

# 1. Welcome



## IGU WOC4 (Working Committee Distribution) Survey



During the triennium 2009-2012, under the guidance of the Malaysian Presidency of IGU, our Committee is developing a series of studies on the following study areas:

- Gas Distribution Safety Management Systems
- Smart metering systems: characteristics, technologies, costs
- Unaccounted For Gas: identification, measurement, calculation and management

One of the targets of the studies is to review processes and methodologies used and to identify best practices in the gas distribution sector worldwide.

To reach this target our Committee is gathering information from gas distribution companies via a single internet questionnaire, that we hope simplifies your submission. Your information will not be circulated outside WOC4 members and data will be used only in an aggregated way on a regional basis (for more details on regions identification please visit IGU website page at:

<http://www.igu.org/html/iguinfo/>

Your responses will play a vital part in preparing the reports and recommendations to be presented to the World Gas Conference in 2012.

Contributors will be kept up to date with the study groups' progress via the IGU website, [www.igu.org](http://www.igu.org)

Many thanks to Eurogroup Consulting for offering to format and host the questionnaire.

Many thanks again in anticipation of your support for this valuable work.



**Alessandro Soresina**

Chairman, WOC4 IGU

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**Attention: the questions in *italic font* are facultative.**

### 3. Part 1 - Section 0 - General (to all Study Groups)

**1. Please nominate a primary contact for your company for submission of this questionnaire.**

*Name	<input type="text"/>
*Email address	<input type="text"/>
*Company name	<input type="text"/>
*Company address - City	<input type="text"/>
*Company address - Country	<input type="text"/>

## 4. Part 1 - Section 0 - A) Company profile

### 1. Your response to the following questions will provide a general overview of your company's network size and activity.

1. Please indicate the total length of mains operated by your company [km]

2. How many connected end use customers (= exit points =gas meters) does your company supply through its network [number]

3. What is the total volume throughput of gas in your system per year [m3]

## 5. Part 1 - Section 0 - B) Liberalisation regime

Liberalisation: intended as a set of laws or systems that allow the development of a free market.

### 1. Is your company operating in a liberalised market?

Yes

No

Partially

### 2. If 'yes' or 'partially':

Only large customers can choose their supplier

All customers can choose their supplier

### 3. If 'no', is there a program settled by the national government to introduce liberalisation in the gas market in the mid-term (1-2 years)?

Yes

No

### 4. Is your company legally unbundled from the retail sector?

Yes

No

## 6. Part 1 - Section 0 - C) Privatisation regime

Privatisation: occurs when a (local) government sells an industry, company or service that it owns and controls, so that it becomes privately owned and controlled.

### 1. Please indicate your company's ownership structure:

Private

Public

Mixed

### 2. If 'public' or 'mixed', is there a program settled by the national government to introduce privatisation of distribution companies?

Yes

No

In the future

## 7. Part 1 - Section 0 - D) Regulation regime

Regulation: Refers to the form of financial regulation that governs your company.

### 1. Please indicate the regulatory regime that your company is operating under:

Incentive Regulation

Cost Plus

Price cap

Other

## 8. Part 1 - Section 1 - Process safety leadership

### 1. Who in the company approves the approach to process safety? Select one only.

- Company Board
- Chief Executive Officer, Chief Operational Officer
- Director Safety
- Director Operations
- Senior Manager
- Safety Manager
- Other, please describe

### 2. How far down the organisation is the safety strategy communicated? Select one only.

- Senior Management
- Technical/ Supervisory Staff
- Team Leaders
- Team members
- No communication about strategy

### 3. Are contractors and subcontractors included in the communication?

- Yes
- No

### 4. What methods of communication are used? Can select multiple answers.

- Mail and email drops direct to employees
- Internal web pages
- Direct briefing
- Explicit training
- Other (eg. company publications, including company annual reports and objectives)

### 5. Is the measurement of the safety performance linked to employees reward and remuneration?

- Yes
- No



**6. Which KPI's are the most important within your company? Select three answers.**

- LTIF - Lost Time Injury Frequency
- Lost gas supply to customer
- Number of leakages (public reported and own activities)
- Response for emergencies
- Number of accidents and serious incidents
- Average repair time for failures (unplanned)
- Number of employees trained per year

**7. Do you have a dedicated set of management information for monitoring process safety?**

- Yes
- No, it is a part of normal reporting

**8. Do you have a separate Safety Department?**

- Yes
- No

**9. If yes, where is this department situated?**

- Within the asset management division
- Within the operations division
- Directly linked to the Board
- Other, please describe

## 9. Part 1 - Section 2 - Human Factor and Competence

### Human factor

These processes and/or procedures concern employees in engineering, operations (in normal and subnormal conditions) and maintenance of the gas network.

The principal interest is the fact that human factors can be triggered/disturbed by abnormalities in procedures, materials, equipment, the organisation and the external environment, but operating procedures do not generally seek to observe and analyse human factors that may be affected by these.

These processes and/or procedures consist of developing analysis (Return of Experience) to understand the influence of human factors.

An incident is defined as an event during the work which is not normal or has not been predicted.

### 1. Do you analyse activities of your workers (in terms of human factors) in:

	Yes	Partially	No
Engineering	jn	jn	jn
Operations in normal conditions	jn	jn	jn
Operations during an emergency	jn	jn	jn
Maintenance	jn	jn	jn

### 2. Do you use the following types of process and/or procedures?

	Yes	Partially	No
Collective check-in by working group before work	jn	jn	jn
Feedback in group with local manager after work	jn	jn	jn
Feedback in group with local manager after a technical incident	jn	jn	jn
Use of an individual questionnaire after work	jn	jn	jn
Use of a collective questionnaire after work	jn	jn	jn
Survey of perception of the approach at the workers for evaluation of the process	jn	jn	jn
Training for human factor process	jn	jn	jn

### 3. How do you rank important key items for human factors process and/or procedures: (1 means "most important")

	1	2	3	4	5
Quality of follow-up by managers	jn	jn	jn	jn	jn
Speed of follow-up by managers	jn	jn	jn	jn	jn
Confidence between managers and workers	jn	jn	jn	jn	jn
Transparency	jn	jn	jn	jn	jn
Exemplary nature (the learning process)	jn	jn	jn	jn	jn
Frequency of analysis	jn	jn	jn	jn	jn

#### 4. What are the KPIs used to measure efficiency of human factor process?

	Yes	No
Number of analysis / month or year	<input type="checkbox"/>	<input type="checkbox"/>
% of incidents with human factor identified as a cause	<input type="checkbox"/>	<input type="checkbox"/>
Number of incidents communicated by workers (formally or naturally)	<input type="checkbox"/>	<input type="checkbox"/>

Another KPI:

## 10. Part 1 - Section 2 - Competence

These processes and/or procedures concern employees in the design, engineering, operations and maintenance of the gas network.

