

# Earn **LEED® v4** points with AGC glass

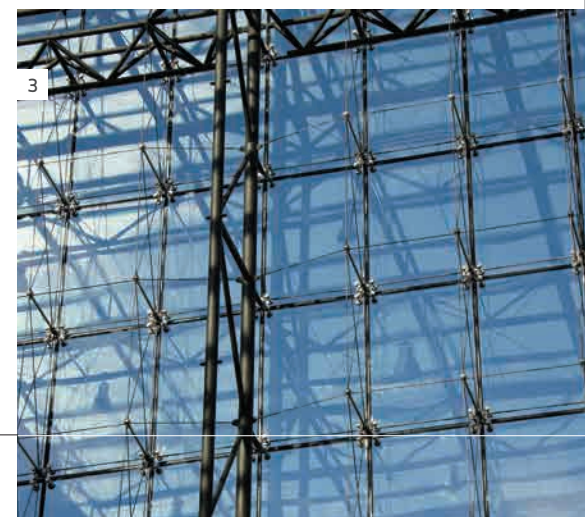


# What is LEED®?

**LEED® (Leadership in Energy & Environmental Design)** is a green building certification system developed by the **US Green Building Council (USGBC)** in which the total performance of a building is compared to a set of specific criteria. USGBC has developed several rating systems, the most widely used being LEED® Building Design and Construction (BD+C), which applies to new constructions and major renovations.

As of late 2016, all new projects must comply with LEED® v4, which puts a stronger emphasis on product transparency, information disclosure and on a better life-cycle understanding of the building's materials and components.

How does it work? LEED® v4 BD+C is divided into nine main categories, in each of which a range of established requirements (called credits) are set to assess different parameters of the material or products used in a project. Each credit is eligible for points (unless it is a prerequisite), depending on its relevance to sustainability and well-being.





## How can AGC Glass Europe help you to gain LEED® credits?

In order to support our customers' efforts to improve their building's rating, AGC Glass Europe has joined forces with **third-party LEED® assessors** to analyse how AGC glass solutions could contribute within the certification system. Glass itself is an outstanding material for enhancing building performance and directly or indirectly\* impacts four of the nine categories (highlighted in green in the table below).

Integrative Process	Water Efficiency	Indoor Environmental Quality
Location & Transportation	Energy & Atmosphere	Innovation
Sustainable Sites	Material & Resources	Regional Priority

\*Most of the contribution to credits comes from the combination of glass and other building materials; together they can help impact the credit.

Categories	Credit	Credit reference	Points to which AGC glass products can contribute
<b>Energy and Atmosphere (EA)</b>	Minimum Energy Performance	EAp2	Prerequisite
	Optimize Energy performance	EAc2	18
<b>Material and Resources (MR)</b>	Building Life-Cycle Impact Reduction	MRC1	3
	Building Product Disclosure and Optimization – <i>Environmental Product Declarations</i>	MRC2	2
	Building Product Disclosure and Optimization – <i>Sourcing of raw materials</i>	MRC3	1
	Building Product Disclosure and Optimization – <i>Material Ingredient</i>	MRC4	2
	Construction & Demolition Waste Management	MRC5	2
<b>Indoor Environmental Quality (EQ)</b>	Low-Emitting Materials	EQc2	3
	Thermal Comfort	EQc5	1
	Daylight*	EQc7	3
	Quality views*	EQc8	1
	Acoustic Performance	EQc9	1
<b>Innovation (IN)</b>	Innovation in Design	INc1	5

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\*Those points are only influenced by glass products.



The total number of points earned determines the certification level: higher levels of achievement are rewarded with higher levels of certification.

LEED Certified	LEED Silver	LEED Gold	LEED Platinum
40 – 49 points	50 – 59 points	60 – 79 points	80 points or above

AGC Glass Europe products can contribute **up to 41 points** out of 110 to certification. This document offers an overview of how AGC products provide solutions for each green building project. AGC also provides customers dedicated information in order to guarantee that each project enjoys specialised support and achieves higher performance.

If you have any questions, please contact our Sustainability & Product Stewardship department at [sustainability@eu.agc.com](mailto:sustainability@eu.agc.com).

