

Assignment 2: Evaluating New Technologies for Waste Disposal

Suggested Answers

Table of Costs and Benefits (in dollars):

	Lagoon/Sprayfield	EST
New farmer:		
Private Marginal Costs	16.00	28.00
Private Marginal Benefits	23.50	26.50
Old farmer, existing technology:		
Private Marginal Costs	4.00	
Private Marginal Benefits	23.50	
New farmer:		
Social Marginal Costs	32.00	32.00
Social Marginal Benefits	23.50	42.50

Please note: **social marginal costs and benefits include both private marginal costs and benefits and external costs and benefits.**

Most of these entries are easily derived from the costs and benefits provided in the problem set. The Social Marginal Benefit for EST is a bit tougher. Note that the power companies receive \$0.10 per kilowatt-hour for their product from consumer, and so we can think of that as the social benefit of electricity generation. If we use that price to value the electricity generated by the farmer under EST and add that amount to the \$22.50 in revenue for hogs, we get the \$42.50 reported in the table. The farmer only receives 1/5 of that from the power company, and that smaller amount is put into the Private Marginal Benefits for EST.

1. The private marginal cost and benefit per hog of the lagoon/sprayfield technology is given in the table above, both for those who have already equipped their hog farms and those considering starting a new hog farm.

There are no fixed costs, here, as they are all defined “per 1000 hogs” for new farmers (who are still choosing their scale of operations). For an existing farmer with a fixed scale of operation, the payment for installation costs is both a fixed cost and a sunk cost – she will have to pay that cost whether or not she continues operation.

2. The social marginal cost and social marginal benefits of the lagoon/sprayfield technology are given in the table above. Social marginal costs include private marginal costs and the external costs to NDR. Social marginal benefits include the private

marginal benefits and the added benefit to the power company of the electricity generated (in other words, the electricity is valued at its marginal cost to the consumer).

3. Society does prefer the EST to the lagoon/sprayfield technology, whether old or new farmer. The social marginal benefits exceed the social marginal costs by \$10.50 per hog for EST, while the comparable figure for a new lagoon/sprayfield operation is -\$8.50. For existing farms, the similar calculation yields net social benefits of \$3.50 per hog.

4. The farmer will not adopt the EST given the current structure of costs and benefits, because there is a private loss of \$1.50 per hog from its operation. The lagoon technology, if the farmer is already in operation, is yielding net marginal profits of \$19.50.

5. The text (chapter 10) identifies three techniques for reducing externalities: negotiation, adjudication, and legislation. I evaluated your answers on these for clarity and for application to this specific example.

6. Mike Williams is correct. There are net social benefits of \$10.50 per hog from allowing a new hog farm to operate, so long as the technology used is EST. New farms using the old technology, by contrast, lead to a per-hog loss of -\$8.50.

7. If the power company offered to buy electricity from the finishers at 8 cents per kilowatt/hour, it will not change the answer to question 3. The power company's offer just redistributes the gains from electricity generation but does not change the social benefits and costs. The offer does change the answer to question 4, however, because private marginal benefits from EST become \$38.50. Even with private marginal costs of \$28.00, there is a \$10.50 net profit per hog.

Grade distribution

96 – 100	0	
91 – 95	2	
86 – 90	2	
81 – 85	2	Mean: 79.3
76 – 80	5	Median: 80
71 – 75	2	
61 – 70	1	
0 – 60	1	
Missing	2	
Total	17	