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# Statistics and Analysis of Electrical Accidents

2015. 11. 04

 **한국전기안전공사**  
KOREA ELECTRICAL SAFETY CORPORATION



## KESCO

My name is Jong-min Lim, currently I'm the head of disaster management/Professional engineer.

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I will try my best to make fun and valuable presentation time.



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- A circular graphic on the left side of the page, containing the logo for the PyeongChang 2018 Candidate City. The logo features a stylized red and blue figure, the text "PyeongChang 2018 CANDIDATE CITY", and the Olympic rings.
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# I . Introduction



## I . Introduction

### 1. Investigation Method

#### ❖ Electrical Fire Statistical Research

- Analyze data from National Fire Information System at the Ministry of Public Safety and Security
  - Refer to statistical data from electrical fire area at national fire classification

#### ❖ Electric Shock Statistical Research

- Investigate electrocuted people through accidental death records from all over **250 police stations.**
- Investigate treated electrocuted people through medical records from all over **1,510 Hospitals.**

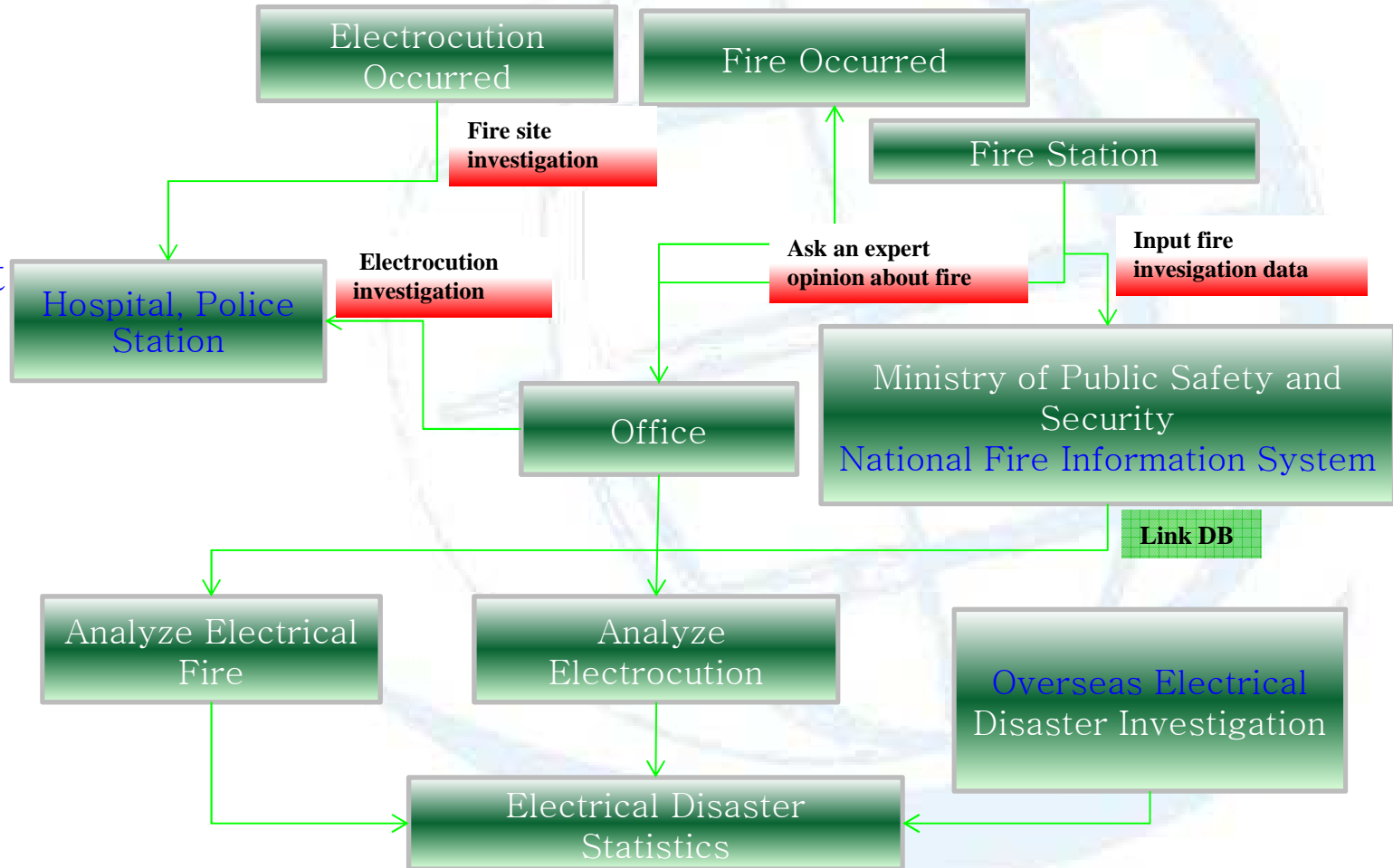
#### ❖ Overseas Electrical Disaster Research

- Investigate fire corresponding technique by directly visiting related agency in advanced countries
- Analyze online data, that released by overseas agency, or purchasing overseas pressed books



# I . Introduction

## 2. Statistics Producing Flow Chart







## II. Electrical Fire and Investigation Techniques



## II. Electrical Fire and Investigation Techniques

### 1. Current State of Electrical Fire Analysis

◆ 2014 Analysis of damage on life and assets by electrical fire

<Unit: Case, Person, 100 million won>

Total Fire	Electrical Fire	Death	Injured	Property Damage	Comments
42,135 (40,932)	8,287 (8,889)	31 (43)	295 (285)	706 (737)	( ) value is from 2013

