

# SUSTAINABILITY REPORT 2012

'MAKING A DIFFERENCE TO OUR WORLD  
THROUGH GLASS TECHNOLOGY'



## MAKING A DIFFERENCE TO OUR WORLD THROUGH GLASS TECHNOLOGY

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.

We are committed to Sustainability. We supply high-quality glass products that make an important contribution to improving living standards, to people's safety and well-being and to energy conservation and generation, working safely and ethically.

We have a clear commitment to sustainable development. Our Sustainability targets, are consistent with our overall strategy, but seek to move our performance forward in a number of important areas relevant to our Sustainability agenda. Our targets and progress are shown on page 7 of this Report.

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.

### Cover picture

The Adgar Plaza building in Warsaw, Poland, features around 3,000 sq meters of Pilkington **Insulight™ Sun** insulating glass units, fitted with Pilkington **Suncool Optilam™ 50/25**.  
Photo credit: Wojciech Krynski.

## ABOUT THIS REPORT

During 2012, we made further progress in embedding the principles of sustainable development within our company.

Last year, we joined 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.

Corporate governance has been strengthened with the publication of a Group Anti Bribery/Anti Corruption manual and improvements in the Reporting of Concerns procedures.

Our principal Sustainability targets and the progress we have made so far towards their attainment are 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 on the Sustainability section of our website, [www.nsg.com](http://www.nsg.com).

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The NSG Group

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Management

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Special features

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Basis of reporting



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## 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

# 10,200

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

# 14,800

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
- Other glass fibers

# 3,800

Employees in five countries

## Sales by region

Financial Year 2012



# 43%

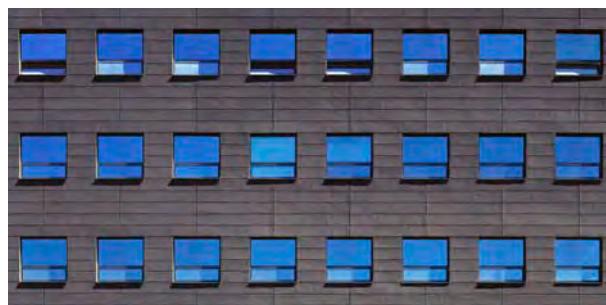
Contribution to Group sales\*

Proportion of Group CO<sub>2</sub> emissions 62%

\*All figures Financial Year ending 31 March 2012.

## 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 2012



# 46%

Contribution to Group sales\*

Proportion of Group CO<sub>2</sub> emissions 33%

\*All figures Financial Year ending 31 March 2012.

## 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 sector

Financial Year 2012



# 11%

Contribution to Group sales\*

Proportion of Group CO<sub>2</sub> emissions 5%

\*All figures Financial Year ending 31 March 2012.

## 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.



#### THE NSG GROUP CONTINUED

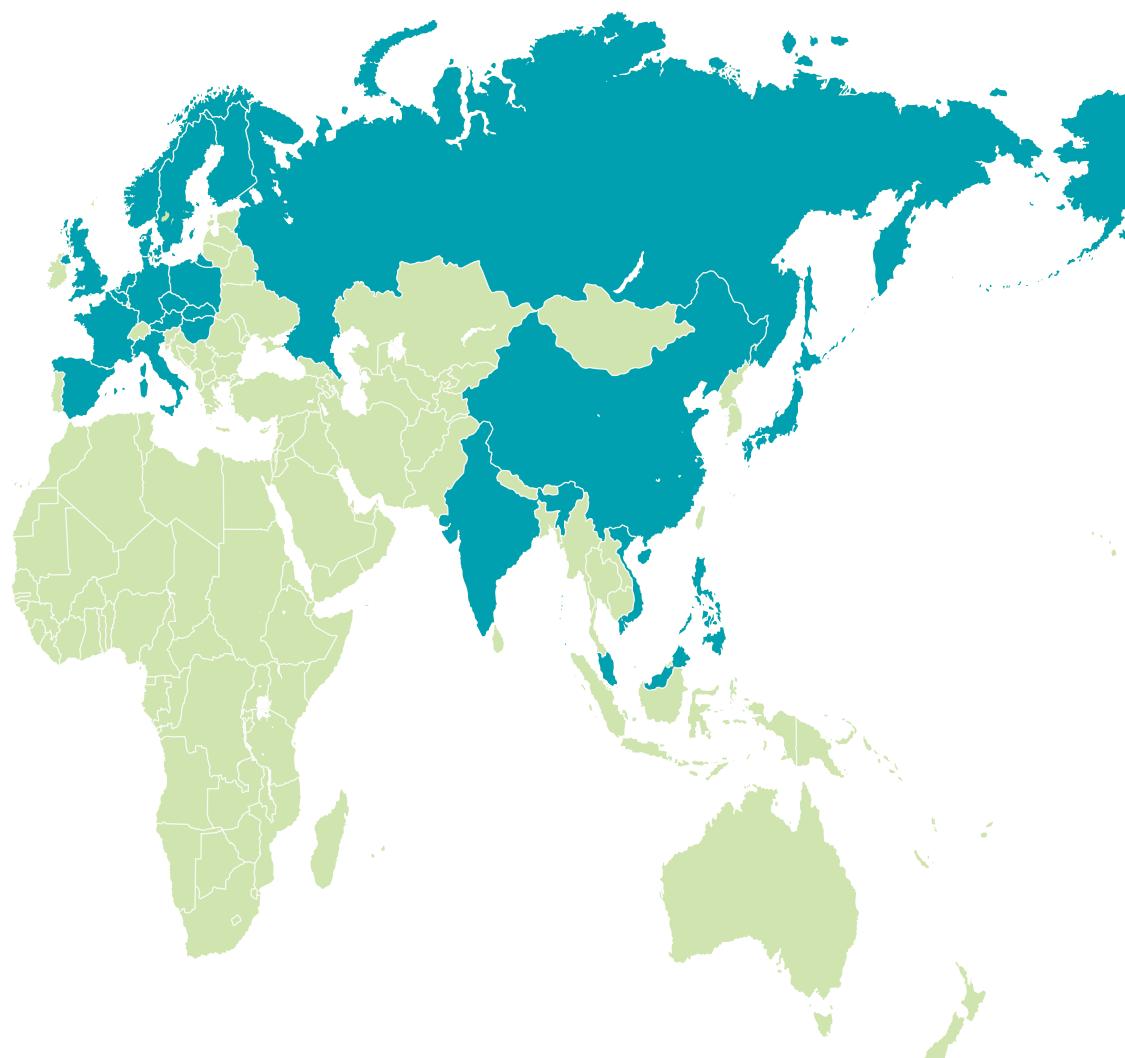
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## GLOBAL OPERATIONS

OUR OPERATIONS SUPPORT A WORLDWIDE CUSTOMER BASE. WE HAVE PRINCIPAL OPERATIONS IN 29 COUNTRIES, AND MARKET OUR PRODUCTS IN OVER 130 COUNTRIES.

### Principal operations

- Argentina
- Austria
- Belgium
- Brazil
- Canada
- Chile
- China
- Czech Republic
- Denmark
- Finland
- France
- Germany
- Hungary
- India
- Italy
- Japan
- Malaysia
- Mexico
- Netherlands
- Norway
- Philippines
- Poland
- Romania
- Russia
- Spain
- Sweden
- United Kingdom
- United States
- Vietnam



## Architectural

### Manufacturing

Glass for architectural and Solar Energy applications

Principal operations in 21 countries. Overall, the Group manages, or has a stake in, 49 float lines around the world.

### Global spread

Major presence in Europe and Japan. Also in North America, China, South America and South East Asia

## Automotive

### Manufacturing

Supplying the world's leading vehicle manufacturers

Principal fabrication facilities at 31 sites in 16 countries. Major presence in Europe, Japan, North America, South America and China.

### Global spread

Leading share of the global Original Equipment (OE) and Specialized Transport Markets. Largest player globally in Automotive aftermarket (AGR) glazing distribution and wholesale.

## Technical Glass

### Manufacturing

Producing the world's thinnest float glass

Major fabrication facilities in Japan, China, the Philippines and Europe.

### Global spread

World leader in thin display glass and optical devices for office machinery and glass fiber for battery separators and timing belts.



### Europe

**12,500 employees**

- 12 float lines
- Rolled glass operations
- Automotive OE plants in seven countries
- Architectural downstream in 10 countries
- Extensive AGR network
- Technical Glass operations in UK

### North America

**3,990 employees**

- Six float lines
- Automotive OE in US, Canada and Mexico
- Extensive AGR network in US
- Technical Glass operations in Canada

### S & SE Asia

**3,000 employees**

- Two float lines and Automotive operations in Malaysia
- Automotive plant in India
- Two float lines in Vietnam
- Technical Glass operations in the Philippines

### Japan

**4,910 employees**

- Four float lines
- Architectural downstream network
- Automotive OE plants and AGR network
- Technical Glass operations

### South America

**2,780 employees**

- Seven float lines
- Architectural downstream operations
- Automotive OE in Brazil, Argentina and Chile
- AGR network

### China

**2,520 employees**

- 16 float lines
- Two Automotive plants
- Technical Glass operations
- Rolled glass for photovoltaics

All figures Financial Year ending 31 March 2012.

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## PRESIDENT AND CEO'S INTRODUCTION

**OUR COMPANY IS COMMITTED TO SUSTAINABILITY. WORKING SAFELY AND ETHICALLY, WE SUPPLY HIGH-QUALITY GLASS PRODUCTS THAT MAKE AN IMPORTANT CONTRIBUTION TO IMPROVING LIVING STANDARDS, TO PEOPLE'S SAFETY AND WELL-BEING AND TO ENERGY CONSERVATION AND GENERATION.**

"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. Good management of our people, our resources, our communities and our environment also makes good business sense. This Report covers our activities and progress over the past year and our targets for the future."



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

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

Despite challenging market conditions and significant organizational restructuring during 2012, we have continued progress on our sustainability targets. We aim to balance the needs of all our stakeholders, managing the environmental impacts of our activities, developing our people, encouraging innovation in processes and products, working in harmony with the communities in which we operate and encouraging our customers, contractors and suppliers to do the same.

Our policies underline the contribution our products can make to addressing climate change. 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.

