I. Title of Proposed Project
“Community-Scale Bio-Diesel Enterprises in Colorado Farming Communities”

II. PI Name(s) and Contact Information
Jerry Johnson, PhD, Extension Specialist, CSU, Fort Collins, CO
Alan Helm, Regional Extension Specialist, Golden Plains
Ron Meyer, Regional Extension Specialist, Golden Plains
Scott Brase, Regional Extension Specialist, SE Colorado
Merlin Dillon, Regional Extension Specialist, San Luis Valley
Ravi Malhotra, Executive Director, iCAST (International Center for Appropriate & Sustainable Technology)

III. Will this be a state-wide project, or have multi-county emphasis? If multi-county, list all counties that will be participants.
The project will be state-wide, involving multiple counties and regions of rural Colorado.

IV. Indicate which Core Competency Area(s) this work falls under, or if it addresses the Front Door mission of the University.
✓ Competitive & Sustainable Agricultural Systems,
✓ Community Resource Development,
✓ Natural Resources and the Environment.

V. Cooperative Extension Work Team Affiliation
1) For CCA Competitive and Sustainable Agricultural Systems, we would be in the Wheat-based Dryland Cropping Systems work team,
2) For CCA Community Resource Development – work team and members to be determined.

VI. Situation Statement
Diesel is a primary fuel source on the modern farm, with an average family farm consuming ~20,000 gallons/year and some farms consuming as much as 100,000 gallons/year. Rising fuel costs are hurting profitability for family farms and are increasing insolvency rates for small- and medium-size farms. Community-scale biodiesel production would provide fuel self-sufficiency, reduce dependence on costly fuel resources imported by communities, produce oilseed meal for local livestock feeds, and create rural, off-season employment opportunities. Oil seed crops grown for biodiesel production would reduce water demands, especially during peak demand periods in mid-late summer, and reduce pollution emissions. In addition, the production, transportation and use of petro-diesel fuel results in numerous environmental and public health impacts. The primary hurdles to establishing community-scale biodiesel facilities are lack of sufficient feedstock at competitive prices and the lack of hands-on experience and demonstrations showing producers the agronomic and economic feasibility of community-based biodiesel production.

VII. Project Description
This project proposes to plant crop demonstration plots and conduct educational demonstrations for its outreach efforts in order to overcome the hurdles to establishing community-scale biodiesel facilities. We will build a mobile skid-mounted working prototype demonstration unit called SID -- “Seeds Into Diesel”. SID will consist of a seed crusher and biodiesel reactor to convert oilseed into biodiesel. A team of engineering students working with CAST staff have already designed a SID prototype. The project will fund construction of the demonstration SID unit. The SID will be
moved around the state to demonstrate ease of making biodiesel and potential for fuel independence. This project will hold at least four regional outreach tours in Colorado that target communities expressing an interest in this opportunity. These demonstrations will include educational and informational presentations about the economic, environmental and public health benefits of creating a profitable biodiesel production facility in the community based on feasibility reports already developed by CAST.

The Cooperative Extension specialists will help organize and conduct these community tours and promote biodiesel crop demonstration plots at each location. These plots will include the range of potential oilseed crops: canola, Indian brown mustard, Camelina, safflower, sunflower, and other oilseed crops that local producers would like to demonstrate.

The overall objective of the project is to establish one to four community-scale biodiesel production facilities in rural Colorado with the help of local producers. The Rocky Mountain Farmers Union Cooperative Development Center will help organize the producers.

CAST has already conducted technical and economic feasibilities in collaboration with students and faculty at Colorado institutions of higher education, with the participation of subject matter experts. This study demonstrates that community-scale biodiesel production can create economic, environmental and public health benefits. CSU Cooperative Extension has been working with CAST and RMFU to promote the concept of community-scale biodiesel production to producers and communities throughout rural Colorado. As part of this process, presentations of preliminary information about the opportunity were made in Monte Vista, Alamosa, La Junta, Pueblo, Eads, Dove Creek, Holyoke, Flagler, Karval and Burlington. Farmers in these communities have shown interest in the project but are hesitant to make a commitment, since they do not understand the technology, are unaware of the simplicity of the process or are wary of the opportunity. A detailed dissemination program as outlined in this proposal will help allay some of their concerns.

