Industrial Assessment Center
U.S. DEPARTMENT OF ENERGY

UCONN
SCHOOL OF ENGINEERING

University of New Haven
TAGLIATELA COLLEGE OF ENGINEERING

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy
ADVANCED MANUFACTURING OFFICE

Southern New England Industrial Assessment Center at the University of Connecticut and the University of New Haven

IAC Partners Meeting, February 23rd, 2022

Welcome

Emmanouil Anagnostou

Interim Associate Dean for Research & Industrial Partnerships and Interim Executive Director-UConn Tech Park

UCONN | RESEARCH

IPB| UCONN TECH PARK

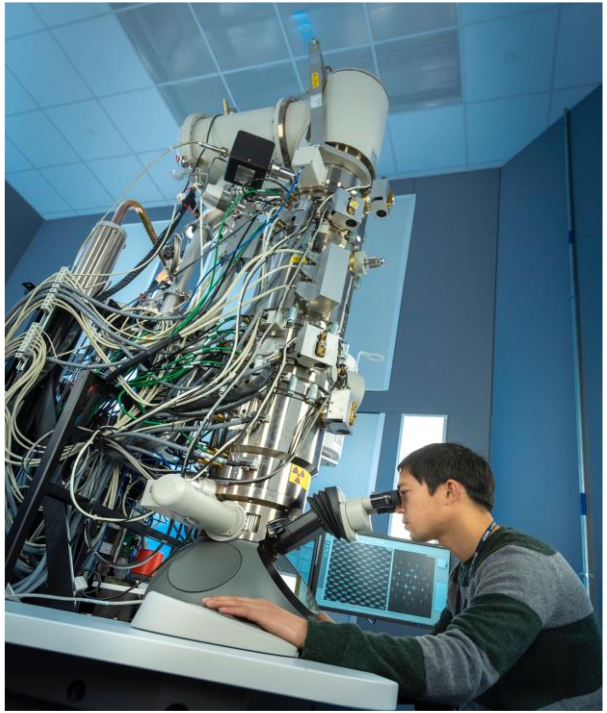
OVERVIEW

Emmanouil Anagnostou

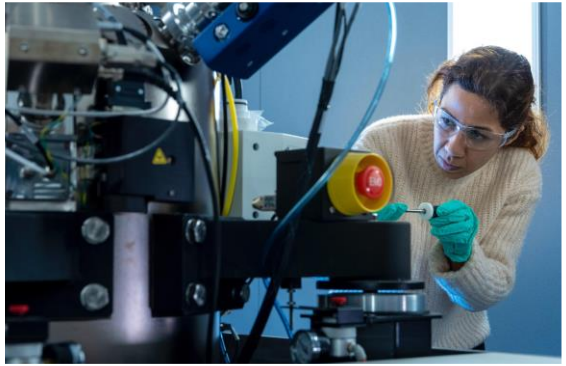
Executive Director, UConn Tech Park

Board of Trustees Distinguished Professor

INNOVATION
PARTNERSHIP
BUILDING



Electrocaloric device:



STATE OF THE ART EQUIPMENT

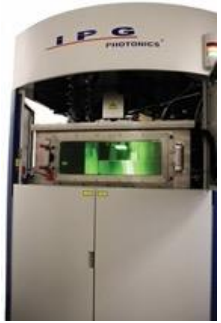
Xradia Versa 520

2 REVERSE ENGINEERING (X-RAY TOMOGRAPHY) MACHINES

Titan Themis ACEM

6 ELECTRON MICROSCOPES

IPG Photonics Metal Powder Test Bed



Stratasys Connex350

10 3D PRINTERS

ADDITIONAL EQUIPMENT:

- **2** X-Ray Characterization Machines
- **2** Optical and digital Microscopes
- **1** Robot/Automation
- **1** In-Situ Electron Microscope
- **1** Circuit Editing
- **1** Reverse Engineering
- **9** Water Filtration
- **3** High Speed Computation
- **1** RTDS power system testbe

6 FOCUSED ION BEAM MILLING SEMs

Orion Nanofab

Helios 460F1 Dual Beam

7 MANUFACTURING AND MATERIALS PROCESSING MACHINES

Haas CNC Mill

ICONIC CNC Router

Haas CNC Lathe

12 MATERIALS TESTING MACHINES

Gleeble 3500

Anton Paar Furnace Rheometer System FRS 1800

STRENGTHS

ENERGY

- Utility Companies
- Energy Storage
- Water Filtration
- Clean Energy
- Sustainability

CYBER

- Cybersecurity
- Hardware Assurance
- Cyber-physical Security
- Big Data
- Information Technology

MATERIALS

- Electron Microscopy
- X-Ray Tomography
- Custom Materials Design
- Aerospace Materials

