Building New Traditions Using Traditional Concepts

Courtesy of the Arizona Historical Society
Himdag Ki: Library and Archives; 2006.0224:
AZHIST001a, AZHIST005e,AZHIST021v, AZHIST040ao

Arizona Department of Commerce

Building New Traditions Using Traditional Concepts – a sustainable building workshop

David Eisenberg, Director
Development Center for Appropriate Technology

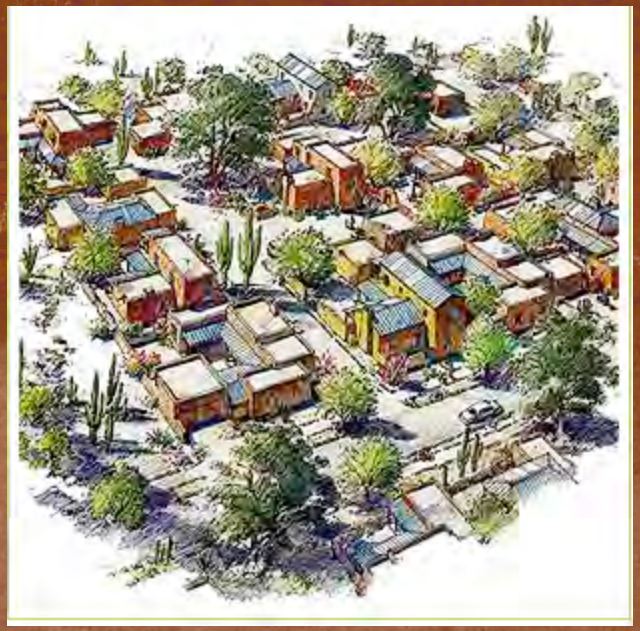
Susan Buchan, Green Building Program Manager
Pima County

3.28.2008


What Is Green Building?

Building in a way that enhances…

HEALTH **VITALITY** **PROSPERITY**



For People, Communities and Nature

Green Building is about the Whole Lifecycle of Buildings

Goals of Green Building

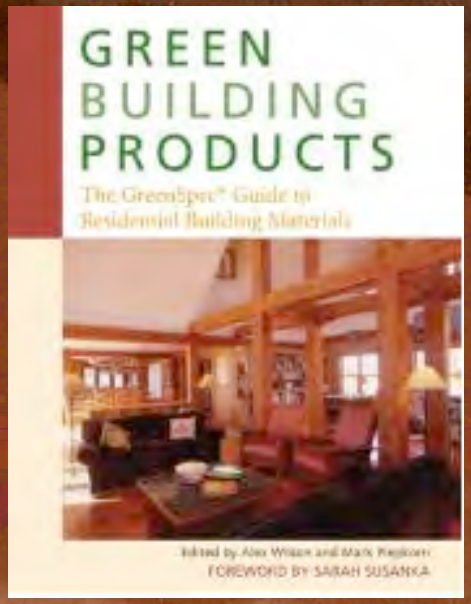
Green building is an attempt to take responsibility for the negative environmental impact of buildings.

Greening the built environment means taking responsibility for environmental stewardship by:

- Improving energy efficiency
- Reducing global warming impacts
- Conserving material resources
- Improving water efficiency
- Reducing landfill deposits
- Improving indoor environmental and air quality
- Preserving open space for wildlife
- Improving community quality of life

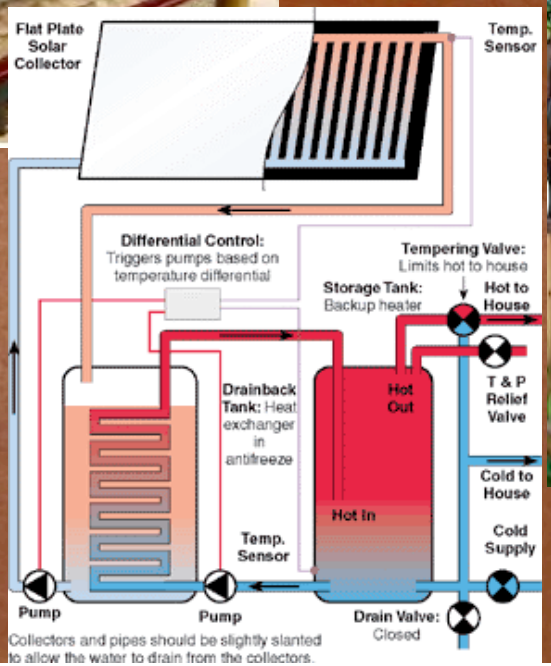
Examining Green Building

…better things and better thinking



Examining Green Building

…better things and better thinking



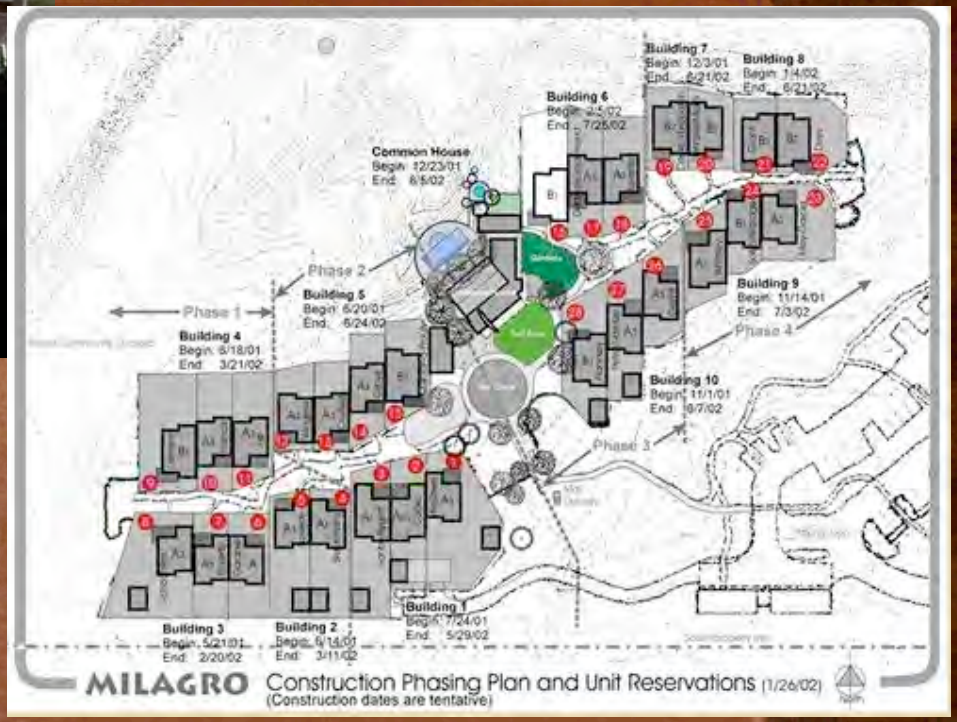
Examining Green Building

...better things and better thinking

A great example of integration is the Lewis Center at Oberlin College in Ohio, for David Orr's environmental studies program. The building aims to generate its own power, clean its own wastewater, and be a teaching example of more sustainable architecture and construction. It is a big step in the right direction.

Examining Green Building

…better things and better thinking



The Reach of Green Building

Sustainability requires balancing three spheres of concern - what many call the "Triple Bottom Line"

The Reach of Green Building

Most people think "sustainability is just about the environment. It's all three.

But ecology is the only one that can render the other two meaningless…

Experiencing Green Building

- May be indistinguishable from conventional building
- Can be more comfortable, functional, create more awareness of the relationship to nature
- Lower operating costs
- Less vulnerable to resource volatility


WHY GREEN BUILDING?

I think we have a small window of opportunity to save ourselves as a species.

Most of the systems we have created are far beneath the dignity and magnificence of the human species.

These systems denature us.

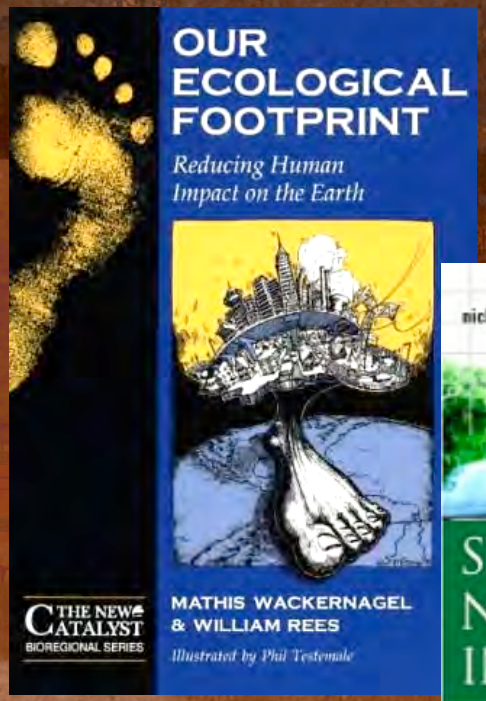
They override our fundamental nature as a caring, creative, nurturing species.

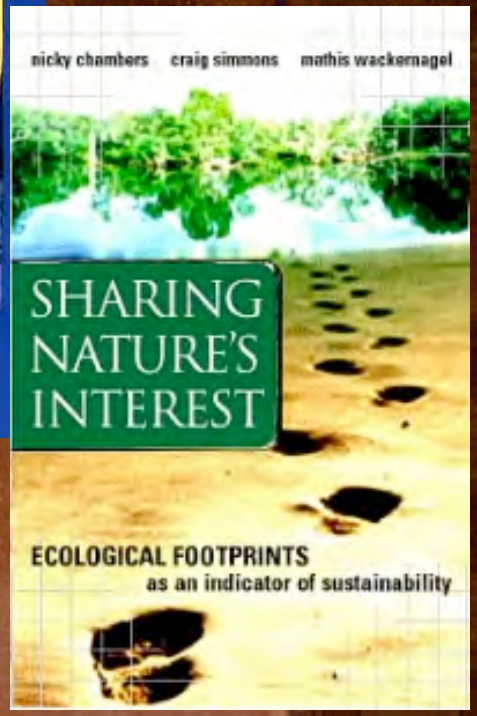
In order to enable our survival we have to evolve as a species.

This will be the first time in history that evolution takes place as a conscious act.

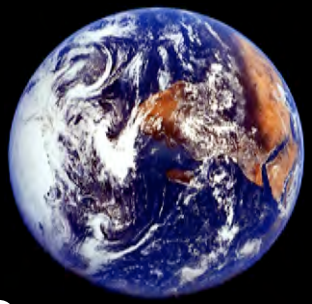
Where We Are - Ecological Footprint

Ecological footprint is a concept based on carrying capacity. It's a way to calculate the amount of productive land required to supply resources and absorb wastes from a given activity - of an individual, organization, community, nation or population, including the world population.





The Picture that is Emerging…

There's credible evidence that if each person on Earth used resources & generated wastes at the rate of the average American, Canadian, or member of the EU we would need several more Earths to sustain that level of human activity. And that's for Earth's current population.

Our Ecological Footprint, Wackernagel and Rees

The Big Picture - Living Planet Report

WWF for a living planet®

LIVING PLANET REPORT 2006

Download the Report:
http://www.footprintnetwork.org

Global Footprint Network

ZSL
LIVING CONSERVATION

www.footprintnetwork.org

THE ECOLOGICAL FOOTPRINT

The Ecological Footprint measures people's demand on nature. A country's footprint is the total area required to produce the food and fibre that it consumes, absorb its waste, and provide space for its infrastructure. People consume resources and ecological services from all over the world, so their footprint is the sum of these areas, wherever they are on the planet. The footprint can be compared with nature's ability to renew these resources.

The global Ecological Footprint was 13.5 billion global hectares in 2001, or 2.2 global hectares per person (a global hectare is a hectare whose biological productivity equals the global average). This demand on nature can be compared with the Earth's biocapacity, based on its biologically productive area – approximately 11.3 billion global hectares, which is a quarter of the Earth's surface. The productive area of the biosphere translates into an average of 1.8 global hectares per person in 2001.

The global Ecological Footprint decreases with smaller population size, less consumption per person, and higher resource efficiency. The Earth's biocapacity increases with a larger biologically productive area and higher productivity per unit area.

In 2001, humanity's Ecological Footprint exceeded global biocapacity by 0.4 global hectares per person, or 21 per cent. This global overshoot began in the 1980s and has been growing ever since (see Figure 1). In effect, overshoot means spending nature's capital faster than it is being regenerated. Overshoot may permanently reduce ecological capacity.

Figure 3: The Ecological Footprint per person for countries with populations over 1 million.

Figure 4: Humanity's Ecological Footprint grew by about 160 per cent from 1961 to 2001, somewhat faster than population which doubled over the same period.

