Toolkit for Promoting Sustainable Development

CITY OF OAKLAND

August 29, 2001

California Integrated Waste Management Board
Toolkit Contents:

1. What is Green Building?
2. Benefits of Green Development
3. Countering Myths of Green Development
4. The Green Development Process
5. Green Contracts
6. Resources
1. What is Green Building?
What is Green Building?

Resource Efficient
Healthy & Productive
Maximizes return on investment & lifecycle value
Treads lightly on the Planet

So. Cal. Gas Energy Resource Center
All Buildings Can Be “Green”
Green Building Benchmarks

- LEED certified building
- >30% below California’s Title 24 energy code
- Indoor air quality thresholds - (ppb TVOC)
- 75% - 90% waste diversion from landfill
- 20% - 30% recycled content products
- Water efficient and uses recycled water
- Daylight penetration into core of building, e.g. 1.5-5% daylight factor depending on use
- 5% - 10% Renewable energy production
- Individual thermal comfort & control
- Pedestrian and transit access
Rating System Categories:

- Sustainable Sites – 14 points
- Water Efficiency – 5 points
- Energy & Atmosphere – 17 points
- Materials & Resources – 13 points
- Indoor Environmental Quality – 15 points
- Innovation & Design Process – 5 points

Total Points (64 Core + 5 Innovation)
LEED Award Levels

- **Certified**: 26 – 32 Points
- **Silver**: 33 – 38 Points
- **Gold**: 39 – 51 Points
- **Platinum**: 52+ Points

Let the Competition Begin!
Oakland Sustainable Design Guide

http://www.oaklandpw.com/OSDG/index.html

29 August 2001 © WorldBuild Technologies Inc.
Oakland Sustainable Design Guide

- Site: 13 points
- Water: 8 points
- Energy: 23 points
- Indoor Environmental Quality: 20 points
- Materials: 15 points
- Waste: 13 points
- Transportation: 8 points
- Total 100 points possible
Sample Strategy:
Indoor Environmental Quality Strategy 4.1

Control and Isolate Source of Pollutants: Performance Indicator

1. Site is analyzed to identify potential sources of indoor air pollution. Remedial action is taken if the site contaminants will result in unacceptable indoor air emissions according to the Oakland Urban Land Redevelopment Program Guidance Document. 1 point

AND

2. Pollution generating activities are eliminated where feasible or zoned to an isolated area of the building and have a separate ventilation system. Air intakes are separated from pollution sources with a minimum separation distance to minimize risk of capture of contaminated air. 1 point.

AND

3. Ducted returns are used within the building. Internal duct insulation is eliminated. If that is impossible the duct lining should be chosen to minimize the risk to occupants. 1 point.
2. Benefits of Green Development
“Green” is about Value

- Lifecycle Value = value over time
  - lifecycle budgeting
  - reduced annual operating costs
  - higher building value
- Increased productivity
# Increased Building Value Example

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Retrofit Savings</td>
<td>$100,000</td>
</tr>
<tr>
<td>Water Savings</td>
<td>$5,000</td>
</tr>
<tr>
<td>Waste Savings</td>
<td>$5,000</td>
</tr>
<tr>
<td>Total Annual Savings</td>
<td>$110,000</td>
</tr>
<tr>
<td>Normal Capitalization Rate</td>
<td>8%</td>
</tr>
<tr>
<td>LEED Capitalization Rate</td>
<td>7%</td>
</tr>
<tr>
<td>Increased Building Value</td>
<td>$1,375,000</td>
</tr>
<tr>
<td>LEED Value</td>
<td>$1,571,000</td>
</tr>
<tr>
<td>Increase related to LEED</td>
<td>$196,000</td>
</tr>
</tbody>
</table>
Increased ROI

- Lower operating costs due to higher efficiencies
- First cost increases, if any, offset by higher building value
- Higher net operating income
- Lower cap rate ---> higher building value
- Better financing opportunities
Other Benefits of Green Building

