

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 (12th)**

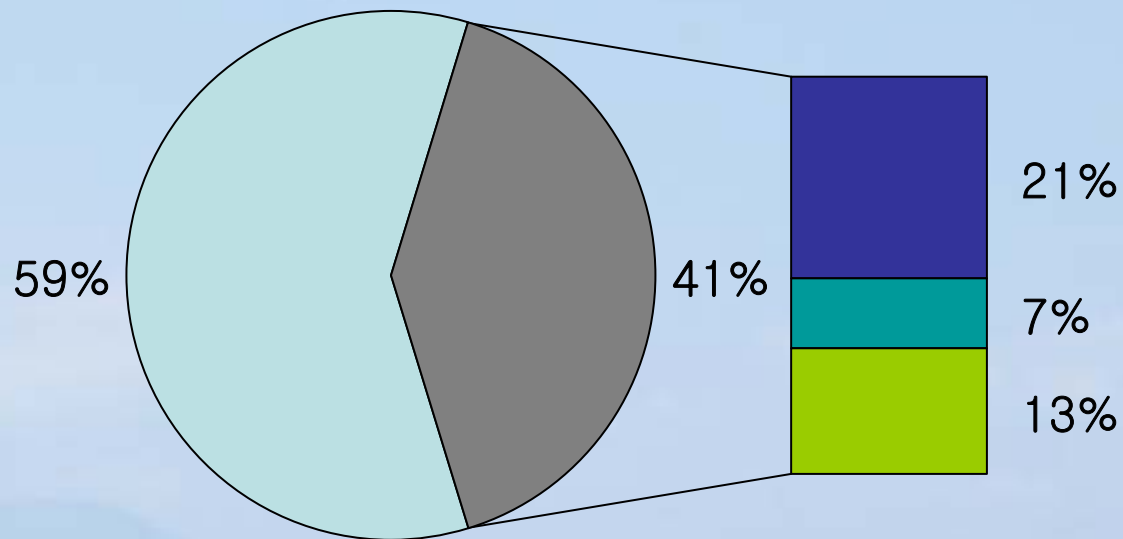
- **GNI per capita 17,690 USD(33rd - 34th)**

