

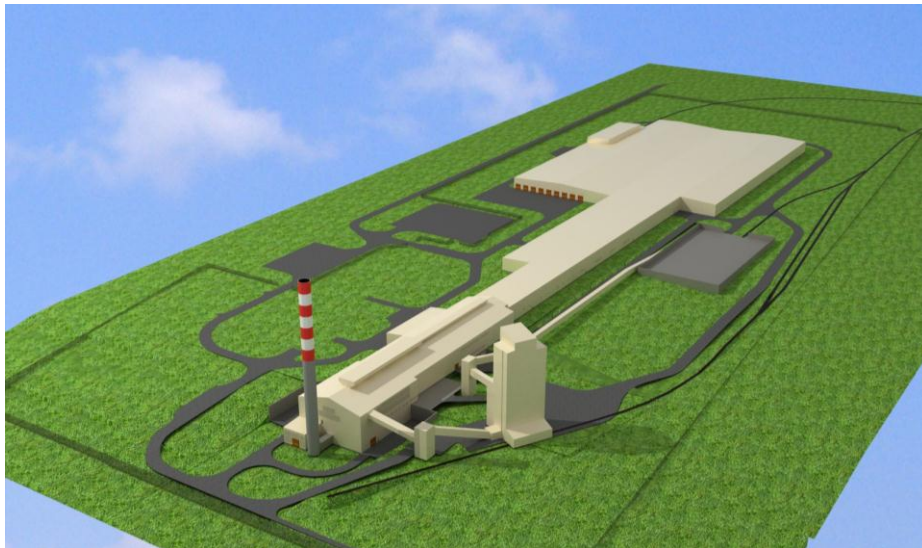


**GUARDIAN**

Glass • Automotive • Building Products

## **Non-Technical Summary**

### **Guardian Steklo Rostov LLC Float glass plant and glass coating line project**



**Krasny Sulin, Rostov Region, Russian Federation**

**10th November, 2011**

## Introduction

Guardian Industries Corp. (“Guardian”) is a privately owned multinational corporation engaged in four principal business activities: glass manufacturing and fabrication, automotive glass fabrication and distribution, automotive trim manufacturing, and building products manufacturing and distribution. Headquartered in Auburn Hills, Michigan, Guardian operates manufacturing and distribution businesses in 27 countries on five continents. Guardian is one of the largest manufacturers of float glass and fabricated glass products in the world. Guardian’s Automotive Glass and automotive trim group, SRG Global, are tier-one suppliers to the global automotive industry and have operations in North America, Europe, and Asia. Guardian’s Building Products group manufactures fiberglass insulation for residential and commercial applications, and distributes a broad range of building products through out the North American market.

Guardian Steklo Rostov LLC, an indirectly wholly owned subsidiary of Guardian Industries Corp., will own and operate a new flat glass manufacturing facility in Krasny Sulin, Russian Federation. The facility will include a 900 metric ton per day (“MTPD”) float glass line, Guardian’s largest, and a modern coating line, which will be the largest in Russia. The Rostov plant will produce clear float glass along with Guardian’s high-performance, energy-efficient ClimaGuard® (residential) and SunGuard® (commercial) coated glass products for construction of homes, offices, retail, health-care and other facilities. The plant is expected to begin operation in Q3 2012.

The European Bank for Reconstruction and Development (“EBRD”) is considering financing the construction of the Project.

This non-technical summary presents information enclosed in environmental and social; documentation prepared in relation to the Project.

## The Project

Guardian Steklo Rostov LLC is constructing a Greenfield facility within a designated industrial zone in the city of Krasny Sulin, Russian Federation. The site has been selected following a review of a number of alternative locations. Prior to current development, the land was state owned agricultural land, which has been re-categorized by the local authorities for industrial use. A number of other developments are planned in the new industrial zone in the future.

The facility will include a 900 metric ton per day float glass plant and glass coating line. The new facility has been subject to all Russian permitting, inclusive of an OVOS (Environmental Assessment) and has been designed to include state-of-the-art technology and environmental abatement. The facility will be operated in the same way as existing facilities globally, to attain the same high standard of product and environmental and safety performance.



