

# **New Strategy on Managing Chemical Substances in Korea**

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Health Agency**

- **Statistics**
- **Occupational Disease Outbreak**
- **Actions taken after the event**
- **Reemerging issues**
- **Problems and solution**

- **People**

- **Population : 48.4 millions**

- **Economically Active population : 25 millions**

- **Wage workers: 15 millions**

- **Workers Compensation: 11.7 millions**

- **Economy (2006)**

- **GDP 888 billion (12<sup>th</sup>)**

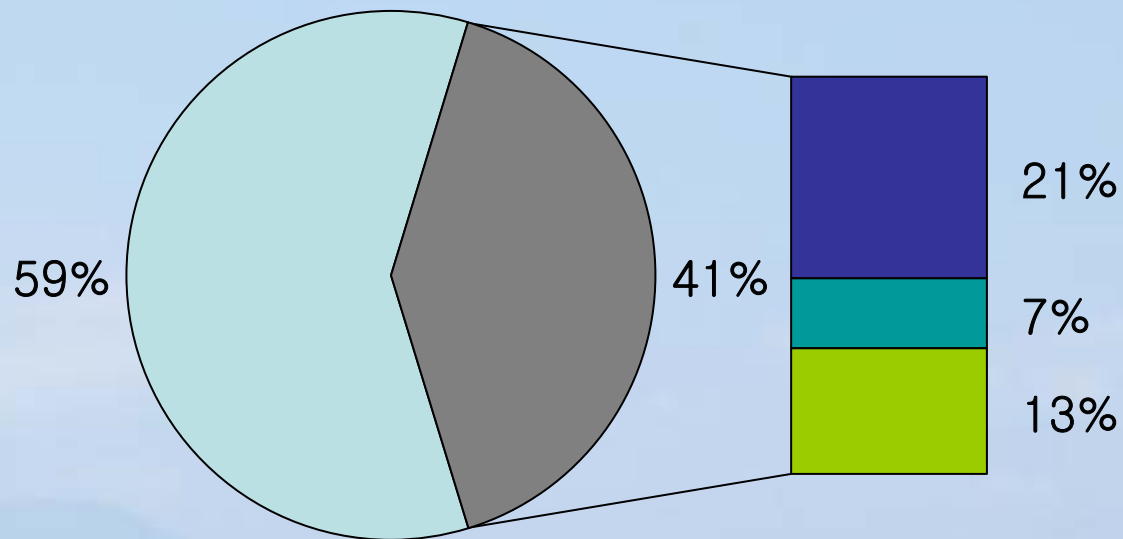
- **GNI per capita 17,690 USD( 33<sup>rd</sup> - 34<sup>th</sup> )**

- **Trade scale (12<sup>th</sup>)**

- **Shipbuilding(1), automobile(5), synthetic textile(1), styrene(1), Semiconductors, LCD, Mobile phone**

