SMART WINDOW SOLUTION

VEXA

When the Function of Glass Changes, the Value of Space Changes.

VSION's exclusive smart window solution delivers privacy, openness and energy efficiency through advanced PDLC technology.

VSION

VSION

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Expansive and Beautiful Windows Troubled by Glare and Scorching Heat?

Buildings, Automobiles, Aviation - Across All Industries, Glass Is the Largest Point of Energy Loss.

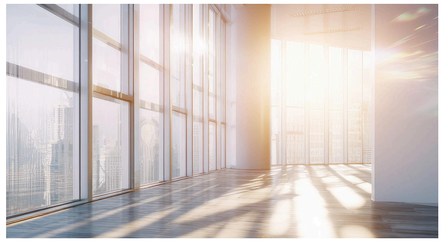
Share of Energy Loss Through Glass in Buildings, Automobiles, Aircraft, etc.

30–50%

Source: Lawrence Berkeley National Laboratory, Energy and Buildings, 2011



Larger Glass Areas. Familiar Concerns.



UV Rays and Heat

"The view is great because the windows are large... but it gets excessively hot during the day."



Energy Efficiency

"The sunlight streaming through the windows is so intense that electricity bills skyrocket."



Privacy

"I worry about people seeing in from the outside, but installing blinds or curtains is inconvenient."



Design

"It's a beautifully designed space; I wish there were a sleeker solution for the windows without resorting to blinds and curtains."

Conventional Methods Fall Short in Resolving These Concerns



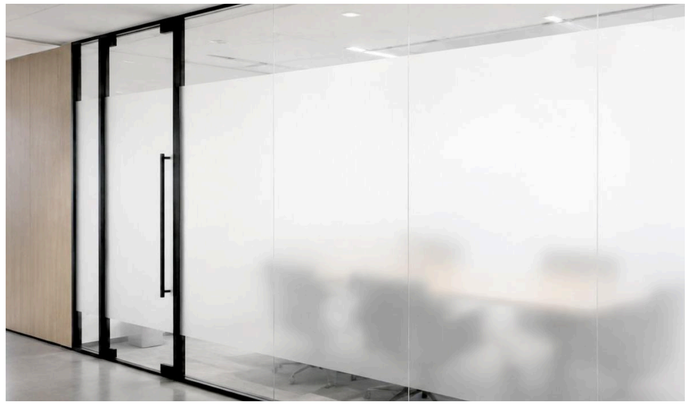
Blinds / Roller Screens

- Impair spatial openness
- Compromise design cohesion
- Maintenance and malfunction issues



Standard Glass Partitions

- Preserve openness
- Lack privacy
- Limitations during meetings and consultations



Screens / Window Films

- Permanently obstructed
- Restrict space utilization
- Inability to switch dynamically

You need an adaptable spatial solution that transitions seamlessly based on the occasion.

PDLC: A Proven Material for Energy Conservation

Evaluated in simulation research by external institutions.

- The study simulated two retrofit methods for an existing office building: attaching PDLC film to existing glazing, and adding a window incorporating laminated PDLC glass.
- Annual heating and cooling energy fell by 3.1–17.0% with film attachment and 18.8–22.4% with an additional window, depending on the modeled configuration.
- With film attachment, the annual occurrence of discomfort glare fell from 42.7% to as low as 7.8%. Results varied with film optical properties and installation method.
- These are simulation results under the study conditions, not measured performance of VSION products or a guaranteed reduction for every building.

[Research excerpt]



energies

MDPI

Article

Evaluation of Energy and Daylight Performance of Old Office Buildings in South Korea with Curtain Walls Remodeled Using Polymer Dispersed Liquid Crystal (PDLC) Films

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ed: 26 September 2019

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einforced to improve energy
ildings. The South Korean
g on research and product
ain walls. In line with this,
spersed liquid crystal (PDLC)
addition, energy efficiency improvement and daylight performance according to remodeling were analyzed. Attaching PDLC films to the glass of old curtain walls was analyzed; this can reduce heating and cooling energy, reduce the annual discomfort glare occurrence rate, and increase the annual indoor appropriate illuminance ratio. Furthermore, producing a window by laminating a PDLC film between two sheets of glass and putting it over the existing curtain wall was also analyzed; this can reduce annual building energy consumption and the annual discomfort glare occurrence rate, and improve the annual indoor appropriate illuminance ratio. Therefore, PDLC film is expected to be applicable as a next-generation green remodeling material because using it in remodeling can improve energy efficiency of old office buildings and indoor daylight performance.

Keywords: polymer dispersed liquid crystal; green remodeling; building energy efficiency; EnergyPlus

PDLC

Cost-effective, with a response time under one second

Material formulations can be adjusted during production to achieve the desired visible-light and solar transmittance. PDLC can be made as a film for retrofit application or integrated into laminated glass. Its transparent and opaque states support privacy and energy savings. Maintaining transparency requires continuous power, and transmittance control is limited by the ON/OFF states.

PDLC-Based Smart Window Solution

VEXA

Preserve the View.
Ensure Complete Privacy.

Transform the functions of glass while maximizing spatial and energy efficiency.

Four Major Challenges Resolved with a Single Smart Window Solution.

Privacy Control
Privacy Control

Energy Efficiency
Energy Efficiency

Light & Heat Regulation
Light & Heat Control

Spatial Openness
Spatial Openness

Smart Window Solution Feature 01.

Secure Instant Privacy Whenever Needed

Rapid 0.01-second switching / Effortlessly transition between transparent and opaque states via simple power control.

Single Glazing, Dual States.

Experience smart technology that switches instantaneously between transparency and opacity without opening or closing curtains and blinds.



Smart Window Solution Feature 02.

Premium Design and Smart Functions in Harmony with Your Space

Elevate energy efficiency and perfect interior spaces with clean, glass-centric design aesthetics. Do not ruin the expansive windows of your stunning new space with suffocating blinds or curtains.

