

# SAFETY IN GAS DISTRIBUTION ACTIVITIES: TECHNICAL STANDARDS, PERFORMANCE STANDARDS, AND ECONOMIC REGULATION

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***Autorità per l'energia elettrica e il gas***

# ***WHAT IS SAFETY?***

**SAFETY IN GAS TRANSPORTATION AND  
DISTRIBUTION ACTIVITIES**

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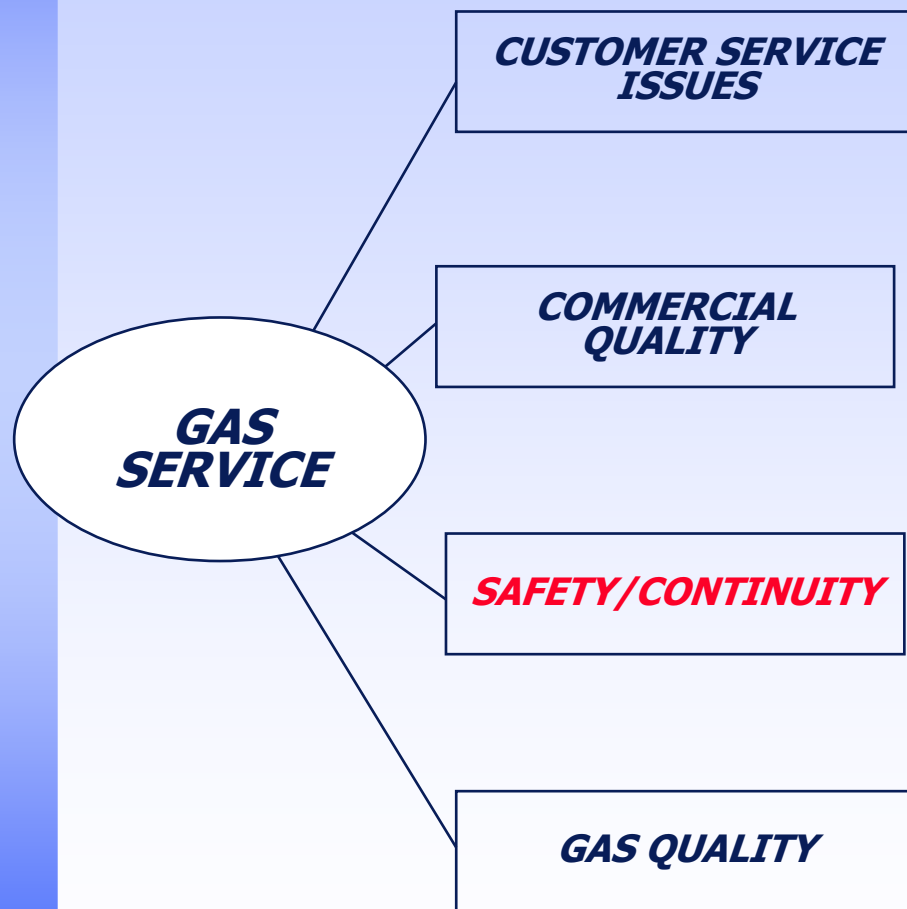
**THE CAPABILITY TO PREVENT ACCIDENTS AND TO  
MANAGE EMERGENCIES**

**SAFETY IS THE PRIMARY QUALITY FACTOR IN GAS  
DISTRIBUTION SERVICE**



# **MAIN QUALITY FACTORS**

## **Gas Service**



**SUPPLY**

**DISTRIBUTION**

- **NETWORK SAFETY RULES**
- **GAS LEAKS**
- **GAS ODOURIZATION**
- **CATHODE PROTECTION**
- **EMERGENCY INTERVENTION**
- **SUPPLY INTERRUPTIONS (WITH AND WITHOUT NOTICE)**



# ***SAFETY IN GAS DISTRIBUTION***

- ◆ SAFETY CANNOT BE INDIVIDUALLY NEGOTIATED
- ◆ UTILITY REGULATION SHOULD EXPLICITLY INCLUDE SAFETY RULES
- ◆ THESE ARE EVEN MORE NECESSARY IF:
  - THE BUSINESS HAS BEEN **PRIVATIZED**
  - THE GAS BUSINESS HAS BEEN **UNBUNDLED**
  - **PRICE-CAP** REGULATION HAS BEEN INTRODUCED
  - **COMPETITION FOR THE MARKET** (COMPETITIVE CONTRACTING) HAS BEEN LAUNCHED
- ◆ GAS SUPPLY COMPETITION HAS NO DIRECT EFFECTS ON SAFETY LEVELS

