



Best Practices in Effective Energy Management - Integrated Energy Strategy Solutions

Rajiv Bazaj

Executive Director – West Region Sales

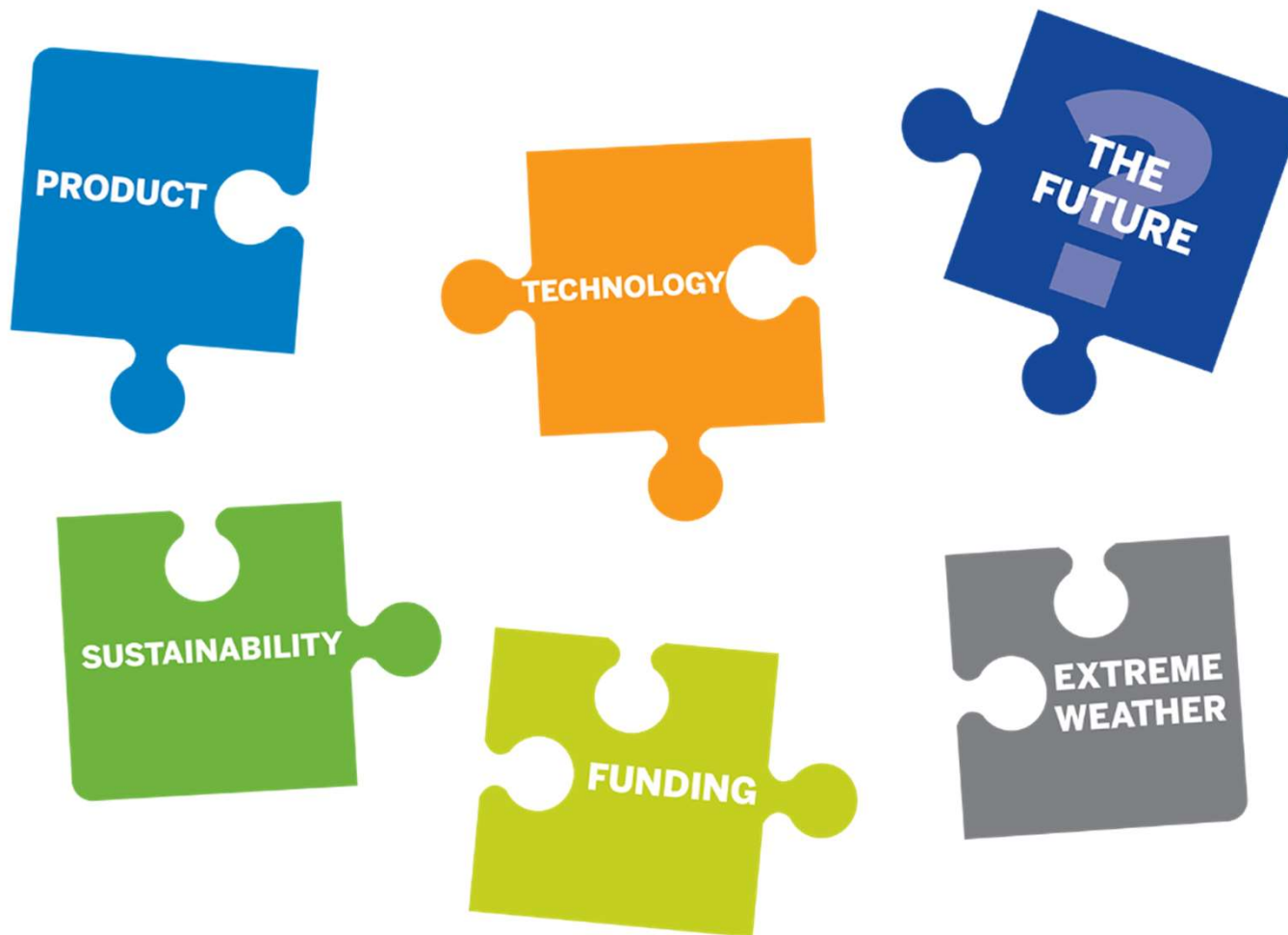
March 21, 2019



Customer Macro Concerns – Environmental, Social & Business



Energy Spend - Short & Long Term Strategy



The Cost of Climate Change



Calculating The Costs Of Climate Change

SINCE TAKING OVER THE global supply chain for Merck in 2012, Craig Kennedy has handled tornadoes, droughts, and powerful storms.

Hurricane Maria, which tore through Puerto Rico in 2017, was a more onerous challenge: Merck's cholesterol drug Atozet and its chemotherapy product Temodar are manufactured on the island. Kennedy got the factory up and running in a week, but the roads were still a wreck, so he began planning for a new supply chain out of Singapore.

"We weren't as prepared for the destruction of the infrastructure as we would like to have

been," Kennedy recalls. "You cannot predict what's going to happen."

Such dangerous unpredictability is only likely to increase. Stronger and more frequent storms, like the hurricanes in 2017 and 2018, are among the signs of global warming, or climate change, scientists say.

In recent years, corporations such as Merck (ticker: MRK) have been citing climate change as a risk factor in their annual filings. In fiscal 2017, some 15% of the S&P 500 publicly disclosed an effect on earnings from weather-related events, says Standard & Poor's Global Ratings. Only 4% of the companies

Energy Resiliency: New Buzzword or New Normal

Constellation Blog – June 25, 2018

Congress introduces the National Defense Authorization Act for 2019 (#H.R. 5515).

- “Anticipation, preparation for, and adaptation to utility disruptions and changing environmental conditions and the ability to withstand, respond to and recover rapidly from utility disruptions while ensuring sustainment of mission critical operations”
- “It is undeniable that the homeland is no longer a sanctuary.” Must face the challenges and prepare our military and federal agencies to ensure their core missions are protected and resilient.

JOHNSON CONTROLS HALL OF FAME VILLAGE NAMES CONSTELLATION OFFICIAL ENERGY PROVIDER THROUGH MULTI-YEAR DEAL

ENERGY LEADER RECEIVES NAMING RIGHTS FOR CENTER FOR EXCELLENCE; AND
WILL SUPPORT CLEAN ENERGY INITIATIVES FOR THE VILLAGE AND PRO FOOTBALL
HALL OF FAME

CANTON, OHIO – Johnson Controls Hall of Fame Village has entered into a multi-year agreement with **Constellation**, a leading competitive energy company. The deal includes the naming rights for the **Constellation Center for EXCELLENCE**, a key component of the \$889 million Johnson Controls Hall of Fame Village project under way in Canton, Ohio. Constellation will be the **exclusive energy provider** to the Village and the Pro Football Hall of Fame.

“Constellation provides energy solutions to two-thirds of the Fortune 100. We look forward to bringing that expertise to the Pro Football Hall of Fame and Johnson Controls Hall of Fame Village,” said **Mark Huston**, president, National Retail Business, Constellation. “In addition to serving as the official power and gas provider, we are helping the Hall and the Village deliver on their commitment to become more sustainable organizations and will leverage our full suite of clean energy solutions to help achieve that goal.”

As a leader in creating customized, innovative solutions for its nationwide customers, Constellation will design and implement energy management strategies to help the Village and the Hall of Fame reduce their carbon footprint. Constellation will also offer its Efficiency Made Easy® (EME) program to help the Johnson Controls Hall of Fame Village implement energy conservation projects to save energy and money as the Village's development continues to progress.

Challenges & megatrends create opportunities to differentiate and enhance competitiveness, that is only achievable by...

Creating a robust short & long term
Integrated Energy Strategy



Five Pillars of an Integrated Energy Strategy

1. Market Trends: Pricing, Regulatory, Generation

2. Product Selection: Risk vs. Price

3. Demand Reduction

4. Sources for Funding

5. Sustainability

1. Market Trends: Pricing, Regulatory, Generation

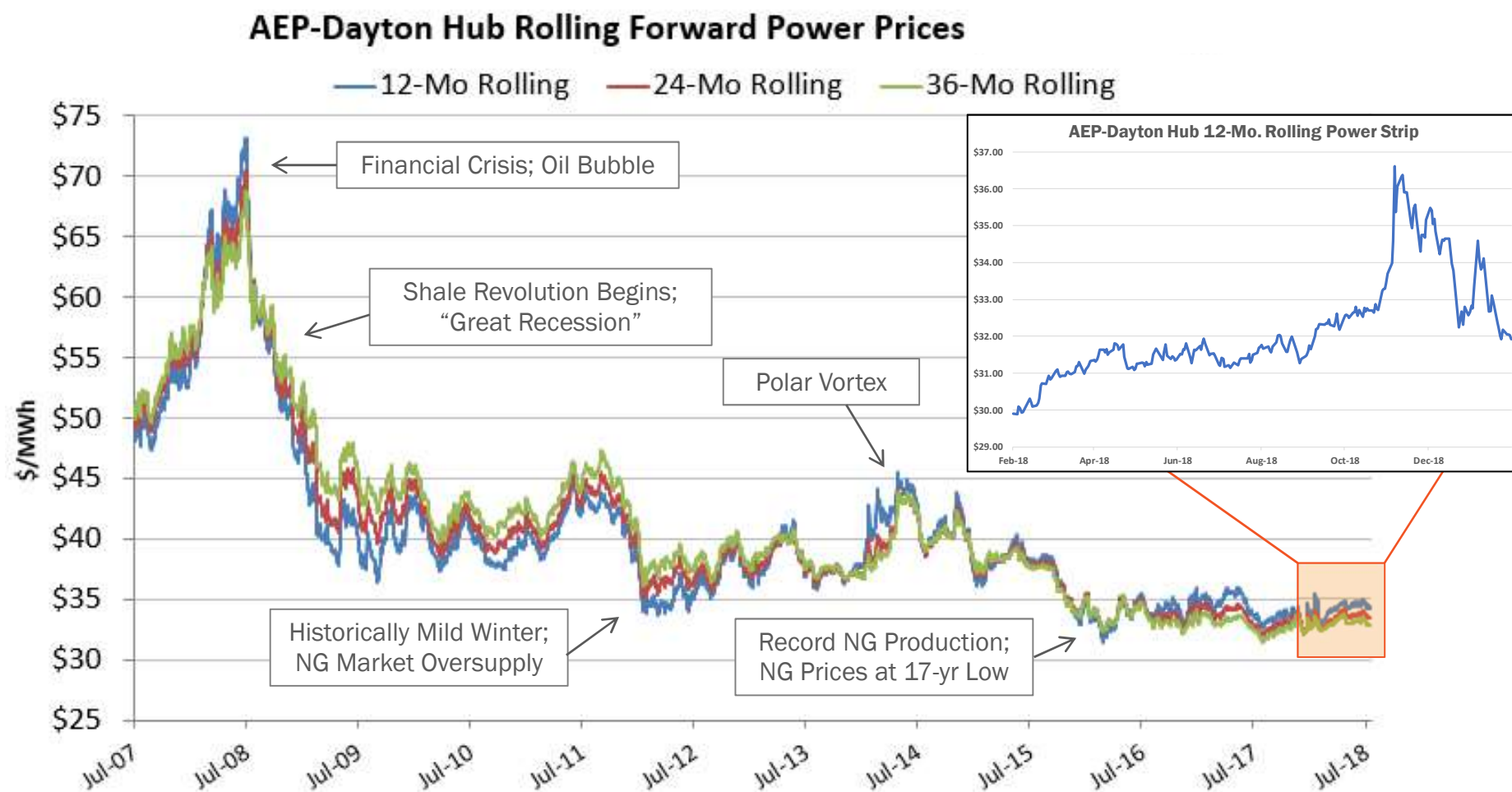
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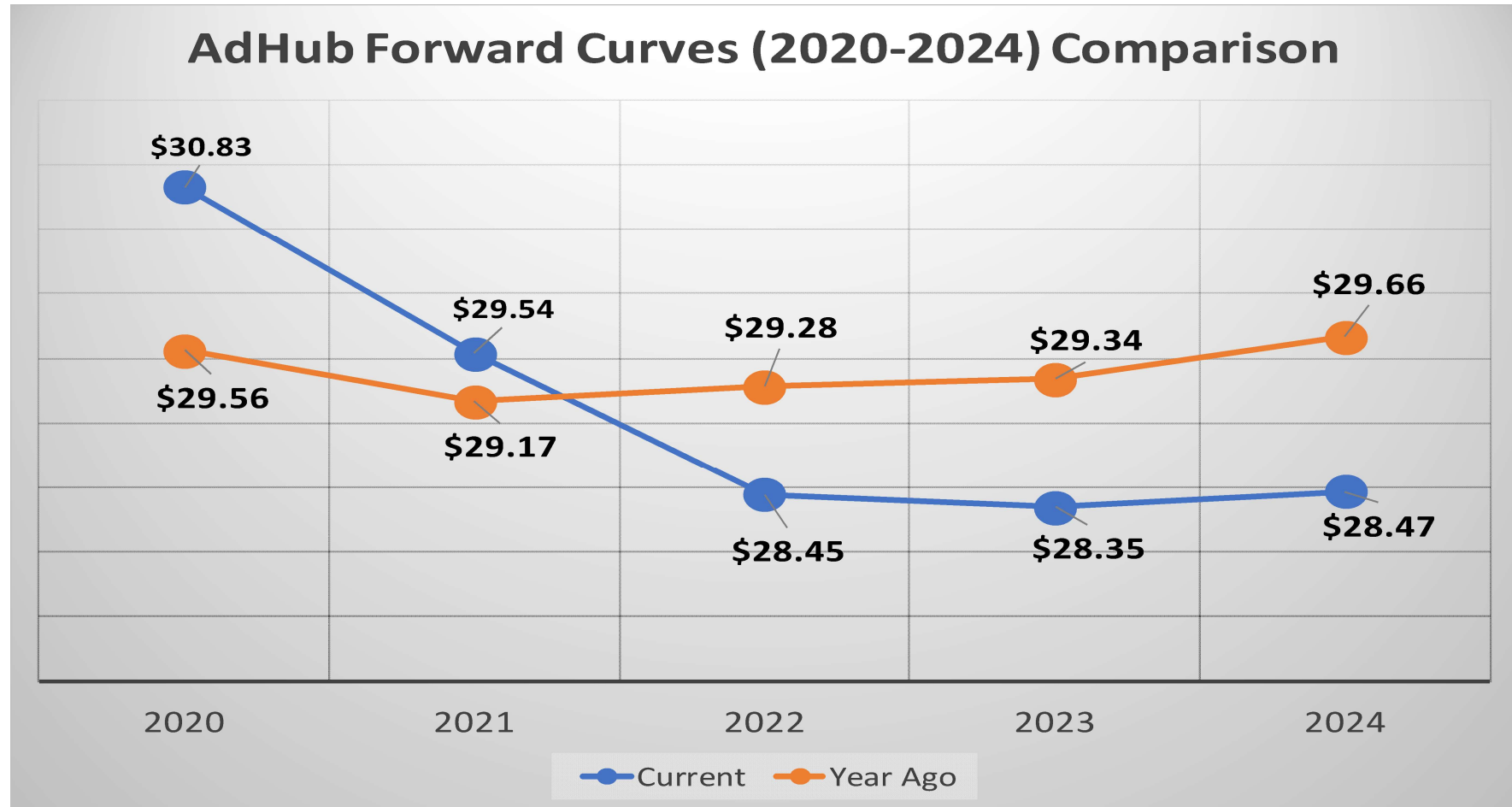
5. Sustainability

