

CONVERTING FROM GRAVITY FLOW



## INEFFICIENCIES OF FLOOD IRRIGATION

- Uneven application
- Excess water runoff
- High labor demand



WATER RUNOFF IN FLOOD IRRIGATED FIELD



EFFICIENT WATER AND CHEMICAL APPLICATION WITH CENTER PIVOT IRRIGATION SYSTEMS



LOW ENERGY PRECISION APPLICATION (LEPA)

## FAQs

**Q:** What are my conversion options?

**A:** Most producers converting to mechanical move irrigation choose center pivot or lateral move systems. A typical seven-tower Zimmatic pivot will cover 131 acres (53 ha) of a standard quarter section. Add a corner arm and you can cover up to 154 acres (62 ha) or, in a rectangular 240 acres (97 ha) field, up to 182 acres (74 ha). Zimmatic mobile pivots also give you the option of using one system on multiple fields. A lateral move gives you equal versatility, plus the ability to irrigate up to 98 percent of square or rectangular fields.

**Q:** Will my present water source be adequate?

**A:** In most cases, yes. In fact, acre-for-acre, mechanical move irrigation saves 30 to 50% of water over gravity flow irrigation.

**Q:** What kind of power will I need?

**A:** Zimmatic systems require a 480-volt, three-phase power source which can be supplied either by a buried line between the power grid and the pivot, or by an engine-powered generator at the site. If three-phase power is not available, a phase converter can be used to adapt available 230- or 480-volt single-phase commercial power.

**Q:** Where is the best system location?

**A:** Your Zimmatic dealer will consult with you on the best location and discuss what site preparation will be needed. His recommendation will balance maximum coverage of the field and safely avoiding obstacles that may affect system operations.

## Converting from flood irrigation

The reasons are clear – when you convert to mechanical move irrigation, you're using a proven method of conserving water and improving your return on investment in time, labor, fertilizer and chemicals, while virtually eliminating deep percolation and runoff.

	SPRINKLER		GRAVITY FLOW	
	Average Yield per acre (MT/ha)	Average Water Applied feet (mm)	Average Yield per acre (MT/ha)	Average Water Applied feet (mm)
<b>Corn (grain)<sup>1</sup></b>	197 bu (12.36)	1.1 (335)	191 bu (11.98)	1.4 (426)
<b>Soybeans<sup>1</sup></b>	57 bu (3.83)	0.8 (243)	51 bu (3.43)	1 (304.8)
<b>Sugar Beets<sup>2</sup></b>	30 tons (67.3)	2.4 (732)	28 tons (62.8)	3.2 (975)
<b>Peanuts<sup>1</sup></b>	4,555 lb (5.1)	0.7 (213)	3,831 lb (4.27)	0.8 (243)
<b>Potatoes<sup>1</sup></b>	414 cwt (51.9)	1.7 (518)	244 cwt (30.6)	1.5 (457)

## SAVINGS

CORN	SOYBEANS	SUGAR BEETS	PEANUTS	POTATOES
<b>3% MORE YIELD</b>	<b>12% MORE YIELD</b>	<b>7% MORE YIELD</b>	<b>19% MORE YIELD</b>	<b>70% MORE YIELD</b>
<b>21% LESS WATER</b>	<b>20% LESS WATER</b>	<b>25% LESS WATER</b>	<b>13% LESS WATER</b>	<b>13% LESS WATER</b>

Table Sources: <sup>1</sup>Farm and Ranch Irrigation Survey, 2013; <sup>2</sup>Farm and Ranch Irrigation Survey, 2003

This information should be used as a guide and is not intended to be a guarantee on cost of ownership or yield improvement. Actual results may vary due to soil make-up, water quality, chemigation, fertigation, regional climate, management practices, crop selection, irrigation techniques and marketing.

## More value out of less water

The correct amount of water on your crop at the right time is crucial to getting top yields, but it's also important to apply it uniformly. Zimmatic irrigation systems bring a cost-effective solution to alleviate risk when the weather turns dry.

A well designed, maintained and managed center pivot irrigation system can provide a high level of irrigation application efficiency and distribution uniformity. It offers the ability to apply a range of application rates to meet changing crop water requirements, and it can be re-nozzled if needed to adapt to changing irrigation capacities.