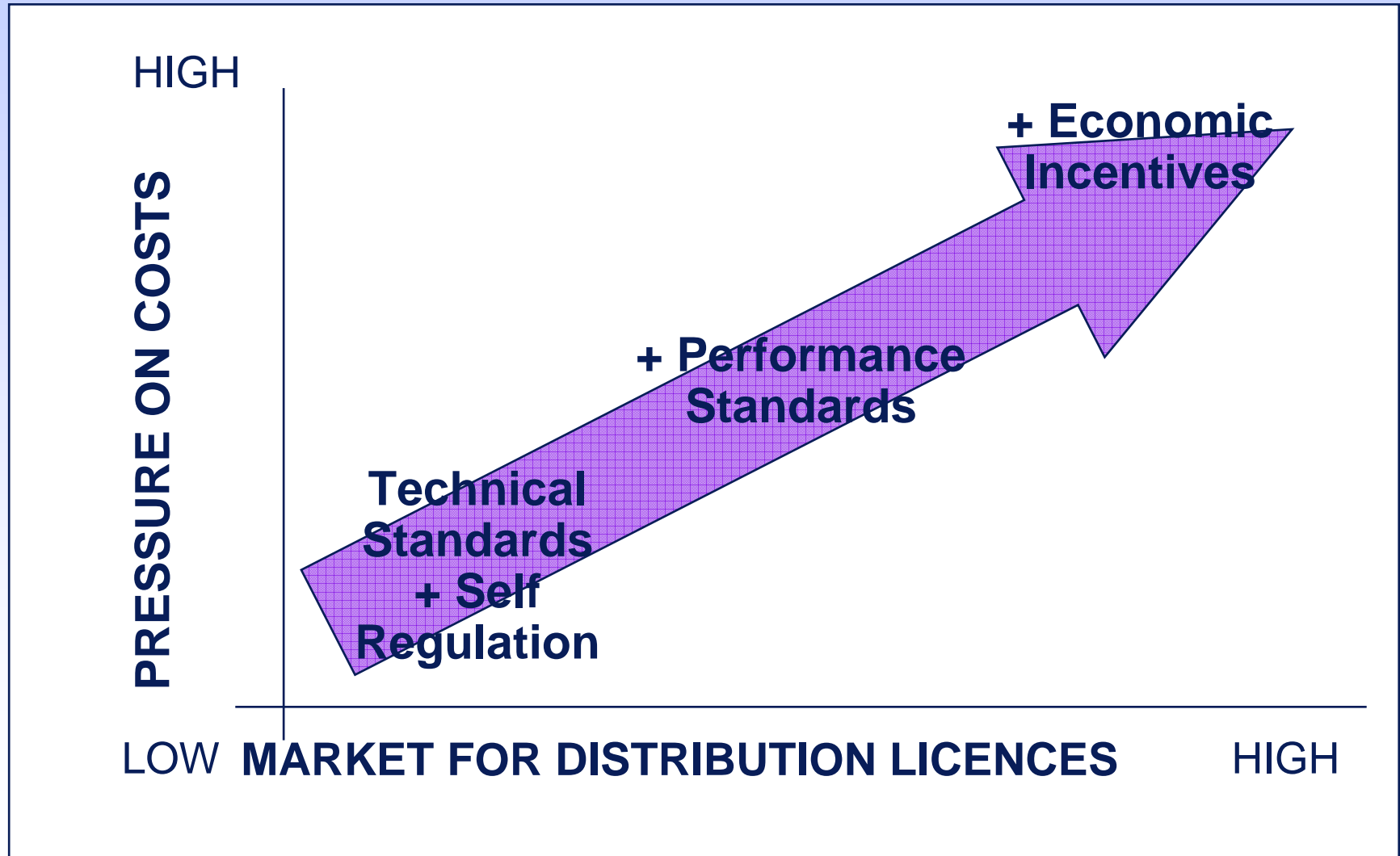


# ***REGULATORS APPROACH TO GAS SAFETY***

- ◆ FROM COMPANIES' DECISIONS (NATIONAL CHAMPIONS; SELF-REGULATION) TO REGULATION
- ◆ MIX OF ECONOMIC AND TECHNICAL REGULATION
- ◆ SELF-REGULATION IS WELCOME, PROVIDED THAT ADEQUATE CONTROLS AND SANCTIONS FOR VIOLATION ARE INTRODUCED
- ◆ PUBLIC SAFETY RULES FOR (AT LEAST PARTIALLY) PRIVATE MANAGEMENT APPEARS TO BE THE NEW PREVAILING REGULATORY APPROACH