Ohio Power Prices Rally Off of Market Lows Y-o-Y



Source: Constellation, NYMEX

Forward Curve Comparison Year-over-Year



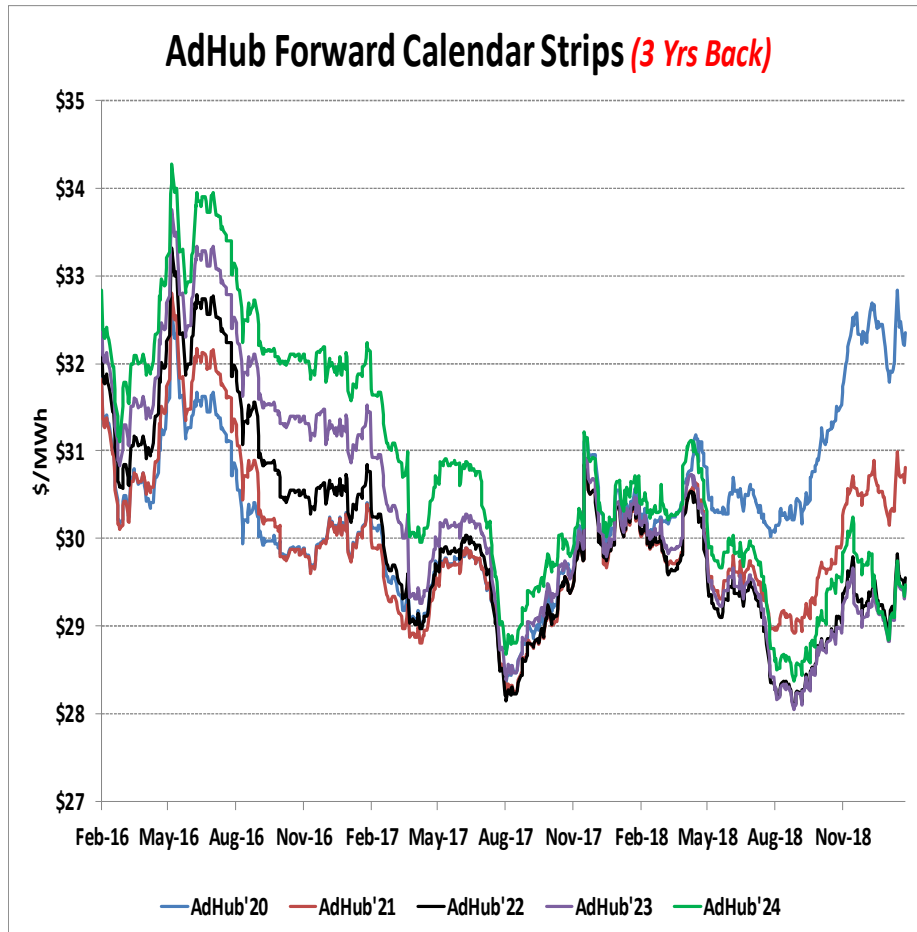
Customer Takeaway: AdHub forward curve has risen a bit for 2020 due to the possible impacts of gas storage deficits heading into next winter, while the back-end (2022–2024) has fallen significantly as an abundance of natural gas and new wind generation continues to put downward pressure on the outer years.

Source: Constellation, NYMEX

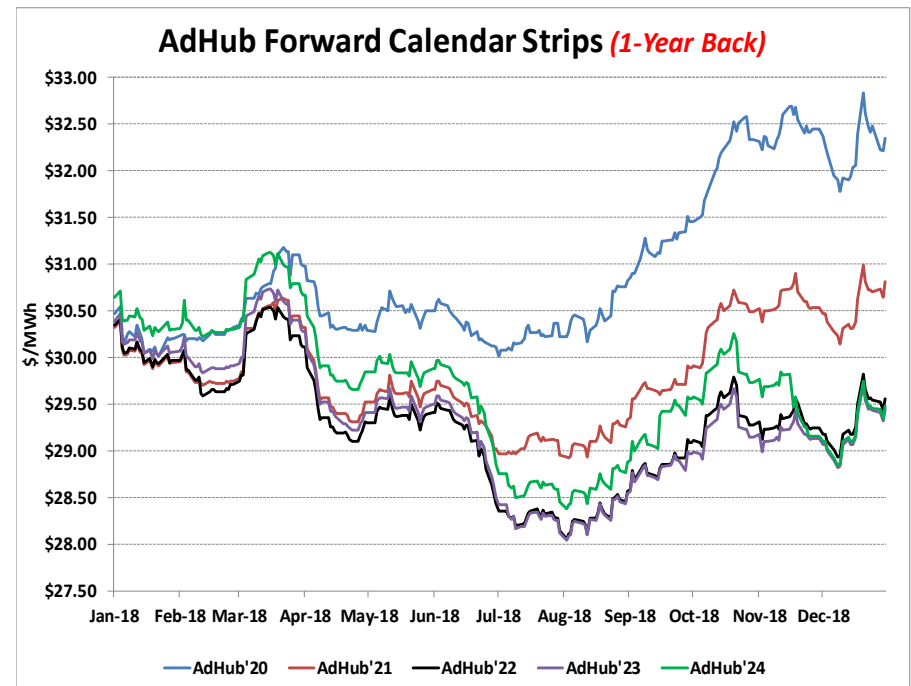


AEP-Dayton Hub Forward Power

Forward Power



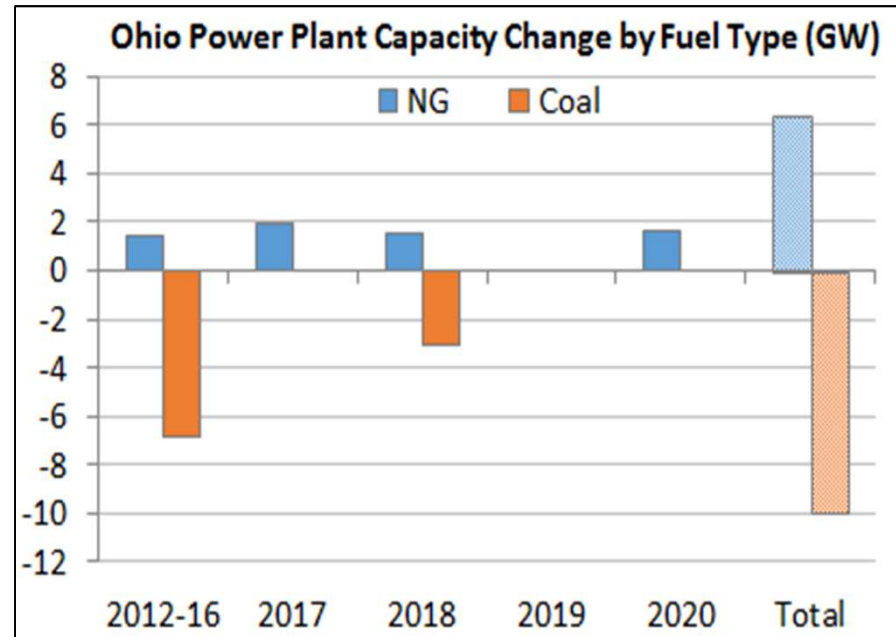
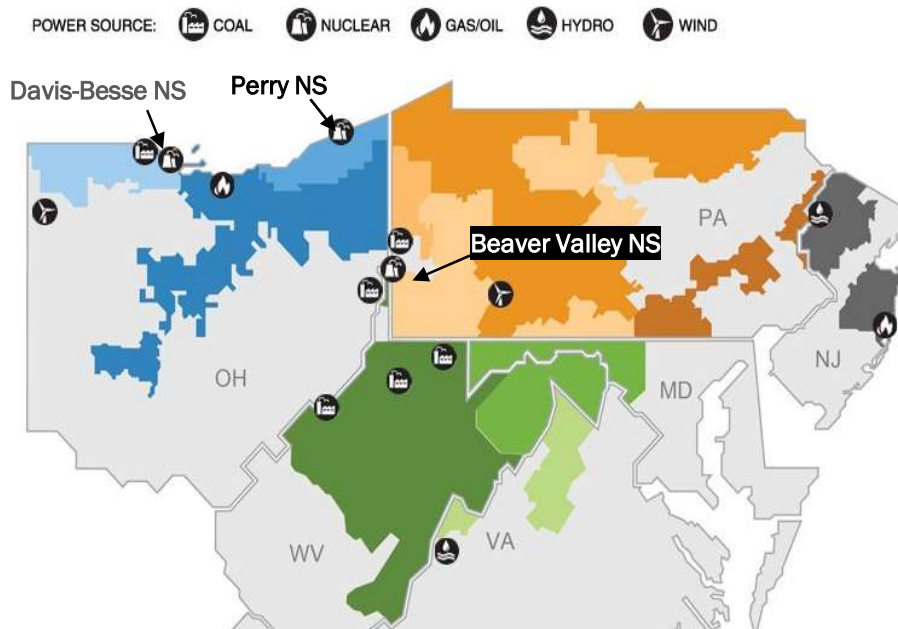
Power Strip	AdHub'20	AdHub'21	AdHub'22	AdHub'23	AdHub'24
Last Price	\$32.41	\$30.79	\$29.53	\$29.42	\$29.45
vs. 3-Yr Avg	7%	3%	-2%	-3%	-4%
vs. Max	-1%	-6%	-11%	-13%	-14%
vs. Min	14%	9%	5%	5%	4%



Data Source: Constellation

Note: Prices shown above are an indicative, non-transactable snapshot of the retail market as of COB 1/29/2019.