- Quicker fill rate
- Marketing advantages
- Increased sales
- Competitive quality work space
- Higher rents and sales price
- Faster permit approvals in some cities
- Access to outside funds and grants
The Flow of Money in Buildings

30 Year Building Costs

- Initial Cost: 2%
- Operation & Maintenance: 6%
- Personnel Costs: 92%

Maximize life-cycle return on investment
Economic Opportunity Areas

- Energy Efficiency
- Water Efficiency
- Waste Efficiency
- Litigation & Insurance
- O & M Savings
- Productivity

- Energy Supply
- Green Finance
- Green Procurement
- Building Value
- Return on Investment
- Other Benefits
City of San Diego
Ridgehaven Green Building
# Ridgehaven Energy Figures

<table>
<thead>
<tr>
<th>Category</th>
<th>Figures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Case</td>
<td>21 Kwh/sf</td>
</tr>
<tr>
<td>Title 24 Code</td>
<td>17 Kwh/sf</td>
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<tr>
<td>Goal</td>
<td>9 Kwh/sf</td>
</tr>
<tr>
<td>Actual</td>
<td>6.5 Kwh/sf</td>
</tr>
<tr>
<td>Sister building</td>
<td>22 Kwh/sf</td>
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</tbody>
</table>
Ridgehaven Financial Performance Scenario 1, with financing

<table>
<thead>
<tr>
<th>Building Square Footage</th>
<th>73,020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title 24 Compliant Building Level</td>
<td>17.67</td>
</tr>
<tr>
<td>Actual Average Consumption Level</td>
<td>6.51</td>
</tr>
<tr>
<td>% Reduction from Code Level</td>
<td>63%</td>
</tr>
<tr>
<td>Annual Savings from Code Level</td>
<td>$114,086</td>
</tr>
<tr>
<td>Extra 1st Cost of Energy Measures</td>
<td>$269,000</td>
</tr>
<tr>
<td>SDG&amp;E Financing</td>
<td>$230,000</td>
</tr>
<tr>
<td>Net Owner Investment</td>
<td>$39,000</td>
</tr>
<tr>
<td>Internal Rate of Return to City</td>
<td>150%</td>
</tr>
<tr>
<td>Payback period to City (years)</td>
<td>0.68</td>
</tr>
<tr>
<td>10 Year Total Estimated Savings</td>
<td>$910,864</td>
</tr>
<tr>
<td>10 Year % Return on Initial Investment</td>
<td>2351%</td>
</tr>
</tbody>
</table>

Note: numbers are based on estimates provided by building owner
Ridgehaven Financial Performance
Scenario 2, without financing

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Building Square Footage</td>
<td>73,020</td>
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<tr>
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</tr>
<tr>
<td>Extra 1st Cost of Energy Measures</td>
<td>$269,000</td>
</tr>
<tr>
<td>SDG&amp;E Financing</td>
<td>$0</td>
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<tr>
<td>Net Owner Investment</td>
<td>$269,000</td>
</tr>
<tr>
<td>Internal Rate of Return to City</td>
<td>41%</td>
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<tr>
<td>Payback period to City (years)</td>
<td>2.36</td>
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<tr>
<td>10 Year Total Estimated Savings</td>
<td>$1,140,864</td>
</tr>
<tr>
<td>10 Year % Return on Initial Investment</td>
<td>425%</td>
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</tbody>
</table>

Note: numbers are based on estimates provided by building owner
Water Efficiency

- Savings up to 30%
- 1 - 3 yr. payback
- Water + Sewer
- Non residential use = 35% of total

Program creation
- Site landscaping
- Building interior
- On-site treatment
- Capture
Waste Reduction

- Limited Landfill Capacity
- C & D occupies 25%
- Waste separation and hauling practices
- Integrate through building process
- Portland Arena:
  - $186,000 Savings
  - Tipping fees/scrap
Litigation & Insurance

