



25th world gas conference
"Gas: Sustaining Future Global Growth"

Emergency Services and Technology Development to Respond to Gas Leaks on Customers' Premises

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Tokyo Gas Co., Ltd.

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Venue: 302/3



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- Part A:

About Emergency Service
(Japan, Tokyo Gas)

Hajime Kojima

- Part B:

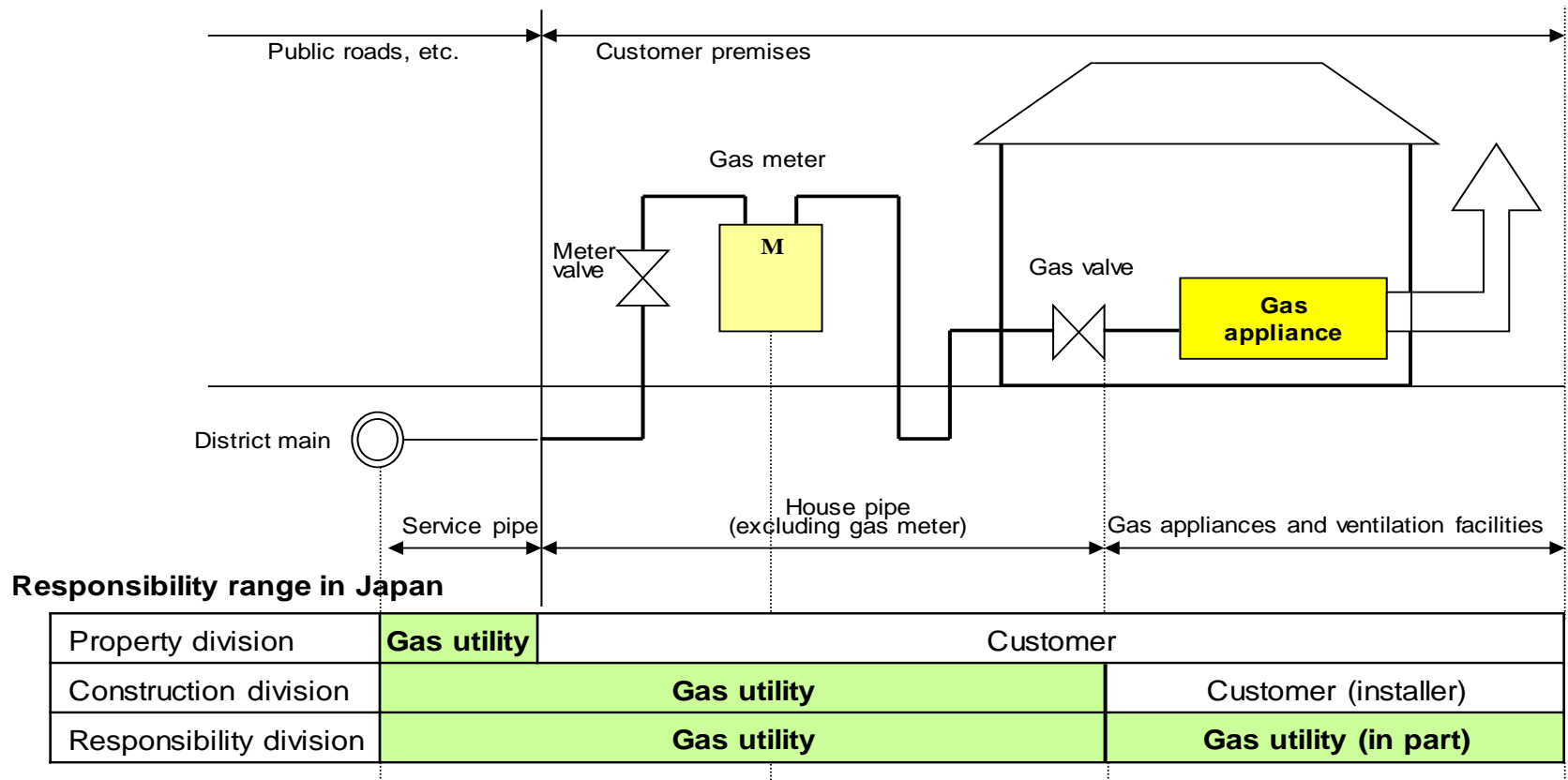
Technological Development
(For emergency repair work)

Sosuke Yahata

[Part A: About Emergency Service]

Emergency Service Work in Japan

- Dispatch workers 24 hours a day, 365 days a year.
- Regardless of its property or responsibility division.
- Compete with companies supplying other kinds of energy.