First Energy Announces Closure of 3 Nukes



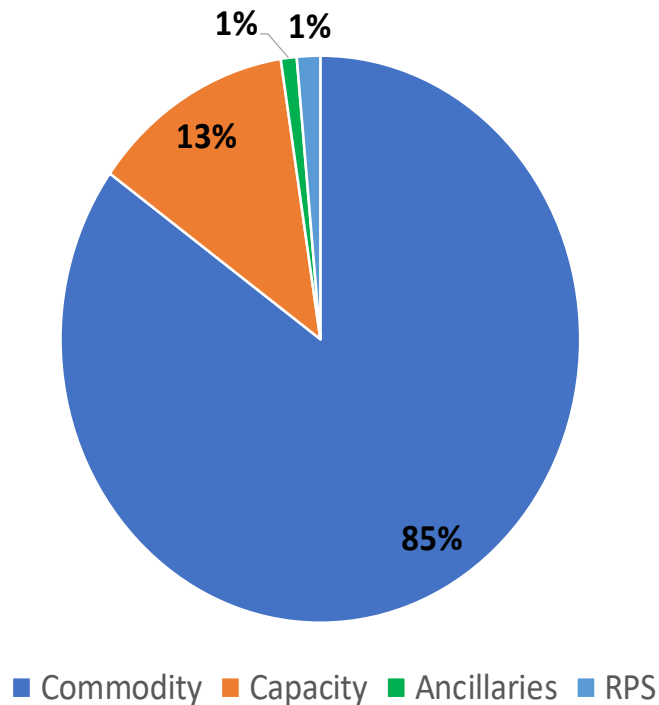
- First Energy recently notified PJM of their plans to retire three of it's nuclear plant assets, totaling 4,048 MW's of capacity over the next three years, citing poor market conditions as the main reason.
- Davis-Besse (908-MW), Perry (1,268-MW) and Beaver Valley (1,872-MW) nuclear stations are the plants slated for retirement; PJM is in the process of reviewing impact of closures on grid reliability.
- Nearly a dozen of natural gas-fired plants are being built or are in the planning stages in Ohio with most of them still in the latter, pending any plans for the state to aid the struggling coal and nuclear plants.

Customer Takeaway: Favorable economics in most regions of PJM, due to the easy access to Marcellus and Utica shale gas, has further challenged both nuclear and coal-fired generation in favor of existing and proposed development of gas-fired generation through various regions of OH and PA.

Sources: Platt's, First Energy, Power Engineering

What's in Your Electric Supplier's Price?

ATSI Power Supply Cost Breakdown



- **Commodity** – The cost of procuring the actual electrons transmitted through the T&D lines. Largely determined by cost of natural gas for New England.
- **Capacity** - Charge for fulfilling capacity requirements imposed by the ISO or otherwise. Generally, these costs are associated with ensuring there is enough generating capacity available now and in the future to meet customer requirements.
- **Transmission** – Costs associated with the regular operation, maintenance and enhancement of transmission lines across a system. *These costs are captured in your utility bill in Ohio.*
- **Renewable Portfolio Standards (RPS)** – State mandated %'s for load-serving entities (supplier) to purchase a certain amount of their supply from renewable energy sources. Rates determined by markets for renewable energy certificates (RECs).
- **Ancillaries** – Small administrative charges billed to load-serving entities by the ISO to operate grid safely and reliably.

Customer Takeaway: The portion of the bill where customers can manage their electricity costs continues to shrink making what opportunities are available to them all the more important.

1. Market Trends: Pricing, Regulatory, Generation

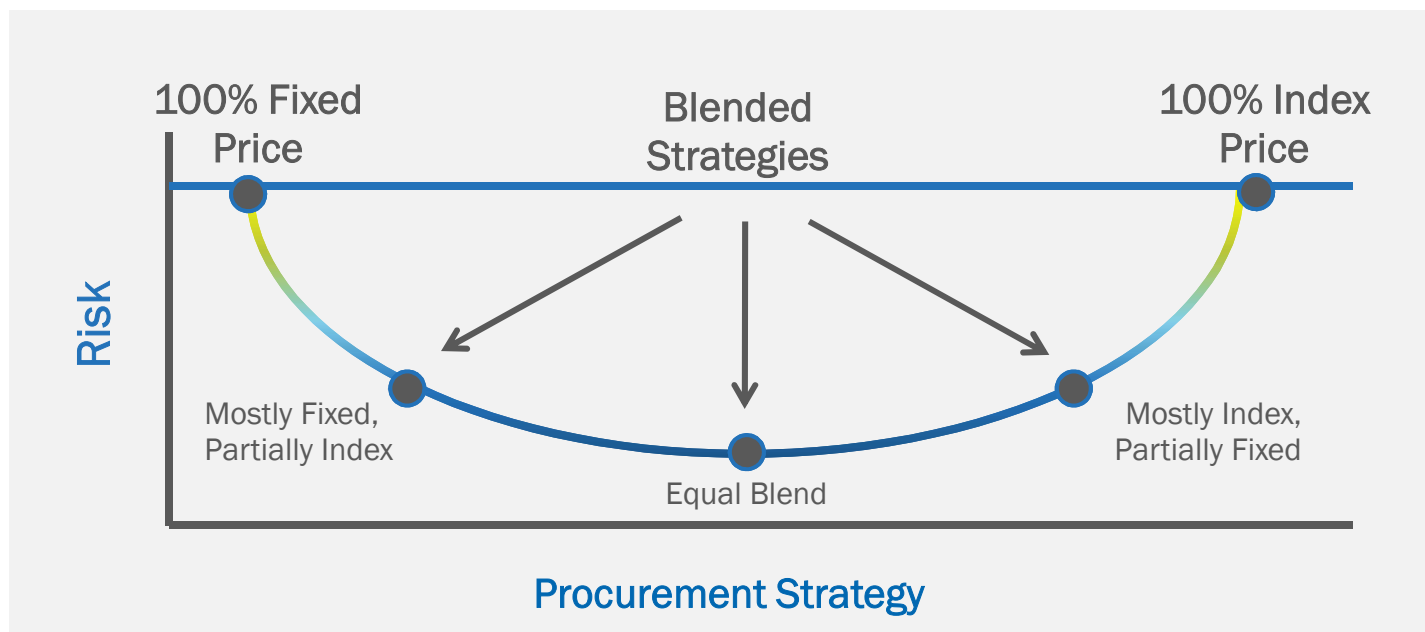
2. Product Selection: Risk vs. Price

3. Demand Reduction

4. Sources for Funding

5. Sustainability

Power Procurement Options

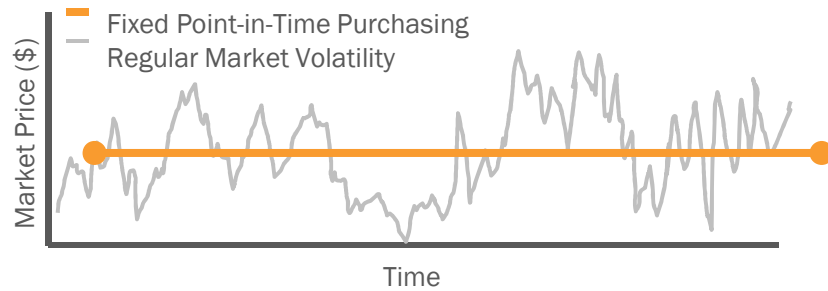


100% Fixed Price	
Pros	Cons
Certainty	Limited Flexibility
Budget	Timing Risk
Simplicity	Cost (to fix)

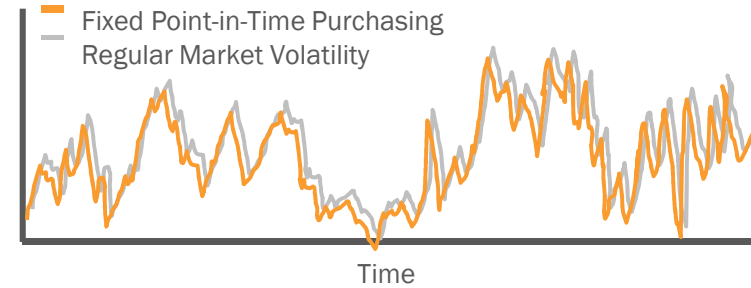
100% Variable Index	
Pros	Cons
Flexibility	Volatility
Minimize Timing Risk	Uncertainty
Cost Savings	Budget