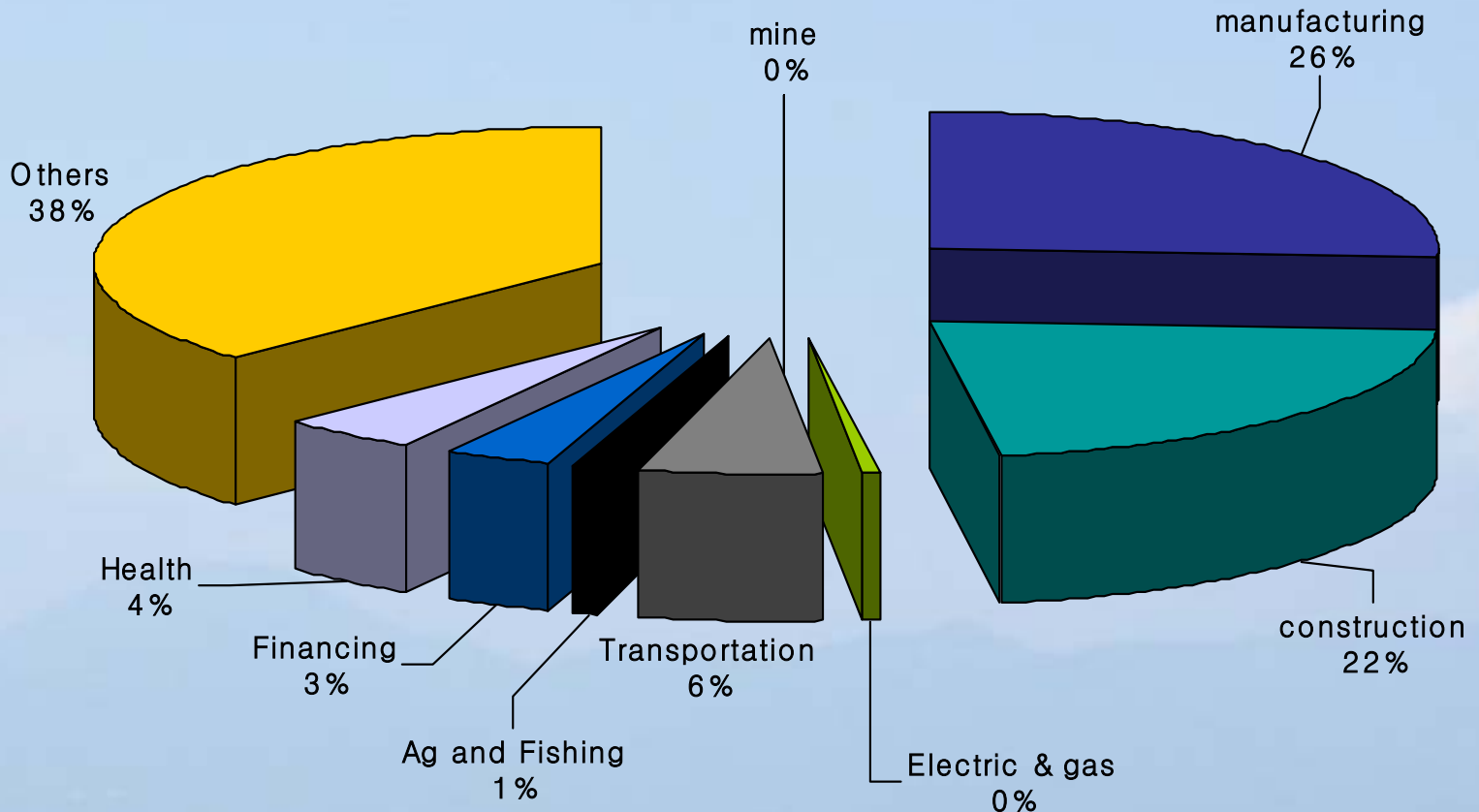
- **Hi-speed broad band Internet(4)**

# Employment of wage workers (15 millions 2007)



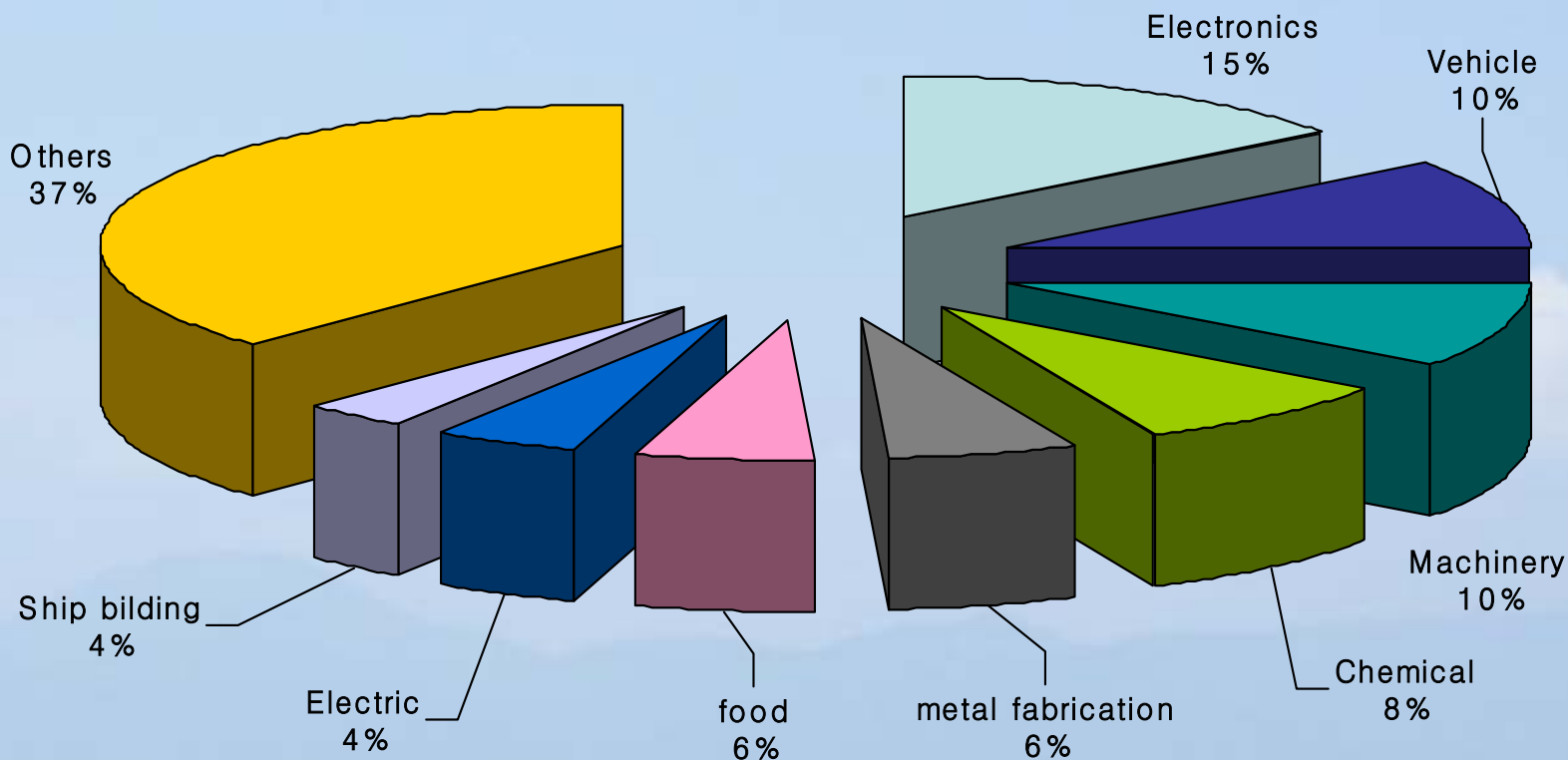
Regular contingent Part-time Atypical

# Insured workers by Industry (11.7 millions, 2006)



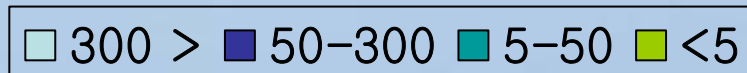
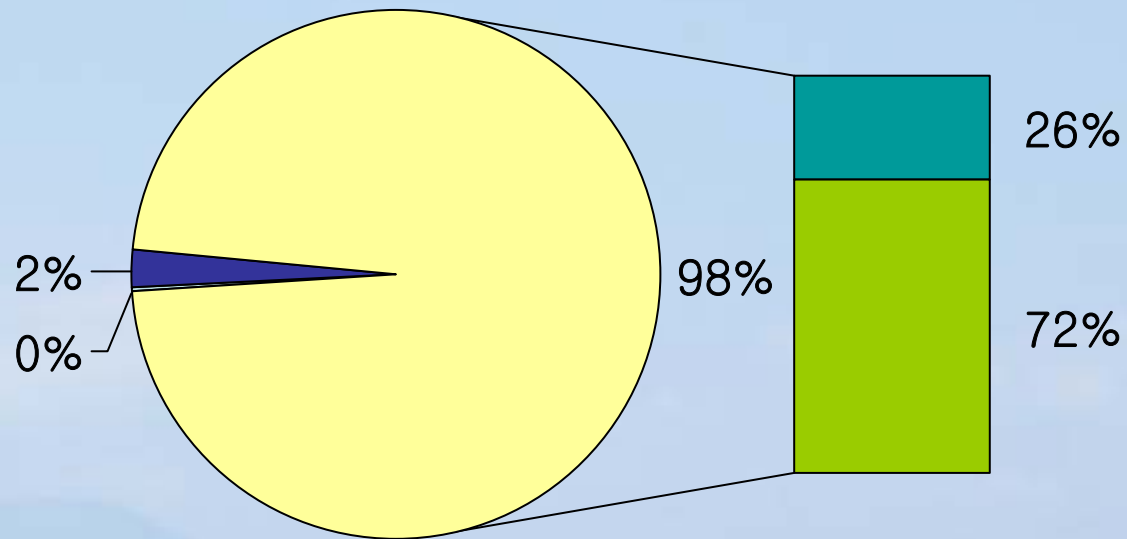
# Workers in Manufacturing Industry

