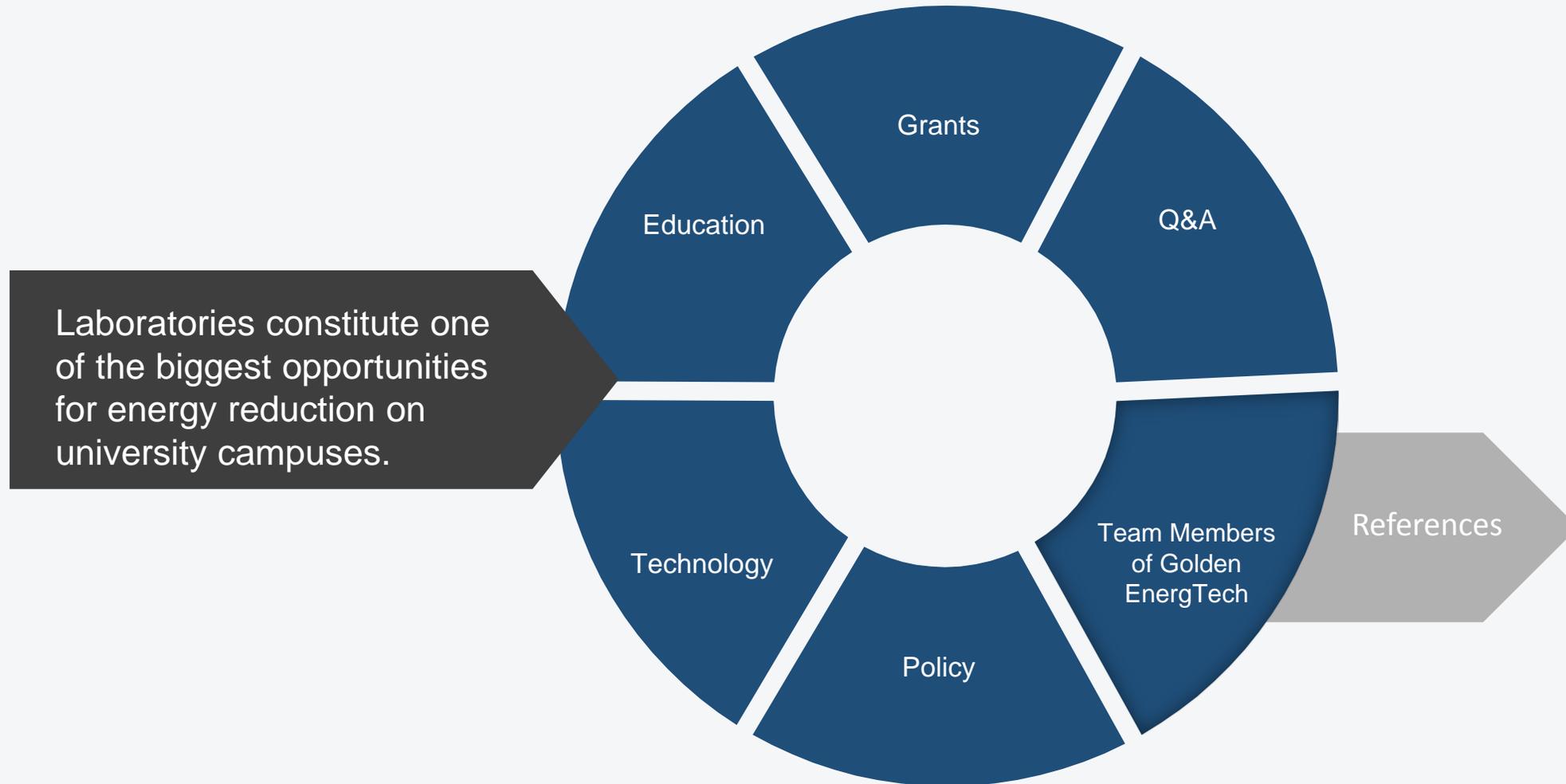




# Golden EnergTech

Experimenting with  
Efficiency Proposal

# Presentation Overview



# Golden EnerTech Team



**Nanavati Low**

Policy, procurement, server farm optimization, metering, and university partnerships



**Michael Chang**

Energy Incentive Program, Grant Restructuring, F&A Rate Improvements



**Daniel Tjandra**

HVAC and Technology Retrofitting, Grant Restructuring



**Grace Vasiknanonte**

Preventative Maintenance and Education Policy/Implementation

# Streamlining the System



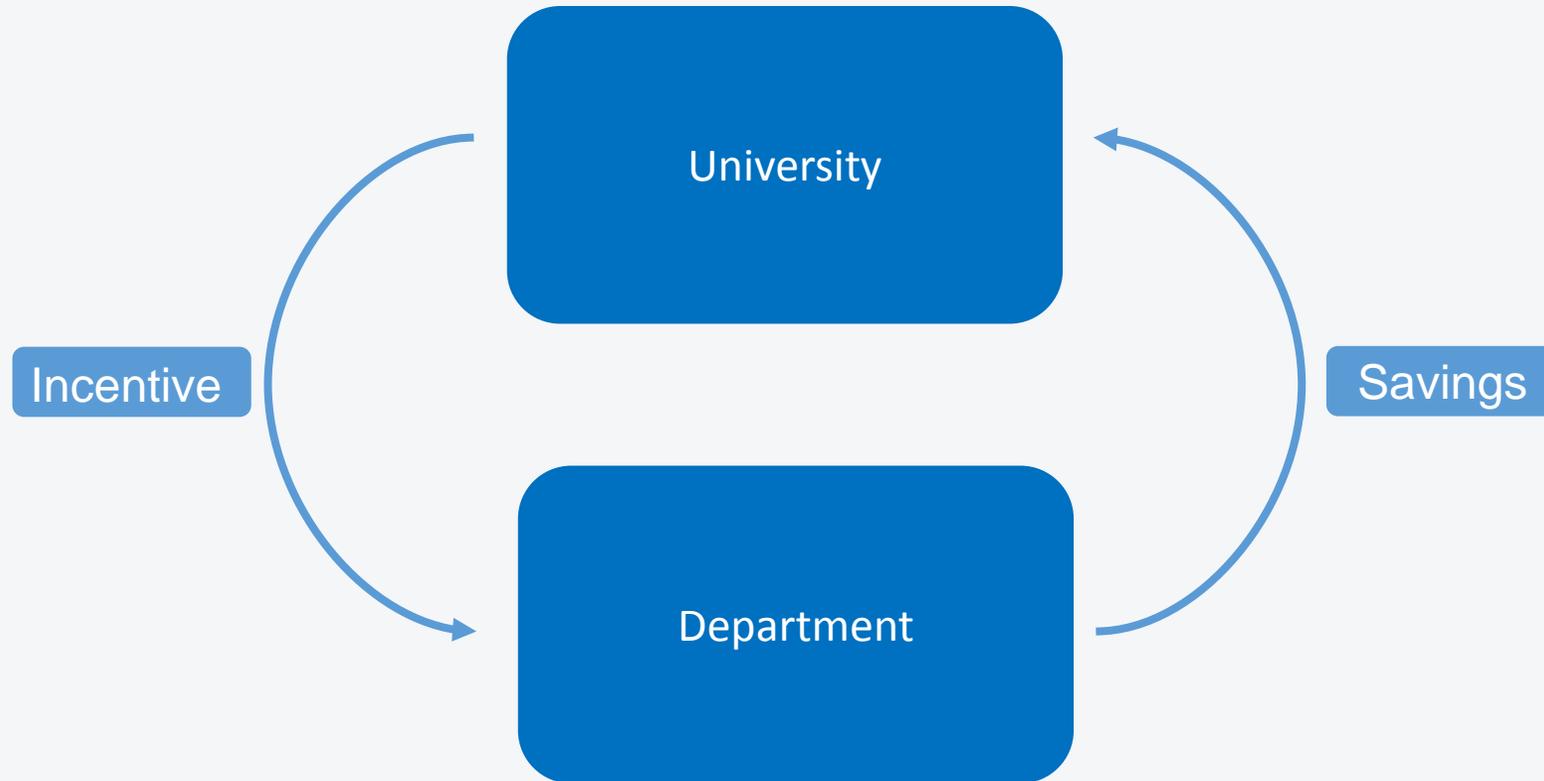
## Problem Identification:

- Utility bill paid by central campus
- Energy consumption is not systematically measured and managed across campus

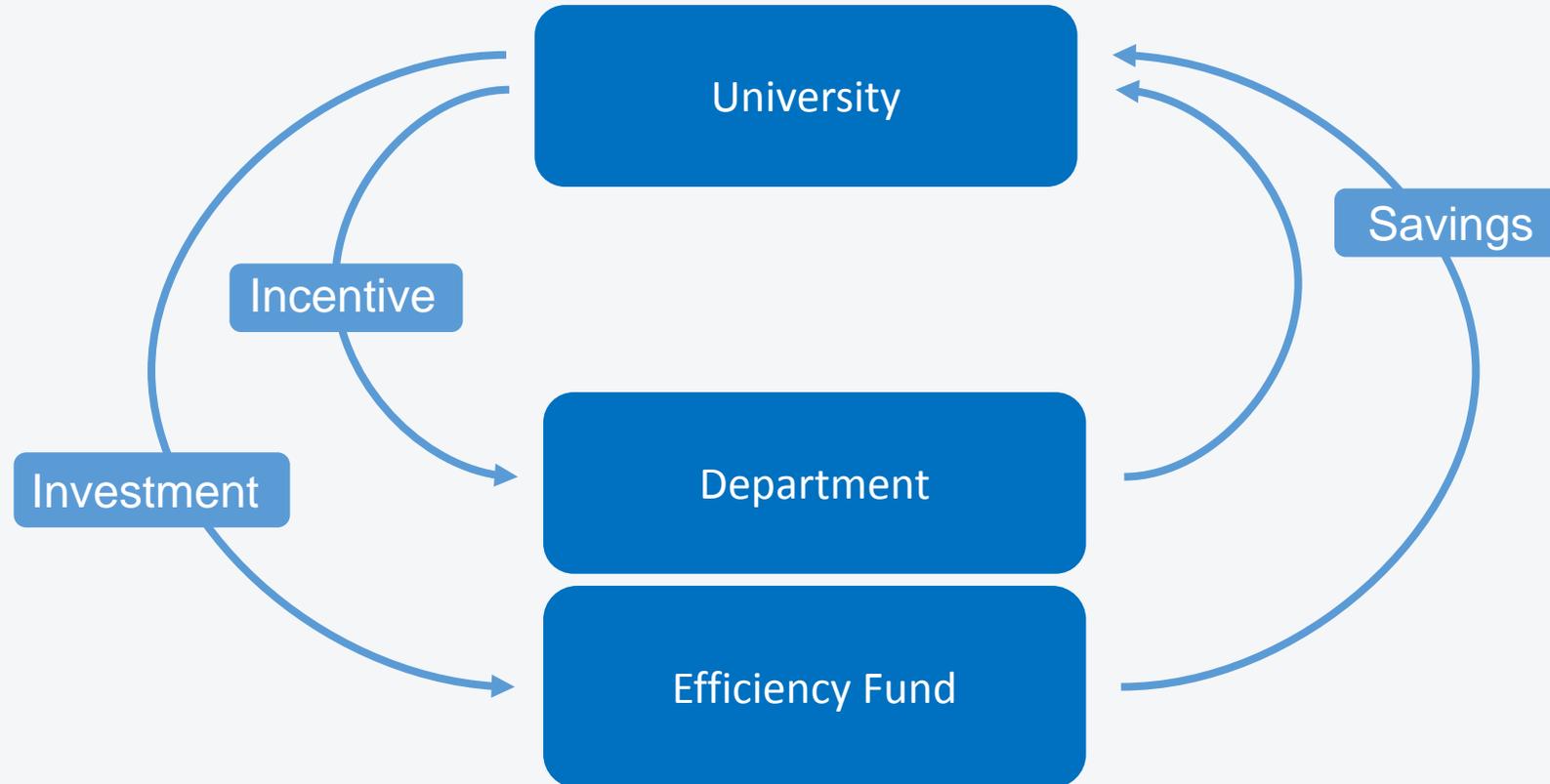
## Solution:

- Incentive system based on variable energy output saved following building energy baseline standards
- Metering and increased monitoring via public energy dashboard

