



SUSTAINABILITY REPORT 2013

# MAKING A DIFFERENCE TO OUR WORLD THROUGH GLASS TECHNOLOGY

THE NSG GROUP IS ONE OF THE WORLD'S LARGEST MANUFACTURERS OF GLASS AND GLAZING PRODUCTS FOR THE ARCHITECTURAL, AUTOMOTIVE AND TECHNICAL GLASS SECTORS.

**With around 28,000 permanent employees, we have principal operations in 30 countries and sales in over 130.**

**Just over a third of our sales are in Europe, around a third in Japan and the rest primarily in North and South America, South East Asia and China.**

**Architectural – supplies glass for buildings and solar energy applications.**

**Automotive – serves the original equipment, aftermarket replacement and specialized transport glazing markets.**

**Technical Glass – products include very thin glass for displays, lenses and light guides for printers, and glass fiber, used in battery separators and engine timing belts.**

**Cover picture**

The NoveKino cinema building in Siedlce, Poland features Pilkington **Insulight™** Sun insulating glass units fitted with Pilkington **Suncool™** 66/33, Pilkington **Suncool™** 70/40 and Pilkington **Optilam™** 6,4

Photo: Wojciech Kryński.

## ABOUT THIS REPORT

During 2013, we made further progress in embedding the principles of sustainable development within our company.

As members of the UN Global Compact, we consider its 10 principles to be a natural extension of our Code Of Conduct, which defines our commitment to social and environmental responsibility.

The benefits of our profit improvement and efficiency programs are beginning to be reflected in our results and reduced energy consumption.

Progress towards our sustainability targets is covered in this report and on our website. We report in accordance with the Global Reporting Initiative (GRI) and have self-assessed our reporting level at 'B' for the period covered by this year's Report.

Additional information, charts and tables covering our performance are shown in the Sustainability section of our website, [www.nsg.com/sustainability](http://www.nsg.com/sustainability).

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About us

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Good governance

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Environmental responsibility

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Social responsibility

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Basis of reporting



## ABOUT US

We are an innovative, forward-thinking glass technology company built on a foundation of many years of expertise. Our global team is committed to developing and manufacturing products that meet the needs of current customers, and open up new markets through continuous research, development and innovation.

We are committed to sustainable development. Working safely and ethically, we supply high-quality glass products that make an important contribution to improving living standards, to people's safety and wellbeing and to energy conservation and generation.

Glass manufacture is energy-intensive, but our products make a major contribution to energy conservation and power generation. We are working hard to reduce our waste, to minimize embodied energy and carbon in our manufacturing and to improve the energy-saving capabilities of our products during their life cycle.

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### Architectural

A leader in architectural glazing and solar energy products.

### Automotive

Supplying every major manufacturer in the world.

### Technical Glass

World leader in thin display glass and optical devices.



**Keiji Yoshikawa**  
President and CEO, NSG Group



## BUSINESS SECTORS

WE OPERATE IN THREE BUSINESS SECTORS: ARCHITECTURAL, SUPPLYING GLASS FOR THE WORLD'S BUILDINGS AND FOR SOLAR ENERGY APPLICATIONS; AUTOMOTIVE, PRODUCING GLASS AND GLAZING SYSTEMS FOR VEHICLES WORLDWIDE; AND TECHNICAL GLASS, OPERATING IN THE DISPLAY, OFFICE EQUIPMENT AND GLASS FIBER SECTORS.

### Architectural

A leader in float glass technology and coatings

#### Main products

- Thermal insulation glass
- Fire protection glazing
- Solar control glass
- Glass for solar energy
- Noise control glazing
- Safety and security glazing
- Self-cleaning glass

# 9,100

Employees in 21 countries

### Automotive

Supplying every major vehicle manufacturer in the world

#### Main products

- Solar control glass
- Glazing systems
- Laminated glass
- Toughened glass
- Security glazing
- Lightweight glazing
- Aesthetic glazings

# 14,400

Employees in 16 countries

### Technical Glass

World leader in thin display glass and optical devices for office machinery

#### Main products

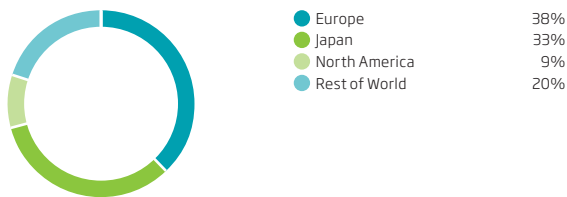
- Thin LCD glass
- Copier/printer lenses
- Glass cord
- Battery separators
- GLASFLAKE
- METASHINE®

# 3,200

Employees in five countries

### Sales by region

Financial year 2013



# 42%

Contribution to Group sales\*  
Proportion of Group CO<sub>2</sub> emissions 62 percent

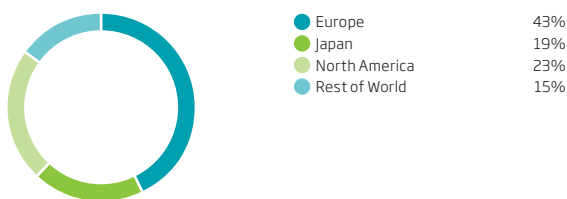
### Making windows better at saving energy

Our thermal insulation products combine unrivalled thermal insulation with high light transmittance and lower reflectance for a more neutral appearance. They help to restrict the amount of heat loss from buildings, offering designers a choice of insulation levels and aesthetic options.



### Sales by region

Financial year 2013



# 47%

Contribution to Group sales\*  
Proportion of Group CO<sub>2</sub> emissions 33 percent

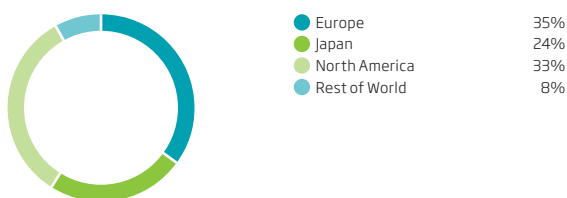
### Developing value-added vehicle glazing

We play a leading role in the development of value-added vehicle glazing, delivering greater functionality to address sustainability issues, such as CO<sub>2</sub> reduction, solar control, lighter and more aerodynamic glazing, vehicle end-of-life issues and recycling.



### Sales by region

Financial year 2013



# 11%

Contribution to Group sales\*  
Proportion of Group CO<sub>2</sub> emissions 5 percent

### Supplying ultra-thin glass for small LCD applications

Our Ultra Fine Flat Glass products are used in the growing touch panel market, particularly in mobile phones and tablets and now expanding into use in vehicles.



\*All figures for financial year ending 31 March 2013.



## PRESIDENT AND CEO'S INTRODUCTION

“The NSG Group is committed to sustainability and continues to support the UN Global Compact’s Initiative and Principles. Our strategy and policies underline the unique contribution our products can make to addressing climate change, and the challenges we face in improving our own energy usage and resource management.”

Our products are designed to make an important contribution to improving living standards, to people’s safety and wellbeing, and to the conservation of energy worldwide.

Despite challenging market conditions and significant organizational restructuring during 2013, we have made continued progress on our sustainability agenda. We aim to balance the needs of all our stakeholders, manage the environmental impact of our activities, develop our people, encourage innovation in processes and products, work in harmony with the communities in which we operate, and encourage our customers, contractors and suppliers to do the same.

We are also committed to improving our own energy usage and resource management. We aim to make a positive environmental contribution to the value chains in which we operate, while benefiting from the international demand for products that help save and generate energy.

**Keiji Yoshikawa**  
President and CEO, NSG Group



# OUR SUSTAINABILITY TARGETS

Targets	Current position and commentary
<p><b>Economic</b></p> <p>We aim to achieve a sustainable operating profit margin in excess of 10 percent.</p>	<p>As at March 2013, the Group's operating profit margin (before amortization arising on the acquisition of Pilkington) was 1.7 percent.</p>
<p><b>Energy</b></p> <p>Report specific direct energy usage for eight key products, across all three business lines, and demonstrate improvement by 2015.</p> <p>Work in this area is the subject of a number of R&amp;D programs in all three business lines.</p>	<p>The eight key products selected are as follows:</p> <p><b>Architectural</b></p> <ul style="list-style-type: none"> <li>• Clear float glass</li> <li>• On-line CVD coated Solar TEC glass for the thin film PV market</li> <li>• Off-line coated Low-E glass for the construction market</li> </ul> <p><b>Automotive</b></p> <ul style="list-style-type: none"> <li>• Solar green absorbing glass side glazing</li> <li>• IR reflective glass laminated windshield</li> <li>• Galaxsee privacy glass rear sidelight</li> </ul> <p><b>Technical Glass</b></p> <ul style="list-style-type: none"> <li>• NSG Glasscord® used in engine timing belts</li> <li>• NSG Selfoc Lens Array for use in office machinery</li> </ul> <p>Data for the selected products is available in the Sustainability section of <a href="http://www.nsg.com">www.nsg.com</a>.</p>
<p><b>Product development</b></p> <p>Report energy payback/life cycle analysis for eight key products, across all three business lines, and demonstrate improvement by 2015.</p> <p>Good progress made with a number of R&amp;D programs ongoing. A forward look at future/modified products and their impact on improved CO<sub>2</sub> payback has been initiated.</p>	<p>The eight key products selected are as follows:</p> <p><b>Architectural</b></p> <ul style="list-style-type: none"> <li>• A thin film PV module</li> <li>• A double-glazed unit containing our off-line coated low-e product</li> <li>• A double-glazed unit containing our off-line coated Solar Control product</li> </ul> <p><b>Automotive</b></p> <ul style="list-style-type: none"> <li>• Car windshield</li> <li>• Car sidelight</li> <li>• Car roof light</li> </ul> <p><b>Technical Glass</b></p> <ul style="list-style-type: none"> <li>• NSG Glasscord® for use in engine timing belts</li> <li>• NSG Selfoc Lens Array for use in office machinery</li> </ul> <p>Data for the selected products is available in the Sustainability section of <a href="http://www.nsg.com">www.nsg.com</a>.</p>
<p><b>Health and safety</b></p> <p>Significant Injury Rate 80 percent reduction from 2007 base of 1.38 to 0.3 (10 SI per month, compared to baseline of 50).</p>	<p>The SIR at the end of FY2013 was 0.38 which represents an 72 percent improvement. Our FY2014 target is a further 20 percent reduction on FY2013 to provide a safer place of work for our employees.</p>
<p><b>Supply chain</b></p> <p>100 percent of suppliers to have accepted our Supplier Code of Conduct (SCoC), with 50 percent of key suppliers audited against SCoC by 2015.</p>	<p>To date, we have directly communicated our Supplier Code of Conduct to 12,000 of our suppliers. In parallel, we have started audits of suppliers to validate these declarations to meet our objective that 50 percent of key suppliers will be audited by 2015. Good progress is being made with formal acceptance of our Code and over 70 of our key suppliers now audited.</p>
<p><b>Recycling and waste</b></p> <p>Reduce the waste we send to landfill by 50 percent, from a 2007 base (i.e. from approximately 46 kt to 23 kt by 2015).</p>	<p>Our waste to landfill figure for 2012 was 22 kt. This is a 53 percent reduction on our baseline.</p> <p>Further waste reduction activities are ongoing to reduce the quantity of waste generated and to increase our recycling rate.</p>
<p><b>People</b></p> <p>All employees to have a training and development review annually, with a target compliance level of 90 percent by 2015.</p>	<p>78 percent of employees were covered by the annual training and development review process in 2012.</p> <p>In order to foster the process of cultural change across the whole organization in the area of health and safety, it was required that all managers were set personal safety objectives in the 2012 process.</p>

About us  
Good governance  
Environmental responsibility  
Social responsibility  
Basis of reporting

## GOOD GOVERNANCE

Our NSG Code of Conduct reflects our values and principles. It ensures that we carry out activities in a safe, professional, legal and ethical manner and in a way that demonstrates sustainable development. We aim to maintain high levels of accountability and transparency, disclosing business goals and guidelines that demonstrate a responsible management approach to all our stakeholders.



