
COLORADO COMMISSION ON
 **HIGHER
EDUCATION**

ACCESS TO HIGH-QUALITY, AFFORDABLE EDUCATION FOR ALL COLORADANS

TECHNOLOGY ADVANCEMENT GRANT
STATUS REPORT
AUGUST 2007

INTRODUCTION

Pursuant to C.R.S. §23-1-106.5(9)(d), the Colorado Commission on Higher Education is pleased to submit to the General Assembly a status report on the Technology Advancement Grant (TAG) program. This will be the final TAG status report from the CCHE since in the 2007 legislative session SB07-182 moved the program to the Colorado Department of Health and Environment effective July 1, 2007. This report summarizes the last round of grants from the TAG program that were awarded from October 2006 to March 2007.

TAG PROGRAM OVERVIEW

The Colorado Commission on Higher Education's Technology Advancement Grant (TAG) program is intended to fund research, development or technology transfer to develop or implement waste diversion or recycling strategies, including the use of waste tires. As well as other environmental research, development or technology transfer for materials or products of any kind. The funds are intended to help spur new innovation within these fields by utilizing Colorado's institutions of higher education and partnerships with the private sector.

Funds for the TAG program are available from the state's advance technology fund, which is financed by the waste tire recycling fee. Legislation passed by the General Assembly and signed by the Governor that went into effect on July 1, 2006, redefined the criteria for expending money from the advanced technology fund.

Prior to the 2006 legislation, grants from the advance technology fund financed a variety of projects across many different technological and scientific disciplines. However, under the 2006 statutory changes, the scope of the grants were changed to focus on waste diversion, recycling and research and development of environmental applications.

At the CCHE's October 2006 meeting, the Commission approved staff's policy, priorities, criteria, and request for proposals for the TAG program. Following approval, staff issued the request for proposals for the last round of the TAG program. Proposals were due by December 5, 2006. A total of 20 proposals were received totaling \$1,949,676 in funding requests. All proposals were reviewed separately three different times according to the same criteria. Staff from CCHE and the Colorado Department of Public Health and Environment reviewed each proposal once and the third review was based on field specific knowledge depending on the focus of the proposal from either, the Office of Economic Development, the Governor's Office of Policy and Initiatives, or various out of state university professors recommended by the National Science Foundation.

Each review evaluated proposals based on overall quality, technical innovation, viable results, ability to complete the project, benefits, and economic impact.

Specifically proposals were judged on the following criteria:

1. **Overall Quality:** *What is the overall quality of the proposal in regard to merit and importance of the proposed tasks? What are the strengths and weaknesses?*
2. **Technical Innovation:** *What is the degree of innovation and relevance to introducing useful technology transfer, research, or development to cited fields?*
3. **Viable Results:** *Does the proposal have a high potential for success beyond initial funding? Are proposed results attainable and useful?*
4. **Ability to Complete Proposed Project:** *Does proposal staff have a sufficient background and qualifications to complete the project?*
5. **Benefits and Economic Impact:** *Is there a potential for new industry, business opportunities or job growth for the State of Colorado? Is this project a worthwhile and efficient use of the TAG funding?*

To ensure that TAG funding was used to its greatest advantage and highest impact, the CCHE wanted to make sure that worthwhile projects which had a high potential of success were funded. Reviewers were asked to give an overall rating of each proposal based on the following scale: Excellent, Very Good, Good, Fair, or Poor. Proposal reviews were assigned a point score ranging from 3-15, with each review having the possibility to assign a total of 5 points for the highest rating. Proposals earning a score of 13 and above were funded.

PROPOSALS

Below are summaries of the 20 proposals that were submitted in. The proposals that were funded are listed first.

FUNDED Proposals

Proposal Number: 12050601

Title: “Viability of Engineered Fuel Briquettes from Biomass and Power Plant Waste Streams”

Principal Investigator: R. Malhotra

Organization: ICAST

Funding Request: \$58,000

Proposal Summary: Proposes to evaluate the viability of commercially manufacturing engineered fuel briquettes composed of 40% fly ash and 60% biomass waste. Project is expected to produce economic, environmental and community benefits. Briquettes have already been produced in the laboratory based on prior research conducted over three years from a partnership between iCAST and CSU-P, CU Boulder and CSU Fort Collins.

Proposal Number: 12050610

Title: “Three Waste-to Value Technologies for Sustainable Urban Infrastructure in Colorado”

Principal Investigator: A. Ramaswami

Organization: CU- Denver

Funding Request: \$155,000

Proposal Summary: Proposes three waste-to value technologies for urban sustainability in Colorado cities; high performance green concrete; zero waste and negative biodiesel processes; and converting organic municipal waste to energy. If the technologies were adopted they would make Colorado a leader in waste diversion and sustainability.

