

# INSPIRING TECHNOLOGY:

## 랑세스의 경량화 기술이 실현하는 "친환경 이동성"

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플라스틱-금속 하이브리드 기술을 사용하여 루프 프레임에 동일한 비용으로 30% 더 가볍게 만들 수 있습니다.

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플라스틱-금속 복합재로 만들어진 하이브리드 프론트 엔드는 금속으로만 만들어진 프론트 엔드에 비해 10% - 40%나 가볍습니다. 열가소성 플라스틱 복합재를 더하면, 알루미늄 강판에 비해 무게를 추가적으로 20%까지 줄일 수 있습니다.

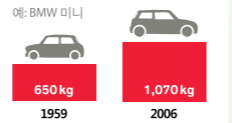
**프론트 엔드**  
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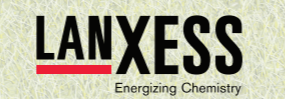


**장비**  
**에어백 하우징**  
Tepex® 하이브리드 기술은 에어백 하우징 측면을 아주 얇게 설계할 수 있도록 해줍니다. 우수한 강성을 지닌 열가소성 플라스틱 복합재를 사용하기 때문입니다. 이 기술을 사용하면 에어백 하우징의 무게를 약 1/3 가량 줄일 수 있습니다.

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랑세스는 특수화학제품 제조분야의 글로벌 선두기업으로 플라스틱, 고무, 중간체 및 특수화학제품 개발, 생산 및 판매를 주요사업으로 하고 있습니다. 현재 전세계 29개국에서 52개 생산시설을 가동 중이며 2014년 기준 매출은 80억 유로, 임직원은 16,300여 명입니다. 랑세스는 세계적 권위의 다우존스 지속가능성지수(DJSI) 및 FTSE4Good지수의 회원사로서 지속가능경영 성과를 인정받고 있습니다.

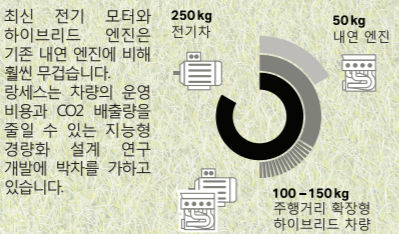


www.lanxess.co.kr  
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### 경량화의 연료절감 효과



### 진보된 엔진 증가하는 자동차 무게



# Responsible Care

The Commitment of the Chemical Industry to Sustainable Development

Issue No + 34

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Je-wung Go, Representative of Lanxess Korea

### Special

Safety Culture of Solvay Korea, One of the Leading Global Enterprises

### Issue

Development of Process Safety Metric

### Members Focus

Members News

### RC Activity

Key Activities of the KRCC Secretariat



# Responsible Care

Issue No + 34

Responsible Care® involves voluntary activity for the chemical companies; the chemical industry makes constant efforts to promote activity for the improvement of the environment and for the safety and health of the people. It begins with management and implements the whole process of chemical products beginning with their development and manufacture, sales, distribution, use, and culminating with waste treatment and disposal.

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## CHEMICAL INDUSTRY, BASIS OF EVERY INDUSTRY RC ACTIVITIES, DRIVING FORCE FOR FUTURE GROWTH

**Je-wung Go**  
Representative of Lanxess Korea

Lanxess is a global company based in Cologne, Germany, and has specialized in specialty chemicals, supplying high performance plastic, synthetic rubber, high-quality special chemicals and intermediates to the global market. After being separated from the Bayer group in 2005, Lanxess has grown into a world-class specialty chemical expert, running 52 factories in 29 countries. In the Korean market, particularly, the company is playing an important role in supplying synthetic rubber, one of key materials for high-performance environmentally-friendly tires, and lightweight plastic that can replace metal for motor vehicles. Let's hear from Je-wung Go, President of Lanxess Korea, about the company's secret of success, his management philosophy, and his thoughts on safety control for the chemical industry.

**Q. Would you please introduce Lanxess with the company's competitiveness and characteristics?**

**LANXESS** Lanxess is a young and dynamic company that has all-round expertise and know-how for the industry of specialty chemicals. We offer a variety of value-added premium products and technologies, including engineering plastics for automobiles and electrical/electronic products, synthetic rubber for high-performance tires, intermediates for industrial use, high-function specialty chemicals, ion exchange resin for industrial water treatment, premium inorganic pigments, and so forth. We expect that growing population, urbanization, and increasing means of transportation such as automobiles will significantly affect climate, lifestyle and people's pattern of consuming energy resources. Lanxess is endeavoring to develop innovative products and solutions to deal with such issues in a sustainable way.

**Q. Lanxess Korea has achieved remarkable results and is considered 'small but big company'. What is the secret of the success?**

**LANXESS** Since established in 2007, Lanxess Korea has continuously pursued mutual growth with other Korean enterprises. Korea is an important market to Lanxess as the country is leading the technological development of the global automobile industry and is one of the major global manufacturers of motor vehicles and tires.

Lanxess Korea is offering various products and solutions to Korea's automobile, tire, shipbuilding, construction, electricity, and electronics industries as well as overseas operations of Korean enterprises and is participating in their technology development, maintaining close partnership with them and providing support to their success based on our global network.

**Q. Many acknowledge that you, as a native CEO, have significantly contributed to the remarkable sales increase. What's your management philosophy?**

**LANXESS** I especially encourage our employees to put themselves in the shoes of the other person. The purpose of an enterprise is to create profits. If we pursue business in a way that profits are shared with our partners, we can form a relationship that benefits each other. If Korean companies are acknowledged in the global market and achieve growth, such accomplishment can positively affect our growth in the market as well. That's why I highly value the relationship that can mutually benefit each other.

Lanxess Korea puts partnership first and thus has maintained a long-term relationship with Korean customers for over 10~20 years. Even during turbulent times we pursued mutual growth, which made possible today's success. I'm sure that such a solid relationship with customers will lay the foundation for our future growth too.

**Q. Lanxess Korea has been included in FTSE4Good Index since 2011(selected by Financial Times and London Stock Exchange according to ethical, social, and environmental criteria in order to access performance of an enterprise based on its social responsibility). Please introduce the company's activities in this regard.**

**LANXESS** Lanxess is running business based on the principle of Good for Business & Good for Society. Therefore, we believe that there should be proper balance among financial, environmental, and social achievements.

Lanxess aims to meet environmental and safety standards in every part of the world, which is necessary for us to become a truly sustainable company. We have established

*"We must minimize the impact of industries on the environment, which is an unavoidable task."*

global management systems to satisfy even the latest international standards. Everywhere in the world we follow the HSEQ (Health, Safety, Environmental and Quality) policy and commission international certification agencies to assess whether or not our integrated management systems comply with SO 9001 and ISO 14001.

Furthermore, we've planned to reduce this year's energy consumption and carbon emissions by 10% compared to 2010 and VOCs by 30%. As to social responsibility, Lanxess Korea will encourage female managers to comprise 20% of the management by 2020. And we will continue to promote resource efficiency and environmentally-friendly solutions for sustainable management.

**Q. Multinational chemical companies have organized TfS (Together for Substantiality) for sustainable management. Would you please tell us the initiative's objectives and activities?**

**LANXESS** Increasing outsourcing and complicated supply market is giving rise to tangible and intangible loss or damage, mainly caused by the lack of social reasonability on the part of suppliers. It's increasingly difficult for companies to manage suppliers due to limitations of labor,



resources, and time. In order to deal with this problem, Lanxess and other companies in the same industry such as Basf, Bayer, and Henkel, organized the TfS initiative, which allows the members to jointly assess and audit supplies and share the results. We expect that this effort can improve efficiency of supplier management.