◆ 602 cases(6.7%) decreased compare with previous year about electrical fire

◆ Loss of life 2 people(0.6%) decreased, property damage **3.1 billion won decreased**



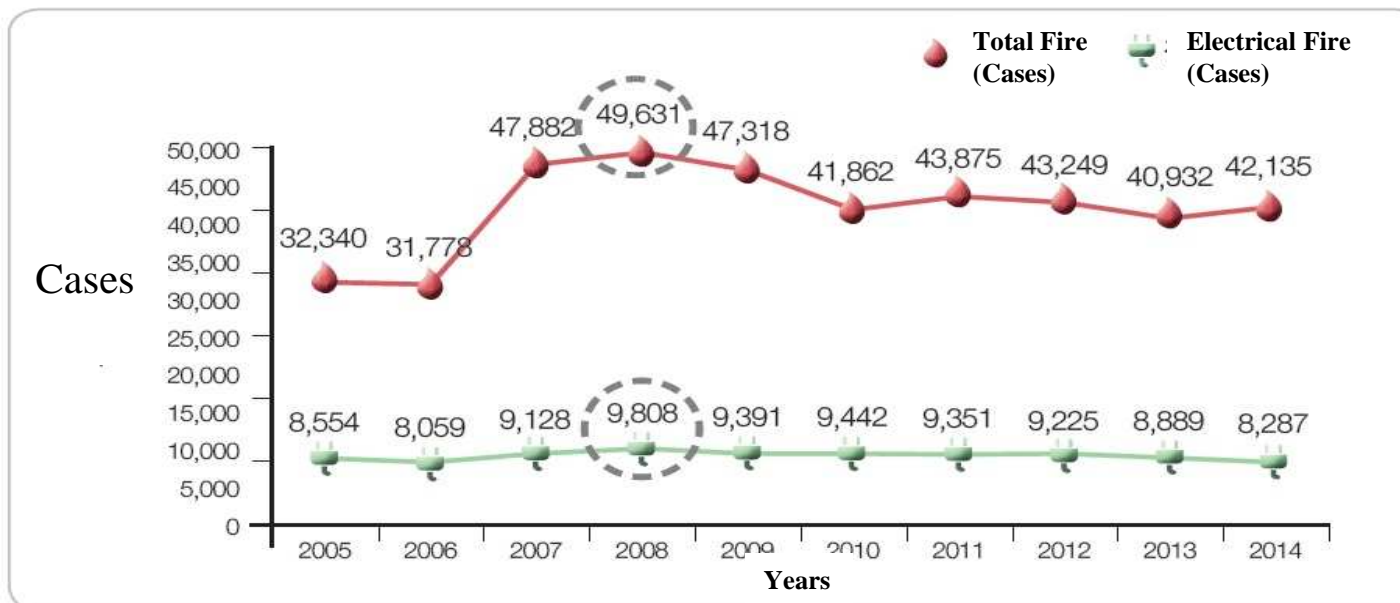


## II. Electrical Fire and Investigation Techniques

### 2. Occurrence trend of electrical fire in 10 years

- ❖ 8,554 cases occurred in 2015 and 8,287 cases in 2014, approximately 0.3% decreased
- ❖ Shares of electrical fire was 26.5% in 2005, it decreased to 19.7% in 2014

