


10-2008

Land Use, Water Conservation and Other Things to Think About

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Dekker/Perich/Sabatini

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Land Use

Water Conservation

(and other things to think about...)

“Reality leaves a lot to the imagination.”

John Lennon





Dekker/Perich/Sabatini

Market Driven, Service Oriented, Design Firm

- Architecture
- Structural Engineering
- Interiors/Space Planning
- Landscape Design/Planning

- 225 employees
- Albuquerque, Las Vegas, Amarillo
- Multi-disciplinary:
 - Architecture
 - Structural engineering
 - Landscape architecture & Planning
 - Interior Design
 - 27 LEED AP (accredited professionals on staff)



- LEED-NC, LEED-CS, LEED-CI, LEED for Schools, LEED-EB studies
- Office, industrial, school, laboratory, university, hospital, fire station, etc.
- Typically do LEED work ourselves, but have used consultants

Dekker/Perich/Sabatini

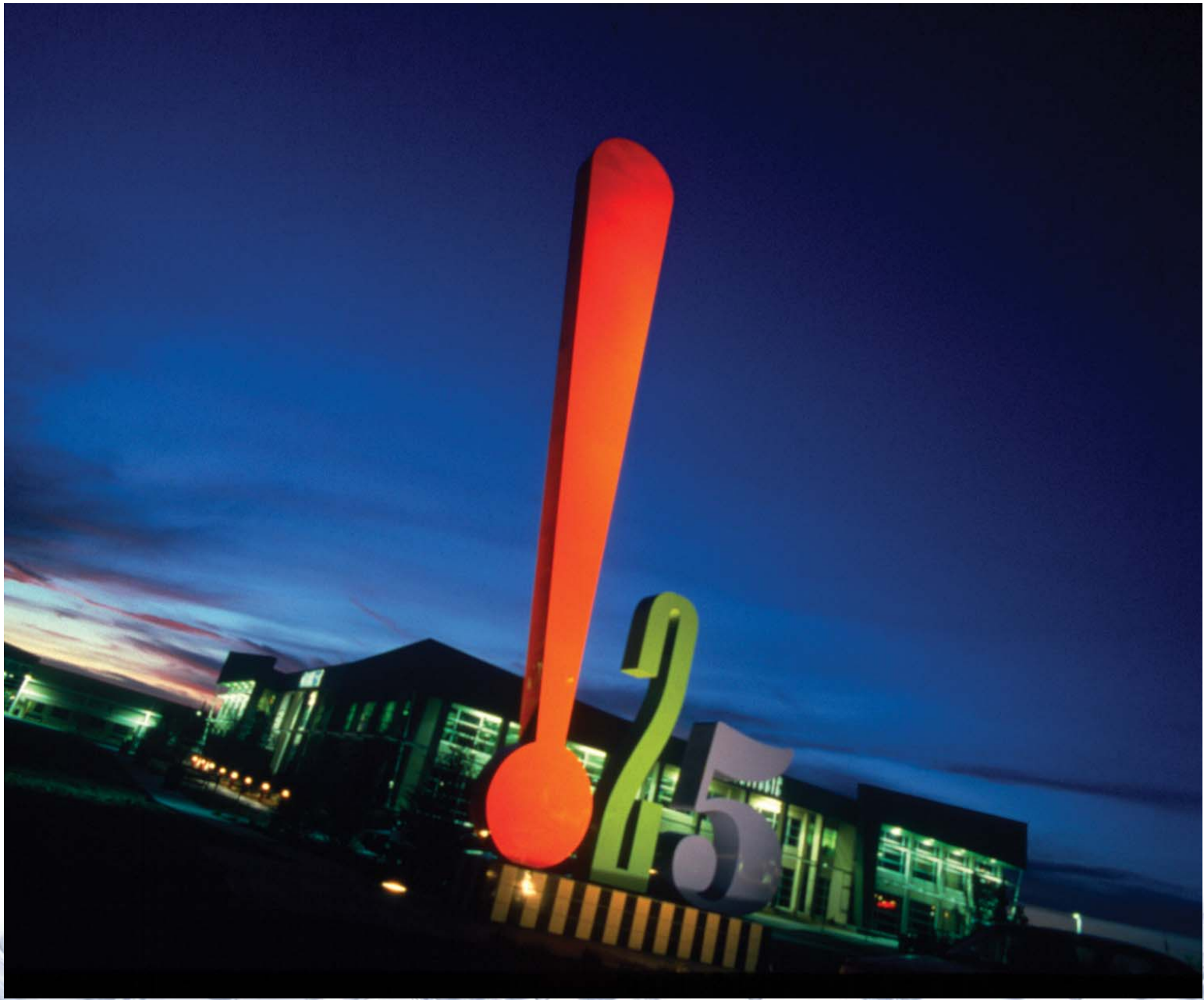






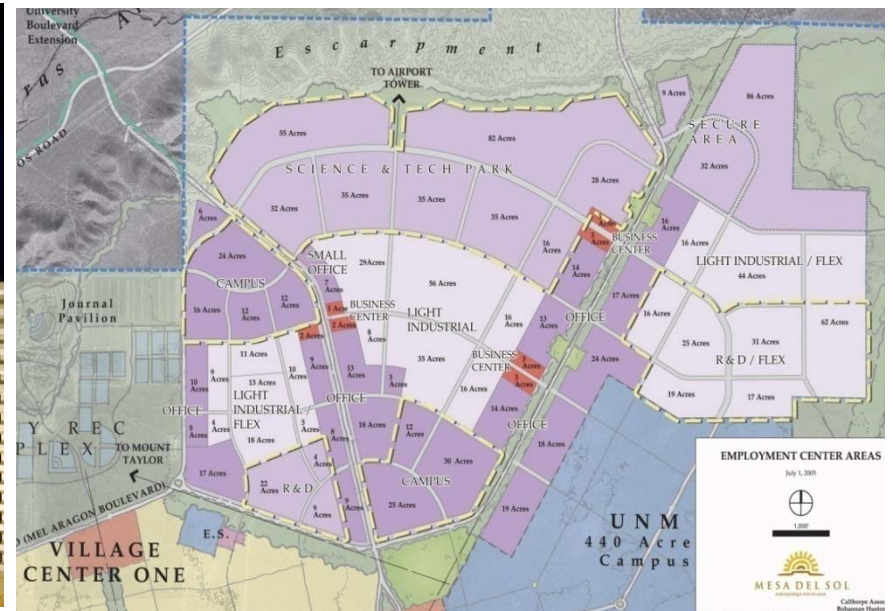














LEED Projects

U.S. passed the **300 million** mark in 9/06

U.S. population growth is about 3 million per year

There will be **400 million Americans in 2043**,

Climbing to 420 million by mid-century, the US
Census Bureau estimates

New Mexico Population to increase to 3.0+ million by 2035

Central NM Population to be 1.6+ million by 2035





- Demographics
- Climate Change
- Urban Growth and Form
- Global Warming
- Water
- Economic Development
- Constrained Resources
- Energy Costs
- **New Reality**

What does this mean for land use...



“Life is what happens to you while you’re busy making other plans.”

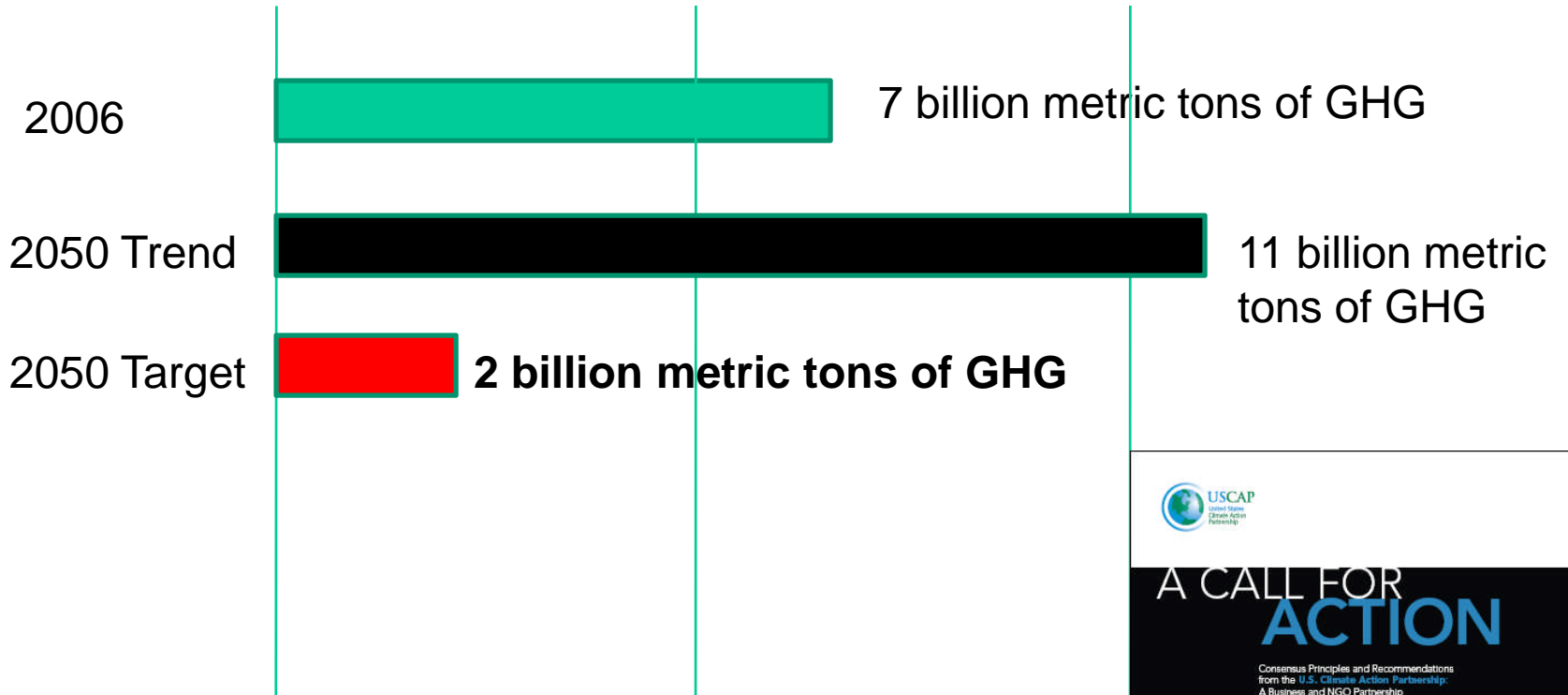
John Lennon

How the west was developed...

- 1) Cheap abundant land...
- 2) Cheap abundant gasoline...
- 3) An infinite supply of water...
- 4) Electricity production had no global impact...

