

# DEMAND-SIDE ENERGY MANAGEMENT & OPTIMIZATION

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A look at the past, present, and future energy reduction achievements on the building side of the Energy Management & Optimization Division

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# Agenda

- History of DS-EMO
- Energy Reduction Methods
- Sample Projects & Results
- Moving Forward

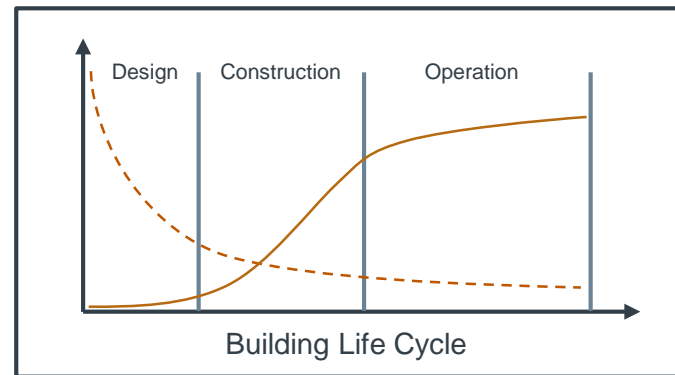
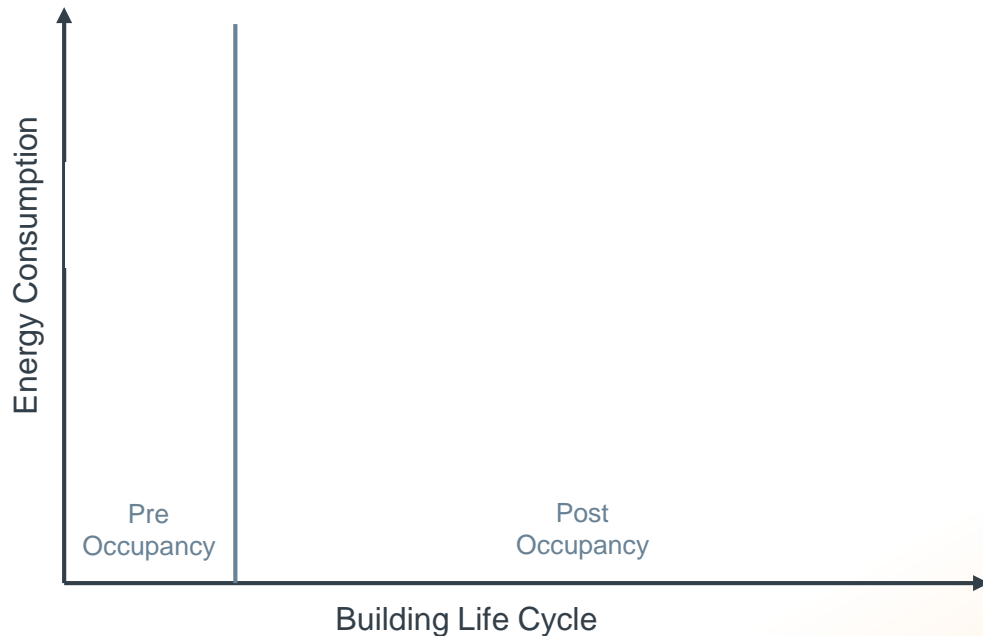


# Our History

- Formed in 2012 to respond to UT's Natural Resource Conservation Plan
- Original Goal: 20% energy intensity reduction by 2020 in E&G buildings



