GO GREEN

FUMIN COATING™

FUMIN COATING™

Japan Patent P-No. 3908252
granted on 19 Jan 2007
Singapore Patent P-No. 137957
granted on 28 Nov 2008
Malaysia Patent No. MY-141240-A
granted on 31 March 2010
Indonesia Patent App. No. WO0200703973
granted on14 May 2010
Australian Patent App. No. 2006253332
granted on 2 Sep 2010
Patent PRC No. ZL2006800119644.9
granted in May 2011
Patent PRC HK No. 1119622
granted in Oct 2011
USA Patent App. No. 8287946
granted on 16 Oct 2012
TAIWAN R.O.C No.I 399350
granted on 21 June 2013
South Korea Patent No.1298460
granted on Jun 2013
INDIA Patent No.265116
granted on Feb 2015
EU Patent No.1886

PCT App. No. JP2006/311013

What is Shading Coefficient (SC)?

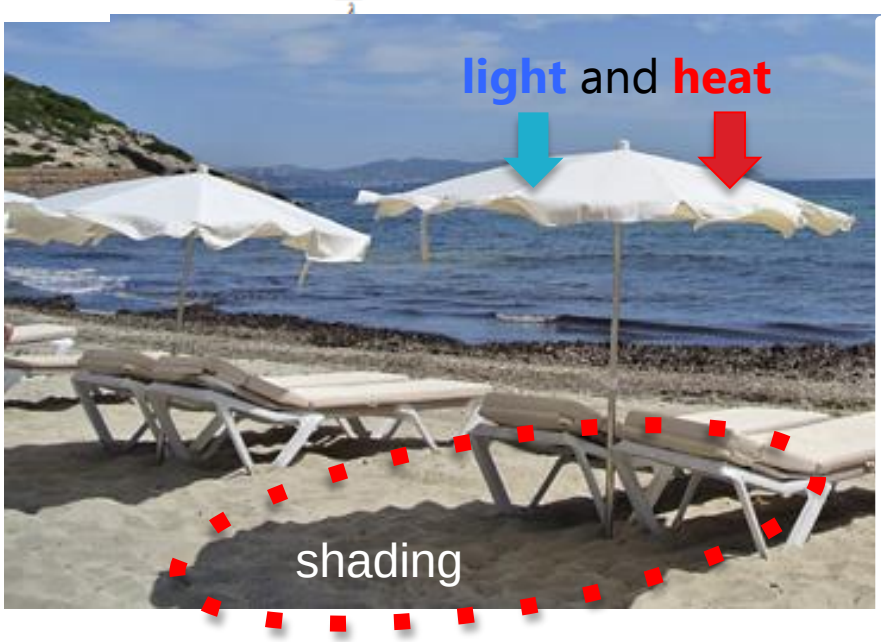
Range of wave length to measure transmittance and reflection of solar radiation for the formulas (4) and (5) to calculate ratios (6) and (7) are from 300nm to 2500nm. This is inclusive of Ultra Violet, Visible rays and Infrared rays. Hence, higher visible ray transmittance and lower reflectance affect the value of Shading Coefficient.

$$\tau_e = \frac{\sum_\lambda \tau(\lambda) \cdot E\lambda \cdot \Delta\lambda}{\sum_\lambda E\lambda \cdot \Delta\lambda} \quad (4)$$

$$\rho_e = \frac{\sum_\lambda \rho(\lambda) \cdot E\lambda \cdot \Delta\lambda}{\sum_\lambda E\lambda \cdot \Delta\lambda} \quad (5)$$

$$S = \frac{\tau_e + Ni\,(100 - \tau_e - \rho_e)}{\tau_{eO} + 0.35\,(100 - \tau_{eO} - \rho_{eO})} \quad (6)$$

$$Ni = \frac{6.3\varepsilon_i + 3.9}{(6.3\varepsilon_i + 3.9) + (6.5\varepsilon_e + 12.2)} \quad (7)$$



By putting up a parasol to prevent direct sun light, Sun light shine on the parasol and transfer the heat to the parasol so that only the parasol becomes warm and people don't feel hot.

"Shading" means to prevent **light** and **heat** to shine directly on the material. "Shading" means "stop radiation" by transferring heat to the material such as a curtain or a parasol.

Fumin Coating is absorbing Infrared (IR) rays to stop radiation.

However, Fumin Coating has high visible ray transmittance rate that is used to calculate SC value, therefore, SC of Fumin Coating would be bigger value.

ATO and ITO known as semiconductor technology are commonly applied to the touch panel etc. in order to absorb Infrared. These Nano size metals, tolerate up to 180 ℃, can be applied with a sponge or with a roller at room temperature.

＜Sponge was used on the left side glass＞

antimony trioxide (ATO)
antimony pent oxide (APO)
FUMIN COATING uses APO

It is a great technology that will stop the heat and ultraviolet rays coming through the glass, however it will impair the value of the glass if there are unevenness, distortion, dripping on the glass. The solution to this problem lies in using ”FUMIN COATING spray gun method”.

The National Art Center in Tokyo

Architect Kisho Kurokawa selected Heat Reflecting glass in 2007, later placed window film….. finally FUMIN COATING in Jan 2011

The National Art Center in Tokyo

Architect Kisho Kurokawa selected Heat Reflecting glass in 2007, later placed window film….. finally FUMIN COATING in Jan 2011

Electric Power Consumption Comparison 2010 vs. 2011 K.Art Center in Japan

K. Art Center in Japan

(A) Electric Power used in 2010 (kWh) Before FUMIN COATING

Jan	Feb	Mar	Apr	May	Jun	
771,338	915,950	864,261	1,022,222	1,006,128	1,154,226	
Jul	Aug	Sep	Oct	Nov	Dec	Total
1,292,385	1,386,125	1,305,365	1,038,537	927,000	859,514	12,543,051