(236,000 enterprises, 3,032,667 workers)



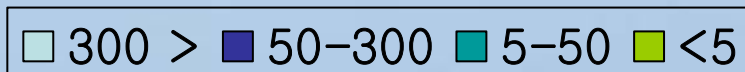
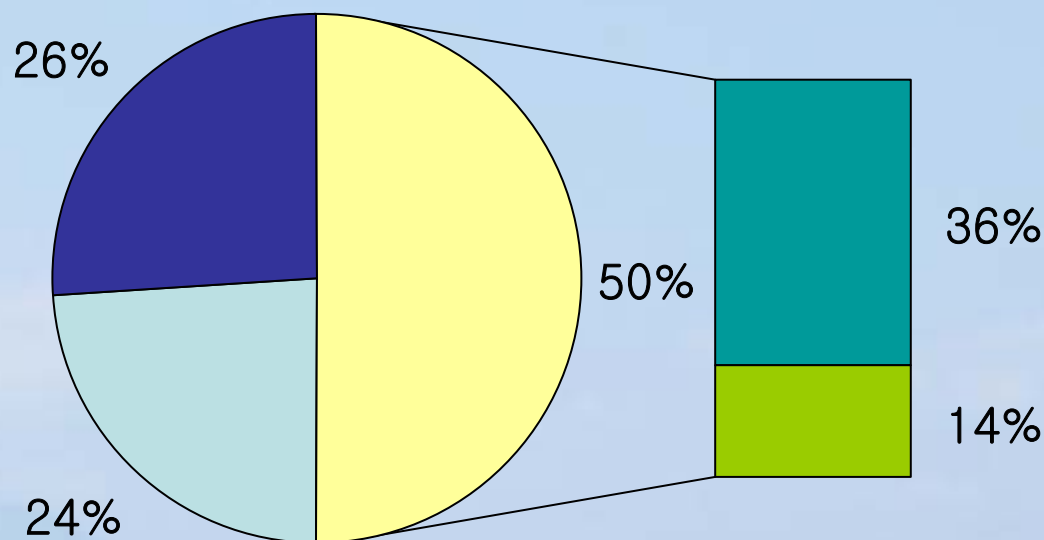
# Number of Enterprises by Size

(1,292,696 enterprises, 2006)

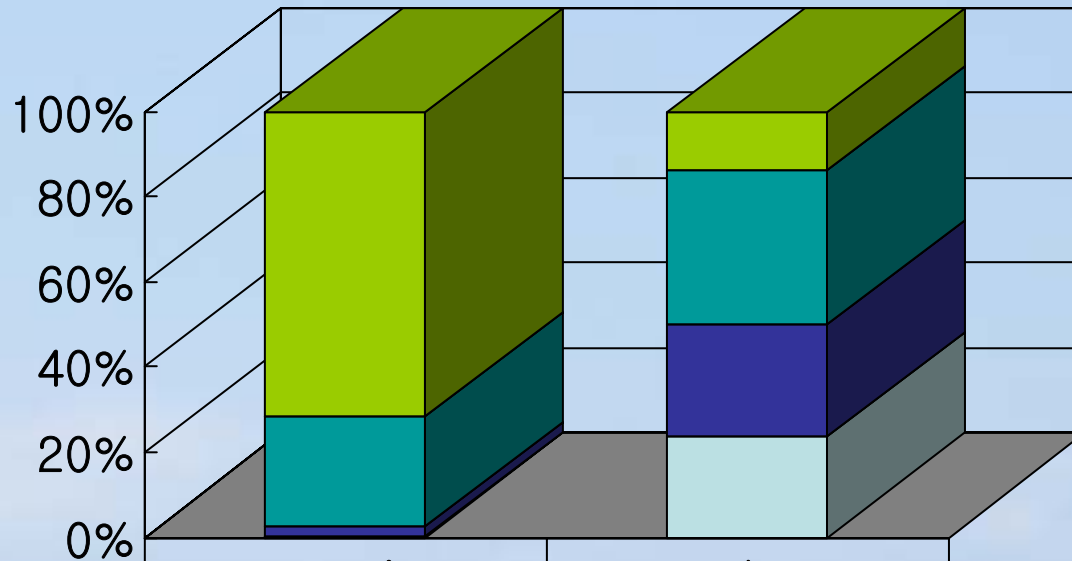


# Number of Workers by Size of Enterprise

(11,688,797 workers, 2006)







	enterprises	workers
■ <5	926140	1641119
■ 5-50	334286	4196631
■ 50-300	28865	3070585
■ 300 >	3405	2780462

# Occupational injuries and illnesses

	1970	1980	1990	2000	2005
• Accident rate (%)	4.85	3.02	1.76	0.73	0.77
• Number of Workplaces	-	63,100	129,687	706,231	1,130,094
• Number of workers	779,053	3,752,975	7,542,752	9,485,557	11,059,193
• Number of injuries	37,752	113,375	132,893	68,976	85,411
• Number of illnesses	-	1,183	1,638	2,937	7,495

## 1972 Philco-Ford Incident

1966, Philco-Ford established factory in Taiwan for the production of TV and stereos. They recruited a lot of female workers to work on the assembly line.