The principal interest is the fact that a significant number of workers will retire in the near future. As a consequence a significant number of younger workers will be employed with the risk of them having insufficient competence. Replacements and adjustments to increase the network quality might result in exotic network components. This can result in maintenance problems. Furthermore developments of new technology and software might require new competences.

These processes and/or procedures aim to develop learning, training, examination and evaluation to assure a good level of competence.

### 1. Do you use competence process and/or procedures for all workers in:

	Yes	Partially	No
Design	jn	jn	jn
Engineering	jn	jn	jn
Operations	jn	jn	jn
Maintenance	jn	jn	jn

### 2. Which of these types of processes and/or procedures do you use specially for operating competence:

	Yes	Partially	No
Use of feedback process (human factor)	jn	jn	jn
Realistic incident scenario practised on site	jn	jn	jn
Use of new training technologies as simulators	jn	jn	jn
Use of new training technologies as training sites	jn	jn	jn
Use of new training technologies as serious games	jn	jn	jn
Use of new training technologies as e-learning	jn	jn	jn

### 3. How do you assure that your employees have or get the competence needed to work on site?

	Yes	Partially	No
Allowed activity certificate according to your internal and/or external specifications	jn	jn	jn
Revision of allowed activity certificate periodically	jn	jn	jn
Observation of real practice by counting sensible activities	jn	jn	jn
Use of this counting to define local rules to engage a training recycling program	jn	jn	jn

**4. What KPIs are used to measure efficiency of the competence process:**

	Yes	No
Workers who receive training during the year	jn	jn
Training to develop competence/workers/year	jn	jn
Training to maintain competence/ workers/year	jn	jn

Another KPI:

# 11. Part 1 - Section 3 - Inspection and maintenance in Distribution Networks (1...

## 1. Who establishes the rules and standards for maintenance and inspection?

- National Energy legislation (government)
- National Energy Regulator
- Professional independent association (e.g. DVGW)
- Own Company
- Other, please describe

## 2. Which kind of maintenance and inspection strategy is mainly in practice in your company? Select one only.

- Preventive (proactive) maintenance & inspection
- Risk-based maintenance & inspection
- Corrective maintenance & inspection
- Other, please describe

## 3. Is there additional supervision of key maintenance and inspection activities besides employees from Operations?

- Yes
- No

## 4. If yes, who are the Supervisors?

- Public authorities
- External professional expert
- Internal professional expert
- Other, please describe

## 5. Which activity are under supervision?

Public authorities	<input type="text"/>
External professional expert	<input type="text"/>
Internal professional expert	<input type="text"/>
Other	<input type="text"/>

**6. What are your company's KPIs for maintenance, inspection and replacement activities related to safety management of distribution pipelines? Multiple answers possible.**

- Break down rate (number of distribution interruptions per 100 km)
- Leakage (number of leakage per 100 km)
- Damages without leakage (number of damages per 100 km)
- Third party Collision with protection or safety buffer zone (number of Collision per 100 km/y)
- Surrounding influencees (all natural and external environmental influence such as landslip, geology)
- Time in operation in years
- Pressure measurement
- Cathodic protection measurement
- Function of cathodic protection anode
- Rate of replacement in lengths per year
- Number of emergency calls
- Other, please describe

**7. What is the critical value of the KPI?**

<i>Break down rate (number of distribution interruptions per 100 km)</i>	
<i>Leakage (number of leakage per 100 km)</i>	
<i>Damages without leakage (number of damages per 100 km)</i>	
<i>Third party collision with protection or safety buffer zone (number of collision per 100 km/y)</i>	
<i>Surrounding influences (all natural and external environmental influence such as landslip, geology)</i>	
<i>Time in operation in years</i>	
<i>Pressure measurement</i>	
<i>Cathodic protection measurement</i>	
<i>Function of cathodic protection anode</i>	
<i>Rate of replacement in lengths per year</i>	
<i>Number of emergency calls</i>	
<i>Other</i>	

### 8. Which is the frequency of monitoring?

	Monthly	Annually	Other
Break down rate (number of distribution interruptions per 100 km)	jñ	jñ	jñ
Leakage (number of leakage per 100 km)	jñ	jñ	jñ
Damages without leakage (number of damages per 100 km)	jñ	jñ	jñ
Third party Collision with protection or safety buffer zone (number of Collision per 100 km/y)	jñ	jñ	jñ
Surrounding influencees (all natural and anthropogenic influences – landship, geologic ...)	jñ	jñ	jñ
Time in operation in years	jñ	jñ	jñ
Pressure measurement	jñ	jñ	jñ
cathodic protection measurement	jñ	jñ	jñ
Function of cathodic protection anode	jñ	jñ	jñ
Rate of replacement in lengths per year	jñ	jñ	jñ
Number of emergency calls	jñ	jñ	jñ
Other	jñ	jñ	jñ

### 9. What are your company’s KPIs for of maintenance and inspection activities related to safety management of distribution regulation stations and odorising equipment?

Multiple answers possible.

