



Introduction to EnerNOC

NCSL Task Force on Energy Supply
August 5, 2017

About EnerNOC



Proven Customer Track Record

- Market leader in demand response
 - 50+ DR programs in 10 countries
 - 6,800 MWs of curtailable load
- 1,100+ software subscription customers
- More than US \$1B in customer payments/savings to date

Full Value and Technology Offering

- Energy intelligence platform and applications
- Combines technology, professional services, and market access
- More than US \$200 M invested in to date technology
- 24x7x365 Network Operations Center & customer support

World Class Team and Resources

- US \$404M revenue in 2016
- US \$98M cash and cash equivalents on balance sheet
- More than 1,000 employees in offices across 10 countries
- Publicly traded on the US NASDAQ (ENOC) exchange

EnerNOC comprehensive enterprise solution



How you buy it

Budgets and Procurement
Utility Bill Management



How much you use

Visibility and Reporting
Facility Optimization
Project Tracking



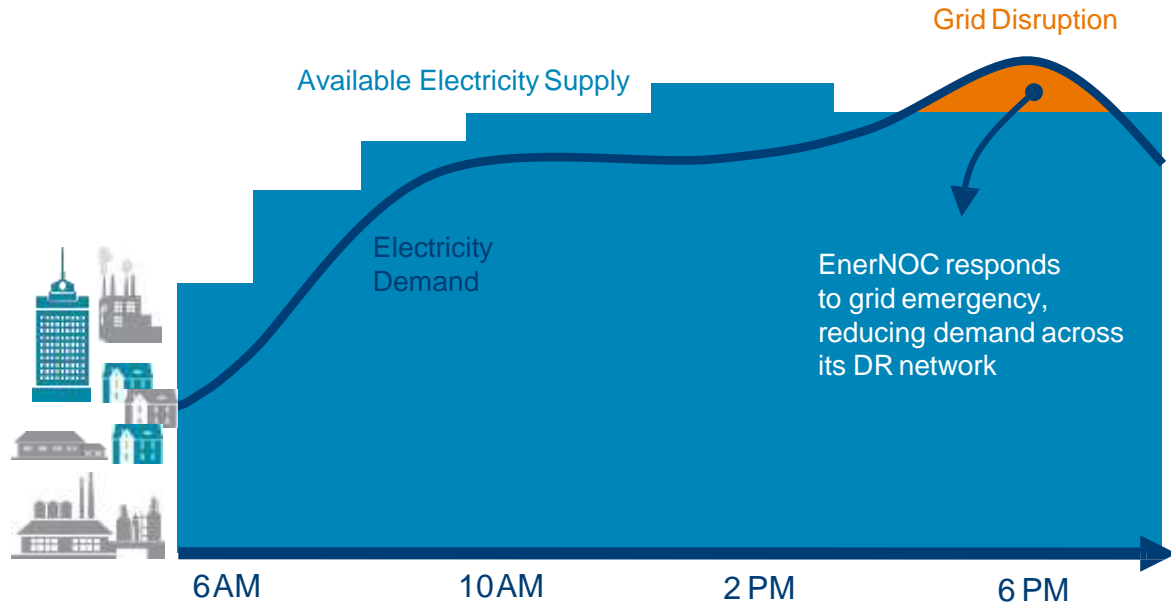
When you use it

Demand Response
Demand Management

Demand Response

What is Demand Response (DR)?

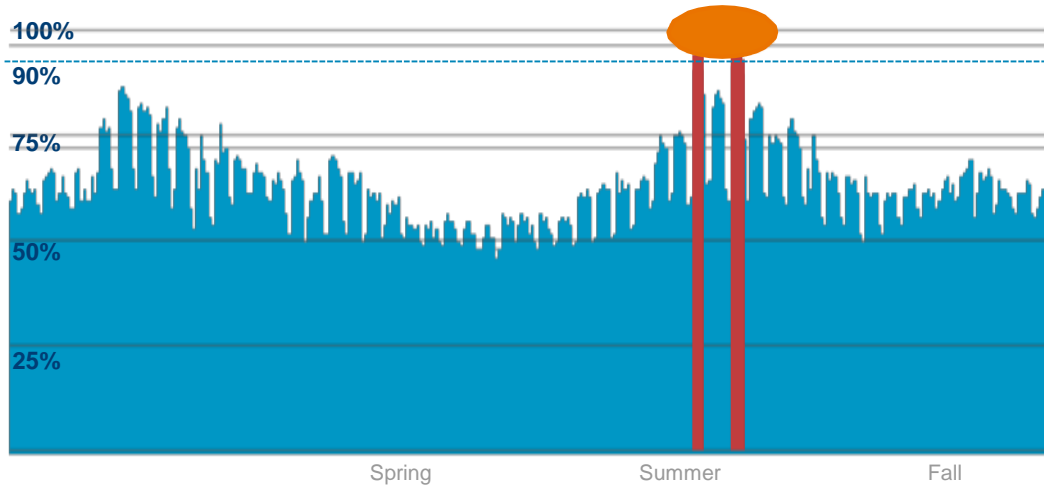
DR pays companies to reduce energy use in response to emergencies that threaten grid stability