(B) Electric Power used in 2011 (kWh) FUMIN COATING sprayed on 4,653㎡ glass windows (21 Dec 2010 - 4 Jan 2011)

Jan	Feb	Mar	Apr	May	Jun	
674,781	815,983	681,753	759,176	851,134	933,006	
Jul	Aug	Sep	Oct	Nov	Dec	Total
1,006,129	1,037,573	1,087,483	895,779	858,625	743,306	10,344,728

(B) - (A) Electric Power Saved (kWh, %)

Jan	Feb	Mar	Apr	May	Jun	
96,557	99,967	182,508	263,046	154,994	221,220	
-13%	-11%	-21%	-26%	-15%	-19%	
Jul	Aug	Sep	Oct	Nov	Dec	Total
286,256	348,552	217,882	142,758	68,375	116,208	2,198,323
-22%	-25%	-17%	-14%	-7%	-14%	-18%

Cool season (Dec - Feb) 381,107kWh Reduced <-11% y-o-y>

Hot season (Mar - Oct) 1,817,216kWh Reduced <-20% y-o-y>

Total Electric Power Saved y-o-y: 2,198,323kWh

CO2 emission reduction

2,198,323kwh (Electricity reduction) x 0.69 (Marginal factor) =1,516t-CO2

(Source) K. Art Center. Japan

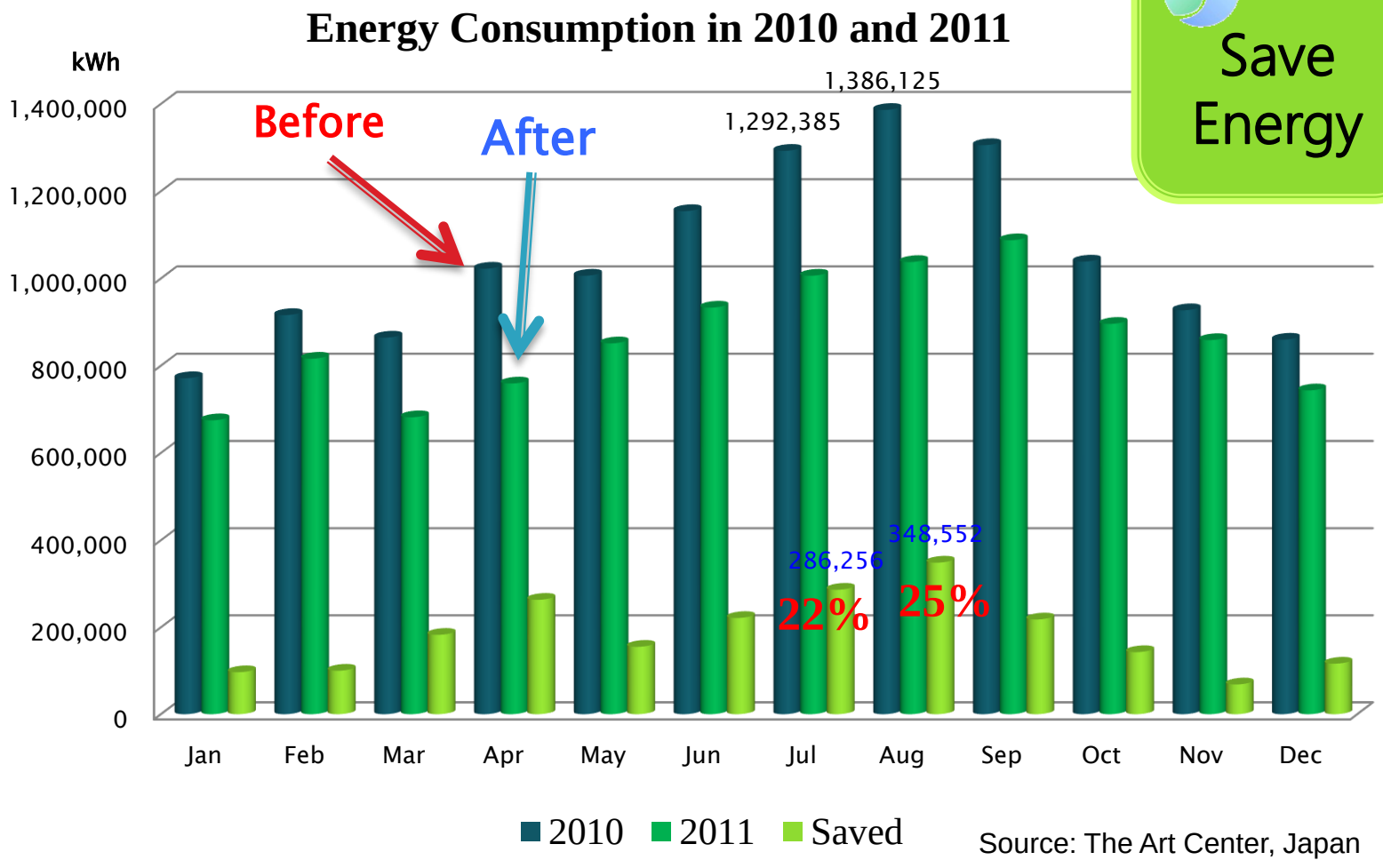
2012/6/25 FUMIN CO., LTD

GREEN

Japan

More Energy saved in Hot Season by FUMIN COATING

Save Energy



Source: The Art Center, Japan

Internal document
Fumin co., ltd

Cost-effectiveness of Fumin Coating

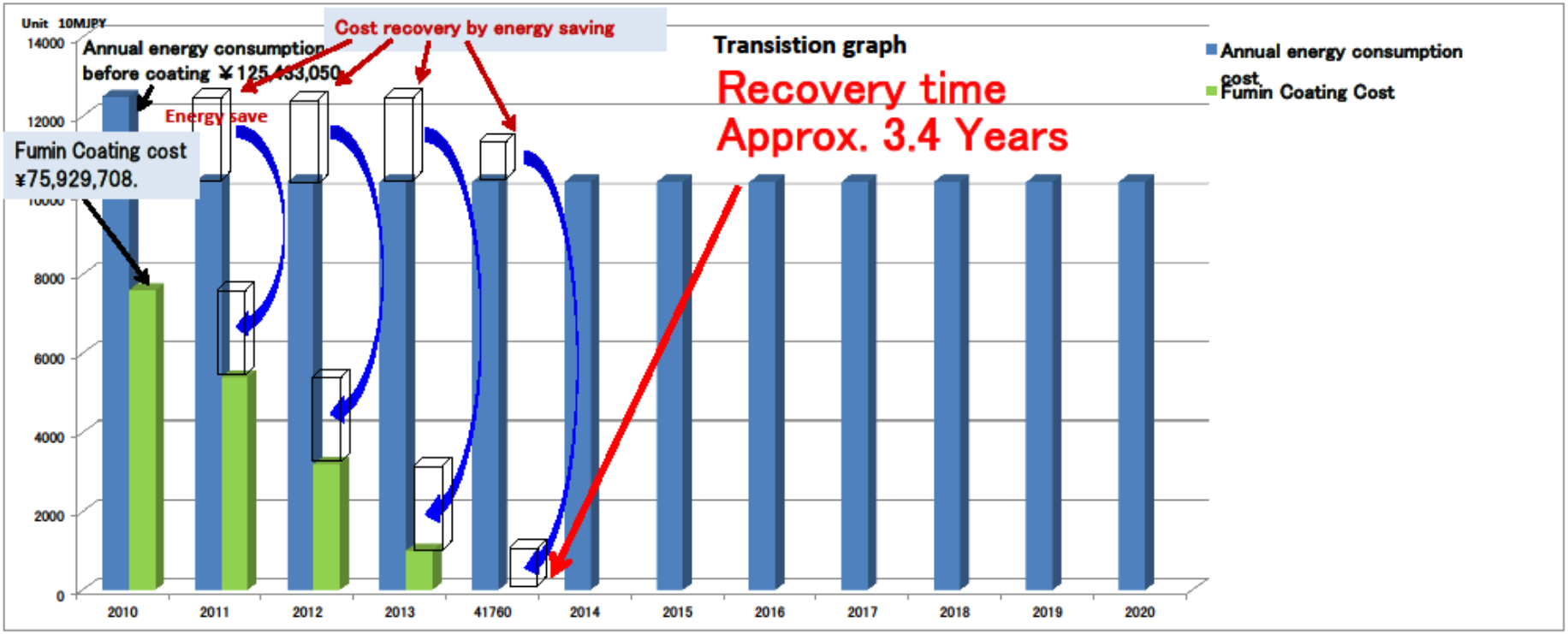
Calculation condition
Example) The National Art Center in Tokyo

Fumin Coating Cost ¥75,929,708 (Approx. 4,700㎡)

Energy save record by Fumin Coating Approx. 18%

Annual energy consumption before coating 12,543,305kwh
Annual energy consumption after coating 10,344,728kwh
Energy save record 12,543,305kwh − 10,344,728kwh = 2,198,323kwh (Approx.18%)
Energy cost = ¥10/kwh ==> Energy save record (JPY) = ¥21,983,230