Figure 5: Ecological Footprint by region in 2001. The height of each bar is proportional to each region's average footprint per person, the width is proportional to its population, and the area of the bar is proportional to its total footprint.

Fig. 3: **ECOLOGICAL FOOTPRINT PER PERSON,** by country, 2001

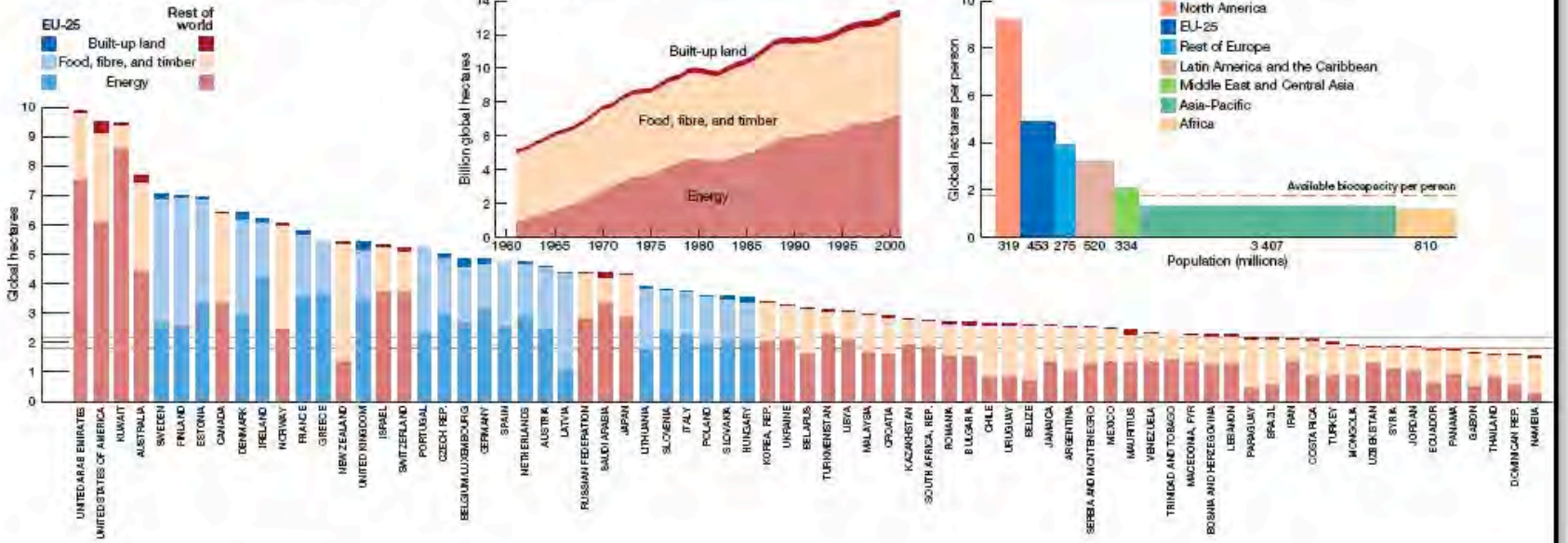
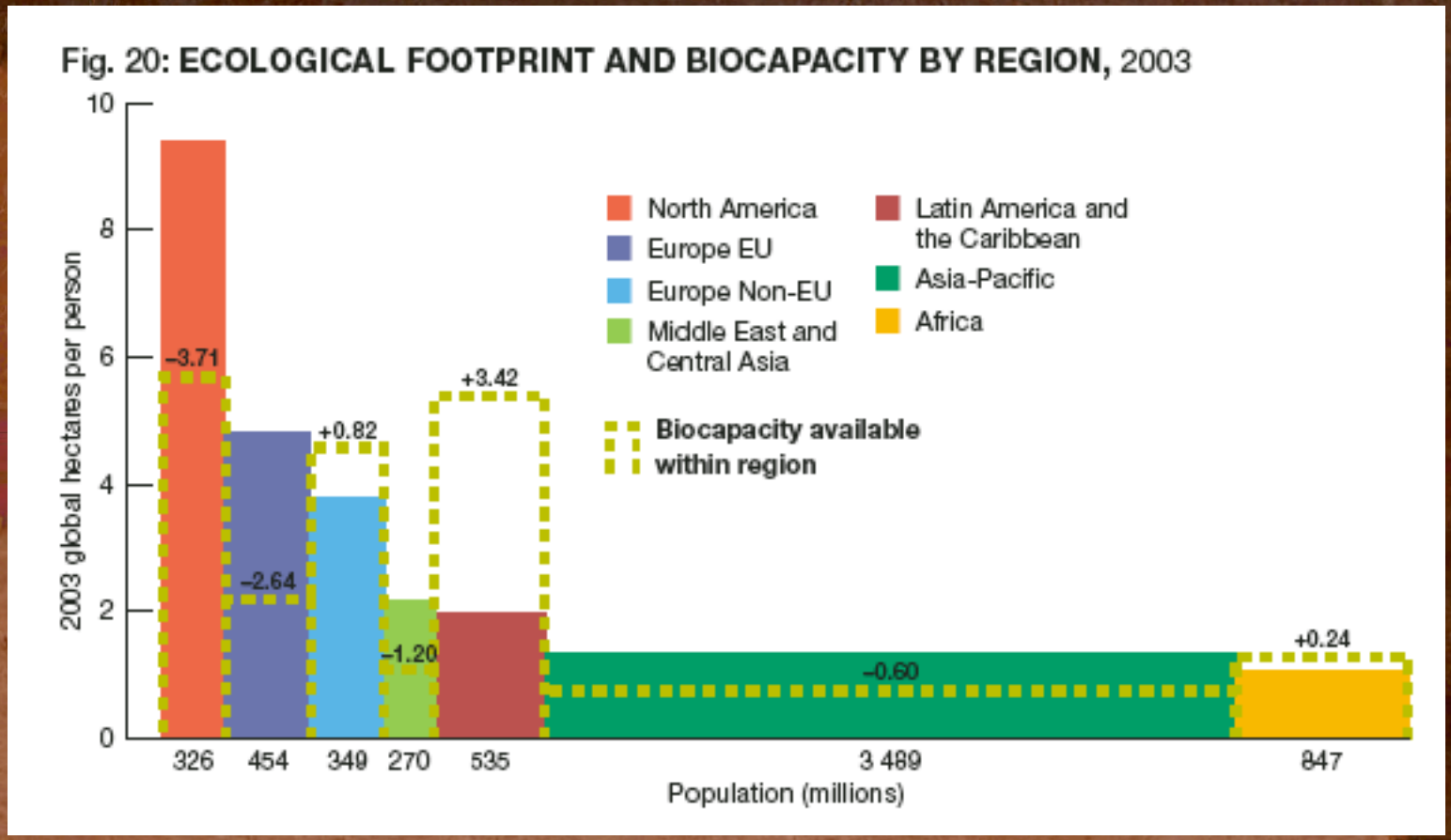


Fig. 4: **HUMANITY'S ECOLOGICAL FOOTPRINT,** 1961–2001

Fig. 5: **ECOLOGICAL FOOTPRINT BY REGION,** 2001

www.footprintnetwork.org



From the 2006 Living Planet Report

Where We Are…

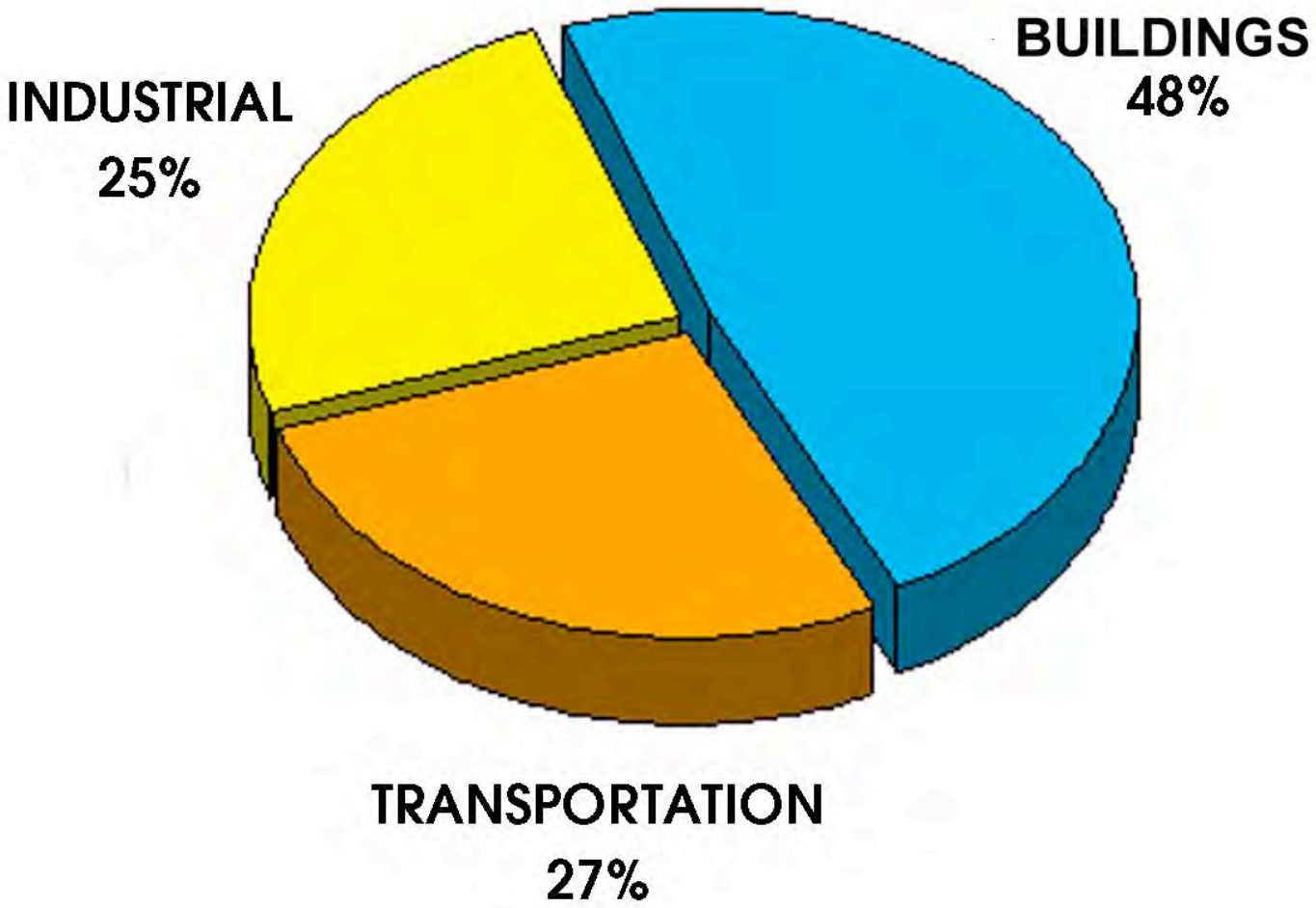
REALITY - We're maintaining our high standard of living by *importing* resources, cheap labor and ecological capacity from the developing world.

Surplus global ecological capacity no longer exists.

Ecological footprint is increasing in both the developed and developing world and world population is growing.

