NM Legislative Science, Technology & Telecommunications Committee

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BE BOLD. Shape the Future.
New Mexico State University

Meeting the U.S. DOE Energy Wind Turbine Recycling Challenge

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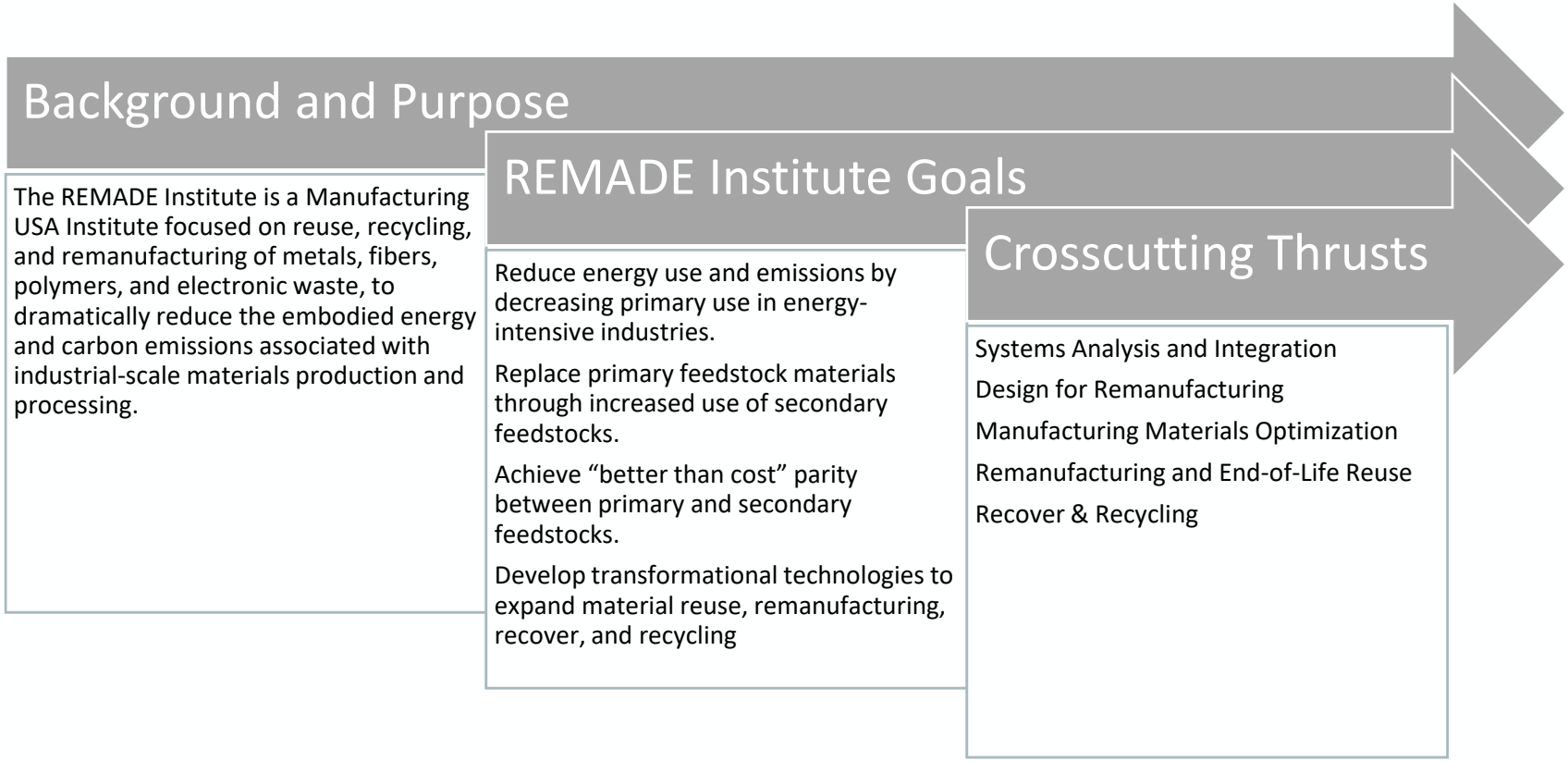
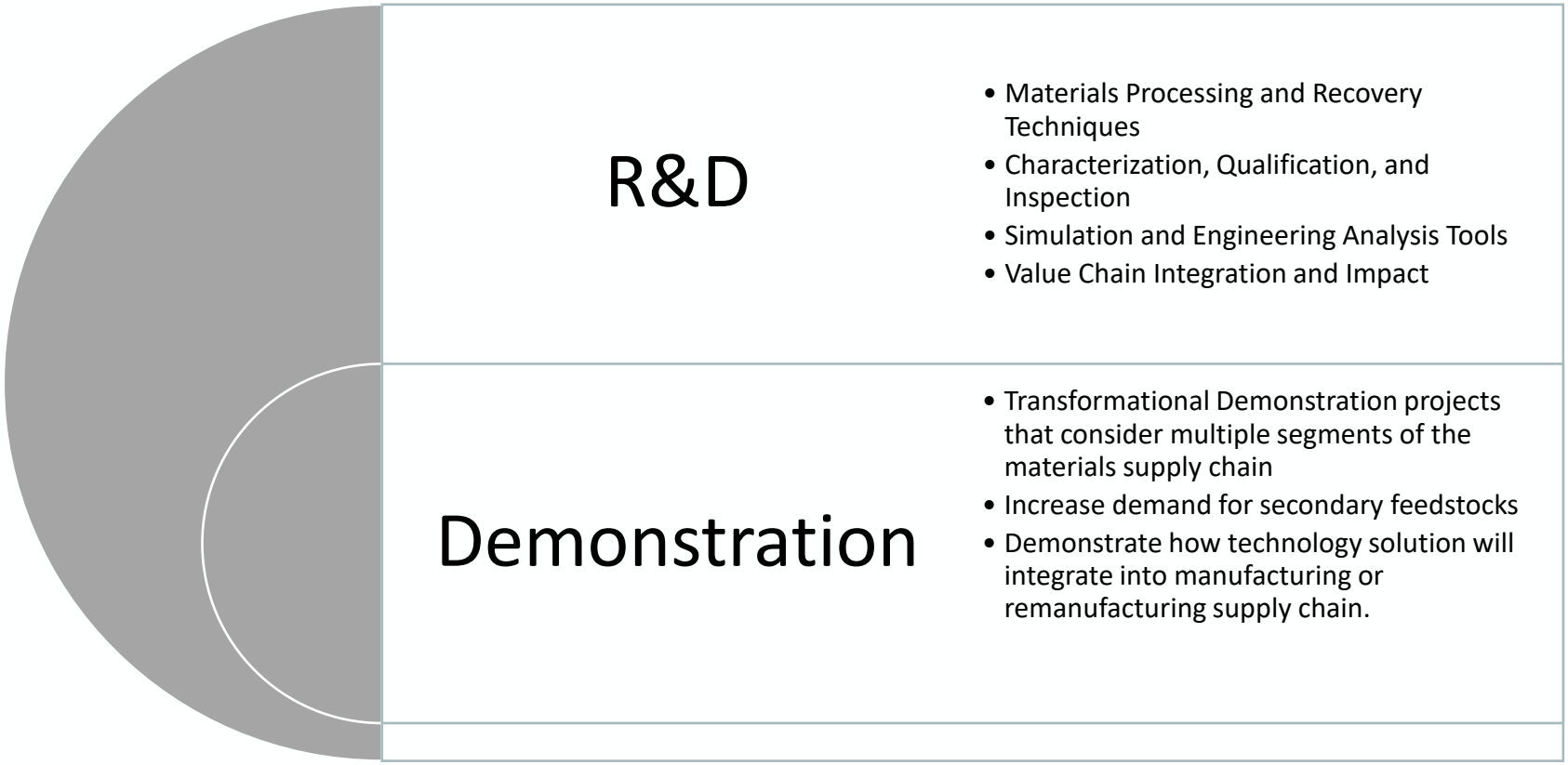
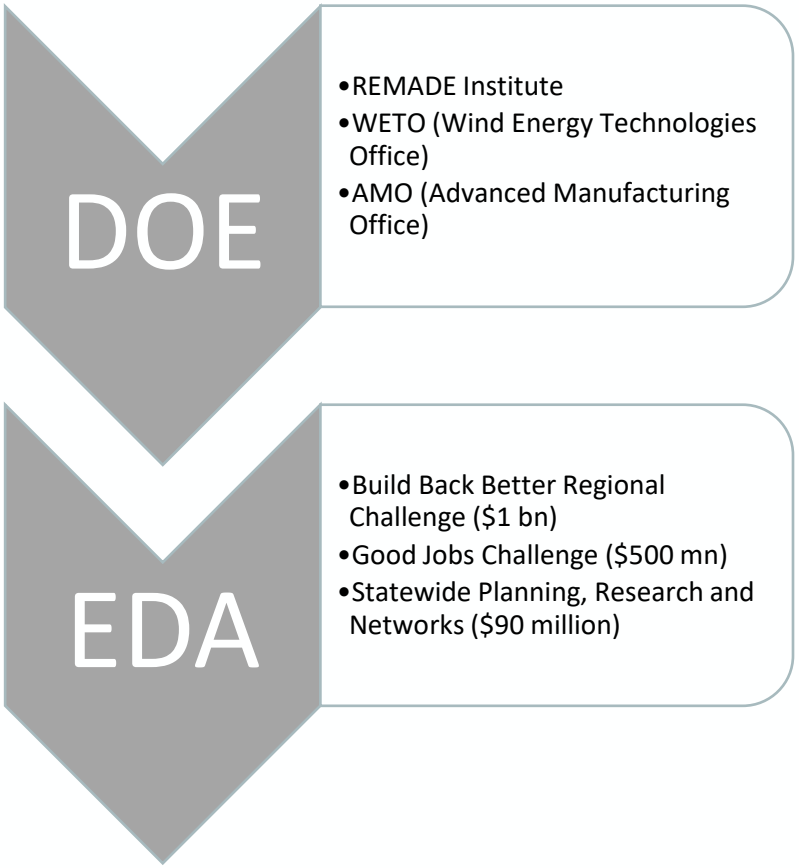
Outlining the DOE Challenge