# Energy and Atmosphere (EA)

— AGC GLASS PRODUCTS CAN INFLUENCE 18 OUT OF 33 POINTS AVAILABLE —

## MINIMUM ENERGY PERFORMANCE (EAp2)

Intent	Contribution from AGC products
<p data-bbox="504 638 862 925"><i>To establish the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use.</i></p> <p data-bbox="616 997 862 1045">→ <b>PREREQUISITE</b></p>	<p data-bbox="896 638 1332 678"><b>CERTIFICATION REQUIREMENTS</b></p> <p data-bbox="896 694 1803 901">Demonstrate a 5% improvement for new construction in the proposed building performance rating compared to a reference building performance rating. The baseline requirements vary depending on the project location, with specific climate criteria taken into account. For glazings, the threshold values are set for the whole window and range from 0.35 to 1.2 BTU/h.ft<sup>2</sup>.°F.</p> <p data-bbox="896 933 1120 973"><b>AGC SOLUTION</b></p> <p data-bbox="896 989 1803 1276">You can find products* meeting these requirements for all climate zones in our <b>Thermobel and iplus/ipasol Insulating Glazing</b> range, even for the coldest regions. All AGC insulating glazings can be used in warm, hot and very hot climates. For the coldest regions, such as Alaska and northern Sweden, (double or triple) insulating glazing units with Low-E coatings, such as <b>Thermobel Top, Thermobel Advanced and Thermobel Energy</b>, go far beyond the requirements.</p> <p data-bbox="896 1276 1803 1436">Since glass directly and indirectly influences the energy used for heating, lighting, ventilation and air conditioning, our technical experience in glazing solutions can be of the utmost importance in providing all the necessary information for the required Whole-Building Energy Simulation.</p>

\*The list of products mentioned in this document is not exhaustive.

## OPTIMIZE ENERGY PERFORMANCE (EA<sub>c2</sub>)

Intent	Contribution from AGC products
<p data-bbox="450 379 741 695"><i>To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use.</i></p> <hr/> <p data-bbox="472 783 734 810">→ <b>UP TO 18 POINTS</b></p> <hr/>	<p data-bbox="792 379 1216 411"><b>CERTIFICATION REQUIREMENTS</b></p> <p data-bbox="792 435 2022 549">The most accurate way to fulfil this credit is by developing an energy simulation for the building for which both the Ug-value and solar factor play pivotal roles in improving energy performance. The primary energy consumption of an actual building should be compared with that of a reference building.</p> <p data-bbox="792 596 999 628"><b>AGC SOLUTION</b></p> <p data-bbox="792 652 2011 724">With respect to energy performance optimisation, AGC is at the forefront in developing coated glass that contributes to thermal insulation, solar control and glare control.</p> <ul data-bbox="831 748 2063 1291" style="list-style-type: none"> <li>→ <b>Thermal Insulation:</b> AGC has developed a wide range of super insulating coated glass products with a variety of low light reflection and neutral appearance values. One such product is <b>iplus</b>, which saves energy while ensuring a comfortable living space.</li> <li>→ <b>Solar control:</b> AGC manufactures various solar control solutions including both magnetron-coated (e.g. <b>Stopsol, Stopray, ipasol</b>) and pyrolytic-coated (e.g. <b>Sunergy</b> and <b>Planibel Low-E</b>) ranges. They allow sunlight to pass through a window or facade while radiating and reflecting much of the sun's heat, making indoor spaces much cooler and saving on air conditioning costs.</li> <li>→ <b>Smart-tinting glass system:</b> In this highly advanced solution (<b>Halio</b>), the window transitions from clear to dark through a reaction involving chemicals and low-voltage electricity. In its clear state, it lets in more light to enter from the outside; a room or building can cut lighting costs by harnessing natural light and can even benefit from free solar gain. Then, by tinting the glass during certain times of day, the building can lower its air conditioning costs by blocking glare and drastically reducing the influx of solar heat.</li> </ul> <p data-bbox="792 1315 2063 1474">AGC offers its customers limitless creativity for using coated glass in multiple ways: simply as a single glass pane that can be laminated, bent, toughened, etc., or assembled in insulating glazing that includes advanced double and triple glazed units with highly prized low-emissivity characteristics achieving performance levels of 0.4-0.5 W/(m<sup>2</sup>.K).</p>