MANUFACTURING

- Aerospace
- Naval
- Supply Chain
- Manufacturing Simulations

DATA SCIENCE

- Finance
- Insurance
- Engineering

AI/ROBOTICS

- Artificial Intelligence
- Robots
- Machine Learning
- Industry 4.0

UCONN TECH PARK – HOW WE WORK

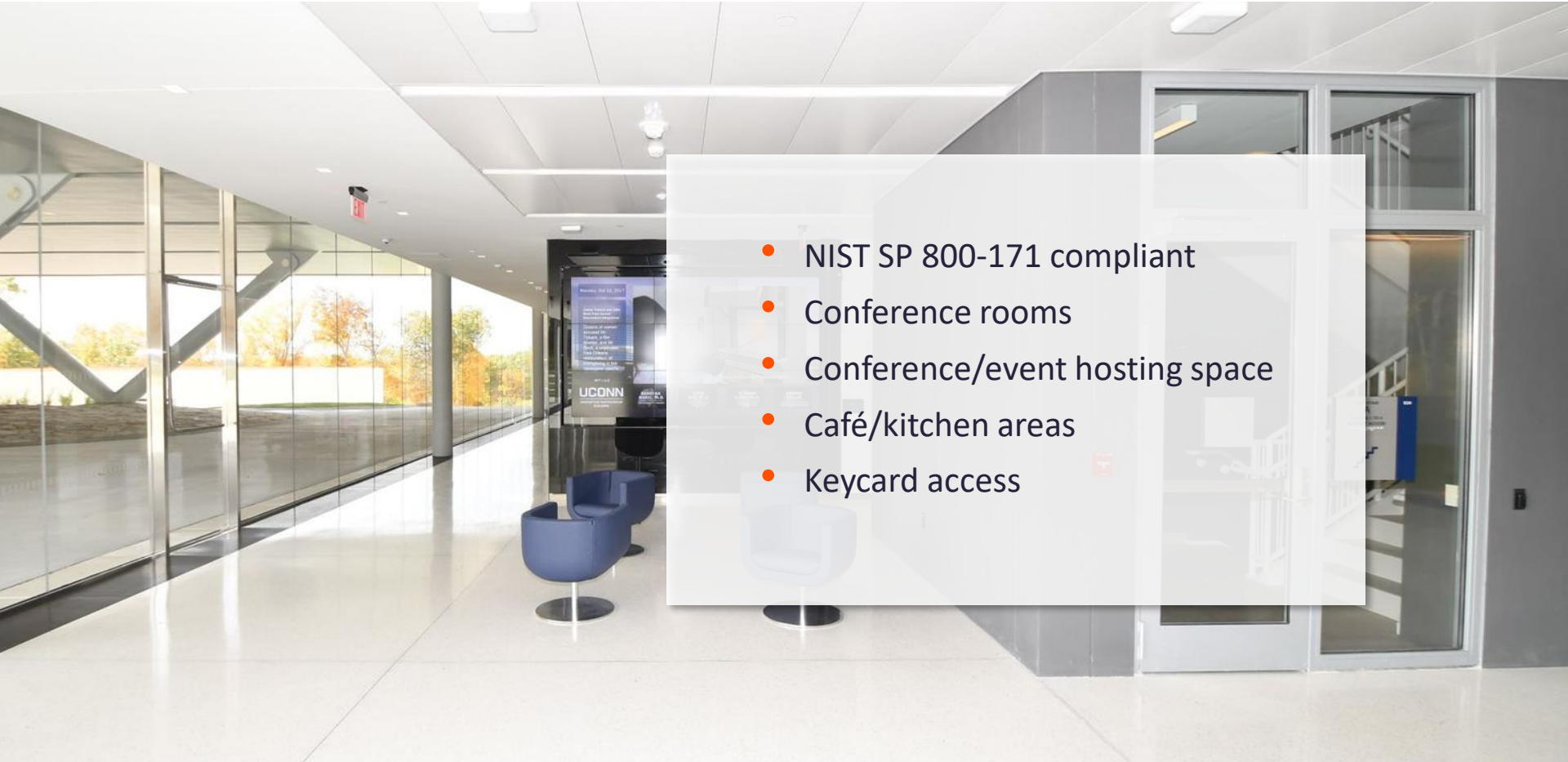
PARTNER WITH INDUSTRY

- Innovations that will define the future of their businesses
- Develop joint research grants
- Attract large corporations and SMEs in supply chain
- Shared equipment
- Advanced modeling
- Faculty expertise across disciplines

PARTNERSHIP OPPORTUNITIES

- Industry Contracts
- Joint Research Grants
- Internships for Students
- Scientific/Engineering Support
- Proof of Concept Space

UConn maintained facilities



- NIST SP 800-171 compliant
- Conference rooms
- Conference/event hosting space
- Café/kitchen areas
- Keycard access

FUNDING SUPPORT

$149M+ FROM INDUSTRY AND FEDERAL PARTNERS

UCONN TECH PARK

$7.5M
Pratt & Whitney Additive Manufacturing Center (PW AMC)

$25M
UCONN - Thermo Fisher Scientific Center for Advanced Microscopy and Materials Analysis (CAMMA)

ThermoFisher SCIENTIFIC

$2.2M
Collins Aerospace Center for Advanced Materials

Collins Aerospace

$7.5M
Comcast Center of Excellence for Security Innovation (CSI)

COMCAST

$31.5M
Eversource Energy Center

EVERSOURCE

$18.1M
Daedalus Air Force Advanced Manufacturing Initiative

PROJECT DAEDALUS
Air Force Advanced Manufacturing Initiative

AFRL

$24.2M
National Institute for Undersea Vehicle Technology

NATIONAL INSTITUTE FOR UNDERSEA VEHICLE TECHNOLOGY

ONR

$10M
Institute for Advanced Systems Engineering (IASE)

Raytheon Technologies

$9M
Reverse Engineering Fabrication Inspection & Non-destructive Evaluation (REFINE)

Refine

$3.2M
Synchrony Financial Center of Excellence in Cybersecurity

synchrony

$12.2M
Connecticut Center for Applied Separations Technologies (CCAST)

CCAST

TECH PARK RESEARCH PARTNERS

Pratt & Whitney
Dependable Engines

EVERSOURCE

Raytheon Technologies

NAVSEA
Naval Sea Systems Command
Naval Sea Logistics Center

The University of Rhode Island
College of Engineering

ThermoFisher Scientific

U.S. Air Force

AFRL
The Air Force Research Laboratory
Lead | Discover | Develop | Deliver

Department of the Navy
ONR
Science & Technology

National Institute for Undersea Vehicle Technology

Refine

Collins Aerospace

CAST
Connecticut Center for Applied Separations Technologies

synchrony

COMCAST

UCONN | RESEARCH

Innovation. Collaboration. Inspiring Great Ideas.

Today's agenda

Time	Program
11am – 12noon	Introduction to the Southern New England IAC
12noon – 12:20pm	Lunch Break
12:20pm – 12:35pm	Presentation: The United Illuminating Company: Small and Medium-Sized Industrial Customer Programs and Outreach.
12:35pm – 12:50pm	Presentation: Eversource Energy, CT: Small and Medium-Sized Industrial Customer Programs and Outreach.
12:50pm – 1:25pm	Open discussion: How can the IAC work with your organization?
1:25pm – 1:30pm	Closing remarks

Southern New England Industrial Assessment Center

Partnership, Program Overview, and Status Updates

IAC Partnership

CNG SCG UI
Part of the AVANGRID Family

EVERSOURCE

CONNECTICUT ENERGY ENVIRONMENT

Connecticut
Department of Economic and Community Development

CONNECTICUT GREEN BANK SM

CEAMA

MANUFACTURE
MAKE THE FUTURE

CT MRG
Connecticut Manufacturers Resource Group

NAVAL & MARITIME NMC CONSORTIUM

ACM
Aerospace Components Manufacturers

QUANTUM
BIOPOWER

DNV

Paul Lavoie

Chief Manufacturing Officer
State of Connecticut

Photograph by Mark Mirko | mmirko@courant.com (Mark Mirko/The Hartford Courant)

