University Research & Development:

Impact of New Mexico's Technology Enhancement Fund

Presentation to the

Science, Technology, and Telecommunications Committee

Las Cruces, New Mexico

October 30, 2023

NEW MEXICO HIGHER EDUCATION DEPARTMENT

Fostering Student Success from Cradle to Career

THE UNIVERSITY OF NEW MEXICO

NM STATE

New Mexico State University

NEW MEXICO TECH

SCIENCE • ENGINEERING • RESEARCH UNIVERSITY

Presentation Overview

- **Welcoming Remarks**
- **Today's Presentation Components**
  - **Overview of the Technology Enhancement Fund (TEF)**
    - Gerald Hoehne, Acting Deputy Secretary, New Mexico Higher Education Department
  - **Highlights of Current Research Projects Selected for TEF Matching Fund Awards; Projected Impacts**
    - Luis Cifuentes, Vice President for Research, NMSU
    - Ellen Fisher, Vice President for Research, UNM
    - Hengameh Raissy, Vice President for Research, UNM Health Sciences
    - Mike Doyle, Vice President for Research, NMT
  - **Technology Enhancement Fund Awards and Eligibility**
  - **Downstream Effects: Building a Robust Research and Technology Ecosystem in New Mexico**

Overview of the Technology Enhancement Fund

Technology Enhancement Fund – Creation and Funding

- **The Technology Enhancement Fund was created in statute in 2003 and amended in 2021.** The **non-reverting fund** provides matching funds to state research universities to support innovative applied research that advances knowledge and creates new products and production processes in the following fields: NM Stat § 21-1-27.2 (2021)

  - **Agriculture**
  - **Biotechnology**
  - **Biomedicine**
  - **Energy**
  - **Aerospace**
  - **Materials Science**
  - **Microelectronics**
  - **Water Resources**
  - **Manufacturing Science**
  - **Similar research areas**

- Governor Lujan Grisham and the legislature approved **$55 million in FY24** for the Technology Enhancement Fund following the 2023 legislative session, **a $10 million increase from the FY23.**
- During the 2022 legislative session, a transfer of **$45M** was made to the Technology Enhancement Fund (TEF)
- **$20M** was appropriated from the TEF to the NMHED during the 2022 legislative session
- The NMHED promulgated rules to administer the TEF with final adoption on October 25, 2022
- Rules included two main points: Allocations from the fund shall be **based on a competitive process** with applications reviewed by a committee and **distributions from the fund are made at least quarterly.**

Technology Enhancement Fund – Committee

- **In February 2023, the NMHED appointed the following members to the Technology Enhancement Fund Committee (TEC):**
  - **Wafa Hozien, Ph.D.,** *Navajo Technical University*
  - **Ellen R. Fisher, Ph.D.,** *University of New Mexico*
  - **Elizabeth (Lisa) J. Kuutila,** *University of New Mexico Rainforest Innovations*
  - **Hengameh Heidarian-Raissy, Pharm.D.,** *University of New Mexico Health Sciences Center*
  - **Luis Cifuentes, Ph.D.,** *New Mexico State University*
  - **Patricia M. Knighten,** *New Mexico State University Arrowhead Center*
  - **Michael Doyle, Ph.D.,** *New Mexico Institute of Mining and Technology*
  - **Myrriah Tomar, Ph.D.,** *New Mexico Institute of Mining and Technology Office of Innovation*
- The panel is comprised of scientific and business experts in research and economic development from each of the research institutions in New Mexico

Technology Enhancement Fund – Process

- Institutions develop proposals for submission
- TEF Committee reviews and scores applications based on a rubric
- TEF Committee meets to discuss applications and selects proposals for recommendation to NMHED
- NMHED reviews proposals and determines final awards
- Annual reporting – October of each year

2023 Awards and Return on Investment

- **The New Mexico Higher Education Department awarded $14.3 million in FY23 to four New Mexico public universities and the University of New Mexico Health Sciences Center** to fund research projects in medicine, education, agriculture, transportation engineering and other areas that directly benefit the state.
- **27 projects were selected for funding** through the Technology Enhancement Fund, which provided state dollars to help colleges and universities secure funding from federal and private sources which require matching funds, such as the National Science Foundation, the National Institutes of Health, NASA, the US DOE, and others.
- **These awards helped bring in over $100 million in research dollars into New Mexico.**
  - **New Mexico Institute of Mining and Technology** - $2 million, 8 projects
  - **New Mexico State University** - $5.4 million, 3 projects
  - **University of New Mexico** - $4.5 million, 7 projects
  - **Navajo Technical University** - $393,135, 3 projects
  - **University of New Mexico Health Sciences Center** - $2 million, 6 projects

