

UCI SMART IAC Updates

CalPlug Workshop
04/17/2023



**Industrial
Assessment
Center**
U.S. DEPARTMENT OF ENERGY

UCI SMART Industrial
Assessment Center

CSUN

CALIFORNIA
STATE UNIVERSITY
NORTHRIIDGE

Cypress  College



UCI SMART IAC

Sustainable Manufacturing Alliance for Research and Training
Industrial Assessment Center



UCI SMART IAC Energy Assessments

- Focus on energy efficiency, waste reduction, and productivity enhancements
- Energy efficiency: lighting, air compressors, motors, furnaces, ovens, boilers, HVAC, chillers, water treatment systems, renewables, and much more!
- Bringing SMART into our IAC: smart manufacturing, cybersecurity, life-cycle analysis and fuel switching

UCI SMART IAC Energy Assessments

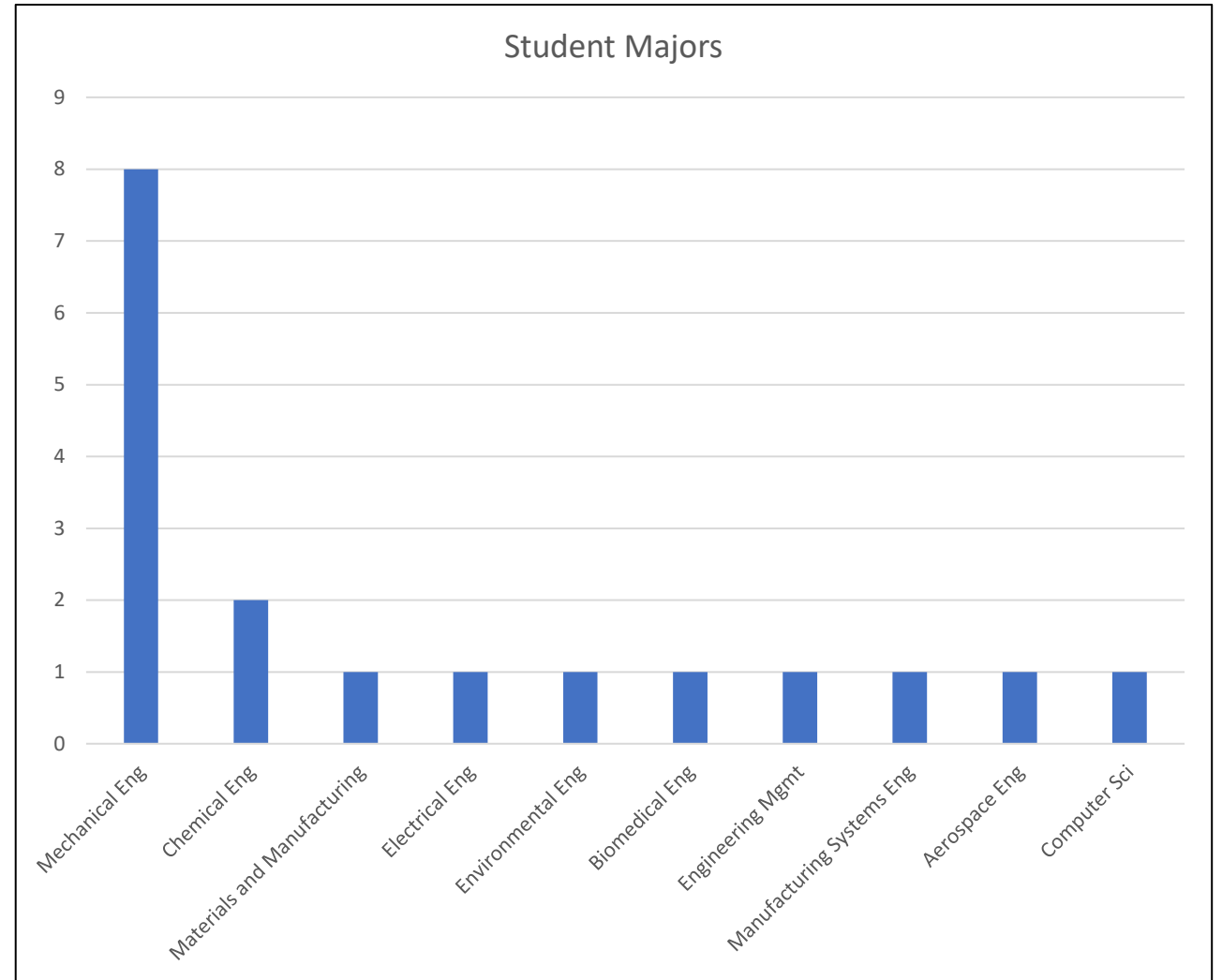
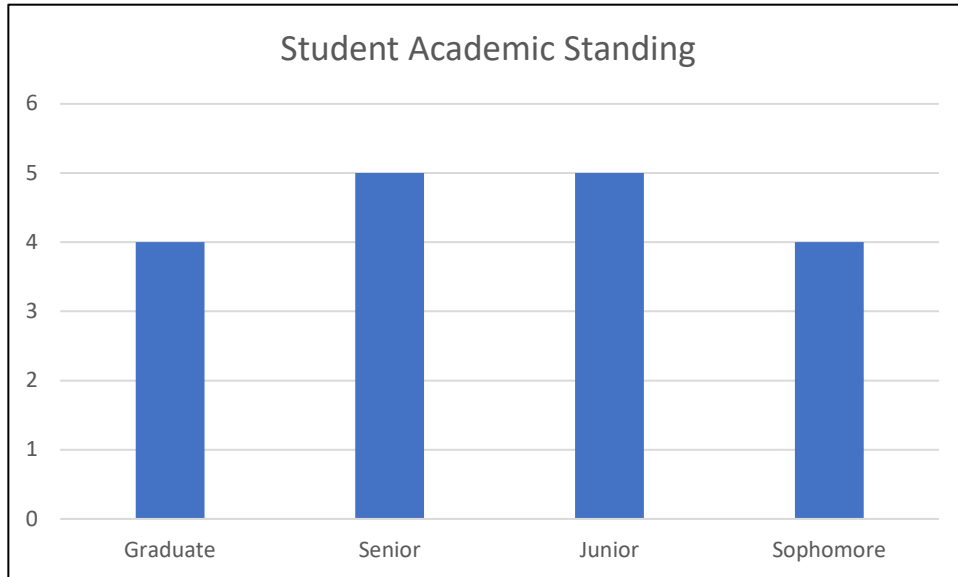
- Tour the manufacturing facility, noting initial ideas for energy savings
- Team brainstorming session to identify areas of interest
- Data collection from shop floor
- Return to campus, develop a full report with engineering and financial analysis
- Follow up in 6-9 months to determine how well the report has served the client and how many recommendations have been implemented

