

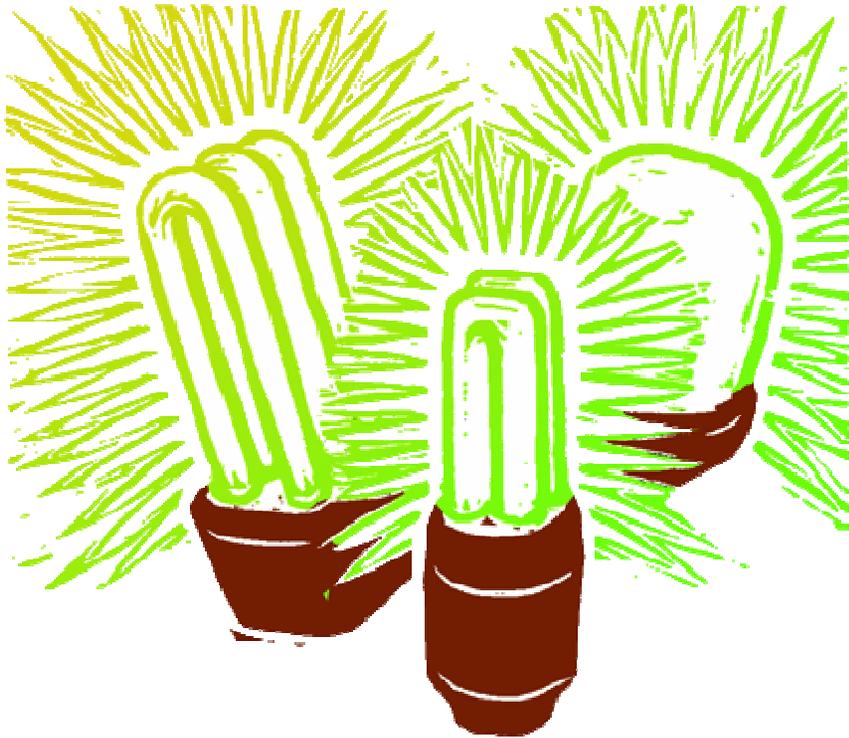
Green Buildings

- Different Technologies and Approaches
- Integrated Case Studies

State-of-the-shelf

Currently available technologies can:

- Make old buildings 3X to 4X more efficient
- New buildings 10X more efficient



Aerogel Insulation

- Super lightweight solid (as per Guinness book) of 96% air
- Clear Windows with the energy efficiency of a solid wall
- Reduces noise twice as much as a double pane window



Rocky Mountain Institute

*10-for-one benefit of
"superwindows"*

- Saved energy
- Radiant comfort
- Downsize HVAC
- LOWER construction cost
- No perimeter zone
- Reduced fading from UV
- Reduced noise
- Less condensation
- Improved day lighting
- Productivity



Go for the Gold! Toyota Sales Campus – Torrence, CA

- 624,000 square feet, 2500 employees
- PV Roof, tilt-up construction, 96% recycled waste, 50% used recycled materials
- Largest Gold Rated Building
- \$63/sqft exterior



age for

The Solaire

- Country's first green residential high-rise and first since 9/11 in downtown Manhattan
- 293 units, 27 floors – 80% full
- 35% less energy
- Reduced load demand by 65%
- 1/3 less potable water use
- Increased indoor air quality, and natural lighting
- PV-intergrated structure
- No ODC's for A/C
- Black water system
- Green roof
- High percentage of recycled materials with little/no VOCs

Build it Better: Bren Hall- University of California, Santa Barbara

- 2nd LEED Platinum Rated Building in America
- Surpasses CA Energy Code by 32-40%
- 100% demolition waste recycled, 92% of construction waste recycled
- Generates 7-10% of its own energy on-site through a PV system
- Cost to “go green” was less than 2% of the total building cost.
- Construction materials were from 80%-30% recycled content, depending on the material
- Natural ventilation, energy efficient light, heating and cooling, recycled floors, air monitoring system
- Waterless urinals, low-flow water fixtures, green paints and adhesives, reflective paint on the roof





City of Chicago's City Hall's Green Roof

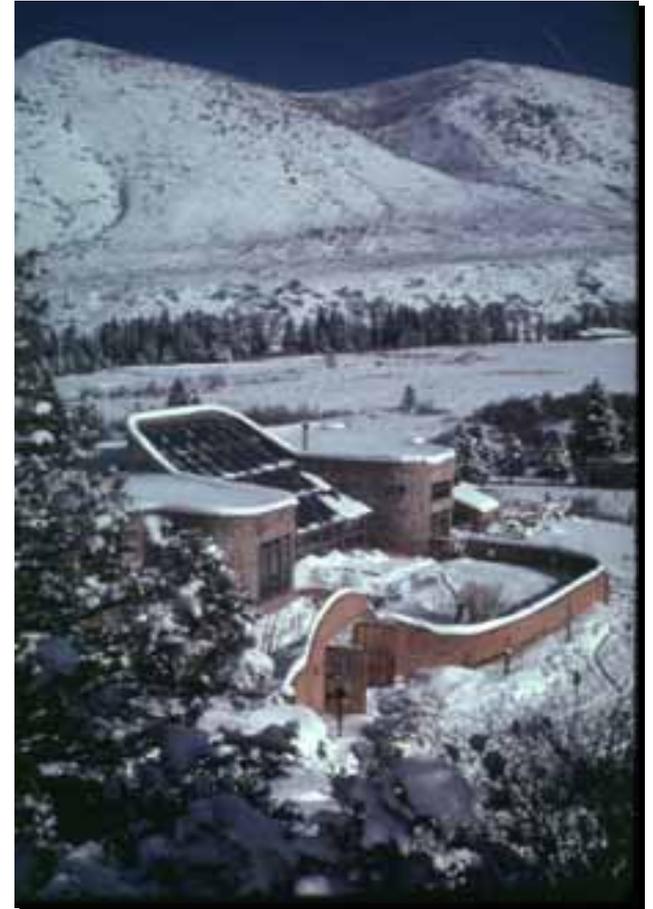
City of Chicago estimates that greening all of the city's rooftops would produce \$100M in saved energy annually and peak demand would be cut by 720 MW.

Rocky Mountain Institute

- ☞ Super insulated
- ☞ Solar heated
- ☞ Passively cooled
- ☞ Heat exchangers
- ☞ Daylit
- ☞ Water efficiency
- ☞ Efficient lighting, equipment
- ☞ PV arrays

Savings:

- 😊 90% electrical
- 😊 99% space/water heating
- 😊 10 month payback
- 😊 Power bill \$5/month
- 😊 Market-average cost when built in 1984



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EPA Campus- Research Triangle Park, North Carolina

- DOE-2 modeling confirms 40% less energy than conventional practice, saving the EPA more than \$1M/yr.
- Day lighting and High-efficiency lighting produced savings of over \$200K/year and a return on investment of less than 1 yr.
- 90% of land-clearing and construction waste was recycled and reused
- Natural woodlands, wildflower plantings and a wetland pond to decrease water usage and for storm water management.





Tango
Housing
Complex
-
Sweden