

CENTER PIVOT AND DRIP IRRIGATION SYSTEMS COMPARISON

INCREASING ROI

THROUGH EFFICIENT CENTER PIVOT IRRIGATION SOLUTIONS

HIGHER YIELDS... LOWER COSTS...
PRECISION APPLICATION



Why center pivot irrigation is a better investment

Center pivot irrigation systems are the leading method of crop irrigation in many agricultural zones across the world.

Field-proven center pivot systems are steadily replacing, traditional flood irrigation and other types of sprinklers, and also subsurface drip irrigation (SDI) in some instances.

A great number of irrigation conversions are being made to offset farm labor shortages but, as an added benefit, center pivots are also highly efficient with up to 95% efficiency in terms of application uniformity.

California State University's Center for Irrigation Technology maintains that center pivots adapt most

easily to the greatest number of conditions, such as soil type and topography.¹

Mechanical move irrigation has been at the leading edge of farming technology. This makes it a better management tool for increasing efficiency, so growers can stay competitive.

¹ <http://www1.eere.energy.gov/inventions/pdfs/nwpreag.pdf>

THE COST-SAVING, EFFICIENT AND LONG-LASTING SOLUTION

• Fully automated

- State-of-the-art controls for precise irrigation management and scheduling
- Accurate water, chemical and fertilizer usage reports
- Remote control and monitoring capability via internet and cell phone

• Versatile

- Multiple crops under one circle
- Crop rotation – no need to change emitter spacing for different crops

• Efficient

- 90-95% efficiency in varied climates and all soils
- Even water distribution
- Reduced deep percolation and runoff of chemicals
- Uniformity little affected by wind when using drops – 89-91% efficiency with 18.6 mph (30 km/hr) winds²
- Irrigates slopes up to 30%
- No salt buildup
- Low per acre/hectare investment cost

• Reliable

- 20+ year operation with regular maintenance
- High-quality components

• Eco-friendly

- 95% recyclable components
- Simple removal from fields
- Resale capability

² Hart, W.E., and Heerman, D.F., "Evaluating water distribution of sprinkler irrigation systems," Colorado State Univ. Exp. Sta, Tech. Bul. 128, Ft. Collins, CO, 80523, 1976



THE FIRST LINDSAY PIVOT
IN OPERATION SINCE 1969

Why pivots/laterals?

**CENTER PIVOT
IRRIGATION
SYSTEMS
INCREASE MOST
CROP YIELDS
BY AT LEAST 20%**



Zimmatic on sugar cane

Applying the correct amount of water at the right time is crucial to achieving a good yield, but it's also important to apply it uniformly and at precisely the right amount.

Higher return on investment

The long life of a pivot or lateral system will save you money year after year. You'll use less water, reducing your energy costs. A Zimmatic pivot or lateral system also applies chemicals and fertilizers evenly, accurately and inexpensively. All this adds up to consistently higher yields.

Pivots/laterals v. drip

Better return on investment

A pivot or lateral system costs less per acre (hectare) to install. For example, a drip system costs over 200% more than a pivot system to install on 125 acres (50 hectares).³ On larger fields, the cost difference

is even greater. The irrigation efficiency is similar with use of drops and Low Energy Precision Application (LEPA) nozzles (95% v. 97%).⁴ Pivot systems also retain a high resale value, whereas SDI systems cannot be resold.

Fewer maintenance hassles and labor costs

Compared to an SDI system, maintenance is extremely simple for pivot and lateral systems. There is no emitter clogging by small contaminants or lime/calcium deposits, and no filter maintenance – it requires only a screened intake. Rodents, roots and cultivation equipment won't damage a center pivot system. Even algae and chemicals aren't issues. SDI systems need to be monitored regularly because problems may be hard to pinpoint, arise quickly, and prove difficult to fix. The potential of salt buildup at the

perimeter of wetted area is another concern. When crops draw water up into the root zone, the water evaporates, leaving salt around the roots – which can interfere with the ability to absorb water.

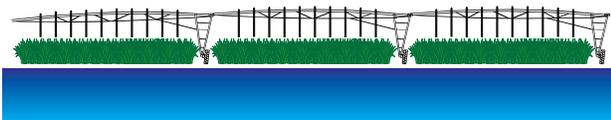
More benefits for the grower and the environment

A pivot/lateral system can be monitored and controlled remotely. A grower can quickly apply water after seeding and as often as needed after that. It's also easier on the field. If the equipment needs to be removed or replaced, it won't damage the field. Not to mention the fact that pivot systems are nearly 95% recyclable.