Distribution of electrical fire in recent 10 years

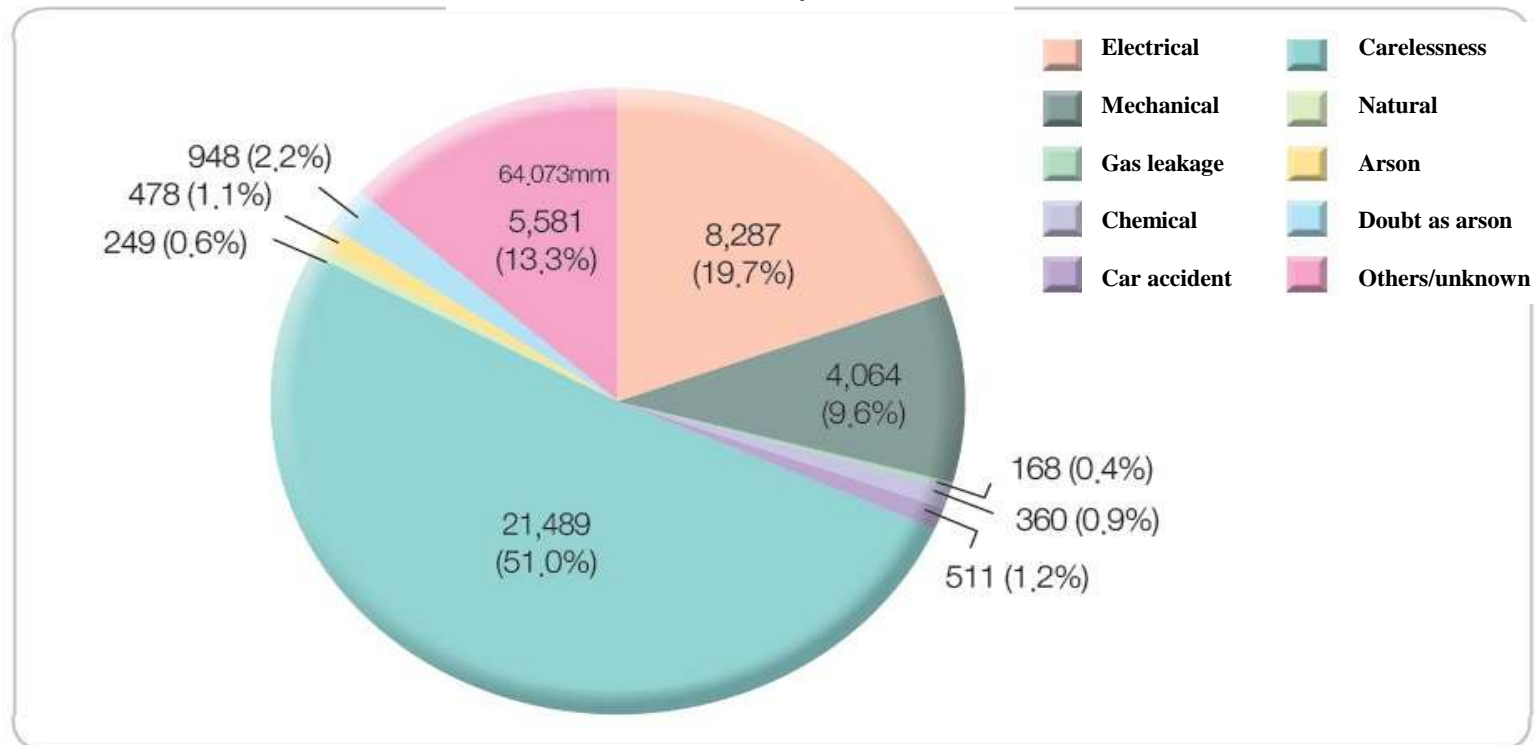


## II. Electrical Fire and Investigation Techniques

### 3. Electrical fire analysis by causes

- ❖ Fire caused by **carelessness** is the highest as 51% from total fire
- ❖ Fire caused by **electrical factors** is **19.7%**

Distribution of fire by causes

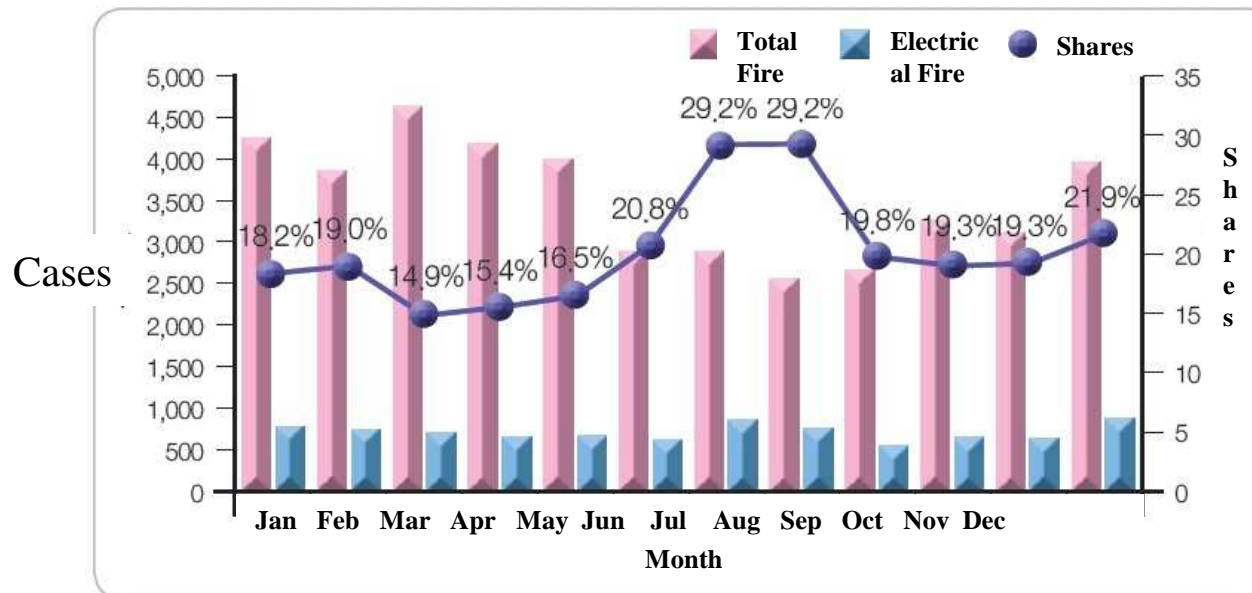


## II. Electrical Fire and Investigation Techniques

### 4. Monthly Analysis of Electrical Fire

- ❖ Total fire was occurred the most in **march** as **4,629** cases,
- ❖ Fire on September was the least as **2,532** cases,
- ❖ Number of **electrical fire** on December was the most in whole year as **865** cases

Monthly Distribution of Electrical Fire



## II. Electrical Fire and Investigation Techniques

### 5. Analysis of Electrical Fire by Types of Combustion

❖ **Short by insulation aging** from overall electrical fire factors were 2,141 cases (25.8%), fire caused by **unknown short** were 2,074 cases (25.0%)

