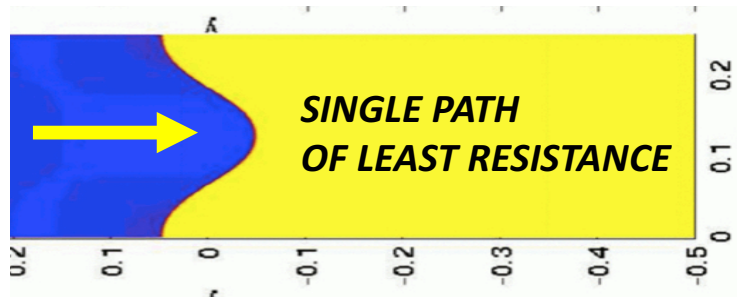




The New Fluid Flow Standard

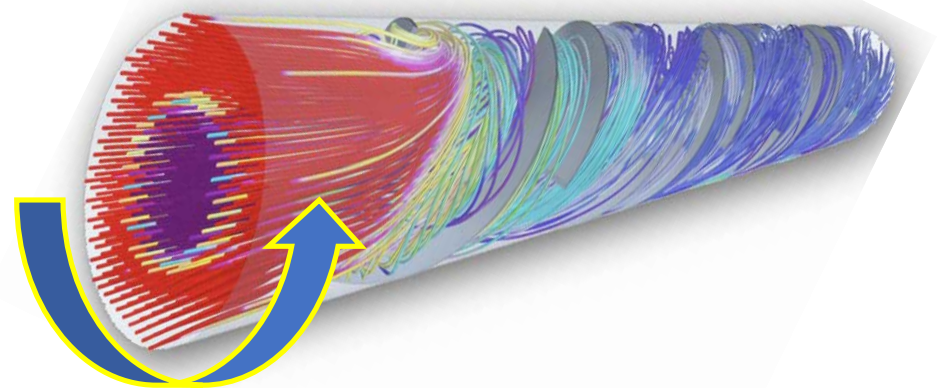
## VORTEX TECHNICAL BREAKTHROUGH



### PROBLEM

- *Laminar flow sleeves drag against pipe walls & each other*
- Flowing drag results in **INEFFICIENT, COSTLY PUMPING**
- Unreliable flows, blockages requiring expensive intervention
- *Higher flow requires costly square law power increases*
- *Flowing pressure declines rapidly - a symptom of drag losses*
- Yield, productivity and operations continually compromised
- Endure higher capex/opex/emissions of larger pumps, pipes ?