General Power Product Types

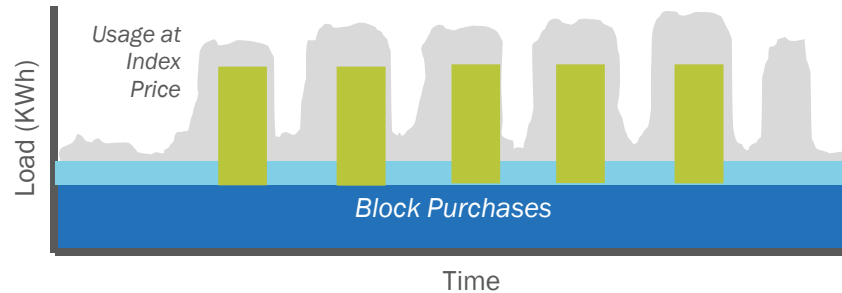
Fixed or Secured Price*



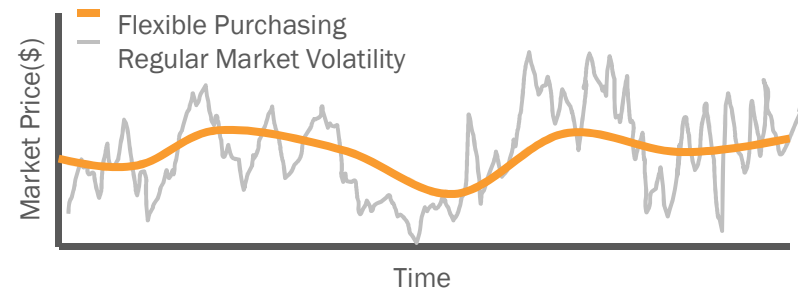
Index Price



Index + Block Solutions



Diversified Solutions



**Graphs are for illustrative purposes only, not representative of real data*

Purchasing Strategies Whitepaper Update

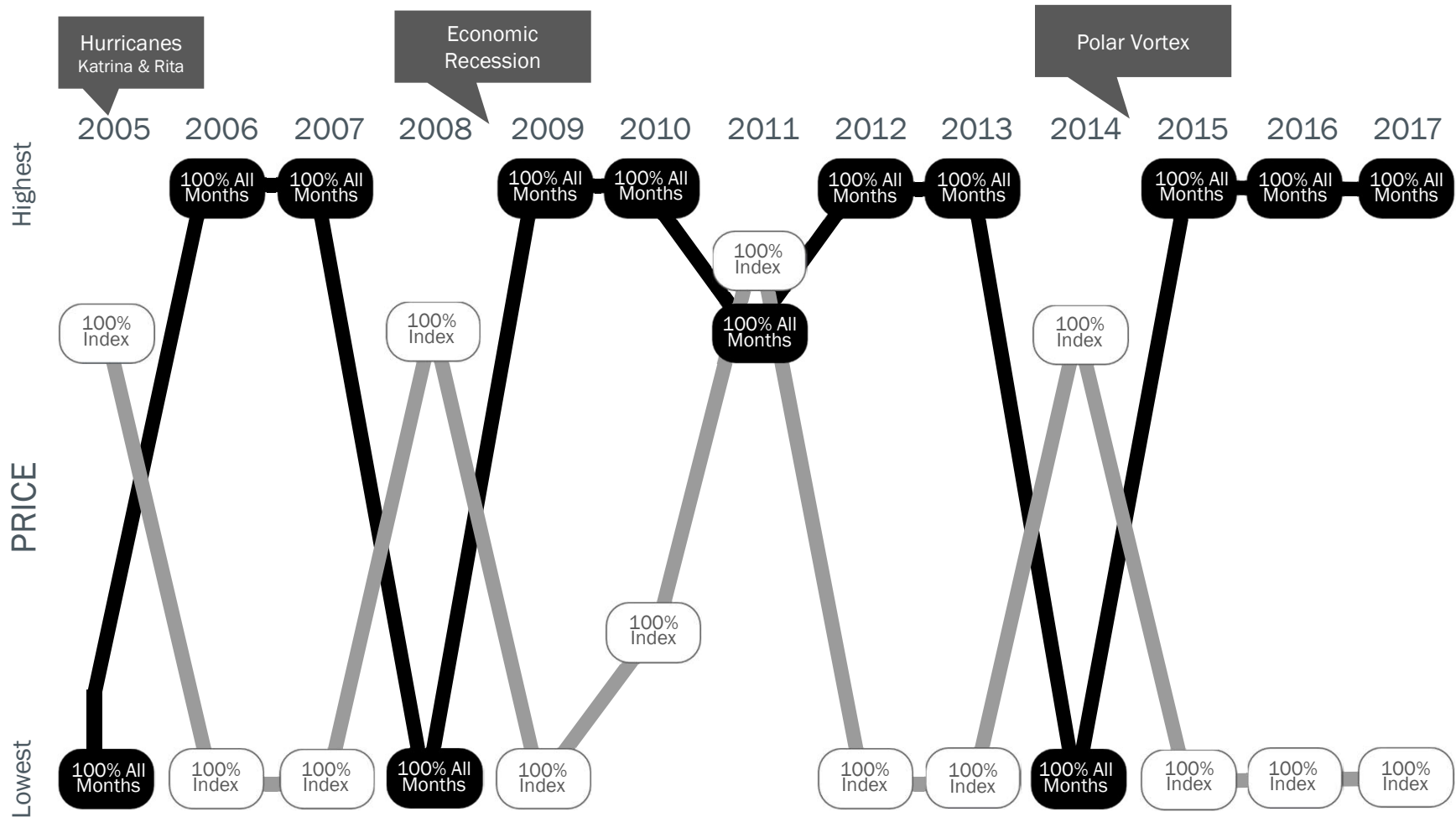
Energy Purchasing Strategies for Your Business

How Procurement Strategies Perform Across Varying Energy Market Conditions

A Constellation Whitepaper—August 2018

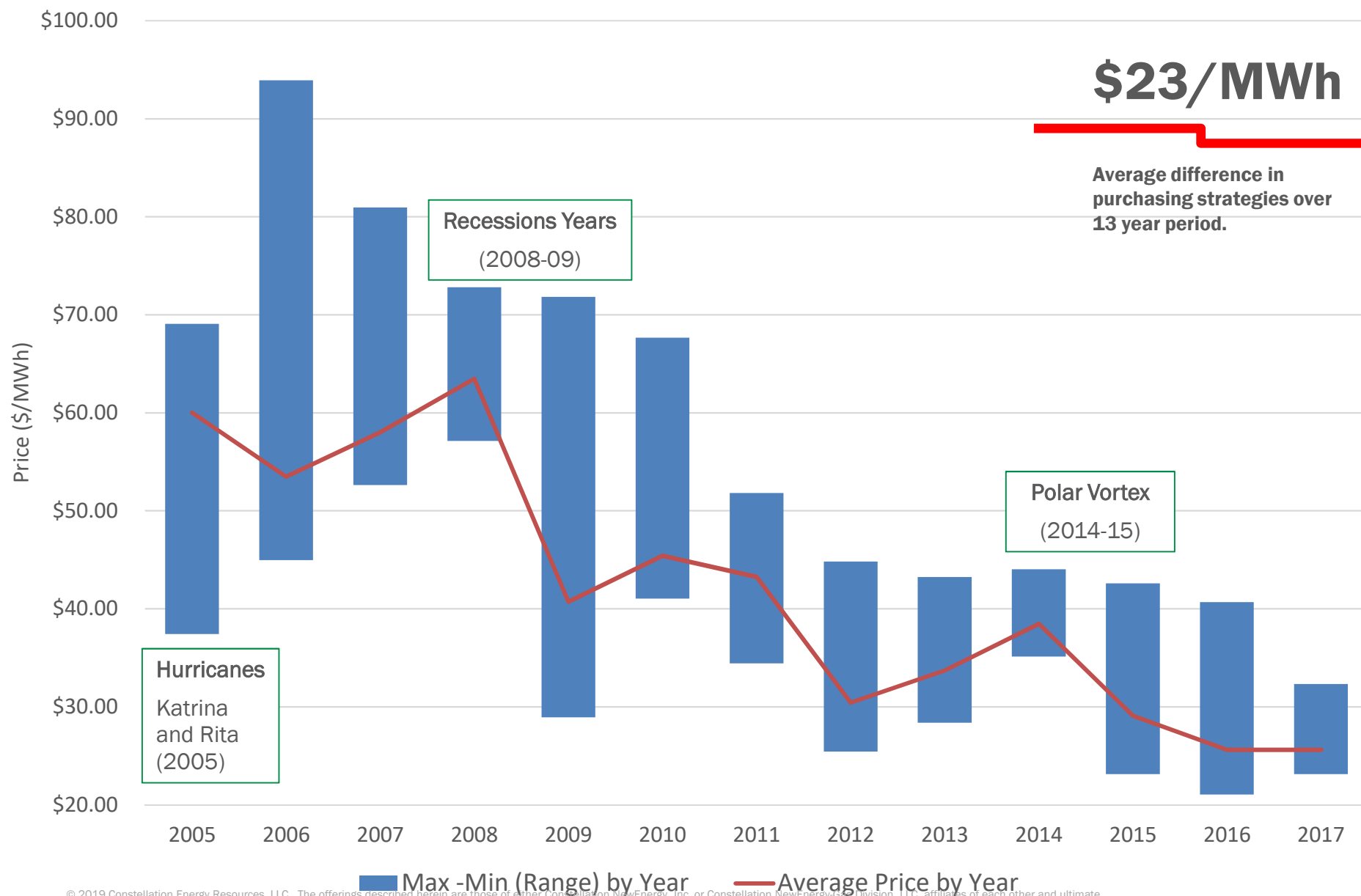
This study evaluated the price and risk performance of seventy-three assorted energy purchasing strategies over a 13-year period to determine which approaches would have helped customers manage both budget volatility (risk) and energy supply costs (price) over time.

