



MnDRIVE: Advancing industry, conserving our environment

GOAL

Apply research-based new technology to solve environmental challenges and more efficiently use current and future energy sources, creating opportunities for Minnesota's energy, agriculture, and mining industries.

RATIONALE

- New technology can minimize the environmental impact of upcoming mining projects in northern Minnesota
- Microbial bioremediation renders wastes in water, soil, and air less hazardous to human health
 - » **Microbes in agriculture** fix nitrogen, mobilize iron and phosphorus from the soil, degrade toxic compounds, and provide barriers against pests
 - » **Microbes in mining** transform metals from toxic to less toxic and inert states, remove metals from waste streams, and enable clean mining processes
 - » **Microbes in energy** provide third and fourth generation biofuels, convert waste products into useful compounds, and remediate chemical contaminants in water used in fracking for recovery of natural gas from shale
- Microbial remediation provides solutions for currently stalled industrial and agricultural processes, including:
 - » Reuse of mine pits for aquaculture (fish farming)
 - » Copper/nickel mining
 - » Fracking

STRATEGIES

- Consult with industry to target the top water contamination challenges
- Develop bench top solutions
- Test pilot technology at key sites
 - » Use U of M Morris as a test site for integrating wind energy into smart grid technologies, including evaluating real-time energy demand pricing and understanding consumer energy use preferences
- Deliver technology to startups and industry

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STATEWIDE OUTCOMES

Short-term

- New technologies for microbiological systems to diagnose, treat, and prevent water contamination arising from mining, agricultural activities, and natural gas exploration
- Low-cost, low-carbon energy use via the smart grid
- More precise energy demand forecasting

Long-term

- More permits for currently stalled mining, industrial, and agricultural processes requiring environmental remediation
- Improved water quality throughout the Iron Range and Mississippi watersheds
- Increased employment and commerce in vital Minnesota industries