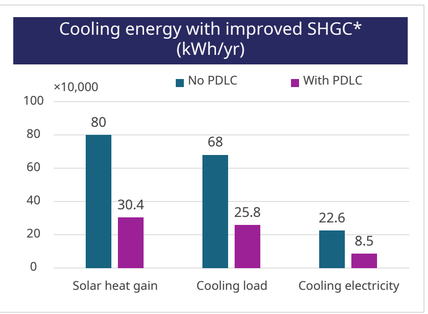
RETROFIT
Film on Existing Glass

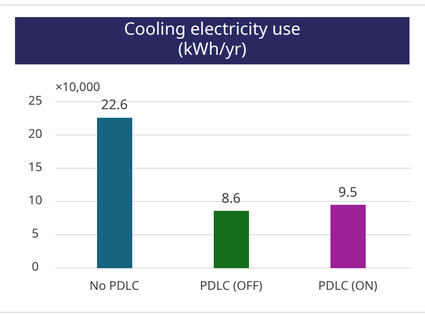
NEW BUILD
Smart Glass for New Builds

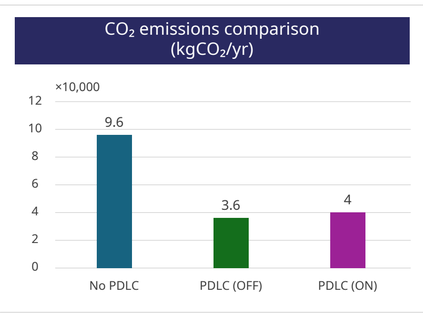
Smart Window Solution Feature 03.

Easily Retrofitted to Existing Windows for Greater Energy Efficiency in Zero-Energy Buildings

Energy Savings from In-House Simulation (Approx. 1,000 m² Window Area)



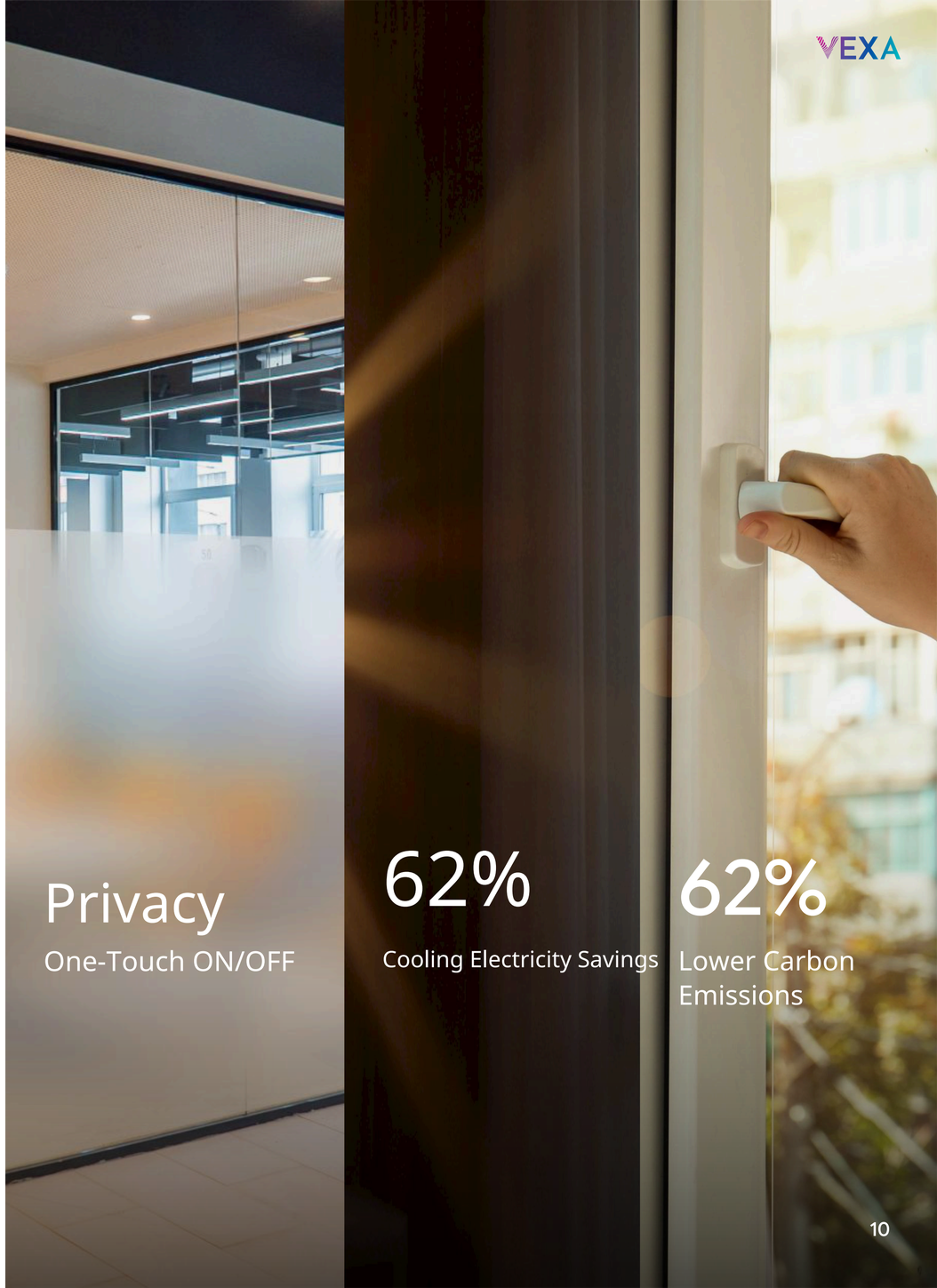




*SHGC: Solar Heat Gain Coefficient

Item	Baseline (No film)	PDLC OFF	PDLC ON / mixed 5 h/day assumed	Notes
Cooling electricity (kWh/year)	226,667	86,133	95,258	OFF: SHGC effect only
Electricity cost (KRW/year)	29,466,710	11,197,290	12,383,540	Calculated at KRW 130/kWh
Cooling electricity / emissions reduction	-	62%	58%	Constant emission factor
Film unit price (KRW/m², assumed)	-	150,000	150,000	Varies by supply / installation
Estimated payback (years)	-	Approx. 8.2 years	Approx. 8.8 years	Film cost / electricity savings

Assumes film at KRW 150,000/m² × 1,000 m². Payback excludes installation and other costs; actual results depend on terms and usage.