Price Performance Comparison: 100% Fixed vs. 100% Index

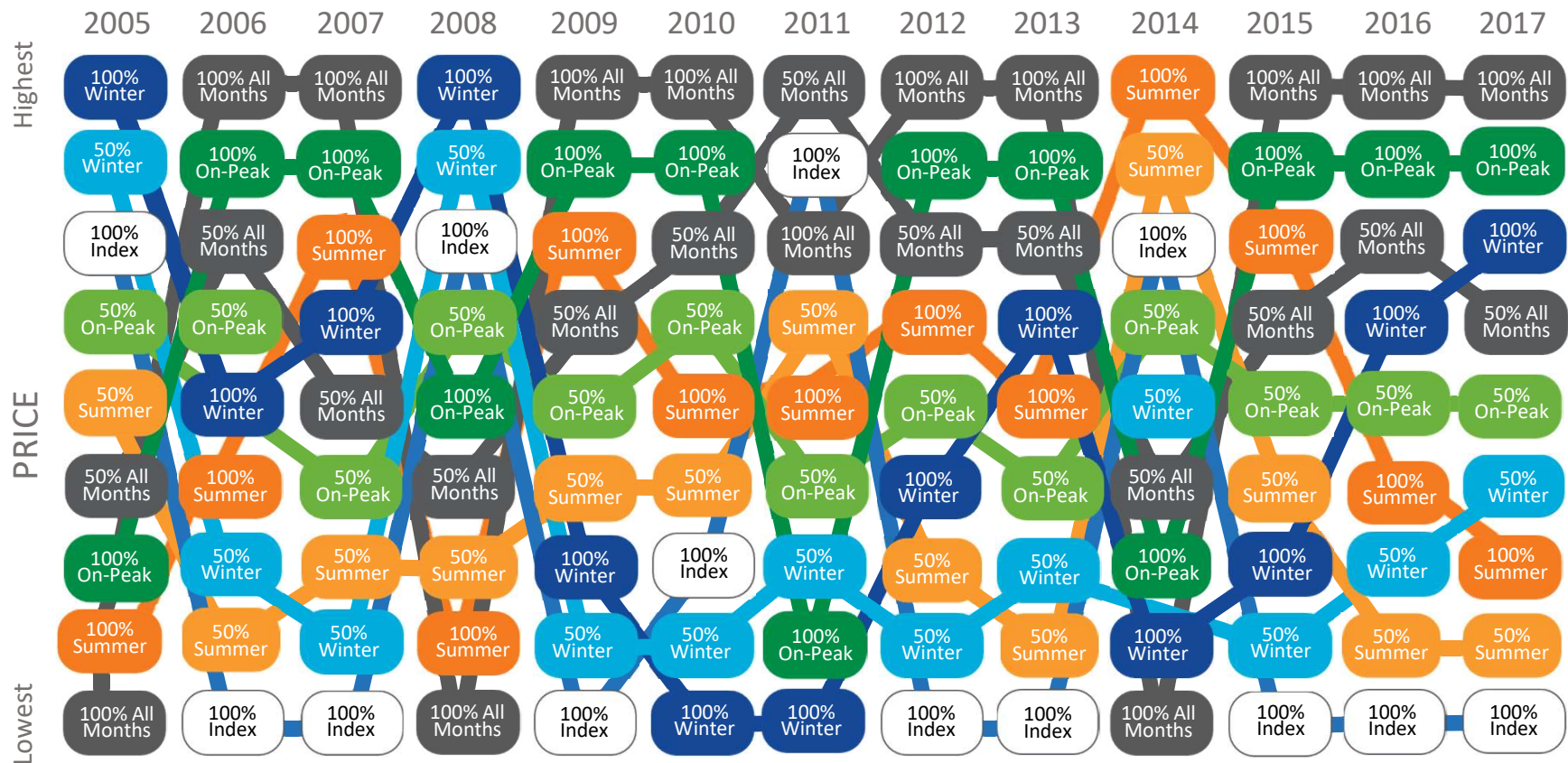


All Purchasing Strategies

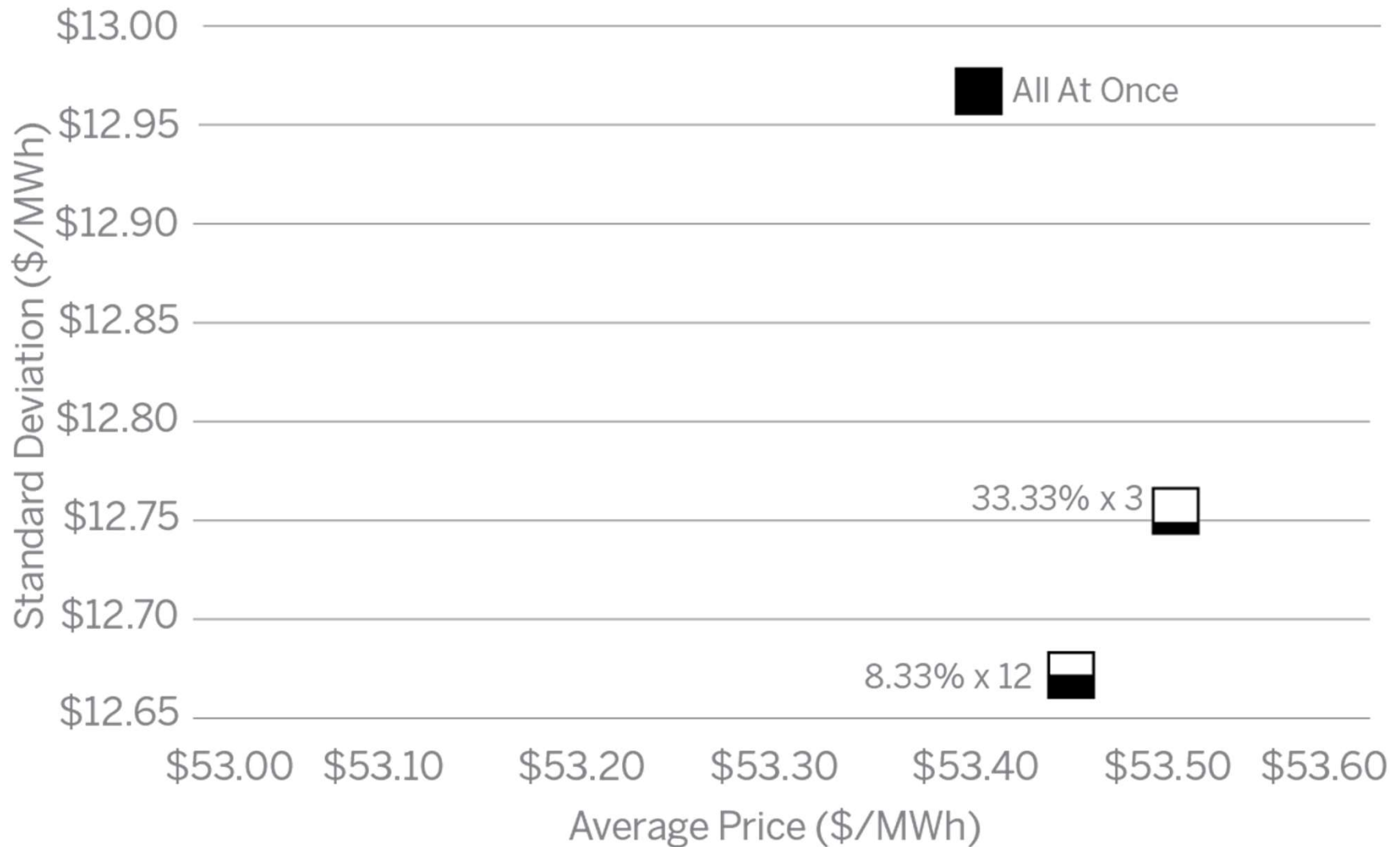
Annual High, Low and Average Prices (2005–2017)



Price Comparison of 9 Strategies Emphasizing Price



Price vs. Standard Deviation by Layering Method: 2005–2017



Structuring a Retail Agreement for an Integrated Energy Strategy

1. Market Trends: Pricing, Regulatory, Generation

2. Product Selection: Risk vs. Price

3. Demand Reduction

4. Sources for Funding

5. Sustainability

PUCO Guideline on Contracts Stating “Fixed”

November 2015 – The PUCO issued a new guideline for all suppliers with the intent for suppliers to more clearly and transparently define fixed-rate contract language starting January 1, 2016.

- Suppliers could only use the word “fixed” in an agreement if a component would never adjust under any circumstances, even a true change-in-law
- “The expectation is simple—fixed means fixed.” – Andre T. Porter, PUCO Chairman
- [Link to article detailing the guideline](#)
- Many suppliers were unwilling to use the word “Fixed” due to the substantial risk assumed without being able to adjust for a change-in-law event

Since the implementation of the PUCO “Fixed means fixed” guideline, terminology in Ohio agreements has become more obscured and it is often more difficult for customers to understand the price and regulatory risk of their agreements.

Apples-to-Apples Among Complex Contract Language

The Request: an apple



Due Date:	3/1/2019
Utility:	Dayton Power & Light
Account:	1234568790
Product:	Fixed, All-In
Terms:	12, 24, 36 Months
Start Month:	July 2019

The Response: a variety of “apples”



Ask the Right Questions to Determine the Difference

- Does a change in PLC count as a “change in law” event?
- What will happen when capacity rates change in the future?
- Does the “change in law” language only apply if there is an increase?
- Does material change or tolerance band language apply if there is an increase or decrease in forecasted usage?
- Does material change apply to usage only or does it also include demand components (PLCs)?
- What will happen to a contract price if the material change threshold is met?
- How will a contract price be impacted if a brand new charge is introduced in the region or state?
- Will my contract price change as the percentage of Renewable Portfolio Standards increases in Ohio through 2027?
- Are volumes being adjusted upwards to compensate for a lower price?

Asking strategic questions can result in uncovering differences in contract terms that lead to price differences.

Integrating Retail Contracts into a Holistic Energy Strategy

Retail electric supply is a function of both Quantity (how much a customer uses) and Price. It's important to consider the customer's overall energy strategy to determine the right retail product and term to maximize the impact of upgrades.

Managing Quantity:

Efficiency Upgrades

Updated Controls

Demand/Peak Response Programs

Shifting Usage to Off-Peak Times

Lowers Usage: Lowering usage means that a customer uses fewer MWh in total therefore lowering the total amount they will pay for electricity supply.

Can Also Lower Price: Quantity management can lower price by lowering a customer's capacity obligation and other demand-based components, shifting more usage to off-peak times, and flattening out load shape. All of these will lower a customer's price, however, if a customer is already locked-into a fixed price contract, they will not see these benefits until their renewal period.

Demand Reduction & Project Funding

1. Market Trends: Pricing, Regulatory, Generation

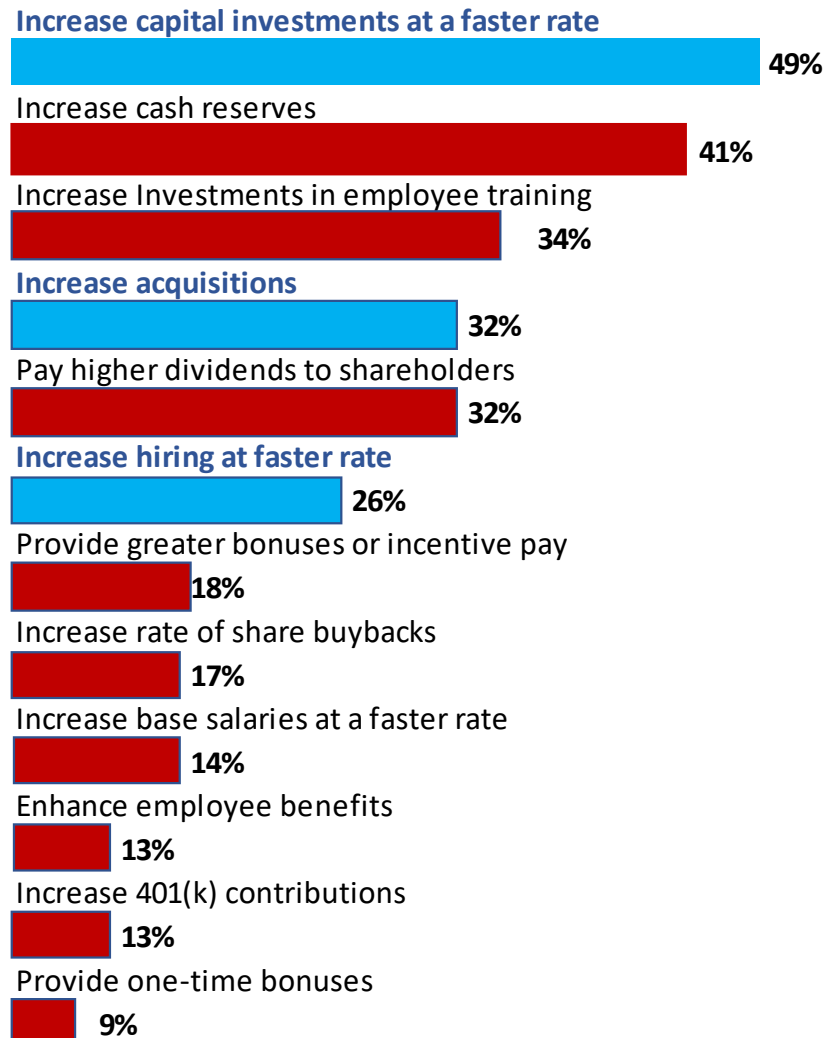
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Percentage of companies using the dollars saved from the tax cut



