



Deriving Additional Value from Smart Grid Investments: VVO Strategies at Duke Energy

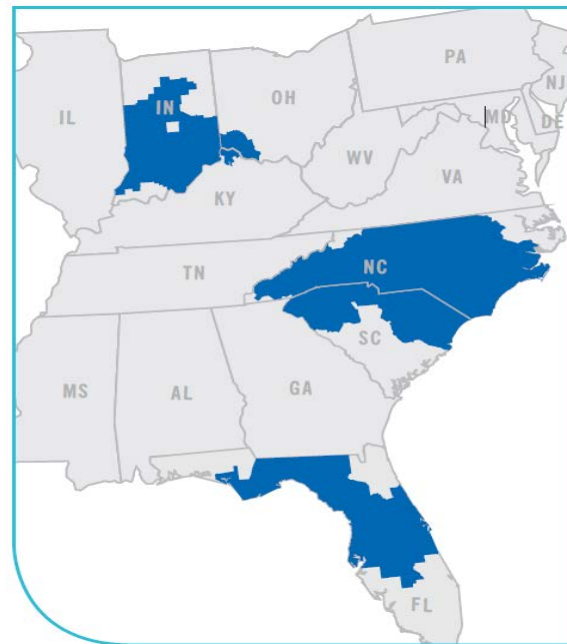
Michael B. Johnson, Project Director | Duke Energy

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About Duke Energy

Regulated Utilities

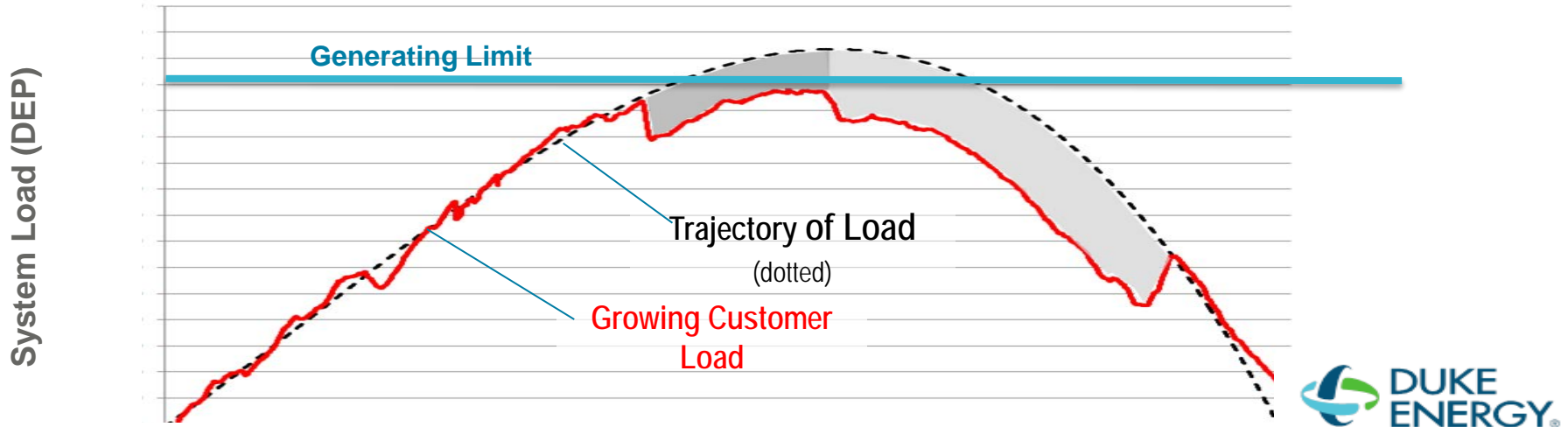
States Served	NC, SC, IN, OH, KY, FL
Size of Service Territory	104,000 sq. miles
Total Generation Capacity (owned capacity)*	49,626 MW
Total Electric Retail Customers	7.2 million
North Carolina	3.2 million
South Carolina	720,000
Ohio	690,000
Indiana	800,000
Kentucky	140,000
Florida	1.7 million



Duke Energy Service Territory – Regulated Utilities

Results and Benefits – DE Ohio and DE Progress

- Duke Energy Ohio
 - CVR provides 1.0 to 1.5% reduction in customer energy usage
- Duke Energy Progress
 - Reduced Summer Peak Demand by 3.6%
 - Saved fuel by reducing the need for physical spinning reserve - 2,000 to 4,000 hours per year
 - 2.5% demand reduction in 10 minutes