Product Information

VEXA Delivers Smart Glazing Tailored to Your Space

Demands for privacy, energy efficiency, solar control, and design vary across different environments. Through an expansive smart glazing portfolio, VEXA delivers customized solutions optimized for architectural spaces and next-generation mobility. From privacy protection to solar heat rejection, energy savings, and superior user experiences.



01

Architectural Interior Windows

VEXA Space Basic

Essential smart window solution providing effortless switching between transparency and opacity for conference rooms, offices, hospitals, and commercial venues.



02

Architectural Interior & Exterior Windows

VEXA Space SOLAR

Privacy combined with high-performance thermal insulation. High-efficiency smart window reducing solar radiation and indoor temperature buildup.



03

Automotive & Specialty

VEXA Mobility

Smart film solutions tailored for mobility and specialized environments, including vehicle sunroofs, side windows, and special-purpose vehicles.

Product Information

For Interior Windows

Intelligent Privacy. Sleek Design. Superior Energy Efficiency.



Key Features

01.
Replaces curtains and blinds

02.
Switches in approximately 0.01 seconds

03.
Easy privacy control by remote

04.
Modern, minimalist interior design

05.
Energy-saving performance

06.
Easy retrofit onto existing glass

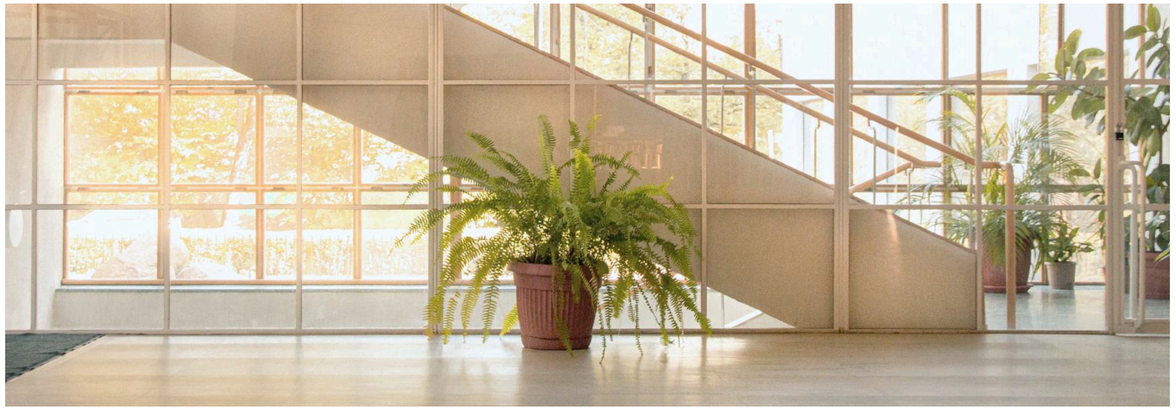
Product Specifications

Parameter	Specification
Total Transmittance (ON)	**>83%**
Haze (ON)	**<3.5%**
Haze (OFF)	**>98%**
Viewing Angle	**140°**
Operating Voltage	**48–110 V**
Power Consumption	< 5 W/m^2
UV Rejection	**>99.9%**
IR Rejection	80% or higher
SHGC (Solar Heat Gain Coefficient)	**0.34**
TSER (Total Solar Energy Rejection)	**66%**
ON/OFF Switching Cycle Test	> 3,000,000 cycles
Service Life / Warranty	Up to 10 years / 3-year warranty

Product Information

For Interior / Exterior Windows

Cooler. More Comfortable. More Efficient.



Key Features

01.
Privacy and solar control together

02.
Privacy with natural daylight and openness

03.
For curtain walls and commercial buildings

04.
For homes and large exterior windows

05.
Reduces cooling energy and operating costs

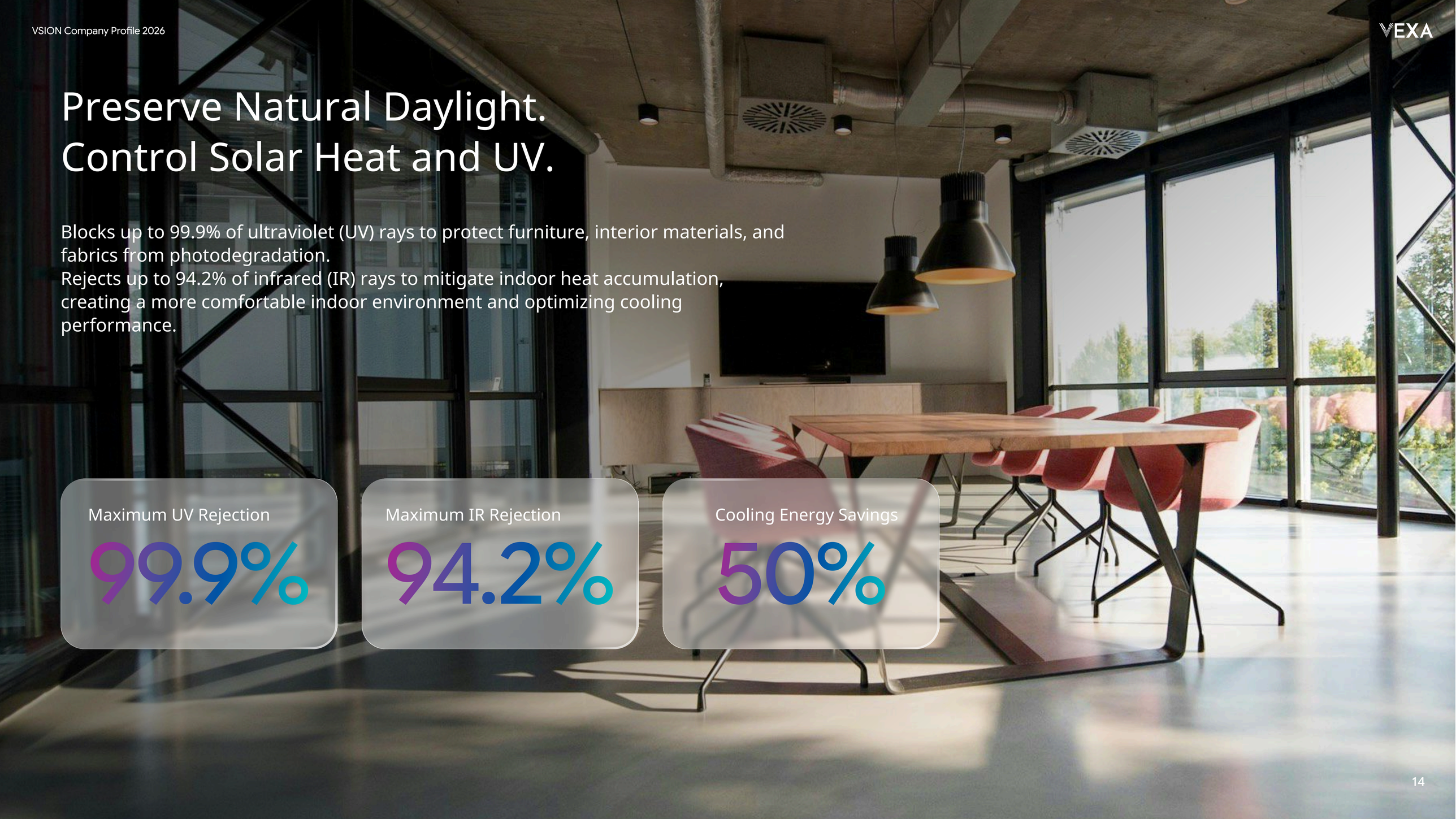
06.
Retrofit installation on existing glass

