Innovation
in New Mexico

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Science &Technology Base in NM

$6B+ annual Federal R&D

Los Alamos National Laboratory
Sandia National Laboratories
Phillips Laboratory -
    Kirtland Air Force Base
White Sands Missile Range

Santa Fe Institute
New Mexico Institute of Mining
    and Technology
New Mexico State University
University of New Mexico

New Mexico Science and Technology Plan

New Mexico is developing a S&T Plan with the goal of making
continuing, long-term investments in S&T by:
    1) Defining areas for R&D investment including:
            Priorities and level of investment
    2) Process for making recurring and capital investments

Working groups in S&T Areas of Strength in NM:
    Aerospace
    Bioscience
    Energy, Environment, Water
    Information Technology
    Nanotechnology

Aerospace

New Mexico has long history in aerospace dating back to Robert Goddard in the 1930s.
- White Sands Missile Range
    - Research, development, testing, and evaluation of missiles, tracking systems, remote sensing, …
- Air Force Research Laboratory
    - Directed energy (hi-power lasers, microwaves
    - Space vehicles

Several observatories and strong optics industry

Spaceport America will soon start construction
- Will provide low-cost access to low-earth orbit
- Potential applications in communications, remote sensing, …

Spaceport America

First Commercial
Spaceport
Being Developed in
Dona Ana County in
Southern NM
Virgin Galactic is
Prime Partner with NM

Based on success of
X-Prize
and Spaceship One
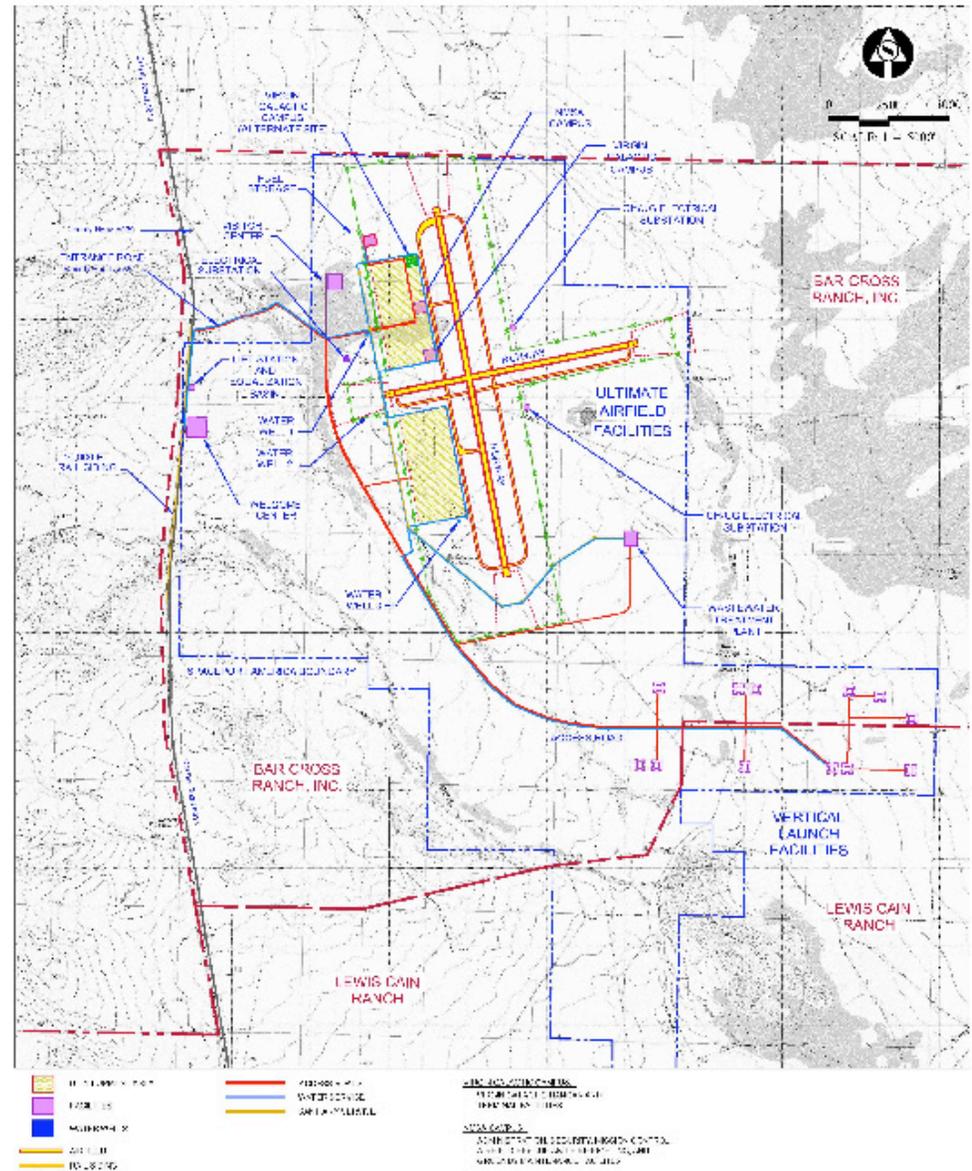
Bioscience

