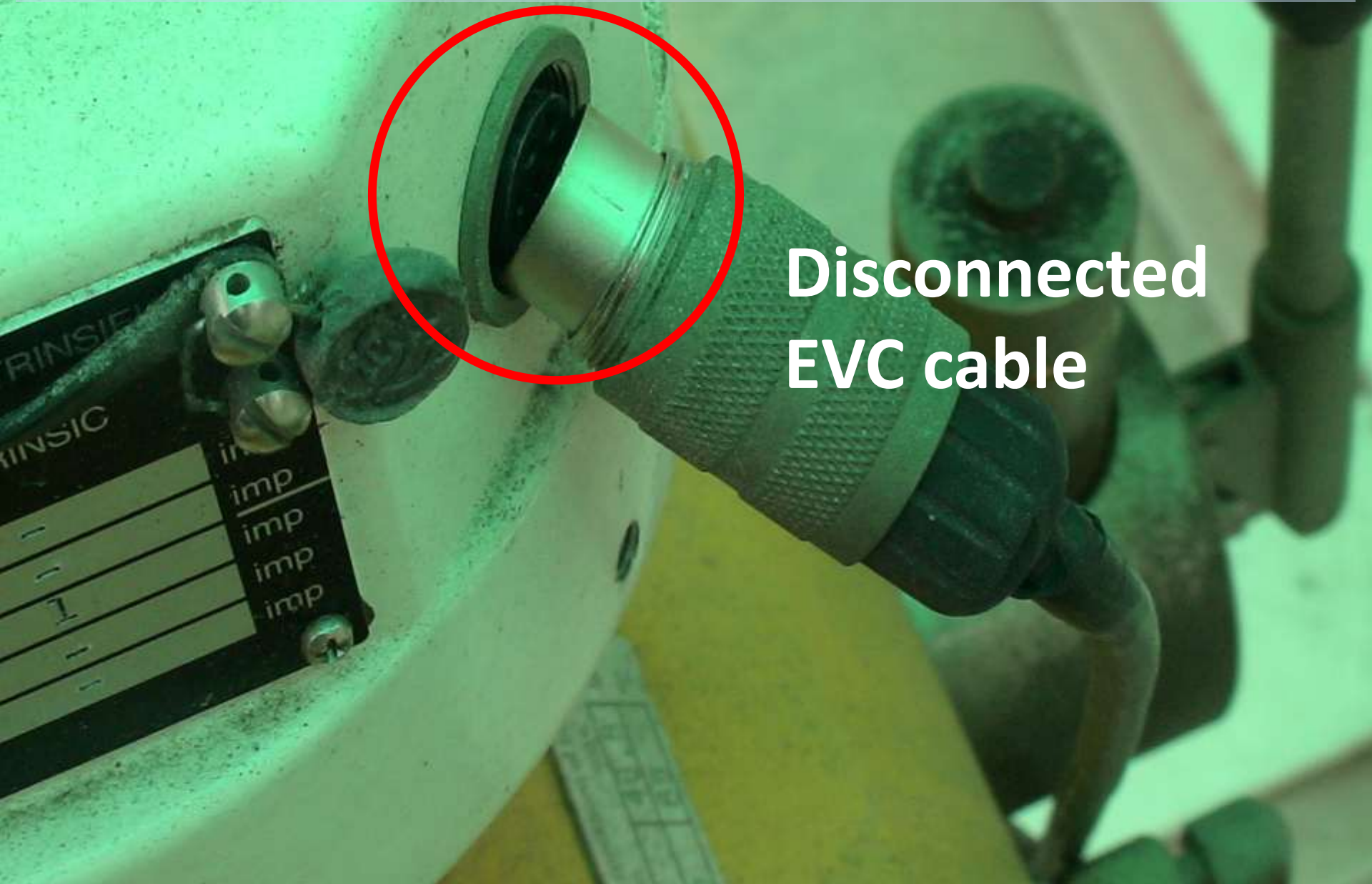
G 400	
Qmax	650 m³/h
Qmin	32 m³/h
pmax	18.8
No	74083
M	-



