

OKLAHOMA STATE UNIVERSITY

RURAL ENERGY ASSESSMENT CENTER

SPONSORED BY U.S. DEPARTMENT OF AGRICULTURE (USDA)



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**TOGETHER,
AMERICA PROSPER**

ABOUT US

The objective of **Rural Energy Assessment Center (REAC)** program is to implement a state-wide energy audit program to assist eligible agricultural producers and rural small businesses to decrease the demand for energy through energy conservation and energy efficiency improvements and promote renewable energy development in Oklahoma to cut down energy costs.

HOW MUCH DOES IT COST?

FREE. This type of energy audit normally would cost more than \$5,000 but USDA will cover all the cost.

BENEFITS

- REAC energy audit recommendations can help the client save around 5 to 15 % of annual energy costs and possibly operating costs, as well.
- REAC audits cover assessment of all energy consuming equipment including lighting, HVAC, building envelope and operational productivity.
- REAC team helps clients by offering recommendations and guidance about the latest and advanced solutions available in the market on an effective energy management, enhanced operational productivity and cybersecurity. The REAC assessments offer insight into industrial best practices and latest technologies currently in use.
- The energy audit findings can help the client to prioritize the most promising energy projects for implementation through USDA-Rural Energy for America Program (REAP) grants and guaranteed loans.
- The grants range from \$1,500 and \$250,000 and cannot exceed 25% of total project costs.

HOW TO GET STARTED?

Contact the REAC Director, Dr. Vora or REAC Program Coordinator, Dr. Patil if you have any question or wishes to schedule an energy audits through this USDA program.

WHAT YOU GET?

FREE SERVICE

Since the REAC is funded by the USDA, your assessment comes at **NO CHARGE WHATSOEVER AND IS ABSOLUTELY FREE!**

30-DAY REPORT

We deliver our assessment report within 30 days from the date of the assessment visit as a printed copy and by email.

FOLLOW UP ACTION

The REAC staff follow up on your implementation post assessment up to one year.

CONFIDENTIALITY

We maintain complete confidentiality of our clients and any proprietary information about your facility will remain strictly confidential

LATEST TECHNOLOGY/PRACTICES

The REAC assessments can give your company insight into industry best practices and latest technologies currently in use.

WHO IS ELIGIBLE?

AGRICULTURAL PRODUCERS & RURAL SMALL BUSINESSES

- An agricultural producer [an individual or entity directly engaged in the production of agricultural products, including crops (including farming); livestock (including ranching); forestry products; hydroponics; nursery stock; or aquaculture], whereby: (1) 50 percent or greater of their gross income is derived from those products).
- A small businesses (An entity or utility, as applicable, described below that meets Small Business Administration's (SBA) definition of Small Business as found in 13 CFR part 121.301(a) or (b), (2) located in a Rural Area or that can demonstrate the proposed project for which assistance is being applied for under this subpart is located in a Rural Area, and (3) annual expenditure toward energy bills (including electricity, natural gas, water, and all other fuels) is minimum \$25,000.

MORE DETAILS ON BACK



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INITIAL SCREENING AND PRE-ASSESSMENT ANALYSES

- Once initial contact is made with a potential client, data will be collected to determine eligibility.
- The pre-assessment phase of the process involves data collection to assure that the client is qualified and research to ensure that the site-visit time is maximized.
- Eligibility is assessed in two steps: (1) current activities, through a screening questionnaire, and (2) past activities, through historic utility/production documentation.
- An interested potential client is contacted by phone and/or e-mail in order to address the pre-assessment questions.
- Any questions as to the eligibility of a potential client will be discussed with the State Rural Development Energy Coordinator before scheduling the energy audit.

