Industrial Assessment Center (IAC) at Arizona State University

Pat Phelan

Arizona State University (ASU)

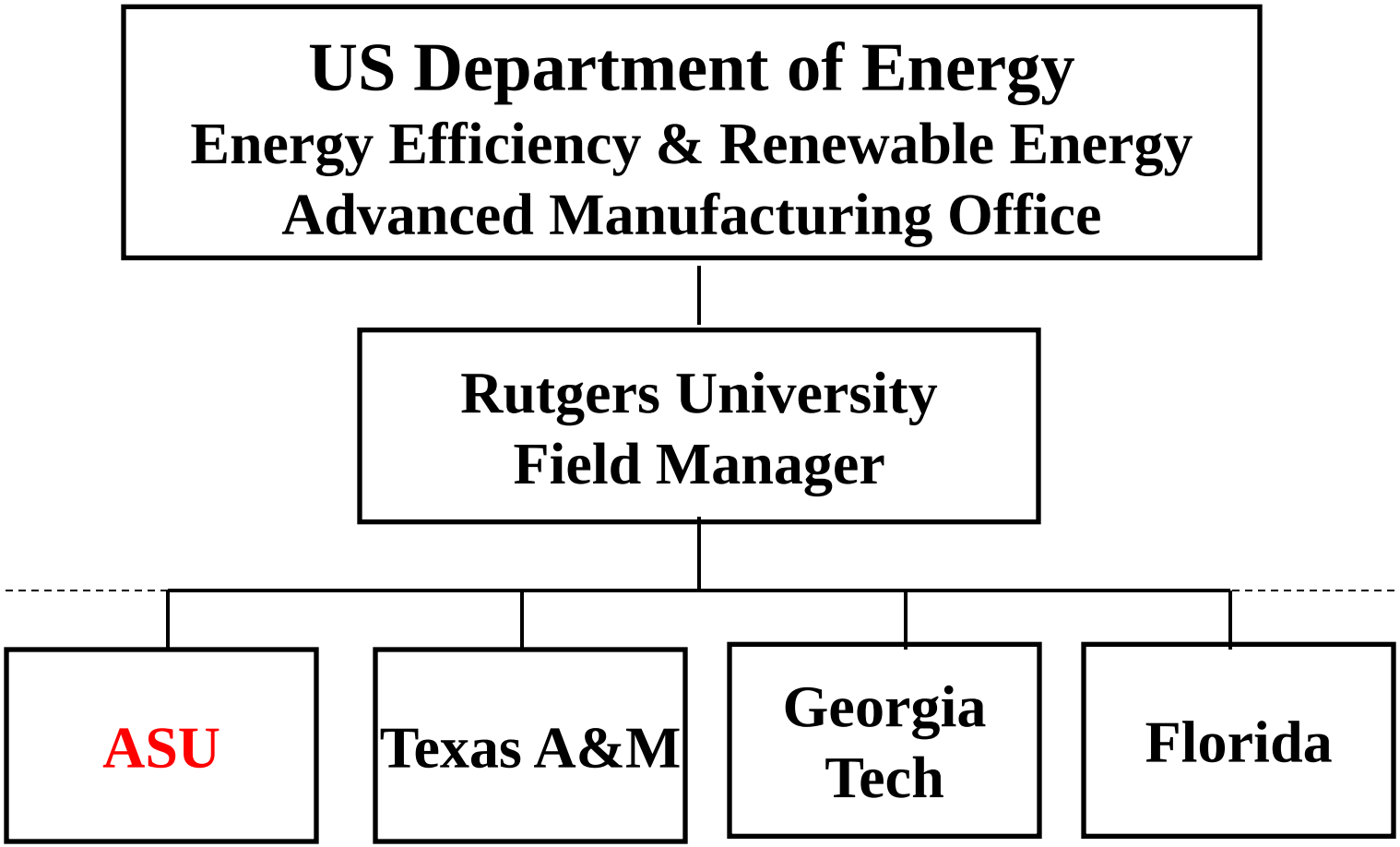
School for Engineering of Matter, Transport & Energy

Mechanical & Aerospace Engineering

phelan@asu.edu

(480)965-1625

What Is an IAC?