Glass has an important contribution to make in helping to reduce greenhouse gas emissions. We work with stakeholders in the framing of policies and regulations to help improve energy efficiency through the use of glass.

We work continuously to minimize energy input into all our processes, using as diverse a range of energy sources as practicable. The new 3,000-panel solar field at our facility at Northwood in the US, is now generating 250 kW of energy, or about 10 percent of what the facility uses, every year.

A major focus with our employees is to improve Safety. Despite significant improvements in our performance over the last 10 years, we have still not made sufficient progress in this area. In July 2012 a permanent contractor at our San Salvo facility was killed while re-energizing a transformer. This tragic event underscores the work we have left to do.

My aim is to build on and continue to move Safety to the next level. Our safety programs emphasize the importance of individuals taking personal responsibility and of appropriate safe behavior, with managers taking the lead through their commitment to our Key Safety Leadership Behaviors. NSG Group Safety Day is designed to bring special focus to this important area in all our plants around the world. A report on the 2012 event can be found on pages 32 and 33.

We have further strengthened our Sustainability governance, by allocating defined responsibility to named individuals for managing and monitoring our progress. Over the coming year we will continue the process of aligning all our activities more closely to the principles of sustainable development and embedding these principles into all our activities.

# OUR SUSTAINABILITY TARGETS

Targets	Current position and Commentary
<b>Economic</b> We aim to achieve a sustainable operating profit margin in excess of 10 percent.	As at March 2012, the Group's operating profit margin (before amortization arising on the acquisition of Pilkington) was 2.8 percent.
<b>Energy</b> Report specific direct energy usage for eight key products, across all three business lines, and demonstrate improvement by 2015. Work in this area is the subject of a number of R&D programs in all three business lines.	The eight key products selected are as follows: <b>Architectural</b> <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> <b>Automotive</b> <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> <b>Technical Glass</b> <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> Data for the selected products is available in the Sustainability section of <a href="http://www.nsg.com">www.nsg.com</a> .
<b>Product development</b> Report energy payback/life cycle analysis for eight key products, across all three business lines, and demonstrate improvement by 2015. Good progress made with a number of R&D programs ongoing. A forward look at future/modified products and their impact on improved CO <sub>2</sub> payback has been initiated.	The eight key products selected are as follows: <b>Architectural</b> <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> <b>Automotive</b> <ul style="list-style-type: none"> <li>• Car windshield</li> <li>• Car sidelight</li> <li>• Car roof light</li> </ul> <b>Technical Glass</b> <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> Data for the selected products is available in the Sustainability section of <a href="http://www.nsg.com">www.nsg.com</a> .
<b>Health and Safety</b> Significant Injury Rate 80 percent reduction from 2007 base of 1.38 to 0.3 (10 SI per month, compared to baseline of 50).	The SIR at the end of FY2012 was 0.35 which represents an 82 percent improvement. Our FY2013 target is 0.28 to provide a safer place of work for our employees.
<b>Supply Chain</b> 100 percent of suppliers to have accepted our Supplier Code of Conduct (SCoC), with 50 percent of key suppliers audited against SCoC by 2015.	At 31 March 2011, we had 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 supplier acceptance of our Code (approx 30 percent) and over 60 of our key suppliers now audited. Suppliers have an impact on our carbon footprint and on the communities and environments in which they operate. It is our intent that suppliers share our values and principles as set out in our Supplier Code of Conduct.
<b>Recycling and Waste</b> Reduce the waste we send to landfill by 50 percent, from a 2007 base (i.e. from approximately 46kt to 23kt by 2015).	Our waste to landfill figure for 2011 was 32kt. This is a 30 percent reduction on our baseline. The achievement of further reductions will require significant changes in the way we operate.
<b>People</b> All employees to have a training and development review annually, with a target compliance level of 90 percent by 2015.	67 percent of employees were covered by the annual training and development review process in 2011. In order to foster the process of cultural change across the whole organisation in the area of Health and Safety, it was required that all managers were set personal safety objectives in the 2011 process.

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## OUR APPROACH TO SUSTAINABILITY

**GLASS HAS A MAJOR PART TO PLAY IN SOCIETY'S EFFORTS TO REDUCE CO<sub>2</sub> 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 and procedures and reflected in our seven Sustainability targets. In achieving these, we also help the business to be more successful for all stakeholders.

We aim to balance the needs of all our stakeholders while achieving our targets. We continue to train and develop our people while keeping them safe from workplace injuries and helping them stay safe at home as well. 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 and the world 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 in regard to sustainability reporting.

Our customers are increasingly expecting information on carbon content, hazardous materials, recycled content and other life cycle analysis information, among their many data requests, and we are aware of the competitive need to be able to provide this data swiftly and accurately.

We work with the 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 area 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 consumption our products can and do have a tremendously positive contribution 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 management leadership team remains actively committed to our High Risk Activity reduction safety program. In 2012, we repeated the successful annual NSG Group Safety Day, covered elsewhere in this Report.

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 our responsibility to protect the natural habitats of these regions seriously.

We continue to make progress in energy-saving initiatives within our own operations. A new lighting system for our Automotive plants in Italy is expected to cut energy costs by nearly 60 percent. The project will replace more than 5,000 lamps across the three sites with an energy-saving system which reacts automatically to levels of daylight.

The system not only saves a great deal of energy, it also provides a steady light level which makes working conditions far more comfortable for our employees. The completed project is expected to result in a reduction in energy consumption of some 4.4m kWh, with CO<sub>2</sub> emissions cut by more than 2.8k tonnes. A similar system has been installed in our newly-commissioned coating plant at Cowley Hill in the UK.

The solar field installed alongside our North American research and development facility at Northwood, Ohio, has generated nearly 330,000 kWh in its first year of operation. Energy from the field is utilized by the plant under a net-metering agreement with the local utility, which allows Northwood to purchase power from the solar field and defray power taken from the grid. In its first year, the field has supplied 7 percent of the site's energy needs.

## Our vision

Defines our determination to make a positive contribution to Sustainability, through our expertise in glass technology.

As a global glass manufacturer, we are using our products and technology to play a positive role in helping to reduce greenhouse gas emissions and mitigating the effects of climate change.

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.

People are our most important asset. We value:

- Trust and mutual respect.
- Integrity and professionalism.
- Teamwork and mutual support.
- Open communication.
- Initiative and creativity.
- Passion and resilience.
- Individual and social responsibility.
- Sustainability.

## Our Code of Conduct

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

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

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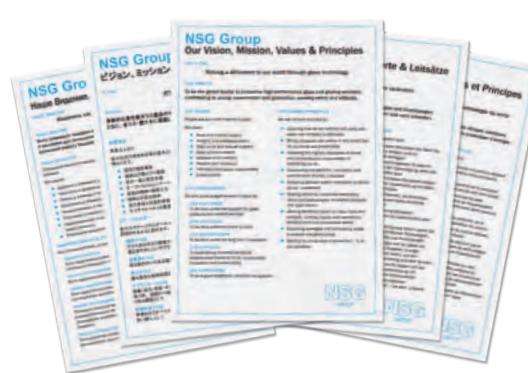
Our Code of Conduct reflects our values and principles, particularly the emphasis on safety, taking personal ownership for actions and communicating with openness and involvement.

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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.

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## OUR APPROACH TO SUSTAINABILITY CONTINUED

### Our management approach

#### Economic

We are executing our strategy through a market-facing regionally organized business, based on three business areas: Architectural, Automotive and Technical Glass. A good balance between regional and global organizational structures will drive efficiency and allow us to react quickly to market developments.

Our immediate priority is to improve the profitability of the Company and earn the trust of our stakeholders through our achievements. Our profit improvement programs are well advanced and since our initial announcement in February 2012 we have introduced additional measures and accelerated restructuring activities.

We are examining carefully all aspects of our current asset base. Our objective is to right-size our business urgently and to accomplish this within the fiscal years FY2013 and FY2014.

We aim to improve manufacturing performance through efficiency improvements and rationalization. We have been quick to take action to adjust our capacity to demand through temporary and permanent closures of plants.

We operate in a good industry with positive prospects, but we must ensure we are cost competitive. We are aiming to lower the breakeven point of our business by reducing overheads, improving manufacturing efficiency and controlling our input cost through best-in-class procurement and shared services. We aim to ensure that we spend our limited resources wisely and generate capacity at much lower capital costs.

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**Our immediate strategic priority is to improve the profitability of the Company and earn the trust of our stakeholders through our achievements.**

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#### 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 do. We conduct regular environmental audits designed to achieve continuous improvement, to sustain 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, both positive and negative.

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. 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. 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.

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

We aim to certify our manufacturing facilities to the internationally recognized ISO 14001 environmental standard. We now have 81 certified sites around the world, representing 70 percent of our business by turnover. The most senior executive with responsibility for environmental aspects is the Group Director of Sustainability.

#### Human rights

Our Code of Conduct acknowledges internationally proclaimed human rights and the impact these have on employment. Employment standards have been set, derived from external international human rights employment guidelines and our own business requirements.

The Code and our overall employment policy provide employees with reassurance on how they will be treated, and guide employment policy and practice in individual businesses.

Our equal opportunity policy aims to prohibit discrimination based on race, color, 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.

**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.**

### **Labor practice**

Our management philosophy values people as 'the most important asset of our company'. Around 29,000 people work in the NSG Group, operating in 29 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 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 Employees section of this Report.

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.

### **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 in the project 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.

### **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.

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## 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 to all our stakeholders business goals and guidelines that clearly demonstrate a responsible management approach.

The Audit Committee, chaired by an independent external director, Sumitaka Fujita, comprises six members, including 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, George Olcott, and comprises five members, including three independent external directors.

### 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, the Vice-Chairman, three directors concurrently serving as representative executive officers and four independent external directors. In the fiscal year 2012, the Board of Directors met 11 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, Seiichi Asaka, the Committee consists of seven 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 page 15.

## 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.

It defines the conduct expected of the Group and its employees across all areas of our business and applies to relationships with employees, customers, suppliers, business partners, the community and all others with whom we have contact in daily business life (our stakeholders).

Alan Graham is Group Chief Compliance Officer. His responsibilities include the development, implementation and maintenance of an integrated internal compliance management and control system as well as the creation and review of relevant Group policies and procedures.

In line with best practice, we have strengthened our 'Reporting of Concerns' procedures, which allow employees to voice any corporate governance issues using a reporting line and web portal.