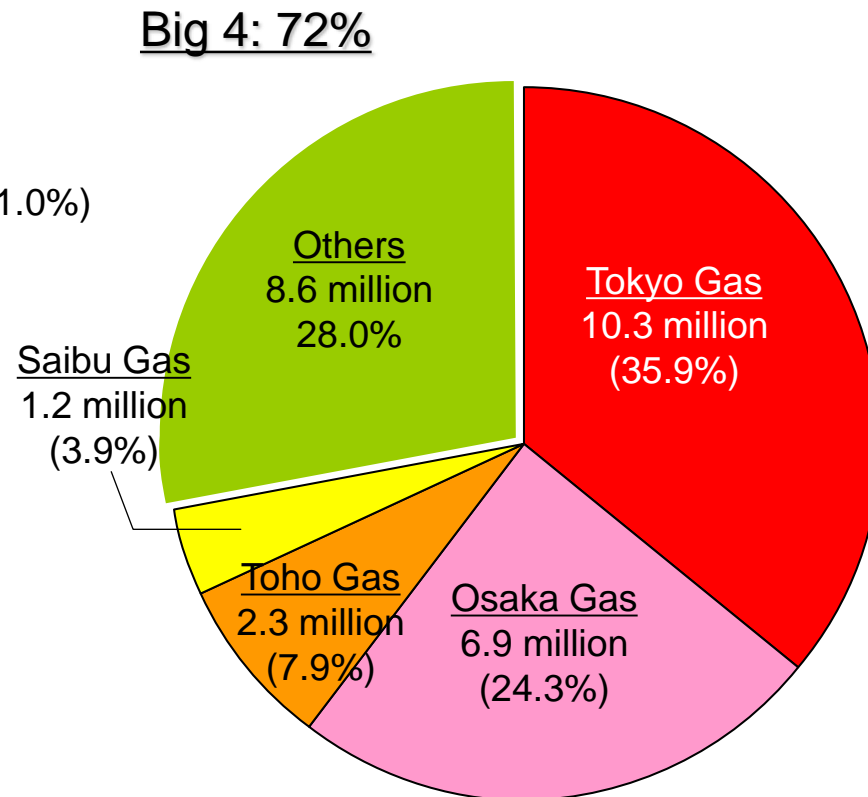
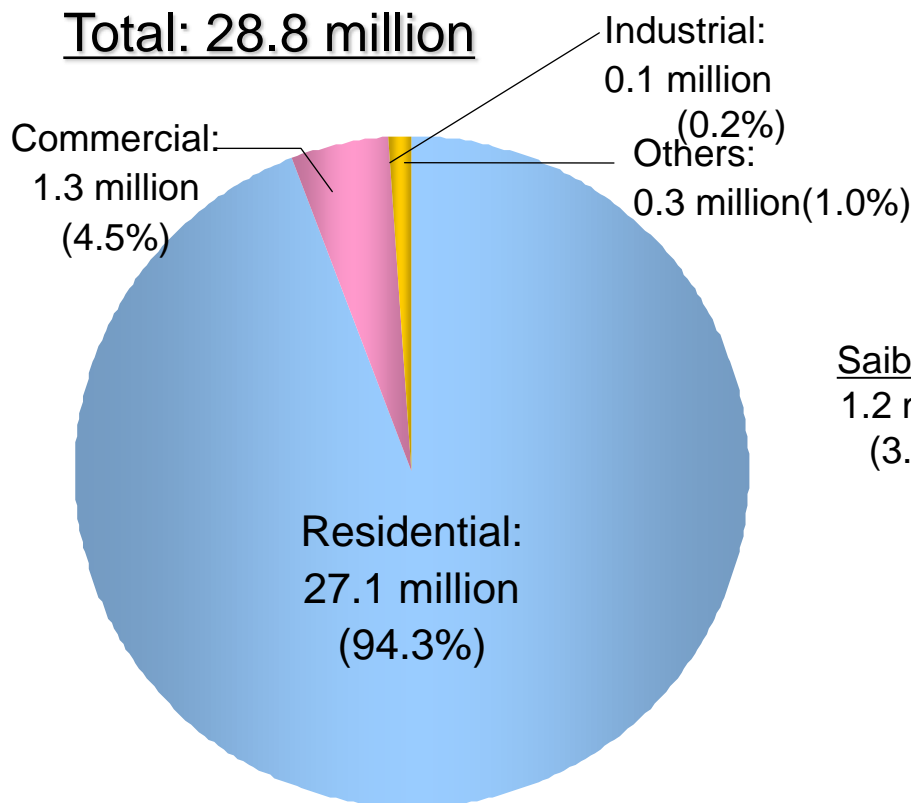