A Strategic Analysis of VVO Benefit

Benefits of VVO	Duke Energy Ohio	Duke Energy Progress	Desired Future State
Current			
Centralized Var Control	X	X	X
CVR	X		X
Peak Shaving		X	X
Spinning Reserve		X	X
Load Shed		X	X
Future			
DER Integration - Steady State Voltage			X
DER Integration - Manage Duck Curve			X

These two business cases made sense and each had a different VVO strategy

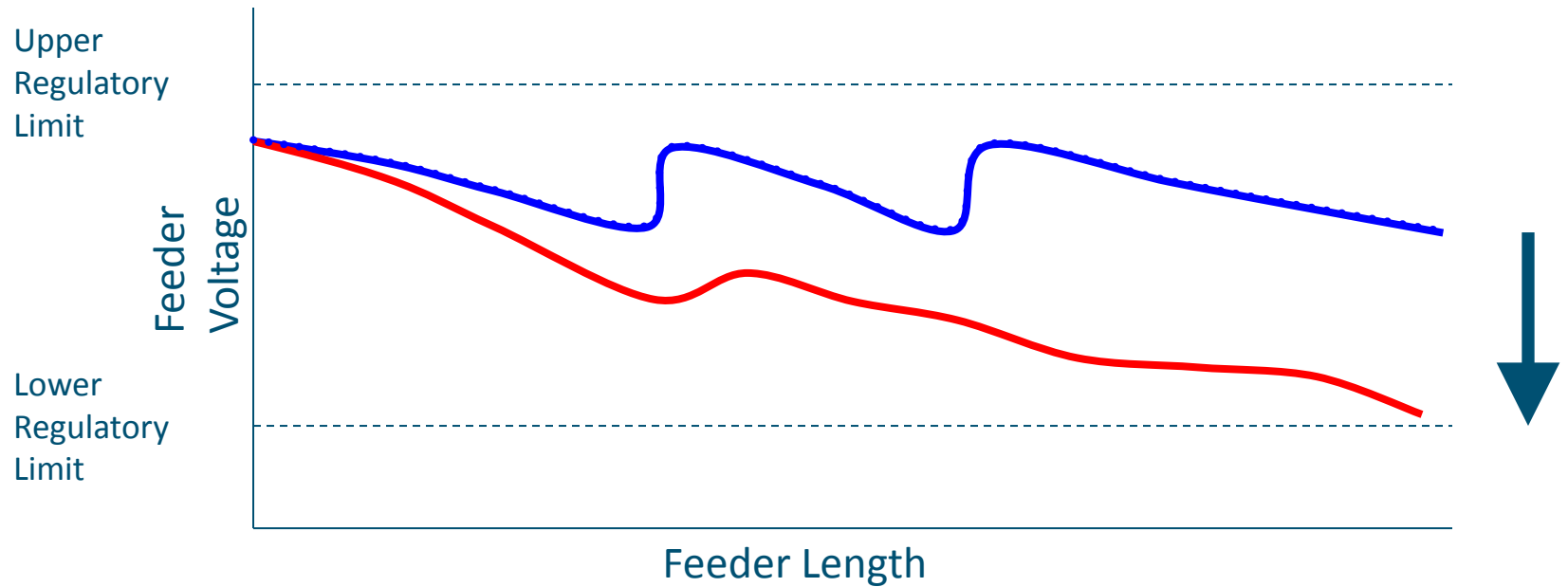
All of these benefits can be delivered to all of our customers!

The Business Case for Volt/Var Optimization (VVO)

Benefits of VVO	Environmental Benefit	Customer Financial Benefit	Utility Operational Benefit
Current			
Centralized Var Control	Fuel Savings	\$\$	+++
CVR	Fuel Savings	\$\$\$	+
Peak Shaving	Deferred Generation Build	\$\$\$	+++
Spinning Reserve	Fuel Savings	\$	+++
Load Shed			
Future	Renewable Energy	\$	++
DER Integration - Steady State Voltage	Renewable Energy	\$\$	+++
	Good for the environment!	Good for the Customer!	Good for Utility Operations!

We have a good business case because we are aligned!