Quick Stats



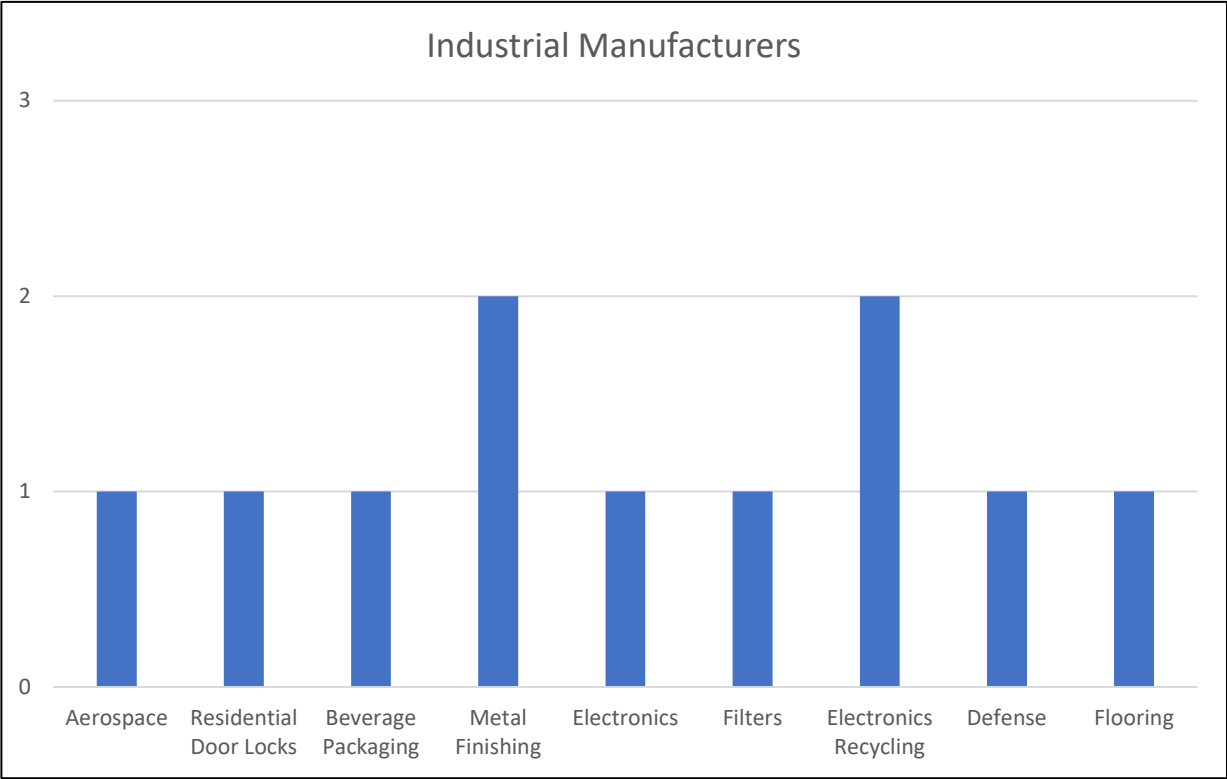
Student Team

- UCI: 14 Students
- CSUN: 4 Students
- Cypress: 6 Students

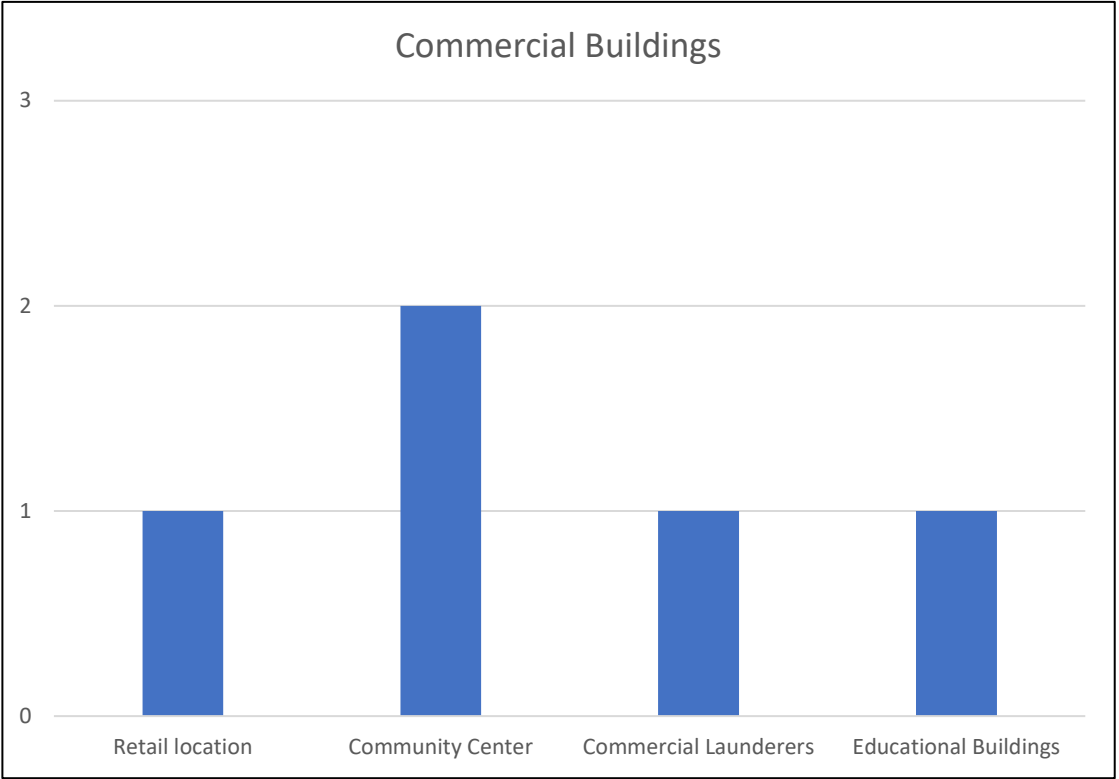


Energy Assessments Performed

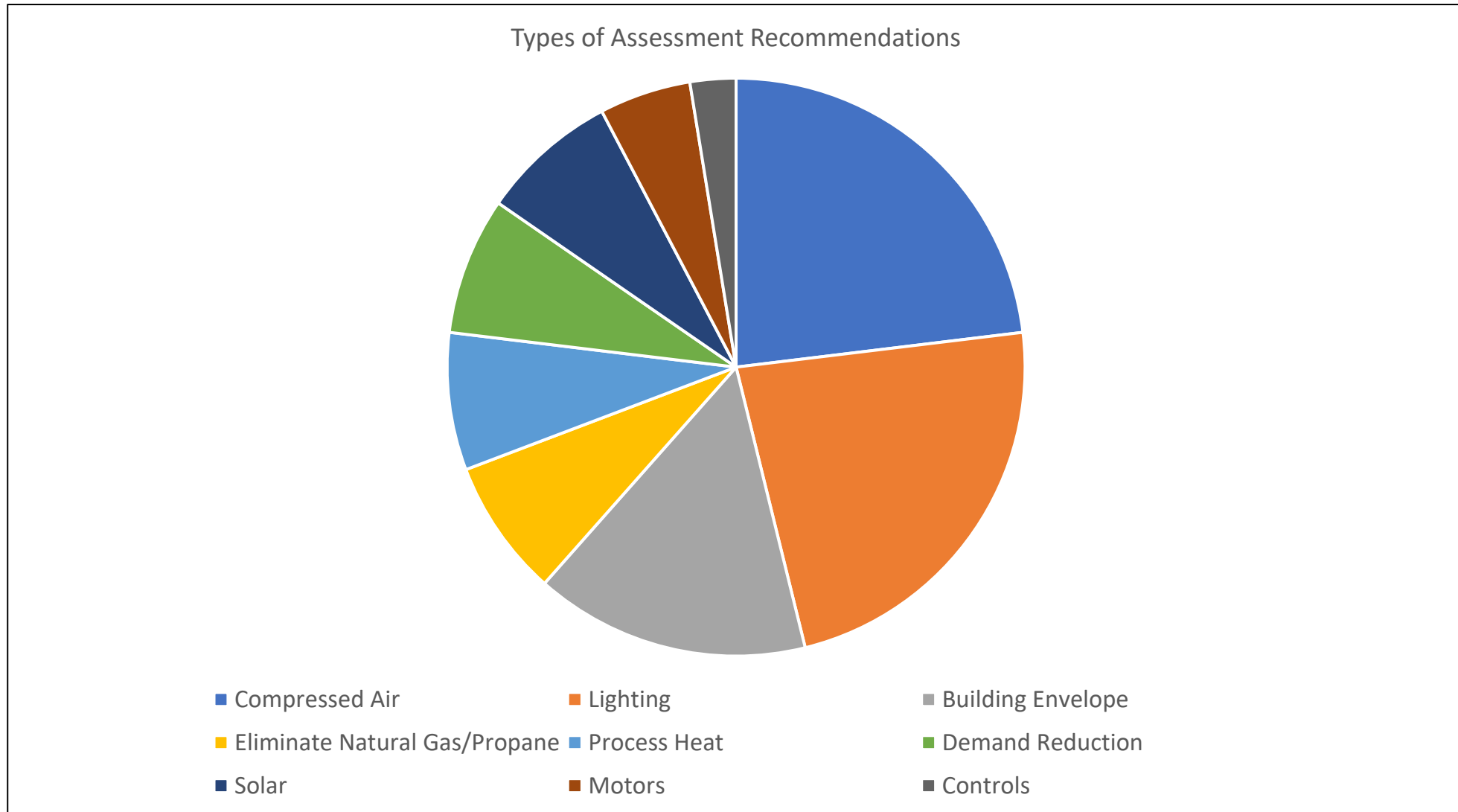
11 industrial energy assessments



5 commercial energy assessments



Assessment Recommendations