- **Trade scale (12th)**

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

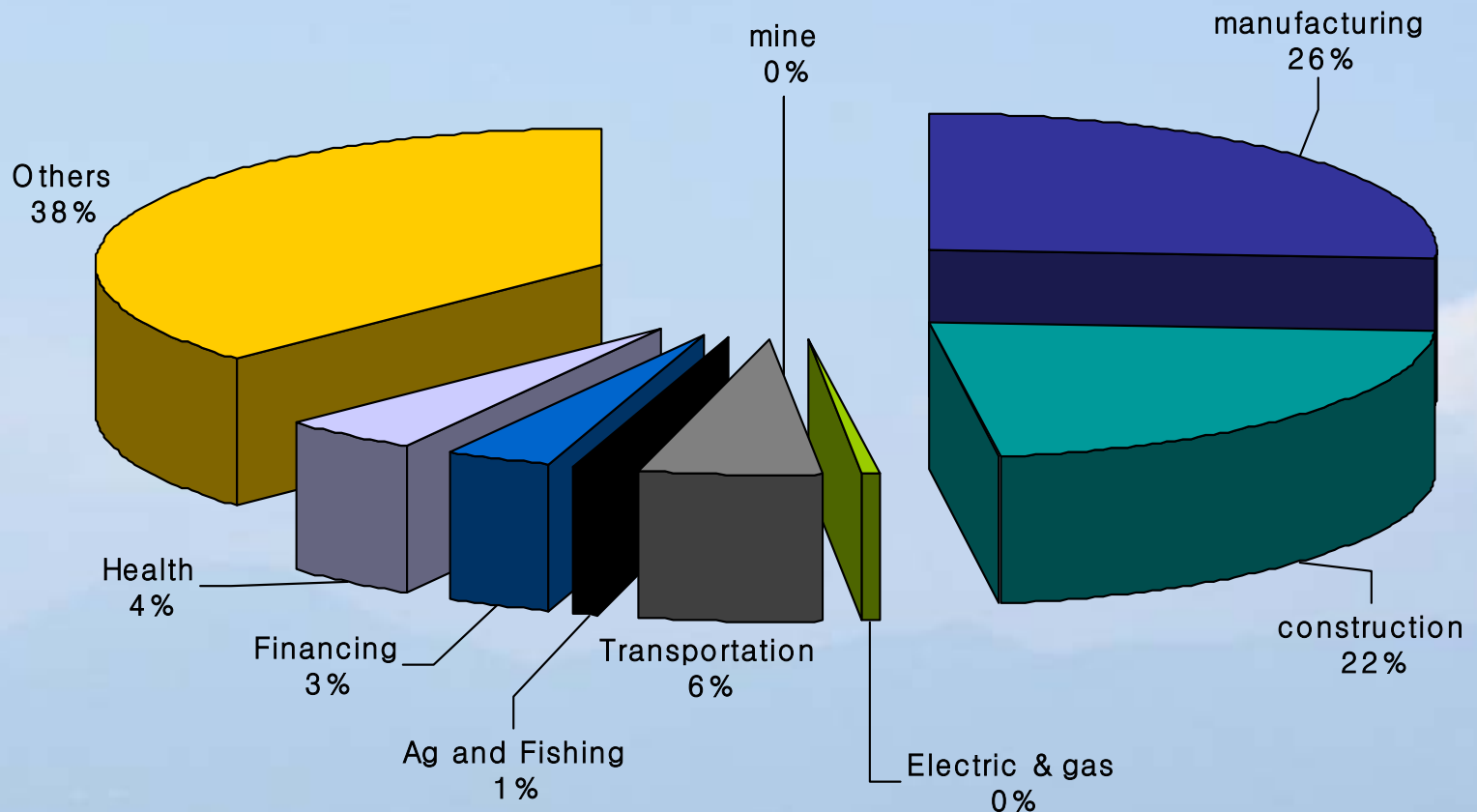
- **Hi-speed broad band Internet(4)**

Employment of wage workers (15 millions 2007)



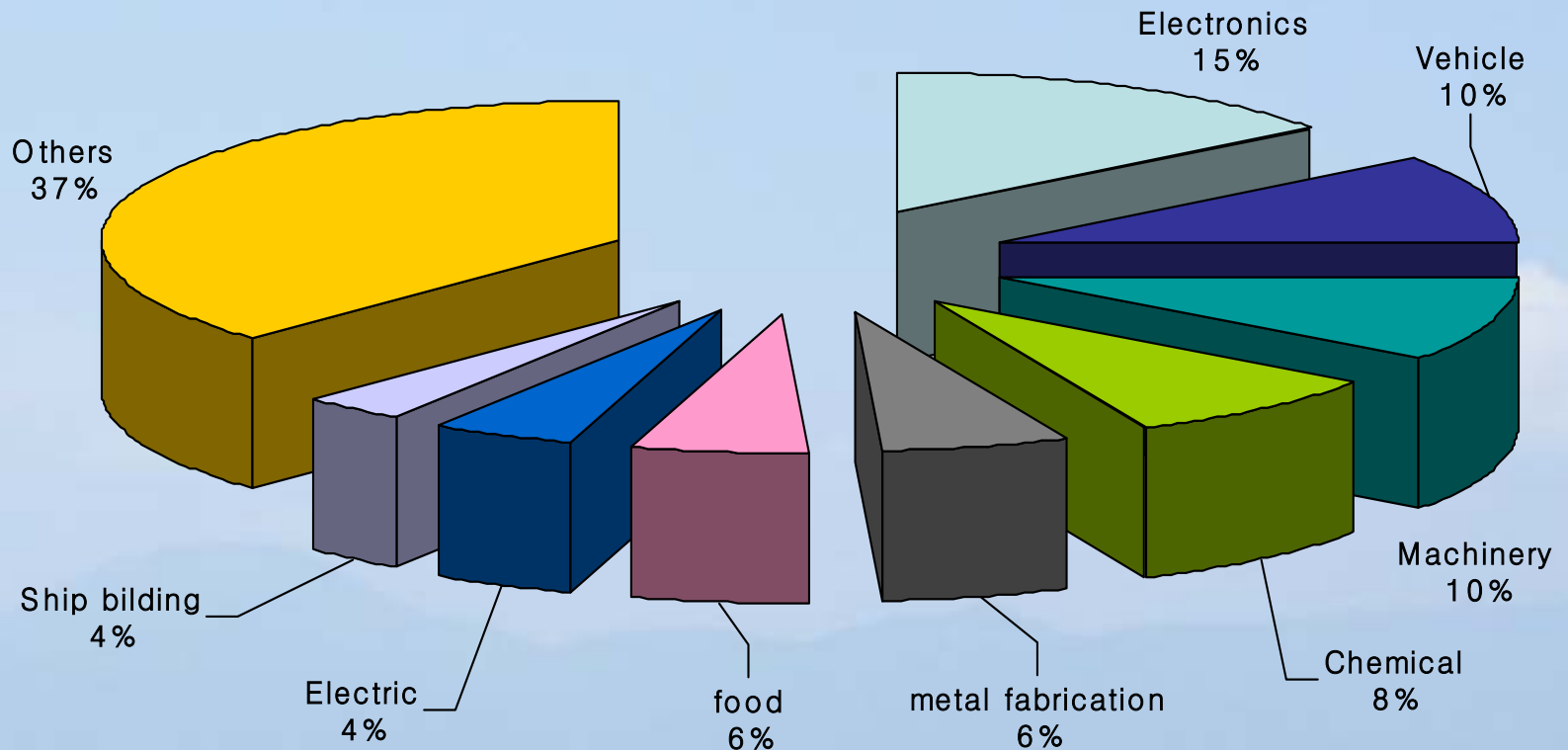
Regular contingent Part-time Atypical

Insured workers by Industry (11.7 millions, 2006)