Scratches at the allen screw

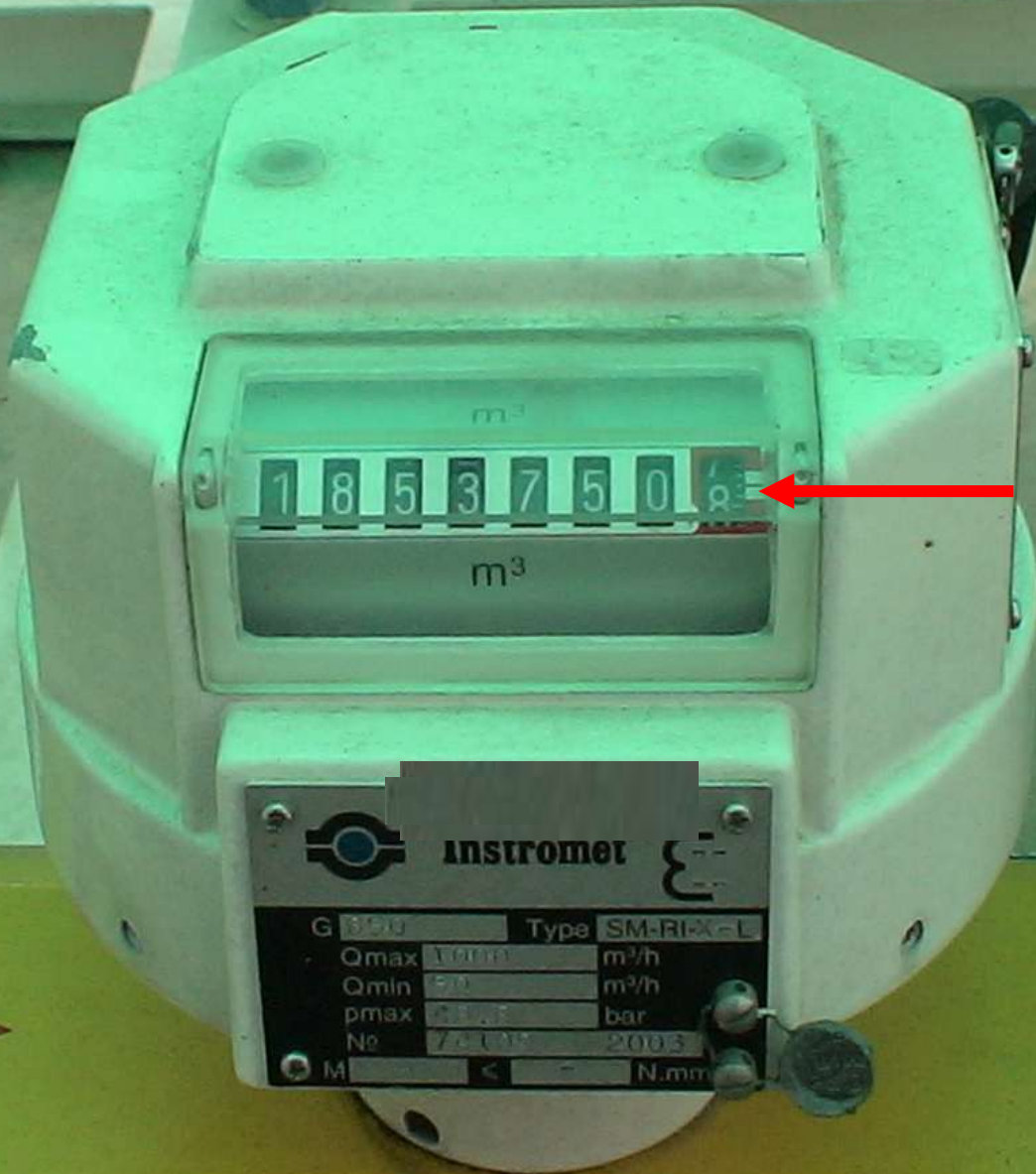
GM001779
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Disconnection and loosening of EVC cable





Disconnected
EVC cable

Frequent meter failure



Meter index
not moving
smoothly or
stop
completely

		instromet			
G	800	Type	SM-RI-X-L		
Qmax	1000		m ³ /h		
Qmin	50		m ³ /h		
pmax	10		bar		
Nº	7000		2003		
M			N.mm		

