



UNIVERSITY OF  
MARYLAND

**SIEMENS**  
*Ingenuity for life*

# Total Energy Management Portfolio Role of CHP Plant

Consume Sparingly, Spend Wisely,  
Generate Responsibly, Analyze Continuously

IDEA Campus Energy, February 28, 2019



# Agenda



- New Energy Management Challenges, Practices and Tools
- Supply Procurement & Performance Benchmarking
- Portfolio Optimization Framework in Evaluating Supply Options
- Role of the Central CHP Facility
- Q&A

## Reflecting on the Past Decade – Greater Challenges Ahead



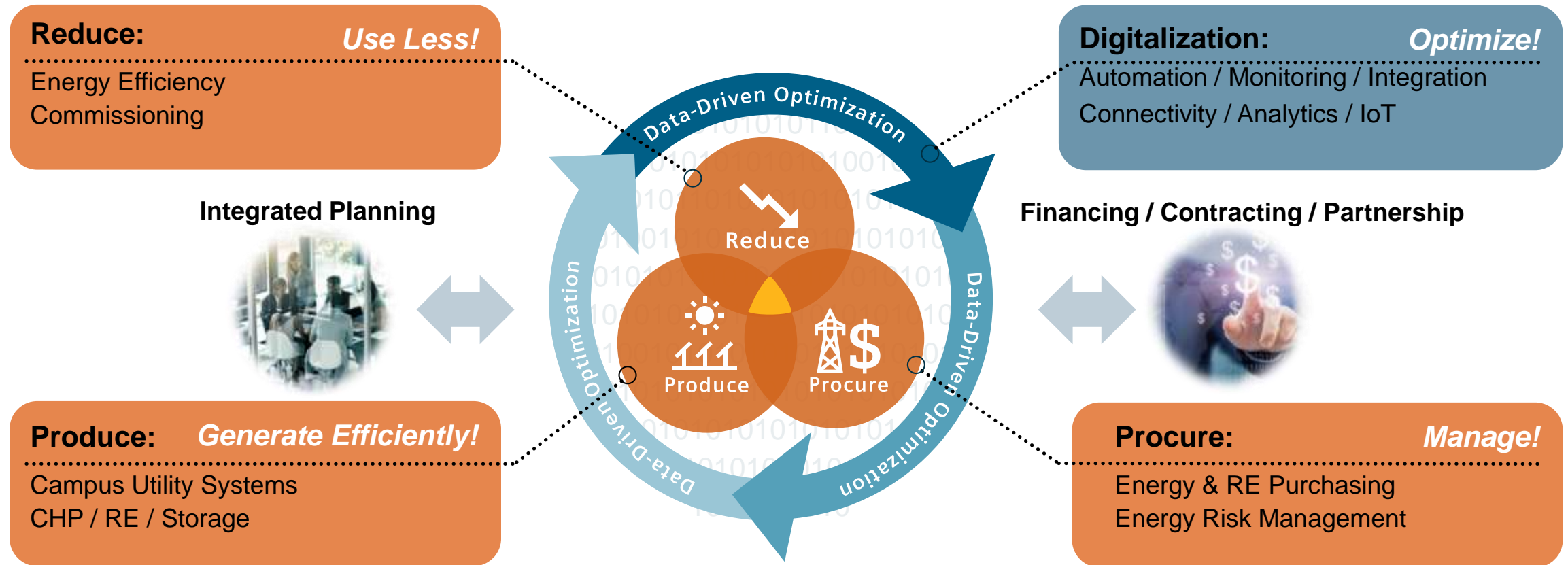
- Over the past decade, Higher Education has experienced many facilities related changes and challenges:

Consumer Price Index (CPI)	+19%	State funding per student at public universities	-16%
Campus Building Space – Research Universities*	+14%	Facilities Operating Budgets* (\$/sqft)	-5%
Public HE DM Backlogs* (\$/gsf)	+30%	Maintenance Coverage* (#FTE/gsf)	-20%

- In this environment, we must: 1) Optimize our Assets; and 2) Do more with less!*

\* Sightlines

# Total Energy Management Approach - Integrated approach to optimizing our assets and operations





# Tools Enabling Us to Optimize Our Assets and to Do More with Less!



## Integrated Planning

- Energy and Climate Action Plans
- Supply Portfolio Planning
- Energy Master Planning



## Digitalization

- Supply Portfolio Optimization
- TEM-based Asset Optimization
- Predictive Maintenance