### **UNLIMITED FLOW PATHS OF LEAST RESISTANCE**

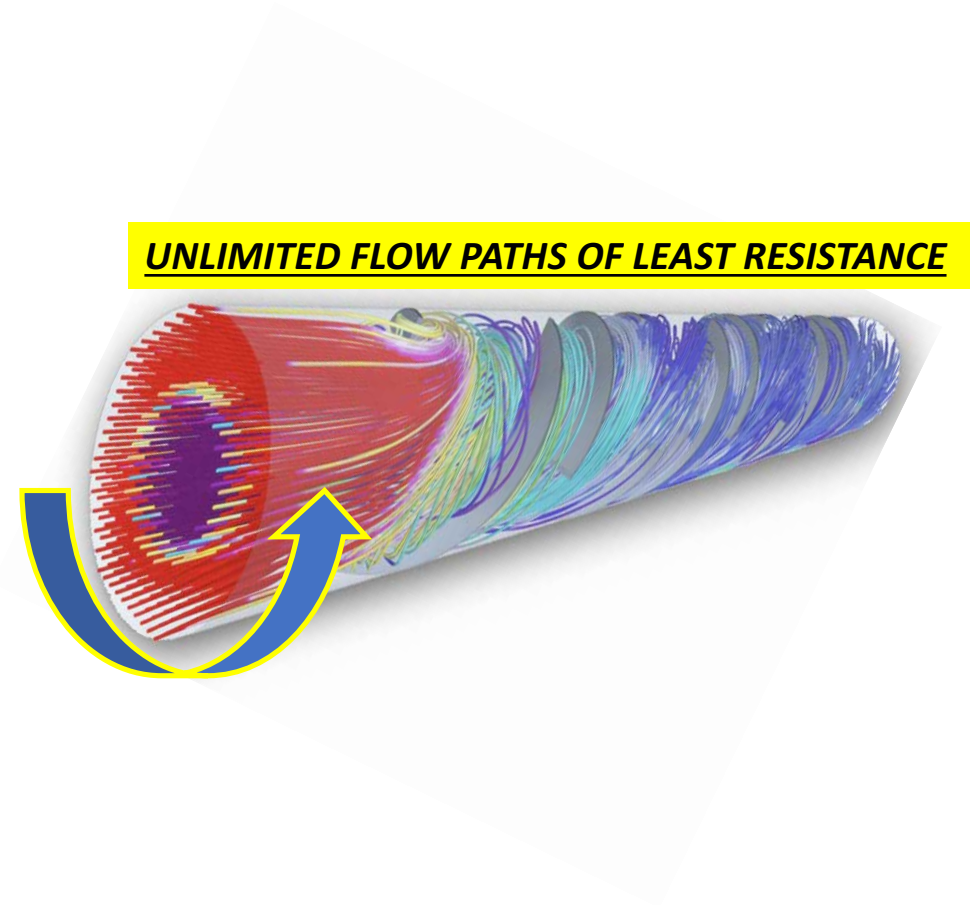


### SOLUTION

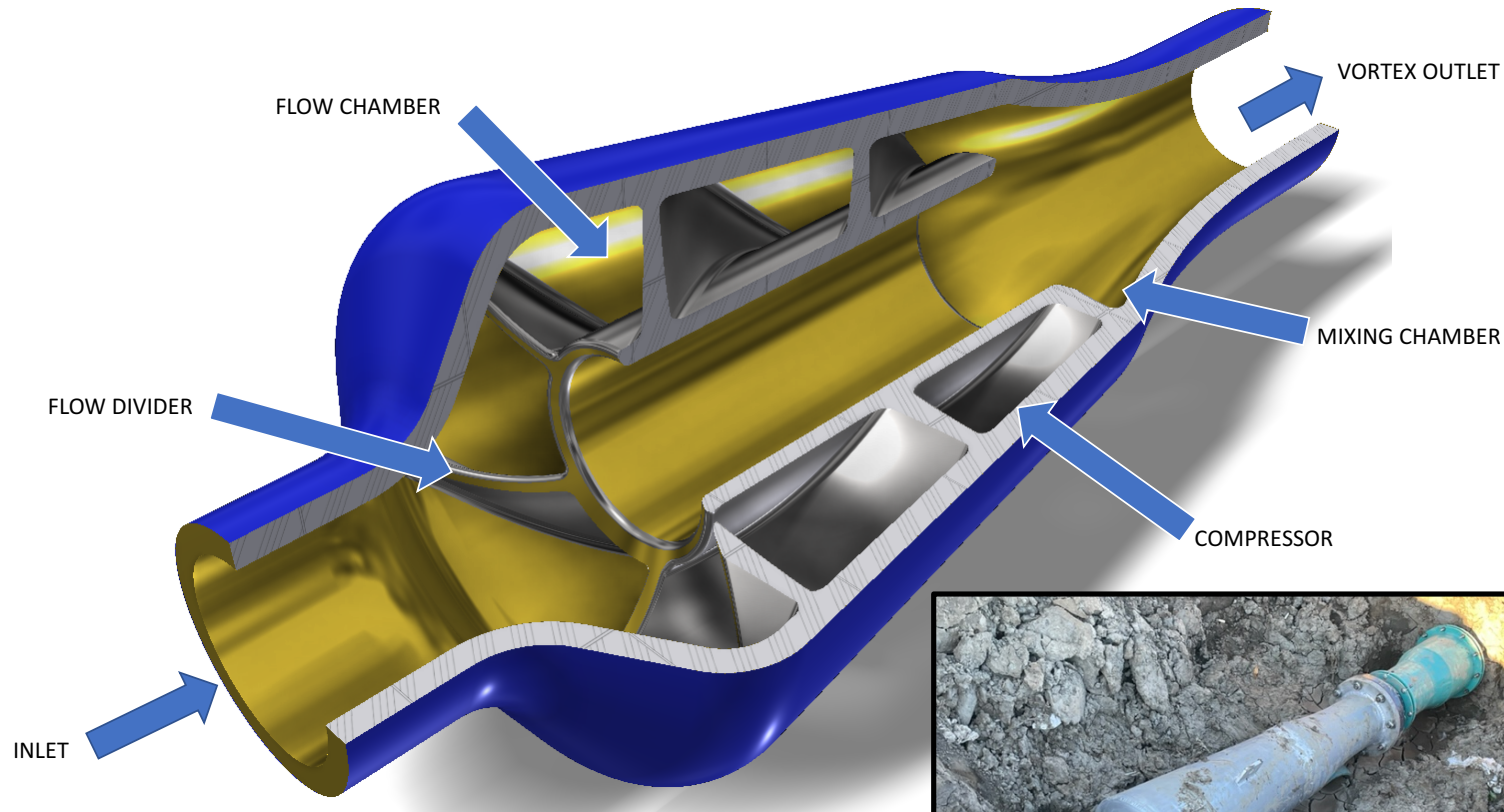
- **FLOW ROTATION REDUCES FRICTIONAL DRAG**
- **LESS ENERGY CONSUMED AT ALL FLOW RATES**
- **FULL PIPE VOLUMETRIC CAPACITY UTILISED**
- **HIGHER FLOW ENABLED IN EXISTING LINES**
- **SIMPLE, INEXPENSIVE VORTEX RETROFIT**