Currently, there are 28 IACs throughout the USA.

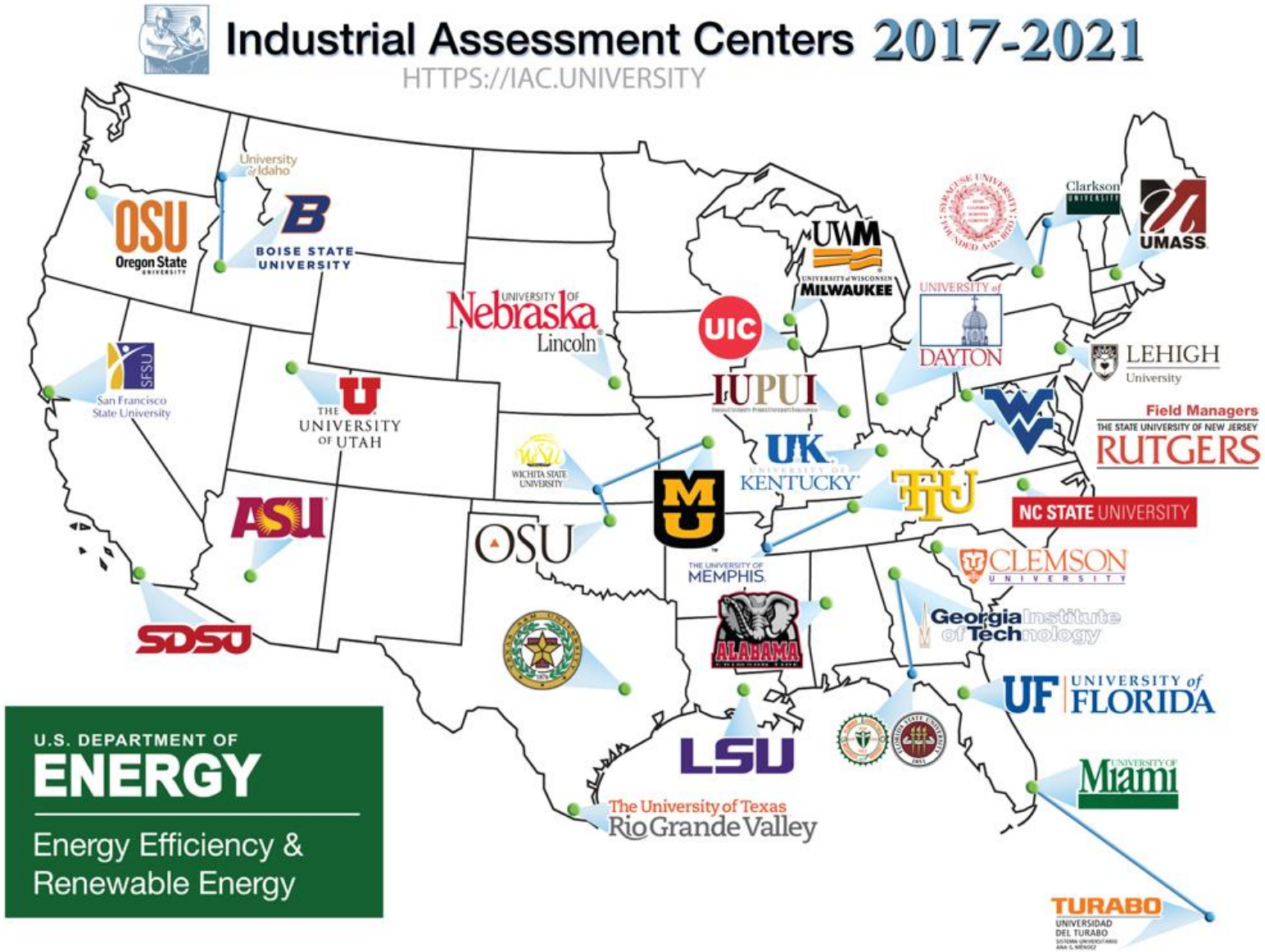
IAC Mission

Enable manufacturers to *reduce costs* through:

- **increasing energy efficiency**
- **improving waste management (including water use reduction)**
- **improving productivity**

All at *no charge* to the manufacturer.

