

**YOU ALREADY CAN DO ZNE BUILDINGS
(BUT YOU WON'T UNLESS SOMEONE MAKES YOU)**

**ACEEE National Symposium on
Market Transformation**

Duane Jonlin

Seattle Department of Planning & Development

SO, WHERE ARE WE GOING HERE?

- 1) Incentives, or regulations?
- 2) National leadership, or local?
- 3) Good for business, or bad?
- 4) ZNE buildings: The right goal?
- 5) What must we do *now*, to get to ZNE *eventually*?
- 6) With legislation, or without?
- 7) What's holding you back?



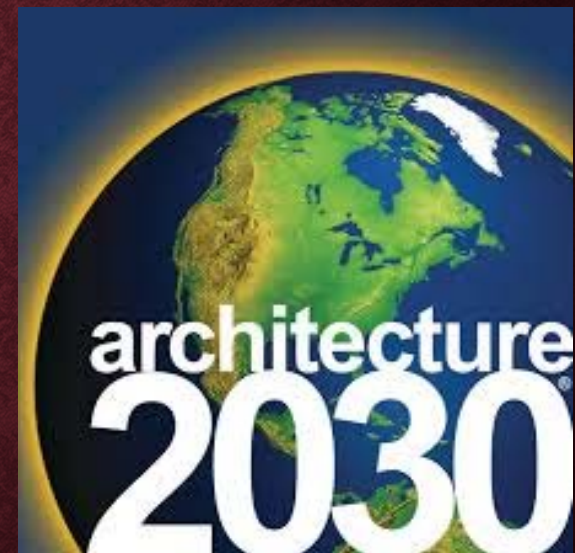
INCENTIVES, OR MANDATORY CODES?

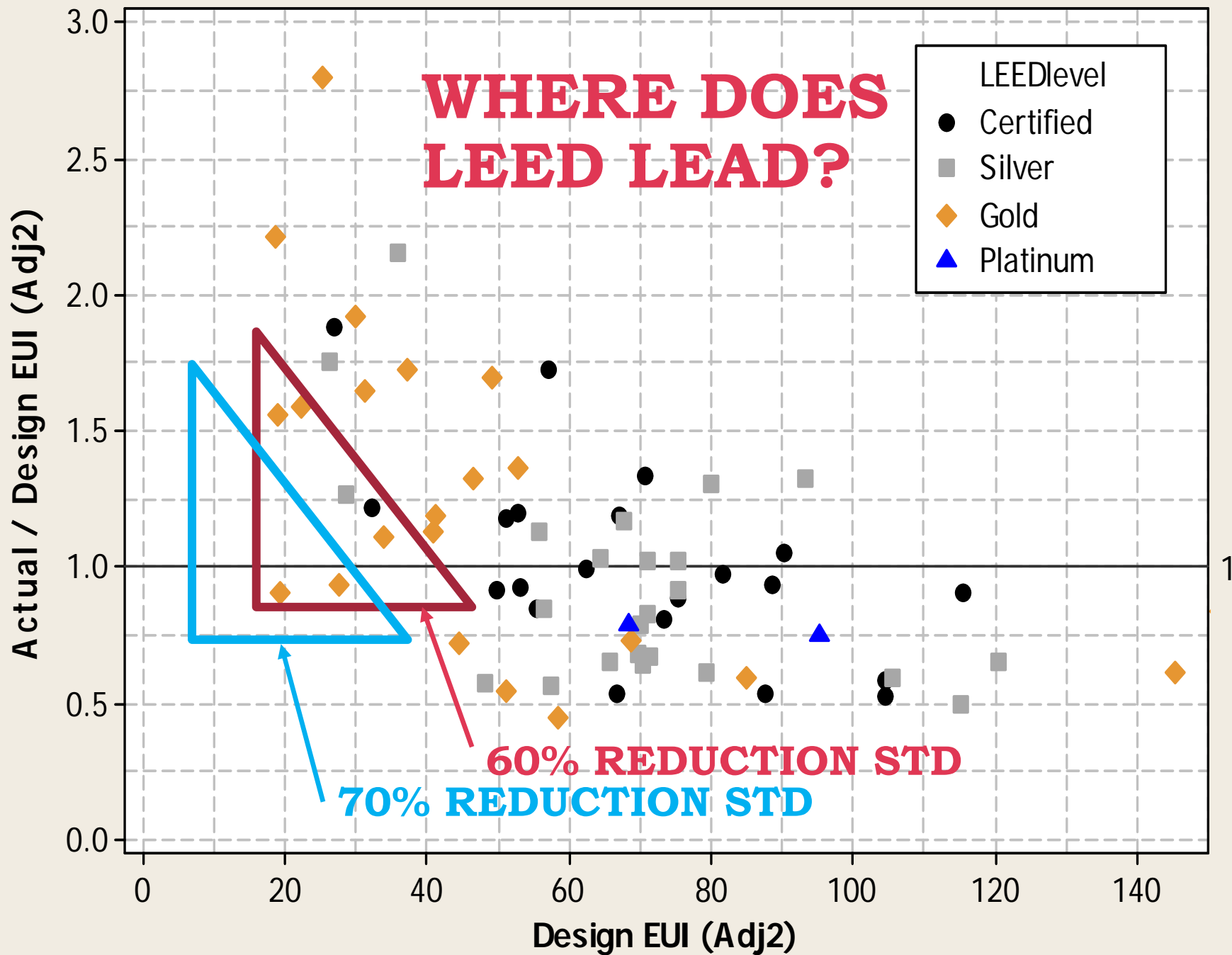
- Everyone loves incentives
 - Free money from nowhere!
 - But it doesn't change standard practice
- Everyone hates regulations
 - Political struggle
 - But the industry changes fast
- Cost comes down when everybody has to do it



