



# **Emerging Technologies Summit**

MAKING THE CONNECTION:  
From Energy Efficiency Innovation to Delivery

**April 19 – 21, 2017**

# Demystifying Integrated Solutions

MARK MARTINEZ, ANNE DOUGHERTY, JON ANDARY, MARY ANN PIETTE,  
MUGI LUKITO

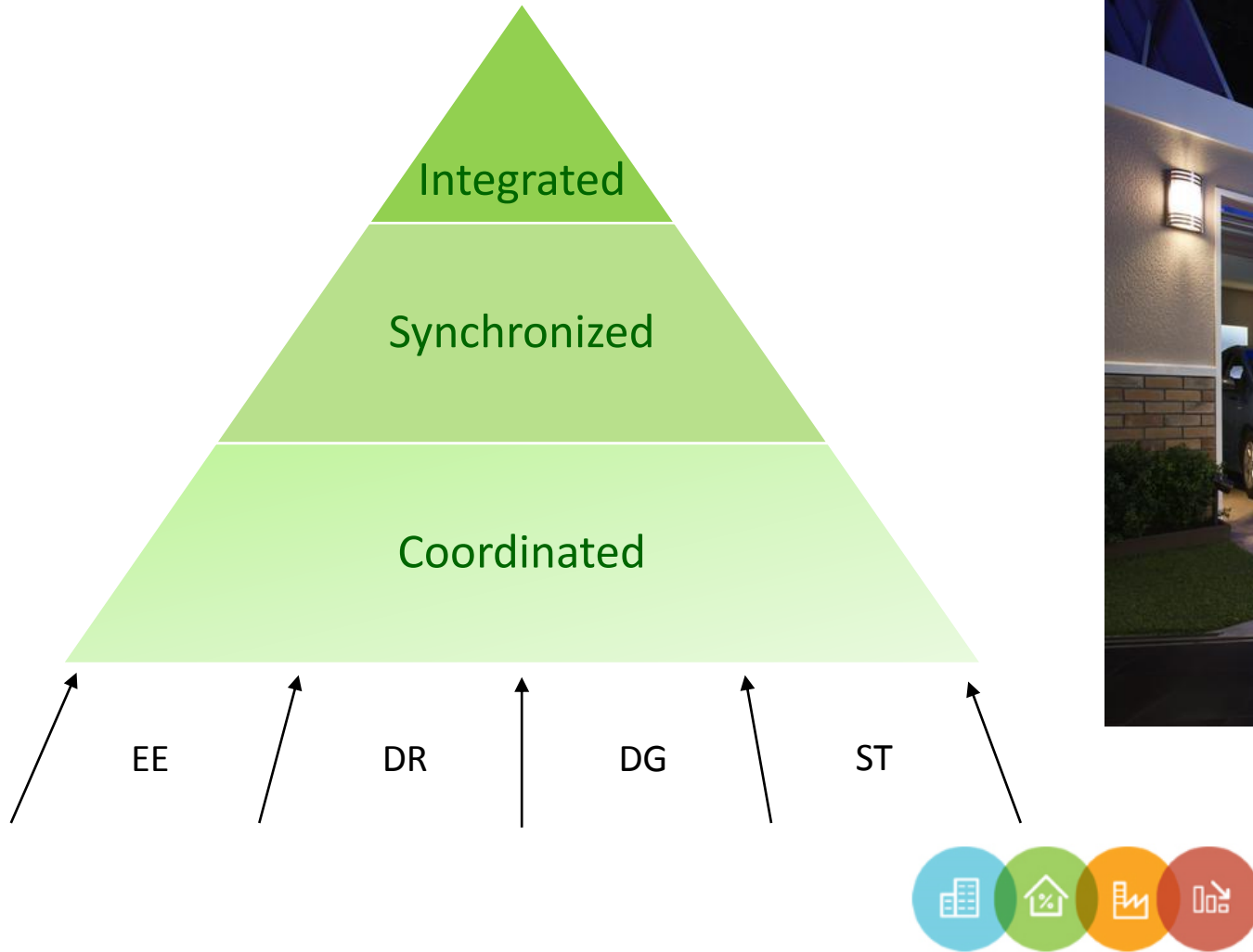


# What is an integrated solution?


- With many definitions floating around, integrated solutions cover a lot of ground.
- What exactly is an integrated solution from a market perspective, and what are the benefits of combining several widgets or technologies?
- Beyond the basics, what are the challenges faced to make this integration seamless?
- Are there really any integrated solutions that customers think work well?



