



2022

IDAHO GLOBAL ENTREPRENEURIAL MISSION ANNUAL REPORT



IGEM



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WHAT IS IGEM?

The Idaho Global Entrepreneurial Mission (IGEM) is a unique program that invests public funds in advanced university research and capacity building to further economic development initiatives for the state.

The IGEM grant program uses a three-pronged approach to support a statewide entrepreneurial and commercialization pipeline to bring to market advances in industries vital to the state's economy. IGEM successfully advances important research projects, funding strategic research capacity investments and propelling innovations that position Idaho industries in new and profitable markets.

This annual report provides a succinct update on the IGEM program, its funded projects and successes over the past ten years.

IGEM-COMMERCE OVERVIEW

The IGEM-Commerce grant program funds research initiatives where university investigators and private

sector business experts partner together to bring viable technologies to market. IGEM-Commerce commercialization grants are a powerful economic resource. Through its support of commercialization partnerships, IGEM-Commerce invests in developing new business ventures, creating new products and high-value jobs, while supporting the research capacity of Idaho's universities.

At the helm of the IGEM-Commerce program is the IGEM Council, a twelve-member body appointed by the Governor as prescribed in Idaho Code section 67-4726.

The IGEM Council's diverse and experiential make-up consists of the brightest business, research, policy, strategy and financial minds in the state. The council thoroughly vets IGEM-Commerce grant proposals to mitigate risk and maximize the return on investment. The IGEM Council's fiscal stewardship and strategic direction advances IGEM's overall intended goal of economic prosperity through investments in technological advancements and innovation.

IGEM PROVIDES THREE DISTINCT FUNDING OPPORTUNITIES

\$1M

IGEM-COMMERCE

Managed by Idaho Commerce under the direction of the IGEM Council.

Funds research ventures where industry and university partnerships work together to bring viable products and technologies to market.

\$2M

IGEM-HERC

Managed by the State Board of Education (SBOE) and administered by the Higher Education Research Council (HERC).

Invests funds to support infrastructure and advance key capacities at Idaho's research universities.

\$2M

IGEM-CAES


Managed by the SBOE and administered by the Center for Advanced Energy Studies (CAES).

Leverages the partnerships between Idaho's three public research universities (Boise State University, Idaho State University and University of Idaho) and Idaho National Laboratory to fund advanced energy projects and initiatives.


IGEM-COMMERCE GRANT PROGRAM

With \$1 million in annual funding, Idaho Commerce awards \$950,000 in grants, utilizing \$50,000 for administration costs.

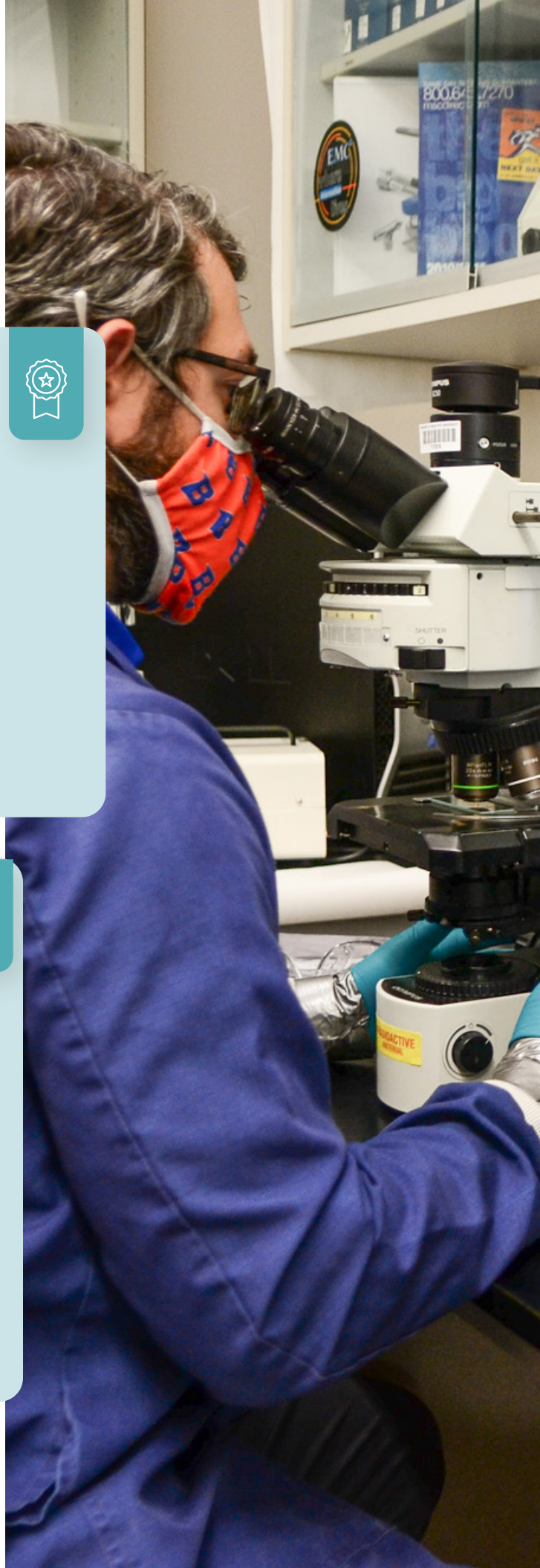
To date, IGEM-Commerce has funded 43 original projects and 8 supplemental grants, resulting in over \$10 million invested in university and industry research partnerships.



