

Integrated Project Delivery for Passive Houses & Net-Zero Homes



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Why?

- The key to energy efficiency is **INTEGRATED PROJECT DELIVERY (IPD)**
- The key to IPD is revolutionary **CHANGE** to business as usual
- All green building professionals are **AGENTS OF CHANGE**

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Effecting change ... EFFECTIVELY

MOST EFFECTIVE

LEAST EFFECTIVE

- **New MINDSET – reeducate**
 - Public
 - Design professionals & students
 - Building professionals & trades
 - Finance and real estate professionals
 - Educators (yes, even them)
- **New PROCESSES – revamp**
 - Goal-setting
 - Design collaboration
 - Energy modeling
 - Construction
- **New TOOLS – reevaluate and redesign**
 - Energy models
 - Collaboration tools
- **New TECHNOLOGIES ... maybe?**

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Defining “Integrated”

An **integrated project TEAM** is one that is unified by coming together to work as a whole.

and

In an **integrated building DESIGN**, the building components and their interconnections are brought together into a unified whole.

THIS ↓

© Pressmaster | Dreamstime.com

NOT

THAT ↓

© Alexei Gubanov | Dreamstime.com

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Integrated Processes

- Recognize that each aspect of building design & performance influences others
 - Envelope affects HVAC sizing
 - Windows affect lighting loads
 - Lighting affects cooling loads
 - Waste heat from one process can be pre-heating for another
 - And so on ...



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Integrated Process Principles

1. If your **PROCESS IS SOUND**, good outcomes will follow.
2. A sound process, **carried out by the RIGHT PEOPLE**, all but guarantees a good project (or product).
3. **The person left out is the one who will cause trouble.**



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Who are the RIGHT PEOPLE?



- Owner/developer
- Architect
- Contractor/builder, **subs, WORKERS!**
- MEP consultant, energy analyst
- Structural, interiors, lighting, landscape ...
- Renewables consultant/vendor

QUALIFIED,
COMMITTED,
& CREATIVE!

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EE* is a Recessive Gene

*EE = ENERGY EFFICIENCY

EE Design + EE Construction = EE Buildings

[ORDINARY]
Design
+
EE Construction
≠
EE Buildings

EE Design
+
[ORDINARY]
Construction
≠
EE Buildings

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What's a SOUND PROCESS?

1. Set goals – net-zero definition and project boundary or scope – and priorities.
2. Build a qualified team.
3. Engage whole team with charrette(s).
4. Promote teamwork as you work through the design.
5. Model energy use early and often.

TYPICAL INTERACTIONS REQUIRING INTEGRATION

	Landscape Architect	MEP	Energy Modeler	Owner	Architect	Builder
Landscape design/shading	■	■	■			
Hot water distribution		■	■	■	■	■
Water heating system		■	■			■
Ventilation / air quality		■	■			■
Heating & cooling system(s)		■	■		■	■
Materials selection	■		■	■	■	■

Based on Figure 3-6 (p. 63), *Energy Free: Homes for a Small Planet*

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Launching an Integrated Process

- Ensure owner's commitment to an integrated process
- Hold a charrette
- Establish communication protocols
- Meet regularly
- Identify responsibilities and **interactions** for all parties



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The KEY to Integrated Processes

WELL, OK, it's ONE key!

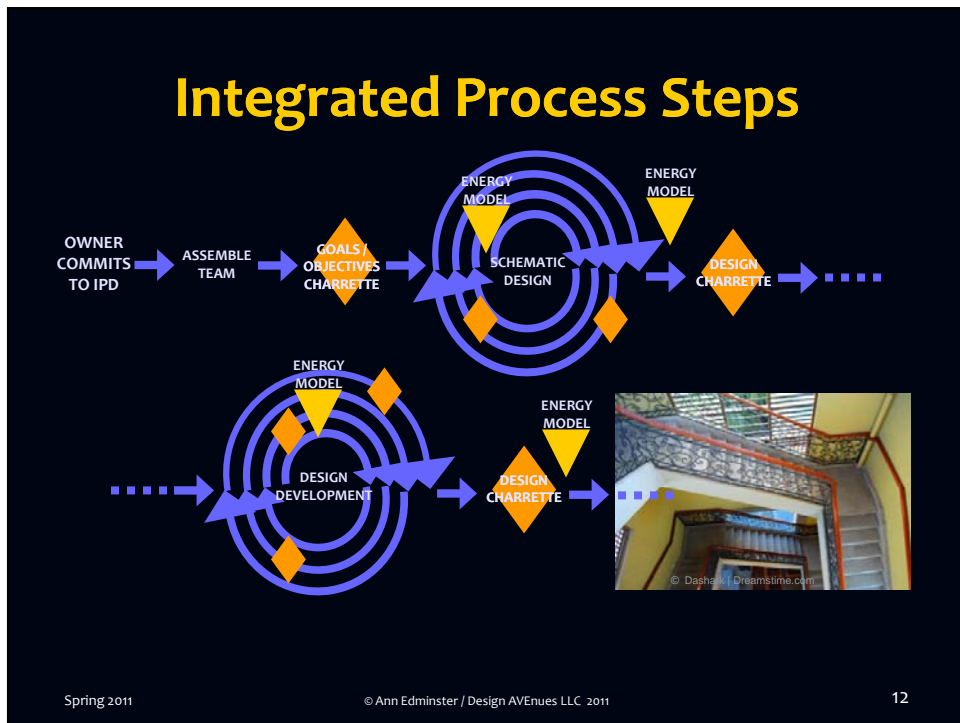
is ENERGY MODELING ...