**Picture 1 – Aerial picture of the Project site taken in October 2011**

## **Float Glass Plant**

The Rostov plant will produce clear float glass in thicknesses from 3 mm to 12mm to serve the growing Russian residential and commercial construction market as well as the neighboring markets of Ukraine and to a lesser extent Belarus.

Float glass derives its name from the “float” process used to produce the highest quality of flat glass. It is known for its distortion-free surface, uniform thickness and bright appearance. Its most important characteristics include high light transmission, optical clarity and the ability to be further fabricated into reflective, low-emissive, laminated, security, insulating and mirror glass products.

## Float Glass Manufacturing Process

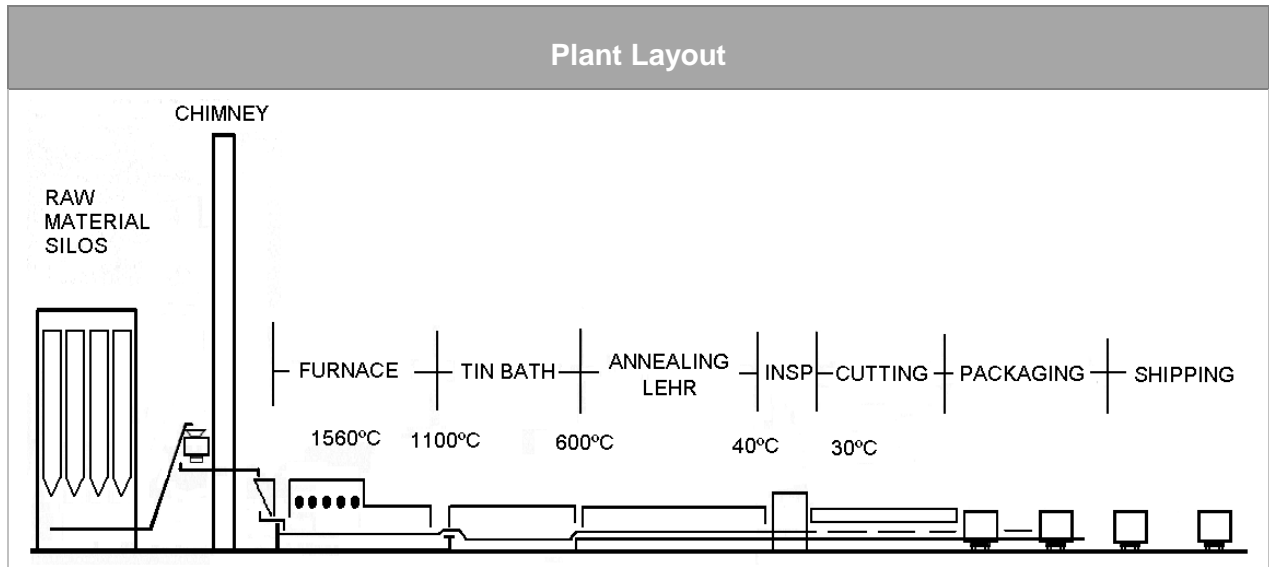


Figure 1 –Float plant layout

Due to inherent efficiency and quality advantages over the sheet and plate production methods, the flat glass industry worldwide has essentially converted to the float process. The most significant advantages of the float process are the highly automated production process and the consistency of product quality. The final product consists of large pieces of glass packed essentially on metal racks or in wooden containers for shipment to fabricators.

The glass manufacturing process consists of receiving raw materials (silica sand, soda ash, limestone, dolomite, salt cake, and minor ingredients materials including rouge and charcoal) by rail and truck from various locations. Raw materials are unloaded and stored in the batch house, then weighed into batches, mixed and then layered with broken glass ("cullet") returned from the end of the process line. It is inherent to the process that a small percentage of the pulled glass will be of poor quality and unable to be sold. This cullet will be recycled to 100%.