- Damages to components
- Leakage in the components
- Unplanned shut downs
- Odorising value measurement (value of odorant mg/m³)
- Pressure measurement output of the regulation station
- Level of the noise
- Other, please describe

5

6



### 10. What is the critical value of the KPI?

Damages to components	<input type="text"/>
Leakage in the components	<input type="text"/>
Unplanned shut downs	<input type="text"/>
Odouring value measurement (value of odourant mg/m <sup>3</sup> )	<input type="text"/>
Pressure measurement output of the regulation station	<input type="text"/>
Level of the noise	<input type="text"/>
Other	<input type="text"/>

### 11. Which is the Frequency of monitoring?

	Monthly	Annually	Other
Damages to components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leakage in the components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unplanned shut downs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Odouring value measurement (value of odourant mg/m <sup>3</sup> )	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pressure measurement output of the regulation station	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of the noise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 12. Part 1 - Section 3 - Inspection and maintenance in Distribution Networks (2...

### 1. What are your company's KPIs for maintenance and inspection activities related to safety management of gas meters and inhouse (customer) installations? Multiple answers possible.

- Damage rate of small household meters (% of the breakdowns per year)
- Verification plan fulfilment (calibration)
- Number of leakages on the gasmeter counter
- Number of emergency calls (% from the household customers per year)
- Other, please describe

### 2. What is the critical value of the KPI?

*Damages rate of small household meters (% of the break downs per year)*

*Verification plan fulfilment (calibration)*

*Number of leakages on the gasmeter counter*

*Number of emergency calls (% from the household customer per year)*

*Other*

### 3. Which is the Frequency of monitoring?

	Monthly	Annually	Other
<i>Damages rate of small household meters (% of the break downs per year)</i>	j0	j0	j0
<i>Verification plan fulfilment (calibration)</i>	j0	j0	j0
<i>Number of leakages on the gasmeter counter</i>	j0	j0	j0
<i>Number of emergency calls (% from the household customer per year)</i>	j0	j0	j0
<i>Other</i>	j0	j0	j0

**4. Which format do you use to administer safety KPIs? Can select multiple answers.**

- GIS
- SAP or another ERP System
- Special safety monitoring software
- Excel
- Other, please describe

**5. How are the values of the KPIs set? Can select multiple answers.**

- Internal professional experts
- External professional experts
- Based on risk analysis
- Based on past performance
- Other, please describe

**6. What system have you implemented to improve maintenance and inspections KPIs?**

- Annual regular review
- Quality Management System (ISO 9001; PAS 55; TCM ...)
- No system implemented
- Other, please describe

## 13. Part 1 - Section 4 - Emergency Arrangements

### 1. Are KPI established by the Authority (Regulators e.g.)?

Yes

No

### 2. Are there any costs regarding safety emergencies that are not covered by the tariff and/or charged to the party that caused the accident?

Yes

No

### 3. Do you distinguish emergency treatment based on the scale of the accident impact or results?

Yes

No

### 4. Is your emergency call system operated:

by your own

via a national organisation (other than utilities e.g. fire brigade, emergency organisation)

other solution, please describe

	5
	6

### 5. Are the gas emergency teams

Outsourced

Sourced internally

Mixed, please describe this system

	5
	6

### 6. Is the number of personnel for first intervention sent to solve the incident regulated?

Yes

No

### 7. If yes,

One person for all the incidents

Two persons for all the incidents

More

**8. Are you responsible by law as the first level respondent to all customer installations devices in the case of an emergency call?**

Yes

No

**9. How often do you have periodical “emergency trainings” with your own staff?**

Once a year

Twice a year

More often

Less

**10. Do you practice emergency training with organisations such as the fire brigade, the police or another professional authority?**

Yes

No

## 14. Part 1 - Section 5 - A) Audit and review - Regulation topics

**1. Please indicate whether mandatory national legislation in gas distribution influences the following issues: (can select multiple answers)**

	Yes	Partially	No
Safety issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**2. Please indicate whether mandatory regulation in gas distribution influence on the following issues: (can select multiple answers)**

	Yes	Partially	No
Safety issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**3. Does the regulator monitor your company's safety/technical/health/ performance?**

Yes

No

**4. If 'yes', does the regulator sets incentives based on**

	Yes	No
Promotion of safety issues	<input type="checkbox"/>	<input type="checkbox"/>
Promotion of technical issues	<input type="checkbox"/>	<input type="checkbox"/>
Promotion of health issues	<input type="checkbox"/>	<input type="checkbox"/>

**5. Please indicate how often your company, as the Distribution System Operator, is required to report to the regulator on the following areas:**

	More than once a year	Annually	Less than once a year	No report Required
Promotion of safety issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other technical issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 15. Part 1 - Section 5 - B) Audit and review - Safety Management Systems includ...

### 1. Which certification system is in use for safety management systems in your company? Can select multiple answers.

- ISO 9001
- PAS 55
- OHSAS
- None
- Other, please describe

### 2. How mature do you think your safety management system is? Select only one.

- Pathological (who cares as long as we are not caught)
- Reactive (safety is important, we do a lot every time we have an accident)
- Calculative (we have a system in place to manage all hazards)
- Proactive (we work on the problems that we still find)
- Generative (HSE is how we do business round here)

### 3. Which type of audits does your company utilise?

	Yes	No
Technical safety audits (e.g. inspection and maintenance)	<input type="checkbox"/>	<input type="checkbox"/>
Organisation safety audits (e.g. emergency arrangements)	<input type="checkbox"/>	<input type="checkbox"/>
Personnel audits (incl. competence and procedural knowledge)	<input type="checkbox"/>	<input type="checkbox"/>

### 4. Which type of auditors does your company utilise?

	Internal	Both	External
Technical safety audits (e.g. inspection and maintenance)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organisation safety audits (e.g. emergency arrangements)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personnel audits (incl. competence and procedural knowledge)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 5. If 'external', who performs these audits in your gas distribution company?