Genomics research is major area of strength
- Human genomics project arose in New Mexico in 1980s.
- Genomic base for personalized medicine being developed at National Center for Genomics Research
- Genetic engineering to enhance biofuels

Sandia and Los Alamos working on detection and remediation of natural and engineered biothreats
- Capabilities developed being applied to diseases.
- Strong record of development of medical diagnostics

World-class capabilities in computational biology
- Being applied to design of therapeutics

Great strength in neuroscience
- MIND Institute provides forefront R&D in brain functions

Algal Biodiesel

Microalgae has highest oil yield per acre of any crop.
  Requires:
  • Flat, unused land
  • High level of sunlight
  • CO_2
  • Saline water

Crop	Gal/Acre of Oil
Soybean	48
Peanuts	113
Rapeseed	124
Coconut	287
Palm Oil	635
Algae	15,000

Southeast New Mexico is ideal location for meeting all needs.

Development is required to optimize several stages of algae growth, oil production extraction, and conversion to biodiesel.

Primary issue is economics of biodiesel from algae.

The State is supporting this development effort.

Energy Innovation

New Mexico is developing a roadmap to become the first state to achieve a clean and sustainable energy future
- Created a Renewable Energy Transmission Authority
- Created Energy Innovation Fund
- State Investment Council funding for energy projects

New Mexico has large reserves in oil, gas, coal

New Mexico has strong potential in wind, solar, biofuels

New Mexico has remarkable intellectual resources
- Developing revolutionary approaches to solar energy
  - Direct electrical and hydrogen production
  - Nanoparticles increase photovoltaic efficiency
- Biofuels production (biodiesel from microalgae)

Energy Innovation

SolareC - Los Alamos Renewable Energy Co.

Proprietary solar thermo-chemical process

1	Solar Focus @ 2400 °C	$CO_2 \rightarrow CO + \frac{1}{2} O_2$
2	Water-Gas Shift Reaction	$CO + H_2O \rightarrow H_2 + CO_2$
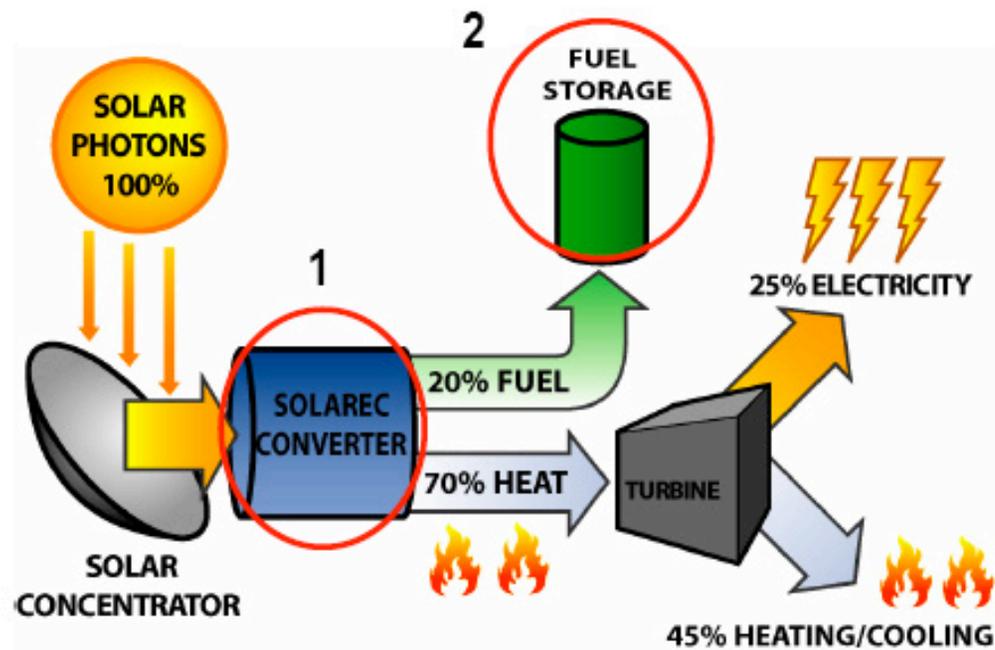
Energy Innovation

Primary issues:
- Integration of all systems
- Full-scale demonstration
- Economics

The State is partnering with SolareC to address these issues.

