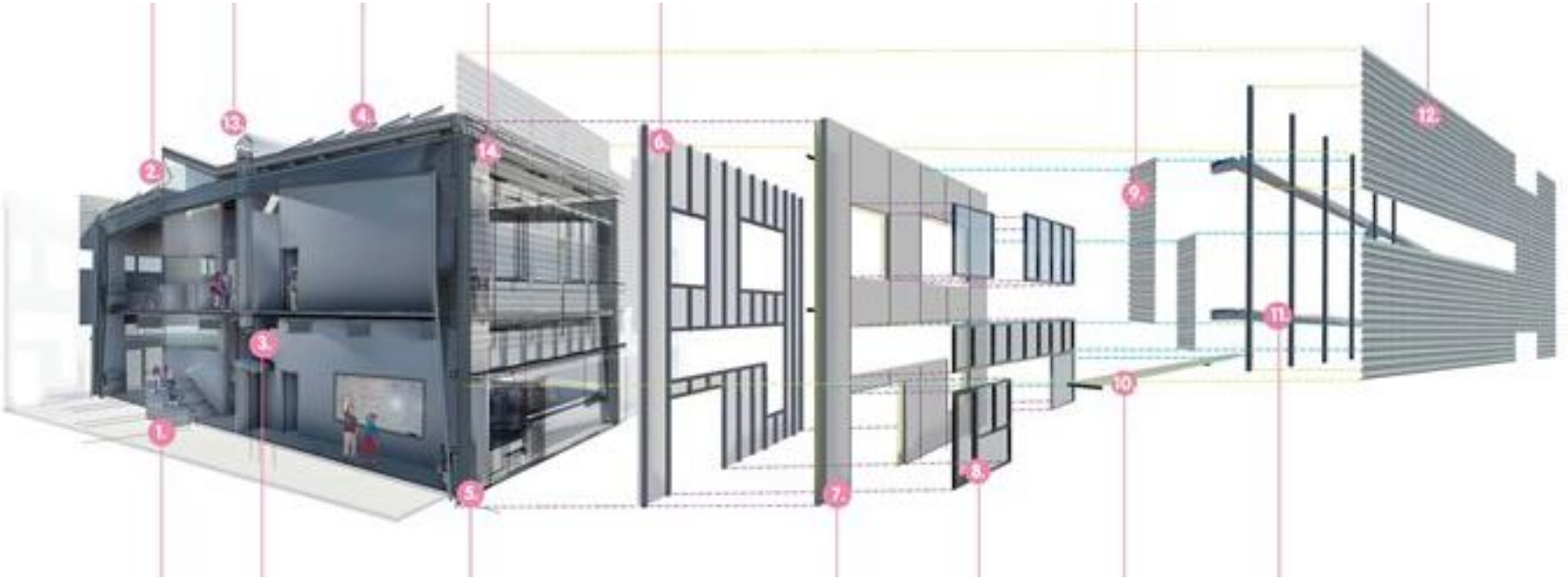
Redefining the Rules: Driving Deep Efficiency in Existing Buildings