Proposal Number: 12050617

Title: “Durable Roof Tiles from a Fly-Ash/Tire Composite: Testing and Manufacturing Toward a Sustainable World”

Principal Investigator: P. Heyliger

Organization: CSU

Funding Request: \$113,126

Proposal Summary: Proposed project focuses on refining the development of “green composite roof tiles” consisting of structural composite combinations of fly ash, the by-product of coal combustion in power plants, and ground up used tires. The project will: refine composite mixtures to find the most durable tile; produce enough for a real life test against benchmark standards for concrete roof tiles; conduct cost analysis for various production scales; and create a marketing and overall commercial strategy.

Proposal Number: 12050618

Title: “Expansive Foundation Soils Stabilized with Waste Tire Rubber”

Principal Investigator: J. Carraro

Organization: CSU

Funding Request: \$128,913

Proposal Summary: Proposes to carry out original basic research to evaluate and demonstrate the feasibility of using waste tire rubber to reduce the swell potential of local expansive foundation soils from Colorado.

UNFUNDED Proposals

Proposal Number: 12050602

Title: “University/Industry Cooperative Membrane Research”

Principal Investigator: A. Greenberg

Organization: CU-Boulder

Funding Request: \$197,074

Proposal Summary: The Membrane Applied Science and Technology (MAST) Center and CU Boulder proposes five separate projects on membrane research: polymerization techniques to fabricate high capacity membranes; membrane processes for fractionation and recovery of lignins; micro sensors for detection of biofouling; separation of divalent and trivalent copper and iron species in liquid solutions; and organic carbon components.

Proposal Number: 12050603

Title: “Creating Engineered Structural Building Components from Oriented Strand Board that has been Diverted from Landfill Waste Stream”

Principal Investigator: W. Schmelzer

Organization: Green Giant LLC

Funding Request: \$86,600

Proposal Summary: Proposes to confirm that scrap oriented strand board (OSB) can be laminated into thicker boards and beams that are suitable for replacing new lumber in residential building. Commercial success in reusing OSB would divert tens of thousands of tons of waste from the waste stream as well as reduce the need for new lumber.

Proposal Number: 12050604

Title: “Green Water Reuse Investigation to Create New Colorado Jobs, Develop New Technologies, and Conserve Colorado Water”

Principal Investigator: J. Flobeck

Organization: Aqua Prima

Funding Request: \$98,000

Proposal Summary: Proposes to investigate individual county health requirements for green and gray water usage, then analyze these requirements and develop standards that all counties will agree on. Then take the company’s existing green water device and adapt it to the standards agreed on by counties and formulate a business plan to manufacture and market the devices across the West.

Proposal Number: 12050605

Title: “The Colorado Roadmap to Construction and Demolition Recycling and Reuse”

Principal Investigator: T. Plant

Organization: ReSource Conservation

Funding Request: \$65,175

Proposal Summary: Proposes to comprehensively analyze the construction and demolition waste stream and determine the most effective ways to manage and maximize diversion of that waste stream from the landfill for communities throughout the state. Project will examine model legislation and innovative procedures gathered from around the country and the world as well as potential market opportunities for waste products.

Proposal Number: 12050606

Title: “Development and Marketing of In-Situ Soil Mixing for Cleanup of Contaminated Soils and Reuse of Contaminated Lands”

Principal Investigator: T. Sale

Organization: CSU

Funding Request: \$148,440

Proposal Summary: The objective of this project is to broaden the scope and realize the full commercial potential of two environmental technology patents donated by DuPont to CSU, covering in situ admixing of waste zero valent iron and stabilizing agents for treatment of chlorinated solvents in subsurface settings. The net benefit of this technology is a dramatic reduction in future releases of contaminants to down-gradient groundwater.

Proposal Number: 12050607

Title: Web-Based Image Processing System for Environmental Resource management

Principal Investigator: L. Johnson

Organization: CU-Denver

Funding Request: \$148,945

Proposal Summary: Proposes to use web based image processing for utilization in enterprise spatial decision support systems. Project will harness satellite and data processing technology to provide distributed image processing to various organizations for environmental monitoring and removal of waste.

Proposal Number: 12050608

Title: “Construction Site Recycling; Model for Efficient Landfill Diversion and Industry Growth”

Principal Investigator: L. Skumatz

Organization: Econservation

Funding Request: \$24,790

Proposal Summary: Proposes to demonstrate successful recycling programs for the construction industry and communicate this information to private sector construction companies. The project will examine models of successful recycling programs, establish a pilot program and conclude with a manual of best practices for construction site managers and an analysis of future opportunities.

Proposal Number: 12050609

Title: “Development of High Durability Rubber-Modified Concrete”

Principal Investigator: Y. Xi

Organization: CU-Boulder

Funding Request: \$50,000

Proposal Summary: Proposes to use crumb rubber in concrete to enhance the ductility and toughness of concrete and reduce disposal of waste tires. The project will research rubber modified concrete to find the optimal mix and proper coupling agents to improve the long-term durability which could be used later on various projects such as roadways and bridges.