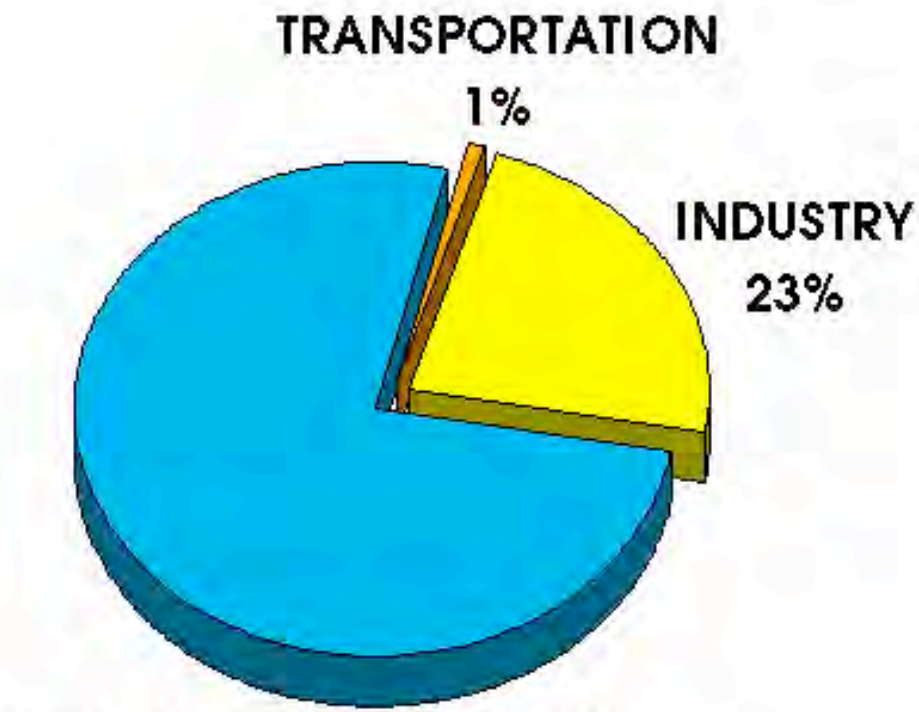
Buildings account for a majority of this footprint and energy accounts for much of that.

architecture 2030



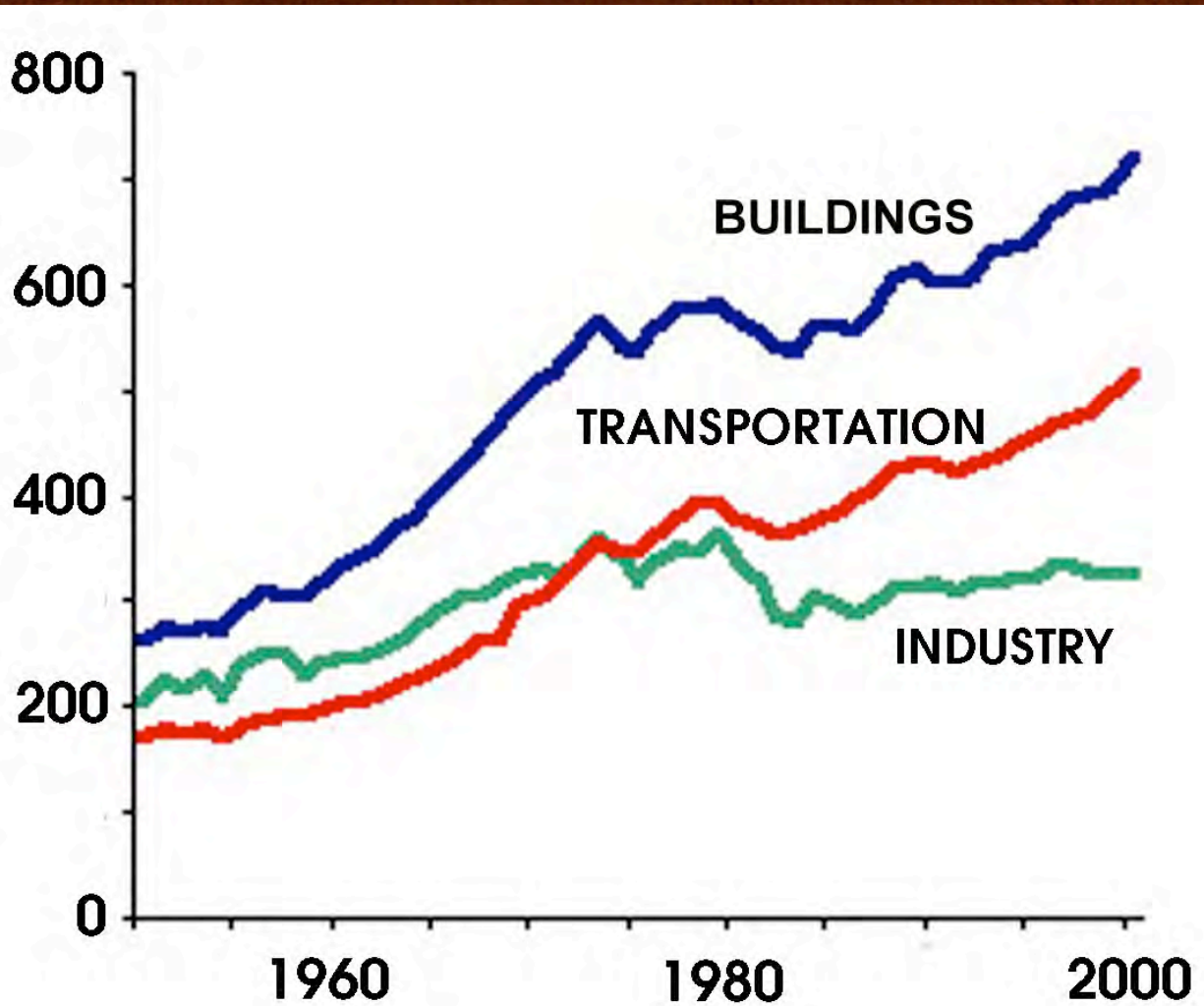
U.S. ENERGY CONSUMPTION

architecture 2030



U.S. ELECTRICITY CONSUMPTION

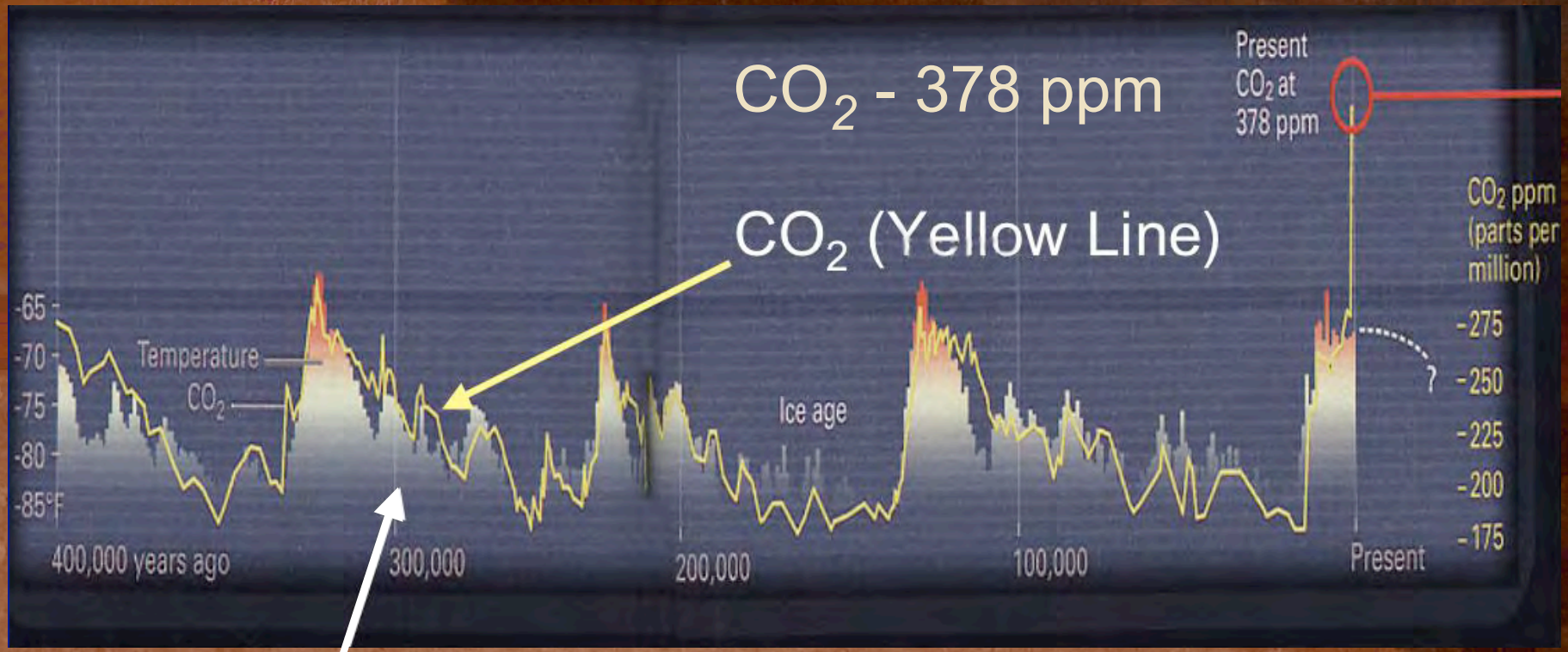
architecture 2030



CO2 EMISSIONS by SECTOR

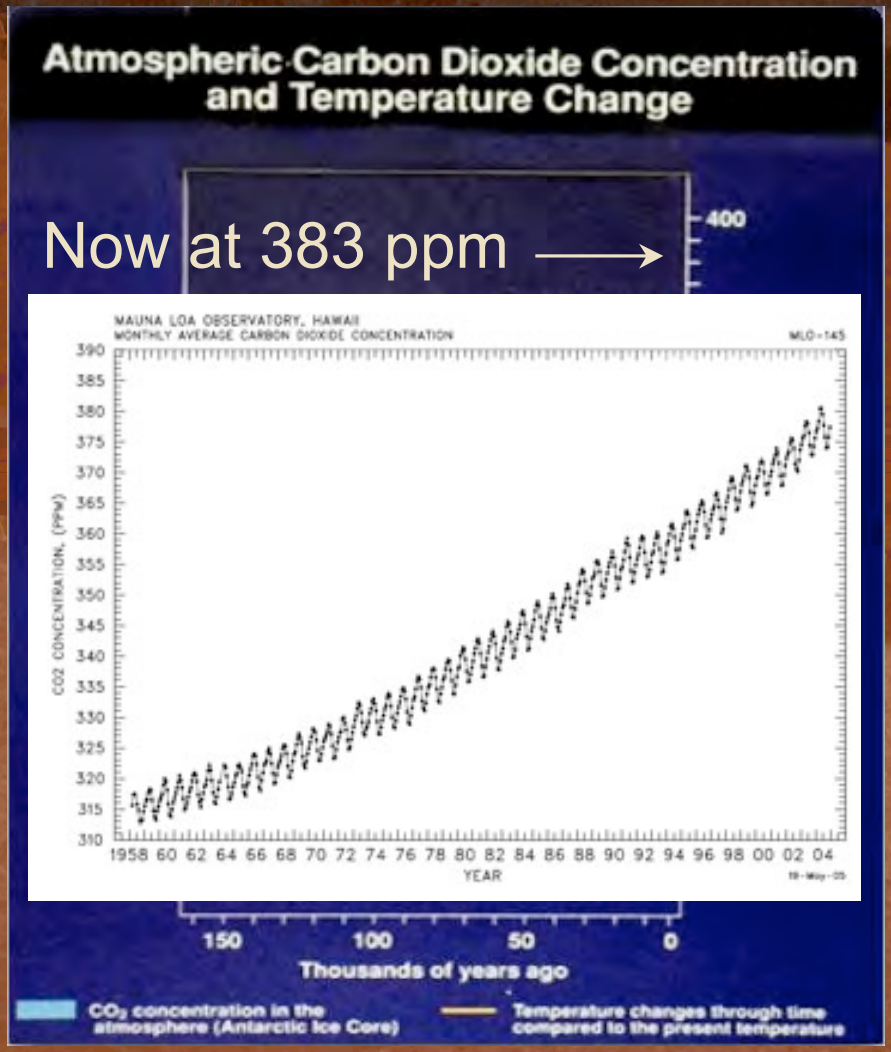
(Million Metric Tons of Carbon)