Ariel Vega

Office of U.S. Senator Chris Murphy
State Economic Development Director

External Partners

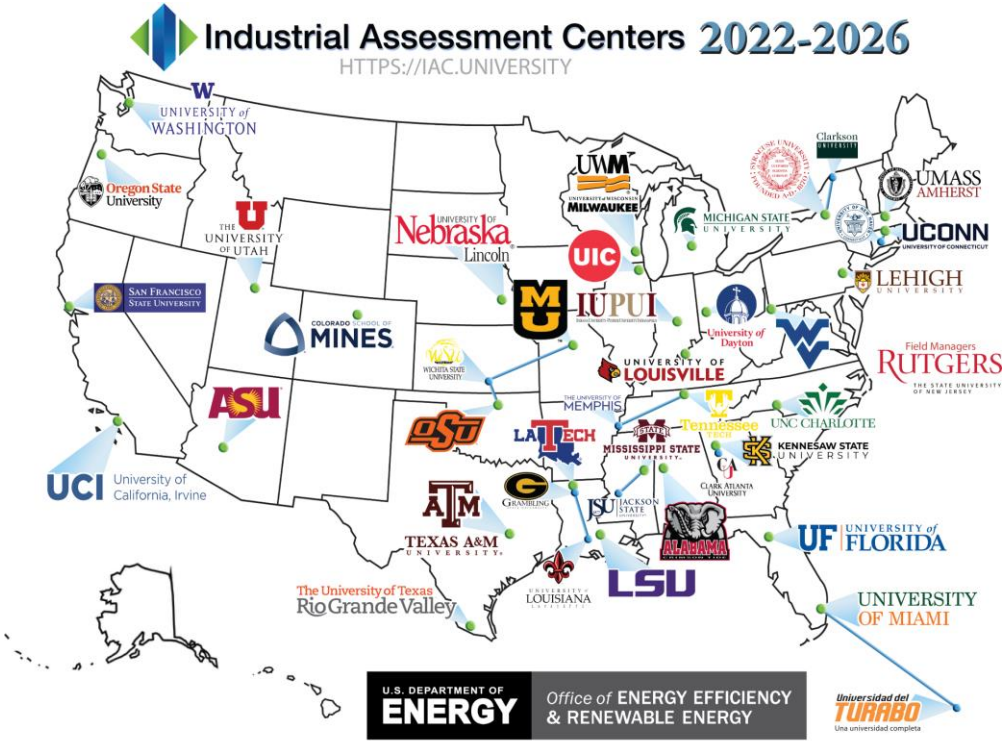
Name	Title/Organization	In-person	Online
Paul Lavoie	Chief Manufacturing Officer, Department of Economic and Community Development, State of Connecticut	✓	
Ariel Vega	Office of U.S. Senator Christopher Murphy State Economic Development Director	✓	
Todd Rossi	Associate Director, Center for Advanced Energy Systems, Rutgers University		✓
Peter Ludwig	Senior Manager, CT Green Bank		✓
Hammad Chaudhry	Senior Manager, Conservation & Load Management, UI-Avangrid	✓	
Sheri Borrelli	Senior Business Development Personnel, Avangrid		✓
Lawrence Rush	Manager, Residential CLM, Avangrid	✓	
Joel Kopylec	Manager, C&I CLM, Avangrid	✓	
Ron Araujo	Director, Energy Efficiency, Eversource	✓	
Ricky Jordan	Manager, Energy Efficiency, Eversource		✓
Alexandra Sopelak	Supervisor, Energy Efficiency, Eversource		✓
Jamison Scott	Executive Director, Manufacture CT		✓
Walker Potts	Executive Director, Naval and Maritime Consortium	✓	
Beth Devine	Chair, CT Manufacturers Resource Group (CTmrg)	✓	
Satyen Moray	Director, DNV	✓	
Kate Donatelli	Research Analyst, CT Department of Energy & Environmental Protection		✓

Internal Partners

Name	Title/Organization	In-person	Online
Kevin McLaughlin	Executive Director, Vergnano Institute for Inclusion, UCONN	✓	
Stephany Santos	Associate Director, Vergnano Institute for Inclusion, UCONN	✓	
Michael Accorsi	Emeritus, Senior Associate Dean and Professor, CEE, UCONN		✓
Joseph Luciani	Director, Proof of Concept Center (POCC) Director, Quiet Corner Innovation Cluster (QCIC), UCONN	✓	
Bill Kelly	BK Supply Chain Consulting LLC Connecticut Manufacturing Resource Center, UCONN	✓	
David Rodney	Principal - IDDS LLC Connecticut Manufacturing Resource Center, UCONN	✓	

Current National IAC Network

- Help small and medium sized US manufacturers save energy, improve productivity, and reduce waste by providing **no-cost technical assessments** conducted by university-based teams of engineering students and faculty.
- First time an IAC is awarded to universities in Connecticut.
- IAC Field Manager: Rutgers University



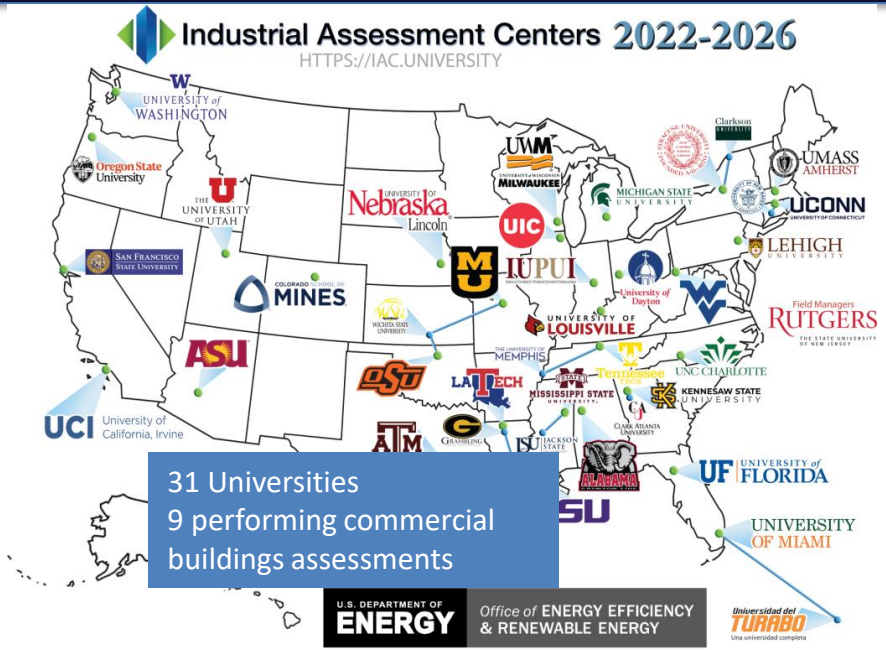
Industrial Assessment Centers (IAC)

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Dr. Todd Rossi
Rutgers University, Field Manager

IAC Program Overview

- Founded in 1976 after oil crisis
- Primary objectives
  - Help small-medium manufacturers save energy costs
  - Educate energy engineering students – firsthand experience
- Energy assessments in small-medium manufacturing plants by University faculty led teams of engineering students
- Additional roles
  - Production waste
  - Cybersecurity
  - Resiliency
  - Smart manufacturing
  - Energy management
- Achievements quantified and tracked for success



The IAC program has already conducted over 19,852 assessments with more than 149,008 associated recommendations. Average recommended yearly savings is $137,448.

