Energy Pyramid for Diversifying Energy Portfolios

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Abstract

Most agricultural production and processing operations are competitive and energy-intensive. Societies and governments are beginning to dictate for increased sustainability of these operations. To increase energy sustainability, people are enamored by the recent technologies of renewable energy, such as solar photovoltaics, wind machines, and biomass. But before defining a strategy for energy sustainability, one must develop a diversified energy portfolio, analogous to building an energy pyramid. A pyramid is built with the base first and then progressive layers are added until finally the apex is added. Likewise, no one should consider a renewable energy project without first developing a diversified energy portfolio consisting of specific objectives for: 1) energy conservation; 2) energy efficiency; 3) energy demand management; and 4) renewable energy technologies as the apex of the pyramid.

This presentation will identify various algorithms, decision-aides, and instructional fact sheets that have been developed and evaluated to effectively address each of the four specific objectives so that agricultural producers and processors can develop diversified energy portfolios. Emphasis will be placed on documenting cost-effectiveness of various energy conservation and energy efficiency approaches, optimizing load factors to achieve energy demand management, performing dynamic cost comparisons of various heating fuels, and establishing multi-fuel flexibility. Then criteria for selection of appropriate renewable energy technologies will be presented. Development of a diversified energy portfolio is the first step in understanding and then reducing the carbon footprint of agricultural production and processing operations.