



2009 NAA Green Conference & Exposition

April 28-29, 2009 • Phoenix Convention Center • Phoenix, Arizona

Affordable Green Housing: the Green Movement for Development, Redevelopment and Retrofit

Seminar Overview

- Cost/Benefits Report of Affordable Housing
- Top areas that make sense for Greening Affordable Housing
- Ideas to incorporate green into every project
- Questions and Answers

Costs / Benefits Report

- Grew out of demand for more information on how green applies to affordable housing
- Seeks to answer, “Is it worth it?”
- Originally identified 59 developments
- 16 cases completed
- Developed Net Present Value (NPV) analysis for measuring value
- 2005, New Ecology and the Tellus Institute



Overall Approach

- Compare life-cycle costs of actual green building developed versus hypothetical comparable conventional building
 - Total development costs
 - Operating costs (utilities, maintenance)
 - Replacement costs
- Consider first costs and life-cycle costs
- Discount future costs and savings to account for time value of money

Lessons Learned

- Cost of Greening
 - Mean: 4.95%
 - Median: 3.83%
 - Range: -25% to 38.94%
 - 11 of 16 cases under 5%

Lessons Learned from Report

- What does the premium buy?
 - Financial benefits: reduced costs and increases project value over 30 year life-cycle
 - Non-quantifiable benefits

Life-Cycle Analysis

- Different perspectives in terms of who pays and who benefits
 - Developers
 - Residents
 - Society
- Benefits of green accrue differently base on ownership structure

Residents Win!

- Utility costs are usually lowered
- Replacement costs reduced
- Total occupant (renter/owner) life-cycle benefits:
 - Median: \$7,370 per unit
 - Mean: \$12,637 per unit

In/Out Developer

- In and Out Developer usually does not benefit from any additional first costs
- Must have
 - Low increase in first cost
 - Ability to pass on increases
 - Creative Financing or Subsidy
 - Long-term interest in the property



Developers w/ Long Term Interest

- Common area utility costs lower
- Replacement costs reduced
- Green subsidies available
- Project experience counts (many first timers in study)



The Bottom Line

- Residents/Homeowners
 - win / draw in 16 of 16
- Owners/Developers
 - Win or draw in 7 of 16 cases before subsidy
- Owners/Developers
 - win or draw in 10 of 16 after subsidy
- Projects win in 14 of 16