Where We Are - Climate Change



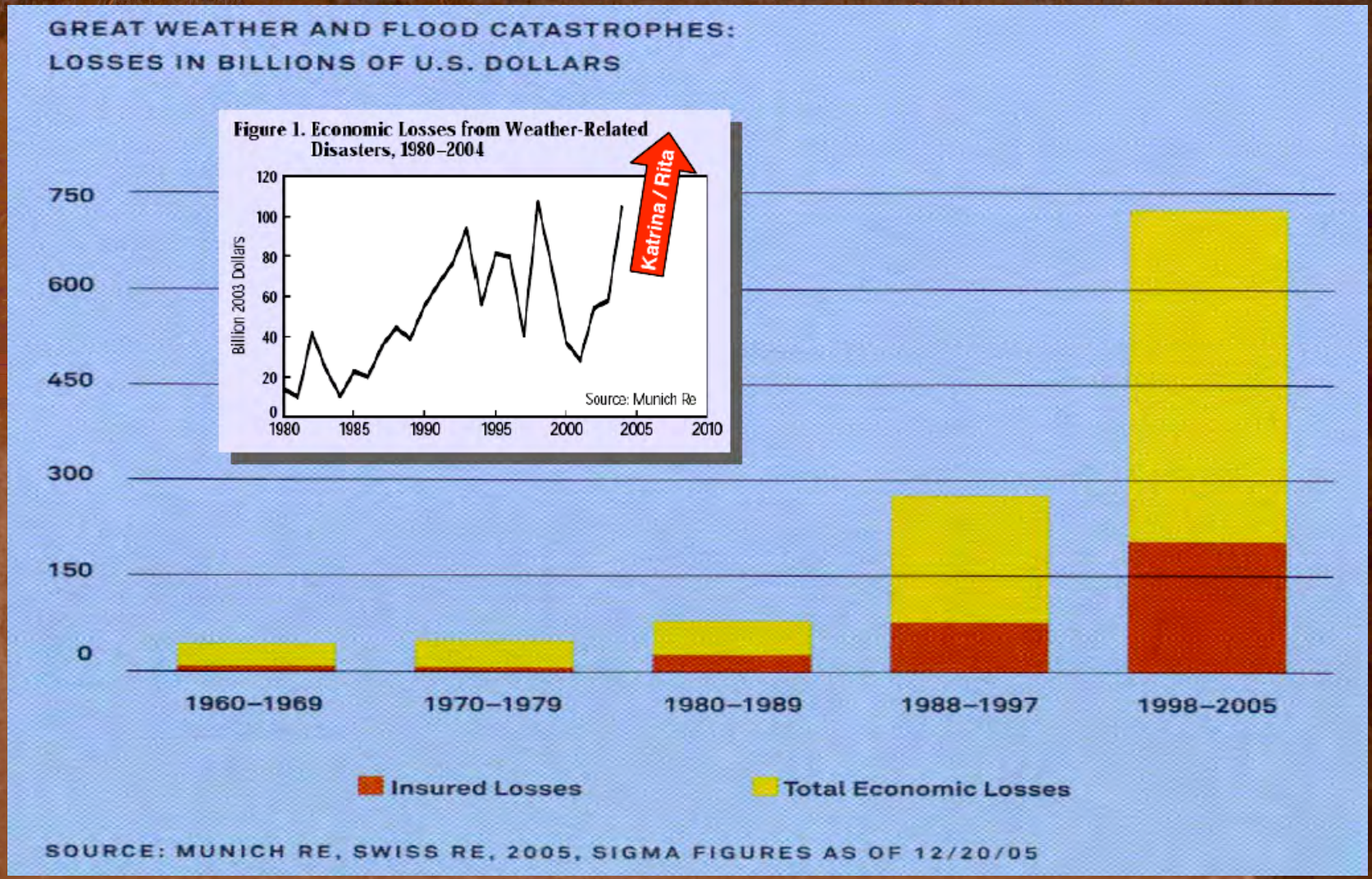
Temperature (Gray Shaded Area)

Where We Are - Climate Change

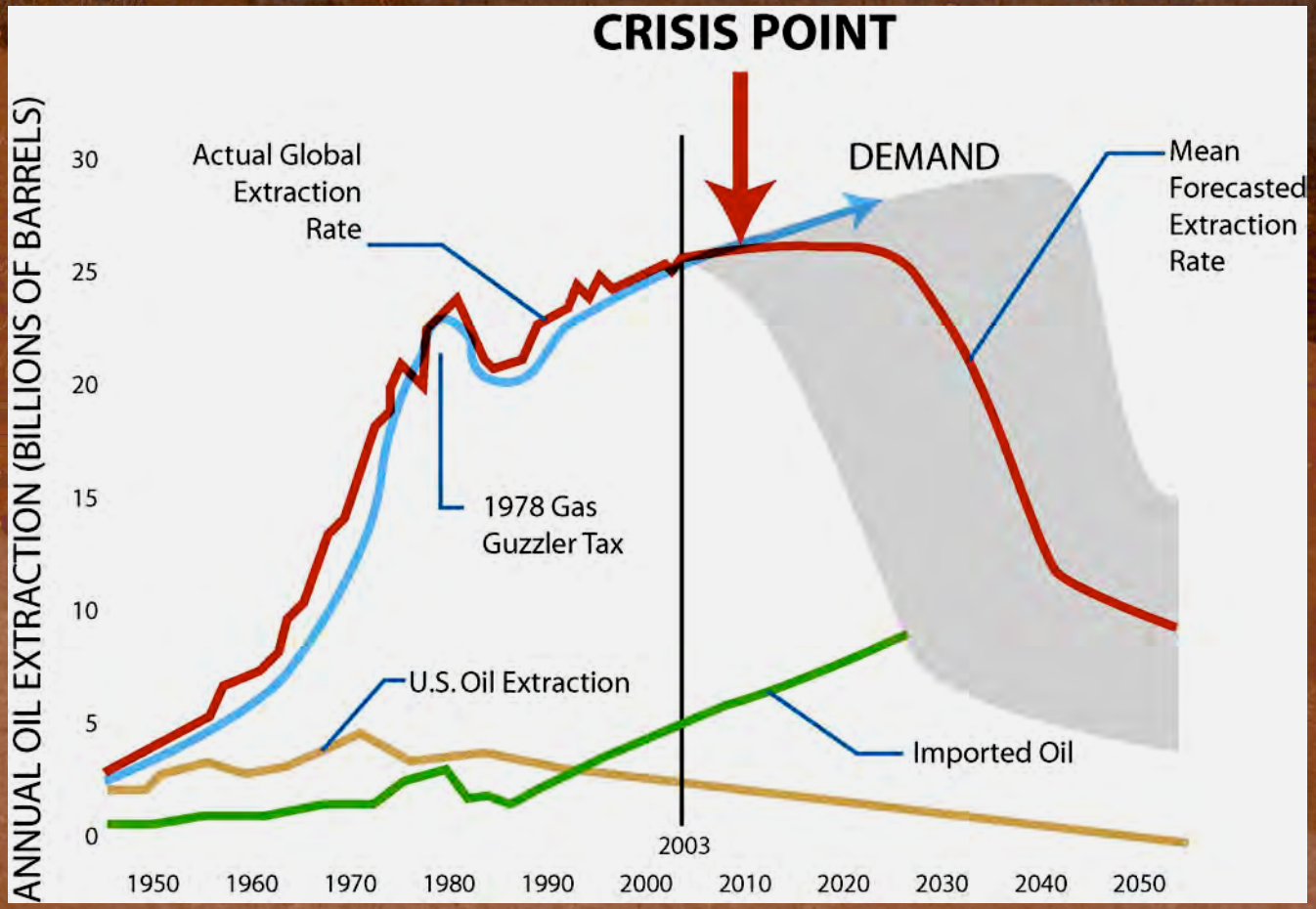


Given that current levels of atmospheric CO_2 exceed historic levels, and that few scientists conclude that the correlation between global temperature and CO_2 levels will magically disappear, the question is what will happen next.

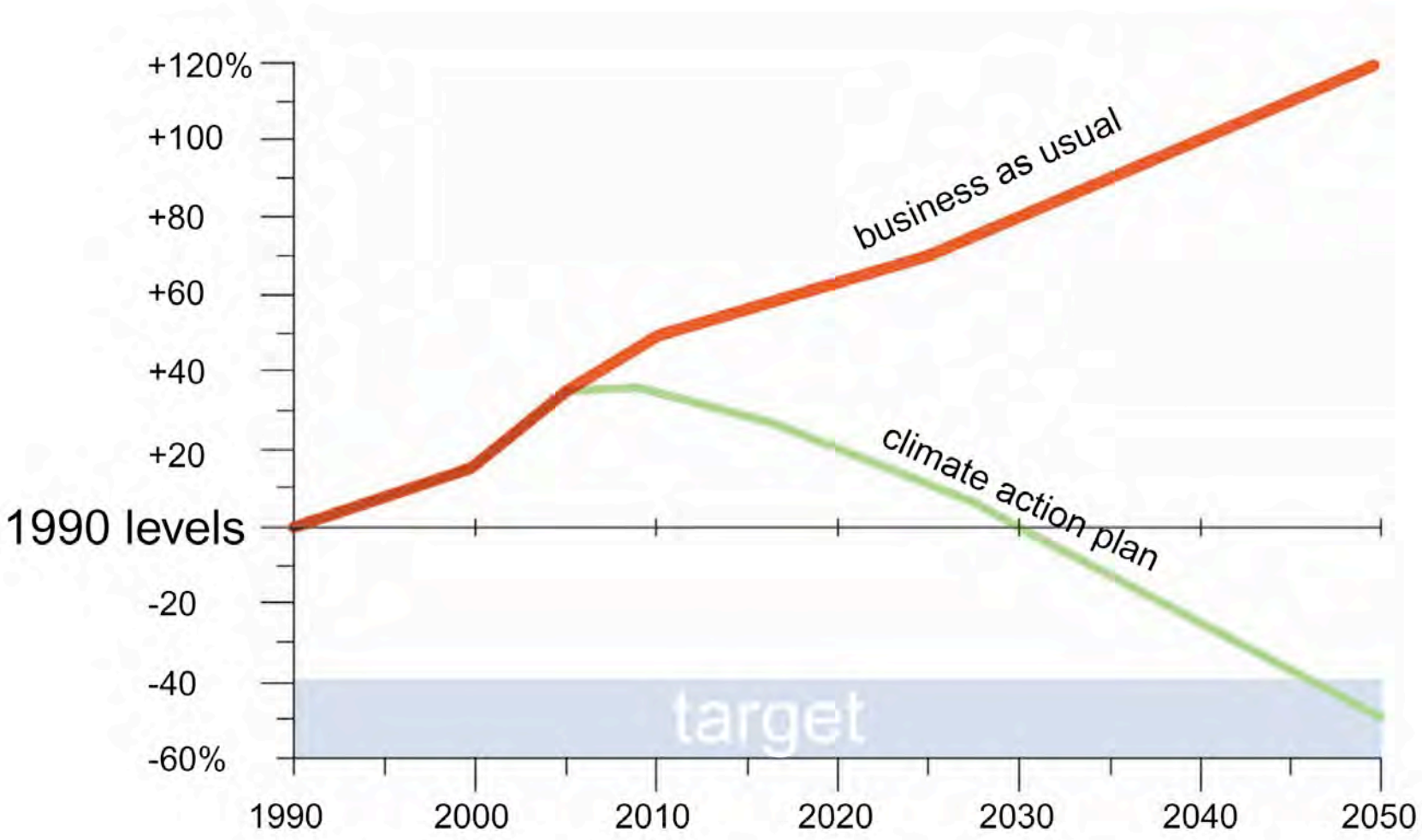
Don't Trust Scientists?...How About Insurers?



Where We Are - Peak Oil



Source: Dr. Donald Aitken, ISES/ASES World Solar Congress 2005



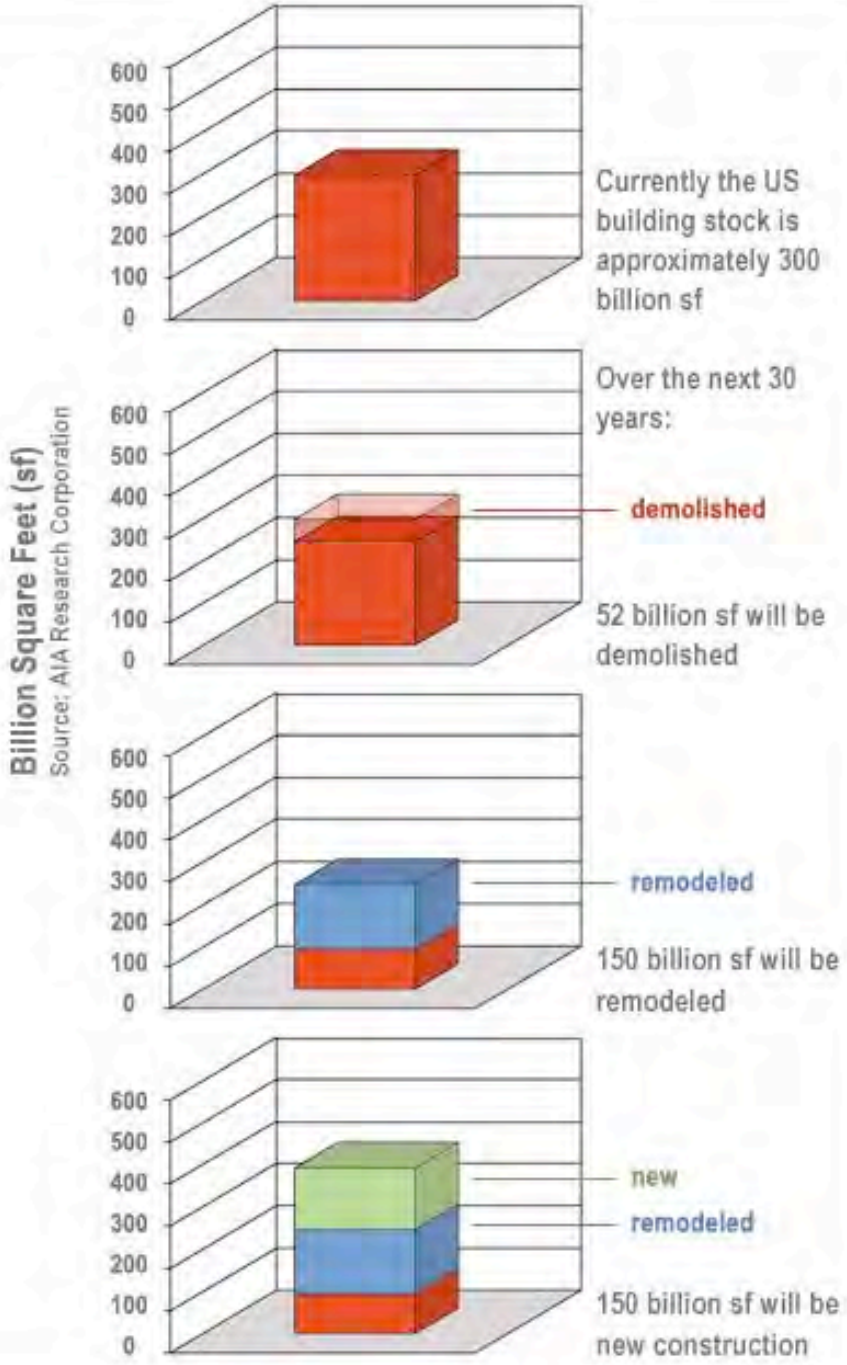
U.S. Building Sector CO2 Emissions

Source: Mazria Inc. 2005 (Assumes a 15% embodied energy reduction in the construction of new buildings)

