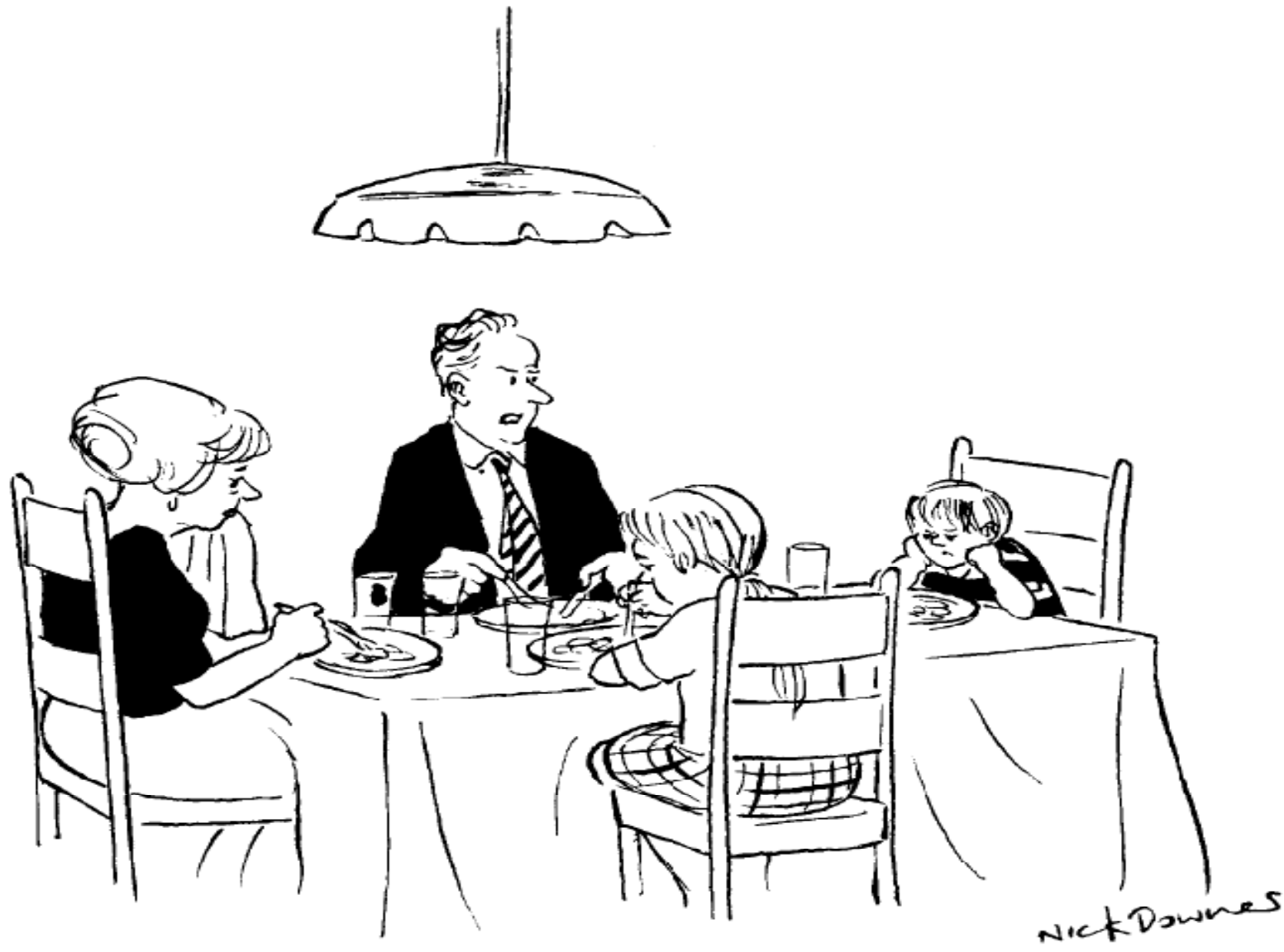

A Whole Systems Integrated Approach – Shifting the Way We Think about Buildings

NAESCO Midwest Regional Meeting

Helen J. Kessler, FAIA, LEED A.P.
HJKessler Associates

11 June 2008

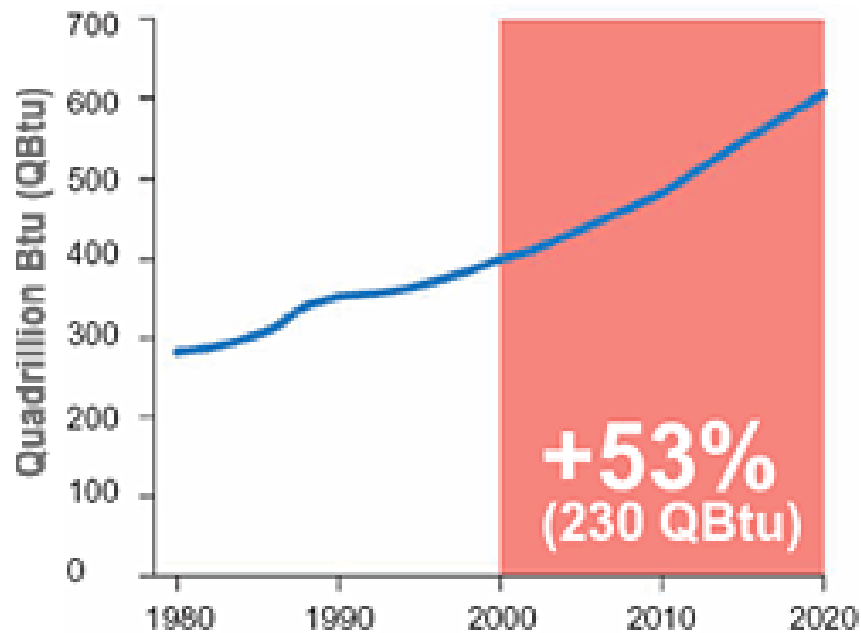


"Have you any idea, young man, how much water was polluted, energy consumed, top-soil eroded, and pesticides pumped into the atmosphere in order for those beans to be on your plate?"

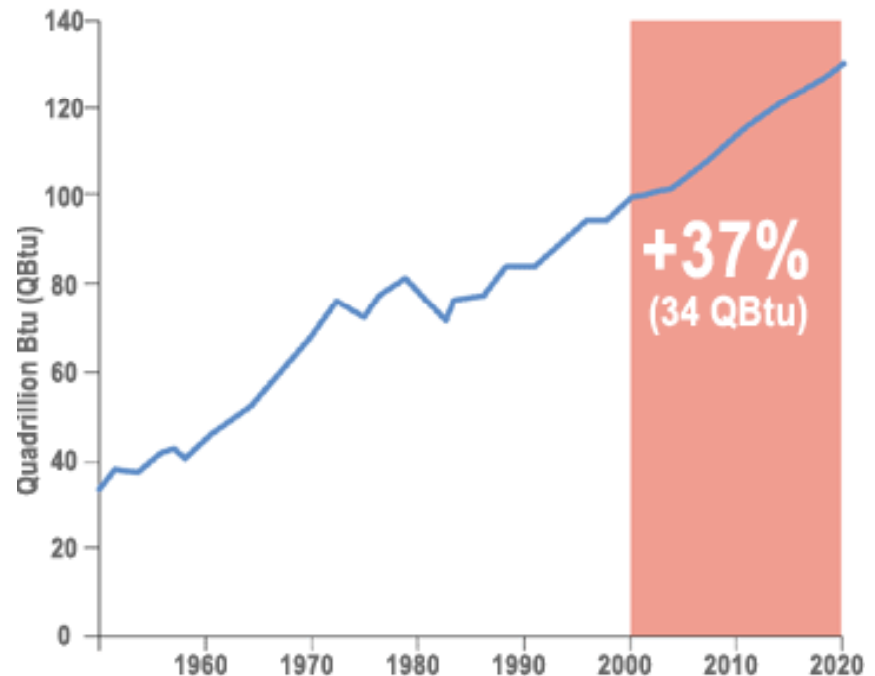
Overview

- Building's Impact on the Environment
 - An Integrated Way of Thinking About Buildings and Efficiency
-