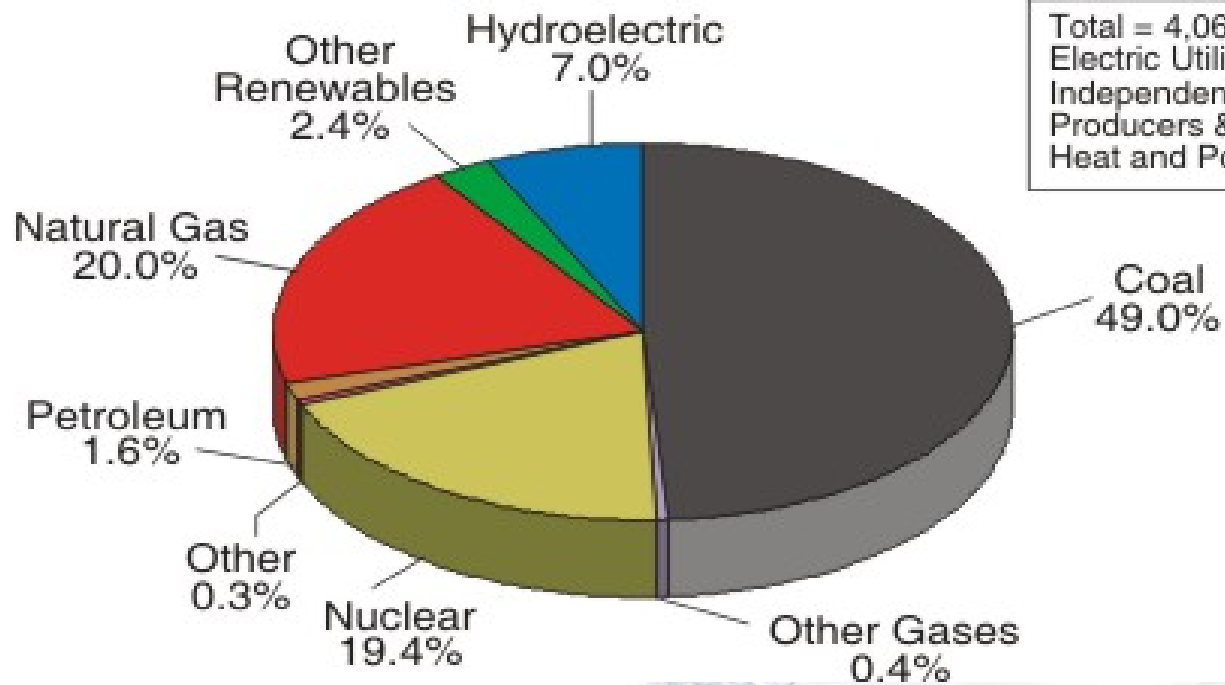
...oops...now what???





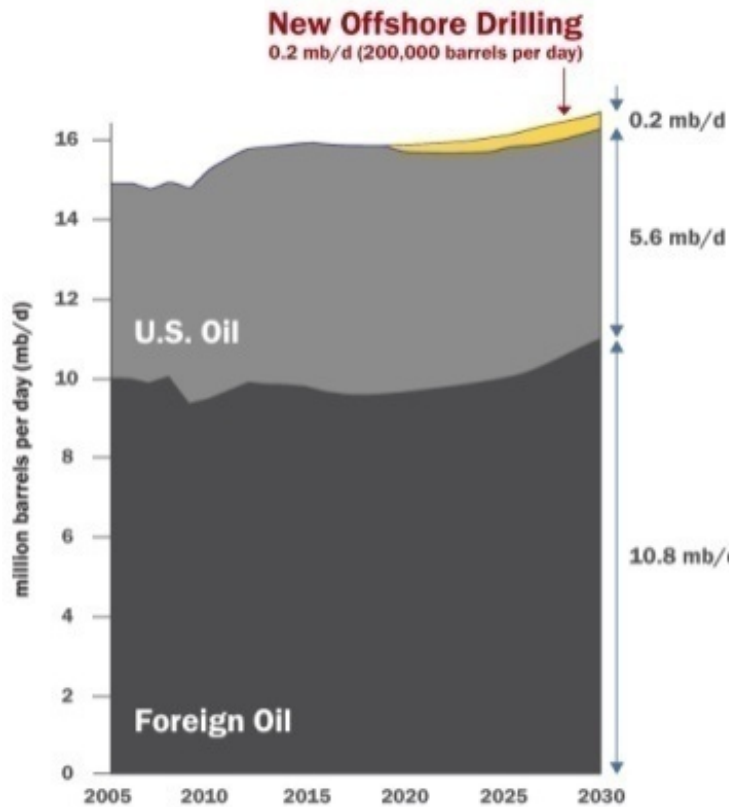
U.S. Climate Action Partnership (USCAP)





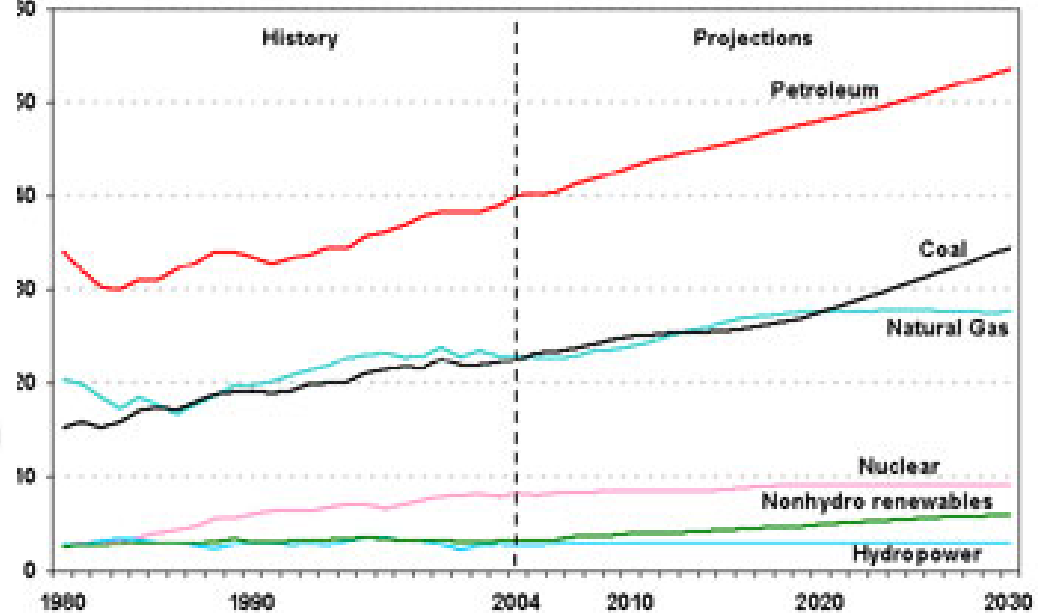
Total = 4,065 Billion KWh
Electric Utility Plants = 61.1%
Independent Power Producers & Combined Heat and Power Plants = 38.9%

Source: DOE



US OIL CONSUMPTION

©2008 2030, Inc. / Architecture 2030
Data Source: US Energy Information Administration



Does anybody really think long term gas prices will ever be low again???

- Source: U.S. Energy Information Administration

Global Warming – Climate Change



Development and land use patterns will change in the west...

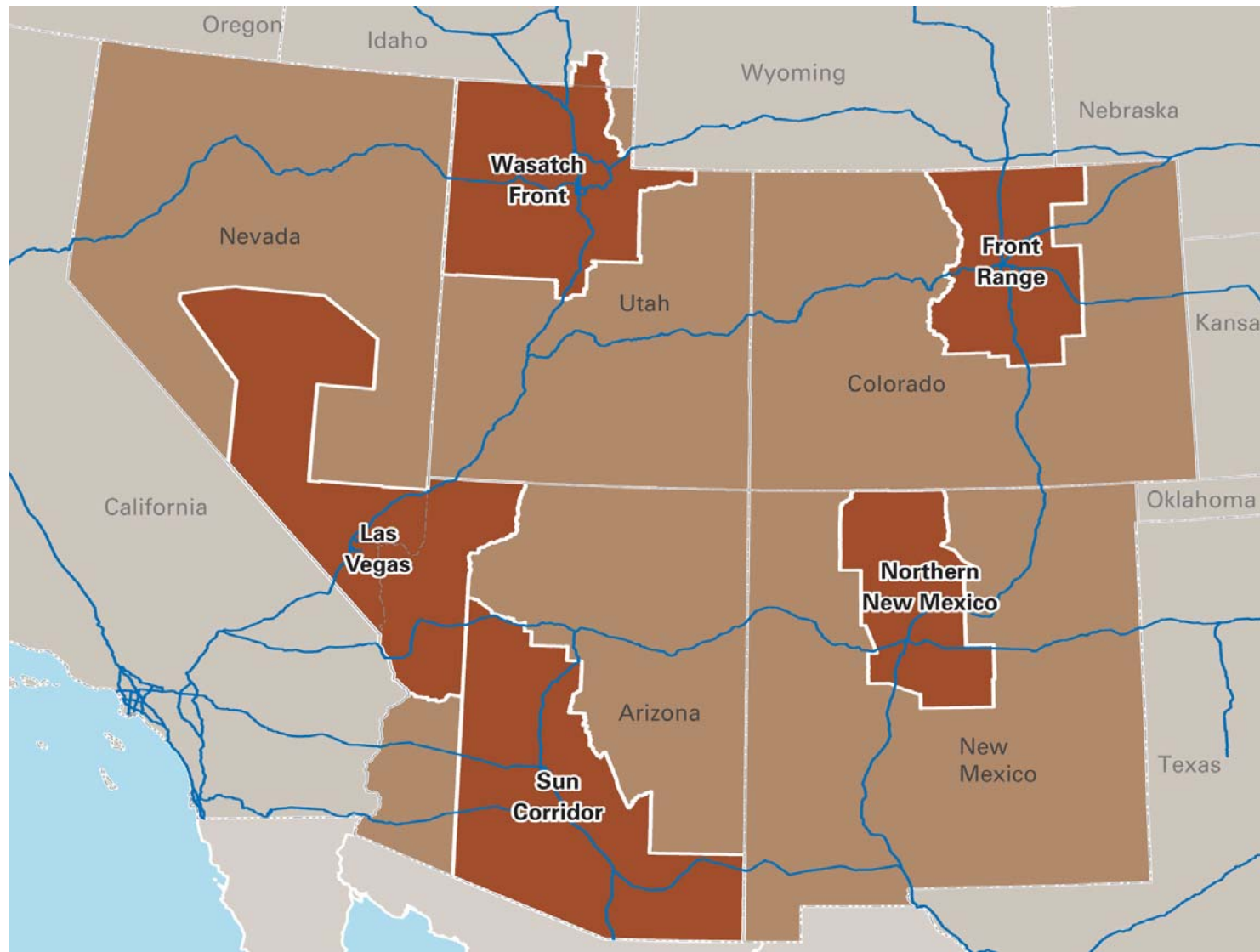
New land use codes and ordinances will drive mixed use, live/work/play developments...