YEAR	APPS	FUNDED	REQUESTED	AWARDED
2022	17	8	\$3,272,611	\$1,289,693
2021	16	7	\$3,066,777	\$1,020,240
2020	19	4	\$4,991,353	\$953,711
2019	13	5	\$3,444,862	\$1,016,728
2018	14	3	\$5,375,198	\$950,000
2017	14	4	\$3,628,640	\$979,569
2016	18	6	\$4,149,029	\$1,104,830
2015	14	3	\$3,044,732	\$950,000
2014	20	4	\$3,506,145	\$972,371
2013	18	7	\$3,088,169	\$844,093
TOTAL	163	51	\$37,567,516	\$10,081,235



YEAR	AVERAGE REQUEST	AVERAGE AWARD
2022	\$192,507	\$161,211
2021	\$191,674	\$145,748
2020	\$262,703	\$238,428
2019	\$264,989	\$203,346
2018	\$383,943	\$316,667
2017	\$259,189	\$244,892
2016	\$230,502	\$184,138
2015	\$234,210	\$316,667
2014	\$175,307	\$243,093
2013	\$171,565	\$120,585
PROGRAM AVERAGES	\$231,898	\$197,671



10 YEARS OF IGEM

This year, IGEM celebrates a milestone: 10 years of innovation, facilitating private and public partnerships and elevating research capacities at Idaho's public universities.



ROI 1:1.5 - Conservative amount as some investments are undisclosed



The largest grant award was **\$427,173**

The smallest grant award was **\$46,146**



The average grant request was **nearly \$250,000**



The average grant award was **nearly \$200,000**



Total awarded over all 10 years is **\$10,081,235**



Total request over all 10 years is **\$37,567,516**



51 total projects funded



Received an average of **16 applications every year**





IGEM COUNCIL

The IGEM Council is a 12-member authoritative body appointed by the Governor to preside over the IGEM program. The council thoroughly vets IGEM grant proposals to mitigate risk and maximize the return on investment. The IGEM Council's fiscal stewardship and strategic direction advance IGEM's overall intended goal of economic prosperity through investments in technological advancements and innovation.

FY2022 MEMBERS

DR. DAVID HILL (CHAIR), STATE BOARD OF EDUCATION

RICK STOTT - SUPERIOR FARMS

DAMOND WATKINS - STELVIO STRATEGIES

JUAN CARLOS DUQUE - GALENA CAPITAL

DR. MARIANNE WALCK - IDAHO NATIONAL LABORATORY

DR. CHRISTOPHER NOMURA - UNIVERSITY OF IDAHO

DR. DONNA LYBECKER - IDAHO STATE UNIVERSITY

DR. NANCY GLENN - BOISE STATE UNIVERSITY

SENATOR KELLY ANTHON

REPRESENTATIVE PAUL AMADOR

TOM KEALEY - DIRECTOR, IDAHO COMMERCE

PHOTO COURTESY: UNIVERSITY OF IDAHO



IDAHO STRATEGIC RESOURCES WILL WORK WITH THE UNIVERSITY OF IDAHO TO DEVELOP NEW DRILLING AND EXTRACTION TECHNIQUES.

The company was asked to participate in the IGEM grant program by the University of Idaho (UI) and partner with them to develop new drilling and extraction techniques for rare earth elements.

The project will explore different techniques such as bioleaching, a process using leach tanks full of environmentally friendly biologic materials and agro-mining which is a process of genetically modifying plants to hyper-accumulate materials.

In addition to partnering with UI, the company also worked with Idaho National Laboratory, Idaho Geological Survey and the Center for Advanced Energy Studies, providing a cross-governmental collaboration unique from other projects.

Research is already underway and in addition to receiving an initial grant of \$348,241, UI also received a supplemental award of \$92,177.

"I think (the project) brought together a lot of people in the state of Idaho that otherwise would not be talking and the price tag and the value of that is many, many multiples of whatever the grant is," John Swallow said.

PRESTO GEOSYSTEMS

Utilizing geosynthetic materials as a pavement base is the goal of IGEM awardee Boise State University (BSU) and industry partner Presto Geosystems.

Presto Geosystems manufactures geosynthetic products such as Geocells, a soil stabilization system that is the product at the forefront of this research project.

BSU is partnering with Presto Geosystems to develop new methods of building pavement bases

IGEM SUCCESS STORIES IDAHO STRATEGIC RESOURCES

Mining has historically been a top industry in Idaho. With one of the best mineral endowments in the country for rare earth elements, it is no wonder that publicly traded and community-minded Idaho Strategic Resources has called Idaho home for decades.

The company is led by John Swallow, who joined the company eight years ago and works alongside his family and sons, Travis Swallow and Ryan Swallow. With family at the forefront, the company has over 50 employees, many of which include father and son teams like John, Travis and Ryan.

Headquartered in North Idaho, Idaho Strategic Resources is one of the few companies in Idaho that possesses rare earth element properties and gold production. The company's unique qualities made it stand out as a perfect candidate for the IGEM grant program.



PRESTO GEOSYSTEMS CREATES GEOSYNTHETIC PRODUCTS SUCH AS GEOCELLS (PICTURED).