**The Way we do Business**  
Our Code of Conduct defines the behavior we expect across all areas of our business.



**Doing the Right Thing? It's Easy**  
The Reporting of Concerns procedure allows employees to report violations.

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**Global Compliance Culture Assessment**

**73%**

Response rate from 1,232 employees

**Bribery/Corruption and Competition Law**

**65%**

NSG Group's non-shop floor workforce required to complete annual training

**Environmental Management System**

**ISO 14001**

70 percent of our business by turnover is certified



OUR APPROACH TO SUSTAINABILITY GLASS HAS A MAJOR PART TO PLAY IN SOCIETY'S EFFORTS TO REDUCE GREENHOUSE GAS EMISSIONS AND TO MITIGATE THE EFFECTS OF CLIMATE CHANGE. WE AIM TO BE THE GLOBAL LEADER IN INNOVATIVE HIGH-PERFORMANCE GLASS AND GLAZING SOLUTIONS, CONTRIBUTING TO ENERGY CONSERVATION AND GENERATION, WORKING SAFELY AND ETHICALLY.

"The past year has been a challenging one for the NSG Group. Despite difficult markets around the world and significant internal restructuring and cost reduction programs, we have maintained our commitment to the core principles embodied in our sustainability policies."

We continue to train and develop our people while keeping them safe from workplace injuries. We continue to reduce the amount of energy we consume and the amount of waste we produce.

We develop new products and processes that help our customers reach sustainability targets. Finally, we will encourage our customers, contractors and suppliers to take similar steps.

**Shiro Kobayashi**  
Director of Sustainability

Our sustainability agenda is integral to decreasing our costs and increasing our market opportunities. Over the past year, we have renewed our efforts in areas such as energy saving and waste reduction; both of which can have a significant and swift impact on the business performance of the Group. Glass markets are extremely competitive around the world and it is imperative that we can meet the ever-increasing demands of customers.

We work with communities and governments in the areas we operate to ensure compliance and forward-looking thinking. We do this directly and through our membership of trade associations, standards bodies and other organizations. We also work to influence legislation, particularly in the areas of energy conservation and emission regulation.

Glass making is an energy-intensive process. Significant energy is consumed in obtaining and melting the raw materials for the manufacture of glass. Despite this necessary resource consumption our products can and do make a tremendously positive contribution to climate change efforts and to the quality of living and working environments.

We have communicated our approach to sustainability to our employees around the world and have solicited their participation in this important work. Our leadership team remains actively committed to our High Risk Activity reduction safety program. In 2013, we repeated the successful annual NSG Group safety day to reinforce this commitment.

We have communicated our Supplier Code of Conduct to our suppliers and have conducted audits to verify the declarations we have received. Our products require raw materials and energy that must be extracted from the Earth. Therefore we take seriously our responsibility to protect the natural habitats of the affected regions.

### Our vision...

...defines our determination to make a positive contribution to sustainability, through our expertise in glass technology.

Making a difference to our world through glass technology.

### Our mission...

...describes how we will achieve our business objective, contributing to energy conservation and generation by producing and supplying innovative products in a sustainable manner.

To be the global leader in innovative high-performance glass and glazing solutions, contributing to energy conservation and generation, working safely and ethically.

### Our values...

...define the behaviors we value and intend to follow in all our dealings with our stakeholders.

### Our Code of Conduct...

...sets out the standards we expect of everyone working in the NSG Group.

Our Code of Conduct reflects our values and principles, particularly the emphasis on safety, taking personal ownership for actions and communicating with openness and involvement.

The overriding basis of the Code is that we will carry out these activities in a safe, professional, legal and ethical manner and in a way that demonstrates corporate social responsibility and promotes sustainability. Wherever possible, the Code defines a fair and common sense approach to doing business, with some elements dictated by strict legal requirements.

### Our Group policies and procedures...

...detail the procedures everyone in the Group must follow to achieve sound governance, tight controls, risk management and adherence to legal, ethical and sustainable principles.



### Our stakeholders

We aim to be judged as best in class by:

#### Our customers

To be their preferred supplier for glass products and related services.

#### Our employees

To be their preferred place to work.

#### Our shareholders

To be their preferred long-term investment.

#### Our suppliers

To build strong mutually beneficial relationships based on trust, co-operation, innovation and sustainability.

#### Our communities

To be a good neighbor, wherever we operate.

## OUR APPROACH TO SUSTAINABILITY CONTINUED

### Our management approach

#### Environmental

We take our environmental responsibilities extremely seriously. All our operations are required to meet all legislative standards as a minimum, and where local requirements are not considered sufficient to address an issue, our own corporate standards are applied. We conduct regular environmental audits designed to achieve continuous improvement, and to maintain and raise standards.

Our Group Environmental Policy defines our approach on environmental matters. In particular, it outlines our management of both current activity and the legacy of past and inherited liability. It reinforces our commitment to using good scientific principles to try to predict and assess our impacts on the environment.

We acknowledge that our activities will inevitably affect the local and global environment but we have taken steps to minimize any adverse effects and have put in place systems to try to ensure that we manage such impacts in a controlled manner. Principal among the tools we use is our environmental management system, which is certified to ISO 14001 for all our glass manufacturing and automotive manufacturing sites. We now have 81 certified sites around the world, representing 70 percent of our business by turnover.

We are committed to reporting on our performance both good and bad. Environmental data is collected under the broad headings of energy, emissions to air, water usage, recycling and waste. The data collected is based primarily on the core environmental performance indicator set of the Global Reporting Initiative (GRI). In addition to the collection of environmental emissions and resource usage data, the Airsweb™ system also incorporates an incident reporting system. The most senior executive with responsibility for environmental aspects is the Group Director of Sustainability.

#### Society

We believe we have a responsibility to be a good steward of the environment and a responsible corporate citizen in the communities in which we operate. We monitor carefully the impact of our operations on the local communities in which we operate. We work hard to minimize potentially negative effects, such as pollution, noise and traffic. We operate programs that assess and manage the impacts of our operations on communities, in entry, operational and exit stages.

In addition to our business investments, helping to sustain local operations, we also invest in the communities in which we operate. We aim to help through direct cash donations to charities and other projects or through in-kind resources – to improve the health of the community or tackle specific social issues.

We also encourage our people to play a part in developing our community relationships. This can take the form of matching contributions raised by employees or allowing individuals time to make personal contributions of time and effort in local projects. The most senior position with responsibility for society aspects is the Group Director of Sustainability.

#### Human rights

Our Code of Conduct defines our expectations for all employees. It reflects our values and principles, particularly the emphasis on safety, taking personal ownership for actions and communicating with openness and involvement.

The overriding basis of the Code is that we will carry out these activities in a safe, professional, legal and ethical manner and in a way that demonstrates corporate social responsibility.

The Code acknowledges internationally proclaimed human rights and these are also reflected in our overall employment policies and standards, providing our employees with reassurance on how they will be treated. Our equal opportunity and diversity policy aims to prohibit discrimination based on race, colour, creed, religion, age, gender, sexual orientation, national origin, disability, union membership, political affiliation or any other status protected by law. This policy operates in all employment-related decisions. The most senior executive with responsibility for human rights aspects is the Chief Human Resources Officer.

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**We value the health and safety of all our employees above all other considerations and aim to ensure that we provide a working environment that allows our people to reach their full potential.**

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### Labor practice

Our management philosophy values people as ‘the most important asset of our company’. We have around 28,000 people working in 30 countries and speaking over 25 languages.

Safety and quality underpin everything we do, with the principle of ‘open communication’ central to our employment policies. Our human resources strategy aims to ensure we have the right people where they are needed and that we maximize our talent management around the world.

We operate as an integrated international Group, with a multinational management and 80 percent of our employees work outside Japan. We reflect diversity in our workforce and believe that the range of nationalities, skills, qualifications and experience available in our many operations are a positive benefit to our business. Our management style is to put the best person in each job, regardless of nationality or region.

To attract, motivate, develop and retain high-performing employees, our approach on rewards and retention includes market-based competitive pay and market-based competitive benefit offerings for eligible full and part-time employees. We have identified specific challenges in attracting and retaining talent, particularly in emerging markets, and we are already putting in place policies to address these.

We work to create a culture that allows employees the opportunity to work without fear of intimidation, reprisal or harassment. We have systems in place to permit employees to raise any concerns in a confidential and timely manner. The most senior executive with responsibility for labor aspects is the Chief Human Resources Officer.

We value the health and safety of all our employees above all other considerations and aim to ensure that we provide a working environment that allows our people to reach their full potential.

Our safety programs emphasize the importance of appropriate safe behavior and of individuals taking personal responsibility. We regard all injuries at work as unnecessary and avoidable. No matter how minor, each one must be reported and investigated. Details of our progress on safety performance are shown in the Health and Safety section of this Report.

### Product responsibility

We are committed to the safety of our products and to ensuring they can be effectively handled, fitted and used by our customers. Our product risk-review procedures are designed to identify risks and to provide advice to users on safe handling. We communicate these risks through safety data sheets, labels and Glazing and Handling Guidelines.

Every R&D project developing new products and processes is required to have an Environmental Impact Assessment completed early on to highlight any positive or potentially negative implications, so that the project can be managed accordingly. We aim for a cradle-to-cradle life cycle management approach, incorporating environmental health and protection into every step of the life cycle of our products.

Our formal project management processes include thorough intellectual property searches, so that our customers can be very confident that the new products and processes we develop can be used freely without fear of infringing third-party patents. The most senior executives accountable for product responsibility are the heads of the strategic business units.

## CORPORATE GOVERNANCE

CORPORATE GOVERNANCE IS A KEY ELEMENT IN THE SUSTAINABILITY ACTIVITIES OF THE NSG GROUP. WE ARE COMMITTED TO EFFECTIVE AND TRANSPARENT ENGAGEMENT WITH ALL OUR STAKEHOLDERS.

We believe that good corporate governance contributes to sustainable development by enhancing the performance of companies and increasing their access to outside sources of capital.

We aim to maintain high levels of accountability and transparency, disclosing business goals and guidelines that clearly demonstrate a responsible management approach to all our stakeholders.

### Our governance structure

The NSG Group is governed by its Board of Directors, which is appointed by resolution at the General Meeting of Shareholders. The Board comprises the Chairman of the NSG Group, four directors concurrently serving as executive officers and four independent external directors. In the fiscal year 2013, the Board of Directors met 12 times.

The Board of Directors oversees the Group's economic, social and environmental performance and compliance with internal and internationally agreed standards, codes of conduct and principles.

### Company with Committees

The adoption of the 'Company with Committees' model has brought the NSG Group into line with a number of leading Japanese corporations and with best practice. It has introduced additional safeguards for shareholders, increased transparency and enhanced corporate governance, with the role of the independent external directors strengthened.

There are three Board committees (Nomination, Audit and Compensation) and four independent external directors. The Nomination Committee decides the details of the agenda items to be submitted to the General Meeting of Shareholders concerning the appointment and removal of directors. Chaired by an independent external director, George Olcott, the Committee consists of six members, including four independent external directors.

