Broader Impact Strategies in Rural States

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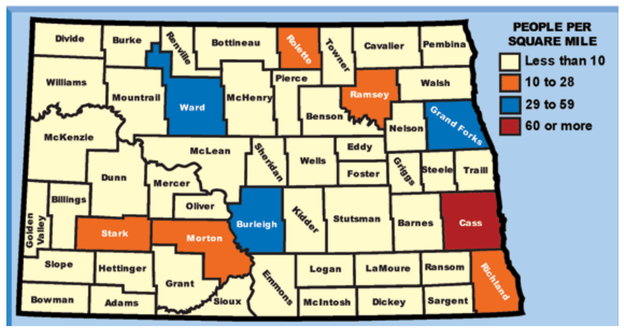

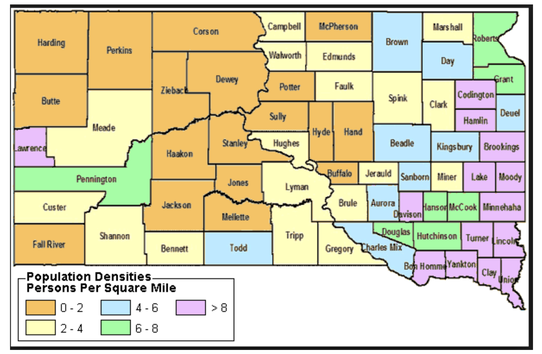

Summary – Dakota BioCon is an NSF EPSCoR project to establish a multi-state/ institution/ disciplinary research collaboration that will produce economically viable renewable replacements for existing petrochemicals. The project has several outreach components targeting different age groups. A broader impact was achieved by coordination with public library summer reading programs and the 21st Century Community Learning Center summer school programs of rural communities.

Grades 3-5

The Dakota Science Center worked with rural teachers to incorporate the renewable energy theme at the elementary level. A summer school schedule was developed that included 4-H curriculum and Dakota Science Center inquiry-based STEM lesson plans. A week-long elementary level *STEM Kids* class with a renewable energy theme was developed to be used at public libraries.

Grades 6-7

The UND College of Engineering and Mines collaborated with the Dakota Science Center to develop the middle school outreach program *You're Hired Engineering Camp*. Through this 21st Century Community Learning Center summer rural school program, students work in teams to investigate renewable replacements for existing petrochemicals, hone research and presentation skills and present their findings to a panel of judges.

Schedule

MWF	**Experimentation and Presentation**
9:00 – 9:30	Gather for paperwork and discussion
9:30 – 10:00	Discuss problems / Demos / Proper use of equipment
10:00 – 12:00	Morning work session
Mon – filtration	Wed – solar power Fri - fermentation
12:00 – 12:30	Lunch
12:30 – 2:30	Afternoon work session prep for presentation
2:30 – 3:00	Presentations to Boards of Directors
T Th	**Soft Skills Development for Group Work and Presentation Skills**
9:00 – 10:00	Feedback and discussion
10:00 – 11:30	Session 1 Engineering Design Process with assigned challenge
11:30 – 12:00	Lunch
12:00 – 1:25	Session 2 Data Visualization with assigned challenge
1:35 – 3:00	Session 3 Giving a Presentation with assigned challenge

Grades 11-12

The UND Chemistry Department designed the *Beyond Crude Oil: biobased chemicals and fuels* workshop for junior and senior high school students. A substitute teacher and bus mileage stipend allows rural schools to participate.

The workshop consists of

- Short presentations introducing students to renewable chemicals and fuels, polymers and chemical methods used for their study and characterization.
- Hands-on demonstrations: generation of biofuel via transesterification and using the biowaste, microbial production of enzymes, explore chemistry of polymers: sodium alginate and acrylate snow, modeling chemistry of polymers, and mass spectrometry and analysis of polymers.
- Tour the Grand Forks Airport to see the research and measurements conducted on the University of North Dakota's Cessna Citation Research Aircraft.