Abnormal consumption profile

- **EVC data trending:**

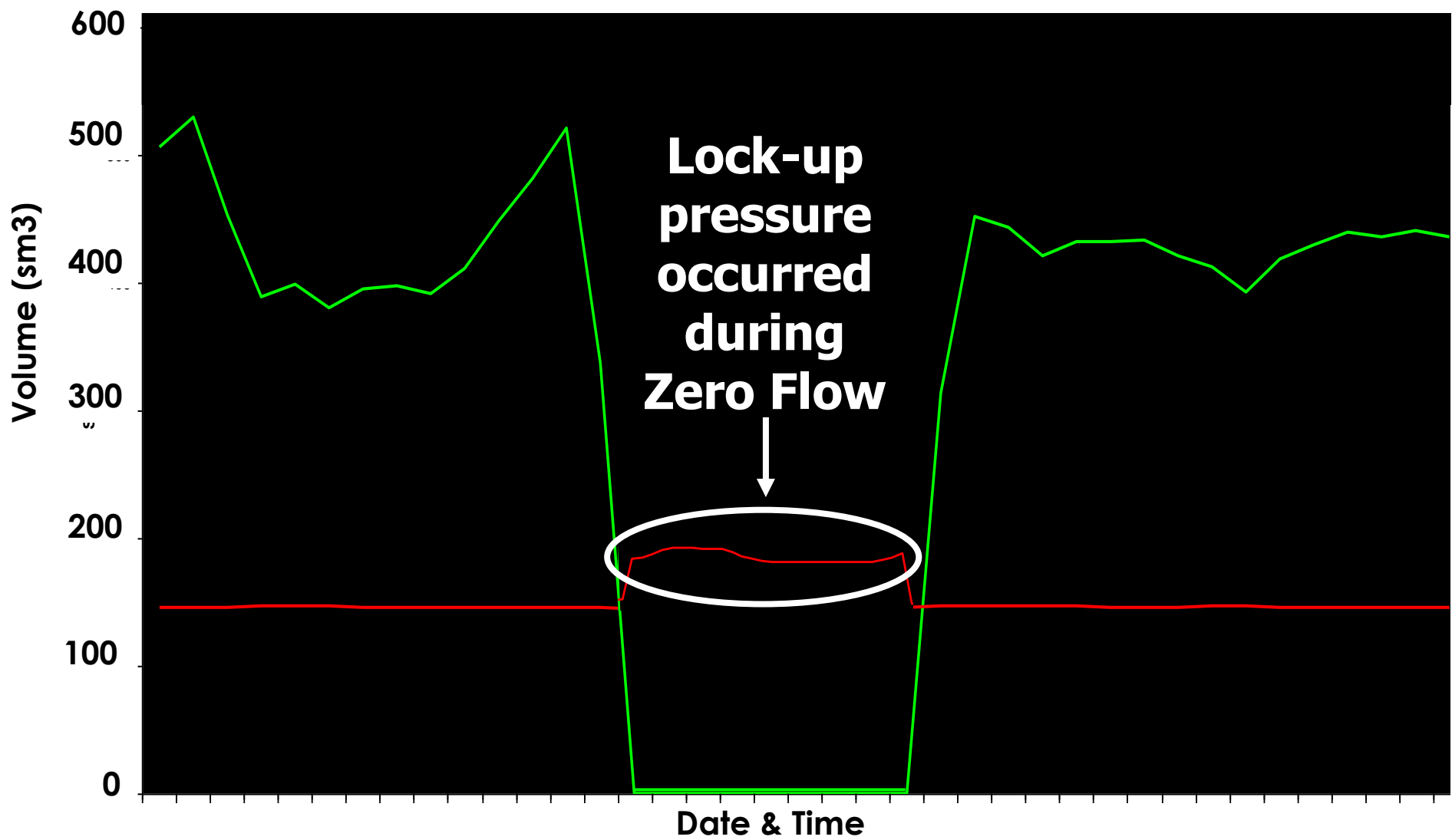
- ⇒ **Normal:**

- No flow will result in lock-up pressure**

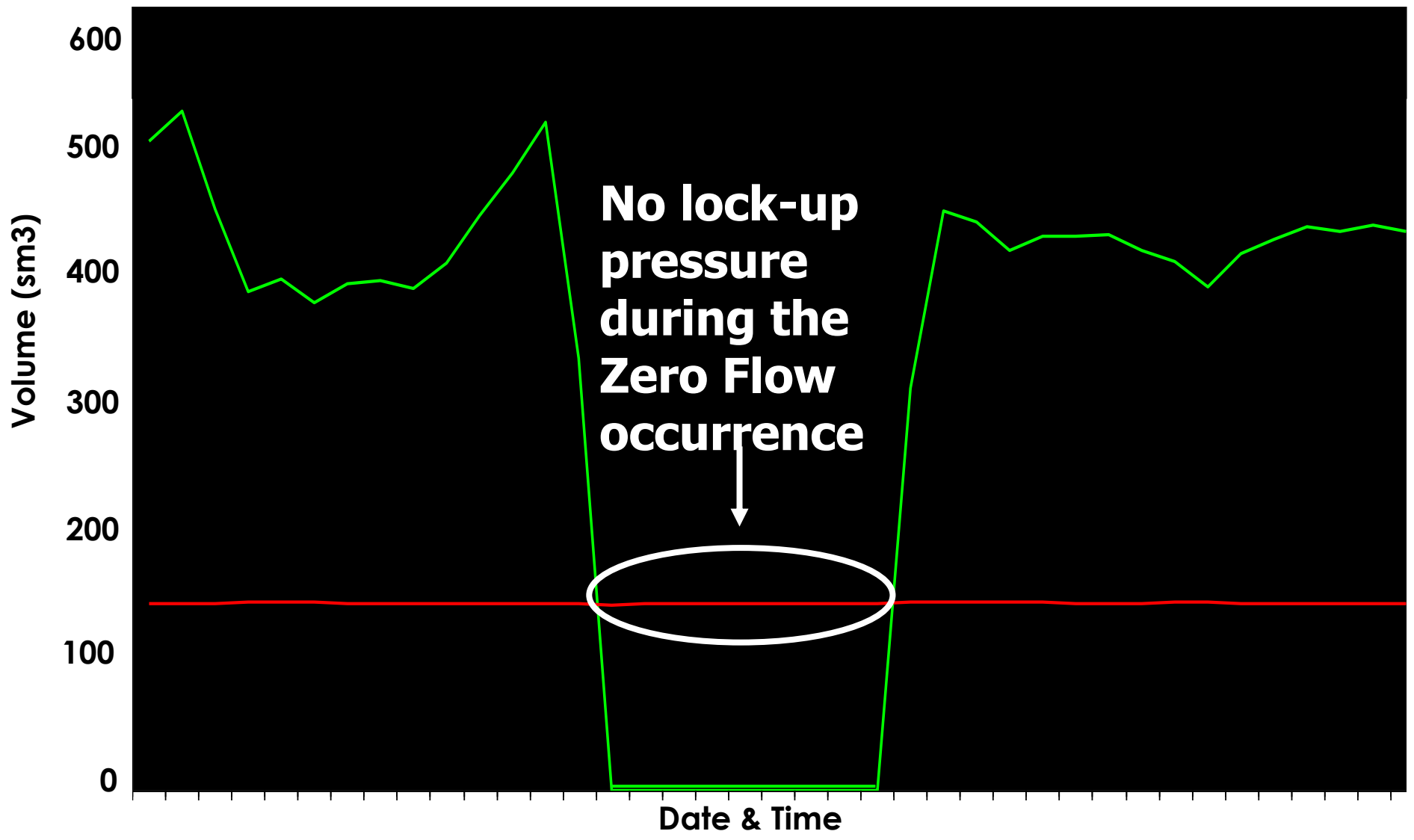
- ⇒ **Abnormal:**

- No flow indicate no lock-up pressure**

GRAPH 1: Normal EVC Trending



GRAPH 2: Abnormal EVC Trending



- **Challenges:**
 - **Proving the theft/tampering**
 - **Gas installation safety**
 - **Personnel safety**
 - **Recovering the loss of revenue**
 - **Additional cost**