## VORTEX VALUE PROPOSITION

- Value Proposition : **SIMULTANEOUS**
- Pumping **COST REDUCTION**
- Higher **FLOW CAPACITY IN EXISTING LINES**
- Low Cost **DE-BOTTLENECKING**
- Lower **UNIT TRANSPORT COSTS**
- Lower **ENERGY USE**
- Reduced **EMISSIONS**



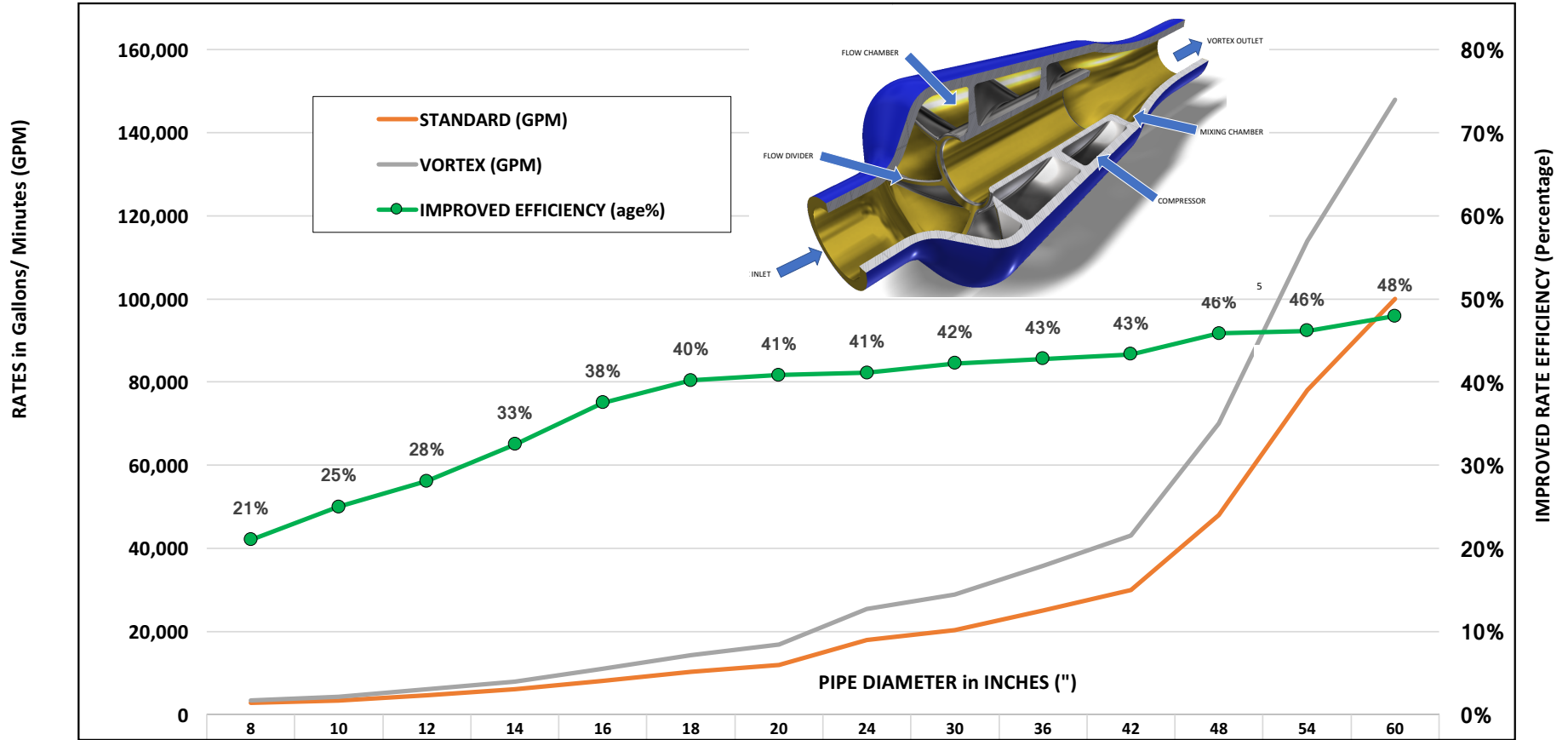
### VORTEX AMPLIFIER CROSS-SECTION



- *Installs simply in line*
- *No moving parts*
- *No energy required*
- *No maintenance*
- *Fully Piggable*
- *Fit and forget*