# Methods Overview



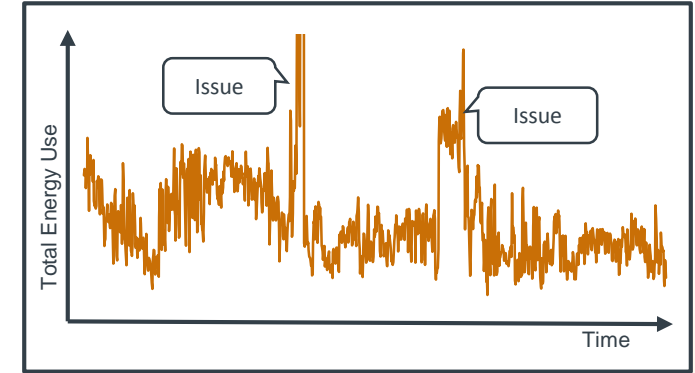
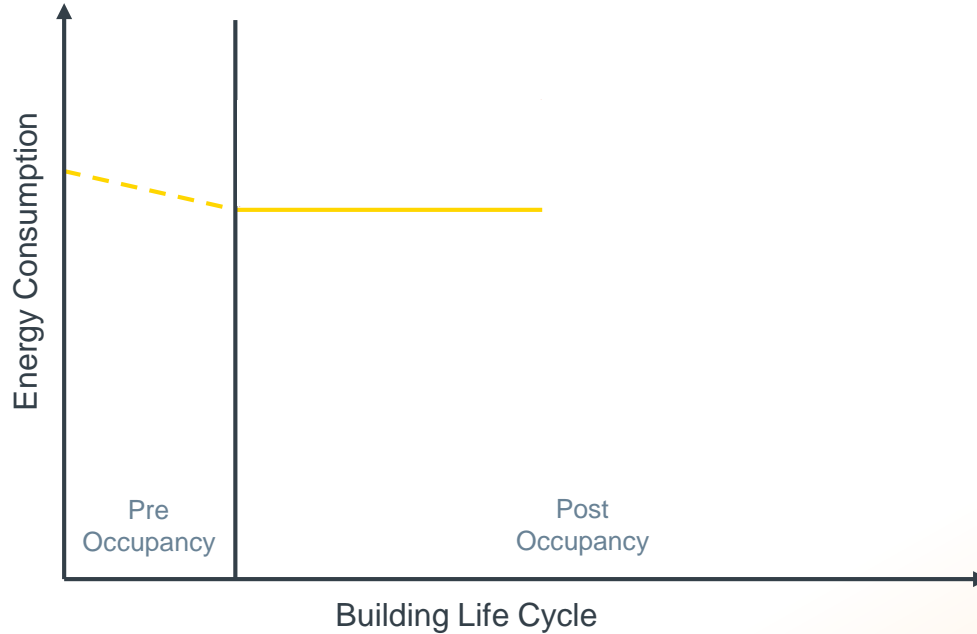
- Opportunity to make changes
- Cost incurred to make changes

# New Construction Methods

- Assist in writing design construction standards
  - Sequence of Operation Guideline for HVAC systems
- Design Reviews
- Energy Model Requirements
- EUI Targets
  - Energy Use per Square foot of building per year
  - Ensures energy efficient new construction

Use Type	Target EUI
Classroom	113
Housing	99
Office	82
Public Assembly	112
Laboratory	275

# Methods Overview



## On-Going Strategies

- Continual Commissioning (Cx)
- Monitoring


# Ongoing Methods

## Continual Cx

- Monitors and resolves operating problems
- Improves comfort
- Optimizes energy use

## Monitoring Tools


- Building Automation System
- Billing Software
- Energy Portal
- Variance Report
- Occupants



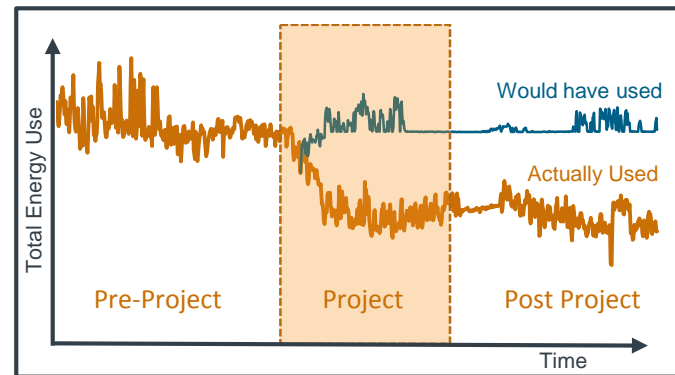
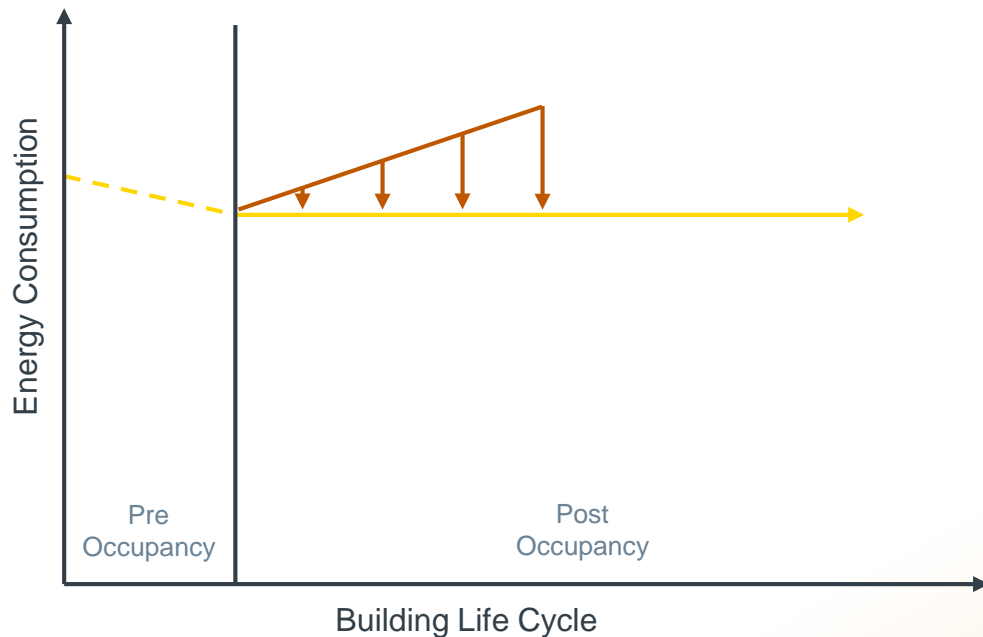
Rank	Bldg	% over average	Cost over expected	Steward	Possible Cause	Details
1	NH3	53%	\$11,625	Meagan Jones		
2	NMS	46%	\$3,521	Meagan Jones		
3	PAT	114%	\$3,268	Meagan Jones		
4	FME	48%	\$3,011	Meagan Jones		
5	ARC	53%	\$1,921	Meagan Jones		
6	BIO	60%	\$1,585	Meagan Jones		
7	MDP	29%	\$1,490	Meagan Jones		
8	JON	42%	\$1,399	Meagan Jones		
9	PCL	18%	\$1,251	Grace Hsieh		
10	PHR	24%	\$1,208	Meagan Jones		