The mixed batch is conveyed to the furnace where the raw materials are melted in a natural gas fired furnace. Molten glass from the furnace flows by gravity and displacement into a tin bath where a continuous ribbon is formed by controlling glass temperature with time. The ribbon is pulled, or drawn, through the bath on a layer of molten tin, the temperature of which is controlled by means of electric heating. Upon exiting the bath, the ribbon of glass enters the annealing lehr wherein it is cooled prior to being cut into sheets. Depending on the product, electric heating is required in specific areas during the annealing process in order to assure a precise level of residual stress, without which cutting of the ribbon will be impossible.

A computer controlled automatic cutting system cuts the ribbon into predetermined sizes as dictated by customer orders. Pieces are then either placed on racks, boxes, or on

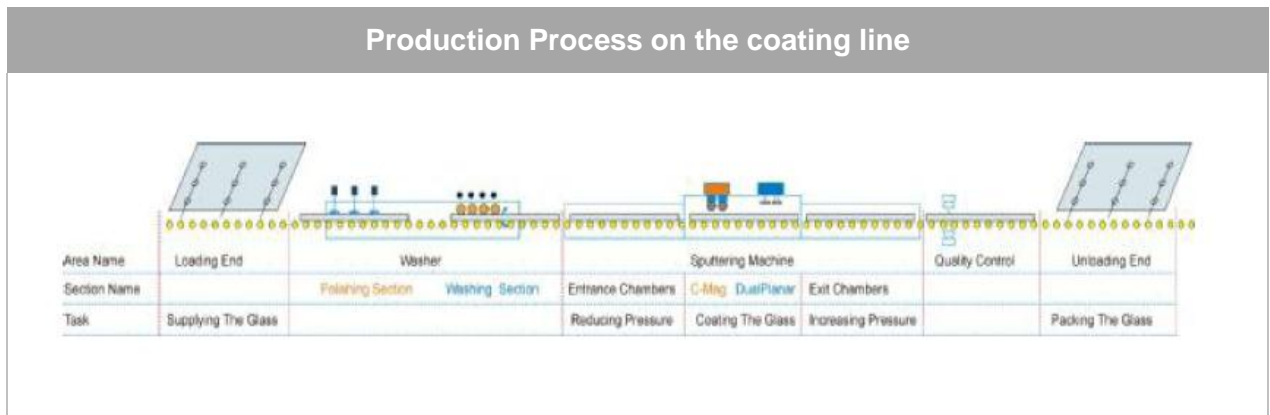
dollies for storage or direct shipment. Any waste or damaged glass is broken and recycled to the batch house as cullet.

## Coater

The Rostov coater will produce Guardian’s high-performance, energy-efficient ClimaGuard® (residential) and SunGuard® (commercial) Low-E glass products for construction of homes, offices, retail, health-care and other facilities. A Low-E glass coating on the inside surface of the outer light of a double-glazed window unit dramatically improves the energy efficiency of the unit, while maintaining high light transmission.

## Large area Glass Coating Machine

The purpose of a Large Area Glass Coating Line is to apply very thin layers of carefully selected metals onto the surface of the glass to manage natural optical and physical features of glass.



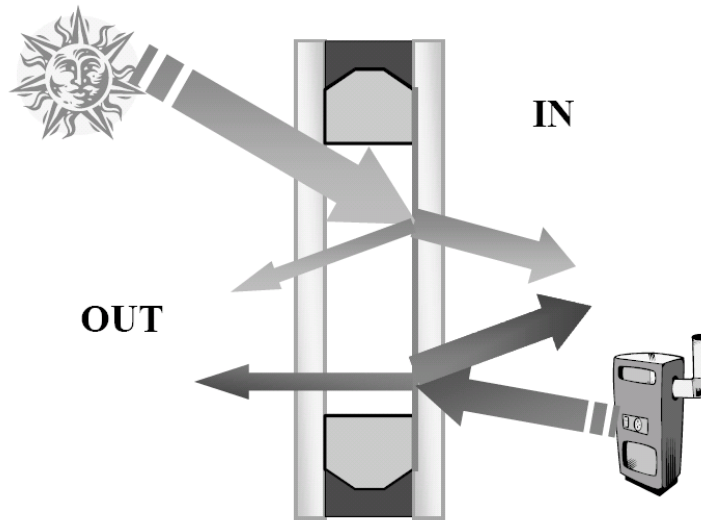
**Figure 2 – Production process of the coating line**