# ***SAFETY REGULATION PHASES***



# ***GAS DISTRIBUTION IN ITALY***

## ***Main features***

- ◆ ABOUT 400 LOCAL DISTRIBUTORS
- ◆ MUNICIPAL DISTRIBUTION LICENCES (ABOUT 6000)
- ◆ MORE THAN 3000 DISTRIBUTION PLANTS
- ◆ SINCE JANUARY 2003 DISTRIBUTION AND SUPPLY ARE LEGALLY UNBUNDLED (DIFFERENT COMPANIES)



# ***SAFETY REGULATION IN ITALY***

## ***Stage 1 (until 2000)***

- ◆ SAFETY REGULATION IS BASED ON TECHNICAL STANDARDS AND RULES





# ***SAFETY REGULATION IN ITALY***

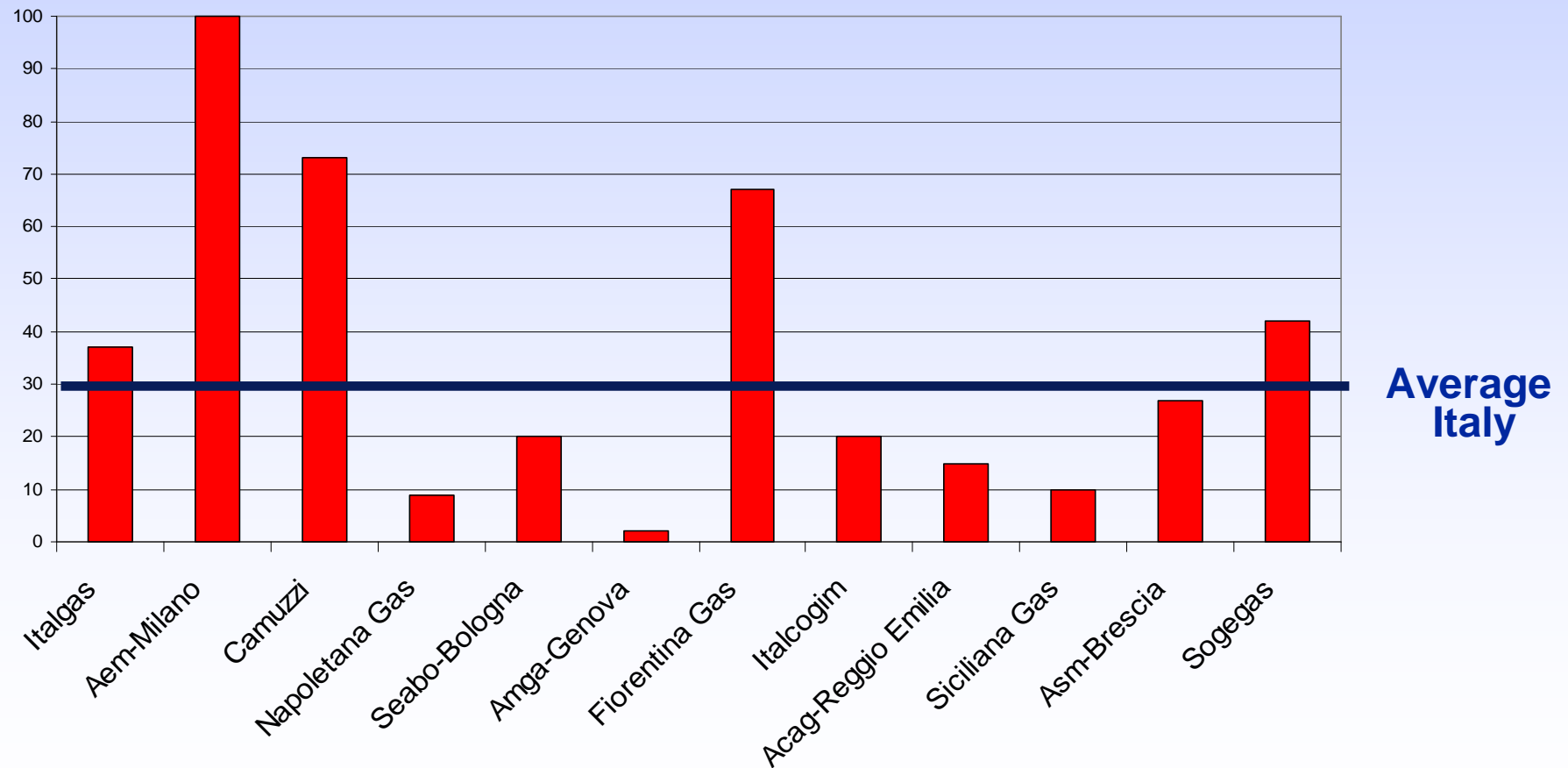
## ***Stage 2 (2001-2003)***

- ◆ SAFETY REGULATION IS BASED ON STANDARDS OF PERFORMANCE
  - MEASUREMENT RULES FOR LEADING SAFETY AND CONTINUITY FACTORS (SINCE 2001)
  - FOR EACH DISTRIBUTION PLANT, SAFETY AND CONTINUITY INDEXES FOR EACH DISTRIBUTION PLANT (SINCE 2002)
  - OVERALL STANDARDS (SINCE 2002)



# ***SAFETY-RELATED PERFORMANCE*** ***Before regulation***

**YEARLY PERCENTAGE OF LOW PRESSURE PIPES INSPECTED – 1999**



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# ***SAFETY REGULATION 2001-2003***

## ***Overall standards***

SAFETY INDICATOR	OVERALL STANDARDS	OPTIMUM QUALITY LEVELS
PERCENTAGE OF HIGH AND MEDIUM PRESSURE PIPES INSPECTED	<b>30%</b>	<b>90%</b>
PERCENTAGE OF LOW PRESSURE PIPES INSPECTED	<b>20%</b>	<b>70%</b>
NUMBER OF LOCALIZED LEAKAGES PER KM OF PIPES	<b>0,8</b>	<b>0,1</b>
CONVENTIONAL NUMBER OF GAS ODORIZATION LEVEL MEASUREMENTS PER THOUSAND OF CUSTOMERS	<b>OD<sub>min</sub> (see paragraph 9.4 of Reg. Order 236/00)</b>	<b>0,5</b>