- Balancing supply and demand on the electricity grid is difficult and expensive.
- Curtailing usage during grid emergencies is a cost-effective alternative to building more power plants.
- Grid emergencies can be due to extreme weather, wholesale price spikes, or unexpected system issues.

DR provides payments to the customers that provide it, and saves all electricity customers money

Annual Electricity Demand
as a Percent of Available Capacity



- More than 10% of grid infrastructure costs are spent to meet peak demand that occurs less than 1% of the time.
- Building a new power plant for that 1% of the time is incredibly expensive.
- Demand response is a fast and cost-effective way to meet peak electric demand.

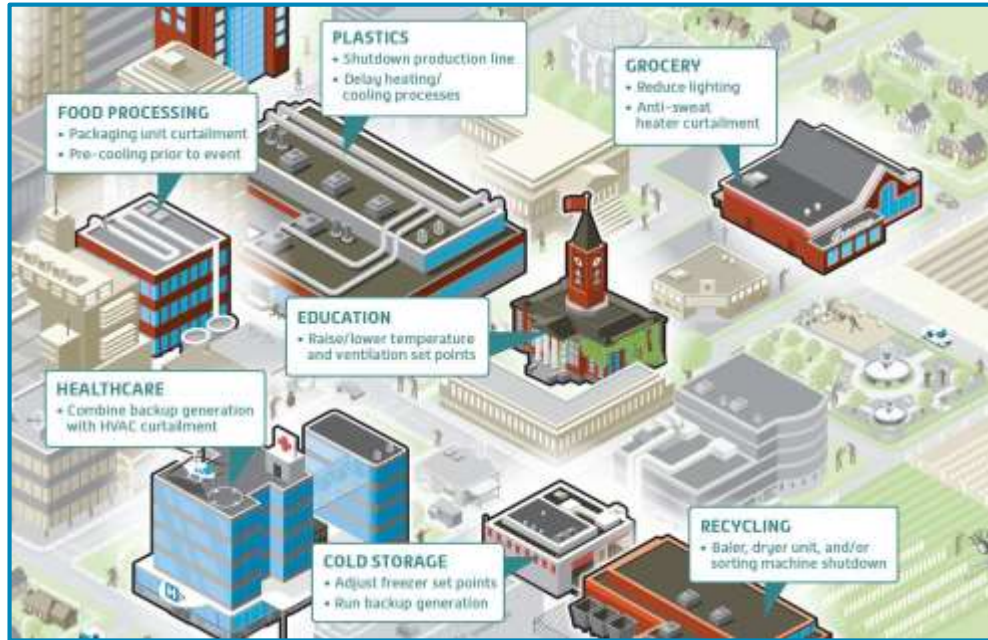
DR: The digital layer connecting energy users to market opportunities to balance supply and demand

We create value for **C&I customers** by identifying and monetizing load flexibility

We create value for **utilities and grid operators** by delivering cost efficient, reliable, and clean capacity and balancing resources



Diverse mix of industries contribute during DR events



When the electric grid needs resources, EnerNOC “dispatches” resources and thousands of facilities across nearly every industry reduce electricity consumption.

