Colorado
Office of Economic Development and International Trade

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ADVANCED INDUSTRY ACCELERATOR PROGRAM
PROGRAM UPDATE
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Legislative Report to House and Senate Finance Committees
Advanced Industry Accelerator Program
By the Colorado Office of Economic Development and International Trade

Advanced Industries (AI) are prime drivers of the U.S. and Colorado economies, comprised of engineering and R&D intensive companies that deliver products and services in industries ranging from aerospace to medical devices. Colorado's Advanced Industries include: Aerospace, Advanced Manufacturing, Bioscience, Electronics, Energy and Natural Resources including CleanTech, Infrastructure Engineering, and Technology and Information. The economic impact of these industries accounts for nearly 30% of the state's total wage earnings, nearly 30% of the total sales revenues across all industries within the state, and nearly 35% of the state's total exports.

The AI Accelerator Programs were created in 2013 to promote growth and sustainability in these industries by driving innovation, accelerating commercialization, encouraging public-private partnerships, increasing access to early-stage capital and creating a strong infrastructure that increases the state's capacity to be globally competitive.

As part of the statewide strategy to support these critical industries in their various phases of growth, OEDIT offers four types of grants and two global business programs. Four targeted grant types are available: Proof of Concept, Early-Stage Capital & Retention, Infrastructure Funding and AI Exports. A network of consultants and an export training program are also available as part of the AI Global Business Programs to support these industries as they strive for worldwide markets.

Infrastructure Grants

In order to align private industry and Colorado Research Institutions, Commercialization Infrastructure grants help fund Advanced Industry projects that substantially build or utilize existing infrastructure to support or enhance the commercialization of Advanced Industry products, assist Advanced Industry start-ups with mentoring or access to outside capital, or contribute to the development of an Advanced Industry workforce.

Infrastructure grants are used to assist in the implementation and execution of action items identified in Advanced Industry Strategic Plans, as developed through the Colorado Blueprint Key Industry Network initiatives. Infrastructure Grants may also be used to assist in the implementation of newly identified action items that are needed to accelerate such Advanced Industries.

In addition, infrastructure grants may also be used to leverage federal funding opportunities that address a specific need of an Advanced Industry.

Commercialization infrastructure funds have supported Colorado's involvement in three national manufacturing initiatives and two additional Colorado projects: development of a green energy

park in the San Luis Valley and an analysis and strategy development for Colorado's Advanced Industries.

Light Weight and Modern Materials Manufacturing is a supported initiative with the Colorado School of Mines (CSM). CSM is partnering with world-class US universities to create an institute that will focus on light weight and modern materials manufacturing innovation (LM3I). The state has committed up to $1 million of infrastructure funding annually over five years to facilitate and support Colorado's involvement in the manufacturing institute. CSM will be the lead institution focusing on "thermomechanical processing" which is a "heat and beat" process that produces lightweight materials that enable reduced weight of a product while maintaining performance, operational supportability, survivability and affordability. Such technology has broad application to military and defense (ships, tanks, etc), aerospace (rockets), bioscience (medical devices), energy (oil/gas pipes and transportation mediums), manufacturing (steel), and transportation and logistics (rail).

Digital Manufacturing and Digital Innovation is the application of computing and data analytics to improve manufacturing machines and factories. The Digital Lab for Manufacturing (Digital Lab) is an applied research institute that will both develop and demonstrate digital manufacturing technologies and deploy and commercialize these technologies across key manufacturing industries. University of Colorado will be the lead institution focusing on "cyber physical systems" which is a system of collaborating computational elements across various physical machines, including cyber security. Such technology has broad application to all Advanced Industries but because of use of classified intelligence and sensitive IP it is specifically applicable across military and defense, aerospace and bioscience. The state has committed up to $1 million of infrastructure funding annually over five years to facilitate and support Colorado's involvement in the manufacturing institute.

As part of the federal National Network for Manufacturing Innovation (NNMI) effort, the US Department of Energy released a funding opportunity for a Clean Energy Manufacturing Innovation Institute for Composites Materials and Structures Institute. In partnership with NREL and four other states, Colorado submitted a proposal for this manufacturing institute. The US Department of Energy has committed $70 Million in funding to the implementation of the winning proposal. Colorado has been selected as a finalist and the final decision is expected by the end of November. The state has committed up to $1 million of infrastructure funding annually over five years to facilitate and support Colorado's involvement in the manufacturing institute.