The Audit Committee, chaired by an independent external director, Sumitaka Fujita, comprises four independent external directors. It conducts audits of the execution of duties by directors and executive officers and ensures that adequate risk management processes are followed.

It also decides the details of agenda items to be submitted to the General Meeting of Shareholders concerning the appointment and removal of independent auditors.

The Compensation Committee makes decisions on compensation of individual directors and executive officers. The Committee is chaired by an independent external director, Hiroshi Komiya, and comprises six members, including four independent external directors.

### Adoption of IFRS

We adopted International Financial Reporting Standards (IFRS) for our consolidated financial statements, with effect from 1 April 2011. Enabling the whole Group to use the same accounting language has clear benefits for the Company's internal decision-making processes and further enhances our corporate governance structure.

Beginning with the financial year to 31 March 2012, the Group's results are now reported in IFRS. This has increased the amount of financial information we publish, prompting our decision to divide the content of our annual reporting between the Annual Report and an Annual Financial Statements document; both can be downloaded in English from our website.

### Risk management

The scope of our operations introduces potential risks to our business activities, requiring effective risk management. These include the effects of changes in debt market prices, foreign currency exchange rates, credit risks, energy prices, liquidity interest rates and business disruption. Our enterprise risk management process enables the impact and likelihood of key risks to be assessed in a standard format.

The information is used to assess the cumulative risk exposure of the Group and promote effective global risk responses, thus strengthening our overall risk management structure. For further discussion on our risks and opportunities associated with climate change, see pages 24-31.

### Compliance

Our Code of Conduct sets out the values on which the NSG Group has been built and on which the Group and its member companies must depend for future success. NSG is committed to compliance with all relevant laws, including anti-corruption laws in its Code of Conduct.





## ENVIRONMENTAL RESPONSIBILITY

Glass manufacture is energy intensive, but our products make a major contribution to energy conservation and power generation. We are working hard to reduce our waste, to minimize energy usage in manufacturing and improving the energy-saving capabilities of our products during their life cycle.

Total energy used by the Group

# 53.10 PJ

The total energy used by the Group in 2012 was 53.10 PJ (14.75 TWh)

Total CO<sub>2</sub> emitted by the Group

# 4.5 MtCO<sub>2</sub>

NSG Group emitted 4.5 million tonnes CO<sub>2</sub> in 2012 to manufacture a range of net energy-saving products.



Environmental responsibility  
Responsibly sourcing raw materials.



Furnace energy  
Striving to reduce energy usage and carbon emissions.



Raw material consumption  
Increasing recycled content and re-melting glass whenever possible.



Energy efficient glass  
Manufacturing energy-saving products.

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## ENVIRONMENTAL POLICIES AND MANAGEMENT

WE TAKE OUR ENVIRONMENTAL RESPONSIBILITIES EXTREMELY SERIOUSLY. WE REQUIRE ALL OPERATIONS TO MEET LOCAL LEGAL STANDARDS BUT APPLY OUR OWN CORPORATE STANDARDS WHERE THESE ARE STRICTER THAN THE LAW.

Our Group Environmental Policy defines our approach on environmental matters. In particular, it outlines our management of both current activity and the legacy of past and inherited liability. It reinforces our commitment to using good scientific principles to try to predict and assess our impacts on the environment, both positive and negative.

### Our Environmental Policy

Given the nature of our business, we acknowledge that our activities will inevitably have an impact, but we have taken steps to minimize the adverse nature of any impact and have put in place systems to try to ensure that we manage such impacts in a controlled manner.

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Our environmental management system is certified to ISO 14001 for all our glass manufacturing and automotive manufacturing sites.

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Principal among the tools we use is our environmental management system, which is certified to ISO 14001 for all our glass manufacturing and automotive manufacturing sites.

We are committed to reporting on our performance both good and bad.

Calendar year 2007 is our chosen starting point for reporting on the progress of the enlarged Group. Environmental performance is monitored and reported for manufacturing operations that are under the direct control of NSG Group. We continue to work with regulatory authorities worldwide on issues relating to historical industrial activity on and around Group premises.

### Data collection

Environmental and safety performance data is now collected right across the Group using an online electronic data reporting system known as Airsweb™. This database is multilingual and accessed over the corporate intranet, by sites under NSG operational control, allowing monthly updating of relevant information.

Environmental data is collected under the broad headings of energy, emissions to air, water usage, recycling and waste. The data collected is based primarily on the core environmental performance indicator set of the Global Reporting Initiative (GRI).

## ISO 14001

# 70%

of our operations take place on sites certified to ISO 14001 environmental standard.

In addition to the collection of environmental emissions and resource usage data, the Airsweb™ system also incorporates an incident reporting system. This allows the timely reporting and recording of incident data both safety and environmental, as well as provision for tracking the progress or remedial actions and communication of learning points.

### Monitoring performance

Supplementing the routine monitoring of our business, we also maintain a number of central registers used to guide our strategic development and maintain a high level of corporate governance in the sustainability field. For example, a register of all furnaces, their associated permits, relevant legislation and abatement capabilities is maintained and used to support the assessment of any proposed changes in operation or design.

To ensure a consistent and innovative approach, we operate a number of multidisciplinary design panels whose task is to ensure full assessment and review of proposed changes. Our stage gate process ensures that an appropriate level of information and resource is applied to an issue at set points within the development of a project or proposal. This ensures the most efficient use of our resources and encourages innovation.

**Our Automotive business was one of the first in the automotive industry to achieve a corporate certificate for environmental management. A single DIN EN ISO 14001 certificate covers the Group's Automotive sites worldwide.**

For glass manufacturing plants we have defined our strategic approach to abatement in order to ensure that across the world we hold fast to our principles even in parts of the world where legislative controls are less well developed.



Our German glass-melting sites have recently been certified to the ISO 50001 energy management system.

### Certification

We aim to certify our manufacturing facilities to the internationally recognized ISO 14001 environmental standard and now have 81 certified sites around the world, representing 70 percent of our business by turnover. Our Automotive business line was one of the first companies in the automotive industry to achieve a corporate certificate for environmental management.



A single ISO 14001 certificate from TÜV SÜD Management Service GmbH covers central functions and the vast majority of our Automotive plants worldwide.

Our German glass-melting sites have recently been certified to the ISO 50001 energy management system. This system is currently being implemented in our Italian sites.

[www.nsg.com/sustainability](http://www.nsg.com/sustainability)

More details on our environmental policies and risk analysis can be found on our website.



## ENERGY USAGE

WE WORK CONTINUOUSLY TO MINIMIZE ENERGY INPUT INTO ALL OUR PROCESSES, SO THAT THE USAGE OF GLASS CONTRIBUTES NET BENEFIT TO SUSTAINABILITY.

### Our energy usage

For both environmental and financial reasons, we use natural gas as the fuel of choice for glass melting. We reduced consumption by 7 percent compared to 2011.

Heavy fuel oil has been substituted for natural gas and is used as back up. We reduced consumption by 13 percent compared to 2011.

Diesel oil and liquid petroleum gas are used as back-up fuels and to power small engines and boilers.

In 2011, our consumption of diesel oil was 20.3 million liters (up 3 percent on 2011) and that of liquid propane was 11,500 tonnes (a 10 percent increase on 2011).

During 2012, we consumed 8.5 PJ (2.3 TWh) of delivered electricity (a 3 percent decrease on 2011).

The total energy used by the NSG Group in 2012 was 53.10 PJ (14.75 TWh). This represents a 7 percent reduction on 2011 data.

### Initiatives to reduce energy usage

We have continued our efforts with an ongoing program of work across all sites to increase energy awareness. This program involves a number of teams within the manufacturing organization with the objective to deliver significant improvements in energy efficiency of our operations and includes the development of a Group-wide database of energy-saving projects. These activities can be broadly categorized into two areas:

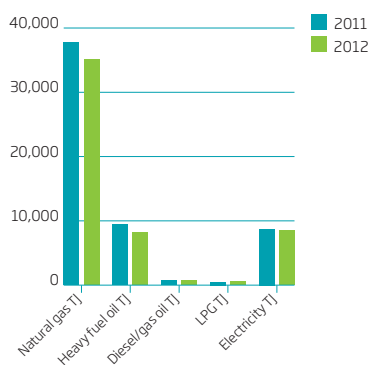
#### 1. Management systems

Investment in energy management systems includes the achievement of ISO 50001 certification across all operations in Germany and installation of sub-metering hardware and software.

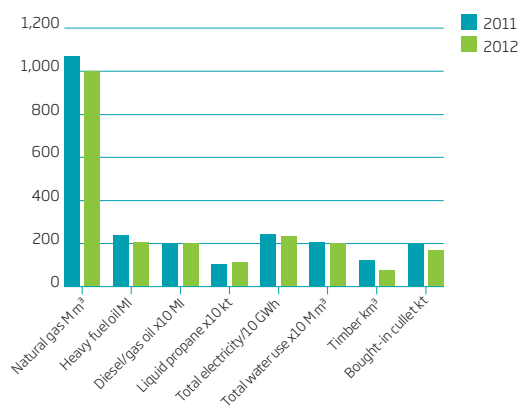
#### 2. Efficiency improvements and investments

A number of projects to improve energy consumption within our processes. A significant amount of investment in key areas of energy consumption includes:

NSG Group energy usage



NSG Group resource usage



### Energy optimization during shutdown/hot-hold activities

As a result of the economic downturn, leading to reduced demand, some of our float lines have been put on hot hold (maintaining working temperature but not producing glass). Others have been closed down with a view to restarting when markets improve. Our Automotive and Technical Glass operations were similarly affected, with an unusual number of shutdowns and restarts. Although some markets have since picked up, these developments affected absolute resource consumption and emission data in 2012.

### Partnership with suppliers

We are working with key suppliers to develop projects to reduce energy consumption in our manufacturing sites. Close collaboration with leaders in specific technologies is enabling us to implement optimum solutions to specific energy management challenges. For example, in our sites in Italy and the UK, new efficient lighting systems have been installed in place of old outdated lamps, leading to a halving of electricity consumption and a significant reduction in ongoing maintenance. Collaborative projects have also been implemented to address compressor inefficiency, to make better use of waste heat generated in our glass-making processes and to reduce peaks in electricity demand.

### Renewable on-site energy generation

Our Rossford technical center in North America produces about 7 percent of its own electricity with on-site photovoltaic generation.

We have recently installed photovoltaic panels on the roof of our German Weiherhammer plant.

### IT Server virtualization

Virtualization technology allows the server administrator to convert one physical server into multiple virtual machines. Each virtual server acts like a unique physical device, capable of running its own operating system. We have virtualized 485 physical servers and IT plans to virtualize all servers that meet requirements. At the moment they are located in seven regional data centers (UK, Germany, Poland, Japan, US, Brazil and China) and operated by 36 physical boxes (hosts).

If each server is constantly powered on, virtualization technology saves over 1,250 tonnes of CO<sub>2</sub>/year. An additional benefit is maintenance reduction and travel savings.

### Alternative fuels

Our Chilean plant is using waste-derived diesel oil from a treatment plant that separates waste fuel from water.

### Solar panels fitted to plant roof in Germany

We are steadily increasing NSG's global renewable energy generating capacity.

Our Weiherhammer plant in Germany has recently leased out 15,000 m<sup>2</sup> of roof space for the installation of solar panels incorporating thin film technology (cadmium telluride CdTe).

The panels have the capacity to generate approximately 800,000 kWh for the national grid each year.