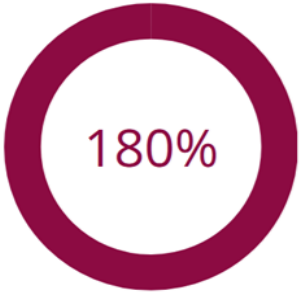
Highlights of Selected Research Projects

FY23 By the Numbers

$5,375,033
TEF INVESTMENT IN NMSU

$15,072,406
RETURNED NMSU TOTAL PROJECTS VALUE

$9,697,373
GAIN



RETURN ON INVESTMENT OVERALL FY23

Project#1

Technology Enhancement for a Biomedical Research Facility at an HSI on the US-Mexico Border

OUR PARTNERS

NIH National Institutes of Health

NEW MEXICO HIGHER EDUCATION DEPARTMENT

RETURN ON TEF INVESTMENT

State TEF Investment:	$2,762,300
Matching Funds:	$7,084,640
Total Project:	**$9,846,940**

Project #2

Analytical Instrumentation Suite for Research in Energy, Agriculture, Water, and Materials Science

OUR PARTNERS

RESEARCH CORES PROGRAM

Chemistry & Biochemistry
New Mexico State University

New Mexico INBRE

SHIMADZU Excellence in Science

RETURN ON TEF INVESTMENT

State TEF Investment:	$1,961,418
Matching Funds:	$1,961,418
Total Project:	**$3,922,836**

Project #3

Chemistry and Biochemistry Molecular Structure Determination Core

OUR PARTNERS

RESEARCH CORES PROGRAM

New Mexico INBRE

Chemistry & Biochemistry
New Mexico State University

RETURN ON TEF INVESTMENT

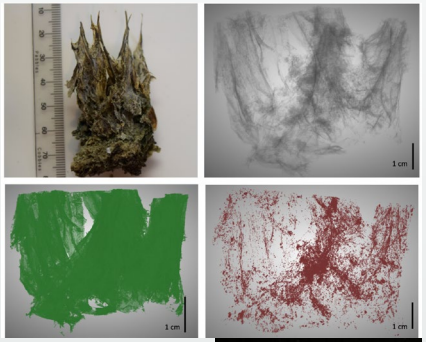
State TEF Investment:	$651,315
Matching Funds:	$651,315
Total Project:	**$1,302,630**

University of New Mexico

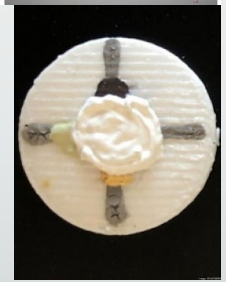
- **Project Prioritization and Selection**
  - **Less than 5% of research proposals (~950 per year) are prioritized for TEF review**
  - **Q0 FY 2022**
    - 14 proposals prioritized for review by TEC
    - 7 recommend for TEF matching by TEC and selected by HED
    - All 7 awarded by Federal agencies
    - $4.5M TEF; $33M Fed; (ROI = 7.4)
  - **Q1/2 FY 2023**
    - 12 proposals prioritized for review by TEC
    - 8 recommended for TEF matching by TEC (2 recently awarded)
    - Projected ROI: 5.2

- **TEF Awards: Highlights of TEF-Supported UNM Projects**
  - State-of-the-art instrumentation
  - Methane sensor development
  - Wildlife habitat analysis for conservation
  - Opioid addiction, neuroscience & data science research

- **Projected Impacts**
  - Advancing knowledge of & addressing climate change impacts
  - Economic development & training STEM workforce
  - Development of new career pathways for underserved populations
  - Experiential learning opportunities for K-16 students



CT data from Antarctica



Methane sensor prototype

UNM Health Sciences

- Project Prioritization and Selection
  - Less than 5% match for Federally funded proposals awarded by TEF
  - Q0 FY 2022
    - 6 recommended for TEF matching by TEC and selected by HED (total federal funds: $44,409,178)
  - Q1/2 FY 2023
    - 6 proposals prioritized for review and recommended for matching funds by TEC
      - 2 still pending (grant submitted and pending for scoring)
  - TEF Awards: Access to cutting edge technology for biomedical research, counteracting toxicity associated with environmental toxins, health disparity to health equity, and enhancing career pathways for underrepresented minorities
  - Projected Impacts: advancing knowledge, education K-12 to post-doc, economic development and training the future workforce, improving health of New Mexicans and beyond

