

## The European Union's programme for India

**Clean Energy Cooperation with India (CECI): Legal and policy support to the development and implementation of energy efficiency legislation for the building sector in India (TA-ECBC)**

**Webinar**  
8<sup>th</sup> April 2019

*Building Glass Industry: regulatory and markets developments dynamics in Europe and beyond*



This project is funded by  
The European Union



Project implemented by **EXERGIA S.A.**  
member of **SACO Consortium**, in  
collaboration with **PwC India**

# JOINING YOU TODAY FROM SAINT-GOBAIN



Emmanuel  
VALENTIN

Speaker



Céline  
CARRE

Speaker



Hélène  
LOHR



Soumya  
HARIDAS

Speaker



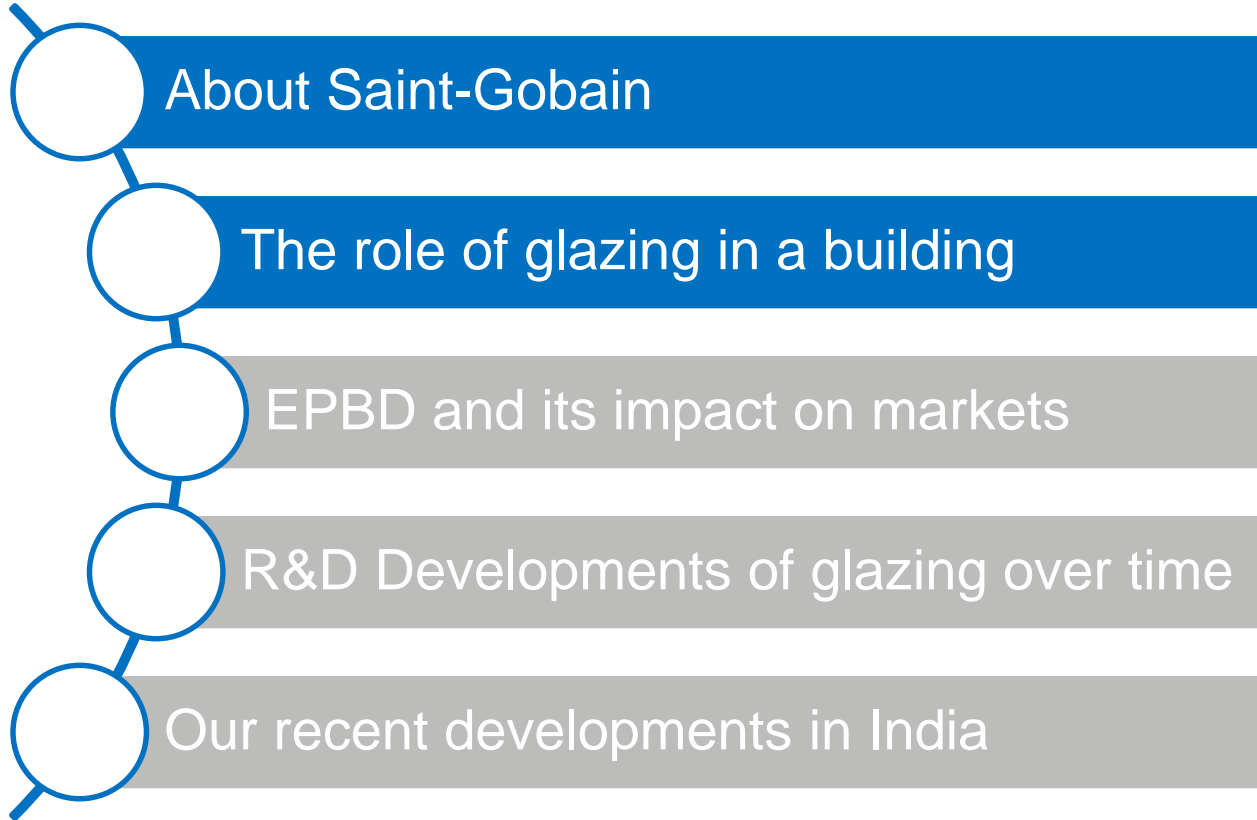
Venugopal  
RAVI



# OVERVIEW



# OVERVIEW



## ABOUT SAINT-GOBAIN

2016 net sales

**€39.1** BN

Present in

**67** countries

More than **80%** of sales  
are made in the habitat markets:  
construction, renovation,  
infrastructures and civil  
engineering

**CONSTRUCTION**



Created more than  
**350** years ago

More than **170,000** employees  
and **100+** nationalities  
represented

Around **4,100**  
sales outlets

One of the top **100** industrial  
groups in the world with around  
**950** production sites



# SAINT-GOBAIN OUR BRAND PROMISE

AT SAINT-GOBAIN, WE HELP TO CREATE  
GREAT LIVING PLACES AND IMPROVE DAILY LIFE  
BY COMBINING

COMFORT



WHICH ANSWERS TODAY'S  
INDIVIDUAL  
NEEDS

&

SUSTAINABILITY



WHICH ADDRESSES TOMORROW'S  
COLLECTIVE  
CHALLENGES

TO ENHANCE THE WELLBEING OF PEOPLE EVERYWHERE



# THE ROLE OF GLAZING IN A BUILDING

Physical principles & The 3 main characteristics of a glazing



## + THE ABILITY TO INSULATE

- + Heat loss coefficient
- +  $U_g \text{ W/m}^2 \cdot \text{K}$



## + THE ABILITY TO LET THE DAYLIGHT SHINE IN

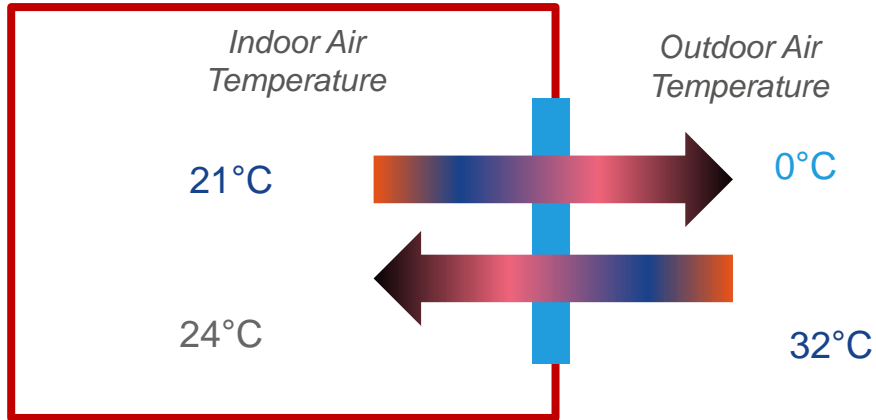
- + Light transmittance
- + TL %



## + THE ABILITY TO MANAGE SUN ENERGY (Protect or Catch free solar gain)

- + Solar Factor
- + g

# PHYSICAL PRINCIPLE : GLASS INSULATION – PROTECT AGAINST COLD OR HOT TEMPERATURE ENVIRONMENT



## ABILITY TO INSULATE

Between to ambience with a difference of temperature

Heat loss coefficient  
 $U_g \text{ W/m}^2 \cdot \text{K}$

The lower the  $U_g$  is, the more insulated capacity





# GLASS INSULATION

$$U_g = 5.8 \text{ W/m}^2\text{K}$$

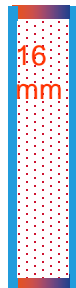


4mm

Single glass

Thermal conduction  
Management

$$2,6 \text{ W/m}^2\text{K}$$



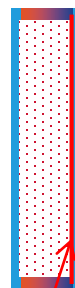
4 mm 4 mm

Gas cavity  
Mixte Air + Argon

Double Glazing Unit

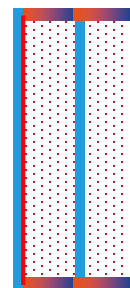
Radiative  
Management

$$1,1 - 1,0 \text{ W/m}^2\text{K}$$



Low e coating

$$0,7 - 0,5 \text{ W/m}^2\text{K}$$



2 cavities + 2 low e coatings

Triple glazing unit

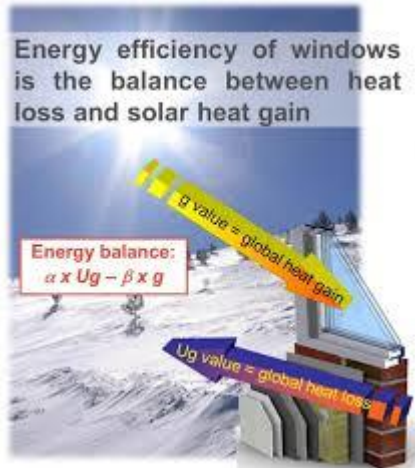
BETWEEN A SINGLE GLASS AND A DOUBLE GLAZING UNIT THE POWER OF INSULATION IS MULTIPLY BY 5  
(10 FOR TRIPLE GLAZING UNIT)