### CO<sub>2</sub> neutral heating with timber pellets in Finland

Our Tampere plant has substituted the heating system's oil burner for a compacted sawdust pellets system. One ton of pellet is equivalent to 500 liters of oil in heating power so the new system will immediately and significantly reduce the plant's CO<sub>2</sub> footprint, saving approximately 375 tonnes of CO<sub>2</sub>/year. The equipment is financed and maintained by an external provider.

The pellets' high density also permits compact storage and optimized transport over long distance.



## MINIMIZING ENVIRONMENTAL IMPACT

GLASS MANUFACTURE IS AN ENERGY-INTENSIVE PROCESS, INVOLVING THE MELTING OF RAW MATERIALS AT HIGH TEMPERATURES. PRINCIPAL EMISSIONS FROM THE PROCESS ARE TO AIR AND ARISE AS PRODUCTS OF THE COMBUSTION OF FUEL AND AS CO<sub>2</sub> FROM THE DECOMPOSITION OF SODA ASH, DOLOMITE AND LIMESTONE USED IN THE PROCESS.

Our environmental impact analysis of the float glass and automotive glazing production processes reveals that the significant emissions are carbon dioxide, oxides of nitrogen, oxides of sulphur and, to a far more limited extent, particulate matter.

In the operation of our float plants, heavy oil to natural gas conversion has helped to reduce carbon emissions by around 50 percent over the past 40 years, and a combination of design and operational innovations has made further progress.

### Recycled glass cullet

Glass for recycling is a valuable resource. Wherever quality allows, we recycle any glass off-cuts or cullet within our own glass melting lines. Glass from our downstream operations and from our customers represents a potentially useful resource to us.

We gain a double benefit from the use of such cullet. Its use to make glass reduces the requirement for raw materials and avoids disposing of what would otherwise be a waste material and closes the recycling loop. Ten percent cullet use saves 3 percent furnace energy and leads to reductions in CO<sub>2</sub> emissions.

In 2012, we sent 446,000 tonnes of glass for recycling and bought in 169,000 tonnes to supplement cullet from our own internal recycling. 37,000 tonnes of glass could not be successfully recycled so was sent for disposal.

### Cullet usage to improve efficiency and reduce emissions

One of our sites has recently manufactured glass using 100 percent cullet. Cullet return projects are ongoing to try to minimize the need for virgin raw materials.

### Lexington Kentucky Scrap Glass Recycling Project

Our North American plants have recently worked with Reflective Recycling to separate glass from the PVB interlayer in reject windshields and tempered glass. This has significantly reduced the haulage distances of waste products and has allowed the end product to be recycled, thus reducing CO<sub>2</sub> emissions alongside waste and transport costs.

In Automotive, all supplied materials are registered in the global IMDS (International Material Data System) to ensure we have complete visibility of material content to identify hazardous materials and opportunities for recycling. This data is shared openly with our automotive customers, to support their own recycling efforts.

PVB is used to manufacture laminated glass. PVB trims from the edges of the laminated glass are returned to PVB suppliers to be recycled in their manufacturing processes. In 2012, around 2,000 tonnes of PVB trim was returned to our suppliers or other recyclers to be reused.

### Waste

The glass manufacturing process itself produces very little waste material. All trimmed glass is recycled back into the melting process and waste is limited to maintenance waste, occasional off-specification raw material that cannot be blended and packaging waste.

If glass is produced that cannot be remelted on-site, it is sent, where practicable, for external recycling. We use the waste hierarchy to guide our disposal options. In this system, landfill is the least favored option.

However, with significant tonnages of mineral materials arising for disposal we have not eliminated landfill completely. We disposed of 47,000 tonnes of non-glass waste (a 20 percent reduction on 2011), of which 1,132 tonnes of hazardous (36 percent reduction on previous year) and 21,000 tonnes of non-hazardous waste (32 percent reduction) were sent to landfill. We disposed of 6,544 tons of hazardous waste in 2012 (a 46 percent reduction on 2011).

### Emissions to air

These arise from the combustion of fuel in melting the raw materials. The principal materials emitted are oxides of sulphur and nitrogen. Some particulates arise partly from trace components in the fuel and some from the glass formation itself.

The fuels we use – oils and natural gas – all contain sulphur compounds as contaminants. Natural gas, our preferred fuel, contains less sulphur than oil. Heavy fuel oil contains the highest levels of sulphur of all our fuels, especially that readily available in Japan. Our furnaces in Japan are therefore fitted with efficient emission gas-cleaning equipment. The combustion of such fuels can produce a mixture of sulphur oxides (SO<sub>x</sub>).

Most sulphate arising from soda lime glass manufacture is released as sodium sulphate, which is of low toxicity. Nitrogen compounds released arise from the combustion air in which the fuel is burnt. At the high temperatures used in glass-making, the nitrogen in combustion air is oxidized to a mixture of nitrogen oxides (NO<sub>x</sub>). Actions we take to reduce or prevent the emission of these oxides of nitrogen are detailed on our website.



## Reducing carbon emissions

In 2012, the NSG Group was responsible for the direct and indirect emission of 4.5 million tonnes of CO<sub>2</sub>. This represents an 8 percent decrease on 2011.

Our direct emissions were 3.5 million tonnes (a 9 percent decrease on 2011). Direct emissions occur from our furnaces and from fuel used in bending and toughening furnaces in Automotive and Building Products. In Europe, externally verified, direct 2012 CO<sub>2</sub> emissions from the Emission Trading Scheme were reduced by 6 percent compared to 2011.

In the operation of our float plants, heavy oil to natural gas conversion has helped to reduce carbon emissions by around 50 percent over the past 40 years and a combination of design and operational innovations has made further progress.

## Water management

In glass-making, water is used for cooling, but most of our plants operate with closed loop systems and so only require top up. Water is also used for washing glass in plants but there the need is for very high purity, so water is treated and then reused. We seek to minimize our water consumption by working with suppliers to recycle water and to install advanced water treatment facilities. This not only reduces the consumption of water itself but also the chemicals used in the treatment of the water.

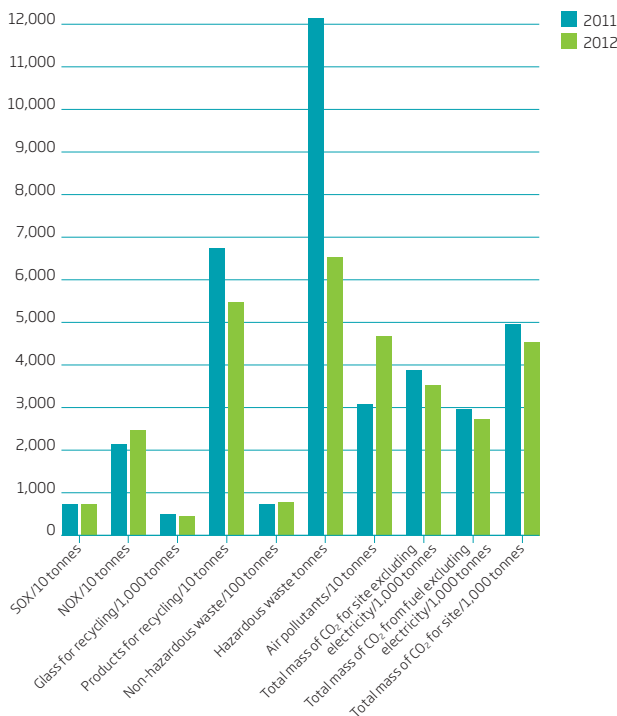
Across the Group water consumption can vary considerably according to process and product demands as well as water quality. Typically, ~2 m<sup>3</sup> are required to manufacture one tonne of float glass and ~90 liters are required to process each square meter of automotive product.

We used a total of 20.2 million cubic meters of water in 2012. This was a decrease of 3 percent on 2011 data.

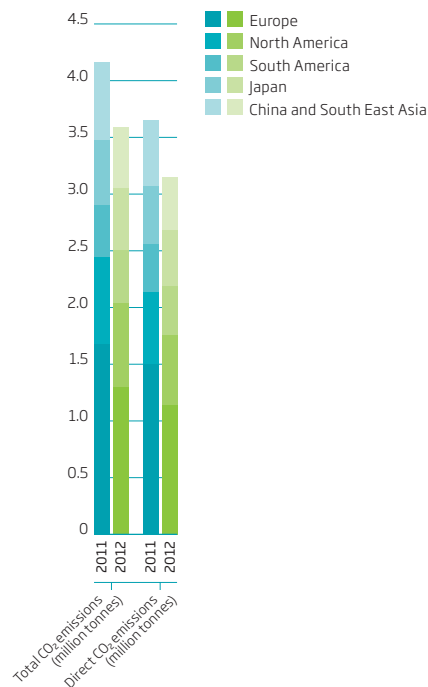
## Timber

In Europe, much of our glass is transported on steel stillages without packaging, utilizing specialist 'Floatliner' vehicles. We use a significant quantity of wooden packaging in our operations. Although much of the timber we use comes from sustainable forestry, we cannot yet guarantee this worldwide and this remains an area for improvement. We also work with our suppliers to design reusable wooden packaging.

Principal emissions from the NSG Group during 2012



NSG Group glass-melting carbon emissions



## GLASS IN BUILDINGS

OUR PRODUCTS ARE AT THE HEART OF MODERN ARCHITECTURE, ENGINEERING AND CONSTRUCTION. THEY PLAY A BENEFICIAL ROLE IN ADDRESSING SOME OF THE MAJOR ENVIRONMENTAL CHALLENGES OF BUILDINGS.

### Sustainability in buildings

Around the world, our products play a vital role in improving energy efficiency and reducing CO<sub>2</sub> emissions. But they also offer other advanced functionality and create safer buildings for communities; fire protection, noise attenuation, safety and security, privacy, decoration and even self-cleaning properties.

Architects increasingly seek to bring natural environmental factors into the interior of buildings by maximizing natural daylight. This has been achieved through the use of larger glazed areas in façades and roofs, and entirely glazed façades, where the glass is a structural component of the building. The correct choice of glass can help to reduce the capital outlay, running costs and associated carbon emissions of buildings.

Glass has a unique role to play in promoting sustainability, reducing greenhouse gas emissions and mitigating the effects of climate change. On average, buildings account for almost 50 percent of the energy consumed in developed economies. The 'energy balance' between the manufacture of high-performance glazing products and their use means that the energy used and CO<sub>2</sub> emitted in manufacture are quickly paid back through the lifetime of most of our products.

Sustainable building rating system initiatives are increasingly being used to rate the environmental performance of buildings across the globe.

### Energy efficiency in buildings

Energy issues are crucial to the building glass industry, as glass products can make an important contribution to combating climate change. Improving the energy efficiency of buildings also brings other benefits. Well-glazed buildings are more comfortable and cheaper to run for the owner and occupier. From a social point of view, national economies and energy security will improve when energy-importing countries become less dependent on increasingly expensive supplies from other parts of the world.

In hot climates, reliance on air conditioning, which would otherwise be increased by such larger glazed areas, is mitigated by the use of advanced solar control glass, allowing the sun's light into buildings, while blocking much of its heat.

In cold climates, low-emissivity glass reduces heat loss, while allowing high levels of valuable free solar gain to heat buildings without significant loss in natural light.

Our products help in addressing some of the major environmental challenges of buildings, new and old. Governments are putting increased focus on legislation and policies to improve their energy efficiency. We work closely with trade associations, governments and authorities that frame building standards to ensure that the energy-conservation properties of glass and CO<sub>2</sub> reduction targets are taken into account when standards are set.