AIA LOVES THE 2030 CHALLENGE (BUT WE STILL GIVE THE BIG DESIGN AWARDS TO ENERGY HOGS)

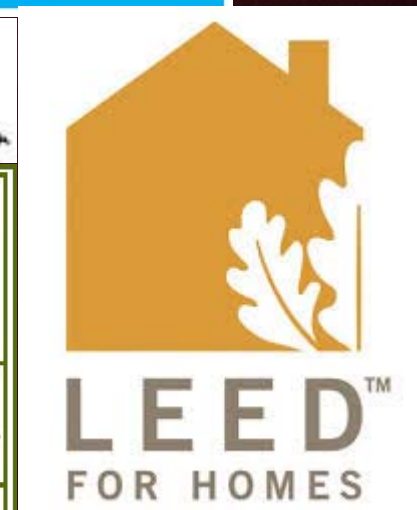
- Just 14% of new buildings meet the 2010 standard (60% below CBECS)
 - Mostly where required by code?
- How many will meet the 2015 level (70% below CBECS)?
- My prediction: 2%
 - Except where it's required by code





ONE BIG “VOLUNTARY” SUCCESS

- Above-code programs in more than half of **new homes**
 - Because it's a really successful sales strategy!
- A big reason that homebuilders don't want stronger codes