How Demand Response is executed

1. Grid operator or utility anticipates a supply imbalance and notifies EnerNOC



3. Customers initiate participation plan (manual or automated)



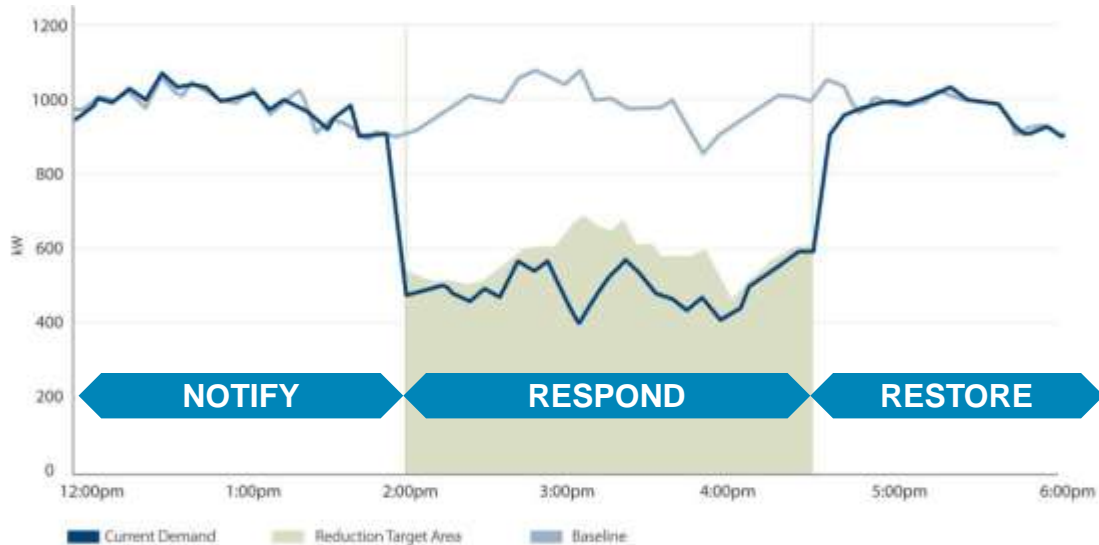
5. Customers receive payment for verifiable load delivery (increase or decrease)



2. EnerNOC dispatches its portfolio of customers to curtail or increase energy usage

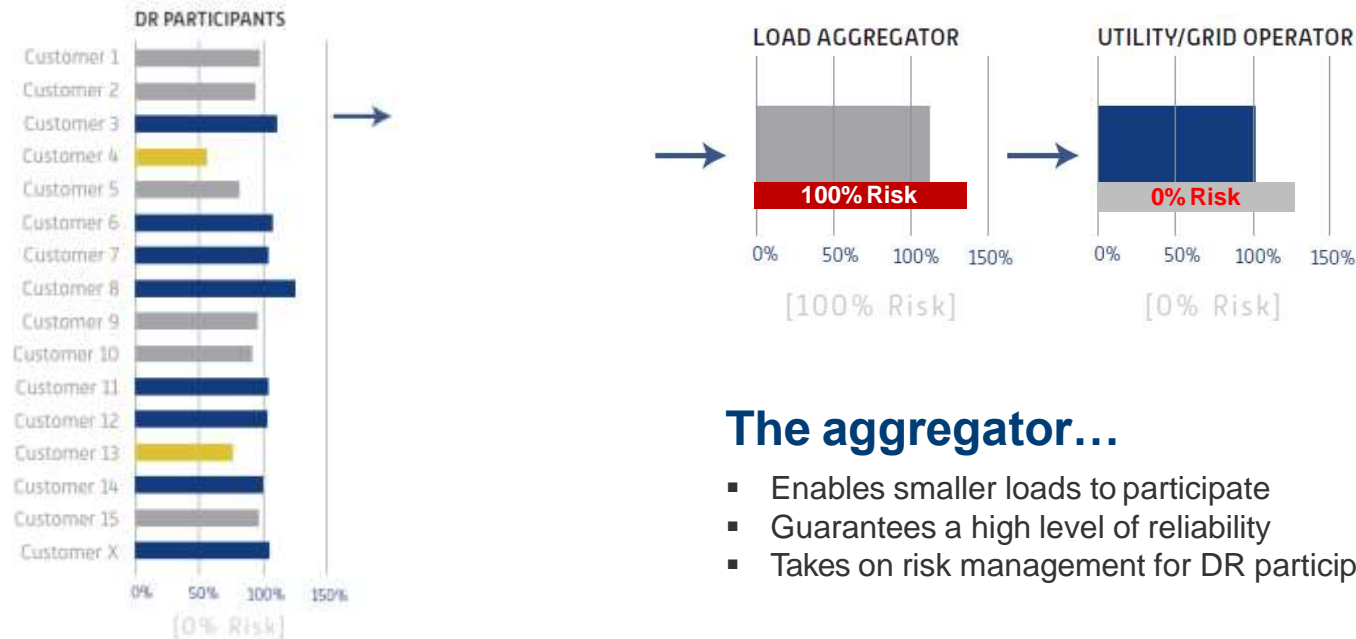
4. Load reduction or increase is delivered to the grid operator or utility

