



1



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Who We Are...



Tom Culp



Steve Selkowitz



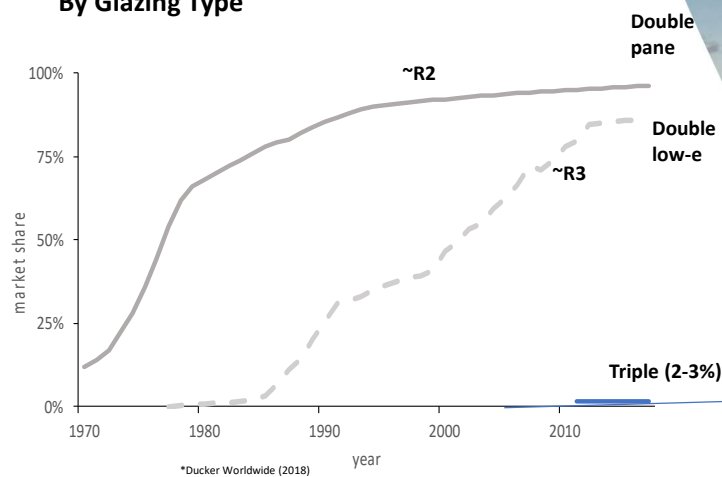
Thom Zaremba



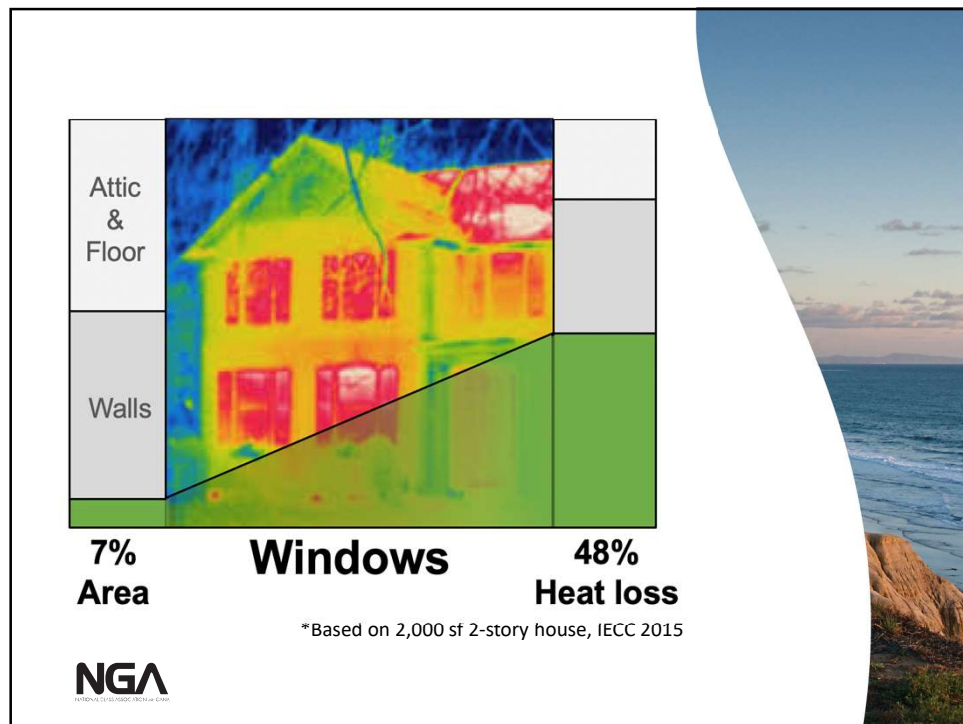
3

Markets Evolve Over Time.....(slowly)...