An overview of the coating process is presented on the above figure. Glass is provided to the coating line from the Loading Stackers or from the float glass line directly. Then the glass is polished, washed, and dried in the Washer. These actions ensure the quality of the glass surface and provide for the correct adhesion of the applied coating. Dry glass is conveyed in front of the coater and gets into the Sputtering Machine via Entrance Chambers: entrance, buffer and transfer chamber (not included in the figure above). The purpose of Entrance Chambers is the gradual reduction of pressure from the normal atmospheric level (ca. 1 bar) to the process pressure of the sputtering process (ca.  $2 \times 10^{-7}$  bar). Glass is then moved to the Process Chambers, where the application of the coating occurs. Within the Process Chambers, the sputtering process can operate with two types of cathode designs: C-Mag and Dual Planar.

After the sputtering process, the glass is moved to the Exit Chambers where the pressure is increased from range of  $2 \times 10^{-6}$  bar up to atmospheric pressure. Then glass

is released on external conveying system, inspected for quality and finally packed by stackers in the Unloading End.

A Low-E glass coating on the inside surface of the outer light of a double-glazed window unit dramatically improves the energy efficiency of the unit, while maintaining high light transmission. With low-E double glazing, energy losses through windows become so reduced that they are more than compensated for by solar gains coming from outside. This results in a positive energy balance, i.e. the energy leaving the house through the window is less than the energy coming into the house through the windows due to sunlight. The same applies to CO<sub>2</sub> emissions, meaning that there is a net reduction in CO<sub>2</sub> emissions for the whole building. This is demonstrated in the figure below.



**Figure 3 – working principle of low-e glazing**

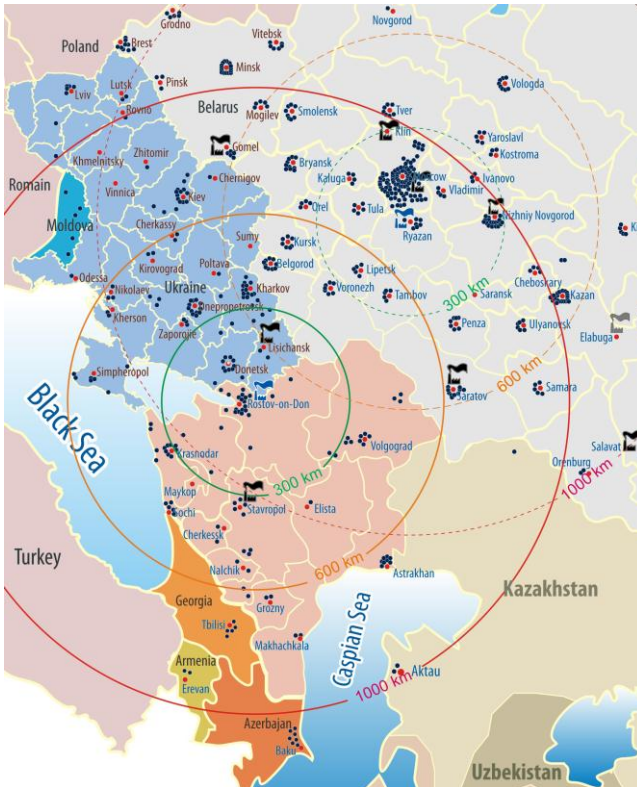
ClimaGuard®\* glass is used in double-glazed residential applications, and coated glass products for commercial projects.

SunGuard\* products, are used in commercial buildings to provide effective thermal insulation to conserve resources and to minimise heating costs while allowing maximum visible light transmission for virtually any application. From the other side by blocking unwanted solar energy these products help to minimize expenditures for air-conditioning or other types of sun protection.