**Q. Would you please introduce Lanxess' RC (Res-ponsible Care) activities?**

**LANXESS** Lanxess views Responsible Care (or RC) as one of the most important elements for the company's future and has provided full support to the activity since 2006. Lanxess is one of the companies that have signed the RC Global Charter adopted by the International Council of Chemical Associations (or ICCA). The chemical industry must minimize its impact on the environment. We have developed production processes that can reduce pollution/waste and that use resources in the most efficient way. Our renewable energy project aims at optimized energy consumption as well.

Lanxess pursues environmentally-friendliness and sustainability through development of materials as well.

Our synthetic rubber such as neodymium polybutadien rubber (Nd-BR) and solution styrene butadien rubber (SSBR) are used as key materials for environmentally-friendly and high-performance tires which reduce carbon emissions and fuel consumption by lowering rotational resistance.

Engineering plastics used for lightweight automobiles are favored by manufacturers of environmentally-friendly cars. We have introduced CO2 Monitoring Dashboard since 2012 in order to allow environmental efficiency, timeliness, and proper prices to be considered when selecting and operating means of transportation. In addition, the Porto Feliz factory in Brazil, which in charge of inorganic pigments, has realized 100% carbon neutral production through the cogeneration system

run by sugar cane fuel. Our Krefeld factory in Germany uses oxidized compounds, obtained from precipitation of process water, as high quality black pigment, which helps to reduce waste, increase production, and treat even refined water.

**Q. Lanxess is supporting the Fun Chemistry Class and donating Lanxess science experiment kits to promote education. Would you tell us more about the activity?**

**LANXESS** Lanxess provides educational support in order to arouse children's interest in science and to develop talented human resources in the chemical industry.

Lanxess Korea is promoting social contribution activities as well, especially centered on education for local communities. Our science education project is one of the examples. We have donated science experiment kits to schools in areas where the company's operations are located. We have developed the experiment kits jointly with the chemistry education department at Dortmund University of Technology, and 1,000 sets, which are worth about 360,000 euro, have been donated to schools in Germany, UK, Canada, and Japan.

Lanxess Korea, as a member of the Korea Responsible Care Council, has constantly supported the Fun Chemistry Class since 2008 and donated 12 sets of the experiment kits to schools and the association of science teachers. Our employees regularly participate in volunteer services as well.

**Q. Would you tell us about the company's safety control system and training program?**

**LANXESS** Lanxess has implemented 'Xact Global Safety Program' since 2011 and is operating a team dedicated to HSEQ (Health, Safety, Environmental, Quality). The team is in charge of environmental/chemical safety/

risks assessment and compliance with laws/regulations for the safety of products and factory. Although Lanxess Korea doesn't have a production facility, we implement a safety training program every year for our employees in order to prevent accidents and protect their health. After collecting feedback from the employees, the company has provided safety programs, which deal with disasters such as a typhoon, fire, and earthquake as well as safe driving and CPR. In particular, the employees participated in the 'Pledge of the Xact Safety Guidelines Compliance' last year in order to raise their awareness about safety.

**Q. Would you please tell us the desirable future objective of the chemical industry and that of Lanxess Korea?**

**LANXESS** When it comes to the advanced industry, we think of digital or IT industry. However, most of their processes require chemistry. Actually, chemistry is affecting almost every part of our life.

Chemistry is a fundamental industry on which the modern society is based, and it contributes to development of mankind's life through high-tech materials and convergence technologies for renewable energy. Hence, the chemical industry shall continue to improve people's life. This is what Lanxess is pursuing and one of the core values promoted by the company. Lanxess will endeavor to develop environmentally-friendly value-added products to save energy and preserve the environment, putting first safety and environmental efficiency as a responsible enterprise. 🌱



Safety Culture of Solvay Korea, One of the Leading Global Enterprises

## “NO PAIN, NO GAIN!”

**Hyeon-cheol Bak**  
HSEQ Director, Solvay Korea



### 1. Introduction

Charles Perrow, the author of Normal Accidents, says that we're living with high-risk technologies, emphasizing the fact that high risks are present in our society.

Unlike other industrial disasters, a leakage, fire, or explosion of chemicals such as a flammable or toxic substance can seriously impact on the environment and ecosystem as well as workers and residents of the affected area. Therefore, Korea has made diversified efforts to prevent such an incident. In particular, a factory that handles a large amount of chemical substances has introduced Responsible Care (or RC) programs, increased the efforts to comply with the Occupation Safety and Health Acts, and extended PSM (process safety management) system so as to prevent serious industrial accidents.

Nevertheless, a series of industrial accidents have occurred in Korea, including an 'environmental incident' such as the leakage of hydrogen fluoride in September 2012, 'safety incident' such as the tragic sinking of Sewol Ferry in April 2014, and 'health incident' caused by MERS (Middle East Respiratory Syndrome) recently, and these incidents have raised public concerns about safety, health, and environment. At this point, it is urgent to establish a 'culture of safety' through cooperation between safety experts and technicians, active leadership of the management with guidance provided by responsible supervisors, and voluntary participation from workers.

I majored in chemistry at university and learned valuable lessons while I was working at chemical factories of mid-sized, large, and foreign companies over the past 34 years. Particularly, I'm quite proud of the HSE success story achieved with patience and enthusiasm when I served as the head of the HSEPT (Health, Safety, Environment, and Product Transportation, or 'HSE') department of a

foreign company from the beginning of 2003. In 2008 HSE officers of public agencies and safety-related institutions began to acknowledge that "Solvay Korea has outstanding HSE systems". In 2010, companies in Ulsan began to benchmark Solvay Korea, in 2012 the company was designated as the first mentor for the culture of safety by the Ulsan Office of the Ministry of Employment and Labor, and in July 2014 I received a presidential citation on the Day of Occupational Safety & Health. For many years I did my best to share Solvay Korea's safety culture with numerous domestic and overseas enterprises that went the extra mile to benchmark us and gave a lecture a dozen times upon request from the Ministry of Employment and Labor. In this article, I'd like to share once again how Solvay Korea has successfully established the safety culture.

### 2. Establishment of Solvay's HSE System

Established in 1863 by Ernest Solvay, a chemist, Solvay Group is running 119 operations and 15 research institutes in 52 countries with SCMS (Solvay Care Management System), a top quality HSE management system. SCMS is the company's tailored HSE system, developed in 1991 according to international QHSE standards such as ISO9001, ISO/TS16949, ISO14001, and OSHAS18001 as well as the results of in-depth analysis of the chemical company's requirements for operation. In addition, the group's HSE department, comprised of HSE experts, continues to improve SCMS and the group's HSE procedures with the purpose of efficient and effective control of relevant risks.

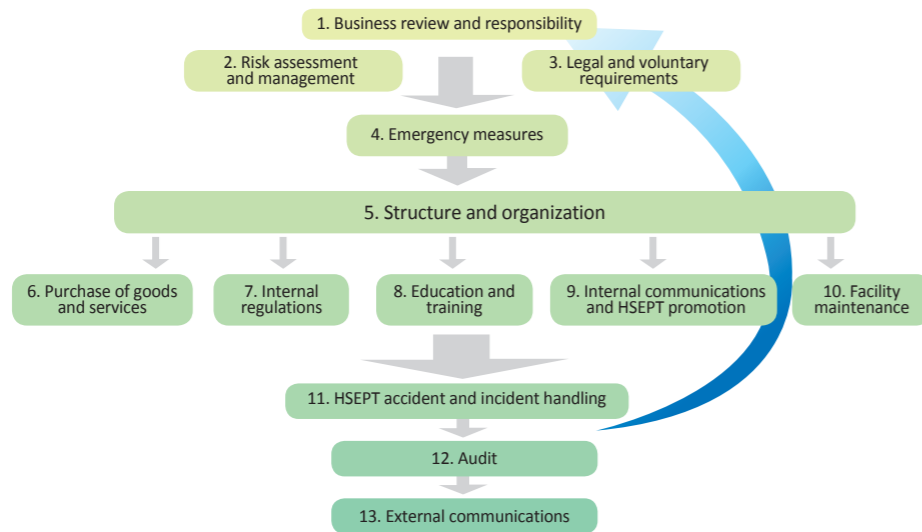
Solvay Korea was Hanbool Chemistry in 1991 with 50% capital investment from Oriental Chemical Industries Group and the other 50% from Rhone-Poulenc in France but now the company is funded 100% by Solvay Group in Belgium. Solvay Korea is manufacturing adipic acid, polyamide 6.6, engineering plastics, and so forth, recording annual sales of KRW 600 billion.