- We spend approximately 80-90% of our time inside.
- EPA ranks indoor air pollution among top 5 environmental risks to health.
- Poor IAQ found in up to 30% of buildings.
- Sick building syndrome & building related illness costs $60 billion/yr. (US EPA)
- Successful litigation lawsuits.
- Lower insurance for good IAQ.
- More insurance companies moving into field.
Operations & Maintenance

- Building Performance Assurance Program Development & Implementation
- Life-cycle Commissioning
- Operational Efficiency Savings:
  - Energy
  - Water
  - Waste
  - Staff salaries
  - Supplies
- Emphasize Education, Training and performance based incentives & empowerment
Occupant Productivity

- 92% of building-related expense over a 30 year period
- 6 - 16% gains documented by case study
- Salaries = largest financial commitment
- $650 p.s.f. paid annually for salaries
- >300 times greater than energy bill
- 1% increase = $6.5 p.s.f.
- 6% increase = $39 p.s.f.
Owner Occupant Benefits

- Improved indoor environmental quality
- Lower worker absenteeism
- Improved worker productivity
- Improved worker satisfaction
- Higher employee retention
- Lower churn costs and downtime
- Higher employee tenure periods
- Lower training costs for new hires
Energy Reliability

- Roof or wall photovoltaic panels can supply 5-10% of building demand
- Fuel cells
- Cogeneration
3. Countering Myths of Green Development
Green costs more

- It depends, sometimes yes, sometimes no
  - SF Main Library: +1.4%
  - Santa Monica Public Safety Facility: minimal increase
  - Cal/EPA Headquarters Building: +1.6%
  - Laguna Honda Hospital: +1.25%
  - Pier 1 Building, SF: +0.7%
  - Capitol East End Complex, Block 225: +2.4%

- First cost increases are lower with an experienced team and the program establishes green goals from the beginning
- Harnessing systems efficiencies greatly reduces first costs
- Energy efficiency and IEQ measures can cost more in first costs, though not always, but yield high returns on a lifecycle basis
- Green features can increase annual income and the building future value upon sale
- Soft costs do increase in green design, but should provide a high return on investment
Green takes longer

- There may be more time spent in planning and design due to integrated team approach, though experienced teams take no longer.
- Construction progresses more quickly because more decisions are made, there are fewer RFI’s and change orders in the field.
- Result is that greening a project, if started early, does not add time, and can even accelerate the schedule.
Green Increases Risk

- Energy efficient design and technologies used today are not experimental; many are off the shelf
- Green materials are readily available and offered by major manufacturers. This trend is rapidly increasing.
- Green can reduce risk of sick building syndrome, IEQ issues
- In the future, by not going green, the risk will be increased – negligence clauses
Green is hard to do

- Design technology of green is not difficult, but it is different than conventional process
- Goal setting, benchmarking and commissioning for optimal performance are new emphasis areas
- Green requires a dedicated team and buy-in from the ownership and management entities
- Refer to City of Oakland guidelines for “no-brainer” features of green buildings
- The hardest part of “green” is to open ourselves up to change and new ideas and processes for success
I am Already “Green”

- In California, Title 24 requires energy efficiency, but all projects can do better
  - Even beyond Title 24 2001 <20 – 30%
- There are many other areas besides energy efficiency, such as site, IEQ, water, materials, transportation, which need to be addressed to be green
- Green is performance based
- No matter how good we are doing, we can always improve and continually advance
Our project is too far along to change anything in its design

- It is always better to start early in the design process to introduce “green”
- Many projects can be “greened” at the back-end, especially for the tenant interiors
- Bren School at UCSB greened at 90% construction documents will attain a LEED gold rating, at some additional first cost but much higher lifecycle value
- Ridgehaven was also greened at a late date, resulting in a few months of delay, but 63% energy savings that made up for the delay in the first year of operations
Green only works for the public sector, not private