Energy Consumption Projections



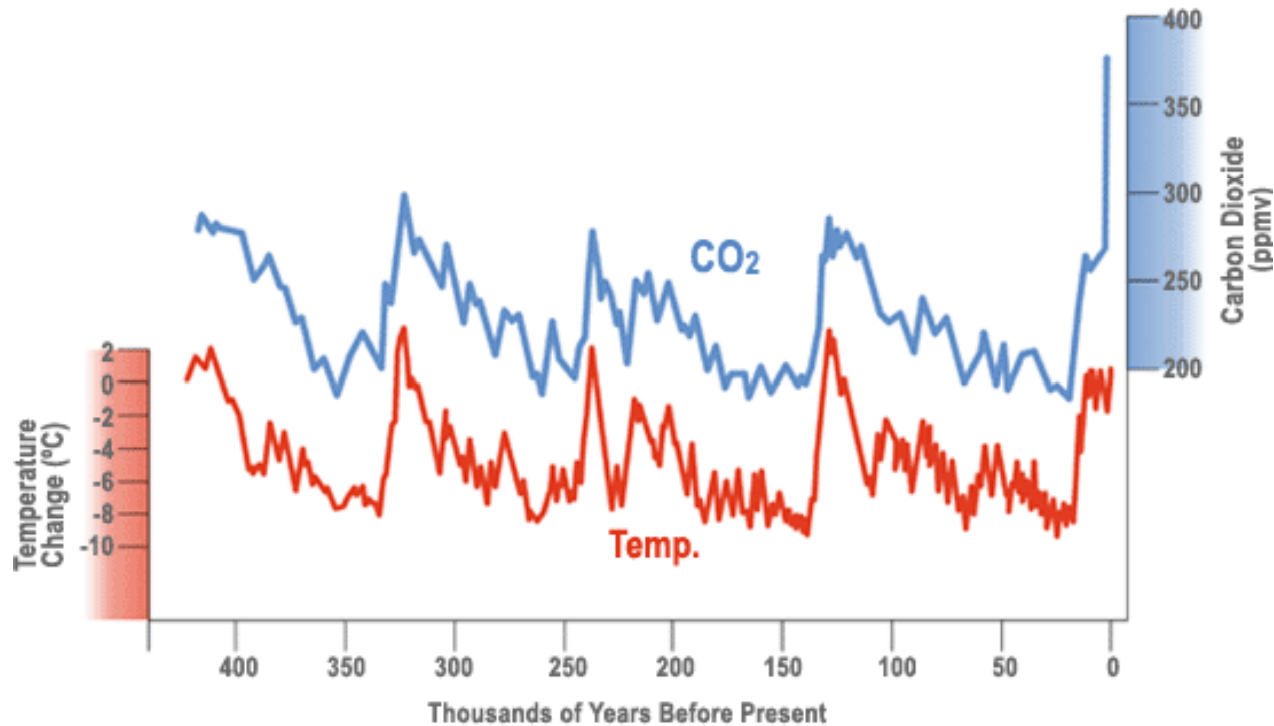
World
Energy Consumption Projections



U.S. Energy Consumption Projections – China, which currently uses 1/3 of what we use today will use as much as we use today by 2020.

Source: U.S. Energy Information Administration Statistics Center

Global Temperature and CO₂



Concentrations of CO₂ in the atmosphere have not been higher than 300 ppm for the past 450,000 years.

Source: UN Intergovernmental Panel on Climate Change (IPCC),
Third Assessment Report, Climate Change 2001