Note: Survey of 152 companies with combined annual revenues of \$700 billion

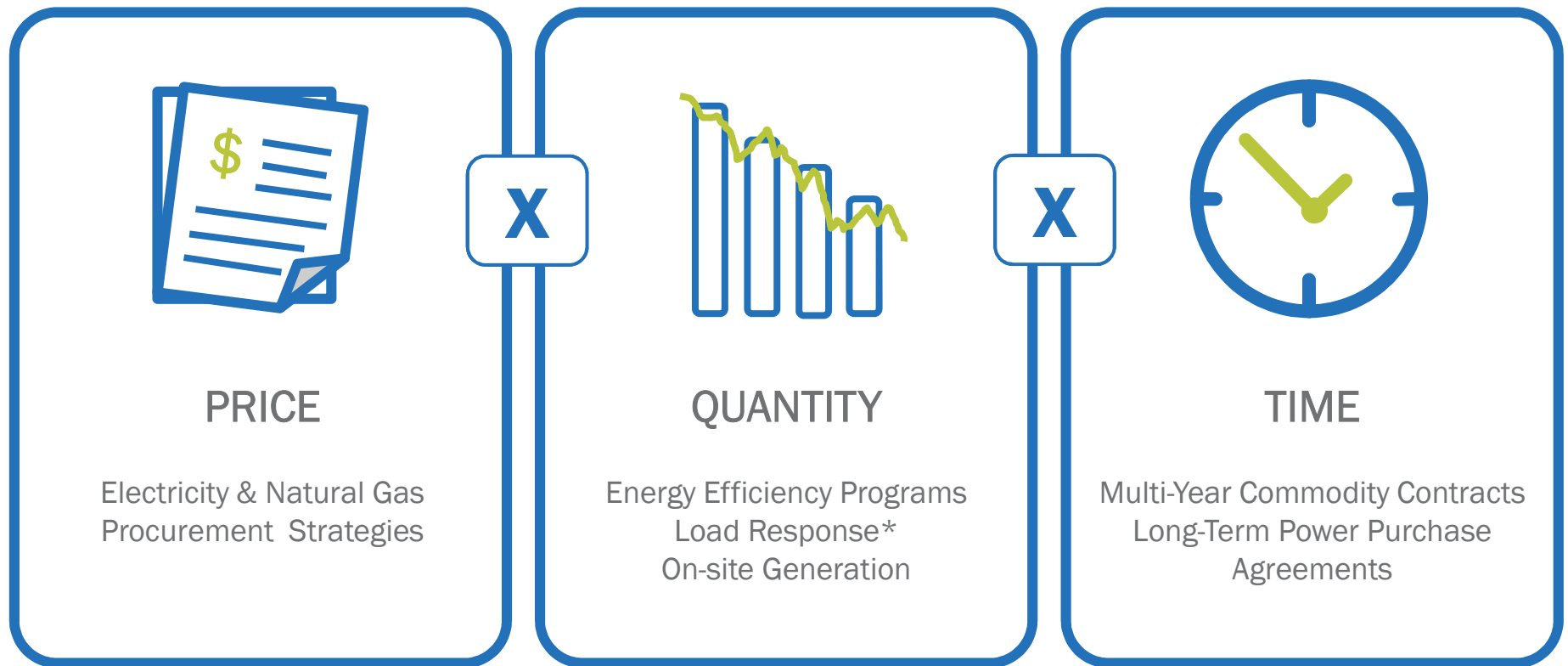
Source: Korn Ferry

THE WALL STREET JOURNAL

Managing the Total Energy Cost

Manage your price and lower your quantity under a strategic time frame.

$$\text{Energy Cost} = (\text{Price} \times \text{Quantity}) \text{ Time}$$



Needs and Challenges of Implementation

Businesses identify a need for energy efficiency measures and upgrades primarily to:



But it has increasingly become more challenging to identify the best method for financing these projects.

Sources of Funding

- Cash
 - Partial Cash
 - Term Loan
 - State/Local Bond
 - Lease

- Performance Contract
 - PPA
 - PACE
 - Other?

- Other

A Seamless Option For Project Funding

Efficiency *Made Easy*

How it works:



Energy (Power and Gas) Spend

Purchasing Your Energy Supply



Efficiency Measures

Building High Impact Efficiency
into Energy Supply Contracts



No Upfront Capital
Required



Energy Spend
Savings



Included in Your
Constellation Power
or Gas Supply Bill

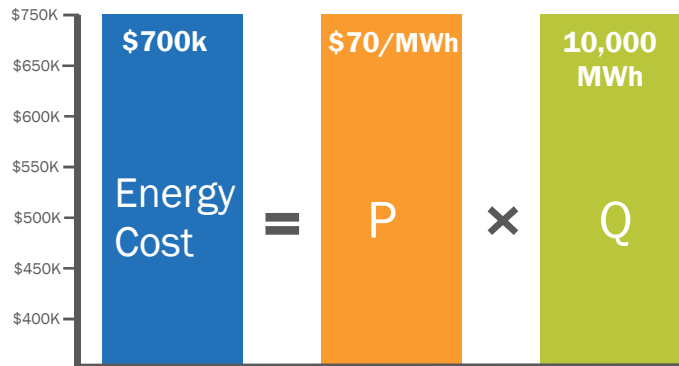


Reduced
Energy
Consumption

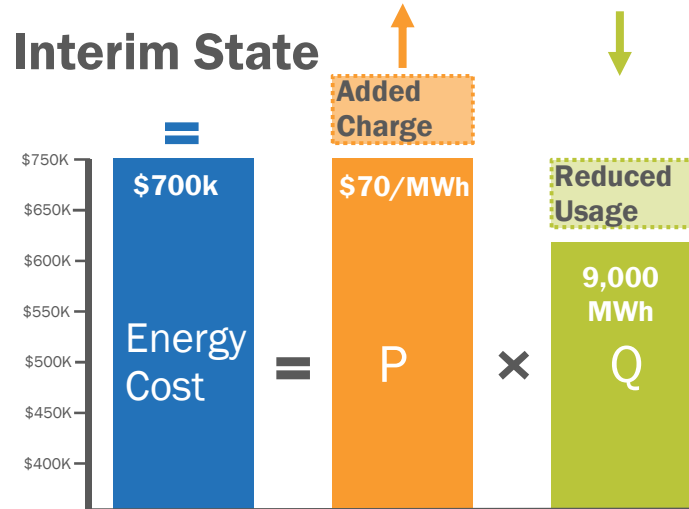
How Does It Work?

Current State

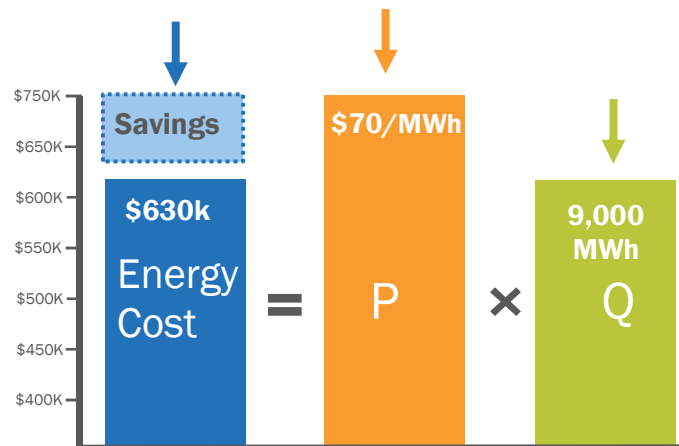
P = Electricity Price
Q = Electricity Quantity



Interim State



Future State

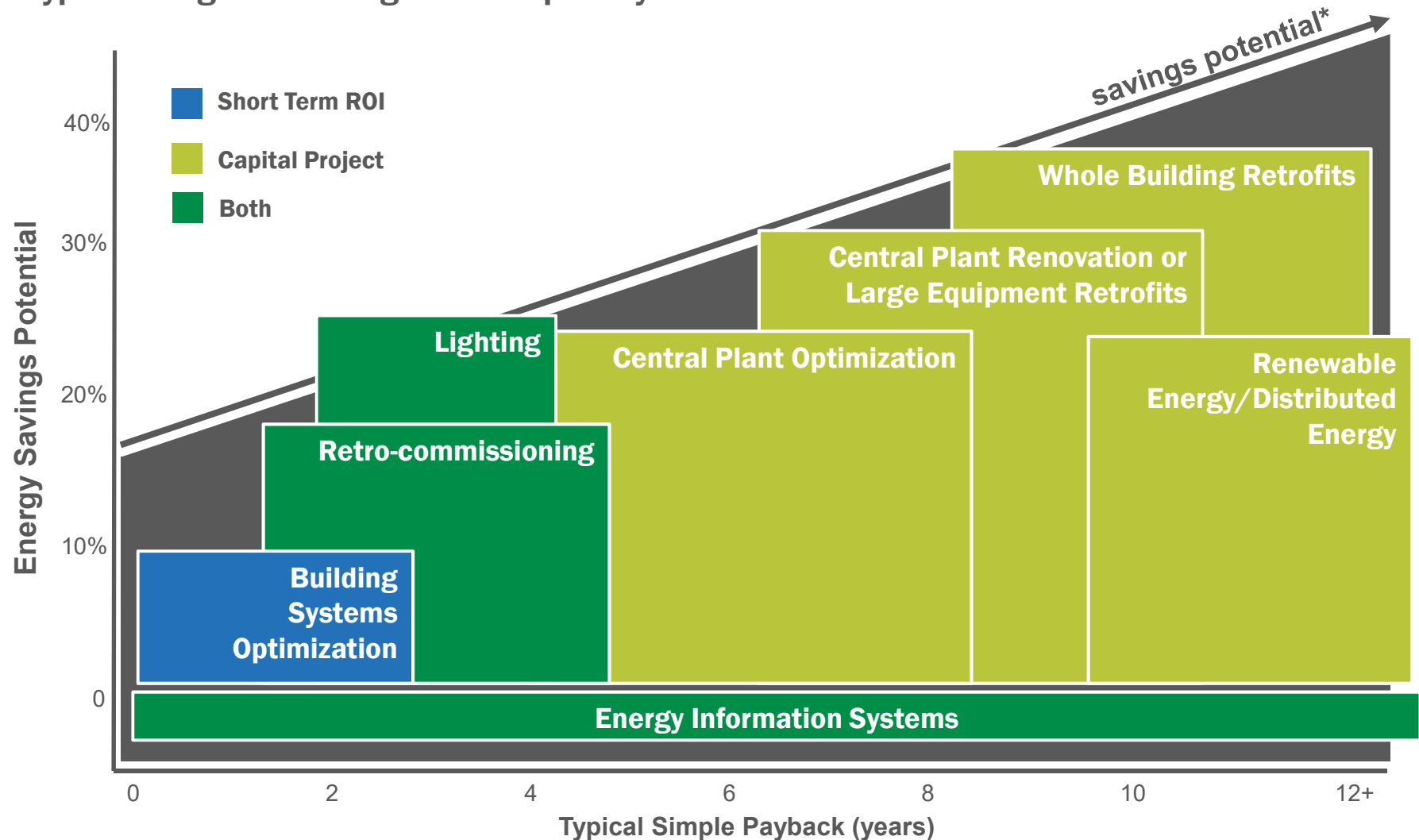


Benefits Summary

- Energy Savings
- Quantity Reductions
- Warranty Savings
- Maintenance Savings
- Greenhouse Gas (GHG) Savings
- No Upfront Capital Needed

The Spectrum of Energy Efficiency Solutions

Typical Ranges Of Savings and Simple Paybacks



**graph is for illustrative purposes only. Results of efficiency measures may vary*

Energy Conservation Measures (ECMs)



Water Conservation

- Ultra-low flow toilets
- Ultra-low flow urinals
- Low flow faucet aerators
- Leak detection systems



Building Envelope

- Roof improvements
- Crack repair/weather-stripping
- Window solar film



Data Center/Telecom

- Data Center Consolidation
- Airflow Measures
- “Virtualization” and “Cloud”
- Next Gen EMCs
- Enhance telecom system



Communication, Training, & Awareness

- Stakeholder involvement
- Communications – internal & external
- Community participation



Lighting System Upgrades

- Occupancy based redesign
- Direct/Indirect systems
- Intelligent lighting system controls
- High efficiency re-lamp and re-ballast
- LED Applications
- Incandescent to fluorescent conversion
- Parking area lighting upgrades



HVAC System Upgrades

- New air handling systems
- Economizer/HVAC Damper
- Zone isolation
- High efficiency motors
- Variable speed drives on many systems
- Instantaneous hot water heaters
- Refrigeration upgrades
- Retro/Continuous commissioning



Central Plants

- Cogeneration system
- Evaluate chiller & boiler efficiency
- Cooling tower evaluation
- Primary/secondary systems
- Heat recovery systems
- Variable speed pumping systems



Building Automation System Upgrades

- Enhance existing systems
- Complete new EMCS systems
- Unoccupied setback control
- Integration of multiple systems
- Remote access and monitoring
- Efficient operations algorithms
- Outside air control strategies
- Elevator controllers



Energy Procurement

- Risk mitigation strategy
- Long-term electric and gas
- Renewable Energy Credits
- Load Response Programs



Renewable Energy

- On-site solar energy systems
- Vertical wind turbines
- Solar hot water systems

Sustainability

1. Market Trends: Pricing, Regulatory, Generation

2. Product Selection: Risk vs. Price

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Top Sustainable Companies



What is Sustainable Energy?