Recovery time : ¥75,929,708 ÷ ¥21,983,230 = Approx. 3.4 Years



GO GREEN

Okinawa resort hotel

GO GREEN

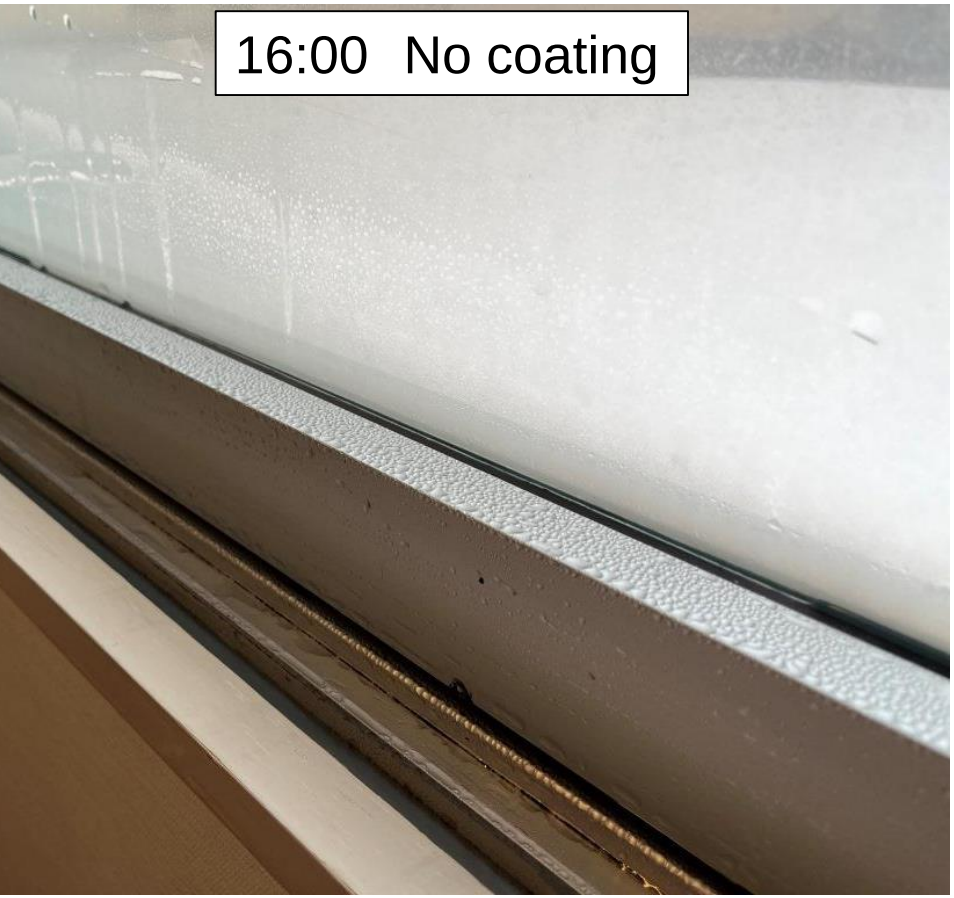
Okinawa resort hotel ・Before

GREEN

After Application of FUMIN Coating

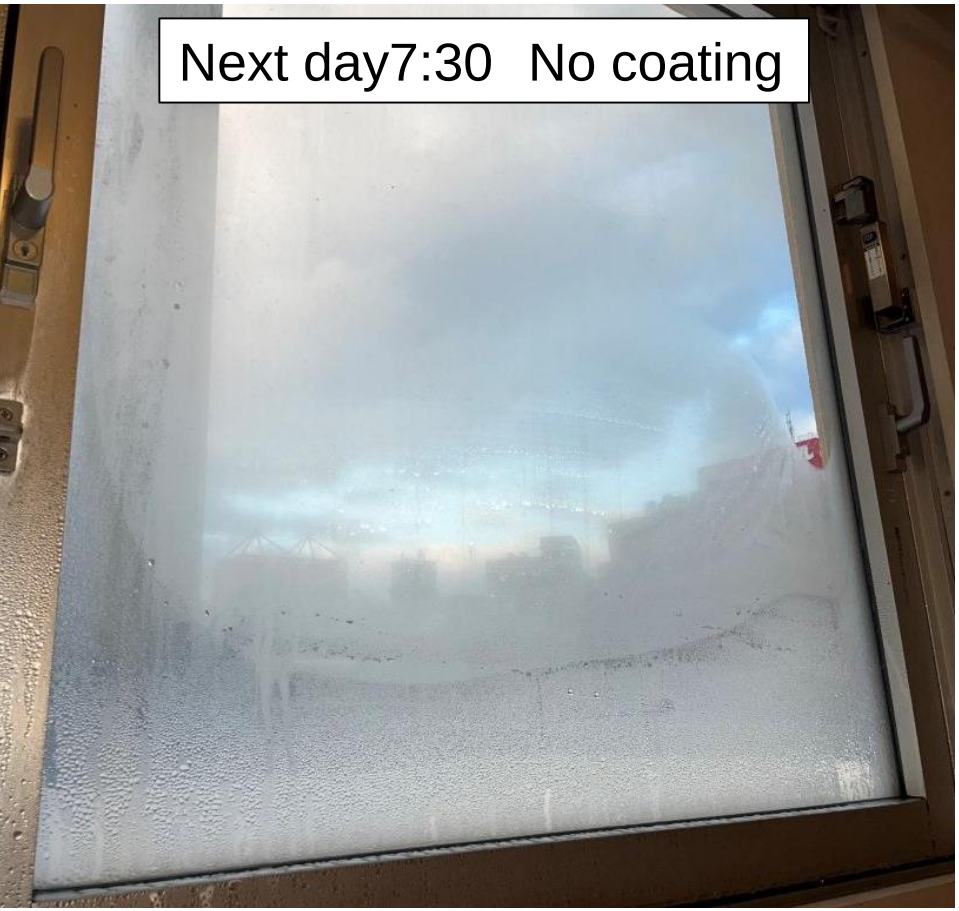
Condensation suppression effect①

January 21, 2022　Niigata City, Niigata Prefecture



Condensation suppression effect②

January 21, 2022　Niigata City, Niigata Prefecture



Infrared Rays 70% CUT

UV 90% CUT

Reflection 7%

transparent

energy saving

FUMIN COATING™

fire retardant

easy application & maintenance

Long life

recyclable

No toxic gas

GO GREEN

CONTENTS OF FUMIN COATING™

Certified by manufacturer

Phthalate-2-Ethruhekishiru

Dibutyl phthalate

Chlorphrifos

Tetradecane

Paradichlorobenzene

Stylene

Xylene

Ethylbenzene

Diazinon

Fenobucarb

Toluene

Acetaldehyde

Formaldehyde

Very Volatile Organic Compounds

[illegible]年3月 8日

〒538-8666
大阪市鶴見区鶴見4-1-12
株式会社アサヒペン
工業用開発部
TEL 06-6930-5040
FAX 06-6930-5035

厚生労働省指定化学物質不使用証明の件

拝啓　貴社益々ご清栄のこととお慶び申し上げます。
平素は格別のご高配を賜り厚く御礼申し上げます。
　さて、ご照会頂きました標記の件につきまして下記にご回答申し上げますので、何卒ご高覧の程宜しくお願い申し上げます。

敬具

記

下記商品の化学物質の含有は以下のようになっております。

商品名　フミンコーティングＩＲ－ＵＶ

色　名　クリヤー

1）ホルムアルデヒド	2）アセトアルデヒド	3）トルエン
4）キシレン	5）エチルベンゼン	6）スチレン
7）パラジクロロベンゼン	8）テトラデカン	9）クロルピリホス
10）フェノブカルブ	11）ダイアジノン	12）フタル酸ジ-n-ブチル
13）フタル酸ジ-2-エチルヘキシル		

●上記物質は弊社では配合しておりません。
●製品の分析データについては測定値を持ち合わせておりませんのでご了承下さい。

以上

GREEN

Shading Coefficient is to quantify the amount of light coming through the window. To be effective, Shading Coefficient is lower the better. The dark film or reflective glass were believed to be good.

