

# SUSTAINABILITY REPORT 2011

'MAKING A DIFFERENCE TO OUR WORLD  
THROUGH GLASS TECHNOLOGY'



## MAKING A DIFFERENCE TO OUR WORLD THROUGH GLASS TECHNOLOGY

The NSG Group is fully committed to Sustainability. Our aim is to 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.

Our Strategic Management Plan, which sets the course for the Company to the end of FY2014, includes a clear commitment to sustainable development. We have also set specific Sustainability targets, which 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 to date are shown on page seven of this report.

Glass manufacture is energy-intensive, but our products can make a major contribution to energy conservation and power generation. Our targets seek both to reduce embodied energy and carbon in manufacture and to improve the energy-saving capabilities of our products during their life cycle.

### Cover pictures

**Top:** Internal dividing wall in the Volkswagen 'Gläserne Manufaktur' plant, Dresden, Germany, featuring Pilkington Pyrostop® fire-resistant glass. Photo credit: HGEsch.

**Bottom:** Fitted in the Mercedes SLK, Pilkington Sundym™ allows vehicle glazing to be switched from dark to tinted at the touch of a button. Photo credit: Daimler AG.

## ABOUT THIS REPORT

During 2011, we made further progress in embedding the principles of Sustainability within the NSG Group.

In the past year, we took the decision to join the UN Global Compact and to the advancement of its ten principles. We consider these to be a natural extension of our Code of Conduct, which defines our commitment to social and environmental responsibility.

We have also further strengthened our sustainability governance, with the allocation of defined responsibility to named individuals for managing and monitoring our progress on the indicators defined in the GRI reporting framework to which we subscribe. Corporate governance has been strengthened with the appointment of a Chief Compliance Officer for the Group.

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.

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 [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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Environment

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Stakeholders

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Basis of reporting

## BUSINESS LINES

WE OPERATE THREE WORLDWIDE BUSINESS LINES: BUILDING PRODUCTS, SUPPLYING GLASS FOR ARCHITECTURAL, SOLAR ENERGY AND TECHNICAL APPLICATIONS; AUTOMOTIVE, PRODUCING GLASS AND GLAZING SYSTEMS FOR VEHICLES WORLDWIDE; AND SPECIALTY GLASS, OPERATING IN THE DISPLAY, OFFICE EQUIPMENT AND GLASS FIBER SECTORS.



### Building Products

A leader in architectural glazing, solar energy and other technical products

#### Main products

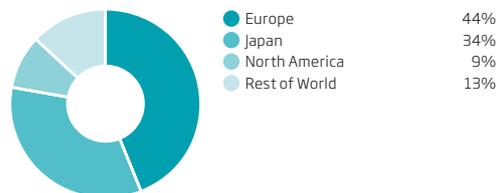
- Thermal insulation glass
- Fire protection glazing
- Solar control glass
- Glass for solar energy
- Noise control glazing
- Safety and security glazing
- Self-cleaning glass

# 43%

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

### Sales by region

Financial Year 2011



### 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 provide thermal insulation and passive solar heat gain, helping demand for more energy-efficient windows.



# 10,200

Employees in 21 countries

\*All figures Financial Year ending 31 March 2011.



## Automotive

Supplying every major vehicle manufacturer in the world

### Main products

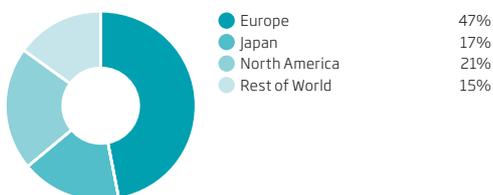
- Solar control glass
- Glazing systems
- Laminated glass
- Toughened glass
- Security glazing
- Lightweight glazing
- Aesthetic glazings

# 46%

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

### Sales by region

Financial Year 2011



### 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 and recycling.



# 14,400

Employees in 16 countries



## Specialty glass

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

### Main products

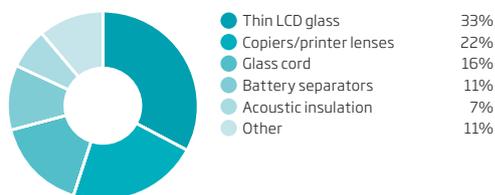
- Thin LCD glass
- Copier/printer lenses
- Glass cord
- Battery separators
- GLASFLAKE
- METASHINE®

# 11%

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

### Sales by sector

Financial Year 2011



### 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 computers and now expanding into use in vehicles.



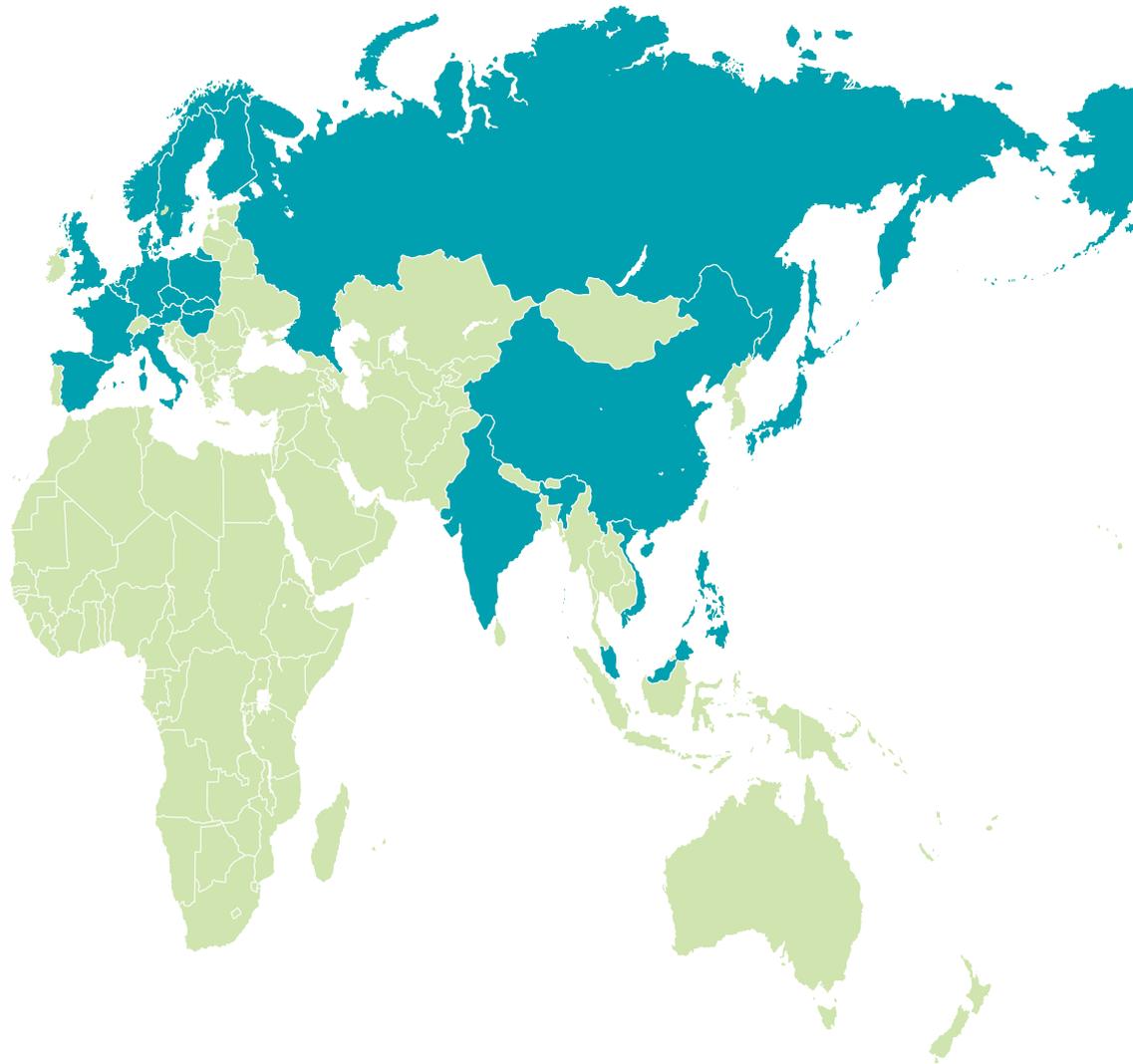
# 3,900

Employees in five countries

## GLOBAL OPERATIONS

OUR OPERATIONS SUPPORT A WORLDWIDE CUSTOMER BASE. WE HAVE PRINCIPAL OPERATIONS IN 29 COUNTRIES, EMPLOYING AROUND 29,300 PEOPLE AND MARKETING OUR PRODUCTS IN OVER 130 COUNTRIES.

- 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



## Building products

Manufacturing

**World leader in float glass technology and coatings**

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, Japan and North America. Also in 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 glazing distribution and wholesale.