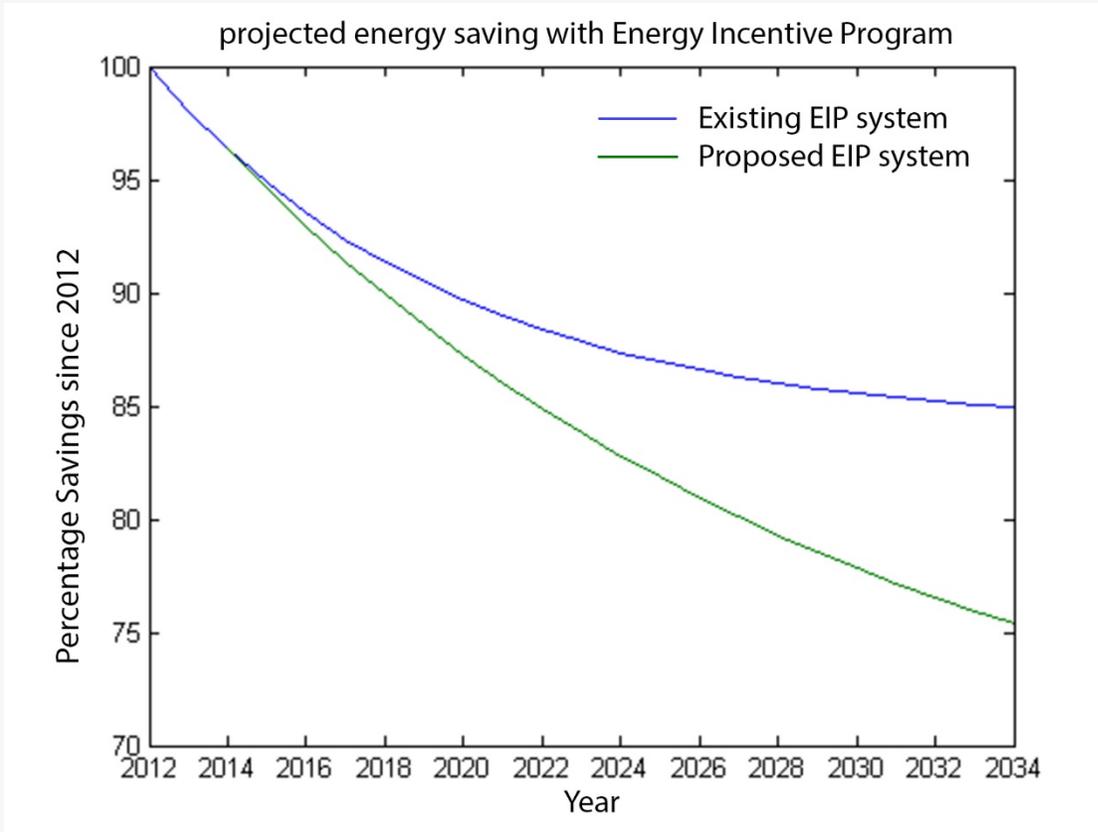
# Energy Incentive Program (EIP)



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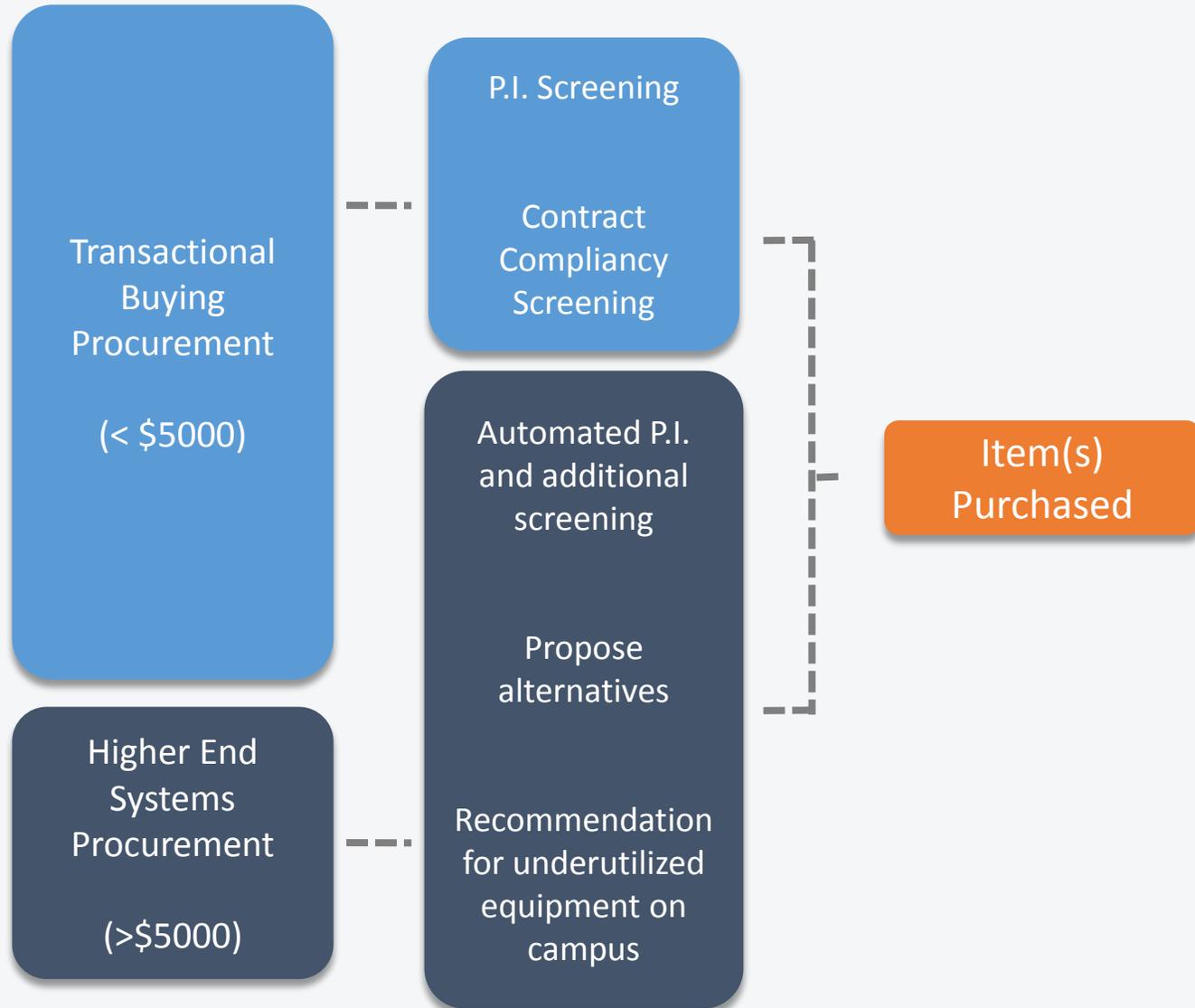


The simple EIP rewards colleges directly with no reinvestment stipulation. Better equipment sharing and lab practices can cut laboratory energy usage by 15% over 20 years. **The modified system has a mechanism to reinvest savings in energy star appliances, thus reducing use by 25%.**

- Variable baseline and refund based on local utility rate
- If the university has more ambitious goals, it could contribute a matching amount to see more savings long-term
- Growth and equipment purchases in various laboratories are accounted for.