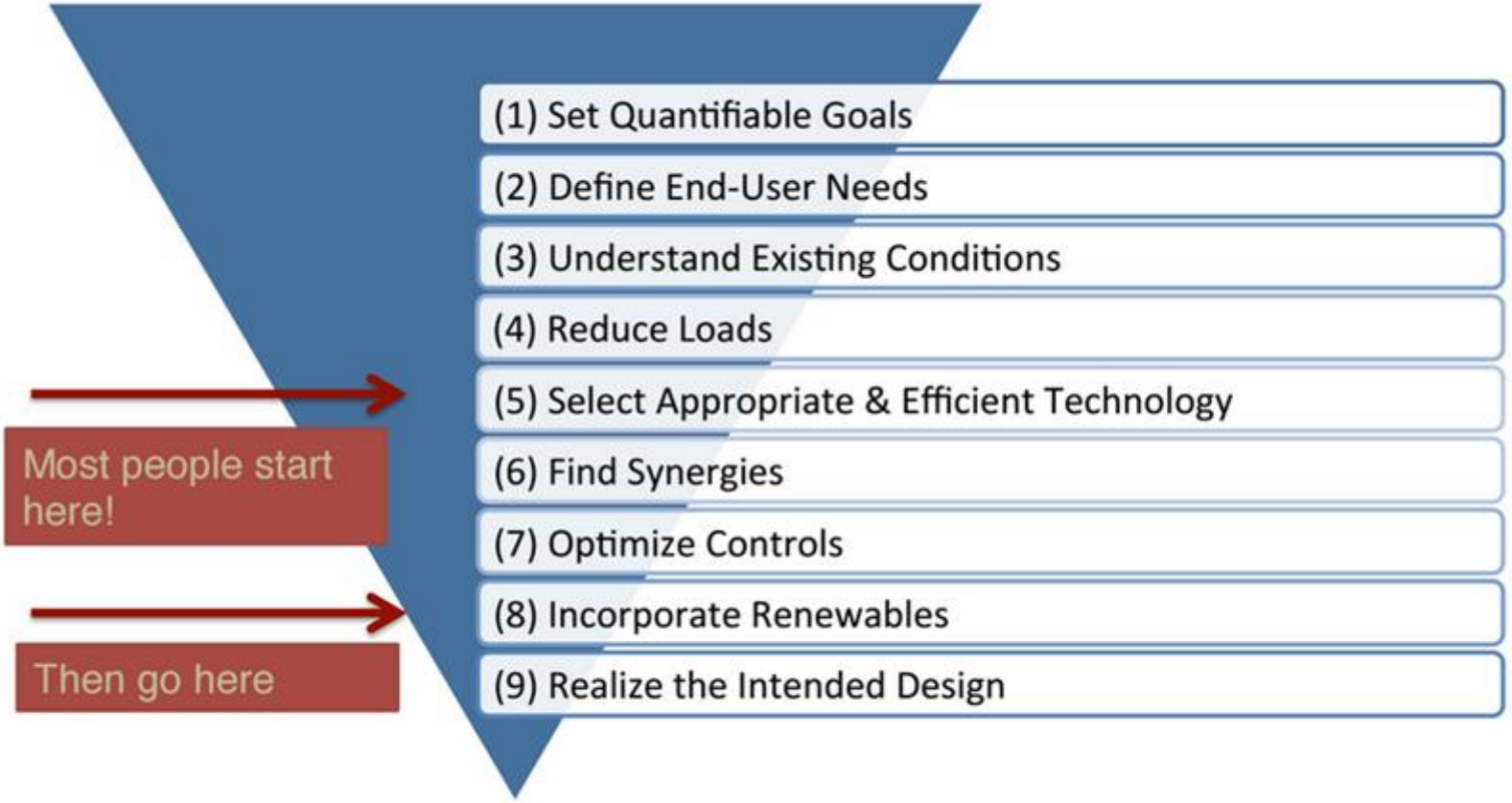
Zachary Hart
The American Institute of Architects

What is a Deep Energy Retrofit (DER)…?

A design-based, comprehensive approach to evaluating and improving whole building performance.