Product Specifications

Parameter	Specification
Total Transmittance (ON)	>83%
Haze (ON)	<3.5%
Haze (OFF)	>98%
Viewing Angle	140°
Operating Voltage	48–110 V
Power Consumption	< 5 W/m^2
UV Rejection	>99.9%
IR Rejection	Up to 94.2%
SHGC (Solar Heat Gain Coefficient)	0.34
TSER (Total Solar Energy Rejection)	66%
ON/OFF Switching Cycle Test	> 3,000,000 cycles
Service Life / Warranty	Up to 10 years / 3-year warranty

Preserve Natural Daylight. Control Solar Heat and UV.

Blocks up to 99.9% of ultraviolet (UV) rays to protect furniture, interior materials, and fabrics from photodegradation.
Rejects up to 94.2% of infrared (IR) rays to mitigate indoor heat accumulation, creating a more comfortable indoor environment and optimizing cooling performance.



Maximum UV Rejection

99.9%

Maximum IR Rejection

94.2%

Cooling Energy Savings

50%

FAQ

Frequently Asked Questions

01.

What benefits does architectural film provide?

Architectural film provides on/off switching capabilities as an alternative to blinds and curtains, allowing occupants to selectively enjoy privacy or outdoor views. Furthermore, it blocks solar heat and UV rays, suppressing indoor temperature rise and reducing air conditioning loads.

02.

Can it be applied directly onto existing glass?

Yes. Most architectural films can be retrofitted directly onto existing glass without requiring glazing replacement. Installation can proceed while the building remains occupied and fully operational, minimizing construction time and overhead costs.

03.

Does applying the film make the indoor space dark?

Minor differences in clarity or tint may exist compared to untreated glass. However, cutting-edge solar control films are engineered to effectively block solar heat and UV radiation while transmitting natural daylight, preserving an open, well-lit interior atmosphere.

04.

Does it provide a blackout effect?

Architectural film is primarily engineered for solar heat reduction and glare control. While select products offer variable light-dimming effects, they do not function as full blackout solutions. If complete room darkening is required, we recommend combining the system with conventional blinds or blackout curtains.

05.

Does it effectively reduce electricity bills?

Yes. Architectural film suppresses solar heat gain through windows, cutting cooling loads and substantially lowering cooling energy expenditures. The actual savings rate may vary depending on building orientation, window area, existing glazing performance, and installed HVAC systems.

Case Studies

One Technology. Diverse Spaces.

