EARN LEED® V4.1 POINTS
with AGC glass

AGC

Your Dreams, Our Challenge

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® v4.1, 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® v4.1 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.


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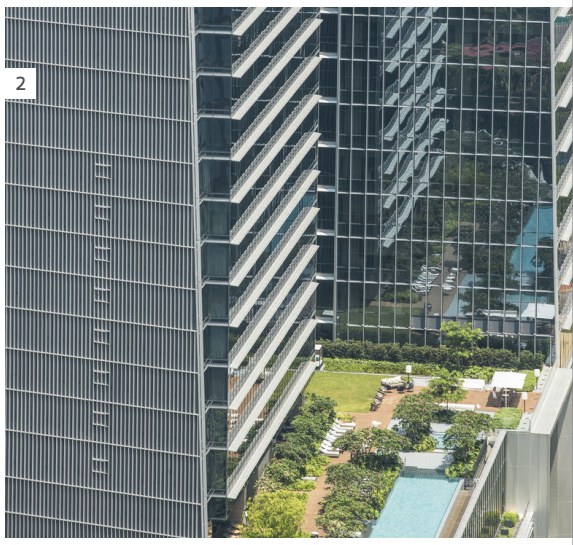
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ITALY MILAN, GENERALI TOWER - SUNERGY CLEAR AND STOPRAY VISION-50T - *ZAHA HADID ARCHITECTS* - **LEED PLATINUM** (COVER)
ROMANIA BUCHAREST, AFI PARK OFFICE - PLANIBEL DARK BLUE AND STOPRAY VISION-50T - *ALON YITZHAKI, MYS ARCHITECTS* - **LEED GOLD** (PICTURE 1)
SINGAPORE SINGAPORE, TANJONG PAGAR CENTER - STOPSOL SUPERSILVER CLEAR AND STOPRAY VISION-37T - *SKIDMORE, OWINGS & MERRIL (SOM) USA & ARCHITECTS 61 PTE LTD* - **LEED PLATINUM** (PICTURE 2)

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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.

CZECH REPUBLIC PRAGUE, ARTGEN - STOPRAY VISION-50T - *CMC ARCHITECTS* - **LEED GOLD** (PICTURE 3)
ITALY MILAN, BOSCO VERTICALE - IPASOL NEUTRAL 73/42, IPASOL NEUTRAL 48/27 AND STOPRAY VISION-36T - *BOERI STUDIO* - **LEED GOLD** (PICTURE 4)

Categories	Credit	Credit reference	Points to which AGC glass products can contribute
Energy and Atmosphere (EA)	Minimum Energy Performance	EAp2	Prerequisite
	Optimize Energy performance	EAc2	18
	Renewable Energy Production	EAc5	3
Material and Resources (MR)	Building Life-Cycle Impact Reduction	MRc1	3
	Building Product Disclosure and Optimization – *Environmental Product Declarations*	MRc2	2
	Building Product Disclosure and Optimization – *Sourcing of raw materials*	MRc3	1
	Building Product Disclosure and Optimization – *Material Ingredient*	MRc4	2
	Construction & Demolition Waste Management	MRc5	2
Indoor Environmental Quality (EQ)	Low-Emitting Materials	EQc2	3
	Thermal Comfort	EQc5	1
	Daylight*	EQc7	3
	Quality views*	EQc8	1
	Acoustic Performance	EQc9	1
Innovation (IN)	Innovation in Design	INc1	5
			45

*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 45 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.

Energy and Atmosphere (EA)

AGC GLASS PRODUCTS CAN INFLUENCE 18 OUT OF 33 POINTS AVAILABLE

MINIMUM ENERGY PERFORMANCE (EAp2)

Intent	Contribution from AGC products
To reduce the environmental and economic harm of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.	**CERTIFICATION REQUIREMENTS** 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 1.9 to 6.8 W/m².K.
→ **PREREQUISITE**	**AGC SOLUTION** You can find products* meeting these requirements for all climate zones in our **Thermobel and iplus/ipasol Insulating Glazing** 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 **Thermobel Top, Thermobel Advanced and Thermobel Energy**, go far beyond the requirements. 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.

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

OPTIMIZE ENERGY PERFORMANCE (EAc2)

Intent

To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use.

→ **UP TO 18 POINTS**

Contribution from AGC products

CERTIFICATION REQUIREMENTS

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.

AGC SOLUTION

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.