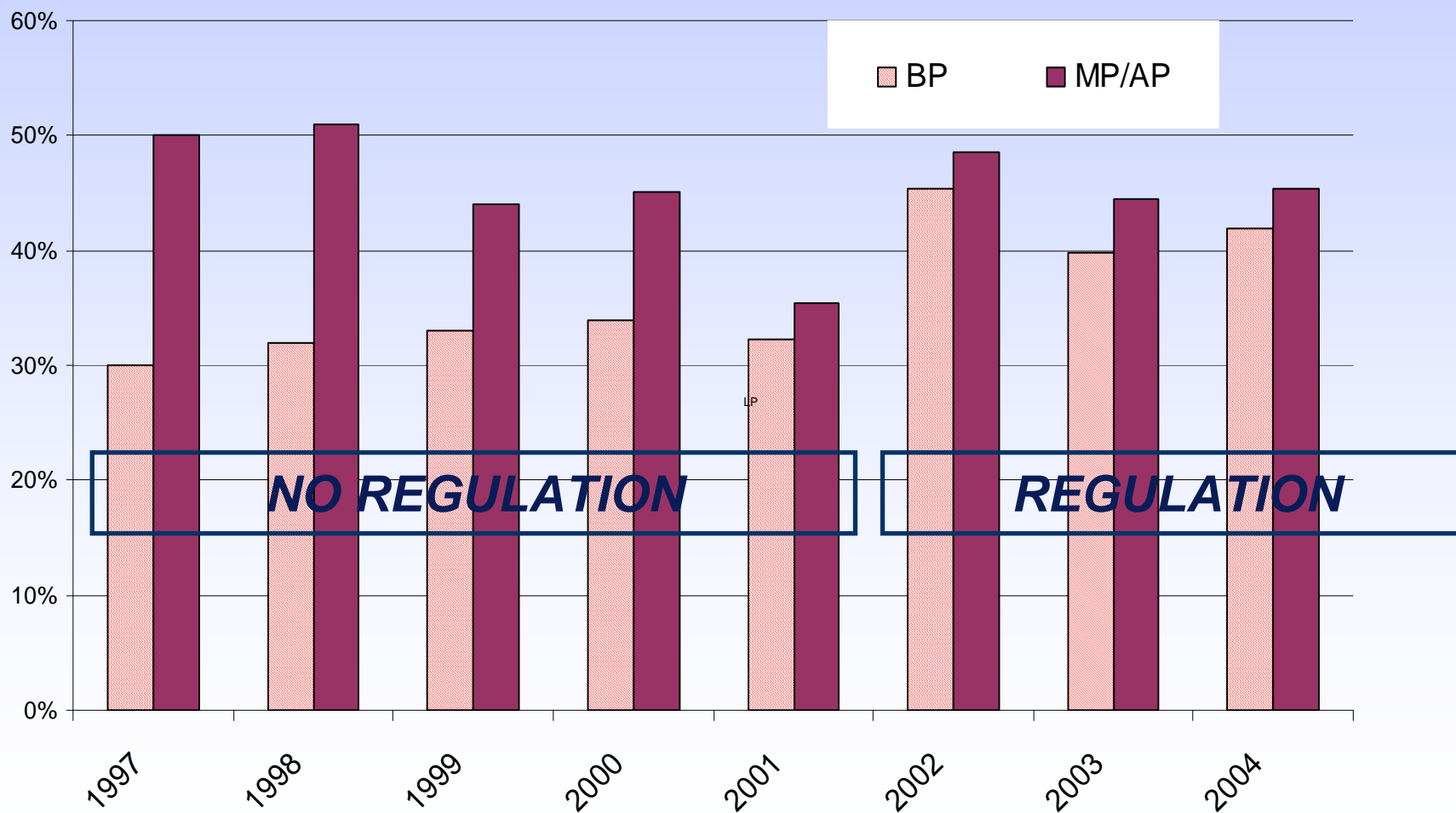


**Compulsory minimum overall standards**



# ***SAFETY REGULATION EFFECTS (1)***

**PERCENTAGE OF PIPES INSPECTED 1997-2004  
(Mandatory Targets: LP 20%/year; HP/MP 30%/year)**