Constellation Blog – Ways to (Realistically) Achieve Your 2020 Energy Sustainability Goals

Environmental sustainability is the ability to maintain the factors and practices that contribute to the quality of environment on a long term basis. Two components to sustainability:

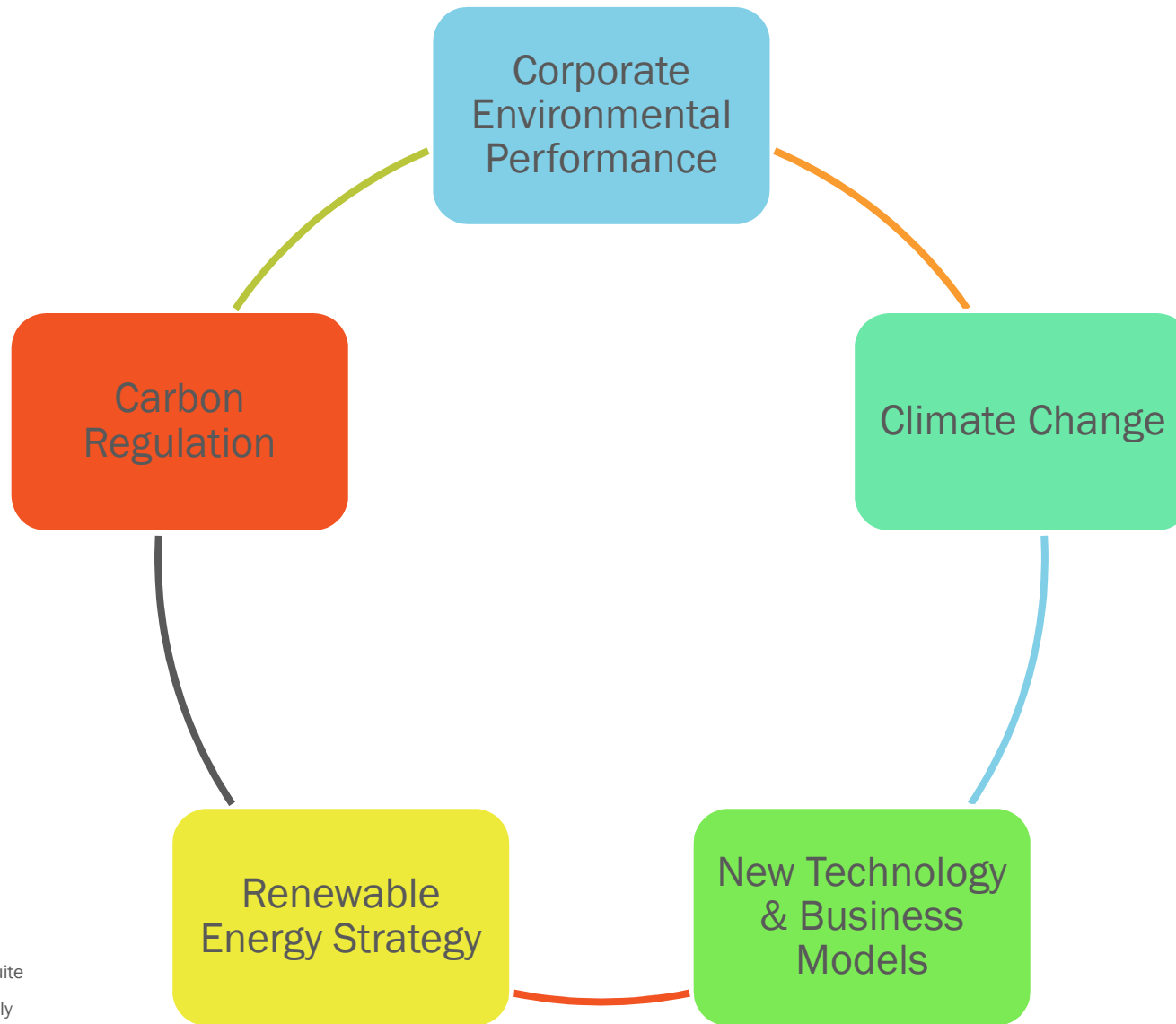
Renewable Energy

Energy produced from sources that do not deplete or can be replenished within a human's lifetime (compared with non-renewable sources like fossil fuels)

Energy Efficiency

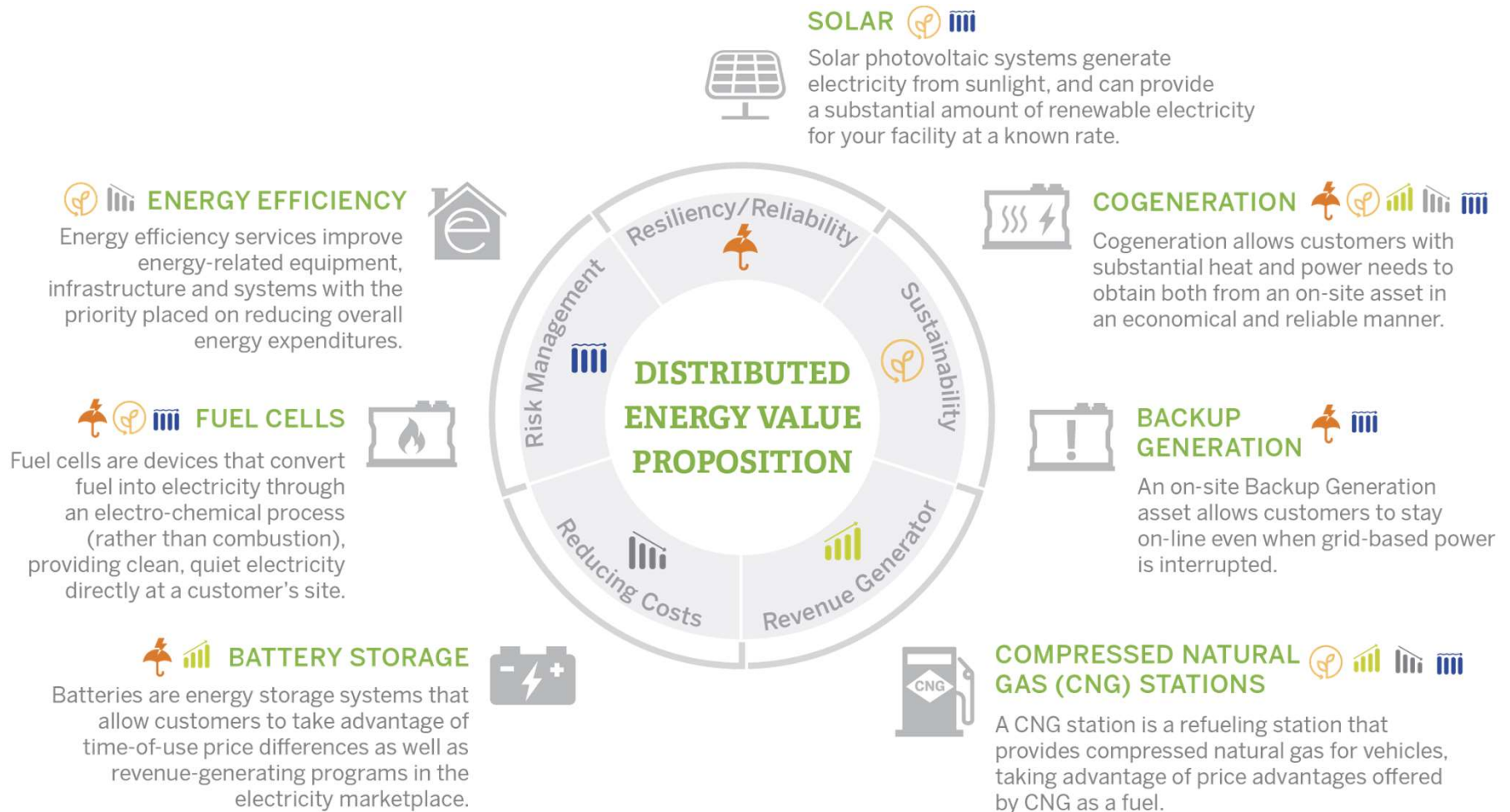
Using a lower quantity of energy to provide the same amount of energy as a non-energy-efficient alternative, which can help lessen greenhouse gas emissions and therefore safeguard the environment

Sustainability

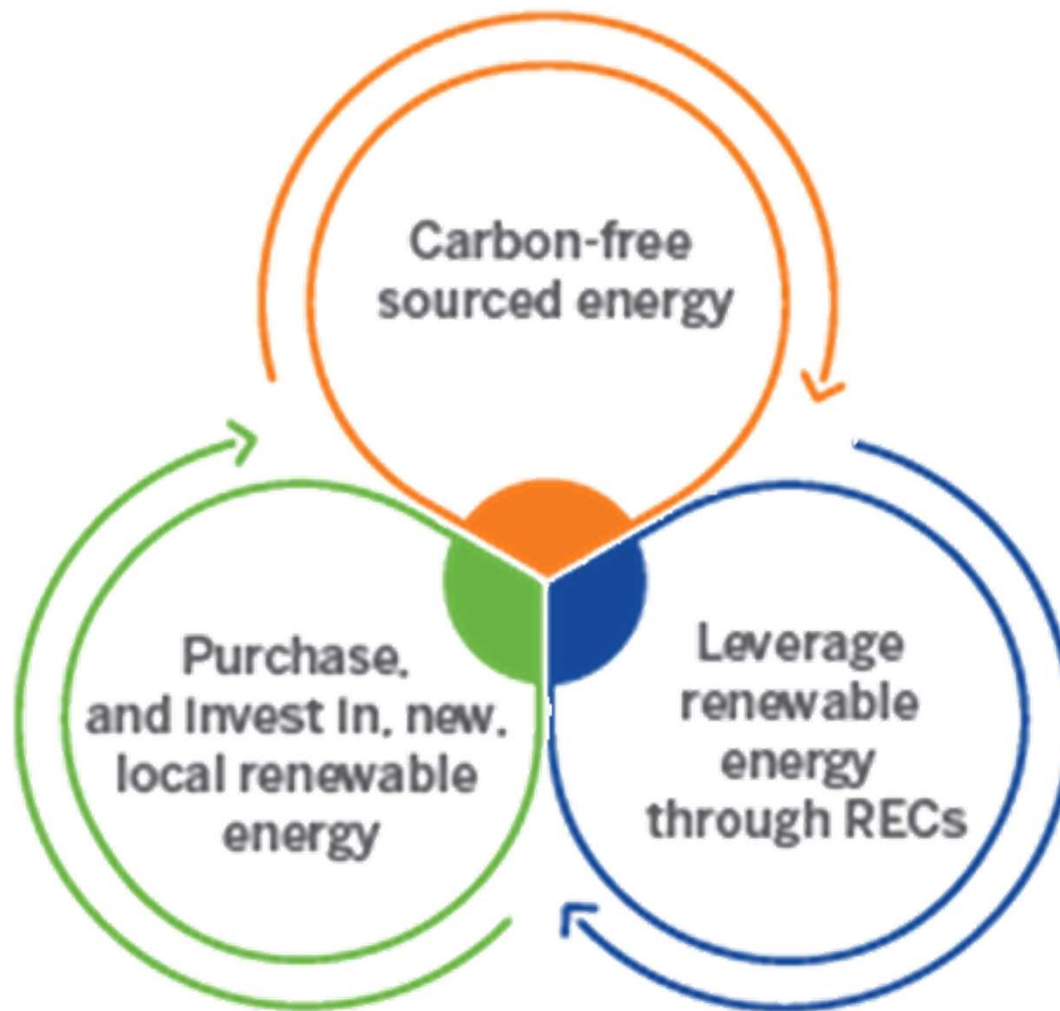


Energy Strategy for the C-Suite
Winston, Favaloro and Healy
HBR – January –Feb 2017 Issue

