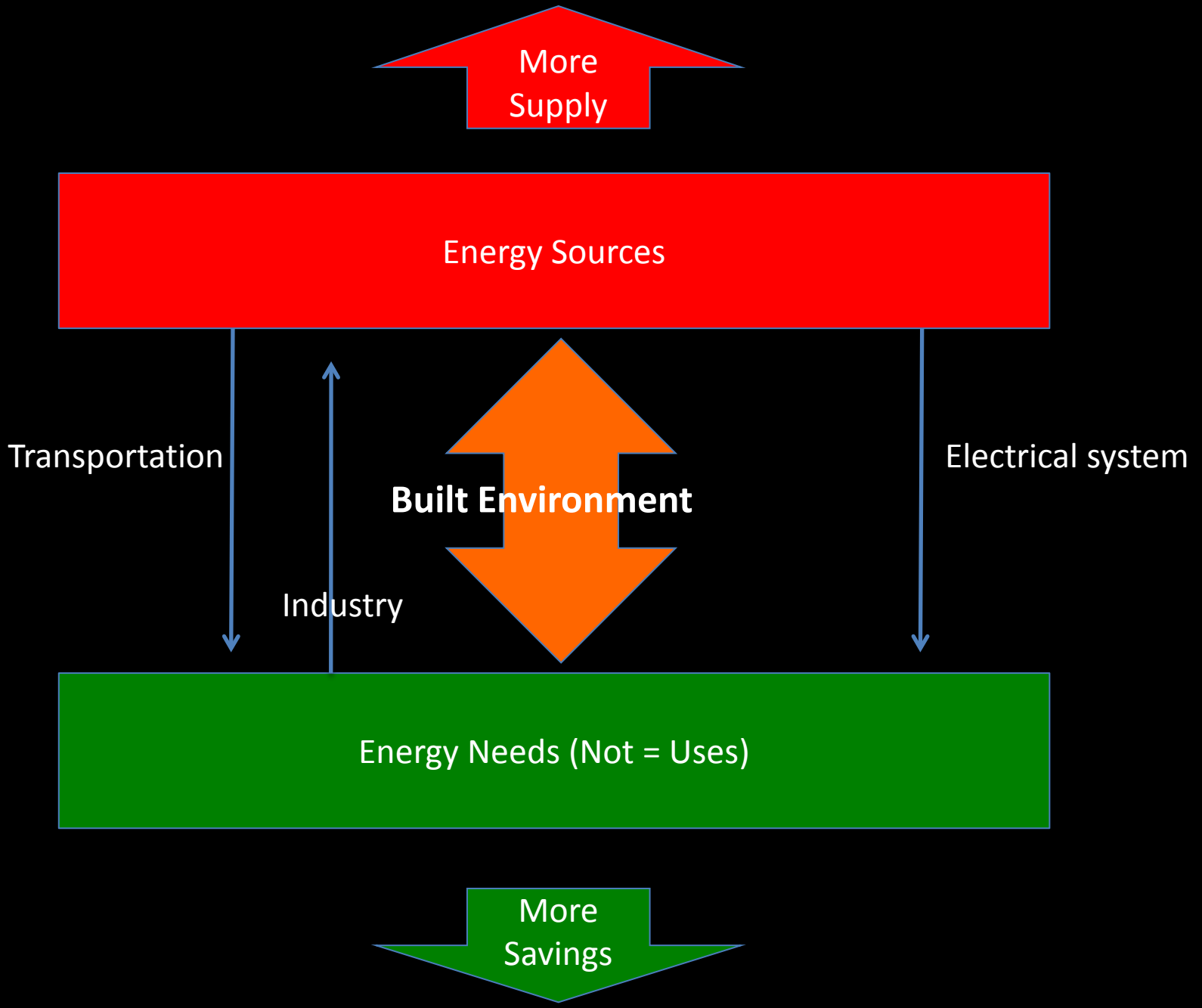