Locations of Existing IACs



History of the IAC National Program

Industrial Assessment Centers

Sponsored by the: U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy
ADVANCED MANUFACTURING OFFICE

Energy and Cost Saving Assessments for Small and Medium-sized US Manufacturers

The USDOE Industrial Assessment Centers (IAC) are teams of university-based faculty and student engineers that provide **no-cost** energy, productivity, and waste assessments to small and medium sized US manufacturers nationwide.

After the site visit, a comprehensive report is developed the provides specific details on all **cost-saving** opportunities identified during the assessment, including applicable rebates and incentives.

APPLY NOW or Ask the IACs a technical question

The IAC program has already conducted over 17,749 assessments with more than 134,649 associated recommendations.
Average recommended yearly savings is $136,088.

- Started in 1976 by the US Dept of Commerce
- Moved to US Dept of Energy in 1978
- Funded by US DOE Advanced Manufacturing Office

Source: https://iac.university/#history

History of the ASU IAC (Part 1)

Version 1.0 (1990 – 2006)

- Performed 433 assessments throughout Arizona and in the Las Vegas area
- 3,563 total recommendations (8.1/assessment)
- 1,358 total implemented recommendations (3.1/assessment)

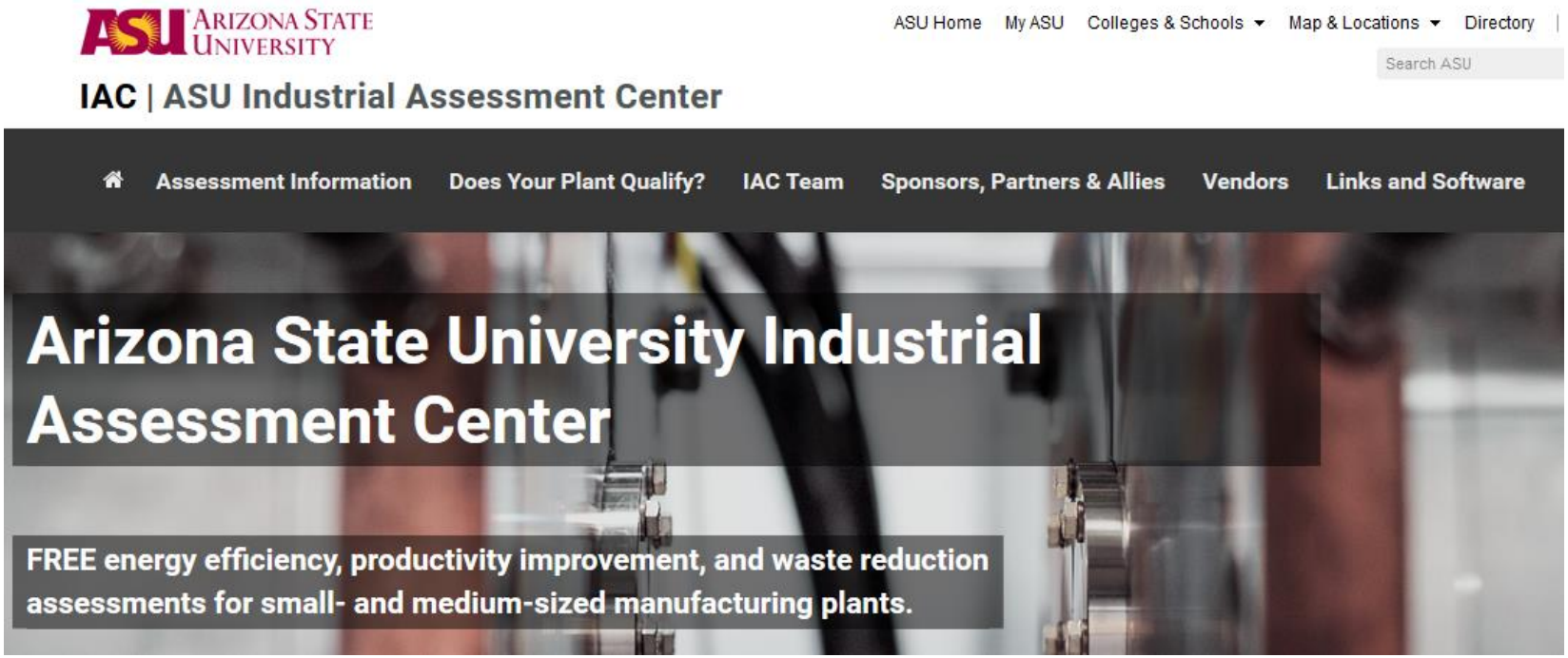
Type of Recommendation	Average Recommended Savings Per Assessment	Average Implemented Savings Per Assessment
Energy	$63,477	$18,534
Waste	$2,993	$1,057
Productivity	$85,742	$15,761
TOTALS	$152,212	$35,352