The HSE standards of Solvay Korea are higher than those of other similar enterprises in Korea and even within the Solvay Group. The group has introduced SCMS to all of its operations in the world, evaluates HSE performance of each site every three years, and shares the results through the Intranet. Solvay Korea obtained 96.1 points out of 100 points when the group conducted an audit in December 2013 and was ranked in first place within the group. As to the category of human injury, one of the safety-related lagging indicators, the company has recorded zero accident from July 3 until now, including the company's employees, subcontractors and their employees, and visitors.

I entered the company in 2003 and that year alone the site had three industrial accidents. However, the site's number of serious accidents dramatically dropped after 5-year operation of the HSE system along with risk assessment and development of safety programs. Furthermore, Solvay Korea has been known to operate exemplary HSE systems, especially driven by the leadership of the CEO, which allows the culture of safety to be established within the organization more effectively.



[Figure 1] Structure and Elements of the Solvay HSE System



Solvay Korea's HSE system (refer to Figure1) consists of 13 elements and 115 requirements. The 13 elements are managed by the president, factory managers, and department heads according to their functions with their team members. Management of the elements is inspected internally and improved based on the results. For the internal audit, the head of the HSE department has served as a head auditor since 2005, and two of head supervisors working in the field are selected every three years for a quarterly SCMS internal audit. That is, each business unit implements HSE in a voluntary manner, the HSE team collects HSE-related information such as revised laws or regulations to communicate the data to relevant business units, and the internal audit monitors their compliance for further improvement. In case of installing a new facility or changing existing facility, risks are identified and evaluated in advance by the HSE risk assessment method. If a high risk is identified, corrective measure is taken in order to eliminate or reduce the risk down to the acceptable level. The risk assessment methods used by the company include CTA (Critical Task Analysis) and CTES (Critical Task Exposure Screening) for human safety and health, SRD (Safety Review on Diagram) and PHR (Process Hazard Review) for process safety, EAA (Environmental Aspects Analysis) and EIA (Environmental Impact Analysis) for the environment, RASP (Risk Assessment on Product) for product safety, and QTA (Quantitative Transport risk Analysis) for transportation safety. Furthermore, 'ESTOP' tool is used to reduce risks down to the acceptable level, applying Elimination, Substitution, Technical Measures, Organizational Measures, and PPE & Training in the order named.

### 3. Achievement of Safety Culture by the HSE Leadership

In June 2005 the new site general manager provided an opportunity to experience the importance of leadership in establishing safety culture. At that time I was serving as the head of the HSE team

and experiencing much difficulty due to lack of support and cooperation from factory managers and business unit managers regarding implementation of SCMS. But the new leader changed their thinking and behaviors by exercising strong leadership, emphasizing safety at meetings and also the importance of HSE in the site's operation.

The HSE leadership was demonstrated as follows.

- 1) The site's vision was established through a workshop attended by both managers and employees and made known to every business unit. At that time, safety was set as the site's top priority, HSE policies and objectives were shared, and all of us were reminded that Safety First must be accompanied by Compliance with Regulations.
- 2) HSE performance was announced first when the group's president or other executives visited the site, HSE review meeting was held monthly and annually, and priority was given to investment in the HSE sector.
- 3) The leader was in charge of SCMS operation and management of two elements (1. Business Review & Responsibility and 5. Structure & Organization) for continuous improvement. Operational status and results were audited internally once per quarter and externally four times per year in order to identify areas of improvement.
- 4) As SCMS accounts for 70% of the Solvay Way, which is part of Corporate Social Responsibility (CSR), the leader evaluated the Solvay Way once per quarter to show the leadership emphasizing safety.
- 5) The leader selected a specific process to perform MSV (safety visit) twice per year with the factory manager and the HSE team leader. In addition, he took the HSE tour of the site to have the HSE interview with the employees every quarter and sent the HSE letter to all managers and employees every quarter so as to remind them of the importance of HSE. Also, he took charge of one item from the Annual HSE Improvement Plan to make improvement.
- 6) When group executives, who visited the site about five times per quarter, conducted LSV (Leadership Safety Visit) at the site, the leader accompanied them and took the initiative to make necessary changes.

As we've reviewed, effective implementation of HSE must be accompanied by HSE leadership and initiative on the part of both managers and employees. Supervisors and HSE team members shall visit employees to provide guidance and employees should comply with internal regulations, identifying unsafe behaviors or risks for improvement. The site general manager demonstrated the fact that safety is achieved by action not by word.

#### 1) HSE Programs

While I was observing the serious attitudes of the foreign managers in the Solvay Group toward HSE, I could experience the safety culture and way of thinking different from ours. Whenever they visited the site, they asked us to present the HSE status and plans, which allowed me to study HSE systems,

risk assessment methods, programs, best practices, and so forth, laying the foundation for my new career as an HSE expert.

From 2003 I began to implement the HSE programs, required by the HSE system manual, through development of procedures, training, and internal audit. When I first studied the HSE system (SIMSER+ in the past), it wasn't easy to figure out the purpose of each requirement provided in the English manual but, now, I can fully understand meanings of every line. At present, the site's written HSE procedure includes one HSE manual, 11 regulations, 45 procedures, 42 guidelines, and 208 forms. Solvay Korea developed and implemented about 20 HSE programs until it could achieve zero accident in 2008. Some of the programs are MSV (manager safety visit, twice per month), NCR (non-conformance report, twice per month), HSE tour (tour by the management, four times per year), hierarchical HSE meeting (once per month by the site, business units, and the shift), HSE performance evaluation (once per year by office workers, once per half year by blue-collar workers, and once per year by subcontractors), internal audit (SIMSER+, once per quarter), risk assessment and management (HSEPT, 1 round per five years), daily plan review (GPI, once per month by business units and the shift), evaluation of subcontractors (once per two years), LTT (100%, energy management), BBS (once per week by business units), safety interview with employees (once per week by supervisors), and so forth. From 2010 our ability to implement HSE increased and thus could analyze HSE issues of other operations to develop customized systems based on SCMS requirements. Targeting subcontractors, who account for 70% of human injuries and 90% of fatal accidents in Korea, we have developed safety work plans, performed safety interviews, and provided HSE training with an audit so as to prevent industrial accidents.

### 2) How to Resolve Conflicts

When new systems, method, or programs are introduced, employees tend to reject changes at first. But such a conflict can be resolved by the initiative taken by leaders through patience and active communications with the labor union, employees, and their families. Any conflict or dispute among the HSE team, production and maintenance business units was coordinated by putting safety first. Rewards and compliments, rather than discipline, were used in order to encourage employees to accept the new changes. Now, the labor union and employees take pride in the company's HSE system and participate in the activities of their own accord.