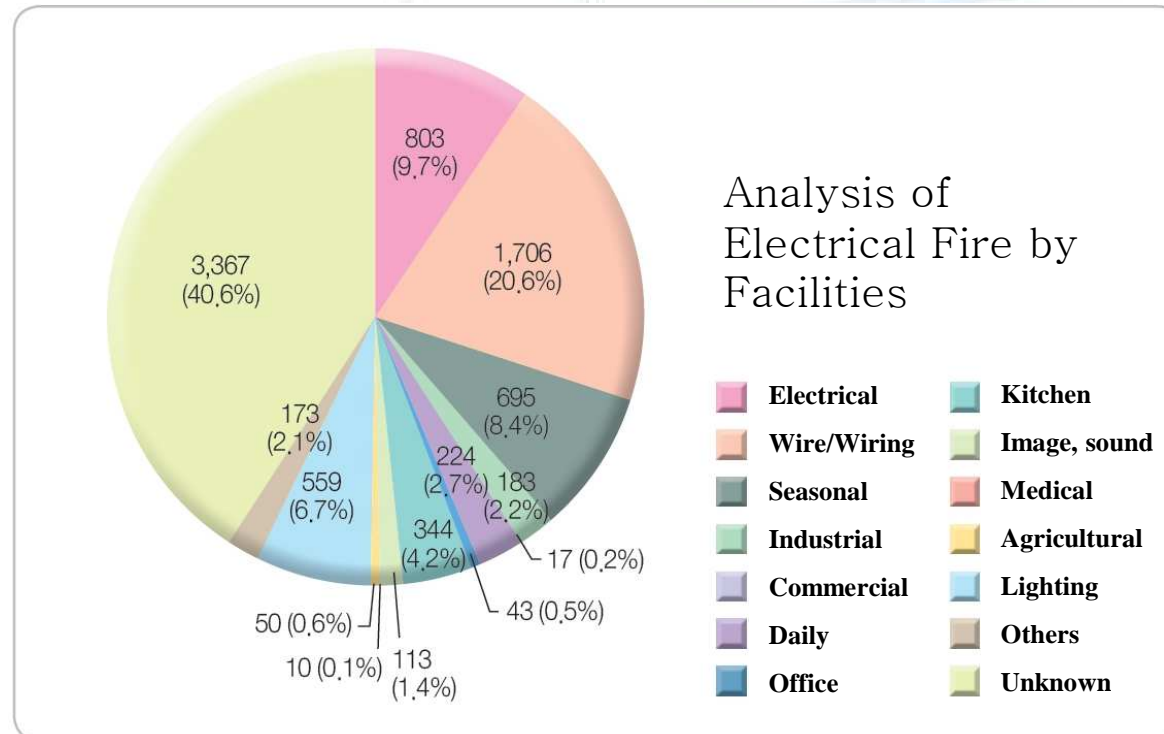
Analysis of Electrical Fire by Types of Combustion

Types of Combustion Classification	Total	Short by insulation aging	Short by traking	Short by pressure damage	Layer short	Unknown short	Overload	Current leakage by faulty ground	Connect ion failure	Half disconnection	Others
Electric al Fire (cases)	8,287	2,141	728	496	94	2,074	847	372	704	162	671
Ratio(%)	100	25.8	8.8	6.0	1.1	25.0	10.2	4.5	8.5	2.0	8.1

## II. Electrical Fire and Investigation Techniques

### 6. Analysis of Electrical Fire by Facilities

- ❖ Fire from **wiring and wiring appliance** 1,706 cases(20.6%)
- ❖ Fire caused by electrical facilities were 9.7% as 803 cases
- ❖ Fire caused by seasonal facilities are 695 cases (8.4%)
- ❖ Fire caused by unknowns are 3,367 cases (40.6%)



## II. Electrical Fire and Investigation Techniques

### 7. Analysis of Electrical Fire by Voltage

- ❖ Fire at 380/220V were the most as 4,252 cases (51.3%)
  - Lighting, home appliances, electrical power facilities, etc.
- ❖ Over 22.9kV → 68 cases (0.8%)
  - D.C volatage 12V/24V → 19 cases (0.2%) occurred

Analysis of Electrical Fire by Voltage

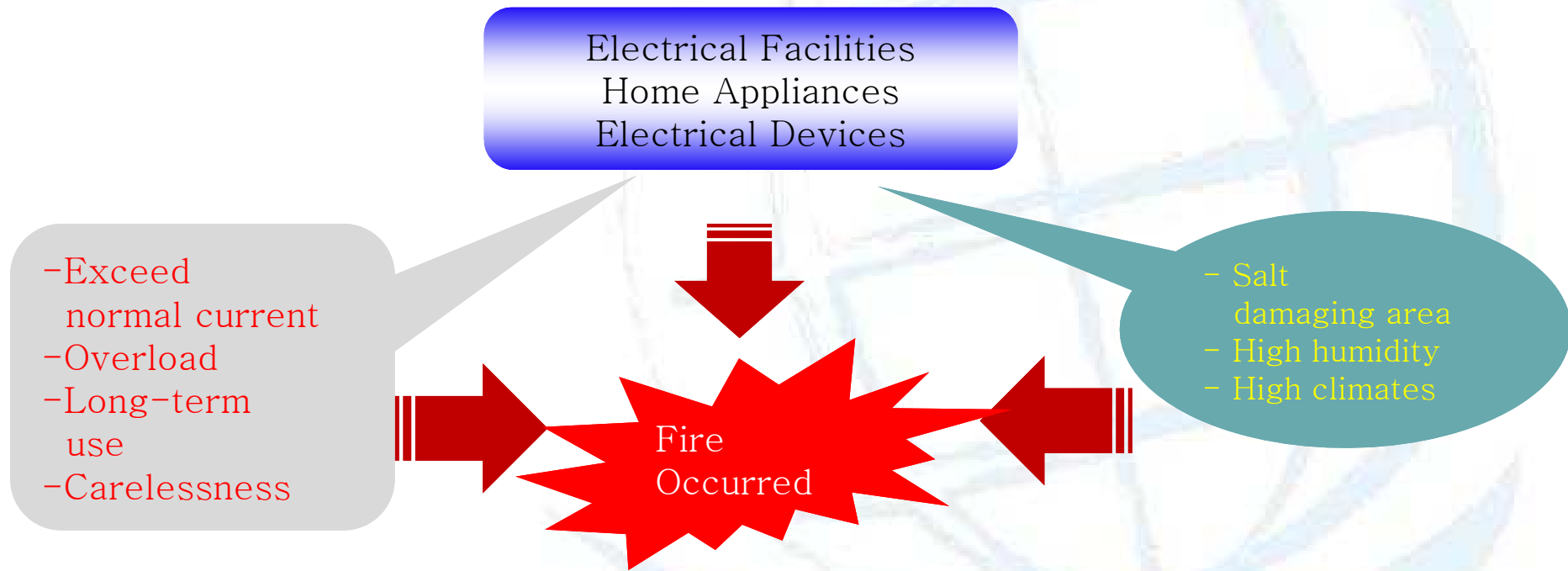
Voltage Classifi- cation	Total	DC 12V/ 24V	Lower t han 110V	380/ 220V	Over 440V	Over 3.3 kV	Over 22.9 kV	Others	Unkn- owns
	Electrical Fire (cases)	8,287	19	8	4,252	13	19	68	81
Ratio(%)	100	0.2	0.1	51.3	0.2	0.2	0.8	1.0	46.2