# LET THE SUN SHINE IN

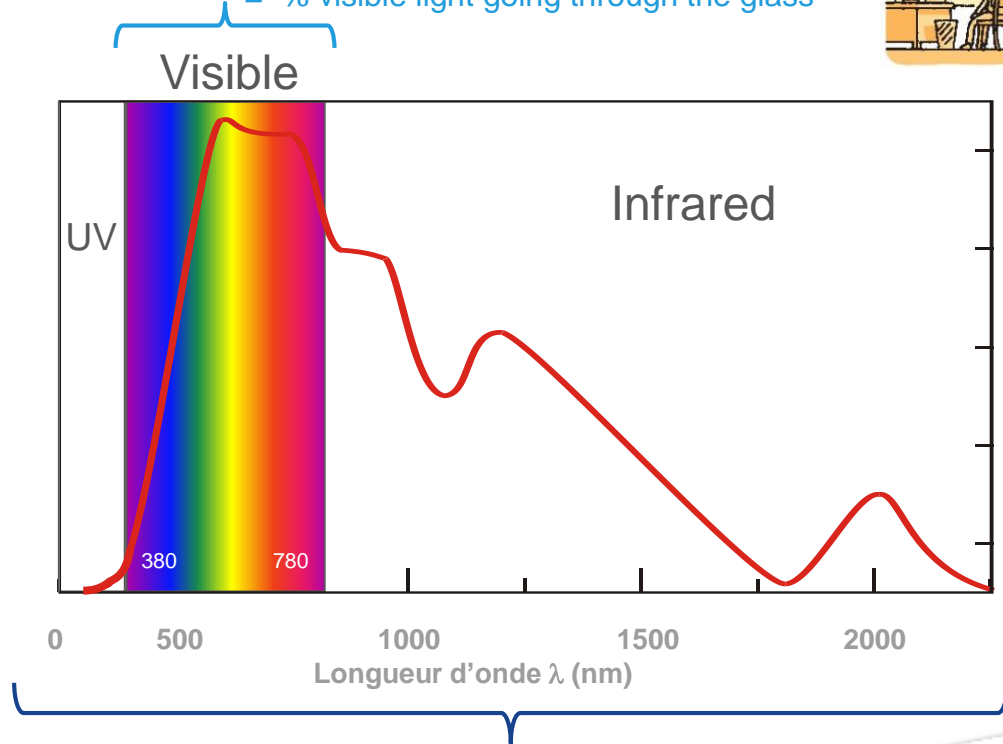
The SUN = SOURCE OF LIGHT



AND FREE ENERGY



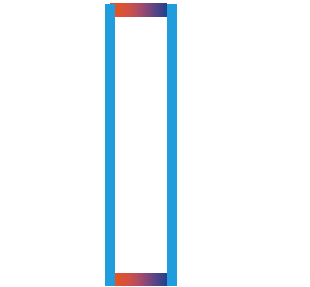
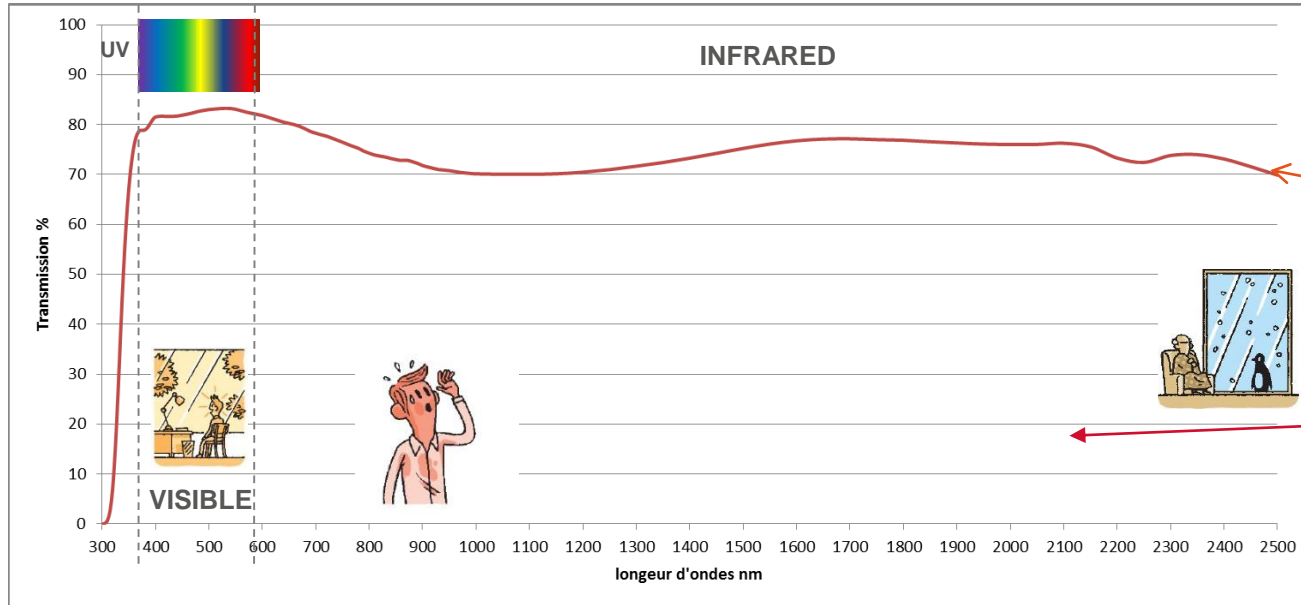
Light transmission TL  
= % visible light going through the glass