- → **Thermal Insulation:** 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 **iplus**, which saves energy while ensuring a comfortable living space.
- → **Solar control:** AGC manufactures various solar control solutions including both magnetron-coated (e.g. **Stopray, ipasol, Energy**) and pyrolytic-coated (e.g. **Stopsol, Sunergy** and **Planibel G**) 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.
- → **Smart-tinting glass system:** In this highly advanced solution **(Halio)**, 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.

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^2.K).

RENEWABLE ENERGY PRODUCTION (EAC5)

Intent

To reduce the environmental and economic harms associated with fossil fuel energy by increasing self-supply of renewable energy.

→ **UP TO 3 POINTS**

Contribution from AGC products

CERTIFICATION REQUIREMENTS

Use renewable energy systems to offset building energy costs. The most abundant renewable energy resources on site such as sunlight, wind or water should be determined. Calculate the percentage of renewable energy with the equation based on 'equivalent cost of usable energy produced by the renewable energy system' and 'total building annual energy cost'.

AGC SOLUTION

→ **SunEwat** is AGC's range of energy-generating glazing. Monocrystalline or polycrystalline photovoltaic cells are embedded between sheets of laminated safety glass. The product is then installed in the shell of the building as an alternative to conventional construction elements. Since the photovoltaic cells are built right into the glazing, it is not necessary to install a separate photovoltaic system. This product enhances a building's ability to produce energy from a renewable energy resource. SunEwat offers various types of energy-generating solutions, either transparent (for window applications), or opaque (for spandrel and cladding applications).

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

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
To encourage adaptive reuse and optimize the environmental performance of products and materials.	**CERTIFICATION REQUIREMENTS** 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.
→ **UP TO 3 POINTS**	**AGC SOLUTION** 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. Key fact: For each tonne of CO_2 emitted by AGC Glass Europe during the glass production process, nearly 8 tonnes of CO_2 are avoided by using our products!

BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION – *ENVIRONMENTAL PRODUCT DECLARATIONS* (MRc2)

Intent

To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

→ **UP TO 2 POINTS**

Contribution from AGC products

CERTIFICATION REQUIREMENTS

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.

AGC SOLUTION

AGC provides EPDs verified by an external assessor for the following ranges of products:

- → Float **(Planibel)**
- → Magnetron-coated glass **(iplus, Planibel AS, Energy, ipasol, Stopray)**
- → Pyrolytic-coated glass **(Stopsol, Sunergy, Planibel G Fast)**
- → Fire-resistant glass **(Pyrobel, Pyrobelite)**
- → Mirrors **(Mirox)**
- → Painted glass **(Lacobel, Lacobel T)**
- → Insulating glazing **(Thermobel, iplus /ipasol Insulating Glazing)**
- → Laminated safety glass **(Stratobel, Stratophone, ipasafe, ipaphon)**
- → Acid-etched glass **(Matelux)**

EPD VERIFIED

All these EPDs conform to standards ISO 14025, 14040/14044 and EN 15804.
They are available upon request.

BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION – *SOURCING OF RAW MATERIALS* (MRc3)

Intent

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. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.

→ **UP TO 1 POINT**

Contribution from AGC products

CERTIFICATION REQUIREMENTS

Provide evidence that 25% of the cost of the total materials permanently installed in the building comply with responsible extraction criteria, i.e.:

- → Products purchased from a manufacturer participating in an extended producer responsibility programme
- → Material from reuse
- → Made from recycled materials

AGC SOLUTION

On average, AGC products contain at least **30% recycled glass** (internal and external cullet). The average recycled content is detailed below and varies from one plant to another.

Contact us for project-specific data.

	AGC Glass Europe average*	Recognition in LEED® v4.1
Internal cullet	22.8%	Not recognised**
External cullet, pre-consumer	9.1%	50% recognition
External cullet, post-consumer	0%	100% recognition

*Value based on 2019 data.

**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

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.

→ **UP TO 2 POINTS**

Contribution from AGC products

CERTIFICATION REQUIREMENTS

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.

AGC SOLUTION

AGC products can help secure these points as most of our portfolio is Cradle to Cradle Certified™.

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.

This means gauging sustainability from the first stage of production right up to the breakdown of the end products.

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.