Infrastructure Investment and Jobs

The Infrastructure Investment and Jobs Act included $550M activities over five years that called out the IACs (now IRACs) as implementors

Expand and enhance the IRAC program ($150M over 5 years)

- Increase the number and geographic reach of existing Centers
- Designate IRAC Centers of Excellence
- Include other academic institutions into the expanded IRAC program, including trade schools, community colleges, and union training programs
- Promote R&D for alternative energy sources for energy intensive industries
- Increase coordination with MEP centers, FEMP and BTO, DOE labs, and ESCOs
- Enhance stakeholder outreach
- Provide a clearinghouse for industrial process and energy efficiency technical assistance
- Pay the Federal share of associated internship and/or apprenticeship programs to implement the recommendations of industrial research and assessment centers

Infrastructure Investment and Jobs

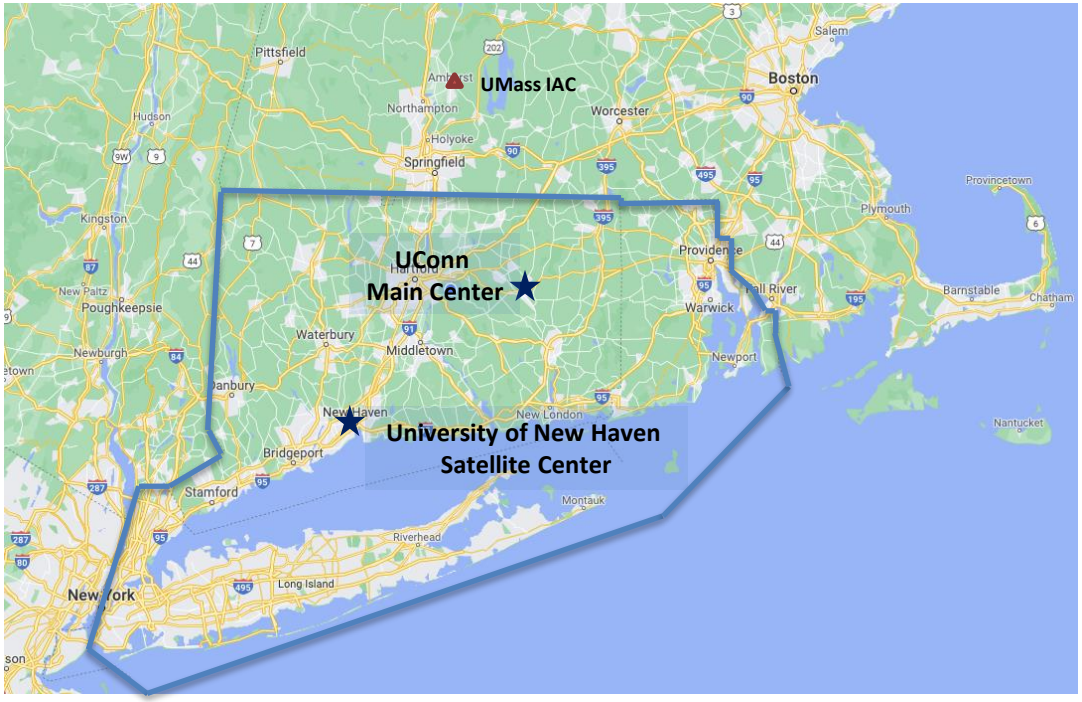
The Infrastructure Investment and Jobs Act included $550M activities over five years that called out the IACs (now IRACs) as implementors

Implementation Grants ($400M over 5 years)

- Establish a program to provide grants to eligible entities to implement covered projects
  - Have had an energy assessment completed by an IRAC
  - propose to carry out a covered project with a greater potential for (i) energy efficiency gains; or (ii) greenhouse gas emissions reductions.
  - The amount of a grant provided shall not exceed $300,000 (50 percent cost-share)
- Implementation details expected later this year
- Consider larger capital projects with paybacks of 4 years or more depending on client attractiveness – make shovel ready

Our Mission

- Coverage of service: Connecticut, Rhode Island, NYC, Long Island, etc.
- Workforce training and development
- Curriculum and education
  - New energy management course
  - New degree program
  - Senior design capstone projects
  - Research engagement
- With a focus on diversity, equity, inclusion (DEI)



Timeline

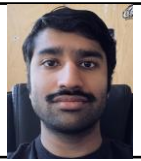
Goals/deliverables:

- 20 on-site assessments annually
- Including 2 wastewater treatment facility per year
- Recruit and train 10 students into the program every year
- Education for non-participating clients

Faculty Team

Main Center (UConn)		Satellite Center (U of New Haven)	
	Director Liang Zhang, PhD, Associate Professor Elec. and Comp. Engr. ,Liang.zhang@uconn.edu		**Director** Ravi Gorthala, PhD, Mech. Engineering RGorthala@newhaven.edu
	Director of Operations Amy Thompson, PhD, Associate Prof.-in-Residence Systems Engineering, amy.2.thompson@uconn.edu		**Affiliated Faculty Member** Nadiye Erdil, PhD, Associate Professor Ind. Engr., NErdil@newhaven.edu
	Affiliated Faculty Member Ugur Pasaogullari, PhD, Professor Mech. Engineering, ugur.pasaogullari@uconn.edu		**Affiliated Faculty Member** Ibrahim Baggili, PhD, Associate. Prof., Computer Science, IBaggili@newhaven.edu
	Affiliated Faculty Member Baikun, Li, PhD, Professor Civil and Environmental Engr., baikun.li@uconn.edu		**Affiliated Faculty Member** Mohamad Nassar, PhD, Assistant Professor Cyber Security, MNassar@newhaven.edu
	Affiliated Faculty Member Haitham Ghalwash, PhD, Assistant Prof.-in-Residence Comp. Science and Engr., haitham@uconn.edu		

Student and Staff Team

	Communication/Administration Coordinator Shruthi Nagaraj shruthi.nagaraj@uconn.edu		
	Student Lead Yishu Bai, Graduate Student Electrical and Computer Engineering		**Student Lead** Prathamesh Patil, Graduate Student Mechanical Engineering
	Student Assessor Colby Hoffman, Junior Management and Engr for Manufacturing		**Student Assessor** Mia Langston, Junior Chemical Engineering
	Student Assessor Alain Olhaberry, Senior Chemical Engineering		**Student Assessor** Julia De Oliveira, Senior Mechanical Engineering
	Student Assessor Amogh Garudadwajan, Sophomore Computer Science and Engineering		**Student Assessor** Nicholas Satta, Junior Electrical and Computer Engineering

Subject Matter Expert: Consultant to SNE-IAC

Satyen Moray Director, DNV

DNV, 2021 – Present

Energy & Resource Solutions, 2001 – 2021

University of Dayton IAC, 1999–2001
Performed assessments for more than fifty facilities to reduce energy consumption and waste creation and improve productivity.