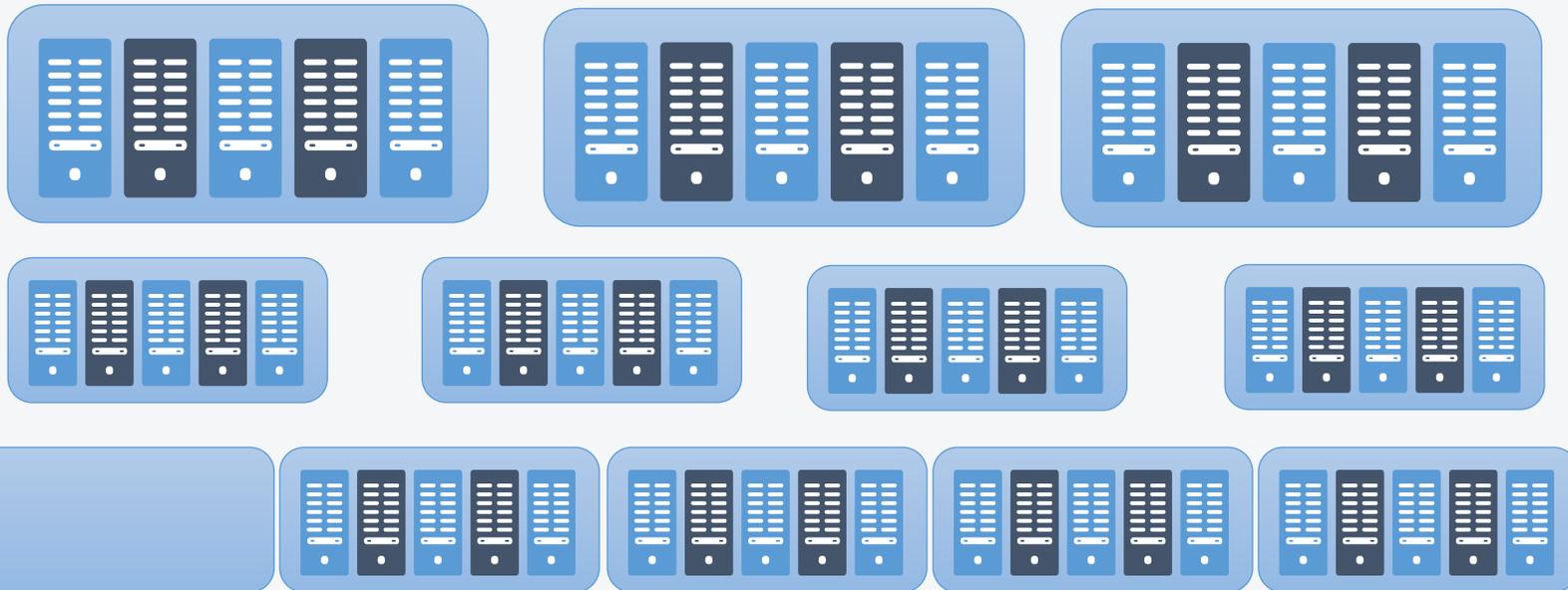
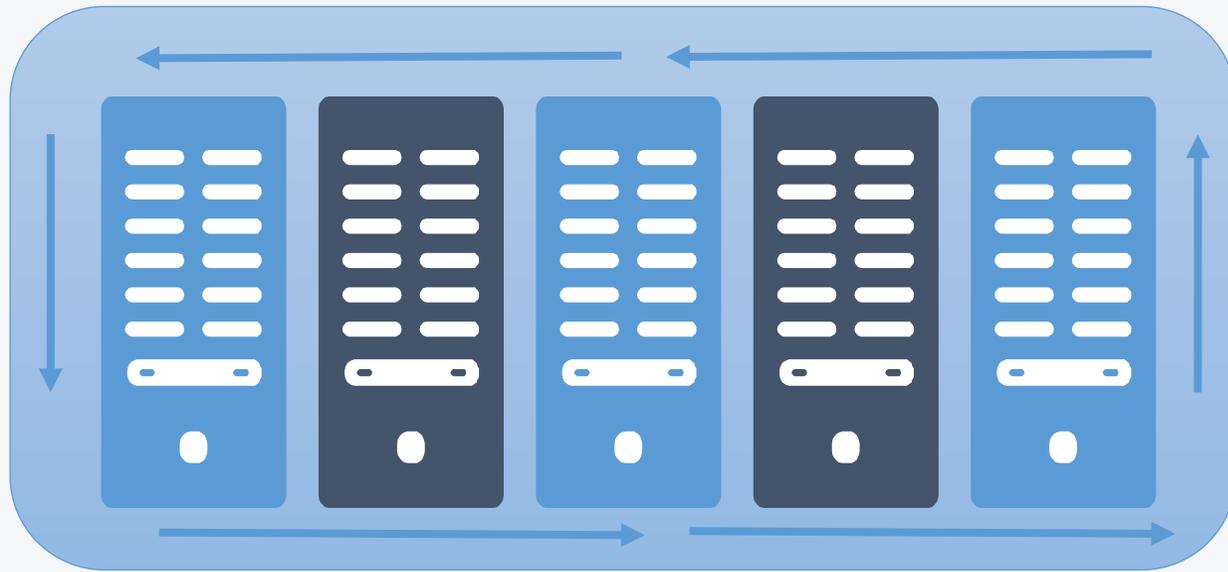
# Streamlining Procurement and Procedures

## Two Tiered E-Commerce Approach



- Visibility in Central Location
- Managed Online Catalogue
- Item Purchasing Information
  - Information storage in central database
  - Accessible and granular analysis for college, department and P.I.

# Efficient Server Farms Management



Problem:

- Campus server farms highly decentralized and underutilized
- Average US server operates at only a 5-15% utilization level while consuming 60-90% of its maximum power