New Mexico Tech

- **Project Prioritization and Selection**
  - **Projects were selected which best match the evaluation criteria**
  - **Q0 FY 2022**
    - 12 proposals prioritized for review by TEC
    - 8 recommend for TEF matching by TEC and selected by HED
    - All 8 awarded by Federal agencies (total Federal funds: $60,208,20
  - **Q1/2 FY 2023**
    - 17 proposals prioritized for review by TEC
    - 7 recommended for TEF matching by TEC

- **TEF Awards: Highlights of TEF-Supported UNM Projects**
  - Geologic mapping of New Mexico
  - Advanced Technology for desalination of brackish and produced water
  - Additive manufacturing technology for use in space
  - Subsurface hydrogen production

- **Projected Impacts**
  - Inventing new technologies and advancing knowledge
  - Improving New Mexico's access to and management of water and energy resources
  - Economic development at the local and state levels
  - Workforce development in STEM fields for both traditional and nontraditional students
  - Research and workforce skills experience for students

Technology Enhancement Fund "Big Picture" and Next Steps

TEF: Building a Foundation for Increased Knowledge, Better Health, and Economic Opportunity

Expanding Basic Research

- Putting more homegrown ideas along the Technology Readiness Pathway

Building New Collaborations Between HEIs, Industry, Trade Associations, and National Labs

- More than half the funded projects include multiple NM institutions collaborating with each other

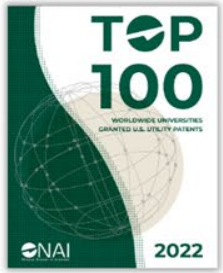
Strategic Handoffs of Intellectual Property to our Commercialization Partners

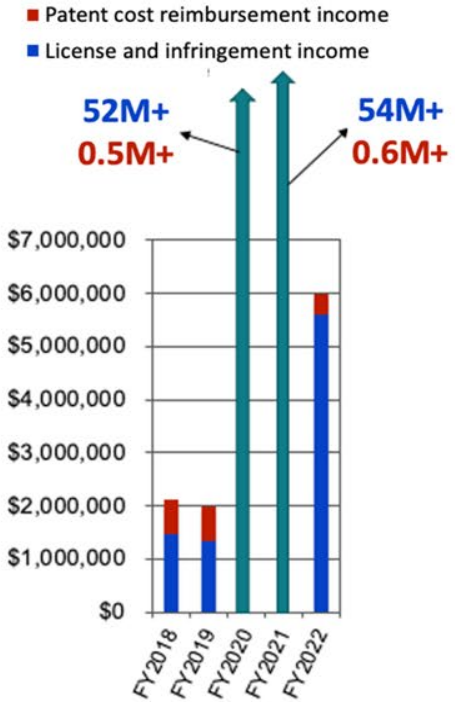
- Cultivate and protect IP and those commercial interests who can leverage it

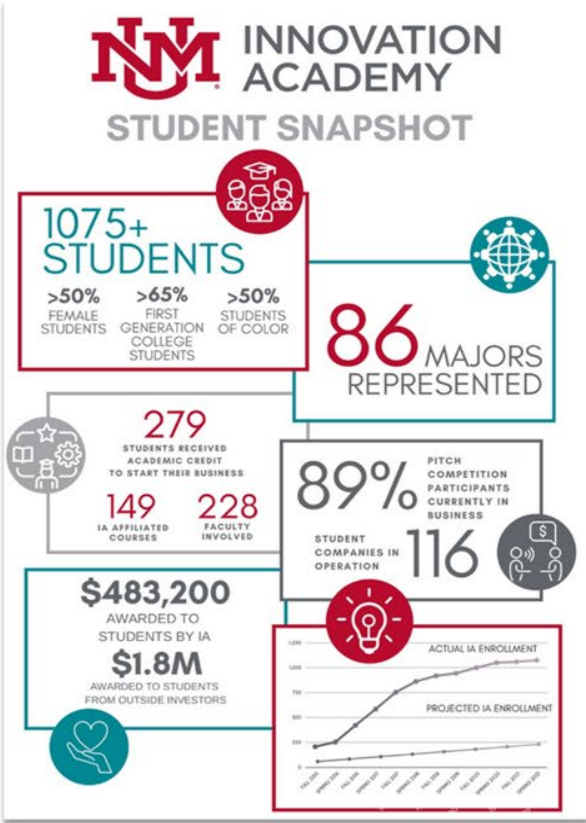
UNM RAINFOREST INNOVATIONS

Supporting Technology Transfer and Catalyzing Economic Development

- Major Programs
  - Rainforest Accelerator
  - Innovate New Mexico
  - EDA University Center
  - Tribal Entrepreneurship Program
- In top 100 worldwide universities with largest number of issued US patents for the seventh year in a row
- *56% of the 162 companies spun out from the University of New Mexico are still in business and active; 48 of these startups are active in New Mexico*







