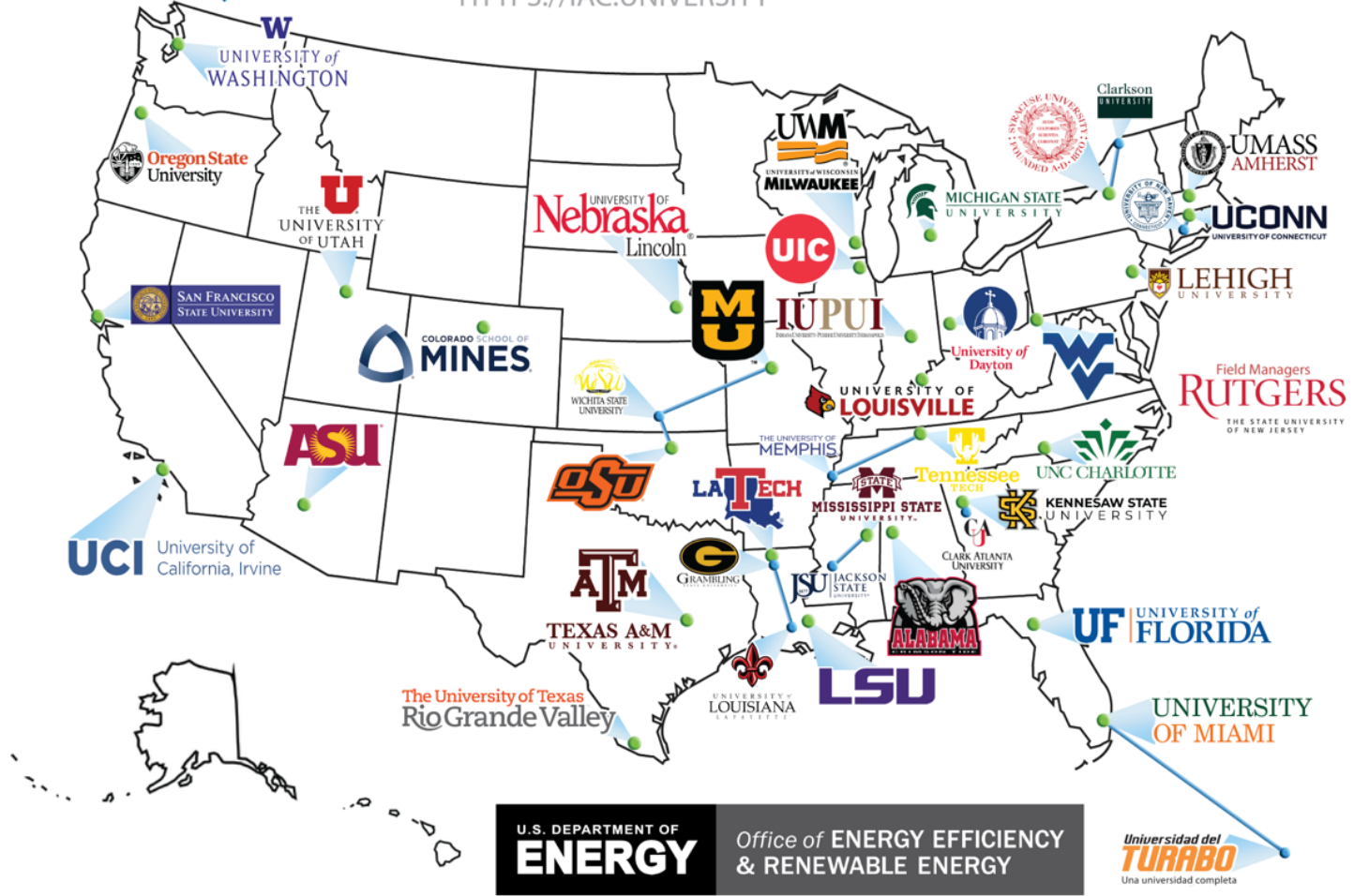


Industrial Assessment Centers:
Workforce Development

Industrial Assessment Centers 2022-2026

[HTTPS://IAC.UNIVERSITY](https://iac.university)



MSU IAC –Center



Industrial Assessments
(MSU & Michigan Tech)

Throughout Michigan & surrounding areas



Commercial Building Assessments
(MSU & Henry Ford College)

Targeting central/south Michigan



Industrial Assessment Center @ MSU

Leadership @ MSU



Dr. Kristen Cetin
Civil and Environmental Engr.
Director
Building and operation



Dr. Annick Ancitil
Civil and Environmental Engr.
Assistant Director - Industrial
Process