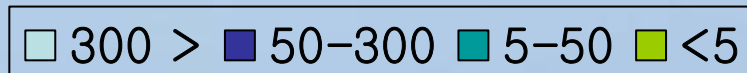
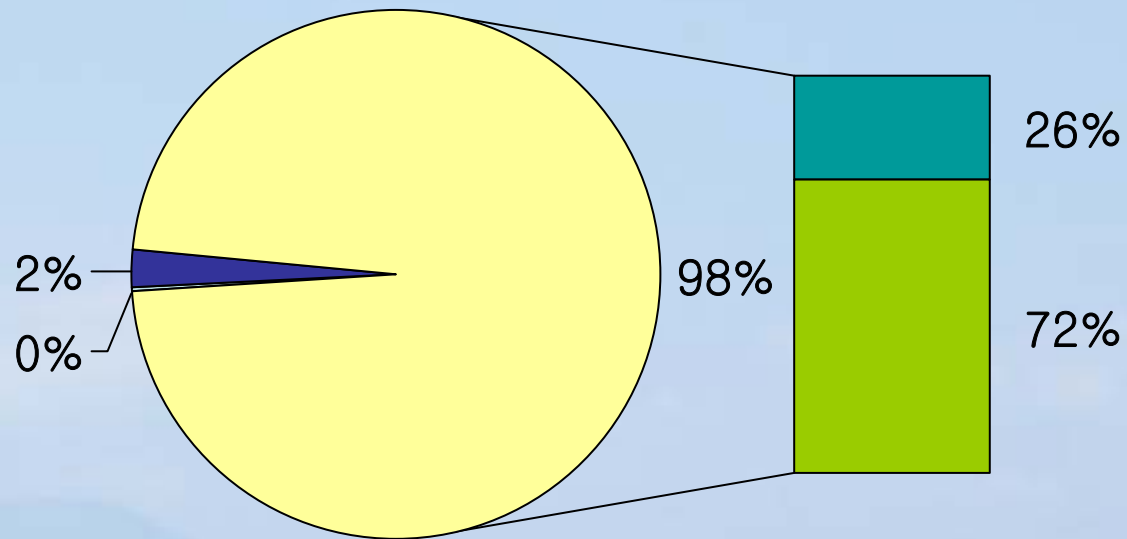
Workers in Manufacturing Industry

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



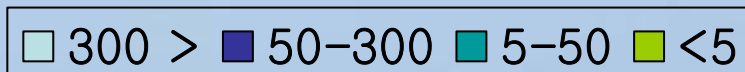
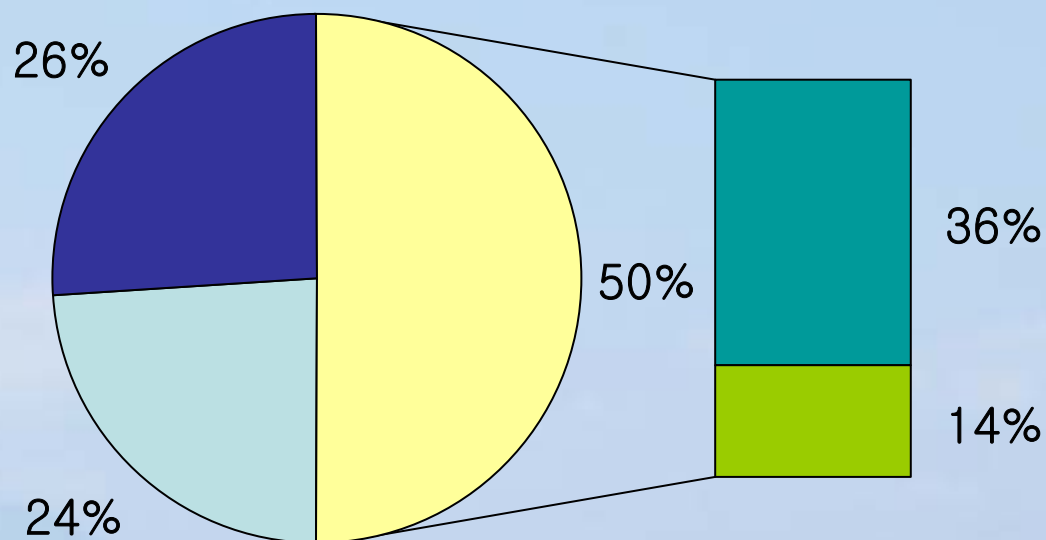
Number of Enterprises by Size