Proof of Concept Grants

Proof of Concept (POC) grants help fund research at Colorado Research Institutions with commercial applications. Grant funding is used to identify and pull technologies from research institutions where they were discovered and connect them to the private sector where they can be developed into commercialize-able products. These grants provide significant economic impact or competitive advantage for Colorado and the advanced industries by accelerating the pace of applied research and leading to the rapid commercialization of products and services. Grants support the commercialization of technologies at research institutions at two distinct stages

along the commercialization pathway: Pre-Commercial Research (Phase I) and Commercialization Preparation (Phase II). To date the program has awarded 21 grants to researchers at Colorado research institutions to bring their cutting-edge technologies closer to market. These grants are usually matched by funds from the technology transfer offices to allow the investigators to reach commercialization milestones.

Early- Stage Capital and Retention

Early-Stage Capital and Retention (ESCR) grants provide Early- Stage Development grants to support technology commercialization funding product development in preparation for a product launch; or the advancement of a product or technology to achieve a commercial milestone that significantly increases the company's value and stability, and better positions the company for follow-on investment - including SBIR, angel funding or venture capital. The resulting product or service must be manufactured or performed in Colorado.

Under the Early-Stage Capital and Retention Grant, 19 grants have helped Colorado companies further advance. Early-Stage Capital and Retention Grants allow early-stage businesses to complete commercial activity such as production, sales and distribution, and business growth. Funds can also be used for business start-up activities, market validation and pre-production prototypes.

The program's statute requires an allocation of at least 15% of the funds to Proof of Concept grants, 15% of the funds to Early-Stage Capital and Retention grants, and up to 15% of the funds to Commercialization Infrastructure. The table below summarizes all grants awarded by June 30, 2014.

Status	Program	Number	$ Awarded	$ Spent to date	$ Matched to date	Jobs Created	Jobs Retained	Companies Created	Follow-on Capital	Intellectual Property Advancements
	Proof of Concept	21	$1,567,169	$468,255	$517,166	3	4	N/A	N/A	N/A
Active Grants	Early Stage Capital and Retention	19	$4,943,883	$1,358,005	$9,887,766	12.5	22.25	N/A	$7,146,837	12 Patents
	Infrastructure	4	$4,100,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals		**44**	**$10,611,052**	**$1,826,260**	**$10,404,932**	**15.5**	**26.25**		**$7,146,837**	**12**

Approximately $10.7 million from the Advanced Industry Fund has been granted. The chart above shows returns realized during the grant term and those that continue to accrue as the technologies become closer to and actually enter the market-place. To date, the program successes include the creation of 15.5 new jobs and approximately 26.25 jobs retained. Additionally, these funds have helped the technologies acquire an additional $7.1 million dollars in grants and investments to further commercialize these advanced technologies.

Below is one successful story about an AI grantee and how the Advanced Industry Grant Program has provided critical gap funding to technologies in early development.

Steelhead Composites, Inc:

Since the awarding of the grant, Steelhead has made significant – and very exciting – progress in meeting their grant goals. Due in part to this grant, they made significant additions in terms of personnel, adding 7 new jobs, and they are therefore on track to have completed both (Commercializing tanks for compressed natural gas (CNG)) and (Design analysis of tanks and testing/certification of vessels by DOT/UN for on-road use) by the end of 2014.

This milestone is characterized by the manufacturing and successful testing of pressure vessels such that an independent auditor (Authorized Testing, based in Riverside CA) is expected to allow Steelhead Composites to sell CNG tanks to the natural gas vehicle market by allowing them to stamp their vessels with: ISO 11439, FMVSS and NGV2. These three certifications permit their vessels for on-road use in natural gas fueling systems in Europe (UN), Canada and the U.S. (DOT).

Steelhead Composites have been working alongside NREL to help create an ecosystem in Colorado for hydrogen vehicles. Andrew Coors, Steelhead's CEO, was nominated as a board member of the Colorado Hydrogen Coalition as a representative of the critical supply chain for the "hydrogen economy." Commercialization of hydrogen fuel cell vehicles is expected to be slow, but Steelhead is committed to being one of the few companies able to manufacture the vessels.