Technical Themes



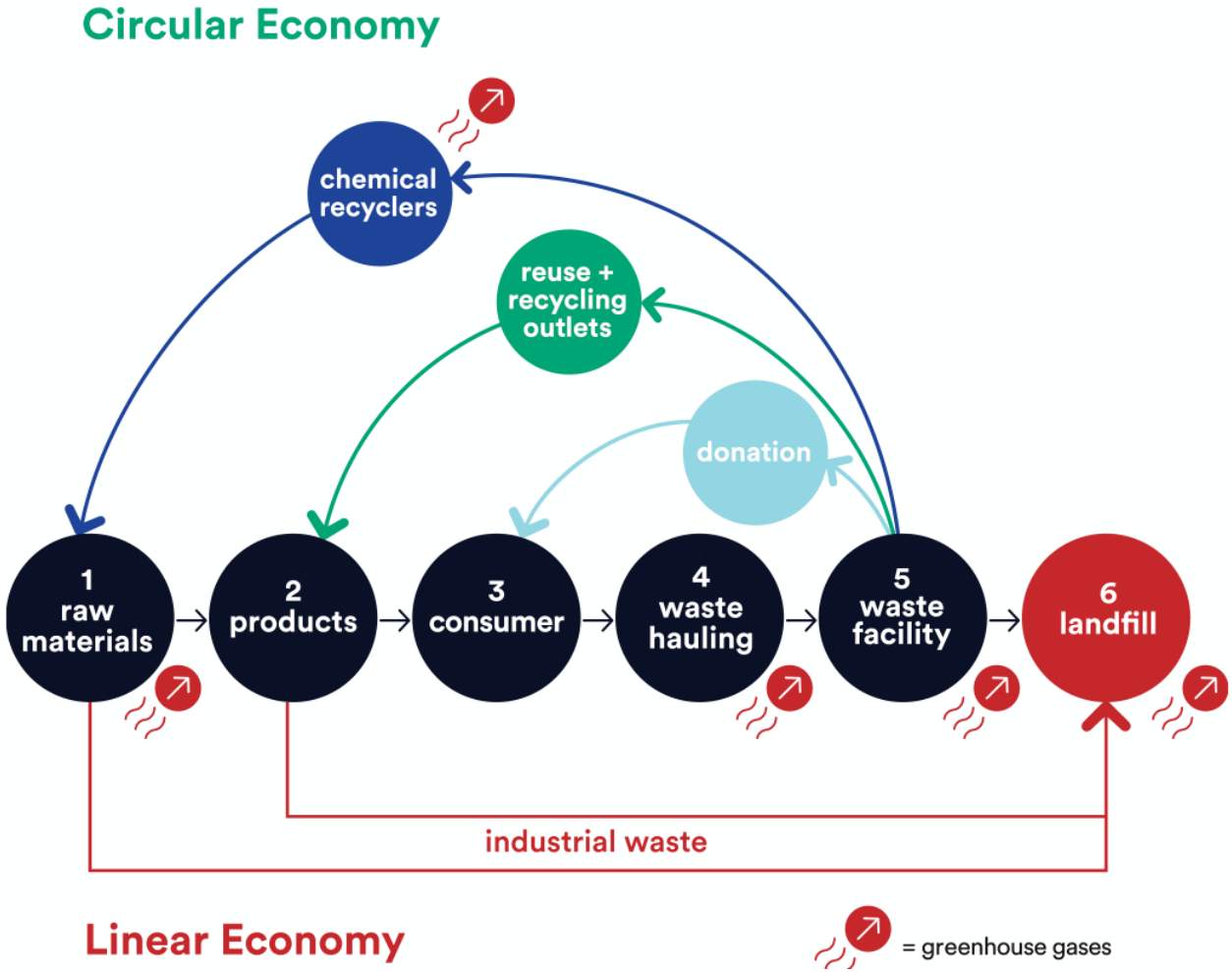
Funding Opportunities



- Most funding opportunities require matching funds
- Partnerships should be organic and established to increase program success
- Aligned outcomes including economic development and workforce development strategies

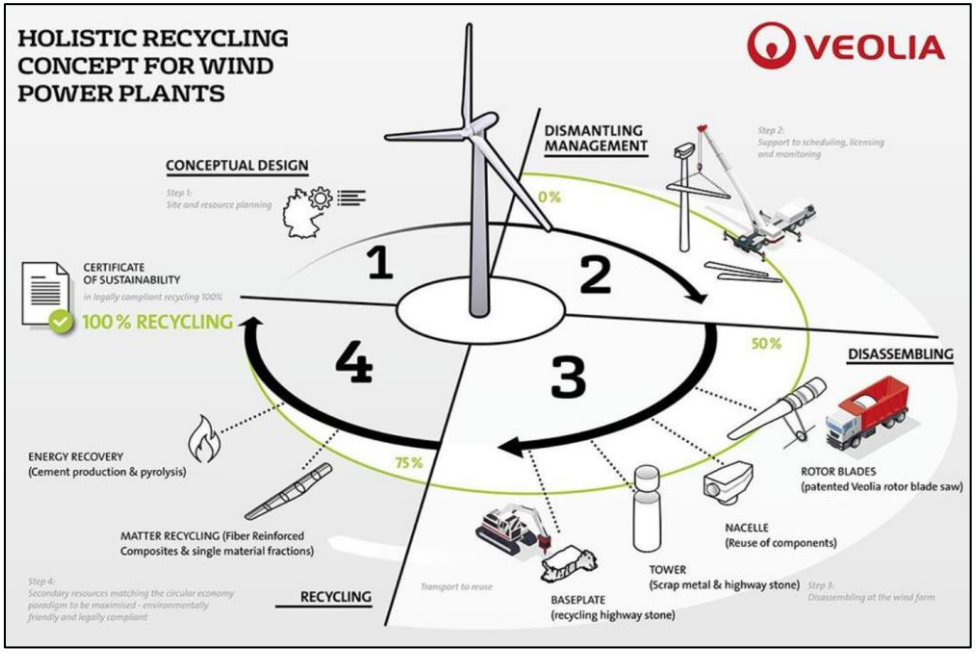
Wind Turbine Blade Recycling and Reuse: Framing the Challenge