## Specialty Glass

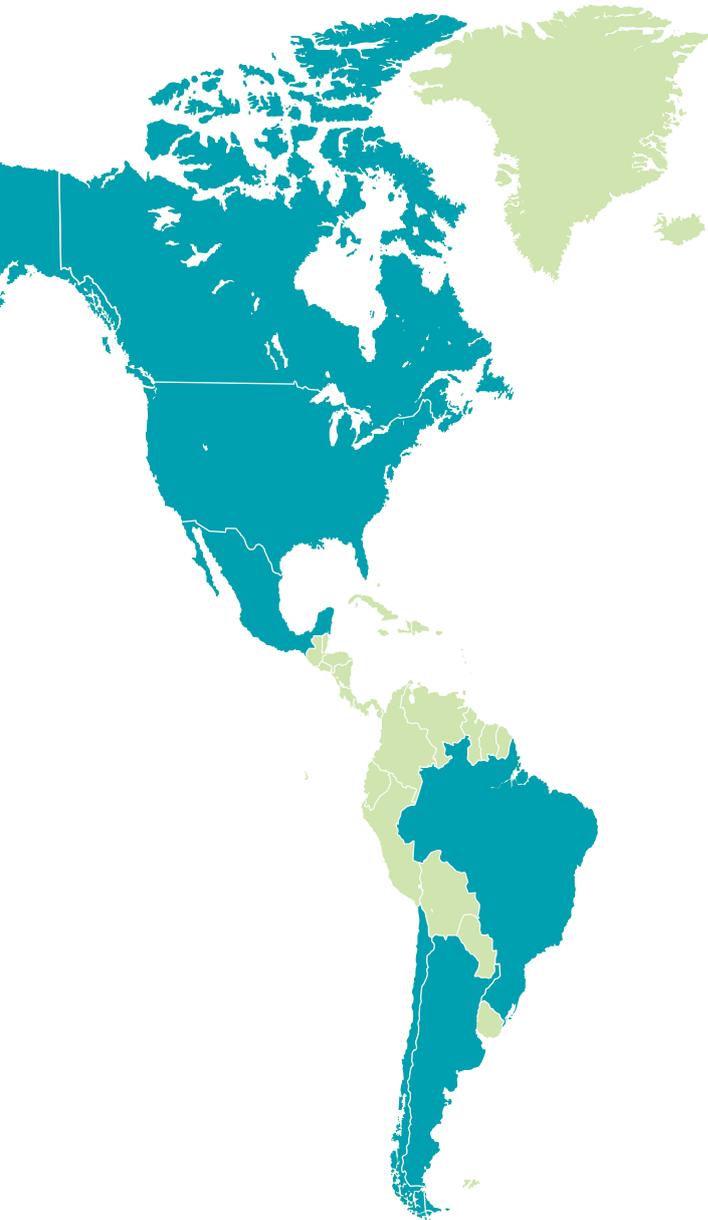
Manufacturing

**Producing the world's thinnest float glass**

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

### Global spread

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



### Europe

**12,200 employees**

- 13 float lines
- Automotive OE plants in seven countries
- BP downstream in 10 countries
- Extensive AGR network
- Specialty Glass operations in UK

### China

**2,800 employees**

- 16 float lines
- Three Automotive plants
- Specialty Glass operations
- Rolled glass for photovoltaics

### Japan

**5,000 employees**

- Four float lines
- BP downstream network
- Automotive OE plants and AGR network
- Specialty Glass operations

### North America

**3,900 employees**

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

### S & SE Asia

**2,800 employees**

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

### South America

**2,600 employees**

- Six float lines
- BP downstream operations
- Automotive OE in Brazil, Argentina and Chile
- AGR network

# OUR MISSION IS TO 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.

"Our objective is to achieve profitable growth and to realize our vision of 'Making a difference to our world through glass technology'. Our Strategic Management Plan places a great deal of emphasis on Sustainability, with clear targets for the organization, particularly in our own energy saving and waste management."



**Craig Naylor**  
President and CEO  
NSG Group

We are fully committed to Sustainability. Our strategy and 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 benefitting from the growing international demand for our 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 are playing an important role in the development of the growing photovoltaics sector.

As a world leader in automotive glazing, we aim to provide further opportunities for vehicle manufacturers to meet their Sustainability requirements. During the year, we launched Pilkington Sundym™ Select, a variable transmission automotive glass, fitted in the new Mercedes SLK.

In Specialty Glass, we produce ultra-thin glass for displays and touch-panel technology, LED print heads for more efficient office machinery, battery separator technology for electric and hybrid vehicles, and glass fiber timing belts, making engines more efficient.

Glass manufacture is energy-intensive, but 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 expected to generate 250 kW of energy, or about 10 percent of what the factory uses, every year.

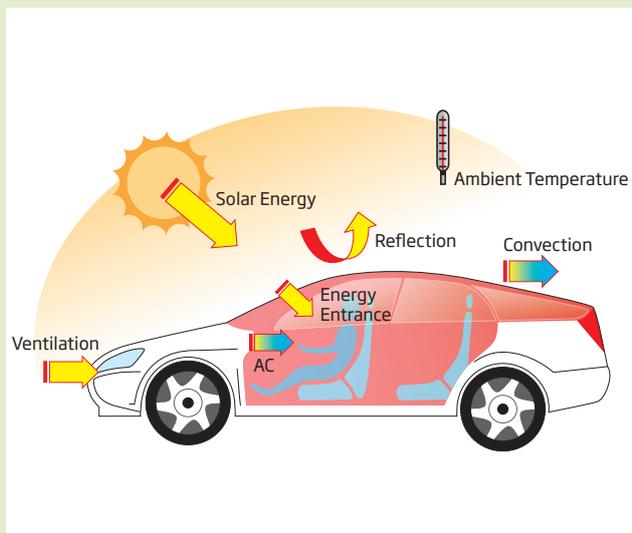
A major focus with our employees is to improve Safety. Despite significant improvements in our performance over the last ten years, I believe we are still some way from making Safety truly one of our core values. My aim is to move Safety in the NSG Group to the next level. The effective implementation of our 10 Key Safety Leadership Behaviors is now an important focus for us. In 2011, we launched NSG Group Safety and Environmental Awards to encourage best practice. We have also initiated an annual Group Safety Day, increasing employee focus on safety.

In the past year, we joined the UN Global Compact. We consider its ten principles to be a natural extension of our Code of Conduct, which defines our commitment to social and environmental responsibility.

We have further strengthened our Sustainability governance, by allocating defined responsibility to named individuals for managing and monitoring our progress on the GRI reporting indicators. 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	Commentary
<p><b>Economic</b> We aim to achieve a return on equity of low double-digit percent.</p>	As at 31 March 2011, the ratio was approximately 6 percent.	This is a key performance target under our Strategic Management Plan to be achieved by FY2014.
<p><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&amp;D programs in all three business lines.</p>	<p>The eight key products selected are as follows:</p> <p><b>Building Products</b></p> <ul style="list-style-type: none"> <li>• Clear float glass</li> <li>• On-line CVD coated Solar TEC glass for the thin film PV market</li> <li>• Off-line coated Low-E glass for the construction market.</li> </ul> <p><b>Automotive</b></p> <ul style="list-style-type: none"> <li>• Solar green absorbing glass side glazing</li> <li>• IR reflective glass laminated windshield</li> <li>• Galaxsee privacy glass rear sidelight.</li> </ul> <p><b>Specialty Glass</b></p> <ul style="list-style-type: none"> <li>• NSG Glasscord® used in engine timing belts</li> <li>• NSG Selfoc Lens Array for use in office machinery.</li> </ul>	Baseline data is for the selected products is now available. Details are shown in the Sustainability section of <a href="http://www.nsg.com">www.nsg.com</a> .
<p><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&amp;D programs ongoing. A forward look at future/modified products and their impact on improved CO<sub>2</sub> payback has been initiated.</p>	<p>The eight key products selected are as follows:</p> <p><b>Building Products</b></p> <ul style="list-style-type: none"> <li>• A thin film PV module</li> <li>• A double-glazed unit containing our off-line coated low-e product</li> <li>• A double-glazed unit containing our off-line coated Solar Control product.</li> </ul> <p><b>Automotive</b></p> <ul style="list-style-type: none"> <li>• Car windshield</li> <li>• Car sidelight</li> <li>• Car roof light.</li> </ul> <p><b>Specialty Glass</b></p> <ul style="list-style-type: none"> <li>• NSG Glasscord® for use in engine timing belts</li> <li>• NSG Selfoc Lens Array for use in office machinery.</li> </ul>	Baseline data is for the selected products is now available. Details are shown in the Sustainability section of <a href="http://www.nsg.com">www.nsg.com</a> .
<p><b>Health &amp; 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).</p>	The SIR for financial year FY11 was 0.57.	Focused plans are in place to make our employees ever safer at work.
<p><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.</p>	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.	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.
<p><b>Recycling &amp; 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).</p>	Our waste to landfill figure for 2010 was 24kt.	We have made good progress, but the achievement of further reductions will require significant changes in the way we operate.
<p><b>People</b> All employees to have a training and development review annually, with a target compliance level of 90 percent by 2015.</p>	Over 77 percent of employees were covered by the annual review of regular performance and career development process in 2010.	In the 2010 process, we particularly focused on the area of objective setting, aiming to significantly improve the quality of personal objectives.



## Vehicle air-conditioning use can generate up to 20 percent extra fuel consumption.

Reduced vehicle cabin temperatures allow a reduction of the load on air-conditioning and improvements to vehicle overall efficiency by 2 to 4 percent.