A key to efficient irrigation management through center pivot application is optimizing irrigation scheduling (depth and timing) to meet the crop water demand with an application rate (precipitation rate) to match soil permeability.<sup>1</sup>

<sup>1</sup> <http://www.ksre.ksu.edu/irrigate/OOW/P09/Porter09.pdf>

<sup>2</sup> Freddie Lamm, Daniel O'Brien, Danny Rodgers, Troy Dumlal, "Sensitivity of Center Pivot Sprinkler and SDI Economic Comparisons," American Society of Agricultural Engineers (ASAE) Meeting Paper. #MC02-201 (4/2002).

**Increases yields through more uniform application**

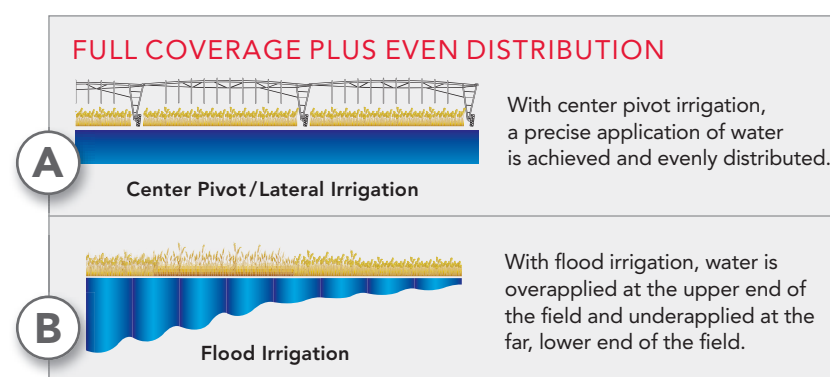
Gravity flow irrigation has changed very little over the years, but mechanical move irrigation has kept up with farming technology, making it a more efficient management tool so you can stay competitive. Uniform application of water, chemicals and fertilizers generally results in improved plant yield, growth and quality. A Zimmatic irrigation system can provide proper application to every part of your field throughout the growing season, even in those areas that are currently over- or under-irrigated. If you have fields where water retention is poor, especially with sandy soils, using a pivot irrigation system can increase your yields by 10% up to 50%.<sup>2</sup>

**Reduces waste**

Because water and chemicals are applied uniformly over the field, a pivot or lateral system produces less waste, especially when compared to flood. With a Zimmatic system, you get even, precise water application across the field (Figure A), rather than having too much water at one end and not enough water at the other end (Figure B). Plus, you won't lose water to overirrigation because you can control the timing and amount of water that is applied. Eliminating runoff and deep percolation helps prevent contamination of the water table and nearby streams.

**Lower seasonal labor and maintenance costs**

The Zimmatic system is automated, so no one has to move pipes, or open and close gates. In fact, there's virtually no labor required to apply water. Plus, remote control and monitoring options are available. There is no emitter clogging, and no filter maintenance – it requires only a screened intake.



Comparable Pivot and Flood Operation Costs*			
	Flood	Pivot	Pivot Savings
<b>Annual fuel cost (diesel at \$3.50/gal)</b>	\$14,918	\$11,987	\$2,931
<b>Annual labor cost (at \$12/hr)</b>	\$2,880	\$624	\$2,256
<b>Operator labor (hrs/acres)</b>	1.5	0.4	75% reduced

\* Chart costs are based on studies from the University of Nebraska: "Estimated Irrigation Costs, 2001"

## The highly efficient irrigation option

The less efficient the irrigation system, the more effect that fuel price, pumping lift, and wage rate have on the cost of producing an irrigated crop.

As a result, when there is inflation or volatility with these cost factors, it is more feasible to adopt more efficient irrigation systems and technology.