## II. Electrical Fire and Investigation Techniques

### 8. Electrical Fire Occurrence Process



## II. Electrical Fire and Investigation Techniques

### 9. Electrical Fire Investigation Method



## II. Electrical Fire and Investigation Techniques

### 10. Electrical Fire Investigation Method

#### ◆ Purpose of identifying electrical fire

- Establish countermeasures to prevent fire by figuring out causes of fire that based on all the matters from situation before and after fire from related people as well as investigate combustion phenomenon in fire site.
- Minimize loss of life and property by preventing similar fires from raising and promoting awareness about fire damage to nation.
- Figure out firefighting management status for causes that can make loss of life. Also Use those as evacuation and safety maintenance countermeasure data
- By making fire occurrence situation, cause and damaged detail into statistics and use it as fire prevention administration data
- Identify fire causes scientifically and prevent duplication of same fire

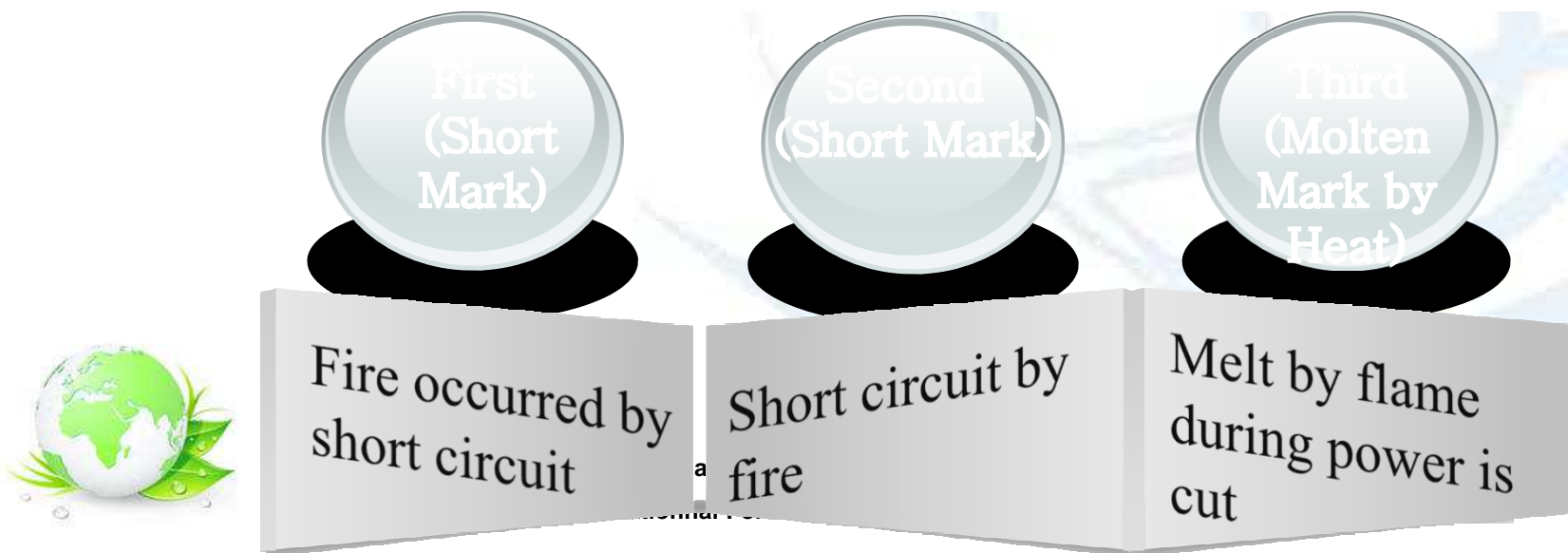


## II. Electrical Fire and Investigation Techniques

### 11. Electrical Fire Investigation Method

#### ◆ Molten Marks

- It is a mark that appears on discovered electricity line or metal parts in site of fire
- Molten mark at electricity line is useful to identify electrical fire cause.



