

marcogaz

TECHNICAL ASSOCIATION
OF THE EUROPEAN NATURAL GAS INDUSTRY



European Pipeline Safety Regulations and Standards

Daniel Hec, Secretary General

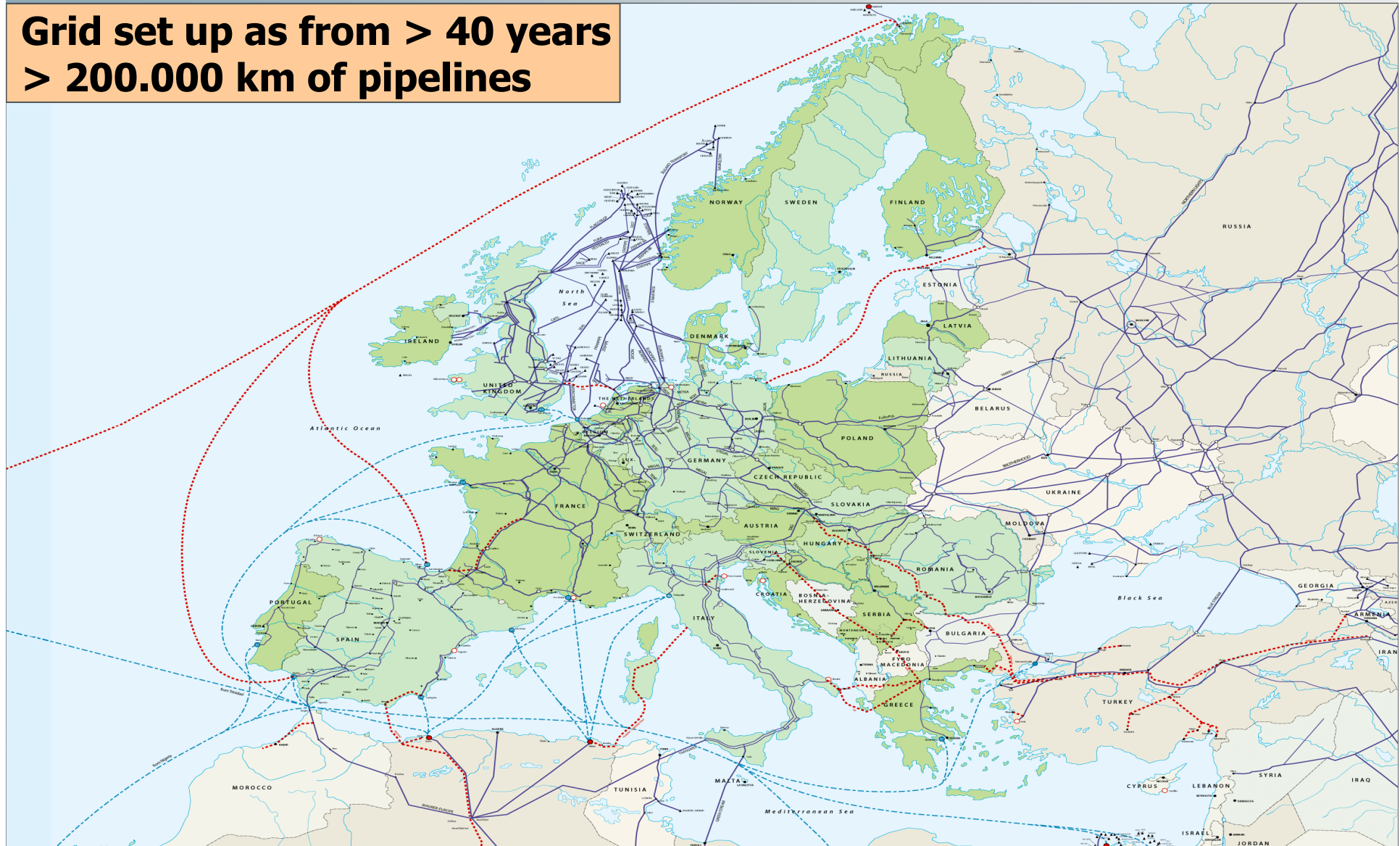
daniel.hec@marcogaz.org

UN-ECE, Geneva, 22nd-23rd January 2008

European gas grids: a very complex system

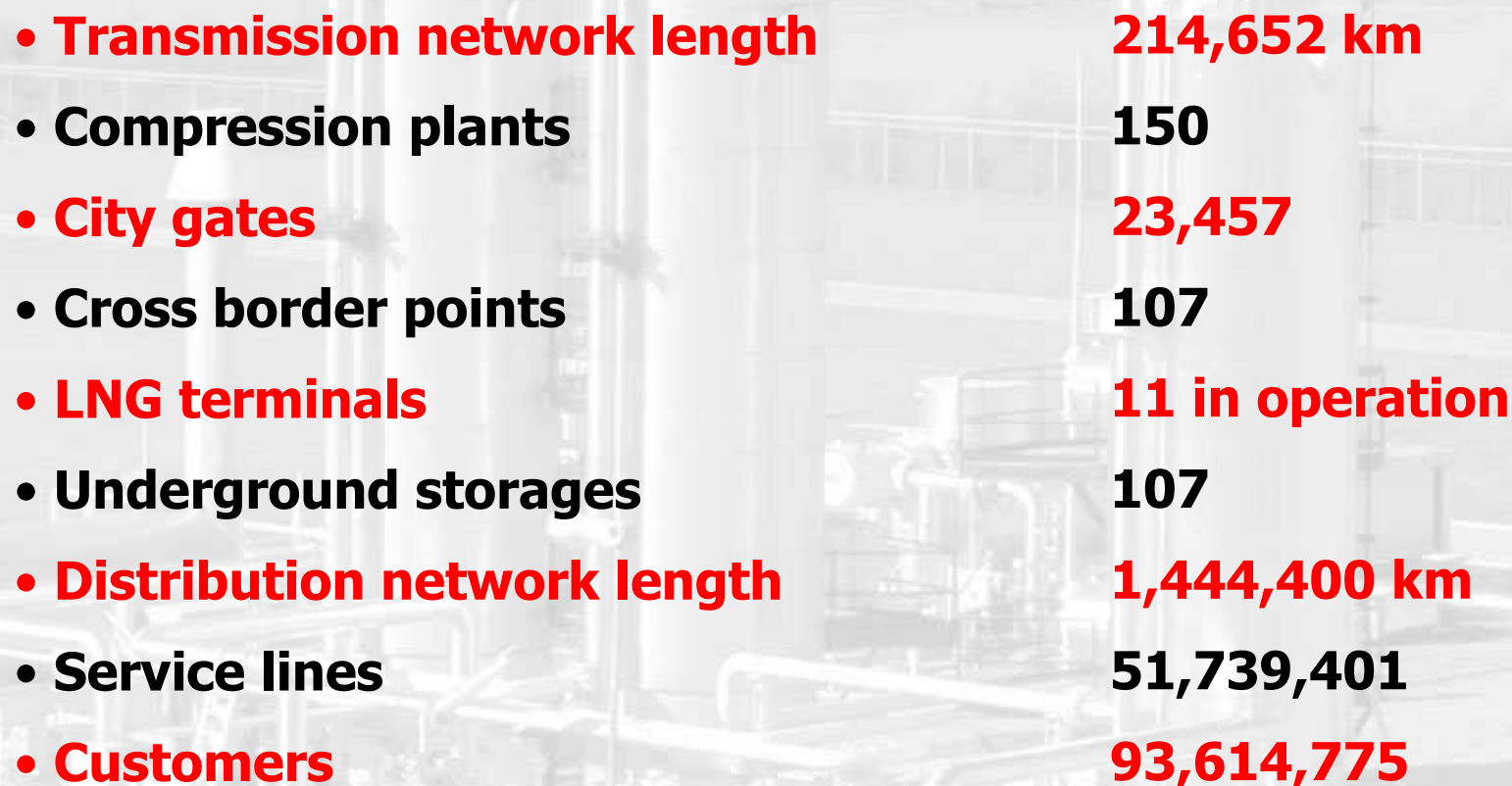
marcogaz

**Grid set up as from > 40 years
> 200.000 km of pipelines**



European gas pipeline system: main figures

marcogaz



Source: marcogaz statistics 2005

1. Role of self-regulation

2. The basis: European technical standards

3. Main concerns

4. Conclusions

- **Safety regulations: 2 types**

- **mandatory** by law : European or National legislation (directives, regulations, environmental rules,..)
- **not mandatory**: guidelines (European or national)