ii. Billing and Metering

- Prior to 2004, billing based on fixed Pressure & Temp.
- P & T fluctuations are not compensated
- UFG rate – more than 2%

- **2004 – P & T corrector installed at all major industrial customers**
- **Improved in UFG rate**
- **Currently 94% of volume supplied are measured through the electronic volume corrector**

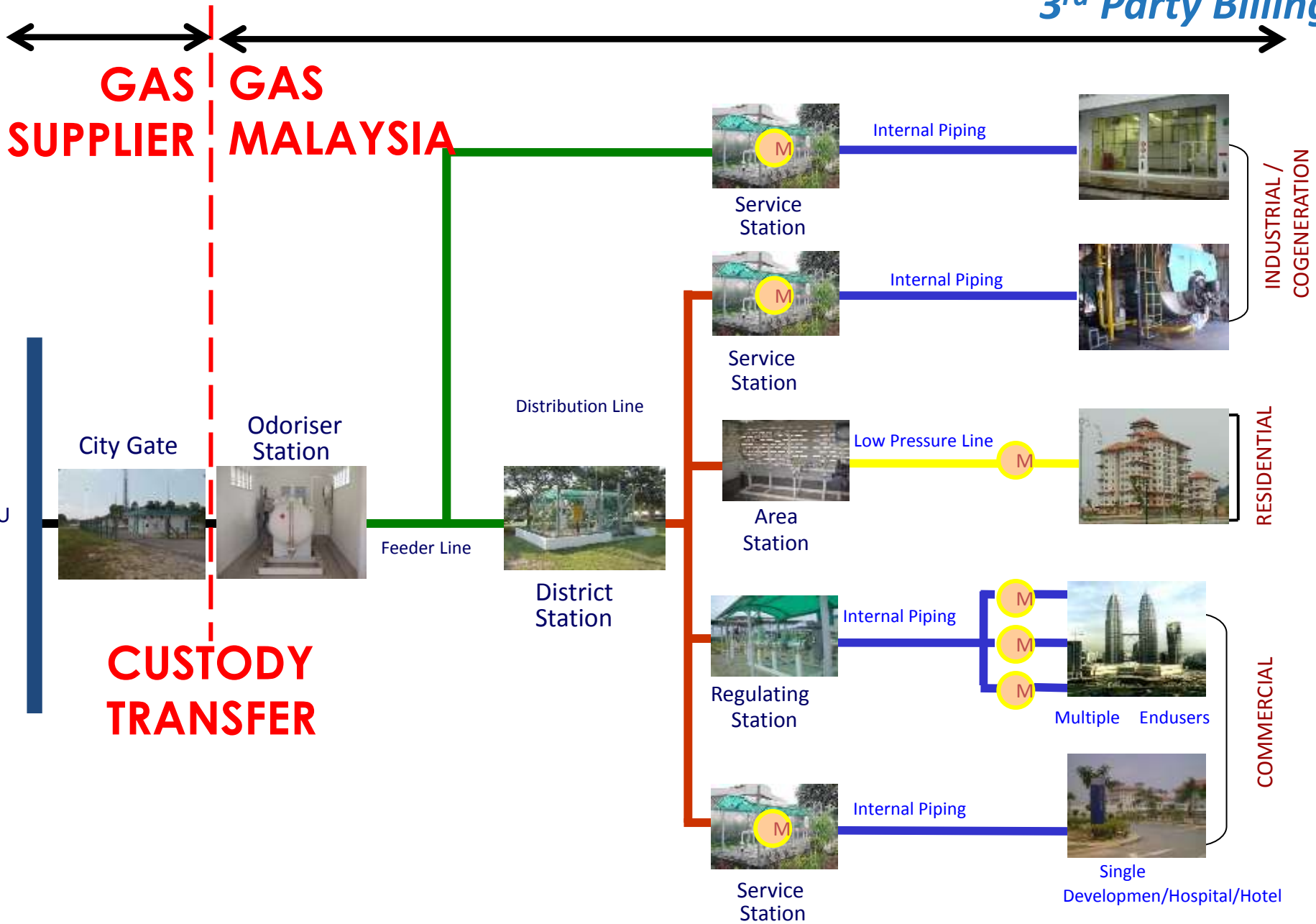
- **Metering equipment:**
 - **Component failure**
 - **Inaccurate sizing**
 - **Contamination**
 - **Maintenance and calibration**