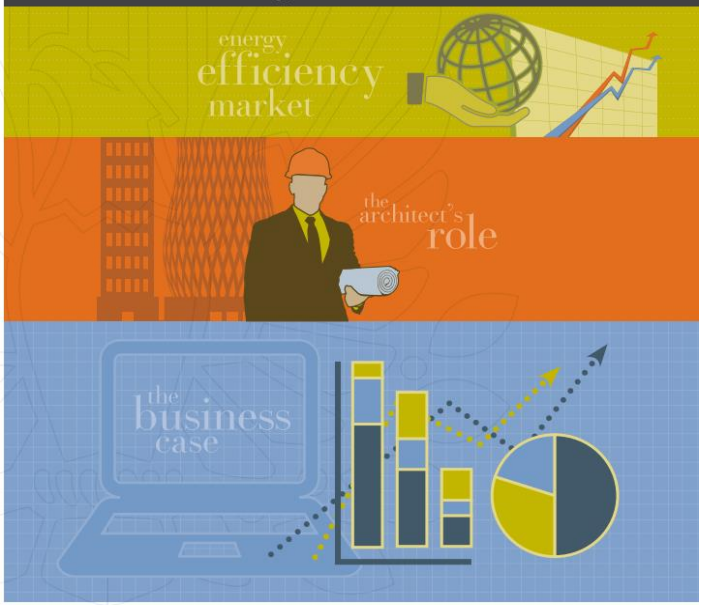


The Right Steps in the Right Order



DEEP ENERGY RETROFITS:
AN EMERGING OPPORTUNITY

An Architect's Guide to the Energy Retrofit Market



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A California Department of Motor Vehicles
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C UCLA Center for the Health Sciences

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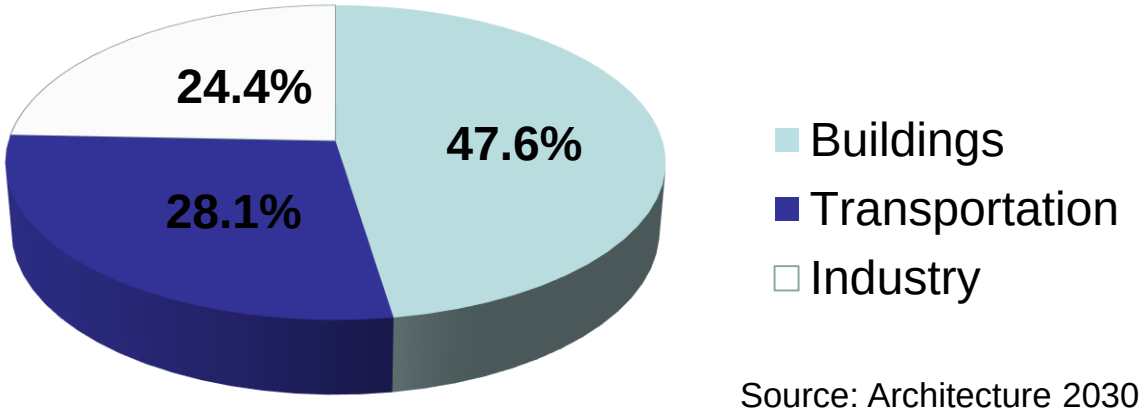
Opportunity

Energy Consumption By Sector



Source: Architecture 2030

Investment Opportunity in Improving Efficiency by 30% in pre-1980 Building Stock

Building Sector	Residential	Commercial	Institutional	Total
Energy Savings (Trillion Btu)	1,892	848	293	3,033
Total Investment ($ Billions)	$182	$72	$25	$279

Source: Rockefeller Foundation and DB Climate Change Advisors, *United States Building Energy Efficiency Retrofits: Market Sizing and Financing Models*