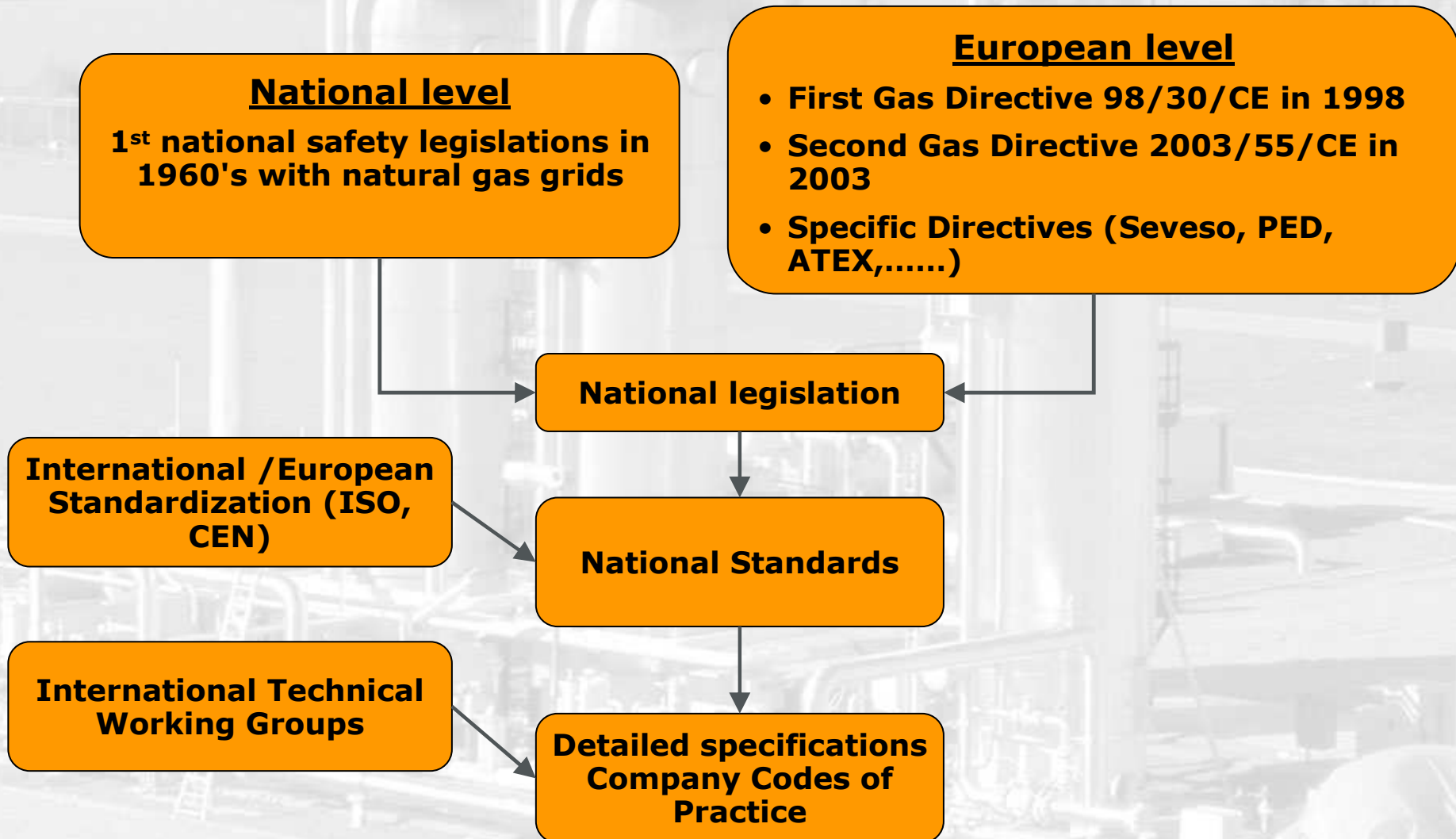
- **Self regulation: technical specifications**