### 3) Introduction of Incentives

While I interacted with colleagues from France, I found that many of them were engineers but still had completed the master's or doctor's course in management or business and this motivated me to enter a business school in 2010 and obtain the doctor's degree in business consulting in February 2015. Now I'm preparing a thesis for a doctorate on safety & health management.

At the business school I've learned that people's behaviors are significantly affected by a given environment or attitudes of mind unlike machines. I believe that an incentive compensation system is essential to protect employees from morale hazard and managers from adverse selection, especially

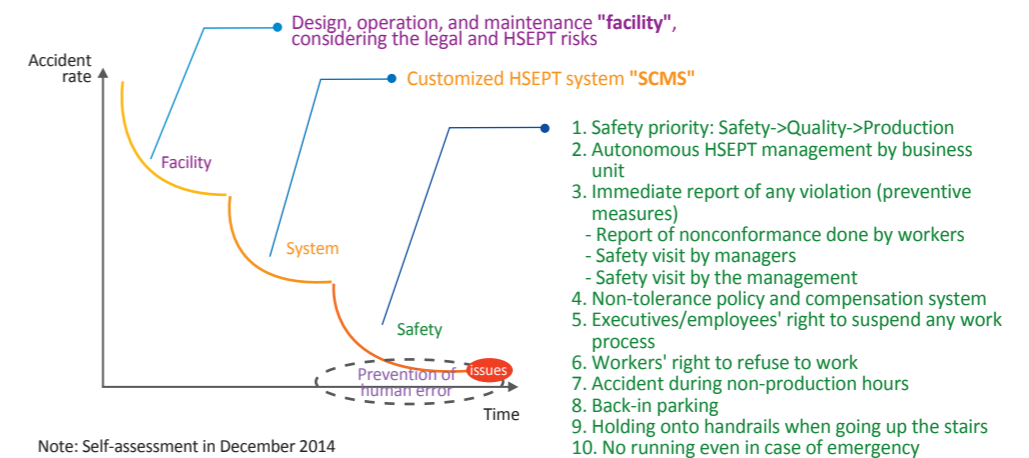
for those whose job is repetitive. Applying this finding to the HSE sector, I've developed the HSE assessment standards targeting both managers and employees. The standards were developed based on HSE leading indicators and complemented by lagging indicators.

The assessment is conducted once per year for office workers including the president and engineers, twice per year for blue-collar workers including a team leader and operators, and once per year for residing subcontractors in connection with the incentive compensation system. Individual HSE performance is reflected in the compensation system through objective assessment and strict target management.

### 4) Solvay Korea's Safety Culture

Looking back on the past, zero accident at the site could be achieved only by the remarkable leadership and active participation by the employees. As shown in Figure 2 and Figure 3, the employees developed high safety consciousness and participated in the activities for preventing human error.

[Figure 2] Solvay Korea's Safety Culture



However, any failure to perform the activities in the leading indicators, which serve as barriers, can lead to a serious accident. If we create the bird pyramid<sup>1)</sup> for minor accidents, close calls, incidents,

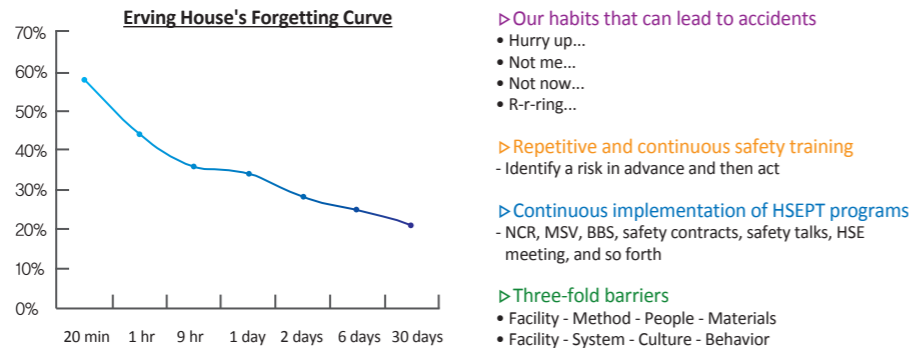
1) The theory developed by Bird Jr in order to improve Heinrich's theory. He has analyzed the figures about accidents and incidents and found that the ratio of serious accident: minor accident: property loss: close call is 1 : 10 : 30 : 600.



and unsafe behaviors which take place at the site by the employees of Solvay Korea and residing subcontractors, the result shows that it verifies Heinrich's ratio of 1 : 10 : 30 : 600. We have identified and eliminated the potential and existing risks at the base of the bird pyramid so as to prevent serious industrial disasters.



[Figure 3] Prevention of Human Error



#### 4. Accomplishment of the HSE System and Safety Culture

As of June 9, 2015, Solvay Korea is maintaining the best HSE results as follows.

- ① Number of accident-free days: 2,530 days (including subcontractors and visitors)
- ② Process Safety Management (PSM): Class P (2003~), four consecutive years
- ③ Fire safety: Class 1 (2010~)
- ④ Mutual cooperation program: Class A (2010~)
- ⑤ Emergency response: Class A (2004~)
- ⑥ Environmentally-friendly enterprise (2008~)
- ⑦ HSEPT system ranked in first place within the Solvay Group (SCMS, 96.1%, December 2013)
- ⑧ CSR activity ranked in first place within the Solvay Group (Solvay Way, 73.0%, 2014)
- ⑨ Integrated management system certified first within the Solvay Group (DNV: ISO9001, ISO14001, OSHAS18001, and TS/ISO16949, November 2014)
- ⑩ Mentor for safety & health management first designated by the Ministry of Employment and Labor (August 2012)

These achievements are attributed to the safety activities voluntarily carried out by residing and temporary subcontractors as well as Solvay Korea's management and employees.

#### 5. Conclusion

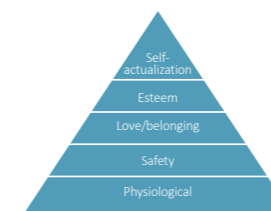
According to Maslow's hierarchy of needs, our physiological needs at the bottom have been met and thus safety needs in the second stage are being tested through various processes. That is, 'safety' will come to the fore along with 'jobs' in our society. At this point, presidents, factory managers, and executives of each site shall demonstrate effective leadership by action, which can motivate their employees to change the way of thinking, behaviors, and habits and to establish safety culture. Increased safety will result in improved costs, quality, productivity, labor-management relation, and corporate image.

Safety and innovation can't be achieved without knowledge, which explains why training is important. A company should provide at least 2-hour HSE training every month, accompanied by evaluation and feedback collection. Solvay Korea helps its employees to understand why HSE is a must and how to implement the system through Solvay Onsan University, multi-skill training for blue-collar workers, and outside lecturers. The company also grants executives/employees the right to suspend a work process and blue-collar workers the right to refuse to work.

There is no company that can implement perfect HSE systems. As shown in the Swiss Cheese Model of Accident Causation, even a minor unsafe behavior can lead to a major accident when it occurs along with failure of a safety device, system, or activity. That's why we need to keep looking for potential and existing risks around us for continuous improvement. In particular, the chemical industry where we engage is prone to safety and environmental problems due to the nature of relevant processes and thus we need to ensure more strict management of materials and processes in order to prevent serious accidents, protecting safety/health of workers and residents and contributing to creating a pleasant environment as part of CSR. 🌱



2) Maslow presented five stages of human needs, which are physiological, safety, love/belonging, esteem, and self-actualization needs, in order to explain human motivation. The hierarchy includes the concept of prepotency: lower needs must be met before higher needs would appear.



[Maslow's hierarchy of needs]

3) The Swiss cheese model of accident causation, developed by James Reason, social psychologist in UK, illustrates that there are flaws in each layer of defense such as the holes of Swiss cheese and if the flaws are aligned, they can allow accidents to occur.