PHOTO COURTESY: PRESTO GEOSYSTEMS



PHOTO COURTESY: HEMPITECTURE

RESEARCH CONDUCTED ON THE FIBER BATT INSULATION WILL TEST FOR FIRE RETARDANCY, THERMAL INSULATION AND NOW MOLD RESISTANCE.

using native soil and Geocells.

The project plans to reuse excavated material back into pavement construction as much as possible. By reusing the native soil, not only will it save money but also lessen environmental impacts from emissions and soil disposal.

After being approved for \$286,316 in IGEM funding, BSU has already begun conducting tests as part of this two-year project.

Mike Dickey, director at Presto Geosystems said that being able to partner with BSU has been a great opportunity for his company.

“For us, I mean, it is really about the opportunity to continue to fulfill our mission as innovators in the geosynthetics space and to work with thought leaders who are working to develop the next generation of construction techniques and technologies that are ultimately going to meet the world’s needs for more sustainable and resilient infrastructure,” Dickey said.

HEMPITECTURE

Since receiving not one, but two IGEM grants, the University of Idaho (UI) and industry partner Hempitecture have hit many milestones over the last year.

Hempitecture manufactures plant-based building materials utilizing the husk of hemp stalks to produce building products such as HempWool.

Since receiving the initial \$206,624 grant award, the focus of the university’s research has been testing the fire retardancy and thermal insulation of HempWool. UI’s Integrated Design Lab (UI IDL), located in Boise, focused on the thermal resistance analysis whereas the Moscow team focused on the fire-retardant research.

Recently, the team hit a milestone regarding its fire retardancy tests, receiving a Class A ranking, the highest ranking on a litmus test for fire retardant materials.

Additionally, through this partnership with UI, the school was able to purchase a thermal testing apparatus, which will be a new piece of equipment for UI IDL.

With the new testing apparatus, the company was able to gain more insight into the thermal resistance of HempWool.

To support this important research, UI was awarded a supplemental grant for \$106,175. This supplemental grant will support the research of antimicrobial and mold-resistant properties of the insulation and provide a carbon footprint analysis.

In addition to making strides in research, the company also had a monumental year in acquiring funding, raising \$4.7 million in its first crowdfunding seed round, bringing together 1,800 people.

The company’s manufacturing facility is well underway and will commission the line shortly to begin production of insulation products in Idaho.

Hempitecture’s team will also be growing, doubling its staff by the end of this year to nearly 12 employees.

“We are really thankful for Idaho Commerce and its support,” Hempitecture founder Mattie Mead said. “We get to continue our research into the future, which is exciting because that affords us the opportunity to take this research and bring it to the industrial real-world full-scale level. It has been a great year of working with the team and I feel like we are actually picking up momentum and inertia moving forward.”

IGEM-COMMERCE COMPLETED PROJECTS



LEARN MORE ABOUT IGEN-COMMERCE
COMPLETED PROJECTS AT
IGEM.IDAHO.GOV/COMPLETED-PROJECTS/

YEAR	SCHOOL	PROJECT	AWARD
2020	UI	Free To Feed Food Allergen Test Kit For Human Milk	\$255,496
2019	UI	Convert Agricultural Waste Into An Effective Nematode Suppressing Food And Fertilizer	\$241,667
2019	BSU	Development In Optimizing Laser Metal Deposition Additive Manufacturing Techniques	\$274,167
2019 - 21	BSU	Development Of A Scalable Manufacturing Process For On Chip Color Tunable Lasers	\$291,125
2019	ISU	Washie Sanitizing Toilet Seat	\$82,792
2019	ISU	ARPRI: Augmented Reality Platform For Robotic Systems Design And Interaction	\$162,606
2018	BSU	General-Purpose Goniometer	\$368,772
2018	UI	Modeling And Design Of Borated Aluminum Cask For Used Fuel Cooling	\$237,898
2018	BSU	MSM Micro-Pump	\$343,330
2017	ISU	HOPlite Skate Armor Testing	\$111,453
2017	BSU	Flexible Sensors Assisted Miniaturized Air Scrubber For Protecting Stored Potatoes	\$413,681
2017	BSU	Time-Of-Flight Spectroscopic Reflectometer	\$260,435
2017	BSU	Remote Sensing Of Alfalfa Seed Crop Bloom	\$194,000
2016	UI	6,000 Watt Split Phased Gallium Nitride High Frequency Inverter	\$178,178
2016	UI	Technology Development For Efficient Provision Of UAS Products	\$161,524
2016	BSU	Evaluation Of The Ankle Roll Guard's Effectiveness To Improve Clinical Benefit	\$148,927
2016	BSU	Sensor Adapter For Enhanced M2M Integration	\$211,098
2016	UI	Smart Raised Pavement Marking Integration With Traffic Signal Control Systems	\$299,651
2016	UI	Licensing And Commercialization Of A Live Attenuated Aquaculture Vaccine	\$105,452
2015	BSU	Precision Ag-Increasing Crop Yields Using Internet Of Things & Data Science	\$343,072
2015	ISU	Expanding Precision Agriculture Market Opportunities With UAS Sensors	\$179,755
2015	UI	N-E-W Tech: Innovation At The Nutrient, Energy, Water Nexus	\$427,173
2014	BSU	Innovative Surfactant Strategies: Sustainable Recycling And New Manufacturing	\$265,000
2014	ISU	RISE Analytical Services	\$300,000
2014	UI	2E-Hexenal: The Future Of Potato Disease Control In Storage	\$296,917
2014	BSU	Preclinical Testing Of Hip Resurfacing Technology	\$110,454
2013	BSU	Preparation And Preclinical Testing Of DNA-Modifying Anticancer Agents	\$80,986
2013	ISU	Nanofabrication Infrastructure Support	\$250,000
2013	UI	High Speed Digital Package Measurement And Modeling For Next Generation Memory Modules	\$150,000
2013	UI	An Innovative Pesticide Application Technology System For Increasing The Effectiveness And Reducing Pesticide Off-Target Movement	\$46,146
2013	UI	A University-Industry Partnership To Determine The Commercial Viability Of Automated Qualitative Detection Of E.Coli O157:H7 Applicable At A Beef Processing Facility	\$78,076
2013	UI	Commercializing Newly Developed Aquatic Animal Health Products To Benefit Aquaculture Through Disease Reduction	\$124,021
2013	UI	Application Of Microbial Induced Calcite Precipitation To Improve The Strength And Engineering Characteristics Of Soils On A Field Scale	\$114,864