UNM | Rainforest Innovations

Emerging Collaborations in Research Driven Economic Development

- Economic Diversification
- Leveraging Existing Strengths
- Economic Development and Employment Generation
- Collaborative Innovation and Global Leadership
- Funding and Investment Opportunities
- Workforce Transition Support

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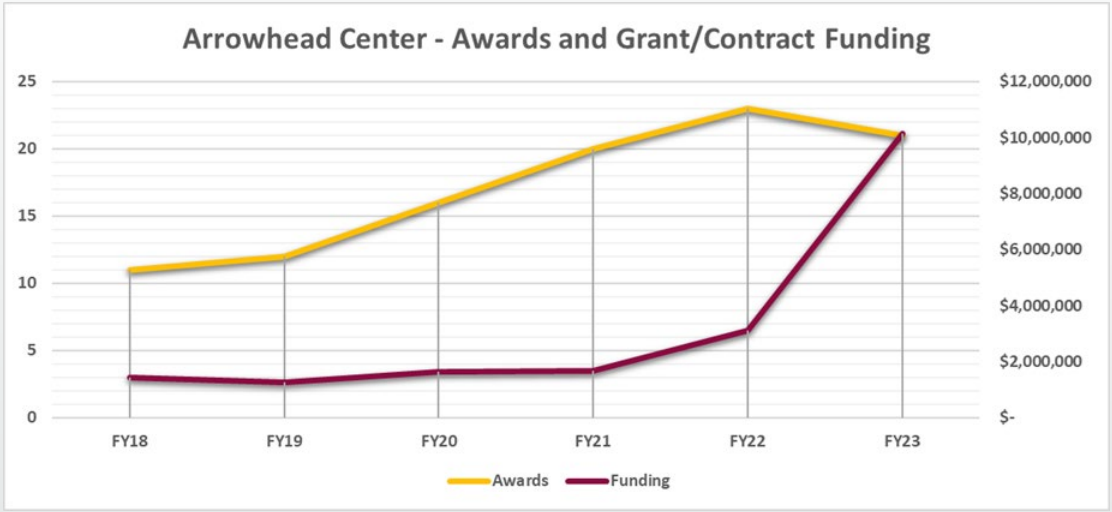


- Infrastructure for Media, Healthcare, and Aerospace Clusters
- NSF I-Corps Southwest Region Hub
- EDA Economic Adjustment Assistance (Building Resilience and Entrepreneurship in a Coal Community [BRECC])
- EDA Venture Challenge (Scale Up New Mexico)

NMT Office of Innovation Commercialization

Current Initiatives

- Advancing Research Translation
- NSF ENGINES projects
- Post-Quantum Cybersecurity for AI

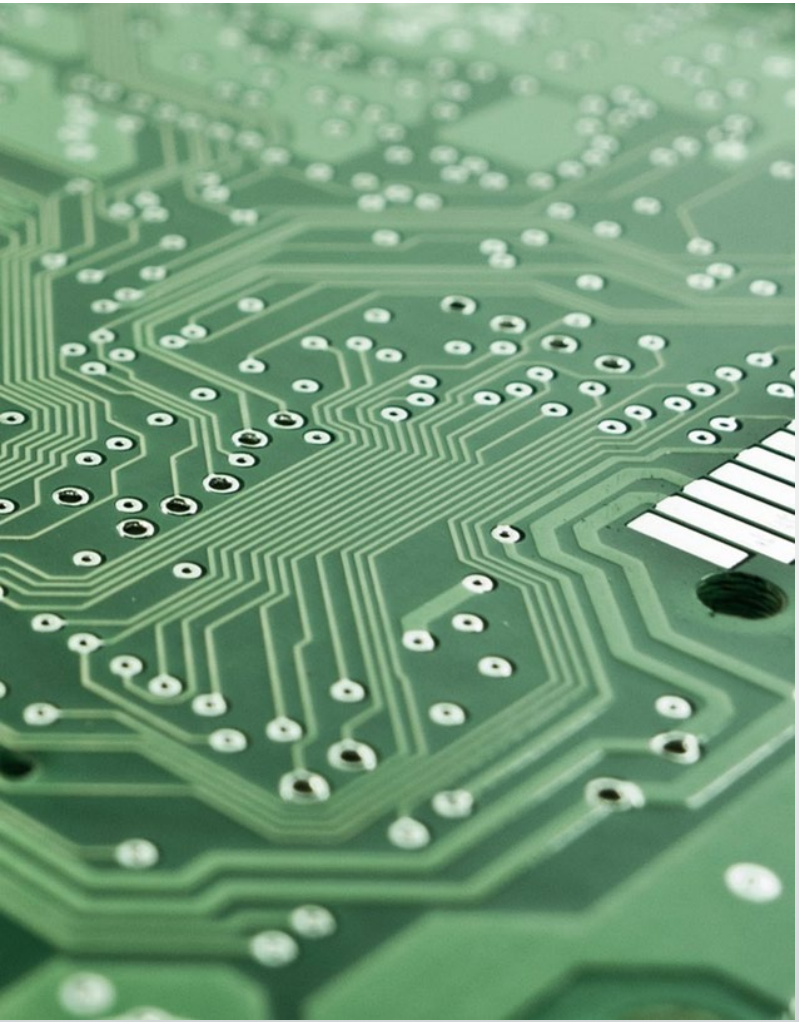
Intellectual Property and Commercialization Highlights