Solar factor  $g$  = ability to transmit solar energy



# LET THE SUN SHINE IN



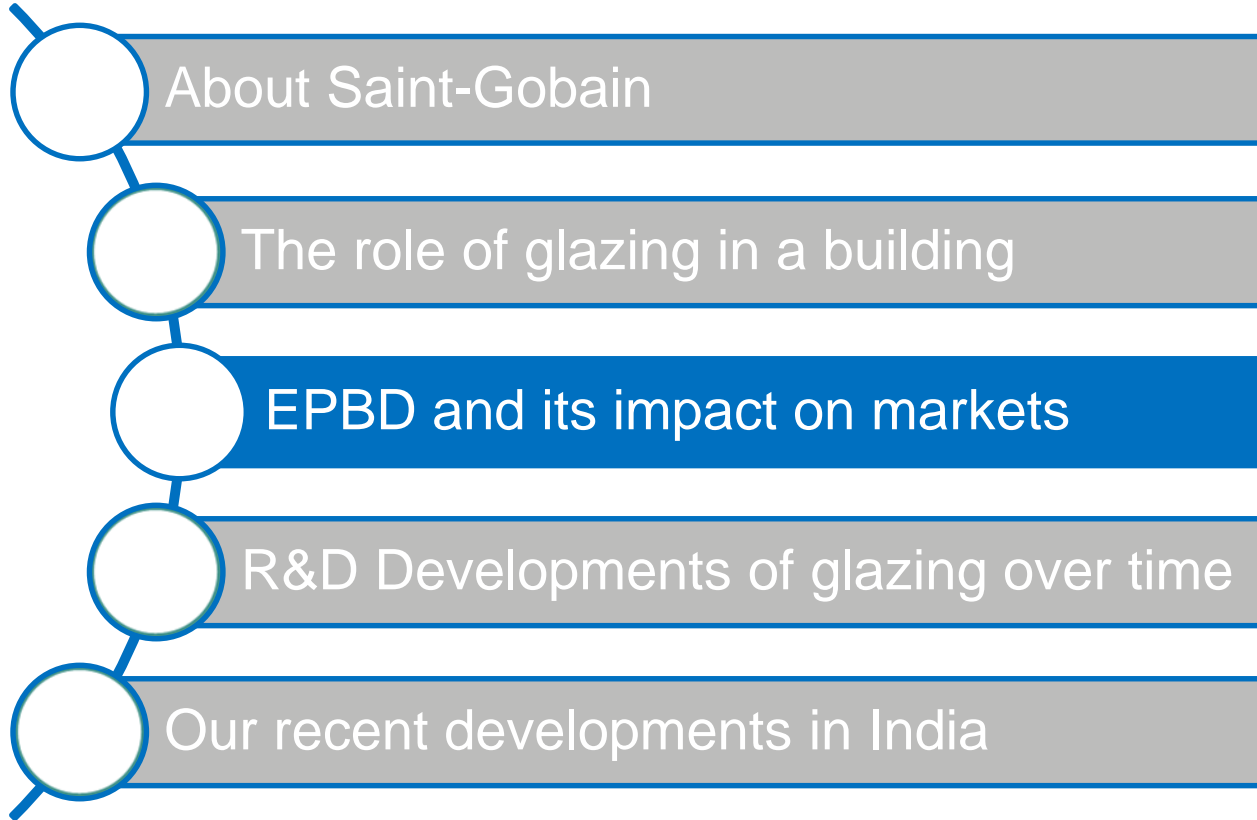
DOUBLE GLAZING WITHOUT COATING



COATED GLASS

THANKS TO COATINGS TECHNOLOGY A DOUBLE GLASS UNIT COULD BALANCE, MORE OR LESS, THE DAYLIGHT AND THE SUN ENERGY GOING THROUGH ITSELF

# OVERVIEW

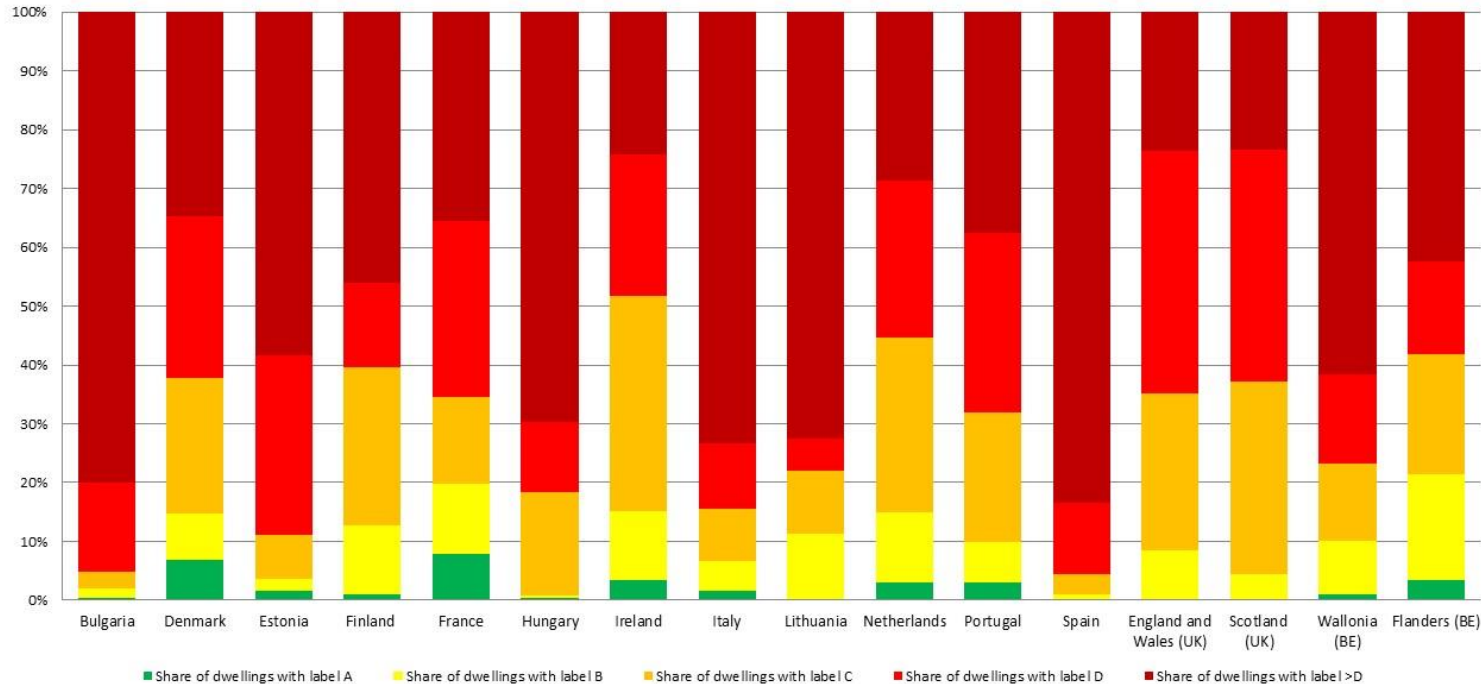


# EUROPEAN BUILDING STOCK STATUS (1/2)

## 97% OF THE EUROPEAN BUILDING NEED TO BE RENOVATED

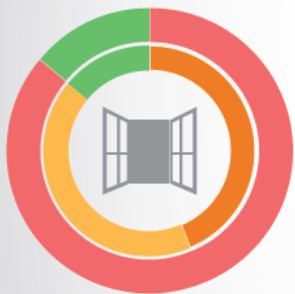


### Distribution of EU Building Stock according to EPC Rating



# EUROPEAN BUILDING STOCK STATUS (2/2)

## A BIG WINDOW TO IMPROVE EFFICIENCY



86%

of glazed areas in Europe's buildings are **inefficient**<sup>3</sup>:

44% single glazed    42% outdated double glazing

100 million tonnes of CO<sub>2</sub> could be saved annually thanks to energy efficient windows<sup>4</sup>



Today, while evaluating the energy performance of windows:

👍 **2 countries** apply the **energy balance**<sup>4</sup> concept factoring both heat losses and heat gains

👎 **8 countries** consider **passive heat gains**<sup>4</sup>

👎 **20 countries** do not properly assess the energy performance of windows, focusing only on heat losses.<sup>4</sup>

1 Billion of new windows are expected to be sold by 2030<sup>4</sup>

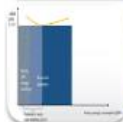
Source: GLASS FOR EUROPE





To be transposed by 9 July 2012

## Energy Performance of Buildings Directive



### Energy performance & Cost optimality

- MSs: Minimum energy performance requirements
- Cost-optimal methodology (common framework)
- Requirements for technical building systems

Cost-optimality



### Existing Buildings

- All the buildings undergo major renovation should implement energy efficiency measures
- Minimum requirements for buildings and components

Minimum Energy Performance Requirements



### New Buildings

→ Nearly Zero Energy Buildings

- By 31 Dec. 2018 public admin. Bdgs
- By 31 Dec. 2020 all buildings
- National plans for nZEB

Near Zero Energy Buildings



### Energy performance certification

- Implement EPC schemes
- Recommendation for cost-optimal improvements
- Independent control systems

Energy Performance Certificates



### HVAC inspection

- Regular inspections (heating > 20kW, AC>12kW)
- Independent control systems



### Financial incentives & Market barriers

- MSs: to prepare lists of measures and instruments
- Take into account cost-optim. for these measures





ORIGINALLY SUPPOSED TO HELP THE EU  
ACHIEVING A ~~40%~~ GHG REDUCION BY 2030...