Forty projects were approved for funding in Fiscal Year 2013-2014. Total grant funds awarded to these projects exceed $10 million. The table summarizes these awards.

Program	Award $	Grantee	Research Institution	PI	Subject
ESC	$249,000	dbMEDx	n/a	N/A	Creating automated technology that allows any medical professional to provide a very high level of diagnostic measurements and diagnosis.
ESC	$500,000	Lightning Hybrids	CSU	N/A	LH makes a cost-effective hydraulic hybrid solution for fleet vehicles that uses regenerative braking to increase fuel economy and reduce emissions.
	$125,000	Membrane Protective Technologies, Inc (MPTI)		N/A	MPTI's GameteGuard is a technology that protects sperm during the freezing and thawing associated with artificial insemination.
ESC	$150,000	Prieto Battery, Inc	CSU	N/A	D Cu2Sb Anode: Prieto is developing a high performance anode product that is expected to deliver high volumetric energy density with the potential for high cycling capability, better than other anode compounds, i.e. graphite (the current industry standard),and silicon (Si).
ESC	$250,000	Solid Power, LLC	CU Boulder	N/A	Develop advanced rechargeable batteries for applications including aerospace, electric vehicles, utility grid storage and consumer electronics.
ESC	$500,000	Steelhead Composites	CSU & Mines	N/A	Steelhead is requesting grant funding to accelerate and expand our product offering to light-weight vessels for alternative fuels.
ESC	$499,883	Sunflower Corporation dbaSundolier, Inc	n/a	N/A	Sundolier offers a competitive skylight on steroids with a brain streaming the highest quality indirect daylight to large core spaces.
ESC	$250,000	VetDC, Inc	CSU	N/A	VDC-1101 is a novel drug being developed to treat canine lymphoma, one of the most common and deadly cancers affecting dogs and cats today.
ESC	$250,000	BASiC 3C		N/A	Resulting in smaller, lighter, efficient electric vehicle powertrains and more efficient components in the SmartGrid, our patented technology (HFCVD) delivers 3C-SiC substrates which enable price/performance leading devices operating at higher voltage, higher power, faster switching speeds, and elevated temperatures.
ESC	$250,000	Biota Technology		N/A	Biota Technology combines affordable DNA sequencing with breakthrough IT, developed by co-founder and CU Boulder professor Dr. Rob Knight, to solve industrial problems.
ESC	$250,000	EcoVapor Recovery Systems		N/A	ERS provides vapor recovery equipment that eliminates flared gas from oil tanks while delivering incremental revenue to customers from day 1.
ESC	$250,000	FitBionic, Inc	n/a	N/A	FitBionic , Inc. will include customer-requested functionality in our flagship prosthetic foot product, develop a sample foot that allows user-adjustability (and therefore eliminates the customer's need for large sets of samples with factory settings), and complete a cloud-based dashboard that allows our customers to monitor and report their patients' safety and activity levels.