- Desalination of produced and brackish water
- Tin Whiskering Solution for electronic infrastructure resilience
- SuperAlloy for additive manufacturing

Impact

- New sources of potable water
- Dramatically extend the useful life of electronic components
- Enable 3D printing of machine components for high-temperature environments
  - Turbine blades

Technology Enhancement Fund - Updates and Next Steps



Technology Enhancement Fund – Process Updates

- **FY23 Q4 awards issued - $14,265,133**
- **FY24 Quarterly Meeting Schedules were established as follows:**
  - **Q1 – July 11**
  - **Q2 – October 10**
  - **Q3 – January 9**
  - **Q4 – April 9**
- NMHED paused the schedule to evaluate discussion from LFC at their June 28, 2023 meeting in Las Cruces

Technology Enhancement Fund – Process Updates

New committee member was added to Technology Enhancement Committee

- Representative from Economic Development Department

Project Review Rubric was updated and implemented on August 22, 2023

- **Research Impact: Potential outcomes that enhance research and benefit New Mexico.**
  - Innovative Foundational Research: Discovery and fundamental research principles that spur innovation.
  - Applied Research: Identifying solutions to specific research problems or issues.
  - Instrumentation: Equipment to further research aligned with economic priorities.
  - Collaborative Research: Collaboration with corporate organizations, nonprofit organizations, other eligible institutions, or other public entities
- **Educational Impact: Potential outcomes that enhance higher education and benefit New Mexico.**
  - Undergraduate training
  - Graduate training
  - Post-doc training
  - Community engaged educational activities
- **Economic Impact – State Priority: Alignment with New Mexico's economic priorities.**
  - Evidence of enhanced knowledge transfer
  - Creates or leads to new products
  - Creates or leads to new production processes
  - Impact on Workforce

Technology Enhancement Fund – Process Updates

- **Budget Justification:** The proposed budget is necessary, reasonable, and justified.
- **Energy, Equity, and Environmental Justice (EEEJ) Impact:** Sustainability and resilience within New Mexico (e.g., impact on environment; climate change, sustainable resources).
- **Equity, Inclusion, and Diversity (EID) Impact:** Potential for positive impact on underserved populations (e.g., increased diversity, equity, inclusion; rural and Tribal community development; access; health care disparities).
- **Institutional Funding Source:** Identify the source and eligibility of the institutional share.

Technology Enhancement Fund – Next Steps

- **Q1 proposals were re-evaluated by each institution against updated rubric**
- **Q1 proposals were included in the review of Q2 proposals**
- **TEF Committee met on October 18, 2023, to review Q1 and Q2 proposals and make recommendations**
  - 18 proposals recommended - $15,881,405
- **Q3 and Q4 will now continue as originally scheduled with meetings in January and April 2024**
- **Future funding to support the TEF is critical in moving New Mexico forward and securing millions in competitive research funding from federal, private, and nonprofit sources.**

Concluding Remarks

- **Thank you** to our policy makers for the **supporting the TEF** and supplying a mechanism for matching funds through the Technology Enhancement Fund
- The additional investment will provide New Mexico's research institutions with the opportunity to **compete with other states** for research funding and expand inter-institutional collaboration throughout the state
- Our ultimate goal is investment in funding to enhance **research and economic development** in the State of New Mexico
- To provide a sustainable resource to **promote New Mexico's research enterprise**, we respectfully propose a series of additional investments into the TEF
    - Provide for continued distributions from the TEF to HED of >/= **$20M per year**, providing matching fund requests from Higher Education Institutions, EDD and our collaborative partners.
    - Consider the **creation of a permanent fund**, which meets the matching fund needs of New Mexico's research enterprise and **enhances New Mexico's workforce and entrepreneurial ecosystem**.