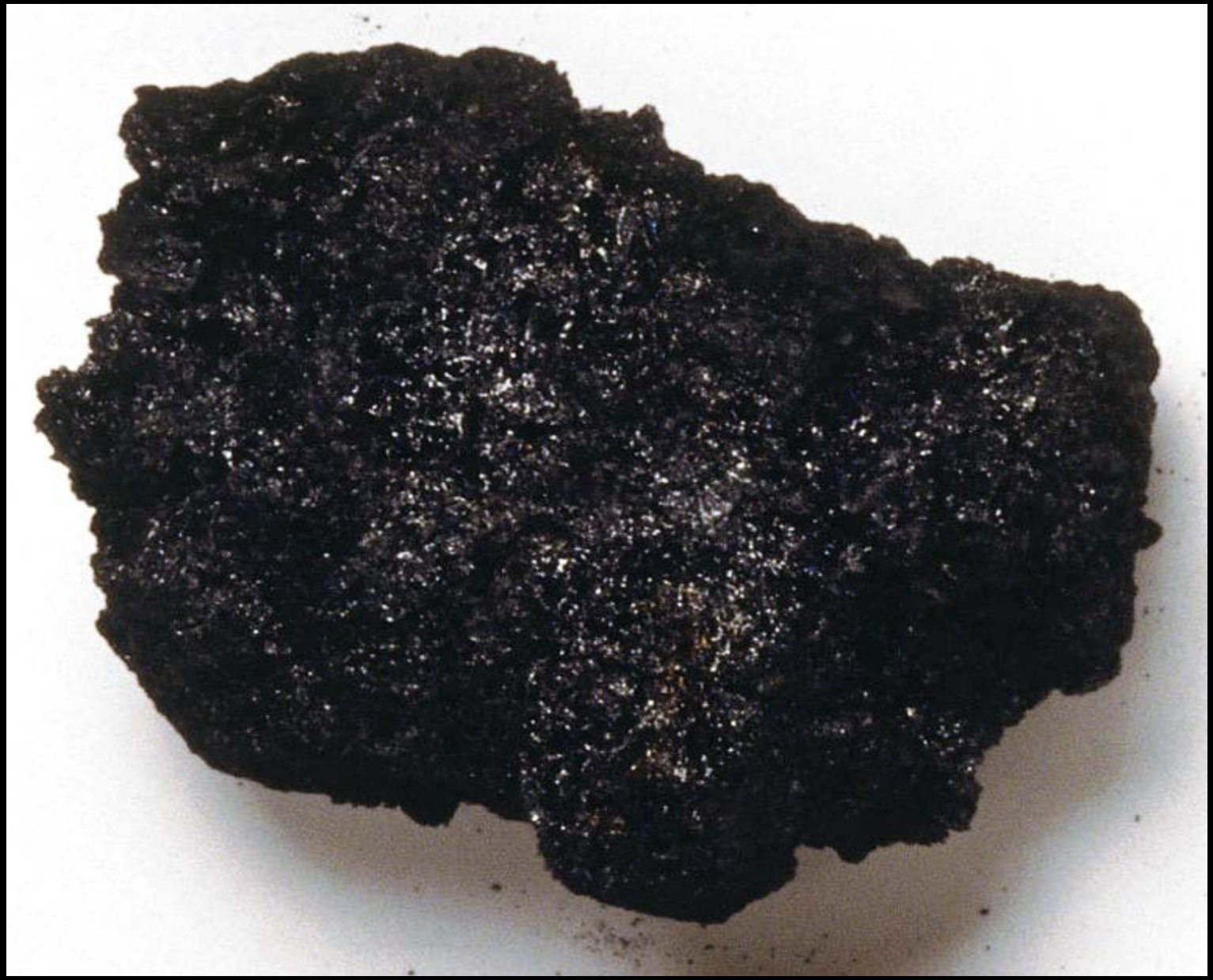
REINVENTING FIRE