	FUMIN COATING	Reflective film
Shading Coefficient	0.88	0.31
U-Value (W/m2/k)	6.0	5.8
Visible ray transmittance (%)	84.7	19.7
Solar transmittance (%)	68.6	15.4
Solar reflectance (%)	6.7	48.6

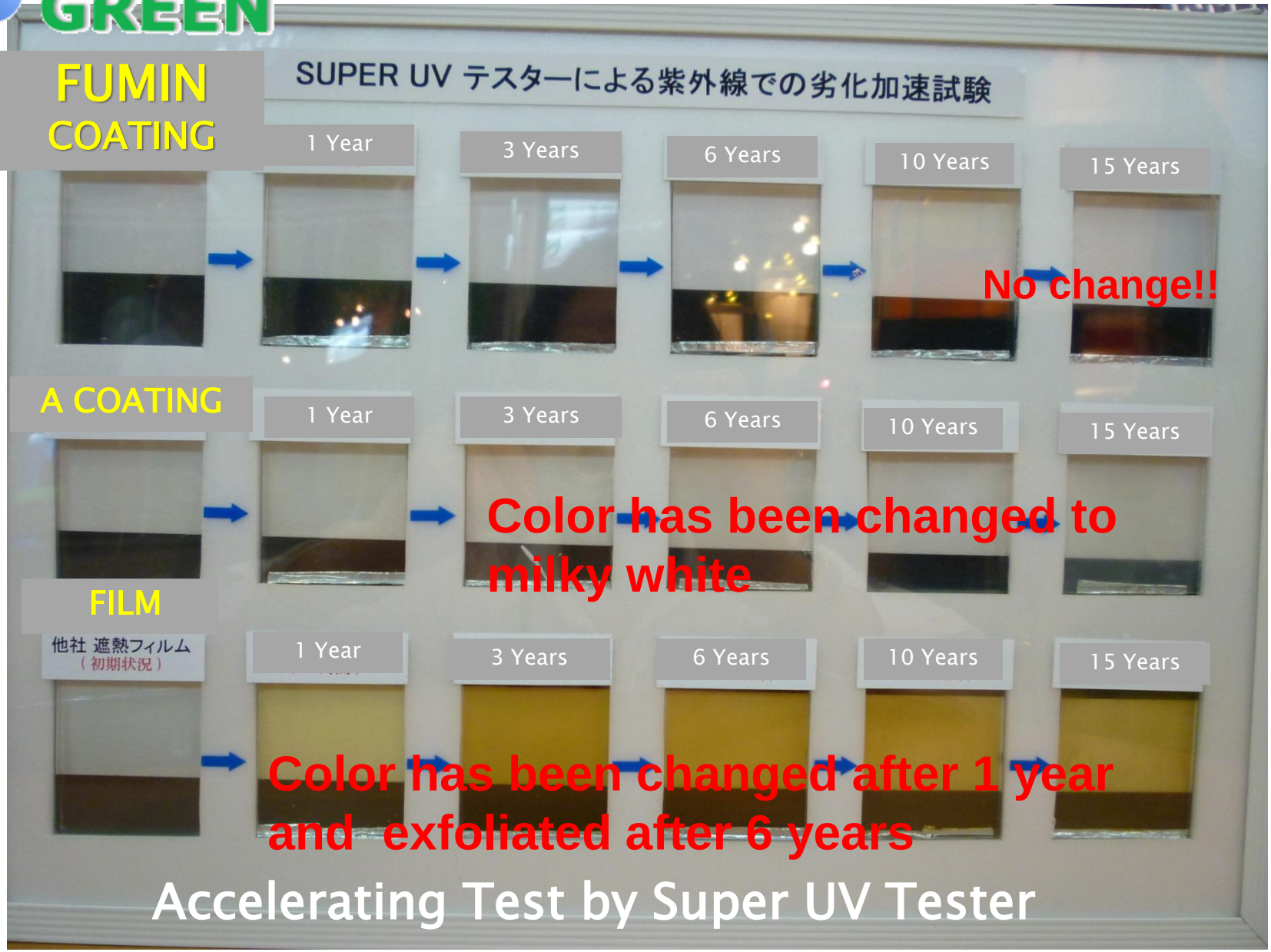
Source: Verification Test Report for Heat-Island Mitigation Technologies

GREEN

The latest window film cuts the heat & UV without blocking the light. Some mixed ITO and ATO to glue and those have the effect of the photo catalyst by absorbing the UV, however, these adhesive would result decomposition and discoloration.

	FUMIN COATING	Window film
Shading Coefficient	0.88	0.78
U-Value (W/m2/k)	6.0	5.7
Visible ray transmittance (%)	84.7	87.0
Solar transmittance (%)	68.6	62.0
Solar reflectance (%)	6.7	18.5