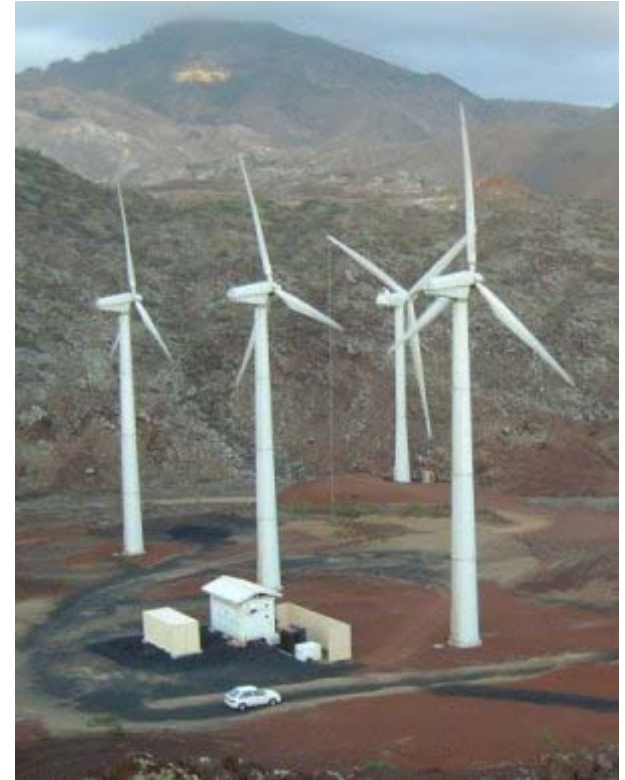


Cost Effectiveness

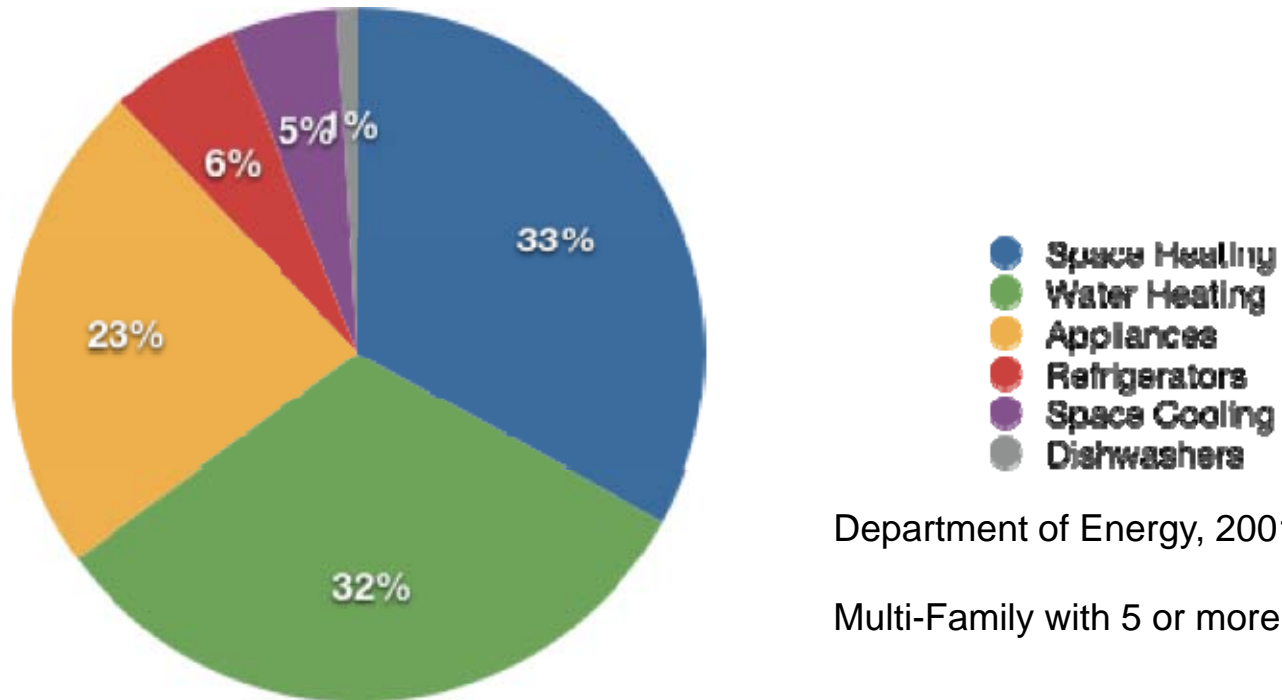
- It is cost effective to focus on
 - Energy
 - Water Efficiency
 - Landscaping/Drainage
 - Durability
 - Health
 - Waste

Energy

- For 5% or less, we can make buildings that:
 - Use 30-50% less energy than code to heat and cool
 - Use 20% less electricity



Energy Usage



Department of Energy, 2001

Multi-Family with 5 or more units

Energy Conservation

- Work with Energy Efficiency Expert
- HVAC
 - Direct vent Boiler – 92%+ efficiency
 - No Duct work installing within the units
- Plumbing
 - Lines insulated to 1”
 - Hot water lockouts on all washing machines

Energy Conservation

- Lighting
 - LED exit signs
 - In garage:
 - Reduce light to 1 light fixture for every two bays
 - Reduce light in center isle of garage down by 50% with motion sensors.
 - Install motion sensors in garbage / mech rooms
 - Outdoor lights to use photo cells

Water Efficiency

- For 5% or less, we can make buildings that:
 - Use 10-20% less water
 - Saves money on water bills, sewer bills, hot water heating bills



Water Efficiency

- Sub-metering
 - Compared with traditional in-rent properties, sub-metering reduced water use by: 16.4%
 - Savings of 22.8 gal/day/unit
- Low flow aerators on kitchen and bathroom
- Single shower heads
- Ultra-low flow toilets

Landscaping

- For 5% or less, we can make buildings that:
 - Have landscapes that are easier to maintain
 - Provide more amenities to occupants
 - Infiltrate stormwater



Landscaping

- Side walk around the building and to the exterior patios
- Site Improvements
 - Ensure usage of Silt Socks
 - Xeriscape - slow growing, drought tolerant plants to conserve water
 - Native plants requested