Number of Customers by Sectors and by Utilities

- Japan: 28.8 million customers, 94.3% residential
- Tokyo Gas: 10.3 million customers, most are residential

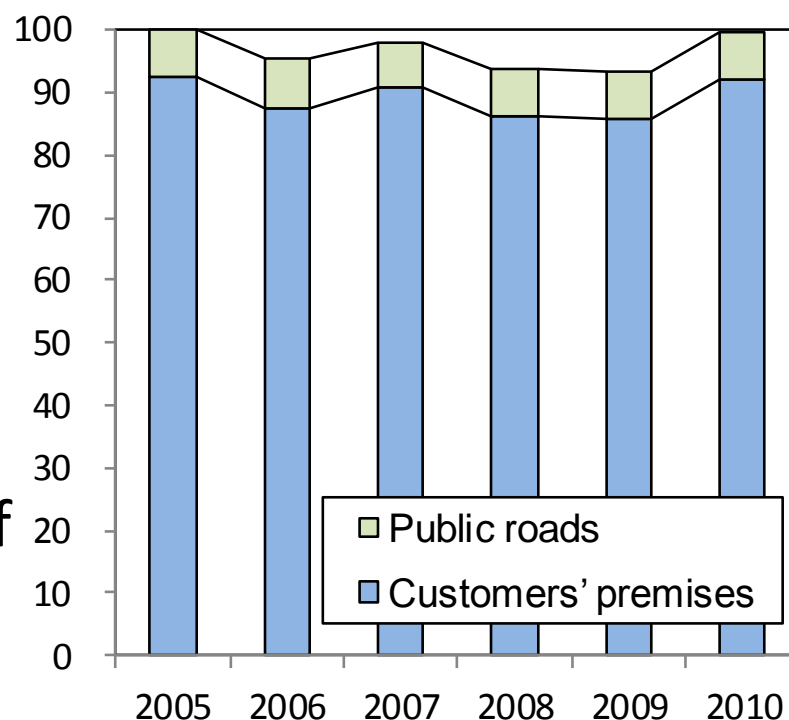
The number of customers by sectors

The number of customers by utilities



A Recent Trend of Leak Repairs (Tokyo Gas)

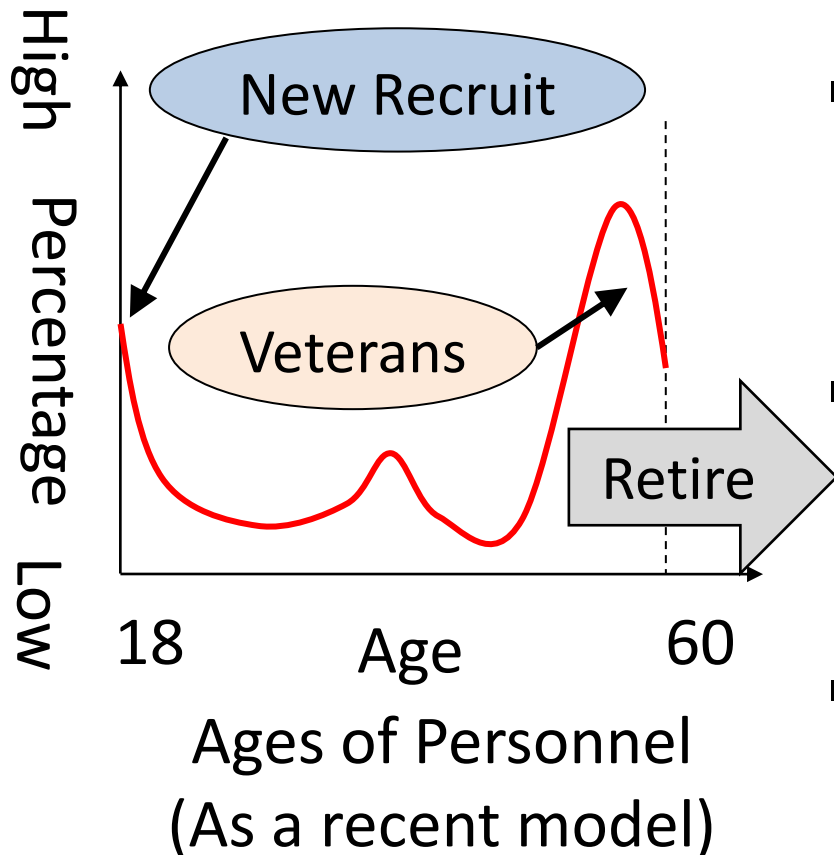
- Unchanging number of leak for the past six years.
- Over 90% of the leaks come from equipment on customers' premises.
- The number and percentages of leaks will be continued at the same level.