We can't build enough roads to accommodate growth and maintain our quality of life...



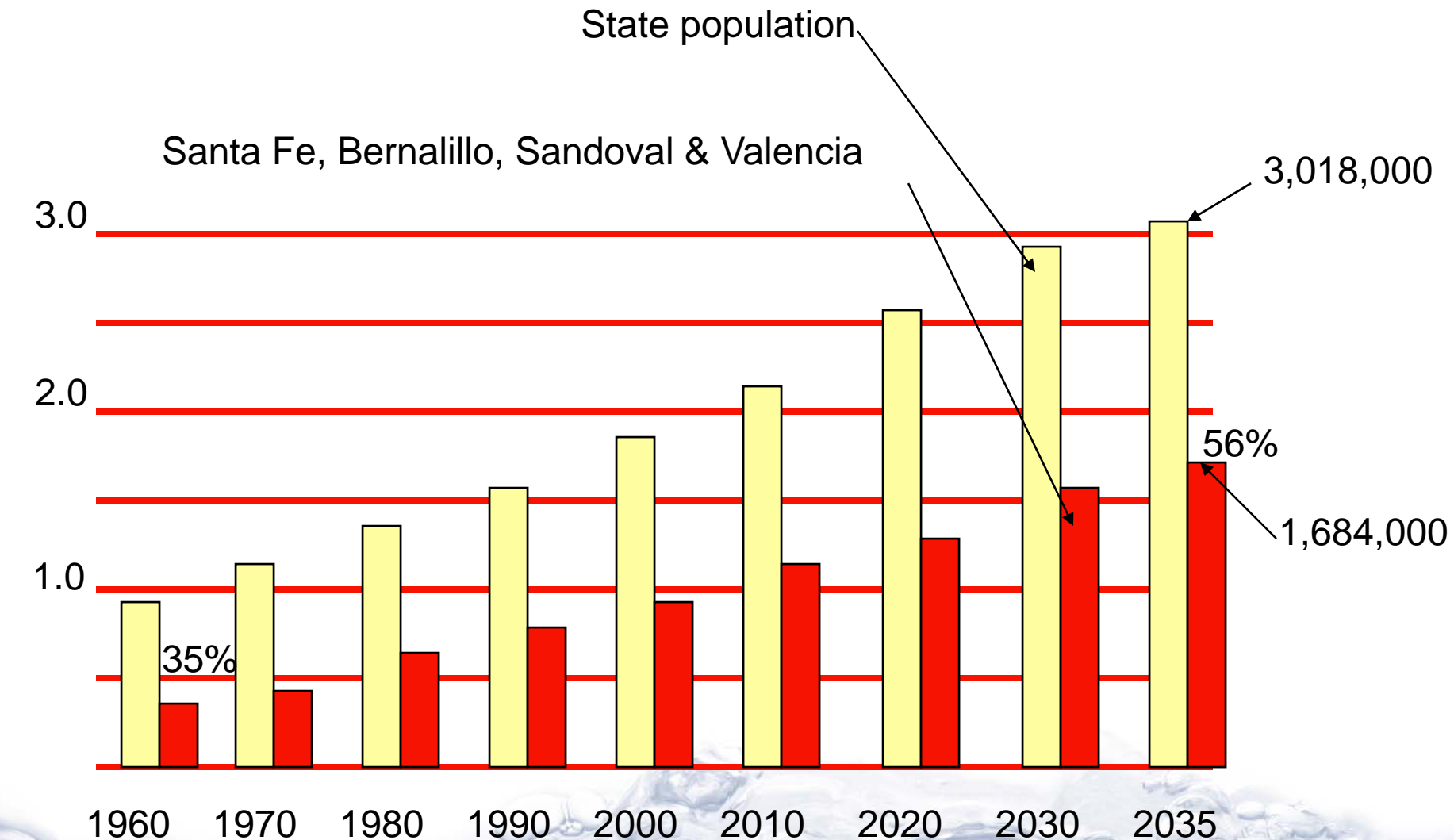
Reduce dependence on foreign oil...

Sprawl no mas...



Source: Brookings Institute

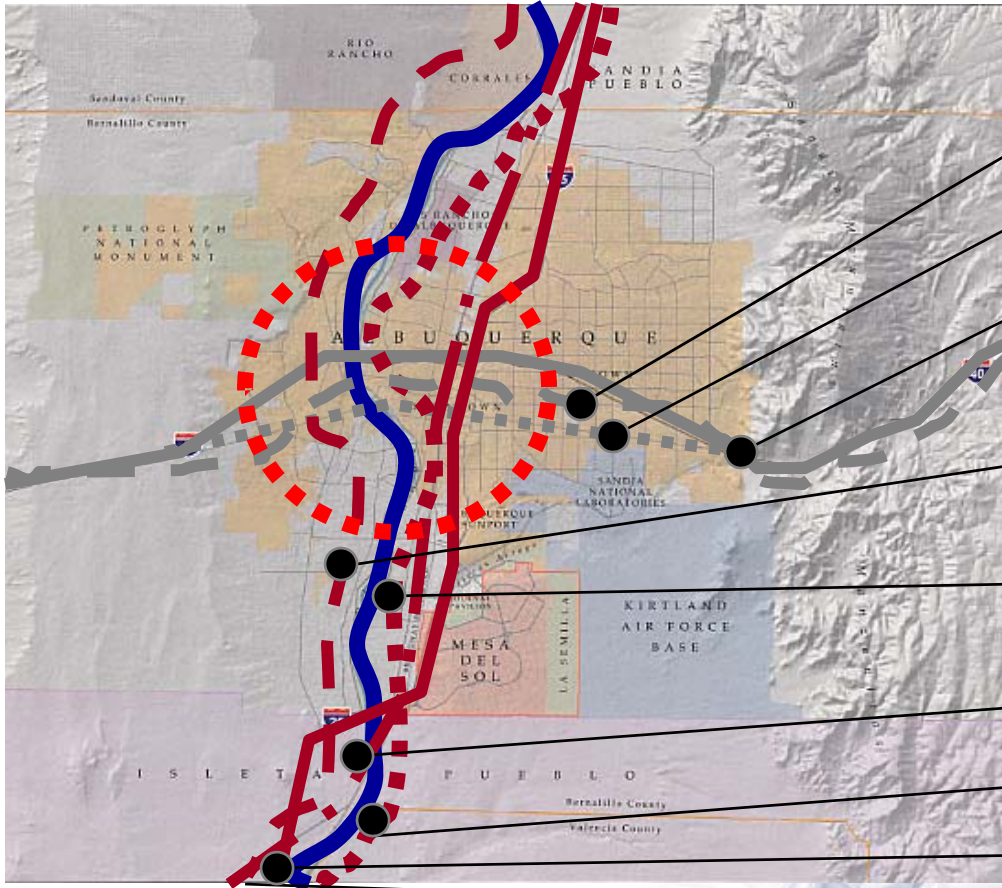
Mega Mountain Regions



Data source: BBER

The Albuquerque Story

At the Crossroads



East-West

Tijeras Pass

Route 66-1937

Interstate 40-1960

North-South

Rio Grande Valley/Ancient People

Coronado 1540/Camino Real

Railroad – 1890

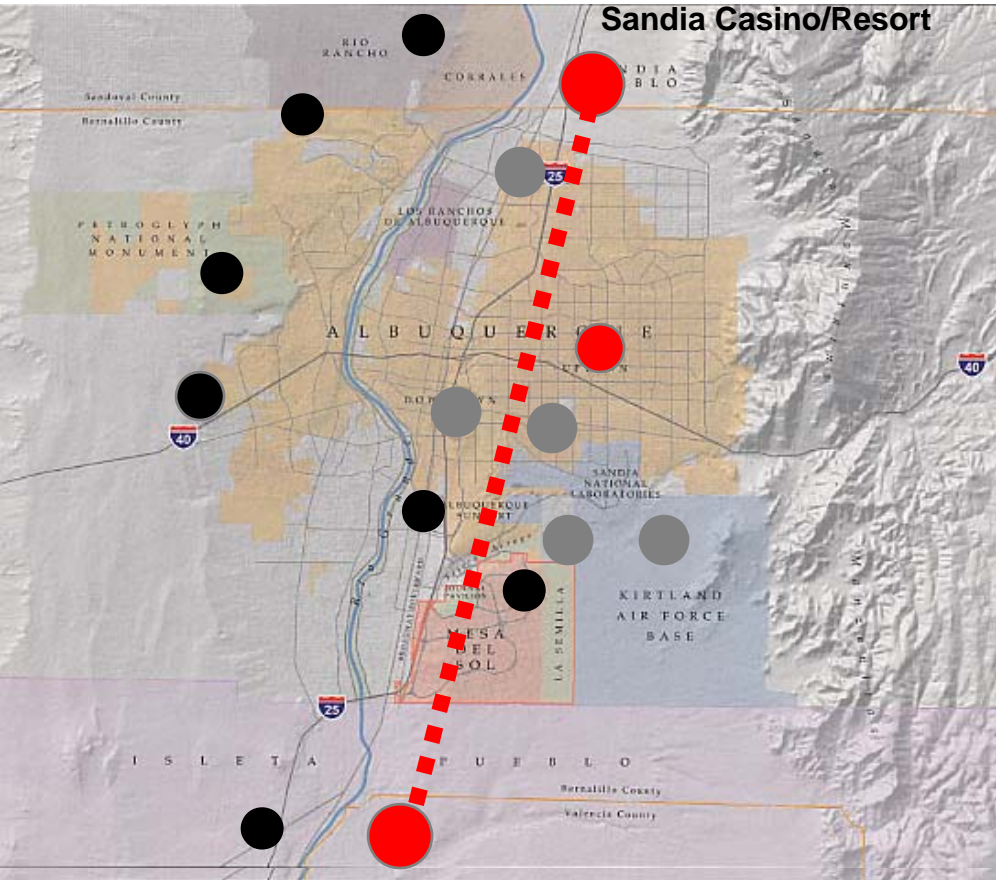
Highway 280-1937

Interstate 25-1960

Rail Runner-2007

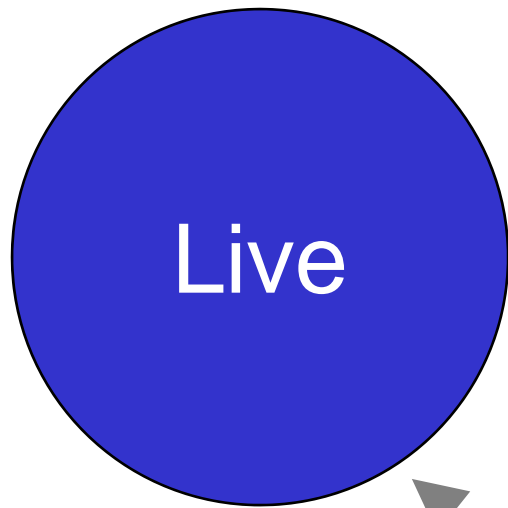
The Albuquerque Story

“Employment Centers”