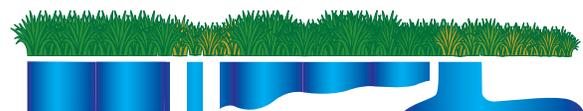
References

³ Freddie Lamm, Daniel O'Brien, Danny Rodgers, Troy Dumler, *Sensitivity of Center Pivot Sprinkler and SDI Economic Comparisons* American Society of Agricultural Engineers (ASAE) Meeting Paper #MC02-201, 4/2002.

⁴ "Economics of Irrigation Systems" – B-6113, Texas Cooperative Extension, Texas A&M University, 12/2001.



Pivot/lateral irrigation – uniform application throughout the field and on any terrain



Drip irrigation – uneven and interrupted application due to clogging and rodent damage

Pivot vs. drip comparison

| PIVOT/LATERAL MOVE | DRIP |
|---|---|
| Best for fields larger than 65 acres (26 ha) o Special models for smaller fields | Best for vineyards, orchards, small vegetable fields |
| Low investment cost per acre/hectare | High investment cost per acre/hectare, especially for sandy soils and closely spaced crops |
| No filtration required | Requires filtration of 120 to 200 mesh |
| Efficient water use (90-95%) | Efficient water use (90-95%) |
| Little or no runoff | Little or no runoff |
| 20+ year life | 1 to 10 year life span |
| Low maintenance costs Easy to maintain | High maintenance costs including labor for inspection o Filter maintenance needed to prevent clogging o Possible root intrusion clogs emitters More complex to maintain, including weekly chlorination |
| Components not damaged by rodents | Rodent damage to drip tubing/tape |
| No flushing | Daily flushing, dirty water requires frequent flushing -1% wasted water |
| No salt buildup at irrigation zone | Salt buildup at irrigated/non-irrigated zone boundary o Difficult to correct o Reduced soil structure/porosity o Soil amendments required o Large volumes of high quality water required |
| Complete automation o FieldNET allows full remote control monitoring via Internet with text message alerts | Local standalone controllers only |



Drip irrigation creates salt buildup at irrigated/non-irrigated zone boundary.

Photo courtesy of Dr. Michael McCarthy, South Australian Research & Development Institute

| IRRIGATION SYSTEM SELECTION | | |
|-----------------------------|--|--|
| | Pivot/lateral move | Drip |
| Crops | Field crops • Vegetables • Sugar cane • Trees • Other tall crops up to 16.4 ft. (5 m) | Some field crops (high cost for closely spaced crops) • Vegetables • Sugar cane • Trees |
| Field size | Large, medium and small | Most effective on medium and small or oddly-shaped |
| Slope | 0-30% | PC drippers limited to 5.8- 43psi (0.4-3 bar) – relatively flat across field |
| Labor | Low | Medium |
| Management required | Low to medium skill | Medium to high skill |
| Efficiency | 90-95% | 90-95% |
| Other limitations | | Light & sandy soils • Dirty water requires frequent filter flushing – 1% wasted water • Costlier on large farms • Closer emitter spacing required • Clogged emitters are only detected by localized crop water stress |

Increasing ROI through pivot irrigation

A study comparing pivot irrigation with SDI indicated that for 160 acre (65 ha) fields, SDI had a distinct disadvantage in net returns of \$21.85 per acre (\$54/ha).

- Results were dependent on SDI life – unprofitable for a lifespan of less than 10 years.
- Corn yield, price changes and drip line costs affected SDI profitability.

Source: An Economic Comparison of Subsurface Drip and Center Pivot Irrigation Systems, D.M. O'Brien, D.H. Rogers, F.R. Lamm, G.A. Clark, Kansas Agricultural Experiment Station, Paper No. 98-123-J. ASAE Paper No. 97-2072.

The economics of pivot irrigation vs. drip irrigation relative to field size

- Lower investment cost per acre than SDI for a savings of 20-200% – 65% lower for 125 acres (50 ha)*
- Longer system life – 20+ years for pivot irrigation compared to 10 years for SDI
- Mortgageable and recoverable asset with realizable resale value
- Easier to finance
- Removable
- 95% recyclable materials

* Source: Freddie Lamm, Daniel O'Brien, Danny Rodgers, Troy Dumler, *Sensitivity of Center Pivot Sprinkler and SDI Economic Comparisons* American Society of Agricultural Engineers (ASAE) Meeting Paper No. MC02-201, 4/2002.

IRRIGATION SYSTEM COSTS (125 ACRE/50 HA SYSTEM)

| Costs (USD) | Pivot Low Drops | Subsurface Drip |
|---|-----------------|-----------------|
| System Cost | \$59,500 | \$153,500 |
| Repairs as Percentage of System Cost | 4% | 6% |
| Repair Costs | \$2,380 | \$9,210 |
| Labor Requirement (Hours) | 125 | 500 |
| Labor Costs at \$10/hr | \$1,250 | \$5,000 |
| Total | \$63,130 | \$167,710 |

Source: Irrigation Capital Requirements and Energy Costs, Kansas State University.
Irrigation Factsheet, British Columbia Ministry of Agriculture and Goods. Irrigation Costs, Division of Agricultural Sciences, University of California.