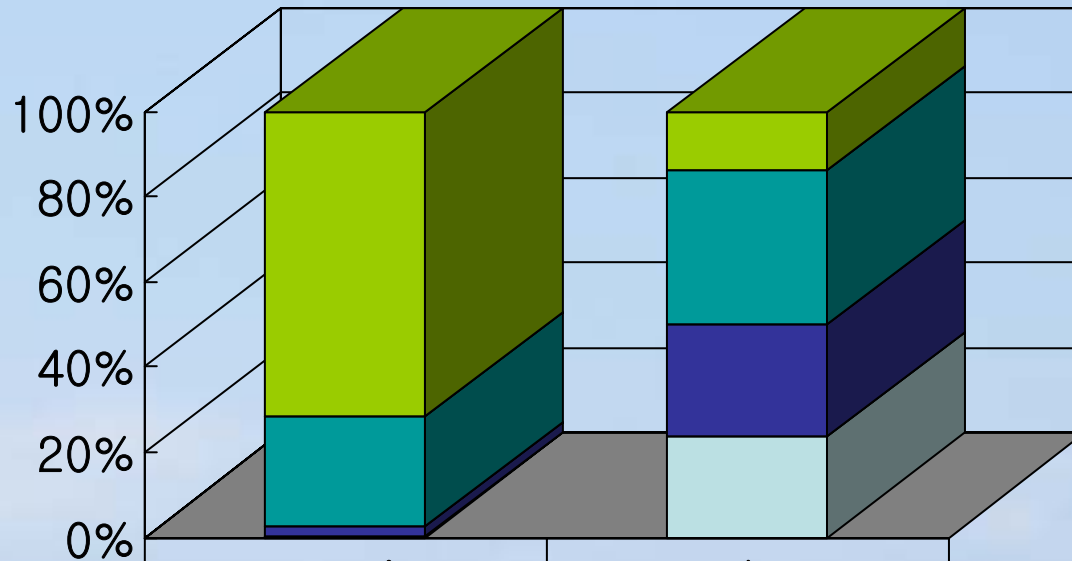
(1,292,696 enterprises, 2006)



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

CS₂ poisoning

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



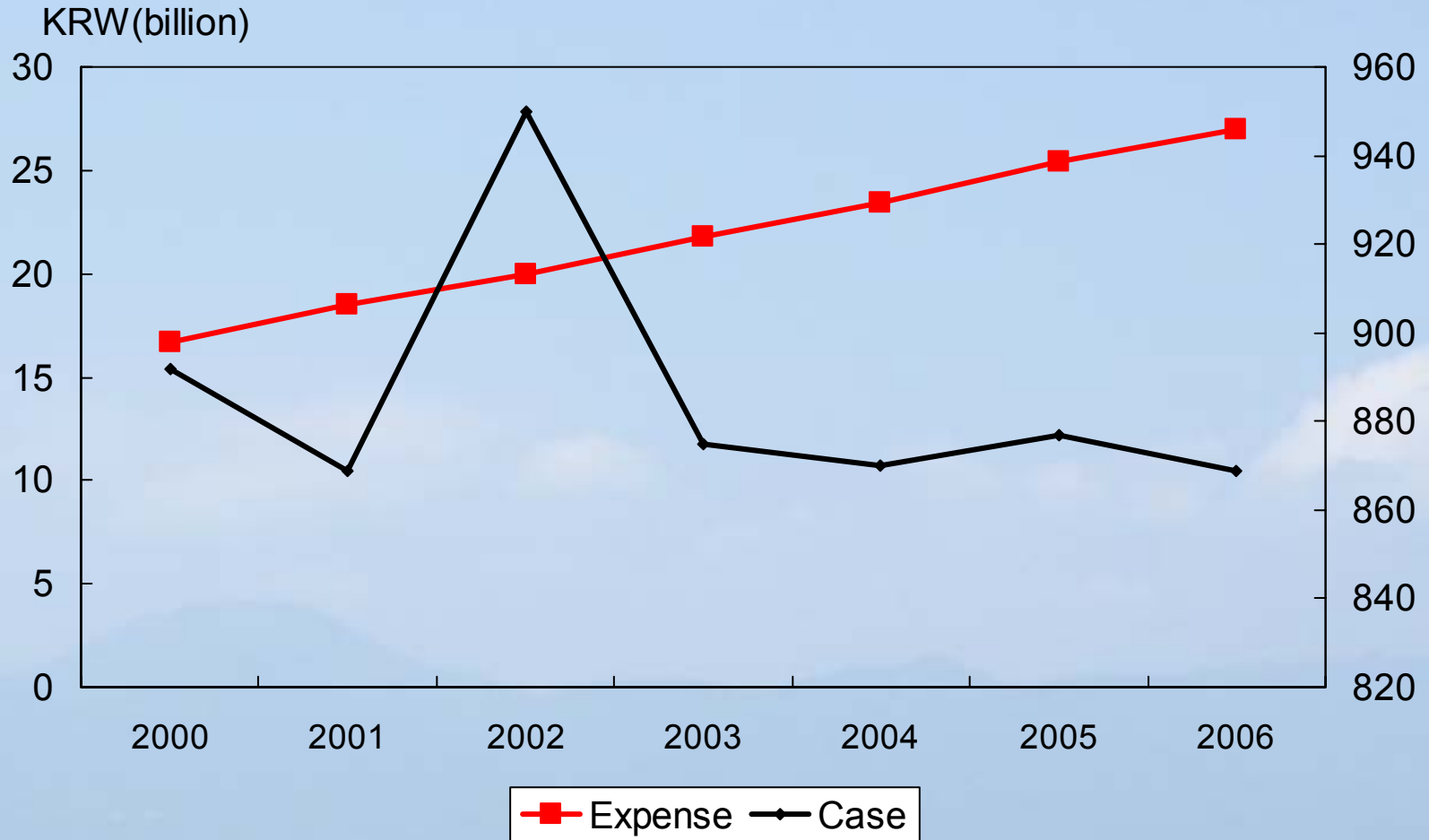
Migration of CS₂ poisoning

- **CS₂ 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(?)**

CS₂ poisoning

- **Diagnostic Criterion (1993)**
 - Cerebrovascular diseases/peripheral neuropathy/ ischemic heart diseases/ renal atherosclerosis/ retinal micro aneurysm/ psychosis/ hearing loss
- **Accepted as CS₂ poisoning**
 - 967 cases including 128 deaths by 2006
 - 170 million USD for compensation from 2000 to 2006