Products	Cradle to Cradle Certified™ v3.1	Material ingredient reporting point	Material ingredient optimisation point
	Float		
Planibel clear and coloured range	Bronze	✓	
ipaclear	Bronze	✓	
SunMax range	Bronze	✓	
	Magnetron coated glass		
Planibel Low-E	Silver	✓	✓
Stopray range	Silver	✓	✓
Stopsol Phoenix	Silver	✓	✓
iplus range	Silver	✓	✓
ipasol range	Silver	✓	✓
Energy range	Silver	✓	✓
Clearsight	Silver	✓	✓
	Decorative glass		
Painted glass **(Lacobel*, Lacobel T, Matelac, Matelac T, Lacomat)**	Silver	✓	✓
Acid-etched glass **(Matelux)**	Silver	✓	✓
Mirrors **(Mirox 4Green)**	Silver	✓	✓
Mirrors **(Mirox MNGE* and Mirold Morena)**	Bronze	✓	
Solar mirrors **(SunMax Premium Reflect)**	Silver	✓	✓

CERTIFIED cradle to cradle BRONZE

CERTIFIED cradle to cradle SILVER

* The C2C certification applies to the products manufactured in Europe.

Products	Cradle to Cradle Certified™ v3.1	Material ingredient reporting point	Material ingredient optimisation point
Laminated glass			
Stratobel and Stratophone	Silver*	✓	✓
Insulating glazing			
Thermobel and iplus / ipasol - Insulating Glazing	Bronze**	✓	
Patterned glass			
Imagin **Imagin Sandblasted & Wired** **Oltreluce**	Silver	✓	✓
Fire-resistant glass			
Pyrobel	Silver	✓	✓
Pyrobelite	Silver	✓	✓

* See Product Specification Sheet (available on the Product Registry listing at http://c2ccertified.org/products/registry) for all variations approved for use.
** Excludes: Thermobel and iplus / ipasol composed of non-C2C® certified glass constituents.

CONSTRUCTION & DEMOLITION WASTE MANAGEMENT (MRC5)

Intent	Contribution from AGC products
To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.	**CERTIFICATION REQUIREMENTS** Demonstrate that waste generated on site does not exceed 12.2 kg/m² of floor area.
→ **UP TO 2 POINTS**	**AGC SOLUTION** 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. 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. In addition to reducing the amount of waste generated on site, AGC has established a stringent target of Zero Waste to Landfill. In 2019, only 1.8% of all of AGC Glass Europe's waste was sent to a landfill.

RUSSIA SAINT PETERSBURG, LAKHTA CENTRE - ENERGY 72/38, IPASOL BRIGHT WHITE ON CLEARVISION AND PLANIBEL LINEA AZZURRA - *TONY KETTLE AND GORPROJECT CJCS* - **LEED PLATINUM**

INDOOR ENVIRONMENTAL QUALITY (EQ)

AGC GLASS PRODUCTS CAN INFLUENCE 8 OUT OF 16 POINTS AVAILABLE

LOW-EMITTING MATERIALS (EQc2)

Intent	Contribution from AGC products
To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity and the environment.	**CERTIFICATION REQUIREMENTS** 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.
→ **UP TO 3 POINTS**	**AGC SOLUTION** 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. AGC decorative painted glass products contain organic-based coatings. The paints used in AGC's **Mirox, Lacobel** and **Matelac** products are applied to the glass in the company's plants. 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.

THERMAL COMFORT (EQc5)

Intent	Contribution from AGC products
To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort. → **UP TO 1 POINT**	**CERTIFICATION REQUIREMENTS** Demonstrate compliance with thermal comfort standard ASHRAE 55-2010, ISO 7730:2005 or EN15251:2007 by providing a thermal analysis of the building project. **AGC SOLUTION** AGC provides a wide range of coated glass products (e.g. **Stopray, Sunergy, Stopsol, iplus, ipasol, Planibel G**) 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.

DAYLIGHT (EQc7)

Intent

To connect building occupants with the outdoors, reinforce circadian rhythms and reduce the use of electrical lighting by introducing daylight into the space.

→ **UP TO 3 POINTS**

Contribution from AGC products

CERTIFICATION REQUIREMENTS

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.

AGC SOLUTION

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 **Planibel Clearvision**, a highly transparent glass, deliver excellent visible light transmission, thus maximising natural daylight.

QUALITY VIEWS (EQc8)

Intent

To give building occupants a connection to the natural outdoor environment by providing quality views.

