WHAT ARE LOW-E COATINGS?

Low-E glass can reduce energy costs by as much as 12-27%.
For a single family house, this could save $1,000/year.

How does it do that?

First let's ask,
Why do windows lose heat?

CONVECTION
Air infiltrates through gaps in the window and building envelope, and carries heat with it.

&

CONDUCTION
Heat is conducted through contact with the components that run through the width of the wall such as the jamb, sash, spacer bar, etc.,

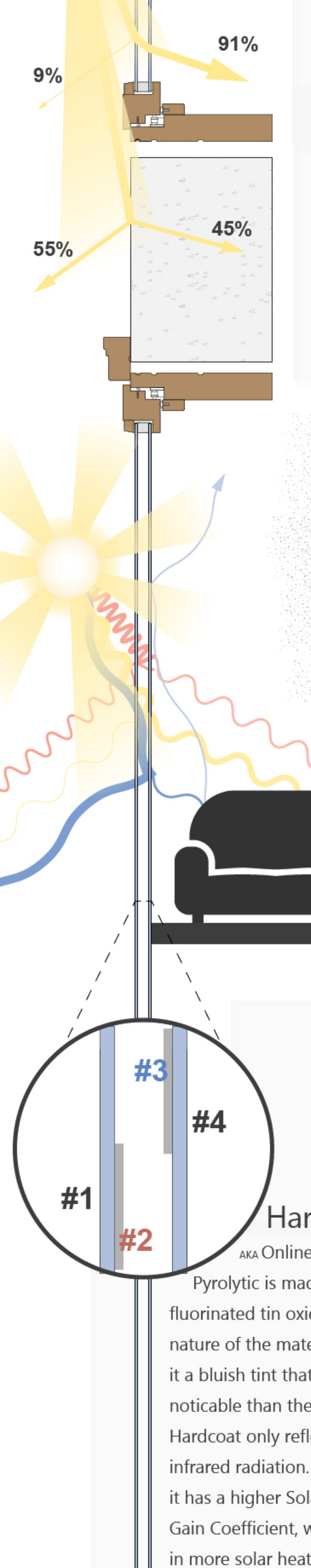
RADIATION
Heat energy is transferred through particles in the air. The sun emits radiation within the solar spectrum, which includes

ULTRAVIOLET LIGHT (UV)
The part of the spectrum with wavelengths of 300 to 380 nano-metres. This portion is responsible for fading materials like curtains and furniture.

VISIBLE LIGHT
The part of the spectrum with wavelengths of 380 to 780 nano-metres. This portion is the light that can be seen as colour.

NEAR INFRARED LIGHT
The part of the spectrum with wavelengths of 780 to 2500 nanometres. This is the portion of the spectrum that we feel as heat.

Everything reflects, transmits, and absorbs this radiation. The emissivity of an object defines how capable it is at absorbing infrared radiation and re-radiating it as far-infrared. An object with a high emissivity value will radiate more far-infrared than an object with low emissivity.



Glass has a high emissivity value compared to a concrete wall - this makes glass more susceptible to re-radiating far-infrared radiation.

The transparent nature of glass makes it capable of transmitting near-infrared, and absorbing and re-radiating far-infrared.

Because of this, glass loses radiant heat in the winter and traps radiant heat in the summer.

Low E is a tin or silver coating that is applied to one side of a pane of glass. The coating is able to reflect the infrared wavelengths responsible for heat radiation. Even though the coating is microscopic, it still takes on a solid form, which subsequently reflects some UV and visible light.