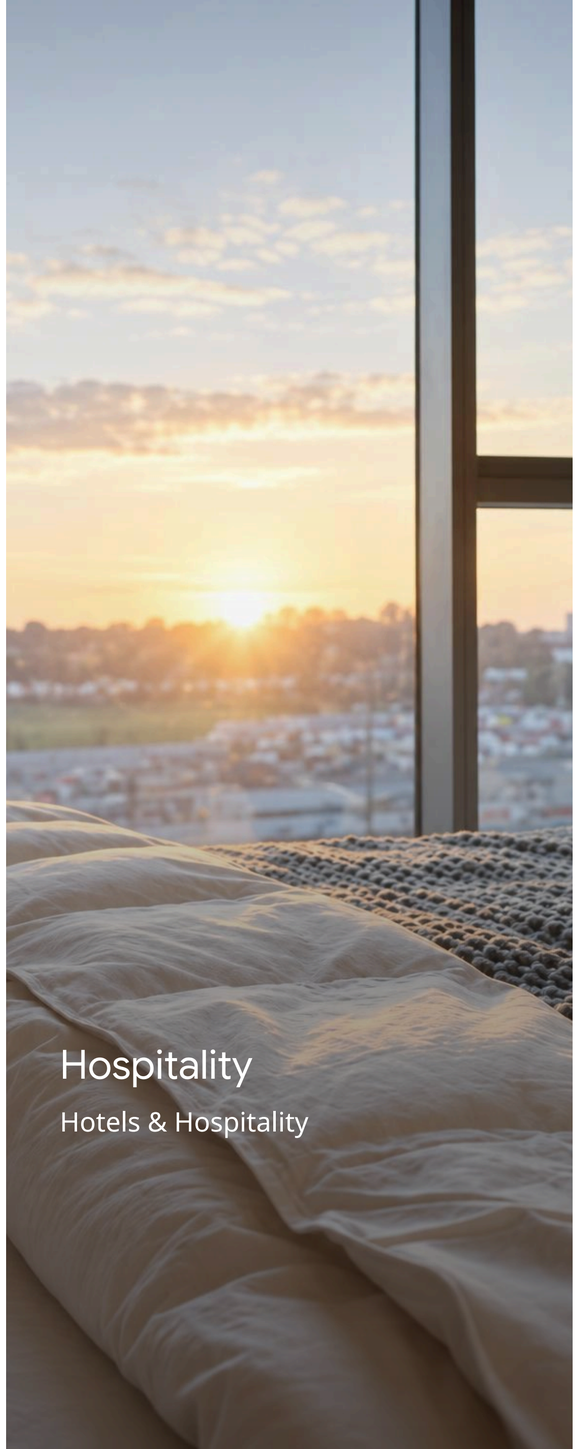
Residential

Residential Spaces



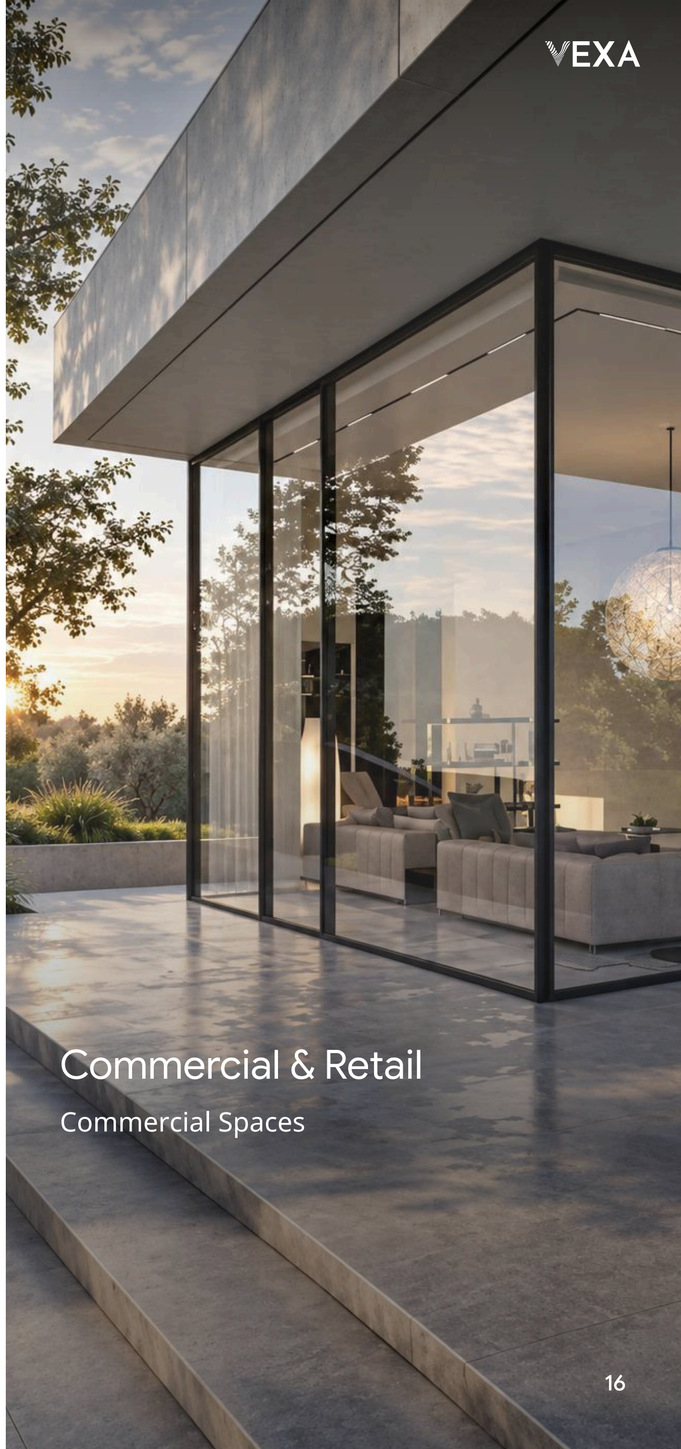
Office & Workspace

Office & Workplace Environments



Hospitality

Hotels & Hospitality



Commercial & Retail

Commercial Spaces

COMPANY OVERVIEW

VSION

Engineering the Full Spectrum of Smart Glazing, from Technology to Manufacturing.

Company Profile

Engineering Smart Glazing from Technology to Manufacturing

VSION infuses glass with revolutionary functionalities powered by advanced PDLC technology. Directly bridging R&D, advanced manufacturing, and turnkey installation, we realize architectural demands for privacy, energy performance, and dynamic spatial utility through an integrated smart glazing solution.

Corporate Overview

Company	VSION Inc.
CEO	Hee-Young Yoon
Location	HQ: 90 Secheonbuk-ro, Dasa-eup, Dalseong-gun, Daegu, 2F, Suite 202 (208-A) Plant: 99 Kkachigol-gil, Jeungpyeong-eup, Jeungpyeong-gun, Chungcheongbuk-do
Business	Smart Window Film Manufacturing & Installation
Company Type	Small and Medium-Sized Enterprise
Commodity Code	3014151101
Telephone	82-1533-7126
Business Reg. No.	765-88-02379
Industry / Business	Manufacturing / Film Production & Processing
Manufacturing	In-House Manufacturing
Item ID	25600547
Website	www.vsion.co.kr

Revenue

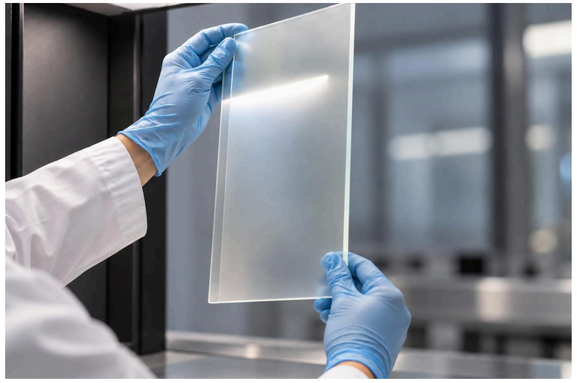
Year	2023	2024	2025	3-Year Total
Revenue (KRW)	1,582,677,496	4,196,162,423	6,759,000,000	12,537,839,919

VSION Differentiators

Expanding the Smart Glazing Market
VSION's Four Core Competencies

Driven by 17 years of technical expertise, manufacturing capabilities, a versatile portfolio and global business operations, we are expanding smart glazing applications across architecture and mobility.