IGEM-COMMERCE FY2022 GRANT AWARDS



NOVEL PAVEMENT BASES USING GEOCELLS WITH MICP TREATED INFILLS

Boise State University
FY2022 Award Amount: \$286,316

Boise State University (BSU) and Presto Geosystems are working on utilizing a microbial-induced calcite precipitation (MICP) process to treat Geocells infilled with native soils. The project team will be combining the use of microbial-induced calcite precipitation (MICP) and Geocells in pavement bases. MICP is a bio-geochemical process that induces calcium carbonate precipitation within the native soils, eliminating the need to quarry aggregate as well as disposing of excavated native soil in nearby landfills.



WITH INDUSTRY PARTNER PRESTO GEOSYSTEMS, BOISE STATE UNIVERSITY WILL BE CONDUCTING RESEARCH TO DETERMINE NEW PAVEMENT METHODS.

UNIVERSITY PARTNER	AWARD	PROJECT
University of Idaho	\$348,241	Development of Idaho-Sourced Rare Earth Elements Drilling and Extraction
Boise State University	\$286,316	Novel Pavement Bases Using Geocells with MICP Treated Infills
Boise State University	\$160,357	Economic Benefit of PEF Treated Barley for Breweries
University of Idaho	\$150,204	Development of an Advanced Genomic Selection Tool for the U.S. Sheep Industry (Supplemental)
University of Idaho	\$106,175	Testing New Manufacturing Methods of Natural Fiber Insulation (Supplemental)
Boise State University	\$98,223	Novel Movement and Inspection System for Drones (Supplemental)
University of Idaho	\$92,177	Development of Idaho-Sourced Rare Earth Elements Drilling and Extraction (Supplemental)
Boise State University	\$48,000	Economic Benefit of PEF Treated Barley for Breweries (Supplemental)
TOTAL	\$1,289,693	



UNIVERSITY OF IDAHO STUDENTS CONDUCT TESTS ON THE THERMAL CONDUCTIVITY OF HEMPWOOL.

IGEM-COMMERCE FY2022 SUPPLEMENTAL AWARDS TESTING NEW MANUFACTURING METHODS OF NATURAL FIBER INSULATION

University of Idaho

FY2021 Award Amount: \$206,624

FY2022 Supplemental Award Amount: \$106,175

The University of Idaho Integrated Design Lab (UI IDL) and Hempitecture, are collaborating to research and develop new bio-based building products. These insulation products are derived from agricultural hemp fibers, which can be grown in Idaho.

UI IDL (a research branch of the College of Art and Architecture) is conducting pilot tests on thermal conductivity while researchers in the College of Natural Resources are testing product additives that will protect against fire and biodegradation.

With supplemental funding, the team will work to commission the manufacturing process and optimize the product by testing other bio-based additives to further increase the insulation value and flame resistance of the product. The team will build upon their current findings as Hempitecture's production line begins in earnest this next year.

DEVELOPMENT OF AN ADVANCED GENOMIC SELECTION TOOL FOR THE U.S. SHEEP INDUSTRY

University of Idaho

FY2020 Award Amount: \$251,114

FY2021 Supplemental Award Amount: \$96,530

FY2022 Supplemental Award Amount: \$150,204

In FY2020, the University of Idaho (UI) and industry partner RILE Ag, received an IGEN-Commerce grant to advance a new genomic selection tool for the U.S. sheep industry.

The genome research will provide better tools and data for sheep ranchers and processors at a lower cost by changing genotyping assay platform to sequencing technology. In addition to being less expensive, this sequencing platform is also more flexible.

In FY2021, the project team received a supplemental grant, allowing the group to continue increasing the number of relevant genetic disease traits to increase the utility of the panel. The identification of the causative markers for these genetic diseases will be extremely valuable to the sheep industry.

The grant has enabled RILE Ag to increase engagement with producers, extension specialists and industry stakeholders.



RESEARCH CONDUCTED BY UNIVERSITY OF IDAHO STUDENTS WILL ADVANCE A NEW GENOMIC SELECTION TOOL.



WITH CONTINUED RESEARCH AND TESTING, PITCH AERONAUTICS CONTINUES TO MAKE ADVANCES ON ITS DRONE.