NATIONAL LEADERSHIP NOT WORKING

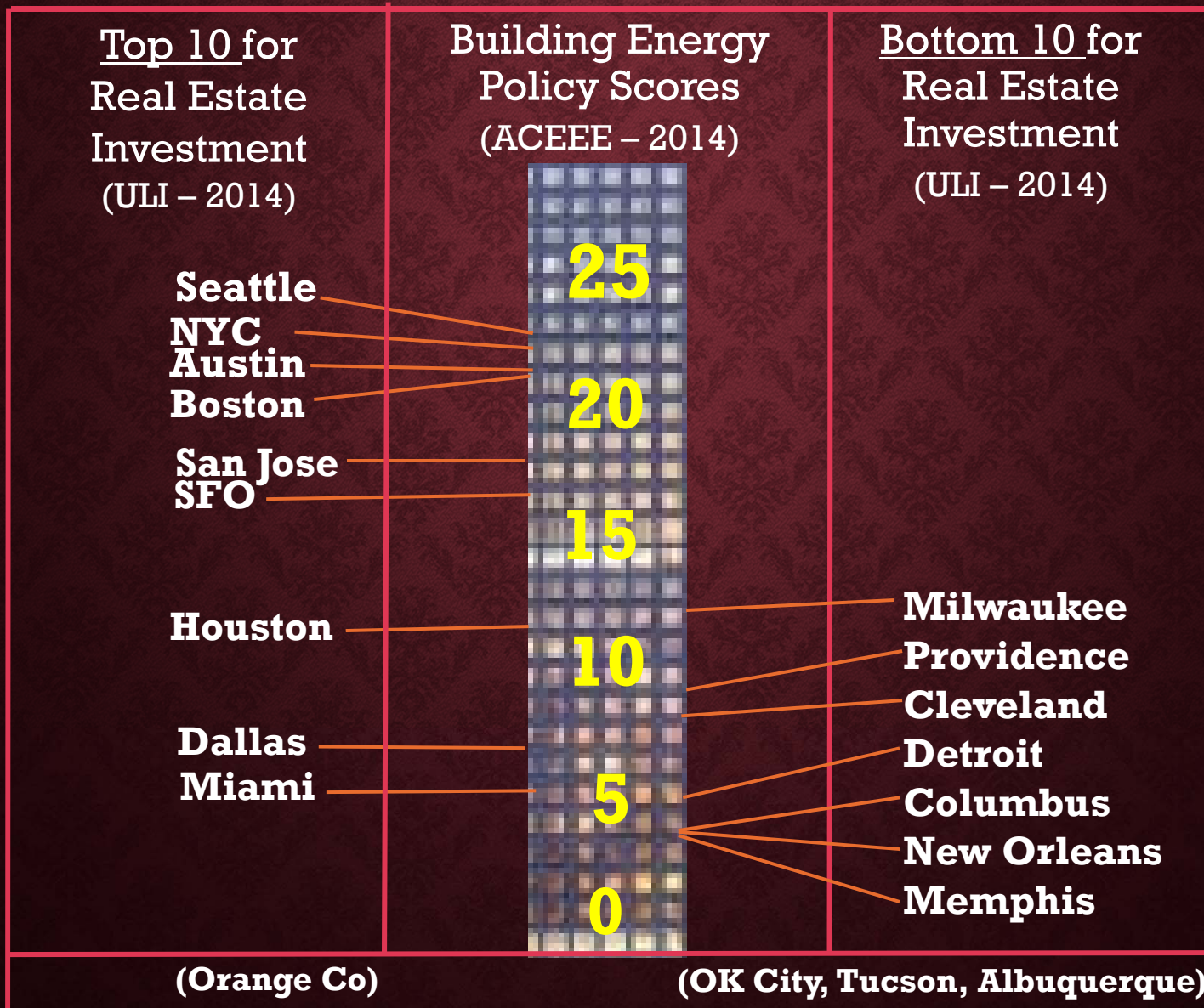


- Federal product standards stifle innovation
- ASHRAE 90.1 not widely adopted
 - (and how many really enforce?)
- Stronger IECC generates backlash in states
- Progress comes from cities & *some* states
- States *might* get on board when they notice that strong energy code states have strong economies

HIGH-PERFORMANCE BUILDINGS: WHO BENEFITS?

<u>Stakeholder</u>	<u>Low-Perf Bldg</u>	<u>High-Perf Bldg</u>
Developer	Lower costs	Higher costs
Tenant	Higher costs	Lower costs
Lender/Appraiser	What?	Huh?
Community	Fuel \$ leaves community	Wages & profits circulate locally
Fossil Fuel Ind	Higher sales	Lower sales

ARE STRONG ENERGY CODES BAD FOR BUSINESS?



ZNE BUILDINGS: NOT THE RIGHT TARGET.



**WAY TOO EASY FOR A CHURCH.
WAY TOO HARD FOR A HOSPITAL.**

WHICH BUILDINGS CAN (AND CANNOT) GET TO ZNE?