ESC	$250,000	Red Canyon Software		N/A	Develop real time autonomous software that will enable future space vehicle missions beyond low-earth orbit (LEO) that involve long flight-time delays.
ESC	$45,000	aWhere, Inc	CSU	N/A	aWhere is transforming the way agriculture initiatives are managed and monitored through a globally accessible location intelligence platform and bio-climatic content.
ESC	$125,000	DH2i		N/A	DH2i is becoming one of the world's premier providers of server application virtualization software
ESC	$250,000	Mbio Diagnostics, Inc		N/A	MBio Diagnostics develops and commercializes revolutionary, inexpensive tests for human disease diagnosis, as well as food, veterinary and environmental testing.
ESC	$250,000	Prima-Temp, Inc		N/A	Prima-Temp, Inc. is a medical device company developing innovative temperature monitoring for early recognition of acute illness and natural pregnancy.
ESC	$250,000	Ravenbrick, LLC		N/A	RavenBrick manufactures RavenWindow, smart windows that automatically reduce unwanted heat and glare when temperatures are high, and allow light and warmth in when temperatures drop. This not only improves building and home comfort and reduces glare, but also dramatically reduces the demand on air conditioning and heating systems, saving both money and natural resources.
ESC	$250,000	Reference Technologies, Inc	CU	N/A	Reference Technologies designs an innovative solution to address the current limited flight duration of battery powered micro-Unmanned Aerial Systems air frames while increasing payload capacity and the ability to deploy mission specific payloads. Their Hummingbird Series UAS's have a flight duration from two to more than 7 hours, and payload capacities ranging from 10 to 50 pounds.
POC	$150,000	Colorado School of Mines - Wolden	CSM	Wolden	We have developed novel PECVD techniques that are amenable to large scale production of high quality films on transparent, flexible substrates instead of silicon wafers.
POC	$150,000	Colorado School of Mines - De Moor	CSM	De Moor	This project pertains to the development of advanced heavy haul rail steels. The project will investigate the effects of varying copper levels on microstructural development, mechanical properties such as hardness through the cross section, toughness and wear performance of heavy haul rail steels.
POC	$63,750	National Jewish Health	n/a	Meehan/Hoffman	The KneeTap™ is a medical device used to facilitate the aspiration of fluid from or the injection of medication into the joint space.
POC	$30,000	Colorado School of Mines	CSM	Lowe	Development of an energy absorbing device for sportswear to reduce trauma
POC	$65,000	Colorado State University Research Foundation TTO	CSU	Kota	Smart Membranes for Highly Energy Efficient Separation and Recovery of Bio-butanol
POC	$150,000	Colorado State University Research Foundation TTO	CSU	Kota	To develop an omniphobic coating that prevents wet-treated seed from adhering to fluidized bed dryer surfaces and a method of applying the coating on seed processing equipment.

POC	$59,958	Colorado State University Research Foundation TTO	CSU	Bandhauer	Thermal management of lithium-ion batteries using passive electrolyte evaporation
POC	$65,000	Colorado State University Research Foundation TTO	CSU	Chandrasekar/Venkatachalam	Concept Demonstration of Electronic Scan radar for Severe Weather Applications
POC	$60,000	Colorado State University Research Foundation TTO	CSU	Henry	Measuring Aqueous Metal Concentrations with the Chemometer
POC	$17,000	Colorado State University Research Foundation TTO	CSU	Williams	Audio-Lingual Interface
POC	$150,000	University of Colorado TTO	CU	Lee/Liew/Lewis	Flexible Thermal Ground Planes for Smartphones and Tablets
POC	$134,847	University of Colorado TTO	CU	Argrow	The TTwistor UAS will immediately fill a niche for high-performance small, electrically-powered UAS. There is currently great demand from agencies, particularly NOAA, to field UAS of this type to provide a cost-effective solution to increase observing capability, develop high science-return missions, and to make such operations routine.
POC	$92,340	University of Colorado TTO	CU	Olson	The project will provide a robust set of in vivo data in terms of safety, efficacy, and biocompatibility of the Wave mini-shunt device in an arena which currently has no direct competition
POC	$103,000	University of Colorado TTO	CU	Vinogradskiy	4DCT-Ventilation: A new lung function imaging modality for radiation therapy
POC	$88,900	University of Colorado TTO	CU	Wagner	The goal of this project is to test the potential therapeutic approach in the EAE model of MS and to perform the required toxicology studies for a new drug.
POC	$47,644	University of Colorado TTO	CU	Pellegrino	Make flexible, polymeric patterning films (FPPF) from commercially available, solvent processable polymers with high glass transition temperature (Tg) and high tensile modulus
POC	$49,730	University of Colorado TTO	CU	Newman	Ultrasonic System for Activity and Fall Monitoring
POC	$22,500	Colorado School of Mines - Boyes	CSM	Boyes	Polymer Modified Nanoparticles as Contrast Agents for the Non--invasive Measurement of pH in vivo
POC	$22,500	Colorado School of Mines - Liang	CSM	Liang	Virus-Mimicking Polymer Molecular Brushes as a Novel Family of Highly Potent Antimicrobial Agents
POC	$22,500	Colorado School of Mines - Voorhees	CSM	Voorhees	Proof-of-concept for Rapid Point-of-Care LFCC Detection of Serum Cancer Biomarkers
POC	$22,500	Colorado School of Mines - Yang	CSM	Yang	Development of Pre-lithiated Silicon Anodes for Next Generation Lithium Ion Batteries