NOVEL MOVEMENT AND INSPECTION SYSTEM FOR DRONES

Boise State University

FY2020 Grant Amount: \$248,083

FY2021 Supplemental Award Amount: \$49,011

FY2022 Supplemental Award Amount: \$98,223

Boise State University (BSU) and industry partner, Pitch Aeronautics Inc., are collaborating on building a drone for up-close and robotic inspection tasks in tandem with an active thermography sensor to detect subsurface defects in concrete.

The grant provided support to build and test both the drone and the thermography payload.

A supplemental grant in FY2021 allowed the team to pursue real-world testing of the active thermography sensor and the drone with potential customers, including the Ada County Highway District and Idaho Transportation Department, and collect feedback for future designs

In FY2022, the team received an additional supplemental grant to continue advancing the drone capabilities.

With these funds, the team will finish the development of an additional sensor for crack-width measurement and design a computer vision positioning system using cameras to navigate instead of GPS. This will better enable the drone to perform its precise up-close tasks.

ECONOMIC BENEFIT OF PEF TREATED BARLEY FOR BREWERIES

Boise State University

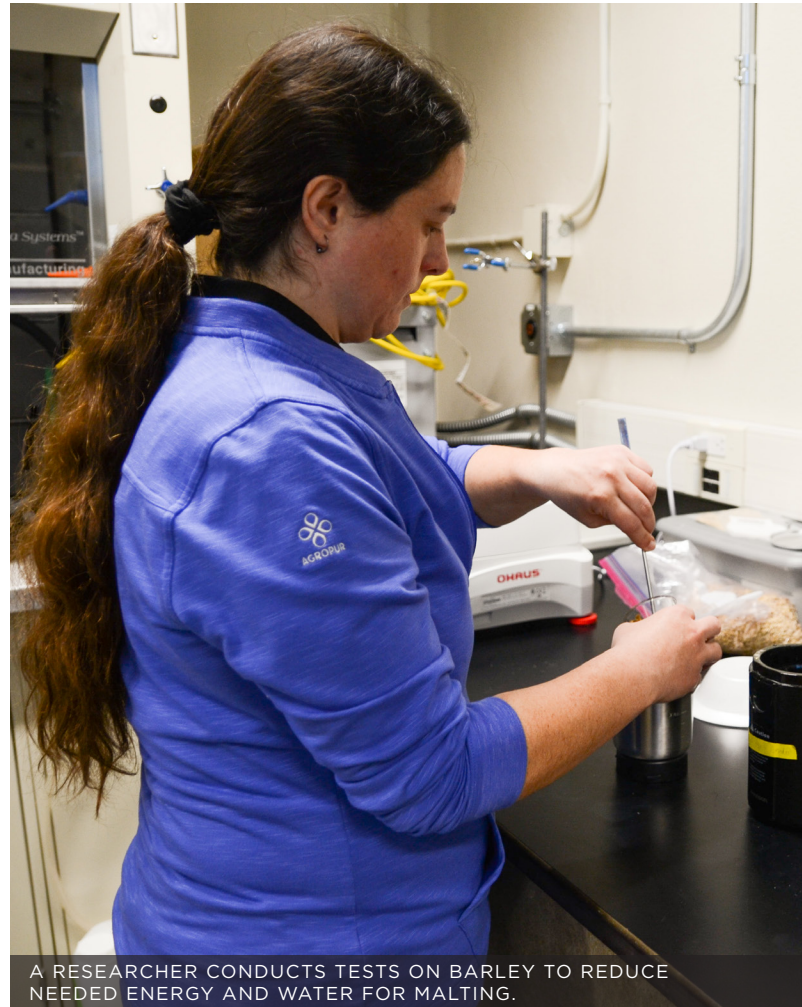
FY2022 Award Amount: \$160,357

FY2022 Supplemental Amount: \$48,000

Boise State University (BSU) along with industry partner, Anheuser-Busch, is working with the Food Physics Group to utilize Pulsed Electric Field (PEF) technology to treat barley for the purpose of reducing processing time and lessen energy and water consumption during malting.

Anheuser-Busch provided the barley for PEF treatment at the Food Physics Group applications lab in Boise. The initial lab scale trial was conducted at BSU, where the use of PEF was shown to accelerate the barley germination rates as well as reduce water and energy consumption.

Anheuser-Busch’s enthusiasm, generated from the lab scale results, led to an industry funded pilot scale study. The project received supplemental funding to support a full plant scale trial.



A RESEARCHER CONDUCTS TESTS ON BARLEY TO REDUCE NEEDED ENERGY AND WATER FOR MALTING.



UNIVERSITY OF IDAHO STUDENTS ARE CONDUCTING TESTS ON DRILLING AND EXTRACTION TECHNIQUES.

DEVELOPMENT OF IDAHO-SOURCED RARE EARTH ELEMENTS DRILLING AND EXTRACTION

University of Idaho Award

FY2022 Award Amount: \$348,241

FY2022 Supplemental Award: \$92,177

The University of Idaho (UI) and industry partner, Idaho Strategic Resources, are partnering with Idaho National Laboratory, Idaho Geological Survey and the Center for Advanced Energy Studies to advance Idaho-sourced rare earth elements (REEs) exploration for potential commercialization.