Reflecting changes in legislation in some jurisdictions in which we operate, we have also reviewed and further clarified Group rules intended to address potential bribery and corruption risks, with the publication of a Group Anti Bribery/Anti Corruption Manual.

All NSG Group directors, officers and employees must adhere strictly to the standards defined in the Manual to avoid bribery and corruption related risks.

The Manual also applies to the Group's investments and interests in joint ventures and joint projects and other comparable business partnerships and arrangements in which the NSG Group is participating.

Reflecting legislative changes, we have reviewed and clarified our rules to address potential bribery and corruption risks, with the publication of a new Group Anti Bribery/Anti Corruption Manual.

## Reporting of Concerns Procedures

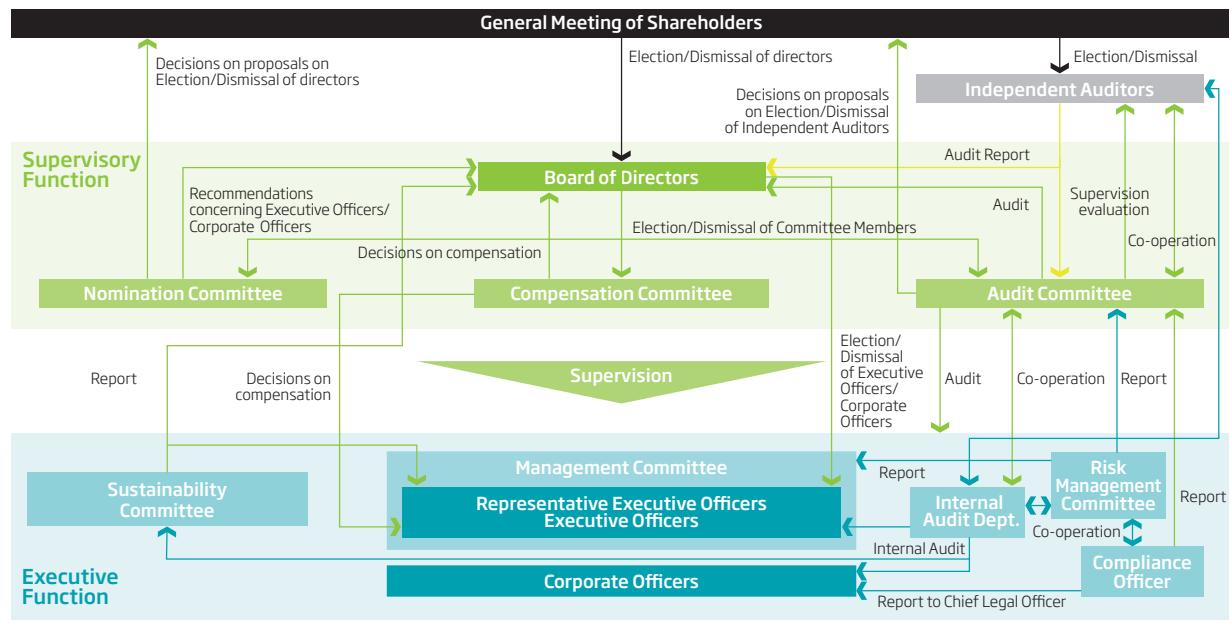
Over the past year, in line with best practice, we have further strengthened our Reporting of Concerns procedures, which allow employees to report any concerns.

Our external partner, Global Compliance Inc., operate a worldwide telephone Reporting Line and web portal system, which is available to all employees, 24 hours a day, every day of the year.



Supporting posters and handouts explaining the new arrangements have been distributed to Group employees in all languages used throughout the Group.

## Open Management System



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## GLASS AND CLIMATE CHANGE

**GLASS HAS A UNIQUE ROLE TO PLAY IN SOCIETY'S ATTEMPT TO REDUCE GREENHOUSE GAS EMISSIONS AND MITIGATE THE EFFECTS OF CLIMATE CHANGE. THE ENERGY USED IN MAKING HIGH-PERFORMANCE ARCHITECTURAL GLASS PRODUCTS IS QUICKLY PAID BACK.**

Glass has a unique role to play in promoting Sustainability, reducing greenhouse gas emissions and mitigating the effects of climate change. 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.

### Glass in buildings

On average, buildings account for almost 50 percent of the energy consumed in developed economies. Governments are putting increased focus on legislation and policies to improve their energy efficiency.

Sustainable building rating system initiatives 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.

We work closely with governments and authorities framing building standards to ensure that the energy conservation properties of glass and glazing are taken into account when standards are set.

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.

### CO<sub>2</sub> emissions and low-e double glazing

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 in a study undertaken for the trade association Glass for Europe of which NSG Group is a member.

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.

To maximize energy efficiency all year round, often the ideal glazing solution balances both solar control and low-emissivity performance. Our products offer two ways in which this can be achieved: by applying a single product that provides both solar control and low-emissivity in an insulating glass unit, or by using both a solar control product and a separate low-emissivity product within an insulating glass unit.

### CO<sub>2</sub> emissions and solar control glazing

In hot conditions or for buildings with high internal loads, solar control glass is used to minimize solar heat gain by rejecting solar radiation and to help control glare. In more temperate conditions, it can be used to balance solar control with high levels of natural light. The issue of air-conditioning is a major concern to building designers and architects. Often, more energy is used to operate air-conditioning systems during the summer months than to heat the building in winter thereby increasing its carbon footprint. It is therefore essential to improve the energy efficiency of buildings during the summer as well as in the winter.

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.

## Low-e insulating glazing can be a net contributor to energy conservation in buildings

Low-e glass is a value-added product that has a transparent coating on one surface. This reflects heat back into the building, thereby 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.

## Glass in vehicles

As we describe later in this report, in the automotive industry, the shift to electric vehicles and plug-in hybrids marks a new era, with CO<sub>2</sub> reduction a major focus. This 'eco-innovation' will drive glazing advances in solar energy control, weight reduction and energy saving. We are well placed to meet these challenges. Our technology will be critical to differentiate us from low-priced competitors and we are currently developing new products to meet the demands of the next generation of vehicles.

## Pilkington Suncool™

When used in building facades, Pilkington Suncool™ offers high light transmission, excellent solar control and thermal insulation. Platinum Business Park, Warsaw Poland. Photo: Wojciech Krynski.



## New off-line coater extends energy-saving glass range

Commissioned in November 2012, the Group's off-line coater, at St Helens, UK is one of the most advanced facilities of its type in the world. It enables ultra-thin special coatings to be applied to glass, creating a range of high performance energy-saving Architectural glazing products.

Off-line coater at Cowley Hill UK.



## Climate change

### Our challenges and opportunities

#### Challenges

The principal risks to our business introduced by climate change are those associated with potential damage to our plants and infrastructure. These include flooding and wind damage. We mitigate these effects through climate change risk assessment in our investment decisions.

Price and availability of fossil fuels is also a risk for us, which we seek to minimize through energy conservation and the use of alternative energy sources for our processes. Our waste reduction programs seek to reduce our consumption of all resources used in the execution of our business.

#### Opportunities

Our added-value products, such as low-e (low-emissivity) glass, solar control glass and glass for photovoltaics have the principal purpose of reducing energy consumption in buildings and generating energy from the sun.

We are therefore in a strong position to help mitigate the effects of climate change by helping to conserve energy in buildings and vehicles and to assist with the generation of solar power.

A significant part of our R&D effort is dedicated to finding solutions to the challenges raised by climate change, reducing energy consumption and waste.

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## 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, NEW AND OLD.

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.

Energy-saving is a key driver. CO<sub>2</sub>-reduction targets have driven tougher legislation for energy-saving glass, making insulating glass units mandatory in much of Europe. This has now developed further into legislation requiring energy-efficient glass.

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. However, unless combined with solar control glass, in the summer it can become uncomfortably hot.

Fire-resistant glass also has an important role to play in promoting the sustainability of communities.

The correct choice of glass can help to reduce the capital outlay, running costs and associated carbon emissions of buildings.

### Sustainability in buildings

Glass is used extensively in most buildings, in both exterior and interior applications; as a construction material, for functionality, for decoration and for interior fittings. Around the world, policy-makers are realizing how the quality of buildings affects the quality of the environment and of people's lives.

Our products play a vital role in improving energy efficiency and reducing CO<sub>2</sub> emissions. But they also offer other advanced functionality: fire protection, noise attenuation, safety and security, privacy, decoration and even self-cleaning properties.

**50%**

Buildings account for almost half of the energy consumed in developed countries. Our products help in addressing some of the major environmental challenges of buildings, new and old.

### Energy efficiency in buildings

Buildings account for almost 50 percent of the energy consumed in developed countries. There is increased focus on legislation and policies to improve their energy efficiency.

Initiatives such as the environmental building rating system (LEED®) in the US and the UK's Building Research Establishment Environmental Assessment Method (BREEAM) are helping to transform the added-value glazing market. Both are increasingly being used to rate the environmental performance of buildings across the globe.

Similar opportunities are anticipated in Europe, with the recast of the EU Directive on Energy Performance of Buildings and new Energy Efficiency Directive.

Many other countries have indicated significant changes to national building regulations to improve the energy efficiency of new and existing buildings. We work with relevant stakeholders in framing policies and regulations that help make buildings more energy-efficient through the use of glass.

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

## 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.

**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

Globally, increasing attention is being given to air-conditioned buildings, to reduce energy usage and CO<sub>2</sub> emissions, thereby 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. We have a wide range of products to satisfy every need; Pilkington **Optifloat™** Tints, Pilkington **Reflite™**, Pilkington **Eclipse™** and Pilkington **SunShade™** Silver 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 in a single product. 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. Their use will increase as climate change results in increased ambient temperatures, thus imposing greater demands on air-conditioning in buildings.

## Self-cleaning glass – Minimizing environmental impact

In the 12 years since its launch, 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.

Minimizing the impact on the environment, Pilkington **Activ™** products complement Pilkington low-emissivity and solar control glass range, and when used with other Pilkington products in an Insulating Glass Unit, it helps to reduce the environmental impact of buildings even further.

## 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, modified super-toughened 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.