Source: https://iac.university/statistics

History of the ASU IAC (Part 2)

Version 2.0 (2017 – 2021) & Beyond?

- Competed for new award (~$1.5M total for 5 years)
- 13 assessments in Year 1 (through Sep 30, 2017)
- 20 assessments/year afterwards



https://iac.engineering.asu.edu/

How An Assessment Is Conducted

- Determine eligibility
- Obtain utility bills
- Conduct on-site assessment
  - Typically 1 day
- Generate recommendations for the facility
- Research and analyze recommendations
  - Generate simple payback for each recommendation
- Deliver confidential report within 60 days, outlining recommendations and their paybacks.
- Follow up 6 to 9 months later on implementation status

During the Assessment: Facility Tour

During the Assessment: Recording Data

During the Assessment: Measurements

Measurement Capabilities:

- Dataloggers for current, voltage, temperature, relative humidity
- Infrared temperature (laser and camera)
- Combustion emissions
- Light intensity

During the Assessment: Brainstorming

Read more at https://fullcircle.asu.edu/outreach/asu-center-helps-arizona-southwest-manufacturers-improve-energy-efficiency/

Typical Recommendations

Energy

- ✓ Compressed Air
- ✓ Motors
- ✓ HVAC
- ✓ Process Heating
- ✓ Steam Systems

Productivity

- ✓ Bottlenecks
- ✓ Process layout
- ✓ Training
- ✓ Scheduling

Waste

- ✓ Recycling
- ✓ Replace solvents
- ✓ Reduce trash or change trash pickup

ASU's Top Ten Assessment Recommendations (4/10/2017)

	ARC	Description	Recc'd	Average Savings	Average Cost	Average Payback	Imp Rate
1	2.7142	UTILIZE HIGHER EFFICIENCY LAMPS AND/OR BALLASTS	435	$5,500	$10,582	2.7	44.8%
2	2.4133	USE MOST EFFICIENT TYPE OF ELECTRIC MOTORS	293	$3,532	$5,693	2.3	53.7%
3	2.4236	ELIMINATE LEAKS IN INERT GAS AND COMPRESSED AIR LINES/ VALVES	224	$6,442	$979	0.4	72.6%
4	2.4231	REDUCE THE PRESSURE OF COMPRESSED AIR TO THE MINIMUM REQUIRED	193	$3,221	$542	0.3	42.6%
5	2.7135	INSTALL OCCUPANCY SENSORS	172	$1,148	$2,193	2.7	23.1%
6	2.7143	USE MORE EFFICIENT LIGHT SOURCE	142	$2,237	$3,241	2.1	39.0%
7	2.7232	REPLACE EXISTING HVAC UNIT WITH HIGH EFFICIENCY MODEL	135	$7,355	$12,312	2.1	38.7%
8	2.4111	UTILIZE ENERGY-EFFICIENT BELTS AND OTHER IMPROVED MECHANISMS	127	$2,338	$62	0.0	56.6%
9	2.4141	USE MULTIPLE SPEED MOTORS OR AFD FOR VARIABLE PUMP, BLOWER AND COMPRESSOR LOADS	115	$15,933	$19,888	2.1	25.0%
10	3.6192	USE A LESS EXPENSIVE METHOD OF WASTE REMOVAL	97	$3,911	$279	0.1	39.3%