## Contracting & Partnership

- Planning / Energy Services / O&M
- ESCO / Solar PPA / DBOOM
- P3 / EaaS / Concession

# Supply Procurement & Performance Benchmarking

# Benchmarking Electric & Natural Gas Supply Procurement Performance



**Demand Management, Peak Load  
Capacity Pricing and Self-Gen Balancing**

Benchmark to CPP Values, PLC Reduction  
Value & Basic Residual Auction Values

**Market-Based Block & Index Supply  
and Budget-Based Hedging Program**

Benchmark to Full Requirements  
Contract (FRC)

**Baseline Long-Term Renewable  
Energy and Carbon Reduction Goals**

Benchmark to Market (LSE) Block  
& Index Value, Including Hedging,  
REC & Price Stability vs. Downside  
Participation Value

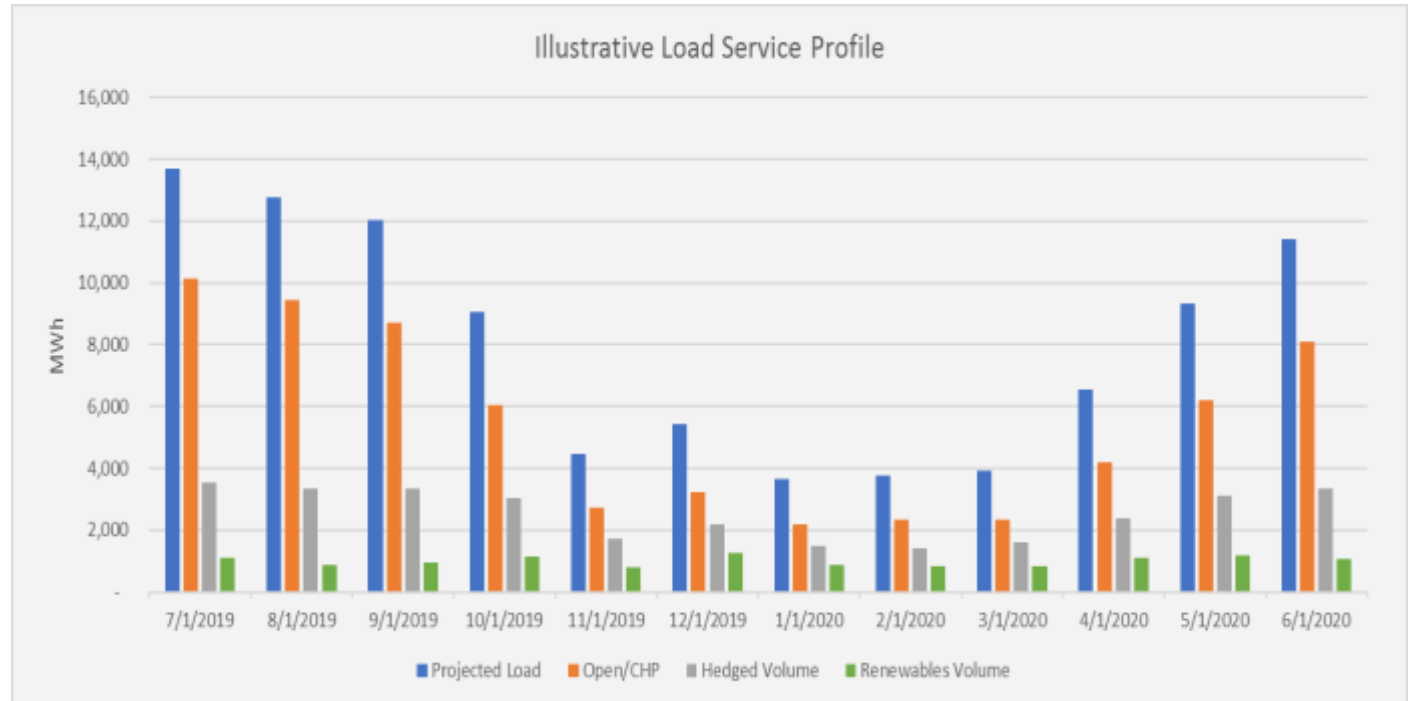
# Portfolio Optimization Framework in Evaluating Supply Options



# Portfolio Supply Optimization within a Probabilistic Framework



- Siemens Utilizes a Portfolio Supply Optimization Model to identify the range of **probabilistic price & load outcomes over time (P-Value x Q-Value = Budget)**
- New supply options are evaluated for how deep in-the-money they are relative to this **Probabilistic Range of All-In Cost Outcomes**
- Lost Opportunity Value of price decline is valued consistently with upside exposure cost, resulting in a probabilistic framework for evaluating new supply contract options relative to market alternatives