- Green is an emerging field and has been supported by public sector projects on a greater initial basis
- Green is now catching on in the private sector
- Examples include: 555 12th Street, GAP Offices, Green City Lofts at 1007 41st Street, Battery Park City high rise residential, 4 Times Square, Walmart, Shorenstein, Hines
- Mainstream firms are now embracing green
  - Disney, Time Warner, Starbucks, Patagonia
My Bank won’t finance Green

- B of A is a member of USGBC and interested in “green” loans
- Banks are concerned about the value of the assets they’re financing; green buildings have more value and they also have less liability.
- LEED may become part of a Phase 1 environmental assessment by Banks
- Banks may soon offer lower interest rates for green; also insurance firm rates
Doesn’t “green” mean funky, experimental technologies?

- Many green projects in all sectors of the economy are using established, off the shelf technologies.
- What constitutes “green” more than anything is a holistic approach and integrated thinking – to harness performance efficiencies and create healthy & productive buildings.
- Many green products are on the market, more everyday, from mainstream product manufacturers.
- Green design has no particular esthetic--all buildings can be green, from small projects to large corporate facilities.
- Green buildings don’t have to look any different than non-green; they just perform better.
4. Greening the Project Lifecycle
“Green” Development Process

I. Lifecycle Based Development Process
   - Plan for Success

II. Best Practice Design Areas
   - Design for Success

III. Lifecycle Investment
   - Fund for Success

IV. Building Performance Assurance
   - Operate for Success

V. Communicate the Performance Results
   - Communicate the Results
“Green” Development Process

I. Lifecycle Development Process
- Define Success
- Hire for Success
- Manage for Success

II. Best Practice Design Areas
- Sustainability
- "Smart"
- Flexibility & Resilicency
- Energy Independence

III. Lifecycle Investment
- Lifecycle Budgeting
- Performance Efficiencies
- Green Finance
- Lifecycle Costing

IV. Building Performance Assurance
- Benchmarking
- Commissioning
- Monitoring & Verification
- Adjustment & Upgrade

V. Communication of Results
- Benchmark Results
- Showcase Features
- Communication Program
- Public Outreach
- Education & Training
- Adaptive Reuse

Define Success
Manage for Success
Energy Independence
Lifecycle Costing
I. Lifecycle-based Development

1. Define Success
   Performance-based goals, project benchmarking, budget & schedule, future adaptability, rate of return on investment

2. Hire for Success
   Create an integrated team with credentials in best practices, modeling and analytical tools capability, and green

3. Manage for Success
   Integrated/Collaborative Process, full scope of work, “Green” scheduling, inclusion of outside “Partners” (industry, government, NGO’s)
Hiring a Green Project Team

- Experience in green work scope areas, in addition to typical work scope
- Ability to work as an integrated team, experience working together
- Specialties: IAQ, green materials, renewable energy, environmental value engineering, LEED certification
Sustainability Work Scope Areas

- Program Definition
- Project Management and Master Planning
- Indoor Environmental Quality and Comfort
- Energy and Atmosphere
- Materials and Resources
- Cost estimating/environmental value engineering
- LEED Certification
Ridgehaven Green Goals

- Create a green showcase project
- Meet budget & schedule
- Beat energy code
- Good IAQ design
- Minimize waste

Green materials:
- Recycled content
- Recyclable
- Renewable sources

Green construction
Green operations
Monitor results
Demonstration
II. Best Practice Design Areas

- Sustainable Building
- “Smart” Control
- Flexibility and Disaster Resiliency
- Energy Security & Control
- Others: Current & Future
Integrated Energy Design

Integrated Team:
- Team approach/integration & collaboration
- Benchmarking to Code and individual targets
- Use of energy modeling & analytical tools

Integrated Design:
- Optimal Building siting
- Building envelope = passive solar approach
- Daylighting capture and penetration
- Lighting optimization & efficiency
- Plug load reduction & efficiency
- HVAC & Plumbing sizing