Transition from Linear to Circular Economy



Source: rts Partners

Wind Turbine Recycling – Blades Are The Challenge



Source: Veolia, ACMA Composites Recycling Conference, 20 May 2020

Materials	Treatment
Steel	90% recycled + 10 % landfill
Al	90% recycled + 10 % landfill
Cu	90% recycled + 10 % landfill
Polymer materials	50% incinerated + 50% landfill
Lubricants	100% incinerated
All other materials (including concrete)	100% landfill

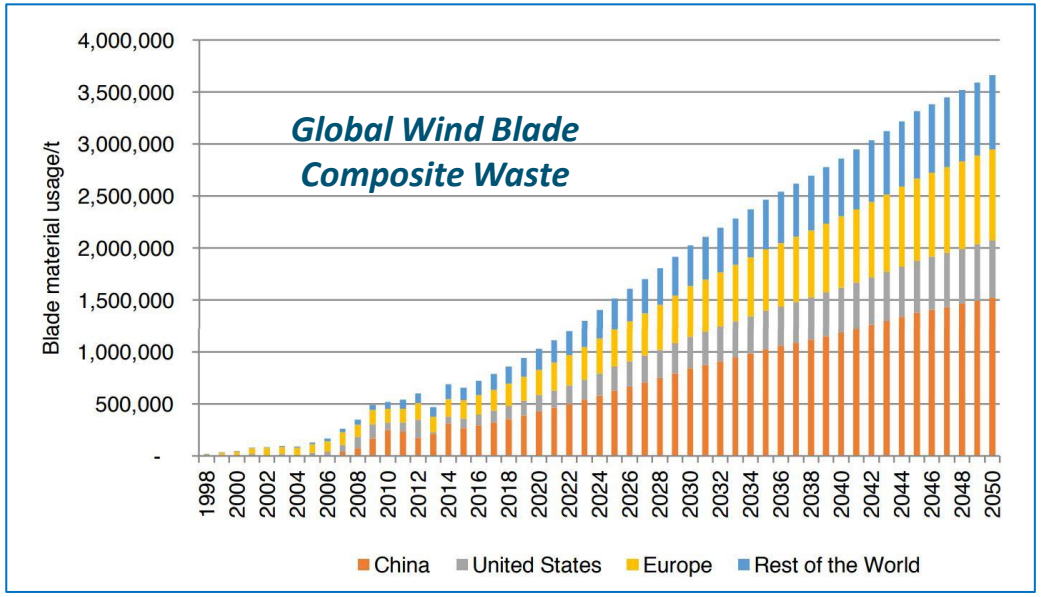
Source:Waste and Material Flow Analysis in the End-of-Life Wind Energy System, Tazi et. Al., Resources, Conservation and Recycling, Volume 145, June 2019, pages 199-207

Wind turbines are between 75% and 90% recyclable (without the foundation)