- **Standards**: European (CEN) or International (ISO)
 - resulting from expert working groups; normally voluntary
 - used as reference by Authorities Gas Operators and Contractors
 - may become mandatory through legislation
- **Company specifications**: imposed on producers or contractors
- **Company codes of practice** : detailed for company operations

•Self regulation

- Possible at all levels (public or private; industry level or individual company)
- Adds complementary specifications to existing minimum requirements
- Mandatory if published as law or included e.g. in permit conditions
- More flexible and thus closer to technological improvements or national/local conditions
- Sound self regulation is ensured through strong involvement of the Gas Industry

Pipeline safety regulation : 4 Levels



Scope: common rules for transmission, distribution, supply and storage

Article 5: Security of supply

- **quality and level of maintenance**
- **technical emergency response**

Article 6: Technical rules for interoperability

- **technical safety criteria**
- **minimum technical design and operational requirements**

Article 8.1.a and 12.1:

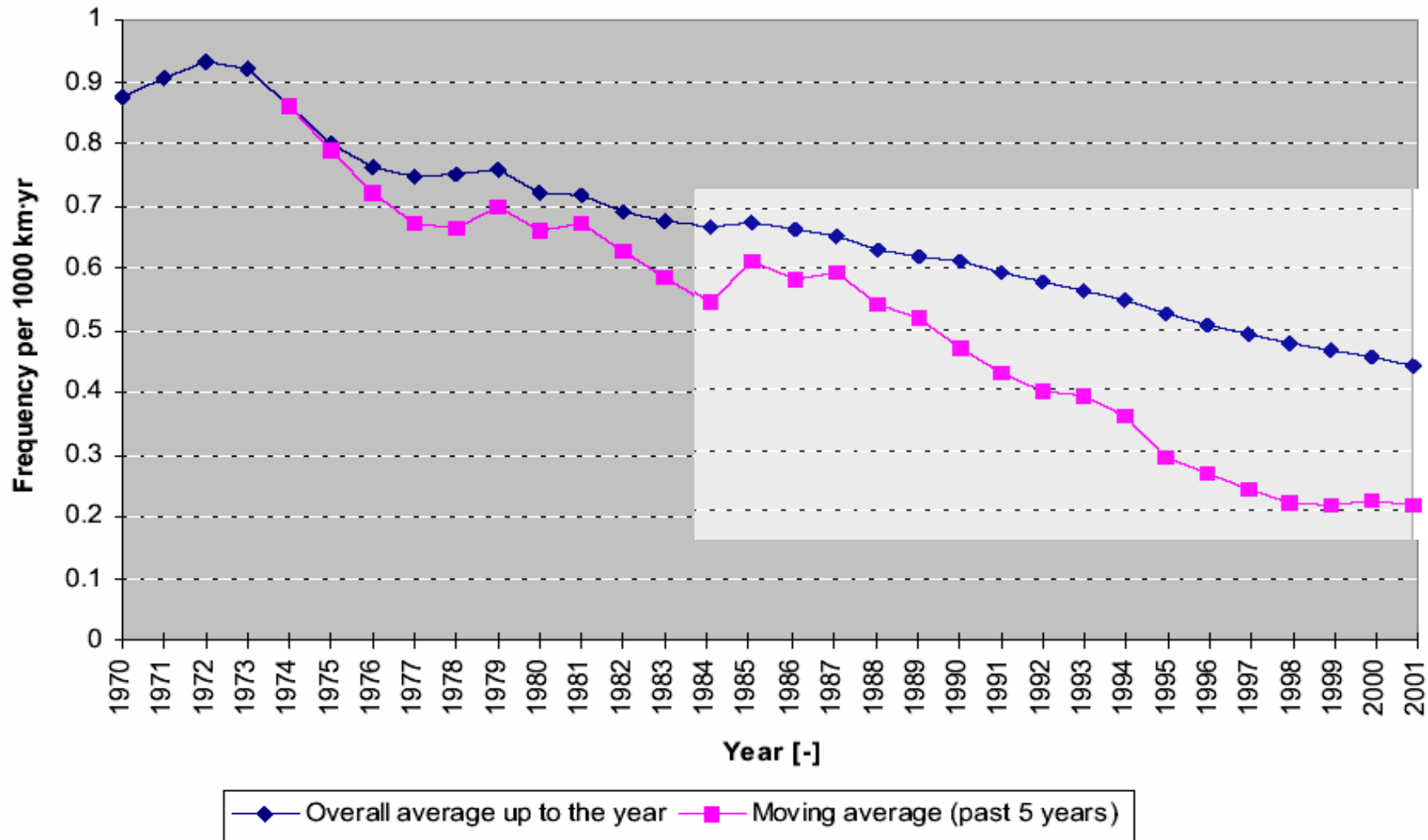
Each transmission and distribution operator shall operate, maintain and develop under economic conditions secure, reliable and efficient systems