# Occupational Disease Outbreaks in Korea

- **Since late 1980s to early 1990s**
  - Carbon disulfide poisoning at a viscose rayon factory
  - Lead, Mercury, Chromium and Cadmium poisoning
- **1990s**
  - 2-bromopropane
  - Fulminant hepatitis by dimethylformamide
  - Parkinson syndrome in welders by manganese exposure
- **2000s**
  - Cardio-cerebrovascular diseases caused by stress or long working hours
  - Work-related musculoskeletal disorders
  - Peripheral neuropathy by n-Hexane in an IT industry

# CS<sub>2</sub> poisoning

- **Viscose Rayon Factory**
  - Established in 1968 and closed in 1993
  - No actual preventive activities until the end of 1980's



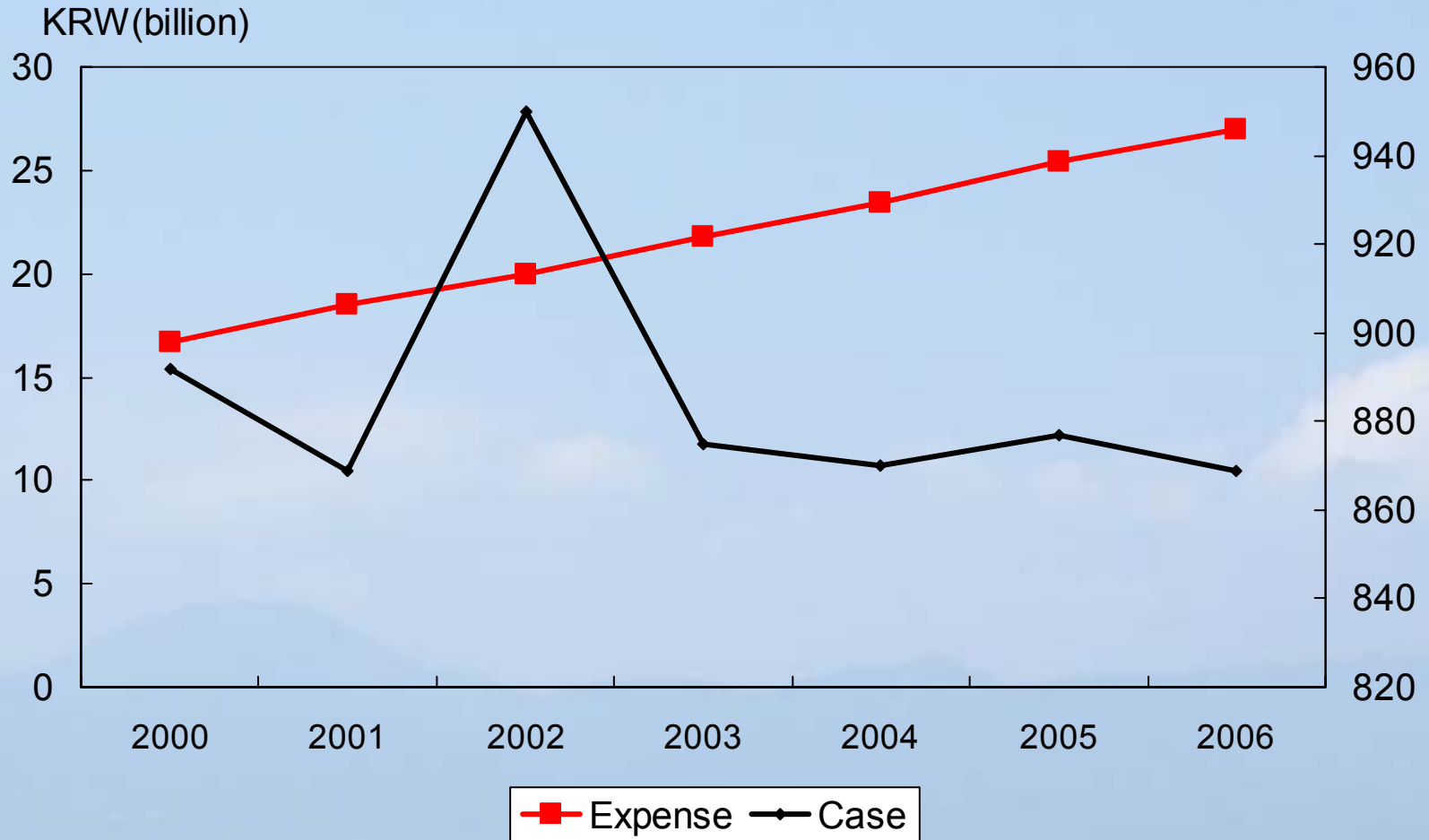
# Migration of CS<sub>2</sub> poisoning

- **CS<sub>2</sub> poisoning in Viscose Rayon factory**
  - Germany in 1890s
- **Spread toward Western Europe**
  - UK, Belgium, Italy, USA in 1920-30
- **1950-60 in Europe, Japan**
- **1980-90 in Korea, Taiwan**
- **2010-20(?)**

# CS<sub>2</sub> poisoning

- **Diagnostic Criterion (1993)**
  - Cerebrovascular diseases/peripheral neuropathy/ ischemic heart diseases/ renal atherosclerosis/ retinal micro aneurysm/ psychosis/ hearing loss
- **Accepted as CS<sub>2</sub> poisoning**
  - 967 cases including 128 deaths by 2006
  - 170 million USD for compensation from 2000 to 2006

# Compensation for CS<sub>2</sub> poisoning





# **Actions taken after the event**

- **Enforced the law and regulation**
  - Revised Occupational Exposure Limit values (324 to 698)
  - Enforce Work Environment Measurement
  - Material Safety Data Sheet since 1995
  - Evaluate hazardousness of new chemicals
- **Research and Education**
  - OSHRI under KOSHA in 1992
  - Quality Control program for analyzing samples since 1992
  - Research funds