But the vast majority of EOL blades currently end up in landfills

Source: Bloomberg

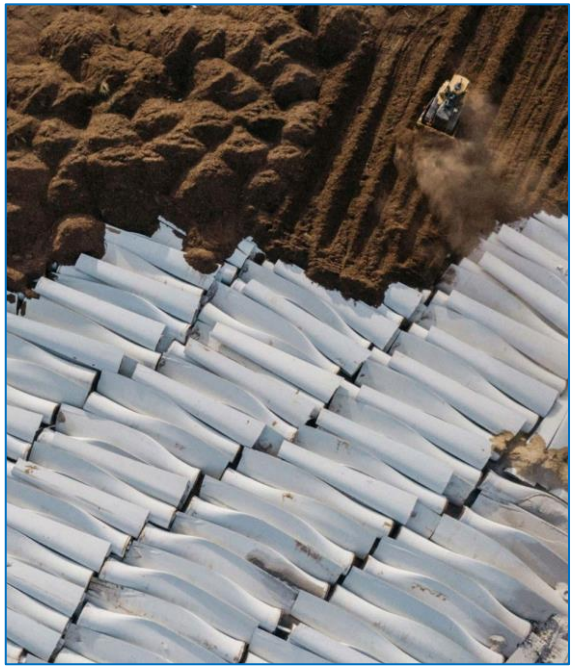
Wind Turbine Blade Composites Waste



Source: *Wind Turbine Blade Waste in 2050*, Pu Liu and Claire Y. Barlow, University of Cambridge Institute for Manufacturing

Source: Derek Berry, NREL

Source: Hammel Recyclingtechnik Equipment



Source: Bloomberg

Over 50 million metric tons of waste by 2050

Challenges of Wind Turbine Blade Composite Recycling

Two Challenges

Existing Thermoset Blades	Advanced Material Recyclable Blades

- Vast majority of blades end up in a landfill at end-of-life
- Few feasible methods to recycle existing blades
- Lack of design for recycling and reuse