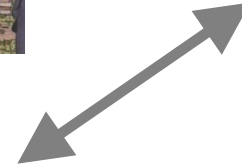
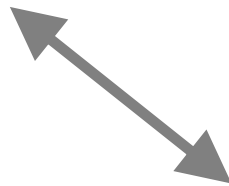
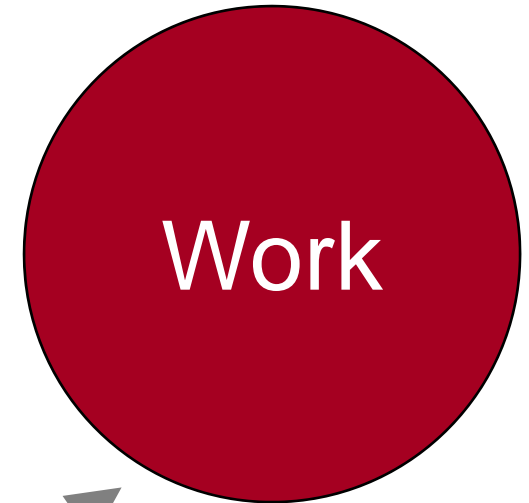


- Old Town
- Downtown & Railroad
- Kirtland AFB
- * **UNM/UNMH/CNM**
- Sandia NL
- Uptown & I-40
- Rio Rancho & Intel
- North I-25 & Journal Ctr.

Link Between...



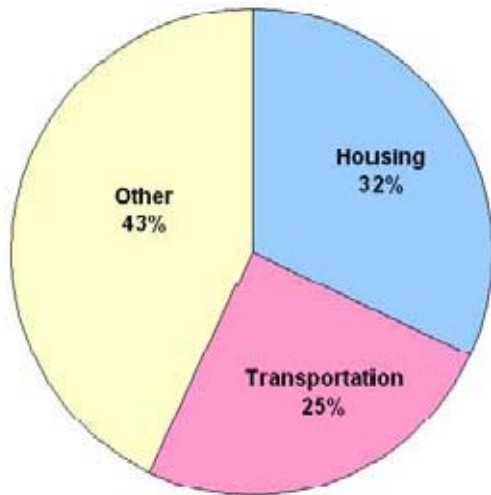
Time



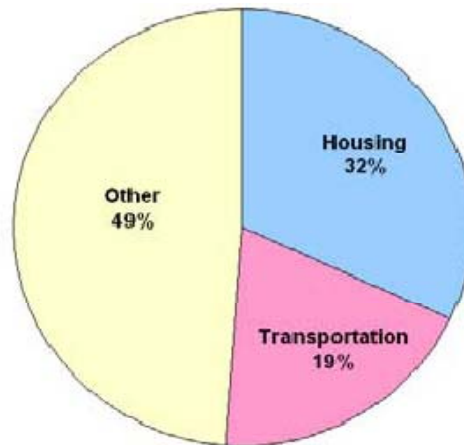
Mixed-Use
Higher Density
Transit Oriented Development



Auto Dependent Suburbs



Average American Family



Transit Rich Neighborhood

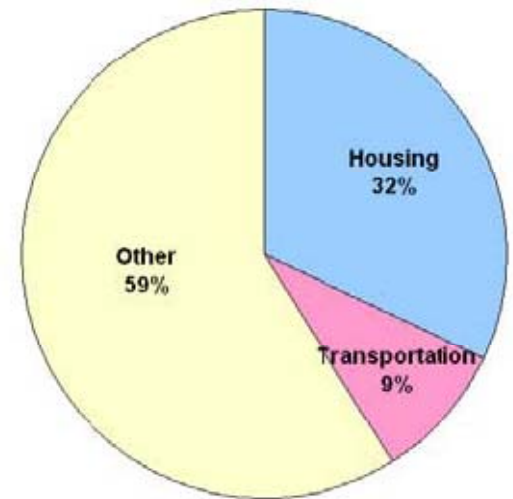
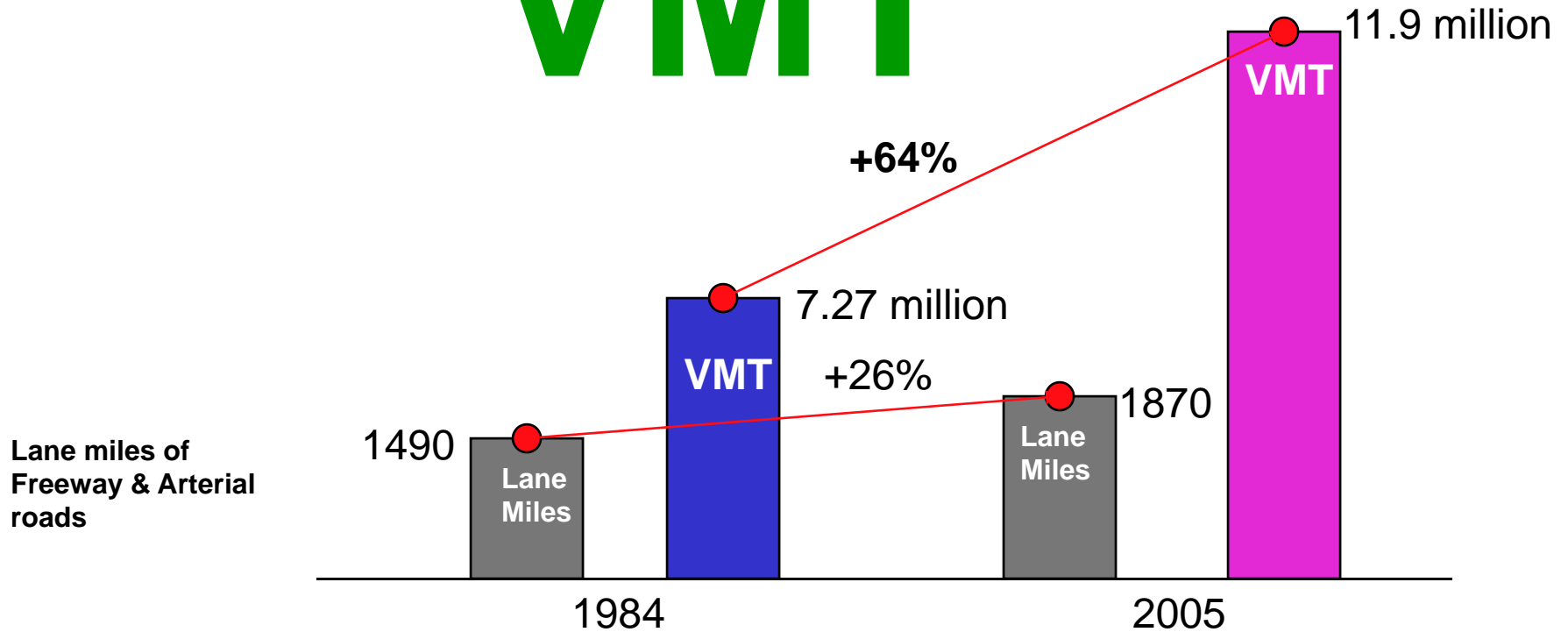


Table 4: Portion of household income spent on housing, transportation, and other by neighborhood type

Source: Reconnecting America's Center for Transit-Oriented Development, "Realizing the Potential: Expanding Housing Opportunities Near Transit," Federal Transit Administration and the U.S. Department of Housing and Urban Development, Report CA-26-6004, 2007

“VMT”



Albuquerque

Land constraints and housing costs

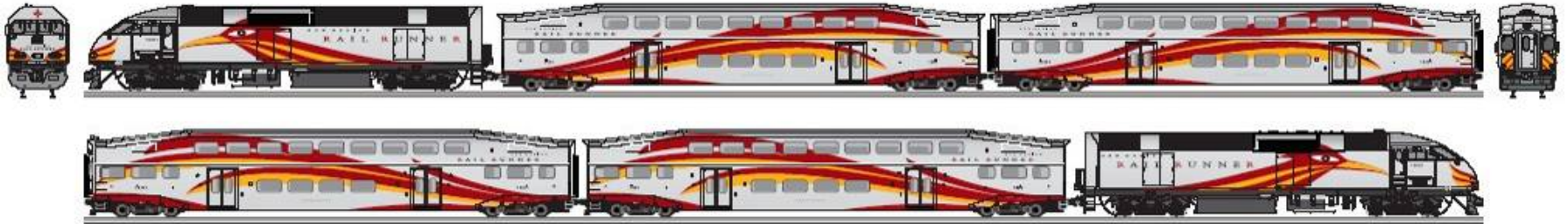
Traffic congestion and commute times

Lifestyle changes (“Creative Class”)