OUR SERVICES

Our energy assessments primarily focuses on

ENERGY SAVINGS

We provide the requisite industrial assessment that can ensure energy savings, and as a result lower your utility bills and possibly operational costs

INCREASED PRODUCTIVITY

We emphasize productivity issues to make processes more efficient and effective

REAC is capable of serving a wide variety of manufacturing and commercial facilities and is equipped with the technical know-how regarding the working of all energy consuming equipments including motors, pumps, HVAC systems, lighting, boilers, compressors and refrigeration systems, etc.

WE SERVE ALL AGRICULTURAL PRODUCERS & RURAL SMALL BUSINESSES IN OKLAHOMA

 MORE DETAILS ON BACK

ON-SITE PROTOCOL

- REAC personnel schedule a site visit after the client is determined to be qualified to participate in the audit program through the pre-assessment process,
- The team of 4 REAC members will do the assessments visit to the plant.
- The site visits will normally begin with a meeting of key personnel at the facility, including all specific contacts as well as associated executives that are available.
- A general work plan is outlined along with a tour of the facility, which allows the team members to become familiar with the location of equipment and the process flow.
- At this point, the team is now ready to develop a specific work plan, including assignment of data acquisition tasks, placement of measurement and data collection equipment, and identification of potential recommendations.
- Our team members will work/collect data in pairs, with intermittent meeting times to assure progress and safety.
- The field visit concludes with a closing meeting with the client's personnel including any available executive staff personnel.
- The preliminary findings of the assessment team will be discussed, and additional questions will be addressed.

HOW CAN REAP HELP ME?

Our energy programs can make you eligible for REAP grant that help fund projects that:

- Install energy efficient lighting
- Upgrade refrigeration systems
- Improve insulation, duct work, windows and other building upgrades
- Lower heating and cooling costs with heating, ventilation, and air conditioning upgrades
- Install solar panels or wind turbines
- Purchase anaerobic digesters
- Establish other renewable energy systems including geothermal or hydropower
- Convert biomass to energy, and more



CONTACTS

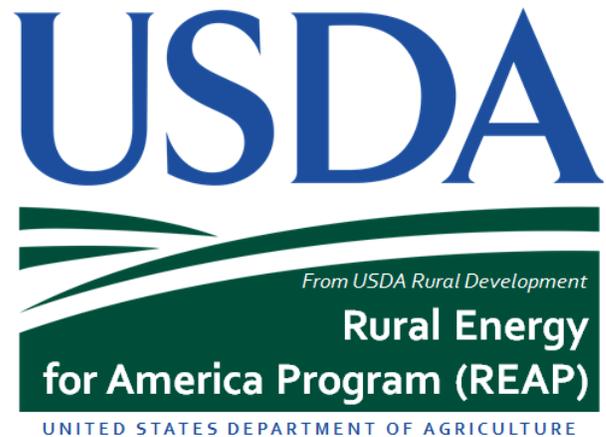
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Executive Summary

The **Rural Energy Assessment Center (REAC)** at the Oklahoma State University (OSU) Stillwater, OK campus is funded through United States Department of Agriculture (USDA) under Rural Development - Rural Energy for America Program (REAP) for providing the Energy Audits & Renewable Energy Development Assistance. The current project is funded for one-year starting from Sept 1, 2020. This center is housed in the Mechanical Engineering Technology (MET) program of the Division of Engineering Technology (DET). This division is a part of the College of Engineering, Architecture, and Technology (CEAT) at OSU. [Dr. Hitesh Vora](#), who is an assistant professor in MET, is a Director and PI of this REAC at OSU. While, Dr. Krushna Patil (MET, Visiting Assistant Professor) is a Co-PIs and Assistant Director of this REAC center.

The stated mission of our OSU REAC is to provide energy assessments/audits to the **small rural businesses and agriculture producers of the state of Oklahoma** that will help reduce energy and waste and increase productivity, while educating and training the next generation of energy, waste, and productivity professionals. Our goal is to save our clients at least 10% of their energy costs (in a cost-effective manner) as well as significant reductions in CO₂ emissions and pollutants in the energy chain. The inclusive goal here is to help Oklahoma rural and agricultural communities to: (i) develop a self-sustaining economy, (ii) introduce technological innovation that promotes productivity, (iii) develop a workforce for energy-related jobs, and (iv) improve the quality of life.