Source: ShareAmerica - U.S. Department of State

Source: Hammel Recyclingtechnik Equipment

Wind Turbine Blade Recycling: Potential Opportunities

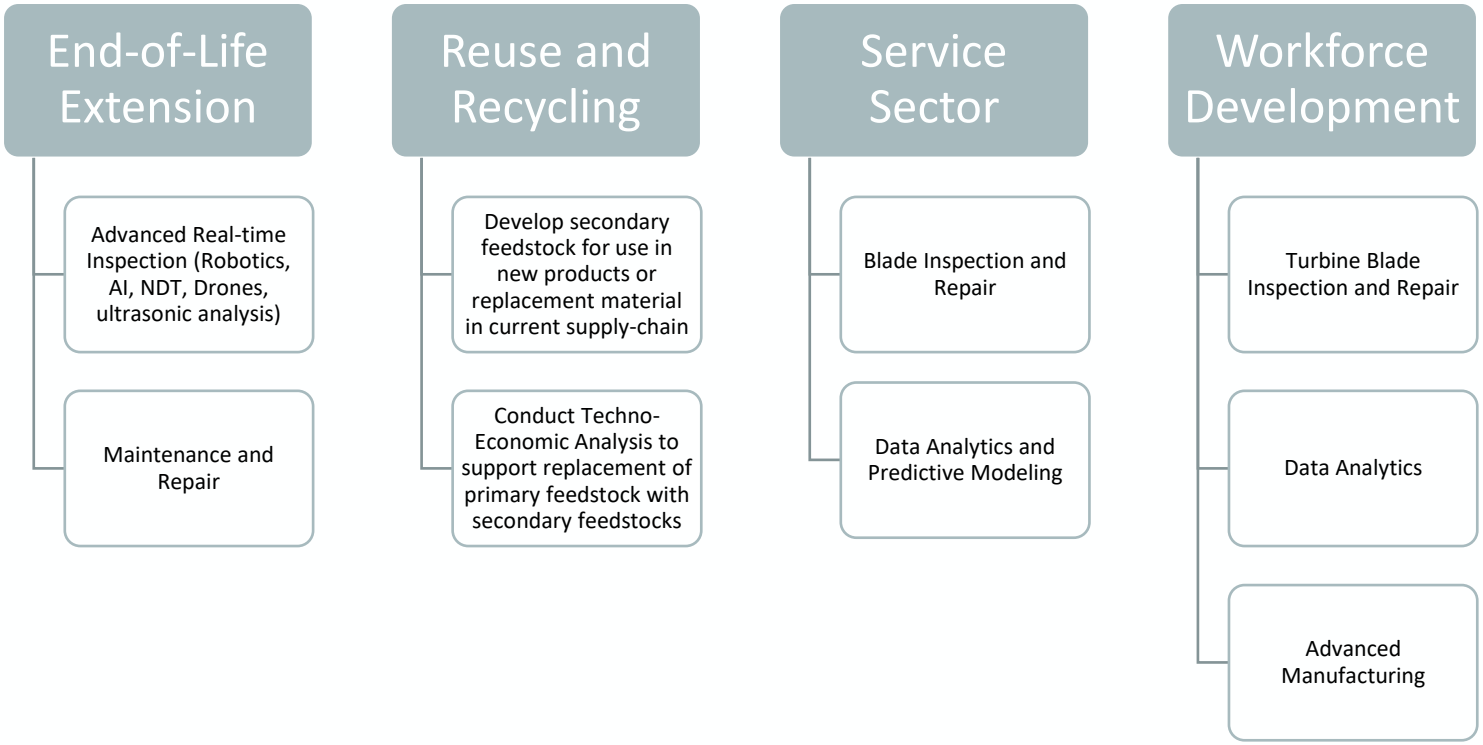
Meeting the Challenge

Technology Development and Innovation

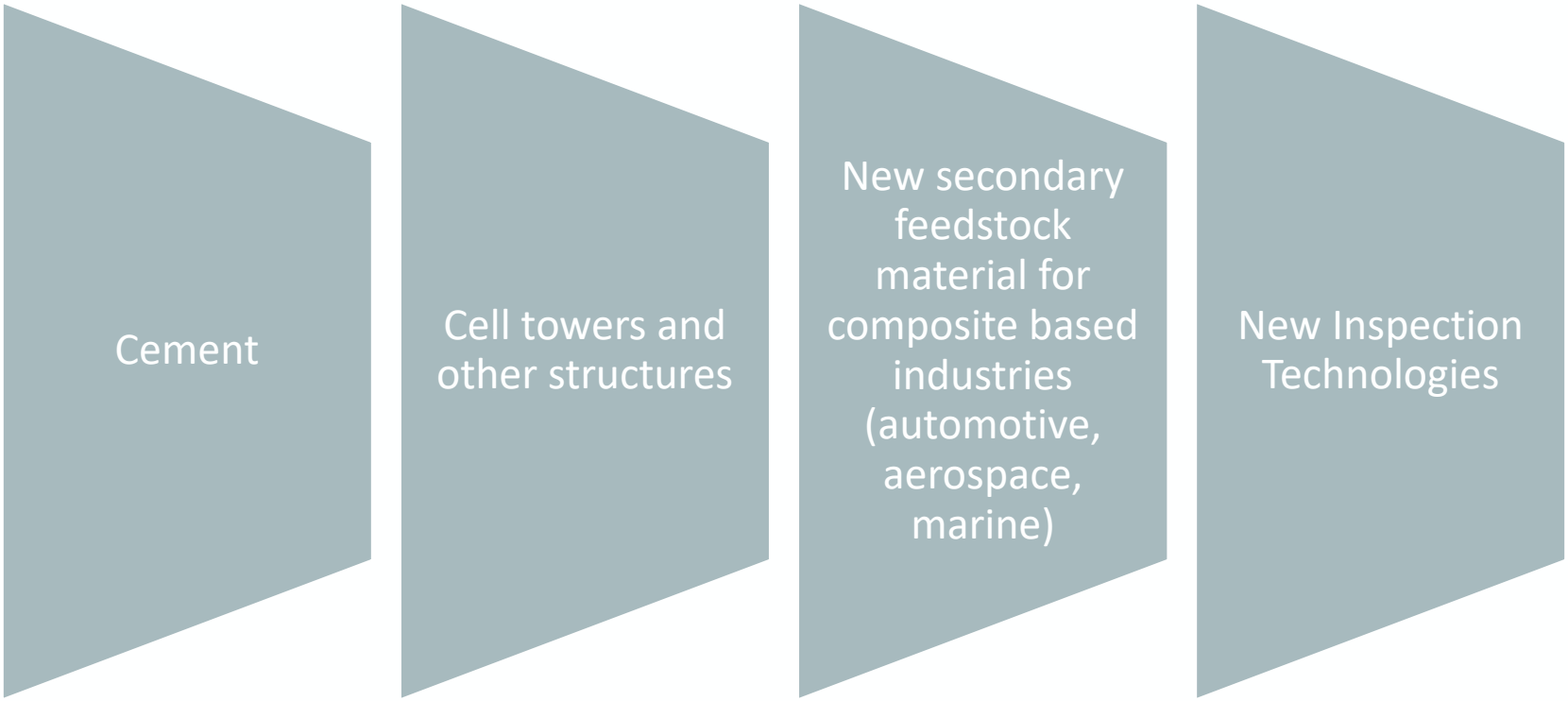
Service Sector and Workforce Development