How Demand Response is executed



- **Notify:** When an event is called, we immediately notify facility contacts via phone, text and/or email.
- **Respond:** Facility responds by curtailing load or shifting load to a generator, manually or automatically.
- **Restore:** When the event is over, operations are returned to normal levels.

Aggregating customers provides a firm resource



The aggregator...

- Enables smaller loads to participate
- Guarantees a high level of reliability
- Takes on risk management for DR participants

Trivia: The benefits of Demand Response

Lower energy bills

How much did demand response save all customers in electricity costs in the thirteen state region served by the PJM Grid Operator from June 2013 to June 2014?

- A) \$11,800
- B) \$11,800,000
- C) \$11,800,000,000
- D) \$111,800,000,000

Trivia: The benefits of Demand Response

Economic development

Approximately how much revenue do businesses, local governments, school districts, and other institutions receive each year from participating in the PJM DR program?

- A) \$25,000,000
- B) \$100,000,000
- C) \$175,000,000
- D) \$250,000,000

Trivia: The benefits of demand response

Environmental benefits

In a study completed by Navigant Consulting, they estimated that “DR can directly reduce CO2 emissions by more than 1 percentFor context, 1 percent of 2012 CO2 emissions from affected sources under the CPP is 19.5 million metric tons.” How many cars on the road each year does it take to create 19.5 million metric tons?

- A) 500,000
- B) 2,000,000
- C) 4,000,000
- D) 15,000,000

Trivia: Obnoxious Boston sports fans

How many championships have Boston sport teams won since 2001?

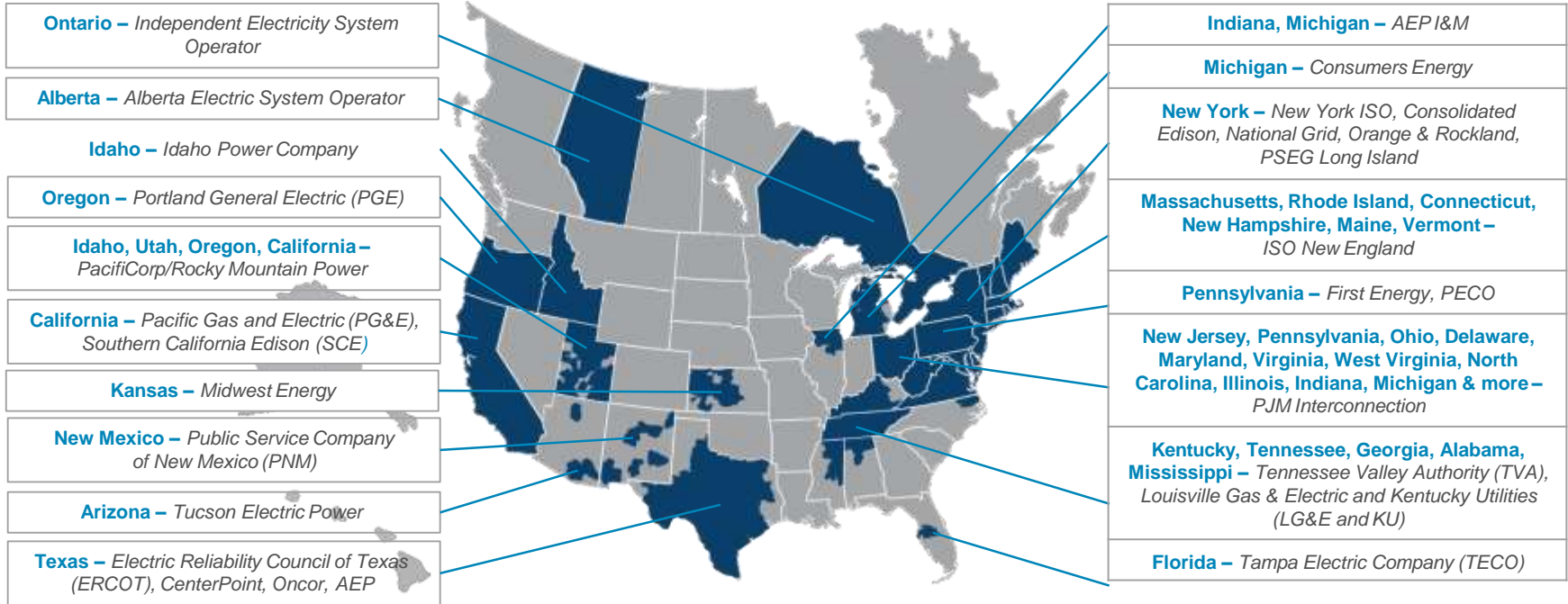
- A) Three
- B) Eight
- C) Ten
- D) Twelve