- **In Europe: more than 40 years of high pressure natural gas systems design, construction and operation**
 - TSOs have proven knowledge of pipeline safety policy, procedures and measures
 - Basis: good standards and state-of-the-art practices.
- **Each country has developed its own approach**
 - Start: mostly from a common ASME standard
 - Later on: adaptations according to the country's specificities (population density, land use planning, regulatory philosophy, etc.)
 - Introduction of common standards (ISO and CEN)
- **All the countries achieved the same over-all level of safety**

- **R&D efforts** led to many technical improvements: high resistance steels (x80, x100), polyethylene pipes systems for distribution.....
- **1990**: creation of **CEN/TC 234** « Gas Infrastructure » Concept of functional standard for design, construction, operation and maintenance of gas systems
- 6 years development of standards series CEN/TC 234 covering the entire onshore gas chain
- **1996**: MARCOGAZ introduced the PIMS (Pipeline Integrity Management System)
- **2006**: frame of reference for PIMS; guidelines for SMS

Result : improving incident statistics

Development of overall failure frequency



1. Role of self-regulation

2. The basis: European technical standards

- **Basic Functional standard: EN1594:2000**
- **Functional standards for gas transmission infrastructures**
- **Product Standards**

3. Main concerns

4. Conclusions

- Covers all aspects concerning the design, construction and operation of safe high pressure gas transmission pipelines (MOP \geq 16 bar)
- Functional standard: established for the user (gas system operator) not for the producer !

- **1 Scope**
- **2 Normative references**
- **3 Definitions, symbols and abbreviations**
- **4 Quality system**
- **5 Safety and the environment**
 - 5.2 Appropriate safety measures
 - 5.3 Routing considerations
 - 5.4 Line valve spacing
- **6 Pressure safety**

• 7 Design

- 7.1 General
- 7.2 Wall thickness determination
- 7.3 Additional design requirements
- 7.4 Analysis of stress and strain
- 7.5 Design report
- 7.6 Land management and geotechnical studies
- 7.7 Depth of cover
- 7.8 Casing pipes
- 7.9 Station design
- 7.10 Pipeline components
- 7.11 Pigging suitability
- 7.12 Arrangements for venting
- 7.13 Corrosion protection

- **8 Materials and components**
- **9 Construction**
- **10 Operation and maintenance**