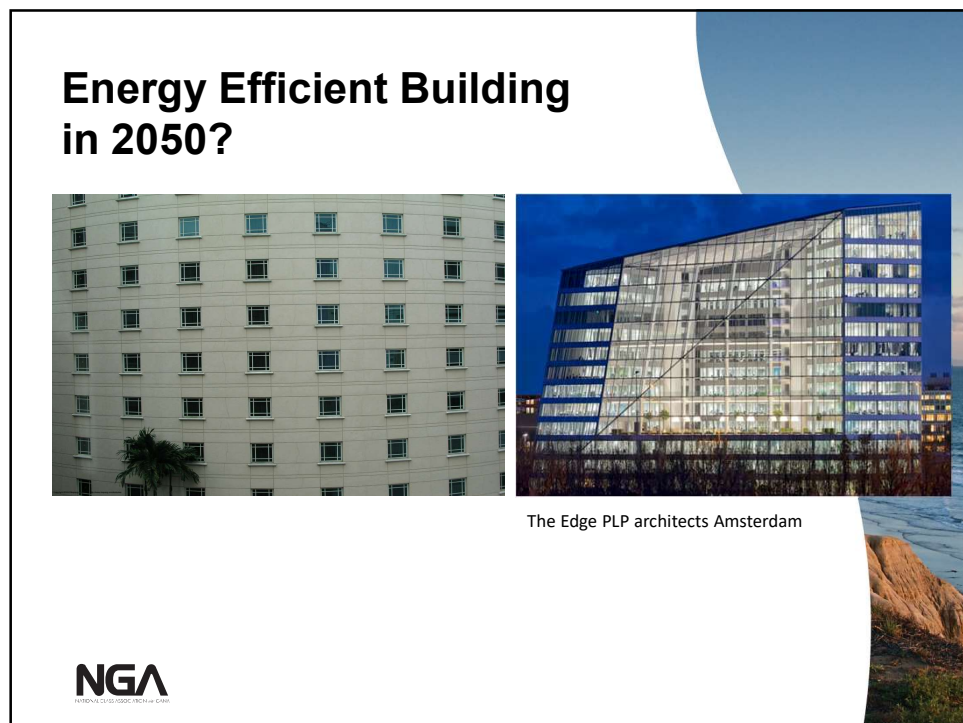
Residential Market Share By Glazing Type



4

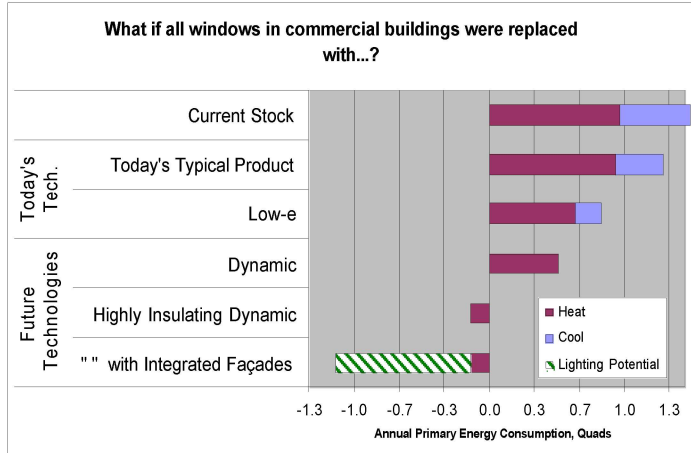


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Retrofitting All Commercial Windows: U.S. Impacts Converting a \$20B/yr cost to a \$15B/yr Net Surplus!



Cost
= \$20B

Saves
\$15B

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Criteria, Metrics for Selecting Glass and Designing Optimal Facades

- Energy/Carbon
 - Operating
 - Embodied
- Comfort
- View/Privacy
- Productivity
- Daylight
- Health
- Grid Impact
- Recycled Materials



- Affordability
- Aesthetics
- Security
- Fire
- Acoustics
- Structure
- Weatherproof
- Maintenance
- Durability

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3 Challenges

- **High Performance Components and Systems**
 - Technology Kit of Parts
- **Static → Integrated, Responsive, Intelligent Systems**
 - Responsive to occupant, owner, electric grid
- **New Business and Delivery Models**
 - Cost, Reliable Performance



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Triple and Quad Thin Glass Windows



Source: Alpen HPP

10

Electrochromic Smart Glass New Options: Gradient Light Control



Source: SageGlass Harmony

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Components → Systems

Still buying **building envelopes** this way?