architecture 2030

It is time for us to lead in the race against dangerous climate change

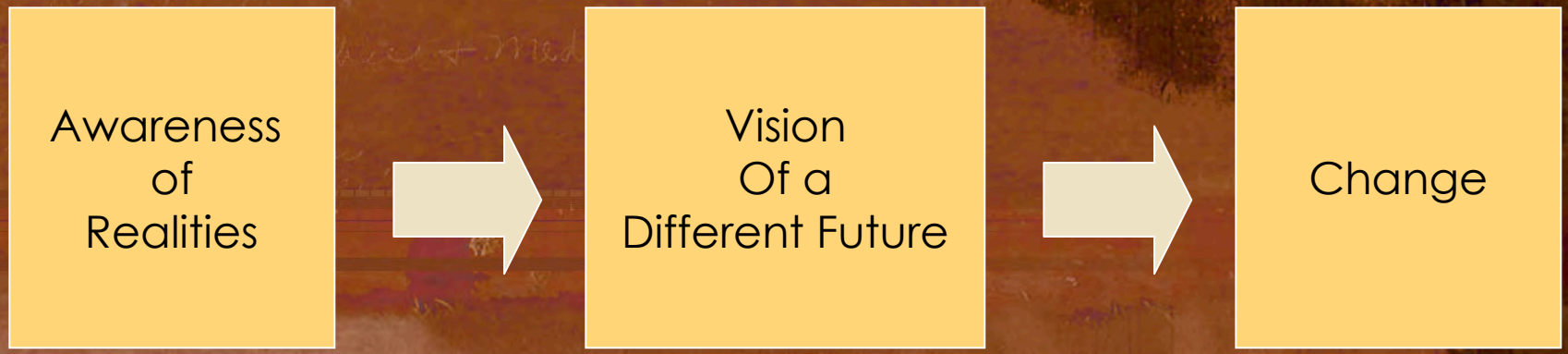
In the year 2035, three quarters of the built environment in the U.S. will be either new or renovated. This transformation over the next 30 years represents a historic opportunity for the architecture and building community to reverse the most significant crisis of modern time, climate change.



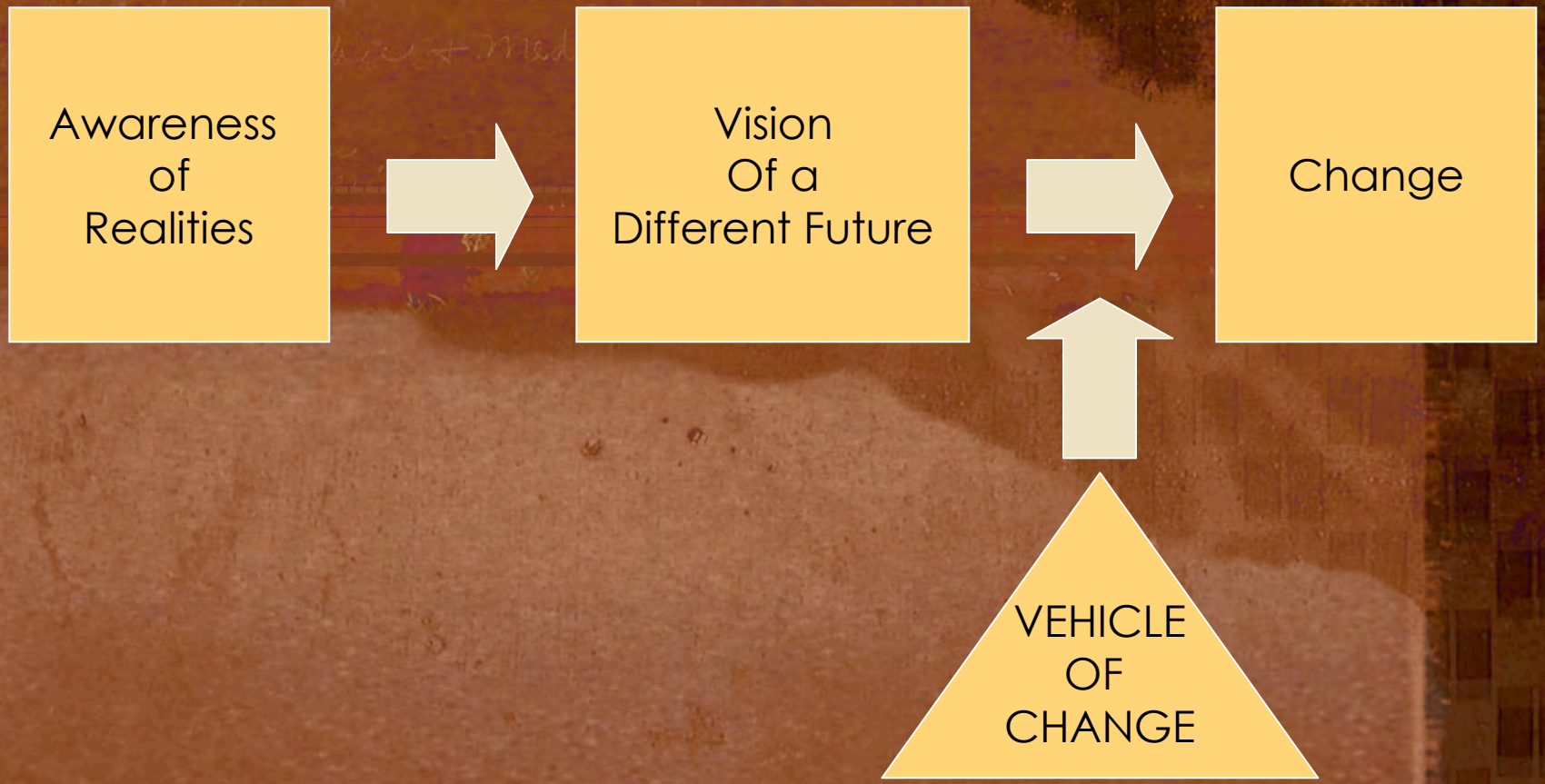
Where we are - at a Crossroads

What Is Driving the Development of Green Building Programs?

What's Driving the Development of Green Building Programs?



What's Driving the Development of Green Building Programs?



Who are Creating Vehicles for Change?

- Government Jurisdictions
- Non-profit Organizations
- Trade Organizations

Green Building Programs as Vehicle for Change

The first green building program, in Austin, TX, was narrowly focused on energy. It was a response to realities of a nuclear energy contract, a desire for change, a vision of a different future for the city's energy supply.

Green Building Programs as Vehicle for Change

In a matter of years, we've learned that green building programs can address a much wider set of changes in a community that just energy or buildings.

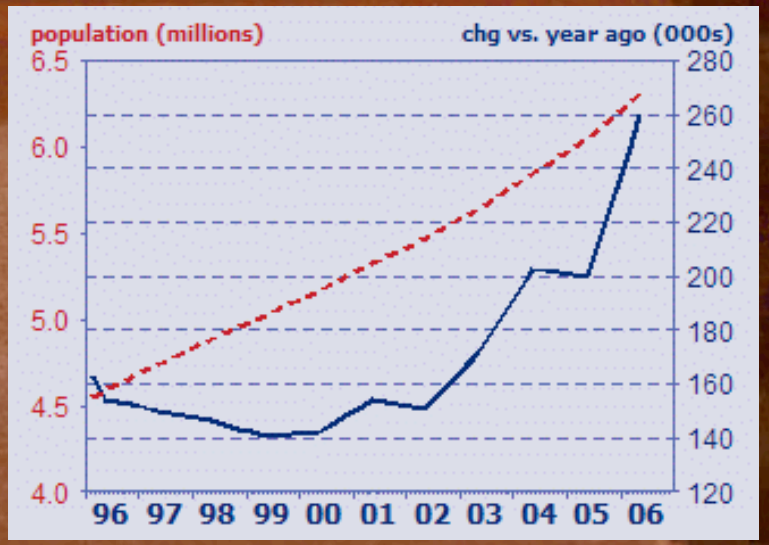
Green Building Programs as Vehicle for Change

- Create awareness
- Education and training
- Standards and accountability
- Incentives


What Issues Are Most
Critical in Arizona?

Critical Issues in Arizona

Water
Energy
Economy
Population



-blackmesais.org, Waseem, ebr.eller.arizona.edu

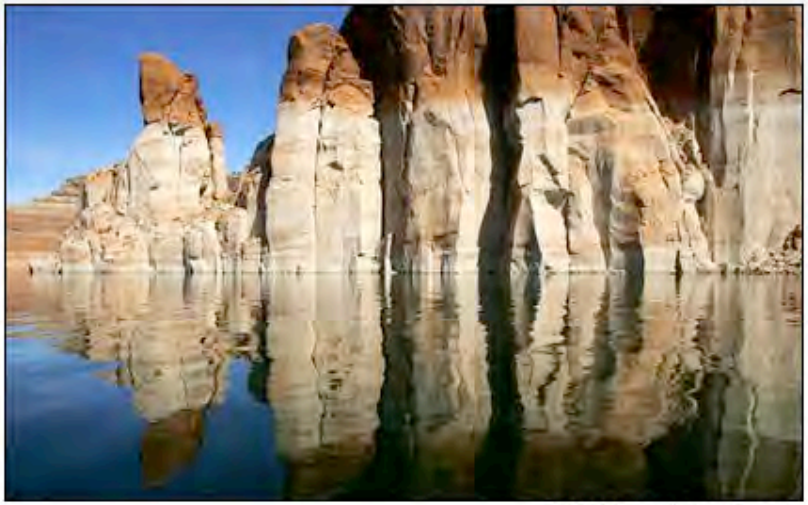
Two Critical Issues are Linked

There is a large energy component to water, and a large water component to energy…

Drought

Scientists predict Southwest mega-drought

Climate models indicate region will be as dry as Dust Bowl for decades



David Mcnew / Getty Images

A bleached "bathtub ring," the result of a six-year drought that has dramatically dropped the level of the reservoir, shows on red Navajo sandstone formations near Last Chance Bay at Lake Powell near Page, Ariz. Lake Powell and the next biggest Colorado River reservoir, the nearly 100-year-old Lake Mead, are at the lowest levels ever recorded.