## II. Electrical Fire and Investigation Techniques

### 12. Reenact Experiment of Electricity short-circuit





# III. Electric Shock and Examples





## III. Electric Shock and Examples

### 1. Electrocution Analysis

- ❖ Total electrocuted people are 569 people that consist of 37 death and 532 injured people
  - Increase 1 death and decrease 37 injured people compare with previous year

Analysis of Electrocution by years

Years	Classification	Total (people)	Death (people)	Injured (people)
2014		569	37	532
2013		605	36	569
Increase or Decrease		△36	1	△37



### III. Electric Shock and Examples

#### 2. Analysis of Electrocution by Types of Occurrence

- ❖ 348 people (61.2%) involved in accidents direct contacted with recharging part
- ❖ 143 people (25.1%) involved into Electrocution caused by arc
- ❖ Electrocution caused by short circuit are death 13 people, injured people 52 people, total 65 people (11.4%)

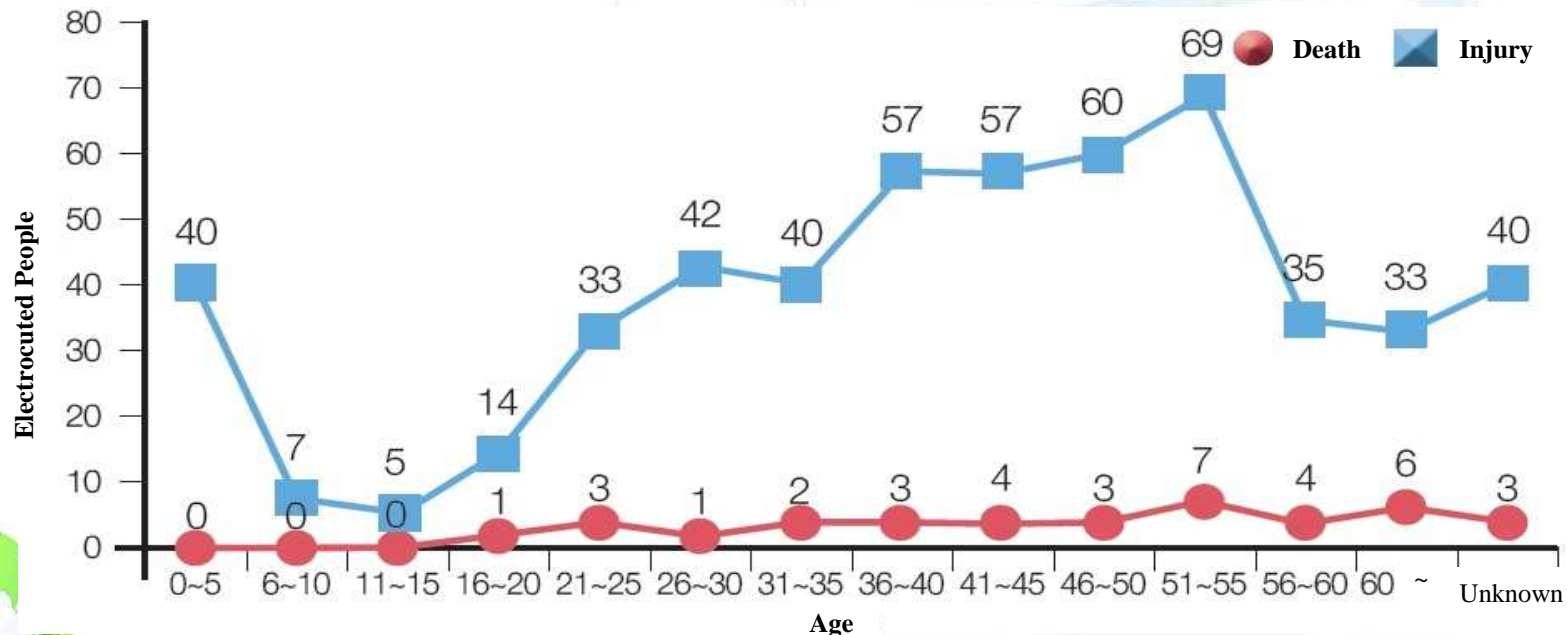
Table of Electrocution Analysis by Types of Occurrence

Classification \ Electric Shock	Total	Direct contact with recharging part	Short Circuit	Electrostatic Induction	Flash over	Arc	Thunder stroke
Death(people)	37	23	13	–	–	1	–
Injury(people)	532	325	52	4	8	142	1
Total(people)	569	348	65	4	8	143	1

## III. Electric Shock and Examples

### 3. Analysis of Electrocution by age

- ❖ **384 people (66.8%)** involved into electrocution from age **above 30th**
  - Those ages are actively engaged with industrial activities
- ❖ 40 children whose age are below 5 involved into electrocution(7.0%)
- ❖ There are 52 injuries (9.2%) including accidents caused by children whose age are below 15 years old



Forum International Fisuel – Séoul / Coree du Sud – 04 et 05 Novembre 2015

Fisuel International Forum – Seoul / Korea – 04th & 05th of November, 2015

### III. Electric Shock and Examples

#### 4. Analysis of Electrocution by activities

- ❖ 217 people (38.1%) involved on accidents while constructing, maintaining electrical facilities
- ❖ (11.8%) had accidents while operating or checking electrical facilities
- ❖ 45 children involved in accidents that caused by using chopsticks or any metals towards wall sockets
- ❖ 34 people electrocuted by short circuit of home appliance or changing lighting equipment