Dr. George Berghorn
Construction Management
Assistant Director - Commercial
Buildings



Ryan Gallagher
MSU IPF
Assistant Director - HVAC

@ Michigan Tech



Dr. Rob Handler
Chemical Engr. - Sustainability
MTU Lead

@ Henry Ford



Chad Richert
HFC Lead



Pete Kiser
Energy Technology
HVAC Systems

Industrial Assessment Center (IAC) @ MSU

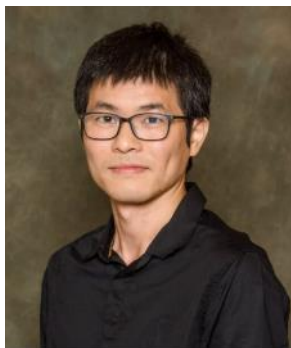
Additional Diverse Expertise



Dr. Tim Mrozowski
Assessment Leader
Building Envelope Systems
Architect



Dr. Susan Masten
Environmental Engr.
Water and Wastewater
Treatment



Dr. Qiben Yan
Computer Science and
Engineering
Cybersecurity



Dr. David Shonnard
Chemical Engineering
Sustainable Materials

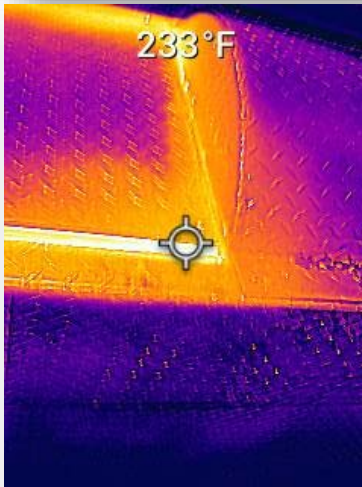
IAC Mission & Goals: *Energy & Cost Savings*

(1) Supporting Manufacturers and Commercial Buildings

- 20 SME industrial assessments/year
- 10 commercial building assessments/year
- No-cost assessments
- Focused on energy, productivity, decarbonization, waste reduction
- Including supporting disadvantaged/underserved communities



Assessments: *On-site 1-day assessment*



Common Systems:

- Lighting
- HVAC
- Compressed air
- Envelope
- Pumps, fans & drive
- Process heat and cooling
- Misc/plug loads

Assessments: *Post-Assessment & Report*



Assessment Report

Reviewed by IAC program
Results entered into IAC database

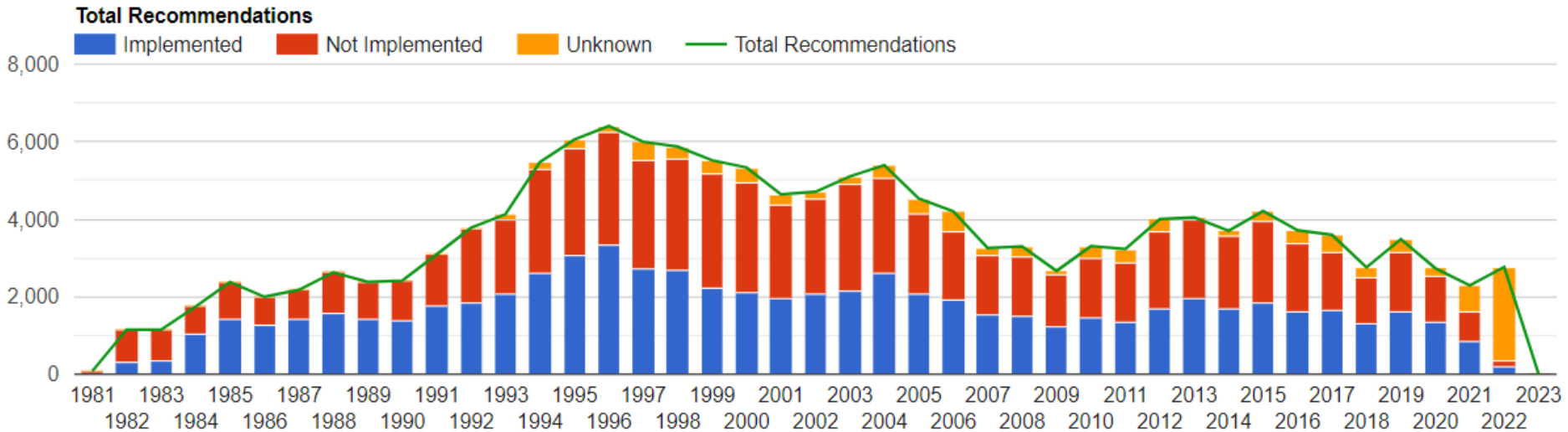
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Report Contents