Lab Space

UConn Engineering and Science Building

Equipment

Equipment

Temperature/Humidity Data Logger

IR Thermal Camera

IR Laser Temperature Gun

Light Meter

Ultrasonic Flow Meter

Anemometer

Current Transducer

Occupancy/Light Data Logger

Pressure/ Temperature Data Logger

Motor On/Off Data Logger

Combustion Analyzer

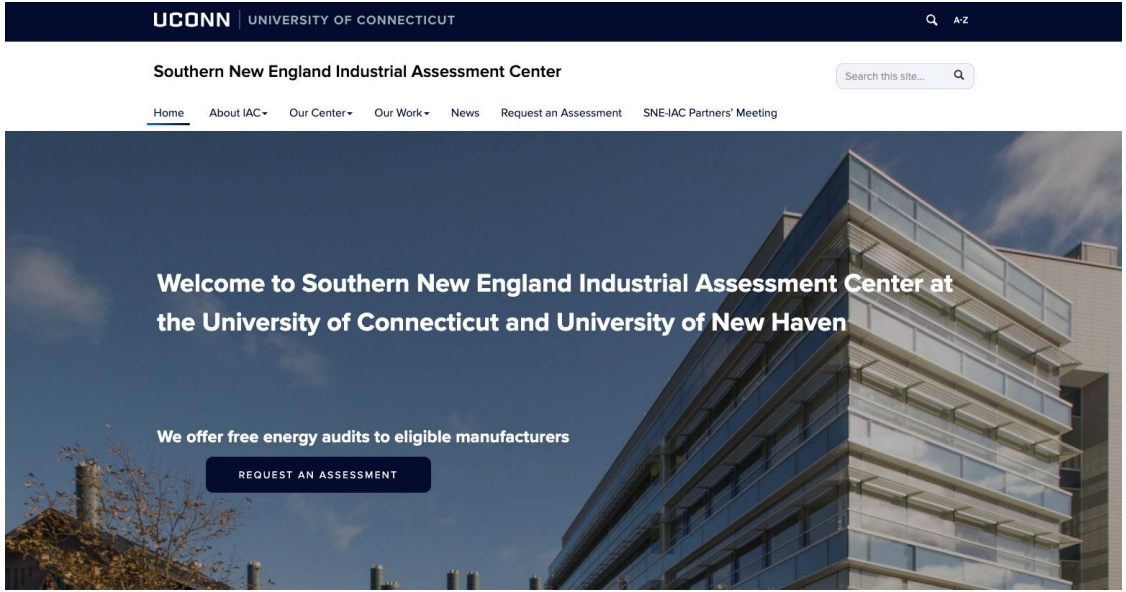
Air Tool Fittings

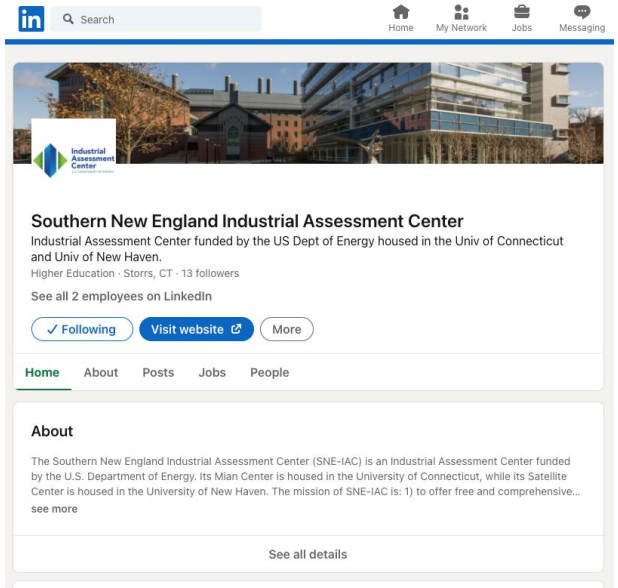
Ultrasonic leak Detector and Transmitter