# MATERIAL AND RESOURCES (MR)

— AGC GLASS PRODUCTS CAN INFLUENCE 10 OUT OF 13 POINTS AVAILABLE —

## BUILDING LIFE-CYCLE IMPACT REDUCTION (MRc1)

Intent	Contribution from AGC products
<p data-bbox="533 644 853 799"><i>To encourage adaptive reuse and optimize the environmental performance of products and materials.</i></p> <p data-bbox="600 842 853 879">→ <b>UP TO 3 POINTS</b></p>	<p data-bbox="909 644 1328 681"><b>CERTIFICATION REQUIREMENTS</b></p> <p data-bbox="909 700 1794 1054">Under LEED® for new construction projects, a cradle-to-grave LCA (Life-Cycle Assessment) enables building professionals to understand the cumulative energy use and other environmental consequences resulting from all phases of the building’s life. LEED® applies life-cycle thinking to the whole building, the most suitable approach for factoring in the benefits of an energy-saving product like glass, which can offset their footprint during use. It enables the design team to understand the trade-offs between material selection and energy performance and to strike the right balance between the two.</p> <p data-bbox="909 1102 1111 1139"><b>AGC SOLUTION</b></p> <p data-bbox="909 1158 1794 1313">AGC has performed product-level LCAs on a wide range of products and can provide the information upon request. This product-level information can contribute to an agile assessment and understanding of the whole-building life-cycle impacts.</p> <p data-bbox="909 1332 1749 1449"><u>Key fact:</u> For each tonne of CO<sub>2</sub> emitted by AGC Glass Europe during the glass production process, nearly 10 tonnes of CO<sub>2</sub> are saved by using our products!</p>



**BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION – ENVIRONMENTAL PRODUCT DECLARATIONS (MRC2)**

Intent	Contribution from AGC products
<p><i>To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.</i></p> <hr/> <p>→ <b>UP TO 2 POINTS</b></p> <hr/>	<p><b>CERTIFICATION REQUIREMENTS</b></p> <p>Provide EPDs (Environmental Product Declarations) for at least twenty products from five different manufacturers used in the project. An additional credit is awarded if products accounting for 50% of the project cost have a proven environmental impact reduction compared to the industry average.</p> <p><b>AGC SOLUTION</b></p> <p>AGC provides EPDs verified by an external assessor for the following ranges of products:</p> <ul style="list-style-type: none"> <li>→ Float (<b>Planibel</b>)</li> <li>→ Magnetron-coated glass (<b>ipasol, Stopray</b>)</li> <li>→ Pyrolytic-coated glass (<b>Stopsol, Sunergy, Planibel Low-E</b>)</li> <li>→ Fire-resistant glass (<b>Pyrobel</b>)</li> <li>→ Mirrors (<b>Mirox</b>)</li> <li>→ Painted glass (<b>Lacobel, Lacobel T</b>)</li> <li>→ Insulating glazing (<b>Thermobel, iplus /ipasol Insulating Glazing</b>)</li> <li>→ Laminated safety glass (<b>Stratobel and Stratophone</b>)*</li> </ul> <p>All these EPDs conform to standards ISO 14025, 14040/14044 and EN 15804. They are available upon request.</p>



\*The EPDs for Stratobel and Stratophone are common to the laminated glass industry. AGC is currently working on an AGC-specific version.

**BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION –  
SOURCING OF RAW MATERIALS (MRC3)**

Intent	Contribution from AGC products												
<p><i>To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts.</i></p> <p><i>To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.</i></p> <hr/> <p>→ <b>UP TO 1 POINT</b></p> <hr/>	<p><b>CERTIFICATION REQUIREMENTS</b></p> <p>Provide evidence that 25% of the cost of the total materials permanently installed in the building comply with responsible extraction criteria, i.e.:</p> <ul style="list-style-type: none"> <li>→ Products purchased from a manufacturer participating in an extended producer responsibility programme</li> <li>→ Material from reuse</li> <li>→ Made from recycled materials</li> </ul>												
	<p><b>AGC SOLUTION</b></p> <p>On average, AGC products contain at least <b>30% recycled glass</b> (internal and external cullet). The average recycled content is detailed below and varies from one plant to another.</p> <p>Contact us for project-specific data.</p> <table border="1"> <thead> <tr> <th></th> <th>AGC Glass Europe average</th> <th>Recognition in LEED® v4</th> </tr> </thead> <tbody> <tr> <td>Internal cullet</td> <td>21.8%</td> <td>Not recognised*</td> </tr> <tr> <td>External cullet, pre-consumer</td> <td>8.6%</td> <td>50% recognition</td> </tr> <tr> <td>External cullet, post-consumer</td> <td>0%</td> <td>100% recognition</td> </tr> </tbody> </table>			AGC Glass Europe average	Recognition in LEED® v4	Internal cullet	21.8%	Not recognised*	External cullet, pre-consumer	8.6%	50% recognition	External cullet, post-consumer	0%
	AGC Glass Europe average	Recognition in LEED® v4											
Internal cullet	21.8%	Not recognised*											
External cullet, pre-consumer	8.6%	50% recognition											
External cullet, post-consumer	0%	100% recognition											

\*As per the definition in ISO 14021, pre-consumer recycled content does not include reutilised materials generated in a process and capable of being reused as a substitute for a raw material without being modified in any way. Accordingly, cullet re-used in the same process cannot be considered to be 'recycled' and is regarded as reutilised material.

**BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION –  
MATERIAL INGREDIENT (MRc4)**

Intent	Contribution from AGC products
<p><i>To reward project teams for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances.</i></p> <hr/> <p><b>→ UP TO 2 POINTS</b></p> <hr/>	<p><b>CERTIFICATION REQUIREMENTS</b></p> <p>Provide evidence that products have demonstrated their chemical inventory and/or documented their ingredient optimisation. Different third-party programmes are recognised by LEED® such as Cradle to Cradle, GreenScreen, etc.</p> <p><b>AGC SOLUTION</b></p> <p>AGC products can help secure these points as most of our portfolio is Cradle to Cradle Certified™.</p> <div data-bbox="862 790 1064 981" data-label="Image"> </div> <p>The Cradle to Cradle Certified™ Products Programme has been developed to assess how sustainable products are overall, i.e. over their entire life-cycle. The aim of this innovative approach is to certify the products using the most environmentally friendly production methods and components.</p> <p>This means gauging sustainability from the first stage of production right up to the breakdown of the end products.</p> <p>The next table show you how our different products have been rated in Cradle to Cradle Certified™ v3.1 and how many points they can influence.</p>

Products	Cradle to Cradle Certified™ v3.1	Material ingredient reporting point	Material ingredient optimisation point
Float			
Planibel clear and coloured range	Silver	✓	✓
ipaclear	Silver	✓	✓
Magnetron coated glass			
Planibel Low-E	Silver	✓	✓
Stopray range	Silver	✓	✓
Stopsol Phoenix	Silver	✓	✓
iplus range	Silver	✓	✓
ipasol range	Silver	✓	✓
Decorative glass			
Painted glass (Lacobel, Lacobel T, Matelac, Matelac T)	Bronze	✓	
Acid-etched glass (Matelux)	Bronze	✓	
Mirrors (Mirox MNGE, Black Mirox)	Bronze	✓	
Laminated glass			
Stratobel, Stratophone	Bronze*	✓	
Insulating glazing			
Thermobel, iplus / ipasol Insulating Glazing	Bronze*	✓	



\*When manufactured with Cradle to Cradle Certified™ Silver or higher AGC/Interpane glass. See Product Specification Sheet (available on the Product Registry listing at <http://c2ccertified.org/products/registry>) for all variations approved for use.



