



### Synopsis

- This is one of 50 DOE (Dept of Energy) Industrial Training and Assessment Centers (ITAC) around the country.
- Provides no-cost energy consulting services to manufacturers within 150 miles of UC Irvine and CSUN (Los Angeles, Orange, Ventura, San Bernardino, Riverside, San Diego, Imperial, and Kern counties).
- A 1-2 days on-site facility visit can typically identify 10-20% energy and productivity savings.
- Led by faculty and students at UCI and CSUN.

### Research Objective

- Help small- and medium-sized manufacturers (SMMs) to implement the recommendations made in assessments through DOE ITAC Implementation Grant Program.
- Bolster the U.S. manufacturing base by supporting projects that modernize SMMs' facilities with improved energy and material efficiency, enhanced cybersecurity, and increased use of smart and advanced manufacturing technologies to reduce waste and pollution, while increasing productivity.
- Implementation Grant awards are up to \$300,000 per manufacturer, at a 50% cost share.

### Research Approach

- Pre-Assessment Information gathering from client.
- Pre-Assessment Analysis of utilities and client production.
- Day of Assessment includes introductory meeting, facility tour, debriefing, data collection and recommendations.
- Post-Assessment Recommendations are made.

### Research Results and Products

- Total dollar savings achieved for clients.
- Reduction in energy consumption.
- Clients applying for U.S. Department of Energy (DOE) Implementation Grant.
- U.S. DOE Industrial Assessment Center (IAC) certification for students.

### Commercialization and/or Societal Impact Opportunities

- **Application:** Mathematical modeling for hydrogen blending in natural gas pipelines
- **Key Values:** Analyze CO2 emission reduction and financial implication
- **Potential Customers:** Manufacturing
- **Awards:** DOE IAC Student Research Award (UC Irvine)

### Team Names & Collaborators

#### ARCS Fellows:

Faria Tahar-Binta, M.S. student in Manufacturing Systems Engineering, Student Lead at CSUN; Miller Alas, B.S. in Mechanical Engineering

#### ARCS Faculty Advisor:

Dr. Bingbing Li, Professor in Manufacturing Systems Engineering, Co-Director of SMART ITAC

#### University of California, Irvine/Cypress College:

Dr. G.P. Li, Director of Calit2, Co-Director of SMART ITAC; Chelsea Choudhary, Program Manager of SMART ITAC; Carlos Urquidi, Co-Director of SMART ITAC

### Citations

Daniela Fernanda Ruiz Diaz, Jiadong Zhao, John Minh Quang Pham, Christopher Ramirez, Huiting Qin, Adrian Jose Jimenez, Akhil Muthappa Pulianda, Chelsea Choudhary, Vince McDonnell, G.P. Li, Mathematical modeling for hydrogen blending in natural gas pipelines moving towards industrial decarbonization: Economic feasibility and CO2 reduction analysis, International Journal of Hydrogen Energy, Volume 88, 2024