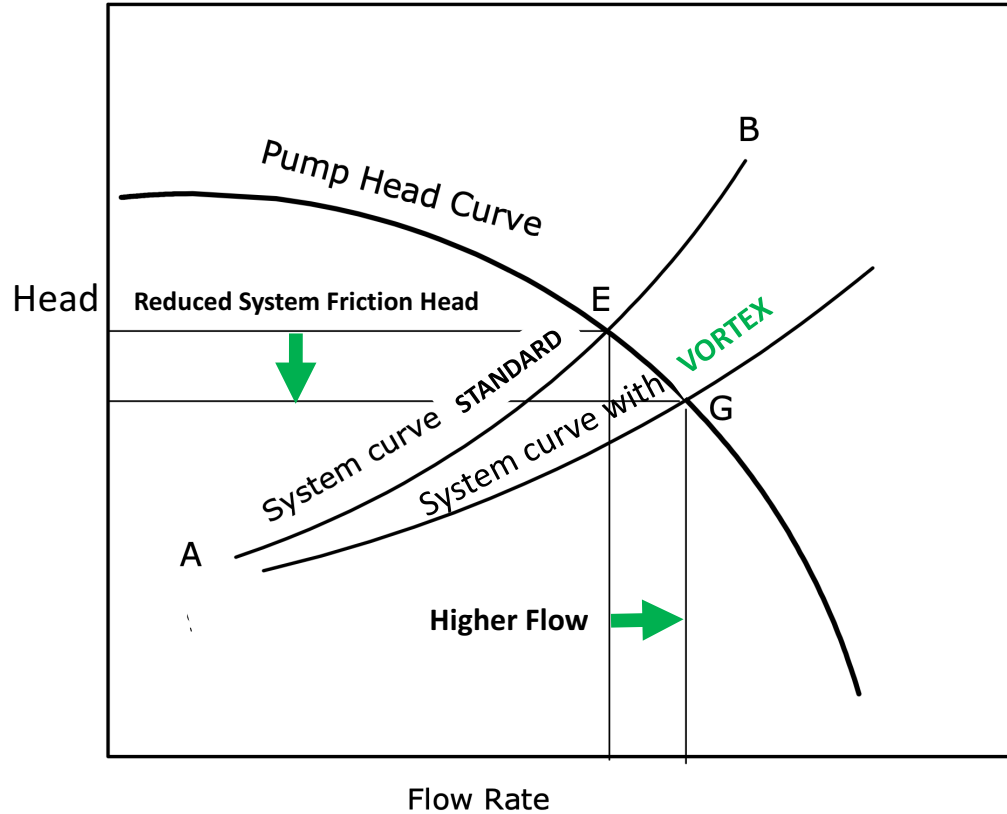


## VORTEX ENABLES HIGHER FLOWS IN EXISTING LINES



STANDARD (GPM)	2,800	3,400	4,700	6,000	8,000	10,200	12,000	18,000	20,250	25,000	30,000	48,000	78,000	100,000
VORTEX (GPM)	3,388	4,250	6,020	7,950	11,000	14,300	16,900	25,400	28,800	35,700	43,000	70,000	114,000	147,939
IMPROVED EFFICIENCY (age%)	21%	25%	28%	33%	38%	40%	41%	41%	42%	43%	43%	46%	46%	48%