Assessments: *Implementation of ARs*

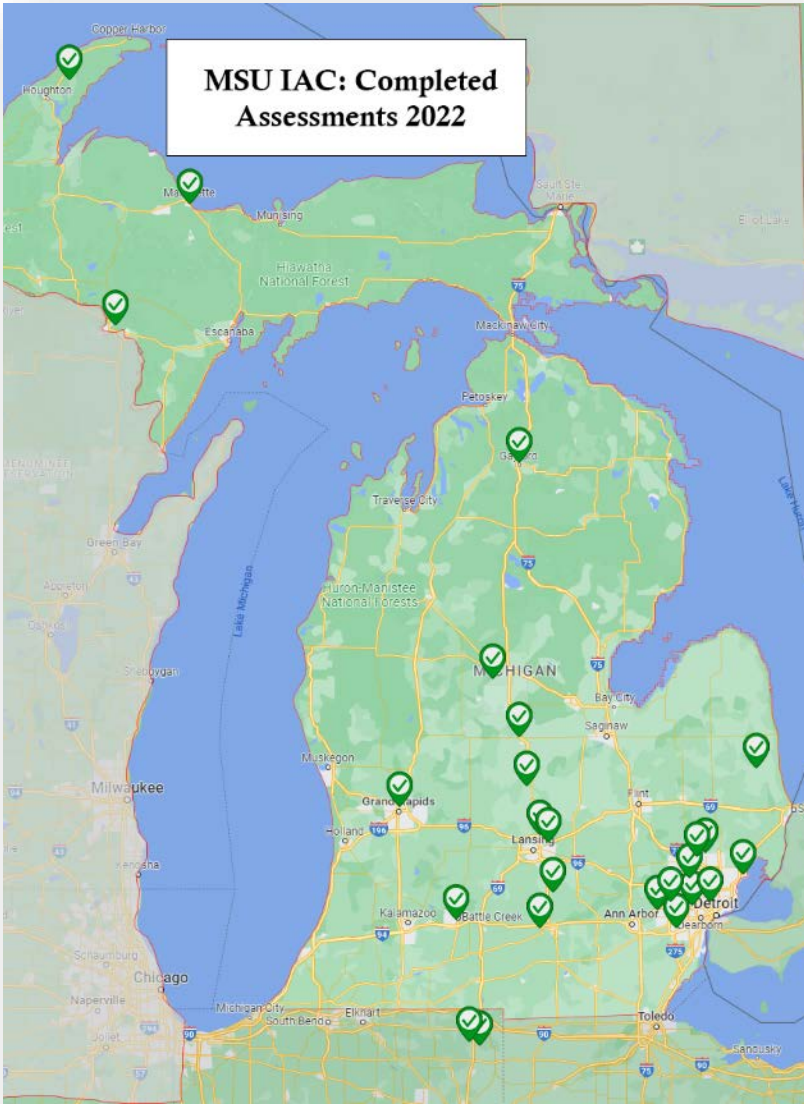
Follow up ~1 year Post-Assessment

- Which recommendations have been implemented
- Other resources, grant funding, etc...