Sorted by the number of times recommended

Source: https://iac.university/searchRecommendations

ASU's Top Ten Assessment Recommendations (4/10/2017)

	ARC	Description	Recc'd	Average Savings	Average Cost	Average Payback	Imp Rate
1	4.4410	INSTALL AUTOMATIC PACKING EQUIPMENT	11	$453,826	$420,992	1.3	27.3%
2	4.1120	REPLACE OLD MACHINE WITH NEW AUTOMATIC MULTI-STATION TOOL	5	$408,820	$176,684	0.6	25.0%
3	4.6520	REPLACE EXISTING EQUIPMENT WITH MORE SUITABLE SUBSTITUTES	15	$393,211	$82,658	1.7	30.8%
4	2.3416	USE COMBINED CYCLE GAS TURBINE GENERATOR SETS WITH WASTE HEAT BOILERS CONNECTED TO TURBINE EXHAUST	5	$336,851	$782,000	3.9	20.0%
5	2.3415	USE A FOSSIL FUEL ENGINE TO COGENERATE ELECTRICITY OR MOTIVE POWER; AND UTILIZE HEAT	23	$202,284	$756,094	4.9	13.0%
6	4.6110	BEGIN A PRACTICE OF PREDICTIVE / PREVENTATIVE MAINTENANCE	8	$152,269	$26,031	0.2	60.0%
7	4.3220	ELIMINATE OLD STOCK AND MODIFY INVENTORY CONTROL	8	$146,706	$19,430	1.7	71.4%
8	2.3212	OPTIMIZE PLANT POWER FACTOR	6	$145,037	$1,080,458	2.1	0.0%
9	4.4510	ADD ADDITIONAL PRODUCTION SHIFT	5	$143,624	$12,055	0.3	60.0%
10	4.7110	INITIATE A TOTAL QUALITY MANAGEMENT PROGRAM	6	$114,401	$5,321	0.2	80.0%

Sorted by the average savings

Source: https://iac.university/searchRecommendations

Some Implemented Water-Related Recommendations (ASU)

Description	Type of Plant	Savings	Cost
MINIMIZE BOILER BLOWDOWN WITH BETTER FEEDWATER TREATMENT	Pharmaceuticals	$2,518	$5,000
REDUCE WATER USE WITH COUNTER CURRENT RINSING	Brass Door Locks	$24,214	$900
TREAT AND REUSE RINSE WATERS	Cardboard Boxes; Corrugated Containers; Bottled Soft Drinks	$12,448 (ave)	$867 (ave)
MINIMIZE WATER USAGE	Juice Bottling	$3,515	$0
ELIMINATE LEAKS IN WATER LINES AND VALVES	Newspapers	$830	$200
USE FLOW CONTROL VALVES ON EQUIPMENT TO OPTIMIZE WATER USE	Pasta Food Products	$1,648	$30
RECYCLE WHITE WATER	Manufactured Homes	$14,029	$500

Source: https://iac.university/searchRecommendations

Qualifications for a Free Assessment

- Standard Industrial Code between 2000-3999 (i.e. manufacturing/industrial)
- Gross annual sales less than $100,000,000
- Annual energy bills between $100,000 and $2,500,000
- Fewer than 500 employees on site

Note: some exceptions (up to 2 per year) are allowed.

IAC Marketing

We're always looking for new clients!

Partners

- RevAZ/Arizona Commerce Authority (NIST Manufacturing Extension Partnership for Arizona)
- Nevada Industry Excellence (same for Nevada)
- Lincus, Inc. (ESCO serving Arizona, California)
- Others?

Marketing Approaches

- Cold calling, mailing, Google ad
- Suggestions?

