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A New Look at Energy Sources

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Editor: **D. E. McCloud**
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Foreword

It is timely to examine energy resources as related to agriculture. Agriculture is the only large industry that converts solar energy into materials useful to man; photosynthesis is the direct and indirect source of most of man's sustenance. In primitive agricultural systems, with low inputs of outside energy, the efficiency of solar energy conversion was high. However, crop yields under primitive agricultural systems were low. As populations of the world increased and most readily available agricultural lands were utilized, man was unable to feed himself without higher crop yields. Fertilizer nutrients then became the major factor limiting agricultural production. In the industrialized countries where labor resources were scarce, agriculture was mechanized which resulted in additional inputs of energy. With these high energy inputs modern mechanized agriculture is much less efficient in the conversion of solar energy to agricultural products.

During the past 2 or 3 decades, agriculture in the industrialized countries has become increasingly dependent upon outside sources of energy to produce the food, feed, and fiber necessary to sustain growing populations. Even in the agrarian countries, fertilizer is being increasingly used to produce the needed agricultural products. The manufacture of fertilizer requires considerable energy. The rapid depletion of fossil fuel supplies has placed mankind in a precarious position. Present world populations cannot be sustained without large fertilizer inputs which require high energy. The question is how can man continue to meet the energy needs so vital to production of high food supply?

The papers in this publication consider the U.S. energy situation and agriculture's energy requirements. The possibility of new energy sources from agricultural products is presented. Finally, the improvement of the basic photosynthesis process in agriculture is considered.

Darell E. McCloud, President
American Society of Agronomy