Changing Numbers of Leak Repairs in Recent Years

Existing Problem of Emergency Security System

- About 680 personnel
(1/3 of the Supply Division)



- Now:
New Recruits < Veterans
- Future:
New Recruits > Veterans
- Problem in the near future
✓ Decline in the skill level

Existing Problem of Emergency Security System

- Strengthen skill training:
 - ✓ Minimize the impact of declining skills
 - ✓ To ensure the trust of our customers

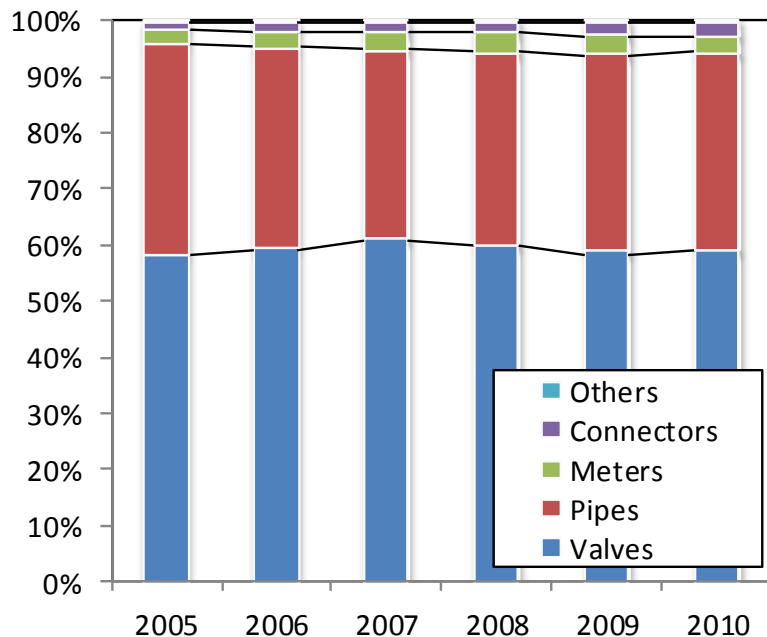
- Further expectation to technological approach
 - ✓ More efficiency
(a large number of leak repairs)

 - ✓ Maintain quality
(decline in the skill level)

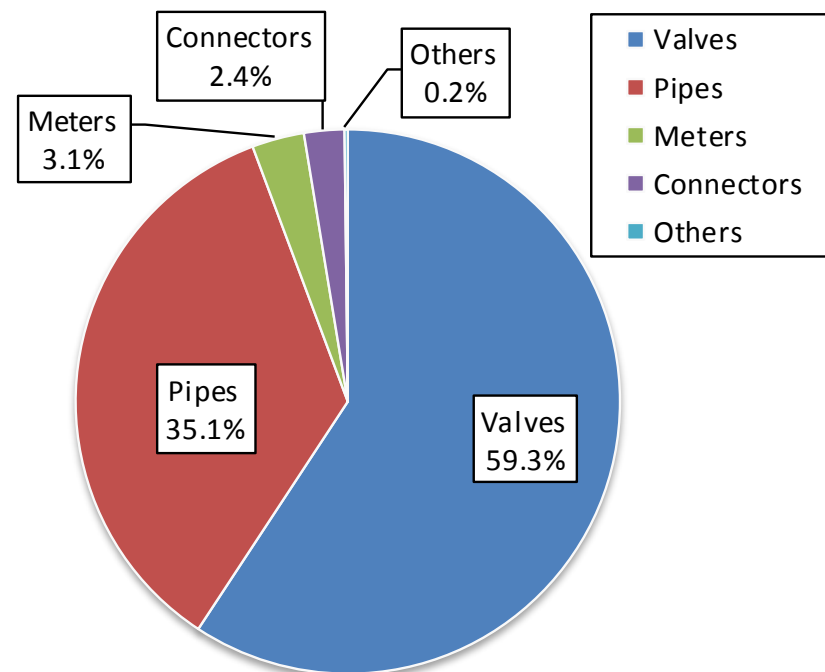
[Part B: Technological Development]

Trends in Leaks on customer premises

- No change in the percentages of leaks by equipment
- 60% in valves, 35% in pipes, and 5% in other types



Changing Percentages of Leaks by Category of Equipment (total for the years 2005 to 2010)