YES

NO

Never mind code compliance – modeling is a DESIGN OPTIMIZATION tool!

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Integrated Process Benefits

“Integrated design can reduce construction cost while providing significant sustainable design benefits. On the CSU [California State University] Monterey Bay Library, by comparing a number of integrated structural, mechanical, and architectural schemes, we found that tradeoffs from one discipline more than offset added costs in another, while achieving energy savings of almost 40 percent.”

~ Scott Shell,
EHDD Architects



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Integrated Processes Save time and money

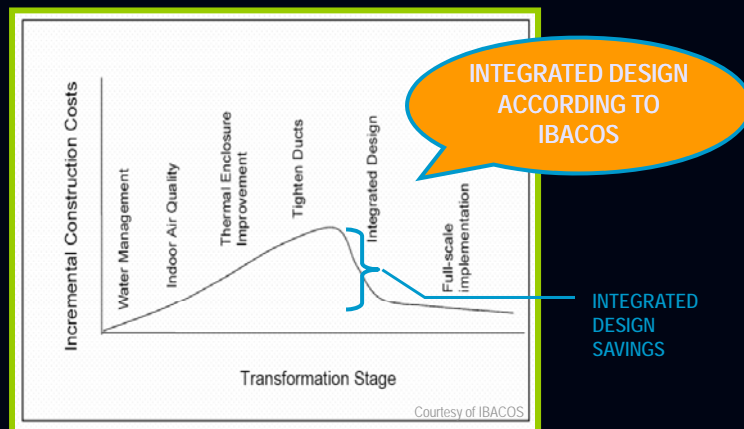


Figure 3-7 (p. 69), Energy Free: Homes for a Small Planet

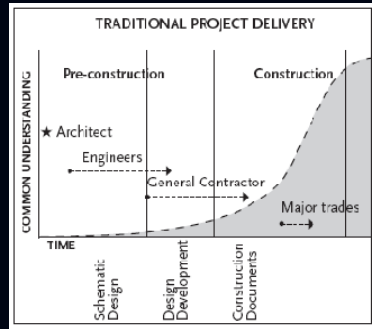
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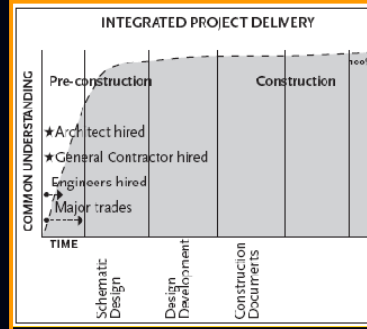
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Why Integration Works

Common understanding develops EARLY!



Business as usual



Integrated project delivery

Figure 3-1 (p. 48), Energy Free: Homes for a Small Planet
Original graphs courtesy of Will Lichtig

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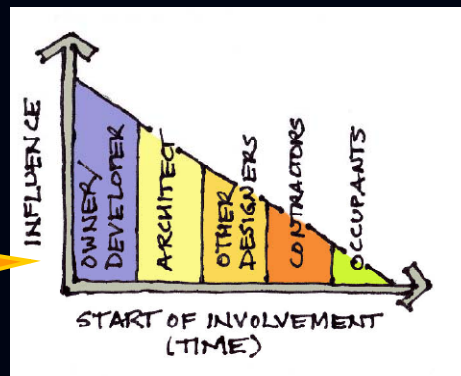
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Another Perspective

Ability to influence design & construction performance is a function of:

- Degree of integration (i.e., when involvement starts)
- Ownership structure

CONVENTIONAL, DEVELOPER-DRIVEN PROJECT

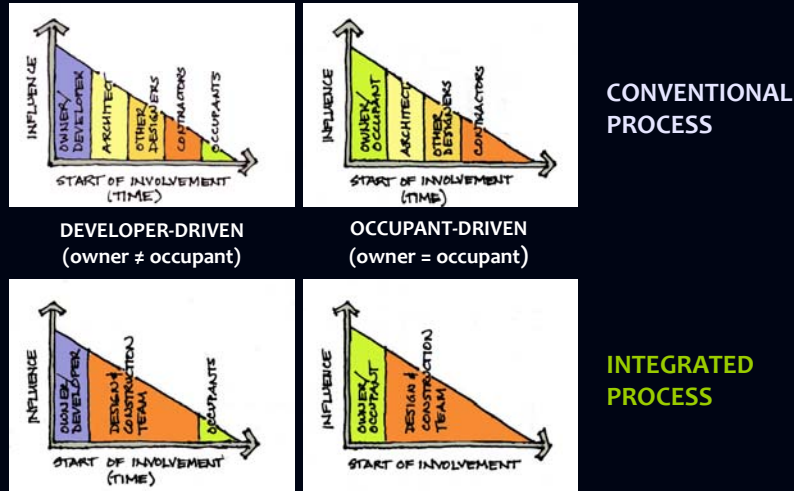


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Players' Ability to Influence Design & Performance



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Early Contractor Involvement

- **PROBLEM:** Contractors are not involved until late in the process
- **PROBLEM:** Contractors are pressured for lowest bid

WHAT'S THE SOLUTION?