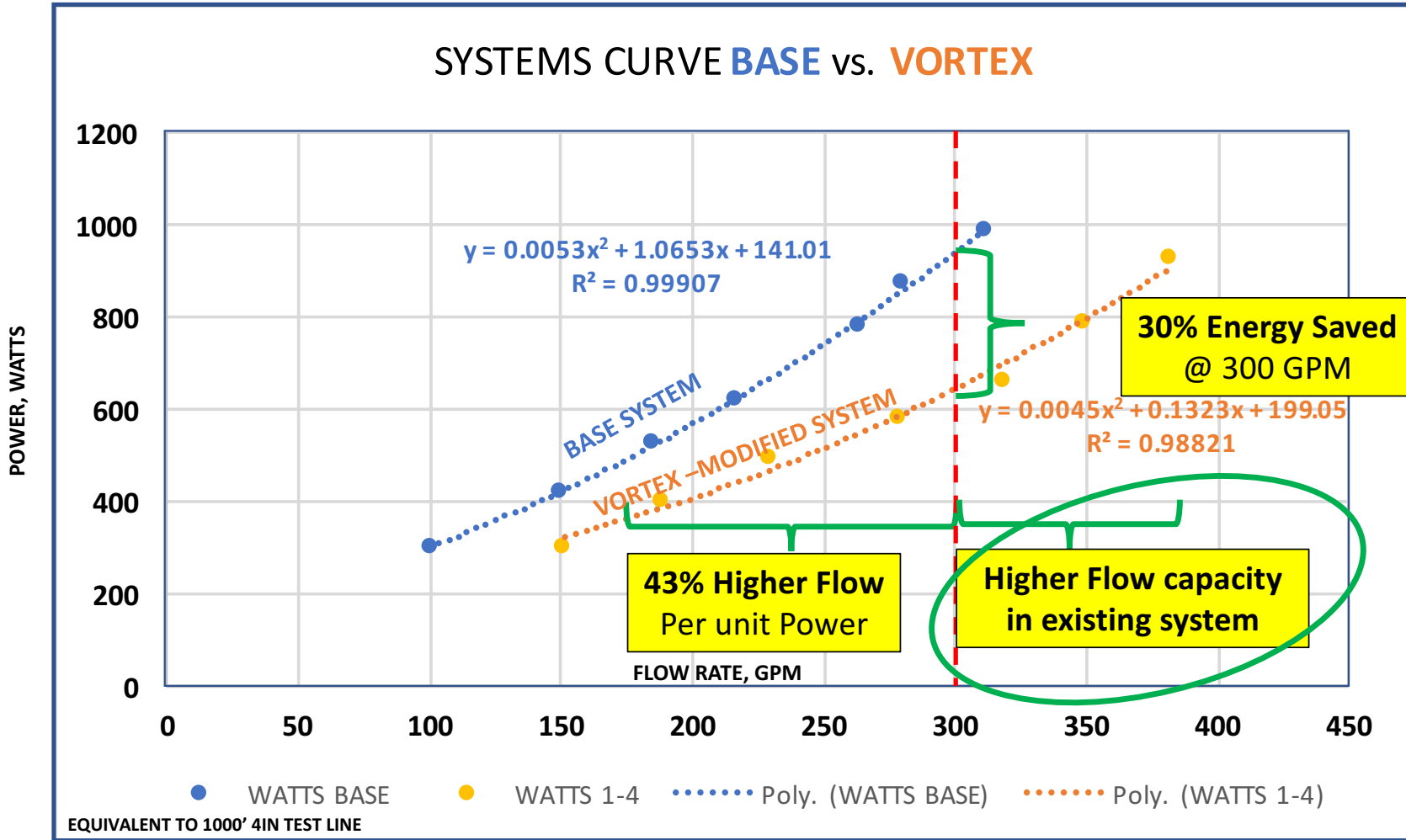
**VORTEX DELIVERS PERMANENT SYSTEMS CURVE IMPROVEMENT**



- **VORTEX REDUCES FRICTION HEAD IN THE SYSTEM CURVE**
- BEST EFFICIENCY POINT (BEP) AT HIGHER FLOWRATE
- CHOOSE REDUCED PUMPING ENERGY AND OPEX
- OR HIGHER FLOW RATES AS DESIRED, WITH COMPLETE FLEXIBILITY
- FLUID ROTATION REDUCES BLOCKAGE RISKS AND COSTLY DOWNTIME
- HIGHER SYSTEM RELIABILITY AND CONTINUOUS LOW-STRESS UPTIME
- DRAMATICALLY IMPROVED FLOW ASSURANCE