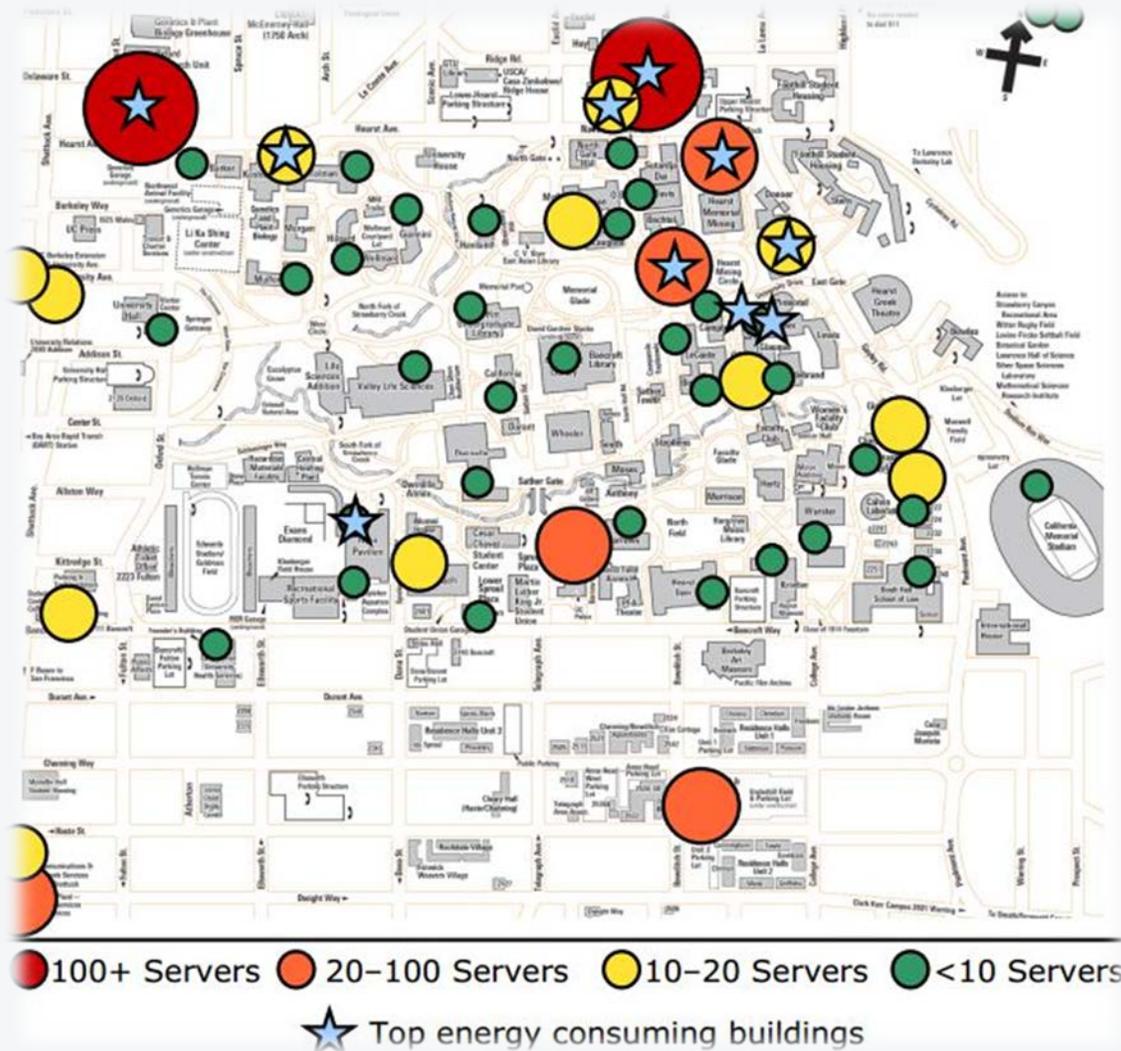
Utilization of Campus Storage Capacity (2.0 PB)



■ Underutilized ■ Utilized

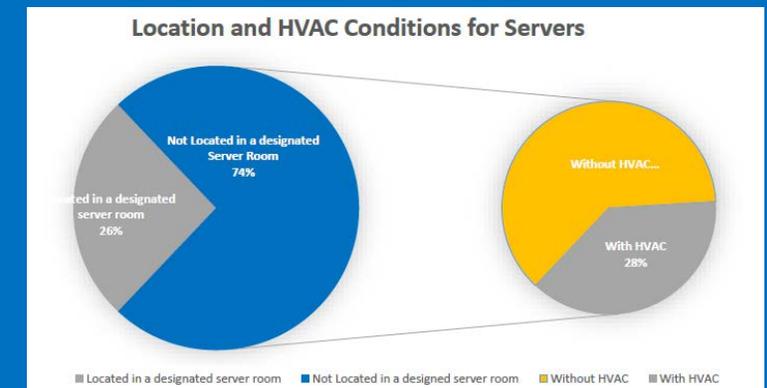


# Efficient Server Farms Management



## Solutions:

- Server consolidation
- Virtualization
- Large, flexible space for robust rack systems design
- Optimize efficiency of cooling, power distribution, lighting and other electrical loads



# University External Partnerships



## Discover & Plan

Combined efforts of identifying and addressing potential energy efficiency retrofit projects



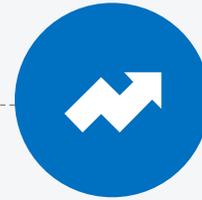
## Organize and Finance

Develop strategies such as cheaper rates per KiloWatt hour saved and financing plans



## Build & Deploy

Projects funded by debt financing and rebates from utility external organization



## Grow & Measure

Calculate and measure project costs, annual utility cost savings, and project payback times.

Scope of what F&A funds can be used for to include building energy upgrades via partnerships, provided that they pay for themselves within the time period of the agreement (Debt financing)

- Funding is usually a limiting factor
- Private-public partnerships for outside financial structures and projects that align with university goals
- Financial innovative, low-risk methods for performing building upgrades
- Partnership with local utility external organization