Durability

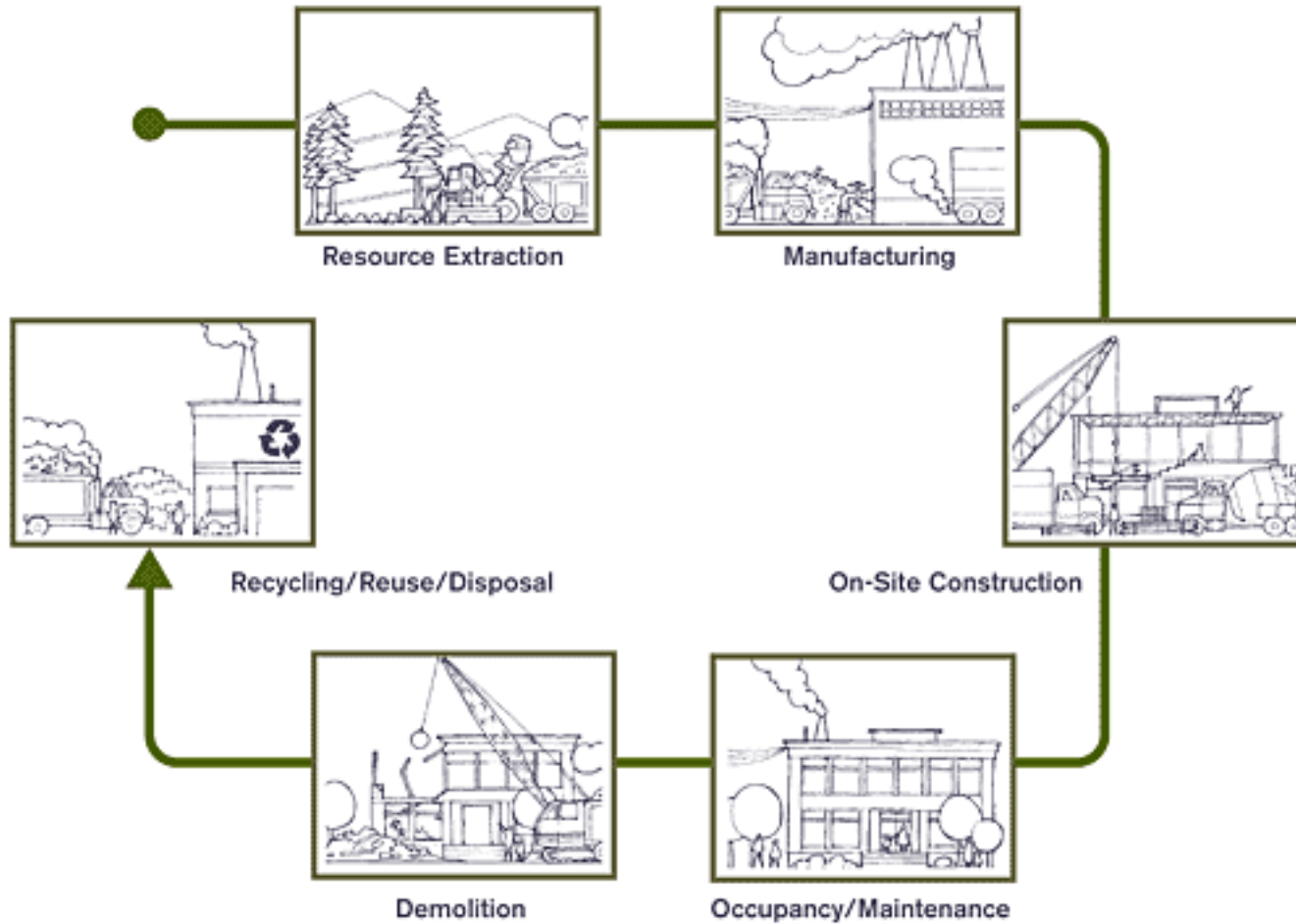
- For 5% we can make buildings that:
 - Are more durable
 - Cost less to maintain