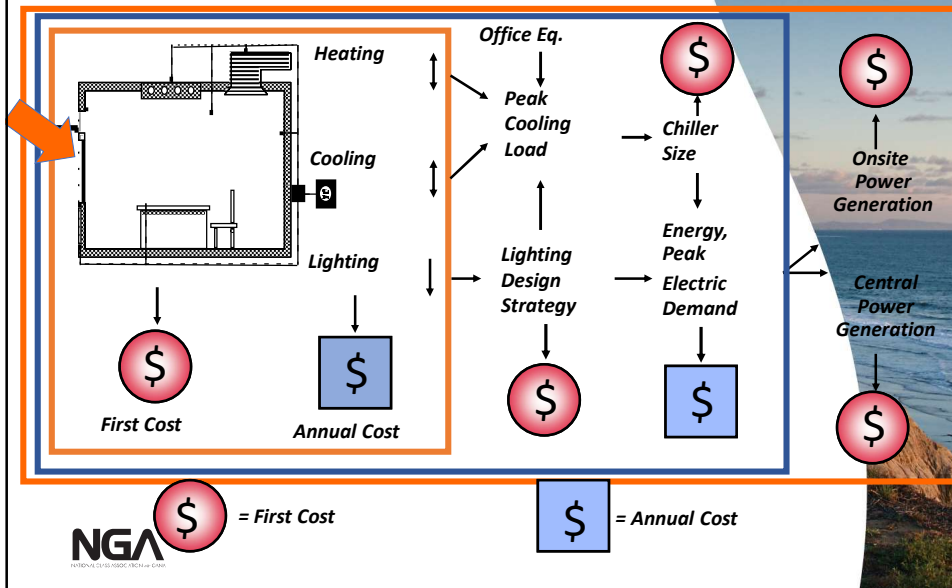


Oldcastle

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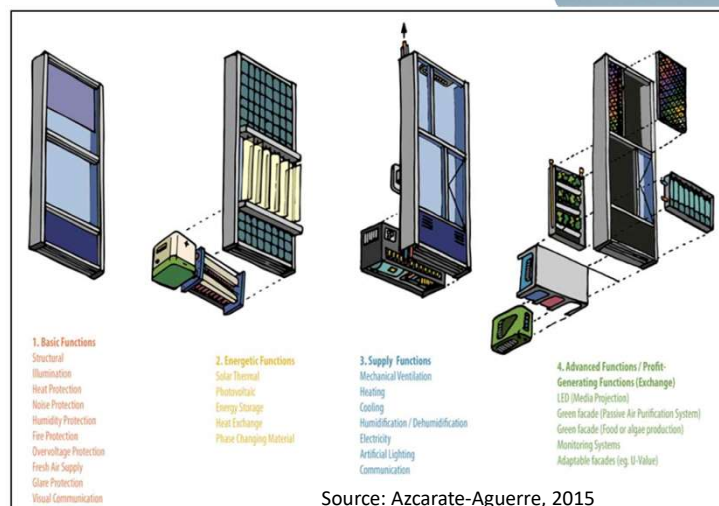
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Reliable System integration → First Cost tradeoffs Improved Façade = Lower HVAC System Cost



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“Service Oriented” Façade Integrated Product (...Integrate HVAC into envelope...)

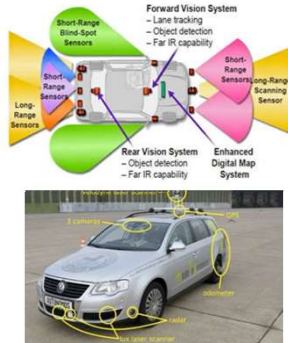


Source: Azcarate-Aguerre, 2015

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Relative Cost and Complexity? A Story of Two \$1T/yr Industries

INDUSTRY "A"



Integrated System:
Autonomous Car w/ Smart Sensors

INDUSTRY "B"



Integrated System:
Sensor-Driven
Automated Shade or EC
w/ Daylight Dimming

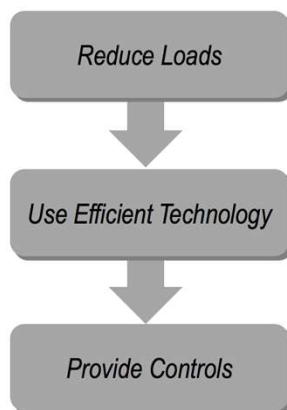
VS



Why Can't Buildings Be as Smart as Cars?

15

Replacement Windows for the Empire State Building: < 10 year payback?



SOLVE THE RETROFIT PUZZLE

BETA

See how taking the right steps, in the right order, makes all the difference

STEP 1: REDUCE LOADS [3 projects]

The first step in any retrofit project is to determine how large a reduction can be made in the amount of energy that a building needs to provide its most essential services.