17 Years of Technical Expertise



We develop advanced smart glazing solutions backed by over 17 years of specialized PDLC technological expertise. We possess verified track records and end-to-end know-how spanning fundamental R&D through mass commercialization.

Production Competitiveness & Manufacturing Capabilities



We ensure superior quality control and dependable supply capacity via our Jeungpyeong plant in Chungcheongbuk-do, featuring a 340,000 m^2/year capacity (based on 2 shifts) and advanced Roll-to-Roll manufacturing infrastructure. We execute all operations in-house, from basic R&D to automated production and quality assurance.

Versatile Smart Glazing Portfolio



We address diverse industry requirements via an extensive portfolio encompassing Normal PDLC, Reverse PDLC, Reverse Gray PDLC, Color PDLC, UV-Blocking PDLC, Smart Glass, and EC (Electrochromic) technologies.

Global Market Expansion Capabilities



We execute international projects across North America, Europe, and Asia, progressively expanding our footprint throughout global architectural and mobility markets. We possess robust supply chain readiness and collaborative capacity to meet the exacting standards of global clients.

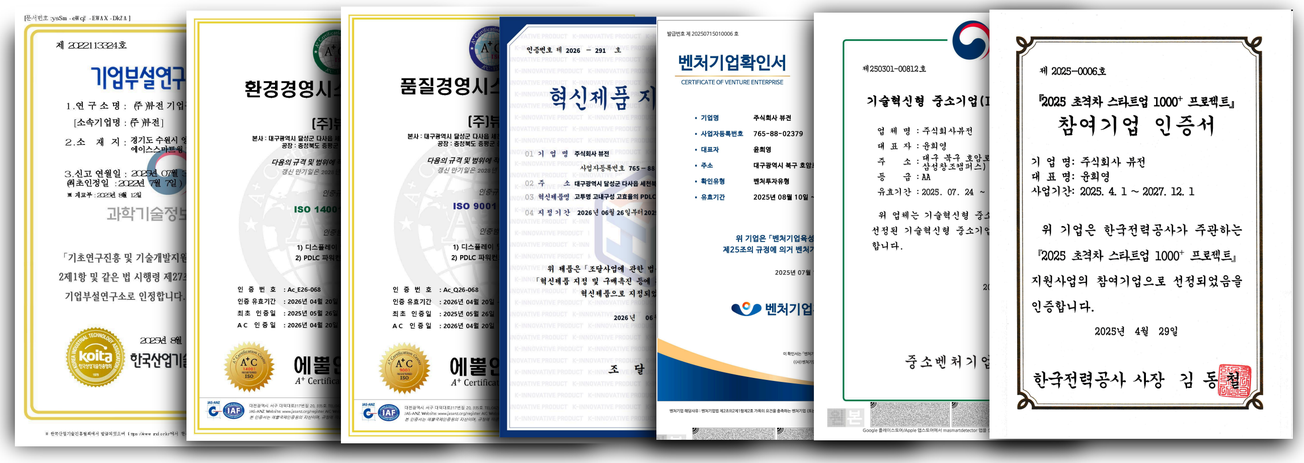
VSION Differentiator 01. 17 Years of Technical Expertise

Proprietary Patents and Key Certifications

Type		Applicant	Country	Status	Application / Reg. No.	Patent Title
Patent	Patent	VSION Inc.	Korea	Registered	10-2424383	Color-capable reverse-mode PDLC assembly without a PI alignment layer, and its manufacturing method
	Patent	VSION Inc.	Korea	Registered	10-2425560	Reverse-mode PDLC assembly without a PI alignment layer
	Patent	VSION Inc.	Korea	Filed	10-2023-0008168	Reverse-mode PDLC film with horizontally aligned liquid crystals
	Patent	VSION Inc.	Korea	Filed	10-2023-0084778	Continuous production equipment for PDLC film with an alignment layer
	Patent	VSION Inc.	Korea	Filed	10-2023-0084781	Continuous production method for PDLC film with an alignment layer
	Patent	VSION Inc.	PCT	PCT Filed	PCT/KR2023/005387	Color-capable reverse-mode PDLC assembly without a PI alignment layer, and its manufacturing method
	Patent	VSION Inc.	Korea	Registered	10-2015-0084458	Method for Manufacturing Microcapsules



Type	Certification	Authority	Date
Cert.	Venture Enterprise Certification	MSS	2022.08
	Corporate R&D Center Recognition	MSIT	2022.07
	Super Gap Startup 1000+	KEPCO	2025.04
	ISO 9001 Quality Management System	IAF	2025.05
	ISO 14001 Environmental Management	IAF	2025.05
	Inno-Biz Certification	MSS	2025.07
	Green Certification	KIAT	2026.07
	Innovative Product Certification	PPS	2026.07