Integrated Operations:
- Building controls, commissioning & optimization
City of Santa Monica
Public Safety Facility
III. Lifecycle Investment

- Lifecycle Budgeting
- Additional “Green” Sources of Capital and Financing
- Life-cycle costing and ROI
- “Green” Procurement
Lifecycle Budgeting

- Budgets typically set too early and not always set to fit the project
- Doesn’t usually include “green”
- Prioritizes green components and systems incorporated into initial budget
- May need incremental green funding
- Lifecycle costing & prioritization
Green Finance

- Lifecycle budgeting first
- Systems Leasing “chafage”
  - Off Balance Sheet financing
  - 1st Cost Capital Reduction
  - Interface Evergreen carpet lease
  - Central plant/mechanical systems
- Industry Partnering
- Green Bonds
- Green Banks, Appraisers & Insurance
Green Procurement

- Supply chain “disintermediation”
- Utilize the Internet to harness efficiencies
- Power to the buyer
- Access to vital information & “knowledge”
- Aggregation potential
- Auction options & tools
- Real time pricing = dynamic
- Global marketplace
### Santa Monica Public Safety Facility
WorldBuild Procurement (Aug-99)

<table>
<thead>
<tr>
<th>Trade</th>
<th>Market Estimate</th>
<th>WorldBuild Price</th>
<th>Hard Cost Savings</th>
<th>Discount</th>
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<tbody>
<tr>
<td>Raised Floor</td>
<td>$633,244</td>
<td>$451,694</td>
<td>$181,550</td>
<td>29%</td>
</tr>
<tr>
<td>Carpet Tile</td>
<td>$176,314</td>
<td>$145,510</td>
<td>$30,804</td>
<td>17%</td>
</tr>
<tr>
<td>Broadloom Carpet</td>
<td>$61,282</td>
<td>$54,188</td>
<td>$7,094</td>
<td>12%</td>
</tr>
<tr>
<td>Ceiling Tile</td>
<td>$166,174</td>
<td>$111,085</td>
<td>$55,089</td>
<td>41%</td>
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<tr>
<td>Resilient Flooring</td>
<td>$45,031</td>
<td>$39,243</td>
<td>$5,788</td>
<td>24%</td>
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<tr>
<td>Ceramic Tile</td>
<td>$224,980</td>
<td>$189,067</td>
<td>$35,913</td>
<td>23%</td>
</tr>
<tr>
<td>Lighting Fixtures</td>
<td>$450,754</td>
<td>$372,625</td>
<td>$78,129</td>
<td>22%</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$1,757,779</strong></td>
<td><strong>$1,363,412</strong></td>
<td><strong>$394,367</strong></td>
<td><strong>26%</strong></td>
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</tbody>
</table>
IV. Performance Assurance

- Full Benchmarking
- Life-cycle Commissioning
- Monitoring, Verification
- Adjustment & Upgrade
- Staff Education & Training
V. Communication of Results

1. Benchmark Results
2. Showcase sustainable design features
3. Develop Communication Program
4. Public Outreach & Education
5. Update over-time
5. Green Contracts
“Green Contracts”

- RFP’s, RFQ’s, Design, Construction, Design-Build, Operations, Development, Loans, Insurance, Cleaning
- Sets intent from the beginning
- Allocate % of Points for Green
- Integrate into Scope of Work
- Part of Performance Requirement
- Related to Liability, Damages

- Description of Work
- Announcement
- Invitation to Bid
- Bid Conference
- Weighting System for Selection
- Design Criteria
- Contract Documents
- Qualifications

- Team Composition
- Green Plan Submittal
- Work Schedule
- Quality Assurance
- Bid Price
- Substitutions
- Warranty & Guarantee
- Final Completion
- Liquidated Damages
- Safety & Health
RFQ/P and Bid Invitation