Period	May 1, 2018 through April 16, 2018	May 15, 2018 through April 30, 2018
Change	37%	
Electricity	18%	
Water	76%	
Steam	-15%	

Energy Increases



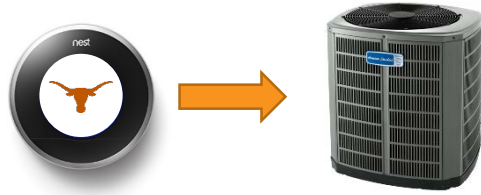
# Methods Overview





# Focused Energy Projects

## Project Methods



HVAC Controls



Lighting



Scheduling



Component Replacement

# Performing Arts Center

## Bass Concert Hall and McCullough Theater

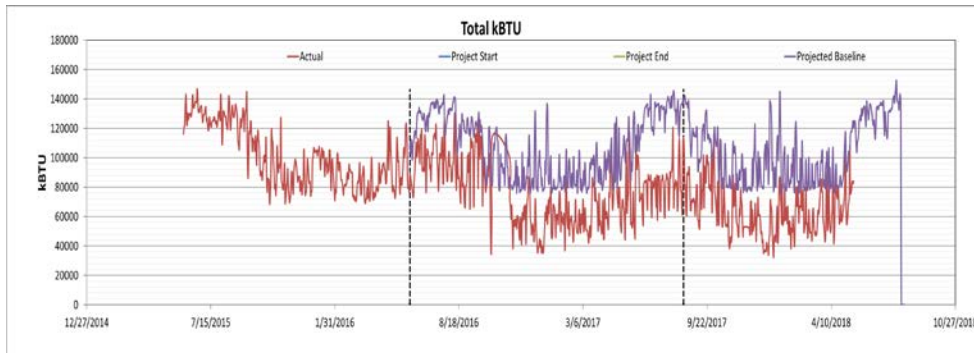
Collaborative effort between Zones, UEM and PAC

### What we did

- HVAC scheduling
- Optimized HVAC Controls
  - Normal and event modes
- Capital Improvements
  - LED lighting retrofit in lobby
  - Concert hall temperature sensors added
  - Valve replacement



The University of Texas at Austin  
Utilities and Energy Management



- Overall energy avoidance: **32%**
  - (38% Chilled Water, 22% Steam, 22% Electricity)
- Total project cost: **\$11,345**
- Payback: **0.18 years**
- Fuel cost savings for UT: **\$60,124**