Idaho is endowed with an abundance of REEs and other critical minerals, but many of these hard rock mineral occurrences have not yet been developed into economic deposits.

This project mainly focuses on REEs novel drilling and extraction techniques.

UI and Idaho Strategic Resources are also set to develop the UI Renewable and Sustainable Manufacturing Lab (RSML).

IGEM-COMMERCE IN PROGRESS PROJECTS MULTI-PRINTER COMPATIBLE NANOPARTICLE INKS FOR ADVANCED MANUFACTURING METHODOLOGIES

Boise State University

FY2021 Award Amount: \$196,324

Boise State University (BSU) and Idaho-based start-up company, INFlex Labs are collaborating to research and develop new nanomaterial inks for printed electronic applications.

The project team aims to develop nanomaterial inks, including biocompatible materials like gold and platinum, for flexible hybrid electronics, to develop the next generation of low-cost, flexible, wearable electronics, health care sensors and more.



THE INFLEX LAB PROJECT WILL DEVELOP NANOMATERIAL INKS, LIKE THE ONE PICTURED.



A RESEARCHER CONDUCTS A CHEMICAL ANALYSIS ON POTATO CHIPS AS PART OF PEF POTATO PROJECT.

PEF POTATO PROCESSING ADVANTAGE

Boise State University

FY2021 Award Amount: \$291,770

Since being awarded a grant in FY2021, Boise State University (BSU) and Boise-based Food Physics Group have been working to showcase the benefits of Pulsed Electric Field (PEF) technology on potato chip production.

The research team is conducting experiments to explore the correlation between different PEF treatment conditions and the formation of acrylamides in potato chip processing. This research is aimed at developing a chip frying model that examines acrylamide formation and other key parameters such as moisture and oil content, color and texture to encourage the adoption of PEF technology to produce better quality food.

Plans for future research include testing the PEF system at local kettle style potato chip processing facilities like Roots Potato Chips and Teton Valley Brands.

IGEM-HERC FY2022 AWARDS

IGEM-HERC (Higher Education Research Council) funds are used to support Idaho public institutions of higher education research and development of projects that foster expertise, products and services resulting in state economic growth. Priority is granted to proposals that can show a strong collaborative effort among institutions, the private sector or exhibit high potential for near term technology transfer to the private sector. IGEM-HERC funded projects may receive funding for up to three years, contingent on annual review and satisfactory progress toward approved performance measures.

IGEM-HERC awards are granted through a competitive

process that is open to Boise State University (BSU), Idaho State University (ISU), the University of Idaho (UI) and Lewis and Clark State College (LCSC). The process incorporates an independent review of proposals and an evaluation component for identifying the project's success and economic benefit to the state.

LIBRARY OF RECONFIGURABLE IMMERSIVE ATTACK AND DEFEND SCENARIOS FOR CYBERSECURITY RESEARCH AND WORKFORCE DEVELOPMENT

University of Idaho

Award Amount: \$693,000

Cybersecurity is a significant component of Idaho universities' five-year strategic research plan for higher education. Idaho's economy depends on secure cyberspace and resilient industrial systems, and thus demands a larger highly skilled cybersecurity workforce.

The University of Idaho (UI) will be working on a game-changing capability for multi-disciplined research and workforce training.

This novel, immersive environment will integrate real physical processes, full-scale enterprise information technology systems and internet-scale cyberattacks on-demand to offer researchers, students and trainees a controlled live-fire environment like no other currently available.

The Reconfigurable Attack-Defend Instructional Computing Laboratory (RADICL) at the UI Idaho Falls Center for Higher Education (UIIF) will provide a hybrid virtual and physical environment of enterprise-scale information technology systems and bench-top physical process systems under digital control.

Combining the unique element of live adversarial activities including remote access malware, ransomware and advanced persistent threat agents, the team will create an immersive environment that is reconfigurable, redeployable and replayable.

The intent is to create an Adversary-as-a-Service offering with real-world physical systems and realistic simulated cyberattacks.



DR. OWEN MCDUGAL PRESENTS ON THE FOOD AND DAIRY INNOVATION CENTER.

THE CYBERDOME: AN INVESTMENT IN IDAHO'S FUTURE

Boise State University

Award Amount: \$700,000

The Idaho Global Entrepreneurial Mission Higher Education Research Council (IGEM-HERC) provided the first year of funding to the Institute for Pervasive Cybersecurity (IPC) at Boise State University (BSU) to build and establish the Cyberdome — a Security-as-a-Service oriented platform meant to leverage force-multiplying efforts of students to secure critical cyber and physical assets of rural and remote clients.

Following receipt of funding, the IPC successfully hired two full-time staff members.

Going forward, efforts will focus on reducing critical cybersecurity risks for State, Local, Tribal and Territorial (SLTT) clients and producing innovative research, tools and techniques to transfer to commercial efforts.



THE CYBERDOME IS MEANT TO SECURE CRITICAL CYBER AND PHYSICAL ASSETS OF RURAL AND REMOTE CLIENTS.

IGEM-HERC IN PROGRESS PROJECTS BOISE STATE UNIVERSITY FOOD AND DAIRY INNOVATION CENTER

Boise State University

Award Amount: \$684,000

The vision of this project is to create a Food and Dairy Innovation Center (FDIC) at Boise State University (BSU).

The FDIC will utilize science and technology to move beyond the current standards in the food and dairy sectors. This shift is required to spur change in Idaho's food and dairy processing industries.