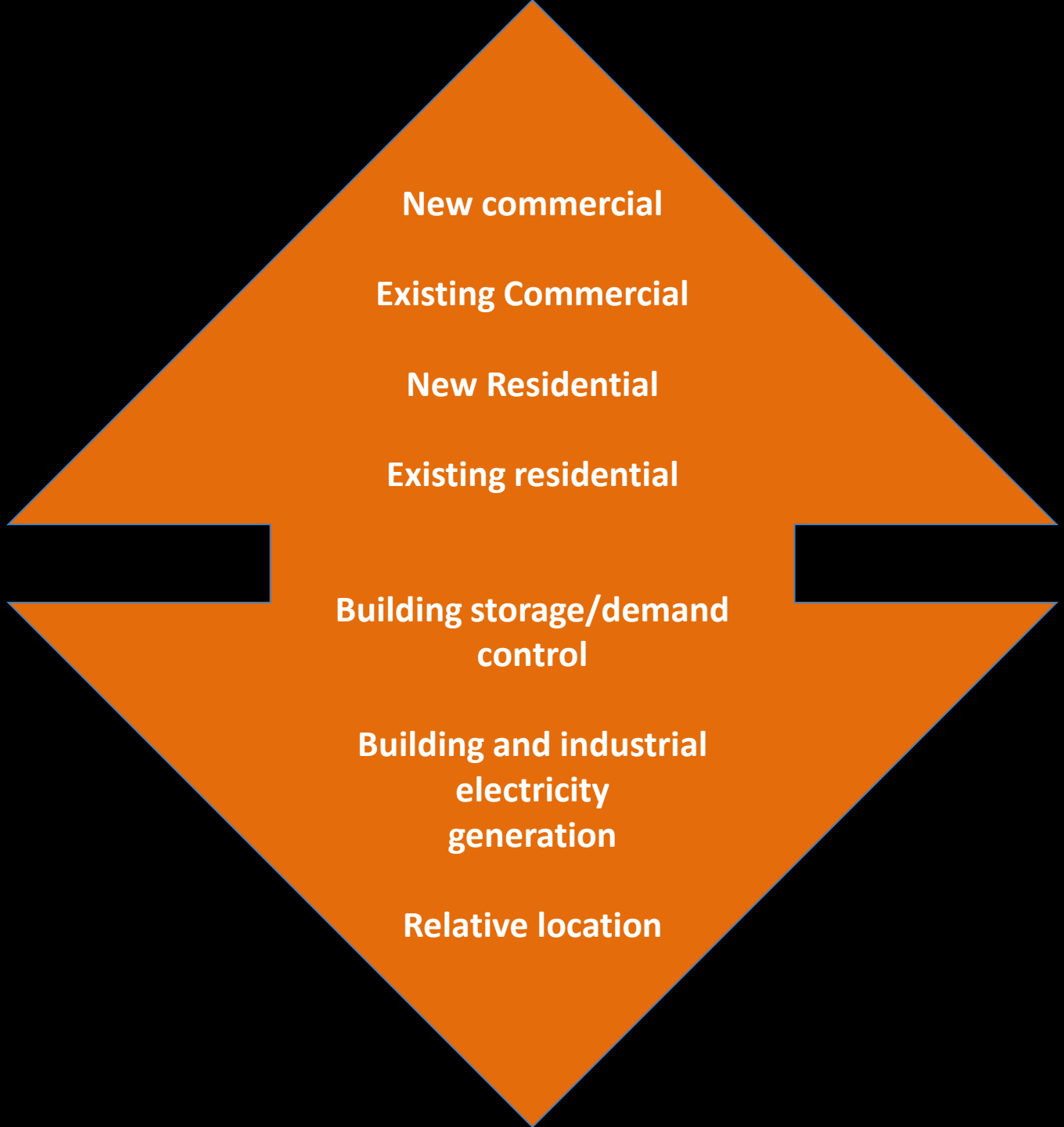
Rocky Mountain Institute
Robert Hutchinson,
Managing Director