- Ratio: Floor to (sun-exposed) roof area
- Process: Cooking, refrigeration, data storage...
- Climate: Summer humidity, winter cold
- Schedule: Arena/school vs. hospital/fire station

GO FOR ZERO (SITE) CARBON

(WE'LL CLEAN UP THE ELEC GRID GRADUALLY)

~~ZNE~~

ZC

Don't install fossil
fuel combustion



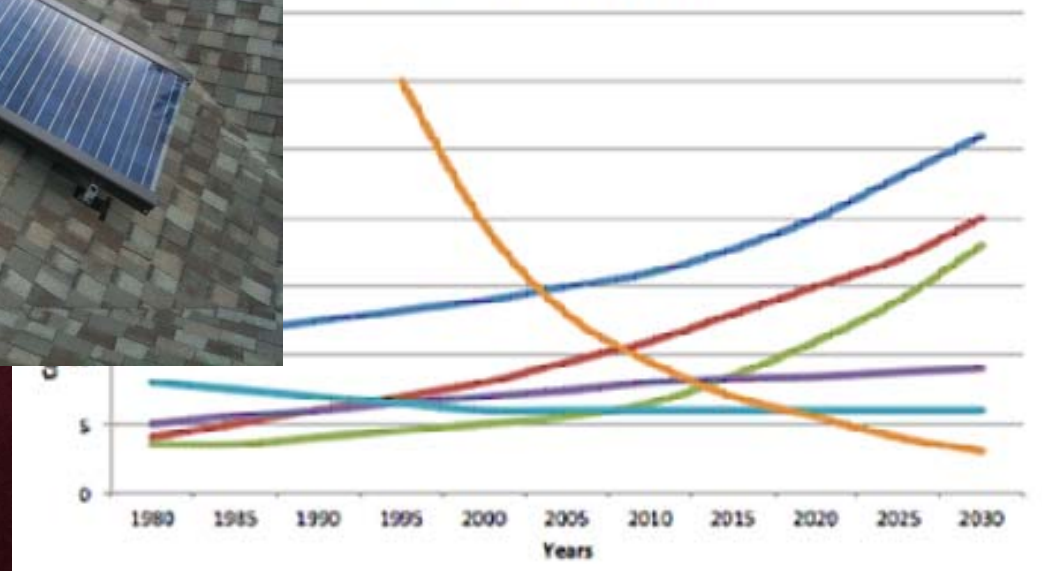
PV: THE LEAST CRITICAL COMPONENT.

~~ZNE~~
ZCR



Rooftop solar is plug & play,
but envelopes last forever

The Cost of Electricity



WOULD ALL THE CHURCH ROOFS IN STOCKHOLM POWER THAT HOSPITAL?

~~ZNE~~
ZCRC



A ZNE burger joint would need a *half-acre* of PV, but check out this school roof

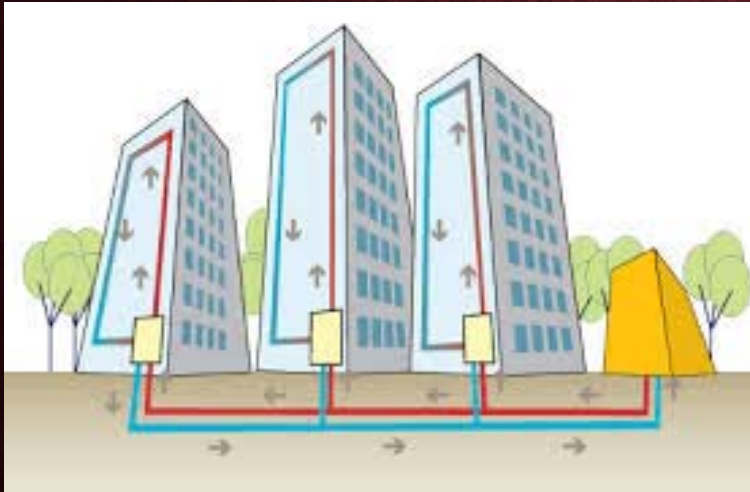


Zero. Carbon. Ready. Community.

What's not to like?