They are helping to transform the market for added-value glazing in North America, Europe, Malaysia and India. In China, legislation is at an earlier stage, but the government has already introduced building regulations to improve the energy efficiency of new buildings. Similar opportunities are anticipated in Europe, with the recast of the EU Directive on Energy Performance of Buildings and new Energy Efficiency Directive.

### Thermal insulation – keeping heat in buildings

In cold weather, low emissivity (low-e) products reflect heat back into the building. Our thermal insulation products, Pilkington **Energy Advantage™**, Pilkington **K Glass™** and Pilkington **Optitherm™**, combine unrivalled thermal insulation with high light transmittance, with lower reflectance for a more neutral appearance. They provide thermal insulation and passive solar heat gain, helping meet demand for more energy-efficient windows.

Low-e glass is a value-added product that has a transparent coating on one surface. This reflects heat back into the building, reducing heat loss through the window. It also reduces the heat transfer from the warm (inner) pane of glass to the cooler (outer) pane, thus further lowering the amount of heat that escapes from the window. The coating also allows large amounts of free solar energy to enter the building, thereby heating it passively.

The potential for low-e glass (double and triple glazing) to cut CO<sub>2</sub> emissions from new and existing buildings has been analyzed by the Dutch scientific institute TNO. It found that up to 90 million tonnes of CO<sub>2</sub> emissions could be saved annually by 2020 if all Europe's buildings (existing and new residential and non-residential buildings) were fitted with double-glazed low-e insulating glass units. An additional seven million tonnes of CO<sub>2</sub> emissions could be cut through a greater use of triple-glazed low-e insulating glass units for new buildings, where appropriate.

Advances in low-emissivity (low-e) glass technology have made windows an essential contributor to energy conservation and comfort, minimizing heat loss and internal condensation.

Pilkington **Spacia™** was the world's first commercially available vacuum glazing, offering the thermal performance of conventional double glazing in the same thickness as single glass. Sales are developing worldwide, particularly for use in historic buildings, in which the original frames can be retained.

### Solar control – keeping heat out of buildings

Increasing attention is being given to air-conditioned buildings, to reduce energy usage and CO<sub>2</sub> emissions, creating opportunities for solar control glass. Most of our solar control products have special coatings that can reflect up to 75 percent of the solar heat, while transmitting the majority of the visible light and reducing glare. We have a wide range of products to satisfy every need; Pilkington **Optifloat™** Tints, Pilkington **Reflite™**, Pilkington **Eclipse Advantage™** and Pilkington **SunShade™** provide different levels of solar control performance.

The best energy-efficient glass combines solar control and low-emissivity properties. Pilkington **Suncool™**, Pilkington **Solar-E™** and Pilkington **Eclipse Advantage™** provide both. The use of these types of glass allows a bright and comfortable environment to be maintained inside a building with reduced requirement for air-conditioning and lighting.

A study undertaken by TNO for Glass for Europe concluded that between 15 and 80 million tonnes of CO<sub>2</sub> emissions annually – roughly between 5 percent and 25 percent of the EU's target – could be saved by the year 2020 by optimal use of solar control glass.

To maximize energy efficiency all year round, our products can offer the ideal glazing solution by balancing both solar control and low-emissivity performance.

### Self-cleaning glass – minimizing environmental impact

Our Pilkington **Activ™** range has been installed successfully in domestic and commercial buildings throughout the world. Using the forces of nature to help keep the surface free from dirt, the world's first advanced dual-action self-cleaning glass ensures less manual cleaning is required – therefore reducing the need for toxic chemicals and hazardous cleaning products and cutting water wastage, as well as reducing maintenance costs and health and safety risks.

Solar control and low emissivity glass for energy efficiency can also be combined with Pilkington **Activ™** self-cleaning glass to further reduce the environmental impact of buildings.

### Fire protection glass – passive and sustainable protection

Buildings that are vulnerable to fire are fundamentally unsustainable. Fire damage can affect lives and communities, through destruction of jobs and public assets. Combining fire safety and integrity with transparency and the ability to bring light into buildings presents significant technical challenges.

Our range of fire-resistant glass, Pilkington **Pyrostop®**, Pilkington **Pyrodur®**, Pilkington **Pyroclear®**, and Pilkington **Pyroshield™ 2** is used in a variety of building, marine and rail transport applications around the world. We offer three technology types – wired glass, advanced, toughened fire-resistant glass and a special proprietary clear intumescent interlayer technology. The latter not only protects against flames and smoke, but also against the heat of a fire, and heat transfer mechanisms.

### NSG supplies glass for World Wildlife Fund building

The Living Planet Centre is WWF-UK's new administrative building and visitors centre. Designed to set a sustainable benchmark, the inclusion of 1,600 m<sup>2</sup> of Pilkington glazing has helped target a BREEAM Outstanding rating whilst creating a comfortable workplace flooded with natural light.

Pilkington **Suncool™** 40/22 glazing units cut the transmission of solar radiation by more than 75 percent, significantly reducing the load on the building's cooling systems. The same specification also assists thermal insulation enabling the glazed areas to surpass not only current Building Regulations but any likely changes in the near future.

Pilkington **Suncool™** 40/22 is also utilized in the roof glazing where it is combined with a heat-strengthened laminated pane for additional safety.

The building has been short listed for the UK Building Sustainable Project of the Year.

Photos: WWF-UK © Richard Stonehouse.



## GLASS AND SOLAR ENERGY

GLASS PLAYS A SIGNIFICANT ROLE IN THE GROWING SOLAR ENERGY SECTOR. WE SUPPLY PRODUCTS FOR ALL THREE OF THE LEADING TECHNOLOGIES, CONVERTING POWER FROM THE SUN INTO CLEAN RENEWABLE ENERGY.

Countries across the globe have adopted legislation to increase the use of renewable energy as it is widely recognized that a move from hydrocarbons is essential. This was propelled in part by the Kyoto protocol, an international agreement linked to the United Nations Framework Convention on Climate Change which established that industrialized countries have an obligation to reduce emissions of greenhouse gasses.

Solar energy panels offer alternative power generation solutions for a variety of markets, from large-scale solar stations to inaccessible geographic areas, from cloudy northern-hemisphere rooftops to hot sunny deserts.

Europe continues to play a leading role in the solar segment, but the Asia Pacific region has quickly closed the gap. North America is also making significant investment in solar installations. In addition to the established markets, Photovoltaic (PV) is increasingly being seen as part of the solution to meet the growing energy demand in emerging economies.

Competitive Levelized-Cost-Of-Energy (LCOE) of PV is largely playing a role in encouraging solar generation. Although many of the early markets were heavily subsidized at the onset, feed-in tariff's in countries such as Germany, Spain, Italy and Greece are becoming less important. The arrival of 'grid parity' is successfully creating sustainable solar markets.

Depending on the type, a photovoltaic panel will typically produce enough power in around two years to offset the energy used in manufacture. In other words, the input energy is equivalent to only 6.6 percent of the total output of the panel. During its life cycle, a solar panel can produce over 15 times the amount of energy used to make it.

Global Photovoltaic (PV) is expected to achieve steady growth based largely on declines in module prices and installation costs. However, it is also aided by significant improvements to module efficiency. In fact, advances in glass and coating technologies are helping our customers manufacture increasingly efficient modules.

Our high-quality glass products are used in the three leading solar technologies aimed at converting solar energy into electricity: thin film PV, crystalline silicon PV and concentrated solar power applications.

In addition to the generation of electricity, our glass products are also used in solar applications that generate hot water.

Glass is an integral and important element of solar modules, used to convert solar energy into electricity. In traditional PV, the solar cells may be encapsulated using toughened glass, which protects the cells from the elements.

Increasingly, electrically conductive glass is used in PV modules as the front contact of the solar cell, to form a system which generates a direct electrical current.

We have been closely associated with the leading companies within the crystalline silicon and, especially, thin film PV industries for a long time. This collaboration has come about, in part, as a result of the historical expertise in on-line coating of both Pilkington and NSG, which has enabled us to become the worldwide leading producer of high-quality, high-volume TCO glass. We have been a technological leader in low-iron glass compositions for over 25 years and our anti-reflective coatings are being used to further increase module efficiency.

## First Solar starts construction of solar power plant in Japan

Over 100 million First Solar photovoltaic (PV) modules have been installed throughout the world. NSG Group supplies the advanced technology glass with a proprietary electrical film tuned to First Solar's thin-film modules.

First Solar has announced the construction of a mega solar project with a generation capacity of 1.4 MW in Kita Kyushu-shi, Japan. Using First Solar's advanced technology thin-film PV modules, the project will provide clean and safe solar power, offsetting demand previously supplied by nuclear reactors and providing energy security to Japan.

NSG, First Solar and construction project leaders attend the ground-breaking ceremony for the 1.4 MW solar project in Kita Kyushu-shi, Japan.



## Thin film photovoltaic solar modules

Thin film PV modules produce power at low cost per watt. They are ideal for large-scale solar farms, as well as Building Integrated Photovoltaic applications (BIPV). They benefit from generating consistent power, not only at elevated temperatures, but also on cloudy, overcast days and at low sun angles.

With our advanced technology, the coating properties can be 'tuned' to a wide variety of Thin Film PV technologies, including silicon and cadmium telluride based.

## Crystalline photovoltaic solar modules

Developed from the microelectronics technology industry, crystalline silicon (c-Si) is the most widely used solar technology. Due to their high efficiency, crystalline silicon modules are best suited to applications where space is at a premium.

## Concentrated solar power applications

Concentrated solar power (CSP) technology uses mirrors to concentrate sunlight. The high-performance mirrors are manufactured using metallic reflective coatings and weather protective paints deposited onto very high-performance low-iron float glass.



### Thin film photovoltaic solar modules

Produce power at low cost per watt, effective at weak light conditions, but require large surface areas for installations.



### Concentrated solar power applications

Typically large area mirror arrays. Require a large area and lots of sunshine. Particularly effective in sunny deserts.



### Crystalline photovoltaic solar modules

Highly efficient, but as the cells are expensive to make, best used in applications where space is at a premium.

## GLASS IN VEHICLES

AS A WORLD LEADER IN AUTOMOTIVE GLAZING, WE AIM TO PROVIDE OPPORTUNITIES FOR VEHICLE MANUFACTURERS TO ADDRESS SUSTAINABILITY ISSUES, SUCH AS CO<sub>2</sub> REDUCTION, SOLAR CONTROL, VEHICLE WEIGHT, AERODYNAMICS AND RECYCLING.

The global automotive industry is increasingly addressing the sustainability agenda. The shift to higher efficiency conventional engines, electric vehicles and plug-in hybrids marks a new era, with CO<sub>2</sub> reduction a major focus. This requires glazing advances in solar energy control, weight reduction and energy saving or generation.

As a world leader in automotive glazing, we are meeting these challenges. We are developing coating technology and glass compositions to produce high-performance infra-red reflecting and advanced infra-red absorbing glazings. Our aim is to provide further opportunities for vehicle manufacturers to meet their sustainability requirements.

Demand is increasing from vehicle manufacturers for glazing solutions that meet the challenge to design cars that are kinder to the environment.

Vehicle manufacturers look towards the supply base to develop and deliver products that address energy reduction, energy generation and recyclability.

We have supplied glass used in automotive photovoltaic roof systems that can actively supply power to the vehicle, helping reduce reliance on conventional energy sources.

We aim both to reduce energy used during the manufacture of products and to increase their contribution to sustainability during their lifetime.

### Hybrid and electric vehicles

The importance of hybrid and electric vehicles is growing, as consumers demand more environmentally-friendly models.