All these products can be combined with other functional glasses to provide additional features, such as solar control, thermal insulation, noise control, and impact safety. Unlike other systems dependent on external energy sources and water availability, our fire-resistant products offer passive and sustainable protection, with a long-lasting life cycle and reliability.

## Glass for a great night's sleep

Pilkington **Optiphon™** is a high quality acoustic laminated glass that offers excellent noise reduction without compromising on light transmittance or impact performance.

The desired acoustic performance can be achieved through combining various thicknesses of glass with a special plastic interlayer.

Pilkington **Optiphon™** helps ensure a good night's sleep for customers of the new, award-winning, Sleeperz Hotel in the heart of Newcastle upon Tyne, UK.



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## GLASS AND SOLAR ENERGY

**GLASS HAS AN IMPORTANT ROLE TO PLAY IN THE DEVELOPMENT OF THE GROWING SOLAR ENERGY SECTOR. WE SUPPLY PRODUCTS FOR ALL THREE OF THE LEADING TECHNOLOGIES, CONVERTING POWER FROM THE SUN INTO CLEAN RENEWABLE ENERGY.**

Over the past years, legislation has been introduced around the world to address the issue of renewable energy, spurred on by the Kyoto protocol and subsequent national targets. It is increasingly recognized that a move from hydrocarbons is essential as supplies are finite and global warming is a reality.

Solar energy panels offer alternative solutions for a range of energy requirements, from small scale domestic applications to large scale solar power stations, from cloudy northern rooftops to hot sunny deserts.

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) continued its growth trend in 2011 and PV markets again grew faster than anyone had expected, both in Europe and around the world. This was in the main due to the reduced cost of solar electricity, but it was also driven in part by our technological advances, helping our customers manufacture increasingly efficient modules.

Glass is an integral and important element of photovoltaic solar panels. To increase efficiency, low-iron glass, which demands special raw materials, but provides a higher energy transmission than ordinary glass, is increasingly specified. Anti-reflective coatings can also increase the amount of usable solar energy. Our high-quality 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 Transparent Conductive Oxide (TCO) glass, with manufacturing sites in all main regions. We have been a technological leader in low-iron glass compositions for 25 years.

**During its life cycle, a solar panel can produce over 15 times the amount of energy used to make it.**

Besides Europe, increasing markets like Japan, China and USA are expected to take an important role in the solar segment. In particular Japan has decided to subsidize officially solar energy generation via Feed-In-Tariffs (FIT) this year and renewable energy is a vital part of the Chinese governmental 5-year plan. US government schemes designed to encourage 'green' industries also play an important part in establishing renewable technologies.

**Our products support the three leading solar energy technologies.**

Competitive Levelized-Cost-Of-Energy (LCOE) of PV is increasingly playing a role in encouraging solar generation. Feed-in tariffs in countries such as Germany, Spain, Italy and Greece are becoming less important. However, in emerging economies PV is increasingly being seen as part of the solution to cover the growing energy demand.

### Thin film photovoltaic solar modules

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



### Crystalline photovoltaic solar modules

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



### Concentrated solar power applications

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



## 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.

Thin film PV modules consist of a stack of extremely thin photosensitive layers sandwiched between a top TCO coating and a back contact. The PV layers are laminated between a TCO coated front glass such as NSG **TECT™**, and a low-cost backing material, such as standard or thermally strengthened Pilkington **Optifloat™** Clear glass.

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.

The glass type normally used for this technology is low-iron rolled glass such as Pilkington **Sunplus™**, often in toughened form, combined with an anti-reflective coating, to ensure that the maximum solar radiation reaches the PV cells. It is also possible to use low-iron float glass such as Pilkington **Optiwhite™**.

## 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. Further developments of CSP cells operating with high transmissible low iron float glasses like Optiwhite™ S will be seen in the CSP segment. Pilkington **Optiwhite™ S** is an ultra-clear float glass with very low-iron content and its high solar energy transmittance makes it ideal as a base substrate for mirrors used in concentrated solar power applications.

## Photovoltaic solar modules in action

The new façade at ALM Brand Headquarters in Copenhagen proudly boasts the first Pilkington **Planar™** panels to incorporate Building Integrated PhotoVoltaics. The BIPV panels, which cover just 10 percent of the new façade, are expected to generate 41.5 kW of electricity, or 5 percent of the overall building energy needs.

The new façade allows the building to harvest incident solar energy, whilst protecting the building's occupants working behind it from unwanted glare, solar gain or energy loss.

To deliver maximum environmental benefit during the renovation works, the original mullion system and fixing anchor points were re-used.

The new façade at ALM Brand Headquarters in Copenhagen.



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## 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 are supplying 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. Opportunities include glazing weight reduction, windshields that do not mist, so reducing the need to operate air-conditioning, and coated glazing to keep the cabin cool in summer and warm in winter. We are constantly improving glass performance, enabling vehicle makers to use windshields and backlights with lower installation angles, enabling more aerodynamic and fuel-efficient designs.

### Hybrid and electric vehicles

Increasing global emphasis on fuel economy and the need to mitigate the effects of transportation on the environment have accelerated demand for vehicles that deliver better environmental performance. 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.

Popular in the smaller car segments is the use of modular glazing systems; fully-integrated or multi-panel rooflights and backlight quarter-light combinations. These inevitably bring with them more complex shaping requirements that the NSG Group, through its experience of designing and delivering processes and products, from the float-glass process to proprietary glass-bending technology, is well placed to address.

#### Contributing to vehicle aerodynamics

The Group's advanced shaping technology enables the supply of glazing with low installation angles for the energy-efficient design of the Chevrolet Volt electric car.



#### 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

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

Shown fitted in the new Range Rover.



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## 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.

Our patented optical products are used in the new generation of LED printer heads, offering the advantages of low power consumption, miniaturization, and low-noise operation. Our expertise in the manufacture of ultra-thin float glass is helping to develop the next generation of touch-screen devices, enhancing mobile communications.

We are world leaders in the development of products using glass fiber, which is now a high-profile, high-tech material in a variety of fields: it is light and strong, fire retardant, non-conductive and resistant to chemicals. Its use in vehicle timing belts helps improve fuel consumption.

### **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. Our sheets of non-conducting porous material between positive and negative plates in storage batteries prevent short circuits caused by plates bending and touching and greatly increase the efficiency of batteries.

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. Enhanced performance characteristics can enable the use of smaller and more powerful batteries in future lower emission vehicles. Our sales of separators for these new batteries are expanding rapidly.

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

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### **Displays in communications devices – helping to cut power consumption and even reduce travel**

We are a world-leading supplier of ultra-thin glass for small LCD applications, helping to reduce power consumption in the display market. Our Ultra Fine Flat Glass (UFF) is produced in thicknesses as low as 0.3 to 1.1mm.

These products are increasingly being used in the growing touch panel market, particularly in mobile phones and computers (including new tablet models) and now expanding into use in vehicles.

This technology helps reduce the need for additional peripheral equipment, such as keyboards and pointers, saving manufacturing resources, raw materials and energy. Mobile communications devices also help reduce the need for face-to-face interaction and travel.

**Our new range of advanced LED print heads offers the advantages of miniaturization, reduced noise and lower power consumption in the next generation of printers and scanners.**

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

We have been involved with printer and scanner manufacturer Fuji Xerox in the joint development of a new generation of Light Emitting Diode (LED) print heads, using our proprietary SELFOC® Lens Array (SLA®) technology, which allows 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. The new print head 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.

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

In the automotive industry, timing belts play a crucial role in maintaining optimal engine performance and fuel efficiency. Our advanced glass cord is used in a new generation of belts. NSG Glasscord® high-tensile strength glass fiber cord improves belt flexibility and stretch resistance significantly. These characteristics help to provide accurate valve operation timing for better fuel efficiency over the lifetime of an engine.

The technology has been advanced with the development of the new 'Belt in Oil' system using NSG Glasscord®. The system improves engine refinement further, through an innovative design that immerses the two main engine drive belts in oil. The system delivers the quietness and more efficient running low friction of a belt, but with the durability of a chain.

### **NSG Microglas® Glass Flake in high-performance coatings.**

Microglas® Glass Flake can be used in formulations with reduced volatile organic compounds meeting environmental requirements and formulating cost-effective replacements for many traditional systems.

Glass flakes dispersed through the coating prevent the ingress of water vapor and chemical solutions and extend life of protective coating. Glass flakes provide a thermal stabilization layer in the protective coating and greatly reduces the risk of cracking and peeling of the coating due to thermal shock. Glass flakes increase the hardness of epoxy and polyester resin coatings, giving higher resistance to surface wear.

The famously endless task of painting Scotland's iconic Forth Bridge was recently completed, thanks to epoxy paint containing NSG Microglas® Glass Flake. This consists of platelets of glass approximately 5 microns thick and 10 to 4000 microns wide. In paint, they help generate a chemical bond producing a virtually impenetrable layer, protecting the bridge's steel frame from the elements for the next 25 years.

### **NSG Glasscord® 'Belt in Oil' system features in Ford's Ecoboost engine**

Ford's revolutionary EcoBoost™ engine features NSG Glasscord® 'Belt in Oil' timing belt system, developed by the NGF EUROPE division of Technical Glass.

The NSG Glasscord® 'Belt in Oil' system features in the new Ford Ecoboost™ engine.



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## ENVIRONMENTAL POLICIES AND MANAGEMENT

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 DO.

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. We utilize a stage gate process to ensure 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 the use of a wide range of skills to assist innovation.

**Our Automotive business was one of the first in the automotive industry to achieve a corporate certificate for environmental management. A single 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.

**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.**

### 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 our Automotive plants worldwide.

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

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



ISO 14001 Audit at Sungai Buloh, Malaysia.



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## ENERGY AND RESOURCE USAGE

WE WORK CONTINUOUSLY TO MINIMIZE ENERGY INPUT INTO ALL OUR PROCESSES, SO THAT THE USAGE OF GLASS CONTRIBUTES NET BENEFIT TO SUSTAINABILITY. IN ALL OUR MANUFACTURING AND PROCESSING ACTIVITIES, WE SEEK TO USE AS DIVERSE A RANGE OF ENERGY SOURCES AS PRACTICABLE.

We own or operate 49 float lines globally and have major automotive fabrication facilities in 31 locations worldwide.

As a result of the global 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 calendar year 2011, on which this year's Report is based.