Manufacturing Education at ASU

We're developing a new undergraduate certificate in Clean Energy Manufacturing:

- Energy Management Course offered Fall 2017
  - Undergraduate/Graduate
  - ISO 50001 Energy Management Standard
- Joint applied project class between engineering/business
- New MS in Manufacturing Engineering

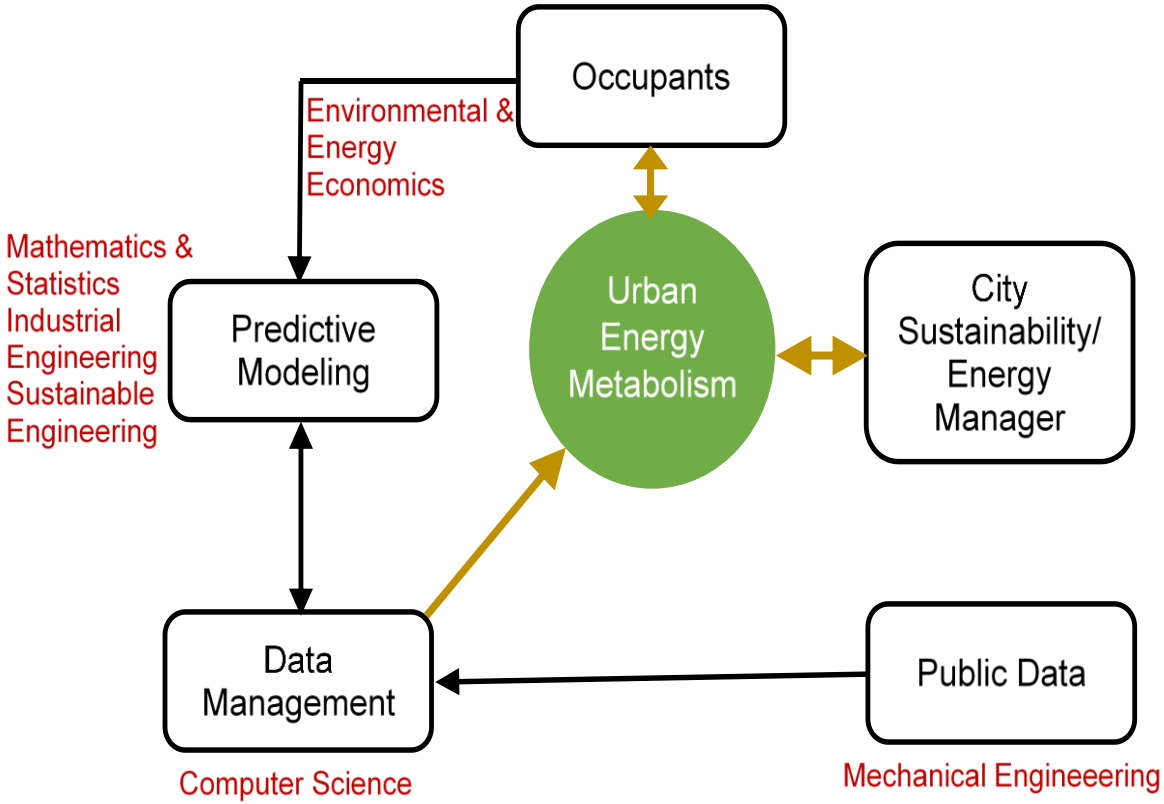
Are there other educational programs that ASU can develop that would help you?

New Proposed Effort with Communities

Urban Energy Metabolism: Integrated Research, Education, and Practical Tools for Connected Communities

Recently submitted proposal to US National Science Foundation ($1M total for 3 years)

Goal: develop online platform to report/predict electricity consumption at block, neighborhood, and city scale