Graphic: [Woods Hole Research Center](#)

Melting Arctic Ice



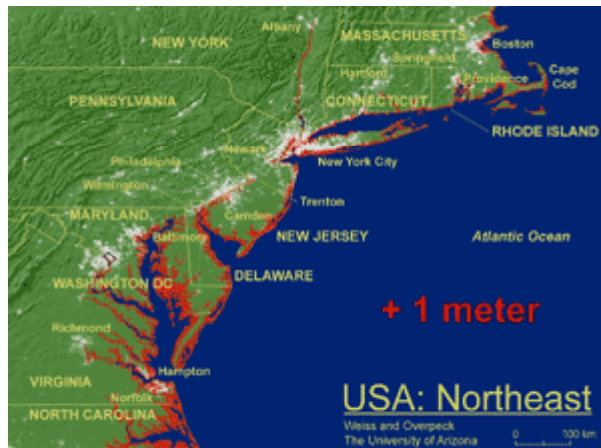
1979



2003

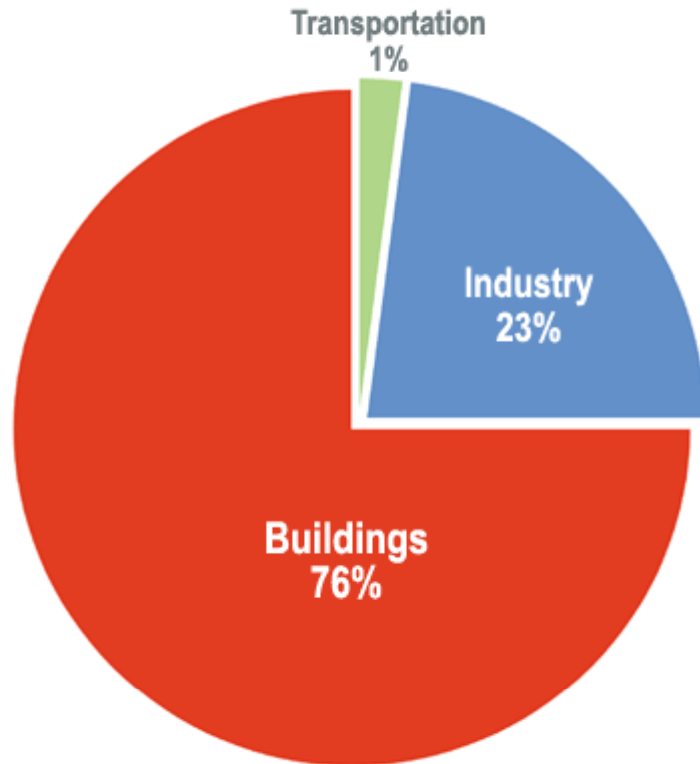
Melting ice could raise sea levels by 3 feet by 2100. If Greenland melts, sea level would rise 23 feet!

Sea Level Rise Due to Melting Ice Pack



Weiss and Overpeck, The University of Arizona
www.architecture2030.org

U.S. Electrical Energy Consumption



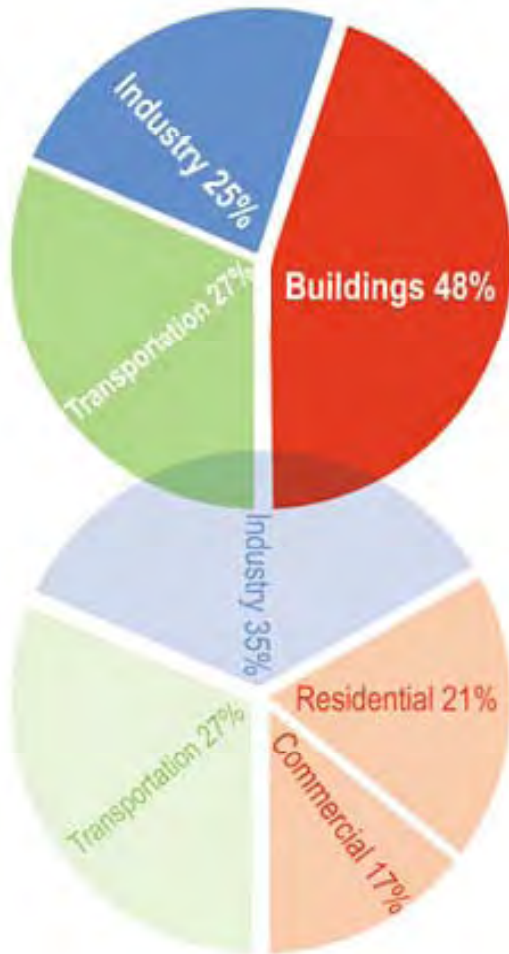
Source: U.S. Energy Information Administration

The Building Sector is the major global greenhouse gas emitting sector!