- **Nationwide Survey for Work Environment of Manufacturing industry**
  - 1993, 1999, 2004, 2009(planned)
- **38,000 chemicals are currently being used**
  - 400 chemicals are newly registered in a year
- **Database of MSDS**
  - 50,800 since 1995/ 762,000 hits in 2007
- **Occupational Exposure Limit values**
  - 698 items
- **Work Environment measurement**
  - 191 items

# Nationwide Survey for Work Environment of Manufacturing Industry in 2004

- **Subjects**

- **Enterprises with more than 5 employees**

- 82,898

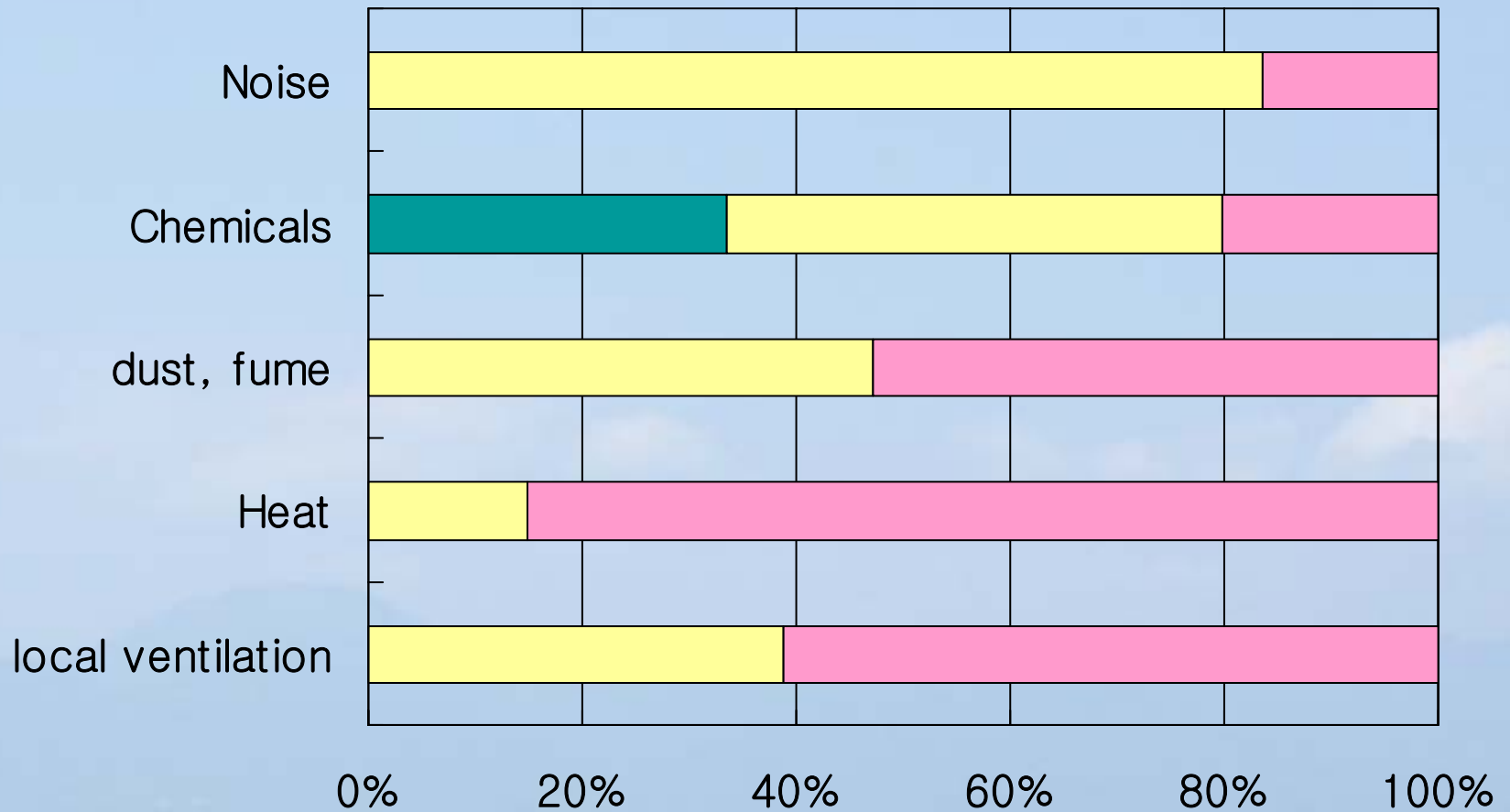
- **Enterprises with less than 5 employees**