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Current Retrofit Market

Current and Projected Revenues of Energy Services Company Industry

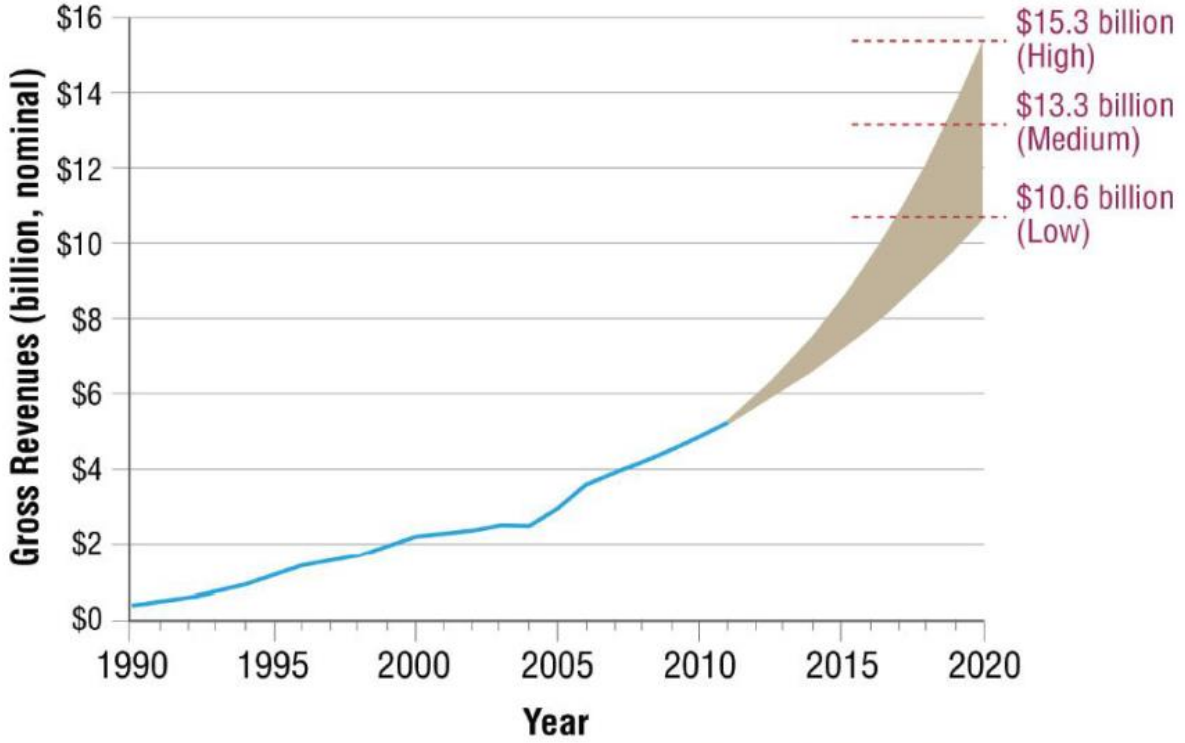

Figure ES- 2. Aggregate industry revenues with long-term projections: 1990-2020

Source: Lawrence Berkeley National Laboratory, *Current Size and Remaining Market Potential of the U.S. Energy Service Company Industry*

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Barriers

Upfront Cost/Capital Constraints

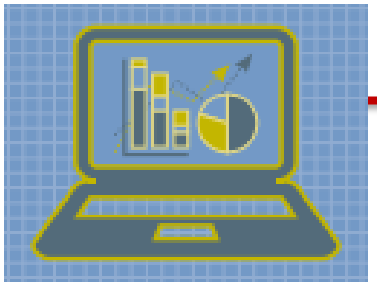
Split Incentives

Hidden Costs

Strategy

Improve Benefit/Cost Ratio

$$\frac{\text{Deeper Energy Savings + Incentives + Value Triggers + Easier Financing + Value Beyond Energy Savings}}{\text{Cost}}$$