## ***SAFETY REGULATION EFFECTS (2)***

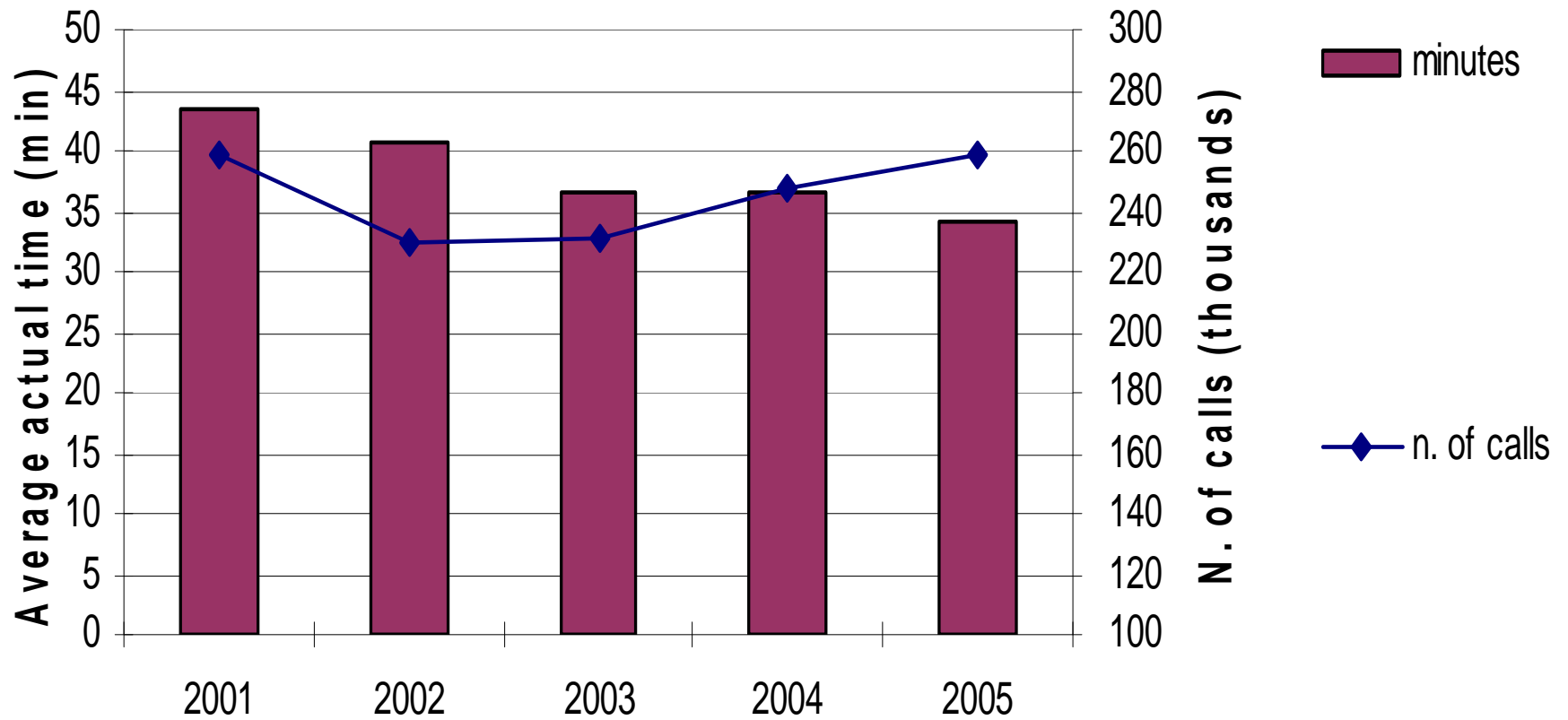
### **◆ 7 NEW NATIONAL GUIDELINES ISSUED BY TECHNICAL ASSOCIATIONS IN 2001-2003 UNDER AEEG'S SUPERVISION**