> 45%

EPBD

Energy Performance of Buildings



MAKING BUILDINGS  
MORE ENERGY EFFICIENT

EED

Energy Efficiency



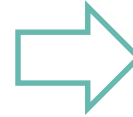
EU HAS A NEW ENERGY EFFICIENCY TARGET  
OF 32.5% FOR 2030  
#CleanEnergyEU  
#EnergyEfficiency

RED

Renewable Energy



32%  
RENEWABLE ENERGY TARGET  
FOR 2030  
#CleanEnergyEU



« We have  
now given the  
Member  
States the  
TOOLBOX to  
make their  
houses more  
energy  
efficient »

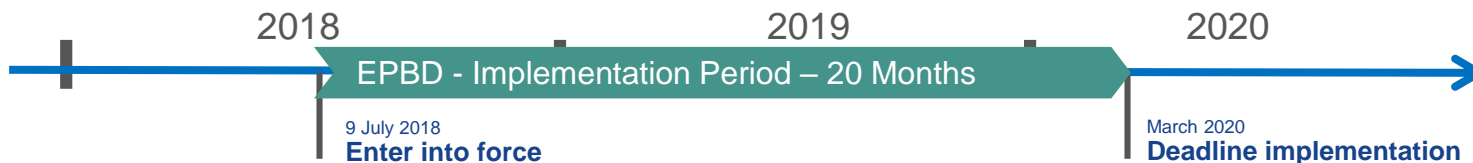
Bendt  
Bendsten,  
European  
Parliament  
EPBD  
Rapporteur





# EPBD 2018 TOOLBOX

## ENERGY PERFORMANCE OF BUILDINGS DIRECTIVE



- ✓ Long term Renovation Strategies => 2050
- ✓ Multiple Benefits
- ✓ Calculation methods & energy balance
- ✓ Building Renovation Passports
- ✓ New requirements to boost TBS/BACs potential
- ✓ Smart Readiness Indicator



# EPBD 2018 – WHAT'S IN IT FOR US ? (1/3)



## LONG TERM RENOVATION STRATEGIES (LTRS)



- ✓ **Objective 2050 : decarbonized building stock**
- ✓ Facilitate transformation of all buildings into nZEB
- ✓ More impactful Renovation Strategies
  - Milestones 2020, 2030, 2040
  - Measurable Indicators
  - Trigger Points
- ✓ Building Renovation Passports
- ✓ Structured stakeholder consultation

- ✓ Take part in consultation
- ✓ Ensure adequate role of envelope & glazing
- ✓ Keep focus on Energy Efficiency First
- ✓ Avoiding trade-offs with renewables



# EPBD 2018 – WHAT'S IN IT FOR US ? (2/3)

## MULTIPLE BENEFITS OF ENERGY EFFICIENT BUILDINGS



### ✓ LTRS should include estimates of expected energy savings and wider benefits:

- Health & well-being
- Air Quality
- Jobs
- Productivity
- Energy Security

*Fostering the Better understanding of the multiple benefits*



- ✓ Ensure recognition of **EE benefits**
- ✓ Ensure that **benefits of glazing** are considered : insulation, free solar gains, daylight autonomy; outside view
- ✓ Support **specific requirements for minimum glazed surface** requirements in new built / major renovation

# EPBD 2018 – WHAT'S IN IT FOR US ? (3/3)

## PERFORMANCE REQUIREMENTS AND ENERGY BALANCE



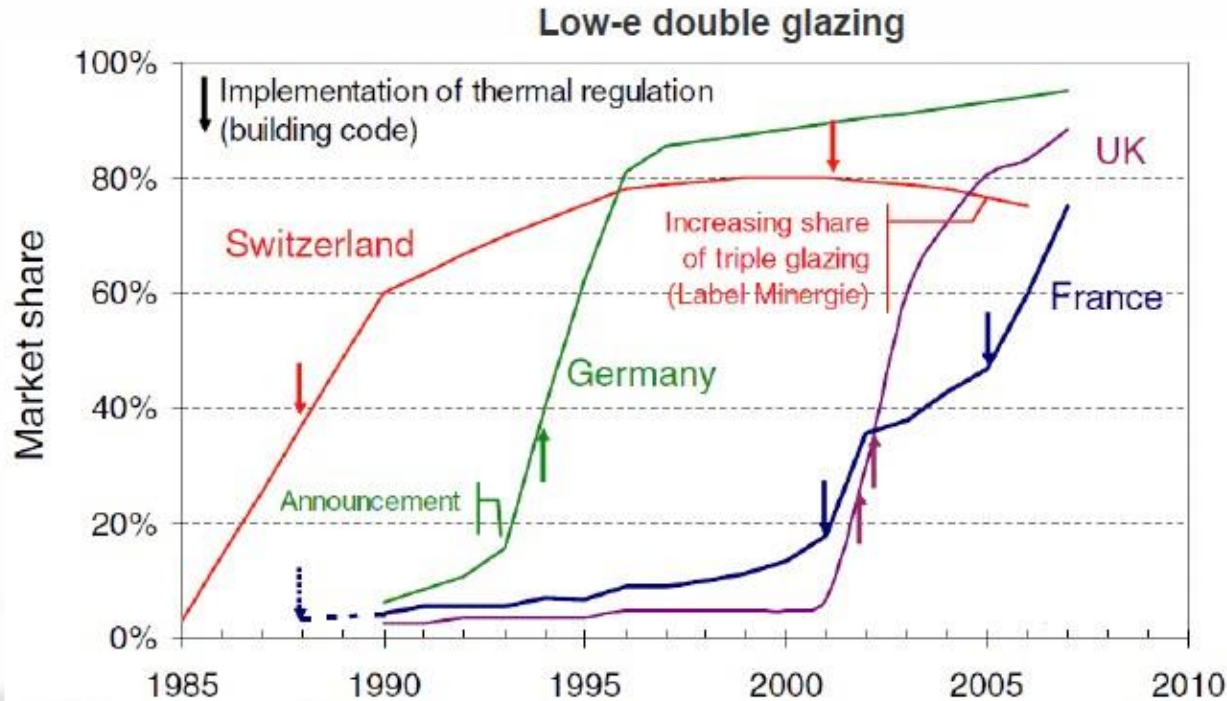
- ✓ In most EU countries minimum requirements remain based on the U-value ( $U_w / U_g$ ) and g-value separately.
- ✓ Opportunity to ensure calculation methodologies and subsequent minimum performance requirements for windows are based on energy balance

- ✓ **Minimum energy performance requirements** to apply to all windows (new built, major renovation, single window replacement)
- ✓ Assess energy performance of windows **using the energy balance**
- ✓ Energy balance based on window performance



Only 2 countries apply energy balance concept (Source : Glass for Europe)

## Double Glazing units with low e coating : Adoption in EU with Thermal Regulation implementation

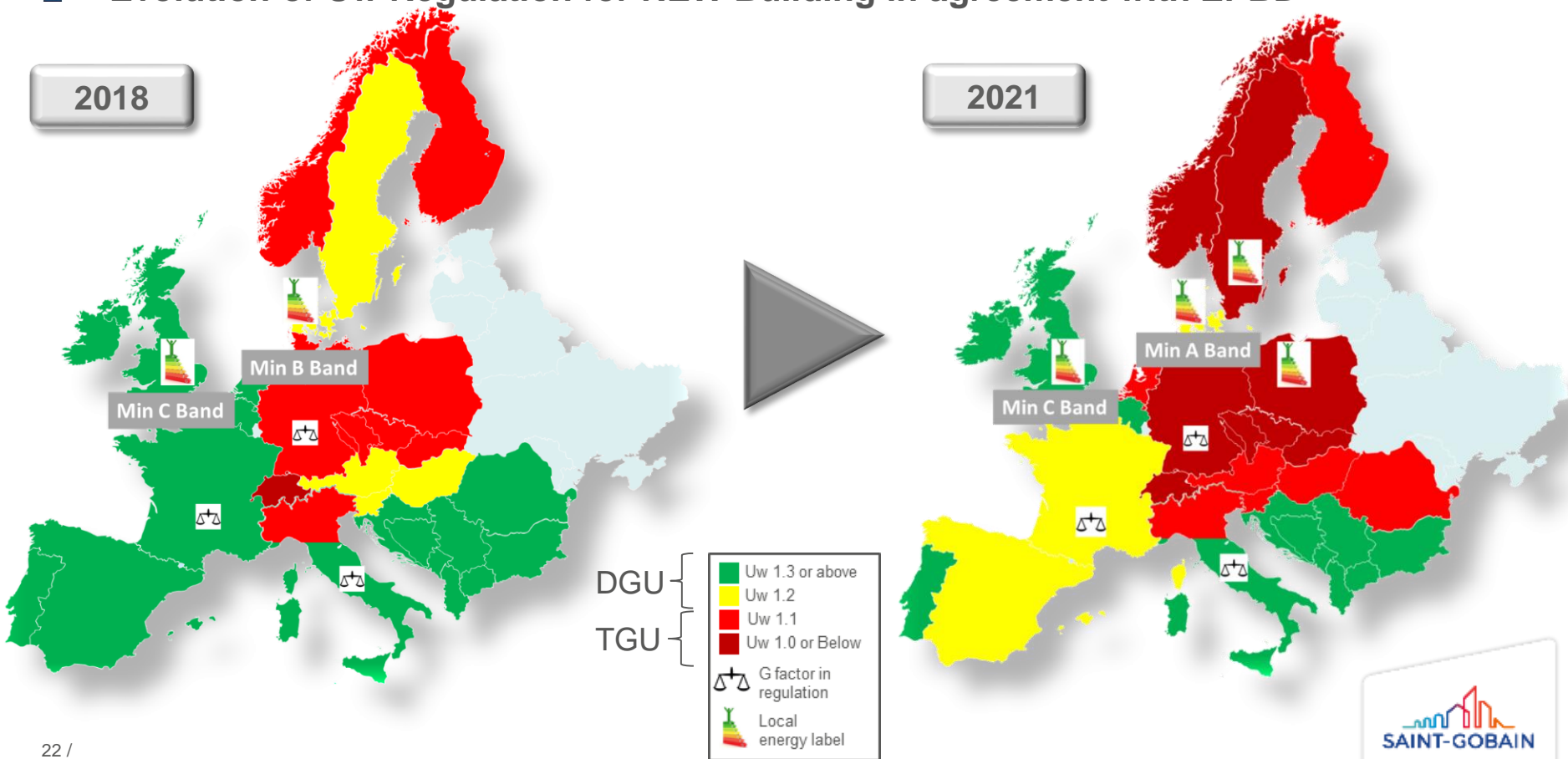
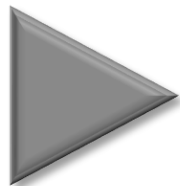