Downtown “centers & corridors” and mixed-use zoning

Linking where one lives with where one works

Infill Housing/Densification/Repositioning



Back to the **Future...**



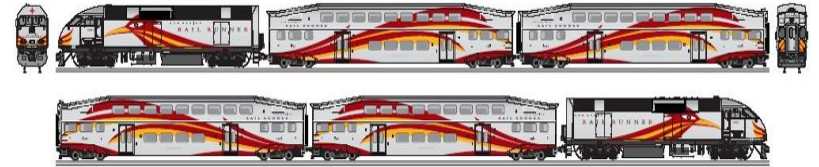
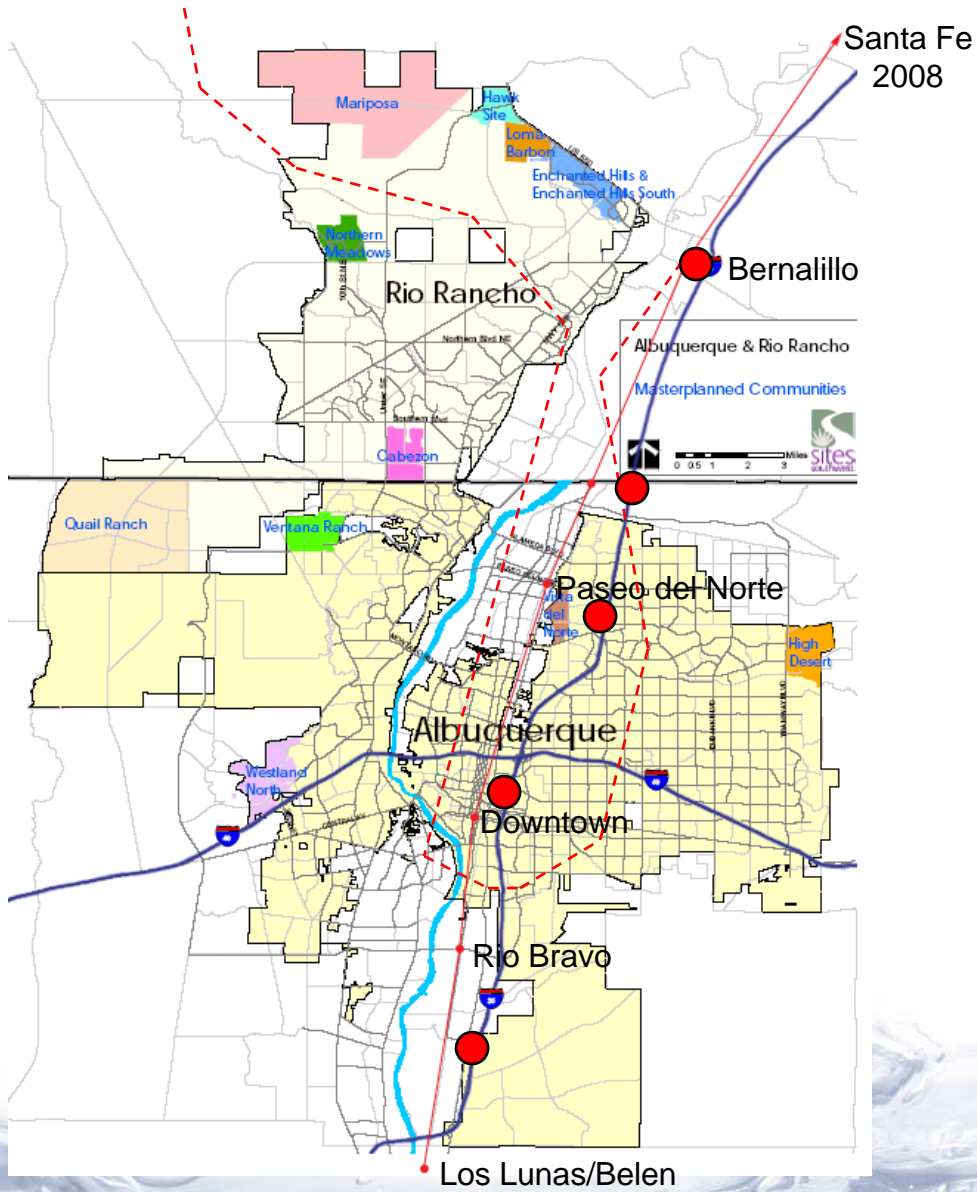








Can you say... **“High Density?”**



GET CONNECTED



On Regional Transit

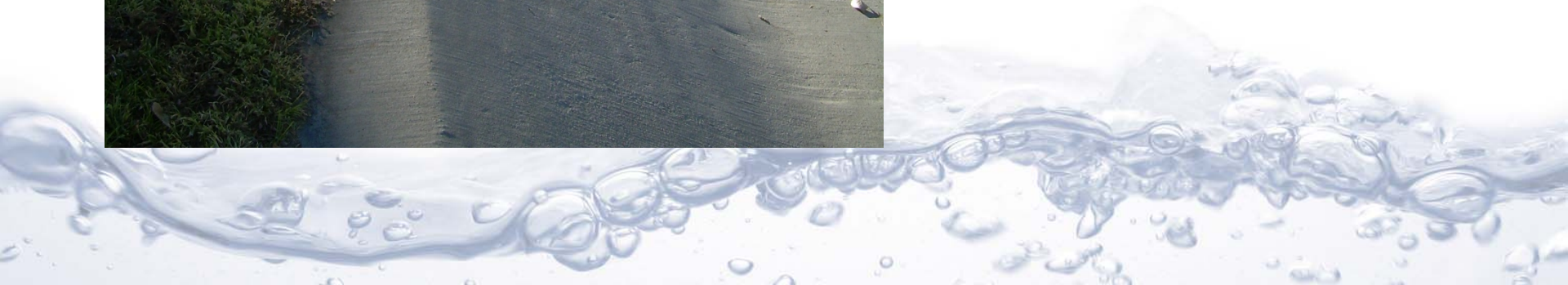
www.getconnectednm.com



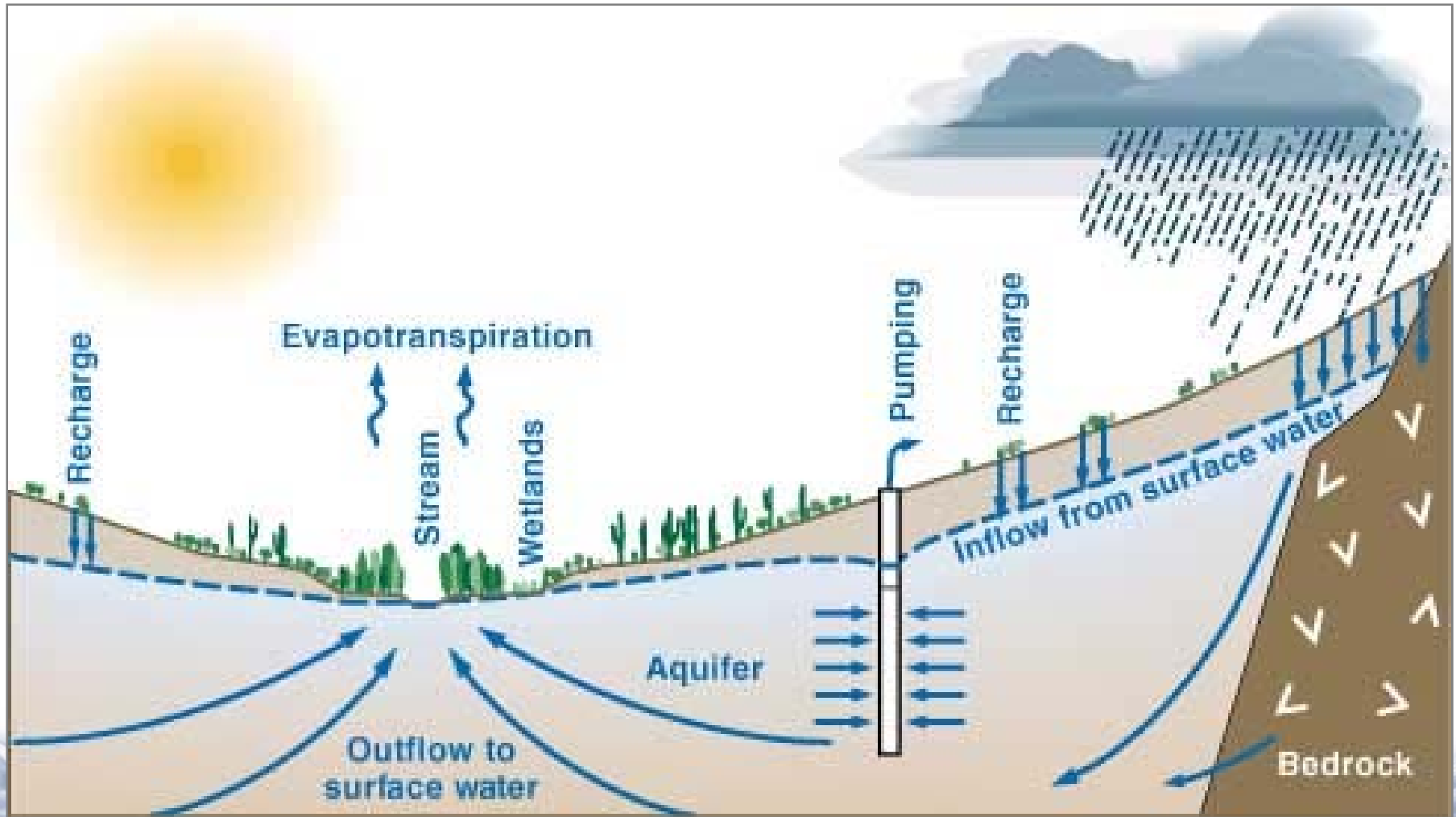


The need to
re-engineer
our cities...

to capture
storm water
run-off...