Source: Verification Test Report for Heat-Island Mitigation Technologies



1 Year= 30 hours of UV rays exposure

GREEN

ガラス窓から省エネ

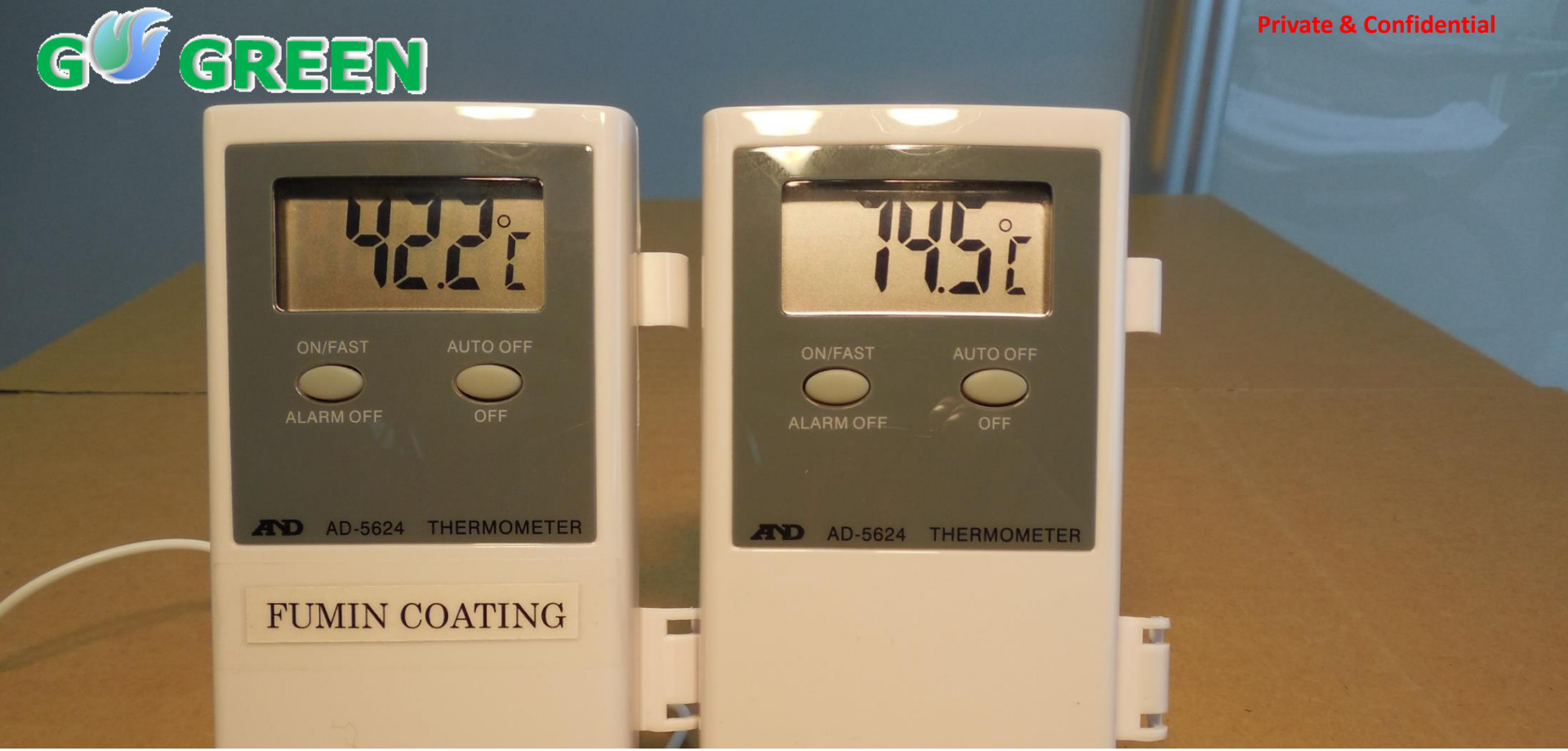
Double glazed glass: FL3mm+A12mm+FL3mm

FUMIN COATING（left）	No Coating (right)
SC 0.88	SC 0.86
U-value 2.9W/㎡.k	U-value 2.9W/㎡.k

VLT 80%	VLT 82%

FUMIN COATING, the world's most advanced nanotechnology with its 2μm thick, its performance is not possible to measure by thin-film thermal conductivity meter. It is possible to measure if the thickness of temperature sensitive paint is more than 50μm. Therefore, we compare with those already measured.

GREEN



375W infrared light irradiation for 1 minute

Double glazed glass retains the heat in the room, but the heat of the sunlight does not stop.

GREEN

8mm glass

FUMIN COATING（left half）

Shading Coefficient 0.88

U-Value 6.0W/㎡.k

Visible ray transmittance 84.7%

Solar reflectance 6.7%

Thickness 2μm

Window film (right half)

Shading Coefficient 0.57

U-value 5.9W/㎡.k

Visible ray transmittance 3%

Solar reflectance 7%

Thickness 46μm

After 375W infrared light irradiation for 1 minute, the both sensors on metal plates detected almost the same temperature.

SC of film is 0.57

Saving Energy calculation

（0.9－0.57）÷0.9x100＝37% of energy saved.