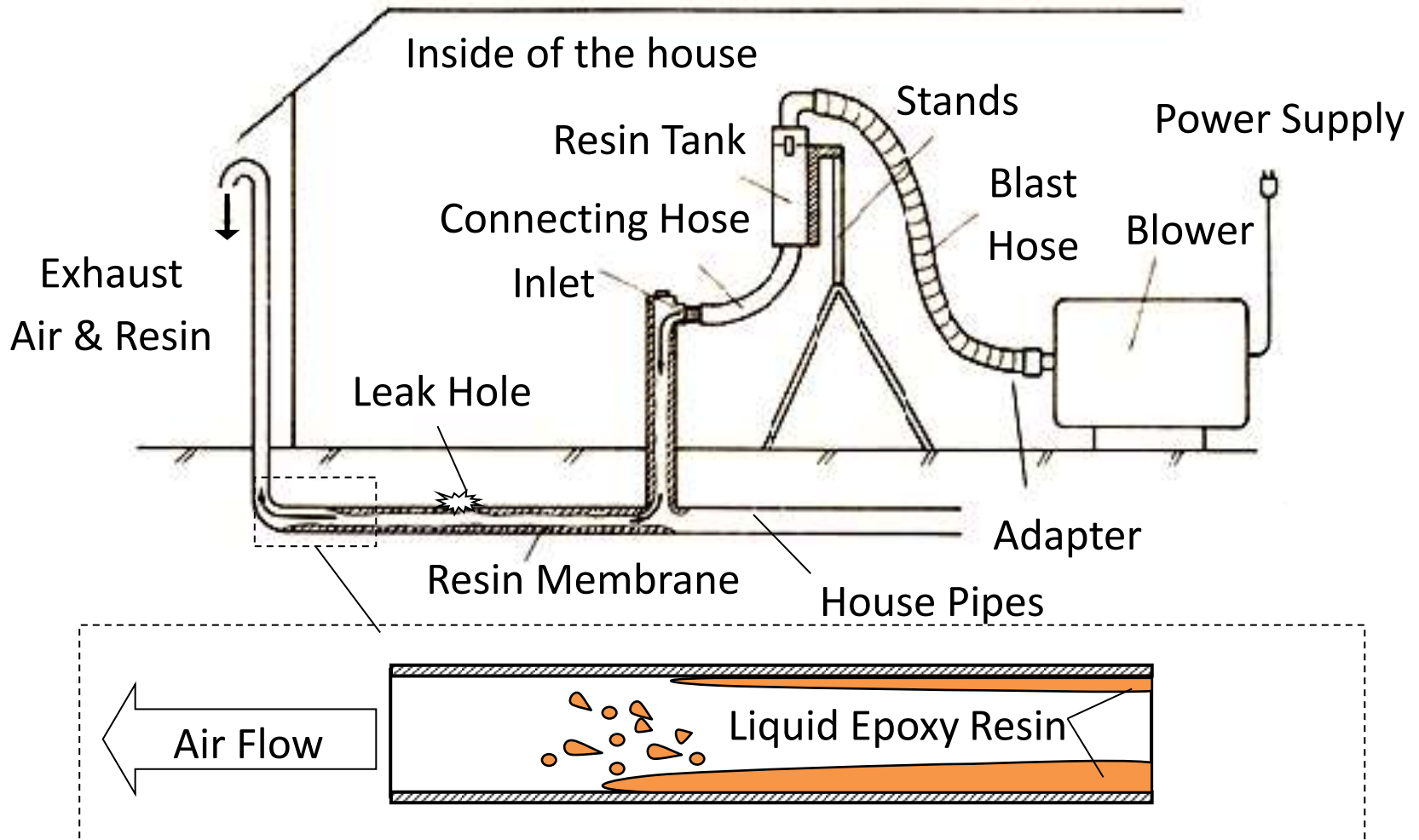
Percentages of Leaks by Category of Equipment (total for 2010)

Difference Between Repair Works

Equipment (Environment)	Leak Level	Repair Works	Required Time	Difficulty
Valves, Meters, Others (Generally Exposed)	Low	Greasing Taping Renewal	Short	Easy
Pipes, Pipe-Joints (Underground)	High	Excavation Breaking Taping Renewal	Long	Difficult

Overview of Interior Lining Method for Emergent Repair

- Locations: Time-consuming, Invisible, Difficult



Problem and Demands for Interior Lining Method

Item	Former Lining Methods	Demands
Temperature	Resin must be selected: Winter or Others	One type of resin usable for every cases
Environment	Resin must be selected: Exposed or Underground	One type of resin usable for every cases
Nominal Diameter	Exposed : 15 ~ 32 mm Underground : 15 ~ 50 mm	15 ~ 50mm (Without distinction)
Resin Odour	Very High (Underground)	Low
Execution	Hard and Difficult to mix	Soft and Easy to mix