Hydrologic Cycle



New Mexico Water Uses

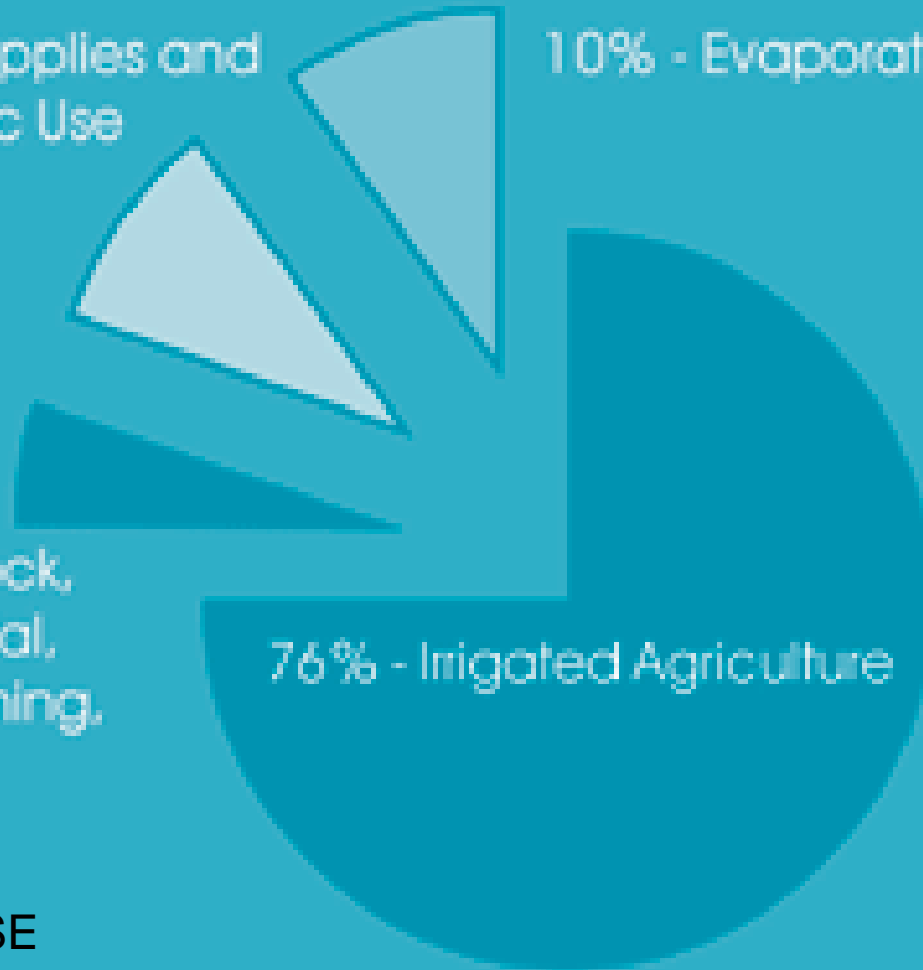
9% - Public Supplies and
Domestic Use

10% - Evaporation

5% - Livestock,
Commercial,
Industrial, Mining,
Power

76% - Irrigated Agriculture

Source: OSE



LEED

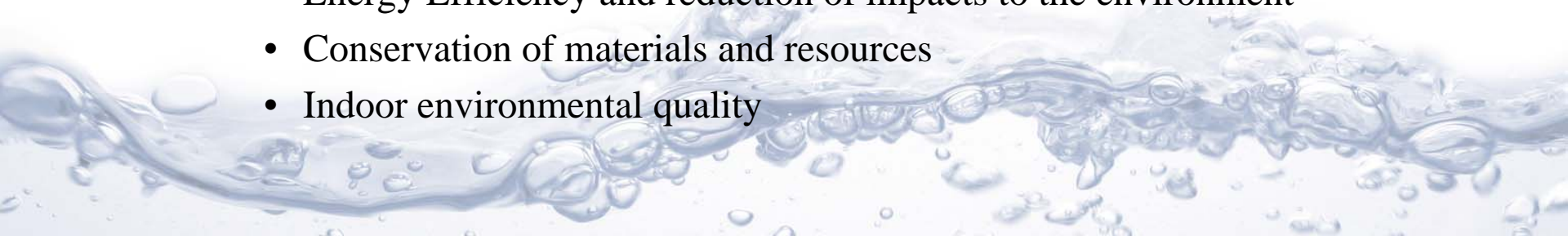


LEED – What is it?

Leadership in Energy and Environmental Design (LEED)

United States Green Building Council (USGBC)

Design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and a buildings occupants.

- **Sustainable site planning (SS)**
 - **Safeguarding water quality and water efficiency (WE)**
 - Energy Efficiency and reduction of impacts to the environment
 - Conservation of materials and resources
 - Indoor environmental quality
- 

What Sustainable Site Points Can You Get?

LEED-NC 2.2 & CS

Yes ? No

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sustainable Sites	14 Points
--------------------------	--------------------------	--------------------------	--------------------------	------------------

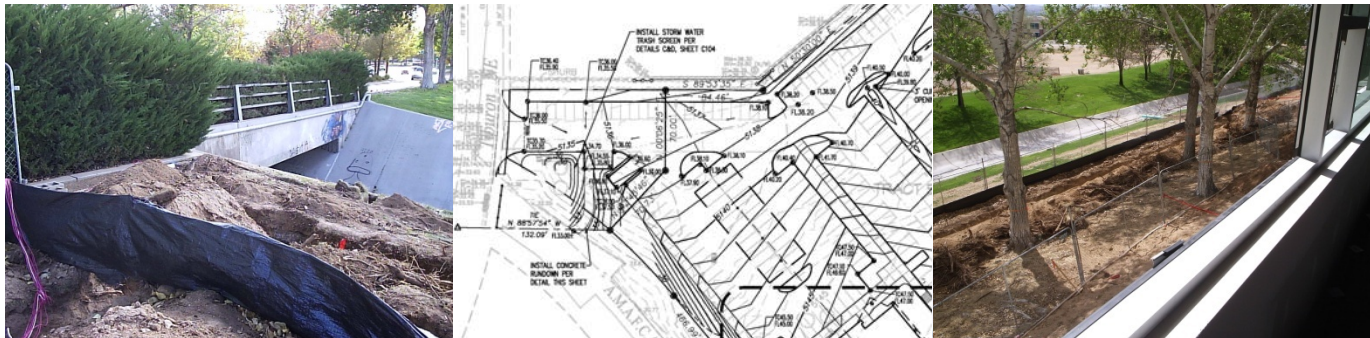
Y	Yes	?	No		Points
				Prereq 1 Construction Activity Pollution Prevention	Required
				Credit 1 Site Selection	1
				Credit 2 Development Density & Community Connectivity	1
				Credit 3 Brownfield Redevelopment	1
				Credit 4.1 Alternative Transportation, Public Transportation Access	1
				Credit 4.2 Alternative Transportation, Bicycle Storage & Changing Rooms	1
				Credit 4.3 Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles	1
				Credit 4.4 Alternative Transportation, Parking Capacity	1
				Credit 5.1 Site Development, Protect or Restore Habitat	1
				Credit 5.2 Site Development, Maximize Open Space	1
				Credit 6.1 Stormwater Design, Quantity Control	1
				Credit 6.2 Stormwater Design, Quality Control	1
				Credit 7.1 Heat Island Effect, Non-Roof	1
				Credit 7.2 Heat Island Effect, Roof	1
				Credit 8 Light Pollution Reduction	1

SSp1 (Prerequisite) : Erosion & Sediment Control

Intent: Control erosion to reduce negative impacts on water and air quality.

Strategies for Achievement:

- Reseeding to stabilize disturbed soils
- Stock piling topsoil for future use
- Use of mulch and silt fencing to reduce erosion
- Identify erosion prone site locations and protect or stabilize these areas



SSc6.1 Stormwater Design, Quantity Control

Intent: Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, and managing stormwater runoff.

SSc6.2 Stormwater Design, Quality Control

Intent: Reduce or eliminate water pollution by reducing impervious cover, increasing on-site infiltration, eliminating sources of contaminants, and removing pollutants from stormwater runoff.



Strategies for Achievement:

- Design roof gardens to utilize rainwater
- Install pervious paving to allow infiltration and recharge
- Reduce stormwater volume with graywater reuse for landscape, toilets, and custodial uses
- Design smaller building footprints leaving more pervious site area
- Comprehensive planning to avoid development in watersheds and natural drainage areas
- Encourage open space and cluster development
- Utilize water harvesting techniques to keep water on site
- Reduce hardscape
- Construct wetlands where feasible
- Construct vegetative buffers around parking lots to remove run-off pollutants



What Water Conservation Points Can You Get?

LEED-NC 2.2 & CS

Yes ? No

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

Water Efficiency

5 Points

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

- | | | |
|------------|--|---|
| Credit 1.1 | Water Efficient Landscaping , Reduce by 50% | 1 |
| Credit 1.2 | Water Efficient Landscaping , No Potable Use or No Irrigation | 1 |
| Credit 2 | Innovative Wastewater Technologies | 1 |
| Credit 3.1 | Water Use Reduction , 20% Reduction | 1 |
| Credit 3.2 | Water Use Reduction , 30% Reduction | 1 |

An Innovation point for exemplary performance is also available for **Water Use Reduction**, 40% Reduction



WE1.1 Water Efficient Landscaping

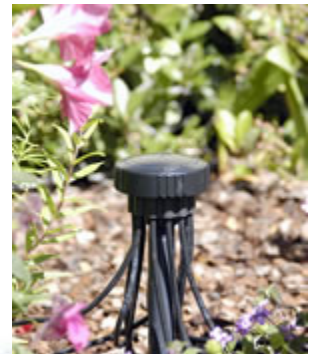
Intent: Limit or eliminate the use of potable water for landscape irrigation resulting in a 50% reduction of potable water over conventional means.

Strategies for Achievement:

To achieve this credit, calculations assessing the plant species, density of planting, microclimate, and irrigation efficiency are completed. In general, applying the following 7 principles for xeriscaping will help achieve this credit:

7 Principles for Xeriscaping

1. **Planning and Design** (place plants according to similar water use or “hydrozones” and create opportunities for water harvesting)
2. **Efficient Irrigation** (efficient drip irrigation, independent zones, smart controllers)
3. **Use of Mulch** (reduces evapotranspiration, lowers soil temperature, and helps prevent erosion.)
4. **Soil Preparation** (composting and tilling help increase water holding capacity of soils)
5. **Appropriate Use of Turf** (for functional uses only)
6. **Water Efficient Plant Material** (low water use, native, adapted, and/or precipitation supported plant material)
7. **Maintenance** (pruning, trash removal, weeding, irrigation inspection, and adjusting irrigation based on seasonal needs)



WE1.2 Water Efficient Landscaping

Intent: Limit or eliminate the use of potable water for landscape irrigation

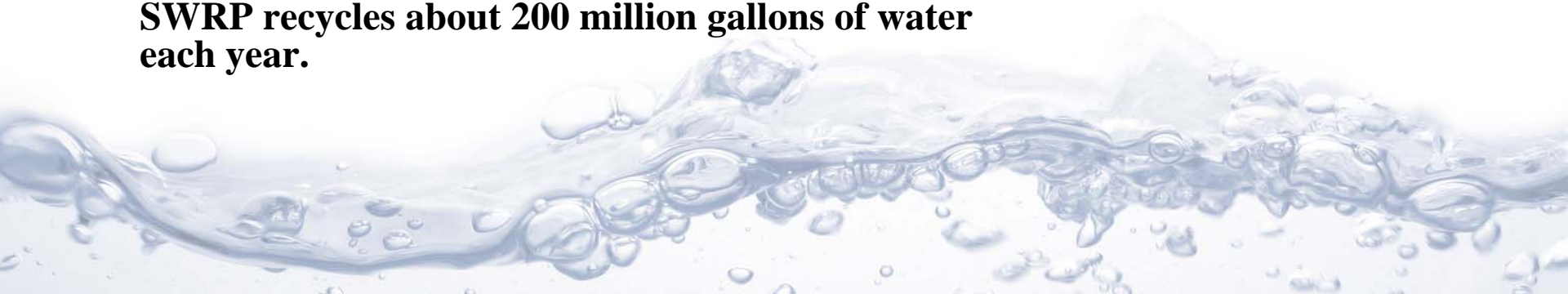
Strategies for Achievement: **Credit WE 1.2 requires that no potable water be used for landscape irrigation. This can be achieved by way of the following:**

- Capturing rainwater on site with cisterns
- Using a non-potable water source for irrigation

Water Reuse Facts:

1,000 square feet of roof or pavement can collect 420 gallons of water from 1 inch of rain.