We are working with a variety of established automotive manufacturers and new entrants who are developing new vehicles that are greener by design. Vehicle glazing is not only important in creating a modern exterior design, but can also contribute significantly to the feeling of space inside the car and all-around visibility.

### Lightweight glazing

There can be over 13 individual pieces of glazing on a vehicle, all contributing significantly to overall weight and affecting fuel consumption. We are focused on the introduction of lightweight glass and glazing technology, with the launch of reduced thickness laminated and toughened sidelights, backlights, windshields and rooflights.

Our in-house developments for glass-shaping technology now make it possible for vehicle manufacturers to reduce the mass of glass components by up to 25 percent.

Glass in vehicles offers more properties than simple transparency, so when designing vehicles for reduced mass in the components, consideration needs to be given to acoustics, stiffness, sealing and guiding systems and solar control.

## Vehicle glass

# 65%

Our range of optimized green and privacy solar absorbing glasses can reduce the heat entering a vehicle by up to 65 percent.

### Solar control technology

Approximately 30 percent of the heat loading on a car's interior comes through the windshield.

The relationship between high-performance solar control glazing and vehicle CO<sub>2</sub> emissions reduction has long been recognized. It is accepted that control of heat energy entering vehicles directly impacts air-conditioning usage and will lead to reduced fuel consumption and CO<sub>2</sub> output. Our advanced solar control glass can make a significant contribution to the reduction of air-conditioning usage by reducing solar heat gain.

Our vehicle glazing products provide advanced solar control by absorbing or reflecting infra-red energy from the sun. Our range of optimized green and privacy solar absorbing glasses can reduce the heat entering a vehicle by up to 65 percent.

Advanced glass coatings used in laminated glazing can selectively allow the transmission of visible light while rejecting heat entering vehicles. Combining solar control properties with a heating function within the glass, for removing condensation, can reduce air-conditioning use on a year-round basis.

### Glazing systems

We develop and supply not only glass, but also glazing systems used to mount and seal the products in vehicle apertures. We work constantly to decrease component content, with a view to reduced cost and weight.

New technology areas, such as integral seals, significantly reduce processing steps and the amount of hardware needed to transform glass products to glazing products. Issues such as driver visibility and pedestrian safety overlay our work in the development of the next generation of automotive glazing.

### Glass and end-of-life vehicles

Glass typically constitutes around 3 percent of the composition of an average car. We are actively involved in the elimination of harmful materials in glass, ink, solder and other components in automotive glass products.

### NSG glazing technology is contributing to more sustainable vehicles

- Superior infra-red reflecting windscreen enhances solar control and reduces the need for air conditioning.
- Privacy glass fitted to the rear lowers temperatures, enables greater cooling efficiency, and reduces UV light transmission.
- Heated windscreen enhances visibility in icy or humid conditions, eliminates the need for de-icer spray and reduces damage to the wiper system.
- Laminated glazing that removes more than 99 percent of UV light transmission significantly minimizes the degradation of interior fabrics.
- By moving from 6 mm to 5 mm windscreen thickness and reducing overall vehicle weight, fuel efficiency is improved.
- Laminated, green tinted, hydrophobic front door glazing reduces the power required from the air-conditioning unit.

As used on the new Range Rover Hybrid.



## TECHNICAL GLASS

OUR TECHNICAL GLASS PRODUCTS CONTRIBUTING TO ENERGY CONSERVATION AND SUSTAINABILITY INCLUDE GLASS FOR DISPLAYS, LED PRINT HEADS FOR OFFICE MACHINERY, BATTERY SEPARATOR TECHNOLOGY FOR ELECTRIC AND HYBRID VEHICLES, AND GLASS FIBER FOR TIMING BELTS AND PAINTS.

### Battery separator technology – an important role in the next generation of electric vehicles

The NSG Group is a world leader in the development of advanced glass products for use in battery separators. Initiatives to achieve a low-carbon society have focused the automotive industry on the development of more fuel-efficient vehicles. The Idling Stop and Start (ISS) system, which stops the engine during idle time and restarts only when necessary, requires advanced performance batteries. Our R&D is focused on improving the capacity, stability, power and safety margins of the next generation of batteries. Our sales of separators for these new batteries are expanding rapidly.

We are developing and expanding sales of separators for smaller and more powerful batteries for use in future lower-emission vehicles.

### Displays in communications devices

We are a world-leading supplier of ultra-thin glass for small LCD applications, helping to reduce power consumption in the display market and reduce the need for travel. Our Ultra Fine Flat Glass (UFF) is produced in thicknesses as low as 0.3 to 1.1 mm. These products are increasingly being used in the growing touch panel market, particularly in mobile phones, tablet computers and now expanding into vehicles.

This technology reduces the need for peripheral equipment, and reduces manufacturing resources.

### LED print heads – reducing power consumption in office machinery

These next-generation LED systems employ our proprietary SELFOC® Lens Array (SLA®) and technology is increasingly being adopted for use by copier and printer manufacturers such as Fuji Xerox, allowing optical systems to be designed compactly and manufactured at low cost.

The new system uses self-scanning light-emitting devices and radially distributive refractive index rod lens arrays to provide images up to 1,200 dpi. Our new range of advanced LED print heads provides an image quality equal to or surpassing more conventional laser scanning units, but with the added advantages of miniaturization, low power consumption and low-noise operation.

Photo: courtesy of Fuji Xerox.







### Microglas® Glasflake™ – C Glass Flake – contributing to expansion of renewable energy

To address global warming, efforts are being made around the world to accelerate the shift from fossil fuel to renewable energy sources. Wind power is an example of the renewable energy resources, and offshore wind power installations have increased, particularly in Europe. Wind turbines and other equipment installed at offshore wind farms need to operate for a long time under exceptionally harsh conditions, such as wind, wave and salt water, as well as collision with floating objects. Microglas® Glasflake™ – C Glass Flake is used in anti-corrosion coatings and linings to protect offshore structures.

### Glass cord engine timing belts – helping to reduce fuel consumption

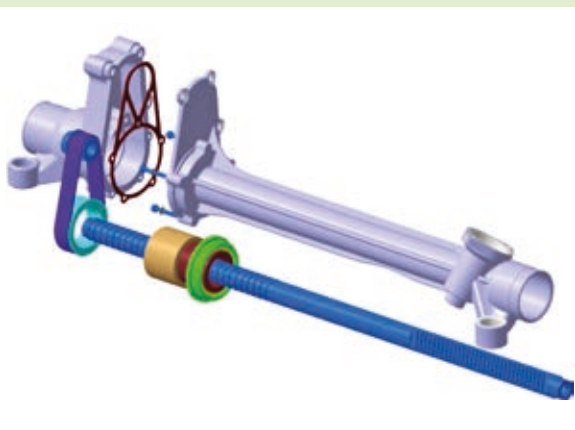
MICROGLAS®CORD is NSG Group's glass fiber cord for engine timing belt manufacture. It is used in the advanced Electric Power Assisted Steering (EPAS) system that can help to cut fuel consumption and reduce CO<sub>2</sub> emissions.

The EPAS technology has been developed by NGF EUROPE Limited's customer Gates Power Transmission with ThyssenKrupp. It delivers a fuel saving of around three to four percent, with a consequential reduction in CO<sub>2</sub> emissions, because it only requires power during actual maneuvering, unlike standard hydraulic systems, which are a constant drain on the engine.

The EPAS drive belt uses 0.2 mm Glass Cord produced by NSG Group. The diameter is key to this application because the belt has to go around a tight pulley system, which requires it to be extremely flexible. The Glass Cord, which actually spirals around the rubber belt, is also coated with our RFL latex composition for optimum adhesion.

EPAS is already used in around two million vehicles in the European market and its adoption is expected to increase throughout Europe and North America. Global demand for our Glass Cord will increase as vehicles with EPAS system become main stream.

Our Glass Cord is being used in a new power-assisted steering system that cuts fuel costs and reduces emissions.



### Inner Glass Skin System – energy-saving solutions for next-generation office buildings

Nippon Sheet Glass Environment Amenity, an NSG Group subsidiary has started, in collaboration with Device, Inc., a new business of designing and building 'zero-emission offices' for small-to-medium-sized office and commercial buildings to help them significantly cut electricity consumption and thereby reduce energy costs.

As its first major product in this new business, NEA has launched Tropos Inner Glass Skin System (Tropos IGSS), a state-of-the-art construction method designed to transform existing buildings into highly energy-efficient buildings with double-skin glass facades. Tropos IGSS was developed based on results from 'D-Project', a demonstration project conducted by Device, Inc. from 2009 on global warming countermeasures. The project has demonstrated that if a building is retrofitted with a double-skin façade structure, and supported with mechanical ventilation that allows the control of air flow in the intermediate cavity between the two facade layers, heating and cooling loads in the building are significantly reduced, thereby reducing energy consumption. The project has confirmed a CO<sub>2</sub> emissions reduction of more than 70 percent compared with the pre-refurbishment levels.

Tropos IGSS can provide both improved indoor climate and reduced use of energy by taking full advantage and effective control of characteristics of glass (light transmission and heat conductivity) in response to changing environmental conditions.



## SOCIAL RESPONSIBILITY

NSG values the health and safety of all employees above all other considerations and we aim to provide a working environment that allows employees to reach their full potential. We also recognize our responsibility to be a responsible corporate citizen in the communities in which we operate.

Number of employees

28,000

Significant Injury Rate

0.38



Employees and safety  
Moving safety to the next level.



Customers  
Committed to the safe use of our products.



Suppliers  
Working with suppliers to improve employee and community safety.



Communities  
Building relationships with local communities.

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## EMPLOYEES

OUR MANAGEMENT PHILOSOPHY VALUES PEOPLE AS 'THE MOST IMPORTANT ASSET OF OUR COMPANY'. SAFETY, QUALITY AND ENVIRONMENTAL RESPONSIBILITY UNDERPIN EVERYTHING WE DO, WITH THE PRINCIPLE OF 'OPEN COMMUNICATION' CENTRAL TO OUR EMPLOYMENT POLICIES.

Our management philosophy, 'people are the most important asset of our company', is deeply rooted in the 400-year-old Sumitomo Spirit to which we subscribe. It has therefore been a cause of great regret that the restructuring initiatives we have had to take over the past year required significant headcount reductions, with some 3,000 people having left the Group since the initiation of the programs.

Our human resources strategy aims to ensure we have the right people in the right position and that we maximize our talent management around the world. We aim to create an environment in which our employees can flourish, leading to greater staff retention and in-house innovation.

### Employee engagement

Employee engagement is a high priority. Following on from the 2011 NSG Group Employee Survey we implemented agreed Action Plans which focused on increasing employee engagement and motivation. These plans focused on the areas which most impact on our employees' motivation and satisfaction helping to increase loyalty and commitment to the Group and covered topics such as Communication, Daily Work, Learning & Development and Health & Safety.

123 action plans covering 333 locations. 80 percent of plans completed to date.

### Diversity

Our Code of Conduct acknowledges internationally proclaimed human rights and these are also reflected in our overall employment policies and standards and provide our employees with reassurance on how they will be treated. Our equal opportunity and diversity policy aims to prohibit discrimination based on race, colour, creed, religion, age, gender, sexual orientation, national origin, disability, union membership, political affiliation, or any other status protected by law.

12 percent of NSG Group managers are female.

### Maximizing the potential of individuals

It is through the skill and effort of our people throughout the world that the NSG Group achieves its success. Our aim is to develop a competent, motivated and flexible workforce that is able to respond positively to the needs of the business against a background of continuing change.

