

ENVIRONMENTAL RESEARCH, DEVELOPMENT, AND EDUCATION FOR THE NEW ECONOMY (ERDENE)



**NORTHERN
ARIZONA
UNIVERSITY**

September 1, 2009

ERDENE

In a time of economic challenge, the intertwining of economic, environmental and community concerns becomes increasingly critical. Environmental Research, Development and Education for the New Economy (ERDENE) encourages creative thinking and inspired partnerships to bring together university researchers with business and community members, sparking a unique integration of environmental technologies, financial performance, and leadership development. ERDENE meets today's challenges with solutions at once bold and practical.

At Northern Arizona University, ERDENE emphasizes five major areas of the university's environmental research strengths: ecological restoration, renewable energy technologies, water resources, applied research for sustaining rural communities, and comprehensive monitoring and management of complex systems. The program also builds on NAU's strong connection with rural Arizona and success in building collaborative partnerships with private, public, tribal and non-profit entities.



Paul Heinrich conducts weather station maintenance on the Babbitt Ranches, Flagstaff, AZ Northern Arizona

With a focus on economic development and sustainable systems, ERDENE promotes environmental, economic and community health to benefit all Arizona citizens.

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*Shelley Silbert
Director of ERDENE and Strategic
Environmental Initiatives*

PERFORMANCE ANALYSIS

| METRICS (\$ in millions) | FY 02 Act | FY 03 Act | FY 04 Act | FY 05 Act | FY 06 Act | FY 07 Proj | FY 07 Act | FY 08 Proj | FY08 Act | FY 09 Proj | FY09 Act | FY 10 Proj | FY 11 Proj |
|--|--------------|--------------|--------------|--------------|--------------|---------------|--------------|---------------|--|---------------|-------------|---------------|---------------|
| <u>Return on Investment</u> | | | | | | | | | | | | | |
| Federal and State Funds | \$5.50 | \$4.30 | \$4.40 | \$12.90 | \$3.30 | \$5.00 | \$8.30 | \$3.90 | \$7.59 | \$4.20 | \$9.40 | \$4.50 | \$4.80 |
| External Funding, Other | \$1.00 | \$0.70 | \$1.00 | \$1.00 | \$0.50 | \$0.70 | \$0.47 | \$1.40 | \$3.30 | \$1.10 | \$2.80 | \$1.20 | \$1.30 |
| Qualitative Returns Including Presentations & Publications | 121 | 180 | 138 | 305 | 119 | 150 | 221 | 150 | 3127 (includes web-site access) | 160 | 114 | 170 | 180 |
| <u>Technology Transfer</u> | | | | | | | | | | | | | |
| Products Generated and in the Marketplace | 0 | 0 | 49 | 6 | 12 | 3 | 5 | 3 | 4 | 6 | 0 | 8 | 10 |
| Business Spinoffs | 1 | 0 | 1 | 1 | 1 | 0 | 4 | 0 | 2 | 1 | 0 | 2 | 3 |
| Patent Applications Generated | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 2 | 2 | 3 | 4 |
| Conferences Sponsored | 14 | 19 | 21 | 28 | 26 | 3 | 21 | 5 | 42 | 10 | 2 | 15 | 20 |
| Business Expansions | 2 | 1 | 5 | 16 | 5 | 0 | 4 | 1 | 8 | 2 | 0 | 3 | 4 |
| <u>Work Force Contributions</u> | | | | | | | | | | | | | |
| Graduate/Postdoc Students in Pipeline or Graduated | 56 | 87 | 102 | 35 | 38 | 65 | 32 | 62 | 104 | 65 | 56 | 68 | 70 |
| High End Baccalaureates in Specific Disciplines | 38 | 27 | 47 | 23 | 15 | 8 | 3 | 6 | 21 | 6 | 22 | 6 | 6 |
| Baccalaureates Produced in Related Disciplines | n/a | n/a | n/a | n/a | n/a | 50 | 15 | 42 | N/A | 45 | 10 | 48 | 50 |
| Certificates Granted | 0 | 0 | 3 | 73 | 0 | 5 | 0 | 5 | 0 | 5 | | 5 | 5 |
| Undergrad Students in Pipeline | 26 | 126 | 63 | 40 | 45 | 50 | 78 | 55 | 325 | 60 | 83 | 65 | 70 |
| Continuing Ed Professionals | 85 | 312 | 1361 | 142 | 265 | 250 | 42 | 130 | 142 | 140 | 29 | 150 | 160 |
| <u>Specific Curriculum Innovations</u> | | | | | | | | | | | | | |
| New Programs such as Certificates (full time students) | 3 | 1 | 1 | 0 | 2 | 0 | 2 | 1 | 2 | 1 | | 1 | 1 |
| Revised Courses | 10 | 14 | 16 | 22 | 6 | 2 | 6 | 3 | 7 | 4 | 4 | 4 | 4 |
| New Courses (full time students) | 2 | 9 | 29 | 31 | 12 | 2 | 5 | 2 | 3 | 3 | 2 | 3 | 3 |
| New Programs – Participating Professionals | 0 | 0 | 0 | 0 | 9 | 0 | 4 | 2 | 0 | 2 | | 2 | 2 |
| <u>Partnerships</u> | | | | | | | | | | | | | |
| Community College 2+2 Programs | 2 | 9 | 7 | 8 | 8 | 2 | 6 | 4 | 5 | 6 | 2 | 8 | 10 |
| Tri-University (ASU, NAU, UofA) | 4 | 6 | 7 | 10 | 9 | 5 | 2 | 8 | 8 | 12 | 12 | 15 | 18 |
| Industry/Private Sector Collaborations | 17 | 73 | 58 | 79 | 48 | 35 | 55 | 38 | 81 | 40 | 6 | 42 | 45 |
| Community-based (including tribes) | 34 | 58 | 51 | 60 | 76 | 35 | 78 | 38 | 45 | 40 | 8 | 42 | 45 |
| Regional, Nat'l, International Research and Linkages | 20 | 41 | 54 | 72 | 69 | 35 | 75 | 38 | 75 | 40 | 12 | 42 | 45 |