The Southside Water Reclamation Plant in ABQ treats and recycles wastewater for irrigation. SWRP recycles about 200 million gallons of water each year.



WE Credit 2: Innovative Wastewater Technologies

Intent: Reduce generation of wastewater and potable water demand while increasing the local aquifer recharge.

Requirement: Reduce the use of municipally provided potable water for building sewage conveyance by a minimum of 50% OR treat 100% of wastewater on site to tertiary standards.

Strategies for Achievement:

- Low water use fixtures
- Low flow toilets, faucet sensors, flow restrictors,



WE Credit 3.1: Water Use Reduction (20% reduction)

WE Credit 3.2: Water Use Reduction (30% reduction)

Intent: Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Requirement: Employ strategies that together use 20% or 30% less water than a baseline building calculation. Does not include irrigation.

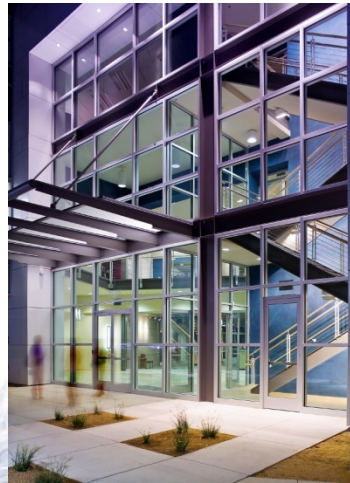
Strategies for Achievement:

- **High efficiency fixtures, dry fixtures, occupant sensors**
- **Use non-potable water for toilets, urinals, mechanical systems, and custodial services.**
- **Water Efficient appliances. Dishwashers. Washing Machines**



Green Solution Case Study

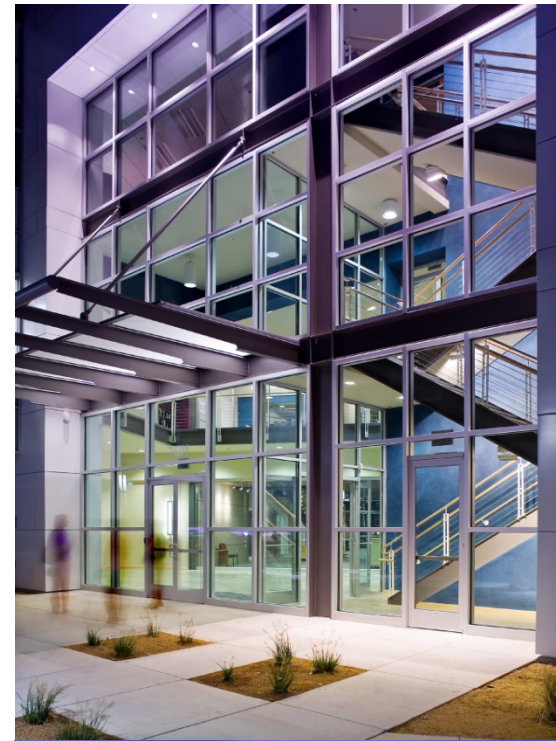
Jefferson Green Office Building



Case Study

Jefferson Green Office Building

- LEED-CS 3-Story 85,000 sf
- Goal: 45% Energy Savings
- Goal: 30% Water Use Reduction
- Operable Windows
- Daylighting and Shading
- Low-Flow Fixtures
- Xeriscape



Jefferson Green Case Study

Site

- Building was sited to preserve existing mature pine and cottonwood trees
- Designed to direct run-off to planted areas (passive water harvesting)
- Xeric landscaping with irrigation provided by the city's non-potable line



Jefferson Green Case Study

Interiors

- Designed to use 30% less water inside the building
- Low-flow urinals and showerheads and faucet sensors reduce water use in restrooms
- Flow restrictors reduce water use at kitchen and coffee bar faucets
- Energy Star appliances and dishwashers



Jefferson Green Case Study



- Energy efficient glazing & day lighting
- High-emissivity roof
- Evaporative cooling & under floor air distribution system
- Efficient lighting

USGBC Leadership in Energy and Environmental Design

Jefferson Green Case Study

- Estimate 5% construction premium
- Estimate payback in 5 or 6 years
- Largest investments were facade & mechanical upgrades
- Utilities have not exceeded those of our previous building (1/3 the size)



- **LEED Gold** design saves energy:
 - 45% based on LEED/ASHRAE 90.1 1999:
- Gas + electric savings saves 754,586 lbs of carbon,
377 tons of carbon
 - This equals 38,896 gallons of gas or **391,789** lbs of coal
- Saves **222,300** gallons of water/year from plumbing fixtures
- Saves **414,000** gallons of water/year based on electricity savings (NM electricity production consumes 1.13 gallons of water to produce 1kWh of electricity)
- **Energy Star Rating of 99** (which means Jefferson Green is in the top 1% of facilities in the nation for energy efficiency)



The “business” case...

Last year:

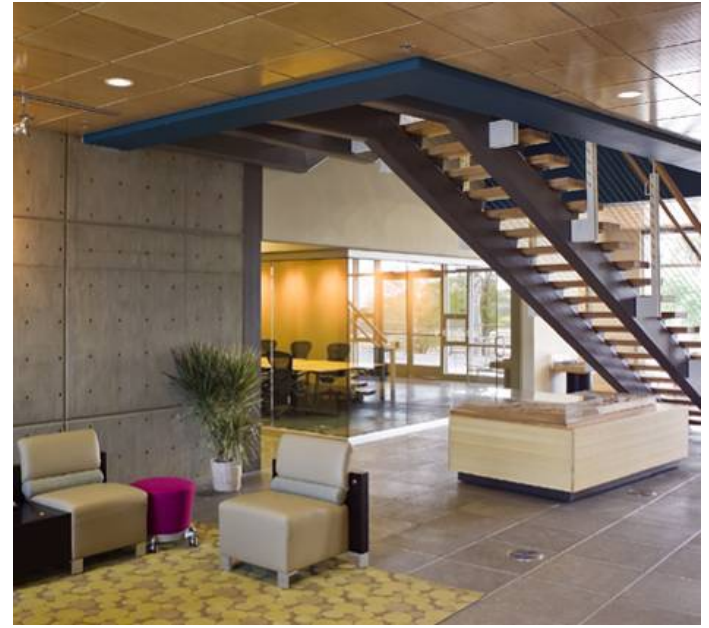
\$.70 per sf vs. \$1.70 per sf
7kWh per sf vs. 17 kWh per sf

After 20% Rate Increase:

\$1.08 per sf vs. \$2.10 per sf

The Future???





LEED-CS

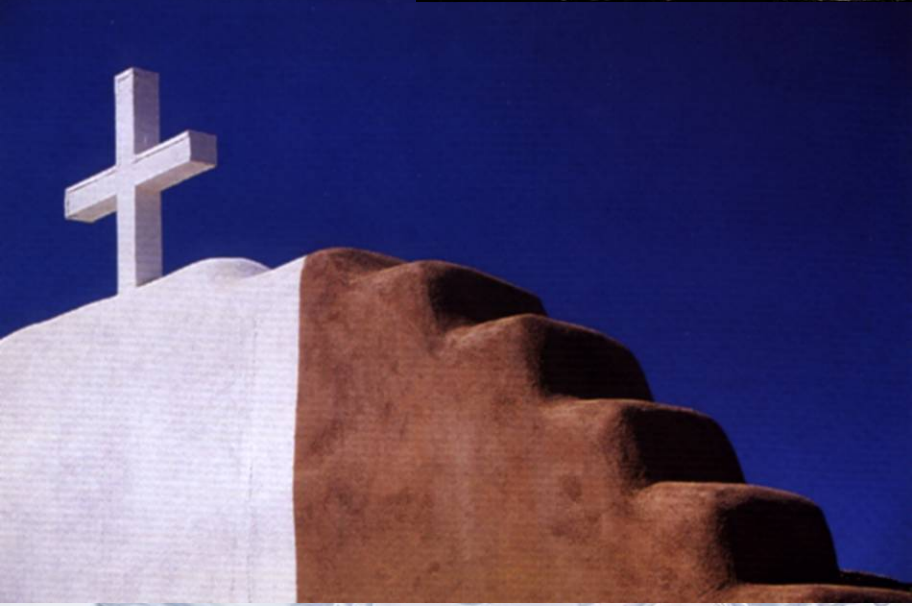


LEED-CI

The Challenge...

















Nature

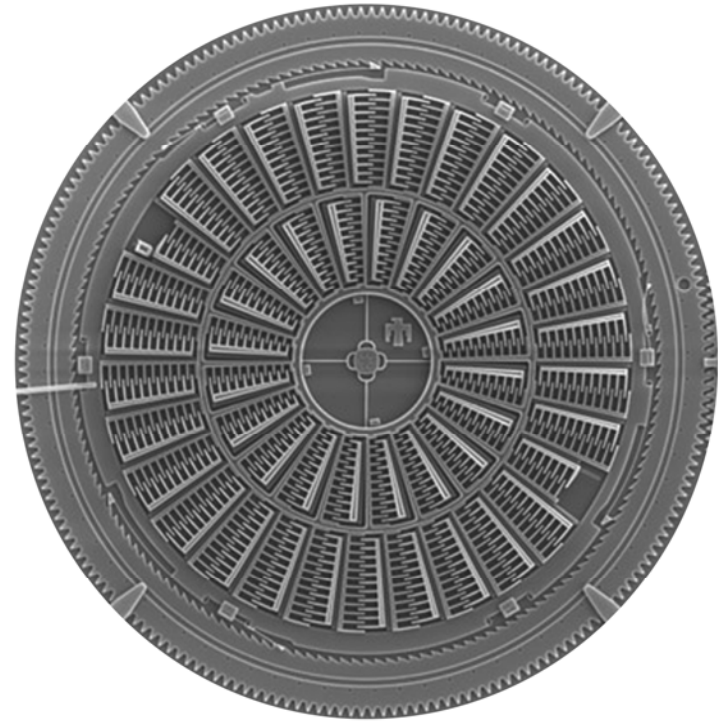


Zuni





Zuni



Sandia





“Meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

Ecology’s working definition of sustainability at its most basic level.



Providing a balance...





Celebrating
what makes
New Mexico...
New Mexico



Hypothetical Case

Albuquerque Mass Transit VMT Reduction

Total Annual VMT – **4.35 Billion miles** (24 round trips to the sun)

Mass Transit Reduction – 10% = **434 Million miles**

Save 21.75 Million gallons of gas (66 acre feet of gasoline)

Create **236,000 metric tons of carbon “offsets”**
(1200#'s of CO₂ per 1000 VMT)

Is this how we will pay for a portion of Mass Transit in the Future...through Cap & Trade?