- An independent organisation (a technical association such as DVGW in Germany)
- A legislative agency
- A regulatory agency

## 16. Part 2 - Questionnaire Smart Gas Metering - Introduction

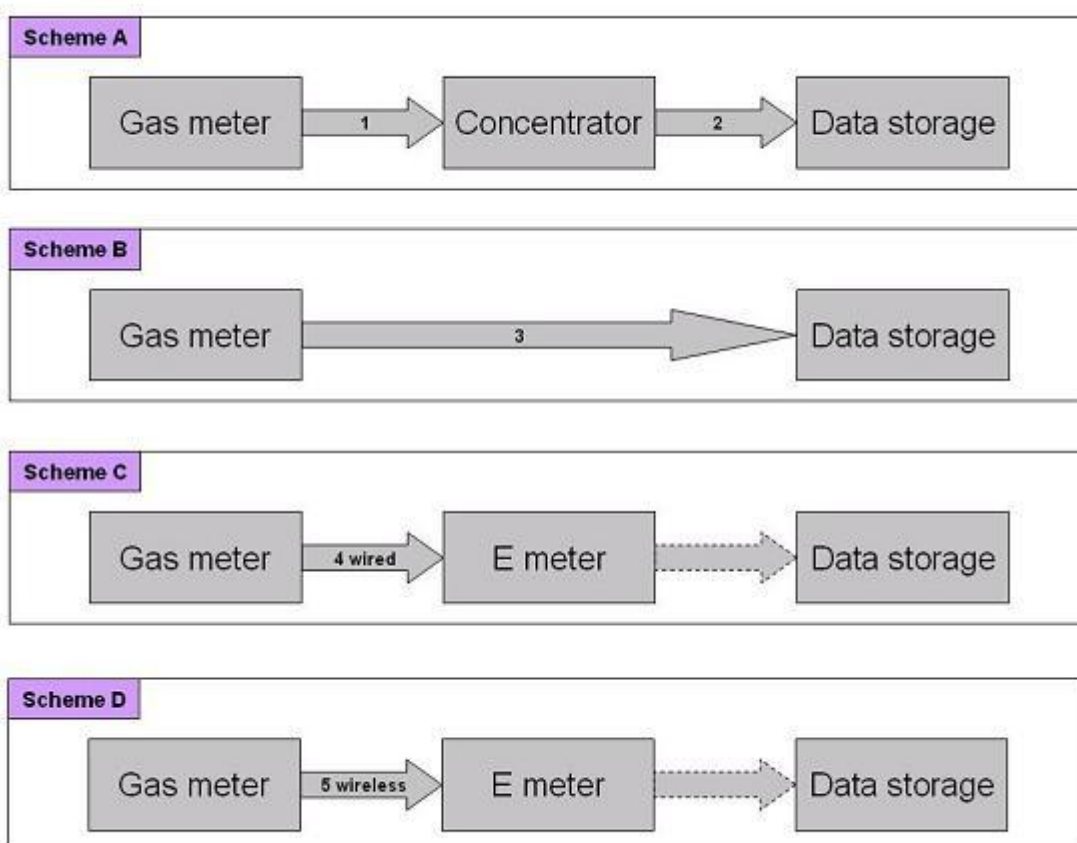
- Scope:

The scope of this questionnaire is limited to residential end users equipped with a gas meter up to G6 (Qmax 10m<sup>3</sup>/h).

- Definition of a Smart Gas Meter:

There is no generally accepted definition for a smart meter. In terms of guiding principles, any smart metering system should be based on:

- helping the end user to manage its gas consumption by providing better quality information;
- facilitating the end users to switch energy suppliers;
- offering the right balance between cost and additional functionalities.





## 17. Part 2 - Section 1 - General

**1. How many meters up to G6 (Qmax 10 m<sup>3</sup>/h) do you have (connected to your network)?**

**2. Who is the meter owner? Multiple answers possible.**

Distribution network operator

Commercial gas supplier

Metering company

Other (please specify)

**3. Who is responsible for the "Meter reading"?**

Distribution network operator

Commercial gas supplier

Metering company

Other (please specify)

**4. What is the mandatory frequency for meter reading?**

Monthly

Yearly

Other (please specify)

**5. What is the usual frequency for meter reading?**

Monthly

Yearly

Other (please specify)

**6. Who does the meter reading?**

Employee of the DSO (Distribution System Operator)

Third party / contractor

Meter reading company

Customer

Other (please specify)

**7. For answer "Customer" only, please specify. Multiple answers possible.**

Letter

Phone

Internet

Other

**8. How often should a physical meter reading be taken by the DSO (or other organization responsible for meter reading)?**

Monthly

Yearly

Other (please specify)

**9. What is the usual frequency for billing the end users?**

Monthly

Yearly

Other (please specify)

**10. What is the frequency of metrological verification of the meter? (Years)**

**11. Does the meter has a maximum mandatory life?**

Yes

No

**12. If your answer is "Yes" please specify how many years, if your answer is "No" please specify what your practise.**

## 18. Part 2 - Section 2 - Smart Meter

### 1. Do you have a current smart gas metering project and if so what is the status?

Yes, experimental (try out technologies, testing,...)

Yes, roll-out

No

### 2. If your answer is "Yes, roll out" please specify.

Planning: how many   
meters are planned and  
when?

In use: how many meters   
are in use?

### 3. Multi utility: are you including other utilities than gas in your project?

Yes

No

### 4. If your answer is "Yes", please specify. Multiple answers possible.

Electricity

Water

Heat

Telecom

Others

### 5. Are you considering the following additional functions? Indicate if yes, multiple answers possible.

Remote reading of metrological register(s) and provision to designated market organisation(s)

Two-way communication between the metering system and designated market organisation(s)

To support advanced tariffing and payment systems

To allow remote disablement and enablement of supply

Communicating with (and where appropriate directly controlling) individual devices within the home / building

To provide information via web portal/gateway to an inhome/building display or auxiliary equipment

**6. Are you concerned about the following obstacles? Score them from 5 (most concerned) to 1 (least concerned) and give comments if applicable.**

Communication technologies

Metrological

Other technical obstacles

Confidentiality of the data

Financing of the project

Permission for installation

Please comment your choices

## 19. Part 2 - Section 3 - Regulation

### 1. Is there a regulation from the government, regulator,... concerning smart gas metering?

Yes

No

In preparation

### 2. Who establishes the requirements for smart metering?

Regulator

National/Federal government

Regional government

Municipalities

Other (please specify)

### 3. What are the main requirements the regulator, government,... are considering for gas smart metering projects? Multiple answers possible.