2022

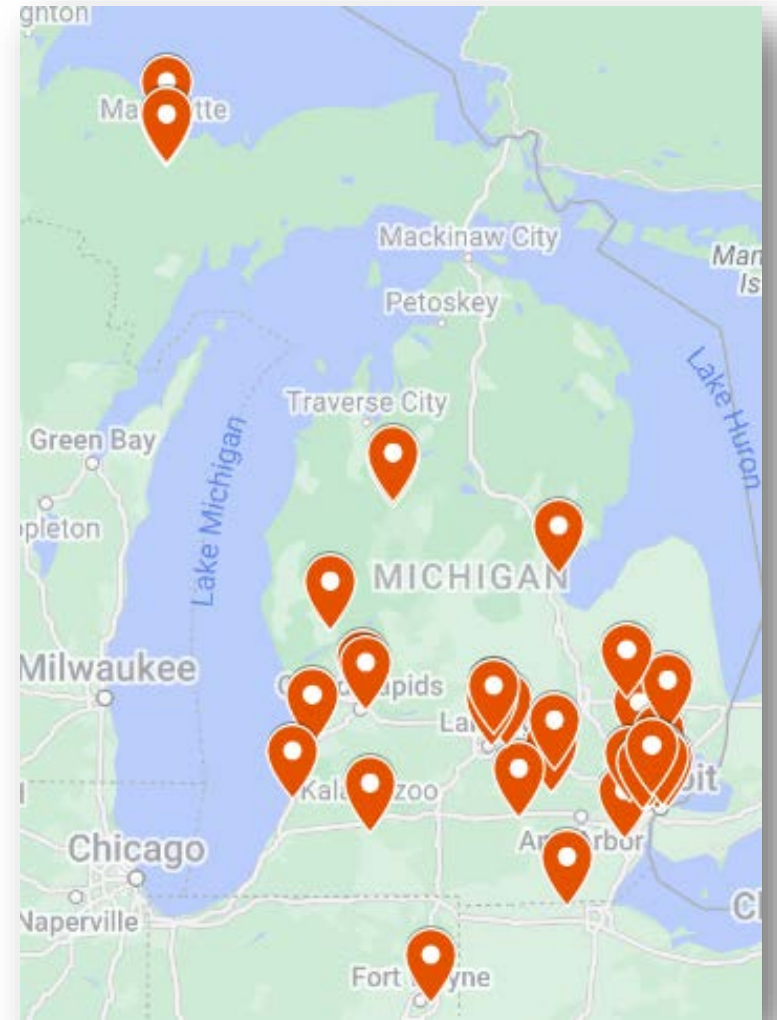
2023



30 Assessments
204 Recommendations
0.09 Tbtu Energy Saving*
\$1.17 million Cost Savings*
18 Students Trained

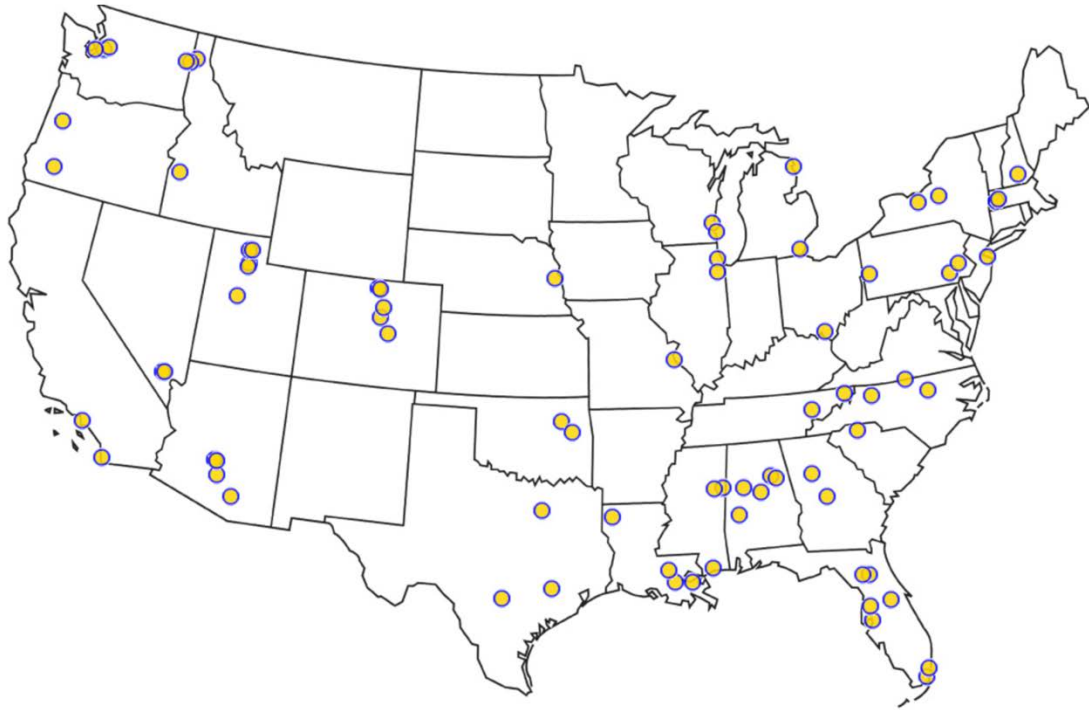
**Recommended Savings*

“Thank you to your amazing team to help us determine areas we can make improvements. The whole experience was very beneficial to our company. We will be implementing a lot of your recommendations to save us energy and money.”