EN 1594 is currently being revised: EN 1594:2008 to be published this year







1. Role of self-regulation

2. The basis: European technical standards

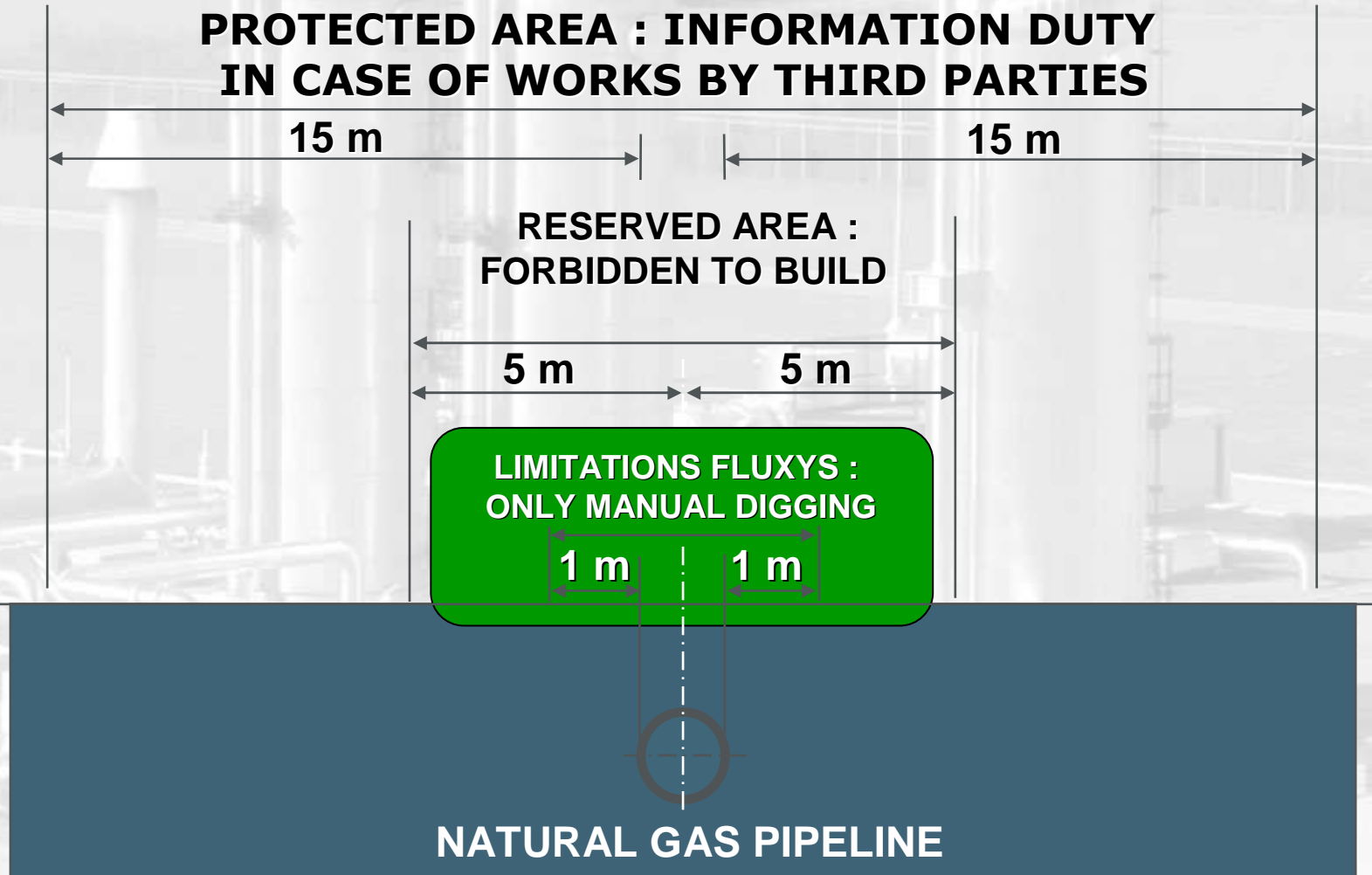
- Basic standard: EN1594:2000
- Functional standards for gas transmission infrastructures
- Product Standards

3. Main concerns

4. Conclusions

• Gas Pipelines

- EN 1594:2000 Gas supply systems - Pipelines for maximum operating pressure over 16 bar - Functional requirements
- Generally taken as basis for national regulation or specifications for design, construction and operation of pipelines
- Particular safety aspects are complemented in the different European countries by national legislation, codes or specifications



- **Above ground gas installation**

- **EN 12186:2000** Gas supply systems - Gas pressure regulating stations for transmission and distribution
- **EN 12186:2000/A1:2005** Gas supply systems - Gas pressure regulating stations for transmission and distribution
- **EN 12279: 2000** Gas supply systems - Gas pressure regulating installations on service lines
- **EN 12279:2000/A1:2005** Gas supply systems - Gas pressure regulating installations on service lines
- **EN 1776:1998** Gas supply systems - Natural gas measuring stations
- **EN 12583:2000** Gas supply systems - Compressor stations