Value Triggers

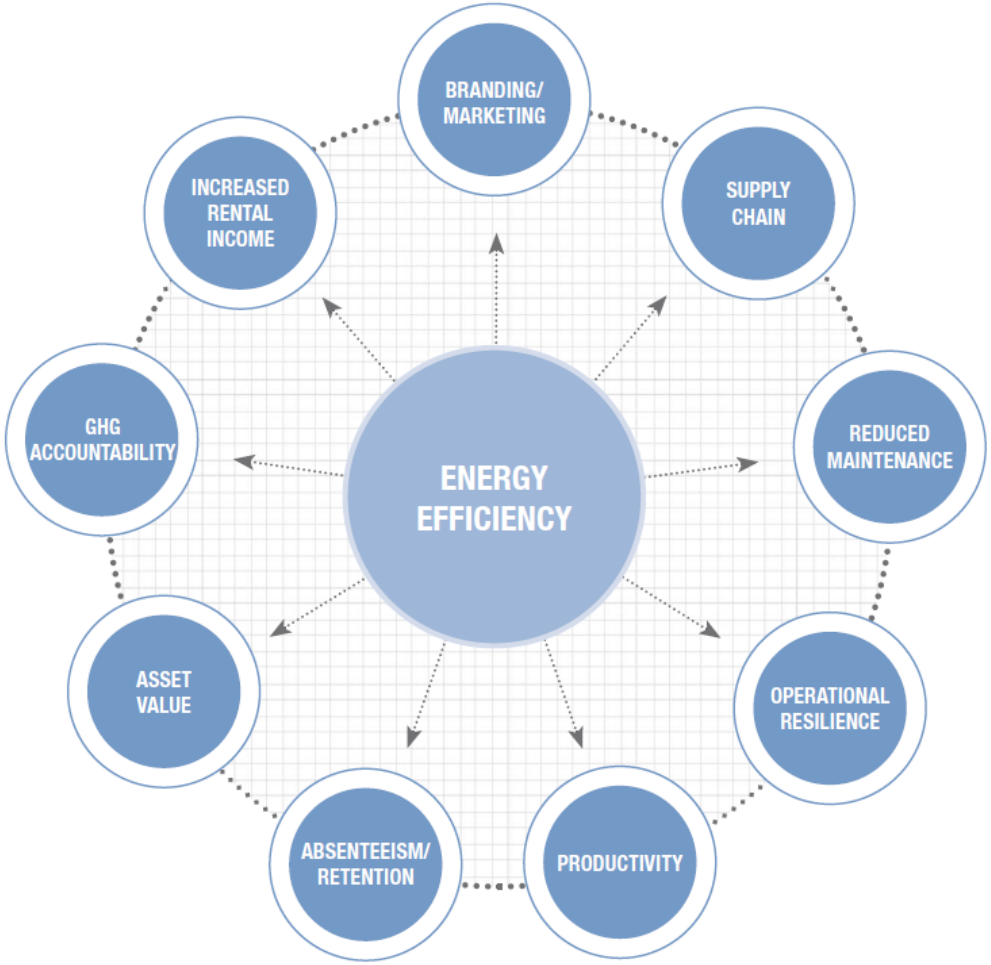
VALUE-CREATION TRIGGERS INCLUDE:

1) Adaptive Reuse, Market Repositioning or Modernization;
2) Roof, Window or other Major Envelope work;
3) Deferred Maintenance / Replacement for HVAC and similar equipment;
4) Code-required updates;
5) New Acquisition and Refinancing;
6) Announcements of utility rate hikes or other related news;
7) Major Occupancy Change, and
8) Owner-initiated Energy Management Planning

Capital Savings Made Possible By Deep Efficiency Savings

VBECS

Value Beyond Energy Cost Savings



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DC Smart Roof Cost-Benefit Report

COMPARISON	Cool compared to Conventional	Green compared to Conventional	Conventional w/ PV (PPA) compared to Conventional
COSTS	**$0.76**	**$22.56**	**$0.00**
First cost	$0.34	$15.00	$0.00
Stormwater BMP review fee	N/A	$0.11	$0.00
Operations and maintenance	$0.23	$7.45	$0.00
Additional replacements	$0.19	$0.00	$0.00
BENEFITS	**$5.04**	**$59.82**	**$46.72**
Energy	$1.57	$2.33	$5.47
Direct energy savings	$1.34	$2.07	N/A
Indirect (UHI) energy savings	$0.24	$0.26	N/A
Energy generation	N/A	N/A	$5.47
Stormwater	N/A	$53.61	N/A
Fee discounts	N/A	$1.14	N/A
SRC revenue	N/A	$52.47	N/A
Health	$3.28	$3.51	$32.56
Ozone	$1.62	$1.52	N/A
PM2.5	$1.05	$1.39	$32.56
Heat-related mortality	$0.61	$0.61	N/A
Climate change	$0.19	$0.37	$8.69
NET TOTAL	**$4.28**	**$37.26**	**$46.72**

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