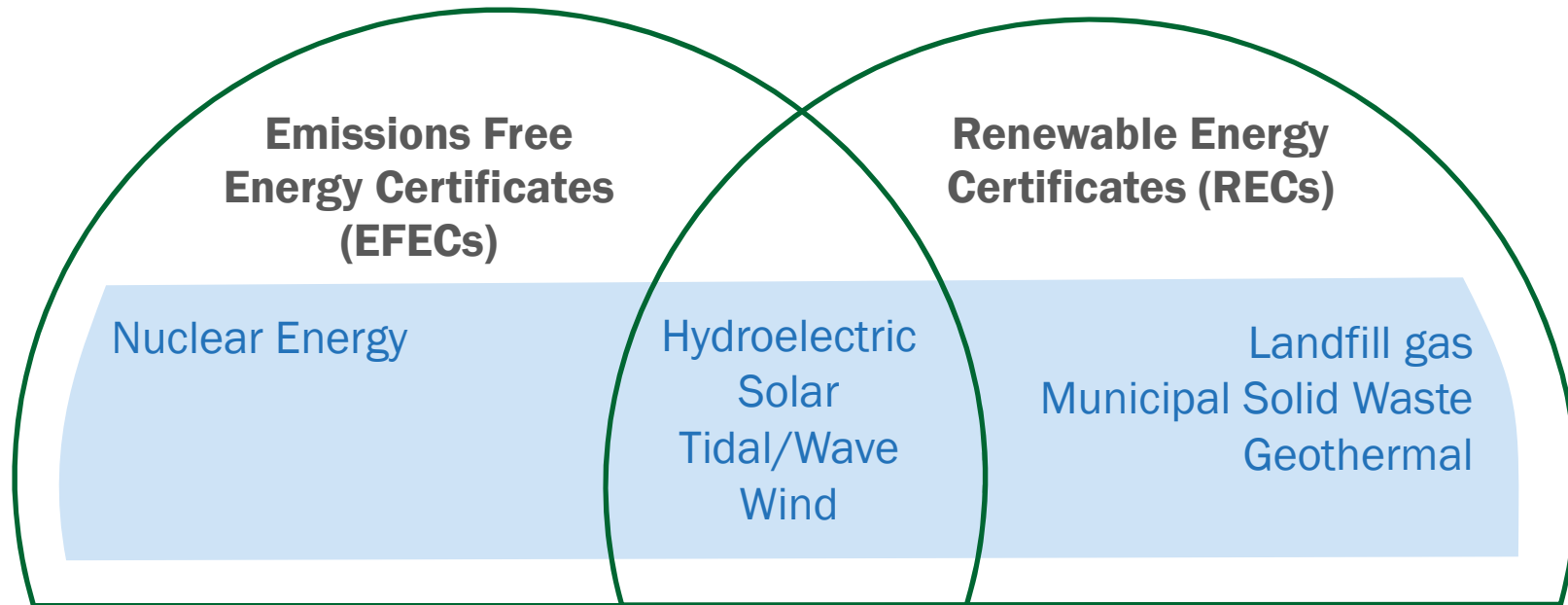
Distributed Energy Solutions & Features



Sustainable Energy: An Action Plan



Comparing RECs and EFECs



EFECs are from emission-free sources

They will allow consumers to claim their power purchases had zero emissions, but not all EFECs are from renewable sources (i.e. nuclear, certain hydro).

RECs are from renewable fuel sources

Some RECs may not have zero CO2 emissions associated with their generation.

EFECs are not carbon offsets

Carbon Offsets are related to projects such as energy efficiency projects, the destruction of industrial pollutants or agricultural byproducts, destruction of landfill methane, and forestry projects.

Renewable Purchasing is Moving Up the Maturity Curve

More Companies are Setting Goals and Taking Action

- 45% of Fortune 500 have GHG reduction targets
- 53 Fortune 500 have renewable energy targets & 23 are committed to 100% renewable
- 65 companies have signed the Renewable Energy Buyers Principles
- 72% of large US energy users are actively pursuing renewable energy procurement

External Pressures on Companies to adopt Renewables is Growing

- Supply Chain: Companies are putting GHG reduction goals on their supply chain vendors
- Employees: Millennials support (and want to work for) corporate social responsibility focused companies
- Stockholders: Institutional investors are applying pressure on public companies to address climate change

Source: CERES, WRI Power Forward 3.0, Renewable Energy Buyers Principles, PWC Corporate Renewable, Energy Procurement Survey Insights

Developing an Integrated Energy Strategy



Developing an Integrated Energy Strategy

Develop a custom
**Power and Natural
Gas Purchasing
Strategy**



Integrate
**Renewables
(RECs, Wind,
Solar)** into your
generation mix

Developing an Integrated Energy Strategy

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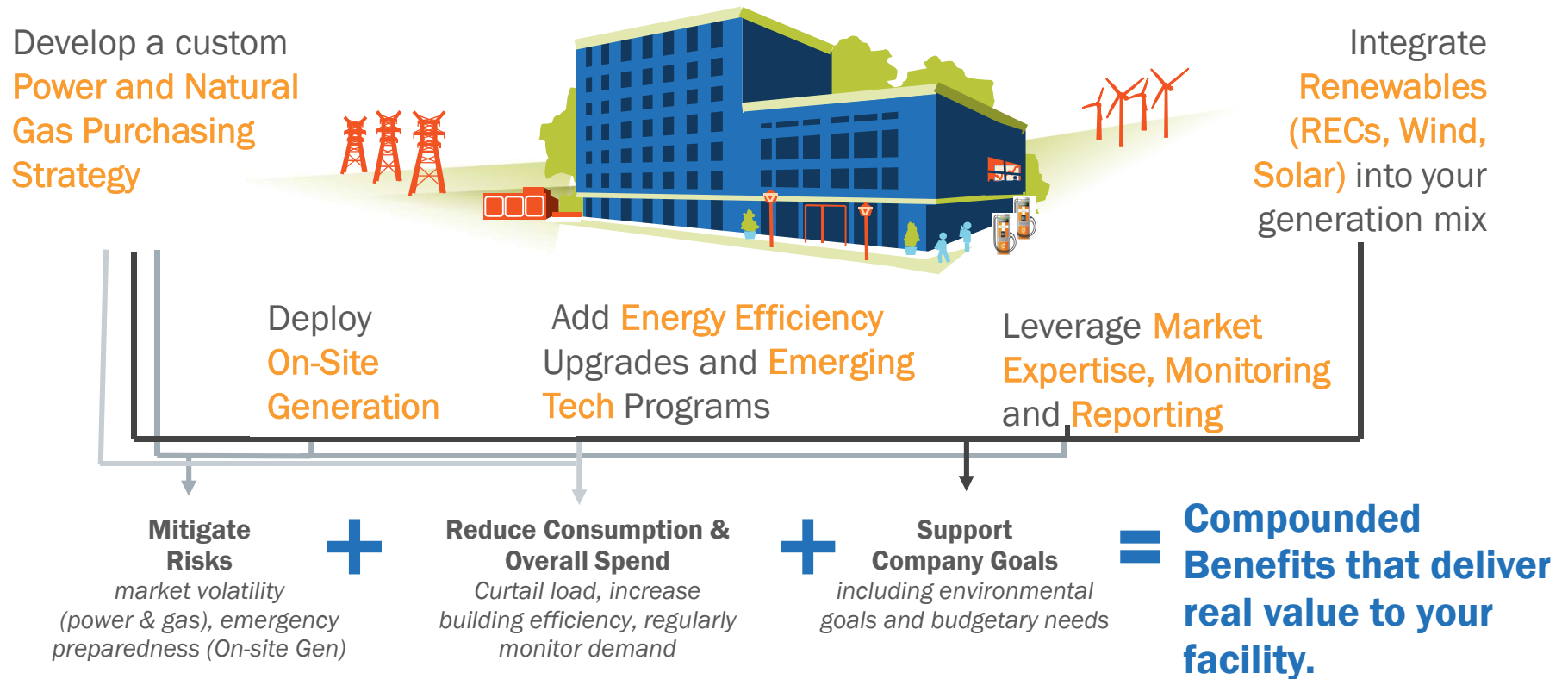
Integrate
**Renewables
(RECs, Wind,
Solar)** into your
generation mix

Deploy
**On-Site
Generation**

Add **Energy Efficiency
Upgrades and Emerging
Tech** Programs

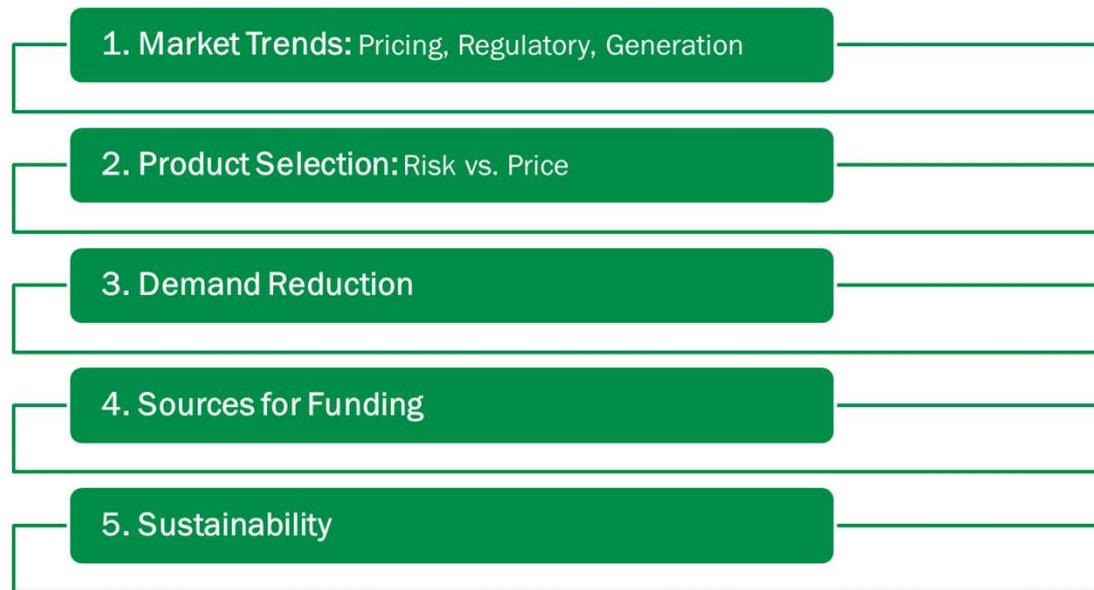
Leverage **Market
Expertise, Monitoring
and Reporting**

Developing an Integrated Energy Strategy



Benefits of an Integrated Energy Strategy

- Improving Organizational Alignment
- Achieving Sustainability Goals
- Mitigating Price Volatility
- Improving Reliability
- Increasing Shareholder Value



Reducing cost and differentiating against the competition

Thank you

Raj Bazaj
Executive Director – West Region Sales
Constellation
Rajiv.bazaj@constellation.com



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