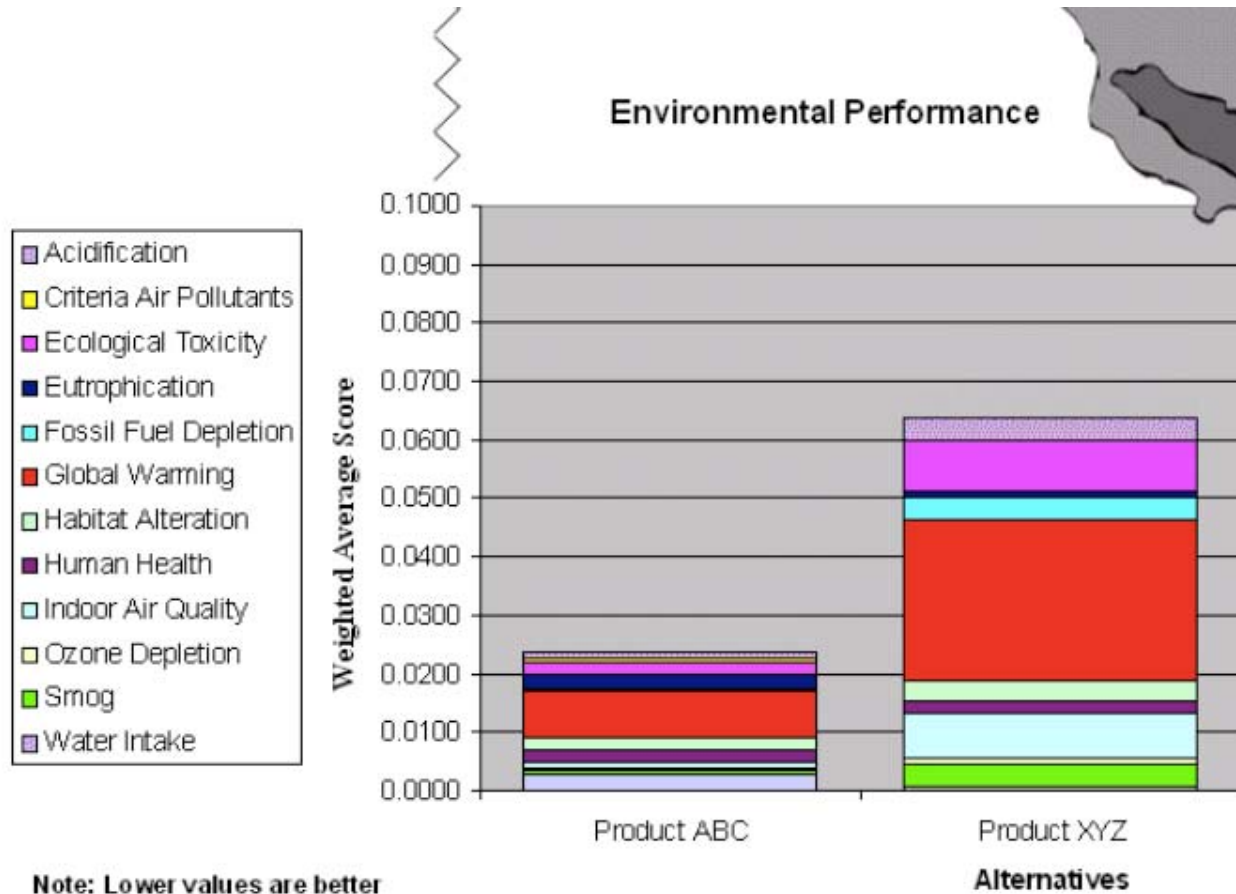
Durability

- Ensure good air sealing by caulking penetrations to exterior inside and outside
- Natural linoleum instead of sheet vinyl
- Regional brick exterior

LIFE CYCLE OF BUILDING PRODUCTS



BEEES



ATHENA Impact Estimator

- Allows users to evaluate whole buildings and assemblies based on internationally recognized LCA methodology
- The only software tool that evaluates whole buildings and assemblies
- Does not include an operating energy simulation



ATHENA EcoCalculator

- Provides instant LCA results for more than 400 common building assemblies (free of charge)
- Indicator of climate change impacts
- Uses ATHENA's Impact Estimator for Buildings tool to calculate results
- Commissioned by GBI for use with Green Globes



Microsoft Excel - GRI-LEA Tool FINAL-HIGH-RISE-1.1

File Edit View Insert Format Tools Data Window Help

Type a question for help

75%

AG1

Athena Institute

ATHENA ASSEMBLY EVALUATION TOOL—HIGH-RISE STRUCTURES

Version 1.1—FOR EVALUATION ONLY

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Tool developed by Morrison Knudsen, Athena Institute, and the Center for Sustainable Building Research at the University of Minnesota

