
KS652.1106 State supplement - economic evaluations

General information

There are numerous computer programs in visual basic (.vbs) and executable (.exe) files and spreadsheets that are available to perform economic analyses for comparison of irrigation system costs. The Kansas State Research and Extension offices have personnel available to assist with irrigation economics.

The Kansas State Research and Extension centers now have a program that can perform an economic evaluation of a pumping plant that looks at improving the efficiency of the pump and/or motor. It also evaluates replacing the existing power plant with a power plant that uses a different type of fuel.

Kansas State Research and Extension has Publication MF-836 titled "Irrigation Capital Requirements and

Energy Costs" that is available at
<http://www.oznet.ksu.edu/library/agec2/mf836.pdf>.

Refer to [Table 11-2](#) for the cost factors (amortization) that are computed using the following equation:

$$\text{Ordinary Annuity of a Present Value (Amortized Value)} = PV \times \frac{(i \times (1 + i)^N)}{((1 + i)^N - 1)}$$

Where: PV = Present value of a single sum
i = Interest rate per compounding period
N = Number of compounding periods

Using this formula, amortization values for other interest rates and time periods can be generated.

This value is the annuity which is needed over a specified number of periods at a given interest rate which is equivalent to a given present value.

To assist with the economic analysis, refer to [Table KS11-1](#) and [Table KS11-2](#).

Table KS11-1 Estimated Life Expectancy of Systems

Item ^{1/}	Expected Life	
	Years	Hours
Irrigation systems		
Center pivot	20 to 25	
Side role	15 to 20	
Microirrigation - above ground	20	
Microirrigation - subsurface drip irrigation (SDI)	20	
Solid set	20	
Big gun	10	
Ditches (earthen needs greater maintenance)	25	
Reservoir	25+	
Pipelines		
Aluminum	15	
Galvanized steel	15	
Plastic	20 to 25	
Concrete	20 to 25	
Gated	10	
Miscellaneous		
Valves	12	
Measuring devices	12	
Automation equipment	12	
Pipe trailers	15	
Sprinkler heads	10	
Well casing	15 to 20	
Power unit		
Propane, natural gas and diesel (KSU staff expects diesel to last longer)	14	28,000
Water-cooled gas	9	18,000
Electric	25+	50,000
Pump, turbine		
Bowl (about 50% of cost of pump unit)	8	16,000
Column, etc. (KSU staff say treated same as "Bowl")	16	32,000
Pump, centrifugal	16	32,000
Power transmission		
Gear head	15	30,000
V-belt	3	6,000
Flat belt, rubber, and fabric	5	10,000
Flat belt, leather	10	20,000

Source of Data: Table CO689.42 in the Colorado Irrigation Guide dated December 1988

^{1/} Estimated average life expectancy - These are averages and may change for particular situations. Equipment may have a lesser life when animal wastes are used.

The expected life for center pivots has been changed based on information from the Kansas State University Department of Biological and Agricultural Engineering staff.

Table KS11-2 Average Labor Required for Various Irrigation Systems

Type of System	Required (hours per acre per irrigation)	Average Labor Required (hours per acre per irrigation)
Hand-moved		
Portable set	0.50 to 1.50	1.00
Solid set	0.20 to 0.50	0.35
Tractor-moved		
Skid-mounted	0.20 to 0.40	0.30
Wheel-mounted	0.20 to 0.40	0.30
Self-moved		
Side-wheel-roll	0.10 to 0.30	0.20
Side move	0.20 to 0.30	0.20
Self-propelled		
Center pivot	0.05 to 0.15	0.10
Side move	0.05 to 0.15	0.10
Single Sprinkler		
Hand-moved	0.50 to 1.50	1.00
Self-propelled	0.10 to 0.30	0.20
Boom-sprinkler		
Tractor-moved	0.20 to 0.50	0.35
Self-propelled	0.10 to 0.30	0.30
Permanent		
Manual or automatic	0.05 to 0.10	0.075
Microirrigation	0.05 to 0.15	0.10
Surface system		
Automated furrow	0.05 to 0.15	0.10
Level border (automated)	0.05 to 0.15	0.10
Level furrow	0.10 to 0.50	0.30
Surface - graded		
Graded border	0.20 to 1.00	0.60
Contour ditch	1.00 to 2	1.50
Graded furrow	0.40 to 1.2	0.75
Corrugation	0.40 to 1.2	0.75
Contour furrow	0.50 to 1.5	1.00

Source of Data: Table CO689.44 in the Colorado Irrigation Guide dated December 1988