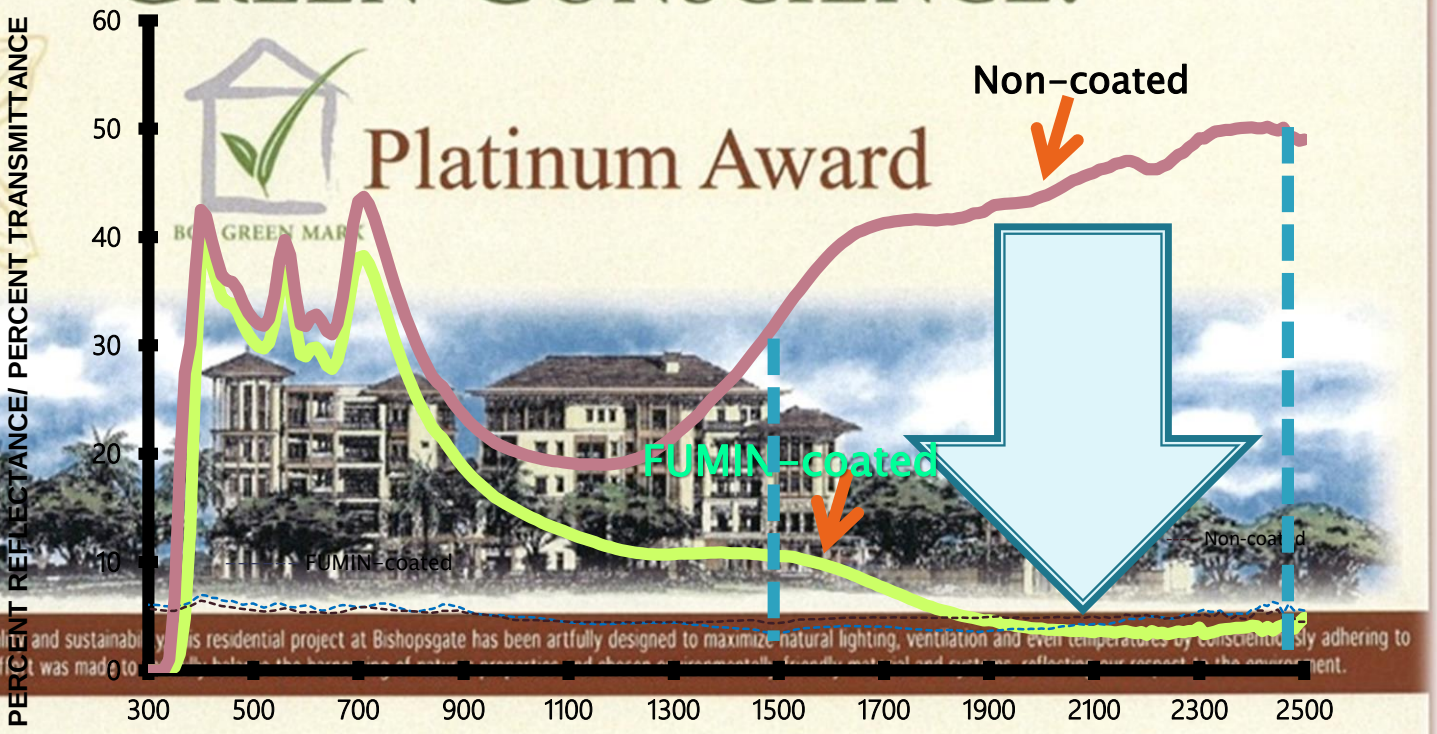
GREEN

DEVELOPING WITH A GREEN CONSCIENCE.

PSB Singapore

Choose certainty. Add value.

Platinum Award



Working with the principle of quality and sustainability, this residential project at Bishopsgate has been artfully designed to maximize natural lighting, ventilation and even temperatures by consciously adhering to passive design principles. Much effort was made to ... the environment.

CONGRATULATIONS FROM ALL OF US

BSD building system & diagnostics

Davis Langdon & Seah

Surbana

KAJIMA DEVELOPMENT

FUMINN

B/S/H/

TOTO

KHL MARKETING ASIA-PACIFIC

Golden Rock General Contractor Pte Ltd

KAJIMA OVERSEAS ASIA PTE LTD
Property Development Group
80 Marine Parade Road, #19-01 Parkway Parade,
Singapore 449269
Tel: 6340 3176 Fax: 6348 7653
www.kajima.com.sg

VIRACON
"The Leader in Glass Fabrication"™

VIRACON
800 PARK DRIVE
P.O. BOX 990
OWATONNA, MN 55060
507-451-9555

VIRACON

11/7/2006

Solar Optical Properties and Thermal Characteristics****

MONOLITHIC PERFORMANCE DATA

Make-up: 5/16" (8mm) Gray

Transmittance

Visible Light:	33%
Solar Energy:	31%
Ultra-Violet:	14%

UltraViolet defined as 300 to 380 nanometers(nm)

Reflectance

Visible Light-Exterior:	5%
Visible Light-Interior:	5%
Solar Energy:	5%

U-Value

NFRC Winter Conditions:	5.74 W / (M2 x °K)
NFRC Summer Conditions:	5.17 W / (M2 x °K)
Shading Coefficient:	0.59
Solar Factor (SHGC):	0.51

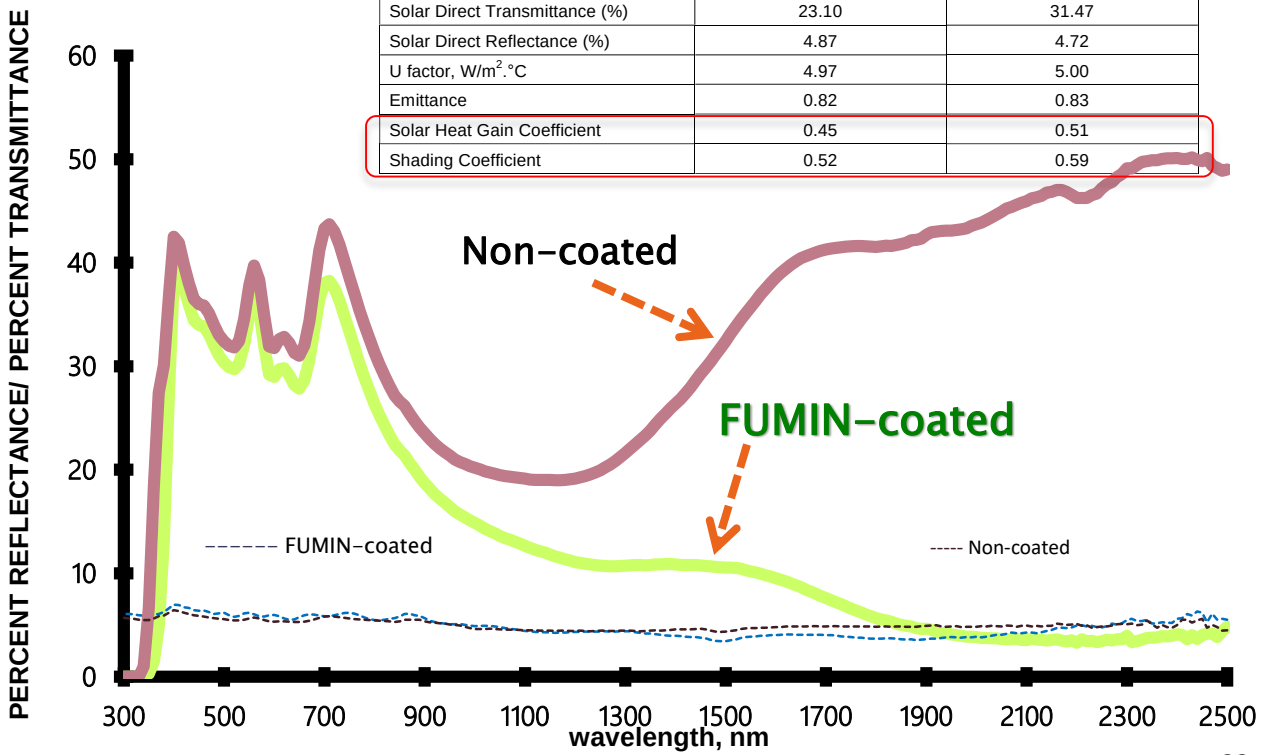
TUV SUD PSB

PSB Singapore
Choose certainty. Add value.