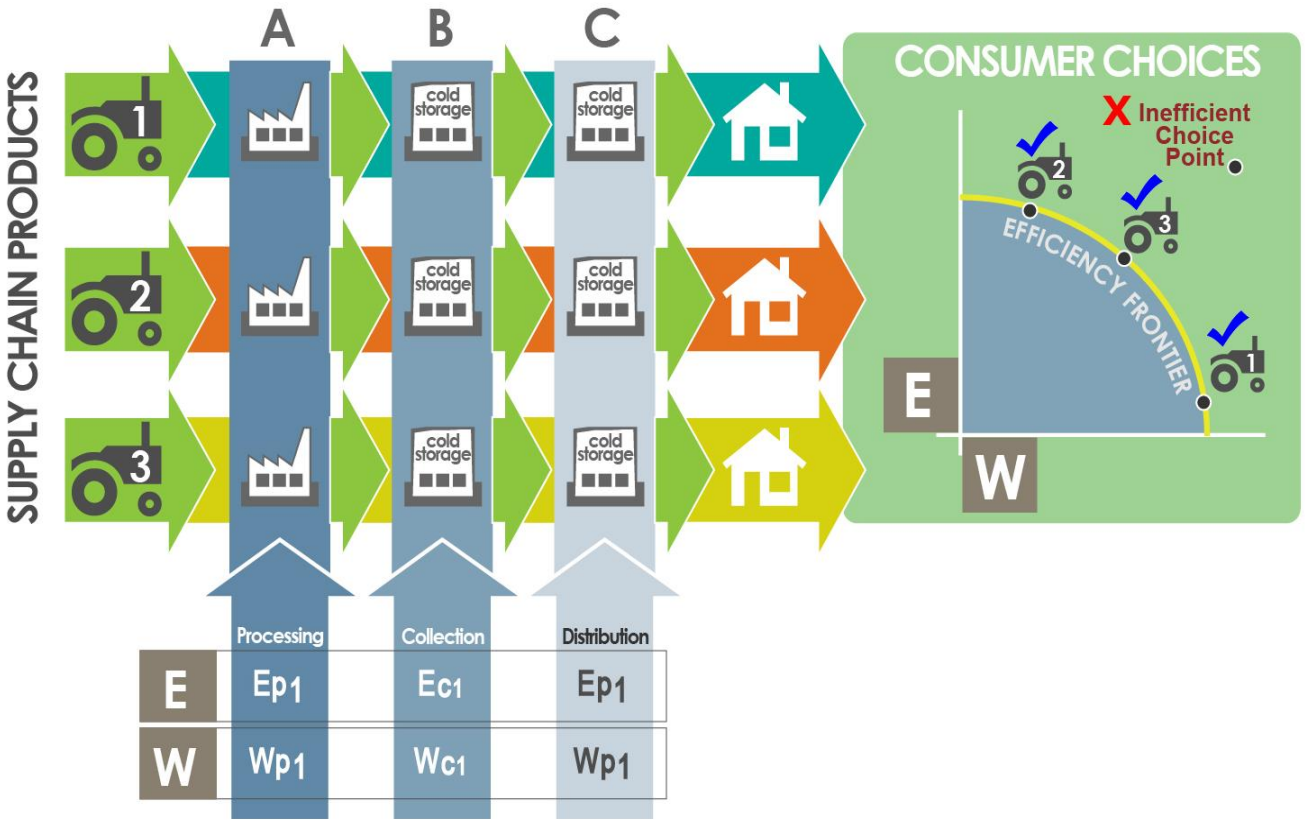
Current partner communities: Tempe, Mesa, Avondale, Boston, Washington DC

New Proposed Effort on Food Waste

Integrated Strategies to Eliminate Food, Energy, and Water Waste in the Supply Chain of Fresh Agricultural Products

Recently submitted proposal to US National Science Foundation ($2.5M total for 3 years)

Goal: reduce waste for fresh fruits and vegetables, thereby reducing energy & water consumption



Principal Investigator: Professor Rene Villalobos, ASU Industrial Engineering

Current IAC Staff

Director: Professor Rene Villalobos, ASU Industrial Engineering

Assistant Director: Professor Pat Phelan, ASU Mech & Aero. Engineering

Manager: Jon Sherbeck, P.E.

Lead Student: Nick Fette, PhD student in mechanical engineering

Plus a team of undergraduate and graduate engineering students, and an undergraduate marketing student

For more information please contact Pat Phelan at phelan@asu.edu, call the IAC at (480)727-6098, or fill out the online form at https://iac.engineering.asu.edu/ .