3-Phase Digital Clamp Multimeter

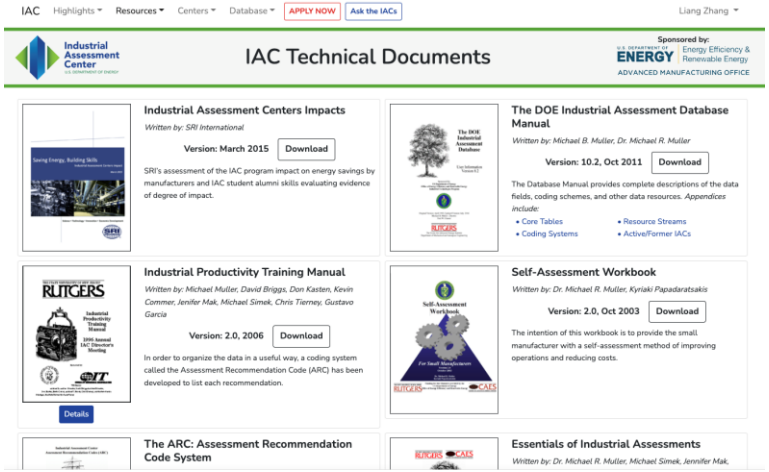
Power Clamp Meter

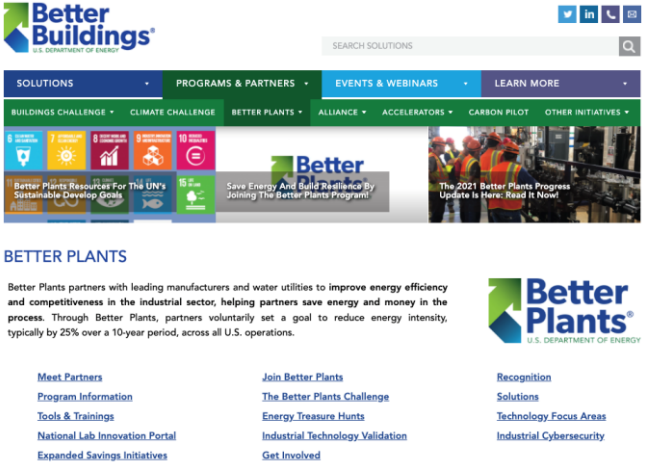
Website and Portals





Student Training



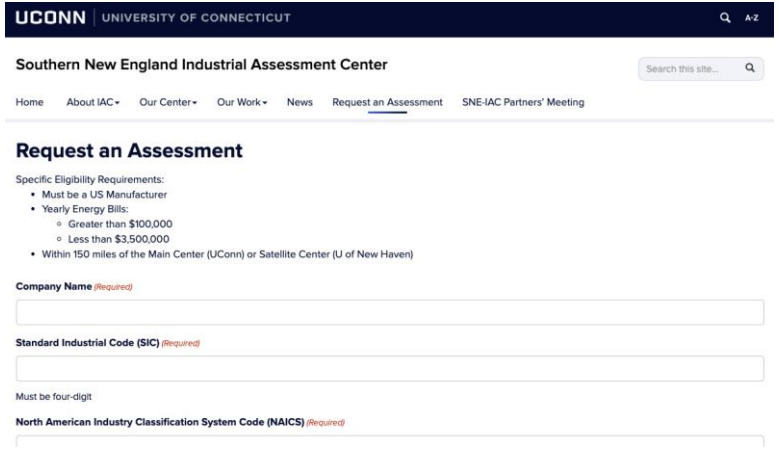


UConn 22MW Central Co-Gen/Chiller Facility

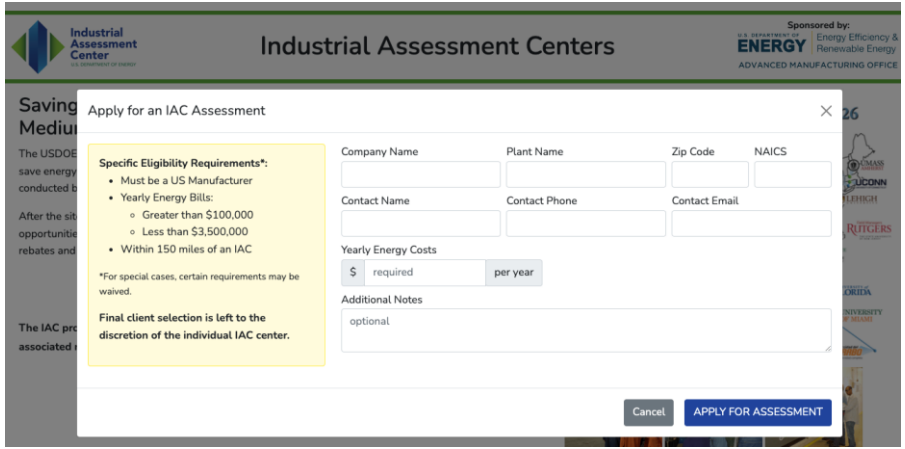
UConn Water Pollution Control Facility

Assessment

- Online request portals:



https://iac.uconn.edu



https://iac.university

Client Recruitment and Outreach

- Tradeshows:

- Outreach to wastewater treatment facilities via SmartBuilding CT, municipal benchmark program
- Outreach to local small/medium-sized manufacturers through Connecticut Manufacturing Resource Center (UConn)
- Collaboration with New England CHP Technical Assistance Partnership
- Collaboration with CT DEEP on potential energy audits for food and beverage sector
- Companies that have contacted us for assessment requests:

Diversity, Equity, and Inclusion

Work and Initiatives

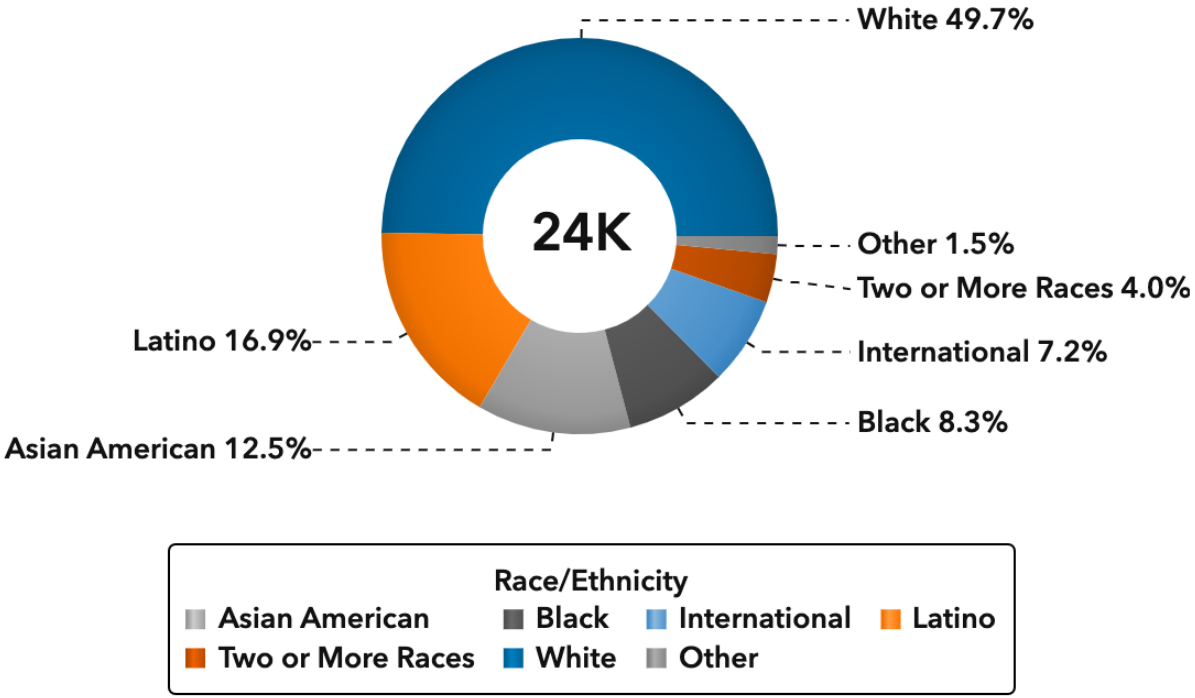
DEI Work and Initiatives

UCONN

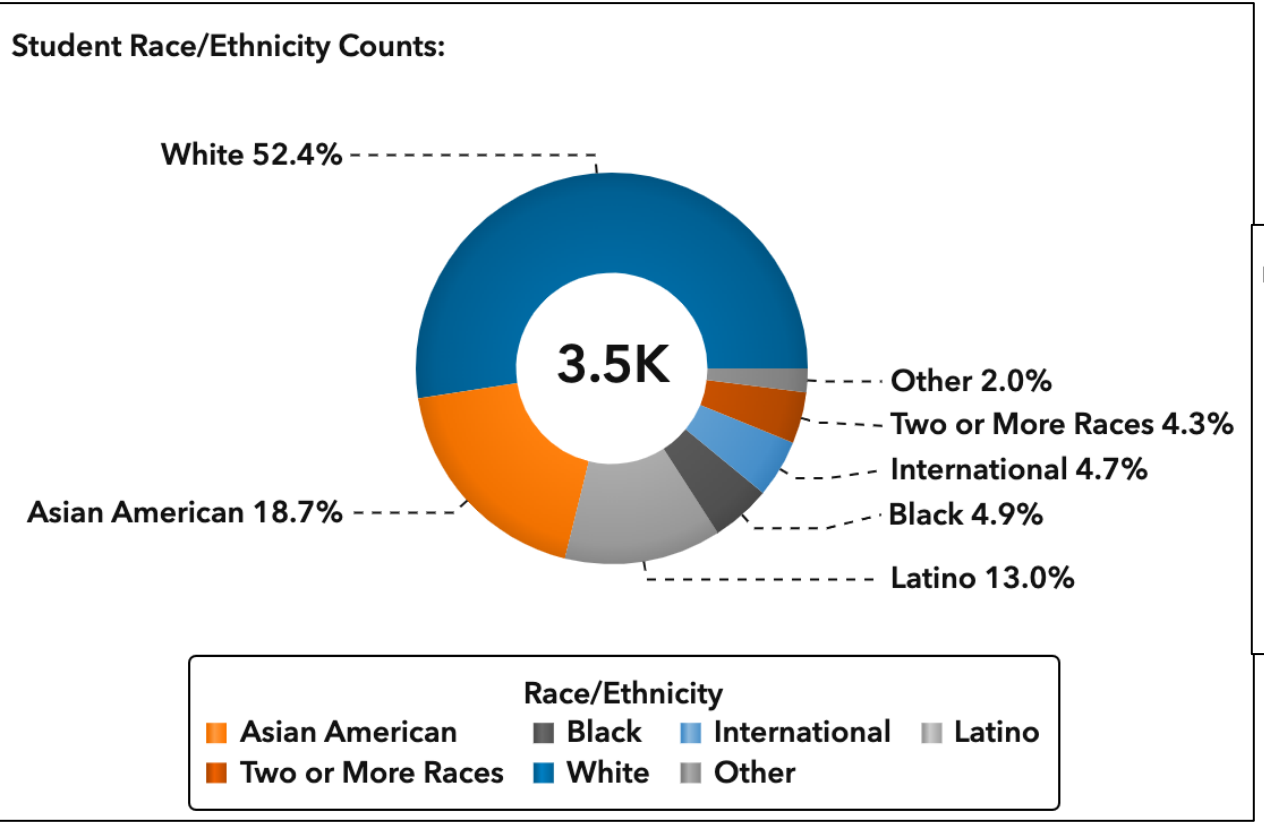
VERGNANO INSTITUTE
FOR INCLUSION

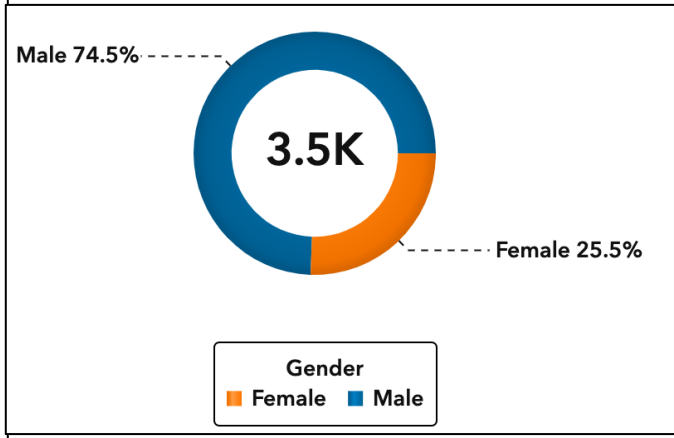
All UConn Students (Graduate & Undergraduate)

Student Race/Ethnicity Counts:



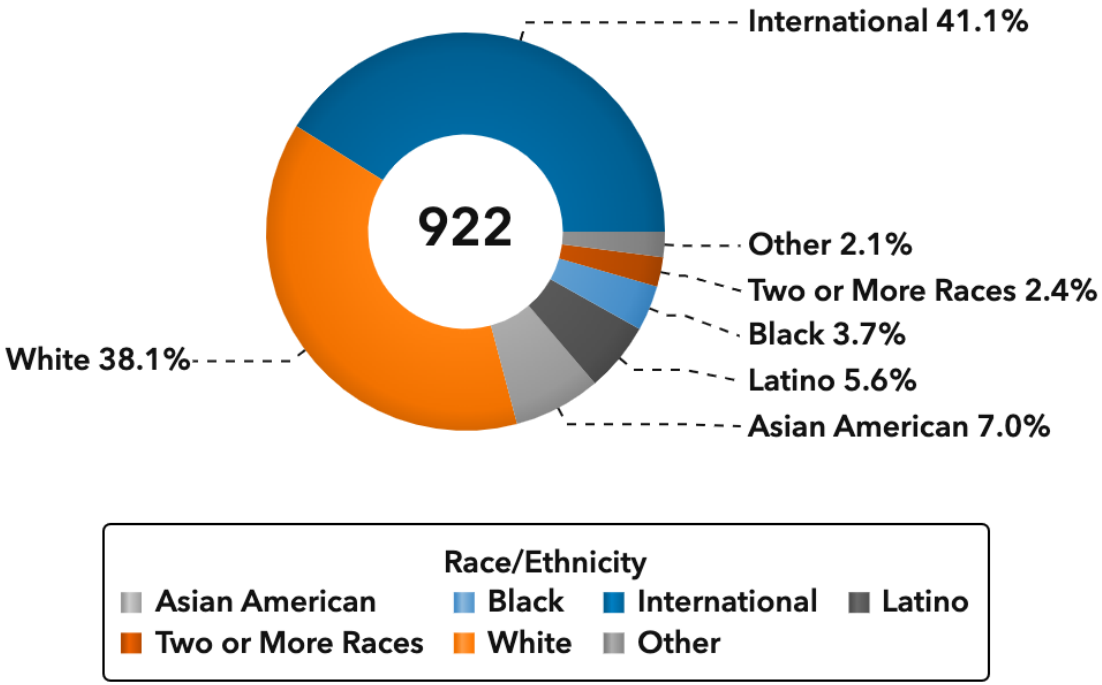
UConn Undergraduate Engineers

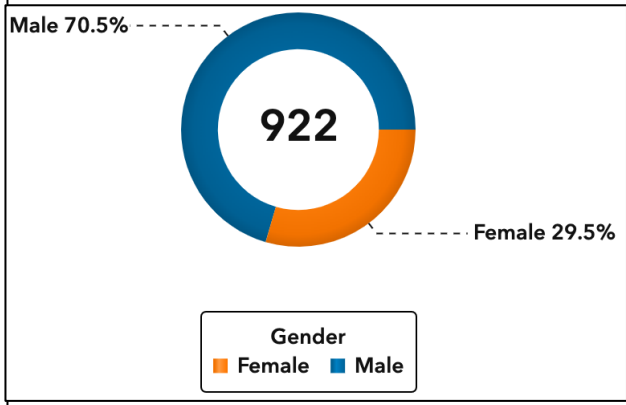




UConn Graduate Engineers

Student Race/Ethnicity Counts:

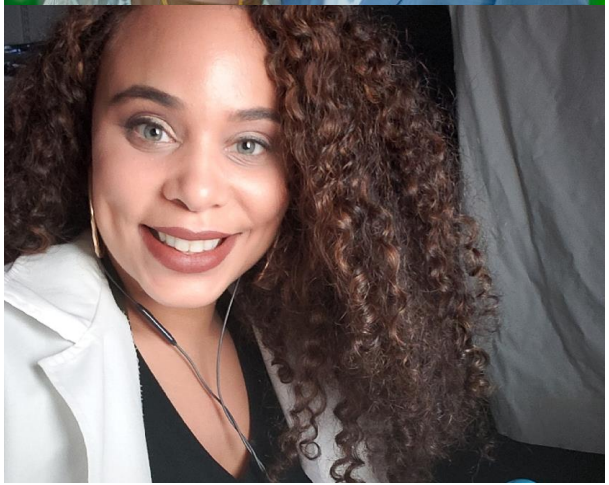




Vergnano Institute @UCONN

https://today.uconn.edu/2021/06/uconn-school-of-engineering-unveils-the-vergnano-institute-for-inclusion-supported-by-uconn-alumni-mark-and-betsy-vergnanos-3m-donation/