Compensation for CS₂ 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

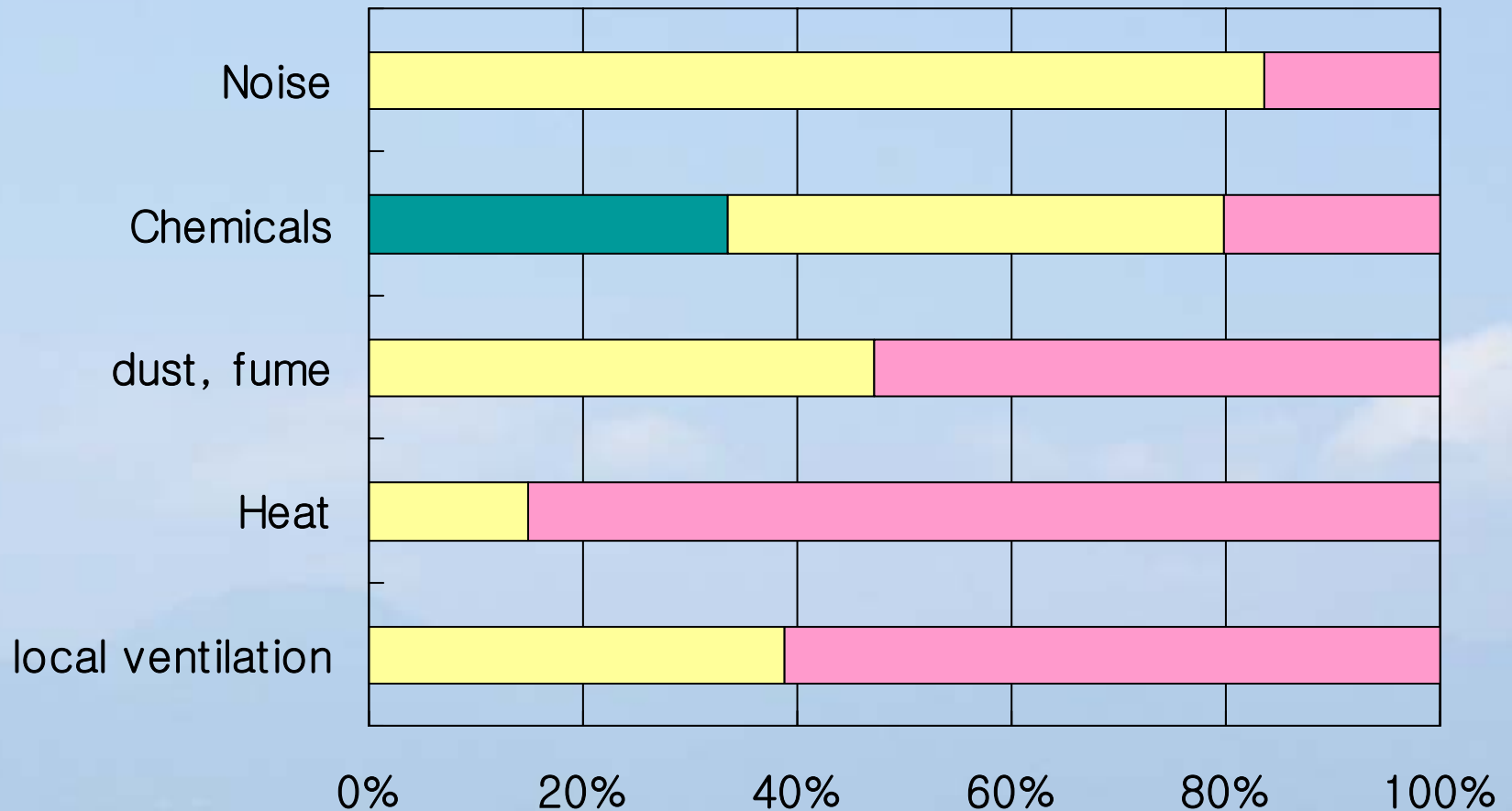
- **Enterprises with less than 5 employees**