# IMPACT OF REGULATION ON WINDOWS IN EU : EPBD 2010 - 2020

## Evolution of Uw Regulation for NEW Building in agreement with EPBD

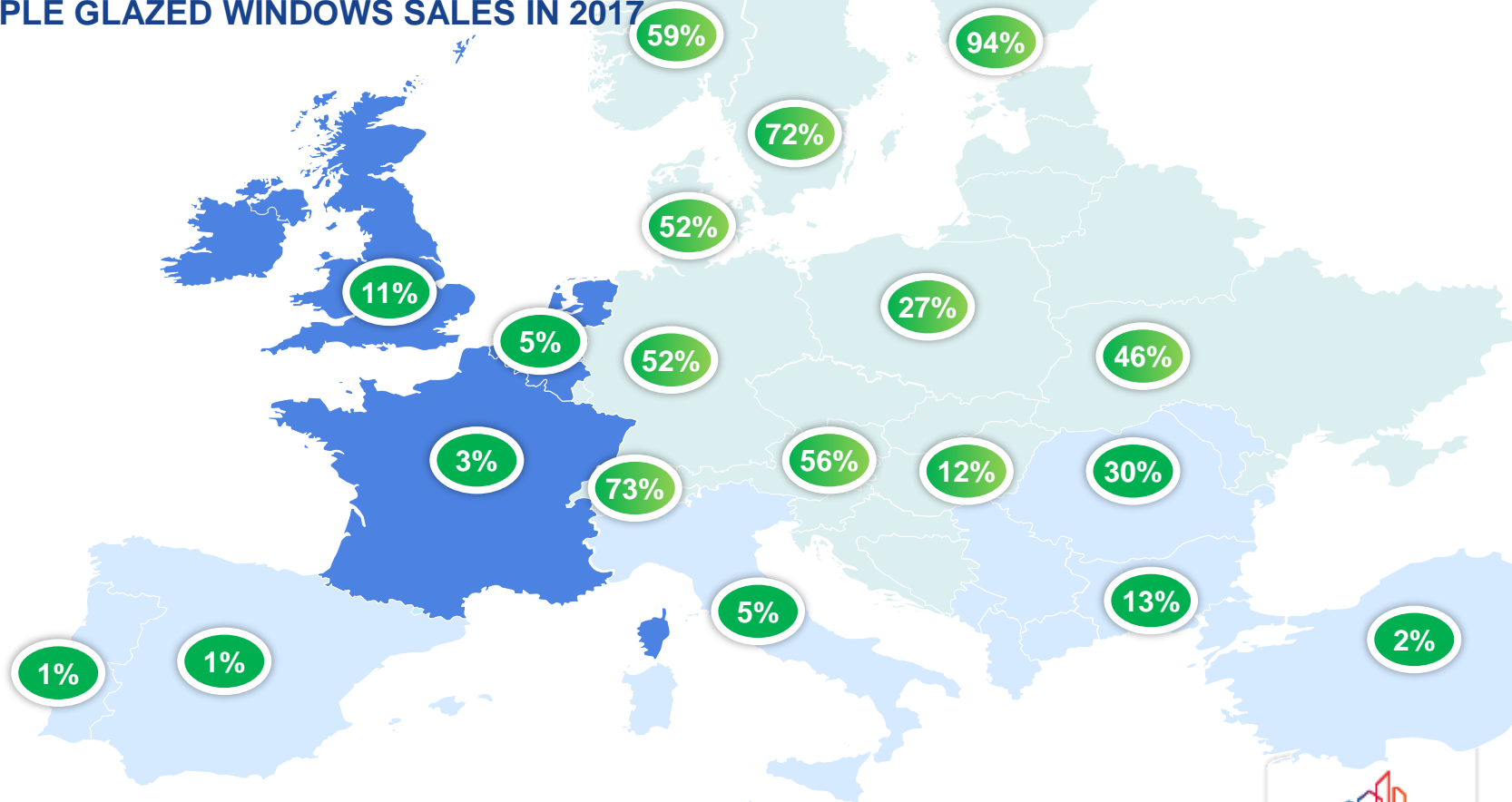
2018

2021



# IMPACT OF REGULATION ON WINDOWS IN EU : EPBD 2010 - 2020

## TRIPLE GLAZED WINDOWS SALES IN 2017



*Source: Interconnection window market study 2017 + CAB 2018 + Batiétude 2017 + Palmer 2017*

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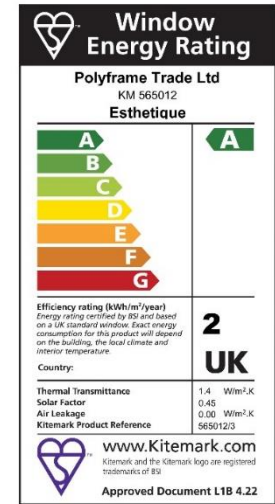
# UK – WINDOW ENERGY RATING SYSTEM

## Label content:

- Consumer-friendly traffic-light style A-E ratings guide similar to that used on 'white' goods (such as fridges, freezers, washing machines etc...).

## Principles:

- Comparison of window performance under identical conditions
- Standard window size
- General orientations of windows in UK homes
- ONE zone in UK
- Does not provide an absolute measure of the energy performance



$$\text{ENERGY INDEX} = 218.6 \text{ GW} - 68.5 (\text{Uw} + \text{L50})$$

**E index** : Energy saved or lost by the windows      **gw** : Solar factor of the window (Glass fraction \* Glass solar factor)      **Uw** : U value of the window calculated by certified simulators (EN10077-2)