And it is poised to fuel the world's rush toward climate change on the back of coal.

The U.S. alone is projected to build 1,300 to 1,900 new power plants over the next 20 years (about one plant every week)...

U.S. Energy Consumption by Sector



“Unknowingly, the architecture and building community is responsible for almost half of all U.S. greenhouse gas emissions annually.

Globally the percentage is even greater.”

www.architecture2030.org

Source:

U.S. Energy Information Administration statistics

Graphic Published first in [Metropolis Magazine](#), 10/2003

So Now What?

Reduce Carbon Emissions Through Smart Building Design

1. Design and Innovation – using low energy consumption and efficient design strategies
 2. Intelligent use of technology, including efficient mechanical, electrical and renewable energy systems
 - Tunneling through the cost barriers (a goal!)
 - Modeling the interactions
 - HVAC, lighting, envelope, glazing, etc
 3. Renewable energy credits
-

How Do We Get to More Sustainable Design/Eco-Design?

- Ask Questions

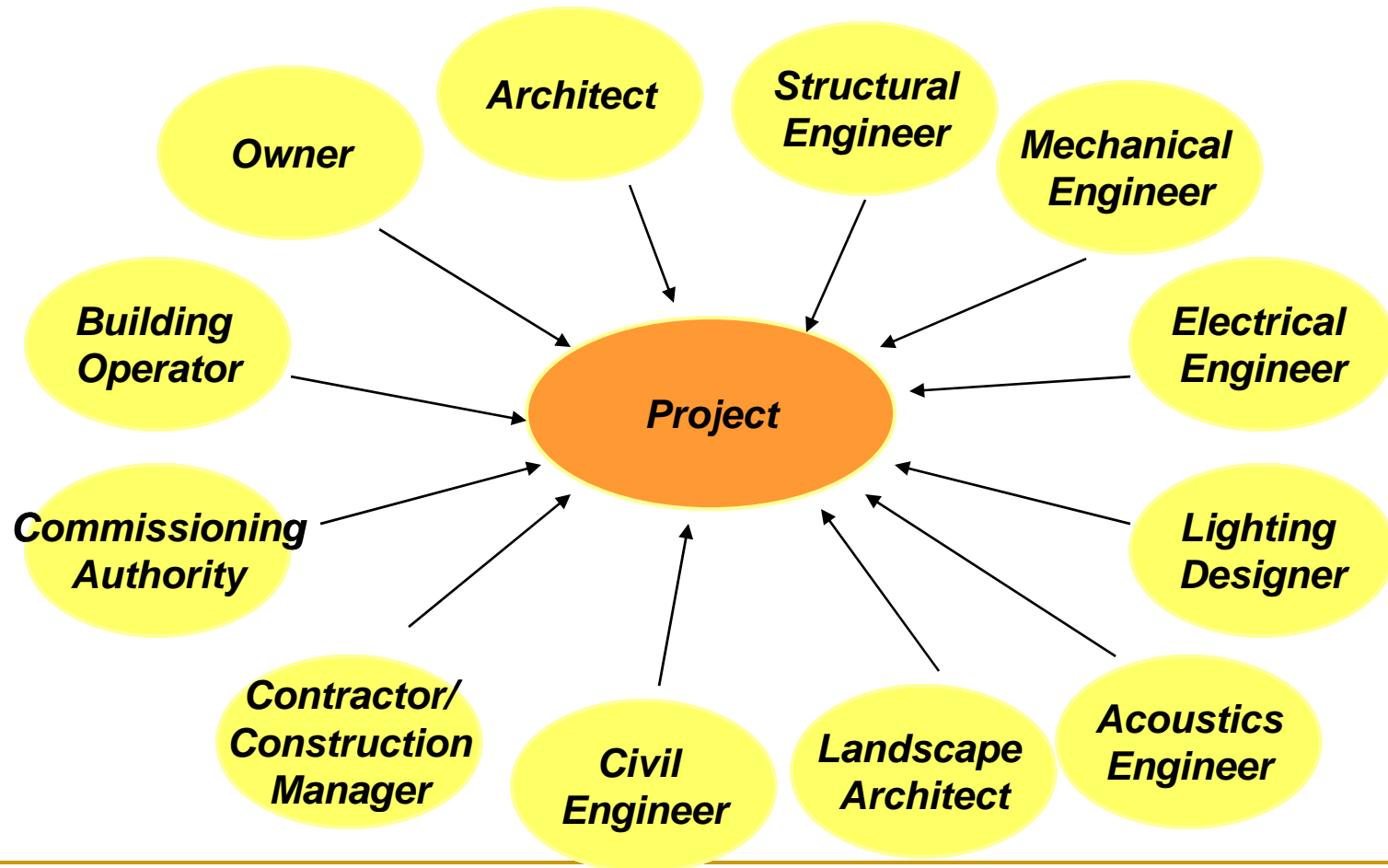
- Site
- Water
- Energy
- Materials
- Indoor Environmental Quality