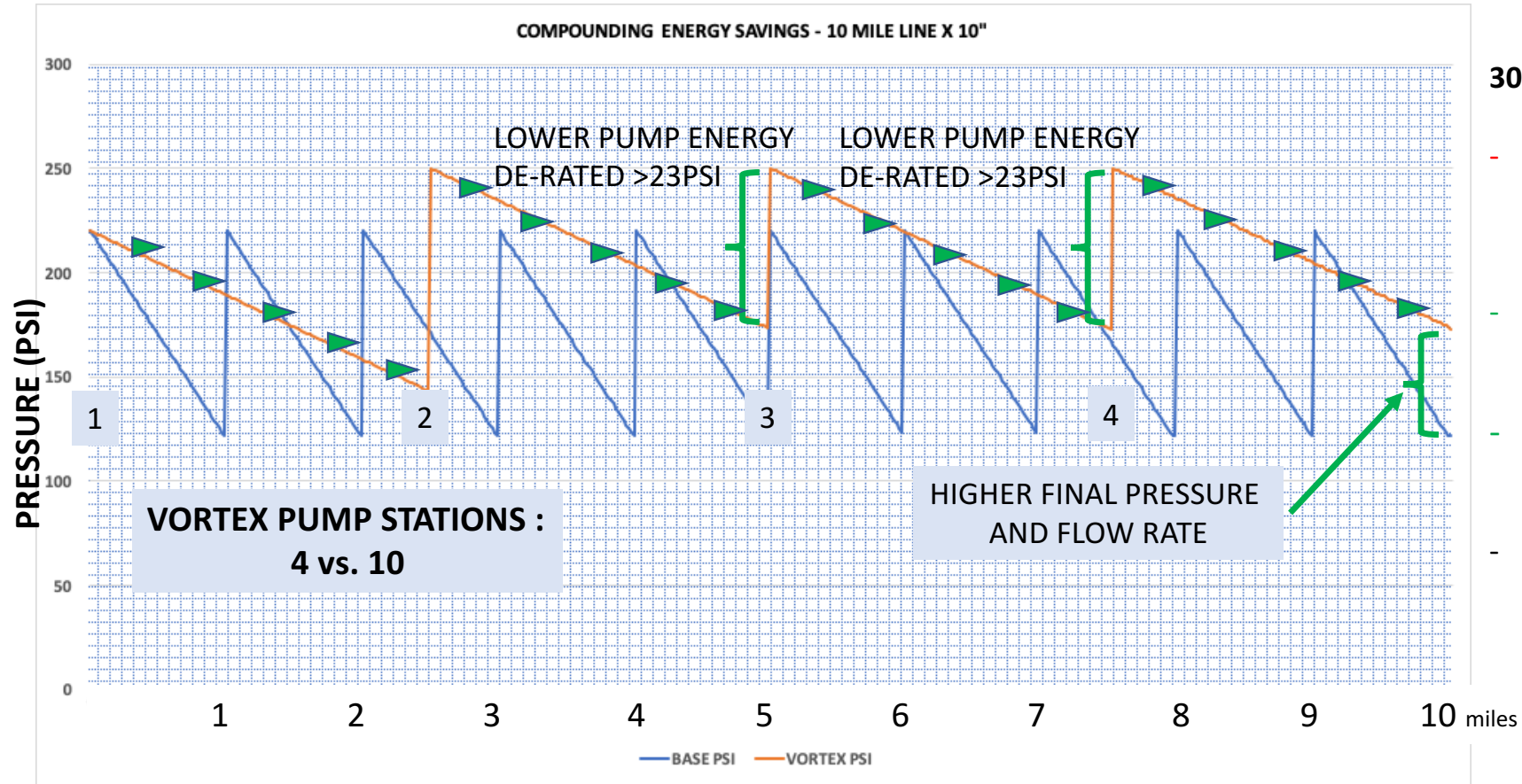
Pipeline Hydraulics, Dr. S. Menon

**VORTEX - SYSTEM CURVE TEST DATA**





## VORTEX DELIVERS COMPOUND ENERGY SAVINGS



3000 GPM, 10" PVC x 10 MILES

- BASE DESIGN WAS 1 PUMP STATION/MILE X 10 MILES NEEDING 10 STATIONS
- USING 20 x VORTEX UNITS ONLY 4 STATIONS NEEDED
- 6 x CAPEX & OPEX SAVED
- VORTEX APPLIED OVER DISTANCE AND GRADIENTS COMPOUNDS SAVINGS



**BASE FLOW, 4" LINE**



VORTEX FLOW, 4" LINE



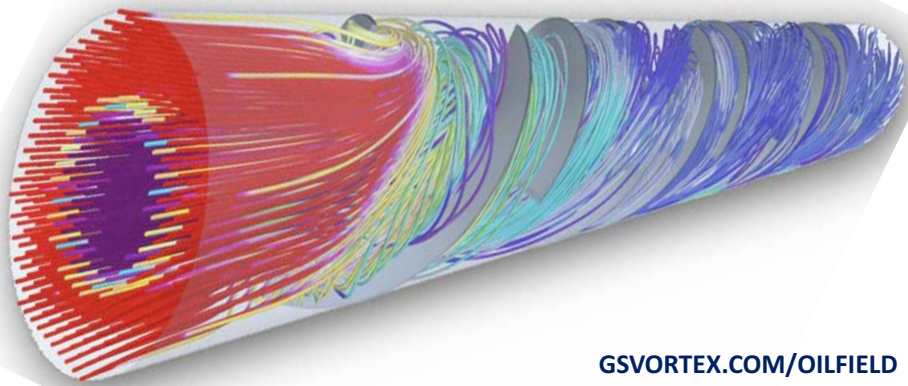




2-3 FT BASE FLOW

Cost Reduction, Higher Flow Capacity  
Lower Emissions

*VORTEX – The New Flow Standard*



[GSVORTEX.COM/OILFIELD](http://GSVORTEX.COM/OILFIELD)



11-12 FT VORTEX FLOW