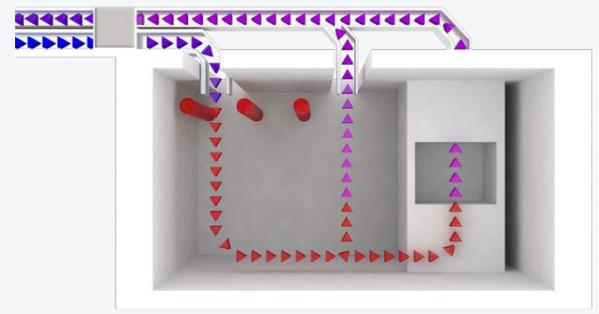
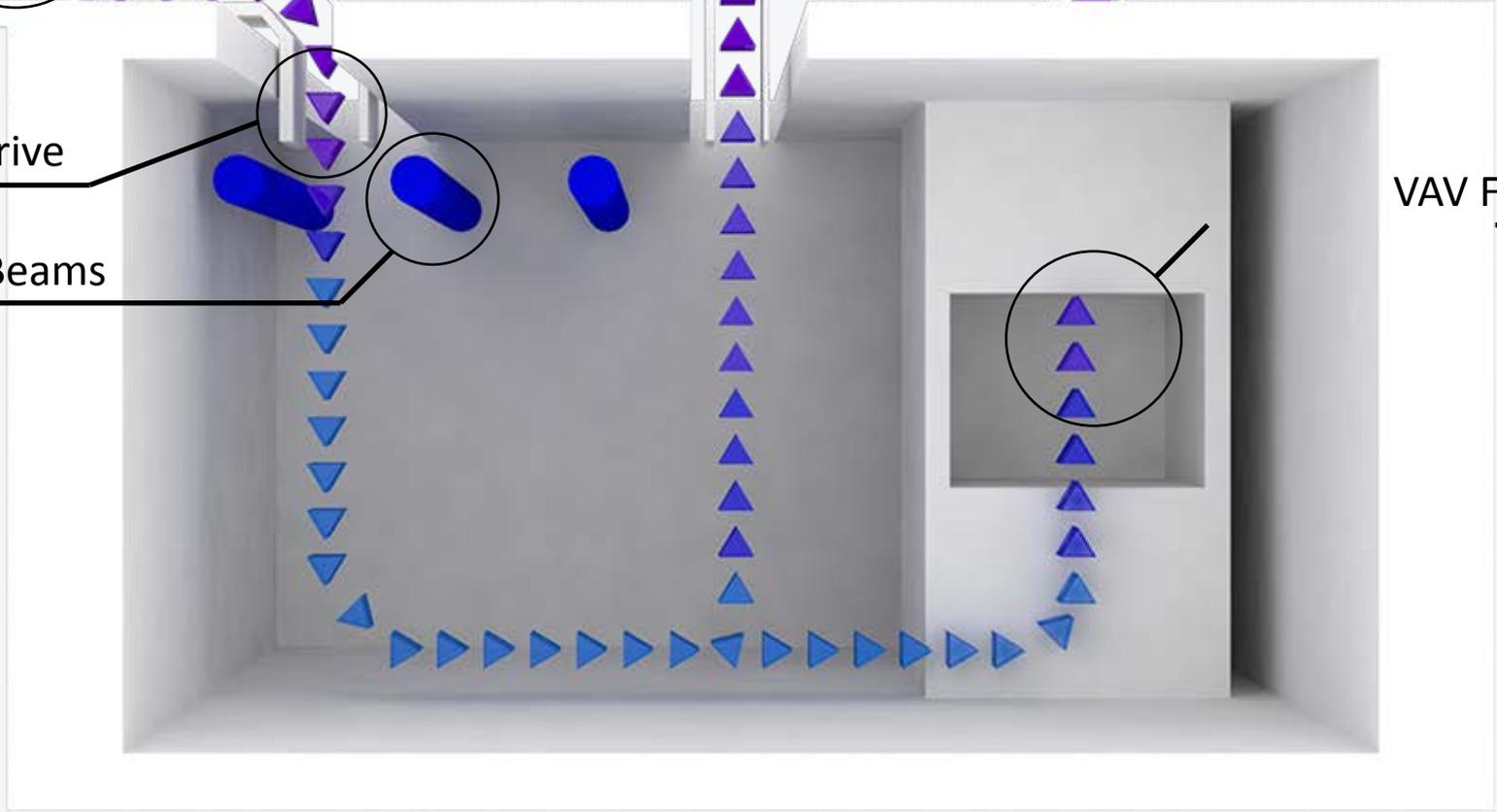
# Technology Retrofits