- More than a Rating System

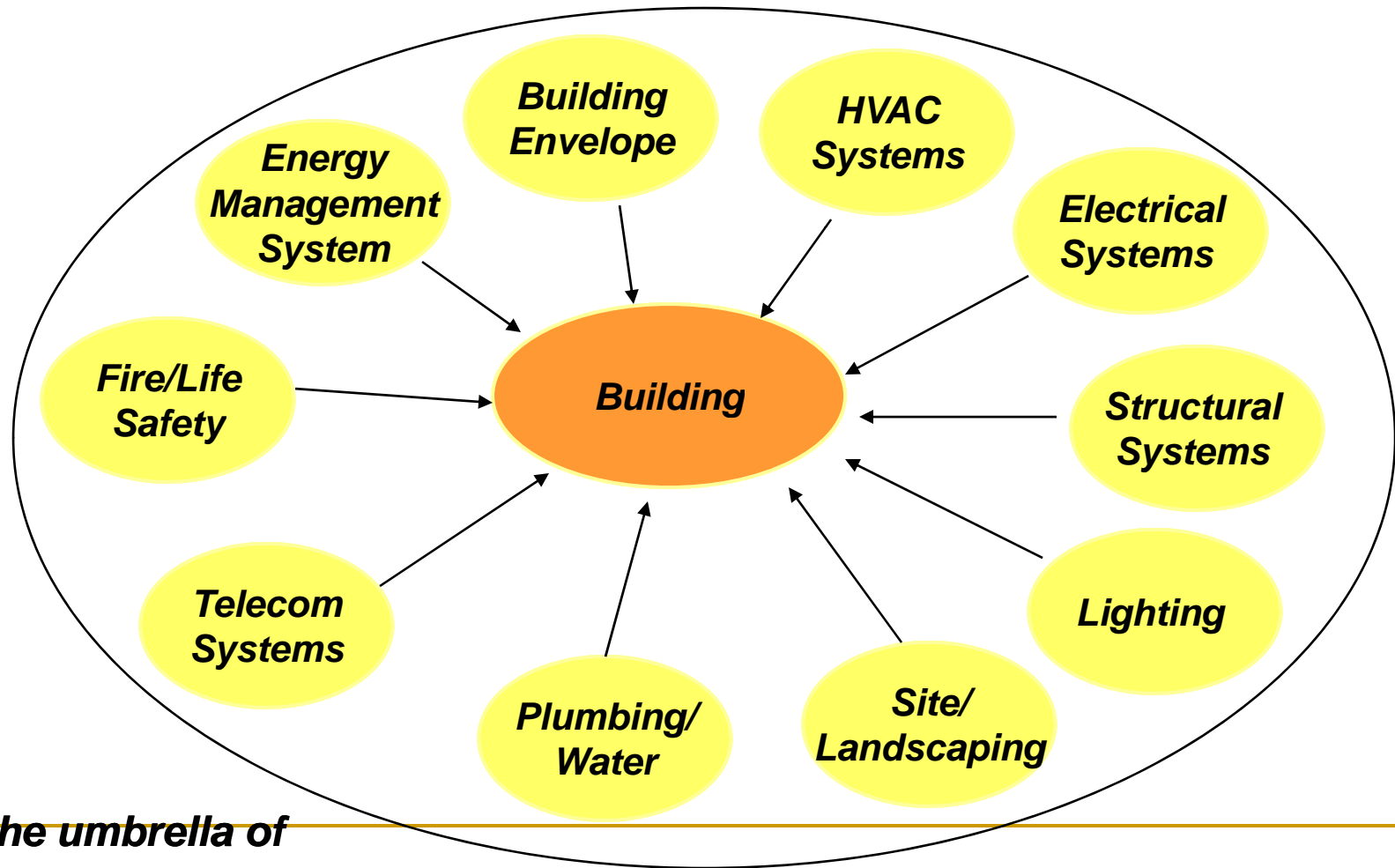
- How would we know we've created a (more) sustainable project?