Drag and drop the projects below onto the building. Try to select the ones that you think will reduce energy loads.



<https://www.esbnyc.com/sites/default/files/ESBOverviewDeck.pdf>

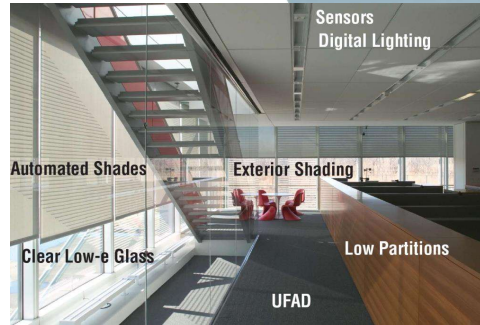
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New York Times HQ, NYC 2007

Largest Installation of Automated Shading and Daylight Dimming



Renzo Piano, Gensler, F&K



2 years of LBNL testing in a 500 m² mockup was used to refine and spec the final design

Outcomes: Energy, Demand, Occupant Satisfaction

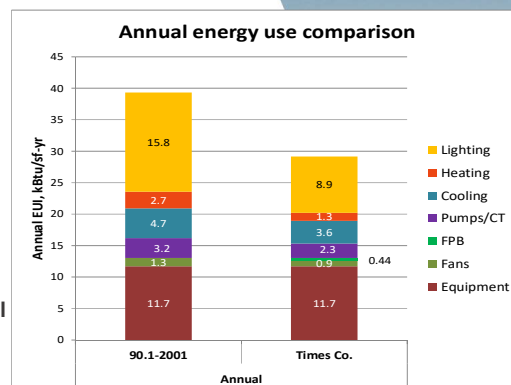


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Measured “As Built” vs Simulated 40% Code Compliant

Energy and demand savings (20th floor)

- Site Electricity
 - **32% savings**
 - 43% lighting savings
 - 23% cooling savings (despite larger WWR)
- Site Heating
 - **51% savings**
- Peak electricity demand
 - 22% savings 628 kW reduction total



Outcome of occupant surveys:
high levels of occupant satisfaction

<http://eta-publications.lbl.gov/sites/default/files/nyt-lbl-occu-satisfaction.pdf>



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What is the Most Costly “Building Component”?

People: Occupancy Costs = 100 x Energy Cost

Can a Well Designed Façade System Improve Satisfaction, Comfort and Productivity? By How Much?

Cost / Sq. Ft. Floor -Year

- Energy Cost: \$4.00
- Rent: \$40.00
- “Productivity” \$400.00+

+ Added Useful Floor Space Benefits



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Benefits of High Performance Windows/Facades

**Improve
Occupant
Comfort,
Satisfaction and
Performance**



Occupant

**Add Value,
Reduce Operating
Costs**



Building Owner

**Reduce Energy,
Greenhouse
Gas Emissions**



Planet

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DealBook / Business & Policy
DEALBOOK

New York Times
1/14/2020

***BlackRock C.E.O. Larry Fink:
Climate Crisis Will Reshape Finance***

In his influential annual letter to chief executives, Mr. Fink said his firm would avoid investments in companies that “present a high sustainability-related risk.”

Blackrock is the world’s largest asset manager with nearly \$7 Trillion in investments....

His intent is to encourage every company, not just energy firms, to rethink their carbon footprints....

“Awareness is rapidly changing and I believe we are at the edge of a fundamental reshaping of finance. The evidence on climate risk is compelling investors to reassess core assumptions about modern finance”

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**“In order to change an existing paradigm you do not struggle to try and change the problematic model.
You create a new model and make the old one obsolete.”**

Buckminster Fuller

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A Review of Annual Conference 2020 Attendee Survey Results

62 responses



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Climate change is recognized globally as a threat to cities and infrastructure and is driven in part by energy use patterns of the built environment.
Many governments and private industries are now implementing new laws, policies and directives to reduce the future carbon impacts of buildings. How do you view these activities?