### Initiatives to reduce resource usage

#### Thermo-Photo Voltaic (TPV) Development

A TPV cell is very similar to a solar cell except it uses Infra-Red rather than visible light to produce electricity. NSG, Lancaster University, QinetiQ, CSI, Wafer-Tech, RWE nPower, and Tata Steel have been given £1.5 million by the UK Technology Strategy Board to develop TPV technology.

A TPV system has been designed by the UK R&D Team and is currently installed in a furnace flue to test the resilience and long-term output of the cells. It is hoped that investment in this technology will reduce environmental impact by generating electricity from our waste heat instead of the current steam turbine system.



A Thermo-Photo Voltaic cell.

### Our energy usage

#### Natural gas

For both environmental and financial reasons and wherever possible, we use natural gas as the fuel of choice for glass melting and convert furnaces whenever practicable.

**We used 1,071 million cubic meters of natural gas in 2011. This equates approximately to 37.7 PJ of energy, a 10 percent increase on the previous year.**

#### Heavy fuel oil

Our second most utilized fuel is heavy fuel oil, readily available and relatively low cost. It is therefore used when gas is not available. It provides good heat transfer and is considered a good fuel for glass melting.

**We used 237 million liters of heavy fuel oil in 2011, or 9.4 PJ; a 10 percent reduction on the previous year.**

#### Diesel oil and liquid petroleum gas

The use of diesel oil and of liquid petroleum gas as fuels for float furnaces is generally limited by cost. Both are used as back-up fuels in case of the failure of the preferred fuel, natural gas. Diesel oil is also widely used to power small engines and boilers.

**In 2011, our consumption of diesel oil was 19.8 million liters, or 0.74 PJ (down 8 percent on 2010) and that of liquid propane was 10.5 k tonnes or 0.5 PJ (an 8 percent reduction on 2010).**

#### Electricity

Electricity is a major resource usage for the Group. The environmental impact associated with electricity is, of course, dependent on the method used to generate it.

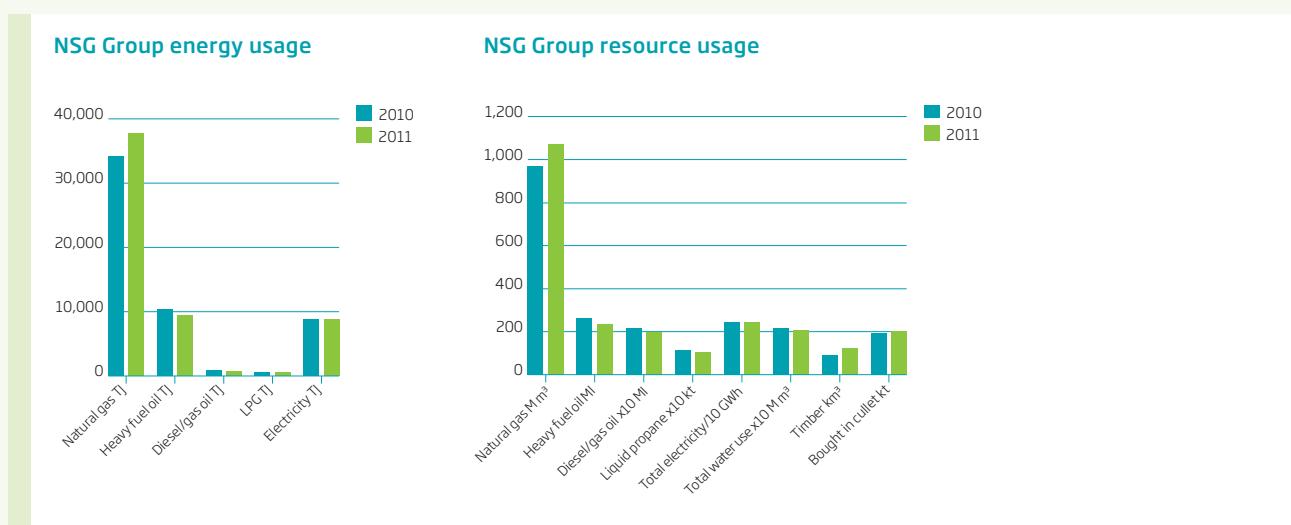
**During 2011, we consumed 8.7 PJ (2.4 TWh) of delivered electrical energy (a 1 percent decrease on 2010).**

**The total energy used by the NSG Group in 2011 was 57.12 PJ (15.87 TWh). This represents a 4 percent increase on 2010.**

### Total energy used by the Group in 2011

**57.12 PJ**

The total energy used by the NSG Group in 2011 was 57.12 PJ (15.87 TWh).



## Our resource usage

### Renewable resources

Some electrical power is directly generated on-site from waste gases or using co-generation installations. In 2011, we received 275 GWh from combined heat and power.

We expect our usage of renewables to increase significantly over the next few years, with projects under way to install photovoltaic arrays and wind generation at some of our facilities. In June 2011 we commissioned a new 3,000-panel solar field at our facility at Northwood in the US. This is now generating 250 kW of energy, or about 7 percent of the facility's requirement, every year.

### Other resources

#### Timber

In Europe, much of our glass is transported on steel stillages without packaging, utilizing specialist 'Floatliner' vehicles.

Outside Europe, more glass is transported in boxes and containers, often made of wood. 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 used 123,000 cubic meters of timber in 2011, mainly in the transportation of glass (up 27 percent on 2010).**

### Water

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.

Across the Group water consumption can vary considerably according to process and product demands as well as water quality. Typically, ~2m³ are required to manufacture 1 tonne of float glass. ~90 liters are required to process each square meter of automotive product.

**We used a total of 20.8 million cubic meters of water in 2011. This was a decrease of 3 percent on 2010 data, despite increased production levels.**

#### Recycled glass

Some cullet (recycled glass) is bought in from external sources and remelted to form new glass, so closing the recycling loop.

**In 2011 we bought in 200,000 tonnes of cullet to supplement cullet from our own internal recycling.**



### Thin film photovoltaic modules in action

The 250 kW PV array installed alongside the Group's North American R&D Northwood OH, USA, has generated nearly 330,000 kWh in its first year of operation; around 7 percent of the site's energy needs. The panels are installed on top of a former waste impoundment originating from the East Toledo float plant that was demolished in 1987.

3,000-panel solar field at the Group's R&D facility at Northwood OH, USA.  
Photo: BlimpShooter.com © John T. Hrosko.

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## 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.

### Recycling

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. 10 percent cullet use saves 3 percent furnace energy and leads to reductions in CO<sub>2</sub> emissions.

Glass for recycling is a valuable resource. Wherever practicable, we recycle any glass off-cuts or cullet within our own glass melting lines. We also recover glass from our downstream operations and from those of our customers.

In 2011 we sent 506,000 tonnes of glass for recycling and bought in 200,000 tonnes. 27,300 tonnes of glass could not be successfully recycled so was sent for disposal.

# 506,000

In 2011, we sent 505,954 tonnes of glass for recycling and bought in 200,433 tonnes of recycled product.

### 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 57,146 tonnes of non-glass waste (a 14 percent increase on 2010), of which 1,771 tonnes of hazardous and 30,483 tonnes of non-hazardous waste were sent to landfill. We disposed of 12,139 tonnes of hazardous waste in 2011.

### Emissions to air

These arise primarily 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.

## Oxides of sulphur and nitrogen

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 2011, the NSG Group was responsible for the direct and indirect emission of 5.0 million tonnes of CO<sub>2</sub>. This represents a 3 percent increase on 2010, but is mainly due to increases in production levels.

Our direct emissions were 3.9 million tonnes (a 4 percent increase on 2010). Direct emissions occur from our furnaces and from fuel used in bending and toughening furnaces in Automotive and Architectural Glass. In Europe, externally verified, direct 2011 CO<sub>2</sub> emissions from the Emission Trading Scheme were increased by 4 percent compared to 2010 but reduced by 13 percent compared to 2007.

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.

## Waste Heat Recovery

The recovery of waste heat is a key aspect which can improve the overall efficiency of the float process.

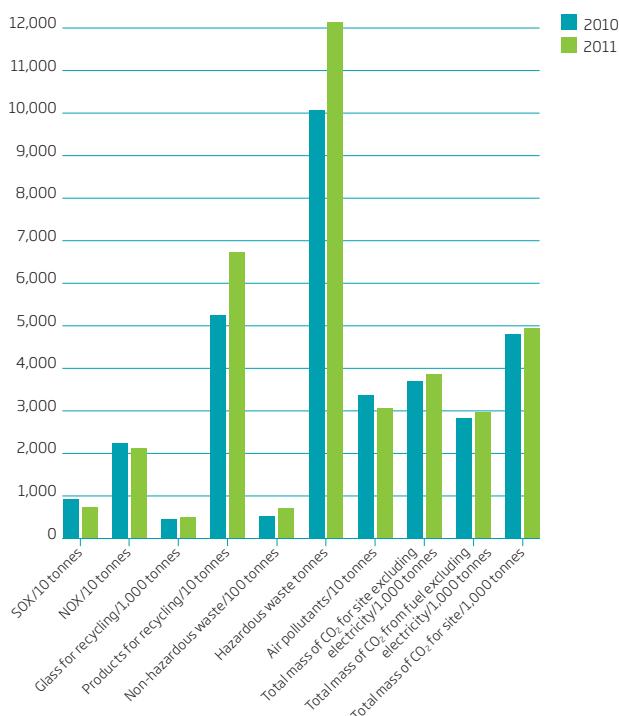
The majority of the heat is recovered through the regenerative process, while a high proportion of the remaining heat can be recovered to generate hot water and/or steam.

Most recently, at Weiherhammer in Germany, a waste heat boiler has been installed to replace the existing package boiler system to generate hot water. The system has resulted in reduced CO<sub>2</sub> emissions of 2,800 tonnes.