Trivia: Demand Response in the US

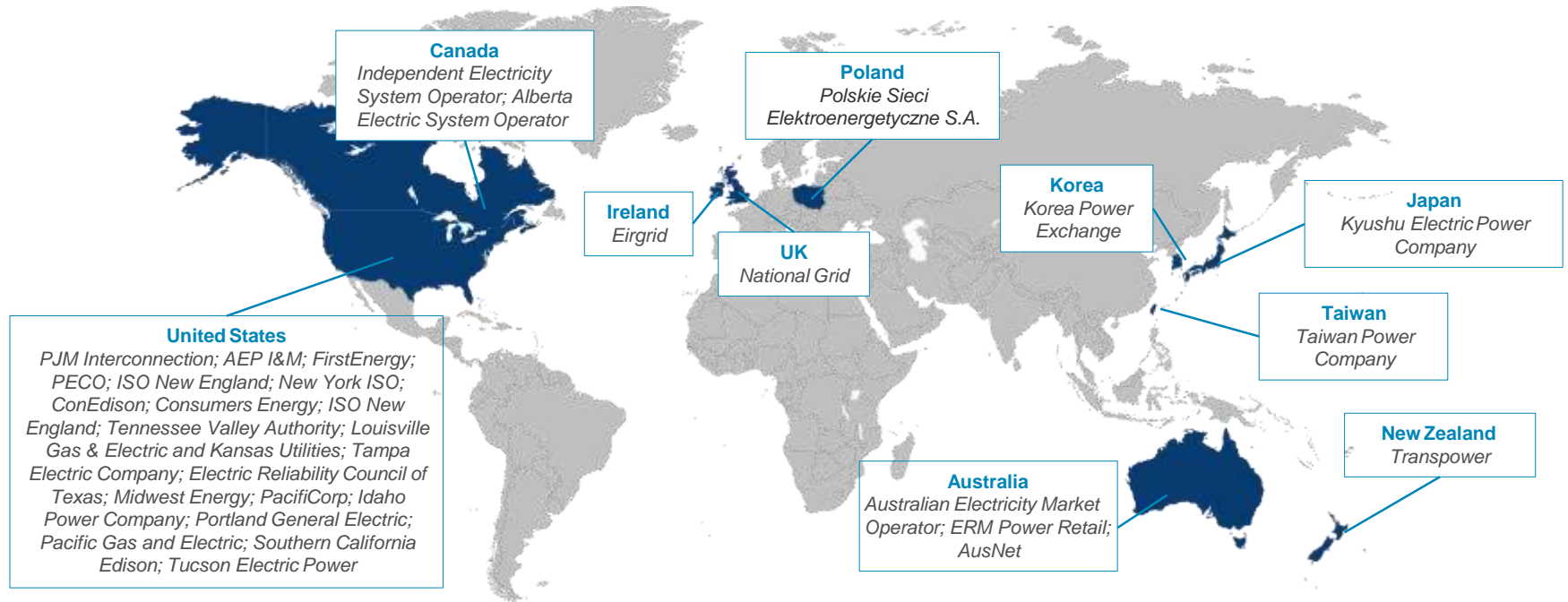
In how many states has EnerNOC provided demand response?