- 7,102 among 116,784

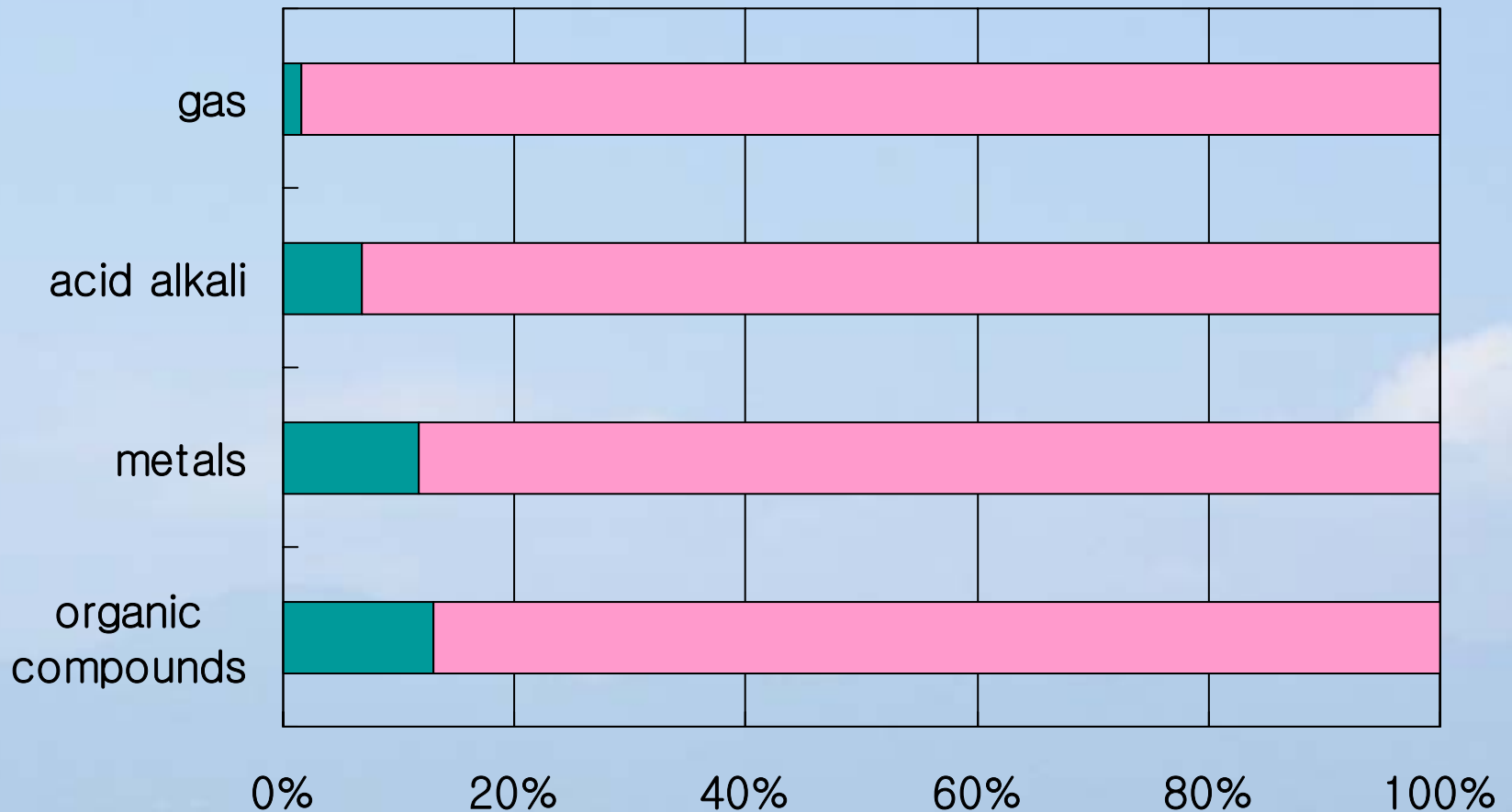
- **Result**

- **Completeness of survey (89%)**

# Results of survey for work environment (2004)



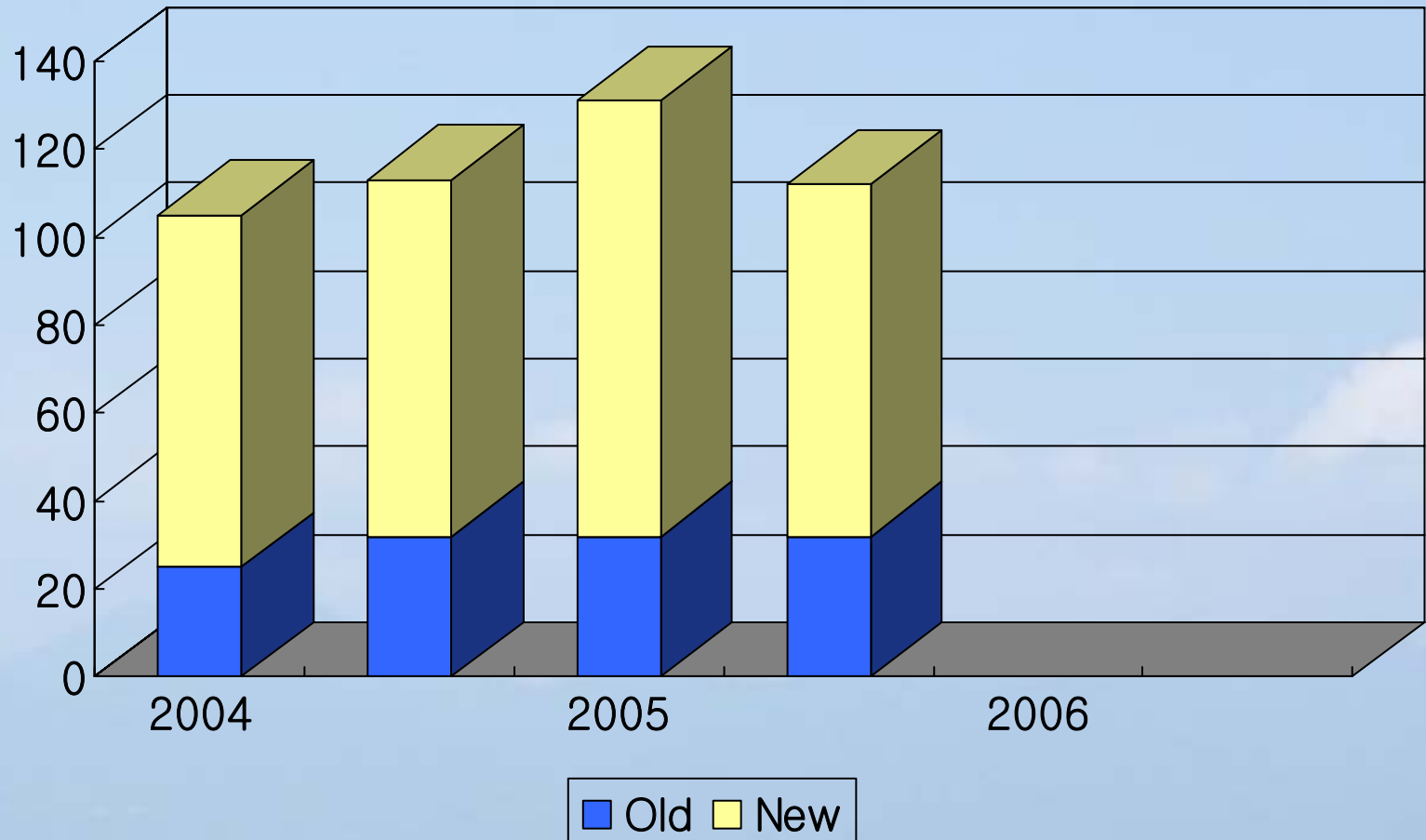
# Proportion of enterprises with chemicals required to be measured(2004)