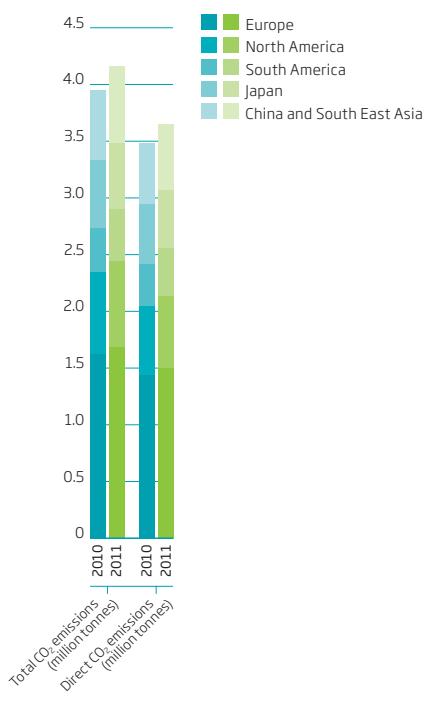
A waste heat boiler installed at Weiherhammer, Germany.



Principal emissions from the NSG Group during 2011



NSG Group glass melting carbon emissions 2011



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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.**

We have around 29,000 permanent employees, working in 29 countries.

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 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.

Employee engagement is a high priority. We invest in the training of our managers and supervisors to ensure they have the communications skills necessary to keep employees well informed of developments. Supporting our managers and supervisors also involves providing them with detailed briefings on developments, such as changes to health and safety practices or programs that promote the health and well-being of our people.

### Safety performance

Our safety programs emphasize the importance of individuals taking personal responsibility and of appropriate safe behavior, with managers taking the lead through their commitment to our 10 Key Safety Leadership Behaviors. All injuries at work are regarded as unnecessary and avoidable. We require full reporting no matter how minor, and appropriate investigation to ensure we learn from all such incidents.

Group-wide initiatives to strengthen further Safety Culture within the Group is under way, with Health and Safety performance a part of the annual Management Incentive Plan. We have also launched a recognition program that rewards sites with outstanding Health and Safety performance indicators.

The Significant Injury Rate (SIR) is now our primary reactive indicator. This records injuries requiring medical treatment or the reallocation of duties to allow an individual to continue working. The SIR for financial year 2012 was 0.35; an improvement of 38 percent compared to FY2011. The Lost Time Injury Rate (LTIR) which records work-related accidents or illnesses preventing individuals involved being able to report for work on the following day or shift has become a less useful measure.

### Group Employee Survey

**87%**

Results from the 2011 Group Employee Survey showed that a total of 87 percent of employees participated – this was unchanged from the 2009 survey. Satisfaction and Motivation was up and Loyalty was unchanged against 2009.

## Diversity

Our Code of Conduct acknowledges internationally proclaimed human rights and the impact these have on employment. Employment standards have been set, derived from external international human rights employment guidelines and our own business requirements.

The Code and our overall employment policies provide employees with reassurance on how they will be treated, and guide employment policy and practice in individual businesses. Our equal opportunity policy aims to prohibit discrimination based on race, color, creed, religion, age, gender, sexual orientation, national origin, disability, union membership, political affiliation or any other status protected by law.

## Group-wide employee survey

We conduct a global employee survey every two years. Results from the 2011 survey showed increased levels of satisfaction and motivation compared with 2009. A total of 87 percent of employees completed the questionnaire, the same as in 2009. Nearly 80 percent of those who took part indicated that they rate NSG Group highly as an employer compared to other companies in the area, with 85 percent stating their belief that the Group is succeeding in its aim of becoming a truly international organization. Almost 90 percent stated their belief that the NSG Group emphasizes safety in everything it does and 67 percent stated that they are kept well informed on matters relating to the NSG Group as a whole.

## Maximizing the potential of individuals

67 percent of employees received a review of training and development in 2011, with our aim being to increase this proportion to 90 percent by 2015. In the 2011 process we continued to focus on the area of objective setting, aiming to significantly improve the quality of personal objectives.

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 2011 process.

## 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, MADO, 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.

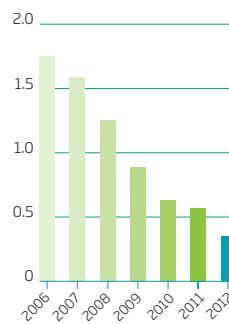
## Moving Safety to the Next Level

Our safety programs emphasize the importance of individuals taking personal responsibility and of appropriate safe behavior, with managers taking the lead through their commitment to our 10 Key Safety Leadership Behaviors.

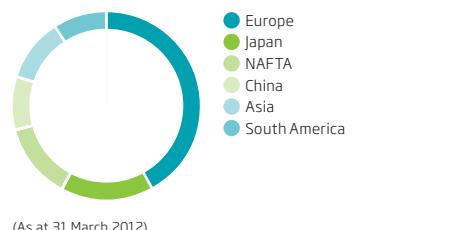
Following the success of the first NSG Group Safety Day in 2011, the second such event was held on 14 November 2012. For more information, see pages 32 and 33 of this Report.



## Significant Injury Rate (SIR)



## NSG Group employee distribution



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## EMPLOYEE SAFETY DAY 2012

THE ANNUAL NSG GROUP SAFETY DAY AIMS TO DEMONSTRATE TO EMPLOYEES AND CONTRACTORS THAT WE CARE ABOUT THEIR SAFETY, THROUGH THE PROGRESS AND COMMITMENTS WE HAVE MADE OVER THE PAST YEAR.

**Key focus areas for the Group's 2012 Safety Day were:**

- 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.

Launching Employee Safety Day 2012, CEO Keiji Yoshikawa said: "The leadership team remains actively committed to the Group's High Risk Activity reduction safety program.

We must acknowledge and learn from the tragic fatality and serious incidents we have experienced this year.

We owe it to our colleagues and their families to fully investigate and follow through on the concrete actions identified. We are committed to our high risk reduction program and the safety tools we have in place.

Our Annual Safety Day provides an opportunity to celebrate what we have achieved. The day should be used to spend time thinking and discussing what we can do to make our company even safer.

We must learn to become more self-critical and respond with concrete actions if we are to achieve the level of excellence in safety performance to which we aspire.

We all tend to think our own behavior is better than it really is in practice. Safety Day provides an opportunity for everyone to evaluate their own safety behavior openly and honestly, identify the behaviors that individuals need to improve and decide how they are going to do things differently.

Our challenge for Safety Day 2012 was for everyone in the organization to complete at least one safety action during the day, learn a new safety skill, complete an outstanding safety action, improve safety in the working area, discuss their safety concerns, or even change behavior."

The feedback we have had from small sites to major manufacturing plants suggests that employees found the day to be informative and entertaining.

Office staff in particular enjoyed the opportunity to experience the safety issues and solutions experienced by employees in the operational sites often providing a very different safety perspective from their own.

Many of those who were responsible for arranging activities suggested that the heightened focus generated by having a single day of focus for the whole organization was more important to the success of the day than any expenditure of time or money.



## 1. Vehicle and Pedestrian Safety

Vehicle movements within our facilities pose a significant risk to both the driver and pedestrians. We have focused on minimizing this risk with our policy of segregating vehicle and pedestrian routes as well as exploring the technical solution of a passive detection system. But a key initiative was introducing simple key safe behaviors that everyone can adopt, like 'signal for recognition' and 'keeping to walkways and crossing point'. Safety Day presented an opportunity for employees to experience the difficulty of driving some of our vehicles and for the drivers to show their unique skills of precision driving.

## 3. Contractor Control

We have sadly experienced fatalities when we have engaged contractors to undertake work at our facilities. We have learnt from these mistakes and fundamentally focus on three key aspects of contractor control: a) Challenge the contractors' method statement; b) Use a permit to work system; and c) Regularly visit the site of work. During Safety Day our procurement function invited contractors and suppliers in to help us understand how they managed contractor control from their perspective.

## 2. Machinery Safety

Machinery safety improvements are one of the major safety challenges we face due to the significant variation in standards across our global facilities. Our training and assessment tools aim to address the gaps in safety and by identifying the gaps we are able to address these with solutions that go beyond legal compliance. We are addressing machinery safety issues in three core areas: a) guarding to prevent contact with machinery; b) frequent access safety systems for production; and c) complete isolation for maintenance and repair activities. Safety Day provided an opportunity for the business support functions to see, touch and feel the experience of machinery safety in a controlled environment.

## 4. Materials Handling

Incorrect lifting of glass packs has resulted in many fatalities in the glass industry. At the forefront of our safety program is the development of the GSI Grab. This is an in-house retrofit design that tells the operator that the grab has engaged onto the glass pack before a lift is attempted. Our unique approach will reduce the risk from moving packs around our facilities and we are committed to rolling these grabs out. Safety Day allowed promotion of the grab to our operators and encouraged critical appraisal of the features.

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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.

### 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.

### 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.

Global supply chains in Architectural Glass are increasing and we are actively contributing to the development of new global product standards that meet Sustainability requirements, through collaboration with working groups set up by organizations such as the International Standards Organization. We work closely with our customers, trade associations, governments and standards-setting bodies to ensure that our products meet and where possible exceed local energy performance standards.

Our Automotive Original Equipment (OE) business operates a single quality management system to ensure the consistent quality of its products from wherever they are manufactured and supplied. It has a corporate ISO/TS16949:2009 (the internationally recognized automotive quality standard) certificate, which covers all of our principle OE operations on a global basis.

We are now a leading supplier of glass products for solar module production where quality standards are set by customers with electronics industry quality experience. Where applicable, our management systems have been extended to include Solar Energy products. In this sector, formal glass product qualifications with major customers are additionally required to ensure end products meet electronic industry IEC 61646 and IEC 61215 standards.

## 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 ¥7,956 million in R&D in FY2012.

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.



## Awards for quality and marketing

### Architectural

- First Solar Sunlight Supplier award presented to Vietnam Glass Industries (VGI) for Flawless Execution And Outstanding Support.
- Polish Responsible Business Forum has praised an NSG campaign to promote 'green' building practices.
- Shimizu Construction Award to Oki Glass Japan, for Excellent Safety, Quality and Work Schedule Achievement at Japan Hewlett-Packard H.Q. Building Project Site.
- Komatsu House Award presented to Takahashi Glass Japan for Excellent Efforts at Zero Disaster Achievement in 2012.
- Malaysian Sheet Glass (MSG) was the recipient of the Customs-Industry Smart Partnership award.
- BorgWarner office building in Jasionka, Poland has been certified with LEED Silver (Products used: Pilkington Activ™ Blue + Pilkington Optitherm™).