- A) Ten
- B) Fifteen
- C) Twenty
- D) Over 35

EnerNOC DR footprint in North America



EnerNOC's global Demand Response footprint



Demand Response is poised for growth

Landmark Supreme Court decision cements DR's position in the US



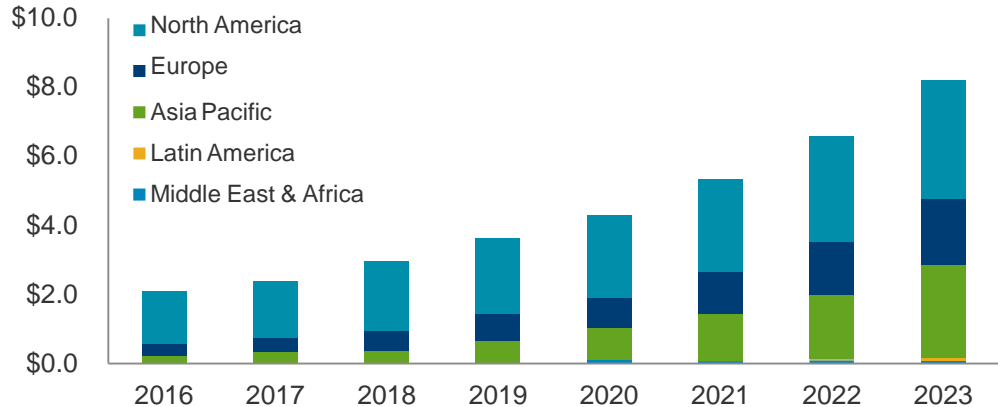
“Demand Response Reigns Supreme: Today's decision secures DR's place within wholesale energy markets...”



“In many states... demand-side resources have become as important as generation.”

C&I Demand Response Revenue by Region

(\$ in billions)



Source: Navigant Research

State policies that stimulate demand response

- Set targets for utilities to reduce peak demand; the 1% of peak hours that drives 10% of costs (PA)
- Procure all cost-effective demand response (MN), or have DR be a primary consideration in Integrated Resource Plans or be first in the loading order (CA)
- Align utility incentives with customer incentives, and consider allowing utilities to earn a return on DR programs (MI), or have shared savings between utilities and customers (NY)
- Require all source RFPs before building a new power plant
- Encourage collaboration between utilities and 3rd party DR vendors

Network Operations Center (NOC) Tour

Modernizing Energy Procurement

The Traditional RFP Process is Flawed...



More Paper



More Time



More Subjective

Three Common Procurement Methods

Sealed Bid

- One-time, private submittal of “best-&-final” bid in advance of deadline

Multiple-Round, Descending Clock Auction

- Multiple rounds of sealed bids; price drops in each subsequent round
- Price is fixed; Volume is bid
- All bidders secure price at market point of least-competitive supplier

Live (on-line) Reverse Auction

- Generates intense competitive bidding for each product, against a hard-stop timeline, and bidders can see others' prices
- Achieves lowest possible prices

In Procurement, Here's What We Don't Want

- ✘ Limited number of suppliers bidding
- ✘ Lack of competition and focus from bidders
- ✘ No opportunity for bidders to improve their bids
- ✘ Lengthy transaction process that increases risk premiums
- ✘ Minimal data controls and transparency

The Antidote – Reverse Online Auction

- ~~✘~~ Limited number of suppliers bidding
- ~~✘~~ Lack of competition and focus from bidders
- ~~✘~~ No opportunity for bidders to improve their bids
- ~~✘~~ Lengthy transaction process that increases risk premiums
- ~~✘~~ Minimal data controls

- ✓ Active bidder recruitment with platform that has a large user network
- ✓ Narrow bid window and interactive bidding leads to intense competition
- ✓ Bidders can see current low bid and pull ahead; 20% of time bidders outbid themselves w/ “last bid blind”
- ✓ 10-minute auction window means bidders don’t worry about market moving, lowering risk premiums
- ✓ Time-stamped bids with immediate electronic access for parties

Extensive World Bank Study on Procurement Methods

- “Most of the energy auctions carried out as part of the first generation of power sector reforms have been designed as sealed-bid auctions...A **clock auction enables an efficient price discovery, and is conducive to more aggressive behavior among bidders ...resulting in lower prices.**”
- World Bank studied the results of a Florida utility who used the anglo-dutch auction design:
 - “the practical usefulness of the auctions is best summarized by an official of the municipal utility who, after the first-time use of the auction to procure an electricity forward contract, observed that **‘the auction resulted in a savings of about 10 percent,** compared with what the muni[cipal utility] normally pays ... the process worked tremendously for us. I see this as something that is going to catch on It’s very good for competition. It’s unmasking the prices and will save us between \$500,000 and \$1 million annually.”