The Basics of VVO Operation – Invest to Flatten the Voltage Profile

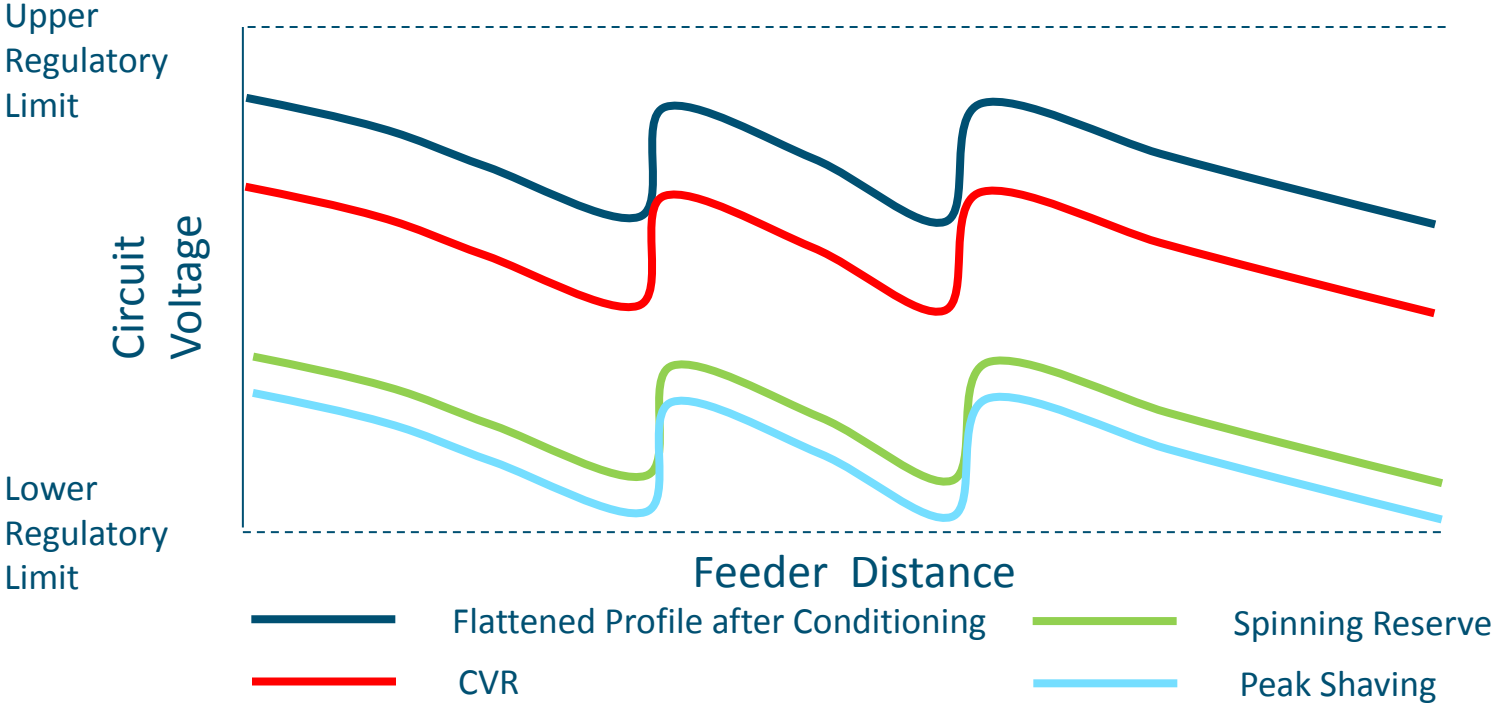


Pre-investment profile
Flattened voltage profile

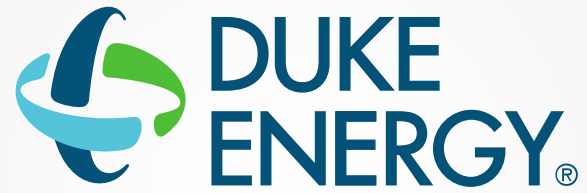


Lower voltage to reduce demand and energy

System Voltage Levels are Dynamic



- We can derive additional customer value by leveraging our past Smart Grid Investments
- VVO can deliver multiple benefit streams
- The business case is strong because it is a win/win/win!
- Regulatory support is crucial
- As we further invest in Smart Grid technology we will derive additional benefits



Thank You!