

“Andromeda” Star of Energy Efficiency Nomination - Energy Systems Laboratory

The Energy Systems Laboratory is a division of the Texas Engineering Experiment Station at Texas A&M University in College Station, Texas, and part of the A&M System. Its mission is both national and international and its programs are highly unique among universities. For 22 years, the Laboratory has conducted ground-breaking energy efficiency-related research for governments, private industry, and institutions while growing to its current 100+ member staff of engineers, researchers, professors, students, programmers, and administrators with a 2006 budget of \$5 million. Its clients include US DOE and EPA, the DOD, national laboratories, airports including DFW International and Austin-Bergstrom International, numerous large universities such as Brown University, Texas Tech, and Texas A&M, K-12 schools, Fortune 100 companies such as IBM, Accenture, and Oracle, and Army medical facilities worldwide. To achieve its numerous outstanding accomplishments, the Laboratory has developed many of its own innovative techniques that are now industry-standard practices and has conducted leading research through external funding and without direct State support until 2001.

Outstanding Contributions and Leadership: The Laboratory, the largest university-based energy-efficiency research program in the U.S., has achieved very significant impacts in the field of building energy efficiency and environment quality as follows:

- 1) Licensed Technology – Pioneered the licensed process of *Continuous Commissioning*[®] (CC[®]) of buildings to optimize operations, comfort, and reduce energy use. The Laboratory was recognized by LBNL (Mills, 2005) as having one of the largest and most successful commissioning programs. CC[®] is very unique since it optimizes buildings to present use and not to “as designed”;
- 2) USDOE Industrial Assessment Center – Runs one of DOE’s most successful and longest running Industrial Assessment Centers for small industry using engineering students for 531 industrial surveys with potential savings of 2.775 Trillion Btus and \$50 Million;
- 3) World-Renowned Tech Transfer – Hosts three on-going national and international building energy and industrial efficiency technology conferences; conducted hundreds of workshops on building energy codes, monitoring and verification (M&V), building commissioning, and energy auditing; and developed FEMP guidelines for commissioning federal buildings and developed the first-of-its kind aviation industry “Best Practices Guide for O&M” for the national Transportation Research Board;
- 4) Energy and Renewable Energy Testing Laboratory – Operates a world-class, university-based laboratory for the testing of technologies for HVAC, air conditioning ducts, metering calibrations, and PV solar-film, and for fan test certification;
- 5) HVAC Technology Research – Conducts ground-breaking research on HVAC expansion valves, duct pressure drop, and development of a laminar flow measurement technique for DOE’s nuclear weapons storage program;
- 6) Monitoring and Verification – Developed the first large-scale, state program for metering and monitoring of energy retrofits for the award-winning \$96 Million Texas LoanSTAR retrofit program. The Laboratory is a nationally recognized expert in monitoring and verification of energy savings, having developed many of the verification techniques in DOE’s International Performance Measurement and Verification Protocol (IPMVP) and ASHRAE’s Guideline 14;
- 7) Energy Engineering Academics – Trained over 200 engineering graduate students who are now leading energy engineers for industry, utilities, USDOE, three national laboratories (LBNL, PNNL, ORNL), and university faculty and energy center directors located in 4 states and 5 foreign countries; and
- 8) Environmental Research – Pioneered the first EPA and Texas Commission on Environmental Quality approved methodology (and web-based emissions calculator) for determining emissions reductions from energy efficiency and renewable energy.

Energy & Environmental Impacts: The Laboratory has achieved significant, quantifiable energy and environmental impacts including:

- 1) The Laboratory has commissioned over 30 million ft² of federal, institutional, university, and commercial buildings since 1992 which has resulted in a total of over **\$75 Million and 10 trillion Btus in primary energy** savings using sub-metering, building automation systems, and monthly utility bill analysis to document savings in accordance with the IPMVP guidelines;
- 2) Emissions reductions from the Laboratory’s energy savings are equivalent to **1,400 tons of NOx and 1.2 Million tons of CO₂**;
- 3) Since 1995, the Laboratory has developed baselines, installed meters, and commissioned over 80 buildings (7.6 million ft²) on the Texas A&M campus and its five (5) central power/thermal plants with measured, weather normalized savings exceeding \$50 million, which contributed significantly to an overall **35% reduction** in campus EUI (Btu/ft²);
- 4) Continuous Commissioning[®] typically saves 15-20% of total annual energy use with an average 2-year payback making it one of most cost-effective, whole-building energy efficiency techniques today; and
- 5) If CC[®] were used as a global climate change strategy for energy use in medium-large buildings (>50,000 ft²), the technical potential can easily exceed 10-20% of existing demand reduction with minimal investments. The Laboratory’s first licensee is now readily achieving over 40 percent savings in buildings in China in support of their mandated energy demand reduction.

Transferability: The Laboratory has been highly successful at transferring its innovative programs nationally and internationally:

- 1) Continuous Commissioning[®] – In 2006, the Laboratory began licensing engineering firms to provide commissioning services. This enables rapid expansion of the engineering techniques developed by the Laboratory with a goal of \$25 million in new savings each year from CC[®] implementation within five years. Also, Austin Energy offers CC[®] rebates for its large commercial customers;
- 2) Industrial Assessment Centers – The Laboratory has helped train IAC staff at three Texas universities as well as 80 universities in the U.S. and a center in Ghana. One Laboratory graduate heads the IAC center at the University of Dayton;
- 3) Environmental Research – The Laboratory was designated the national **Center of Excellence on Displaced Emissions Reductions** by EPA (2007) for the national transfer of its innovative technique for documenting reductions. The Lab’s techniques are referenced in EPA’s national guidelines for creditable emissions calculations from efficiency and renewables; and
- 4) Academic Transfer – Fourteen graduates are faculty at American universities and in Thailand, India, South Korea, and Egypt and one of the original developers of CC[®] has created an energy systems laboratory at the University of Nebraska – Lincoln.

Summary: The Laboratory has demonstrated outstanding leadership within the research community in the development, testing, training, and tech transfer of numerous energy efficiency techniques; has over **\$75 Million in documented energy savings and 1,400 tons of NOx and 1.2 Million tons of carbon emissions reductions**; and produced over 200 outstanding energy engineering graduates. They are an invaluable national resource and would be an outstanding “Andromeda” Star of Energy Efficiency awardee.