### Automotive

- 2012 Master of Quality award presented to Mexicali from Daimler Truck (only glass supplier to win the award).
- 2012 GM Customer Care and Aftersales On-Time Shipping Platinum Award presented to Whitby, Ontario NA.
- AGR Mexico awarded Supplier of the Year by GNP Insurance for outstanding performance and customer service.
- TME (Toyota Europe): Technology Development Award for New Yaris.
- Yachiyo (Honda Gr.): Quality Improvement Award (Japan).
- Toyota: Quality Achievement Award (Japan).
- Toyota Auto Body: Outstanding Quality Award (Japan).
- Mazda: Outstanding CVI (VA/VE) Award (Japan).

### Technical Glass

- Quality improvement certificate awarded by Shin-Kobe Electric Machinery to NSG's Tsu plant.
- Development of durable, High Tensile Strength (HTS) glass cord earned Craig Hayes, a member of NGFE Technical Dept, a PhD in Materials Engineering from Sheffield University.

## Sunlight Supplier Award for NSG Vietnam Glass Industries (VGI)

First Solar is one of the world's leading manufacturers of photovoltaic solar modules. VGI's award is in recognition of 'Flawless Execution and Outstanding Support' of the company's Kulim plant in Malaysia.

VGI went into full online coating production in December 11. There is normally a six-month customer qualifying process, but with good team work and excellent support from the quality teams, NSG VGI achieved qualification of its new online coated product in the record time of 15 weeks.

First Solar Sunlight Award, 1Q 2012.

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## SHAREHOLDERS

WE AIM TO KEEP OUR SHAREHOLDERS INFORMED THROUGH A FOCUSED INTERNATIONAL INVESTOR RELATIONS PROGRAM. THIS ENCOMPASSES REGULAR COMMUNICATIONS THROUGHOUT THE FINANCIAL YEAR, THROUGH MEETINGS, PUBLICATIONS, PLANT VISITS AND OUR WEBSITES.

In communicating with our shareholders, potential investors, the financial community regulatory authorities and the media, our aim is to report in a transparent, timely and accurate manner.

Our overriding objective is to provide as much information as possible to help our shareholders and potential shareholders understand our strategy and performance, to enable them to take investment decisions.

Annual and Interim reports are produced in both Japanese and English and widely distributed to stakeholders who may have an interest in our performance. These documents are also made available on our websites.

The CEO and Chief Financial Officer (CFO) make regular reports to the Board on investor relations and on specific discussions with major shareholders. The Board receives copies of all research published on the Group. Shareholders have an opportunity at the General Meeting of Shareholders to ask questions of the Chairman and the Board.

Our Investor Relations (IR) Policy reflects our aims to be open and fair and to comply with corporate ethics. The NSG Group is listed on the Tokyo Stock Exchange (TSE) and the Osaka Securities Exchange and we disclose information in line with the TSE 'Rules on Timely Disclosure of Corporate Information by Issuers of Listed Securities'.

Where information does not fall under the category of timely disclosure rules, our policy is to communicate it swiftly and fairly, once it has been determined that the disclosure of such information is beneficial to investors.

### Communicating our strategy

Management's immediate priorities are to improve the profitability of the Company and earn the trust of our stakeholders through our accomplishments. Our profit improvement programs are well advanced and since our initial announcement in February 2012 we have introduced additional measures and accelerated restructuring activities.

We are looking carefully at all aspects of our current asset base. Our objective is to right-size our business urgently and we have identified the need for this to be accomplished within fiscal years FY2013 and FY2014.

We aim to improve manufacturing performance through efficiency improvements and rationalization. We have been quick to take action to adjust our capacity to demand, through temporary and permanent closures of plants.

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**We aim to be a sustainable company, believing that good management of our people, our resources, our communities and our environment also makes good business sense.**

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We operate in a good industry with positive prospects, but we must ensure we are cost competitive. We are aiming to lower the breakeven point of our business by reducing overheads, improving manufacturing efficiency and controlling our input cost through best-in-class procurement and shared services. We aim to ensure that we spend our limited resources wisely and generate capacity at much lower capital costs.

We believe that 'people are our most important asset' and that effective use of our people is the main driver to surmount the current challenges we face. We are determined that we will not lose sight of our core Values and Principles, with Safety and Quality remaining top priorities. We aim to be a sustainable company, believing that good management of our people, our resources, our communities and our environment also makes good business sense.

We are executing our strategy through a market-facing regionally organized business, based on three business areas: Architectural, Automotive and Technical Glass. A good balance between regional and global organizational structures will drive efficiency and allow us to react quickly to market developments. In parallel, we are strengthening our market-driven culture, creating a passion for revenue growth, to fully utilize our assets.

### Communicating our performance

We report our results on a quarterly basis. We hold half-year and year-end financial results briefings for securities analysts and investors in Japan, with further communications in the intervening quarters. The CEO and CFO personally present and discuss financial results, charting our progress against our strategy and the future outlook for the Group. Supplementing this, the CFO and IR team give background briefings to analysts and investors following the release of financial results. From time to time, we arrange plant visits, to enable analysts to see to our operations at first hand.

Over the past year, we have increased our focus on non-financial aspects of our performance relating to Sustainability. The current report is an important channel for communicating our progress. Our Sustainability Report is made available to shareholders in both English and Japanese versions, with additional data available on our website.

### Evolving shareholder composition

The acquisition of Pilkington plc in 2006 transformed NSG from a regional Japanese glass company to an international group headquartered in Tokyo. Following the acquisition, the proportion of non-resident foreign corporations and foreign individuals owning NSG Group shares rose, but has since dropped back, with a higher proportion of individual shareholders now based in Japan.

**We hold half-year and year-end financial results briefings for securities analysts and investors in Japan, with further communications in the intervening quarters.**

Nevertheless, as an international group based in Japan, we have expanded our global IR effort to meet the requirements of shareholders and potential investors around the world. Most of our publications are produced in both Japanese and English. Details can be found on page 45 of this Report and on our website. We organize 'road shows' for analysts, investors and potential investors outside Japan, when appropriate.

CFO Mark Lyons



**Distribution of NSG Group shareholders  
(as at 30 September 2012)**



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## 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 which we observe as the standards we expect from our suppliers.

Our manufacturing processes use materials, products and services procured from around 20,000 suppliers throughout the world. 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, co-operation 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.

### 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.

#### Audit

Key elements of the Code now form part of our supplier audits. We have doubled the size of our supplier development team to 20 engineers, covering all regions. This team is responsible for validating compliance.

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Our goal is to audit 50 percent of key suppliers by 2015. This represents around 250 new supplier audits over and above the 180 carried out in 2010 and 2011.

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### New Code of Conduct Audit

# 250

Between 2011 and 2014 we plan to audit around 250 key suppliers.

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Around 120 selected suppliers are currently being audited and will now be subjected to these additional checks. Any that fall short will be given an improvement program.

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

Raw material delivery to an NSG float line.



## 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.

**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.

## Supplier-related activities

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.

### Recycling

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.

### Energy

We have secured supply of natural gas as an alternative to heavy fuel oil for firing our float plants in China. As a result, emissions of CO<sub>2</sub>, NOx and SOx from these sites have been significantly reduced. We are introducing electricity demand management programs in certain sites to enable our consumption to be reduced at time of peak network demand, therefore avoiding the need for additional reserve generation and distribution capacity on the network. In other sites, we have installed photovoltaic generation to fulfill a proportion of our power needs.

### Transportation

Glass is a bulky material, with transport between locations a significant contributor to CO<sub>2</sub> emissions. We work with transportation providers to ensure that they operate cleaner and more efficient trucks to reduce the environmental impact. We are increasing our weighting of environmental factors when selecting our transportation partners.

### Polyvinyl Butyral (PVB)

PVB is used to manufacture laminated glass, mainly for automotive windshields. PVB trims from the edges of the laminated glass are returned to PVB suppliers to be recycled in their manufacturing processes. In 2011, around 2,000 tonnes of PVB trim was returned to our suppliers or other recyclers to be reused.

### Packaging

We use a significant quantity of wooden packaging in our operations. Wood is seen as a sustainable material. We aim to ensure that all our suppliers of wooden packaging have programs to ensure the responsible re-planting of timber, with recognized certifications for chain of custody for timber. We also work with our suppliers to design reusable wooden packaging.

### Maintenance parts

We have developed detailed processes to encourage the repair of used maintenance parts, such as motors. Usually, these repairs are carried out by suppliers local to our plants to minimize transport. We are increasing our use of repaired parts year on year.

### Water management

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.

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## 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 29,000 permanent employees, with principal operations in 29 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.

An important element of our Strategic Management Plan is further expansion into emerging markets. The effects of such 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.

**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.**

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 FY2012, we made contributions worth around ¥102 million to our local communities. Our grants helped the arts, medicine, welfare, job creation and urban renewal.



## NSG plays a part in improving a situation where more young Japanese students are moving away from the sciences.

The former mayor of Yokkaichi, Japan initiated a collaboration project to conduct classes that increase students' interest in science subjects. This aims to prevent them from becoming further indifferent to the sciences, the problem known as 'Rikabanare' in Japan.

NSG Yokkaichi plant has supported this project in the local community for four years and has offered annual science classes to students of junior high schools to contribute to the education of the next generation.

Students at Yokkaichi Junior High School enjoy a glass-focused science lesson developed by NSG employees.

## Employee involvement

Our employees are encouraged to participate in their local communities and appropriate community organizations, either on an individual basis or with help from the Group. As needs vary from community to community, each of the Group's business units has some flexibility to identify the most appropriate way to grow with their respective communities.

We believe that, as well as generating goodwill in the community, involving employees in community projects can also help their development as potential managers and team leaders.

## Community action

### Local initiatives

- In Vietnam, VFG plant and customers donated to a newly established kindergarten construction fund in a poor district of Hoa Binh Province.
- NSG in Poland provided support to a member of the Polish Paralympics team in London.
- North American and UK sites regularly participate in local fundraising activities, charity runs, volunteer sports coaching and toy & food bank donations.
- UK sites have made charitable donations throughout the year through schemes that accumulate contributions on a monthly basis when there has not been an LTI within defined groups of employees.



### Support for education and training

- Sponsors of the Royal College of Art Vehicle Design Award, now in its 25th year (UK).
- Nippon Sheet Glass Foundation for Materials Science and Engineering (Japan).
- Sponsors of the Arkwright Scholarship scheme for students of technology (UK).
- NGF Europe participate in the Young Enterprise programme (UK).
- Member of The Visakha Skill Development Society. Their objective is to increase employability skills amongst rural youth, especially in areas where government has acquired land for industrial development (India).