POINT SUMMARY

Assembly Type	Primary Energy Points	GWP Points	Solid Waste Points	Air Pollution Index	Water Pollution Index	TOTAL Points Achieved
A. INTERMEDIATE FLOORS	0	0	0	0	0	0
B. INTERIOR WALLS	0	0	0	0	0	0
C. WINDOWS	0	0	0	0	0	0
D. EXTERIOR WALLS	0	0	0	0	0	0
E. ROOF	0	0	0	0	0	0
F. COLUMNS AND BEAMS	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0

Yellow highlighted areas show required in
Green highlighted areas show constant in
Blue highlighted areas show outputs calc
Magenta highlighted areas show total points

C. WINDOWS

IN THE YELLOW CELLS BELOW, ENTER THE PERCENTAGE THAT EACH ASSEMBLY IS USED IN YOUR BUILDING

Frame Type	Assembly Points	Percent of total	Possible Energy pt (2.00)	Possible Points	GWP pt (2.00)	Possible Points	Solid Waste pt (2.00)	Possible Points	Air Pollution Index	Possible Points	Water Pollution Index	Possible Points	TOT Possible Points
AVERAGE			44.13		38.81		41.68		7.3288		8.0914		
1 Aluminum	100	0%	8.2033	0	32.84	0	17.28	0	12.0938	0	0.0021	0	1
5 Curtainwall variable glazing	100	0%	298.23	4	28.77	1	5.93	0	7.3288	0	0.0010	0	4

WINDOWS TOTAL POINTS

Ready

Health of Occupants

- For 5% or less, we can make buildings that:
 - Healthier to live in
 - Provide better indoor air quality
 - Use less toxics and pesticides
 - More comfortable
 - Quieter



Health of Occupants

- Interior flooring air quality certified
- Hard-ducted bath fans - minimum of 70 CFM
- Manual J and Manual D for all HVAC
- Surface water drainage detail changed to shed water away from building into exterior gardens.
- Clothes dryers venting to exterior
- Low VOC paints

Waste reduction

- For 5% or less, we can make buildings that:
 - Recycle demolition and construction waste
 - Use recycled materials in construction



Waste reduction

- Recycling on-site: metal, wood cardboard, concrete.
- Charge subs \$90/hour to move items to correct dumpster if they put in wrong dumpster.
- Post number of dumpsters diverted from Landfill (recycled)

Why should we Green Affordable Housing?

- Rising Operation Costs
- Mitigate Risk of Liability
- Mitigate Risk of Cost Overruns
- Provide Sense of Community



Operation Costs

- Mitigate Risk of Rising Operating Costs
 - 25% of building operations budget is for Energy
- In Five years
 - Annual increase of 10% equals 30%
 - Annual increase of 20% equals 40%

 - Similar for water and sewer

Liability

- Mitigate Risk of Liability
- What is the next lead paint-type issue:
 - Asthma: increasing evidence that IAQ has significant effects on attacks
 - Mold
 - Pesticide exposure
 - VOCs and formaldehyde

Cost Overruns

- Mitigate Risk of Cost Overruns
- Green Building helps Control Costs:
 - Green = Quality Construction/Project
 - Strategy for field verification
 - Commissioning
 - Tenant/management education
 - Better planned and spec'd