Date	:	16 Dec 2009	Ref	:	-
To	:	Ms Junko Fukuda	From	:	Eddie Suwand
Organization	:	Fuminn Pte Ltd	Dept	:	MEC
Fax	:	68626776	Fax	:	67793903
Tel	:	68621558	DID	:	68851429
No. of Pages	:	1			

Re: Optical Characterizations

Solar Optical Properties	8mm Grey Monolithic AN Coated	8mm Grey Monolithic AN Non-Coated
Visible Light Transmittance (%)	31.91	34.54
Visible Light Reflectance (%)		
a. Label side	5.26	4.87
b. Other side	5.41	5.40
Solar Direct Transmittance (%)	23.10	31.47
Solar Direct Reflectance (%)	4.87	4.72
U factor, W/m^2.°C	4.97	5.00
Emittance	0.82	0.83
Solar Heat Gain Coefficient	0.45	0.51
Shading Coefficient	0.52	0.59



KuaLa Lumpur: Climate change will continue to be a priority agenda for Malaysia despite the global financial crisis, said Prime Minister Datuk Seri Najib Tun Razak. (The Star)

IGEM 2010 in KLCC, Malaysia - October 2010

Japanese Government Supports

Mr. Yukio Edano,
Minister of Economy, Trade & Industry

FUMIN COATING™ Was selected for the Environmental Technology Verification pilot program by Ministry of Environment in Japan to mitigate Heat Island Effects in 2007

Japan Environmental Technology Verification
ETV Ministry of the Environment
http://www.env.go.jp/policy/etv/

Green Innovations from Japan

JETRO Exhibitor Profiles

APEC JAPAN 2010
7-14 November

APEC Yokohama, JAPAN in 2010

Water treatment

Energy efficiency

Environment

株式会社 フミン

- Address : 21 Gounomeazakami, Fukushima-shi, Fukushima, 960-8161, Japan
- Tel : +81-24-544-0223
- Fax : +81-24-545-0620
- URL : http://www.fumin.jp
- E-mail : k-yagisawa@fumin.jp
- Contact : Mr. Katsuo YAGISAWA

The Ultimate Solar Control Coating Technology FUMIN COATING.
A coating fluid comprising of an ultraviolet-screening agent and an infrared-screening agent is applied onto a glass surface with a spray gun.
Energy Saving & Environmentally Friendly Technology.
The coating will air dry to form a thin-film containing an ultraviolet-screening agent and an infrared-screening agent on the surface of the glass.

究極の省エネルギー
収・カットする伝導
る特許技術です。地
品です。暑い夏場は
昇を抑えます。また
いう優れた特性を

Energy efficiency

25

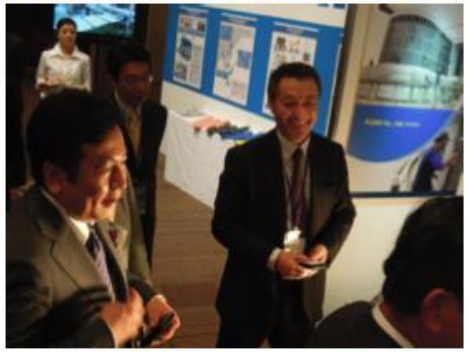
COP17
South Africa
in Dec 2011

the official website of the
Association of Southeast Asian Nations
one vision, one identity, one community

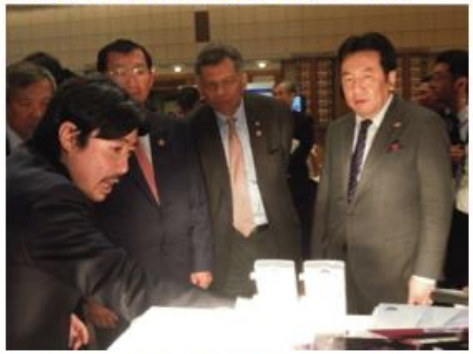
Introduction of FUMIN COATING™ in ASEAN ROAD SHOW 2012

Tokyo, 28 April 2012

ASEAN Ministers visited our booth in the Imperial Hotel in Tokyo on 28 April 2012, Saturday.



Mr. Yukio Edano, the Minister of Economy, Trade and Industry Japan



Dr Surin Pitsuwan from Thailand, Secretary-General of ASEAN

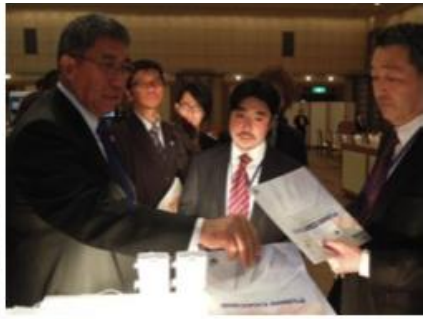
Mr. Cham Prasidh, Minister of Commerce, Cambodia

Mr. Yukio Edano, Minister of Economy, Trade and Industry Japan

Dato' Mukhriz bin Tun Dr. Mahathir, Deputy Minister, Ministry of International Trade and Industry, Malaysia

Economic ministers and senior officials from ASEAN Member States and the Secretary-General of ASEAN also participated in this Roadshow.

Mr. Nguyen Cam Too, Deputy Minister of Commerce and Industry, Vietnam



Dr. Bayu Krisnamurthi, Deputy Trade Minister, Indonesia

Jan. 2013 Big businessmen in Saudi Arabia

GO GREEN

Racing Car
Material: Polycarbonate

GREEN

Helmet Surface temperature lowered by 5℃.

Fig. 1 Temperature Difference (Normal – FUMIN COATING™)