The center will serve as a research core facility for regional academic institutions and industry. This project seeks to catalyze the modernization of Idaho's food and dairy processing industries by creating innovative technologies, providing food safety and food security training and educating the next generation of workers to be prepared to lead in a high-tech, artificial intelligence (AI) dominated work environment.



THE DISASTER RESPONSE COMPLEX PROVIDES RESEARCH, CERTIFICATION AND TRAINING FOR EMERGENCY PROVIDERS.

IGEM-HERC COMPLETED PROJECTS A DISASTER RESPONSE COMPLEX FOR EMERGENCY RESPONDERS IN IDAHO

Idaho State University
Award Amount: \$796,500

The Disaster Response Complex (DRC) at Idaho State University (ISU) is an outdoor facility that allows for various mock-emergency scenarios to be recreated. The DRC continues to offer various opportunities for training and exercise, curriculum and certification and research projects to various groups and entities.

The DRC has hosted a variety of events for the Forest Service, Bannock County, training collaborators, law enforcement, health professionals and Idaho's 101st Civil Support team. Additionally, the DRC also offered the first annual Disaster Preparedness and Response Conference in April of this year, with more than 75 attending.

The DRC and Bannock County have been collaborating in hopes of building a Regional Emergency Operations Center (REOC) based within the indoor DRC facility to serve the southeast region of Idaho. The DRC continues to grow its facilities, abilities and network to better serve the needs of the community.

CELLULOSIC 3D PRINTING OF MODULAR BUILDING ASSEMBLIES

University of Idaho
Award Amount: \$546,000

The objective of this University of Idaho (UI) research project is to identify the methodology, process and materials necessary to three-dimensional cold print (3D print) building assemblies utilizing wood residues.

The project was successful in developing a wood-resin formulation that was extrudable and suitable for additive manufacturing (AM).

In addition, a 3D printer platform was constructed, wood-resin panels were successfully printed and its performance was evaluated.

This project provided a springboard for attaining \$4 million in additive funding from the National Science Foundation to develop a fully bio-based AM platform.

The team has also been in discussion with the U.S. Department of Defense and the U.S. Department of Agriculture Forest Products Laboratory to attain funding for precommercial development of the technology and a demonstration project.



PHOTO COURTESY: UNIVERSITY OF IDAHO

A RESEARCHER CONDUCTS TESTS ON A 3D PRINTER.

IGEM-CAES

The Center for Advanced Energy Studies (CAES) is a research and education consortium between Boise State University (BSU), Idaho State University (ISU), the University of Idaho (UI) and Idaho National Laboratory (INL).

CAES UNIVERSITIES SIGN MOU FOR FULL ACCESS TO FALCON SUPERCOMPUTER

Researchers at Idaho's public research universities gained exclusive access to Idaho National Laboratory's (INL) Falcon supercomputer, one of the nation's fastest academic computers, thanks to an agreement signed in mid-January.

The memorandum of understanding between the universities and Battelle Energy Alliance, which operates INL, means that students and researchers from the universities have unfettered access to the computer, which will remain located at INL's Collaborative Computing Center. The arrangement also increases opportunities for collaboration between INL researchers and those at the universities.

NEW ADVANCED MANUFACTURING SUITE TAKES SHAPE AT CAES

Installation of equipment in CAES' newest laboratory,

the Advanced Manufacturing (AM) Suite, began in late 2021. The new suite boasts a 3D metal printer capable of printing structural nuclear materials and other advanced equipment.

The total investment is more than \$1.4 million in equipment and infrastructure to support materials development, printed sensors and structural additive manufacturing, which will complement Idaho National Laboratory's (INL) advanced manufacturing strategy, accelerate and support INL's research and development and help develop new partnerships with academia.

The equipment will be managed as a shared resource benefiting multiple mission areas at INL.

CAES LAUNCHES THIRD ANNUAL PITCH EVENT

CAES Annual Pitch Event "Pathways to INL Net Zero" was designed to help the CAES research community develop and hone the skills needed to effectively pitch technical ideas or solutions while helping Idaho National Laboratory accelerate its goal of becoming carbon neutral by 2031.

Researchers from all the CAES entities participated in the competition, which began in July 2021 with a call for ideas in three categories: projects that were