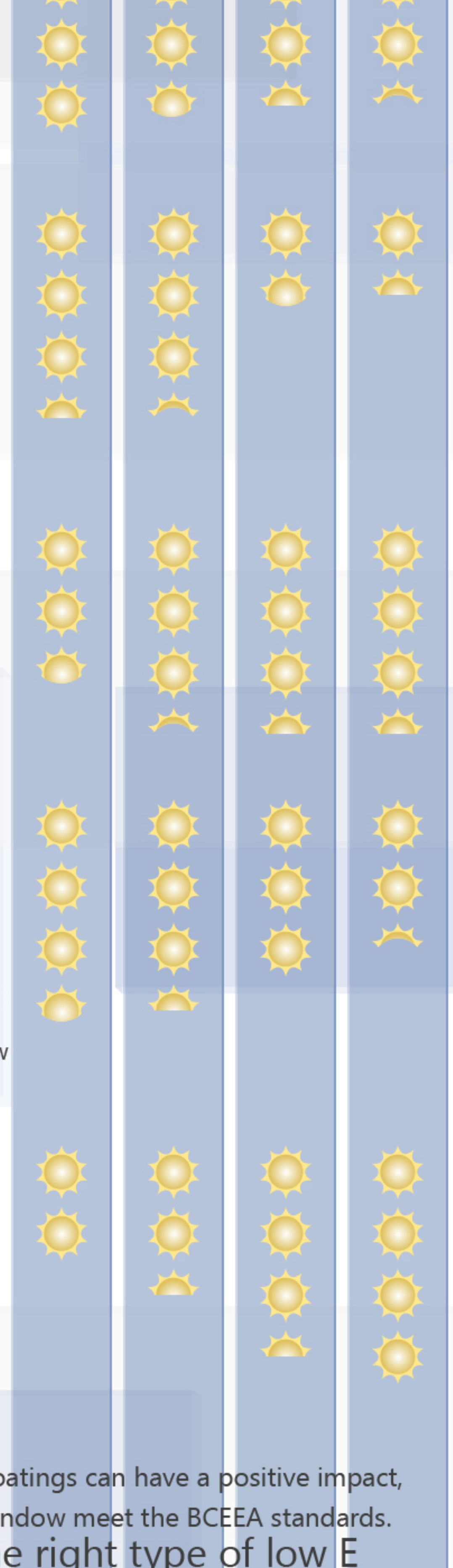
UV
Visible
Near-Infrared
Far-Infrared

The side that the low E coating is installed on can affect how the glass performs. For cold climates, it should be installed on surface #3. For warm climates, it should be installed on surface #2.

Hardcoat
AKA Online AKA Pyrolytic is made with fluorinated tin oxides. The nature of the material gives it a bluish tint that is more noticable than the softcoat. Hardcoat only reflects far-infrared radiation. As a result, it has a higher Solar Heat Gain Coefficient, which allows in more solar heat. This makes it a desirable option for passive heat gain design.

Softcoat
AKA Offline AKA Vacuum Coated AKA Sputter is made with thin silver layers. The coating is environmentally unstable unless it is in a sealed dual-paned glazing unit. The number of coatings can range from one to three allowing a Solar Heat Gain Coefficient as low as 0.04. It is able to do this because it reflects near and far infrared radiation. The coating is unnoticable unless it is placed next to glass with a different type of low E coating.

Both hardcoat and softcoat have advantages.
There are these measurements to consider...



Visible light transmission (VLT)
is the % of light that is transmitted into a building. Glass with a VLT of 0% transmits no visible light.

Solar heat gain coefficient (SHGC)
is the % of solar heat that can be transmitted or absorbed by a material. A SHGC of 0% represents an inpenetrable wall. A higher SHGC is desirable for passive heat gain design.

R-value
is the rate of heat loss through a material. This R-value was measured with an outside air temperature of -18ºC and an inside temperature of 20ºC.

Fraction of absorbed photosynthetically active radiation (FAPAR)
is the amount of light let in through glass that can drive photosynthesis. A FAPAR rating of 0% does not allow any light in for photosynthesis.

Krochmann damage weighted transmission
is the spectrum of light that is responsible for the fading of materials. A rating of 0% will cause the most damage.

It is undoubted that low E coatings can have a positive impact, which is why it can help a window meet the BCEEA standards. Although, choosing the right type of low E coating is important to the desired effect.

Sources:

www.awwd.ca/
www.leyboldoptics.com/
www.nationalglass.com.au/
www.ppg.com/
www.arkema-inc.com/
Couch designed by Luis Martins from The Noun Project

UNISON WINDOWS & DOORS
A Lifetime of Beauty and Performance