- UConn School of Engineering Unveils the Vergnano Institute for Inclusion, Supported by UConn Alumni Mark and Betsy Vergnano's $3M Donation
- The gift represents the largest diversity, equity, and inclusion investment in UConn School of Engineering history and is one of the largest single DEI investments in UConn
- The Vergnano Institute for Inclusion builds upon the School's 30-year legacy of diversity, equity, and inclusion and will enhance several signature diversity programs, such as the school's five-week intensive residential BRIDGE Program, which serves underrepresented incoming freshmen engineering students – both minorities and women.
- Dr. Stephany Santos, Assoc. Director, Vergnano Institute, Ph.D. in Biomedical Engineering from UConn, former BRIDGE student at UConn and Kevin McLaughlin, Executive Director



Summary of Programs

UCONN
SCHOOL OF ENGINEERING

	Program	Audience	Time of Year	Average Impact	Start Date
1	Pre-Engineering Program (PEP)	Middle school students	Academic Year	60-100 per year	1988
2	BRIDGE	Incoming 1st year undergrads	Summer & AY	70-100 per year	1988
3					
4					
5					
6					
1					
1					
1					
1					
1					
1					
1					
		students			

*Student Organizations have additional impact ~3000-6000 per year

Example Da Vinci Workshop

Civil and Environmental Engineering
Faculty: Dr. Tim Vadas

Stream Health and Water Reuse in a Developed Watershed

Learn about the intersection of engineered wastewater treatment systems, hydrologic modeling, and stream health in developed landscapes and opportunities for water reuse. This workshop will provide you with a mixture of activities to take into your classroom.

We will wade a stream to assess biological water quality indicators, understand water quality measurements and toxicity, examine water treatment processes for both treatment and generation of contaminants, and consider treated wastewater in reuse applications to grow crops. This will give you tools to run units in water quality, water treatment, or water reuse using a stream or wastewater treatment plant near your own school.

Fellowships Available: This workshop will be able to support 2 teachers (fee will be waived).

Recommended For: This workshop is highly recommended for Chemistry, Biology, and General Science teachers.

1					
2					
3					
4					
5					
6					
10					
11	SPARK	Middle school students	Summer	100-150 per year	2017
12	Sisters in STEM (SiS)	10th grade URM females	Fall or Spring	150-250 per year	2019
13	BRIDGE+	Incoming 1st year PhDs	Summer & AY	5-15 per year	2021
14	Inclusive JET	Faculty & Staff	Academic Year	5-15 per year	2021
15	Community Conversations	All	Academic Year	5-25 per year	2021
16	Queer Science	High School LGBTQ+ students	Summer	75-150 per year	2022

have in-reach impacts

Potential collaboration points

*Student Organizations have additional impact ~3000-6000 per year

DEI Initiatives at IAC

- Student recruitment of underrepresented groups
- Site recruitment in underserved communities
- Connect professional mentors to DOE IAC students – formal mentoring program development
- Students will work with Vergnano programs to develop hands-on lessons and learning activities associated with Building Energy Assessment
  - Disseminate learning modules and workshops to K-12 teachers through summer programs at UConn and University of New Haven: Da Vinci program
  - Students are ambassadors to K-12 schools and go out and talk about their experience in the IAC program and about energy efficiency and renewable energy

Thank you

We look forward to working with you

Open Discussion: How can our IAC work with you?

Energy Providers

Government Agencies/Offices

Manufacturing Business Associations

Industrial Assessment Centers (IAC)

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Dr. Todd Rossi
Rutgers University, Field Manager

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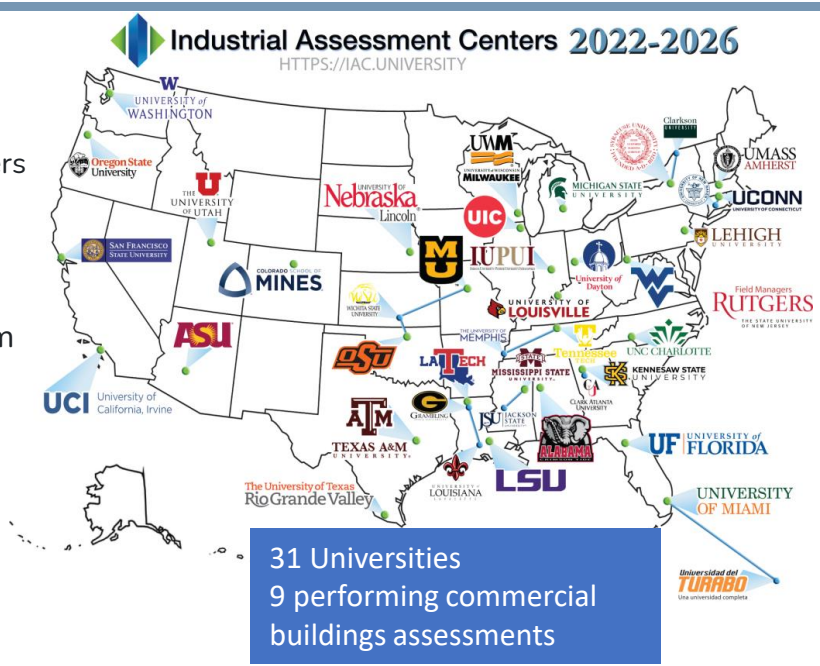
  - Energy management
- Achievements quantified and tracked for success



31 Universities
9 performing commercial buildings assessments

The IAC program has already conducted over 19,852 assessments with more than 149,008 associated recommendations. Average recommended yearly savings is $137,448.

RUTGERS/CAES

Industrial Assessment Center
U.S. DEPARTMENT OF ENERGY

Infrastructure Investment and Jobs

The Infrastructure Investment and Jobs Act included $550M activities over five years that called out the IACs (now IRACs) as implementors

Expand and enhance the IRAC program ($150M over 5 years)

- Increase the number and geographic reach of existing Centers
- Designate IRAC Centers of Excellence
- Include other academic institutions into the expanded IRAC program, including trade schools, community colleges, and union training programs
- Promote R&D for alternative energy sources for energy intensive industries
- Increase coordination with MEP centers, FEMP and BTO, DOE labs, and ESCOs
- Enhance stakeholder outreach
- Provide a clearinghouse for industrial process and energy efficiency technical assistance
- Pay the Federal share of associated internship and/or apprenticeship programs to implement the recommendations of industrial research and assessment centers

Infrastructure Investment and Jobs

The Infrastructure Investment and Jobs Act included $550M activities over five years that called out the IACs (now IRACs) as implementors

Implementation Grants ($400M over 5 years)

- Establish a program to provide grants to eligible entities to implement covered projects
  - Have had an energy assessment completed by an IRAC
  - propose to carry out a covered project with a greater potential for (i) energy efficiency gains; or (ii) greenhouse gas emissions reductions.
  - The amount of a grant provided shall not exceed $300,000 (50 percent cost-share)
- Implementation details expected later this year
- Consider larger capital projects with paybacks of 4 years or more depending on client attractiveness – make shovel ready