Proposal Number: 12050611

Title: “Promoting Rubberized Asphalt and Other Scrap Tire Products in Colorado”

Principal Investigator: R. Amme

Organization: DU

Funding Request: \$110,958

Proposal Summary: Proposes laboratory and field efforts relating to rubberized asphalt. The project will provide technical support for additional Terminal Blend rubberized asphalt as it is used in paving projects by monitoring roadway noise reduction and skid resistance. The project will also attempt to promote new asphalt rubber chip seal maintenance projects among C-DOT entities.

Proposal Number: 12050612

Title: “Development of an Inventory & User Matching Database to Support Colorado Recycling”

Principal Investigator: M. Griek

Organization: Colorado Assoc. of Recyclers

Funding Request: \$70,328

Proposal Summary: Proposes to develop and implement a system to collect, manage, and share baseline data on sources of recycled materials and potential users of these materials within the Colorado business community. The project will obtain tonnage of diverted waste materials that were processed and brokered in 2006 in the state and the tonnage that was exported creating the most complete record of the sources and uses of the state’s recyclable commodities.

Proposal Number: 12050613

Title: “Gap Analysis, Best Practices “Technologies” and Technology Transfer for Residential and Commercial Waste Diversion in the State of Colorado”

Principal Investigator: L. Skumatz

Organization: Econservation

Funding Request: \$46,830

Proposal Summary: Proposes to gather technical information on programs, tonnage, and demographics to identify current waste diversion levels, assess gaps in service, and analyze best practice programs and policy technologies within and outside the state. The project will also provide a practical toolkit for environmental or recycling coordinators to facilitate technology transfer on best practices.

Proposal Number: 12050614

Title: “Development of a Near Real-Time Technique for the Measurement of Carbonyl Compounds in the Atmosphere”

Principal Investigator: L. Anderson

Organization: CU-Denver

Funding Request: \$65,161

Proposal Summary: Proposes to design and construct a laboratory prototype for an automated, continuous system for sampling and analyzing carbonyl compounds in the ambient air. The goal is to develop and test a near real-time system that is capable of sub ppb detection of a broad series of carbonyl compounds. It is intended that this system will be an economically viable option as a replacement for cartridge sampling and laboratory analysis systems that are currently used.

Proposal Number: 12050615

Title: “Low Maintenance, Self-Cleaning Membranes for Water Reuse”

Principal Investigator: R. Wickramasinghe

Organization: CSU

Funding Request: \$92,241

Proposal Summary: Proposes a one year proof of principle research and development project which will result in the development of new low maintenance, self-cleaning nano-filtration and reverse osmosis membranes for water treatment. The project would focus on wastewater and water co-produced during oil and gas exploration.

Proposal Number: 12050616

Title: “A Biological Assessment Tool for Metal Toxicity – Ensuring Colorado’s Environmental Health”

Principal Investigator: T. Roane

Organization: CU-Denver

Funding Request: \$65,999

Proposal Summary: Proposes developing a bacterial indicator for environmental cadmium toxicity. Specifically, the study will take a soil-borne bacterium and investigate it for use in sensing cadmium toxicity. The long-term goal of the research is to create a marketable biosensor for environmental quality indication.

Proposal Number: 12050619

Title: “Building an Environmentally Sound and Sustainable Infrastructure for Electronics Recycling in Colorado”

Principal Investigator: M. Griek

Organization: Colorado Assoc. of Recyclers

Funding Request: \$75,513

Proposal Summary: Proposes to research Colorado’s e-scrap industry in order to determine what business and technology investments will best help it grow. Research and activities will look at access, current environmental health and safety practices, estimate the number of potential jobs, determine best practices, and expand re-use opportunities to bridge technology gaps.

Proposal Number: 12050620

Title: “Optimizing the Effluent from the Vertical Tube Reactor for Agricultural Application”

Principal Investigator: J. McGrew

Organization: Applied Science

Funding Request: \$148,601

Proposal Summary: Proposes to evaluate the environmental effect of direct field application of the reacted effluent from a Vertical Tube Reactor which employs air to oxidize the impurities in aqueous hog waste. The project will utilize a unique laboratory reactor to subject hog waste to different temperatures, pressures, and reaction times to produce different end products which will then be evaluated on plant growth in soil types found in Colorado.

CONCLUSION

The last round of the TAG program funded four proposals totaling \$455,039. The CCHE believes these projects will have a high rate of success and will fulfill the goals of the TAG program. With the passage of SB07-182, the TAG program has now been transferred to the Colorado Department of Public Health and Environment. CDPHE will continue to grant proposals according to the same statutory requirements. Given CDPHE’s departmental mission and the role and mission of the CCHE, this change is logical and a more efficient use of the program and funds.

SB07-182 also created a new Innovative Higher Education Research Authority whose aim will be to provide matching state funds for large federal research proposals from our state’s research universities. The new Innovative Research Authority and the TAG program under CDPHE will share the existing waste tire recycling fee funding stream 40% and 60% respectively. The CCHE believes this split satisfies the parties interested in the TAG money in the best manner and makes the most efficient use of the available funds.