Implementation program (deadlines, milestones,...)

Technical specific requirements

Other (please specify)

### 4. Does the regulator, government imposes additional functions? Multiple answers possible.

No

Remote reading

Prepayment

Cut off valve

Other (please specify)

### 5. Does the regulator, government impose smart metering for a part of the meters?

Yes, consumption over   
\_\_\_\_\_m<sup>3</sup>/y (ex. 300.000

m<sup>3</sup>/y)

Yes, consumption under   
\_\_\_\_\_m<sup>3</sup>/y (ex. 300.000

m<sup>3</sup>/y)

Yes, others

No

**6. Who is/will be responsible for the implementation of a current or future smart gas metering project?**

Distribution system operator

Commercial gas supplier

Metering company

Other (please specify)

## 20. Part 2 - Section 4 - Cost/Benefit

### 1. Do you include the following costs in your analysis? Multiple answers possible.

- Cost of the equipment
- Cost of IT and communication systems
- Installation cost
- Maintenance cost
- Depreciation of existing meters
- Other (please specify)

### 2. Do you include the following benefits in your analysis? Multiple answers possible.

- Remote prepayment function
- Remote cut off
- Less resource costs for meter index reading
- Less complaints
- Improvement of the gas balance
- Creation of new services to customers
- Other (please specify)

### 3. How do you recover the investments and operations cost?

- Included in the tariff
- Paid by the customers
- Other (please specify)

## 21. Part 2 - Section 5 - Technologies

**1. What kind of meter technology do you use in smart metering projects in progress?**

**Multiple answers possible.**

- Diaphragm
- Ultrasonic
- Thermal mass flow
- Other (please specify)

**2. Why? Please give 2 reasons.**

1)

2)

**3. What kind of meter technology are you considering for the future? Multiple answers possible.**

- Diaphragm
- Ultrasonic
- Thermal mass flow
- Other (please specify)

**4. Why? Please give 2 reasons.**

1)

2)

**5. With reference to the schemes in the introduction, what kind of communication technology do you use in smart metering projects in progress? (If you foresee a standard please indicate, for example technologies: Power Line Carrier, GPRS, UMTS, Telephone line, M-bus, Wifi, Radio,... - for example protocols: DLMS, IEC1107,...). Complete your answer only.**

Scheme A Connection 1

Scheme B Connection 2

Scheme B Connection 3

Scheme C Connection 4

Scheme D Connection 5



**6. With reference to the schemes in the introduction, what kind of communication technology are you considering for the future? (If you foresee a standard please indicate, for example technologies: Power Line Carrier, GPRS, UMTS, Telephone line, M-bus, Wifi, Radio,... - for example protocols: DLMS, IEC1107,...). Complete your answer only.**

Scheme A Connection 1	<input type="text"/>
Scheme B Connection 2	<input type="text"/>
Scheme B Connection 3	<input type="text"/>
Scheme C Connection 4	<input type="text"/>
Scheme D Connection 5	<input type="text"/>

**7. What kind of power do you use for the smart meter in smart metering projects in progress? Multiple answers possible.**

- Battery
- Powered by the electricity meter
- Directly connected with the power grid
- Other (please specify)

**8. What kind of power are you considering for the future? Multiple answers possible.**

- Battery
- Powered by the electricity meter
- Directly connected with the power grid
- Other (please specify)

**9. How important do you consider the following technical issues to be? Score from 7 (most important) to 1 (least important).**

Metrological requirements	<input type="text"/>
Reliability	<input type="text"/>
Durability	<input type="text"/>
Inter operability	<input type="text"/>
Battery life span	<input type="text"/>
Influence by weather conditions	<input type="text"/>
Tampering	<input type="text"/>
Other, please specify	<input type="text"/>

**10. How often do you (or do you plan to) capture the data?**

15 min

30 min

1 hour

Other (please specify)

**11. How often to you (or do you plan to) send the data to the IT system?**

Every hour

Every day

Every month

Other (please specify)

**12. Are you considering a link with intelligent home systems (alarms,...) for project in progress?**

Yes

No

**13. Are you considering a link with intelligent home systems (alarms,...) for future project?**

Yes

No

## 22. Part 3 - Section 1 - A) General

### 1. Please indicate the total length of mains operated by your company:

Steel - Coated [Km]	<input type="text"/>
Steel - Uncoated [Km]	<input type="text"/>
Cast Iron - Case [Km]	<input type="text"/>
Cast Iron - Ductile [Km]	<input type="text"/>
Polyethylene [Km]	<input type="text"/>
Other [Km]	<input type="text"/>
Total mains in network (sum of previous voices) [Km]	<input type="text"/>

### 2. Please indicate the length of mains operated by your company by pressure tiers:

Less or equal to 100 mbar [Km]	<input type="text"/>
More than 100 mbar and less or equal to 2 bar [Km]	<input type="text"/>
More than 2 and less or equal to 5 bar [Km]	<input type="text"/>
More than 5 bar and less or equal to 16 bar [Km]	<input type="text"/>
More than 16 bar [Km]	<input type="text"/>
Other [Km]	<input type="text"/>
Total mains in network (Hint: should be same value as under previous question) [Km]	<input type="text"/>

In some cases distribution companies supply gas directly to the final customers (billing both cost of gas and transportation); in other situations customers buy it from a retailer (in this case distribution companies only bill transportation to the retailers).

