

Energy Efficient Building In Silicon Valley



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Menlo Park Green Ribbon Citizens Committee
and

[Keeping The Lights On](#)



Buildings Are Bad Guys



- 40% of U.S. GHG emissions
 - Agriculture: 30%
 - Transportation: 7%
- Reducing building energy usage is a big lever
- Massive scale
 - 130 million buildings in the U.S.
 - Approximately 1 million new buildings/year

But They Can Be Good Guys



- We know how to build and remodel buildings to reduce energy usage by
 - Up to 50% easily often at <2 year payback or less (sometimes it's actually free or profitable)
- Getting buildings to zero net energy usage is more expensive, but possible
 - And has a 5-10 year payback
- Residences, apartment buildings, office buildings, and industrial



Benefits

- Energy savings
- Productivity improvements
- Better comfort
- Better resale value
 - Or rental/lease value
- Longer building life
- Easier to get to net-zero
- Incentives



Breakthrough Thinking Required

- Get rid of preconceptions
- Think outside the box
- Avoid “linear thinking”
- Integrated design is key
- Start with energy efficiency



A New House In 2030



- Not giant, but very comfortable size
- Built with carefully considered materials
- Well-sited
- Uses daylighting
- Includes power generation capabilities
- Uses the minimal energy needed to provide its services
- Excellent comfort
- Energy footprint is near zero, even positive

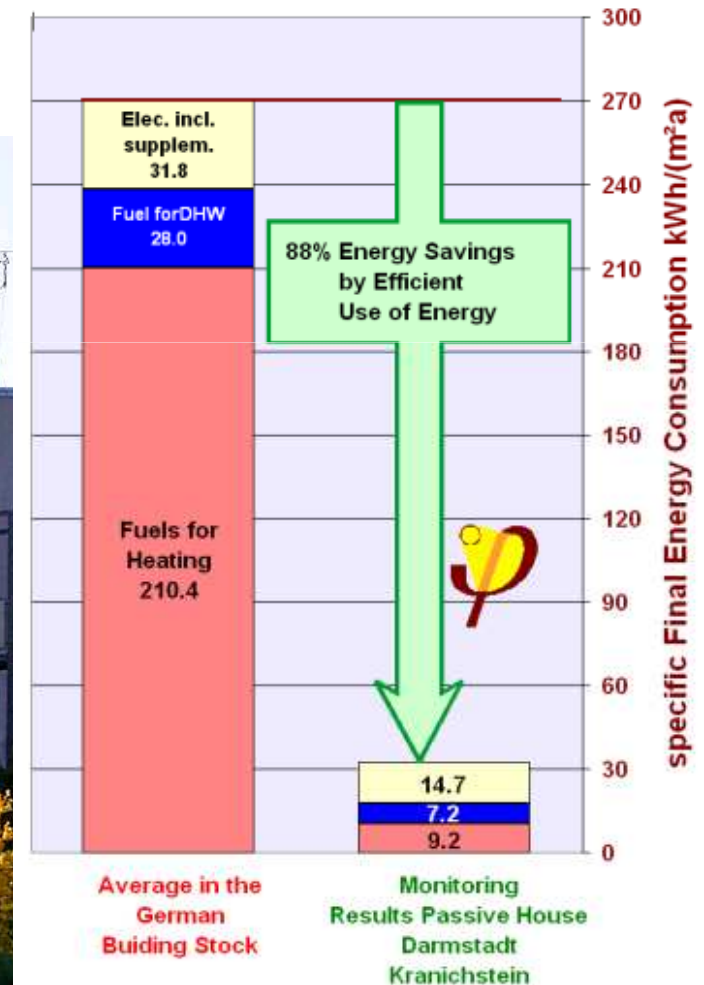
Examples: Palo Alto Net Zero Energy House

o <http://www.paloaltonetzero.com>



Examples: The Original PassivHaus

- Darmstadt, Germany



Examples: Cannon Beach House



Two types of collectors harvest sunlight for electricity and hot water. But producing power and heat is only part of a save-energy house. This design uses green-building materials in creative, energy-efficient ways. Photo taken at A

- o Cannon Beach, Oregon

Examples: Berkeley Remodel (PassivHaus)



- By Nabih Tahan
- U.S. architect who worked in Austria for 11 years
- Featured in Dec '08 NY Times article "*No Furnaces but Heat Aplenty in 'Passive Houses'*"



Example: “PassivHaus” Approach



- German performance standard
 - Based on technology and techniques developed in North America in ‘70-80s
- Highly insulated, with airtight building envelope
- Orientation and window usage optimize solar contribution
- “Passively” recover heat from all the other activities in the home - cooking, lighting, and even human activity
- No furnace or AC
 - Use “heat recovery ventilators” to keep indoor air quality high
 - Constantly replacing the old inside air with new outside air, while keeping the heat from the old air inside
- Very comfortable – no cold spots
- Typically use about 80% less energy for heating and cooling than conventionally-built houses
 - Total energy use < 50% of conventional



Isn't This Expensive?



- Insulation and envelope tightening are expensive
- But no furnace or AC needed
- Net - initial costs are 10-20% higher (in U.S.)
 - Costs have gotten nearly flat in Europe
- Approximately 10 year payback due to lowered operating costs
- Value remains in house when it's sold
 - Rule of thumb: \$20 in value for \$1 in yearly energy savings

Who Is Trying To Solve This?