5 August 2011

Sao Paulo, Brazil

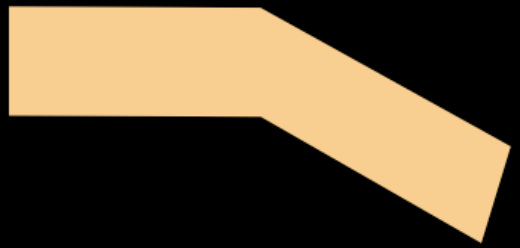

More Supply
Energy Sources
Transportation
Industry
Built Environment
Electrical system
Energy Needs (Not = Uses)
More Savings




New commercial
Existing Commercial
New Residential
Existing residential
Building storage/demand control
Building and industrial electricity generation
Relative location

Case Study: Lewis and Clark State Office Building

- 120,000 square feet
- 400 occupants
- $17 Million
- State Government



Missouri Lewis and Clark State Office Building DNR

Images courtesy of the Missouri Department of Natural Resources

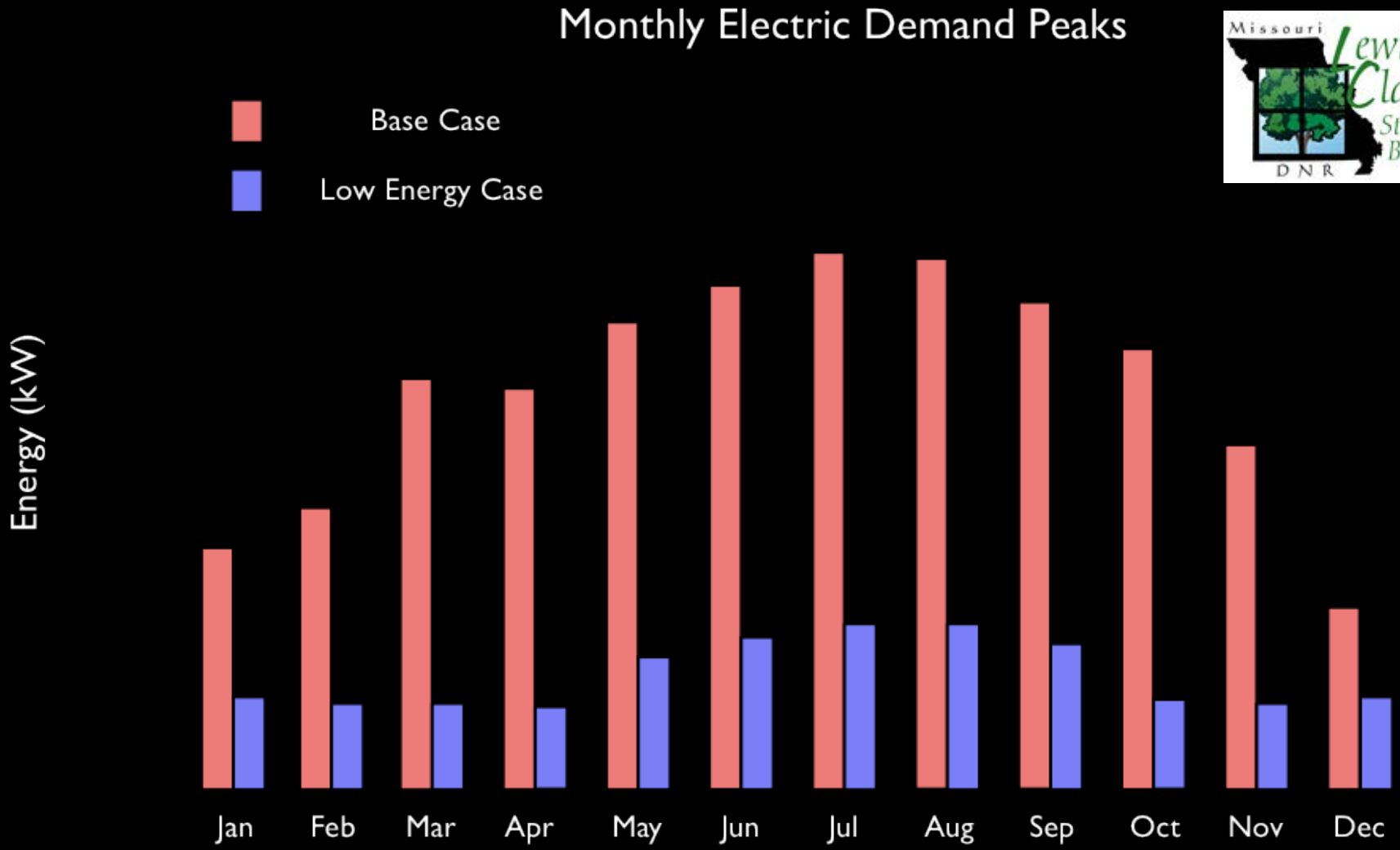
Sound Orientation

Effective Daylighting

Shading and Insulation

Energy Efficient HVAC and Mechanical Systems

Energy Demand



- Zero net increase in capital costs
- $80,000 per year in energy savings

Missouri Lewis and Clark State Office Building
DNR

Players Involved:

Architects

Corporations

Manufacturers

Developers

Designers

Planners

Investors

Utilities

Construction Management

Realtors

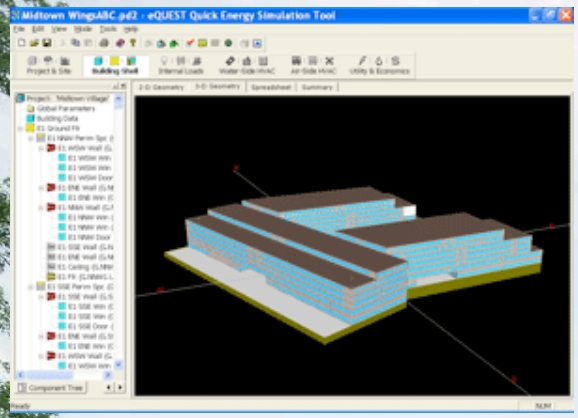
Lenders

Public Agencies

Government Policy

Tenants

Quantification via Energy Modeling



Goal – solve every design problem at once

- 


Top 5 Energy Recommendations

5) Commission (and re-commission) Buildings

4) Consider renewable energy systems as part of design

3) Design with nature (especially light and ventilation)

2) Ensure integrated design – look for ways to do less as well as more

1)

1. Indoor Ski Resorts

1) Set High Goals – and Stick With Them

Other Best Practices

White roofs (dry climate) and green roofs (wetter climate)
Smart and efficient outdoor lighting
Never use potable water for irrigation (including at home) – reduce need and recycle grey water
Use low flow/waterless fixtures
Consider alternative/on-site water/waste treatment
Spec green materials (trust, but verify)
Ensure good controls and visual results – make use patterns real
Understand local utility needs and help meet them

Empire State Building:
A model for large-scale commercial retrofits

Retrofitting the Empire State Building

Energy and cost savings:

- Saving 38% of energy use with a 3-year payback
- Remanufacturing 6,500 windows onsite into super windows
- Installing better lights and equipment
- Replacing old chillers
- PART OF A MUCH LARGER RETROFIT EFFORT TO REPOSITION THE BUILDING

Key findings: Capital costs and energy savings for each individual measure

Measure Description	Full Cost	Committed Capital Budget	Incremental Cost
Windows	$4.5m	$455k	$4m
Radiative Barrier	$2.7m	$0	$2.7m
DDC Controls	$7.6m	$2m	$5.6m
Demand Control Vent	Inc. above	$0	Inc. above
Chiller Plant Retrofit	**$5.1m**	**$22.4m**	**($17.3m)**
VAV AHUs	$47.2m	$44.8m	$2.4m
Tenant/ Daylighting/ Plugs	$24.5m	$16.1m	$8.4m
Tenant Energy Mgmt.	$365k	$0	$365k
Power Generation (optional)	$15m	$7.8m	$7m
TOTAL (ex. Power Gen)	$106.9m	$93.7m	$13.2m