-Associated Press, http://ti.org/Wildfire.jpg

Subsidence

- Groundwater accounts for 40% of AZ water supplies
- Groundwater pumping outstrips recharge by a factor of 500 times in some AZ regions

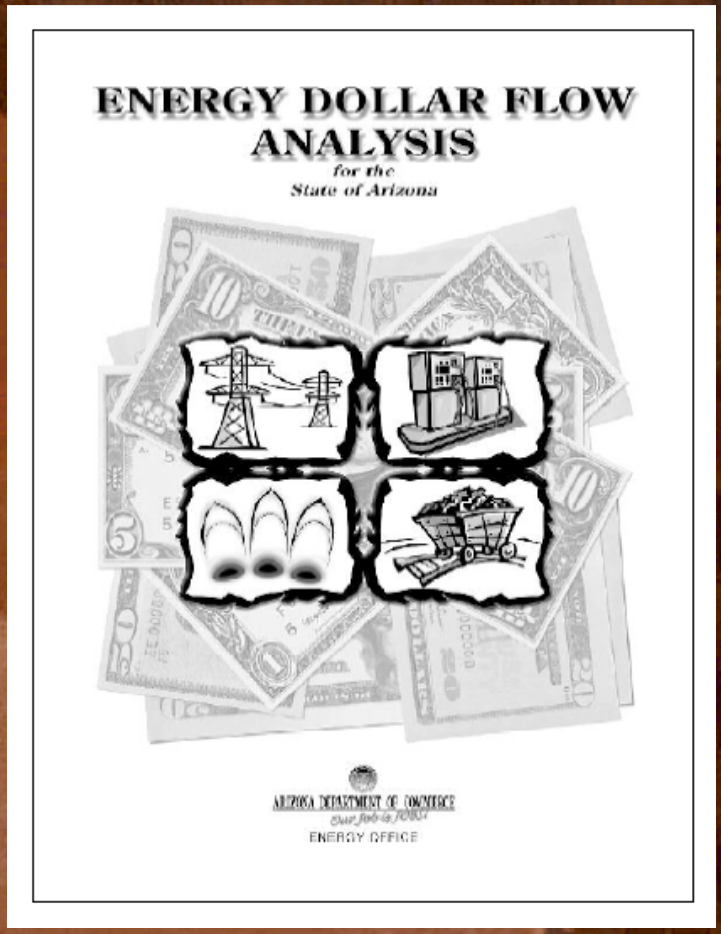
-Arizona Land Subsidence Group, 2007

Local Impacts of Global Issues

- Dependence on imports of fossil fuels translates to economy, food and other crops, transportation, tourism, etc. being vulnerable
- We are not sovereign when we do not control our energy sources

Where Energy Dollars Go

"62.7% of the money Arizona residents spent on energy in 2003 - $6.3 billion - left the state"



Low Income and High Utilities

Affordability Facts

The *average* middle-income household spends about 5% of its monthly income on utilities…

In the worst months of 2001, many low-income households spent up to 70% on utilities.

Retired elderly on SSI spend over 25% on utilities.

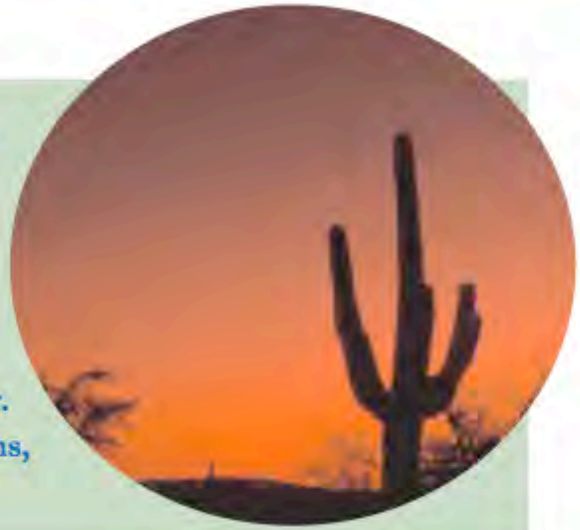
Affordable-qualified tenant spends about 20% on utilities.

-Heschong Mahone Group, 2006

Local Impacts of Global Issues

Global Warming and ARIZONA

The Intergovernmental Panel on Climate Change estimates average temperatures in Arizona could rise about 6.75 degrees Fahrenheit by 2100 if global warming continues unabated. The warmer climate is expected to cause more extreme fluctuations in precipitation levels across the region, contributing to heavier rainfall and flooding events in winter as well as more severe drought conditions and wildfires in summer. Global warming could also bring less snowpack in the mountains, reducing summer flows in many Arizona streams.



- National Wildlife Federation

Local Impacts of Global Issues

Climate Change

- Change in rainfall & temperature
- Loss of wildlife & habitat
- Impacts on tourism economy

What's at stake for Arizonians?

The recent drought and intense wildfire seasons in Arizona are consistent with what climate scientists expect will occur more and more as global warming continues. These destructive weather events are just one way the warmer climate will touch the lives of Arizonians, as global warming resonates through the tourism, agriculture, wildlife recreation and timber industries.

- Arizona currently is experiencing a decade-long drought that has shown no signs of stopping and has already depleted water reservoirs. A longer drying trend could lead to severe water shortages for the state.
- Global warming's effect on crop production could include a 70-percent reduction in wheat yields and 11-percent reduction in cotton yields as temperatures rise beyond the tolerance level of the crops. To compensate, farmers would have to increase the number of farmed acres requiring irrigation, further stressing the water supply.

"Global warming poses an overriding challenge to our responsibility to protect wildlife for our children's future. We must advance balanced solutions that work for people, wildlife and the economy to overcome this challenge."—
Larry Schweiger
President, CEO
National Wildlife Federation

- Loss of wildlife and habitat could mean a loss of tourism dollars. In 2001, more than 1.7 million people spent nearly $1.6 billion on hunting, fishing and wildlife viewing in Arizona, which in turn created 31,654 jobs in the state.

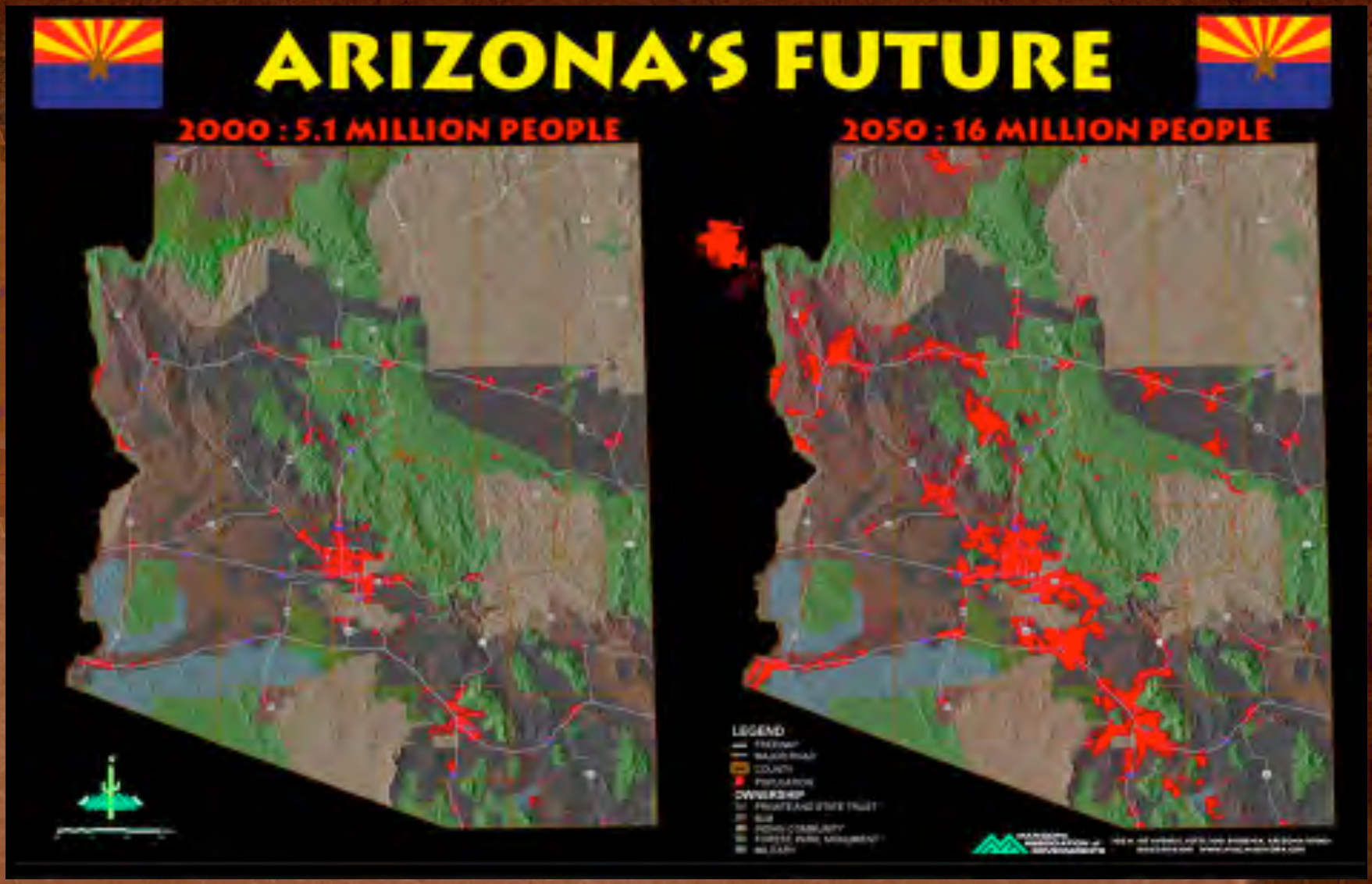
- National Wildlife Federation

Local Impacts of Global Issues

"Of any state, Arizona is particularly susceptible already to climate variability–and that vulnerability is increasing dramatically with our rapid population growth."

- Prof. C. Castro, Univ. of AZ

- National Wildlife Federation



- Maricopa Association of Governments

Opportunities in Arizona

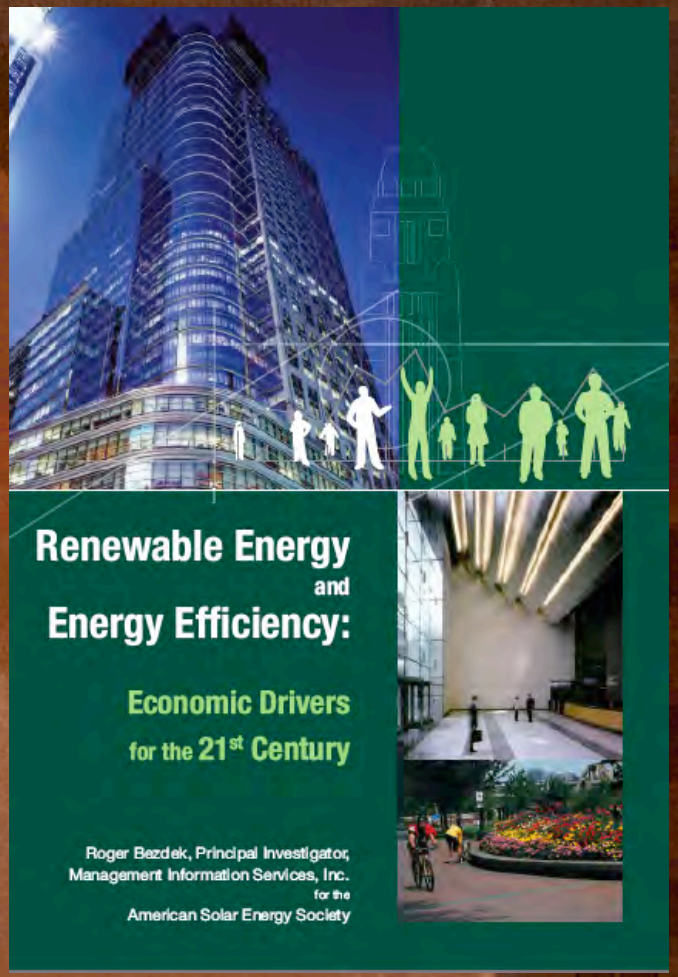
It is also critical to realize the opportunities that these challenges represent and develop appropriate responses for your community

What are the Potential Benefits & Challenges of Green Building?