- 7,102 among 116,784

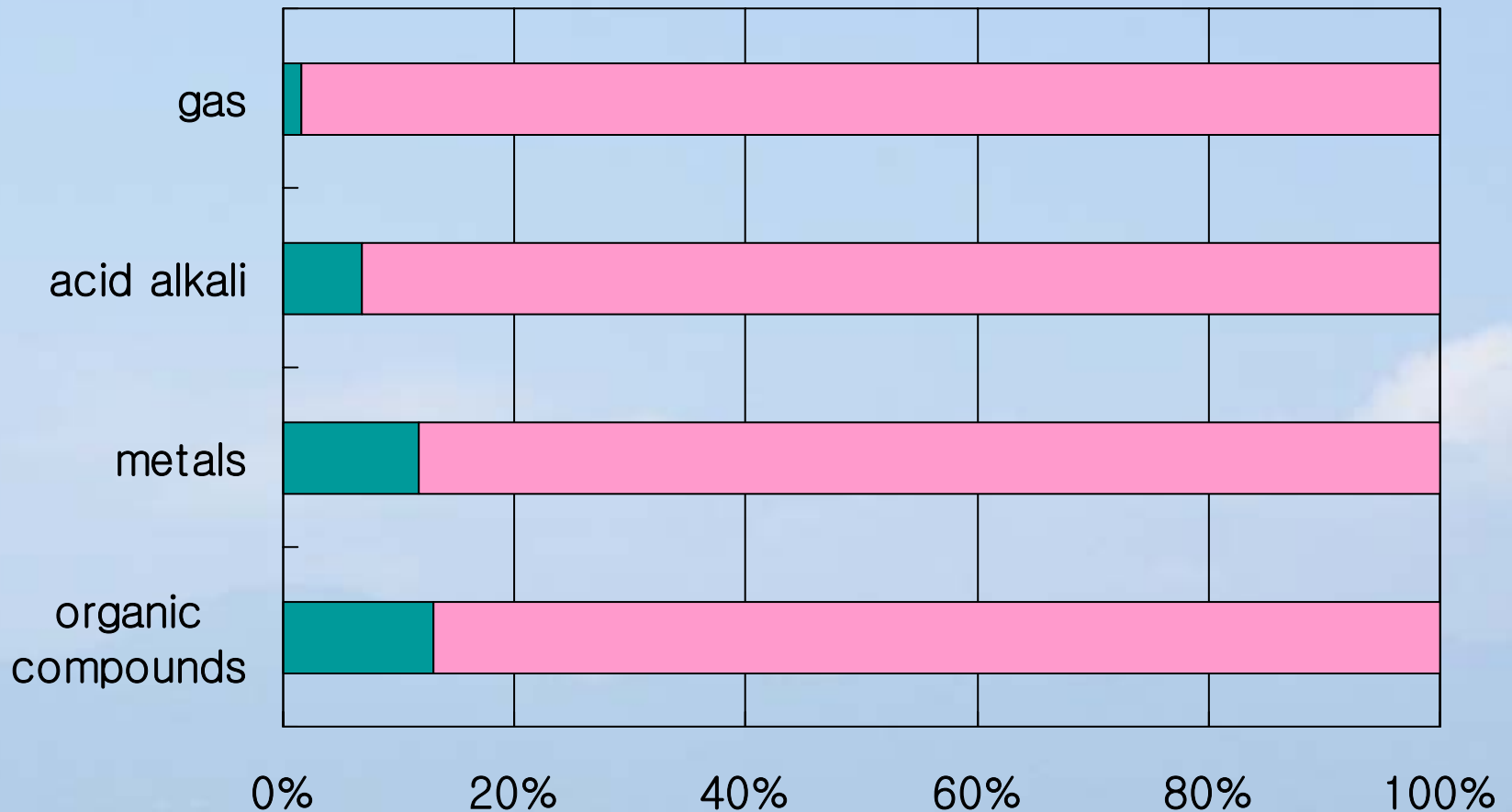
- **Result**

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

Results of survey for work environment (2004)