Will cities be issued “permits” just like any other entity?





What does this mean for land use...





How could we get to carbon neutral buildings?

- Reduce building energy usage (more efficient systems or envelope)...LEED, 2030 Challenge
- Offset remaining energy usage with renewables (wind, solar, etc.)\$4-6,000 per kWh installed for PV...useful life of PV array is 50 years...prices coming down...Efficiencies going up
- Clean up coal plants...scrubbers*
- Carbon Capture & Sequestration
- Regulatory carbon cap & trade...
- Creation of a “carbon tax”



* It is estimated there is a 250 year supply of coal in the U.S.

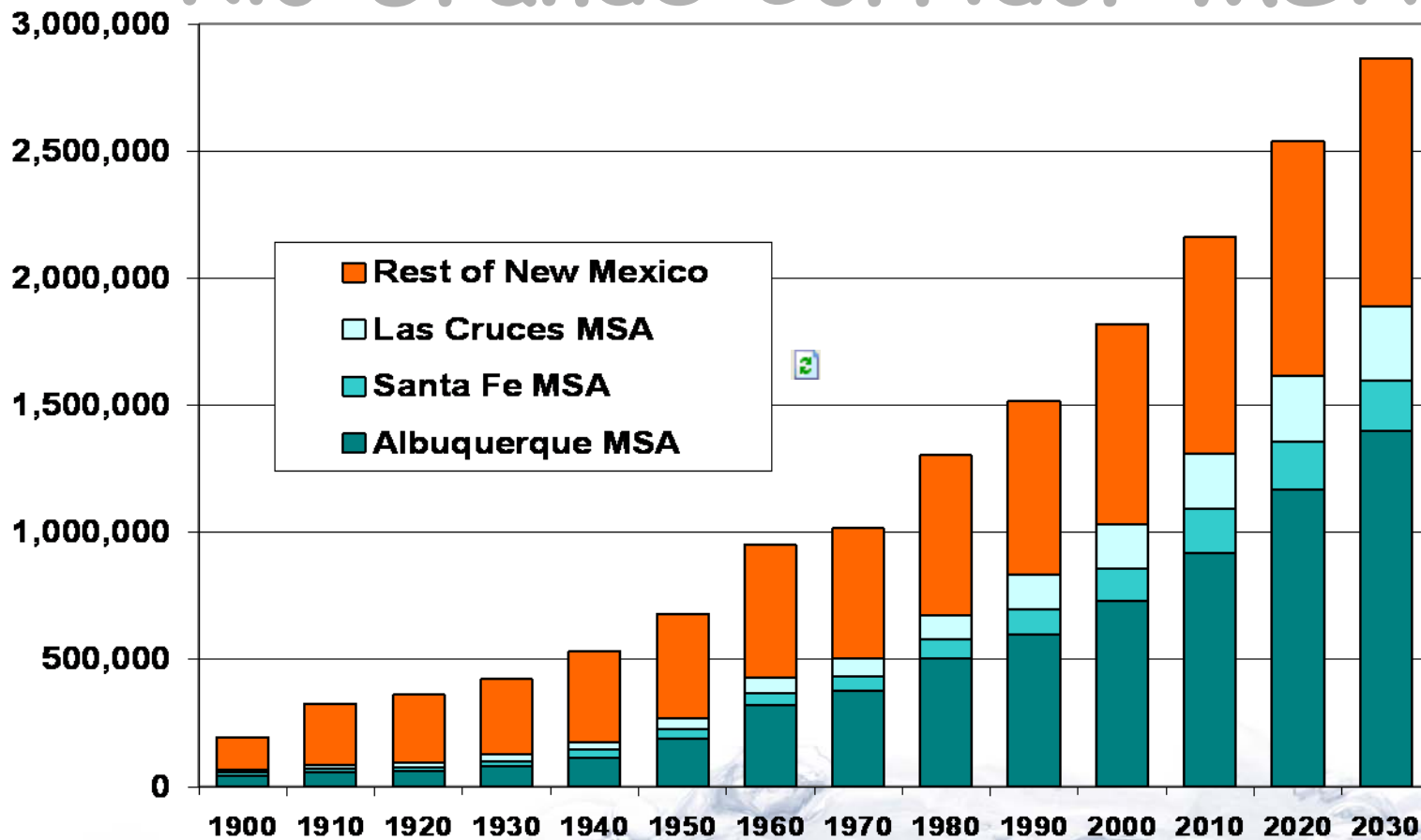
Jefferson **Green** Office Building

- Total Project Cost:
\$16.34 million
- Total Project Cost:
\$195 per sf
- Total Hard Shell Construction Cost:
\$106 per sf
- Cost of LEED enhancements:
\$6.00 per sf
- LEED AP design: \$60,000
- Enhanced Commissioning: \$30,000

Costs & Benefits

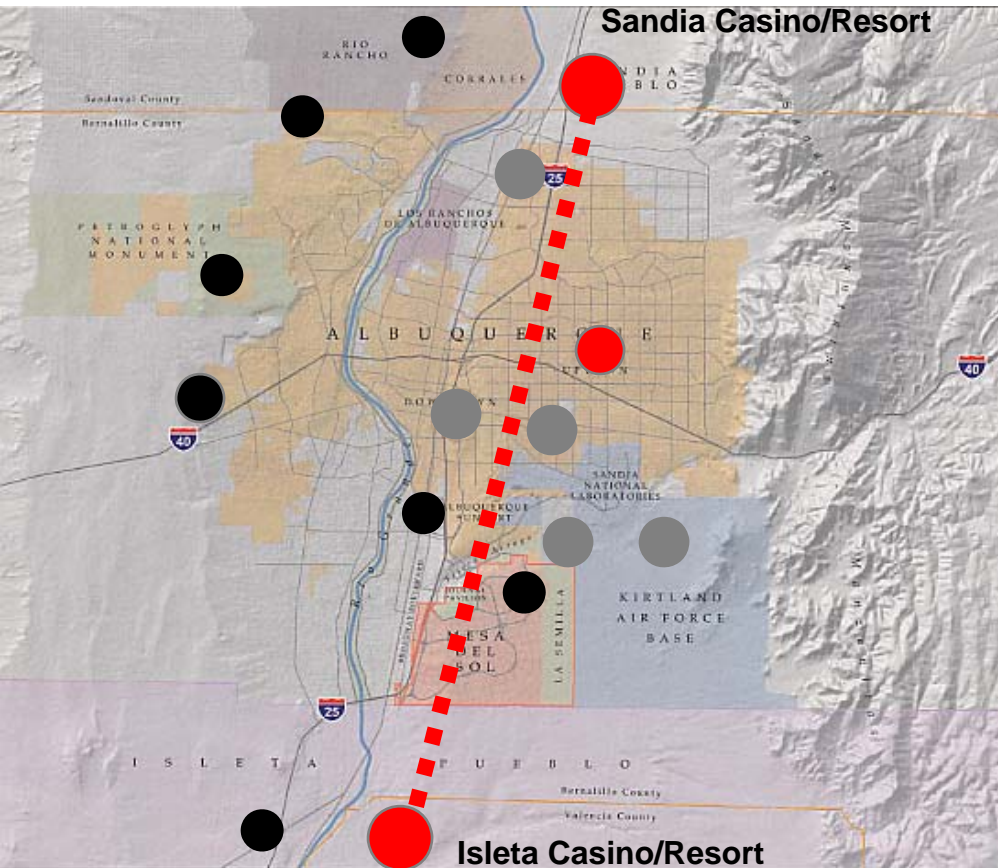


Population: Growing dominance of Rio Grande Corridor MSAs

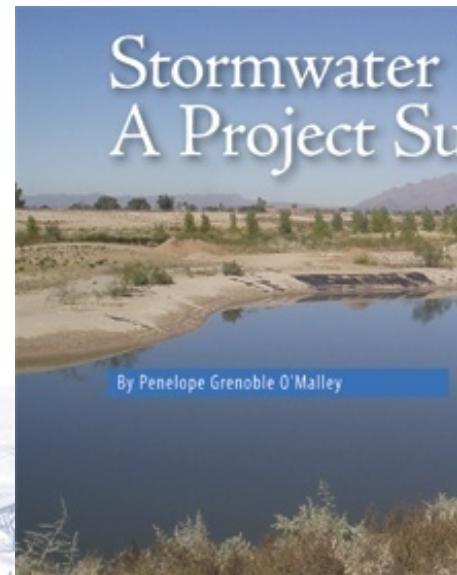


Source: UNM BBER

New Employment Centers



- Quail Ridge
- Rio Rancho Town Center
- Mesa del Sol
- South Valley/Rio Bravo
- Double Eagle/Eclipse
- PdN/Unser
- Tempurpedic/SunCal
- Los Lunas
- Casinos



Jefferson **Green** Case Study

Buildings are responsible for 12% of potable water consumption

Jefferson Green is estimated to save:

- **222,300** gallons of water/year from plumbing fixtures
- **414,000** gallons of water/year based on electricity savings (NM electricity production consumes 1.13 gallons of water to produce 1kWh of electricity)
- Additional uncalculated savings from xeriscaping and non-potable irrigation source



Jefferson Green Case Study

As Designed

- Electric: 424,937 kWh
- Gas: 520,706 kBtu
- EI*: 23 kBtu/sf/yr
- CO2: 919,295 lbs
(11 lbs. per sf)
- Water*: 484,939gal/yr

If Built per Code

- Electric: 790,658 kWh
- Gas: 655,996 kBtu
- EI*: 39 kBtu/sf/yr
- CO2: 1,673,881 lbs
(19 lbs. per sf)
- Water*: 707,239gal/yr

*EI = Energy Intensity – energy used on site per sf, allows comparison of different sized buildings

* Water use number here is based on indoor plumbing fixture use only



Mixed-use adjacent to robust transit vs. Low Density Suburban Development

Which development pattern generates the smallest carbon footprint?

Will Impact Fees in the future include a Carbon Impact Fee?



Can you say...

“Mass Transit?”

In the future if Mass Transit shows a real reduction in VMT...will that qualify for Cap & Trade?

It's Time To Change The Way We Use Water!

- In ABQ, we use 40% of our drinking water on our yards every year.
- State-mandated conservation goals have helped reduce our use from 250 gallon per capita daily in 1987 to a goal of 165 gallons per capita daily in 2008.
- **Objective: Increase the supply of water while simultaneously promoting demand-side reductions.**



Source: ABCWUA