- **Billing process:**
 - **Inaccurate meter reading**
 - **Error in billing parameter**

iii. Billing by gas supplier

- **Measuring equipment faulty**
- **Billing error**
- **Third party billing**

3rd Party Billing



SUPPLY CONCEPT

PGU



CITY GATE STATION



ODORISER STATION



NATURAL GAS VEHICLE



GAS DISTRICT COOLING

DISTRIBUTION NETWORK

- **Seller's customers:**
 - ⇒ **Gas District Cooling Plant (GDC)**
 - ⇒ **NGV Station**
- **Seller pay transportation fee**
- **Volume deducted from total volume**

- **GDC – with dedicated meter**
- **NGV – meter based on dispenser**
 - ⇒ **Conversion factor**
 - ⇒ **Operational loss**

- **Challenges:**
 - **Multiple coordination**
 - **Various parties i.e. Seller & its Agent**
 - **Timely response**

iv. Network Operations

- **Major Leak**
 - **Third party damage**
 - **Other causes i.e. corrosion, soil movement etc.**
- **Major commissioning**

4.3 HOW WE MONITOR?



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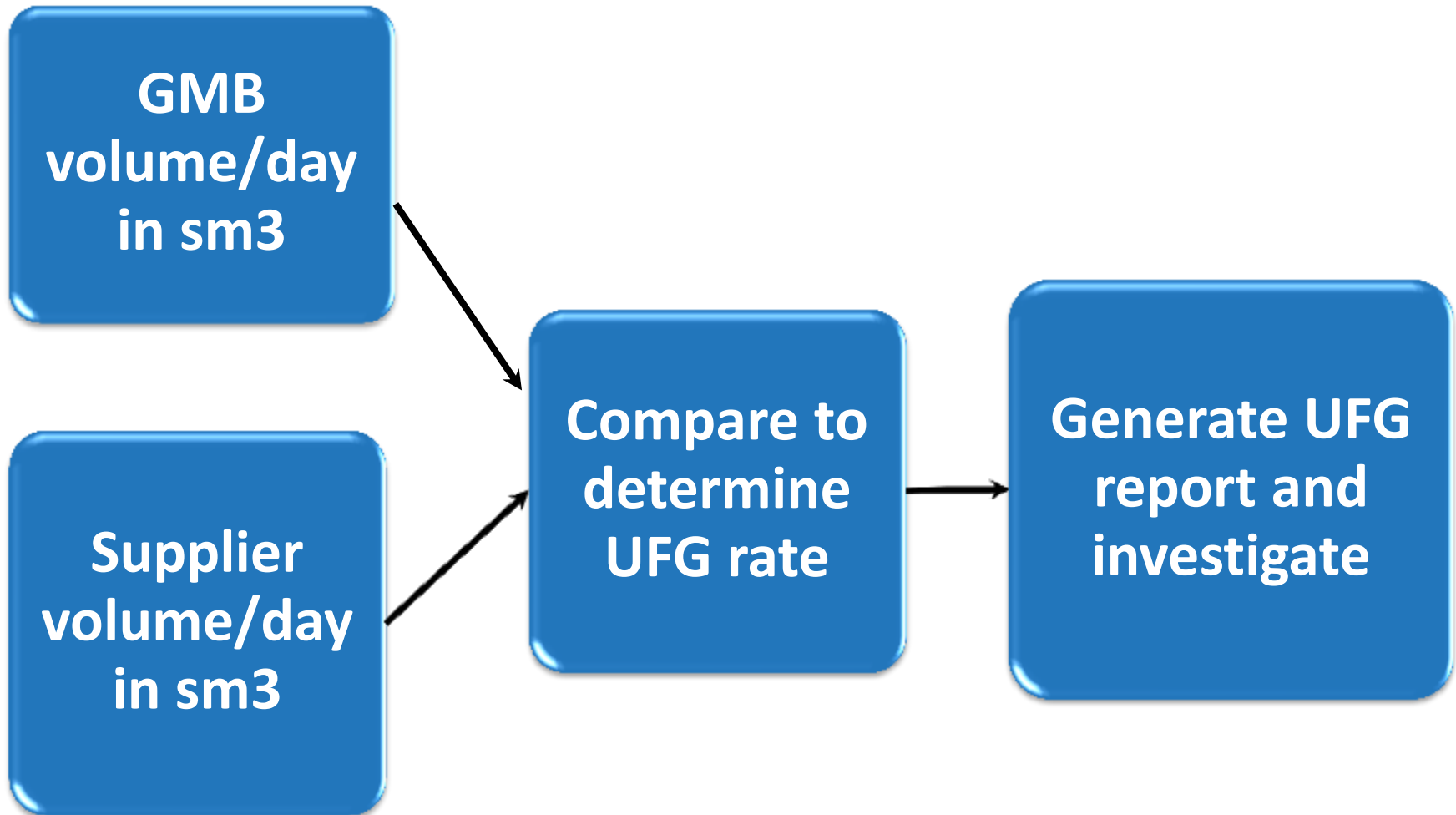
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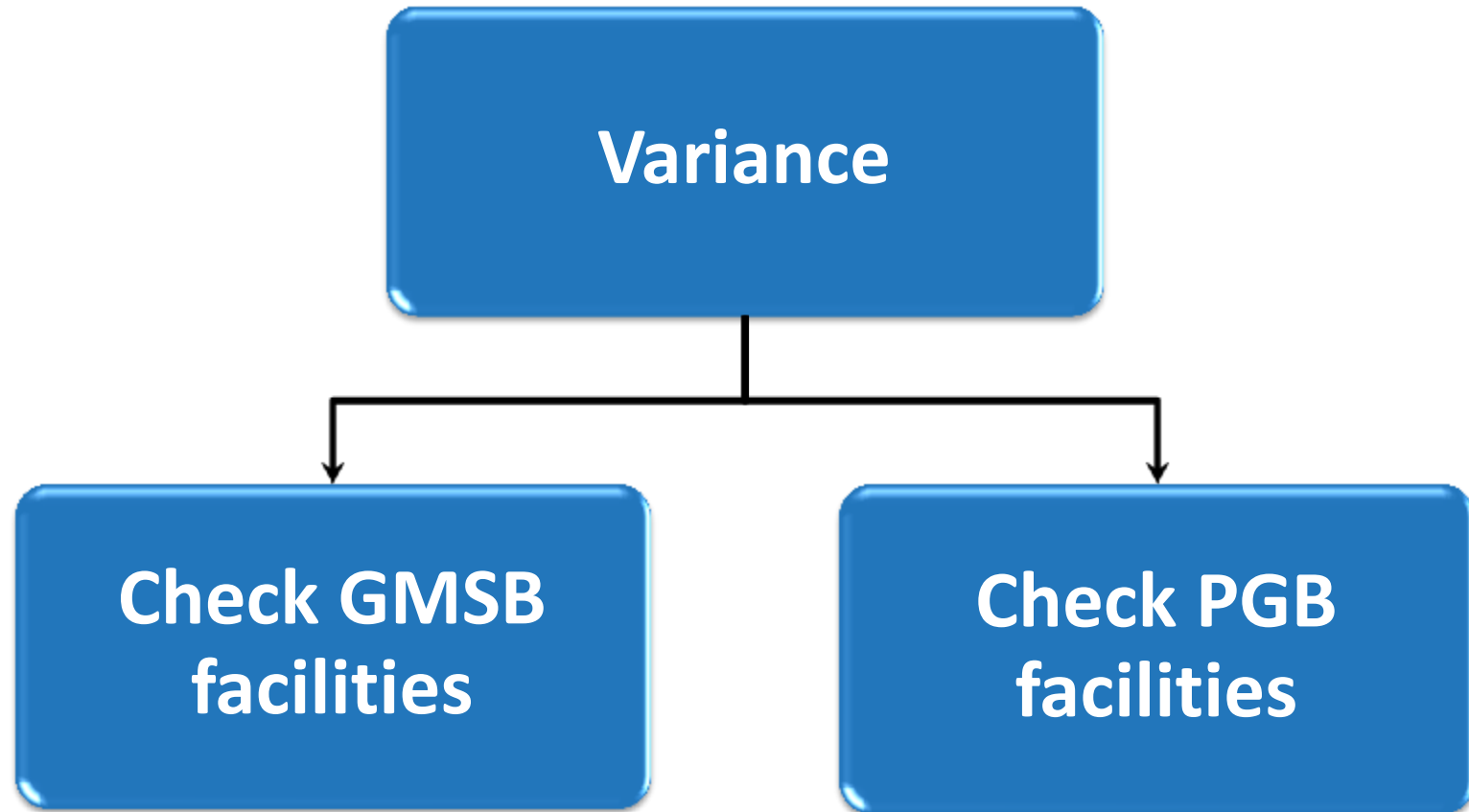
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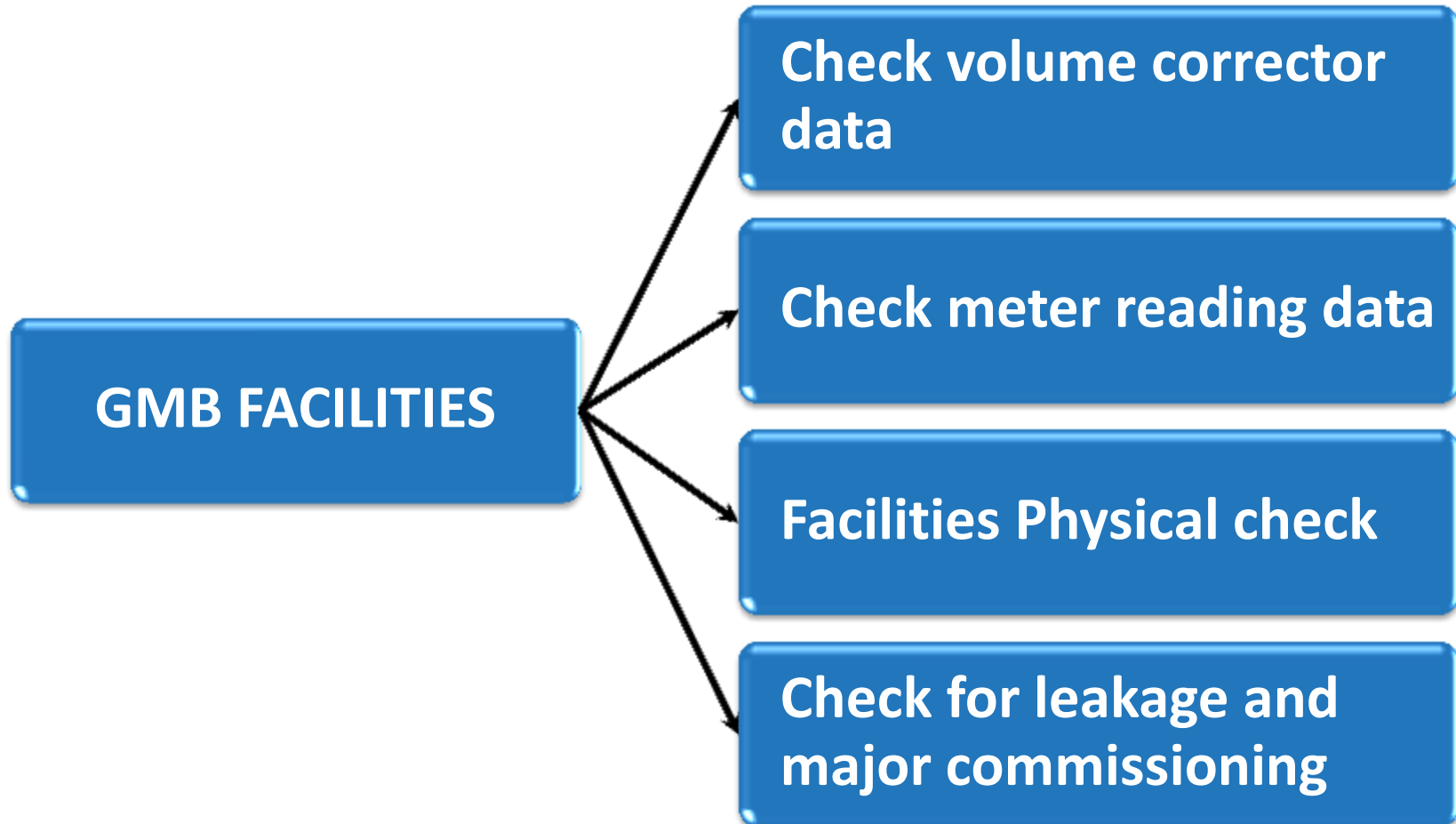
Process Flow