Emissions from vehicle air-conditioning are not currently included in official fuel consumption data. Proposals to change this are under discussion.

Glazing can play a major role in reducing air-conditioning load and this should be accounted for in future test procedures.

Solar control glazing in vehicles can work in two ways, by absorbing and/or reflecting solar radiation.

**Our tests quantify the beneficial effects of installing solar control glazing in vehicles.**

## CASE STUDY: AUTOMOTIVE SOLAR CONTROL GLAZING HELPING TO REDUCE AIR-CONDITIONING LOADING AND FUEL CONSUMPTION IN CARS.

### Regulatory and economic environment

Vehicle manufacturers need to reduce the environmental impact of vehicles and driving, faced with:

- Legislative demands for improved emission standards
- Consumers adopting efficient vehicles, encouraged by: Increasing fuel costs, government intervention and taxation and greater environmental awareness
- Trends towards increased glass area, providing a bright interior, but also greater potential for 'greenhouse effect' in vehicles. Increased awareness of passenger comfort.

Development of new vehicle power-trains and electric vehicles mean that less energy is available for heating/cooling demands in efficient vehicle designs.

Heating/cooling demands can reduce range in electric vehicles by up to 50 percent.

Tests demonstrate that high-performance solar control glazing can:

- reduce heat penetration in vehicles by over 25 percent
- reduce inside cabin temperatures by up to 7 or 8°C.

### Vehicle model test conditions

Cabin conditions and AC load determined by considering:

- Compound angle between glazing and sun
- Glazing Performance (ISO 13837 Tts)
- Stationary and driving cases (convection dependent on vehicle speed)
- Ambient conditions
- Glazing area
- Sun position.

Outputs:

- Energy entrance (W) = AC Load
- Head air temperature.

### Results for advanced windshield types\*

	Heat entrance through WS (W)	Embodied Product CO <sub>2</sub> (Kg p WS)	CO <sub>2</sub> saved vs std WS (g/Km)	Pay back
Standard windshield	156	35		
Solar absorbing windshield	142	34	0.6	immediate
Solar reflecting windshield	112	41	1.8	3 months

\* For average European climate. Savings for hot climates are greater.



## Building glass has an important role in helping to reduce CO<sub>2</sub> emissions and mitigating the effects of climate change.

The 'energy balance' between 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 the products.

Low-e glass reflects energy back into a building, to achieve much lower heat loss than ordinary float glass. Different types of low-e glass allow different amounts of passive solar heat gain, which helps reduce heating requirements and costs, especially in colder months.

Low-e products from the NSG Group include Pilkington **K Glass™**, Pilkington **Energy Advantage™** and **Pilkington Optitherm™**.

## CASE STUDY: RESIDENTIAL BUILDING LOW-E GLAZING HELPING TO REDUCE HEATING BILLS AND CO<sub>2</sub> EMISSIONS IN BUILDINGS.

### Regulatory and economic environment

In European studies, it is estimated that 40 percent of energy is used in buildings, mostly for space heating and cooling.

Windows have the great ability of allowing natural sunlight into buildings. In a cold climate, windows also have the benefit of allowing the sun's heat in. This 'solar gain' reduces the energy needed for heating.

However, old glazing also allows a lot of heat to escape. Reducing this wasted energy, and the CO<sub>2</sub> emitted in producing it, is achieved using double glazing with modern low-e coatings.

Greater use of modern energy efficiency glazing would radically reduce the energy usage and CO<sub>2</sub> emissions due to our buildings.

Compared to single glazing, modern double glazing with a low-e coating reduces the conduction of heat through windows by a factor of five.

- Greater use of modern energy-efficient glazing would radically reduce the energy usage and CO<sub>2</sub> emissions attributable to buildings.
- Savings of more than 100 million tonnes of CO<sub>2</sub> could be achieved annually if all Europe's buildings were fitted with advanced energy-saving glass.

### Energy-use computer modeling

8.3m <sup>2</sup> glazing	MJ Primary Energy	Months
<b>Manufacturing energy</b>		
4mm Single glazing	1283	
4mm Double-glazed unit with low-e coating	4039	
<b>Annual heating energy demand for apartment</b>		
Single-glazed	16420	
Low-e double-glazed	11550	
Energy saved	4870	
Months to payback energy required to manufacture low-e double glazing		10

### With single-glazed windows

A mid-terraced apartment in the UK with old single-glazed windows requires about 16.4GJ of heating energy per year to maintain its temperature at a comfortable level.



### With low-e double glazing

The same apartment with low-e double glazing requires about 11.6GJ, of heating energy per year – a saving of 29 percent.



## OUR APPROACH TO SUSTAINABILITY

GLASS CONTRIBUTES TO EFFORTS TO REDUCE GREENHOUSE GAS EMISSIONS AND MITIGATE THE EFFECTS OF CLIMATE CHANGE. WE AIM TO BE THE GLOBAL LEADER IN INNOVATIVE HIGH-PERFORMANCE GLAZING SOLUTIONS, CONTRIBUTING TO ENERGY CONSERVATION AND GENERATION.

“Sustainability is embedded in all that we do as a company. We manufacture products that can have a very beneficial impact in terms of life cycle, energy usage or CO<sub>2</sub> emissions, but we recognize that the processes we employ to manufacture them are energy-intensive and consume significant amounts of raw materials. We need to make sure that we do all we can to minimize the negative impacts of our actions, pushing for better process efficiencies and reduced waste, while also developing our products to maximize their life cycle benefits in use in our customers’ applications.

Last year, we set targets across a wide range of areas. These were carefully chosen to reflect the need to minimize negative aspects, while maximizing the positive effects. I am pleased to be able to use this report to publish our progress, and to further clarify our targets and baselines in the complex areas of energy usage and product development.”



**Nick Shore**  
Director of Sustainability

Our Sustainability Committee, which I chair, has enjoyed excellent support from the Executive Committee and Board over the year. Our proposals for executive accountability were accepted, allowing us to make good progress with individual executives on the key aspects of our strategy. Our Group-level targets have been allocated to the business lines and functions, and cascaded through the organization.

The Group’s investment program is carefully targeted, and is fully in line with our strategy and Sustainability objectives. We plan to expand our solar energy business in Vietnam and China, and we have exciting energy efficiency projects underway at many of our large manufacturing sites.

We have adopted the UN Global Compact, and support the ten principles it embodies. We have conducted a full review of our Code of Conduct and Policies to ensure that these support our commitments under the Compact. We have found that, while we were already reasonably well aligned, this exercise has been very useful in helping us focus our attention in the right areas, and in giving our employees even clearer guidance about what we expect of them, and what they can expect from the Company.

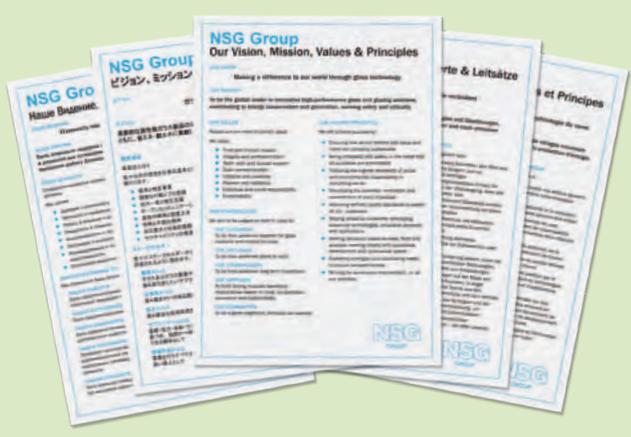
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**Our principal raw materials are mineral in nature and we recognize our responsibility to ensure that in obtaining those minerals, natural habitats and biodiversity are preserved or enhanced.**

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Our customers are placing increasing demands on us with regard to our Sustainability Policy, and in particular how we are managing and improving our Carbon Footprint. We have made many reports, both under the Carbon Disclosure Project and to address bespoke customer requests. Our customers, notably in Solar Photovoltaics, are also making public declarations, and need good data from us as they expand their reporting from Scope 1 and 2 to include Scope 3.

I was delighted with the response to our inaugural Health and Safety and Environmental awards. These attracted over 250 responses from around the Group. The quality of submissions was excellent and our judges, including independent experts in each area, had a very difficult time choosing between the many projects that met our selection criteria. This has been a valuable initiative to recognize good work, spread best practice, and encourage other sites to develop ideas for future awards.



### 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.

As well as working to maximize the life cycle benefits of our products, we are very committed to minimizing any negative aspects of our business, or those of our suppliers. We are working to achieve full adoption of our Supplier Code of Conduct, and we have made a public declaration of our stance on Conflict Minerals.

Through our membership of trade associations, standards bodies and other organizations we work to influence legislation, particularly in the area of energy conservation.

### Our vision

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

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

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

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.

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

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

#### Our vision

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

#### Our mission

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

#### Our values and principles

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

#### Our Code of Conduct

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

#### Our 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 APPROACH TO SUSTAINABILITY CONTINUED

### People, health and safety

We regard people as the most important asset of our company. 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 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. See page 33 for details on our safety performance.