Top Assessment Recommendations

Compressed Air

- Reduce leaks
- Install storage tank
- Reduce air pressure

Lighting

- LEDs
- Photosensors
- Occupancy sensors

Building

- Insulate dock doors
- Heat pump water heaters
- CO2 sensors

Eliminate Natural Gas

- Replace propane forklifts with electric
- Replace natural gas boiler with electric

Top Assessment Recommendations

Process Heat

- Recover waste heat
- Reduce heat loss
- Install thermal storage

Demand Reduction

- Charge electric forklifts off-peak
- Run DI water system off-peak

Energy Generation

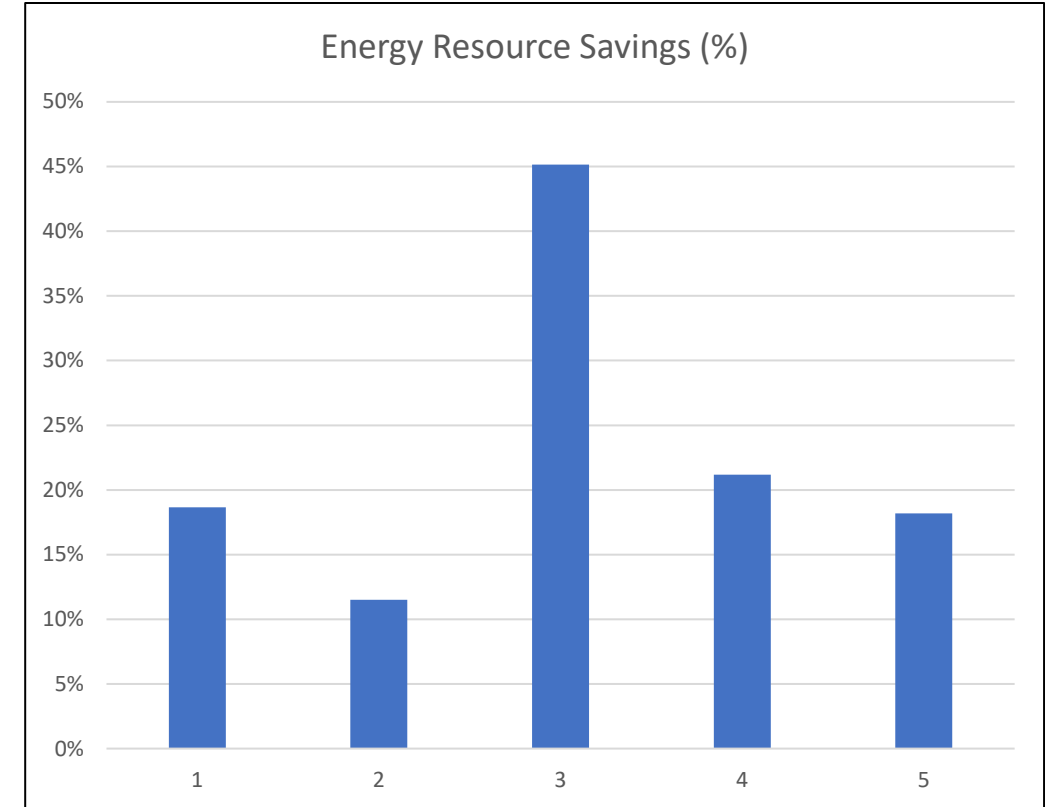
- Solar rooftop systems
- Solar parking structures
- Energy storage