An associated goal is to produce graduates who are technically competent and able to handle all facets of client relations and communications, so that they will be prepared to serve as energy engineers/managers and be in demand with employers. In addition, our mission is to work throughout our region to coordinate with utilities (including rural and tribal cooperatives), manufacturing extension programs, and manufacturing associations in order to provide potential clients (in addition to the ones directly served) with relevant information on facility energy conservation and the establishment of effective and efficient energy management systems.

Many of the energy assessment/audit-reacted activities are overlapping with the PI and Co-PIs' current project – [Industrial Assessment Center \(IAC\)](#) at Oklahoma State University [1]. OUS IAC is completely funded by the U.S. Department of Energy (DOE) [2], with a mission to save clients energy and to train students as energy engineers (land-grant mission). The overall IAC program has already conducted over 19,129 assessments with more than 144,277 associated recommendations with average recommended yearly savings is \$137,203 [3]. The OSU IAC is one of the 31 Industrial Assessment Centers (IAC) in the U.S. [2]. The OSU IAC serves customers in Oklahoma, Arkansas, Kansas, and north and northwest Texas, including the Texas Panhandle (about 10% of the state of Texas) [1]. The OSU IAC has successfully performed just over 1000 industrial assessments since 1982,

all at no cost to our clients [1, 4]. This is one of the OSU programs that is consecutively funded for each 5-year cycle. Overall, the DOE-led IACs have accomplished the cost savings of ~ \$4.5 billion, and our OSU IAC program contributed the saving of \$308 million since 1982 (end of year 2019) [3]. This is a huge boost in the economic development in our territory that would not be possible without the support from the faculty and students who work for the center, along with the strong relationship with the stakeholders and channel partners like manufacturing extension programs, Manufacturing Extension Agents (MEAs) of OSU and Oklahoma Manufacturing Alliance, utility companies and their rebate programs, etc. Historically, MEAs offer our free energy audit services to the manufacturers, and the OSU IAC does a one-day energy audit and provides its recommendations. Later, the stakeholders and channel partners work with the clients to implement our recommendations, which is a "Win-Win" for all.

The IAC located at Oklahoma State University is a proven model that has been working well over the last 40+ years. The contracting arrangements are well understood by our research offices. The technical details of performing energy assessments (developing marketing materials, recruiting clients, communicating with clients, traveling to the audit sites, and writing the reports) have evolved to the point that the affiliates have gained an understanding of the OSU IAC pre- and post-assessment processes. The OSU IAC personnel provide a single-point interface with the DOE and Field Managers at Rutgers (NJ). Hence, responsibility for all work is very well established among the OSU IAC program personnel and management, and this proven model of energy audit will be successfully implemented for OSU REAC for effective results.

The OSU REAC program is fully supportive of the land-grant mission of OSU. This program integrates the three important objectives—community service, teaching, and research—of the land-grant mission. The REAC provides the public service of energy audits to help reduce energy and waste and to increase productivity, at the same time training students through this service-learning approach to make them capable of becoming the next generation of energy, sustainability, and productivity professionals. In addition, the REAC works with utilities, manufacturing extension programs, and manufacturing associations to educate them about energy conservation and energy management systems. Finally, the REAC team learns what practices and products work—and which ones don't. Team members share this "field research on the go" with other rural small businesses and agricultural producers as a form of consumer protection to follow the best practices.