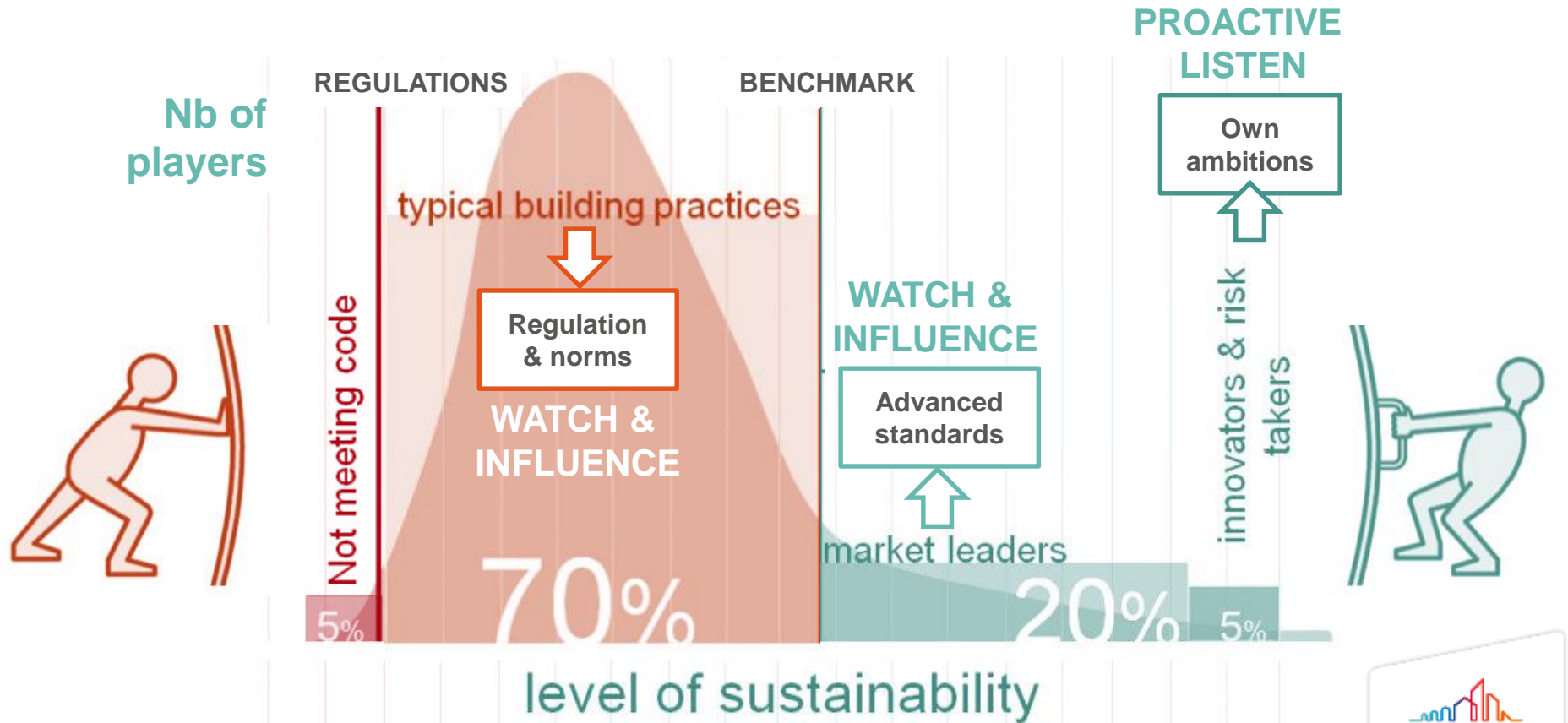
Valorisation of High g Factor (== more free Solar Gains)

Level	E index
<b>A</b>	>0
<b>B</b>	-10 TO <0
<b>C</b>	-20 to < -10
<b>D</b>	-30 to < -20
<b>E</b>	-50 to < -30
<b>F</b>	-70 to < -50
<b>G</b>	< -70

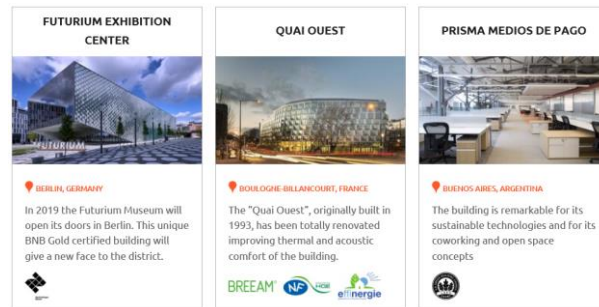
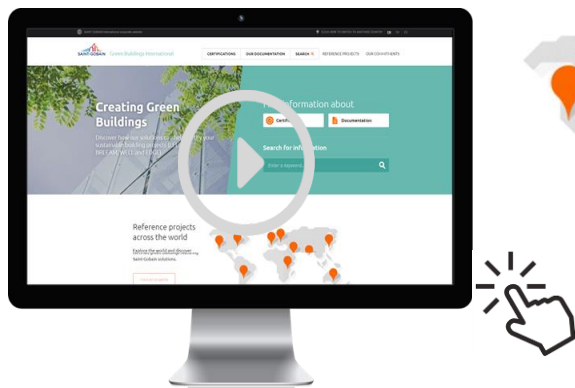




# BEYOND REGULATION... MARKETS ARE DRIVEN BY LABELS



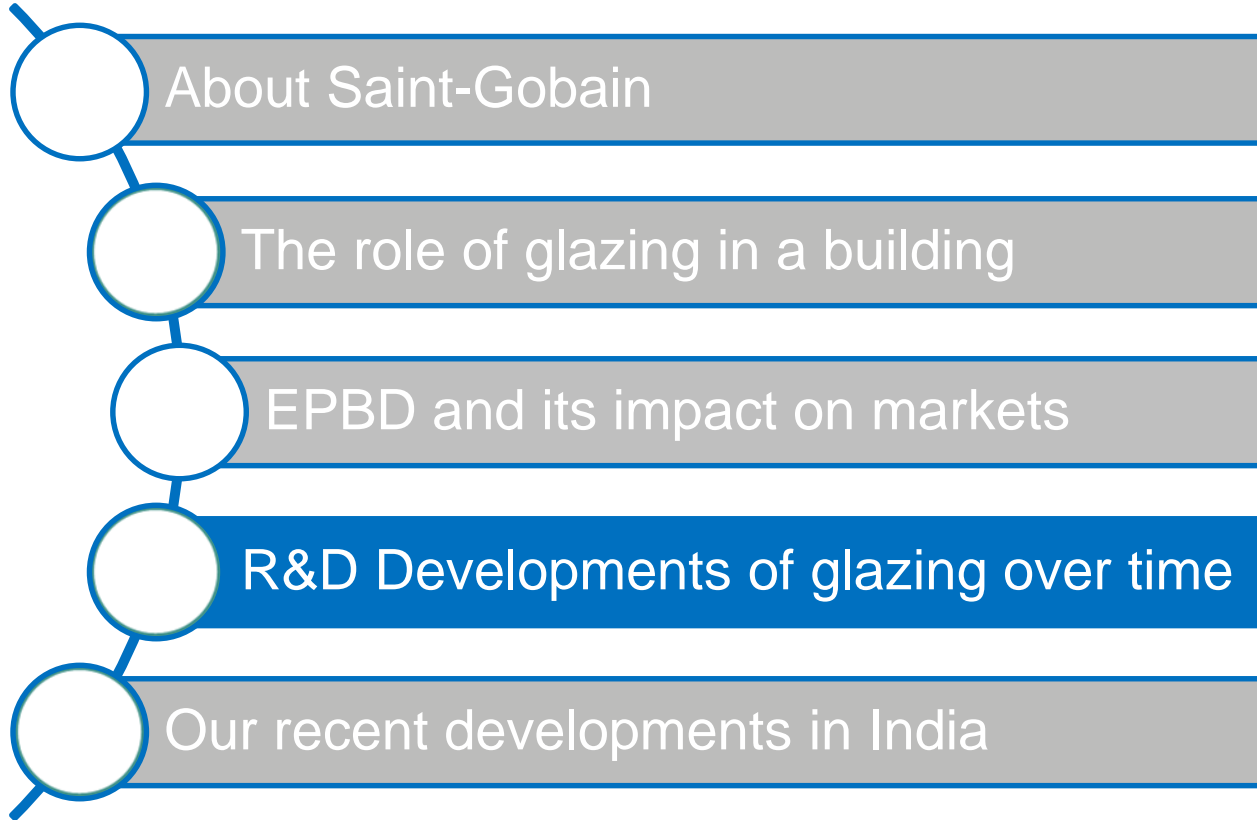
# SAINT-GOBAIN GREEN BUILDING PLATFORM



- TO PROMOTE **SAINT-GOBAIN CONTRIBUTIONS TO GREEN BUILDING CERTIFICATIONS**
- TO DOWNLOAD **REQUIRED DOCUMENTATION FOR GREEN BUILDING CERTIFICATION**
- TO **DISCOVER MAJOR CERTIFIED PROJECTS WITH SAINT-GOBAIN GLAZING**



# OVERVIEW



# GLASS & BUILDING - THE MAIN PARAMETERS WE CONSIDER TO DEVELOP ADAPTED GLASS TECHNOLOGY

**THE CLIMATE**

**THE FACADE ORIENTATION**

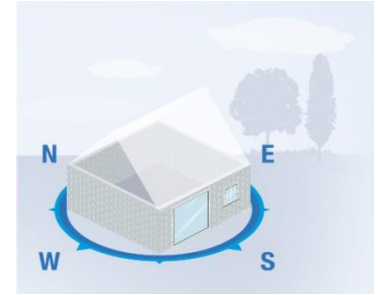
**THE PERCENTAGE OF GLASS AREA**

**THE USE OF THE BUILDING**

Home, school, offices, hospital...

