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## ENERGY CONSERVATION AT MONSANTO

Ray E. Doerr  
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We at Monsanto want to thank you for the opportunity to tell you about our energy conservation program. We are proud of our accomplishments to date, and are very optimistic regarding plans for the future in energy conservation.

Through our five operating companies and supported by corporate departments, Monsanto directs the conservation efforts at 50 locations in the United States. We also have a very active conservation program in Canada and Europe.

As you can imagine, we are a very large consumer of energy in the forms of electricity, oil, coal and natural gas. Our annual U.S. expenditure for purchased energy in these forms will approach \$250M in 1975.

As a successful company over the years in a highly competitive industry, we have had utility and process improvement programs. The motivation of these programs was to reduce our operating costs and improve profits. However, these programs did result in substantial energy savings. Now Monsanto has no choice but to be committed to energy conservation because of the potential energy savings in the face of sky-rocketing energy costs. Today many of our plants have

experienced a 300% increase in their fuel costs since 1970, and some plants as high as a 500% increase. Insofar as the United States is concerned, we are also committed to a Federal Energy Administration, chemical industry, energy conservation goal. Therefore, Monsanto must have a strong conservation goal.

Monsanto's formal conservation program was organized in August 1973. Monsanto assigned the responsibility for organizing and coordinating our corporate energy conservation program to our Corporate Engineering Department. As coordinator of the program, I report to an Energy Advisory Board. This board is made up of representatives from our five operating companies, Corporate Engineering Department, and Energy Materials Management. This advisory board deals with energy conservation, fuel selection and energy utilization. Each operating company is responsible for the implementation of its own conservation program.

The Federal Energy Administration has a chemical industry goal which Monsanto participates in. The FEA goal is to reduce our energy consumption rate (BTU's per unit of output) by 15% between 1973 and 1980 as compared to the base year

of 1972. The government has made it very clear that some companies will have difficulty achieving 10%, while others must achieve 25% if the overall chemical industry is to meet the 15% goal. The FEA program is a voluntary program, but industry has been warned that if it does not cooperate, FEA will make the program mandatory. FEA has requested information on companies' energy conservation programs. Also they are soliciting a commitment from each company to establish a higher, long range, conservation goal. FEA representatives have visited one of our larger plants and our world headquarters in St. Louis to informally review our conservation program. As energy conservation results from industry begin to emerge, FEA will audit companies' conservation programs. The evidence is mounting that we will be living daily with the FEA, just as we do now with EPA and EEO agencies.

The Manufacturing Chemists Association has an agreement with FEA, whereby initially MCA would develop a measurement system, based on BTU's per unit of output as compared to 1972. Also, each chemical company would report its energy savings to MCA. MCA would average the savings and report the overall chemical industry performance to FEA. In March 1975, Monsanto made its first report to MCA. MCA averaged the chemical industry's performance through 1974 as compared to 1972 and reported an 8% savings to FEA.

When we started our conservation program, we did not have sufficient data to use the BTU per unit of output method, and consequently, to obtain a rapid response, we went to the activity method. This method measures BTU's of energy saved during the year from conservation, as compared to the energy used.

Monsanto now uses the FEA energy rate method (BTU per unit of output). The activity method generally gives a higher percent savings than the energy rate method. One of the reasons for the difference is that the energy rate method does not compensate for changes in energy efficiency as the production rate varies. Changes in production rate will have a major effect on percent energy savings. Therefore energy savings, using the energy rate method, will be low in 1975 because production rate has been low in 1975 as compared to 1972, even though conservation results were outstanding. The activity method is not affected by changes in production rate because it deals only with energy savings resulting from conservation activities.

To achieve the FEA goal by 1980, Monsanto management has approved certain positive actions relative to conservation. The first deals with reducing energy consumption in our existing plants. The routine energy saving activities like dialing down thermostats and repairing steam leaks have been essentially completed. Also some of the more obvious process changes have been completed. The tougher problems are ahead of us. We are now intensifying energy audits of our major energy consuming plants, and identifying and approving projects to further improve the efficiency of our operations to save energy. Many of those projects have been identified.

The second thing we are doing is developing processes and designs that will consume 15% less energy per unit of output. In most cases this will involve even more long range planning of projects, involving early consideration of energy requirements during research or process development. For every capital project, an energy

statement has to be prepared. The statement must cover:

- (1) Energy availability
- (2) Energy and utility costs for evaluating project capital alternates
- (3) Product energy rate for the project and the existing product energy rate
- (4) Percent reduction in energy rate

As a result of increased energy costs, new technology, and energy awareness programs, it is not uncommon for the energy rate of new projects to be reduced by 30%.

For our existing plants, Monsanto is committed to capital programs to improve the energy efficiency of our existing processes. Also computers are being used to monitor utility usage to determine load optimization, efficiency, and scheduling of overhaul due to drop off in equipment efficiency. At one location, a computer is used to monitor the plant electrical load and to shed non-critical electrical loads on a selected basis to prevent establishing a higher electrical demand. This is another approach to saving energy.

At Monsanto's World Headquarters this past year, a change was made in our refrigeration system for air conditioning to save electrical energy. A thermocycle system was installed on two 2000 ton refrigeration machines at the Research Center complex. The thermocycle system will permit shutting down a 2000 horsepower motor and operating a 10 horsepower motor in its place to supply the winter refrigeration load. The thermocycle system will save 2 million kilowatt hours a year, reducing Monsanto's electric bill by \$50,000. Part load refrigeration capacity is made available during the winter without the use of the compressor by the use of cold cooling tower water.

A large number of innovations have been made to reduce the energy consumption in our process departments. For example, one operating company research and development department, working with Engineering, developed a manufacturing process change that in 1974 saved over one trillion BTU's/year or \$1.5 million in electricity and fuel at one of our plants.

Also in 1974, at another Monsanto plant, \$1.2 million savings in purchased energy resulted from the installation of a new low pressure process, replacing the old inefficient high pressure process. In another plant, \$364,000 in purchased gas was saved by the installation of additional heat recovery surface in the reformer convection section, and by the burning of off gas in the reformer furnace. In another department, a \$354,000 saving was realized by the replacement of carbon steel superheater tubes with alloy tubes. This permitted higher temperature process operation, resulting in reduced steam usage and higher conversion with increased production.

In 1974, \$2.7 million energy savings have resulted in our steam generation facilities from improved combustion efficiency mainly by the reduction in excess air for combustion in twenty plants, burning of waste streams and off gases in place of primary fuel in three plants, and the installation of heat recovery surface in four plants.

As a part of our conservation program, we have developed employe awareness programs. One such program was the employe energy conservation ideas contest held during February, March, and April 1975 for more than 80 Monsanto United States locations. Monsanto's president, John W. Hanley,

announced the program in a letter sent to employees. Elements of the program included specially prepared bulletin board posters, paycheck stuffers, localized news releases and an energy display. Fifty \$500 U.S. Savings Bonds were awarded to employees submitting the best energy saving suggestions in on-the-job or off-the-job categories.

Monsanto has also produced a 25 minute film on "Energy Conservation At Monsanto". This film is intended primarily for showing to plant employees. It is designed to build an awareness for energy conservation and to communicate ways through which it can be achieved. In the film, Mr. J. W. Hanley, president of Monsanto, strongly emphasizes conservation and urges all employees to participate.