Already completed 22/30 this year

NAICS 3273 Cement and Concrete Product Manufacturing



National data on concrete & concrete industry

Only 0.4% of total IAC assessments since 1981

TOP	NAICS	Description	Assessments	Recommendations	Recommended \$ Savings	
back	327xxx	Nonmetallic Mineral Product Manufacturing	327	2,447	\$81,905,344	Map
	3273xx	Cement and Concrete Product Manufacturing	81	540	\$20,197,811	Map
open	32731x	Cement Manufacturing	17	101	\$15,792,156	Map
open	32732x	Ready-Mix Concrete Manufacturing	19	119	\$1,027,341	Map
open	32733x	Concrete Pipe, Brick, and Block Manufacturing	20	138	\$1,590,192	Map
open	32739x	Other Concrete Product Manufacturing	25	182	\$1,788,122	Map

All time

NAICS 3273 Cement and Concrete Product Manufacturing

	ARC	Description	Recommendations	Recommended \$ Savings	Average Payback (yrs)	Implementation Rate
open	2.xxxx	ENERGY MANAGEMENT	504	\$17,185,785	1.6	46.6%
open	3.xxxx	WASTE MINIMIZATION / POLLUTION PREVENTION	15	\$473,292	1.0	20.0%
open	4.xxx	DIRECT PRODUCTIVITY ENHANCEMENTS	21	\$2,538,733	0.6	50.0%

Looking only since 2013

The Assessment Recommendation Codes ARC is a system for classifying recommendations. [\[Manual\]](#)

Center State Year >= 2013 X SIC NAICS 3273 X

[Filter](#) [Reset](#)

NAICS 3273 Cement and Concrete Product Manufacturing

	ARC	Description	Recommendations	Recommended \$ Savings	Average Payback (yrs)	Implementation Rate
open	2.xxxx	ENERGY MANAGEMENT	251	\$13,473,515	1.7	42.7%
open	3.xxxx	WASTE MINIMIZATION / POLLUTION PREVENTION	9	\$300,997	0.7	22.2%
open	4.xxx	DIRECT PRODUCTIVITY ENHANCEMENTS	9	\$1,792,516	0.5	37.5%

The Assessment Recommendation Codes ARC is a system for classifying recommendations. [Manual]

Center State Year >= 2013 SIC NAICS 3273

Filter **Reset**

NAICS 3273 Cement and Concrete Product Manufacturing

All data on IAC is available at

<https://iac.university/#database>

TOP	ARC	Description	Recommendations	Recommended \$ Savings	Average Payback (yrs)	Implementation Rate
back	2.xxxx	ENERGY MANAGEMENT	251	\$13,473,515	1.7	42.7%
	2.4xxx	Motor Systems	104	\$1,447,824	1.1	45.5%
open	2.41xx	MOTORS	37	\$691,910	1.5	34.4%
open	2.42xx	AIR COMPRESSORS	60	\$731,321	0.9	55.1%
open	2.43xx	OTHER EQUIPMENT	7	\$24,594	1.1	28.6%

Recommendations. [Manual]
 013 SIC NAICS 3273

NAICS 3273 Cement and Concrete Product Manufacturing

TOP	ARC	Description	Recommendations	Recommended \$ Savings	Average Payback (yrs)	Implementation Rate
back	2.xxxx	ENERGY MANAGEMENT	251	\$13,473,515	1.7	42.7%
	2.2xxx	Thermal Systems	31	\$1,914,373	2.0	27.6%
open	2.21xx	STEAM	8	\$107,961	2.4	57.1%
open	2.22xx	HEATING	-	-	-	-%
open	2.23xx	HEAT TREATING	-	-	-	-%
open	2.24xx	HEAT RECOVERY	11	\$1,524,474	1.7	20.0%
open	2.25xx	HEAT CONTAINMENT	10	\$249,016	2.1	20.0%
open	2.26xx	COOLING	2	\$32,922	0.8	0.0%
open	2.27xx	DRYING	-	-	-	-%




- Most recommendations are not specific to the cement/concrete industry
- Implementation rate for all but motor systems are low

IAC Mission & Goals: *Workforce Development*

(2) Train future workforce

- Engineering & non-engineering students
- Develop curriculum
- Teach energy & manufacturing related skills;
- Hands-on involvement/learning
- Provide & support internship/traineeship opportunities



Students Trained	 MICHIGAN STATE UNIVERSITY	 HENRY FORD COLLEGE FUTUREDRIVEN	 Michigan Technological University® 1885
2022	17	2	2
2023	19	10	2