# Integration of DSM: technology leads regulation




# But regulation is catching up!




## Energy Division Staff Proposal

- Limited integration of 2018 EE & DR applications
  - Capitalize on convergence of applications / business plans
  - 1. **Focus on a few high-opportunity controls**
  - 2. **Integrate the potential studies where possible**
  - Address study recommendations & critiques




2



## Energy Division Staff Proposal

- Integrate EE & DR potential studies
  - Focus on high potential end uses that straddle EE and DR
  - Integrate methodologies where possible
    - LBNL end use supply curves: data & models
  - Scenarios for interaction of DR & EE
  - Joint funding for studies



5

From the 2018-2022 Demand Response Applications workshop held April 5, 2017



# Four integrated perspectives to share today

- Anne Dougherty – integrating behavior into portfolios
- John Andary – integrating socially responsible design
- Mary Ann Piette – integrating buildings systems operations
- Mugi Lukito – integrating the programs at the IOU



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# DESIGNING FOR A HUMAN GRID

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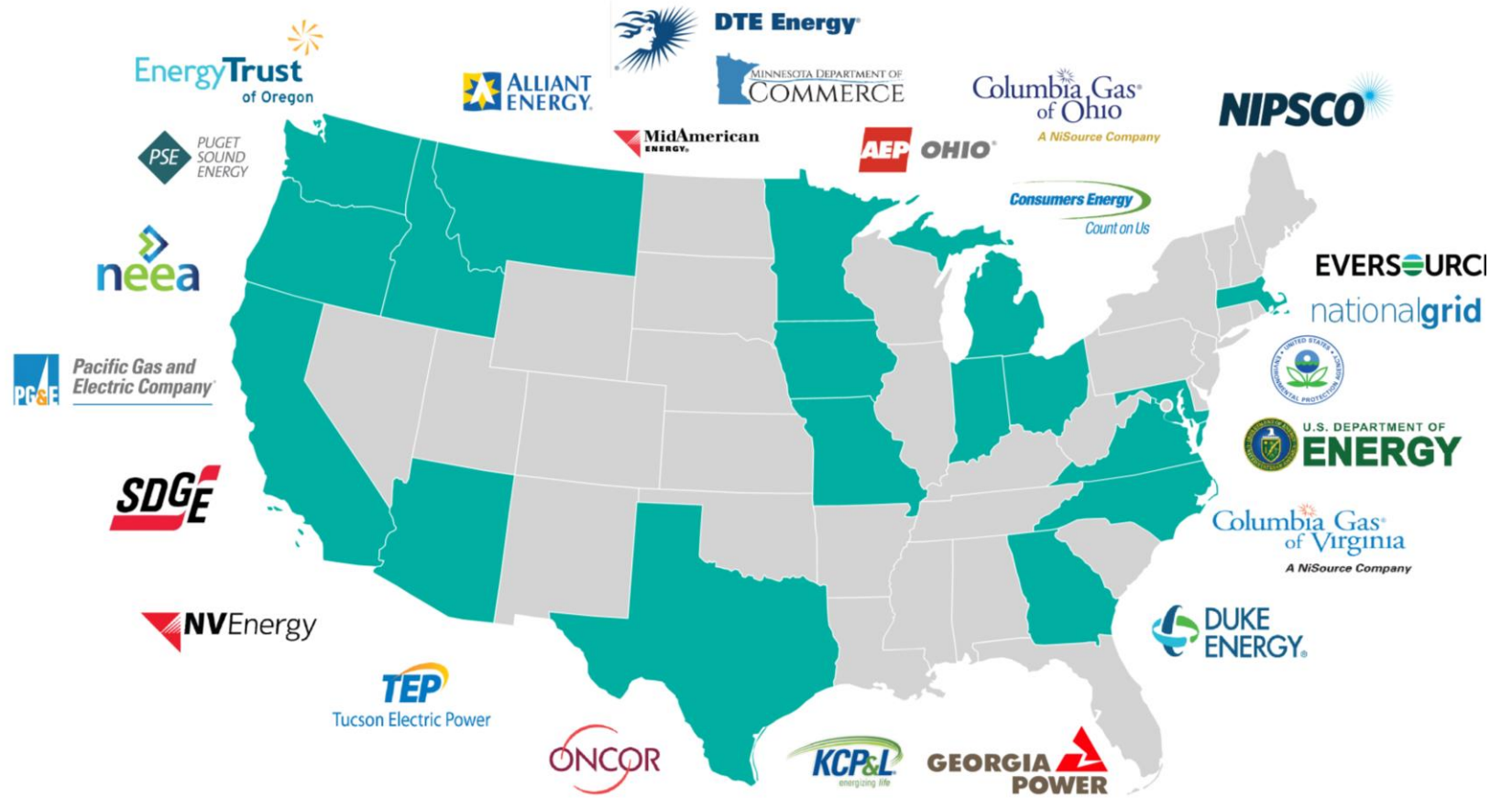
ANNE DOUGHERTY  
Founding Advisor