Guardian Rostov's coater to be constructed as part of the Project will have the capacity to coat 12 million m<sup>2</sup> / year of ClimaGuard and SunGuard products.

\* ClimaGuard and SunGuard are registered trademarks of Guardian Industries Corp.

## Location of the Project



Located 950 kilometers from Moscow in the southern Russia along the Black Sea, Rostov has excellent access to natural resources, a large workforce and a well-developed transportation infrastructure. The area is also close to Sochi, home of the 2014 Winter Olympics.

The project is the logical next step in Guardian's growth strategy to supply glass to Russia and neighboring countries. In 2008, Guardian began production at its plant in Ryazan, Russia, serving the greater Moscow region. Guardian was one of the first companies to invest in Eastern Europe in 1990 following the fall of the Berlin Wall, and presently operates facilities in Hungary, Eastern Germany and Poland, among other European locations.

## Environmental objectives and environmental impact of the Project



It is the policy of Guardian Industries Corp. to conduct our worldwide operations in full compliance with all relevant environmental laws and regulations; to perform our functions in a manner that protects the health and safety of our customers, employees and neighbors; and to pursue our business in a way that achieves economic goals while simultaneously addressing environmental objectives

The Company will implement corporate EHS management systems and the new plant will attain certification to ISO 14001 or equivalent certification.

Guardian is committed to structure the Rostov project to be in compliance with relevant Russian Federation and regional legislation, environmental and occupational health and Safety rules, regulations, norms and standards as well as in line with corporate EHS standards and international best practice. This will be implemented among others by:

### Sustainable raw material supply

The main raw materials for the float glass production process are sand, soda ash, and dolomite/limestone. They will be delivered on site via a mix of rail and road (truck) delivery systems, which are readily available. Guardian Rostov will ensure, where possible, supply contracts with at least two suppliers for each of the essential raw materials. By contracting at least two suppliers for the raw materials, Guardian Rostov will ensure price and quality competitiveness and will have the possibility to eliminate non-compliant suppliers for environmentally sustainable delivery of contracted services. Guardian Rostov will conduct an internal review of the environmental performance of all major raw material suppliers prior to contracting.

### Air-Water and Soil emissions

The Plant has been designed to incorporate the philosophy of Best Available Techniques (BAT) as required for similar plants in European Union countries and to limit environmental impacts. Guardian Rostov will be committed to following EU Directive IPPC (Integrated Pollution Prevention Control) BAT Bref as applied in float glass manufacturing in EU27

The new plant will include energy efficacy measures in accordance with the BAT requirements set out in the latest draft BREF Notes for the sector.

Guardian Rostov will utilize natural gas as the main fuel (natural gas is a clean fuel and does not result in the formation of dust by itself). Light fuel oil or diesel, which is low in sulphur, will be used as the Back-Up Fuel, and will result in air emissions with a low content of sulphur oxide.

To limit the NOx emissions Guardian Rostov will install Low – NOx Burners and will apply primary measures which will allow the plant to reduce NOx emissions at the source. Given the location of the plant, NOx emission will not result in any elevated concentrations.

Dust emissions from the float glass manufacturing are not significant as the emissions from the melting process are mainly sodium sulphate (similar to the content of sea water mist) and therefore have limited impact on public health.

Nevertheless, the Company has agreed to include a combination of primary and secondary measures in the design of the new float line in accordance with EU IPPC and IED BAT requirements. These primary and secondary measures will be installed latest in 2016 allowing appropriate optimisation of the manufacturing process prior to installation and will further reduce emissions as well as the water vapor plume, which can limit the visual impact of the plant.

## **Waste prevention and Waste management program**

Water consumption and wastewater from the Guardian Rostov facility will be limited. Cooling water (float process) and wash water (coater process) will be re-circulated in closed loops, recycled, with a very small blow down being discharged into the sewage system.

