

FINAL REPORT

Conservation Innovation Grant

Energy A*Syst Assessment and Audit Tools

(Upper Midwest)

CIG AGREEMENT #68-3A75-6-150

PROJECT ACTIVITIES

The fundamental purpose of this grant was to develop energy efficiency, renewable energy, and greenhouse gas reduction self-assessment tools that could be used by producers in the upper Midwest to determine whether or not they are suitable candidates for specific technologies. These tools could also be used by energy service professionals and energy auditors.

FUNDING RECEIVED AND EXPENDED

NRCS EQIP Funding in the amount of \$216,723 was obligated for this effort.

Project Period: 08/09/06 – 08/09/07

The total expended was \$216,710.14

MATERIALS AND METHODS (“How the deliverables were accomplished”)

The tools were developed using pre-existing studies of the energy characteristics of available energy conserving technologies. Greenhouse gas emission reduction (in pounds of CO₂ equivalents) was calculated on the basis of energy saved. The tools were then implemented in a web format similar to the USDA Energy Estimator tools and are being called Energy Self Assessment tools. The tools were presented to the appropriate user groups during suitable meetings, such as the Midwest Rural Energy Council Conference, Potato Growers’ meeting, Organic Farming Conference, Farm Technology Days, and the American Society of Agricultural and Biological Engineers Annual Meeting.

Tools for renewable energy options are also based on pre-existing studies, and are ready for web implementation. These tools include:

- Solar Photovoltaic
- Solar Hot Water
- Wind Turbines
- Biogas
- Biomass

RESULTS

Energy and CO₂ reduction Self-Assessment Tools have been developed for:

- Dairy: Including milk harvesting operations including vacuum pumps, milk cooling, and water heating.
- Grain Drying: Including energy conserving options for all major on-farm and cooperative used grain drying systems and provides a comparison between different types of drying systems
- Greenhouse Operations: Including all major energy savings measures for greenhouses – double glazing, thermal curtains, heating system efficiency improvements, use of DIF, heat distribution, steam trap maintenance and central environmental controllers.
- Irrigation (crops and vegetable production): Including all major irrigation types: Center Pivot, lateral move, traveling gun, solid-set, hand-move, micro irrigation, furrow and flood. Program looks at reducing system pressure, improving pumping efficiency and reducing irrigation applications using irrigation scheduling. The program also provides a calculator so the grower can access if another energy source would reduce energy costs.
- Lighting: This tool requests a list of the lights used and hours operated and then suggests alternate lighting types that will reduce energy use.
- Livestock (Including beef): Including lighting, ventilation and water fountain tools.

- Potato Storage: Including assessing energy savings from using variable speed drives to reduce fan speeds and energy consumption during the holding period after the field heat is removed from the potatoes.
- Ventilation: Including the use of High-Volume, Low-Speed fans for loose housing of livestock and the use of higher efficiency high-speed exhaust fans.
- Water Fountain (for livestock watering): Including use of energy-free water fountains instead of using heated water fountains

All of these tools are available on-line at:

www.uwex.edu/energy/esa

All tools include an estimate of the greenhouse gas reduction (CO₂) based on the energy sources being used. This web site also includes formatting for inclusion of alternative energy calculators.

The tools were validated by means of thirty Energy Audits conducted at farms in the Upper Midwest.

POTENTIAL FOR TRANSFERABILITY OF RESULTS

The results will serve as the structural basis for nationally-appropriate tools, to be developed under NRCS 69-3A75-7-141. In addition to scaling up to nationally-appropriate tools, final audit and validation of the tools, which would have been completed under a no-cost extension, will be completed as the nationally-appropriate tools are finished.

CONCLUSIONS

The completed Energy Self Assessment Calculator will serve multiple clientele. In particular, producers will be able to use it to estimate potential cost savings, greenhouse gas reductions, and economical applications of renewable energy technology. Auditors and farm advisors will be able to use the same tools to validate proposed projects, and to compare actual results of implemented technologies with predicted results. As the library of actual results increases, confidence in the tools will increase, enabling increasingly valid decisions to be made for best practices in enhancing sustainability in agricultural production.