- CATHODE PROTECTION
- ODOURIZATION
- PLANNED PIPE INSPECTION
- LEAKAGE CLASSIFICATION
- PROMPT INTERVENTION
- EMERGENCIES
- ACCIDENTS



# ***SAFETY REGULATION EFFECTS (3)***

## **PROMPT INTERVENTION**



# ***SAFETY REGULATION IN ITALY***

## ***Stage 3 (2004-2008)***

- ◆ SAFETY REGULATION IS BASED ON BOTH STANDARDS AND ECONOMIC INCENTIVES
- ◆ 2004-2005: SOME ECONOMIC INCENTIVES HAVE BEEN INTRODUCED:
  - SANCTIONS FOR VIOLATION OF AEEG DIRECTIVES
  - (NEW) ECONOMIC PENALTIES FOR VIOLATION OF THE OVERALL STANDARD FOR PROMPT INTERVENTION



# ***ECONOMIC PENALTY ON PROMPT INTERVENTION STANDARD VIOLATION***

<b>SAFETY INDICATOR</b>	<b>BASIS THRESHOLD</b>	<b>REFERENCE THRESHOLD</b>
PERCENTAGE OF PROMPT INTERVENTION CALLS WITH ARRIVAL ON SITE WITHIN 60 MINUTES	<b>90%</b>	<b>95%</b>
TIME FOR SAFETY RESTORATION IN CASE OF MAIN LEAKAGES	<b>M</b>	<b>M</b>



**Compulsory minimum threshold**



**500 Euro penalty for each intervention later than 60 minutes**



**Monitoring**

basis threshold = acceptable quality level  
reference threshold = optimum quality level





ECONOMIC PENALTIES WORK

**... but**

SANCTIONS AND PENALTIES PUSH DISTRIBUTORS  
TO COMPLY WITH MINIMUM THRESHOLDS, NOT  
TOWARD CONTINUOUS IMPROVEMENT

➔ INCENTIVES MAY BE USED TO THIS PURPOSE



# ***RELEVANT ACTIVITIES FOR SAFETY INCENTIVES***

- ◆ RELEVANT ACTIVITIES FOR SAFETY INCENTIVES UNDER CONSIDERATION FOR ECONOMIC INCENTIVES:
  1. GAS ODOURIZATION MEASUREMENT
  2. PROMPT INTERVENTION
  3. LEAKAGES LOCALIZATION AND ELIMINATION
  4. CATHODIC PROTECTION OF STEEL PIPES
- **1-2% OF ADDITIONAL REVENUES ALLOWED TO DISTRIBUTION COMPANIES**