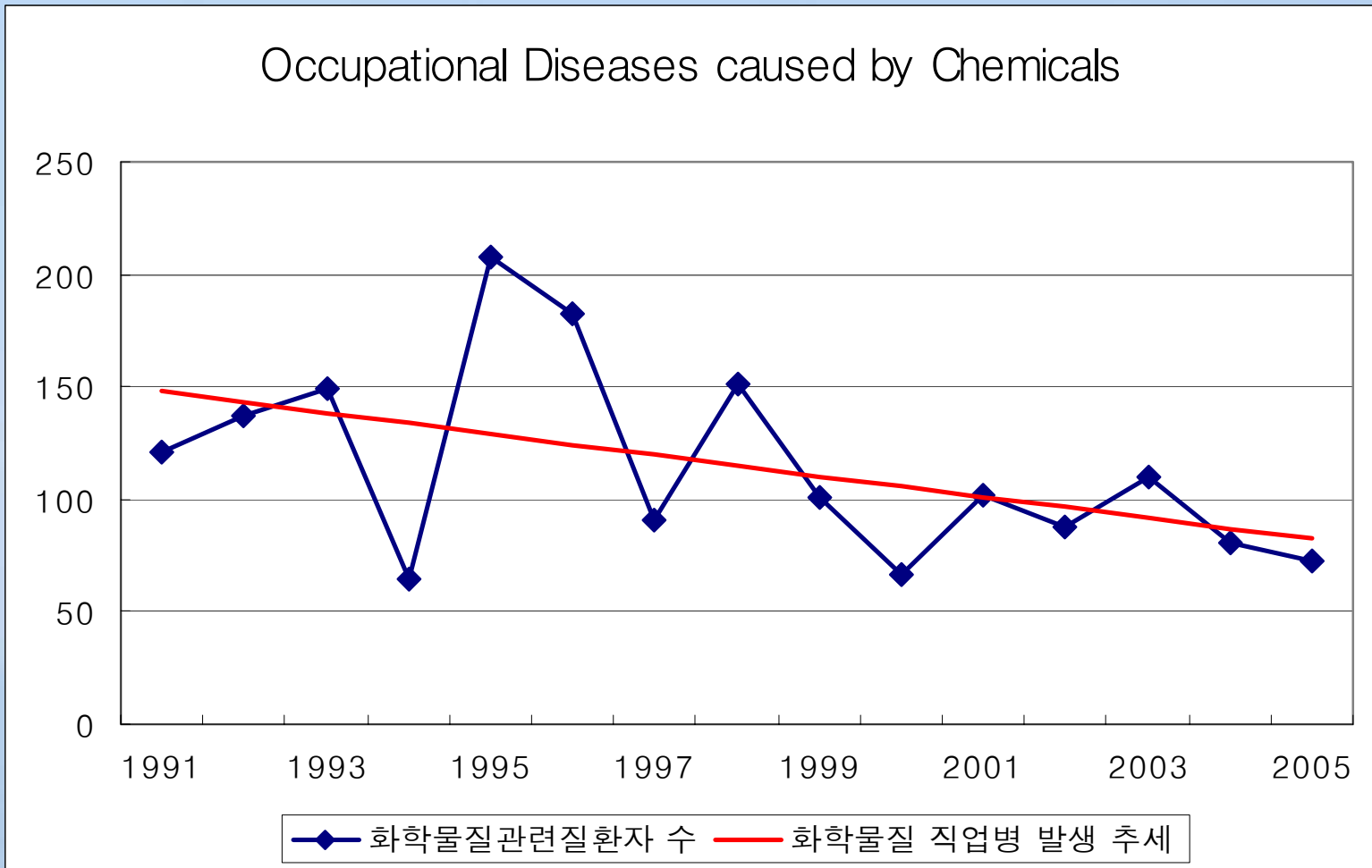
# Work Environment Measurement

- **Twice a year for 189 chemicals**
- **28,434 in 2004**
  - **More than 5 : 23,909 (26.0% of all enterprises)**
  - **Less than 5 : 4,525 (3.1% of all enterprises)**
  - **May miss many enterprises with less than 5 employees**
- **Proportion of enterprises which exceed the OELs**
  - **Dust (2.0%, 275), organic compounds(0.6%, 80), metals (0.8%, 69)**

# Enterprises which exceeded the OEL



# Occupational Diseases caused by Chemicals





# Outbreak of neuropathy by n-hexane

- **January 2005**
  - Eight workers developed polyneuropathy in a factory producing electronic supplies
  - Used n-Hexane as degreasing solvents
  - Undocumented migrant workers from Thailand
- **Investigated by local office of KOSHA**
  - Workers were not aware of the toxicity of n-hexane
  - Results of work environment measurement were underestimated
  - Improper ventilation system
  - No personal protection equipment



# Working condition

- **Estimated amount of monthly consumption**
  - 4 liters solvent (mostly n-hexane)
- **Number of workers: 4-8**
- **Amount of work 5,000 frames per day**
- **Work hours per day**
  - 10-12 hours per day
  - 1-2 days off per month



# History of the work environment measurement

- **2000 – 2001**
  - Mixed solvents 0.04-0.54 (OEL = 1)
- **2002**
  - Mixed solvents 1.28 n-Hexane: 50.96, 51.59 ppm
  - n-Hexane 16.83, 46.92 ppm
- **2003**
  - n-Hexane 12.48 ppm / n-Hexane 54.26 ppm
- **2004**
  - n-Hexane 59.7 ppm/ n-Hexane ND ppm