# DEVELOPMENT OF PROCESS SAFETY METRIC



The Responsible Care® initiative began in 1985 and as the chemical industry's commitment to continuous performance improvements. Process Safety has been a pillar of Responsible Care since its inception, and many regional approaches to tracking and reporting process safety performance have developed over the 30 years of Responsible Care implementation, yet no globally harmonized system had been put into place. In 2012, in the wake of several high profile process safety events, the International Council of Chemical Associations (ICCA) Board of Directors directed the Responsible Care Leadership Group (RCLG) to develop a recommendation for a globally harmonized process safety performance reporting by no later than 2015. Throughout 2013 and 2014, a Taskforce comprised of multinational companies and RCLG associations, chaired by Dr. Peter Schmelzer, Head of Health, Safety and Environmental Protection Bayer HealthCare AG, worked to develop a globally harmonized ICCA approach to process safety performance reporting. A list of Taskforce members can be found in Appendix A. During the same timeframe, the American Petroleum Institute (API) also initiated a process to update its Recommend Practice 754 (RP-754) – Leading and Lagging Process Safety Metric Standard. RP-754 is broadly used in the petrochemical sector and in the Americas region to track process safety performance. To optimize global adoption of a unified standard, the RCLG Taskforce strived to achieve full harmonization of its recommendation with the revised API RP 754 metric, expected to be finalized in mid-2015.

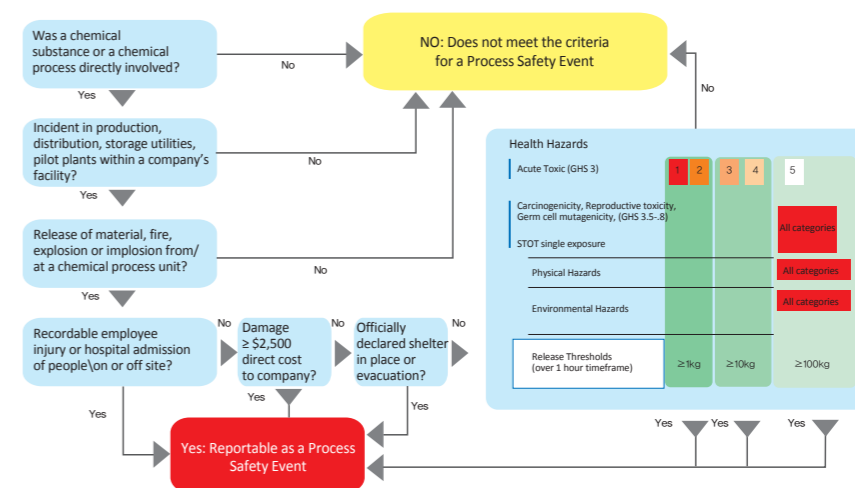
## Executive Summary

After more than 2 years of discussion, research, debate and feasibility assessment, the Process Safety Harmonization Taskforce recommends that ICCA adopt a process safety event rate metric. The adoption of this metric would require each RCLG association to collect the number of process safety events experienced by their members on an annual basis, as well as total number of worker hours (employees and contractors) experienced by their members each year. The process safety event rate is the ratio of events to hours. The Taskforce also recommends that reporting of these data points to the RCLG be phased in over the next 5 years, allowing regions with the desire and ability to report immediately to do so, while also allowing additional time to companies and organizations that are developing the ability to track these data for the first time.

The criteria that determine whether a process-related event qualifies as a process safety event are based on a loss of primary containment of a chemical or a release of energy triggering thresholds any one of four impact areas

- 1) safety/human health consequences
- 2) direct cost due to damage from incident
- 3) community impact
- 4) chemical release quantity.

Appendix B – Overview of ICCA Process Safety Event Criteria as a Flow Chart



See Appendix B flow chart showing reporting triggers. These four impact areas in the recommended ICCA process safety event definition are identical to the impact areas in the RP-754 Tier II incident standard. The thresholds for reporting are also identical in all areas with the exception of the chemical release quantity thresholds. To address this difference, the ICCA process safety event definition allows use of either GHS-based reporting thresholds developed by ICCA for the chemical release criteria, or the UN Dangerous Goods (UNDG)-based reporting thresholds used in the RP-754 standard for Tier II incidents. The Taskforce believes that the two systems, though different, are comparably robust in the universe of chemicals covered and the severity of incidents captured by reporting. While there will

be relatively little difference in the numbers of events captured and reported using the two different threshold approaches, there may be differences that would be most clearly seen at the company level based on raw material and product use; hence the Taskforce cautions companies not to compare their results with companies that use a different chemical release threshold approach. If associations are interested in translating results based on one reporting approach to another, the RCLG will provide a translation table. However, given the complexity of this exercise and the need to access raw incident data, the Taskforce does not believe that this adds value and recommends against it.

The Taskforce believes that this proposal for process safety event reporting will enable broad-based global reporting of process safety performance across the chemical and petrochemical industries. It will provide a roadmap for regions, associations and companies that are currently not tracking process safety performance recognize the benefits that tracking and reporting will bring. For regions, associations and companies that are already experienced in gathering process safety data, this recommendation allows for broader global alignment and focus on continuous improvement in process safety performance.

The systems that are built to improve process safety performance are informed by robust process safety event data, and this is the major objective of this initiative.

**Data to be reported by RCLG Associations to RCLG**

On an annual basis, RCLG Associations will be asked to report two data points into ICCA using the RCLG KPI Reporting Website on the schedule provided above.

- Total Member Company Worker Hours for Association (employee and contractor)
- Total Number of Process Safety Events

ICCA will use the above two data points to report process safety performance in the form of Process Safety Event Rate (PSER), normalized per 100 employees where an employee works 2,000 hours a year.

$$(Total\ Events / Total\ Hours) \times 200,000 = PSER$$

**Appendix C - Key Criteria for Reporting Process Safety Events to RCLG**

**Total Worker Hours**

RCLG Associations should report the total number of employee hours worked for each member company in that association and the total number of contractor, including subcontractor, hours worked for each member company as a combined, single number. For the purposes of this guidance document, each association should refer to their local and regional definitions for employee and contractor. The goal for reporting total hours is to include all individuals who are involved with chemical manufacturing.

**Process Safety Event**

For the purposes of this ICCA Reporting, a process safety event has occurred when

- A. When a chemical substance or a chemical process is directly involved
- B. The incident occurred in production, distribution, storage, utility, pilot plant within the site boundaries of company’s facility
- C. There was a release of material or energy (e.g. fire, explosion, implosion) from a process unit
- D. One or more of the following Reporting Thresholds have been met



**1. Safety / Injury**

- Injury resulting in a Recordable, Lost Time Accident or Fatality or Hospital admission of anyone on or off site

**2. Direct Damage Costs**

- A fire, explosion or clean up necessary to avoid/remediate environmental damage resulting in a direct cost equal to or greater than \$2,500 USDs.