Community

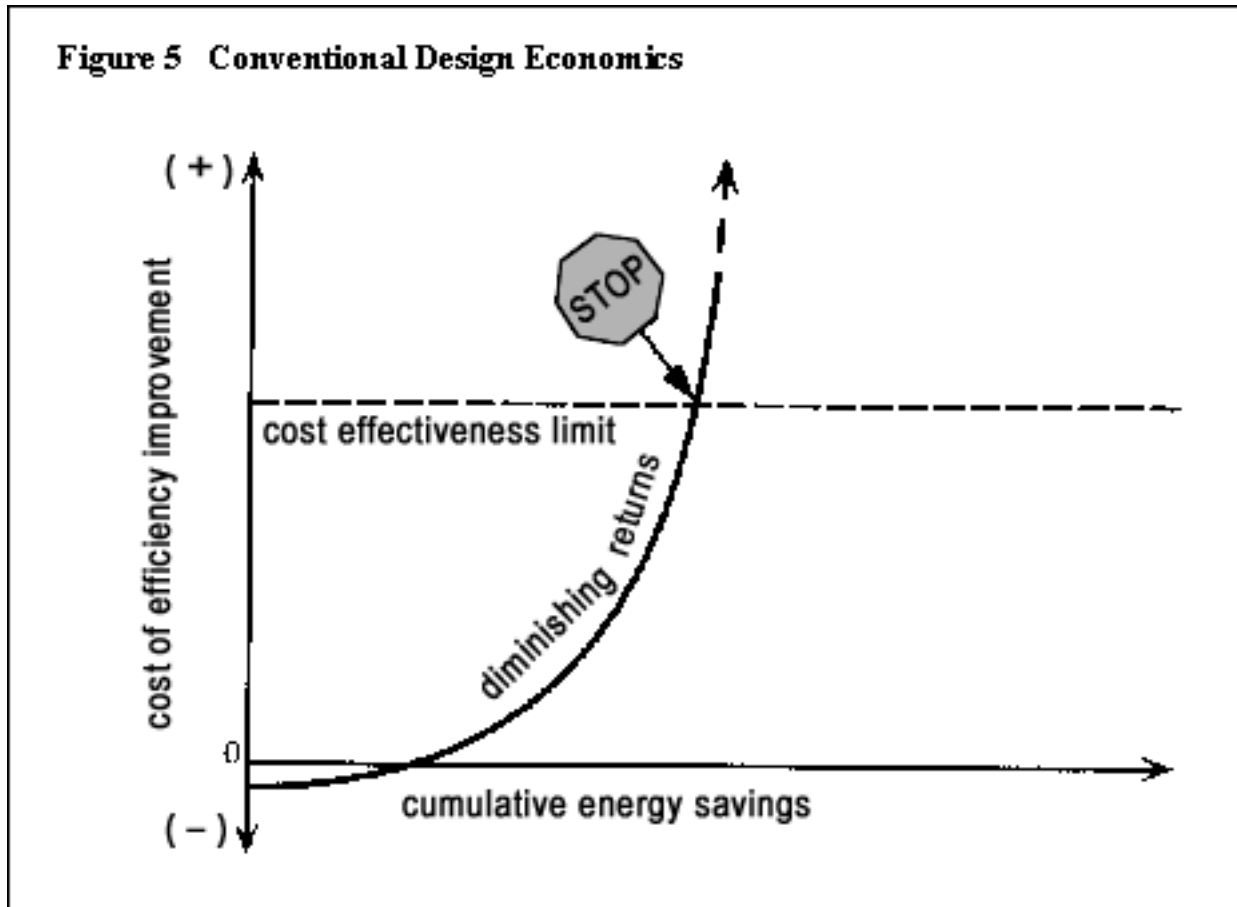
- Green provides a sense of community
- Pride of owning/living in superior product
- Compare commercial benefits
 - Productivity
 - Employee retention
 - Sick day usage

What do we need to change

- Failure to “Think Green” early
- Key Decisions made BEFORE goals set
- Lack of Green Team thinking