- **General standards**

- **EN 12327:2000** Gas supply systems - Pressure testing, commissioning and decommissioning procedures
- **EN 12732:2000** Gas supply systems - Welding steel pipe work

- **Supporting specifications**

- **CR 13737:2001** Implementation Guide for functional standards prepared by CEN/TC 234 "Gas infrastructure"
- **CEN/TS 15173:2006** Gas supply systems - Frame of reference regarding Pipeline Integrity Management System (PIMS)
- **CEN/TS 15174:2006** Gas supply systems - Guideline for safety management systems for natural gas transmission pipelines

- **Standards related to distribution and internal installation**
 - **EN1775:2007** Gas pipeworks for buildings (internal installations)
 - **EN1555 (1-5):2002** Plastics piping systems for the supply of gaseous fuels
 - **EN12007 (1-4):2000** Gas supply systems. Pipelines for maximum operating pressure up to and including 16 bar
 - **prEN15001:2005** Gas installation pipe work with OP greater than 0.5 bar for industrial and greater than 5 bar for industrial and non-industrial installations – ready for formal vote

1. Role of self-regulation

2. The basis: European technical standards

- **Basic standard: EN1594:2000**
- **Functional standards for gas transmission infrastructures**
- **Product Standards**

3. Main concerns

4. Conclusions

- **Product standards constitute a homogeneous collection and have to be considered as a whole**
 - Example: toughness values in the EN10208-2
 - Background: design requirement based upon ductile fracture propagation
 - For this reason EN1594:2000 has only a general comment on the topic, and refers for pipes to the EN10208-2 which mentions specific minimal toughness values in order to avoid ductile fracture propagation
- **Also international standards are used**
 - ISO 3183 / 1996 : Steel pipes for pipeline – Oil and Gas Industries
- **Many standards for distribution and in-house equipment**

1. Role of self-regulation

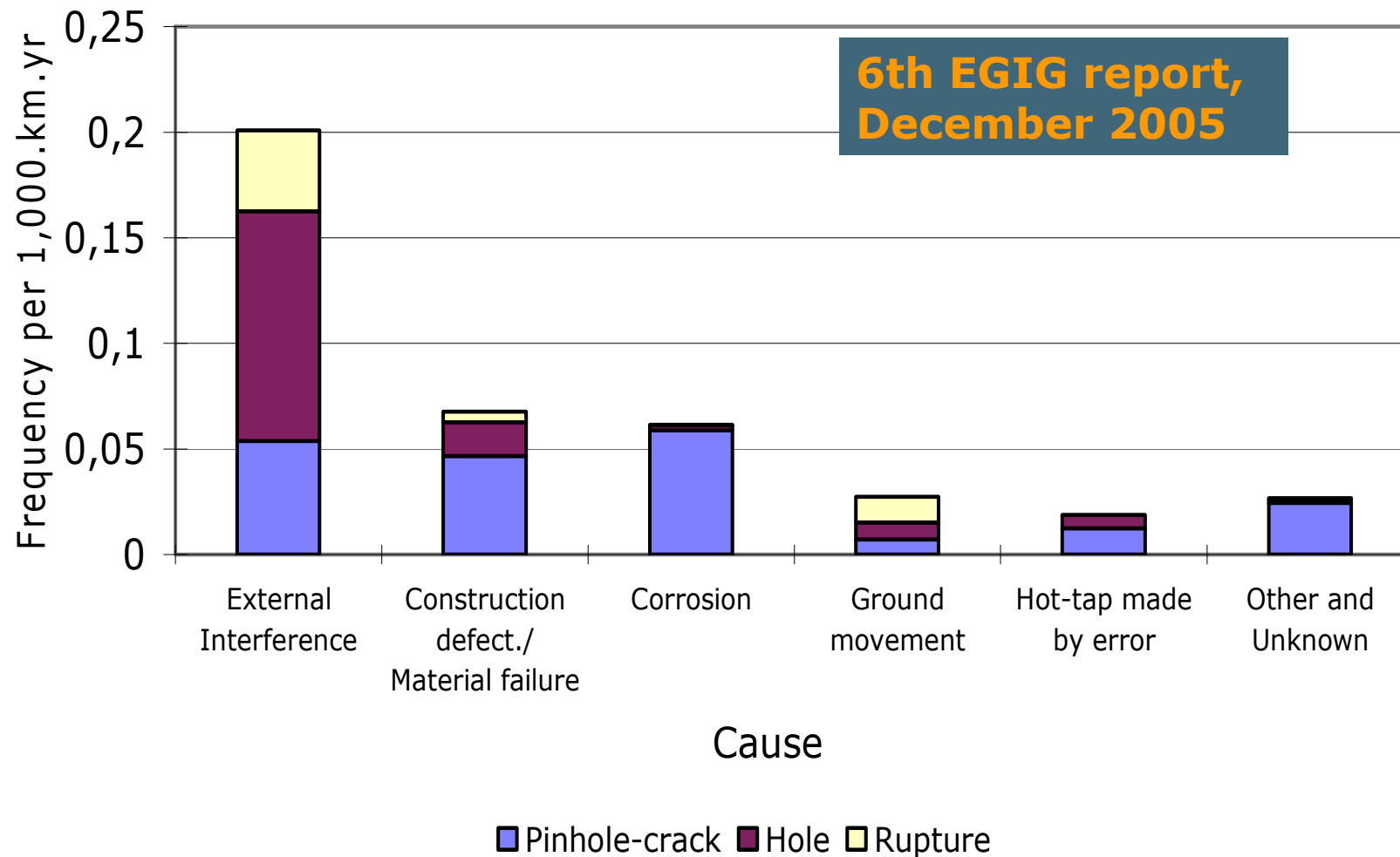
2. The basis: European technical standards