Interdisciplinary Team Working Together From Project Inception



Integrated Design - All Building Systems Designed Together



Under the umbrella of operations and maintenance

Shifting the Way We Think

From a linear process to



an interactive process

to

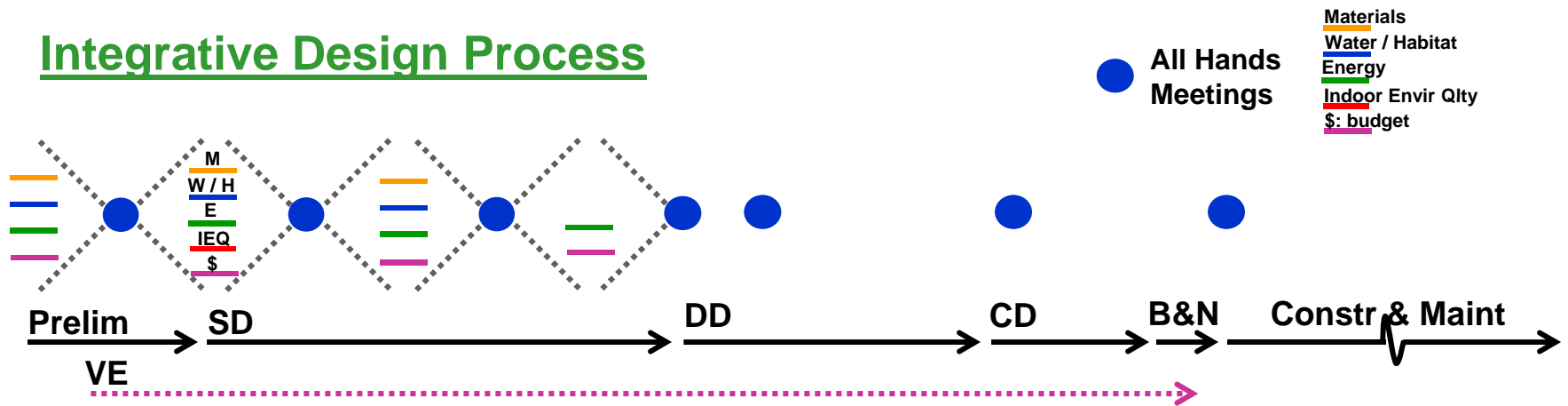


an interdisciplinary
process to

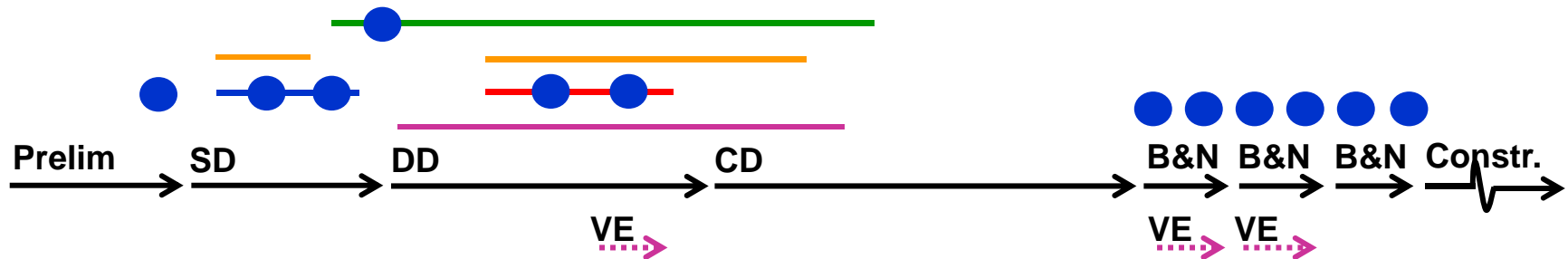


a whole systems
process

Integrative Design Process



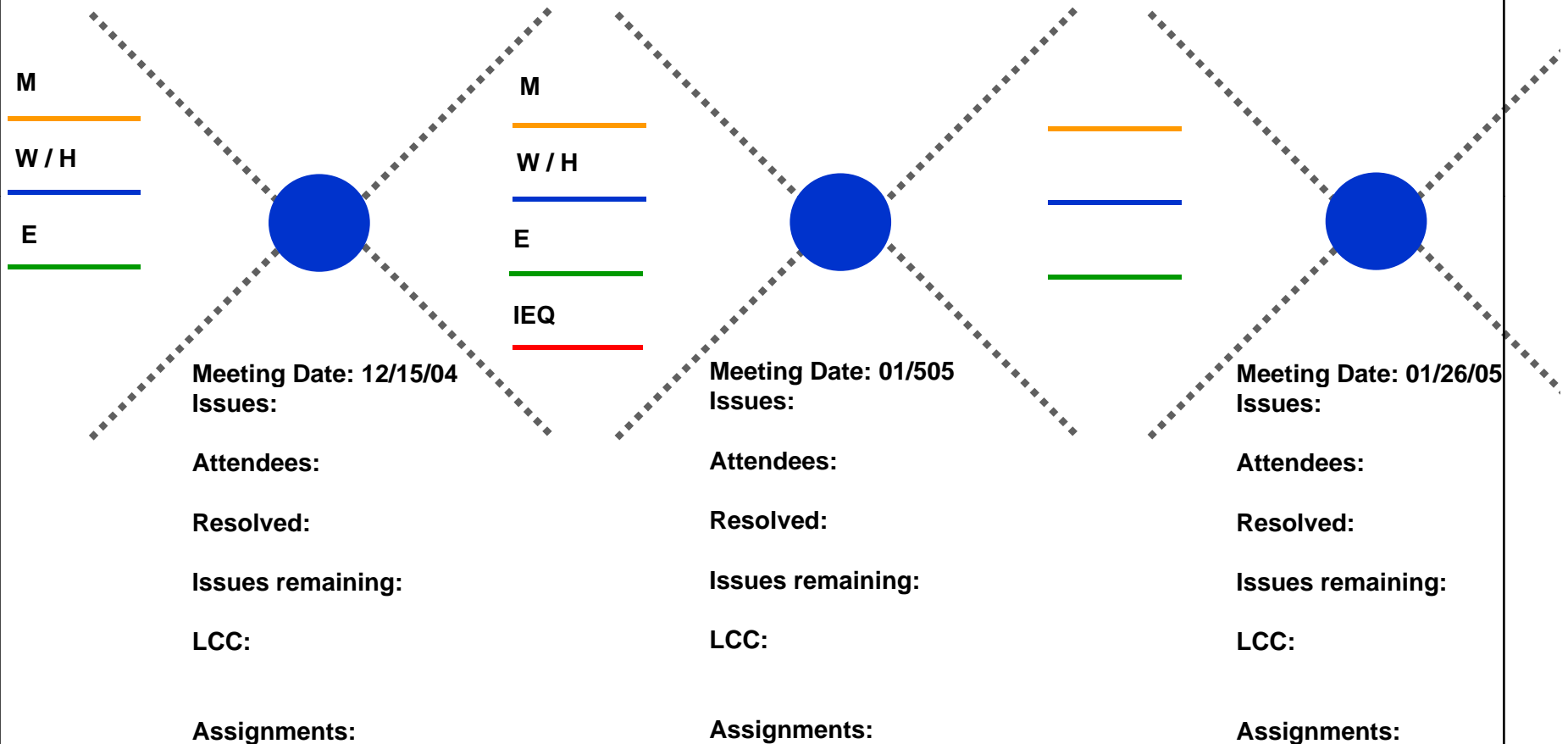
Linear Design Process



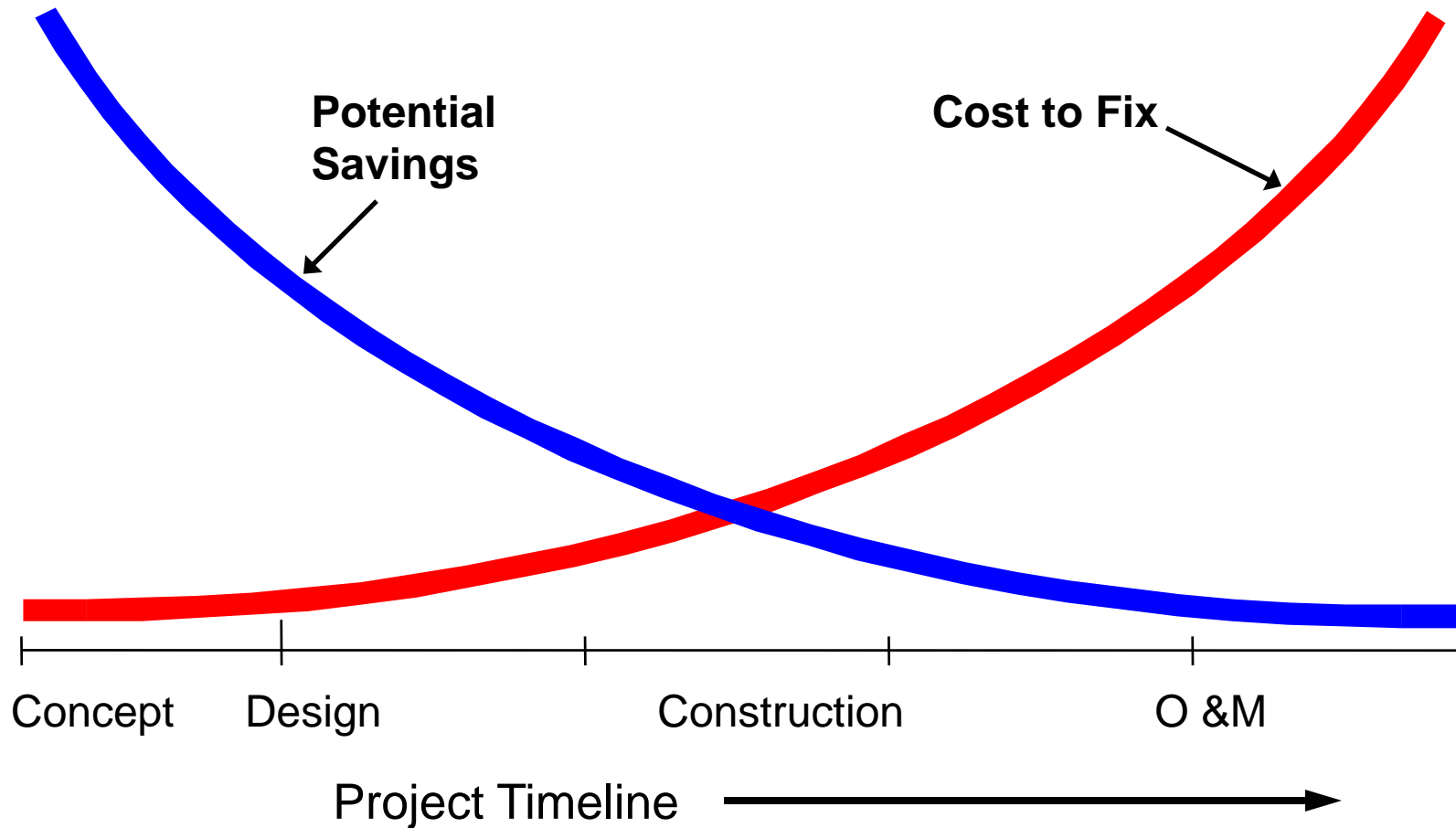
How do we realize it?