### 3. What percentage of your gas is supplied to a retailer, as opposed to the end user?

### 4. What is the scope of responsibility in your gas distribution business? From the network entry point (city gate) to the end of the service line (consumer connection) including the meter:

including interior service lines

excluding interior service lines

another scope of responsibility after the network entry point (city gate), please specify

## 23. Part 3 - Section 1 - B) General - Definition

Here is a definition of unaccounted for gas:

UFG is the difference between gas entering a distribution system at the point of custody transfer and that which can be measured and billed at all delivery points over a defined period of time

### 1. Do you agree with this definition?

Yes

No

### 2. If you do not agree with this definition please comment or provide your definition.

## 24. Part 3 - Section 1 - C) General - Regulation

**1. Does a regulator set a max allowable UFG?**

Yes

No

**2. If yes, what is the percentage?**

**3. If yes, what benefits or losses are incurred/possible if you are above or below?**

***Please explain why.***

	5
	6

## 25. Part 3 - Section 1 - D) General - Carbon Tax

**1. Does a carbon tax or carbon reduction scheme operate in your country?**

Yes

No

**2. If yes, does it influence your UFG management?**

Yes

No

**26. Part 3 - Section 1 - E) General - Drivers**

**1. What are your top three drivers to address UFG?**

- 1)
- 2)
- 3)

## 27. Part 3 - Section 1 - F) General - UFG measurement

### 1. How do you monitor UFG?

By energy value

By volume

By both energy and volume

### 2. What is your average UFG? Please provide unit or percentage.

### 3. Is your average UFG either increasing or decreasing?

Yes

No

### 4. If yes, by how much? Please provide unit.

### 5. If yes, what is the associated increase/decrease associated with (such as a specific network change like pipe degradation or mains replacement)? Please provide unit.

### 6. Is your UFG seasonal or cyclical in any way?

Yes

No

### 7. If yes, how do you cope with the seasonal effect? Are you able to completely offset this effect in your analysis of UFG?



## 28. Part 3 - Section 1 - G) General - Research

**1. Does your company or your gas association undertake any research/studies/projects/initiatives?**

Yes

No

**2. If yes, which UFG components are being addressed and who may we contact for further details? Please provide details.**

	5
	6

## 29. Part 3 - Section 1 - H) General - Components of UFG

**1. The table below lists components that can contribute to UFG. Please indicate the percentage of overall UFG that you feel each component contributes to for your network. If you know it, write the percentage. Please also comment if you do not know, or if the component is absent or is not a problem in your network. Please estimate values if you have no data.**

Network operations A1 Stock variation	<input type="text"/>
Network operations A2 Leakage as a result of third party damage	<input type="text"/>
Network operations A3 Permanent leaks from network (eg cast iron and valves)	<input type="text"/>
Network operations A4 Leakage from client-owned piping upstream of meter	<input type="text"/>
Network operations A5 Planned purging	<input type="text"/>
Network operations A6 Other operational losses	<input type="text"/>
Unbilled B1 Unauthorised consumption (theft)	<input type="text"/>
Unbilled B2 Own gas use	<input type="text"/>
Unbilled B3 Billing lag; unsynchronised billing for gas volume fluctuations	<input type="text"/>
Unbilled B4 Energy calculation and allocation to the consumption points	<input type="text"/>
Metering C1 Meter inaccuracy	<input type="text"/>
Metering C2 Meter error from uncompensated temp/pressure	<input type="text"/>
Metering C3 Meter malfunction	<input type="text"/>
Metering C4 Missing meter readings	<input type="text"/>
Metering C5 Estimation methodology accuracy	<input type="text"/>
Metering C6 Incorrect meter reading	<input type="text"/>
Custody transfer D1 Custody transfer reconciliation	<input type="text"/>

**2. List the top 3 UFG components that your business is focusing on. This question requires exactly 3 answers.**

- Network operations A1 Stock variation
- Network operations A2 Leakage as a result of third party damage
- Network operations A3 Permanent leaks from network (eg cast iron and valves)
- Network operations A4 Leakage from client-owned piping upstream of meter
- Network operations A5 Planned purging
- Network operations A6 Other operational losses
- Unbilled B1 Unauthorised consumption (theft)
- Unbilled B2 Own gas use
- Unbilled B3 Billing lag; unsynchronised billing for gas volume fluctuations
- Unbilled B4 Energy calculation and allocation to the consumption points
- Metering C1 Meter inaccuracy
- Metering C2 Meter error from uncompensated temp/pressure
- Metering C3 Meter malfunction
- Metering C4 Missing meter readings
- Metering C5 Estimation methodology accuracy
- Metering C6 Incorrect meter reading
- Custody transfer D1 Custody transfer reconciliation

### 3. Do you calculate or measure UFG?

	Yes	No
Network operations A1 Stock variation	jñ	jñ
Network operations A2 Leakage as a result of third party damage	jñ	jñ
Network operations A3 Permanent leaks from network (eg cast iron and valves)	jñ	jñ
Network operations A4 Leakage from client- owned piping upstream of meter	jñ	jñ
Network operations A5 Planned purging	jñ	jñ
Network operations A6 Other operational losses	jñ	jñ
Unbilled B1 Unauthorised consumption (theft)	jñ	jñ
Unbilled B2 Own gas use	jñ	jñ
Unbilled B3 Billing lag; unsynchronised billing for gas volume fluctuations	jñ	jñ
Unbilled B4 Energy calculation and allocation to the consumption points	jñ	jñ
Metering C1 Meter inaccuracy	jñ	jñ
Metering C2 Meter error from uncompensated temp/pressure	jñ	jñ
Metering C3 Meter malfunction	jñ	jñ
Metering C4 Missing meter readings	jñ	jñ
Metering C5 Estimation methodology accuracy	jñ	jñ
Metering C6 Incorrect meter reading	jñ	jñ
Custody transfer D1 Custody transfer reconciliation	jñ	jñ

