Energy Inputs to Irrigation

by J. Clair Batty, Assoc. Prof.; Mech. and Manufacturing Engrg. Dept. and Nutrition and Food Science Dept., Utah State Univ., Logan, Utah,
Jack Keller, (M.ASCE), Prof.; Dept. of Agricultural and Irrigation Engrg., Utah State Univ., Logan, Utah,
Safa N. Hamad, (A.M.ASCE), Grad. Student; Dept. of Agricultural and Irrigation Engrg., Utah State Univ., Logan, Utah,


Document Type: Journal Paper

Abstract:
Energy inputs to irrigation are dramatically increasing as irrigated agriculture expands to meet world food demands and more sophisticated technologies are developed to increase water use efficiency. In this study nine irrigation systems, designed for a specific land area, are analyzed and the total energy inputs computed for each system. The analysis includes energy inputs to manufactured components and installation as well as operation and maintenance. The expected life of each system and the energy value of salvable materials are also taken into account. It is concluded that a practical balance must be established between maximizing water use efficiency and minimizing water use efficiency and minimizing energy inputs to the irrigation system.

Subject Headings: Irrigation systems | Water conservation | Water use | Energy efficiency | Irrigation | Hydro power | Irrigation water | Sustainable development

Services: Buy this book/Buy this article

The cost to irrigate a field is determined by the amount of water pumped and the cost to apply a unit (acre-inch) of water (Figure 1). Factors that determine pumping costs include those that are fixed for a given location (in the ovals in Figure 1) and those that producers can influence. The factors that producers can influence include: irrigation scheduling, application efficiency, efficiency of the pumping plant, and the pumping pressure required for center pivot system. Pumping costs can be minimized by concentrating on these factors. Irrigators may also consider changing the type of energy used to power ... This study examines the energy balance between the input and the output per hectare for an apple orchard in the West Azarbaijan province in Iran (2008–2009). Data were collected by using random sampling method for 80 “face to face” questioners. Results showed that the highest share of energy consumption belongs to packaging (57%) and irrigation (16%). Direct energy is required to perform various tasks related to crop production processes such as land preparation, irrigation, intercultural opera-tion, threshing, harvesting and transportation of agricultural inputs and farm production (Singh 2000). Indirect energy consists of the energy used in the manufacture, packaging and transport of fer-tiizers, pesticides and farm machinery (CAEEDAC 2000; Kennedy 2000).