**3. Shelter in Place / Evacuation**

- An officially declared shelter in place (on or off site)/An officially declared evacuation (on or off site)

**4. Threshold Release**

- The material released meets one of the GHS thresholds in Table 1. (measured in amount released during one hour)

- As an alternative, associations could also use the release thresholds contained in the API RP-754 standard

**Table 1 – GHS Classification System**

	1	2	3	4	5
<b>Health Hazards</b>					
Acute Toxic (GHS 3)	1	2	3	4	5
Carcinogenicity, Reproductive toxicity, Germ cell mutagenicity, (GHS 3.5-8)					All categories
STOT single exposure					All categories
<b>Physical Hazards</b>					All categories
<b>Environmental Hazards</b>					All categories
<b>Release Thresholds (over 1 hour timeframe)</b>	≥1kg	≥10kg	≥100kg		

**Detailed Guidelines on Identifying a Process Safety Event**

**A. Chemical Involvement**

When a chemical substance or chemical process is directly involved  
 A chemical or chemical process must have been directly involved in the event or incident. For this purpose, the term "process" is used broadly to include the equipment and technology needed for petrochemical production, including reactors, tanks, piping, boilers, cooling towers, refrigeration systems, etc. An incident with no direct chemical or process involvement, e.g., an office building fire, even if the office building is on a plant site, is not reportable.

**B. Location**

The incident occurred in production, distribution, storage, utility, pilot plant within the site boundaries of company’s facility.

The incident occurs in production, distribution, storage (including passive storage areas), utilities or pilot plants of a facility reporting metrics under these definitions. This includes tank farms, ancillary

support areas (e.g., boiler houses and waste water treatment plants) and distribution piping under control of the site. All reportable incidents occurring at a location will be reported by the company that is responsible for operating that location. This applies to incidents that may occur in contractor work areas as well as other incidents. At tolling operations and multi-party sites, the company that operates the unit where the incident initiated should record the incident and count it in their reporting.

### C. Release of Material

There was a release of material or energy (e.g. fire, explosion, implosion) from a process unit

Release of Material – an unplanned or uncontrolled release of any material, including non-toxic and non-flammable materials (e.g. steam, hot water, nitrogen, compressed CO<sub>2</sub> or compressed air), from a process that results in consequences that exceed one or more of the 4 Reporting Thresholds listed in this document.

A release to a flare or scrubber is still considered to be within the primary containment as long as the mitigation system (e.g. scrubber, flare) is operated under normal conditions without any release above the thresholds defined for normal operation. A release to a secondary containment (e.g. waste water treatment or dike) will qualify as a process safety event because the substance is leaving the primary process system.

### D. One or more of the following Reporting Thresholds must be met for reportable process safety events.

#### 1. Safety / Injury

Injury resulting in a Recordable, Lost Time Accident or Fatality; or Hospital admission of anyone on or off site.

Lost time injuries and fatalities that occur as a result of process related loss of primary containment, fire, or explosion are those that fit into one of the following categories

- Employee (Lost time and/or Fatality)
- Contractor and Subcontractor (Lost time and/or Fatality)
- Third Party (Injury/illness resulting in Hospital Admission or Fatality)

**Hospital Admission** – formal acceptance by a hospital or other inpatient health care facility of a patient who is to be provided with room, board, and medical service in an area of the hospital or facility where patients generally reside at least overnight. Treatment in the hospital emergency room or an overnight stay in the emergency room would not by itself qualify as a “hospital admission.”

Examples of injury or fatality cases that would be reportable include a burn injury resulting from steam released during cleaning; a physical injury from a cap blown off by pressure during a pressure test; or a chemical burn from a spill while taking a sample. Examples of injuries or fatality cases that would not be reportable include a fall from an elevated work station while performing maintenance; a burn from a fire in a laboratory or office building; or injuries from an excavation cave-in. None of these cases are

directly due to the release of energy or material from the process.

#### 2. Direct Damage Cost

A fire, explosion or clean up necessary to avoid/remediate environmental damage resulting in a direct cost equal to or greater than \$2,500 USDs

Costs to be considered for this threshold should be those costs directly attributed to the fire and/or explosion, such as the replacement value of equipment lost, structures lost, cost of repairs, environmental cleanup, emergency response and/or fines. Direct cost does not include indirect costs, such as business opportunity losses, loss of profits due to equipment outages, cost of obtaining or operating temporary facilities or cost of obtaining replacement products to meet customer demand.

#### 3. Shelter in Place / Evacuation

An officially declared shelter in place or an officially declared evacuation either on or off site. For the purposes of this reporting, only an officially declared shelter in place or evacuation, on or off site, is to be considered for this criteria. Precautionary decisions and announcements are not to be counted towards this trigger.

**Officially Declared** – A declaration by a recognized community official (e.g. fire, police, civil defense, emergency management) or delegate (e.g. Company official) authorized to order the community action (e.g. shelter-in-place, evacuation).

**Shelter in Place** – is the use of a structure and its indoor atmosphere to temporarily separate individuals from a hazardous outdoor atmosphere

**Evacuation** – the act or process of removing persons from a place for reasons of safety or protection


#### 4. Threshold Release

An acute release that exceeds one of the GHS thresholds in Table 1 or in the API 754 standard for Tier II process safety release thresholds (measured in amount released during one hour)

As mentioned in the Executive Summary, the ICCA process safety event definition allows use of either GHS-based reporting thresholds developed by ICCA for the chemical release criteria, or the UN Dangerous Goods (UNDG)-based reporting thresholds used in the RP-754 standard for Tier II incidents. The GHS thresholds are listed in Table 1.

**Acute Release** – A release of flammable, combustible, or toxic chemicals from the primary containment (i.e., vessel or pipe) greater than the chemical release threshold quantities is described in Table 1 and in the API 754 standard for Tier II process safety release thresholds. These releases include releases to a properly designed and operating pressure relief device if a quantity is released greater than or equal to the threshold quantities in Table 1, or and in the API 754 standard for Tier II process safety release thresholds, that results in one or more of the following three consequences

- Liquid carryover
- Discharge to a potentially unsafe location
- An on or off site shelter-in-place or evacuation.

Releases to a properly designed and operating pressure relief device (such as a flare, scrubber, etc.) do not have to be reported if they do not meet one of the three criteria above. 



# MEMBERS FOCUS



## Lotte MRC **LOTTE MRC**

### Daesan MMA Changed to Lotte MRC

Daesan MMA has changed its name to Lotte MRC in December 2014.

Daesan MMA was established in August 2006 with 50% investment from Honam Petrochemical Corporation (Now, Lotte Chemical Corporation) and the other 50% from Mitsubishi Rayon in Japan. The company supplies MMA (Methacrylate), manufactured through environmentally-friendly processes, and PMMA (Polymethyl Methacrylate),

which has outstanding optical characters, used for various industries including IT and automobile industries.

Meanwhile, Lotte MRC has established the target sales of KRW 1 trillion by 2018 under the slogan of 'Good Partner for Better Future' and committed to carrying out its social responsibilities in order to become a leading company in the global market.



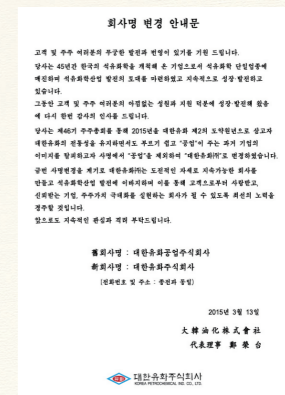
## Korea Petrochemical **대한유화주식회사** KOREA PETROCHEMICAL IND. CO., LTD.

### Changing the Name from Korea Petrochemical Industry to Korea Petrochemical

Korea Petrochemical Industry Co., Ltd. has changed its name Korea Petrochemical Co., Ltd. The new name of the company, Korea Petrochemical Co., Ltd, was approved by the 46th general meeting of stockholders held on March 13 by revising the articles of association.

"We wanted to grow out of the company's old image, conveyed by the word 'industry', while maintaining our tradition so as to take another major leap in 2015. And the new name is much easier to remember," explained one officer of the company.

"We have focused on a single industry for the past 45 years as the first petrochemical company in Korea, laying the foundation for development of the industry in this country. The new name will motivate us to take up a new challenge of becoming a sustainable enterprise and achieving further growth in the future," emphasized the company.