### Our management approach

#### Economic

We are focused on delivering value and growth to all our stakeholders. In the course of 2010, we conducted a major strategic review. This was intended to sharpen the Group's operational focus and ensure that full advantage is taken of the synergies offered by an international Group headquartered in Japan.

The review focused on important growth opportunities, particularly in emerging markets and value-added products addressing climate change. Early investment opportunities were identified in a number of key projects with 12 to 24 month development timescales.

We took quick action to secure funding for these through the Share Offering launched in August 2010. Funding from the share issuance is allowing the Group to seize these important investment opportunities in the technologies that will build sustainable futures, leverage its competitive position and strengthen its balance sheet.

Our Strategic Management Plan includes clear economic targets to be attained by the end of FY2014. We regard the Plan as a 'dynamic' document, on which we are updating our stakeholders on an annual basis.

#### 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, putting in place systems to try to ensure that we manage such impact 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 Airswab™ system we use 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 69 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 Environment, Health and Safety.

#### 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.

### Labor practice

Our management philosophy values people as 'the most important asset of our company'. Just over 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 take safety very seriously, emphasizing 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, every incident 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. A new post of Group Talent Manager was created in 2011, operating within Group Human Resources.

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 three business lines.

### 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 Head of Corporate Affairs.

### Our financial targets\*

- Attain 5 percent Compound Annual Growth Rate in Sales.
- Double operating profit (before amortization) as a minimum.
- Increase EBITDA by 50 percent, as a minimum.
- Achieve low double-digit percentage return on equity.

\*Strategic Management Plan targets to be attained by end of FY2014.

## CORPORATE GOVERNANCE

CORPORATE GOVERNANCE IS A KEY ELEMENT OF OUR SUSTAINABILITY ACTIVITIES. WE VALUE EFFECTIVE AND TRANSPARENT ENGAGEMENT WITH ALL OUR STAKEHOLDERS, AND HAVE FURTHER STRENGTHENED OUR COMPLIANCE ORGANIZATION OVER THE PAST YEAR.

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.

### Our governance structure

The NSG Group is governed by its Board of Directors, appointed by resolution at the General Meeting of Shareholders. The Board comprises the Chairman of the NSG Group, the Vice-Chairman, five executive officers and four external directors. In the fiscal year 2011, the Board of Directors met 14 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

In June 2008, shareholders approved the adoption by the Group of the Company with Committees model, replacing the former Corporate Statutory Auditors model. Three committees were established.

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. The Committee consists of seven directors, including four external directors. Its chairman is Katsuji Fujimoto, Chairman of the NSG Group.

The Audit Committee is chaired by the Vice-Chairman of the Group, Tomoaki Abe, and comprises six directors, including four 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 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 external director, George Olcott, and comprises five directors, including three external directors.

### Adoption of IFRS

On 1 April 2011, the Group formally adopted International Financial Reporting Standards (IFRS) for its consolidated financial statements. Our consolidated financial results for the financial year FY2012 and thereafter will be presented in IFRS.

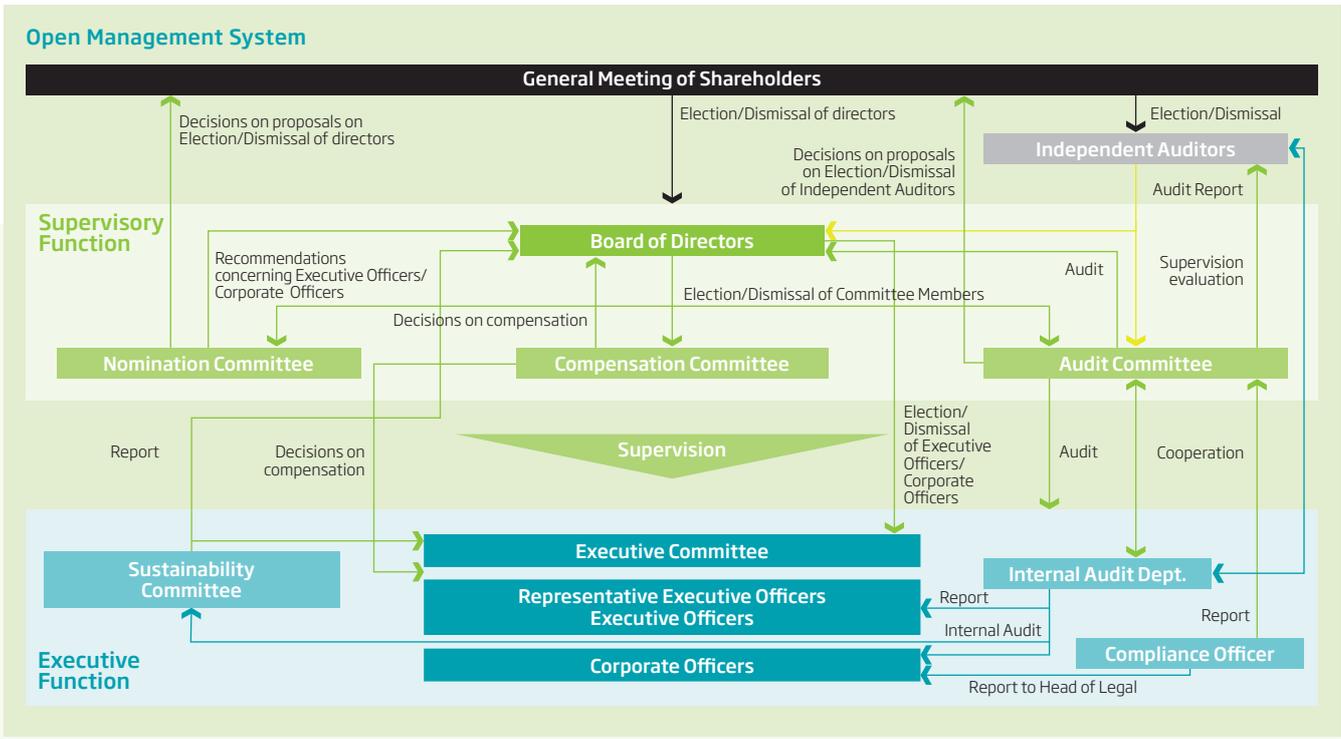
We believe that the use of IFRS in the preparation of our consolidated financial statements is consistent with our international spread of operations and shareholder base.

Behind our decision to be an early adopter is our determination to build a truly international company headquartered in Japan. 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.

### 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 the most important 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 17.



### 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 both 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).

We have over the past year further strengthened our organization to ensure that we have the resources to formalize our policies, procedures, and guidelines in this area and to conduct the necessary training and checks to make sure that we meet the increasingly stringent legal and regulatory environment in which we operate. This has included the establishment of a Compliance function and the appointment of Alan Graham as Group Chief Compliance Officer, reporting to the Head of Group Legal and the Audit Committee.

We are committed to free and open competition and will compete vigorously, but with integrity and honesty. Competition Compliance issues are managed by the Group Competition Compliance Officer who reports to the Group Compliance Officer. Compliance activities have included a training program for people in 'key roles', seen as those most likely to face competition compliance issues in their work, which is in operation Group-wide.

**We have over the past year further strengthened our organization to ensure that we have the resources to formalize our policies, procedures, and guidelines in the area of Compliance, including the creation of a new position of Group Compliance Officer.**



### Appointment of Group Chief Compliance Officer

Compliance issues within the NSG Group have been consolidated into a new Group function, reporting directly to the Audit Committee.

Alan Graham, General Counsel Americas, has been appointed to the new role of 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 Group Policies and Procedures in this area.

Alan Graham  
Group Chief Compliance Officer

## 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.

We research, develop and manufacture glass products fit for a sustainable low-carbon society. We continuously invest in upgrading manufacturing installations to increase our own energy-efficiency, minimize the embodied CO<sub>2</sub> in our products and increase their recyclability.

### 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 the 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.

#### Low-iron glass

When used in building façades, Pilkington Optiwhite™ low-iron glass offers higher light transmission than conventional float glass.



To maximize energy efficiency all year round, the ideal glazing solution often 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 85 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.

### 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, energy-saving and weight reduction. 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.

### 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 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.



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

Low-e glass is a value-added product with a transparent coating on one surface. This reflects heat back into the building, thereby reducing heat loss through the window.

The coating also allows large amounts of free solar energy to enter the building, thereby heating it passively.

Thermal imagery showing heat loss from first floor double glazing is far less than that of the single glazing on the ground floor.

## 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 is 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, in the summer, unless combined with solar control glass, 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 beginning to realize 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.

### 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.

Buildings account for almost 50 percent of the energy consumed in developed countries. Our products have a beneficial role to play in addressing some of the major environmental challenges of buildings, new and old.

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

### Energy consumed

# 50%

proportion of energy consumed in developed countries by buildings.



## Pilkington Spacia™ WAN AWARDS 2011 Product of the Year

The World Architectural News 2011 Product of the Year Award was won by the Group's Pilkington Spacia™ system.



It consists of an outer pane of low-emissivity glass and an inner pane of clear float glass, with a vacuum rather than air or another gas in between.

The result is excellent thermal performance from a unit only fractionally as thick as a standard Insulating Glass Unit.