Live Reverse Auctions Drive Competition

High number of bidders and constant price discovery reduces costs to ratepayers

Auction Information

Auction Start Time: 4/19/2017 11:10:00 AM EPT
Auction End Time: 4/19/2017 11:20:00 AM EPT
Total Quantity: 500,000 MMBtu/day
Opening Bid (\$/MMBtu): 0.05000
Reserve Price (\$/MMBtu): N/A
Reserve Status: N/A

RFP Status: Closed: Awarded
Time Left: Auction Closed
Total Bids: 33 Unique Bidders: 19
Low Bid (\$/MMBtu): 0.02500
Low Bidder: Bidder 1

Price Graph



Live Reverse Auctions Drive Competition

With last bid blind, winning bidder outbids themselves 20% of the time as the lowest bid

Bid History

Company Name	Bid Amount	Bid Quantity	Date and Time of Bid
Bidder A	(\$0.01250)	10,000	4/19/2017 10:59:44
Bidder A	(\$0.01000)	5,000	4/19/2017 10:59:32
Bidder B	(\$0.00500)	5,000	4/19/2017 10:59:10
Bidder A	(\$0.00250)	10,000	4/19/2017 10:56:17
Bidder C	\$0.00000	30,000	4/19/2017 10:52:57
Bidder D	\$0.00000	10,000	4/19/2017 10:57:27
Bidder B	\$0.00000	10,000	4/19/2017 10:55:54
Bidder A	\$0.00500	10,000	4/19/2017 10:55:49
Bidder E	\$0.00850	10,000	4/19/2017 10:54:04
Bidder F	\$0.01000	20,000	4/19/2017 10:55:31
Bidder D	\$0.01000	10,000	4/19/2017 10:57:04
Bidder E	\$0.01100	20,000	4/19/2017 10:53:24
Bidder A	\$0.01250	10,000	4/19/2017 10:55:14
Bidder A	\$0.02000	10,000	4/19/2017 10:54:31
Bidder G	\$0.02000	10,000	4/19/2017 10:54:34
Bidder F	\$0.03000	20,000	4/19/2017 10:52:37
Bidder E	\$0.03000	20,000	4/19/2017 10:51:33
Bidder D	\$0.03000	10,000	4/19/2017 10:51:53
Bidder A	\$0.03000	10,000	4/19/2017 10:53:33
Bidder H	\$0.03000	5,000	4/19/2017 10:56:21

6 – Final Bid

5 & 6 – Last Bid Blind

4 – “midway” bid

2 & 3 – testing waters;
improves own bid

1 – Opening Bid

And Competition Means Large Ratepayer Savings

Final bids are below utility's "transactable" price, leading to ~\$500,000 in savings in this example

	1. 7x24 ATC Q1 '18	2. 7x24 ATC 2H '18	3. 5x16 On- Peak Cal 2018	4 7x24 ATC Cal 2018
Customer Target (\$/MWh)	\$40.00	\$32.03	\$39.60	\$33.81
Final Price (\$/MWh)	\$38.45	\$29.50	\$37.59	\$31.10
\$/MWH Difference	\$1.55	\$2.53	\$2.01	\$2.71
MWh's Procured	21,600	44,160	40,800	87,600
Potential Cost Avoidance	\$33,480	\$111,725	\$82,008	\$237,396

Delaware Case Study



- Delmarva advised the Delaware Commission that the on-line reverse auction platform “with its **transparent price feedback on the prevailing lowest price, can potentially stimulate more aggressive bidding and improved competition** among suppliers. It is generally accepted that increased competition results in better prices for customers...the use of the reverse auction process is a proactive step that should be taken to achieve supply for SOS customers at the lowest reasonable cost.”
- The **Delaware Commission** granted Delmarva’s motion stating that “the World Energy **reverse auction process has proven itself to be effective in achieving robust competition to provide energy supply to customers.**”