Motors

- High efficiency motors
- Variable speed drives

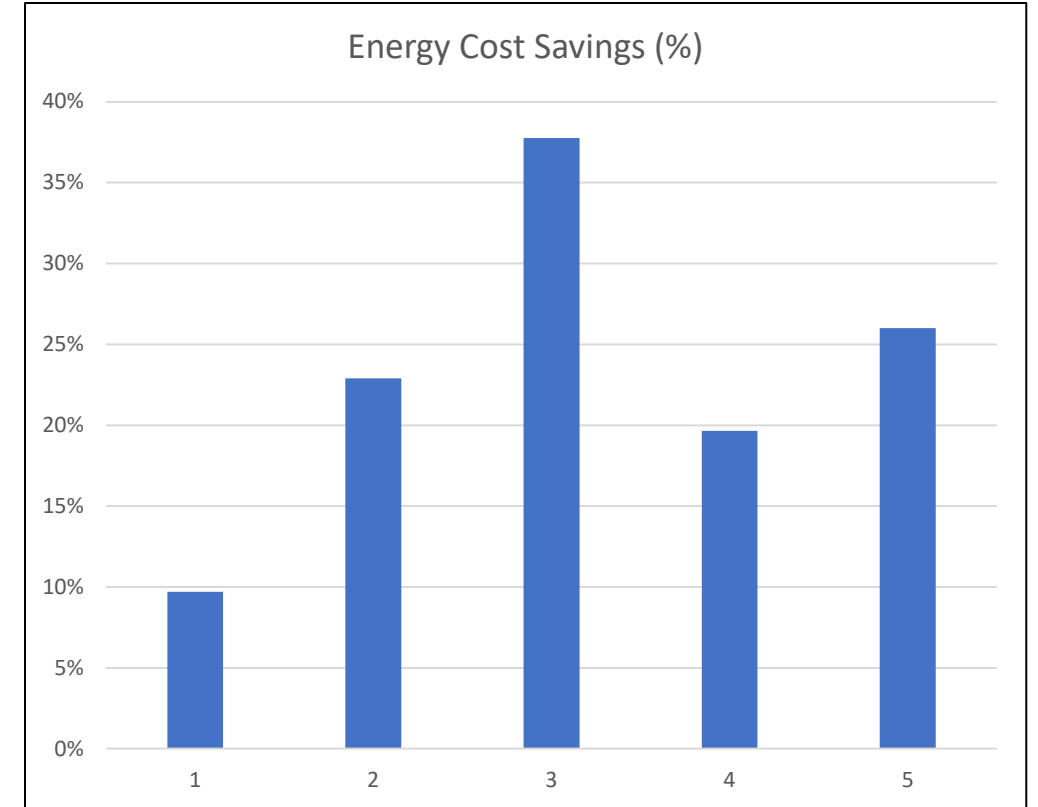
Energy Savings

Client	Energy Resource Savings (kWh/yr)	Total Energy Usage (kWh/yr)	Energy Resource Savings
1	457,582	2,450,797	19%
2	206,689	1,796,000	12%
3	880,355	1,950,117	45%
4	913,425	4,310,672	21%
5	591,720	3,253,632	18%