Illustration by: Marie Boye Thomsen

Research Focus Areas



Potential Opportunities



Strategic Partnerships

- National Renewable Energy Laboratory
- Sandia National Laboratory
- TPI Composites
- Pattern Energy
- Global Fiberglass Solutions Inc.
- Mesalands College
- Secure America Institute
- Border Industrial Alliance
- Albuquerque Economic Development (AED)

Arrowhead Center Sprint Accelerators

AgSprint is a 5-week venture builder for innovators with agricultural applications in food, energy, and the environment. Held in El Paso.

BizSprint is an 8-week Arrowhead Accelerator program for NM's export-based businesses to test the feasibility of their business idea. Held in El Paso, Las Cruces, and Farmington. Multiple cohorts to run in Las Cruces this summer/fall.

EnergySprint is a 5-week venture builder for NM innovators in clean energy technology. Currently in process statewide.

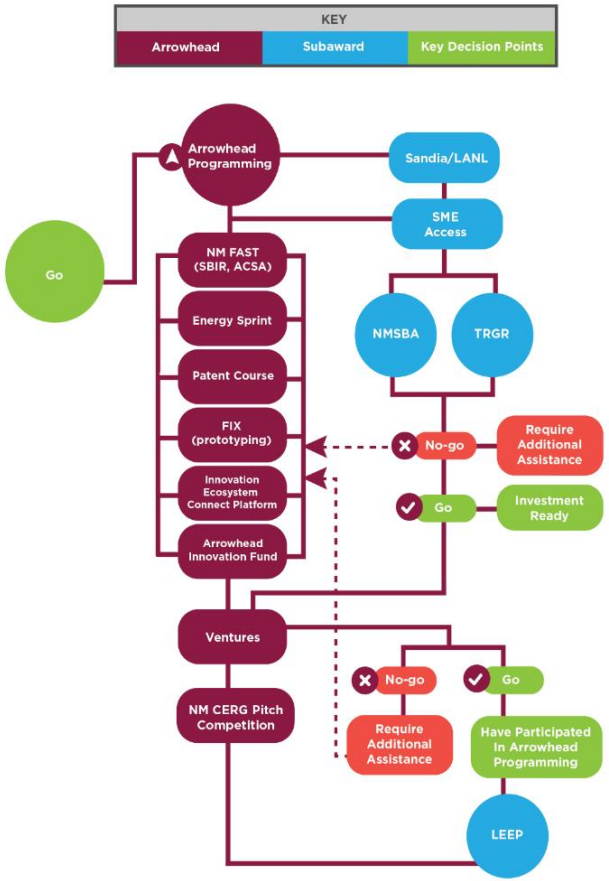
SuperSprint is a one-day Arrowhead Accelerator program focused on expanding offerings into a larger market and how to secure new customers. Held in Albuquerque in partnership with the Minority Business Development Center.

WESprint is a 5-week venture builder for NM women entrepreneurs to test the feasibility of their idea and explore funding opportunities through the SBIR/STTR programs. Held in July.

Native American Sprint is a 5-week accelerator that focuses on the individual needs of each participant, with a goal of helping Native American entrepreneurs successfully start and grow their businesses.

NM Clean Energy Resilience and Growth Cluster (CERG)

- NM CERG will establish a technology development, validation, and growth model that will create a robust pipeline of support for clean energy tech startups in NM
- Funded through the Department of Energy (DOE) Office of Technology Transitions (OTT) Energy Program for Innovation Clusters (EPIC)
- $1,250,000 over three years ($1,000,000 in new money)
- Partners include Los Alamos National Laboratory, Sandia National Laboratories, and the New Mexico Economic Development Department



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