ILLUME

# ABOUT

ILLUME IS ONE OF THE TOP FIVE WOMEN-LED DISRUPTIVE COMPANIES TO WORK FOR IN 2017 – *IVY EXEC*





The sum of the ways in which social groups provide themselves with the material objects of their civilization.

The branch of knowledge that deals with the creating and use of technical means and their interrelation with life, society, and the environment

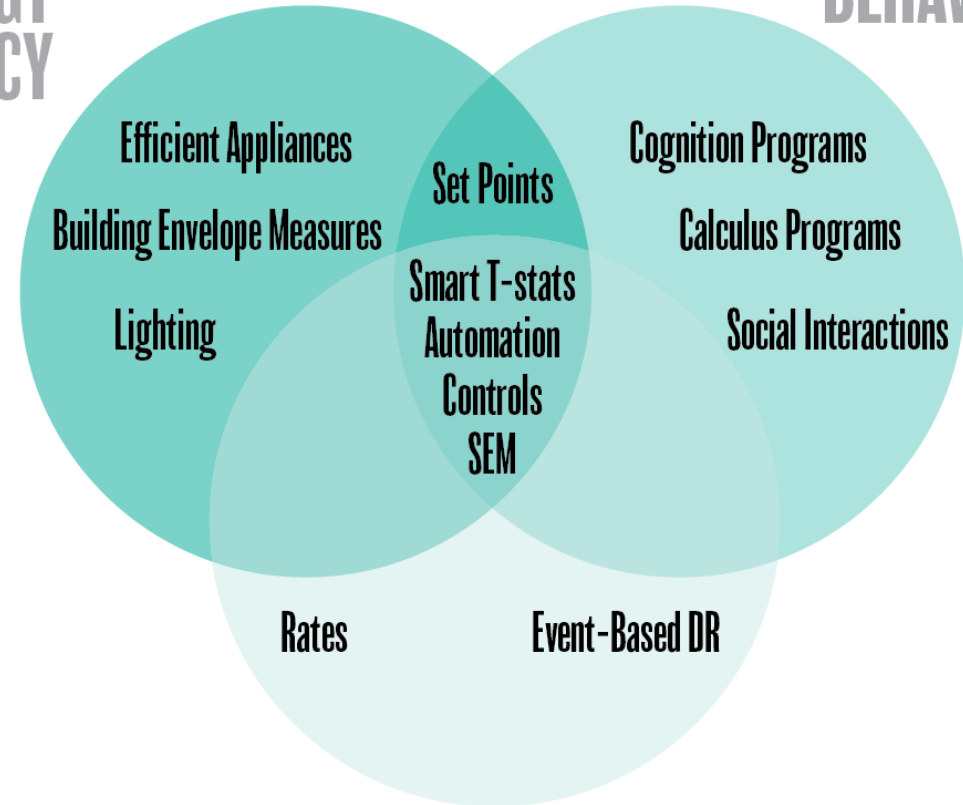
# Technology



# IDS M CHALLENGE

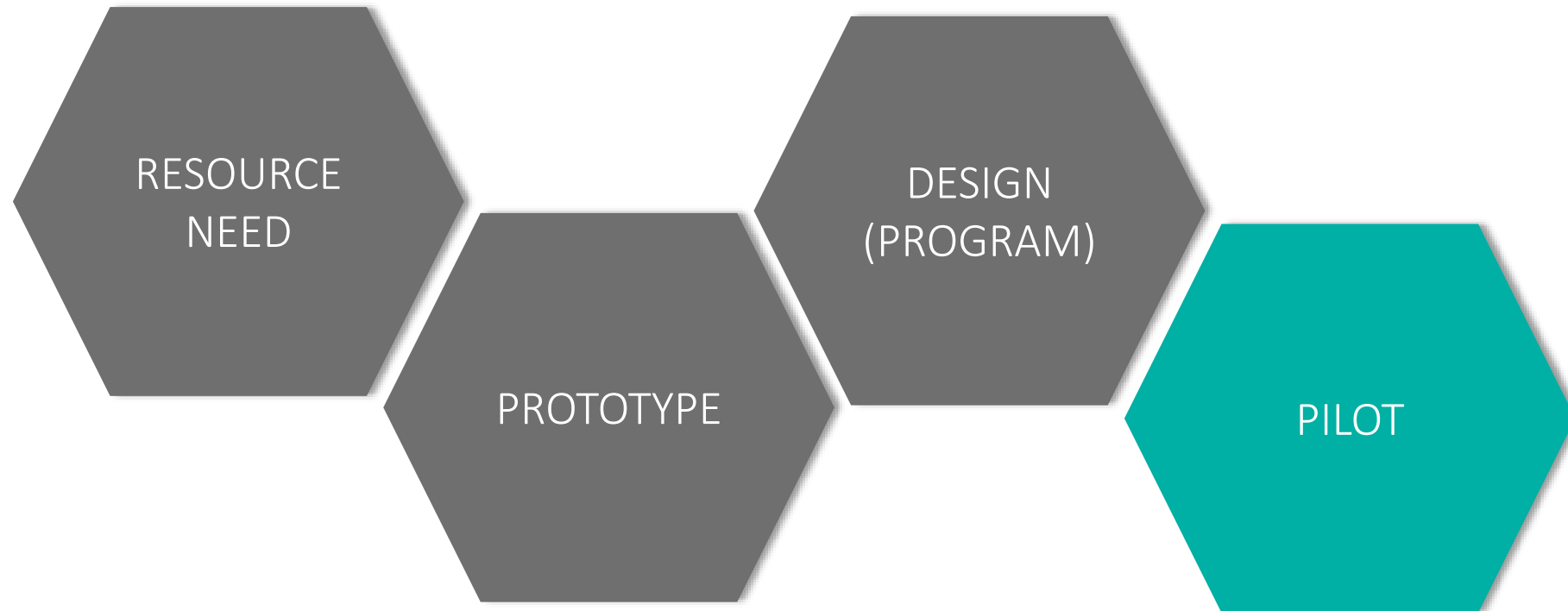
**ENERGY  
EFFICIENCY**

**BEHAVIORAL**



**DEMAND RESPONSE**

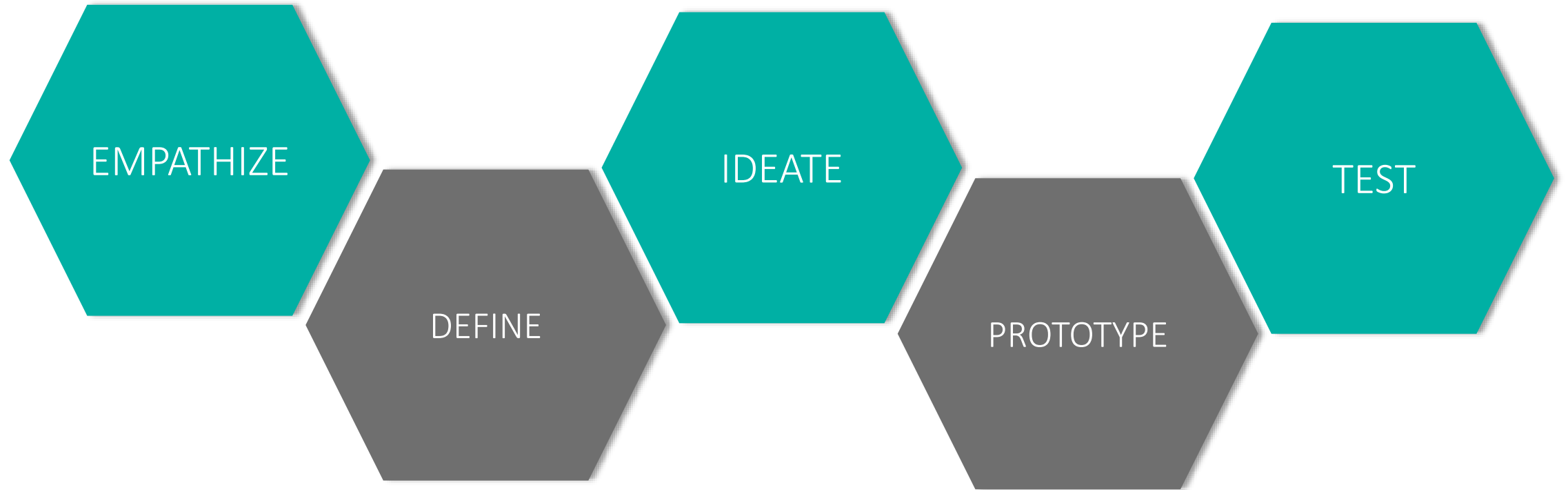
# TYPICAL DSM TECH DEVELOPMENT



# TECHNICAL AND HUMAN



# STANFORD DESIGN