Pilkington Spacia™ and Pilkington energikare™ Legacy were used in the refurbishment of the Hermitage Museum in Amsterdam.

## 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 to 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.

### Fire-protection glass

Use of high-performance fire-resistant glazing allows large expanses of interior glazing, without compromising on fire safety.



## 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.

## Fire Protection Glass

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 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.

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.

Over the past few 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.

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

Between 2000 and 2010, global photovoltaic (PV) demand grew at a compound annual rate of 50 percent, rising from 280 MW to over 17 GW (EPIA). Despite the global downturn and reductions in some government incentives, solar volumes actually increased in 2009-2010. This was mainly due to the reduced cost of solar electricity, but also driven 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 is more expensive, but clearer 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 photovoltaics, crystalline silicon photovoltaics 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.

We have been closely associated with the leading companies within the crystalline silicon and thin film photovoltaics industries for a long time. This collaboration resulted, in part, from the historical expertise in on-line coating of both Pilkington and NSG. This has enabled us to become the worldwide leading producer of high-quality, high-volume Transparent Conductive Oxide (TCO) coated glass, with manufacturing sites in all main regions. We have been a technological leader in low-iron glass compositions for 25 years.

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

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

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

Globally, governments have established policies and incentives to promote renewable energy production. For example, in June 2009, the European Renewable Energy Directive came into force. Carbon-trading schemes encourage CO<sub>2</sub> reductions, adding further impetus to the development of renewable energy options. In March 2011, China adopted its 12th Five-Year Plan, intended to cut its overall carbon footprint. Solar Energy is expected to grow significantly in China, with a target of 10 GW installed capacity by 2015. In the United States, various programs and policies are in place to promote the development of renewable energy supplies, such as the SunShot initiative, designed to make solar energy cost competitive with other forms of energy by the end of the decade.

Our products support the three leading solar energy technologies.

As solar energy costs fall, generous incentives are no longer essential. Solar energy is now approaching grid parity in several countries and is expected to play a significant role in global renewable energy supplies.

#### Thin film photovoltaic solar modules

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



#### Crystalline photovoltaic solar modules

Highly efficient, but the cells are also expensive to make. So, 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 photovoltaic 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 photovoltaic modules consist of a stack of extremely thin photosensitive layers sandwiched between a top TCO coating and a back contact. The photovoltaic layers are laminated between a TCO coated front glass such as NSG **TEC™**, and a low-cost backing material, such as standard or thermally-strengthened Pilkington **Optifloat™** clear glass.

With our advanced technology, 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 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. 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.



### Thin film photovoltaic solar modules in action

In June 2011, we commissioned a 3,000 panel solar field at our facility at Northwood OH, in the United States.

This is expected to generate 250 kW of energy, or about 10 percent of the facility's energy requirement, every year.

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

## 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.



#### Pilkington Sundym™ Select: Variable light transmission glazing

Tinted windows that darken at the touch of a button are now a reality for motorists; thanks to NSG Group technology.

Our new Pilkington Sundym Select™ was launched on the Mercedes-Benz SLK rooflight in 2011. It is the first time that variable light transmission technology has been available in a mass-production car.

The product offers a range of benefits. It provides the best solar control available from any automotive glass product for reduced heat entry and removes the need for a mechanical blind system. This helps reduce weight and increases the car headroom, or allows for vehicle height reduction, and better aerodynamics.

Shown fitted in the Mercedes SLK, Pilkington Sundym Select™ can be switched instantly from clear to tinted mode.

## SPECIALTY GLASS

SPECIALTY GLASS BUSINESS PRODUCTS CONTRIBUTING TO ENERGY CONSERVATION AND SUSTAINABILITY INCLUDE GLASS FOR ELECTRONIC DISPLAYS AND TOUCH PANELS, LED PRINT HEADS, BATTERY SEPARATORS AND GLASS CORD FOR ENGINE TIMING BELTS.

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. These are sheets of non-conducting porous material between positive and negative plates in storage batteries. They 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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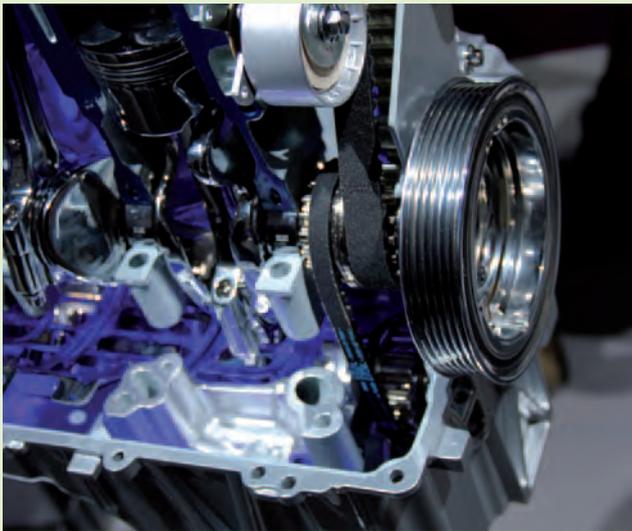
We are developing and expanding sales of separators for smaller and more powerful batteries for use in future lower-emission vehicles.

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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.



## NSG Glasscord® 'Belt in Oil' system features in new Ford engine

Unveiled at the 2011 Frankfurt Motor Show, Ford's revolutionary new EcoBoost™ engine features the NSG Glasscord® 'Belt in Oil' timing belt system, developed by the Group's NGF EUROPE subsidiary, part of the Specialty Glass business.

The use of glass fiber cord in the Belt in Oil system improves belt flexibility and stretch resistance significantly. The new system offers the quietness and low friction running of a belt, combined with the durability of a conventional chain system.

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

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 of a belt, but with the durability of a chain.

### Glass sound insulation – reducing noise pollution

Increasing traffic levels alongside built-up areas have boosted demand for acoustic screening to enhance the quality of life of the local inhabitants. Our Nippon Sheet Glass Environment Amenity (NEA) operation supplies the market for sound insulation systems for industrial use, acoustic architecture, expressways and residences, as well as electromagnetic wave shielding systems.

Although transparent plastics, such as polycarbonates and acrylics, are also used for soundproof panels around expressways, glass offers significant advantages in terms of aesthetics, durability and cost.

## ENVIRONMENTAL POLICIES AND MANAGEMENT

WE TAKE OUR ENVIRONMENTAL RESPONSIBILITIES EXTREMELY SERIOUSLY. WE REQUIRE ALL OUR OPERATIONS TO MEET ALL LEGISLATIVE STANDARDS AS A MINIMUM. WHERE WE CONSIDER LOCAL REQUIREMENTS INSUFFICIENT, OUR CORPORATE STANDARDS TAKE PRECEDENCE.

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

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.

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

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. Since the acquisition of Pilkington in 2006, a great deal of effort has been put into integrating and rationalizing our environmental controls and data systems.

Calendar year 2007 was 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 Airweb™ system also incorporates an incident reporting system. This allows the timely reporting and recording of both safety and environmental incident data, 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 multi-disciplinary 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 DIN EN ISO 14001 certificate covers the Group's Automotive sites worldwide.**

**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.**

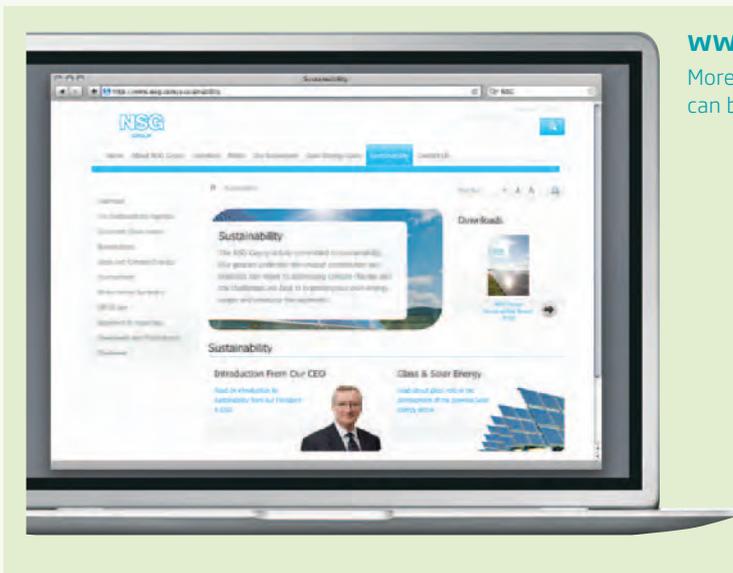
For glass manufacturing plants, we have defined our strategic approach to abatement in order to ensure that across the world we hold fast to our principles, even in parts of the world where legislative controls are less well developed.

### Certification

We aim to certify our manufacturing facilities to the internationally recognized ISO 14001 environmental standard and now have 69 certified sites around the world, representing 70 percent of our business by turnover.

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

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



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

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

## ENERGY AND RESOURCE USAGE

WE AIM TO MINIMIZE ENERGY INPUT IN ALL OUR MANUFACTURING AND PROCESSING ACTIVITIES, ENSURING THAT GLASS USAGE CONTRIBUTES NET BENEFIT TO SUSTAINABILITY, USING 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.