PERFORMANCE ANALYSIS

Highlights of ERDENE accomplishments by NAU investigators in FY09 include:

Proof of concept for a rugged, lightweight mass spectrometer capable of instant field analysis. A potential economic use under discussion is identification of stressed pine trees susceptible to bark beetle infestations.

Assessment of the potential for renewable energy development, particularly wind, across the state.

A feasibility analysis of the native plant and seed market, already distributed to 85 business and agency representatives from 45 different organizations.

A collaboration between NAU and ASU to investigate the impact of exposure to complex chemical mixes on behavior, through the study of endocrine disruption in amphibians and birds.



Undergraduate students funded through the National Science Foundation examine bark beetle damage on piñon pine.

FINANCIAL INFORMATION

| | FY 2002 Actual | FY 2003 Actual | FY 2004 Actual | FY 2005 Actual | FY 2006 Actual | FY 2007 Actual | FY2008 Actual | FY 2009 Budget | FY 2009 Actual | FY 2010 Rev Budget | FY 2011 Rev Budget |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-----------------------|-----------------------|
| REVENUE | | | | | | | | | | | |
| Carry Forward | \$0 | \$175,540 | \$224,067 | \$296,812 | \$476,956 | \$667,386 | \$572,386 | \$611,482 | \$611,482 | \$709,599 | \$0 |
| New TRIF Revenue | \$1,450,500 | \$1,551,412 | \$1,681,405 | \$1,977,600 | \$2,080,472 | \$1,872,092 | \$1,829,165 | \$1,638,036 | \$1,654,496 | \$1,549,595 | \$1,546,791 |
| TOTAL REVENUE | \$1,450,500 | \$1,726,952 | \$1,905,472 | \$2,274,412 | \$2,557,428 | \$2,539,478 | \$2,401,551 | \$2,249,518 | \$2,265,978 | \$2,259,194 | \$1,546,791 |
| OPERATING BUDGET | | | | | | | | | | | |
| Personal Services | \$1,062,225 | \$1,260,419 | \$1,426,244 | \$1,639,348 | \$1,425,694 | \$1,902,726 | \$1,437,357 | \$1,853,292 | \$1,203,103 | \$2,098,999 | \$1,437,791 |
| Operating | \$212,735 | \$242,466 | \$224,416 | \$301,376 | \$464,348 | \$64,366 | \$352,712 | \$396,226 | \$353,276 | \$160,195 | \$109,000 |
| TOTAL EXPENDITURES | \$1,274,960 | \$1,502,885 | \$1,650,660 | \$1,940,724 | \$1,890,042 | \$1,967,092 | \$1,790,069 | \$2,249,518 | \$1,556,379 | \$2,259,194 | \$1,546,791 |
| ROI * | 5.1 : 1 | 3.4 : 1 | 3.0 : 1 | 7.2 : 1 | 2.0 : 1 | 3.0 : 1 | 7.4 : 1 | 3.2 : 1 | 4.2 : 1 | 3.3 : 1 | 3.4 : 1 |