Developing New Method

Photos: Laboratory Test

Test conditions

Pipe: $\phi 20\text{mm}$ Clear PVC pipe

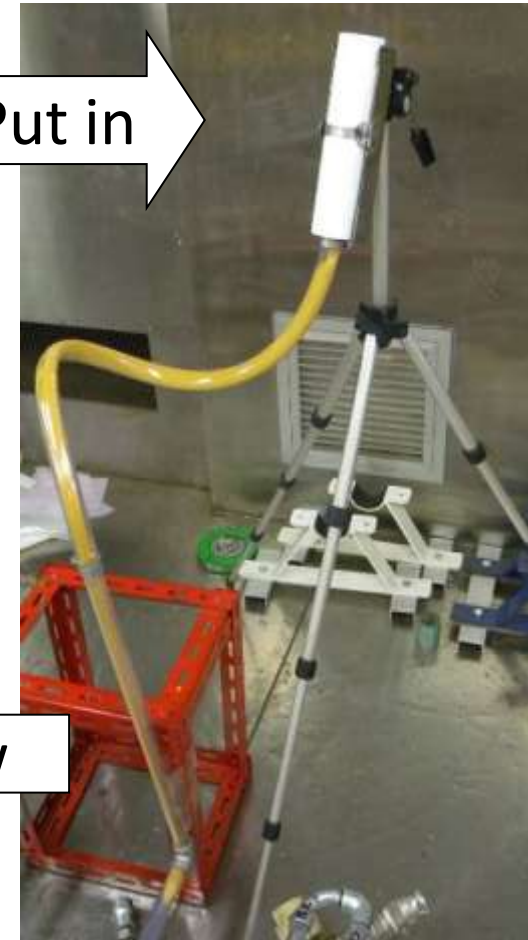
Length: 20 meters