#### 4. If yes, how?

Network operations A1 Stock variation	<input type="text"/>
Network operations A2 Leakage as a result of third party damage	<input type="text"/>
Network operations A3 Permanent leaks from network (eg cast iron and valves)	<input type="text"/>
Network operations A4 Leakage from client-owned piping upstream of meter	<input type="text"/>
Network operations A5 Planned purging	<input type="text"/>
Network operations A6 Other operational losses	<input type="text"/>
Unbilled B1 Unauthorised consumption (theft)	<input type="text"/>
Unbilled B2 Own gas use	<input type="text"/>
Unbilled B3 Billing lag; unsynchronised billing for gas volume fluctuations	<input type="text"/>
Unbilled B4 Energy calculation and allocation to the consumption points	<input type="text"/>
Metering C1 Meter inaccuracy	<input type="text"/>
Metering C2 Meter error from uncompensated temp/pressure	<input type="text"/>
Metering C3 Meter malfunction	<input type="text"/>
Metering C4 Missing meter readings	<input type="text"/>
Metering C5 Estimation methodology accuracy	<input type="text"/>
Metering C6 Incorrect meter reading	<input type="text"/>
Custody transfer D1 Custody transfer reconciliation	<input type="text"/>

#### 5. Do you have any comments on the above list of components?

<input type="text"/>	<input type="text" value="5"/>
<input type="text"/>	<input type="text" value="6"/>

#### 6. If there are any components that you do not include in UFG, please comment.

<input type="text"/>	<input type="text" value="5"/>
<input type="text"/>	<input type="text" value="6"/>

## 30. Part 3 - Section 2 - Network Operations

Stock variation

Definition: total amount of gas contained in network, dependent on network volume, pressure and temperature and on the variation of each of these variables.

**1. How does your stock variation affect your calculation of UFG? Please make a distinction between low pressure, medium pressure or high pressure in your answer.**

Leakage resulting from unintentional damage

Definition: include damage from own operations and third parties

**2. How do you calculate the volume of gas lost as a result of your own operations or third party damage?**

**3. How do you recover the gas value and other costs from such gas leakage from unintentional damage?**

Permanent leaks from network (eg cast iron and valves)

Definition: includes leakage from piping joints and from valve stem packing, and includes above and below ground facilities.

**4. What approach do you adopt for the calculation/measurement of permanent leaks? Examples can include historical coefficients related to pipe material, pressure, winter/summer time and assessment of particular pipe condition. If you have carried out any in situ measurement of the volume of gas leaking from areas or particular types of pipes please provide details, including values and coefficients.**

**5. How do manage this problem? Please provide details if you manage your leak survey to minimise UFG (apart from minimising safety incidents) and what measures do you take when you identify an unacceptable situation.**

**6. If you use mains replacement as a UFG control method please provide details.**

**7. With carbon trading, countries are adopting default methods for calculating emissions losses from networks. Does your company consider this?**

Yes

No

**8. If yes, which methods does your company use (or intends to use) to calculate carbon emissions from your network?**

Leakage from client-owned piping upstream of meter

Definition: includes risers in residential buildings

**9. Do you have any piping owned by the client upstream of your meter?**

Yes

No

**10. Who is accountable for gas lost as a result of leakage from client-owned piping upstream of meter:**

Your company

Client

Other (please specify)

**11. How do you manage this?**

Planned purging

Definition: includes blowdown for pipe replacement or decommissioning

**12. What methods do you use to reduce the need for purging and gas lost during purging?**

**13. How do you calculate/estimate the volume lost?**

Other operational losses

Definition: includes boil-off gas and other losses during LNG storage and delivery

**14. How do you calculate/estimate the losses from satellite plants?**

**15. What other operational losses do you have and how do you address them?**

	5
	6



## 31. Part 3 - Section 3 - Unbilled

Unauthorised consumption

Definition: theft

### 1. Do you have a method for estimating gas loss due to theft?

Yes

No

### 2. Do you have a methodology to prevent theft?

Yes

No

### 3. If yes, please provide details.

	5
	6

### 4. What percentage of incidents do you pursue with legal action to recover economic loss?

--

### 5. What are the most common methods of theft?

	Yes	No
Physical bypass	<input type="checkbox"/>	<input type="checkbox"/>
Meter unit manipulation or violation	<input type="checkbox"/>	<input type="checkbox"/>
Consumption without contract	<input type="checkbox"/>	<input type="checkbox"/>
Tampering with the pressure regulators installed immediately upstream the meter (setting a higher pressure)	<input type="checkbox"/>	<input type="checkbox"/>

Other (please provide details)

	5
	6

Own Gas Use

Definition of Gas used:

- As fuel for heating the gas before/after pressure reducing stages.
- As fuel for heating operation staff premises or producing electricity.
- For purging operating and control equipment.
- As power fluid to actuate automatic (pneumatic) valves (or other devices) in the network.

## 6. How do you measure or calculate gas consumption for your own operations?

Please describe in the table below.

Fuel for heating the gas before/after pressure reducing stages	<input type="text"/>
Fuel for heating operation staff premises or producing electricity	<input type="text"/>
Purging of operating and control equipment	<input type="text"/>
Power fluid to actuate automatic (pneumatic) valves	<input type="text"/>
Other usages	<input type="text"/>

Billing lag; unsynchronised billing for gas volume between the inlet and outlet of the network

Definition: time lag between the measurement and invoicing of the gas delivered into your network from the transport network, and the measurement and invoicing of the gas delivered to the customers supplied by the network (usually meters are read at different moments and over long periods)

## 7. Do you have a methodology to calculate the error in your gas balance connected to time lag?

Yes

No

## 8. Is there a cyclic/seasonal effect in this error? How do you minimise it?

<input type="text"/>	<input type="text" value="5"/>
<input type="text"/>	<input type="text" value="6"/>

## 9. The billing lag tends to become of greater importance the less often you read the customers' meters. How often do you read the customers meters?

	1 time per hour	1 time per day	1 time per week	1 time per fortnight	1 time per month	1 time per 2 months	1 time per 3 months	1 time per 6 months	1 time per year	other
Industrial	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>
Commercial	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>
Residential	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>	<input type="text" value="j0"/>

Energy calculation and allocation to the consumption points

Definition: calculation of calorific value of gas delivered to each client. If there are more than one injection points to one particular network (such as several city gates connected through the distribution network, or biogas plants connected to the network), the gas injected at each point may differ to the gas delivered at the others in its characteristics, namely its Gross Heating Value (GHV).