* New ROI methodology was used in FY 2007, and will continue to be used for all future years. This is an ABOR requested calculation change from FY 2002-2006.

Funding of the Arizona Board of Regents' Technology and Research Initiative Fund (TRIF) is provided by a 0.6 percent increase in the Arizona sales tax rate approved by the voters through Proposition 301 on the November 2000 general election ballot.

GOALS

ERDENE goals specifically include:

- ◆ Promote environmental, economic and community health through research, outreach, and education.
- ◆ Address Arizona's environmental and economic issues with a focus on sustainable systems.
- ◆ Support initiatives with specific environmental, economic and social benefits to Arizona citizens.
- ◆ Continue to identify and capture new funding to further the economic development of Arizona.

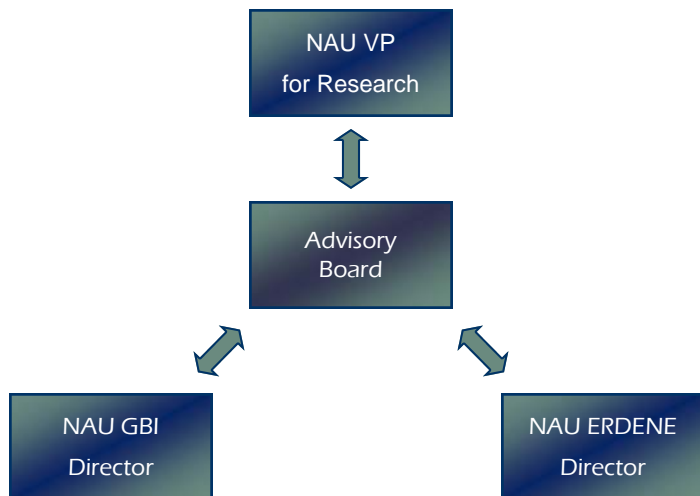


Preparing to model the carbon content of wood products from forest thinning

The Research and Development Advisory Board was formed to oversee Growing Biotechnology (GBI) and Environmental Research, Development, and Education for the New Economy (ERDENE) Initiatives. This board consists of NAU deans, faculty, and professionals with expertise in environmental and/or biotechnology areas.

MANAGEMENT

Shelley Silbert, Director of Strategic Environmental Initiatives and ERDENE, reports to Dr. Laura Huenneke, Vice President for Research, for TRIF related activities.



Michael Bittner

Translational Genomics Research Institute

Russ Yelton

Northern Arizona Center for Emerging Technologies

Barry Gold

Gordon and Betty Moore Foundation

David LaRoche

U.S. Environmental Protection Agency

Paul Jagodzinski

Dean, NAU College of Engineering, Forestry and Natural Sciences

Mary O'Connell

New Mexico State University Plant and Environmental Science Department

Thomas Whitham

NAU Department of Biological Sciences

Marshall Whitmire

Coconino County Sustainable Economic Development Initiative

LEARN MORE

- ◆ Contact Shelley Silbert at (928) 523-7635 or Shelley.Silbert@nau.edu or visit any of the following websites to learn more about individual initiatives:
- ◆ Sustainable Energy Solutions <http://ses.nau.edu>
- ◆ Ecological Restoration Institute <http://www.eri.nau.edu/cms/>
- ◆ Merriam Powell Center for Environmental Research <http://www.mpcer.nau.edu/smallindex.html>

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