Short-Term Seasonal  
Exposures

Mid-Term Uncertainty  
Supply & Demand  
Uncertainties

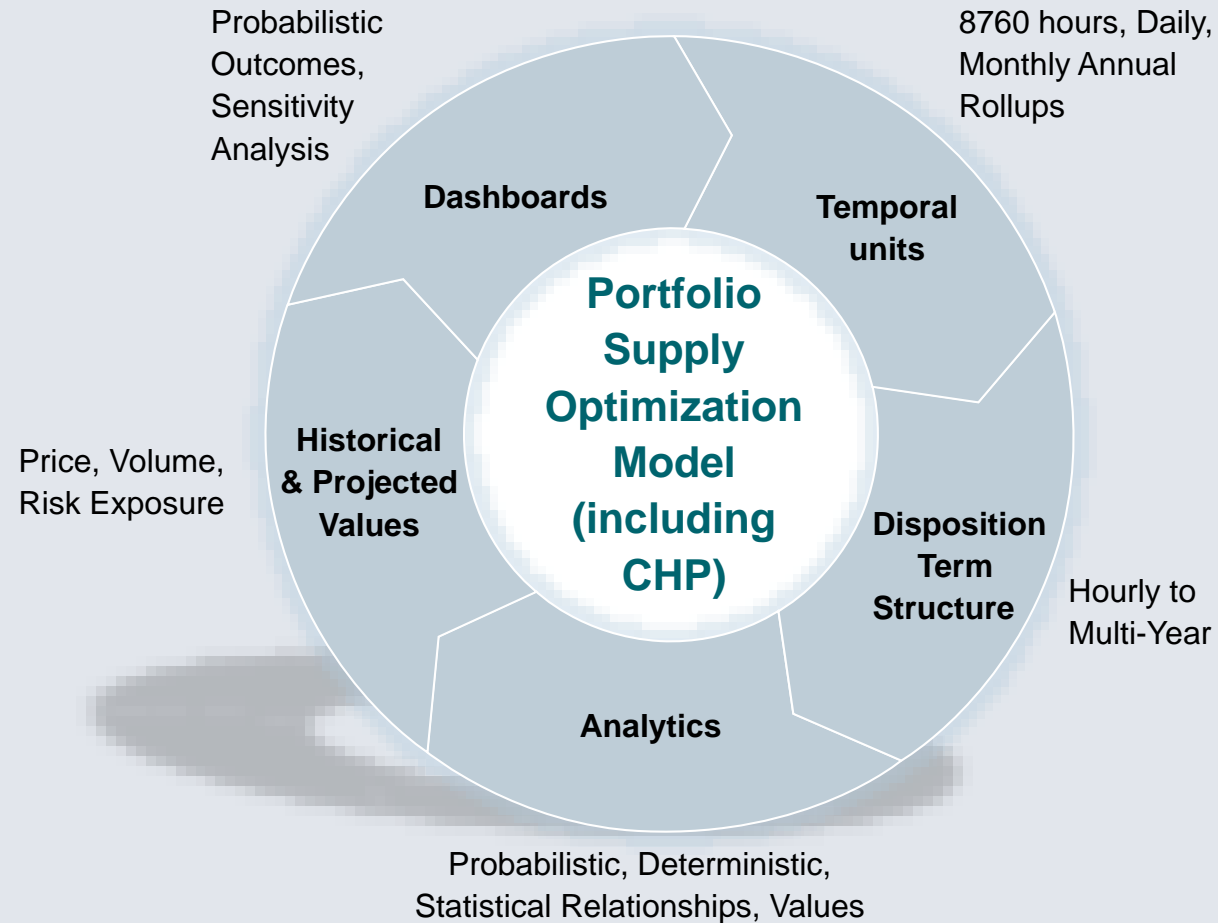
Long-Term Cyclical  
Growth

# Portfolio Supply Optimization Model Development Components



## Data Analytics:

Key is collection of hourly load and price data, analysis and conversion to risk/reward metrics and Management Dashboards for tracking & interpreting portfolio performance