Process Flow: Verification

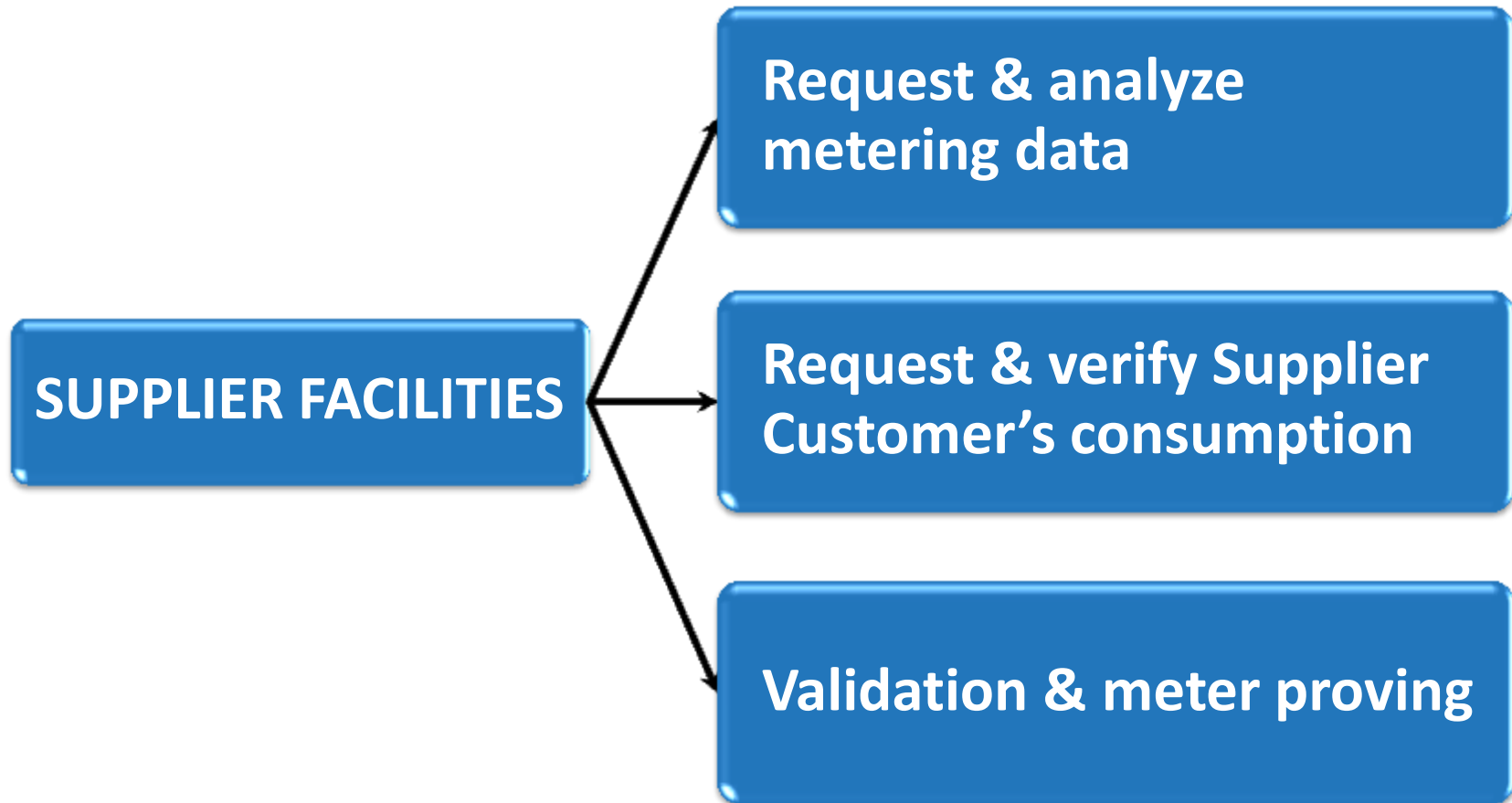


Measures Taken



Monitoring

Measures Taken



5. SUMMARY

- **Continuous monitoring of UFG performance i.e. monthly, yearly etc**
- **UFG management:**
 - ⇒ **At all delivery points**
 - ⇒ **To improve all probable cause**



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THANK YOU



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