## LG Chem **LG화학**




### Donation of 'Full-Of-Hope Books'

Ochang Factory of LG Chem donated 'Full-Of-Hope Books' to schools and welfare facilities for children.

LG Chem offered the books, worth about KRW 9 million, to Yangcheong Middle School, Seobu Social Welfare Center, and local children's welfare facilities (Hyeneung Orphanage and a local study room) after having a donation ceremony on April 27, 2015. The 'Full-Of-Hope Books' program has been carried out by Ochang Factory, LG Chem, since 2012 in order to provide quality books to children and teenagers in the community with the purpose of assisting them in developing their dreams and hopes and becoming competent members of the society. So far the company



has donated a total of 5,000 books to 19 facilities including schools, children's welfare facilities, and multi-cultural centers. "We want to provide support to children's dream through books, which can be a major source of knowledge and information," said one officer of LG Chem. "We're planning a variety of social contribution activities, especially designed for children and teenagers."

Hanhwa General Chemical Co., Ltd.  한화종합화학  
Hanwha Total Co., Ltd.  Hanwha |  TOTAL

### 'New Name and New Start'

Samsung General Chemical and Samsung Total have changed their names into Hanhwa General Chemical and Hanwha Total after having an extraordinary general meeting of stockholders and board meeting on April 30.

Jin-su Hong, Head of the Management Support department at Samsung General Chemical and Hui-cheol Kim, PMI Team Leader of Petrochemical at Hanhwa Group, were appointed as new representative directors of Hanwha General Chemical. Mr. Hong is in charge of the company's business operation while Mr. Kim will maximize synergy effects and efficiency of Hanhwa General Chemical and Hanwha Total. He will also serve as the new representative director of Hanhwa Total.

Joined by Hanhwa General Chemical and Hanwha Total, the sales of Hanhwa Group in the petrochemical sector will amount to KRW 19 trillion, ranked in first place in the country. Moreover, the group's production of ethylene, basic petrochemical

material, goes up by 2.91 million tons, ranked in 9th place in the world, allowing the company to realize economy of scale and thus improve price competitiveness. The group can diversify its material portfolio as well, including naphtha, condensate, and LPG, which can help the company to compete with other petrochemical companies in US and the Middle East. Hanhwa Group's products were focused on ethylene in the past but the efforts to diversify its product range, including not only polypropylene, paraxylene, and styrene monomer but also energy products such as diesel and jet fuel, makes possible more reliable and stable management of the group. The group has set a target of becoming one of global



top 5 companies in the petrochemical industry as it is already ranked in first place in the domestic market by leveraging the know-how of Hanhwa General Chemical and Hanwha Total.

"It is expected that we can secure greater competitiveness if the synergy effects among the companies of Hanhwa Group can be realized to the full" said Hui-cheol Kim, Representative Director of Hanwha Total. "By actively introducing changes to the organization, we will write a new chapter of the company's history."

## Kumho Petrochemical 금호석유화학


### Donating 20 Customized Wheelchairs

Kumho Petrochemical has donated 20 customized wheelchairs to five welfare facilities in Seoul, Gyeonggi, and Gangwon, including Munhye Disabled Care Center (8 units) in Cheorwon, Gangwon-do, Lydia's House (4 units) in Gapyeong, Gyeonggi-do, Hansarang Village (4 units) in Gwangju, Gyeonggi-do, Hansarang Disabled Child Care Center (2 units), and Woosung Disabled Care Center (2 units) in Seoul.

Executives and employees of Kumho Petrochemical, including Chan-gu Bak, Chairman, and Seong-chaek Kim, President of the company, visited Hansarang Disabled Child Care Center of Child Fund Korea, located in Gwangju-si, on May 19 with Won-je Kim, President of the Seoul Association Welfare Institutions For the Disabled and Jae-sam Yun, Head of Disabled Welfare Policy department of Seoul City to attend the donation ceremony.

The ballet club and choir at the facility presented a surprise performance to show the appreciation for the gifts. Kumho Petrochemical has supported the project with Seoul Association Welfare Institutions For the Disabled for 8 consecutive years. A customized wheelchair is a necessity for a severely disabled person who can't maintain a posture, especially for children in a growth period. However, it is four times more expensive than a regular wheelchair, which can be a heavy burden to the disabled.



Meanwhile, Kumho Petrochemical has carried out other social contribution activities such as the White Cane project for the blind and residential environment improvement project using Hugreen products in order to improve the life of the disabled with advanced chemical products. 



**2015 1st Board of Directors Meeting and 16th Ordinary General Meeting**

The KRCC held 2015 1st Board of Directors Meeting & 16th Ordinary General Meeting on February 7, 2015 (Fri) at Westin Chosun Hotel in the presence of around 50 people including KRCC President Huh Jong-pil, employees of member companies, RC coordinators, and chemical industry practitioners. During the general meeting, business results and reports on closing accounts for 2014 were made, and three items including business and budget plans (draft) for 2015 and matters on executive members were discussed and approved as proposed by the Secretariat.

**2015 2nd Board of Directors Meeting  
Jong-hu Lee (Styrolution Korea) appointed as the new President of KRCC**

The KRCC held 2015 2nd Board of Directors Meeting on April 16, 2015 (Thu) in the presence of KRCC President Jong-pil Huh and 8 members of the board. The meeting was held to discuss appointment of a new president who will replace President Jong-pil Huh (President of Tongsoh Petrochemical Corp.). The board of directors unanimously selected Jong-hu Lee (President of Styrolution Korea) as a new president of KRCC. Mr. Lee's term ends in February 2016.



**2015 3rd Board of Directors Meeting**

The KRCC held 2015 3rd Board of Directors Meeting (sports meeting) on June 13, 2015 (Sat) in the presence of KRCC President Jong-hu Lee and 8 members of the board at Blue Heron CC. At the meeting an appreciation plaque was delivered to the former KRCC President Jong-pil Huh (former President of Tongsoh Petrochemical Corp.).



**1st Implementation Committee in 2015**

KRCC held the 1st Implementation Committee 2015 on April 30, 2014 (Thu) in the presence of ten members including In Bak (LG Chem), Chairperson of the committee. They reviewed the checklist for two of six process safety codes, Transportation Safety and Workers. Future plans for application of the checklist were discussed as well.



**2015 Meeting of Teachers Participating in the 'Open! Fun World of Chemistry'**

KRCC held 2015 Meeting of Teachers Participating in the 'Open! Fun World of Chemistry' on February 26,



# NEWS

## RC Activity



2015 (Thu) near Seoul Station in the presence of ten teachers from Seosan, Yeosu, and Ulsan. The attendees discussed the results of the 2014 events and promotion plans for 2015. The main theme of 2015 was set as 'Chemistry Story in Daily Life', which will be supported by sub-themes related with local communities through experiment programs.

Moreover, the meeting reviewed support to developing countries, visit to chemical factories, RC promotion through chemistry education programs, and so forth.