Information Technology

New Mexico developing as center for digital media

New Mexico has world-class computational science supporting national defense

New Mexico is creating world-class supercomputing center (100+ Teraflop computer on line by end of 2007) directed at non-defense applications to drive economic and workforce development, health, and education.

New Mexico Computing Applications Center will partner with Laboratories, universities, R&D institutions, and businesses to address issues and opportunities of mutual interest.
- Center will provide bridge between computation and laboratory facilities in New Mexico.
- Connected by Lambda Rail to Pacific Wave

Nano Technology

New Mexico is rated third in the U.S. in nanotechnology

- Microsystems and Engineering Sciences Application complex at Sandia
- NSF Nanotechnology Center at University of NM
- Center for Integrated Nanotechnologies (CINT)
  - One of five DOE Nano Centers with core facility at Sandia and gateway at Los Alamos
  - Core strengths:
    - Nanophotonics and nanoelectronics
    - Nano-bio-micro interfaces
    - Nanomechanics
    - Complex functional nanomaterials
    - Theory and simulation

Nano Technology and Energy

Breakthrough at LANL using quantum dots

• Nano-sized semiconductor particles of PbSe can produce two or more electrons per photon, providing potential doubling of efficiency.
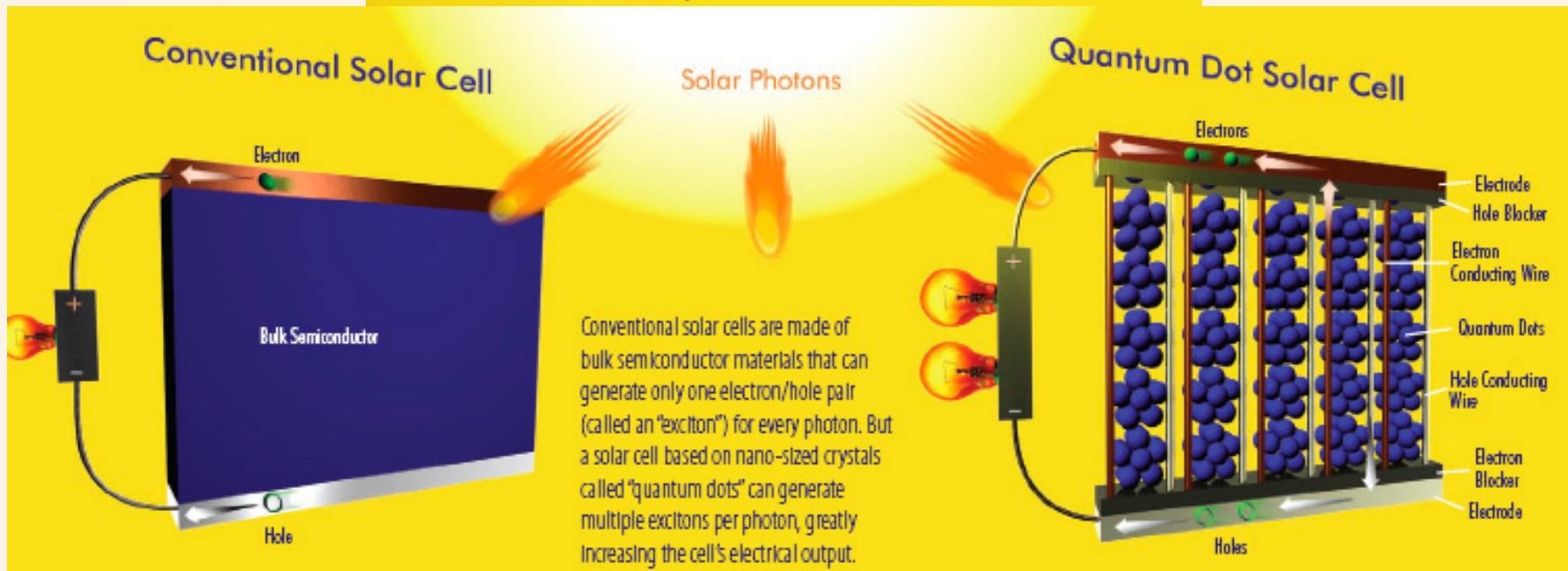
Summary

New Mexico has a wealth of natural and intellectual resources.
- Strong energy resources, budget surplus, committed Governor
- Los Alamos and Sandia National Laboratories, Air Force Research Laboratory, White Sands Missle Range, universities, businesses
- World-class strength within areas of aerospace, bioscience, energy, information technology and nanotechnology.

New Mexico is investing in innovation for a healthy future
- Have started initiatives in energy and supercomputing
- Planning new high-tech initiatives

New Mexico is developing a roadmap to become the first state to achieve a clean and sustainable energy future.
- Anticipate clean energy will be a major economic driver.

New Mexico is very interested in partnering with Japan in areas of mutual interests