Integrative Design Process

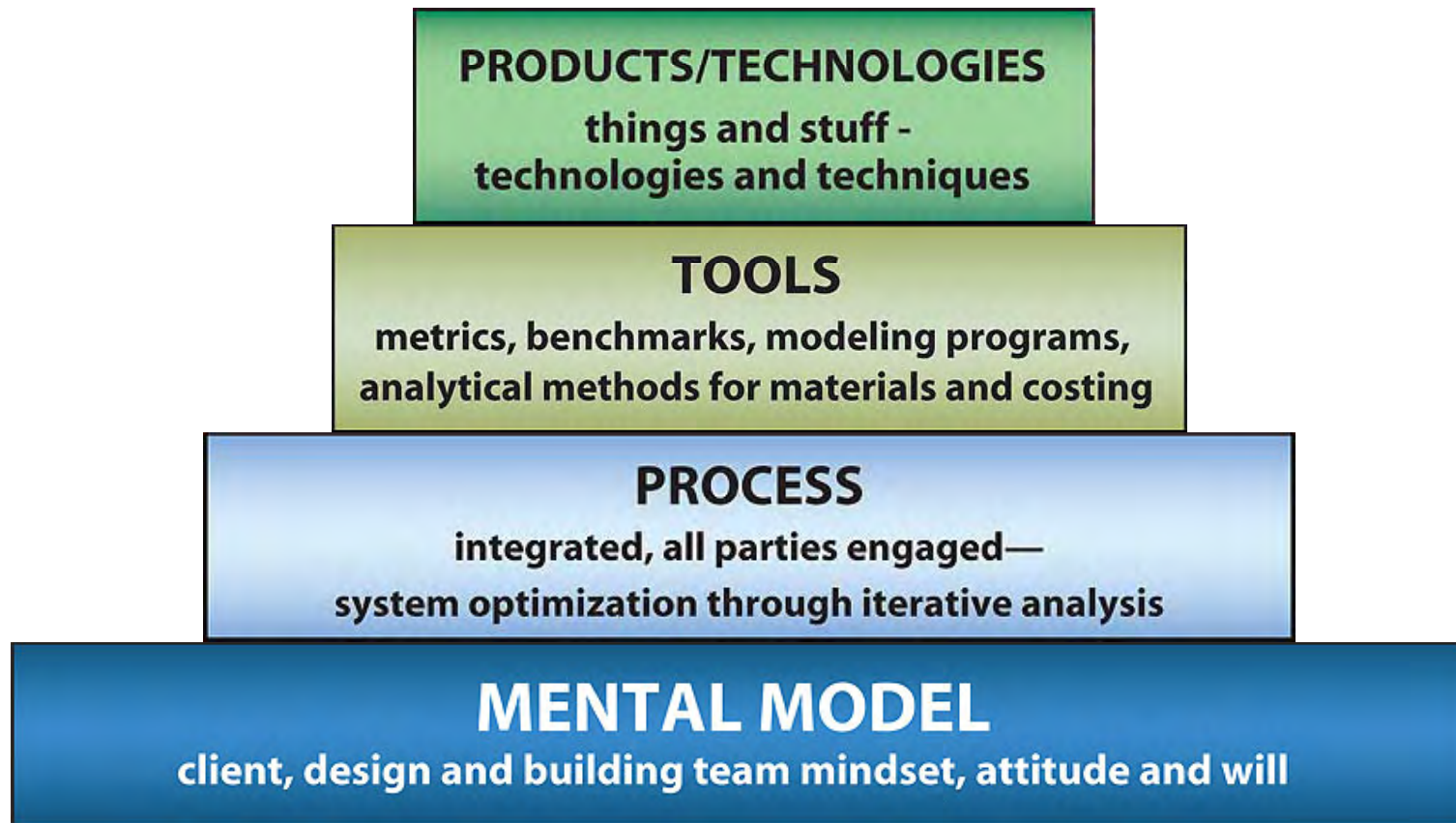
Joint decision-making and problem-solving (not just individual assignments that are later integrated into a whole);



Potential Savings vs. Project Schedule



What's Needed for Integrative Design?



Concept by Bill Reed and Barbra Batshalom

Some Goals of an Integrative Process

- Optimized costs
 - Space designed to be more suitable for occupant – higher productivity
 - Resource efficiency
 - Environmental stewardship
 - On time, on budget
-

Trends in Green Building

- Rapid Growth – LEED registration/certification
 - Higher levels of green achievement – Silver, the new Certified?
 - Shifting expectations
 - Manufacturers improving products
 - Cradle to cradle
 - Still needed:
 - How to deal with split incentives
 - A concerted effort to getting to zero carbon
 - Regeneration of systems
-

Conclusions

- Current level of resource consumption and carbon emissions is globally unsustainable
 - Buildings -- the primary energy users and source of carbon emissions
 - Use an integrative approach to building design
 - Start early
 - Include everyone on design team (owner, designers, occupants, operators)
 - Use whole systems approach to maximize efficiency
 - **We have no time to lose!!**
-



*"What use is a house
if you haven't a tolerable planet to put it on?"*

Henry David Thoreau