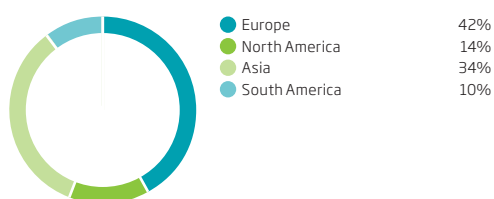
We aim to provide personalized opportunities for growth and achievement and for employees to make a full contribution to their teams, Business Unit, Global Functions and the NSG Group.

### Talent Management

We are committed to maximizing the talent in our organization to create flexible, skilled and motivated people, focused on the achievement of our business objectives.

Throughout this year we have focused on developing our Talent Management processes to ensure that we identify and develop our high-potential employees with the necessary skills, experience, competencies and motivation.

#### NSG Group employee distribution



(As at 31 March 2013)



“Our people need constructive feedback to help them to build on and improve performance. The appraisal feedback training also provides an opportunity for managers to explain why certain types of behavior matter and to reinforce our Group values. At appraisal time people should have clear feedback on how their skills and competencies have either had a positive impact or have hindered their job performance and achievement of objectives.”

**Clemens Miller**  
Chief Operating Officer

78 percent of our employees had an annual training and development review – 86 percent in our best performing region.

### Consultation and open communication

We operate a comprehensive system of regular communication and briefing within all businesses, including effective mechanisms for two-way communication. Everyone receives regular updates on Group and local business objectives, targets, results and best practice at central and business line levels. This includes monthly briefings from the heads of the respective business lines. All employees also receive the Group’s employee magazine, MADDO, every eight weeks in their own language. The Group Intranet, NSG Group Inside, is available to every employee on the company network. We operate formal mechanisms to brief and consult unions and employee representatives on Group operations and future plans, as appropriate to local circumstances and requirements.

### Project Messenger initiative

The NSG Group aims for excellence in communications as an indispensable part of team building, sharing objectives, understanding issues and concerns, meeting targets and creating a positive working environment. Throughout 2012 we focused on delivering our Project Messenger Communications Training Program to all of our managers and supervisors with the aim of giving them confidence in their ability to communicate effectively and appropriately in team briefings, group meetings and on a one-to-one basis.

Globally, 2,415 supervisors and 1,153 managers have attended a Project Messenger program

### Appraisal feedback training

A training program aimed at improving the feedback given to employees was rolled out to managers worldwide.

Globally, 911 managers attended the Appraisal Feedback Workshop. More than 75 percent said that they were highly likely to put the workshop learning into practice.

This workshop underlined the need to give structured, balanced and timely feedback in order to support employees in improving their performance. One of the key messages was that providing specific feedback on what is being done well along with what could be improved should be done on a regular basis, rather than just at the annual appraisal interview. It also looked at how to give effective feedback at appraisal time and the importance of giving feedback, observations and evaluation on the behaviors that have underpinned an individual’s performance, rather than focusing solely on the extent to which they have or haven’t achieved their objectives.



### Management development programs

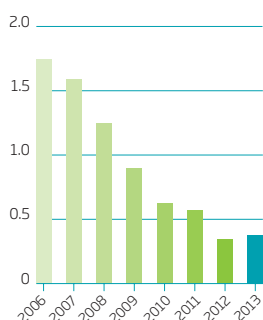
We continue to run global management development programs such as our long-standing ED1 and ED2 programs. Delegates come from all SBUs, functions and regions.

# HEALTH AND SAFETY

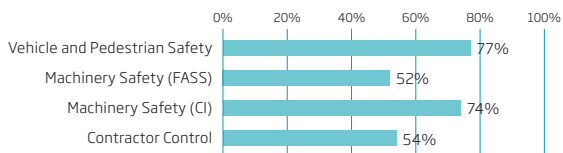
## Focus on high-risk activities in the Group

- Vehicle and Pedestrian Safety
- Machinery Safety: guarding, frequent access and isolation
- Contractor Control including permits
- Materials Handling: moving glass, load security, grabs, trolleys and pallets

### Significant Injury Rate (SIR)



### High-risk activities – percentage completion



Example of regional progress measurement to help prioritization.

## Safety organization and strategy

In 2013 the organization for safety changed. The NSG Group Sustainability Director, rather than reporting to the Group HR Director, now reports to the Chief Operating Officer. Whilst a safety update continues to be provided each month there is a more detailed safety review every six months with the senior Operations Team comprising the Heads of the four SBUs and the Heads of the Group Functions.

The first review in this new format was held in March in Gelsenkirchen, Germany with a follow up in San Salvo, Italy in September. The next review will be held in Germany in March 2014.

## Moving safety to the next level

The safety strategy remains the same with a focus on improving the effectiveness of our safety tools and programs. To help us to move safety to the next level the following initiatives were introduced:

- Independent audits of our safety tools to drive a more consistent approach, develop our safety skills and to improve our shared learning. These audits were cross Regions and cross sites within a Region for maximum impact.
- Further improve our level of proactive employee involvement as a means of continuing to change our safety culture.
- Further develop our First Line Supervisors to improve our overall level of safety leadership.

Our safety tools and programs continue to focus on further improving our control of our high-risk activities and achieving an 80 percent reduction in our Significant Injury Rate by 2015.

## Safety performance

The Significant Injury Rate continues to be our primary reactive indicator. This records injuries requiring medical treatment beyond first aid or the reallocation of duties to allow an individual to continue working in addition to any absence from work. The SIR for financial year FY2012 was 0.35; an improvement of 38 percent compared to FY2011.

The SIR for financial year FY2013 was 0.38; an increase of 9 percent compared to FY2012.

Fire fighting course with local fire service.



Safety Day leaflets distributed to employees.



### Safety Day

Following the success of Safety Day in 2011 and 2012 the third such event was held on 17 October 2013 and proved to be our most successful. The date was set much further in advance to help planning and sites knew from their previous experience what events are best suited to work most effectively in their culture.



Senior managers attended sites to demonstrate their personal commitment and the opportunity was taken to celebrate safety success. Sessions were held to further increase the level of safety awareness, there were many health-related activities and employees were given the opportunity to improve their first aid, fire fighting and emergency response skills.

### Bravo wins Confindustria 'Enterprises for Safety' national prize

Our San Salvo Bravo site in Italy was recognized for its safety performance and won a national safety award. The awards were supported by the lead organization representing Italian industry and the Italian National Institution for Work Accidents.

The prize helps to spread a culture of occupational safety and innovation and publicizes the best practices of enterprises that excel in commitment to continual improvement of health and safety.

Forklift safety driving contest in Vietnam.



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## CUSTOMERS

HIGH QUALITY AND SERVICE STANDARDS ARE KEY FEATURES IN BUILDING RELATIONSHIPS WITH OUR INDUSTRY CUSTOMERS AND END-CONSUMERS. WE ARE COMMITTED TO THE SAFE USE OF OUR PRODUCTS, ENSURING THEY CAN BE EFFECTIVELY HANDLED, FITTED AND USED BY OUR CUSTOMERS.

We aim to be the most efficient, most reliable, most responsive and most sustainable supplier of choice of our customers. Our objective is to produce a wide range of effective, innovative and sustainable products in all our business and our R&D effort is focused on product and process development to support this objective.

Most efficient means having the lowest delivered unit cost of what we supply and using the minimum resources and energy to produce and process them.

Most reliable means that, having committed to a customer order, we deliver what they ordered, with the promised quality, when they expect it, in full, on time, every time, without quality issues or paperwork mistakes.

Most responsive means that when our customers contact us by whatever method, they get an answer immediately. In other words, they know where they stand with us.

To be the most sustainable supplier means ensuring that we set high standards and adhere to them throughout the supply chain, from our own suppliers, through manufacturing, transport and delivery. We aim to achieve an economic performance that ensures the long-term viability of the Company.



### 1. Product responsibility

We aim to provide customers with products that have safety, environmental and in-service benefits. These include personal protection, security, energy saving, solar control, noise reduction, fire protection, improved styling and enhanced visibility for vehicles, and self-cleaning properties for glazing in buildings.

We are well aware that glass products generally require careful handling. We are committed to the safety of our products and to ensuring they can be effectively handled, fitted and used by our customers. Our product risk review procedures are designed to identify risks and to provide advice to users on safe handling. We communicate these risks through safety data sheets, labels, and Glazing and Handling Guidelines.



## Awards for quality and marketing

### Architectural

- 'Supplier of the year' awarded by JE Berkowitz to Pilkington North America.
- PNA was awarded most innovative product from US Glass magazine for Pilkington **MirroView™**.
- Pilkington UK won Commercial Project of the Year at the G13 Awards – one of the main highlights in the UK glazing industry's year.
- Corius office building in Poland was certified with LEED Gold using Pilkington **Suncool™** and Pilkington **Optiphon™**.

- The University of Helsinki library was certified with LEED Gold using Pilkington **Suncool™** Pilkington **Optitherm™** and Pilkington **Optiphon™** OW.

### Automotive

- Our Guilin plant in China won 1st prize in a national Kaizen competition.
- 2013 Master of Quality award presented to Mexicali from Daimler Truck (the only glass supplier to win the award).
- Fiat 'Qualitas Awards' – Argentina.
- Toyota 'Quality Achievement Performance Certificate' and 'Etios Project Contribution Special Award' – Brazil.

- Toyota: Quality Achievement Award and Quality Appreciation award (Japan).
- Nissan: Best Companies in Nissan cars Sales Introduction (Japan).
- Mazda : Outstanding VA/VE award (Japan)

### Technical Glass

- 'Supplier of the Year' was awarded by Gates Europe to NGF Europe in August 2013.
- Display division received Excellent Supplier Award from TPK Holding Co., Ltd in July 2013.



## 2. Highest quality

Quality is a key feature in building successful relationships with our industry customers and end customers. It is also a key factor in sustainability, because high quality can reduce waste throughout the supply chain, while improving production efficiencies. Quality encompasses design, development, manufacture, delivery, assembly and price of glass, as well as customer support. In the NSG Group, the achievement of high quality is supported by the use of rigorous quality management systems and standards.

In the Architectural Glass business, the Group has ISO 9000:2000 quality management certification in Europe, Japan, North and South America.

Our European Architectural Glass business has been a leading player in the development of new glass product standards for the European building industry. These standards have provided a route for glass manufacturers to meet the European Construction Products Directive and apply to virtually all NSG Group products used in buildings.



## 3. Product innovation

The NSG Group is a global leader in manufacturing excellence and innovation, notably in the areas of glass melting, glass forming by the float process, online coating and complex shaping technology, especially for automotive windshields and backlights. The Group invested €6,900 million in R&D in FY2013.

The Group owns or controls approximately 4,000 patents and patent applications, predominantly in the fields of float glass production and processing and automotive glazing and also in the Information Technology field, and has access under license to patents held by third parties. The Group has also been active in selective licensing of its patents and technology, in the areas of online coating, encapsulation (of automotive glazing) and rain sensors for automotive glazing.

## SUPPLIERS

WE PURCHASE MATERIALS, GOODS AND SERVICES FROM OVER 20,000 SUPPLIERS WORLDWIDE. OUR SUPPLIER CODE OF CONDUCT AND RELATED AUDITS HELP ENSURE THAT OUR SUPPLIERS UNDERSTAND AND COMPLY WITH OUR STANDARDS.

As part of our Sustainable Procurement Program, we operate a Supplier Code of Conduct. It outlines behaviors, processes and procedures – in short, the standards we expect from our suppliers. Engagement with suppliers may be via appropriate account managers and the Procurement function has the responsibility to ensure that suitable engagement arrangements are in place and communicated.