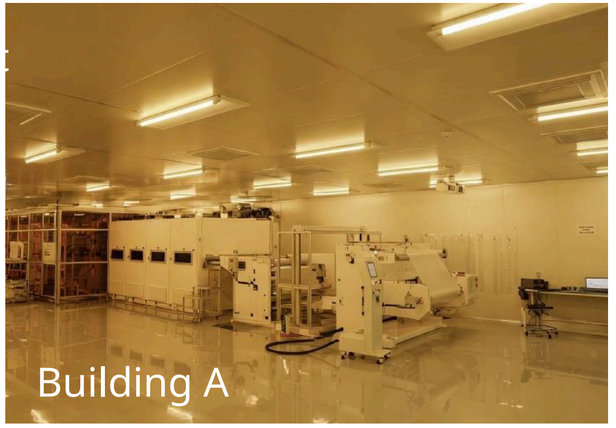


VSION Differentiator 02. Production Competitiveness & Manufacturing Capabilities

A Dedicated Plant of Approximately 5,000 m² in Jeungpyeong



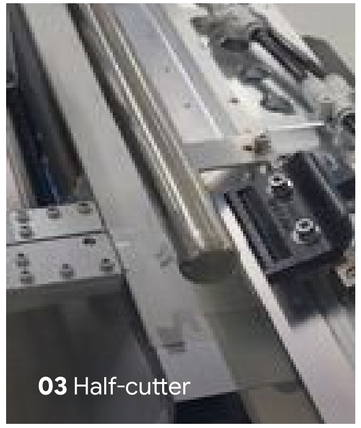


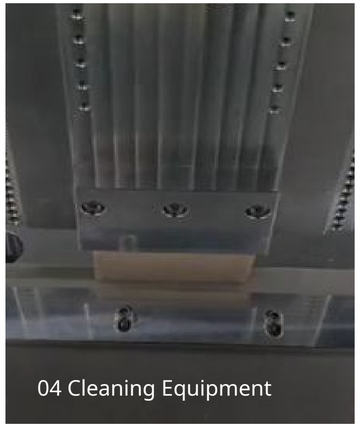














VSION Differentiator 03. Versatile Smart Glazing Portfolio

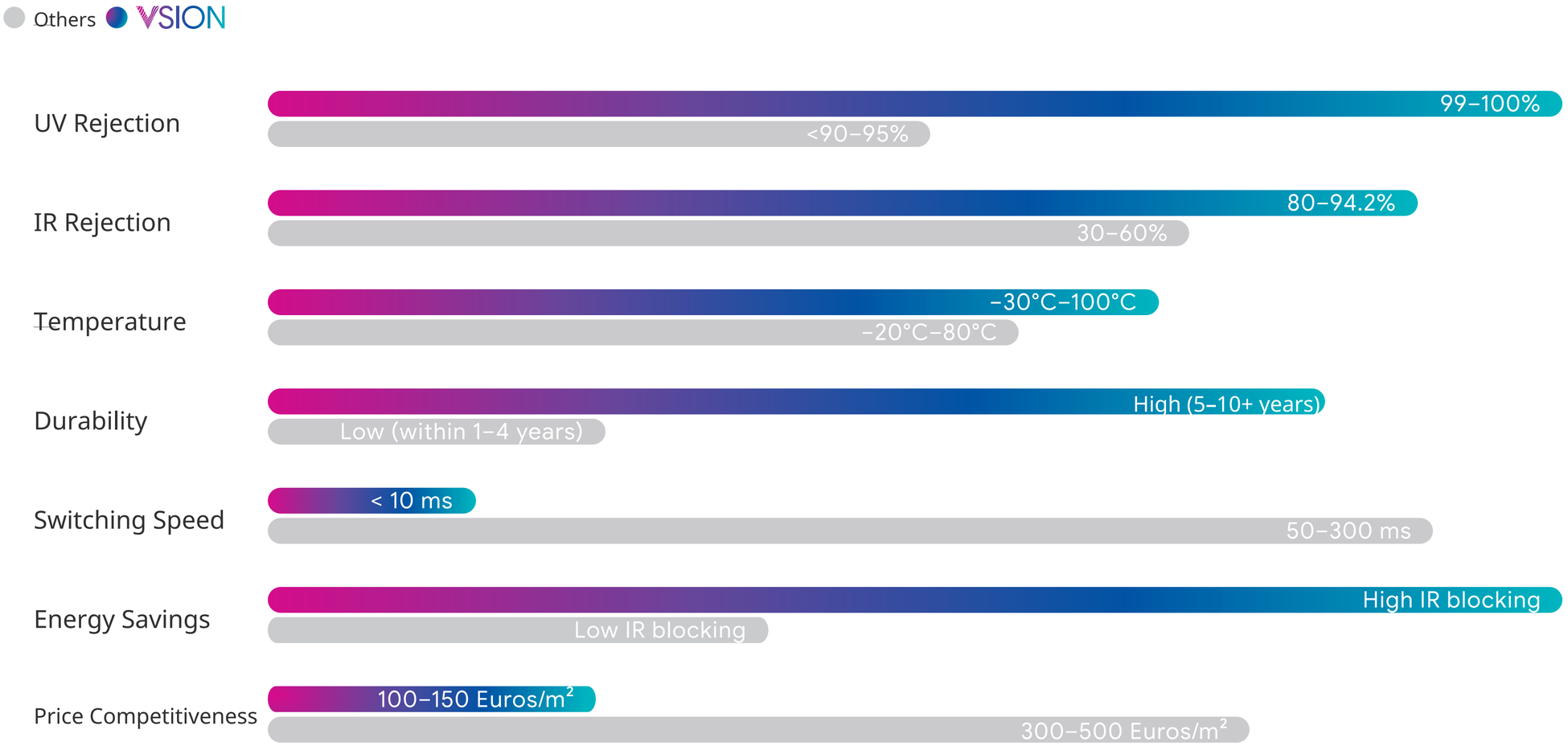
Internalizing Next-Generation Technologies to Expand PDLC Film Utility

Targeting Advanced Dimming Control and Variable Color Implementation Applicable Across Diverse Environments While Maintaining Baseline Transparency

Technology	Core Development Focus	Purpose / Expected Impact
Color PDLC	Developing optimal dye and liquid crystal formulations to introduce diverse color profiles matching customer specifications Targeting Gray Film as the primary release color	Elevating the aesthetic functions of PDLC film to satisfy diverse consumer tastes and drive market expansion Expanding into premium brands within the European EV sector
Memory PDLC	Overcoming continuous power reliance in PDLC films; maintains transparent states even in power-off conditions	Consumes power strictly during on/off switching transitions with zero energy consumption during state maintenance, maximizing energy efficiency
Clear Dimming PDLC	Formulating high-dispersion polymer resins for faster, crisper transmittance tuning relative to solar irradiance	Advancing fundamental technologies to develop products featuring controlled polymer scattering and high-reliability dimming profiles
Electrochromic	Establishing proprietary production protocols and advancing electrochromic technology platforms	Addressing evolving collaborative partner and consumer demands requiring EC functionalities Expanding the Technological Frontiers of VSION Smart Films

VSION Differentiator 04. Technological Superiority

Technical Performance Across Key Metrics, from Optical Control to Energy Savings



VSION Differentiator 05. End-to-End Operational Execution

A Vertically Integrated Framework Spanning R&D, Production, Installation, and After-Sales Support

	Durability	Price Competitiveness
Conventional PDLC Limitations	**Frequent Failures / Short Life**	**High Prices / Paid Repairs**
VSION PDLC Advantages	**Accelerated Weathering Test** Passed 3,000 hours of accelerated weathering testing.	**Competitive Selling Price** Priced at 80% of competing products, with ongoing efforts to reduce unit costs.
	10–15 Years of Service Life Accelerated weathering tests support an estimated service life of 10–15 years.	**3-Year Complimentary Support** Complimentary after-sales support for product issues for three years.
	R&D Capability & Quality Our in-house R&D center improves durability, supports technology development and maintains consistent quality.	**Low Power Consumption** Low power consumption of 5 W/m² enhances operating-cost competitiveness.