Triple Bottom Line

Green Collar Jobs by 2030

- 40 million new green collar jobs predicted in wide spectrum of areas and levels
- As many as 1 of 4 workers to be working in renewable energy and energy efficiency
- Renewable energy and energy efficiency industries predicted to generate $4.5 trillion



-ASES, 2007

Positive Impacts on Local Economies

Investing in energy efficiency allows

- Additional money to be spent in the community
- Construction activity to infuse the local economy

-Heschong Mahone Group, 2006

Local Wealth

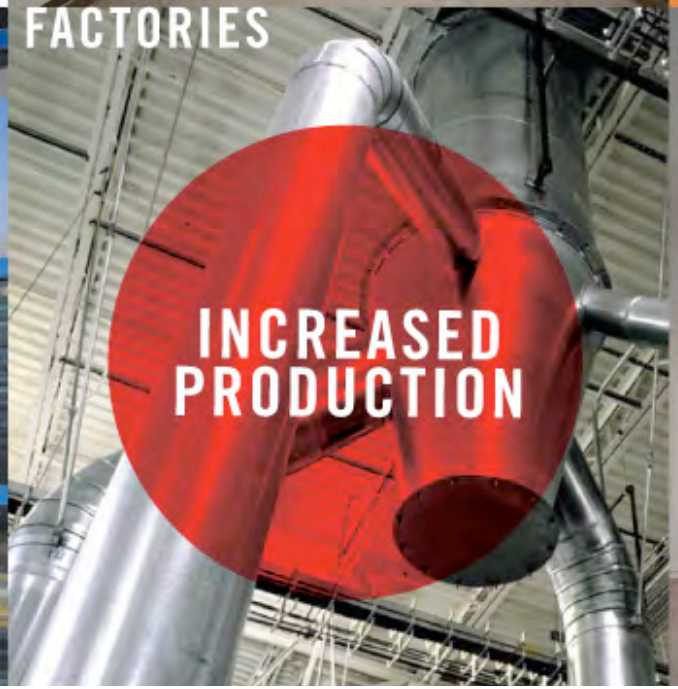
Green building and more sustainable development offer greater opportunities for local economic development, jobs creation and greater community self-sufficiency. By reducing the amount of money flowing out of the local community for energy, materials, and business, while reducing the ongoing costs of operating and maintaining greener buildings, more wealth is created locally and retained in the community.

Improved Human Health

The green building movement has been the driver of the reduction of formaldehyde in manufactured products.

It benefits occupants as well as manufacturing employees, trades people and those living downstream and downwind.

Increased Productivity.

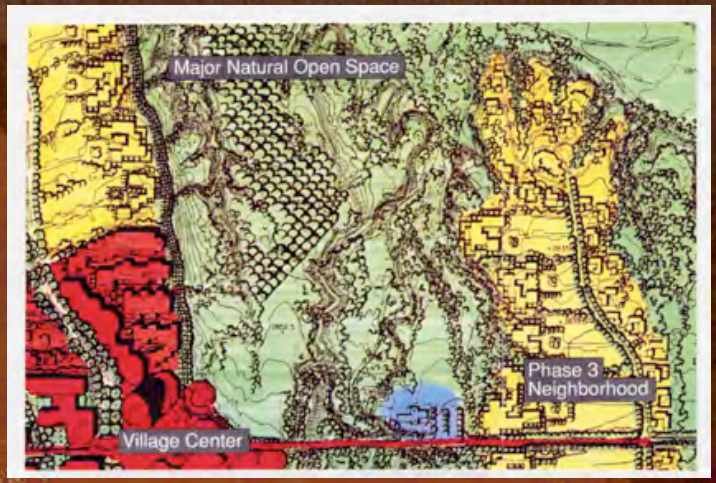


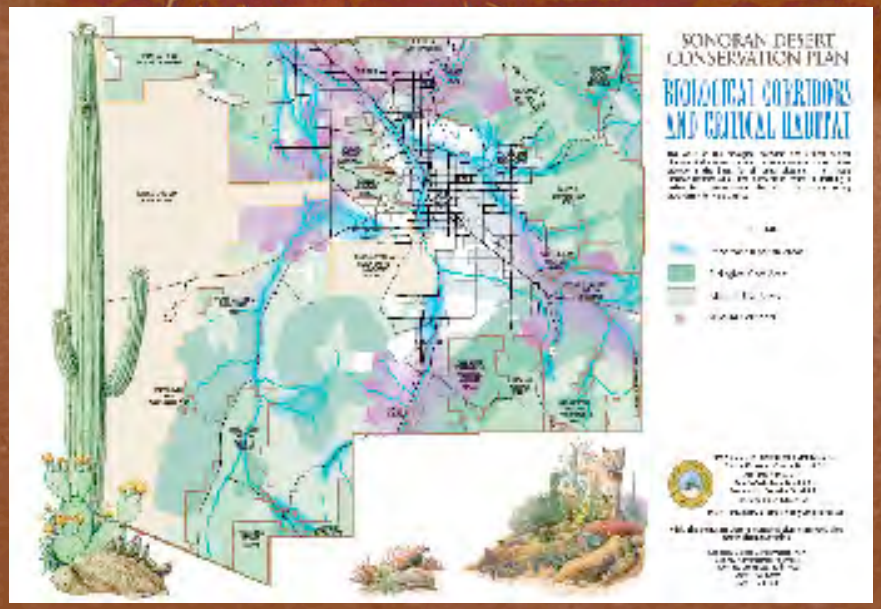
Ecological Health

- Wildlife habitat protection
- Enhanced biodiversity
- Water and air quality
- Reduced impacts from energy and material production, transportation

Improved Land Use & Planning

- Land use planning
- Infrastructure
- Transportation
- Solar access
- Wildlife habitat





Cultural Appropriateness

Green building encourages context based design, appropriate to the land as well as the social and cultural fabric of a community.

-Photo credit Redfeather Development Group

The Next Generation

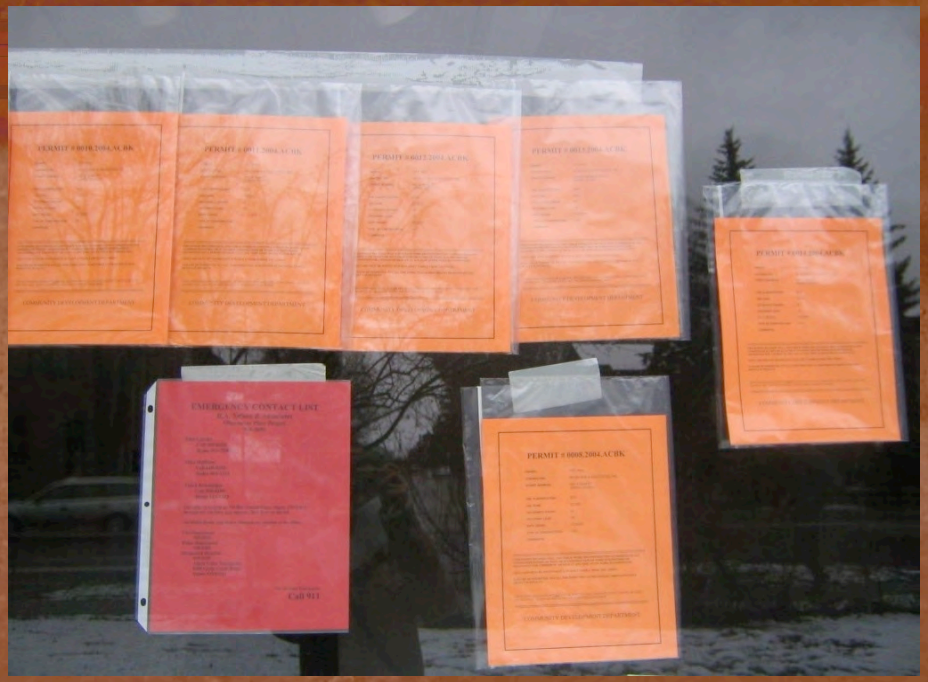
Green building, as part of a larger positive shift in the culture, is more attractive to many younger people than traditional construction, because it is part of a set of larger solutions to the problems that the whole world now must face related to climate change, energy insecurity, water insecurity and such.

Challenges of Green Building

- Misconceptions
  - Codes and Regulations
  - Costs
  - Impacts of buildings
- Local support and resources
- Education and training
- Material selection and availability
- Rural distances and density

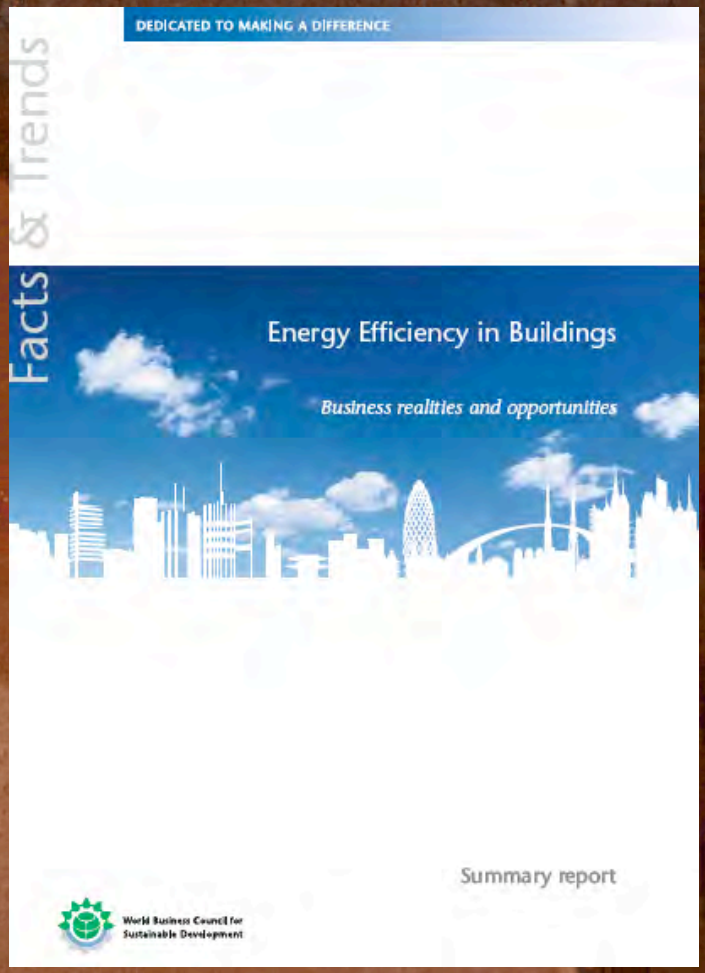
Misconceptions

- Perception that codes and regulations prevent green building



Misconceptions

A recent survey by the World Business Council for Sustainable Development finds that green first costs are overestimated by 300%, as key players in real estate and construction estimate the additional cost at 17% above conventional construction, more than triple the true average first cost difference of about 5%.



Results of the California Study

33 Diverse Buildings

Built over the last **10** year

Cost construction premiums of **1.8%**

Results of the California Study

Average Bottom Line Savings

GREEN INPROVEMENTS PAY FOR THEMSELVES IN 3 YEARS

(ANNUAL RETURN ON INVESTMENT IS 25-40%)

The William and Flora Hewlett Foundation
Menlo Park CA
LEED Gold

Additional constructions costs for LEED-certified buildings

Average for offices and schools, based on 40 buildings

Misconceptions

Our buildings can't be that bad…

The Union of Concerned Scientists ranks housing as the 3rd most destructive human enterprise after transportation and agriculture.

Other Challenges

- Local support and resources
- Education and training
- Material selection and availability
- Rural distances and density


Why Is This Relevant to Native American and Rural Communities?

Native Americans in Arizona

- 4.8% of the state population
- 28% of land base
- 90 cents of every $1 spent goes off reservations

-2006 US Census, www.arizonanativenet.com, "The Economic Importance of Indian Tribes in Arizona", 2004.

Healthy Communities

Sustainable & Sovereign

An appropriate response to past and future realities

Helping ensure the future of communities and to redevelop community self-sufficiency

The Role of Housing in Communities

British architect John F.C. Turner recognized that what is most important is what a house does for its occupants rather than what it is physically… (providing tenure on land, shelter, security, ready access to economic and social networks, potential for improvement, etc.).

Yet we tend to focus nearly all of our attention on the physical attributes of the building, rather than its location, potential to serve as an economic and social foothold, the ease with which it can be altered and improved, etc.

Relocalization

If *security* is a goal, strengthening regional and local self-sufficiency is an essential strategy for us and for everyone else, everywhere else.

Enhancing the local capacity of people and their communities to meet their own needs, also:

- shortens vulnerable supply lines
- creates more robust & resilient supply systems
- supports vital, durable local economies, and
- supports healthy cultural, political, and social structures

Relocalization

When we don't have inexpensive, abundant energy to drag materials around the world, process them as much as we imagine we need to, and then drag them around some more, it will become crucial that we learn, once again, how to use well those resources that are available to us where we live…

The rules and the way we think about risk and benefit will have to change - to become more nuanced, more inclusive, and more responsive to these realities.

Values

Green building is based on similar values to Native American traditions in its respect for and honoring of the natural world and all things in it, and on greater connection to nature and natural systems, for everyone, not just those living in rural settings.


What is Happening Elsewhere?