**HVAC SYSTEMS**

Heating, cooling, naturally ventilated.....



# INSULATED GLAZING OFFER



Winter comfort

Winter / Summer comforts

**CLIMAPLUS  
ECLAZ**

**CLIMAPLUS  
ECLAZ ONE**

**CLIMAPLUS  
SUN**

**CLIMAPLUS  
XTREME 70/33**

**COOL-LITE ST  
BRIGHT  
SILVER**

Light TL (%)

83

80

71

70

68

Thermal Ug  
(W/m<sup>2</sup>.K)

1,1

1,0

1,0

1,0

RL = 30

Solar factor g (%)

71

60

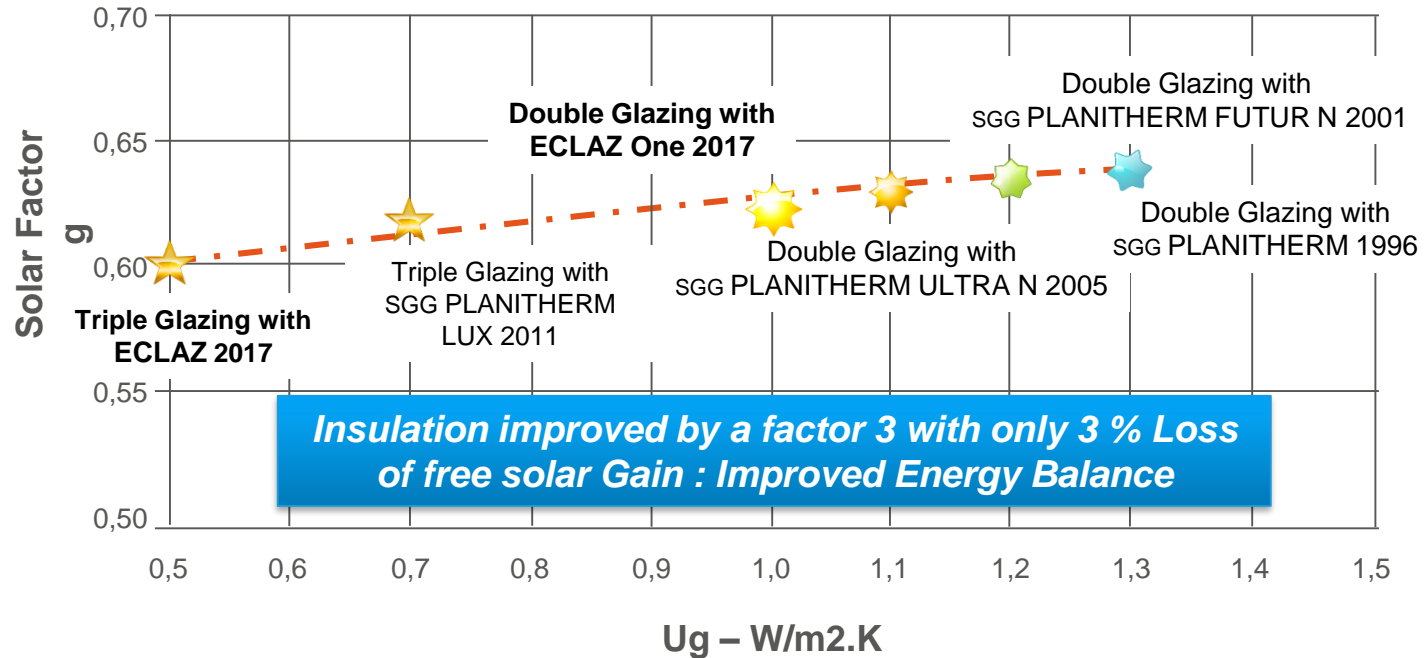
38

33

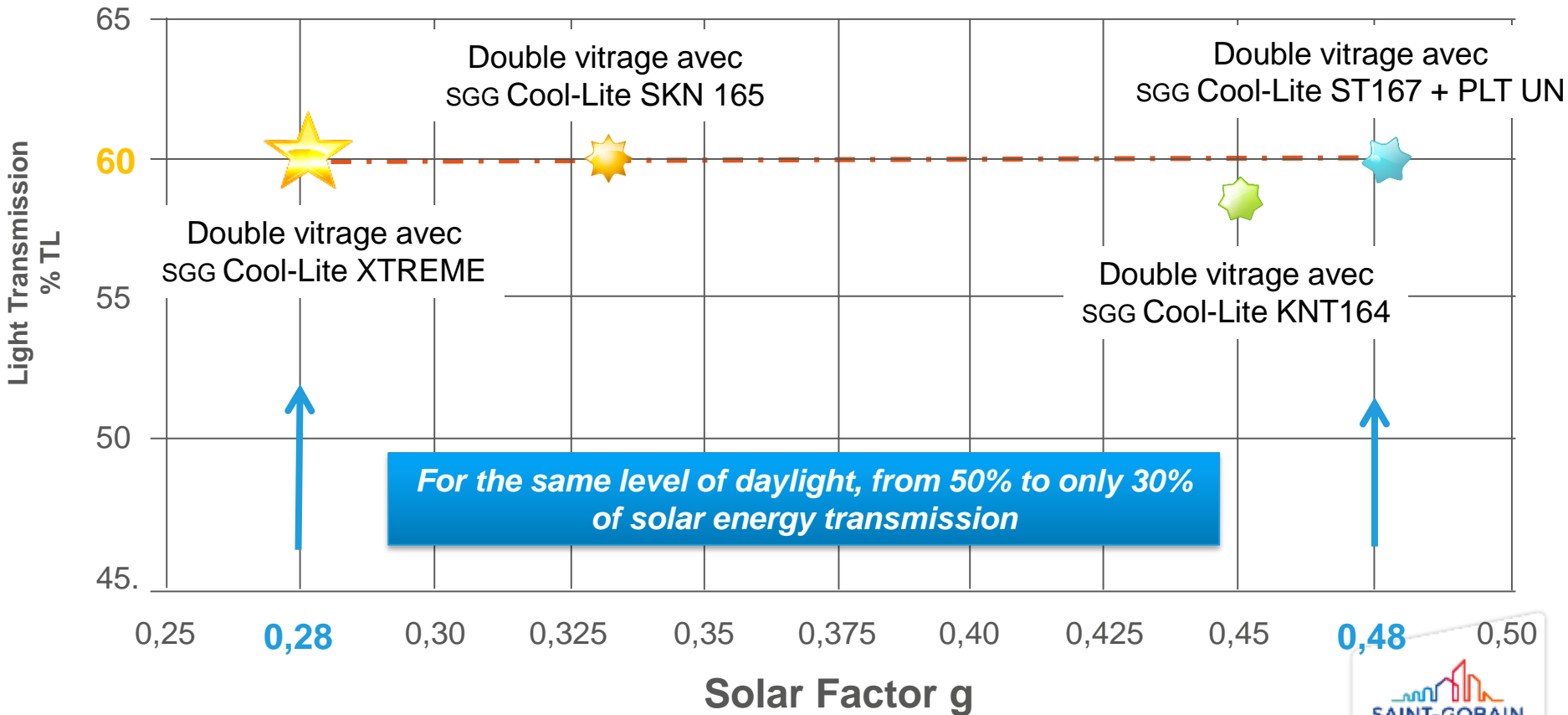
70



# GLASS TECHNOLOGY IMPROVEMENT : LOW EMISSIVITY COATINGS (RESIDENTIAL SEGMENT)



# GLASS TECHNOLOGY IMPROVEMENT : SOLAR CONTROL COATINGS (NON RESIDENTIAL SEGMENT)



*For the same level of daylight, from 50% to only 30% of solar energy transmission*