The effect of the global crisis on our manufacturing base in 2009 was dramatic. Some of our float lines were put on hot hold (maintaining working temperature, but not producing glass). Others were closed down with a view to restarting when markets improve. Our Automotive and Specialty Glass operations were similarly affected, with an unusual number of shutdowns and restarts. This resulted in an absolute reduction of resource consumption and emissions in 2009.

Production levels returned to normal in 2010 and this is reflected in the increased absolute resource consumption and emission data.

### Initiatives to reduce resource usage

Our Automotive business has continued to follow an energy management system to deliver the identified 3 to 5 percent reduction in energy usage. The focus has been on auditing and benchmarking, with identification and roll-out of efficiency projects and best practices across the operations.

Focus projects were identified in key areas of high energy consumption, which typically require some significant investment to deliver targets. One example is improvements in heat recovery from the automotive furnace operations across the Group. This heat can be recovered from the furnace chimney utilizing heat exchangers to provide useful energy to other process areas.

### 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. Natural gas emissions are discussed below, but from a production viewpoint the fuel is easy to control, does not usually demand a large investment in local storage and has generally proved relatively reliable in delivery.

We used 967 million cubic meters of natural gas in 2010. This equates approximately to 34.1 PJ of energy; a 4 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. Its principal disadvantages lie in the emissions caused during combustion, its physical characteristics and consequent difficulty in handling (e.g. it is very viscous at normal temperatures and therefore requires heated storage).

We used 262 million liters of heavy fuel oil in 2010, or 10.4 PJ; an 8 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 2010, our consumption of diesel oil was 21.5 million liters, or 0.8 PJ (down 5 percent on 2009) and that of liquid petroleum gas 11.3 k tonnes or 0.5 PJ (representing a 14 percent increase on 2009).

#### 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 2010, we consumed 8.8 PJ (2.4 TWh) of delivered electrical energy (a 9 percent increase on 2009).

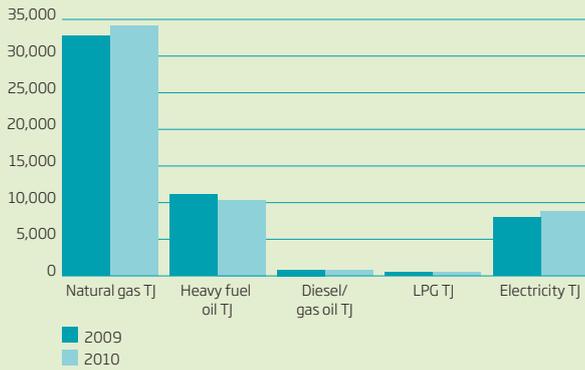
The total energy used by the NSG Group in 2010 was 54.56 PJ (15.16 TWh). This represents a 3 percent increase on 2009.

### Total energy used by the Group in 2010

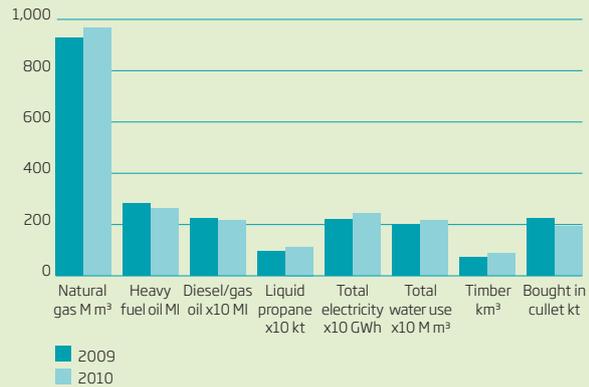
# 54.56 PJ

The total energy used by the NSG Group in 2010 was 54.56 PJ (15.16 TWh).

## NSG Group energy usage



## NSG Group resource usage



## Our resource usage

### Renewable resources

Some electrical power is directly generated on-site from waste gases or using co-generation installations. In 2010, we received 286 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 expected to generate 250 kW of energy, or about 10 percent of the site'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 89,000 cubic meters of timber in 2010, mainly in the transportation of glass (up 18 percent on 2009).**

### 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 21.5 million cubic meters of water in 2010. This was an increase of 7 percent on 2009 data, reflecting 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 2010 we bought in 192,000 tonnes of cullet to supplement cullet from our own internal recycling.**



## 2011 NSG Group Environmental Award

During 2011, we inaugurated the biennial NSG Group Environmental and Safety Awards.

The 2011 Environmental Project Award was won by our Automotive operations at Vizag, India, for its water conservation project.

The project, which has produced a reduction of over 10 percent in specific water consumption, a 34 percent reduction in specific water usage and a 20 percent reduction in costs, is targeting zero emissions as well as environmental amenity improvements creating a 'green carpet' over 40 percent of the site.

The first NSG Group Environmental Project Award was won by the Vizag Automotive site in India, for its water conservation project.

## MINIMIZING ENVIRONMENTAL IMPACT

GLASS MANUFACTURE IS AN ENERGY-INTENSIVE PROCESS, WITH RAW MATERIALS MELTED AT HIGH TEMPERATURES. PRINCIPAL EMISSIONS TO AIR ARISE FROM THE COMBUSTION OF FUEL AND AS CO<sub>2</sub> FROM THE DECOMPOSITION OF CARBONATES.

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 2010, we sent 467,000 tonnes of glass for recycling and bought in 192,000 tonnes. 14,100 tonnes of glass could not be successfully recycled and was sent for disposal (unchanged from 2009).

### Recycling

# 467,000

In 2010, we sent 467,000 tonnes of glass for recycling and bought in 192,000 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 48,987 tonnes of non-glass waste (an 8 percent reduction on 2009), of which 1,452 tonnes of hazardous (a 10 percent increase on 2009) and 22,256 tonnes of non-hazardous waste (a 5 percent reduction on 2009) were sent to landfill. We disposed of 10,080 tonnes of hazardous waste in 2010. This remains high, due to the production of LCD glass units at Suzhou, with used acid being treated off-site rather than within the facility.

### 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 (SOX).



## The Float Glass Process

A float plant, which operates non-stop for between 10-15 years, makes around 6,000 kilometers of glass a year, in thicknesses of 0.4mm to 25mm and in widths up to 4 meters.

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.

One of the 49 float lines owned or operated by the NSG Group, at Barra Velha in southern Brazil.

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 (NOX). Actions we take to reduce or prevent the emission of these oxides of nitrogen are detailed on our website.

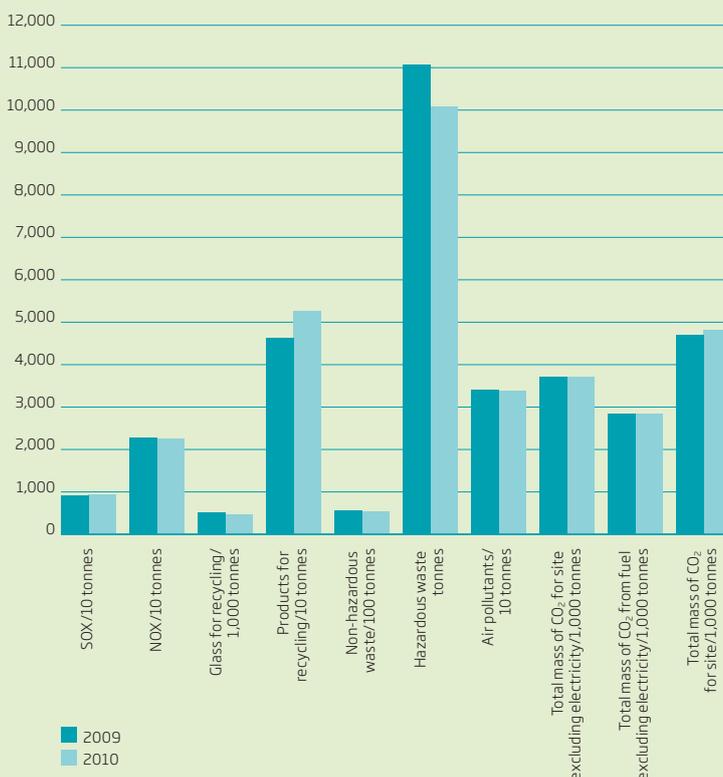
## Reducing carbon emissions

In 2010, the NSG Group was responsible for the direct and indirect emission of 4.8 million tonnes of CO<sub>2</sub>. This represents a 2 percent increase on 2009, but is mainly due to increases in production levels.

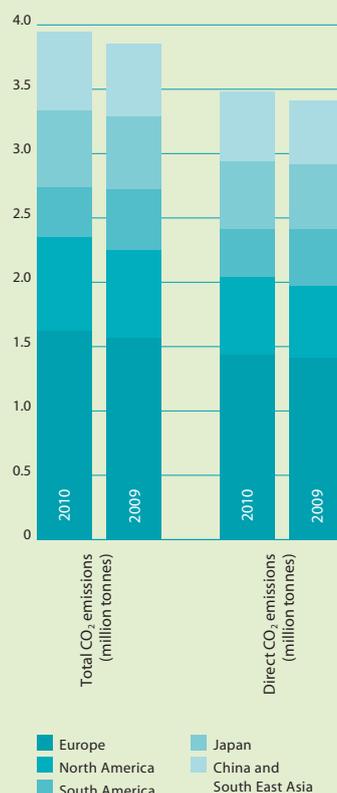
Our direct emissions were 3.7 million tonnes (no reduction on 2009). Direct emissions occur from our furnaces and from fuel used in bending and toughening furnaces in Automotive and Building Products. In Europe, externally verified, direct 2010 CO<sub>2</sub> emissions from the Emission Trading Scheme were increased by 3 percent compared to 2009, but reduced by 18 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.