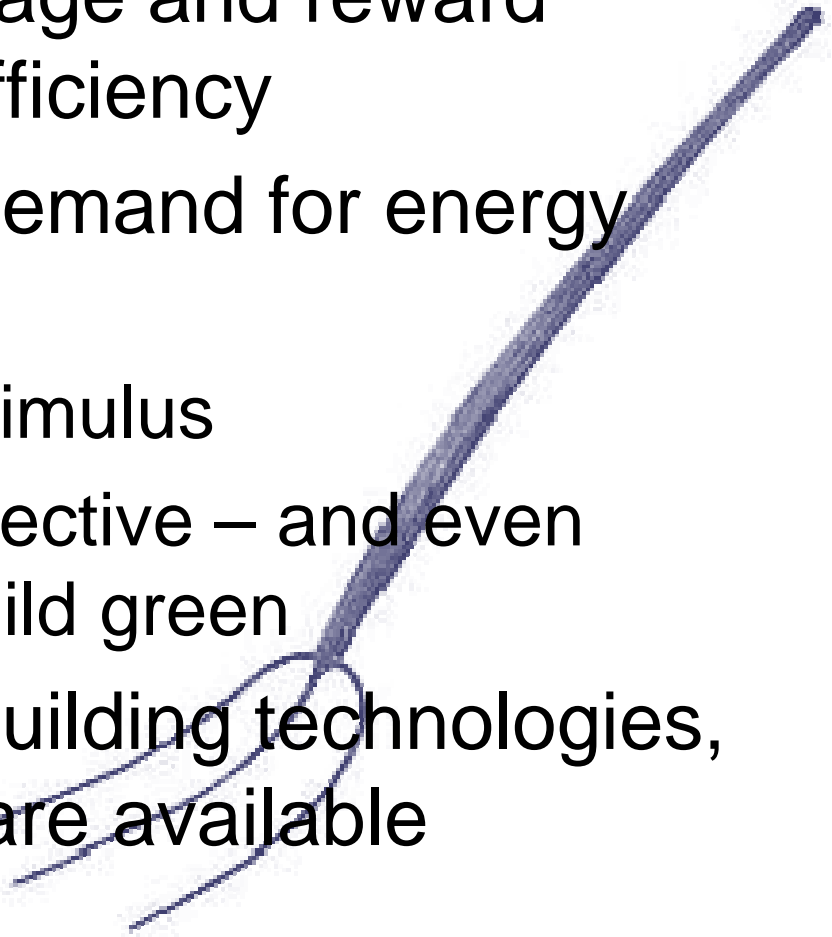


- Lots of organizations and agencies
 - California's Energy Code ("Title 24"), AB 32, AB 811, and more
 - US Green Building Council - LEED
 - Build It Green – Green Point Rating
 - Cool Cities – Sierra Club
 - Architecture 2030
 - Rocky Mountain Institute's Built Environment Team
 - National Association of Home Builders (NAHB)
 - Federal Government's Net Zero initiatives, stimulus package, Energy Star, and HERS
 - PG&E
 - California PUC's Long-term Energy Efficiency Strategic Plan
 - Germany's PassivHaus Institute
- Many individuals





What Has to Be Done: A Three-Pronged Approach

- Policies to encourage and reward extreme energy efficiency
 - Create a market demand for energy efficiency
 - Via education, stimulus
 - It can be cost-effective – and even profitable – to build green
 - Ensure designs, building technologies, and components are available
- 



How?



- Mandates and incentives (in addition to LEED-based mandates and Title 24)
 - “Plug and play” – make it easy for people to choose extreme efficiency
 - Tie into Federal funding so municipalities can afford them
- Education and market building
 - Better terminology
 - Show it can work with normal-look CA houses
- Market development
 - Training architects and builders
 - Importing components and bootstrapping local manufacturers

Why Silicon Valley?

- There's still money here
- Very green-oriented
- Respond to incentives
- Always leading edge
- CA is a gigantic market
 - > 50,000 residential starts in a normal year
 - Could drive entire market for affordable windows, doors, HRVs and ERVs
 - Fifth largest economy in the world
- California is a less challenging state for Passive Houses
 - Industry can learn a lot before having to solve issues in Fargo, ND
- Silicon Valley leads California
 - Where California goes, the U.S. follows



Progress: Codes and Mandates



- New version of Title 24 this year
 - Includes variance for performance modeling
- Sunnyvale and Palo Alto have stringent mandates
 - Based on LEED and/or Build It Green's Green Rating
 - Other municipalities following
 - Cool Cities outcome



Challenges



- Title 24 – could be stronger, sometimes a barrier to better
- Few suppliers; expensive materials and components
- Architects and builders don't have the skills (yet)
 - Design
 - Collaboration
 - Insulation and envelope
- There are few “California-ready” PH designs
 - E.g., Mission style, Craftsman style, ranch style, “contemporary Californian,” etc.
- Misaligned incentives on commercial buildings due to capital budgets (costs) vs. operational (benefits)
- Lots of inertia in the construction industry
 - How do you market new building technologies?

Imagine A Future of Good Guy Buildings

- 25% less U.S. GHGs by 2050 by making buildings better
 - All new buildings
 - 80% of the worst old buildings
- Improved productivity and comfort
- Sets an example for the rest of the world
- Contributes to a revitalized economy based on actual value