# Reconstruction of the work

- **Volunteers worked as it was.**
  - 4 volunteers with ventilation
  - 4 volunteers without ventilation
  - 8 volunteers with ventilation
  - 8 volunteers without ventilation
- **Use same amounts of solvent**



# Result(personal)

workers	Fan	sample	Air level(ppm)		Amount (mL)
			mean	range	
4	With	4	75.0	49.7-93.8	303
	Without	4	173.7	147.3-196.6	340
8	With	8	115.7	69.0-185.3	385
	without	16	204.2	114.8-281.0	385





# Other events

- **Dimethylformamide**
  - **Fulminant hepatitis**
  
- **Trichloroethylene**
  - **Stevens-Johnson Syndrome**



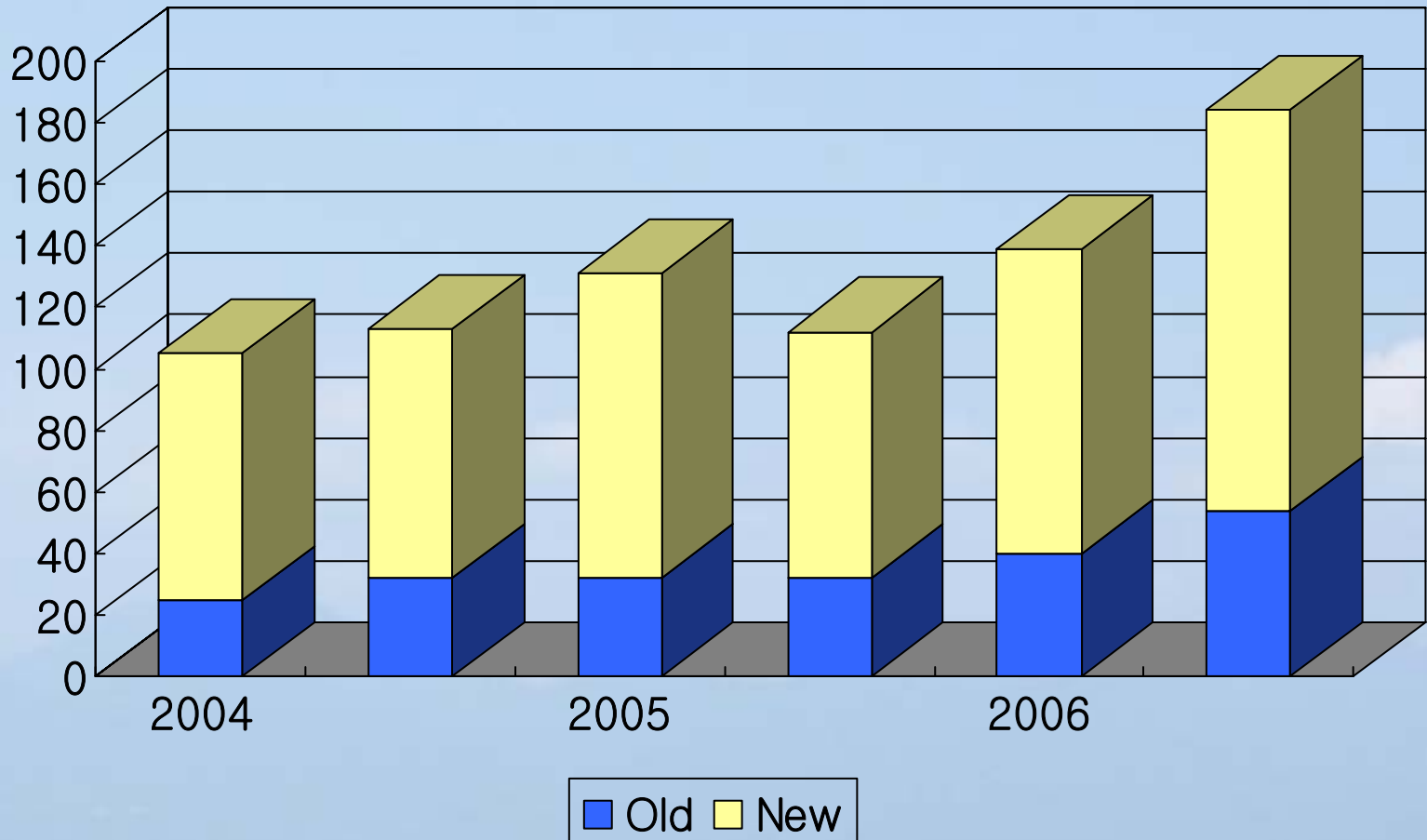
# Problems

- **Hazardous work is moving from LSEs to SSEs**
- **Incorrect data of work environment measurement**
- **Scattered information of chemicals being used**
- **Employers are reluctance to report the bad results**
- **Workers are not aware of toxicity of chemicals**

# Solution

- **Reliability test of the measurement**
  - Targeted to factories which showed changed values without mechanical intervention
  - Performed by KOSHA since 2006
- **Revised the OELs**
  - 86 items were revised in 2007
  - 42 items will be revised in 2008
- **Set-up Permissible Exposure Limit value**
  - 13 chemicals

# Enterprises which exceeded the OEL



# Solution

- **Provide simplified information**
  - **Fact sheet for workers**
  - **Updated MSDS with GHS classification for 3,500 chemicals in 2007**
- **Approach to migrant workers**
  - **Information with different languages**
  - **Consultation service at the ethnic community**

# Solution

- **Selection and Concentration**
  - Select chemicals which commonly caused occupational diseases in Korea
  - 30 chemicals were selected
- **Tracking from production to end-use**
  - 6 chemicals every year
  - Gathered information of ventilation
- **Control Banding(??) especially for ESSEs**
  - Detailed information for intervention
  - More options for control

# Summary

- **KOSHA is focusing on several chemicals which can frequently cause occupational diseases**
- **Self approaching evaluation methods like control banding is necessary to employers and workers in many reasons.**