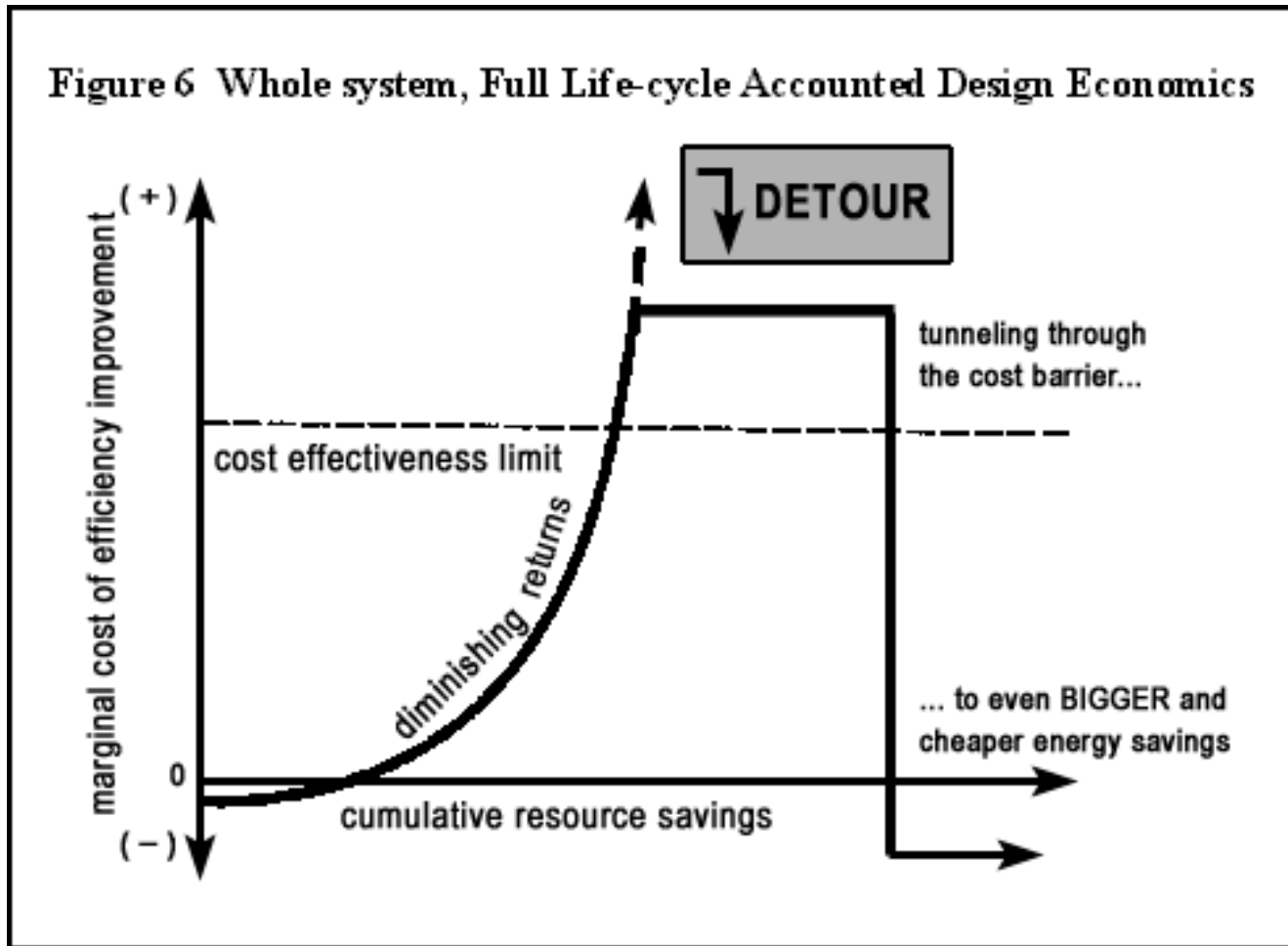


Conventional Design



Whole system design

Figure 6 Whole system, Full Life-cycle Accounted Design Economics



PLANNING

- It starts before you ever get to the job site



Learning from Successful Models



Greening all Projects

- Problem: Failure to “Think Green” early
- Solutions: Develop a vision that combines
 - Programmatic purpose
 - Building design
 - Building Performance
- Expect and demand a green project that meets all goals



Example of Goals

- Improve Energy Efficiency
 - Increase the use of energy efficient heating equipment
 - Reduce electrical light usage
 - Improve window performance
 - Maximize Insulation
- Reduce water usage
 - Limit water usage where appropriated
 - Change landscaping to reduce water usage

Example of Goals

- Ensure material selected are durable
 - Choose materials with longer life spans
- Uphold overall good environmental practices
 - Post project recycling efforts
 - Receive Green Building Certification
 - Choose and highlight recycled content products