The Energy Pyramid depicts a well-proven and a commonly adopted strategy to achieve sustained energy savings. It sets in the energy analysis, energy conservation and energy efficiency efforts at its foundation base, and as the targeted operation achieves the best possible efficiency, then advocates to move up the pyramid to consider time of use management and energy interventions. For the present REAP project, we aimed at the area of Energy Audits, which is the first step (Energy analysis) in the Energy pyramid strategy and proposed to form a new energy center named as Rural Energy Assessment Center (REAC) to implement the proposed work. In addition, it's mission will complement OSU's Land Grant mission goals, as well. Rural Energy Assessment Center (REAC) at Oklahoma State University will encompass its intended broader and long term rural energy service vision for Rural Oklahoma.

Goals & Outcomes

- Provide 15 assessments to small rural businesses and agricultural producers during the one-year duration of this project.
- Produce 3 competent and motivated student energy auditors during the one-year duration of this project.
- Provide innovative elements to support the understanding and promotion of best practices of energy efficiency and management into the rural community.
- Refine and expand our workshop-related presentations in conjunction with utility customer meetings and MEP activities.
- Design, develop, and deliver, via social media, a network that will provide both awareness of our REAC as well as accomplishments and opportunities therein.

- Initiate and maintain an alumni communication network that will track alumni and their progress along energy conservation/sustainability activities.
- Continue to partner and support student chapters of Society of Manufacturing Engineers (SME) and Oklahoma Association of Energy Engineers (AEEOK).
- Continue to support the U.S. Department of Agriculture (USDA) in its initiatives related to our REAC.

Geographic Scope & Service Area

OSU REAC will provide energy assessments/audits to the small rural businesses and agricultural producers of Oklahoma. Oklahoma is one of the geographic regions currently served by the DOE-funded OSU IAC that serves small and medium-size manufactures with annual energy cost between \$100K to \$2.5M. However, there are a significant number of small rural businesses and agricultural producers that are below the minimum requirements (below \$100K) of this DOE grant. Hence, through this USDA REAP grant these unserved rural clients will be specifically targeted for this energy audit service.

Our OSU REAC will strictly follow the above USDA guidelines for identifying and qualifying an agricultural producer and rural small business for the energy audits. OSU REAC will serve 15 clients (agricultural producer and rural small business) and conduct energy audits/assessments and will be responsible for final reports as well as implementation reporting work, cooperating with the State Rural Development Energy Coordinator, under the USDA requirements and guidelines. The specific OSU REAC process structure proposed consists of several major phases: Client Selection, Pre-assessment Analysis, On-site Assessment, Client and Sponsor Communication and Reporting, Lessons Learned, Key Health and Safety Requirements, and Innovative Elements. The offered energy audits by OSU REAC are compliance with the American Society of Agricultural and Biological Engineers (ASABE) - S612 Level 2 audits as well as the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) ASHRAE Level 2 audits.

Client Selection: A critical aspect of our REAC is the selection and development of the customer base. Our customer base will be comprised of those rural small businesses and agriculture producers (defined by USDA) meeting existing or modified requirements as expressed by the USDA. Once initial contact is made with a potential client, data will be collected to determine eligibility.

Eligibility criteria

- Must be a US rural small businesses and agriculture producers (defined by USDA)
 - North American Industry Classification System (NAICS) defined by USDA
- Annual Energy Bills (including electricity, natural gas, water, other fuels, etc.)
 - Minimum \$25,000
- Must be located in the State of Oklahoma

References

- [1] (January 31). *Industrial Assessment Center at Oklahoma State University*. Available: <https://iac.okstate.edu/>
- [2] (2020). *Industrial Assessment Centers*. Available: <https://www.energy.gov/eere/amo/industrial-assessment-centers-iacs>
- [3] U. DOE-IAC. (2020). *Industrial Assessment Center (IAC) Database*. Available: <https://iac.university/>
- [4] (2019). *Industrial Assessment Center at Oklahoma State University celebrates 1,000th Industrial Assessment milestone*. Available: https://news.okstate.edu/articles/engineering-architecture-technology/2019/industrial_assessment_center_at_oklahoma_state_university_celebrates_assessment_milestone.html