## 10. At which points in your network do you measure calorific value? (For example at delivery point of specially large/important customers or at strategic points).

<input type="text"/>	<input type="text" value="5"/>
<input type="text"/>	<input type="text" value="6"/>

**11. Do you measure calorific value at the delivery point of specially large/important customers?**

Yes

No

**12. Do you average the calorific value of the gas based on the relative weight of each source?**

Yes

No

## 32. Part 3 - Section 4 - Metering

**1. What is your acceptable meter accuracy? Please state units (split between industrial/commercial/residential).**

**2. Does an authority influence how you manage meter accuracy?**

Yes

No

**3. Do you have a program to improve the average accuracy of your meters (industrial/commercial/residential)?**

Yes

No

**4. If yes, please provide details. Please include info on frequency of meter calibration, frequency of reburbishment/replacement; include if you keep records that indicate how particular meter families perform in relation to accuracy over time, ie generally tend to drift fast, slow or no trend, is there any overall (average) bias in a meter family.**

**5. If no, do you expect to have to implement a program with the next 5/10 years?**

Yes

No

**6. When sizing meters for a consumer with varying demand, do you minimise inaccuracy by (multiple answers possible)**

- Installing a meter adapted to highest possible flow rate
- Installing a meter adapted to median flow rate or most frequent flow rate
- Installing multiple meters
- Installing a meter with wider measurement range (at more installation cost)
- Other (please specify)

**7. What percentage of meters are inside buildings (that experience less temperature fluctuations in seasons/daily)?**

**8. Which is the percentage of clients with compensated meters?**

Industrial	<input type="text"/>
Commercial	<input type="text"/>
Residential	<input type="text"/>

**9. Which is the percentage of gas volume in the segment with compensated meters?**

Industrial	<input type="text"/>
Commercial	<input type="text"/>
Residential	<input type="text"/>

**10. Which is the percentage of total gas distributed through compensated meters?**

Industrial	<input type="text"/>
Commercial	<input type="text"/>
Residential	<input type="text"/>

**11. What are the conditions of gas measurement assumed when there is no compensation? Does it vary with the part of the country (colder or warmer), or with the season (summer/winter)?**

**12. When you calculate the correction factor from assumed conditions do you include: (multiple answers possible)**

- Outside temperature
- Barometric pressure
- Gas assumed temperature
- Gas pressure
- Other

**13. If "outside temperature", over what period is it averaged?**

- Weekly
- Monthly
- Quarterly
- Semesterly
- Yearly

**14. Please provide a brief description of the method used.**

**15. Do you install a pressure regulator upstream of each meter?**

- Yes
- No

**16. Is the methodology regulated?**

Yes

No

**17. If yes, is it regulated by**

internal process

by an authority

**18. Do you monitor meters that do not read any consumption?**

Yes

No

**19. How are you made aware of meter malfunction: (multiple answers possible)**

Zero consumption

Unusually low consumption

Unusually high consumption

**20. You obtain residential meter readings (multiple answers possible)**

By residents

By sending staff or contractors to read meters

By telemetering

By smart metering

Other (please specify)

**21. What are most common reasons for missed meter readings? Please list the top 3 reasons and describe mitigation measures.**

Cannot access meter

Person taking the reading fails to visit meter

Cannot find meter (most common for new meters)

Meter is not listed on register

Other

**22. For selected reasons only, describe how you manage/mitigate this.**

Cannot access meter

Person taking the reading fails to visit meter

Cannot find meter (most common for new meters)

Meter is not listed on register

Other

**23. What KPI do you set for meter readings?**

**24. What is the maximum acceptable period between consecutive readings of each meter? Please specify the number of weeks.**

**25. How do you estimate the billed quantity when a meter reading is missed?**

**26. Do you use typical consumption profiles to estimate consumption?**

Yes

No

**27. Are the profiles weather/temperature adjustable?**

Yes

No

**28. What is the percentage of the total gas volume estimated with profiles?**

**29. How are you made aware of an incorrect meter reading? Multiple answers possible.**

- Software that tracks historical data
- Customer complaints
- Inspection/audit program
- Other

### 33. Part 3 - Section 5 - Custody Transfer

Custody transfer

Definition: measurement of the quantity of gas entering your network. The quantity can be measured in volume terms (requires the measurement of volume only) or energy terms (requires the additional measurement of calorific value at each delivery point).

#### 1. Who owns the custody transfer meter and calorimeter/chromatograph (if it exists)?

Gas transport operator

Your company

Joint ownership

Duplicate meters

#### 2. What is the acceptable accuracy range of the meter? Please state unit.

#### 3. What type of meters do you use for custody transfer? Multiple answers possible.

Turbines

Positive displacement devices (roots)

Coriolis

Ultrasonic

Other (please specify)

#### 4. How often are they calibrated for accuracy? Please state unit of time.

#### 5. How are the custody transfer meters and any other meters that operate above 1000 kPa pressure calibrated?

on gas at operating pressure

on air at atmospheric pressure

#### 6. Do you follow an international determination and calibration standard? Which one?

#### 7. How do you resolve a discrepancy between two meter readings (when duplicated)?

#### 8. If you are billed for gas entering your network in energy, what equipment do you use to determine GHV: please fill in the following table. Multiple answers possible.

	Continuous	Scheduled
Chromatograph	€	€
Calorimeter	€	€



**9. How often are they calibrated for accuracy? Please state unit of time.**

**10. Do you follow an international determination and calibration standard? Which one?**

**11. What is the traceability of standard gas and its class of accuracy?**

**12. If you use chromatographs, what assumptions are coded for the split of heavy hydrocarbons that are not individually determined?**

**13. How do you resolve a discrepancy between two calorimeters or chromatographs (when duplicated)?**

**14. If you accept biogas into your system, who is responsible for the measurement of gas volume and characteristics?**