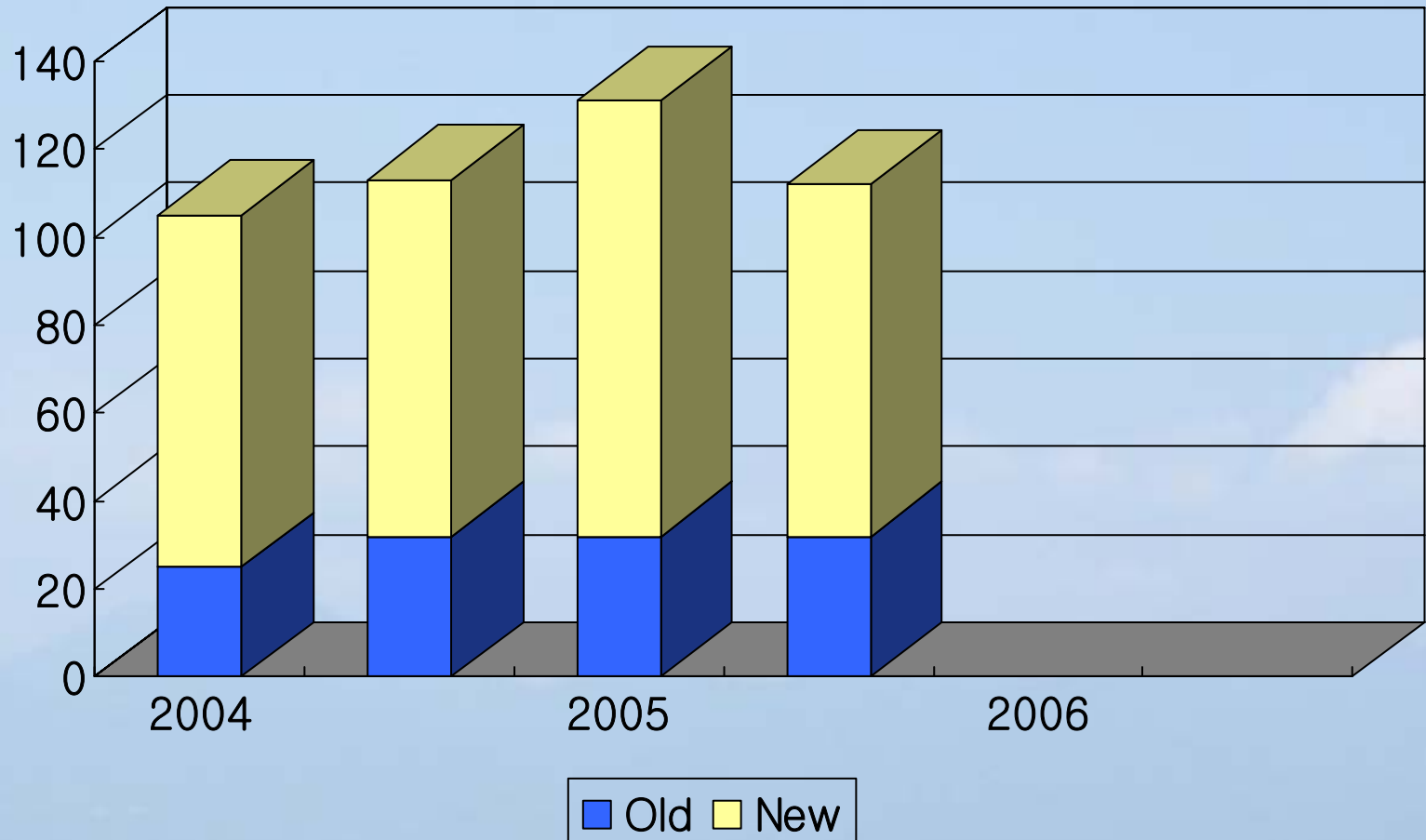
Proportion of enterprises with chemicals required to be measured(2004)