ZCRC

1. Reduce loads
2. Efficient Equipment
3. Trade heat & solar



1. Community
2. Environment
3. Profits

TURN L.E.F.T. FOR THE ZERO-CARBON READY COMMUNITY

- **L**ong-**L**asting components:
 - Follow 2050 Standard *today*
- **E**verything **E**lse:
 - 2014 state-of-the-art *today*
- **F**uture **F**eatures:
 - Capable of upgrade to zero-carbon standard *in the future* (PV, lights, etc.)
- **T**enant **T**ools:
 - Energy dashboards, automated controls

ZCRC

ZCRC COMMUNITIES QUICK CALCULATION

For all buildings in community:

$$\begin{aligned} & \text{Floor area X target EUI} \\ & + \text{process loads} \\ & + \text{transportation energy} \\ & - \text{Clean power generation} \\ & = 0 \end{aligned}$$

Just reduce EUI target, process & vehicle loads, or increase clean power, until you reach zero.

(Easy, huh?)





LEGISLATED TARGETS

- Washington State: 70% reduction 2006 – 2030
- Seattle: Reduction in city-wide building energy:
 - Commercial **5% by 2020**, 10% by 2030
 - Residential 8% by 2020, 20% by 2030
- Seattle: Carbon neutral city by 2050

EXISTING BUILDING STOCK: PROPORTIONATE UPGRADES

- Big project triggers full upgrade
- Little project triggers partial upgrade
- + “Naturally-occurring” upgrades
- + Utility incentive upgrades
- Very unpopular, but least disruptive path to ZCRC
- Way more important than new construction



NEW TECH FACILITATES PROGRESS

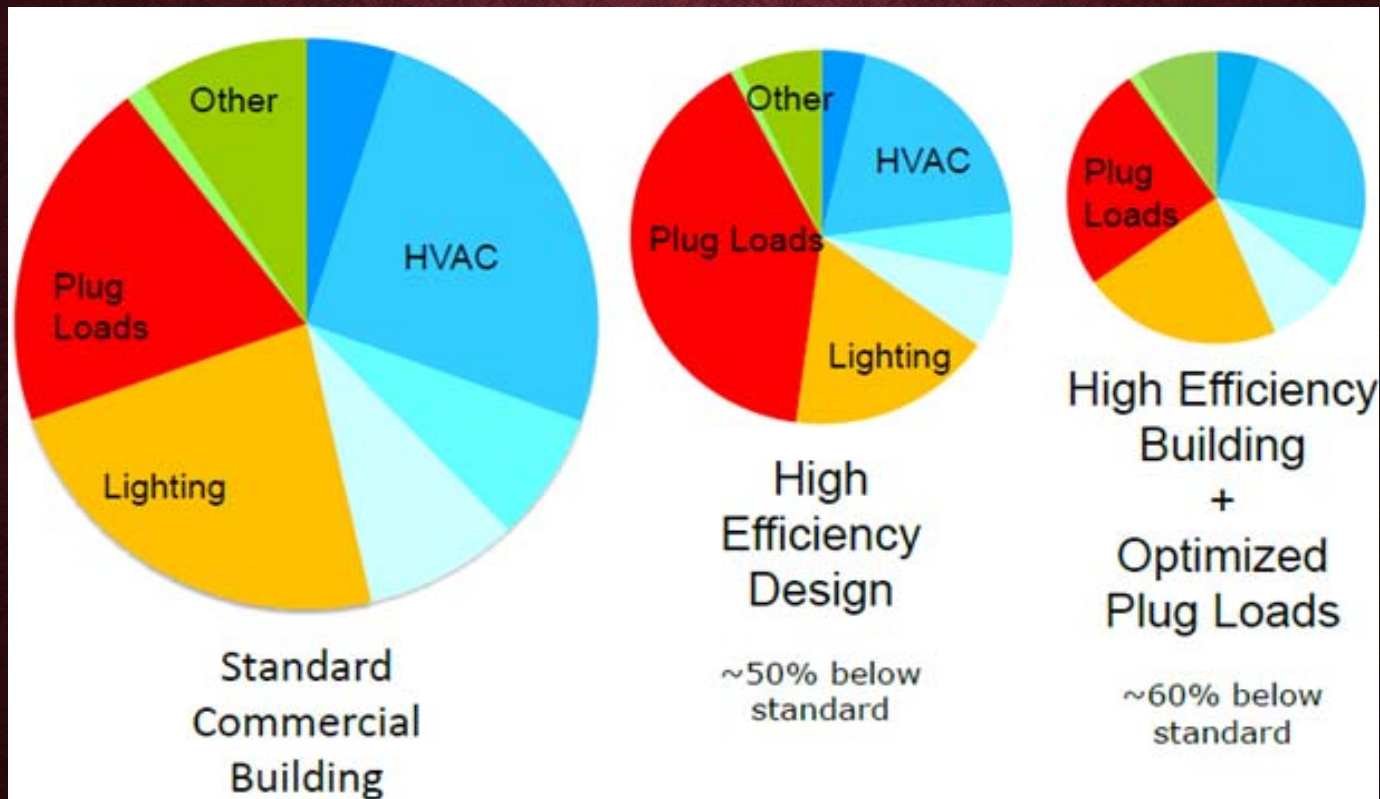
- Photovoltaics
- LED lighting
- LLC
- Dynamic glazing
- Smart controls