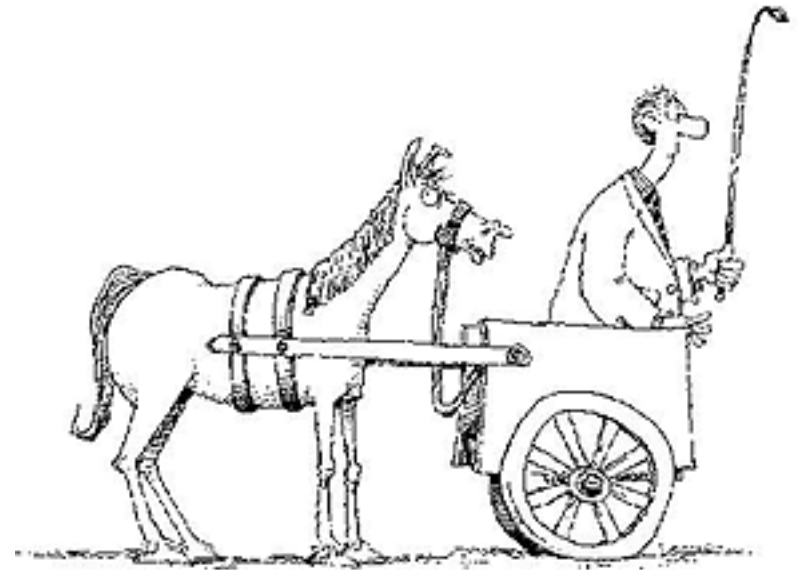
Greening all Projects

⑩ Problem: Key decisions made BEFORE goals

- Orientation, height/size, construction techniques, footprint

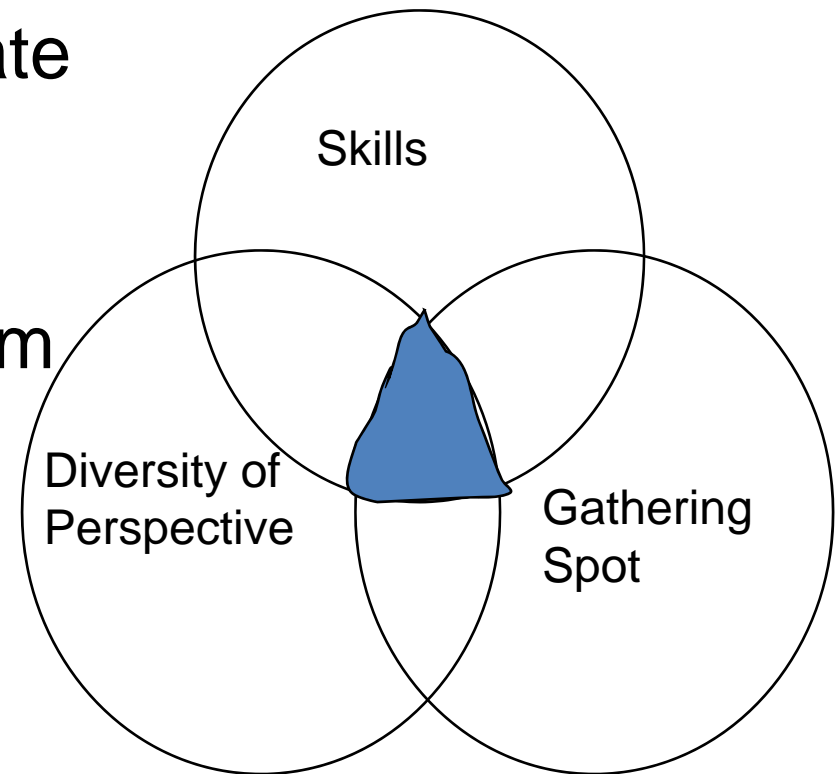
⑩ Solutions:

- Set design/program/performance goals first
- Green Project Team



Whole-building systems approach

- Integrate architecture with mechanical, electrical, and plumbing systems to create synergies
- Bring together architects, engineers, and others from across disciplines and technologies from project initiation



Components of a Charrette

- Includes all critical stakeholders
- Gives the design team a feel for the project site
- Ensures that needed expertise is available
- Focuses on the details without losing the big picture
- Generates “out of discipline” thinking
- Is fun and creative

Results

- Greener project
- Little incremental cost
- Teamwork and innovation
- Positive attention from outside groups
- Fewer call backs
- Happier tenants

Who forms a green team?

- Building Owner
- Builder
- HVAC
- Plumbing
- Framing/Insulator
- Architect
- Green consultant

Green team tasks

- Orientation
- Layout of rooms and functions
- Location of key items:
 - Fireplace
 - Windows
- Material and finish choices
- Handles documentation for certification

Conclusions

- Green Affordable Housing is:
 - Better designed and built
 - Not significantly more expensive
 - Cheaper to operate
 - Healthier
 - More environmentally sound
 - Less risky
 - Very much within our reach

Questions

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