<b>CONSTRUCTION &amp; DEMOLITION WASTE MANAGEMENT (MRC5)</b>	
Intent	Contribution from AGC products
<p><i>To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.</i></p> <hr/> <p>→ <b>UP TO 2 POINTS</b></p> <hr/>	<p><b>CERTIFICATION REQUIREMENTS</b></p> <p>Demonstrate that waste generated on site does not exceed 12.2 kg/m<sup>2</sup> of floor area.</p> <p><b>AGC SOLUTION</b></p> <p>Windows and glazings are products ready to be installed and do not generate waste on the construction site. There is no cutting and therefore no losses on site.</p> <p>In terms of packaging, the steel racks are sent back to the manufacturers for reuse. Only a few elements are left on site: cardboard, wood and plastic, all of which are recyclable.</p> <p>In addition to reducing the amount of waste generated on site, AGC has established a stringent target of Zero Waste to Landfill by 2020. In 2016, only 1.7% of all of AGC Glass Europe's waste was sent to a landfill.</p>

# INDOOR ENVIRONMENTAL QUALITY (EQ)

— AGC GLASS PRODUCTS CAN INFLUENCE 8 OUT OF 16 POINTS AVAILABLE —

## LOW-EMITTING MATERIALS (EQc2)

Intent	Contribution from AGC products
<p data-bbox="362 646 663 879"><i>To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity and the environment.</i></p> <p data-bbox="412 927 658 959">→ <b>UP TO 3 POINTS</b></p>	<p data-bbox="719 646 1137 678"><b>CERTIFICATION REQUIREMENTS</b></p> <p data-bbox="719 703 1794 774">This credit covers emissions of volatile organic compounds (VOC) into indoor air and the VOC content of materials, as well as the testing methods used to measure indoor VOC emissions.</p> <p data-bbox="719 821 920 853"><b>AGC SOLUTION</b></p> <p data-bbox="719 879 1787 991">LEED® recognises glass as an inherently non-emitting VOC material, which means no testing report is required, provided the products do not include integral organic-based surface coatings, binders or sealant.</p> <p data-bbox="719 1016 1778 1128">AGC decorative painted glass products contain organic-based coatings. The paints used in AGC's <b>Mirox</b>, <b>Lacobel</b> and <b>Matelac</b> products are applied to the glass in the company's plants.</p> <p data-bbox="719 1153 1783 1265">The tests conducted as per the standards on the potential release of VOC emissions showed very low levels of VOC and formaldehyde emissions. All our products are rated A+ or A (the two best performance classes) under the French regulation.</p>

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## THERMAL COMFORT (EQc5)

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Intent	Contribution from AGC products
<p data-bbox="439 646 741 799"><i>To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort.</i></p> <hr/> <p data-bbox="501 847 741 879">→ <b>UP TO 1 POINT</b></p> <hr/>	<p data-bbox="792 646 1211 678"><b>CERTIFICATION REQUIREMENTS</b></p> <p data-bbox="792 703 1850 775">Demonstrate compliance with thermal comfort standard ASHRAE 55-2010, ISO 7730:2005 or EN15251:2007 by providing a thermal analysis of the building project.</p> <p data-bbox="792 823 994 855"><b>AGC SOLUTION</b></p> <p data-bbox="792 880 1868 1070">AGC provides a wide range of coated glass products (e.g. <b>Stopray, Sunergy, Stopsol, iplus, ipasol, Planibel Low-E</b>) that can be assembled in (double or triple) insulating glazing units featuring a low solar factor and a high thermal insulation value. These products help prevent discomfort for people seated next to windows. Their high level of insulation reduces cold emanating from windows while the solar factor reduces overheating.</p>

## DAYLIGHT (EQc7)

Intent	Contribution from AGC products
<p data-bbox="376 647 665 959"><i>To connect building occupants with the outdoors, reinforce circadian rhythms and reduce the use of electrical lighting by introducing daylight into the space.</i></p> <hr/> <p data-bbox="412 1007 658 1038">→ <b>UP TO 3 POINTS</b></p> <hr/>	<p data-bbox="719 647 1137 679"><b>CERTIFICATION REQUIREMENTS</b></p> <p data-bbox="719 703 1733 815">Increased access to daylight has positive human behavioural and health effects because it reinforces the circadian rhythms. For this credit, a building project can earn points if significant spatial daylight autonomy is demonstrated.</p> <p data-bbox="719 863 920 895"><b>AGC SOLUTION</b></p> <p data-bbox="719 919 1733 1070">Glass is unique amongst all building materials in its ability to let natural light enter the building through glazed facades, doors and partition walls. Products like <b>Planibel Clearvision</b>, a highly transparent glass, deliver excellent visible light transmission, thus maximising natural daylight.</p>