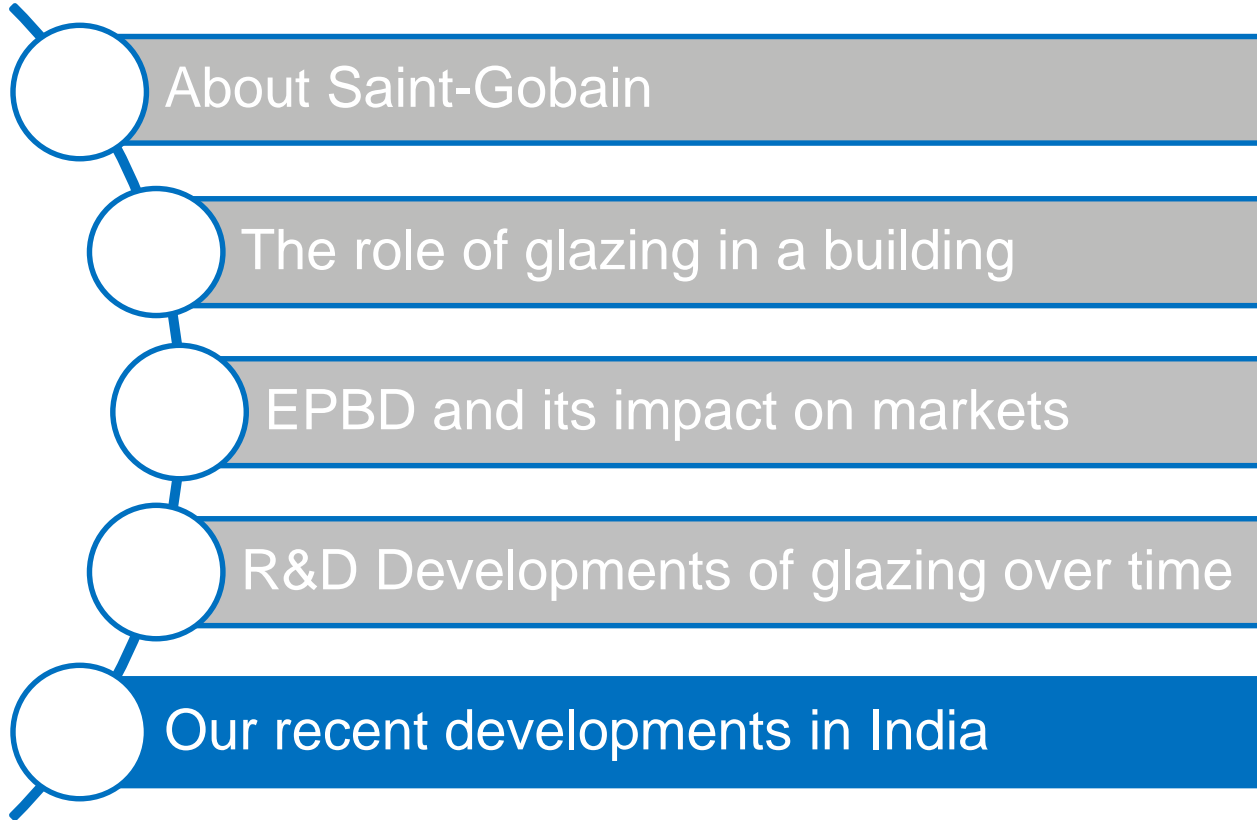


# EXAMPLES OF ECO-INNOVATED PRODUCTS





# OVERVIEW





# Glazing Industry in Building Energy Efficiency

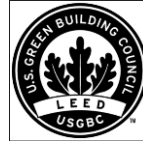
## Role and Response



# Role of Glazing Industry in Energy Efficient Buildings



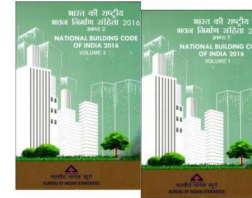
Sustainability



Energy Codes



Quality and Safety





## POLICY MAKING

- ✓ SG has been a part of Core committee members of USGBC, IGBC and TERI
- ✓ Resulted in Strong Rating Systems or Codes
- ✓ These bodies have improved their adoption through incentives from Government like improved FAR

## ADOPTION

- ✓ Earliest adopter of Environmental product Declarations, Sustainable Certifications like GreenPro and GRIHA Certification for our high performance glasses.
- ✓ Our Corporate Headquarters in Chennai and Regional office in Mumbai is LEED Gold rated space. First user of Dynamic plaque.
- ✓ Accredited employees help customers make the most informed choices for their sustainable projects

Early adoption and Effective communication of Sustainability measures has helped to set a positive trend in the industry.

# Energy Codes- Bureau of Energy Efficiency Residential building Star Labelling program



Key committee of the following programs

- ECBC
- ECBC-R
- Star Rating system of Buildings

Areas in which improved rating system will be created.

- The labelling is based on the **products used for envelope ( wall/glass/ insulation material + Electrical appliances**
- Based on the overall energy consumption , the EPI been calculated
  - **EPI – Energy performance index calculated as kwh/sq.m.yr**

**SG is pushing for strong verification system** What It means to Industry...

Some examples:

- With brick wall & less than 10% WWR, clear glass for windows the building will be at 1 star
- **To acheive 3 star with todays residential with french windows ( WWR @ .15%) it require basic solar control glass to acheive the EPI required.**

## ADVOCACY

- Reach out sessions to influencers to communicate the methods of adopting rating systems like ECBC
  - NPTEL sessions (Webinar sessions, run by the MHRD)
  - Education sessions through Glazing Society of India
  - Through educational sessions at Key Influencer accounts



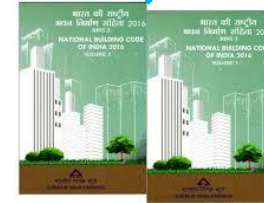
# Quality and Safety

## National Building code of India ( NBC 2016)



### Key committee member and authors of the National Building Codes

- National building code, revised in 2016
- First time, a section on **glass as Glass & glazing - Section 8 ( part 6)**
- **Part 4/part 6 – Mandatory section as per NBC**



### Some Details wrt Glass.....

- Increased use of Glass with no reference or standards lead to the new code
- Over 10 codes wrt to Glass in the list of codes and standards covering aspects of Design, safety and usage.
- Snapshot of the Use of glass in building
- Defines about **safety glass requirement in buildings**
  - Eg. Any glass above 1.5m has to be safety glass
  - **Safety glass mean tempered / laminated**



### ADVOCACY

- Reach out sessions to influencers to communicate the changes in NBC
  - NPTEL sessions (Webinar sessions, run by the MHRD)
  - Education sessions through Glazing Society of India across the country
  - Through educational sessions at Key Influencer accounts



# Quality and Safety

## Codes & Standards launched in 2017/18



- ✓ IS 14900 – Transparent Float Glass specification
- ✓ IS 16231 – Use Of Glass In Buildings (4 parts)
- ✓ IS 16945 \_ Fire Resistance Test For Glass Wall
- ✓ IS 16947 –Fire Resistance Tests For Doors With Glass Panes, Openable Glass Windows And Sliding Glass Doors
- ✓ Is 17004 –Testing Methods For Processed Glass
- ✓ IS 16978 – Glass Resistance To Forced Entry
- ✓ IS 16982 – Heat STRENGTHENED GLASS



Manufacturers  
constantly upgrading  
technology and  
investment towards  
sustainable practices

Advocacy on the  
Codes, Standards  
and Rating systems

## END USERS:

Adoption of the codes and standards are important for development of sustainable projects and environment

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## GOVERNMENT/ REGULATORY BODIES:

Important to have strong enforcement systems that can validate the process and implementation



## CONCLUDING POINTS

- ✓ Developments in the glazing industry are essentially driven by **regulations & standards**
- ✓ In the EU, EPBD **implementation & enforcement** is key
- ✓ The **energy efficiency first** principle is a top priority
- ✓ The **energy balance** should be considered for evaluating **window performance**
- ✓ **Building labelling schemes** support performance & innovation in complement to codes
- ✓ **Advocacy, training , awareness & communication** are essential for driving change



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[www.pwc.in](http://www.pwc.in)

## Project official website

<http://ace-e2.eu/>