# ***1. GAS ODOURIZATION MEASUREMENT INCREASE***

## **◆ PROS**

- ESSENTIAL FOR SAFETY IN THE USE OF GAS
- LEAKAGES LOCALIZATION AND ELIMINATION INCREASE
- FULLY UNDER UTILITY'S CONTROL

## **◆ CONS**

- MARGINAL POSITIVE EFFECTS ARE LOW

⇒ +++ FOR SAFETY INCENTIVES



## ***2. PROMPT INTERVENTION TIME REDUCTION***

### **◆ PROS**

- TIME REDUCTION FOR PROMPT INTERVENTION MEANS RISK REDUCTION

### **◆ CONS**

- THE AVERAGE DELAY FOR PROMPT INTERVENTION IS ALREADY LOW (36 MINUTES IN 2003)
- IT IS NOT COMPLETELY UNDER THE DISTRIBUTOR'S CONTROL (TRAFFIC, WEATHER CONDITIONS, NUMBER OF CALLS, ETC.)

⇒ POTENTIALLY MISLEADING FOR ECONOMIC INCENTIVES



### ***3. LEAKAGES LOCALIZATION AND ELIMINATION IMPROVEMENT***

#### **◆ PROS**

- LEAKAGES ARE THE MAIN RISK FACTOR IN GAS DISTRIBUTION AND USE
- LEAKAGES REDUCTION HELPS:
  - ✓ THE RESPECT OF KYOTO PROTOCOL
  - ✓ ENERGY SAVING
  - ✓ THE REDUCTION OF DISTRIBUTION'S COSTS

#### **◆ CONS**

- BEHAVIUIORS ARE AFFECTED BY WEATHER AND "LARGE EVENTS" EFFECT
- ⇒ +++ FOR SAFETY INCENTIVES



## ***4. CATHODIC PROTECTION OF STEEL PIPES IMPROVEMENT***

### **◆ PROS**

- IT IS ESSENTIAL FOR THE REDUCTION OF LEAKAGES FROM STEEL PIPES

### **◆ CONS**

- COMPLEXITY OF TECHNICAL ASPECTS PREVENT THE USE OF SIMPLE ECONOMIC INCENTIVES

⇒ PROBLEMS FOR SAFETY INCENTIVES



# ***ITALIAN INCENTIVE REGIME FOR IMPROVING GAS SAFETY (1)***

- ◆ AEEG DIRECTIVE 243/2005
- ◆ TARGETS
  - MORE ODOURIZATION LEVEL MEASUREMENTS
  - LEAKS REDUCTION (CONVERGENCE)
- ◆ SEPARATE ECONOMIC INCENTIVES FOR:
  - ADDITIONAL YEARLY GAS ODOURIZATION LEVEL MEASUREMENTS
  - LEAKS REDUCTION (ANNUAL NUMBER OF LEAKS POINTED OUT BY CUSTOMERS)
- ◆ LEAKAGE COMPONENT: A LONG-TERM PROCESS (11 YEARS)
  - 2006-2008: VOLUNTARY PARTICIPATION, ONLY BONUSES
  - 2009-2016: COMPULSORY REGIME, BONUSES AND PENALTIES



## ***ITALIAN INCENTIVE REGIME FOR IMPROVING GAS SAFETY (2)***

- ◆ CALCULATION OF VARIABLE  $\alpha_j$  FOR EACH DISTRIBUTION SYSTEM  $J$  ELIGIBLE FOR LEAKAGE BONUSES
- ◆  $\alpha_j$  EXPRESSES THE ANNUAL RATE OF IMPROVEMENT REQUIRED TO BRING THE DISTRIBUTION SYSTEM  $J$ , OVER THE COURSE OF THREE REGULATORY PERIODS (11 YEARS), FROM THE BASELINE  $LivPart_j$  TO THE TARGET LEVEL  $LivOb^k$
- ◆  $\alpha_j$  IS CALCULATED AS FOLLOWS:

WHERE  $\alpha_j \leq 20\%$

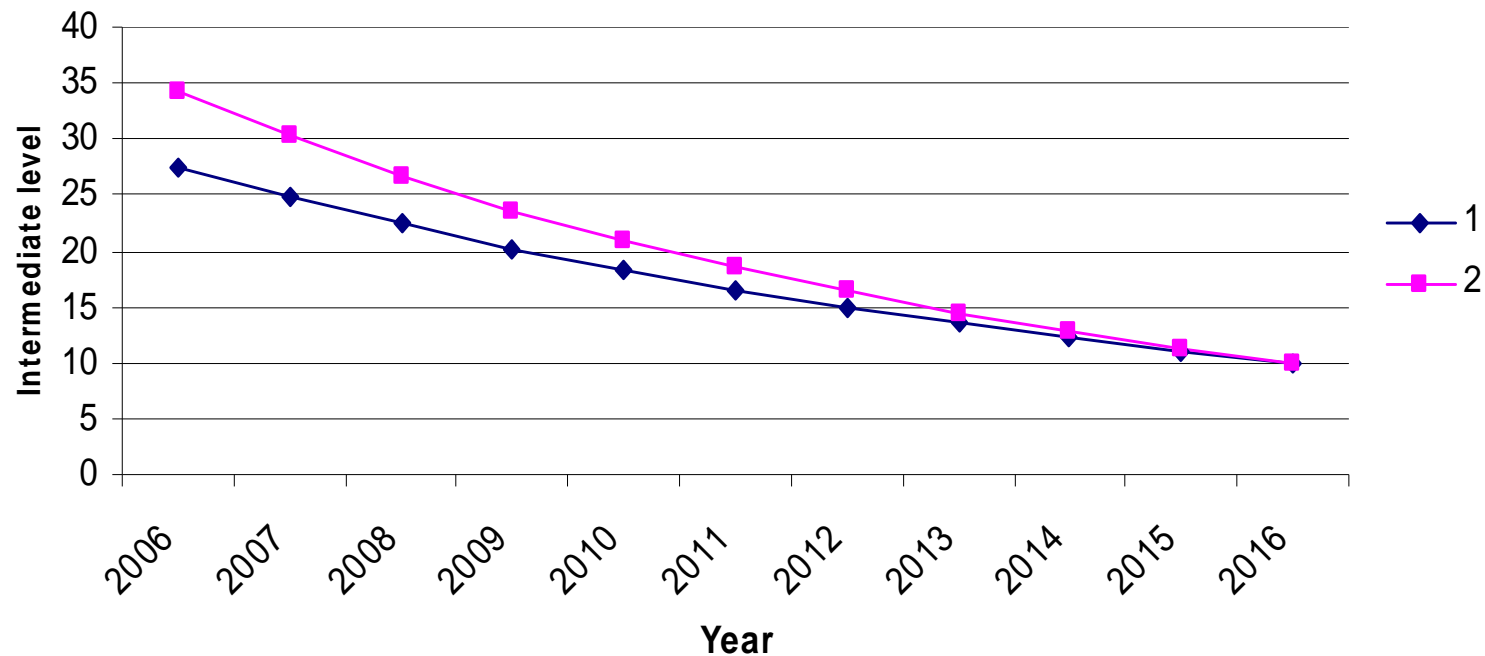
$$\alpha_j = \max \left[ 1 - \left( \frac{LivOb^k}{LivPart_j} \right)^{\frac{1}{11}} ; 2\% \right]$$





# ***ITALIAN INCENTIVE REGIME FOR IMPROVING GAS SAFETY (3)***

- ◆ CONVERGENCE TOWARD NATIONAL TARGETS
- ◆ DIFFERENT TARGETS FOR HIGH, MEDIUM AND LOW CONCENTRATION AREAS



## ***CONCLUSIONS***

- ◆ AN OPTIMAL SAFETY POLICY IS BEYOND THE SCOPE OF PRIVATE DECISION MAKING
- ◆ PRICE-CAP REGIMES AND PRIVATIZATION REQUIRE AN INCREASING ROLE OF THE AUTHORITIES
- ◆ REGULATION SHOULD BE ABLE TO GUARANTEE A WELFARE INCREASE BY ACHIEVING THE REQUIRED LEVEL OF SAFETY
- ◆ MARKET OPENING IS FULLY COMPATIBLE WITH SAFETY
- ◆ ECONOMIC INCENTIVES MAY BE ADDED TO TECHNICAL STANDARDS AND PERFORMANCE STANDARDS TO PROMOTE CONTINUOUS SAFETY IMPROVEMENT