History

Methods

Projects & Results

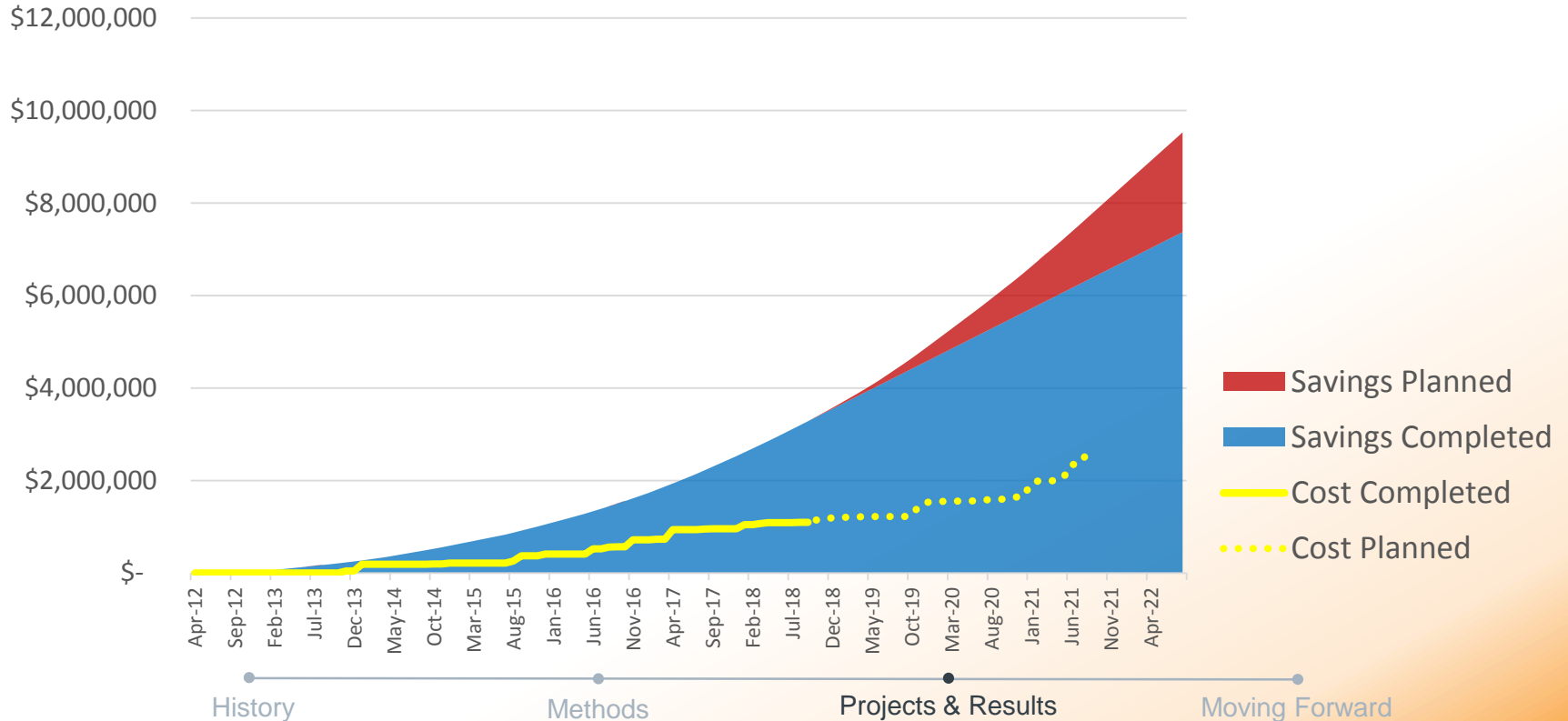
Moving Forward

# Overall Completed Project Results

	HVAC Commissioning	Scheduling
# of Projects Completed	18	14
Avg Initial Cost	\$18,700	\$0
Avg Reduction in Total Building Energy Use	20%	22%
Avg Reduction in Peak Chilled Water	30%	4%
Avg Reduction in Hot/Cold Call Labor	18%	0%
Avg Annual Savings for UT	\$32,400	\$33,000
Avg Simple Payback	0.6 Years	Instant