- Define sustainable building requirements
- State team qualifications
- Define selection criteria
- Pre-bid conference/meeting
Statement of Qualifications

- Team composition and experience
- Sustainability Scope of Work
- Sub-Contractors and Consultants
- Operations and commissioning
- Work schedule
Team Selection

- Establish Technical Evaluation Committee (TEC) or Project Manager to review qualifications/proposals
- Review scope of work
- Review design fees
- Analyze team member qualifications
- Analyze commissioning and building management plan
Bidder Requirements

- Team committed to sustainable building program, goals, performance benchmarks
- Bidder investigation and evaluation
- Design-Build, Design-Build-Operate, Energy Performance Contracts
State of California East End Complex

- 2 Projects – 5 buildings, 1.3 million s.f.
- RFP – Design/Build Teams
  - Short listed in RFQ process
  - Contract Documents previously prepared by Master Architecture Team
- 2 projects: Block 225 & Blocks 171-174
- Selection committee
  - Technical Evaluation Committee
  - Other parties
Evaluation Criteria

- Certification of Stipulated Sum
- Designated Subcontractors (17%)
- Design & CM Plan (31%)
- Small Business/DVBE Plan (4%)
- Building Systems Description (24%)
  - Energy Efficiency/Sustainable Design Measures - (45/216 points = 21%) = 5% of Total
- Quality Enhancements (24%)
Personnel Experience

- Design-Build Projects – 30%
- Similar projects – 25%
- Relevant training – 15%
- Public entities – 5%
- Sustainable Building – 20%
- Other Factors – 5%
Sustainable Design Measures

- Energy Efficiency – (12 points)
- Sustainable Measures – (12 points)
- Indoor Air Quality – (9 points)
- Alternative Energy – (6 points)
- Other Relevant Factors – (6 points)

Total: 45 points
Proposed Quality Enhancements

- Further Energy Efficiency – 12 pts.
- Additional Recycling – 9 pts.
- Additional Resource conservation – 6 pts.
- Improvement to IAQ – 9 pts.
- Additional alternative technology – 6 pts.
- Other Relevant Factors – 3 pts.
- Added durability/quality materials – 15 pts.
TEC Composition

Representatives from the State:

- **Group I – General Design Elements**
  - Master Architect
  - Project Consultant
  - RESD/PMB and OEA
  - State Architect’s Structure Safety Office

- **Group II – Sustainable Building Elements**
  - California Energy Commission
  - CA. Integrated Waste Management Bd.
  - Department of Health Services
  - California Air Resources Board
6. Resources
Where do I go for technical information?

- Alameda County Waste Management Authority, Building and Construction program, Sustainable Building Materials Database, [www.stopwaste.org/fsbuild](http://www.stopwaste.org/fsbuild)
- PG&E Savings by Design Program [www.pge.com/003_save_energy/003b_bus/savings_by_design.shtml](http://www.pge.com/003_save_energy/003b_bus/savings_by_design.shtml)
- Center of Excellence for Sustainable Development: green finance, [www.sustainable.doe.gov/financing/green.shtml](http://www.sustainable.doe.gov/financing/green.shtml)
- Publications: see below
Other green projects:

- 555 12th Street, Oakland, CA
- 1007 41st Street, Oakland, CA
- Thoreau Center for Sustainability, SF
- 525 Golden Gate, City Office Building, SF
- Laguna Honda Hospital renovation, SF
- GAP Offices, San Bruno, CA
- Santa Monica Public Safety Facility, Santa Monica, CA
- Bren School of Environmental Science & Management, UC Santa Barbara, CA
- Kirsch Center for Environmental Studies, De Anza CC, Cupertino, CA
- Pittsburgh Convention Center, Pittsburgh, PA
- 4 Times Square, NYC
- 20 River Terrace, Battery Park City, NYC
- Greenpeace Headquarters, NYC
- Phillip Merrill Environmental Center, Annapolis, MD