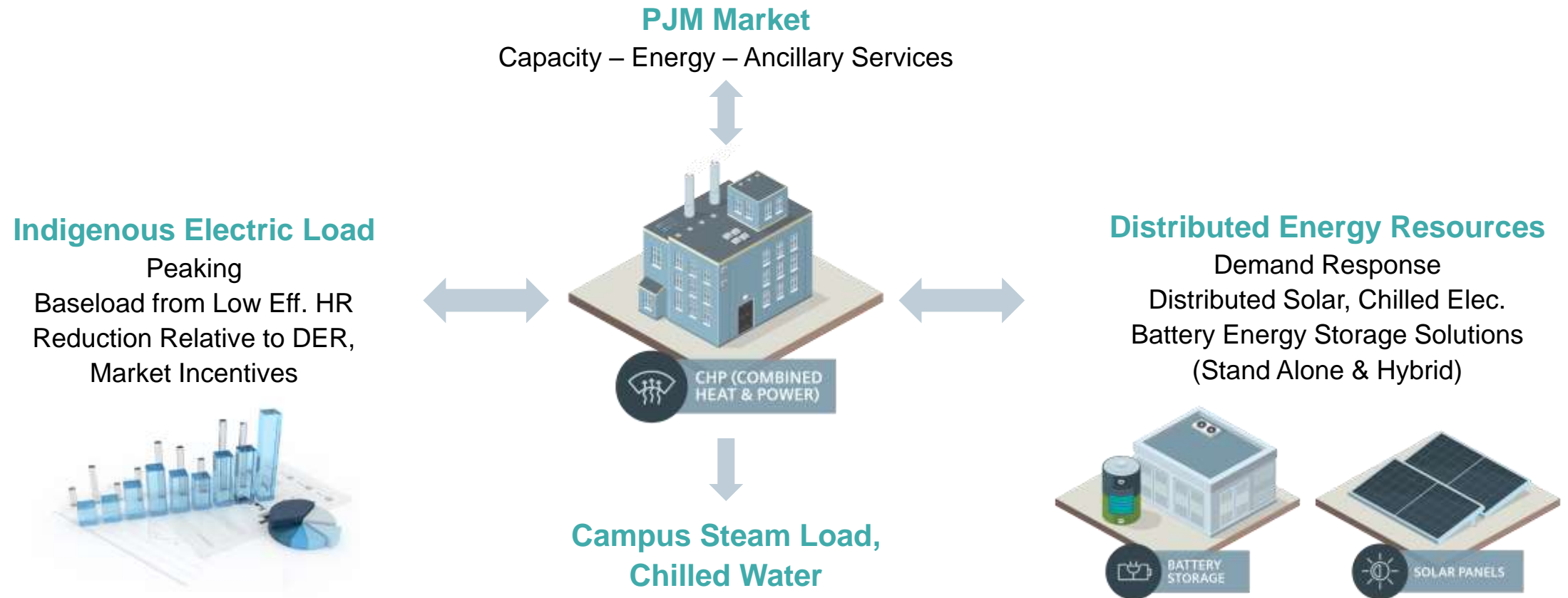


## Probabilistic Value Analysis:

Applied to short, mid and long-term price & quantity relationships to ensure informed valuation and asset disposition relative to market, contract or asset-based alternatives

# Role of the CHP Plant

# Role of the CHP Plant in Portfolio Supply: NextGen Program



**Portfolio Supply Optimization requires a responsive CHP to Serve Indigenous and Connected Steam and Electric Loads, while also responding interactively to internal DER and external capacity and Energy – AS market signals under a 3-Dimensional Dispatch Model, including Load, Distributed (Internal) and ISO (External) Sell, Serve & Buy Supply Service Options**



# Future Rewards are Paid Forward by Integrated Portfolio Management



## Forward Priorities:

- CHP Re-Power Solution & Commercial Structure
- Load Management and Smart Metering
- Climate Action Plan Update Meeting MD's Clean Energy Targets
- RPS Legislation Readiness
- Evaluation of Battery Energy Applications
- Energy – Water Solution Integration

## Contact information



### **Bo Poats**

Managing Director, Risk Management  
Digital Grid / PTI EBA  
Mobile: 1-703-608-5568  
E-mail: [bo.poats@siemens.com](mailto:bo.poats@siemens.com)

### **Fred James**

Director, University Accounts  
Building Technologies / BPS North America  
Mobile: 1-703-608-5560  
E-mail: [fred.james@siemens.com](mailto:fred.james@siemens.com)

### **David Shaughnessy**

Assistant Director Utilities  
Facilities and Energy Management  
University of Maryland /Main Campus  
Office: 1-301-405-3252  
E-mail: [dshaughn@umd.edu](mailto:dshaughn@umd.edu)