**MORE VALUE
OUT OF
LESS WATER**



Why Lindsay?

Tough, dependable Lindsay irrigation systems have been the choice of the world's irrigators for more than 30 years. Lindsay irrigation systems pay for themselves many times over during their lifespan, and alleviate risk when weather conditions are not ideal for planting and growing conditions.

Yields: maximized

A Lindsay irrigation system can provide proper application to every part of a field throughout the growing season, even in those areas that are currently underutilized. Only Lindsay offers powerful, easy-to-use GrowSmart™ irrigation management products.

Energy, water, labor and time: saved

When compared to other irrigation methods, a Lindsay system will help maximize crop yields while using less energy, water, labor and time. Flexible, intuitive GrowSmart control products make scheduling

and operation simple, while Web-based remote control options offer comprehensive monitoring and management.

Application: precision

Zimmatic dealers analyze each grower's operation to customize a sprinkler package based on crop and climate conditions.

Downtime: minimized

Lindsay irrigation systems are designed and engineered for life on the farm. They're constructed using only the highest quality components for superior performance season after season.

Support: certified

Our network of certified dealers is trained to customize, install and service our entire range of irrigation systems.



Watertronics – Customized pump stations for maximum efficiency

Each pump station is engineered based on your needs and field conditions to ensure peak performance.

- All components are integrated and housed in one complete unit
- Precision energy efficiency
Variable Frequency Drive provides immediate energy savings
- Simple monitoring and control
- Continuous surge-free pressure regulation for enhanced efficiencies
- Horizontal and vertical pump stations available

Also available as an economical pump control upgrade for existing pumps.



Machines to fit your field

Zimmatic offers irrigation options like center pivots, lateral moves or MAXField Custom Corner systems that can handle anything from irregular fields to rugged terrain to multiple crops.



Durability

Heavy-duty spans, trusses and drive trains deliver even water distribution. There are varying heights to provide the proper irrigation for different types of crops – proven to withstand the elements in nearly any environment.



Control panels

Depending on your needs, each user-friendly GrowSmart control panel offers a different level of control, convenience and maintenance options.

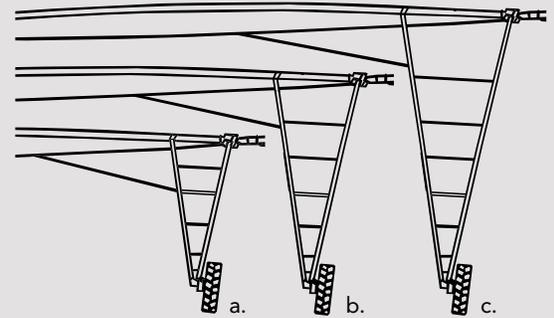
The right pivot option for any field or crop

Lindsay has the pivot options to increase water efficiency and maximize yield. Lindsay offers durable parts, quality components and a range of tower heights for crop clearance and stable operation on varying terrain.

Ultra high clearance towers for citrus, bananas and other tree crops. High clearance for sugar cane.



Height options for every field



DURABLE HEIGHT OPTIONS PROVIDE NEEDED CROP CLEARANCE AND STABLE OPERATION IN VARYING TERRAINS AND FIELD CONDITIONS

- a. Standard Height
- b. High Clearance
- c. Ultra High Clearance



Zimmatic on tomatoes



Customized sprinkler packages

Rotating-spray, fixed-spray and LEPA sprinklers provide a variety of coverage and pressure solutions to fit your specific field/crop conditions and needs.



SmartDesign

This program allows the dealer to design and review with you an irrigation system that fits your specific field to optimize acreage utilized for increased ROI. Determine field boundaries, obstacles, system length, and total irrigated acres to increase application accuracy and efficiency.



FieldNET™

FieldNET builds a network between pivots, providing full control and monitoring capabilities. It's the industry's first completely Web-based, real-time irrigation management system that provides a view of every pivot, including location, status and water usage. Managing pumps is more efficient with a pump control service package.

Zimmatic on potatoes



An international irrigation leader

Lindsay has a worldwide dealer network with warehouses in Nebraska, Texas and Idaho; factories in the United States, China, Brazil, France, and South Africa; and additional sales offices in Argentina, Australia, China, Egypt and Guatemala.

We can coordinate a variety of resources to implement turnkey irrigation systems wherever they're needed, through our dealer network or Lindsay resources.

For more information, visit www.zimmatic.com or talk to your Lindsay dealer.



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Lean, Clean and Green. Lindsay Corporation is committed to developing environmental awareness and implementing sustainable practices to reduce the use of and protect energy, water, and all other resources.



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