How can contractors get involved early?

How do we get past design-bid-build?

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Integrated Design

- Develop a design concept
- Test alternatives using parametric analysis – evaluate effect of one variable at a time on:
 - energy performance
 - constructability & cost
 - other aspects of design
- Test different combinations



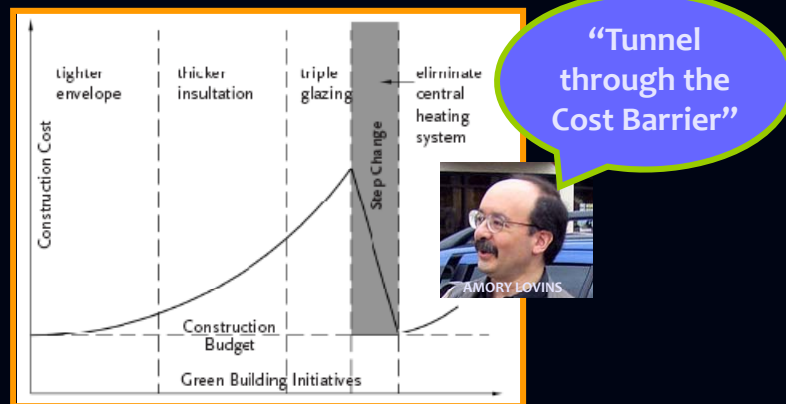
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Integrated Design

Save time and money – optimize PACKAGES



Courtesy of Bruce Coldham, Coldham & Hartman Architects
 Figure 2-1 (p. 21), *Energy Free: Homes for a Small Planet*

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Information Resources

Use research to **MAXIMIZE VALUE**

BUILDING AMERICA 50% Savings Packages	MARINE CLIMATE (Seattle, San Francisco)	HOT/MIXED DRY (Phoenix, Palm Desert)
HDD / CDD	4,854 / 191	1,117 / 3,888
Wall assembly	2x6, R-21 cavity + 1.5" continuous insulation	2x6, R-21 cavity
Ceiling assembly	R-50	R-30
SLA / ACH50	.00015 / 2.6	.0003 / 5.3
Glazing	Low-E, standard SHGC, argon fill (U-0.29, SHGC 0.30)	Low-E, standard SHGC (U-0.30, SHGC 0.26)
Air conditioning	SEER 15+	SEER 13
Heating	AFUE 90+ furnace <i>or</i> HSPF 8.8+ heat pump	AFUE 80 furnace <i>or</i> HSPF 8.1 heat pump
Water heating	gas tankless EF 0.8+ <i>or</i> premium electric EF 0.95+ 64-sf closed-loop solar thermal system	gas tankless EF 0.8+ <i>or</i> electric EF 0.9+








Your tax \$\$ at work!

Excerpted from Figure 2-17 (p. 43), *Energy Free: Homes for a Small Planet*

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Information Resources

Save \$, don't reinvent the wheel!

- Building America (50% savings packages) 
- BuildingGreen.com 
- GreenBuildingAdvisor.com 
- National Renewable Energy Laboratory (NREL.gov) 
- Florida Solar Energy Center (FSEC.ucf.edu) 
- BuildingScience.com 

Case studies & MORE

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Collaboration Tools

The collage features several overlapping screenshots of collaboration tools:

- MindManager**: A mind mapping software interface with a central node labeled "BASECAMP".
- iLIV**: A logo for a live streaming or video collaboration tool.
- BuildingGreen.com**: A web application interface for "LEED for Homes" with a "CENTRAL DESKTOP" dashboard.
- Google Groups**: A screenshot of a Google Groups page showing various groups like "Resource Conservation Group Mailing List" and "NorCal Thousand Homes Challenge".

At the bottom of the collage, the text reads: "Spring 2011 © Ann Edminster / Design AVenues LLC 2011 23".

Meeting Resources

- Scheduling
 - Doodle.com
- Calling + remote desktop sharing
 - Skype
- Web-based meetings
 - Webex
 - GoToMeeting
 - Adobe Connect



Financial Resources



Charrette incentive: 50% up to \$5,000 (10+ units)



Roundtable facilitated by program staff



\$5,000 charrette grant for affordable housing

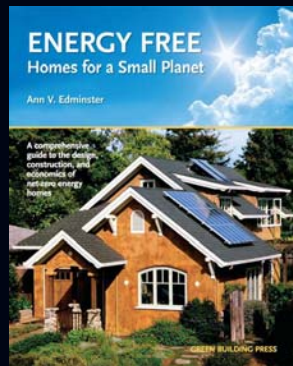


Database of State Incentives for Renewables and Efficiency

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Thank you!

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