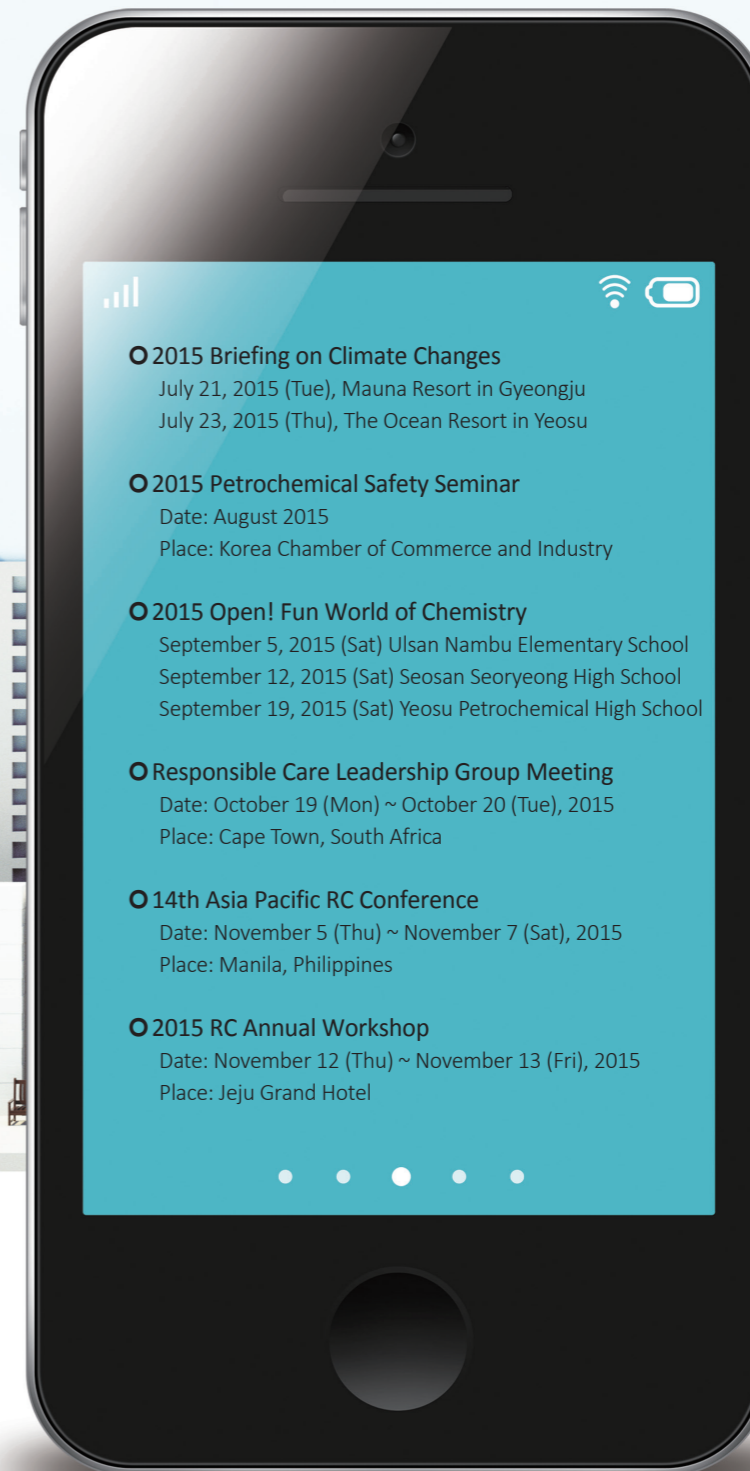
### 2015 Environmental Policy Seminar



The KRCC held a seminar on environmental policy for 2015 (organized by the Korea Petrochemical Industry Association) on May 21 (Thu), 2015 at the Korea Chamber of Commerce & Industry. The seminar was attended by about 50 employees of member companies who are in charge of environment management.

The seminar invited officials from the Ministry of Environment in order to discuss the status and corporate preparation for the "Toxic Chemical Substances Control Act", preparation for application of facility control standards to reduce HAPs fugitive emission, promotion plans on the integrated control of environmental pollution, and promotion plans on "Sub-regulations of the Relief of Environmental Pollution Damages Act". The attendees were given valuable information on the major contents of the laws, future plans, and corporate response measures, followed by a Q&A session. 🌱

## Key Events of the KRCC in the second half of 2015



- **2015 Briefing on Climate Changes**  
 July 21, 2015 (Tue), Mauna Resort in Gyeongju  
 July 23, 2015 (Thu), The Ocean Resort in Yeosu
- **2015 Petrochemical Safety Seminar**  
 Date: August 2015  
 Place: Korea Chamber of Commerce and Industry
- **2015 Open! Fun World of Chemistry**  
 September 5, 2015 (Sat) Ulsan Nambu Elementary School  
 September 12, 2015 (Sat) Seosan Seoryeong High School  
 September 19, 2015 (Sat) Yeosu Petrochemical High School
- **Responsible Care Leadership Group Meeting**  
 Date: October 19 (Mon) ~ October 20 (Tue), 2015  
 Place: Cape Town, South Africa
- **14th Asia Pacific RC Conference**  
 Date: November 5 (Thu) ~ November 7 (Sat), 2015  
 Place: Manila, Philippines
- **2015 RC Annual Workshop**  
 Date: November 12 (Thu) ~ November 13 (Fri), 2015  
 Place: Jeju Grand Hotel



# Members



## Regular Members

Air Liquid Korea  
 AK Petrochemical  
 AkzoNobel PPC Korea  
 ARKEMA  
 ASK Chemicals Korea  
 Axalta Coating Systems Korea  
 BASF Korea  
 Bayer Korea  
 Capro  
 Connell Bros  
 Daelim Industrial  
 Daesung Industrial Gases  
 Dongwoo Fine Chem  
 Dow Chemical Korea  
 Dowcorning Korea  
 Dupont Korea  
 Eastman Fiber Korea  
 Evonik Korea  
 GS Caltex  
 Hanju  
 Hansu  
 Hanhwa Chemical  
 Hanhwa Fine Chemical  
 Hanhwa Global Chemical  
 Hanhwa Total  
 Hyosung  
 ISU chemical  
 Kolon Industries

Korea Alcohol Industrial  
 Korea Petrochemical  
 KPX Chemical  
 KR Copolymer  
 Kumho Mitsui Chemicals  
 Kumho Petrochemical  
 Kumho Polychem  
 Kumho P&B Chem  
 Lanxess Korea  
 LG Chem  
 LG MMA  
 Lotte Chem  
 Lotte MRC  
 Merck  
 OCI  
 Polymirae  
 Samnam Petrochemical  
 Samsung BP Chem  
 Samsung Fine Chemicals  
 Samsung SDI  
 SH Energy Chemicals  
 SKC  
 SK Global Chemical  
 Styrolution Korea  
 Taekwang

Tongsuh Petrochemical  
 TRINSEO KOREA  
 Yeochun NCC  
 Yongsan Chemical

## Associate Members

Korea Chemicals Management Association  
 Korea Chloride Alkali Industry Association  
 Korea Fertilizer Industry Association  
 Korea Petrochemical Industry Association  
 Korea Petroleum Association  
 Korea Specialty Chemical Industry Association  
 Korea Testing & Research Institute  
 Metropolitan Process Safety Council  
 Metropolitan Process Safety Council

## '2015 RC Annual Workshop'

The KRCC invites executives and employees of member companies to the '2015 RC Annual Workshop,' held to encourage networking among those working in the field of environmental safety, promote sustainable development of the chemical industry, and share information on environmental safety and hygiene.



**Date: November 12 (Thu) - 13 (Fri), 2015**

**Place: Jeju Grand Hotel**

**Invitees: Executives and employees of member companies and RC coordinators**

## '14th Asia Pacific RC Conference'



Asia Pacific RC Organization (APRO) invites executives and employees of the member companies in charge of environmental management to the Asia Pacific RC Conference (APRCC) every two years with the purpose of promoting RC in Asia, discussing major issues of the industry, and sharing best practices. This year's APRCC is held in Philippines according to the following schedule. We look forward to your active participation.

**Date: November 4(Wed) - 7 (Sat), 2015**

**Place: Manila, Philippines** (\*Details to be announced soon)

**Invitees: Executives and employees of member companies in charge of environment & safety**