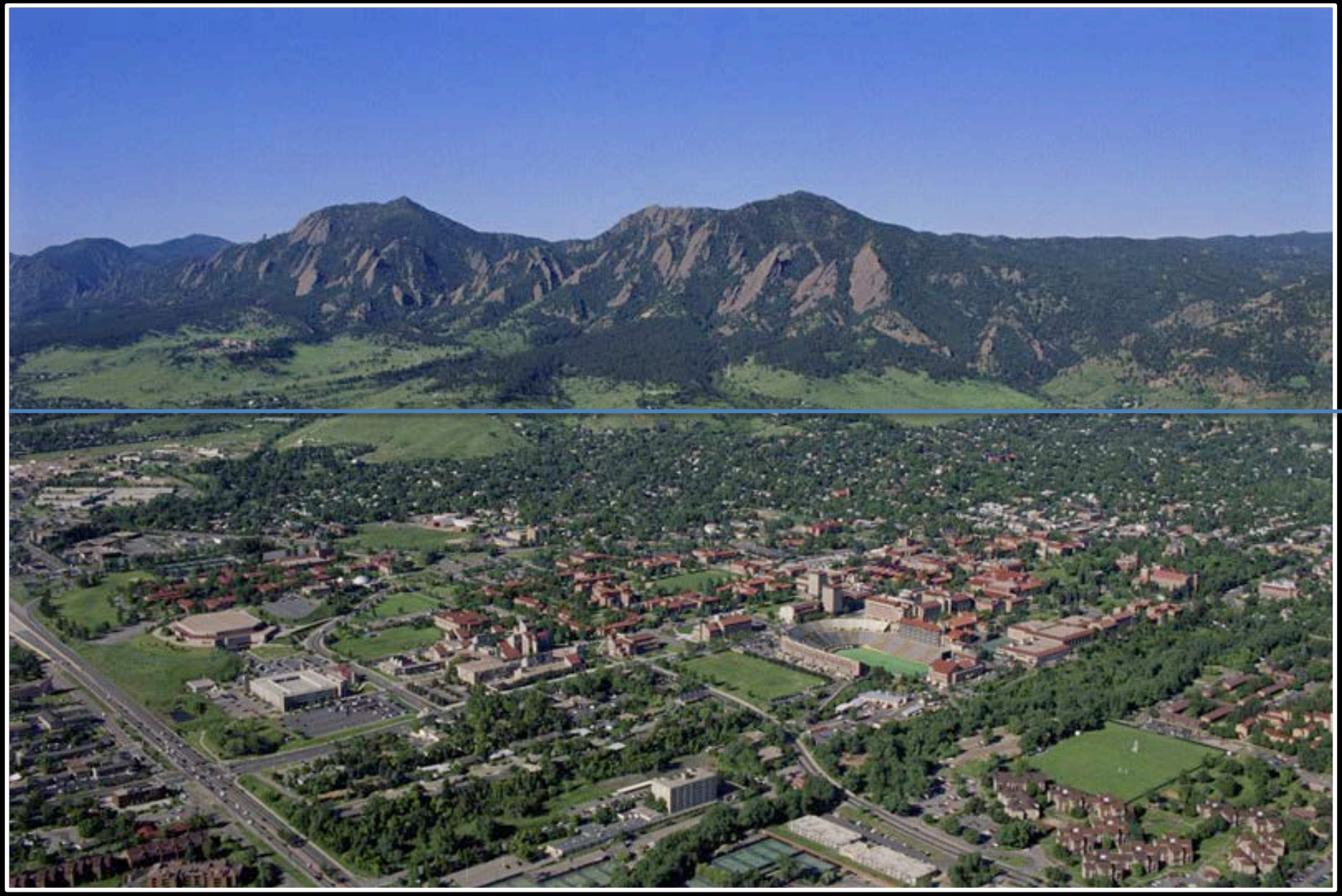
Total energy savings: $4.4m/ yr

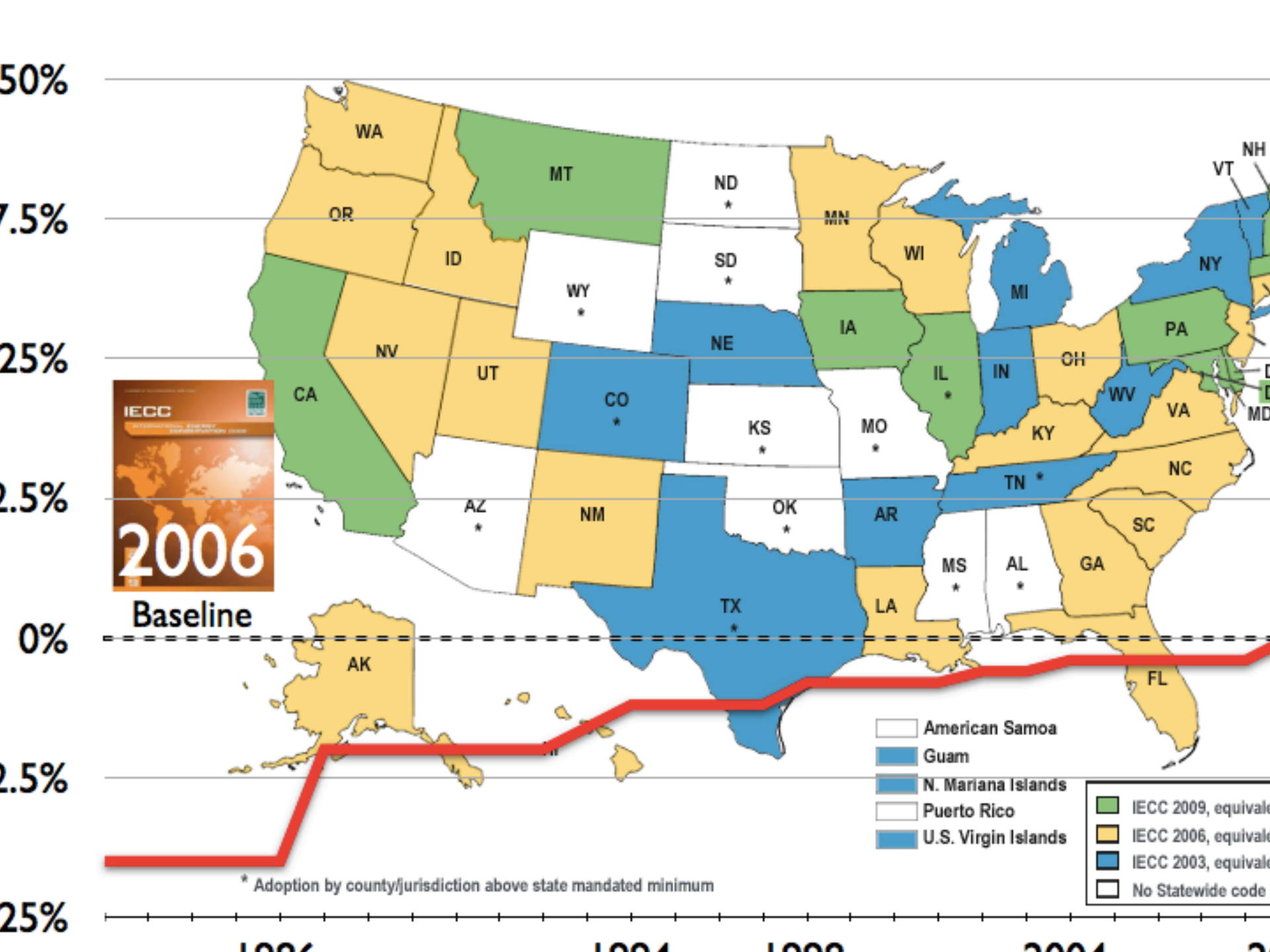
Source: RMI analysis

Deutsche Bank “Greentowers”

Started with life safety improvements and ended with a deep green building


BYRON G. ROGERS FEDERAL BUILDING AND UNITED STATES COURTHOUSE

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MD
AK
* Adoption by county/jurisdiction above state mandated minimum
American Samoa
Guam
N. Mariana Islands
Puerto Rico
U.S. Virgin Islands
IECC 2009, equivale
IECC 2006, equivale
IECC 2003, equivale
No Statewide code


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What to go and do?

- Confirm leverage points for Sao Paulo, Brazil
  - Air conditioning, electronics efficiency, major retrofits, lighting, windows/daylighting/shading, DESIGN
  - Where can codes/rules might help
- Understand the needs of the electrical system
- Make performance transparent – set high goals – it is about value and quality, not (just) energy
- Build, and rebuild, RIGHT!
- Learn like crazy


REINVENTING
FIRE
Thank You!
RMI2009
FROM IDEAS TO SOLUTIONS