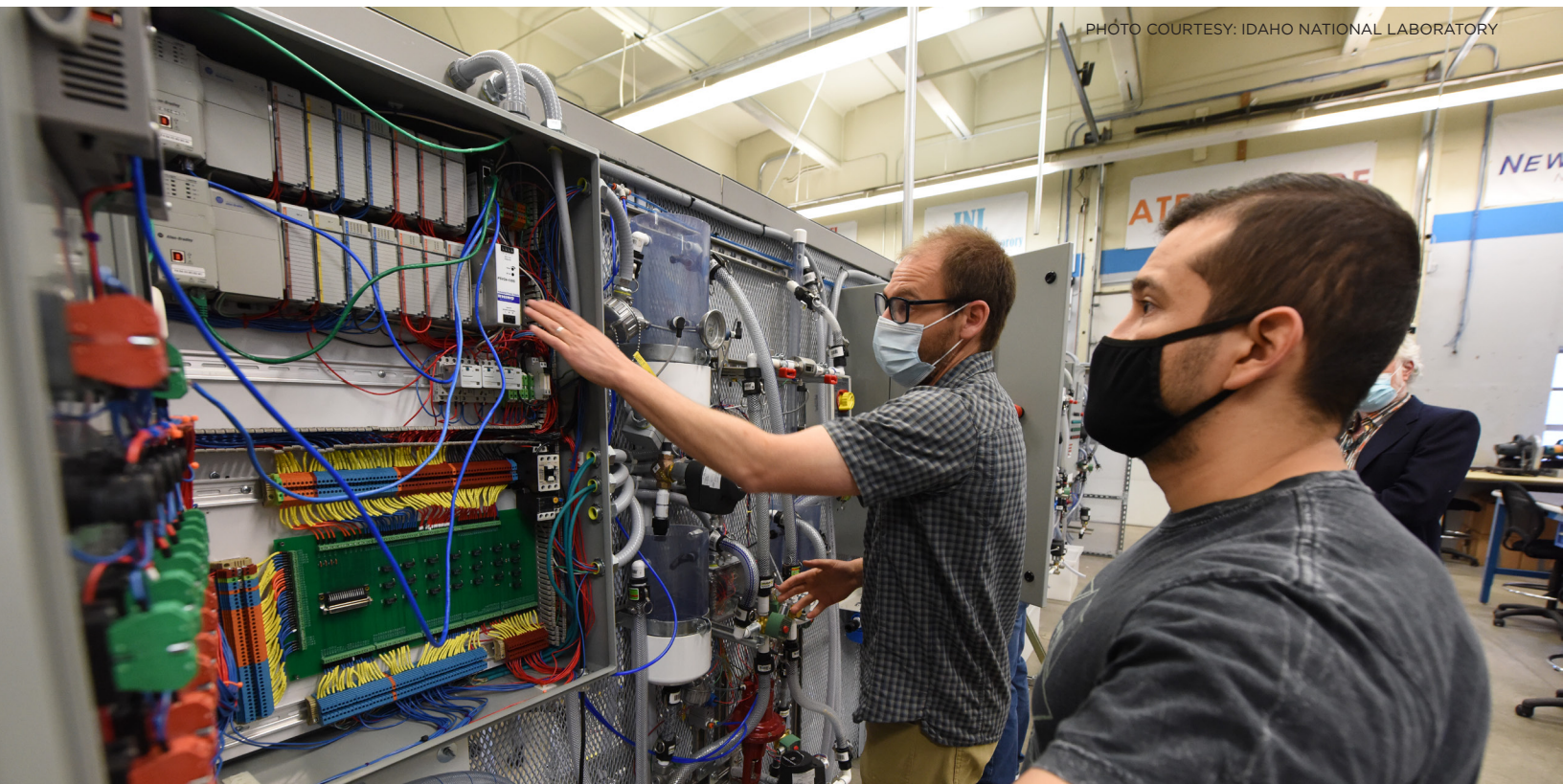


PHOTO COURTESY: IDAHO NATIONAL LABORATORY



CAES RECENTLY OFFERED A 10-WEEK RESEARCH PROGRAM FOR UNDERGRADUATE STUDENTS, GIVING THEM HANDS ON RESEARCH EXPERIENCES.

ready to implement today, demonstration-level projects that require development before implementation and an open submission category in which all ideas were welcome.

One winner was selected in each of the three categories. Each received \$15,000 in research funding to help further develop their idea, and the runners-up also received funding to help advance their ideas.

GRANT LEADS TO NSF SITE AT CAES

Ten students took part in the National Science Foundation Research Experience for Undergraduates (REU): Advanced Manufacturing for a Sustainable Energy Future at CAES.

Boise State University (BSU) received a \$365,000 grant to launch the REU site, allowing CAES to offer a 10-week summer research program for undergraduate students each year through 2024, giving the students hands-on research experiences and networking

opportunities to develop their STEM identity and literacy, while also providing professional development opportunities for careers in the energy sector.

CAES SUMMER VISITING FACULTY PROGRAM KICKED OFF

The CAES Summer Visiting Faculty Program kicked off its fifth year with nine INL researchers and six faculty members from the CAES universities.

The program pairs each faculty member with INL researchers to collaborate on a proposal submitted by the faculty member, with the goal of developing a joint-funded research proposal of value to both parties.

The program aligns with CAES' effort to build and sustain a research collaboration ecosystem and aims to foster inclusion and accessibility by facilitating networks between INL researchers and university faculty and their students.



CAES BY THE NUMBERS

3

\$3 million

State of Idaho investment in CAES.

5

\$5 million

Idaho National Laboratory (INL) investments in CAES.

95

95 intern positions at INL were filled by students from CAES-affiliated universities.

8

8 students from CAES-affiliated universities (Boise State University, Idaho State University and University of Idaho) worked in graduate fellowships at INL in FY2022.

6

6 students from CAES-affiliated universities began postdoctoral appointments at INL in FY2022.

285

285 INL employees took courses at Idaho's higher education institutions* in FY2022.

16

16 faculty members from the CAES-affiliated universities have joint appointments with INL.

7

7 INL interns from the CAES-affiliated universities in FY2022 transferred to either full-time positions or subcontract positions** at INL at the conclusion of their internship.

*Boise State University, Idaho State University, University of Idaho, College of Eastern Idaho and College of Western Idaho.

**Subcontract number could be larger.

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