Temperature: $5\text{ }^{\circ}\text{C}$

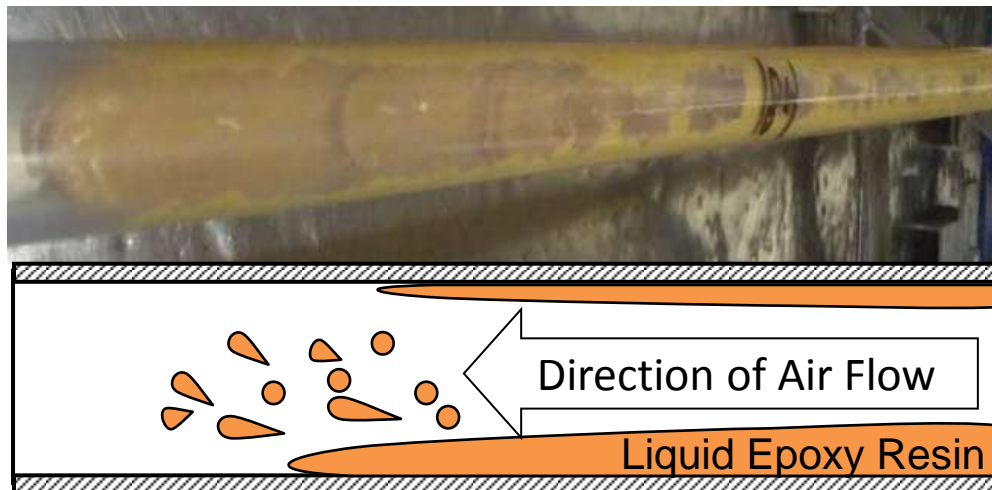
Amount of Resin: 1,000g



Put in

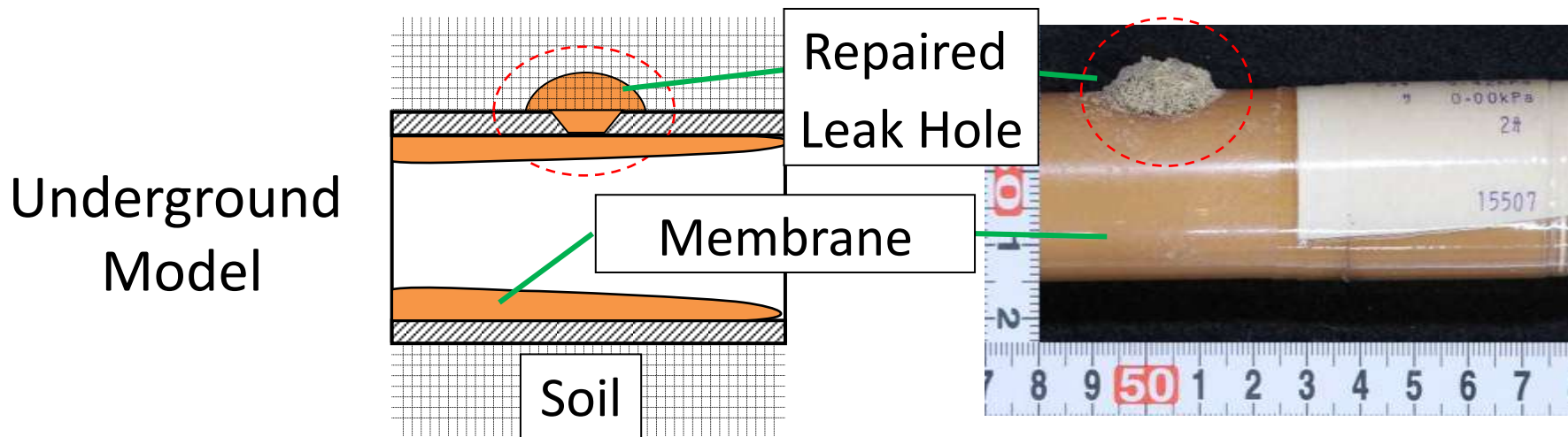
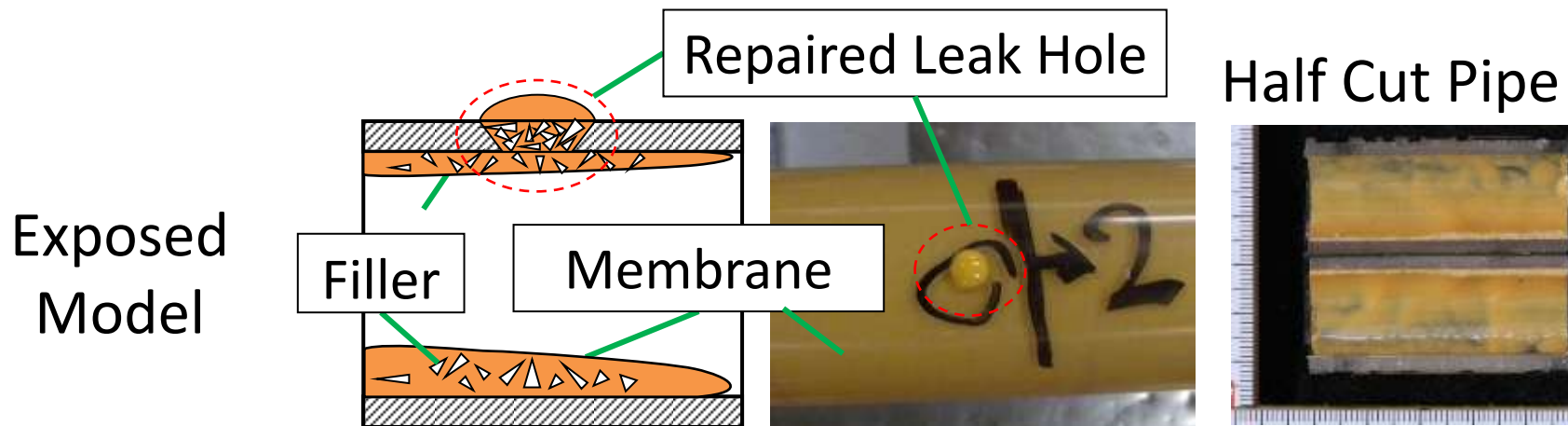