Heat Pipe Heat Exchanger



Variable Flow Drive

Chilled Beams



Cool Outside Air

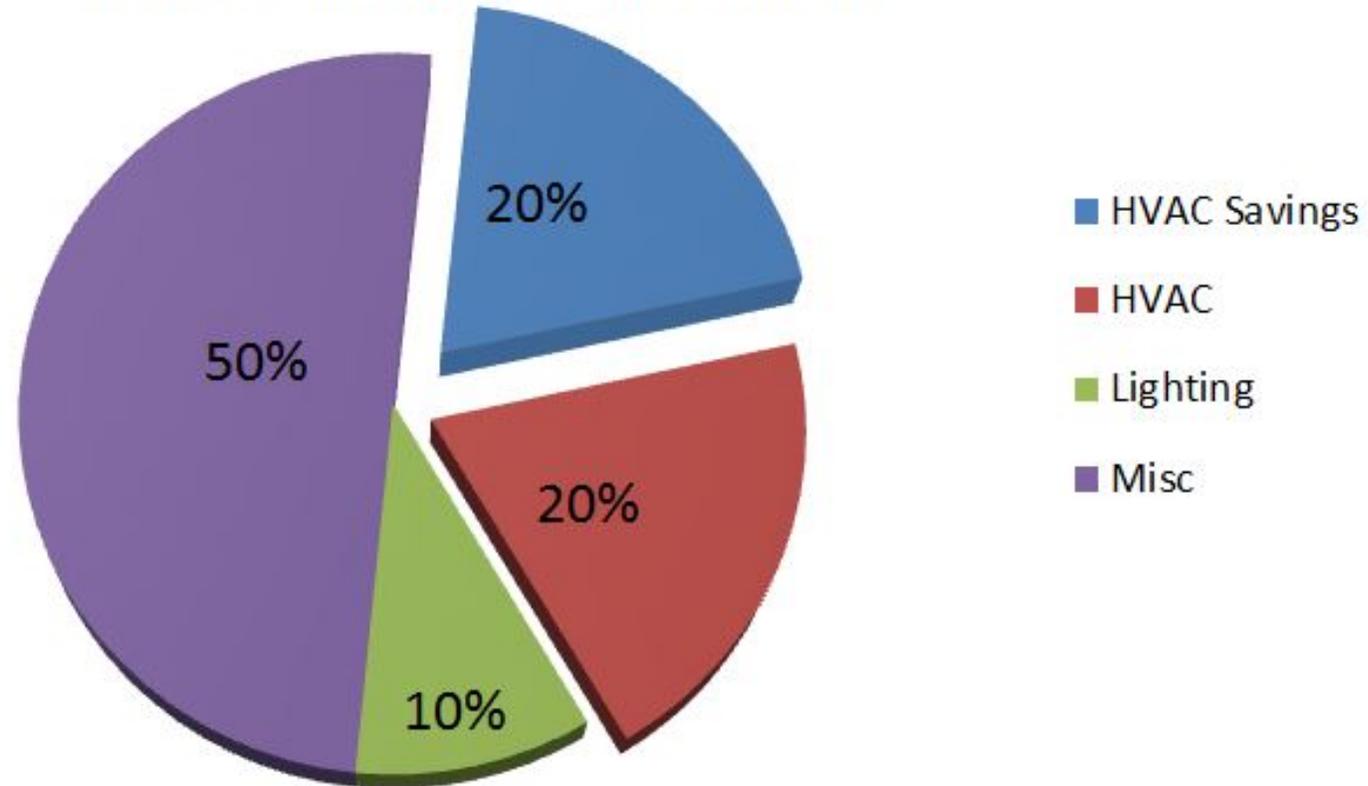
VAV Fume Hoods

Warm Outside Air

# HVAC Savings

Technology Retrofits

## Energy Consumption by Category



# Maintenance and Repair



# Maintenance and Repair

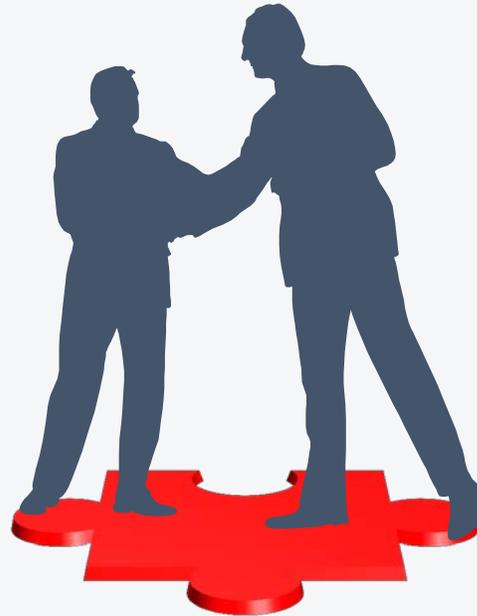


# Generator Explosion

Maintenance and Repair



# Education and the Human Factor



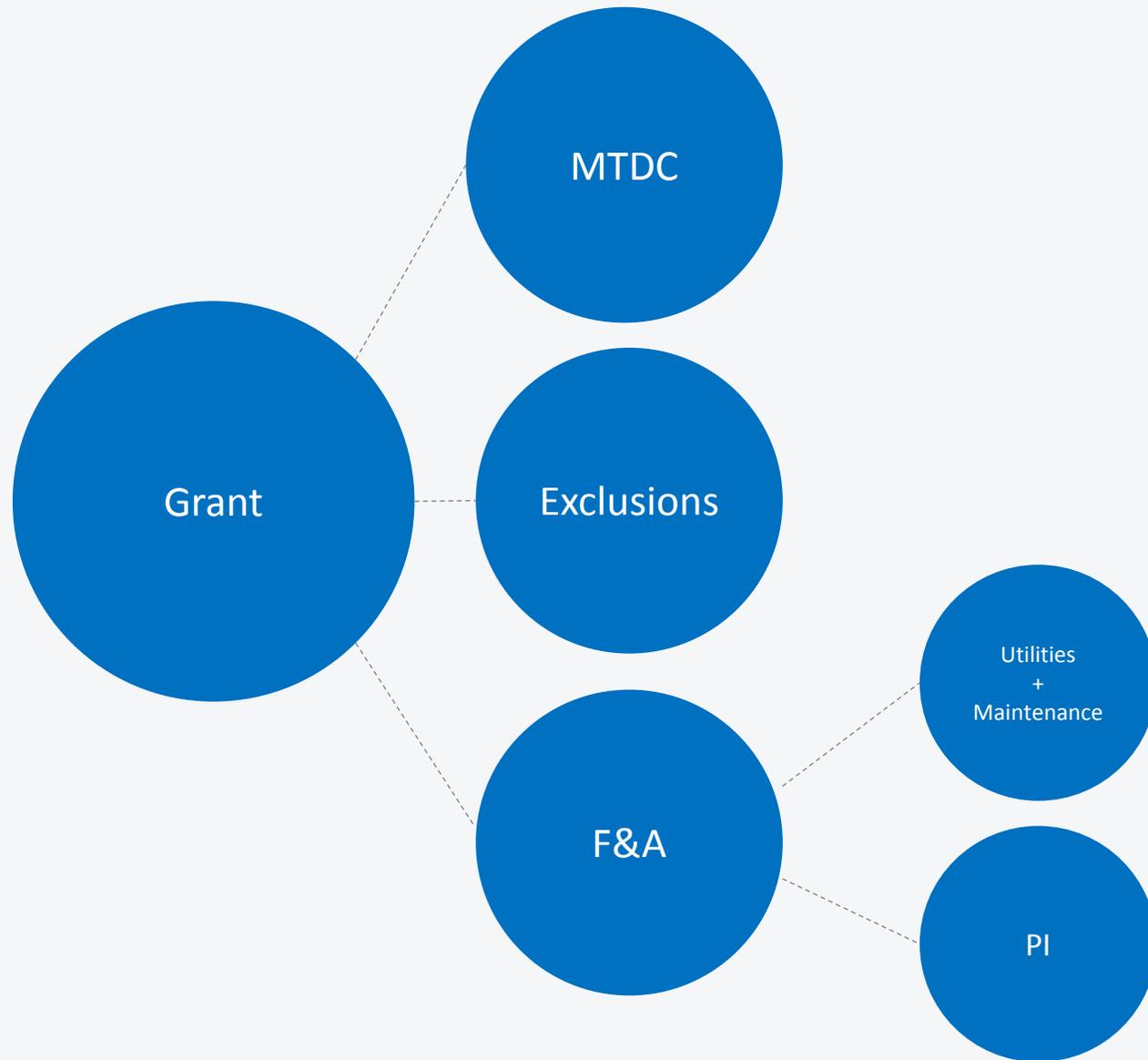
- Holiday and vacation curtailment
- Audits of laboratory spaces
- Education for researchers and campus community
- Energy Campaigns