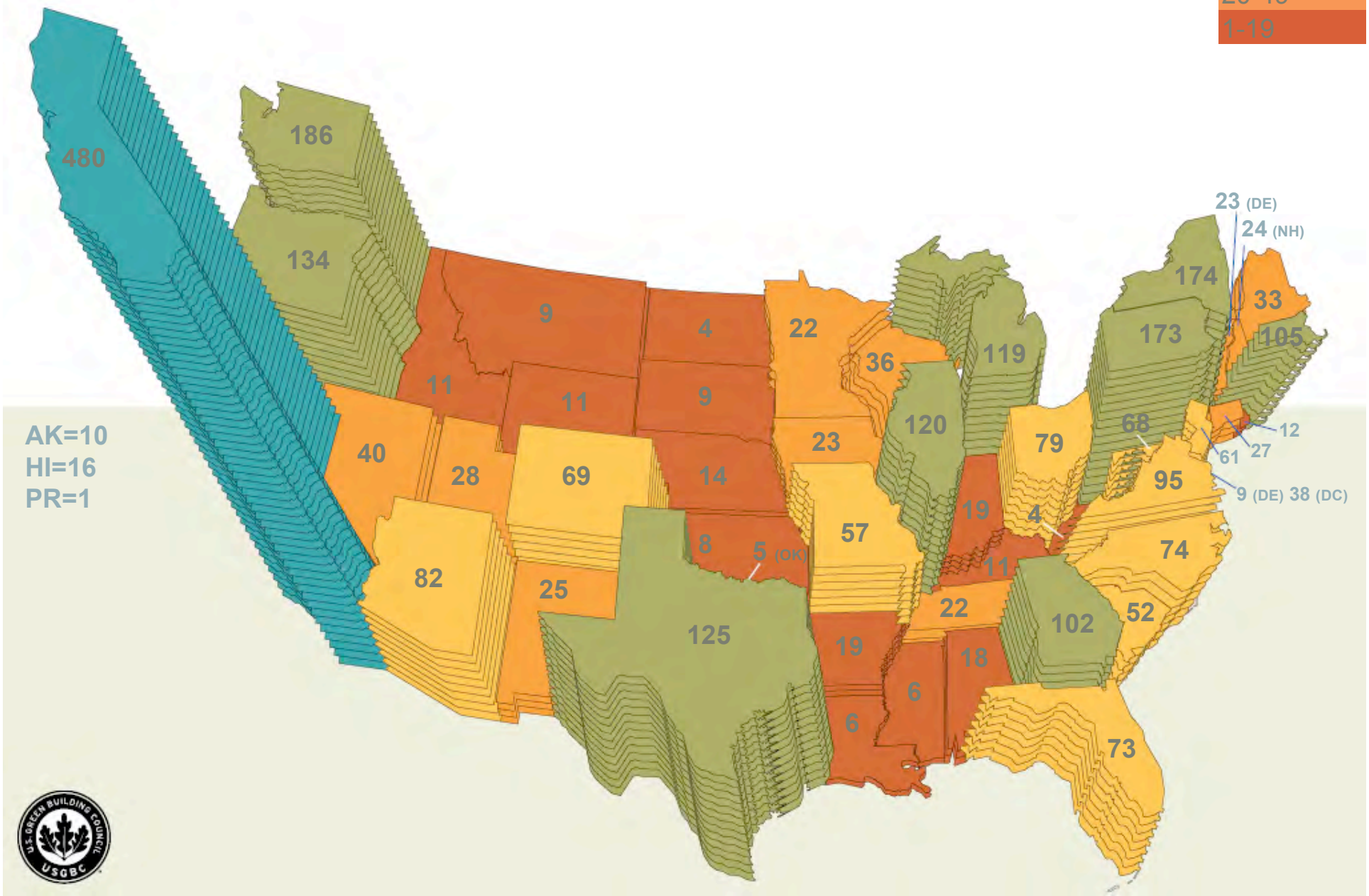
Growth of Green Building

Residential Green Building to Increase by 250-500% in 5 year Period

By 2010, the value of the residential green building market is expected to boost its market share from $7.4 billion and 2 percent of housing starts in 2005 to $19-$38 billion and 5-10 percent of residential construction activity.

Distribution by geography

as of 07/06



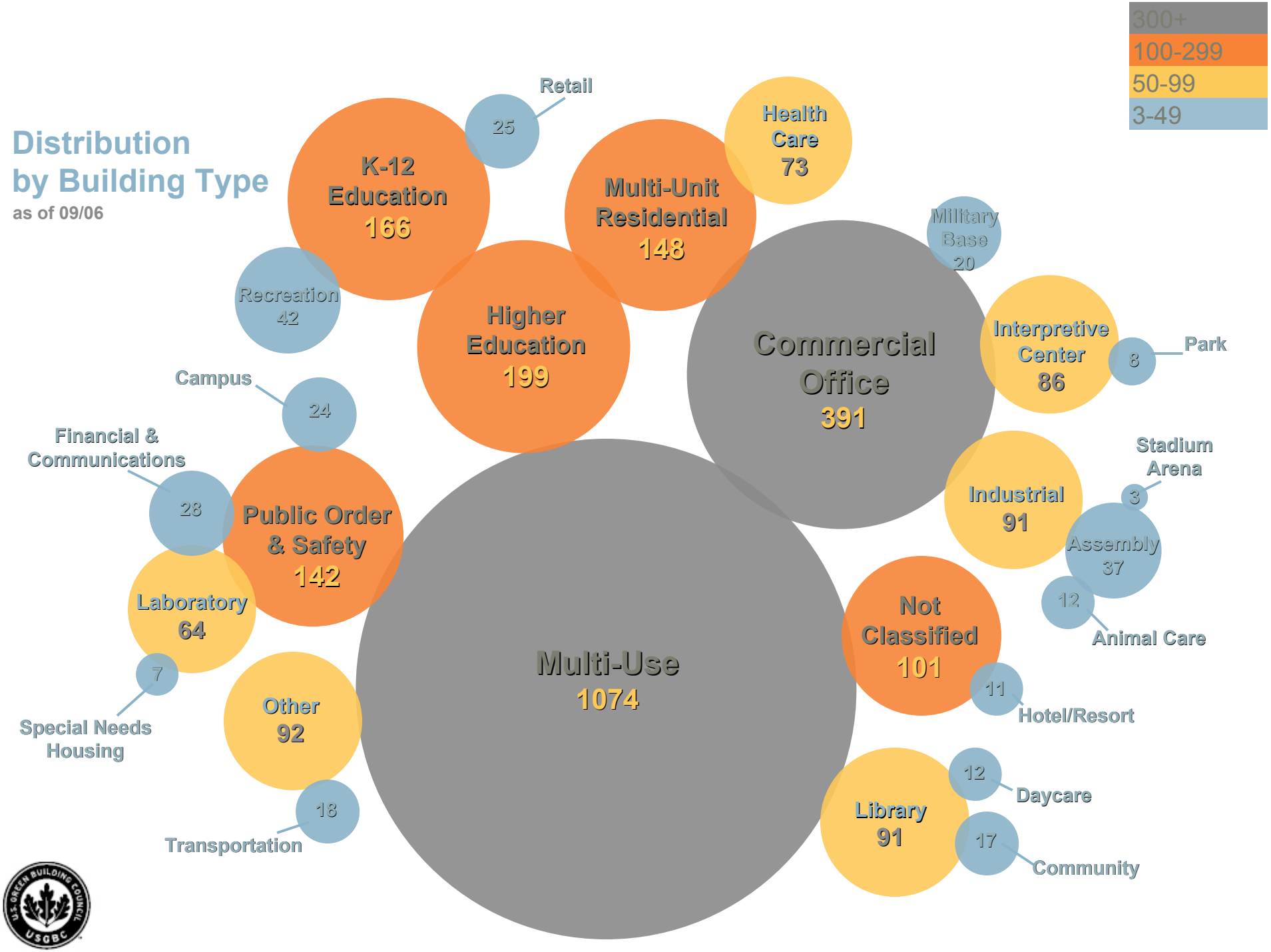
Growth of Green Building

More than 100 municipalities are requiring or plan to require LEED Certification of their projects

Seattle | Chicago | Portland | New York | Austin | Santa Monica | Denver | Kansas City

Distribution by Building Type

as of 09/06



Nk'Mip Cultural Center
Canada
Rammed Earth

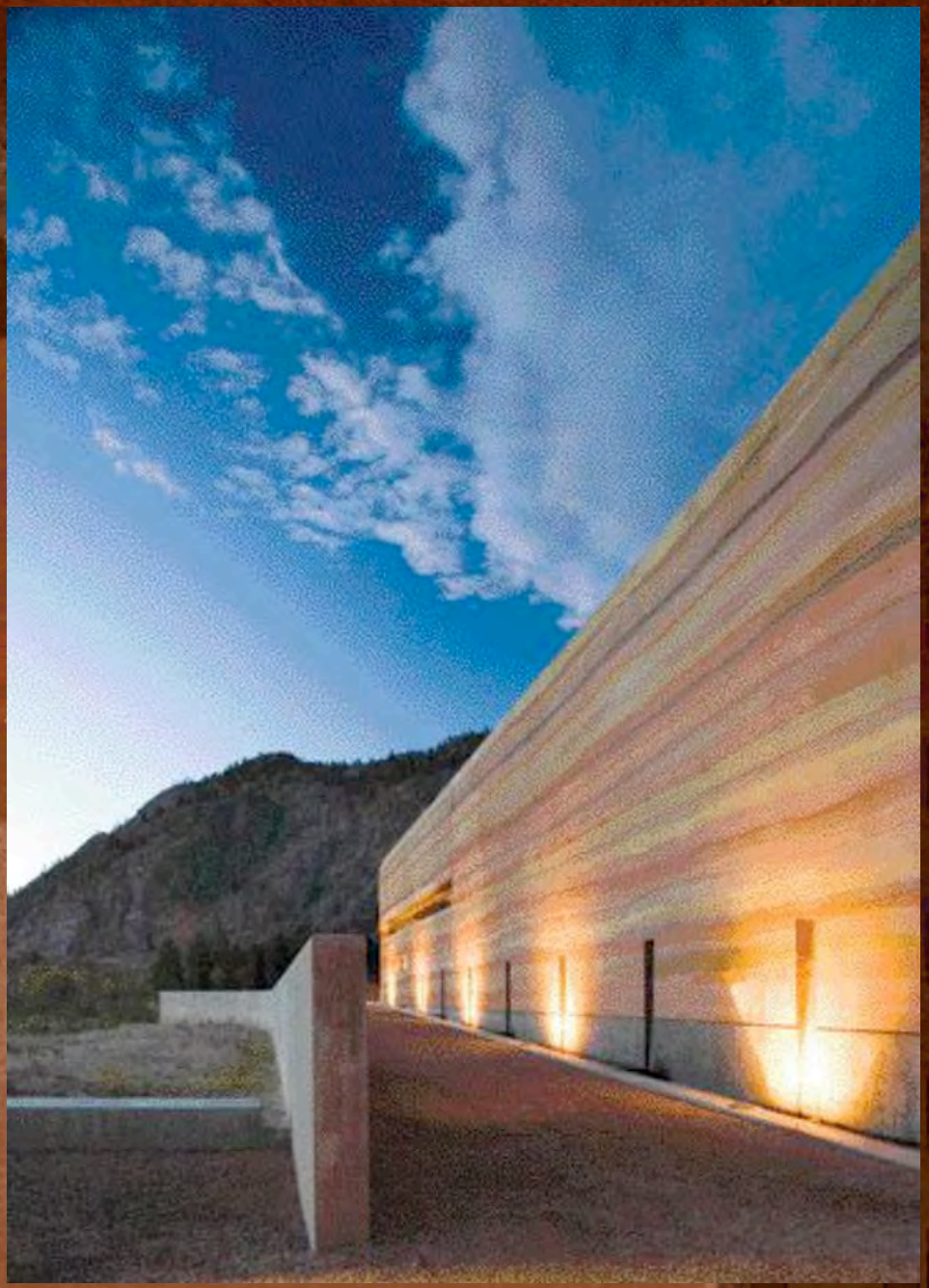
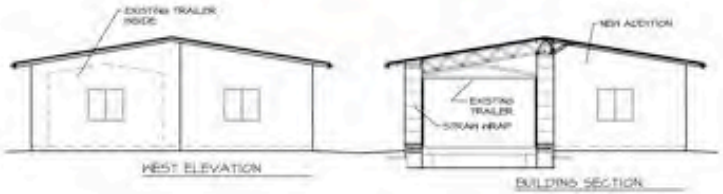


Photo- Canelo Project

COUP FEMA Trailer Wrap Design Project



COUP Credits: A.vonBachmayr, L.Bartels, D.Benjamin, D.Eisenberg, M.Myhrman, B.Gough © 2007

Green Affordable Housing Development

Solara, Poway, CA

Rents 40% below market rate

Zero utility costs

Walkable community

Evolution Continues

Examples of green building exist in such a wide array of choices, there is no need to reinvent the wheel.

However, your community can still serve as a vehicle for its evolution


Is this Appropriate for Your Community?