## Principal emissions from the NSG Group during 2010



## NSG Group glass melting carbon emissions 2010



## EMPLOYEES

OUR MANAGEMENT PHILOSOPHY VALUES PEOPLE AS 'THE MOST IMPORTANT ASSET OF OUR COMPANY'. WE HAVE AROUND 29,300 PERMANENT EMPLOYEES, IN 29 COUNTRIES. SAFETY, QUALITY AND ENVIRONMENTAL RESPONSIBILITY UNDERPIN EVERYTHING WE DO.

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. The second phase of the Messenger Communications program has begun its global roll-out. The one-day program is aimed at managers and covers the communications process, briefing skills, techniques for gathering employee feedback and how to handle sensitive communications.

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.

Following two tragic fatal accidents in 2010, a new Group-wide initiative to further strengthen Safety Culture within the Group is under way, with Health and Safety performance now a part of the annual Management Incentive Plan. Our Safety Culture Leadership Team, which includes two members of the Executive Committee, continues to promote the process. We have also launched a recognition program that awards sites with outstanding Health and Safety performance.

We measure safety performance using two key 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 FY11 was 0.57; an improvement of 9.5 percent. 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. The LTIR for financial year FY11 was 0.17; an improvement of 22 percent on FY10, but this also includes the two fatal accidents. These are expressed as a rate per 200,000 hours (approximately the time worked by 100 people in one year). There were a total of 75 lost time injuries and 174 injuries classified as significant in the year, for the total workforce, employees and permanent contractors. We have also introduced a number of proactive measures of safety performance, targeted at changing behavior.

### Group Employee Survey

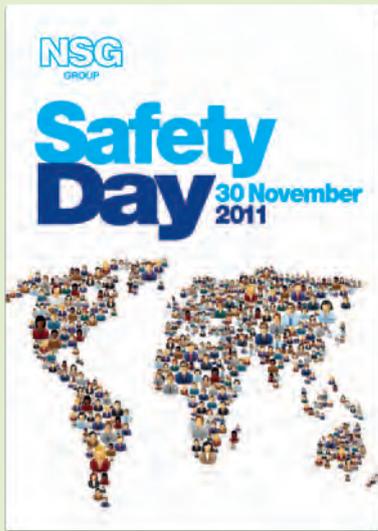
87%

Results from the 2011 Group Employee Survey showed that a total of 87 percent of employees participated – the same as in the 2009 survey. Individual Commitment 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.



## 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.

30 November 2011 saw the first NSG Group Safety Day, designed to bring special focus to this important area in every plant around the world.

## Group-wide employee survey

We conduct a Group Employee Survey every two years. Results from the latest survey will be available in early 2012 and these will be followed up with a series of local action plans, jointly developed with our employees at each location. These results will be compared with those from previous surveys and also against external industry benchmarks.

Actions arising from the previous survey include the expansion of a previous communications training initiative. Targeted at the senior management team, 'Project Messenger II' aims to ensure communication is clear, appropriate and regular, being delivered in a manner that is consistent and world class.

## Maximizing the potential of individuals

Over 77 percent of employees were covered by the annual review of regular performance and career development process in 2010, with our aim being to increase this proportion to 90 percent by 2015. In the 2010 process we particularly focused on the area of objective setting, aiming to significantly improve the quality of personal objectives.

Supporting our commitment to ensuring further performance improvements in the area of Health and Safety, it was required that all managers be set personal safety objectives in the 2010 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.

Our new Strategic Management Plan identifies further expansion into emerging markets as a priority. This presents challenges in terms of human resources planning. We are already addressing issues such as recruitment, retention and specialist and language training to attract the best talent available and recently appointed our first Talent Manager, within Group Human Resources.

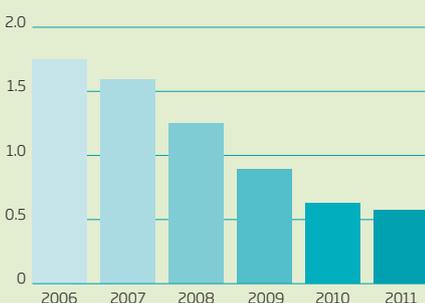
## NSG Group Safety Project Award 2011

The first NSG Group Safety Project Award was won by a Grab Safety Indicator Project, led by the European Building Products Manufacturing Improvements Team and the Cowley Hill site in the UK.

The project features a system of sensors on the grabs used for lifting glass packs, which give the operator clear feedback that the grab is in the correct position before starting lifting, thus avoiding any misalignment, which could result in catastrophic failure.

The judges' decision was influenced by three significant aspects of the project. First, it addressed an activity that is a major risk, not just for the NSG Group, but for the flat glass industry in many parts of the world. Secondly, the project paid close attention to reliability and the feasibility of retrofitting the system to existing grabs. And thirdly, the system was extensively tested and proved by people actually using the equipment.

## Significant Injury Rate (SIR)



## NSG Group employee distribution



Note: As at 31 March 2011

## CUSTOMERS

HIGH QUALITY AND SERVICE ARE KEY FEATURES IN BUILDING RELATIONSHIPS WITH INDUSTRY AND CONSUMER CUSTOMERS. WE ARE COMMITTED TO THE SAFE APPLICATION OF OUR PRODUCTS, THROUGH STORAGE, HANDLING, FITTING AND USE.

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 crucial 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 Building Products business, the Group has ISO 9000:2000 quality management certification in Europe, Japan, North and South America.



## US 'Green Building' Award

The Gold LEED®-certified MSUFCU building at Lansing, Michigan, showcases 44,000 square feet of Pilkington **Eclipse Advantage™** EverGreen, providing a perfect blend of visible daylight and low solar heat gain. Nearly 80 percent of the building takes advantage of natural day lighting, reducing the need for artificial lighting.

The LEED® green building certification program is the nationally accepted benchmark for the design, construction and operation of energy-efficient buildings in the United States.



Michigan State University Federal Credit Union Building, East Lansing, MI, USA.

Our European Building Products business has been a prominent 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 Building Products 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 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/TS1 6949:2009 (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 ¥10,692 million in R&D in FY2011.

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

### Building Products

- G11 Awards: Pilkington Cumbernauld 'Glass Company of the Year' (UK).
- Certified LEED® Gold Award: for MSUFCU building, Lansing, Michigan (USA).
- World Architectural News Awards 2011: Pilkington Spacia™ 'Product of the Year' (UK).
- Best of the Best 2010 award for brand design to Cebrace joint venture (Brazil).
- Modern Customer – Excellence in Customer Services award Home and Building category (Brazil).

### Automotive

- 2010 Toyota cost excellence performance/cost achievement awards (Brazil).
- Autodata Award 'Best of Automotive sector for pieces, parts and components' in 2011 (Brazil).
- Toyota FAW Tianjin Manufacturing Quality Supreme Award (Gold) in 2010 (China).
- Ford Award 'Quantum leap supplier improvement in 2011' – (Brazil).
- VW supplier quality program (Forum Lieferantenqualität) participant 2010 (Germany).
- JLR Quality award presented to Automotive Kings Norton in June 2011 (UK).
- CLAAS (agricultural machinery) award for Quality Achievement Specialized Transport 2011 (Finland).

### Specialty Glass

- Creative Sensor Inc. (CSI) award to NSG Hong Kong for Outstanding Performance and Excellent Support, 2010 (China).
- Fuji Xerox Premiere Partner 2011 NSG Co., Ltd. (Japan).

## 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

In April 2011, we launched our Strategic Management Plan that sets the course for the NSG Group over the next three years. Announced in November 2010, it replaced the Medium-term Plan issued in November 2006. The new Plan covers FY2012 to FY2014, but implementation is well under way, with announcements and the start of work on new investment projects in support of the Plan.

The objective is to take the NSG Group to the next level of its development, building on progress on our 'Phase 1' priorities and leveraging our technology into growth opportunities. The Plan places important emphasis on our commitment to Sustainability and our intention to develop a sustainable enterprise.

## Strategic Management Plan objectives

To take the NSG Group to the next level in its development, by:

- Maximizing profitable growth while reducing our net debt/earnings (EBITDA) ratio.
- Ensuring highest standards of ethics, safety, environmental responsibility and Sustainability in all our activities.
- Being innovative in everything we do.

## 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 continued 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.

## International shareholder base

# 35%

of our shareholders are based outside Japan.

## Evolving shareholder composition

A major issue for us has been the significant changes in shareholder composition over the past five years. 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 has risen markedly.

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

We have consequently expanded our global IR effort to meet the requirements of shareholders and potential investors around the world, including a range of additional publications, some of which are published 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.