Cost Savings

Client	Energy Cost Savings	Total Energy Costs	Energy Cost Savings
1	\$55,079	\$567,215	10%
2	\$67,378	\$294,337	23%
3	\$154,739	\$409,750	38%
4	\$87,712	\$446,187	20%
5	\$82,270	\$316,277	26%

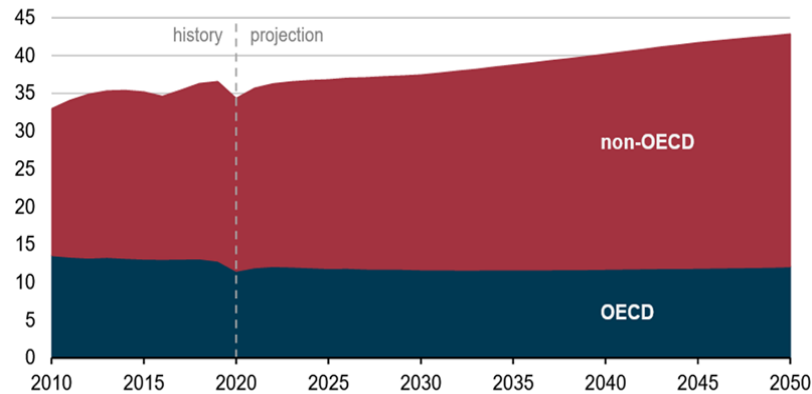


UCI SMART IAC Student Research Award

- UCI was awarded one of 8 Student Research Awards in 2022
- The IAC Student Research Award Competition is designed to create funding for undergraduate and graduate students to pursue assessment-inspired research projects
- Mixing Hydrogen with Natural Gas as an Alternative for Fuel Switching in Manufacturing for Decarbonization/Reducing GHG Emissions
- Lead: Daniela Ruiz
 - PhD Student in Mechanical and Aerospace Engineering

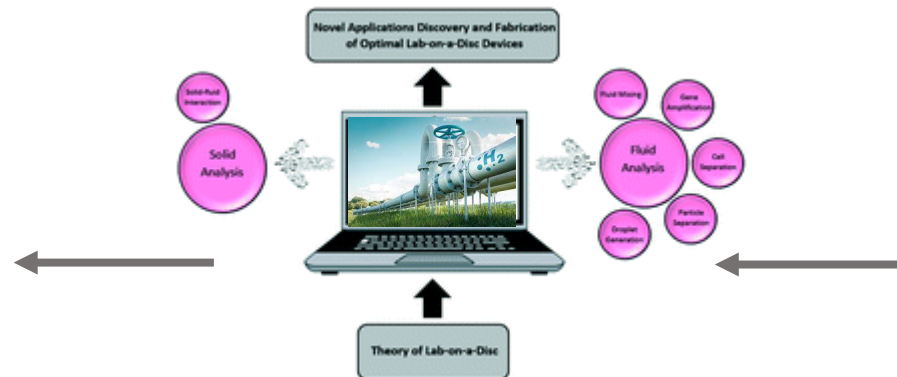
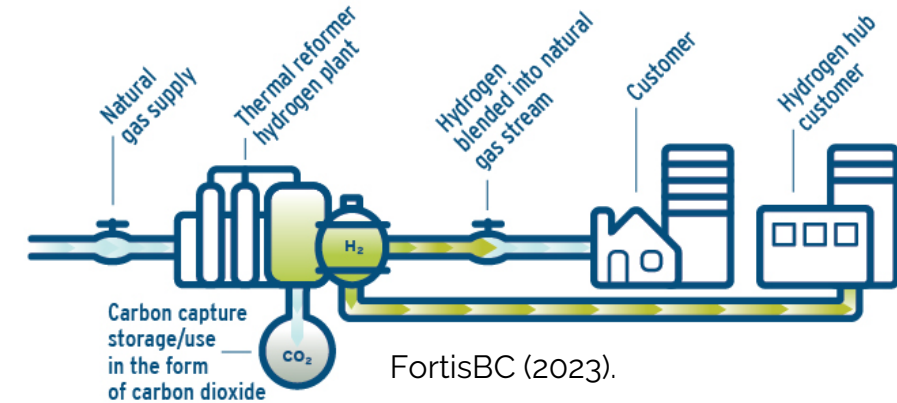
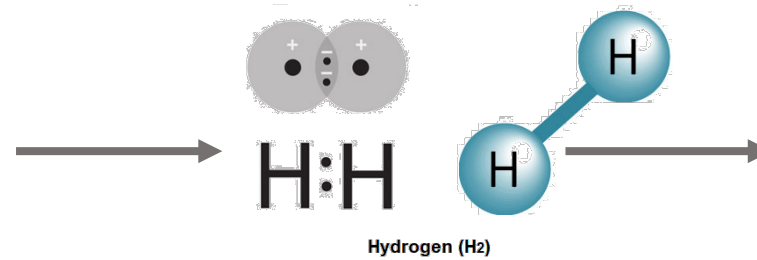
UCI SMART IAC Student Research Award