### Co-operation with business groups

- Supporter of the Sumitomo Foundation (Japan).
- Membership of Business in the Community (UK).
- Nippon Keidanren 1 percent Club (Japan).
- Founder member of 'Glass for Europe' grouping of European flat glass manufacturers (Belgium).

Every year, Mexicali plant and employees make a food collection and donation to an Organization called Banco de Alimentos.

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## GLOBAL REPORTING INITIATIVE (GRI) INDEX

As a global business, we have chosen to assess our performance against the GRI (Global Reporting Initiative). The GRI aims to promote common conventions and to enable comparability, such as currently exist in financial reporting, in corporate reporting on economic, environmental, and social performance.

We believe the GRI approach is consistent with our aim to make steady incremental progress on improving our Sustainability performance and its criteria are a good match with our own Sustainability objectives.

We have self-declared our reporting to be Application Level B (Self-declared). We intend to be able to report further progress in our 2013 Sustainability Report, to be published in early 2014. We report our financial, social and environmental performance via three main channels:

- NSG Group Annual Report and Annual Financial Statements (AR).
- NSG Group Sustainability Report (SR).
- NSG Group corporate website, [www.nsg.com](http://www.nsg.com) (Web).

The table on the right shows where to find information on our performance on the criteria on which we are reporting this year.

GRI Indicator	Criteria	Where to find this information
<b>1 Strategy and analysis</b>		
1.1	Statement from the most senior decision-maker of the organization about the relevance of Sustainability to the organization and its strategy.	SR Page 6
1.2	Description of key impacts, risks and opportunities.	Pages 6-9, 15 & Web
<b>2 Organization profile</b>		
2.1	Name of organization.	Page 45
2.2	Primary Brands, products and services.	Page 2
2.3	Operational structure of the organization, including main divisions, operating companies, subsidiaries, and joint ventures.	Pages 2-5 & AR
2.4	Location of organization's headquarters.	Page 45
2.5	Number of countries where the organization operates, and names of countries.	Page 4
2.6	Nature of ownership and legal form.	AR
2.7	Markets served (including geographic breakdown, sectors served, and types of customers/beneficiaries).	Pages 4, 5
2.8	Scale of the reporting organization.	AR
2.9	Significant changes during the reporting period regarding size, structure, or ownership.	AR
2.10	Awards received in the reporting period.	Page 35
<b>3 Report parameters</b>		
3.1	Reporting period.	Page 42
3.2	Date of most recent previous report.	Page 42
3.3	Reporting cycle.	Page 44
3.4	Contact point for questions regarding the report or its contents.	Page 45
3.5	Process for defining report content, including: determining materiality; prioritizing topics within the report; and identifying stakeholders the organization expects to use the report.	Page 44
3.6	Boundary of the report.	Page 44
3.7	State any specific limitations on the scope or boundary of the report.	Page 44
3.8	Basis for reporting on joint ventures, subsidiaries, leased facilities, outsourced operations, and other entities that can significantly affect comparability from period to period and/or between organizations.	AR
3.10	Explanation of the effect of any re-statements of information provided in earlier reports, and the reasons for such re-statement.	Not applicable
3.11	Significant changes from previous reporting periods in the scope, boundary, or measurement methods applied in the report.	Pages 6, 7
3.12	Table identifying the location of the Standard Disclosures in the report. Identify the page numbers or web links where the following can be found.	Pages 42, 43
3.13	Policy and current practice with regard to seeking external assurance for the report.	Self declared at GRI Application Level B. No external assurance was pursued for this reporting period.
<b>4 Governance</b>		
4.1	Governance structure of the organization.	Pages 12, 13
4.2	Indicate whether the Chair of the highest governance body is also an executive officer.	Page 12 & AR
4.3	For organizations that have a unitary board structure, state the number of members of the highest governance body that are independent and/or non-executive members. State how the organization defines 'independent' and 'non-executive'.	Page 12, AR & Web
4.4	Mechanisms for shareholders and employees to provide recommendations or direction to the highest governance body.	Pages 31, 36
4.5	Linkage between compensation for members of the board, senior managers, and executives and the organization's performance.	Web
4.6	Processes in place for the board to ensure conflicts of interest are avoided.	Web
4.7	Process for determining the qualifications and expertise of the members of the board for guiding the organization's strategy on economic, environmental, and social topics.	Web

GRI Indicator	Criteria	Where to find this information
4.8	Statements of mission or values, codes of conduct, and principles relevant to economic, environmental, and social performance and the status of their implementation.	Pages 8, 9
4.9	Board procedures for overseeing the organization's identification and management of economic, environmental, and social performance, including relevant risks and opportunities, and adherence or compliance with internationally agreed standards, codes of conduct, and principles.	Pages 12, 13 & Web
4.10	Processes for evaluating the board's own performance.	Web
4.11	Explanation of whether and how the precautionary approach or principle is addressed by the organization.	Web
4.12	Externally developed economic, environmental, and social charters, principles, or other initiatives to which the organization subscribes or endorses.	Web
4.13	Memberships in associations or advocacy organizations.	Web
4.14	List of stakeholder groups engaged by the organization.	Pages 8, 9, & 30-41
4.15	Basis for identification and selection of stakeholders with whom to engage.	Pages 8, 9, 44
4.16	Approaches to stakeholder engagement, including frequency of engagement by type and by stakeholder group.	Pages 30-41
4.17	Key topics and concerns that have been raised through stakeholder engagement, and how the organization has responded to those key topics and concerns, including through its reporting.	Pages 30-41
<b>Economic</b>		
	Disclosure on management approach.	Page 10
<b>Economic performance</b>		
EC1	Direct economic value generated and distributed, including revenues, operating costs, employee compensation, donations and other community investments, retained earnings, and payments to capital providers and governments.	AR
EC2	Financial implications and other risks and opportunities for the organization's activities due to climate change.	Page 15
<b>Environment</b>		
	Disclosure on management approach.	Page 10
<b>Materials</b>		
EN1	Materials used by weight or volume.	Pages 26, 27 & Web
EN2	Percentage of materials that are recycled input materials.	Pages 27, 28 & Web
EN3	Direct energy consumption by primary energy source.	Pages 26, 27
EN4	Indirect energy consumption by primary source.	Page 26
EN5	Energy saved due to conservation and efficiency improvements.	Pages 26-29
<b>Water</b>		
EN8	Total water withdrawal by source.	Page 27
<b>Emissions, effluents and waste</b>		
EN16	Total direct and indirect greenhouse gas emissions by weight.	Page 29
EN17	Other relevant indirect greenhouse gases by weight.	Page 29
EN19	Emissions of ozone-depleting substances by weight.	Web
EN20	NOx, SOx, and other significant air emissions by type and weight.	Page 29
EN22	Total weight of waste by type and disposal method.	Page 28
EN23	Total number and volume of significant spills.	Web
EN26	Initiatives to mitigate environmental impacts of products and services, and extent of impact mitigation.	Pages 14-15
<b>Compliance</b>		
EN28	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations.	Web
<b>Product responsibility</b>		
	Disclosure on management approach.	Page 11
<b>Customer health and safety</b>		
PR1	Life cycle stages in which health and safety impacts of products and services are assessed for improvement, and percentage of significant products and services categories subject to such procedures.	Web
<b>Product and service labeling</b>		
PR3	Type of product and service information required by procedures, and percentage of significant products and services subject to such information requirements.	Web

GRI Indicator	Criteria	Where to find this information
	<b>Customer satisfaction</b>	
PR5	Practices related to customer satisfaction, including results of surveys measuring customer satisfaction.	Web
	<b>Marketing communications</b>	
PR6	Programs for adherence to laws, standards, and voluntary codes related to marketing communications, including advertising, promotion, and sponsorship.	Web
	<b>Labor practices and decent work</b>	
	Disclosure on management approach.	Page 11
	<b>Employment</b>	
LA1	Total workforce by employment type, employment contract, and region.	Web
LA2	Total number and rate of employee turnover by age group, gender, and region.	Web
	<b>Labor/Management relations</b>	
LA4	Percentage of employees covered by collective bargaining agreements.	Web
LA5	Minimum notice periods regarding operational changes, including whether it is specified in collective agreements.	Web
	<b>Occupational health and safety</b>	
LA7	Rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities by region.	Pages 30-31 & Web
	<b>Training and education</b>	
LA10	Average hours of training per year per employee by employee category.	Web
LA11	Programs for skills management and lifelong learning that support the continued employability of employees and assist them in managing career endings.	Web
LA12	Percentage of employees receiving regular performance and career development reviews.	Page 7
	<b>Human rights</b>	
	Disclosure on management approach.	Page 10
HR1	Percentage and total number of significant investment agreements that include human rights clauses or that have undergone human rights screening.	Web
HR2	Percentage of significant suppliers and contractors that have undergone screening on human rights and actions taken.	Page 38
	<b>Society</b>	
	Disclosure on management approach.	Page 11
	<b>Community</b>	
S01	Nature, scope, and effectiveness of any programs and practices that assess and manage the impacts of operations on communities, including entering, operating, and exiting.	Pages 40-41
	<b>Public policy</b>	
S05	Public policy positions and participation in public policy development and lobbying.	Web
	<b>Anti-competitive behavior</b>	
S07	Total number of legal actions for anti-competitive behavior, anti-trust, and monopoly practices and their outcomes.	AR
	<b>Compliance</b>	
S08	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with laws and regulations.	AR

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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 7 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 2013 Sustainability Report, which will be published in early 2014.

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 on 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).

# 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 and Annual Financial Statements

The adoption of IFRS has meant that the Group is now publishing more detail on its performance than in previous years. To minimize the size of the Annual Report, the Group has decided to split its financial reporting between two documents: the Annual Report and a second document, the Annual Financial Statements. The latter is available as a download from our website at [www.nsg.com](http://www.nsg.com). In order to obtain a full understanding of the performance of the Group, both documents 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 2012)

**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:** ¥848,752 million

**Net sales:** ¥552,223 million (consolidated)

**Employees:** 29,702

**NSG Group companies:** 251

**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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