Blow



How Leak Holes Repaired

- Supports both environment

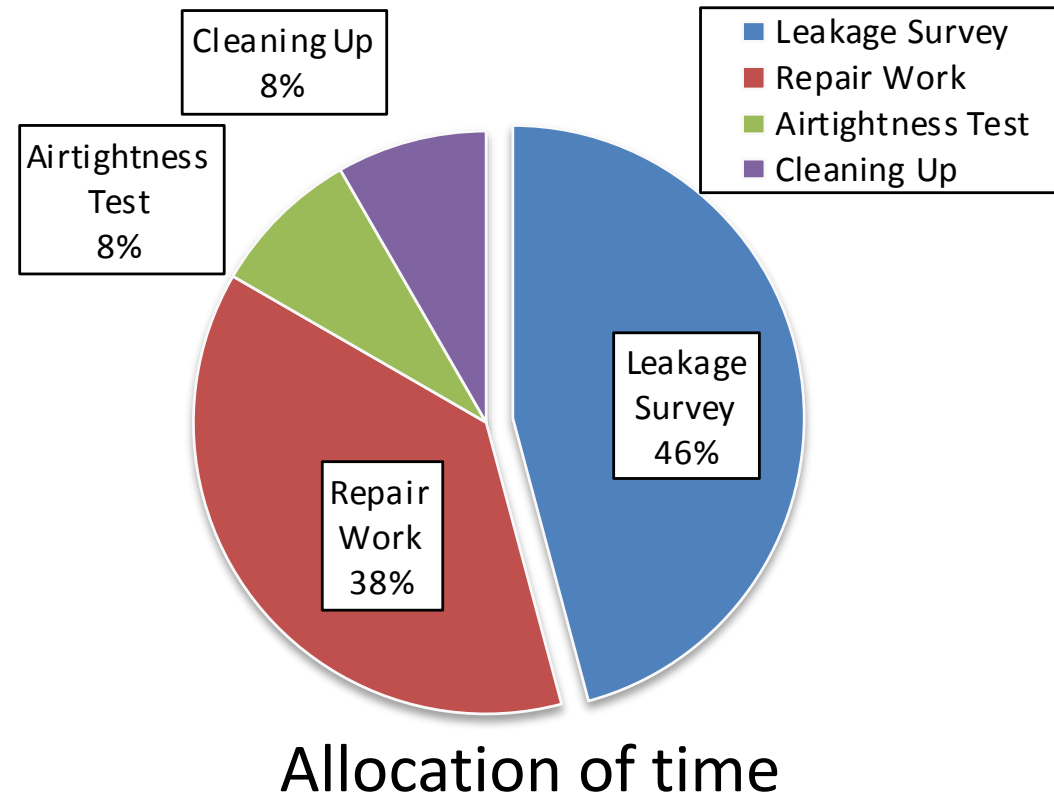
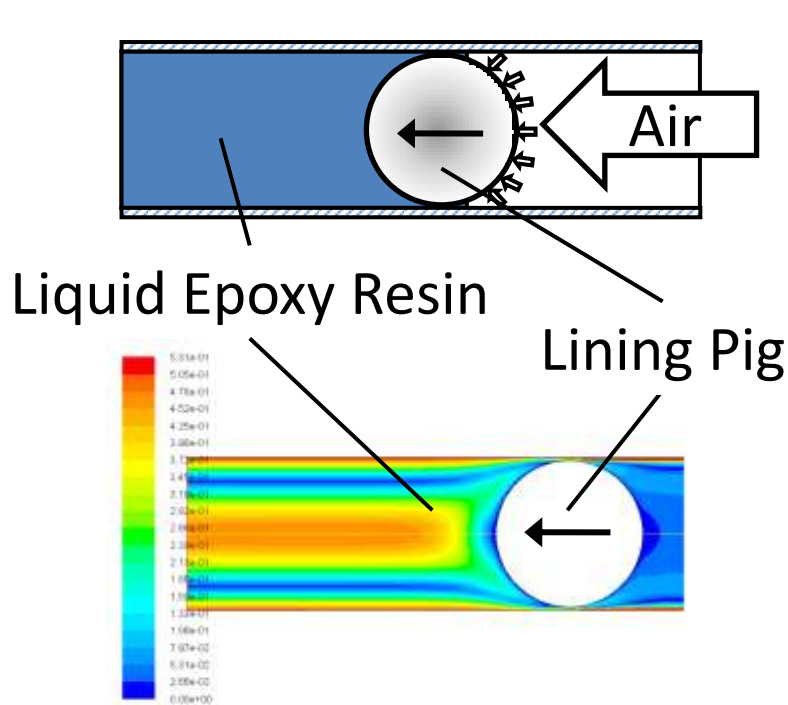


Specification of New Method

Name of Method	Emergency Seal (ES) Method	
Type of Pipes	Galvanized White Gas Pipes	
Type of Resin	Two component, thermosetting epoxy resin	
Nominal Diameter	15 – 50 mm	
Span of Execution	Max 30 m	
Repairable Leak Hole	Exposed	Max. ϕ 0.8mm
	Underground	Max. ϕ 10mm

Future Technology Development

- Longer durability of the interior repair
- Further expansion of its application range
- Shortening the leak survey time



Conclusion

- In the emergency work field, we expect to improve work efficiency and maintain work quality by technological approach.
- As an example of technical approach, we developed new interior lining method (ES Method) to improve efficiency and range of application.
- In the future, three approaches of technology development can be considered to improve emergency works.