9	a. they are a threat to the glass industry
1	b. they will have little to no impact on the glass industry
56	c. they are an opportunity for sales of value added products
5	d. uncertain about potential impacts
8	e. other
	performance and quality will differentiate
	money grab activities for taxes
	it is a opportunity for the glass industry to develop new technologies
	the laws can be so stringent that current technology can't perform, creating a disconnect is enforcing the laws
	it is political; force China to do something first
	how can we show the industry can be progressive and concerned?
	there are calling for the glass industry as a whole to be in the forefront, leading the charge in all construction
	rather it a moral concern than money



24

The EU has set aggressive goals for carbon reductions over the next 10-30 years. The European Glass Industry is promoting an EU-wide initiative to make sales of new and replacement efficient window a central element of the EU program, claiming it could provide 1/3 of the desired savings. Do you think the U.S. Glass industry should:

35	a. develop and promote similar programs
36	b. partner with other groups to address the problem
1	c. do nothing - let other industry groups address the issue
7	d. other
	do it better; not replacement efficient, but longer life cycle, upgrade and reuse of components
	develop our own programs; our climates are different
	discuss why other industries vs us
	need to stay close to these changes as architects/owners will see this as an opportunity
	seems there should be a united front within the industry
	harmonize

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Several organizations have published recommendations to limit glass areas or window size as a strategy to reduce building energy use. If the goal is to make big reductions in building energy use is this an effective strategy

8	a. yes, but reducing window area may limit daylight and view
27	b. maybe, but there are smarter ways to meet new low energy targets
2	c. no, its 'unfair' to the glass industry
11	d. no, because owners want floor to ceiling glass
	e. no, because optimized design with highly insulating, smart glazing/shading can outperform an insulated wall
39	f. other
6	a balance between human wellness and smart energy design needs to be taken into account
	owners want floor to ceiling glass & tenants want to connect with the outdoors
	thermal bridging around perimeters of windows can cause more performance loss than windows themselves so WWR is too simplistic
	owners want large windows & daylight & views
	there is more than just energy in the balance; daylighting benefits
	lets progress to more glass and more efficiency

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The building industry has used many approaches in the past to change building design practice to promote energy efficient, comfortable buildings. Which of these types of programs do you think is the most effective and/or you would prefer to see used:

- 23 a. new mandatory codes and standards setting a level playing field
b. voluntary performance targets, e.g.

15 Energy Star, LEED

- c. financial incentives, tax credits
and rebates

25 d. education and

26 training

- 21 e. R&D to create new cost effective, higher performing options

f.

Other

all are really important and part of overall strategy. At the end of the day, people won't invest in higher cost products unless they are forced to.

we already have high enough performing products, we just need them to be used more to get costs down through economies of scale

voluntary performance targets are necessary to test proposals before they go into mandatory codes

with a education focus on energy & overall cost savings



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Some buildings use 3-5 times as much energy as similar buildings in the same region. Why don't building owners and their design teams specify and use more efficient window products today?

- 23 a. lack of awareness about the availability of these
products

- 35 b. satisfied with just meeting minimum
code

- 16 c. efficient products are too difficult to install or too
costly

- d. lack of suitable design tools to reliably select the best
solutions

- 7 e. high performance, low cost products are not widely
available

- 8 f. other

6 diffenret interests of GC/developer/owner/user -> too many
parties

I don't know why they don't. If you know, please tell
us

upfront cost vs long term
cost

they are not budgeting to accommodate cost of high performance
technology

lack of incentives

performance pather allows for paver envelope to be used at the expense of better
internal systems



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It has been suggested by many writers that future buildings will be zero net energy, intelligent and grid responsive, adaptive to changing occupant needs, and provide enhanced comfort, view and wellbeing. Is the glass and windows industry ready to be part of this vision?

24 a. we are leading or are in sync with others, in creating this future vision

29 b. we are behind and need to partner/catch up

2 c. it doesn't matter because the industry changes very slowly

11 d. other

don't know

the herd docs not all move the same speed; there are some cutting edge technologies, though are not widely-adopted

focus on niche opportunities can lead to broader success

Not somewhere the glass industry is

we are not a leader, but not the tail either

it depends on the situation. In some cases, we are leading edge and some we are behind

we are making progress but with unclear timeline it's difficult to gauge are relative progress

trying to move in that direction

there are some glass industry leaders but not all are on board; likely because only monumental projects look or are becoming to look at zero net.

we need to be in sync globally in this effort and not only N. America focused

we are aware of most aspects; in sync in some areas; behind in others



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Who We Are...



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