Global energy-related carbon dioxide emissions (2010–2050)
billion metric tons

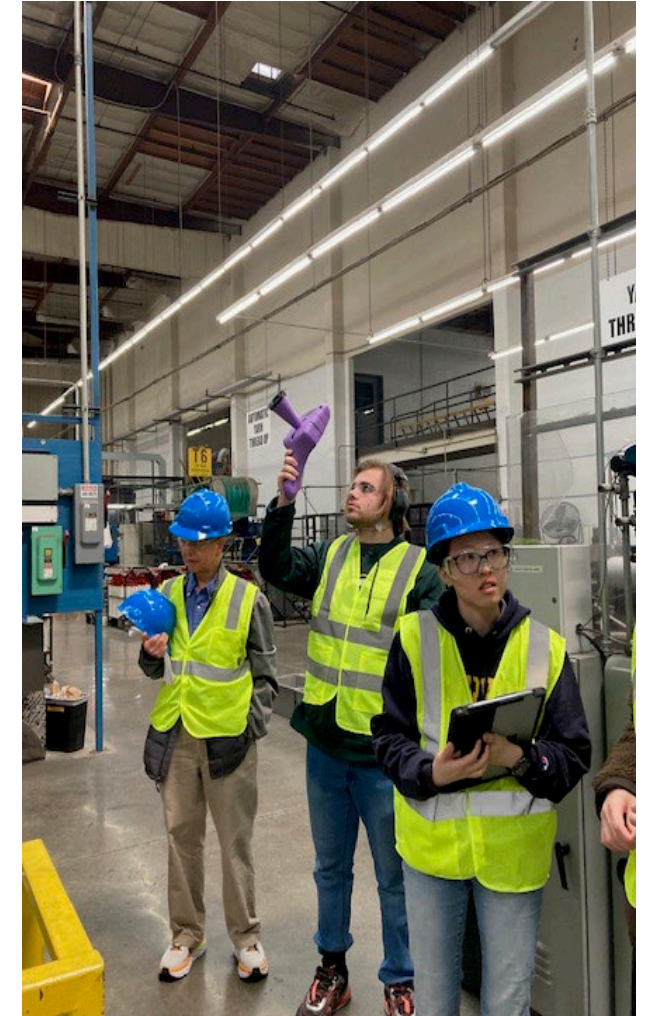


U.S. Energy Information
Administration (2022).

- ✓ Paper
- ✓ Poster
- ✓ Video



- Jeannie Liang
- Senior
- Biomedical Engineering





Questions?