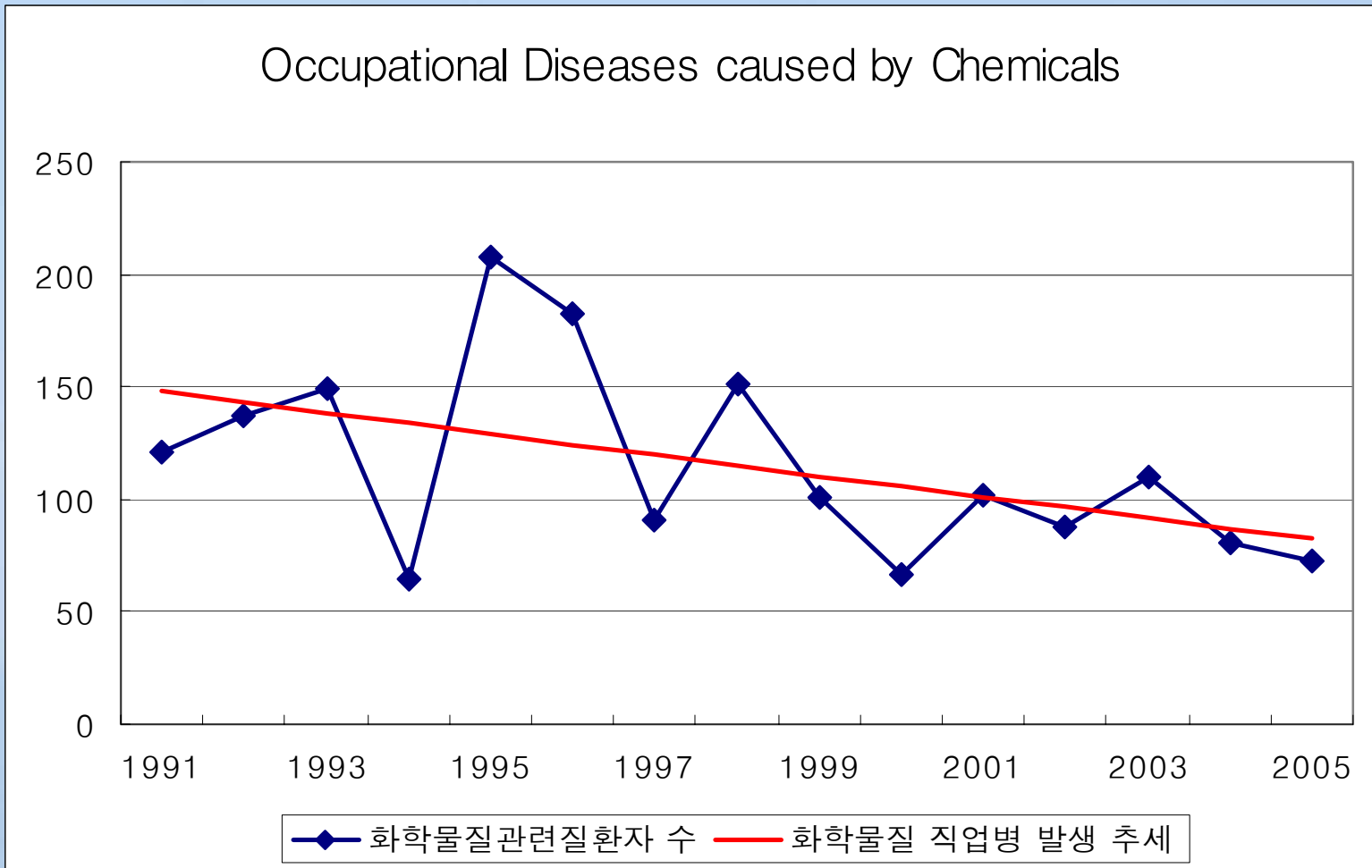
Work Environment Measurement

- **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**

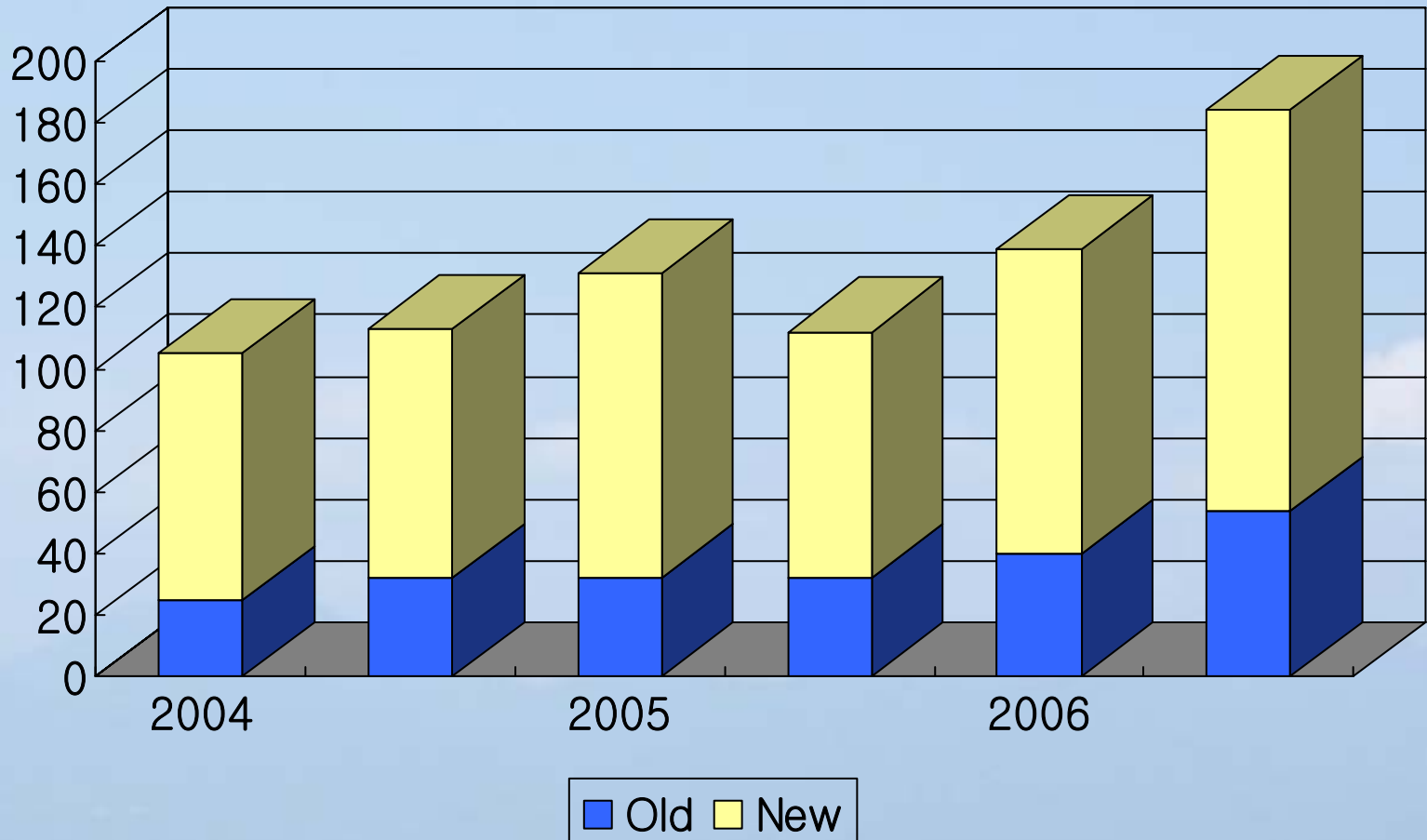
Problems

- **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.**