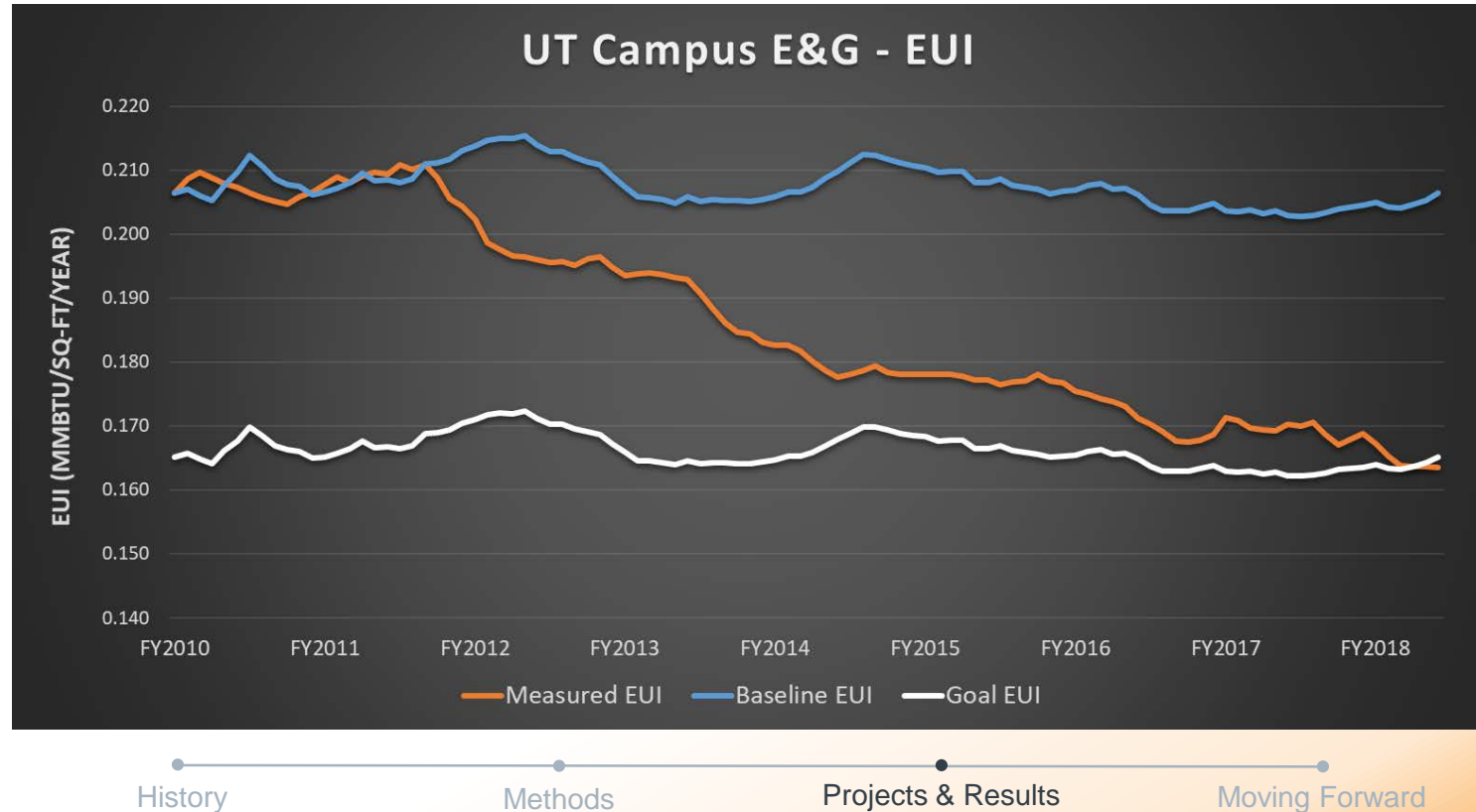
# Overall Results

## Fuel Cost Savings vs. Implementation Costs



# Overall Results

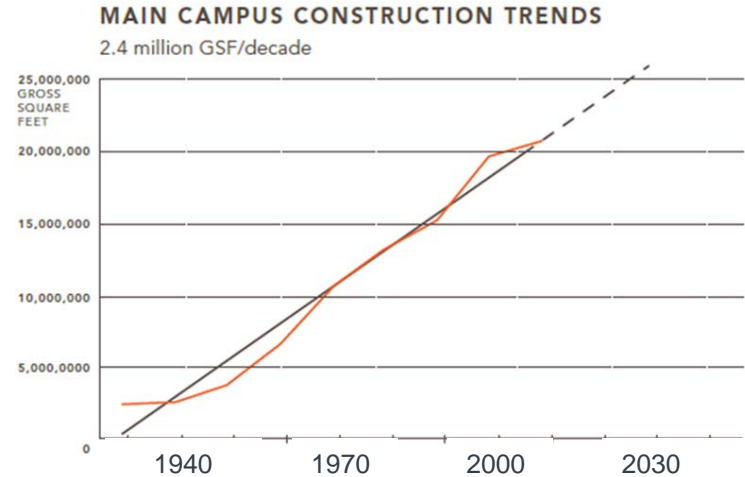
## 20% Goal Progress



# Moving Forward

## Goals and Challenges

- Offset energy use from campus growth
- Avoid need to expand plant generation
- New goal = 2% EUI reduction annually
- Project costs going up
- Savings per project going down
- Expand focus to water conservation



# Moving Forward

## Resources for Future Success

- Revolving fund
  - 80+institutions, \$130M+
- HVAC Controls Upgrades
  - You can't manage what you can't see
- Fault detection software tool
  - To maintain investment



*Ucla*



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# Thank you