## **Noise abatement**

Blower systems for the furnace, due to their construction, will be located in enclosures and will have practically no noise impact on the site and/or vicinity. The main source of noise will be the rail and truck movements.

## **Occupational health & safety as also GIC Loss Control program**

While cut related accidents in downstream handling of flat glass products have been typical for the industry sector, Guardian has a welldeveloped loss control program focused on institutionalizing occupational health and safety practices, through training, organisation, and management involvement. It has significantly reduced cut related incidents in the last decades. Whilst the reduction is impressive, Guardian is continuously looking for opportunities for improvement of the Loss Control program. During the construction period of the Guardian Rostov facility, onsite workers will number between 400 and 500. In the operational phase the float glass and coater lines will employ approximately 300 people who will be hired locally and trained to operate the facility in a safe and environmentally friendly manner.

## **Equal employment opportunities**

As part of Guardian's culture, high emphasis is placed on building good relationships with the local government administration and with the local community. The aim is for the Company to become an integrated part of the local community and to foster a strong day-to-day relationship with the community. The majority of the employees will be hired locally from Krasny Sulin and from the Rostov region.

The Company started to build up its team during 2010, but the majority of employees will be hired by early 2012. Guardian Rostov expects to employ about 250 people on the float line and 50 people on the coater, operating on a 24/7/365 basis. Guardian as a practice operates with a very flat organization and hires employees who can be trained to work in all areas of the plant on a rotating basis. Accordingly, only 15 of the float employees and 1 of the coater line employees will be deemed traditional management employees.

Following the existing Guardian practice, selected employees will go for on-site training organized at Guardian sister plants. In this manner, as production begins, all of the operators and supervisors will be fully trained and ready to begin production.

## **Guardian's programs to ensure sustainability, energy efficiency and environmental protection**

Guardian put in place the following programs and performs the following actions addressing sustainability, energy efficiency and environmental protection:

1) Guardian world wide internal energy audit program:

Guardian's energy audit program conducts an analysis of all operations (natural gas, electricity, water, etc.) to optimize their efficiencies. Guardian has been conducting these energy audits since 2004.

2) Starting in 2011, Guardian formalized a Sustainability program for both North America and Europe. The goal of the program is to align Guardian's operations and use of glass products to optimize sustainability benefits.

3) All of Guardian's European operations are currently undergoing environmental legal and regulatory compliance audits. It is anticipated that Rostov will be included in the environmental compliance audit program during its first year of its operation.

## **Environmental benefits of coated products**

To achieve its economic goals while simultaneously addressing environmental objectives Guardian will build a coater line and produce Climaguard and Sunguard glass products in Russia.



The SunGuard series is a full line of spectrally selective coatings, providing a high light-to-solar ratio. These SunGuard coatings can transmit substantial amounts of daylight while acting as a barrier to solar heat transmission and are targeted to the commercial construction market.

Increased daylight means less artificial lighting is needed inside the building, reducing on-going energy costs and resulting in a more pleasant working environment. Improved solar control in summer also reduces air conditioning costs, while better thermal insulation in winter reduces heating costs.



**Guardian's SunGuard glass on the world's tallest building, the Burj Khalifa in Dubai, U.A.E**

SunGuard Advanced Architectural Glass can help to reduce energy costs. SunGuard Advanced Architectural Glass helps making buildings green. Guardian is committed to developing products that help make buildings environmentally efficient. Green buildings use construction practices and materials that protect people and the environment. These environmentally friendly buildings are designed, built and operated to respond to local climate and conditions, making optimal use of natural resources. Guardian supports the use of recycled materials, reducing energy use, minimizing environmental impact, improving the working environment and reducing greenhouse gas emissions.

For additional information related to Guardian, Guardian in Russia and Guardian's energy-efficient products please visit the following sites:

<http://www.guardian.com>

<http://www.guardian-russia.ru>

<http://www.sunguardglass.ru>

<http://www.energosteklo.ru>

## **Contacts**

The Company has developed a stakeholder engagement program and will maintain this through out the operation of the plant.

For further information of if you have any questions or comments please contact:

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