Our manufacturing processes use materials, products and services procured from around 20,000 local, regional and global suppliers. Our suppliers are therefore crucial to the achievement of our sustainability objectives. To manufacture and supply superior quality glass products to our customers, we aim to build strong relationships with suppliers that are based on a framework of trust, cooperation and sustainability.

### Our Supplier Code of Conduct

The wide range of issues addressed in the Code reflect the many and diverse activities in which our suppliers are involved. Wherever possible, the Code defines a fair and common-sense approach to doing business, while incorporating all relevant legal requirements.

The content of the Code also takes into account our Values and Principles, particularly the emphasis on safety, taking personal ownership for our actions and communicating with openness and involvement. It is the responsibility of all of our suppliers to follow the principles of this Code to ensure compliance with our requirements.

### Supplier Sustainability Evaluation

Between 2011 and 2015 we plan to evaluate approximately 500 key suppliers.

In order to meet our objectives of completing assessments of our key suppliers as well as further due diligence on our suppliers of high environmental impact NSG has engaged in the services of EcoVadis.



EcoVadis is a well-established company in the area of CSR/ sustainability evaluation and has many major companies as clients. After looking at several potential service providers, a decision was made to select EcoVadis based on its global reach, comprehensive online assessment tool, the location and size of our supplier and also its impressive portfolio of customers.

Important aspects of the evaluation are the ethical and social behavior of our suppliers as well as their environmental management system and approaches to health and safety.

Using a third-party provider means we can accelerate the process of completing assessments and, for the low-scoring suppliers identified as a significant risk we will continue to use the services of our own Supplier Development Team to work with them on an improvement plan including clear timescales for implementation.

Suppliers who are unwilling to cooperate may not have a long-term future with NSG.

## The standards we expect

We expect our suppliers to achieve and maintain high standards throughout the supply chain, but particularly with regards to the following:

### Ethical behavior

Our suppliers must accept personal responsibility for behaving professionally, ethically and with integrity and fairness.

### Social behavior – human considerations in the workplace

All our suppliers must conform to the relevant International Labor Organization Labor Standards as a minimum requirement.

### Environmental behavior

Our suppliers must recognize the crucial importance of their role in reducing environmental impact. They must play their part in creating a prosperous and sustainable future by continually seeking to achieve best practice in environmental protection.

### Evaluation

Key elements of the code now form part of our supplier audits. We have a supplier development team of 15 engineers, covering all regions. This team is responsible for improving performance where necessary against these standards.

We expect our suppliers to uphold our standards in dealing with their own suppliers, contractors and sub-contractors and to be able to provide evidence of this if requested.

## Impact on the environment

In 2010, we began to identify suppliers that have a particularly high impact on the environment. Our aim is to ensure that our suppliers minimize their negative impacts and work positively on environmental initiatives. The scope includes wooden packaging, batch materials, waste management contractors and chemicals. We insist that suppliers in these categories have a recognized environmental certification such as ISO 14001 or equivalent. In the case of wooden packaging we look for a recognized chain of custody in regard to the wood supply.

Currently, around two-thirds of our 700 suppliers in this category meet our requirements for environmental certification or chain of custody for wood supply. Those who do not comply are undergoing further evaluation and development or will be phased out.

## Working with suppliers to save energy

Our procurement activities and projects demonstrate our commitment to sustainability. Good practice is shared through Global Procurement Category teams and spread throughout the Group. We leverage our Global Procurement function to achieve this spread of good practice effectively and efficiently.

We are working with key suppliers to develop projects to reduce energy consumption in our manufacturing sites. Close collaboration with leaders in specific technologies is enabling us to implement optimum solutions to specific energy management challenges. For example, in our sites in Italy and the UK, new efficient lighting systems have been installed in place of old outdated lamps, leading to a halving of electricity consumption and a significant reduction in ongoing maintenance. Collaborative projects have also been implemented to address compressor inefficiency, to make better use of waste heat generated in our glassmaking processes and to reduce peaks in electricity demand.

## Communication and co-operation

In line with our Sustainability Policy, we communicate with and work constructively with our suppliers and governments, regulatory agencies, the scientific community and other relevant stakeholders, to develop and encourage business and community practices that make progress towards the common aim of sustainable development.

### Conflict minerals

NSG Group supports the goals and objectives of the Dodd-Frank Wall Street Reform and Consumer Protection Act's Section 1502, which aims to prevent the use of conflict minerals that directly or indirectly finance or benefit armed groups in The Democratic Republic of the Congo (DRC) or an adjoining country as defined in the Act.

Identifying suppliers who provide materials that could potentially include these minerals is now a very important part of our procedures and due diligence is being completed via an online questionnaire.

There is an action plan to eliminate any use of these materials and where there is a level of uncertainty further checks are made, including visits to the supplier, by our Supplier Development Team to confirm and eliminate.

## COMMUNITIES

THE LOCAL COMMUNITIES THROUGHOUT THE WORLD IN WHICH THE NSG GROUP OPERATES ARE THE FOUNDATION OF OUR BUSINESS AND THE LIVES OF EMPLOYEES. WITHOUT A RELATIONSHIP OF MUTUAL BENEFIT WITH THESE COMMUNITIES, THE GROUP AS A WHOLE COULD NOT SUSTAIN ITS OPERATION.

We have around 28,000 permanent employees, with principal operations in 30 countries throughout Europe, Japan, North and South America, China and South and South East Asia. We do this in over 500 separate facilities worldwide – some large and some small. Each has an impact on the community in which it is based, by providing employment, investment and other benefits, but also having an impact on the environment.

The effects of necessary investments on our communities are generally beneficial, bringing additional employment and economic benefits. For every investment we make, an impact assessment is conducted to ensure we understand and manage the likely effects on the community, the environment and the local economy.

As a responsible and often prominent member of the communities in which we operate, we believe it is important to be involved actively by leveraging our core business and management resources to help to address local issues.

### Aims and objectives

We want our operations to function in healthy, thriving communities and to be seen as a good neighbor to those communities.

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For every investment we make, an impact assessment is conducted to ensure we understand and manage the likely effects on the local community, the environment and the local economy.

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We know that if we want to operate effectively and to be able to expand or change when the time is right, we need the goodwill that comes from being an active supporter of the community.

In addition to our business investments, helping to sustain local operations, we also invest in the communities in which we operate. We aim to help through direct cash donations to charities and other projects or through in-kind resources – to improve the health of the community or tackle specific social issues. We operate programs that assess and manage the impacts of our operations on communities, including entering, operating and exiting.

We also involve our staff in providing a lead in developing our relationships with the communities in which we operate. This can take the form of matching contributions raised by staff or allowing staff time to make personal contributions of time and effort in local projects.

In FY2013, we made contributions worth around ¥33 million to our local communities. Our grants helped the arts, medicine, welfare, job creation and urban renewal.

## LOCAL COMMUNITY ACTION INITIATIVES



### Flood relief in Aken, Germany

When the area around our Aken plant was flooded, NSG organized dryers and emergency power supplies for affected NSG employees. Emergency services used the plant facilities and NSG made a donation to the firefighters who supported us during the flood.



### VASA plant community project

Our employees are encouraged to participate in their local communities. Our VASA plant in Argentina was involved in a project to clean and paint a local school.



### Tree planting in Chile

Our Lirquen plant in Chile carried out community projects in the surrounding schools including tree planting and school painting. Caçapava automotive plant organized several employee family visits to the plant.



### Sponsoring community awards

NSG sponsored the Sustainable School Award at the St Helens Reporter Education Awards 2013. This category recognizes schools that have developed environmental awareness and sustainable development education across all the curriculum areas and the life of the school.



### Pilkington Vehicle Design Awards 2013

The annual Pilkington Vehicle Design Awards at the Royal College of Art continues to recognize talented future car designers from around the world. The awards provide a platform for students to showcase their creative talents to prospective employers including the world's leading automotive manufacturers and designers. Employers use the awards to identify up-and-coming talent in the industry.



### NSG apprentices

NSG apprentices based on UK sites have all received distinctions in every single one of their college subjects this year.

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## APPROACH TO REPORTING

This Report forms part of our non-financial performance communications and reflects Group, regional and site-level reporting. Unless otherwise stated, the Report covers those businesses over which the NSG Group has management control.

Data relating to the environmental performance of Group operations covers 31 float and five rolled glass sites. Joint venture sites where we do not have operational control are excluded. All Architectural, Automotive and Technical Glass downstream processing are also included in the reporting. Safety statistics shown cover our 'workforce' (employees and permanent contractors).

Our environmental and social performance is of interest to our stakeholders and important to our business success and we have been reporting on these matters since 2002, in successive environmental, social activity or CSR reports.

We published our first Sustainability Report in 2009, when we decided to widen our reporting to cover all aspects of sustainability. In June 2009, we published our Group Sustainability Policy, setting our sustainability agenda, and in December 2009 established a Group sustainability Committee to direct, coordinate and monitor our efforts to improve our approach to sustainability.

In 2010, the Board agreed specific sustainability targets for the Group. These are shown on page 07 of this Report, along with an account of our progress towards them.

In 2012, Shiro Kobayashi was appointed as the Group's Director of Sustainability. Shiro chairs the Sustainability Committee, which is leading our efforts to ensure that the principles of sustainable development are embedded in all of the Group's activities. We will report further on our progress in our 2014 Sustainability Report, which will be published in early 2015.

This Sustainability Report has been prepared in accordance with the Global Reporting Initiative (GRI) G3 Sustainability Reporting Guidelines, which provide a globally recognized framework for reporting on an organization's economic, social and environmental performance and responsiveness. We have self-declared our performance at Application Level B.

To keep the size of the printed report to a minimum, we have included additional information, charts and tables covering our performance in the Sustainability section of our website.

The printed report can also be downloaded from our website at [www.nsg.com/sustainability](http://www.nsg.com/sustainability).

For detailed GRI and UNGC index, please visit [www.nsg.com/sustainability](http://www.nsg.com/sustainability).

## FURTHER INFORMATION

We produce a regular flow of publications intended to provide current and potential investors with as much information as possible about the Group, the industries in which we operate and the organization, strategy, targets and progress of the Group. The range of these publications is shown below.

### Publications



#### Annual Report

In order to obtain a full understanding of the performance of the Group, this document should be consulted.



#### To our Shareholders

Published twice a year, in June and December, designed to keep shareholders informed of progress against our strategy. Editions in both English and Japanese.



#### The Way we do Business

Produced for Group employees in all of the languages in which the Group operates, summarizing the main points of the Group's Code of Conduct.

### Company information (as at 31 March 2013)

**Company name:** Nippon Sheet Glass Co., Ltd.

**Unified global brand:** NSG Group

**Head office:** 5-27, Mita 3-Chome, Minato-ku, Tokyo 108-6321 Japan

**Established:** 22 November 1918

**Paid-in capital:** ¥116,449 million

**Total assets:** ¥885,436 million

**Net sales:** ¥521,346 million (consolidated)

**Employees:** 27,932

**NSG Group companies:** 244

**Web:** [www.nsg.com](http://www.nsg.com)

### Websites

NSG Group corporate website (English)

[www.nsg.com](http://www.nsg.com)

NSG Group corporate website (Japanese)

[www.nsg.co.jp](http://www.nsg.co.jp)

Commercial website (Architectural and Automotive)

[www.pilkington.com](http://www.pilkington.com)

Sustainability contact

[www.nsg.com/en/contact-us](http://www.nsg.com/en/contact-us)



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