QUALITY VIEWS (EQc8)	
Intent	Contribution from AGC products
<p><i>To give building occupants a connection to the natural outdoor environment by providing quality views.</i></p> <hr/> <p>→ <b>UP TO 1 POINT</b></p> <hr/>	<p><b>CERTIFICATION REQUIREMENTS</b></p> <p>Demonstrate a direct line of sight to the outdoors via vision glazing for at least 75% of all regularly occupied floor area. The project also needs to offer quality views:</p> <ul style="list-style-type: none"><li>→ Flora, fauna or sky</li><li>→ Multiple lines of sight</li><li>→ Unobstructed views</li></ul> <p><b>AGC SOLUTION</b></p> <p>With AGC products, building occupants can visually connect with the outdoor environment while performing their everyday tasks. Project teams can use glazing products to capitalise on desirable views while factoring in the energy and comfort implications. <b>All float and coated glass products</b> can help to meet your needs.</p> <p><b>Halio</b> further enhances occupants' connection with the outdoors by allowing solar control without any shading. Whatever the weather conditions, occupants maintain a direct view to the outside world.</p>

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## ACOUSTIC PERFORMANCE (EQc9)

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Intent	Contribution from AGC products
<p data-bbox="376 647 667 879"><i>To provide workspaces that promote occupants' well-being, productivity and communications through effective acoustic design.</i></p> <hr/> <p data-bbox="427 927 667 959">→ <b>UP TO 1 POINT</b></p> <hr/>	<p data-bbox="719 647 1137 679"><b>CERTIFICATION REQUIREMENTS</b></p> <p data-bbox="719 687 1704 759">Projects must attain limited background noise levels from HVAC (Heating, Ventilation and Air-Conditioning), lower sound transmission and a lower reverberation time.</p> <p data-bbox="719 807 920 839"><b>AGC SOLUTION</b></p> <p data-bbox="719 863 1805 1015">Well-designed acoustics can enhance the environmental quality of the space by facilitating communication, increasing productivity, improving the well-being of workers or aiding in noise control and speech privacy. Double glazing with <b>Stratophone</b> laminated glass reduces noise by up to 52 dB (Rw).</p>

# INNOVATION (IN)

— AGC GLASS PRODUCTS CAN INFLUENCE 5 OUT OF 6 POINTS AVAILABLE —

## INNOVATION IN DESIGN (INc1)

Intent	Contribution from AGC products
<p><i>To provide design teams and projects the opportunity to achieve exceptional performance above the requirements set by the LEED® Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED® Green Building Rating System.</i></p>	<p><b>CERTIFICATION REQUIREMENTS</b></p> <p>Combine innovation with exemplary performance to achieve a pioneering product.</p> <p><b>AGC SOLUTION</b></p> <p>AGC is continually developing innovative products so it can meet future demands. <b>Halio</b> is typically a breakthrough innovation. This smart-tinting glass system can be programmed to adapt automatically to specific building requirements, taking into account criteria such as the function, location and orientation of the building as well as local weather conditions. Halio comes with a centralised remote management system so the user can monitor the status of all system components in real time, enabling automated, proactive and predictive operation. Building information can be processed to ensure continuous improvement and optimised performance throughout the system's life-cycle.</p>

→ UP TO 5 POINTS



**BULGARIA** SOFIA, AIRPORT CENTER - STOPRAY TITANIUM 37T AND IPLUS ENERGY N - CIGLER MARANI ARCHITECTS - LEED GOLD

For more information please consult AGC's yearly sustainability report on [www.agc-glass.eu/en/sustainability](http://www.agc-glass.eu/en/sustainability) or send your questions and/or suggestions by email to the Sustainability & Product Stewardship department at [sustainability@eu.agc.com](mailto:sustainability@eu.agc.com).

**AGC GLASS EUROPE, A LEADER IN FLAT GLASS**

AGC Glass Europe is the European branch of AGC, the world's leading flat glass producer. Its baseline, Glass Unlimited, reflects its core assets: innovative strength in advanced glass technologies, a global sales network and an industrial presence stretching from Spain to Russia. AGC Glass Europe has representatives worldwide. See [www.agc-yourglass.com](http://www.agc-yourglass.com) for more addresses.

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