### BASIC ASSUMPTIONS FOR IRRIGATION DISTRIBUTION SYSTEMS

IRRIGATION SYSTEM	OPERATING PRESSURE (PSI) <sup>1</sup>	APPLICATION EFFICIENCY (%)	EFFICIENCY INDEX	ACRES IRRIGATED
FURROW	10	60	1.47	160
LOW ENERGY PRECISION APPLICATION (LEPA)	15	95	0.93	125

<sup>1</sup>PSI – pounds of pressure per square inch of water

### WATER PUMPED FOR THREE CROP SCENARIOS AND IRRIGATION SYSTEMS IN TEXAS

IRRIGATION SYSTEM	APPLICATION EFFICIENCY (%)	APPLICATION EFFICIENCY INDEX	HIGH WATER USE (in./ac)	INTERMEDIATE WATER USE (in./ac)	LOW WATER USE (in./ac)
FURROW	60	1.47	29.33	20.53	11.73
LEPA	95	0.93	18.53	12.97	7.41

### LABOR COSTS FOR IRRIGATED CORN AT FIVE WAGE RATES FOR IRRIGATION SYSTEMS

WAGE RATE (\$/hr)		10	12	14	16	18
IRRIGATION SYSTEM	WATER APPLIED ACRE-INCHES	LABOR COST \$/ac				
FURROW	29.33	23.63	28.35	33.08	37.80	42.53
LEPA	18.53	9.41	11.29	13.18	15.06	16.94

<http://amarillo.tamu.edu/files/2011/10/Irrigation-Bulletin-FINAL-B6113.pdf>

# A better investment

At a time of water scarcity, increasing land values, expensive seed and chemicals, and limited resources, you have to get the most out of your operation.

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.

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.<sup>1</sup>

Mechanized irrigation increases yields and profitability almost every year and in almost every location. Growers rely on this yield consistency season after season, which allows for more precise planning of

input levels (fertilizer pesticides, labor, and farm equipment).

A great number of irrigation conversions are occurring 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, and generally cost less per acre.

<sup>1</sup> <http://www.Leere.energy.gov/inventions/pdfs/newpreag.pdf>

## Center Pivots: The cost-effective & long-lasting solution

With a Zimmatic irrigation system, not only will you save as much as 75% on labor, but you'll also use an average of 35% less water.<sup>1</sup> And in nearly every case, yields are higher than on crops grown with gravity flow.

You'll also save energy. A Nebraska study<sup>2</sup> comparing gravity flow v. pivot recorded 47% fewer pumping hours for the pivot system, and overall energy cost (using a diesel-driven pump and generator) was 36% less. Plus, when using commercial power, pivots using a programmed control system make it easier to take advantage of off-peak rates.

### Efficient

- 90-95% efficiency in varied climates/soils
- Even water distribution
- Uniformity during windy conditions – 89-91% efficiency with 18.6 mph (30 km/hr) winds using drops<sup>3</sup>
- Reduced runoff of chemicals
- Low per acre (hectare) investment cost

### Versatile

- Multiple crops under one circle
- Crop rotation – Can irrigate close seeded crops like wheat and alfalfa because furrows are not needed
- Operate on slopes up to 15%

### Reliable

- 20+ year operation with regular maintenance
- High-quality construction and components
- Rugged design to handle the toughest field conditions
- Fully automated
- State-of-the-art controls for precise irrigation management and scheduling
- Accurate water, chemical and fertilizer usage reports
- Remote control and monitoring via internet and cell phone

### Eco-friendly

- 95% recyclable components
- Resale capability

<sup>1</sup> Farm and Ranch Irrigation Survey, 1998.

<sup>2</sup> Costs are based on studies from the University of Nebraska: "Estimated Irrigation Costs, 1997"; "Estimated Irrigation Costs, 2001"; "Comparison of Irrigation Distribution Systems"

<sup>3</sup> 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

Even Water Distribution



Efficient Water Delivery



Multiple Crop Versatility





## The Lindsay Advantage

Lindsay is the only single-source irrigation manufacturer that can develop a customized pivot, lateral or drip system for your individual needs. From planning and design to wireless management, filtration and custom pump stations, Lindsay will help you optimize yields and reduce risk while efficiently utilizing resources.

Growers around the world rely on Lindsay's innovative technology and long-lasting products supported by a network of knowledgeable dealers.

To find out how to save time, water, energy and labor while achieving higher yields, visit [www.zimmatic.com](http://www.zimmatic.com) or talk to your local Zimmatic® by Lindsay dealer.



### THE LINDSAY ADVANTAGE

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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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