→ **UP TO 1 POINT**

Contribution from AGC products

CERTIFICATION REQUIREMENTS

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:

- → Flora, fauna or sky
- → Multiple lines of sight
- → Unobstructed views

AGC SOLUTION

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. **All float and coated glass products** can help to meet your needs.

Halio 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.

ACOUSTIC PERFORMANCE (EQc9)

Intent	Contribution from AGC products
To provide workspaces that promote occupants' well-being, productivity and communications through effective acoustic design. → **UP TO 1 POINT**	**CERTIFICATION REQUIREMENTS** Projects must attain limited background noise levels from HVAC (Heating, Ventilation and Air-Conditioning), lower sound transmission and a lower reverberation time. **AGC SOLUTION** 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 **Stratophone** laminated glass reduces noise by up to 52 dB (Rw).

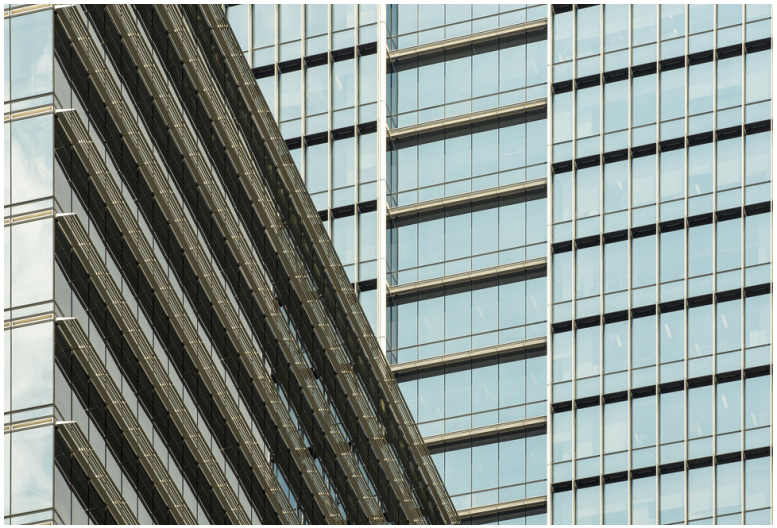
INNOVATION (IN)

AGC GLASS PRODUCTS CAN INFLUENCE 5 OUT OF 6 POINTS AVAILABLE

INNOVATION IN DESIGN (INc1)

Intent	Contribution from AGC products
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. → **UP TO 5 POINTS**	**CERTIFICATION REQUIREMENTS** Combine innovation with exemplary performance to achieve a pioneering product. **AGC SOLUTION** AGC is continually developing innovative products so it can meet future demands. **Halio** 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. **Fineo** is much more than glass technology. This vacuum insulating glass not only delivers amazing energy performance, but also combines exceptionally high thermal insulation with impressive soundproofing and unrivalled durability. The thin vacuum insulating glass also provides an elegant, sleek look. This makes maximum use of sunlight and solar energy. Fineo insulates just as well as triple glass, but is lighter and thinner. So the installation is much less labour-intensive than replacing the complete window frames. This often makes Fineo the most economical solution for renovation and restoration projects. Fineo is also a sustainable investment, because this insulating glass is 100% recyclable. And the vacuum glass also has a very long life without loss of performance. So the building envelope maintains its optimal comfort for decades.

HUNGARY BUDAPEST, VÁCI 33 - STOPRAY VISION-61T - **LEED SILVER**



SINGAPORE SINGAPORE, TANJONG PAGAR CENTRE - STOPSOL SUPERSILVER CLEAR AND STOPRAY VISION-37T - *SKIDMORE, OWINGS & MERRIL (SOM) USA & ARCHITECTS 61 PTE LTD* - **LEED PLATINUM**

CZECH REPUBLIC PRAGUE, ARTGEN - STOPRAY VISION-50T - *CMC ARCHITECTS* - **LEED GOLD**

For more information please consult AGC's yearly sustainability report on 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.**

AGC GLASS EUROPE, A LEADER IN FLAT GLASS

Based in Louvain-la-Neuve (Belgium), AGC Glass Europe produces, processes and markets flat glass for the construction industry (external glazing and interior decoration), car manufacture and solar power applications. It is the European branch of AGC, the world's leading producer of flat glass. It has over 100 sites throughout Europe, from Spain to Russia. AGC Glass Europe has representatives worldwide - See www.agc-yourglass.com for further addresses.

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