VSION

One-Stop Service

01. Product Research & Development
02. In-House Manufacturing
03. Product Sales (B2B / B2C)
04. Installation (B2B / B2C / Global)
05. Customer Support & After-Sales Service

VSION Differentiator 06. Global Market Expansion Capabilities

Expanding Smart Glazing Applications Through Global Partnerships

U.S. Smart Window Market

• Working with U.S. blind manufacturers for North American expansion
• GF TECH USA joint venture established in January 2023
• Participated in CES 2024

Japanese Smart Window Market

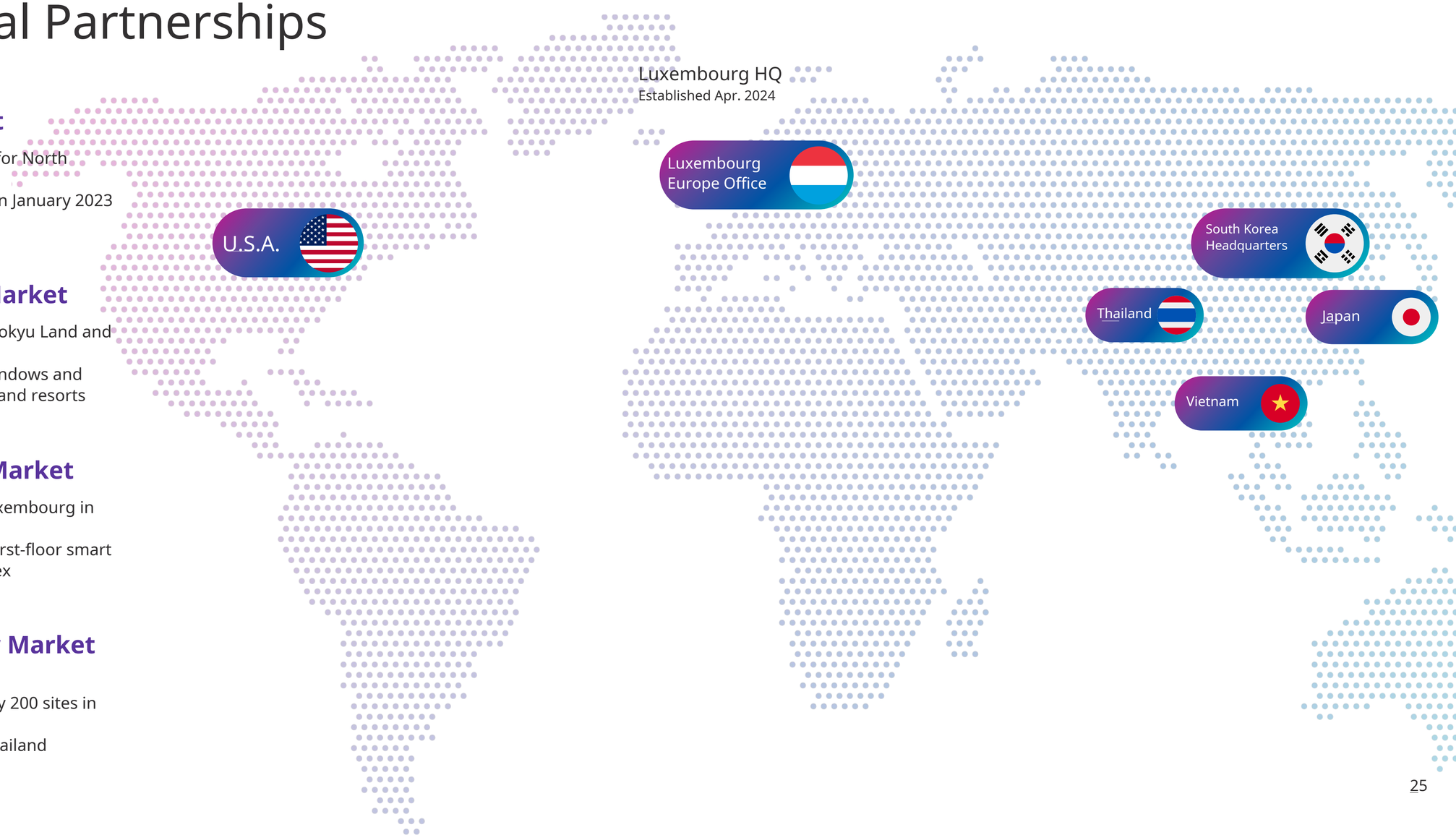
• Developing collaboration models with Tokyu Land and Kajima
• Discussing smart glazing for exterior windows and media facades at Tokyu Land residences and resorts

European Smart Window Market

• VSION EUROPE S.à r.l. established in Luxembourg in April 2024
• Planned Glass-Box vehicle display and first-floor smart windows at a cultural-commercial complex

Asia-Pacific Smart Window Market

• Vietnam subsidiary established
• Installations confirmed at approximately 200 sites in Vietnam
• Smart city market entry confirmed in Thailand



VSION

Head Office: Suite 202 (208-A), 90 Secheonbuk-ro, Dasa-eup, Dalseong-gun, Daegu, Korea
Plant: 99 Kkachigol-gil, Jeungpyeong-eup, Jeungpyeong-gun, Chungcheongbuk-do, Korea
Seoul Office: 17 Gukjegeumyung-ro 2-gil, Yeongdeungpo-gu, Seoul, Korea
Suwon Office: Suite 1008, Ace Smart Wing, 253 Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea
R&D Center: Suite 407, 138 Jiksan-ro, Jiksan-eup, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
Showroom / Training Center: Suite F101, DMC Flex Desian, 217 Hyangdong-ro, Deogyang-gu, Goyang-si, Gyeonggi-do, Korea

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