3. Main concerns

4. Conclusions

- The general basis for building safe gas pipeline systems is ensured by the relevant (existing) standards covering design rules, production specifications, factory tests of materials and equipment, and construction procedures and testing
- Pipeline accidents in Western Europe caused by **third party interference** are the most severe both in probability and in intensity

Incident by cause and size of leak



Measures against external damages inflicted to pipelines should include :

- **Regulations** legally imposed on civil work contractors, engineering offices, other pipeline or telecom operators, etc.
 - **e.g. the obligation to consult pipeline operators before starting any civil works**
- **Safety Management System** including
 - **all measures which ensure the most effective prevention effects**
 - **Emergency plans in agreement with the authorities**
- In order to be prepared for any incident/accident, **organizational arrangements** shall be established and implemented, such as :
 - **internal and external emergency plans,**
 - **call center, one-call systems,**
 - **safety information packages to third parties, etc**

1. Role of self-regulation

2. The basis: European technical standards

3. Main concerns

4. Conclusions

- A **reliable and safe gas supply** is essential to modern societies
- The European Gas Industry has always been **pro-active** concerning safety issues by:
 - producing and using **high level safety standards**
 - developing appropriate **Safety Management Systems**
 - promoting and financing **innovations** through R&D
- The result is that gas pipelines are by far the **safest way to transport energy**
- The main threat to pipelines is **third party damage**: actions shall be carried out with all the interested parties to reduce this risk

- **MARCOGAZ** has recently published a **Policy Paper on Transmission Pipelines Safety**
- **The continuation of such a success story can be done only with the participation of all:**
 - through **Gas Industry Associations (such as MARCOGAZ)**
 - by sending experts in standardization groups
 - by exchanging among **Gas Industry and with Safety Authorities**
- **Following the European rules and standards has led the EU Gas Industry to converge to the same level of safety all around Europe**

Following documents accompanying this slide presentation may be consulted for more information:

- I. Note on the use of safety standards by European TSO's in the field of design, construction and operation of natural gas pipelines**
- II. European safety standards regarding natural gas pipelines (annex 1)**
- III. Position paper on the question of Third Party Interference (annex 2)**
- IV. Policy Paper on Transmission Pipelines Safety (annex 3)**