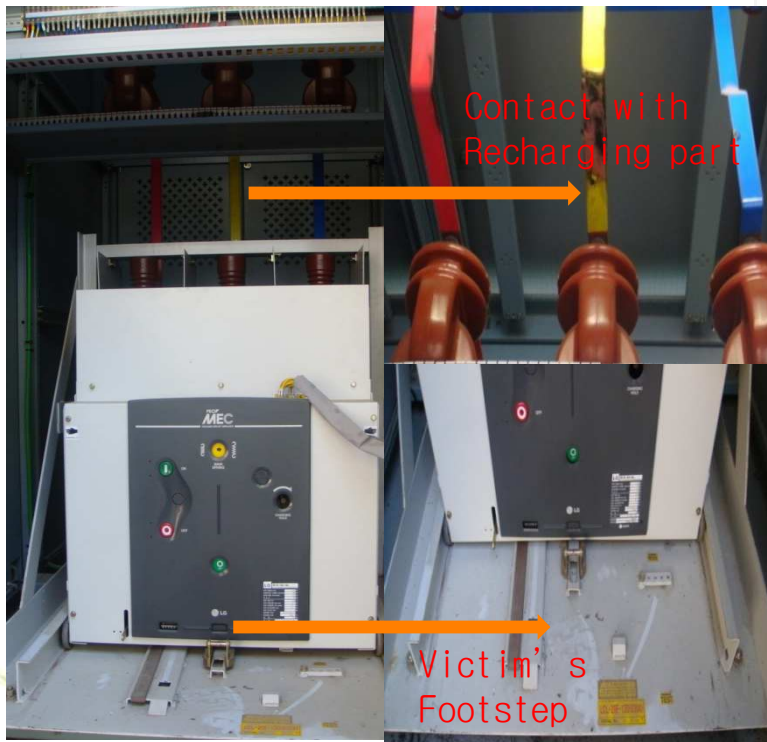
Table of Electrocution analysis by activities

Activities Classification	Total	Construction/maintenance of Electric work	Operation/Inspection of Electric work	Operation/Fix home appliance	Inspection/operation mobile devices	Installation of signboard and communication facilities	Construction/Fix mechanical facilities	Building excavating work	Cleaning and painting work	Fishery and agricultural activities	Playing Prank	Walk	Others / Unknown
Death(people)	37	9	2	-	1	-	2	5	4	2	2	2	3
Injury(people)	532	208	65	39	33	8	19	21	27	6	43	8	55
Total(people)	569	217	67	39	34	8	21	26	31	8	45	10	63
Ratio (%)	100	38.1	11.8	6.8	6.0	1.4	3.7	4.6	5.4	1.4	7.9	1.8	11.1

## III. Electric Shock and Examples

### Accident Summary

Due to customer's short circuit accident on 20\*\*, electrocution occurred by contacting installed booth bar of current transformer at first layer of recharge vacuum circuit breaker while checking electrical facilities



### Accident Occurred

In power retrieving room, inspection mode on over current relay was activated. Due to that, victims try to check connection of transformer at first layer vacuum circuit breaker without any protectors and voltage detection. While checking victim's head was near to booth bar, so accident occurred

### Causes

- ⊙ lack of voltage detection
- ⊙ Not wearing protectors

### Countermeasure

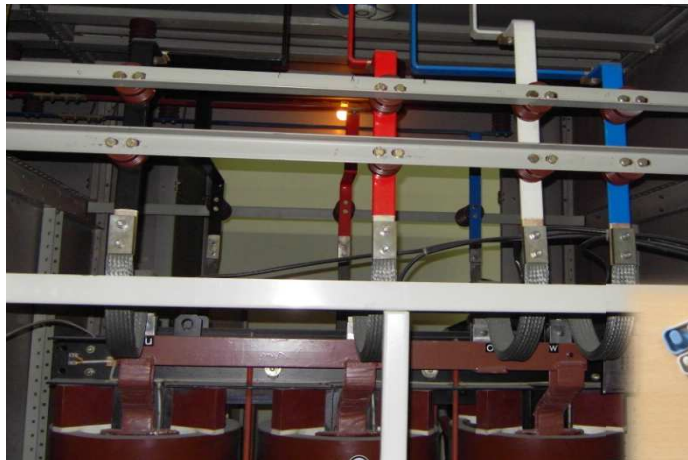
- ⊙ Execute voltage detection before inspection
- ⊙ Wear protectors



## III. Electric Shock and Examples

### Accident summary

In power retrieve room, while checking voltage on lower voltage part in current transformer and inserting internal ASS after periodical inspection, victim is electrocuted by confusing 1<sup>st</sup> layer (22,900v) and 2<sup>nd</sup> layer (380/220v). It occurred that victim checked 1<sup>st</sup> layer.