Delaware Case Study Continued

Positive reviews from independent consultant

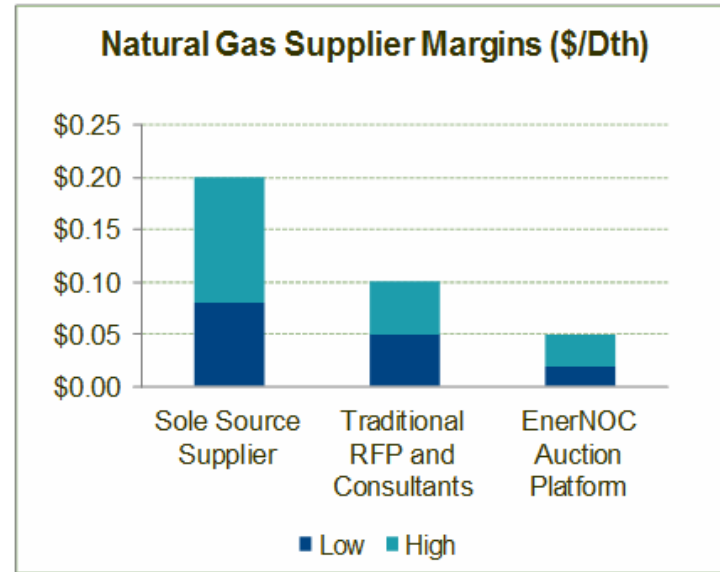
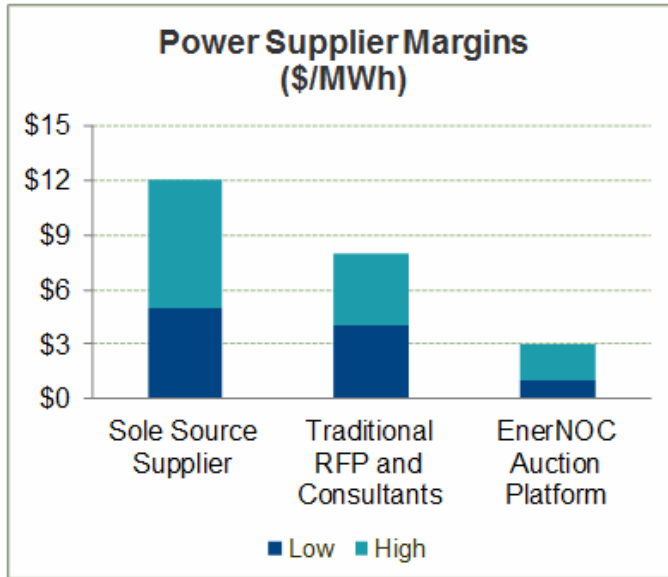


- “The auction process itself promotes competition due to EnerNOC’s auction platform. It provides real-time feedback to induce competitive bidding behavior.”
- “Each of the blocks in each of the tranches received ample bids to create a competitive environment and prices that reflect the competition. Liberty attributes this bid activity to a combination of excellent information provided to power suppliers, and a well-run, relatively transparent auction provided by World Energy. World Energy’s system provides useful bidder feedback to induce competitive bidding behavior.”

Liberty Consulting Group, Technical Consultant’s Final Report to the Delaware Public Service Commission

Reverse auctions to drive down supplier margins

Supplier Margins by Procurement Method



Sources: Restructuring Today, Supplier Annual Reports, and World Energy Supplier Survey

Meeting the Most Rigorous Requirements

- **20** of the Fortune 100, and 80 regional utilities
- **11 states** and the United States Government
- Access to **500 Suppliers**
- Perfect PUC rate case approval record when procuring for utilities
- “Flawless” Execution of RGGI Auctions
- Provides an **even playing field for suppliers** to compete for your business:
 - Only 25% of our power contracts have been awarded to our single most successful supplier*
 - Only 19% of our natural gas contracts have been awarded to our single most successful supplier*

EnerNOC Procurement Business

Energy procurement platform for energy commodities

- Conducted over 50,000 Auctions (208 auction types; 57 configurable parameters)
- Proven track record of execution

\$45 billion+ in electricity, natural gas, & environmental commodities transacted

EnerNOC Exchange is designed specifically to drive optimal results for energy-industry customers