(Unless you trade
them away for a
bad envelope)



PLUG LOAD CONTROLS



- **Plug loads** are ~~20%~~ 40% of building energy use
- Offices & classrooms: Half of outlets are controlled by time clock or occupancy sensors

BUT WAIT, THERE'S MORE!

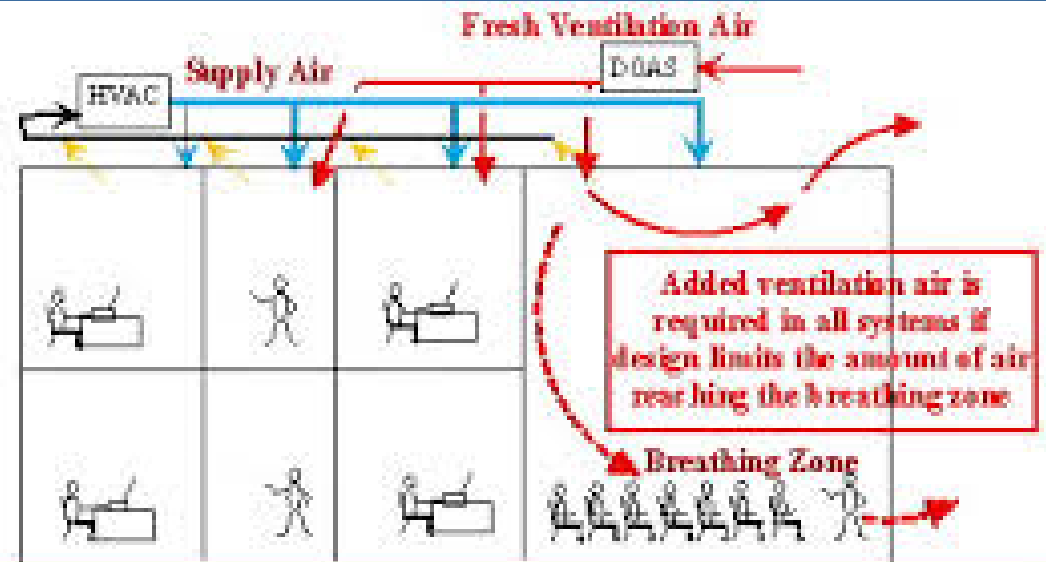
- Air barrier testing
- Commissioning
- Metering
- Daylight-responsive lights
- On-site solar
- Solar readiness
- ...and an outcome-based code!



MOVING FORWARD

Dedicated Outdoor Air Systems

DOAS



Dedicated Outdoor Air System (DOAS): Ventilation Efficiency = 100%

SO, WHAT'S HOLDING US BACK?

- Energy efficiency & climate stabilization seen as “liberal” causes
- Belief that EE rules hurt employment & economy
- Lobbying: powerful from threatened industries, weak from beneficiaries
- Deep fear of change