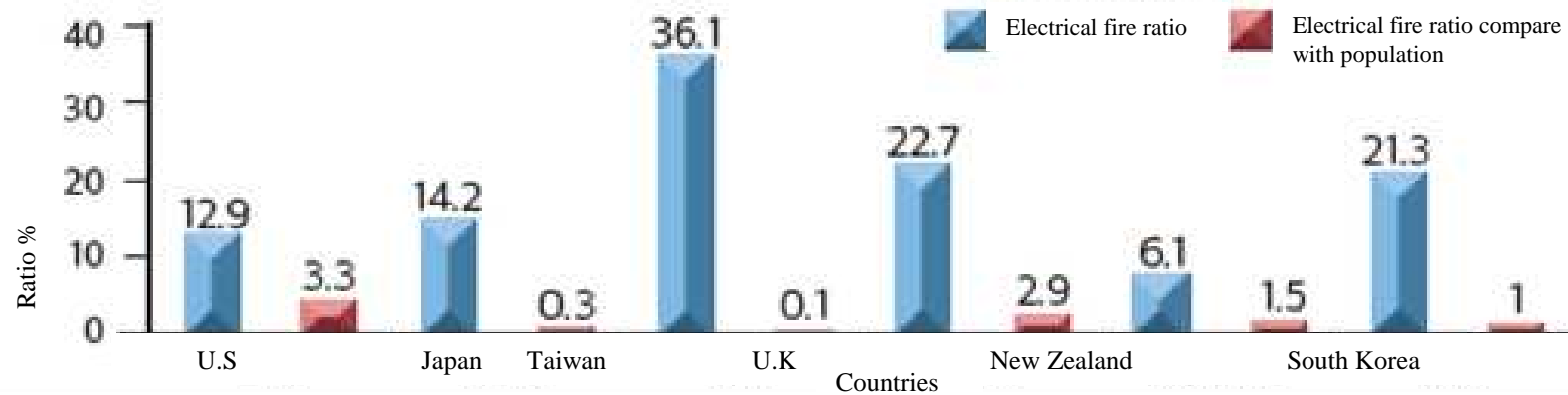


## IV. Overseas Electrical Disaster



## IV. Overseas Electrical Disaster

### 1. Electrical fire ratio of major countries and comparison with population



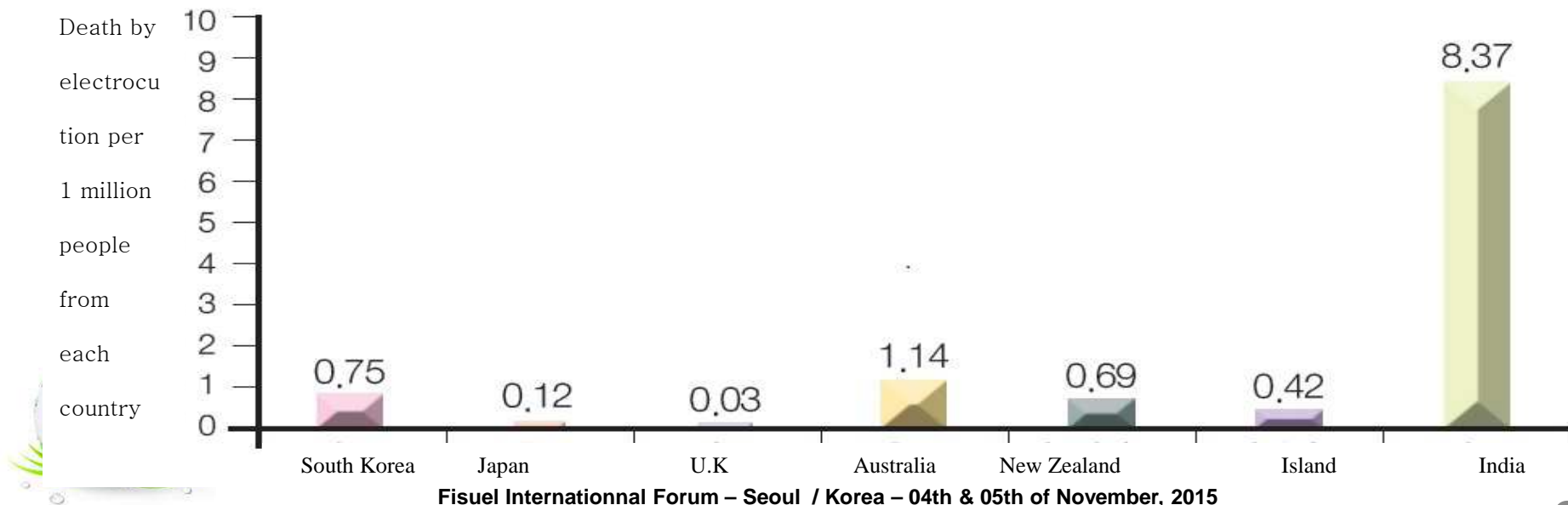
Countries	Total Fire	Electrical Fire	Electrical FireRatio (%)	Electrical Fire / comparison to population	Comment
South Korea	43,875	9,351	21.3	1.0	-
Japan	50,006	7,108	14.2	0.3	-
Taiwan	1,772	640	36.1	0.1	-
U.K.	37,601	8,531	22.7	2.9	Fire on Housing
New Zealand	20,852	1,269	6.1	1.5	-
U.S.	370,000	47,700	12.9	3.3	Fire on Housing

## IV. Overseas Electrical Disaster

### 2. Analysis of Electro Investigation by major countries

- ❖ Japan has 0.12 people and U.K has 0.03 people of death by electrocution per 1 million
- ❖ Korea is 0.75 people. It is 6.3 times higher than Japan and 25 times higher than U.K.

It depends on difference of national awareness about electricity lining type and safety policy by each country





## V. Conclusion



## V. Conclusion

- ◆ Most of electrical fire caused by **insulation aging** like tracking that caused by **long-term use**
- ◆ Prevent Electrical Fire by **opening Power switch** on unnecessary place after use of electrical facility
- ◆ **Most of electrocution** caused by **carelessness** of victims and it is **very critical to human body**
- ◆ **Must check malfunction of power** for constructing electrical facilities
- ◆ Necessary to **prevent electrical disaster** by strengthening safety awareness of **users**



## V. Creation of statistics / Application plan

Publication and distributing “Analysis of Electrical Disaster Statistics, provide as normal national statistics

- \* Number of publications and time: 950 copies, once a year
  - Korean 800 copies / English 100 copies / Chinese 50 copies
- \* Distribution agency: Government, National Assembly, related agency and organization (120 agency and 531 offices)
- \* Provide as statistical data on major policy of government and external ·internal agencies

Promote authorization of “National Statistics Creating Designation Institute”/ National Statistical Office





# V. Conclusion

<http://www.esps.or.kr>



# Q & A





Habituate Electrical Safety  
to keep my valuable life and body



# THANK YOU

**MERCI** - 감사합니다

