Chapter 8
IFDM ECONOMICS

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Chapter 8: IFDM Economics

I. Introduction

Although the cost of planning and implementing an IFDM system may be high, the potential for economic gain and to continue farming may be higher. The benefits from an IFDM strategy include the ability to produce higher value crops and manage salinity and groundwater levels, while complying with regulations.

The potential costs for the planning and implementation of an IFDM system may include:

1) Fees and professional assistance for environmental permitting;
2) Design;
3) Fee for filing a Notice of Intent with the Regional Water Quality Control Board;
4) Land preparation;
5) Surface and subsurface drainage system installation;
6) Installation and maintenance of the solar evaporator;
7) Water distribution/irrigation system;
8) Time to establish the system in whole (2-3 years);
9) Management of system operation;
10) Waste management;
11) Cropping changes; and
12) Development of the salt-tolerant vegetation section.

II. Cost Breakdown

Additional annual costs, not commonly considered, may include the opportunity cost; taxes; assessments on land used for the solar evaporator and salt-tolerant crops; interest and the amortized rate; and length of time to amortize the initial costs of the surface and subsurface drainage system and solar evaporator.

Furthermore, as soil salinity is reduced with an IFDM system and the production of higher value crops becomes possible, an increase in the revenue and value of the farm may be realized. Input costs, such as water, fertilizer and pesticides, may be reduced depending on past cultural practices.

Additional costs to be considered are plant selection, economies of scale, operation and maintenance, and initial and fixed costs.

A. Plant Selection

Plant selections for Stages 3 and 4, which include salt-tolerant crops, forages, trees and halophytes, can affect the crop revenue and land value. The costs associated with plant selection include establishment cost, cultural cost and the value or marketability of the crop.

Some salt-tolerant agronomic crops may be produced in Stage 3 with the higher salinity drainage water, but reduced yields must be considered. In addition, consideration and value must be given to the IFDM system benefits offered by the selected salt-tolerant plants, specifically water use and salt tolerance. The function of these stages is to concentrate salts by using drainage water in a productive way, thus minimizing the amount of water to be processed in the solar evaporator.

B. Economies of Scale

The cost of a complete system could range from $800 to $1,000 per acre depending on the size of the project. A large portion of the budget will be the subsurface drains, the drainage water distribution system, irrigation for salt-tolerant forage crops, and the salt harvest area. The cost of the engineering and CEQA compliance also are significant and should be considered. Any annual costs associated with the Stage 3 and 4 crop areas, the solar evaporator, and regulatory compliance become a cost of doing business (overhead) to be applied to the total IFDM project. The larger the project area, the lower the annual per-acre charge for these expenses.

The average cost of an IFDM system increases as the size of the solar evaporator increases and/or rental rate or opportunity cost of land increases. Improving irrigation management and efficiency will be the key to minimizing the size of the solar evaporator.

Moreover, minimizing the size of the solar evaporator maximizes the land available for production. The size of the solar evaporator is a function of the irrigation management practices and the volume of drainage water collected.

C. Operations & Maintenance Costs

The operations and maintenance costs of the farming operation may increase due to the enhanced level of management and the additional equipment required to transport subsurface drainage water between field stages. Monitoring and reporting should be included in the operations and maintenance budget. The annual operations and maintenance cost for an IFDM system will range from $100 to $120 per acre, depending on the level of monitoring required.

D. Initial, Fixed & Variable Costs

Table 1 shows the estimated costs of installing, operating and maintaining the solar evaporator and the estimated annual costs of land used for the evaporator, salt-tolerant crops, forages and halophytes. It includes the fixed costs, initial costs for a subsurface drainage system, initial costs for a solar evaporator and operations and maintenance costs.

The initial cost for the simplest solar evaporator is approximately $1,000 per acre, which may include a sprinkler system, engineering analysis, construction costs and materials (pipe, pumps and sprinklers for water distribution).

The initial cost for the design and construction of the subsurface drainage system is approx-

Table 1: The estimated costs of installing, operating and maintaining the solar evaporator and the estimated annual costs of land used for the evaporator, salt-tolerant crops, forages and halophytes. Assume costs to be amortized over 10 years and an interest rate of six percent.

Item	Initial Cost ($/acre)	Annual Cost ($/acre)
The Subsurface Drainage System		
Estimated installation cost	400.00	
Amortized installation cost		35.58
Operations & Maintenance		5.00
Sum of estimated annual costs for the drainage system		40.58
The Solar Evaporator		
Estimated installation cost	1,000.00	
Amortized installation cost		137.48
Operations & Maintenance		120.00
Taxes and assessments		25.00
Rental or opportunity cost		150.00
Sum of estimated annual costs for the evaporator		432.48
Land Used for Salt-Tolerant Crops and Forages		
Taxes and assessments		25.00
Rental or opportunity cost		150.00
Annual production costs		339.00
Sum of estimated annual costs for salt-tolerant crops		514.00
Land Used for Halophytes		
Taxes and assessments		25.00
Rental or opportunity cost		150.00
Annual production costs		200.00
Sum of estimated annual costs for halophytes		375.00

imately $400 per acre, including engineering analysis, construction costs and materials.

The fixed costs include annual amortized costs of the subsurface drainage system, solar evaporator and rental or opportunity cost of the land for the solar evaporator.

After determining the fixed cost to include an IFDM system into the farming operation, it is important to determine the variable cost for the system. Variable cost items may include the operations and maintenance, IFDM manager, installation and production cost for the salt-tolerant crops and forages and compliance with environmental and wildlife regulations.

However, the fulltime IFDM system manager can greatly offset the costs associated with regulatory compliance. This manager's responsibilities should include a complete understanding of the significance of the environmental and wildlife regulations, (i.e., draft Title 27 draft regulations). If the regulations are not met, operations and maintenance costs for the system can dramatically increase.

III. Funding Sources

The three main funding sources to plan, design and implement an IFDM system are private financing, bank loans and grants. Grant programs may be from a public source (federal, state, regional and/or local), or from a private source. If the public grant source is used, it is important to remember that any financial records become public documents and are open for public review, and automatically require the implementation of CEQA and/or NEPA.

Current public grant programs may include:

- A state revolving fund available to growers in Westlands Water District for capital improvements to implement source reduction (subsurface drainage and irrigation equipment).
- The Federal USDA-NRCS EQIP grant program with funds available to growers for installing subsurface drains.

There are many funding resources available for possible grants and/or loan programs. Contact the local office of the following agencies or look on the Web for more information:

Federal

- U.S. Department of Agriculture – Natural Resources Conservation Service
- U.S. Department of Agriculture – Agricultural Research Service
- U.S. Department of the Interior – Bureau of Reclamation
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency

State

- Bay- Delta Authority (formerly CALFED Bay-Delta Program)
- California Department of Water Resources
- State Water Resources Control Board
- Central Valley Regional Water Quality Control Board
- California Department of Fish and Game
- California Department of Food and Agriculture
- University of California Cooperative Extension Service
- California State University, Fresno – Center for Irrigation Technology

Regional/ Local

- Resource Conservation districts
- Water and Irrigation districts

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