## Distribution of NSG Group shareholders (as at 30 September 2011)



CEO Craig Naylor and CFO Mark Lyons address a results presentation for financial analysts in Tokyo.

## 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.

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, cooperation and Sustainability.

As part of our Sustainable Procurement Program, we operate a Supplier Code of Conduct. It outlines behaviors, processes and procedures we observe as the standards we expect from our suppliers.

### Our Supplier Code of Conduct

The 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 Code also takes into account our Values and Principles, particularly the emphasis on safety, taking personal ownership for actions and communicating with openness and involvement. We expect all our suppliers to follow the principles of this Code.

We have directly communicated our Code to around 12,000 suppliers and are now asking suppliers to sign a declaration of compliance. Our aim is that all suppliers will sign such a declaration in order that they can continue supplying the NSG Group.

### The standards we expect

We expect our suppliers to achieve and maintain high standards throughout the supply chain, but with particular regard 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 800 new supplier audits over and above the 120 carried out in 2010.**

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## New Code of Conduct Audit

# 800

Between 2011 and 2014 we plan to audit around 800 key suppliers, using a newly-developed Code of Conduct audit.

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.

### Communication and cooperation

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>, NO<sub>x</sub> and SO<sub>x</sub> 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.

### Silver pastes

We use silver pastes in our Automotive business line as an electrical conductor on automobile backlights. Recycling schemes have been extended in our manufacturing plants for the silk screens as well as the cloths and containers used with the silver paste. We and our suppliers are able to reclaim a significant amount of the waste silver for reuse in our production operations.

### 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.

## COMMUNITIES

THE LOCAL COMMUNITIES IN WHICH WE OPERATE UNDERPIN OUR BUSINESS AND THE LIVES OF OUR EMPLOYEES. TO SUSTAIN OUR OPERATIONS, WE AIM TO FOSTER A RELATIONSHIP OF MUTUAL BENEFIT WITH OUR COMMUNITIES.

We have around 29,300 permanent employees, with principal operations in 29 countries throughout Europe, Japan, North and South America, China 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.



## Community action in Japan

When the earthquake hit eastern Japan in the afternoon of Friday 11 March 2011, NSG Group sites and offices across the country suffered varying amounts of damage to buildings and stocks and all were hit by power outages. The worst affected were in the north and east of the country, closest to the epicenter.

Our employees in Japan collected nearly 6 million yen and sent 15 full trucks of aid items to help their colleagues in the stricken areas.

In addition, the Group announced that it was providing a corporate donation toward relief and recovery efforts. Building Products Japan have been heavily involved in supplying replacement products to the stricken areas as the rebuilding process continues.

### Earthquake damage

Building Products Japan has been heavily involved in the rebuilding program in the affected areas.

In FY11, we made contributions worth around ¥196,450,000 (approx. €1,740,000) to our local communities. Our grants helped the arts, medicine, welfare, job creation and urban renewal. By region, Europe and Japan accounted for 90 percent of this total. The bulk of the remainder was spent on activities in South America and South East Asia.

## 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

- The Group and its employees rallied to help those affected by the March 2011 Japan earthquake (see feature above).
- A fundraising campaign was organized by employees, with a matching Company contribution, to help an orphanage in Selangor affected by the landslide in May 2011 (Malaysia).
- Employees in the north-west of England organized events and collections throughout the year in support of the Willowbrook Hospice for terminally-ill patients in St Helens (UK).
- Vidrios Lirquén marked the anniversary of the Company's foundation with employee initiatives to help local institutions related with children at risk and care for the elderly (Chile).
- The Group's operations in Toledo, OH are long-term supporters of the United Way charitable foundation, with employee and Company support totaling \$169,000 in 2010 (USA).

## Support for education and training

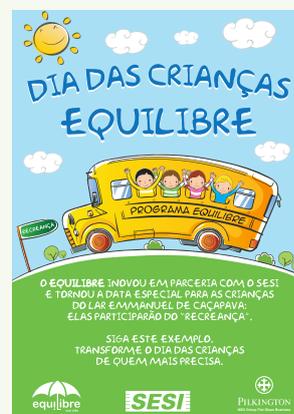
- NSG Group sponsored a delegate from Brazil to the 2011 'One Young World' summit, held in Zurich (Switzerland).
- Sponsors of the Royal College of Art Vehicle Design Award (UK), now in its 24th year.
- Nippon Sheet Glass Foundation for Materials Science and Engineering (Japan).
- Sponsors of the Arkwright Scholarship scheme for students of technology (UK).

## Cooperation 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).

### Children's Day in Brazil

Group operations in São Paulo and Caçapava annually arrange transportation and food for deprived schoolchildren during the celebration of Children's Day (O Dia das Crianças) in Brazil.



## 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 2012 Sustainability Report, to be published in early 2013. We report our financial, social and environmental performance via three main channels:

- NSG Group Annual Report 2011 (AR)
- NSG Group Sustainability Report 2011 (SR)
- NSG corporate website, [www.nsg.com](http://www.nsg.com) (Web)

The table below 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</b>	<b>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 to 11, 16, 17 & Web
<b>2</b>	<b>Organization profile</b>	
2.1	Name of organization.	Page 45
2.2	Primary Brands, products and services.	Pages 2 & 3
2.3	Operational structure of the organization, including main divisions, operating companies, subsidiaries, and joint ventures.	Pages 2 to 5 & AR
2.4	Location of organization's headquarters.	Page 45
2.5	Number of countries where the organization operates, and names of countries.	Pages 4 & 5
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.	Pages 19 & 35
<b>3</b>	<b>Report parameters</b>	
3.1	Reporting period.	Page 44
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

GRI Indicator	Criteria	Where to find this information
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</b>	<b>Governance</b>	
4.1	Governance structure of the organization.	Page 14
4.2	Indicate whether the Chair of the highest governance body is also an executive officer.	Page 14 & 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'.	AR & Web
4.4	Mechanisms for shareholders and employees to provide recommendations or direction to the highest governance body.	Pages 33 & 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
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 10 & 11
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 14, 15 & 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.	Pages 1, 6 & Web
4.13	Memberships in associations or advocacy organizations.	Pages 1 & 16
4.14	List of stakeholder groups engaged by the organization.	Pages 10, 11, & 32 to 41

GRI Indicator	Criteria	Where to find this information
4.15	Basis for identification and selection of stakeholders with whom to engage.	Pages 10, 11 & 44
4.16	Approaches to stakeholder engagement, including frequency of engagement by type and by stakeholder group.	Pages 32 to 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 32 to 41
<b>Economic</b>		
	Disclosure on management approach.	Page 12
<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.	Pages 16 & 17
<b>Environment</b>		
	Disclosure on management approach.	Page 12
<b>Materials</b>		
EN1	Materials used by weight or volume.	Pages 28, 29 & Web
EN2	Percentage of materials that are recycled input materials.	Pages 29, 30 & Web
EN3	Direct energy consumption by primary energy source.	Pages 28 & 29
EN4	Indirect energy consumption by primary source.	Web
EN5	Energy saved due to conservation and efficiency improvements.	Web
<b>Water</b>		
EN8	Total water withdrawal by source.	Page 29
<b>Emissions, effluents and waste</b>		
EN16	Total direct and indirect greenhouse gas emissions by weight.	Page 31
EN17	Other relevant indirect greenhouse gases by weight.	Web
EN19	Emissions of ozone-depleting substances by weight.	Web
EN20	NO <sub>x</sub> , SO <sub>x</sub> , and other significant air emissions by type and weight.	Page 31
EN22	Total weight of waste by type and disposal method.	Page 30
EN23	Total number and volume of significant spills.	Web
EN26	Initiatives to mitigate environmental impacts of products and services, and extent of impact mitigation.	Web
<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 13
<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.	Page 13
<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 13
<b>Employment</b>		
LA1	Total workforce by employment type, employment contract, and region.	Page 13
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 32, 33 & 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.	Web
<b>Human rights</b>		
	Disclosure on management approach.	Page 12
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 13
<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.	Page 13
<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

## 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.

All environmental and safety performance data relates to Calendar Year 2010, but financial performance figures are based on the Financial Year 2011.

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 Building Products, Automotive and Specialty 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 seven of this Report, along with an account of our progress towards them.

In the same year, Nick Shore was appointed as the Group's first Director of Sustainability. Nick Shore 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. As reported in this year's edition, the Board has since agreed specific responsibilities be assigned to named individual directors and managers for promoting Sustainability within the Group.

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. We will report further on our progress in our 2012 Sustainability Report, which will be published in early 2013.

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

## 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 Accounts

Published annually in July, covering the financial performance of the Group in the previous financial year. Editions in both English and Japanese.



#### 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.



#### NSG Group and the Flat Glass industry

Published annually in November. Detailed analysis of the world's Flat Glass industry and the NSG Group's position within it. Published in English.



#### 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 2011)

**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:** ¥868,588 million

**Net sales:** ¥577,212 million (consolidated)

**Employees:** 29,300 (permanent, consolidated)

**NSG Group companies:** 246

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

### Websites

NSG Group Corporate website (Japanese and English)

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

Commercial website (Building Products and Automotive)

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

Sustainability contact

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



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