CSU Cooperative Extension specialists have been testing oilseed production for biodiesel for four years. Variety and agronomic experience gained during the four years has been invaluable. Satisfactory yields for community-based biodiesel production can be obtained under irrigation and limited irrigation conditions. Dryland production has been hampered by prolonged drought conditions during the past four years. We feel like demonstration plots of oilseed production can be conducted under irrigated or limited irrigation conditions with a good chance of success and thus complete the demonstration of the feasibility of community-based biodiesel production.

Implementation Plan

1. Build SID demonstration unit and plan field trials.
2. Plant and evaluate oilseed production demonstration plots.
3. Develop information/education materials and demonstration program including information on results of field trials.
4. Schedule and conduct pilot presentation.
5. Evaluate and refine presentation.
6. Identify target communities and schedule demonstrations.
7. Conduct demonstrations of SID and test plots.
8. Evaluate effectiveness of demonstrations based on number of attendees, interest expressed in creating a biodiesel facility.
VIII. Anticipated Impacts/Outcomes of this Work

Short-term Impact – The project will provide learning opportunities to agriculture, engineering and business school students, while they work on developing the educational materials, test plots and the SID demonstration unit for community-scale biodiesel production.

Mid-term Impact – An outreach campaign such as this will help strengthen the role of the extension service centers and agents because this project will serve as a model whereby CSU provides all the information, including a working model, on new opportunities for producers.

Long-term Impact – Developing a community-scale biodiesel operation can, under favorable market conditions, provide the community with new jobs, pay for new infrastructure and pump real dollars into the local economy. The production of oil seed crops can provide a sustainable solution that improves soil conditions, reduces water needs and improves air quality. Community-scale biodiesel operations can improve small farm profitability, strengthen rural communities and provide a renewable source of energy. A one million gallon per year biodiesel facility is expected to create 10-12 jobs, infuse over $1.5 million into the local economy during construction and another $6 million in revenues each year--money and jobs that stay in the community, turning into more jobs and economic development through the multiplier effect.

IX. Partnerships

This team consists of CSU Cooperative Extension personnel, iCAST, RMFU and local economic development, resource conservation and farming organizations in rural Colorado.

Robert Mailander, Rocky Mountain Farmers Union, 5655 S Yosemite St, Suite 400, Greenwood Village, CO 80111, 303-752-5800, center.director@co-ops.org

Patricia Vice, Lincoln County Economic Development Corporation, 790 Main St, Limon, CO 80828, 719-775-9070, lcedc@netecin.net

Janet Frederick, Kiowa County Economic Development Foundation, PO Box 250, Eads, CO 81036, 719-438-2200, KCEDF@kcedf.org

Jim Ehrlich, Colorado Potato Administrative Committee, PO Box 348, Monte Vista, CO 81144, 719-852-3322, jehrlich@coloradopotato.org

Leon Zimbelton, Colorado Sunflower Growers, 303-435-7951, pvfarms@rtebb.net

Jim Rubingh, Colorado Department of Agriculture, 700 Kipling Street, Suite 4000, Lakewood, CO 80215, 303-239-4114, jimrubingh@at.state.co.us

Jim Mietz, San Luis Valley RC&D, 2205 State Ave, Alamosa, CO 81102, 719-589-5661, james.mietz@co.usda.gov

Jeff Kostar, East Colorado RC&D, 318 5th St, Hugo, CO, 80821, 719-743-2408, Jeffery.kostar@co.usda.gov
XI. Evaluation Plan to Document Outcomes/Impacts
The success of this project will be evaluated based on the following criteria:

- Completion of tasks in the allocated time and budget.
- Number of rural communities and farmers participating in outreach activities, including those participating in workshops.
- Commitment by communities to proceed with planning for a community-scale biodiesel facility as a result of project activities.
- Pollution prevention and other environmental benefits that result from the establishment of biodiesel facilities.
- The number of partners engaged in this project, including government, local community organizations and industry experts.
- The number of university students who are involved in the Service Learning opportunities this project will provide.
XII. Sustainability Statement
Upon completion of this project, both CSU Extension agents and iCAST will continue to work with communities in establishing biodiesel facilities. Funding for this effort will come from the community and entrepreneur plus federal and state grants that iCAST and CSU are applying for and expect to win approval. The partner organizations will use the experience gained through this project to evaluate outreach and demonstration strategies, improve these activities and replicate the outreach program in other communities. If the SID demonstration unit proves to be an effective tool in encouraging interest in community-scale biodiesel production (supported by appropriate outreach strategies and materials developed through this project), this model can be extended in partnership with other state and federal agencies such as the U.S. Department of Agriculture. As part of the final project report, a replication plan will be produced to serve as a manual in implementing these strategies in other regions. The primary metrics for the future success of the model developed through this project lie in its social, environmental and economic benefits achieved through the implementation of community-scale biodiesel facilities throughout Colorado.

As to the continued funding for this project, our partners, iCAST and RMFU will continue to fund the project. If successful, this project will further enhance the stature of CSU Extension Service amongst producers, potentially bringing additional projects and funding to CSU. Since this project is primarily an educational effort, there will not be any direct revenue generated.

Timeline:

<table>
<thead>
<tr>
<th>Project Activity</th>
<th>Months</th>
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<tbody>
<tr>
<td></td>
<td>1 - 4</td>
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<tr>
<td>Build the working prototype model</td>
<td></td>
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<td>Develop outreach materials</td>
<td></td>
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<tr>
<td>Plant and evaluate demonstration plots</td>
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<tr>
<td>Obtain feedback from pilot community outreach effort</td>
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<tr>
<td>Refine outreach materials</td>
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<tr>
<td>Conduct outreach on biodiesel opportunity</td>
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<tr>
<td>Develop plans for pilot community scale facility</td>
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<tr>
<td>Develop replication plans</td>
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**Budget:**

<table>
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<tr>
<th>Budget Category Activity</th>
<th>Year One</th>
<th>Year Two</th>
<th>Total Request</th>
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<tbody>
<tr>
<td><strong>Personnel</strong></td>
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<tr>
<td>Project Personnel &amp; Consultant Fees</td>
<td>$2,000</td>
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<td>$3,500</td>
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<td>Student Interns</td>
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<td><strong>Infrastructure, Equipment &amp; Supplies</strong></td>
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<tr>
<td>Brochures, Charts, &amp; other outreach</td>
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<tr>
<td>materials</td>
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<td>$1000</td>
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<tr>
<td>SID (working demonstration unit)</td>
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<tr>
<td>Establish &amp; evaluate demonstration plots</td>
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<td>$1,500</td>
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<tr>
<td><strong>Travel</strong></td>
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<td>Transportation, boarding &amp; lodging</td>
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<td>$2,500</td>
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<td>(2 persons for 2 days times 5 trips)</td>
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<tr>
<td><strong>Totals</strong></td>
<td>$7,500</td>
<td>$7,500</td>
<td>$15,000</td>
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**Funding Request and Budget Narrative (separate page)**

Our total funding request is $15,000 for the two year project.

**Year One would expend $7,500:**
- $3,000 for equipment purchases to construct the SID demonstration unit.
- $2,000 in project personnel & consultant fees (40 hours x $50/hour) to design and build the demonstration unit, develop the educational material content and manage the students.
- $1,000 in student intern costs (100 hours x $10/hour) in helping to design and build the demonstration unit and develop the educational material content.
- $1,500 for establishing and evaluating demonstration plots.

**Year two would expend $7,500:**
- $1,500 in project personnel & consultant fees (30 hours x $50/hour) to conduct the demonstration and outreach.
- $1,000 in student intern costs (100 hours x $10/hour) to help with the outreach effort.
- $1,000 for outreach materials to accompany the community demonstrations (printing brochures, posters, charts, handouts and adding content to appropriate partner websites).
- $2,500 in travel expenses (2 persons x 2 days x 5 trips) to implement the community demonstrations.
- $1,500 for establishing and evaluating demonstration plots.