IAC Mission & Goals: *Workforce Development*

(2) Train future workforce

- *Student Certificates*
- *Student Research Awards*



IAC Highlights Resources Centers Database APPLY NOW Ask the IACs Login

Industrial Assessment Center U.S. DEPARTMENT OF ENERGY
IAC Student Research Awards Sponsored by: U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy ADVANCED MANUFACTURING OFFICE

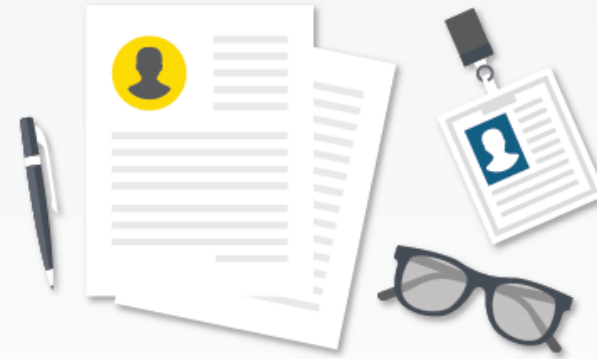
2020 Student Research Awards

University of Massachusetts	View Center Page	University of Utah	View Center Page
Design of Latent Thermal Energy Storage Heat Exchangers for Combined Heat and Power Plants		Improving the Economics of Industrial Battery Storage: A Proactive Policy and Management Approach.	
Students Kedar Prashant		Students Anne Dougherty, Blake Billings and Nestor Camacho	
Director Dr. Beka Kosanovic		Director Dr. Kody Powell	
		Staff Adviser(s) Dr. Julie Sieving	
University of Wisconsin, Milwaukee	View Center Page	Texas A&M, College Station	View Center Page
The Power Reclamation of Utilizing Micro-hydro Turbines in the Aeration Basins of Wastewater Treatment Plants.		Peak Electrical Demand Reduction in Fluid Distribution Systems through Load-shifting using Model Predictive Control.	



IAC Mission & Goals: *Workforce Development*

IAC ALUMNI IN THE WORKFORCE



SKILLS

IAC Alumni graduate with an average of 8.9 specific, applicable skills in energy efficiency.



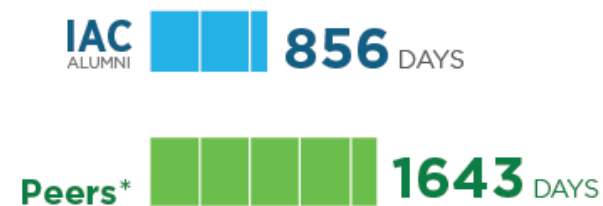
SALARY

IAC Alumni have a skill mix worth \$6,210 more than their peers



HIRED

IAC Alumni are hired almost twice as fast as their peers into an energy efficiency job.



Workforce Development: *Pilot 3-credit course*

Spring 2023 Training Schedule

Date	Topic
Week 1	Introduction to Energy and Sustainability Assessments of Commercial and Industrial Buildings – motivations and need
Week 2	Building Assessment – Field work practice Part (1) - Identifying building equipment, components, asking energy assessment questions; ASHRAE Level 1, 2 and 3 assessments
Week 3	Utility Bill Analysis, AMI Data analysis, Building Benchmarking, CO2 emissions
Week 4	
Week 5	Building Energy Balance, Significant Energy Users
Week 6	Pre-Assessment Meeting Procedures & Practice
Week 7	Building Envelope Systems - components, energy use, operation, energy savings opportunities, field equipment
Week 8	Spring Break – NO CLASS
Week 9	Lighting Systems
Week 10	Compressed Air Systems
Week 11	Pumps, Motors & Drives
Week 12	HVAC systems
Week 13	Solar Energy Systems ; Field Work Practice Assessment Part (2)
Week 14	Post Assessment Processes & Implementation Follow up
Week 15	Water and Wastewater Treatment
Week 16	Combined Heat and Power (CHP)

**Resources
cement/concrete
industry
would help train
students and develop
recommendations
specific for this sector**

**Traditional
scope of
IAC**

New areas

Workforce Development

Training Research

Evaluating the use of Virtual Reality to improve training and better prepare students for assessment processes; improve Post-Assessment process



Assessing the use of virtual reality for training



Virtual environment for assessment training

Collaborate with us!



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<http://iac.msu.edu>

<http://iac.university>