# Incentivizing environmentally sensitive behavior

Agency-University-PI Accountability



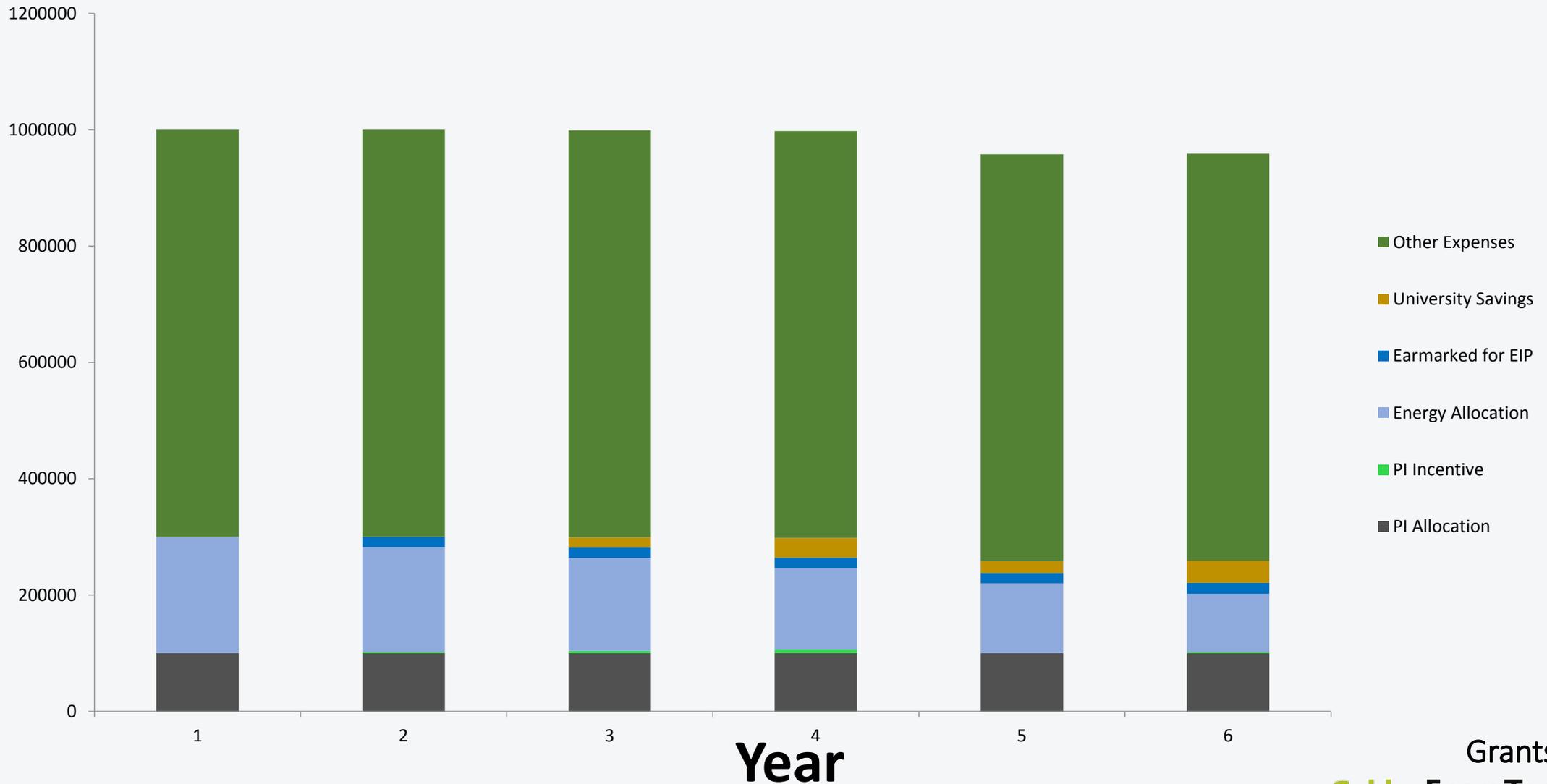
# Modifying the F&A With Incentives



- Allow surplus funds in maintenance and utility to be reallocated for any other purpose, including incentives
- Introduce measures to give the university surplus in return for energy saving when the rate gets renegotiated

# Projected Combined Savings (F&A)

Simulated Money Flow over 6 Years



# Energy Incentive Program (EIP)

## Incentivizing ALL players

PI

Receives portion of energy savings

Department

University

Savings on its buildings that may not be completely covered by F&A, classroom/lab shared buildings

Grant making Agencies

Invests in the potential for lower F&A rates in the future.

## Responsibilities

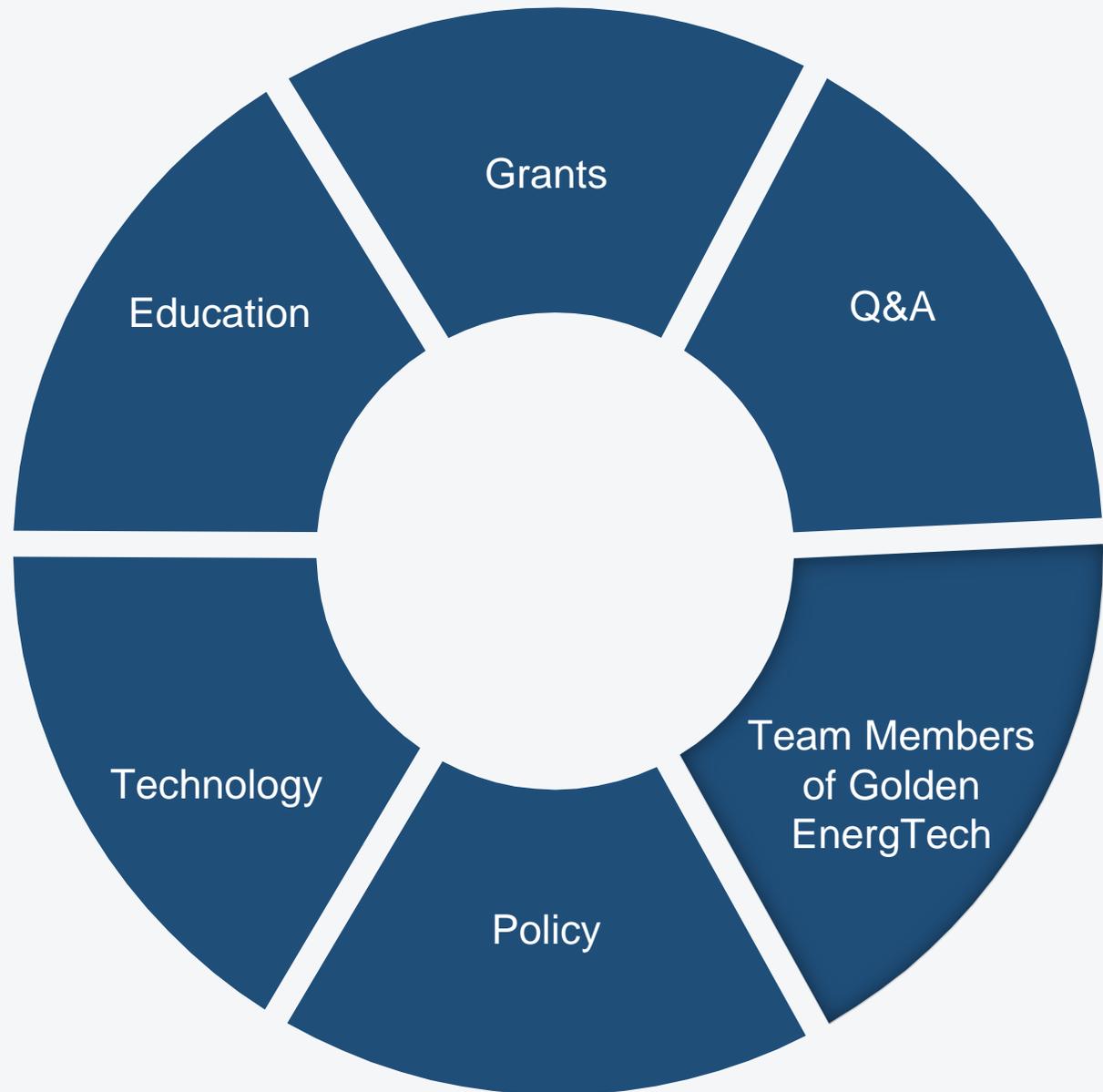
Promote efficient behaviors and practices, purchase efficient equipment

Spearhead larger scale efficiency measures

Use sweeteners to encourage good behavior



# Questions



# Acknowledgements

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