PROCESS



# MATERIAL & EMOTIONAL SATISFACTION

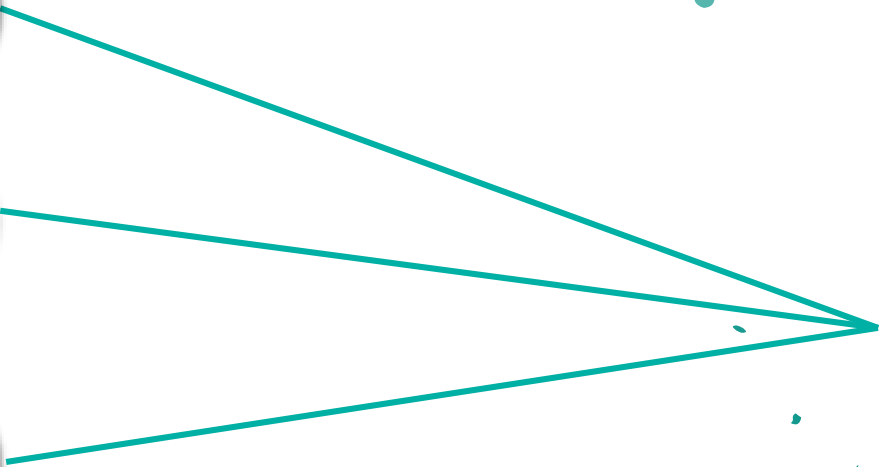
## MATERIAL SATISFACTION MODEL:

User satisfaction is driven by product features, which determine performance and the extent to which the technology meets the user's needs.

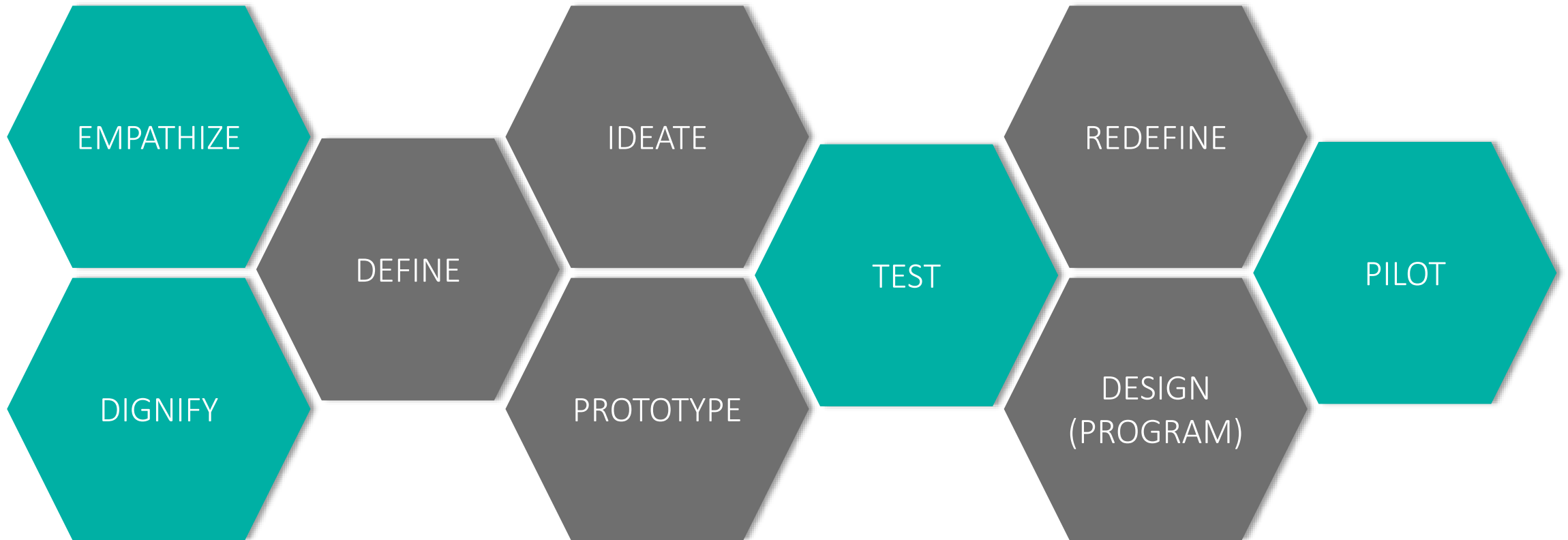
## EMOTIONAL SATISFACTION MODEL:

Satisfaction with technology not only depends on the material features, but also on the disparity between user expectations and performance (disconfirmation), and the context through which the technology is accessed, including price and the physical setting of use (product setting).

# THE NEXT EXAMPLE



# BEGIN WITH DIGNITY

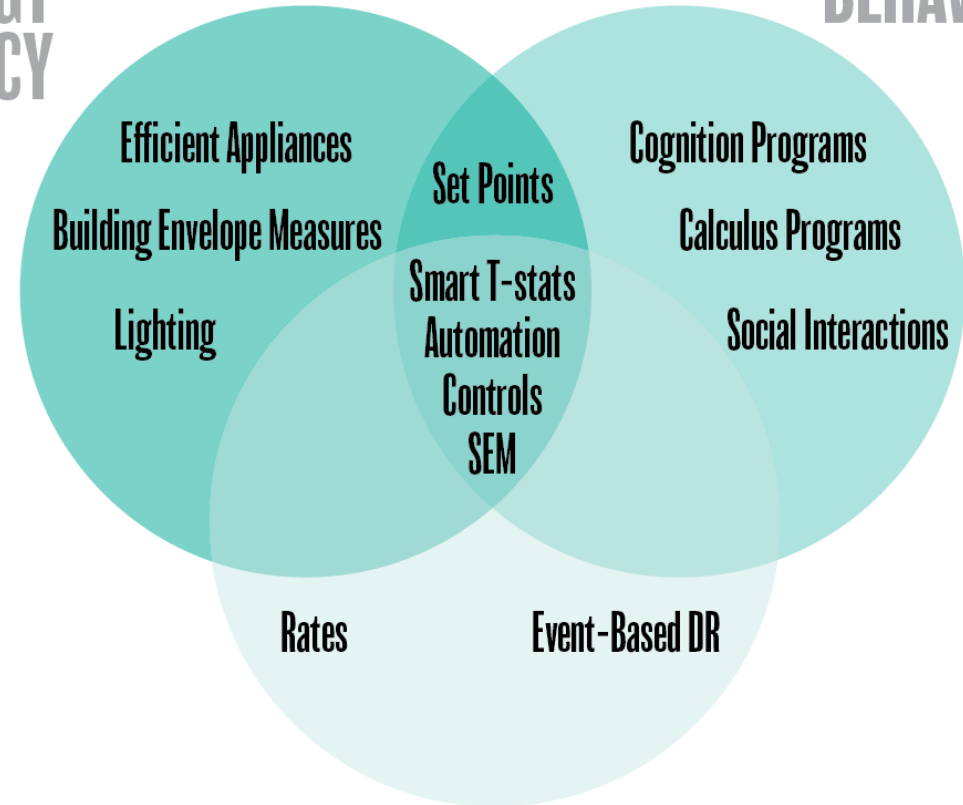




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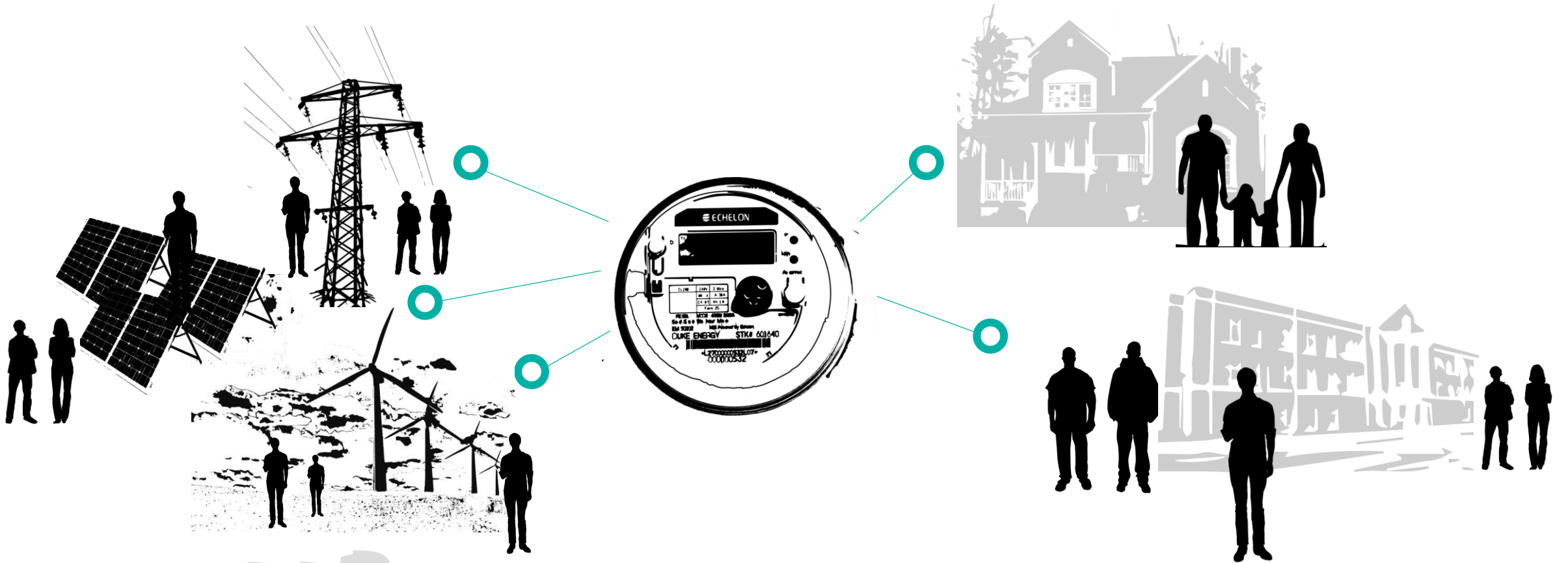
**ENERGY  
EFFICIENCY**

**BEHAVIORAL**



**DEMAND RESPONSE**

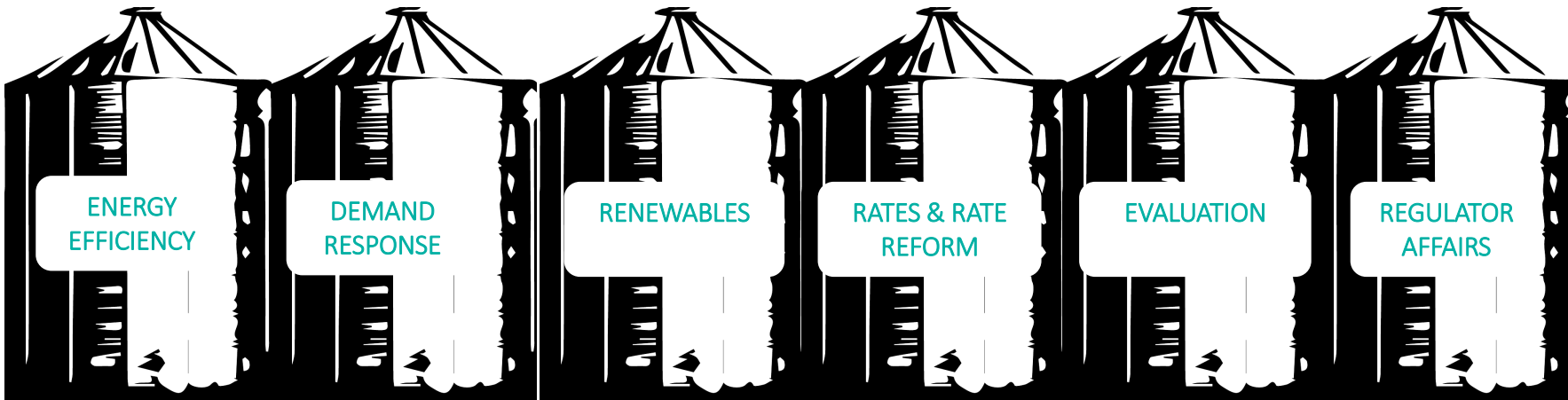
# A HUMAN – HUMAN CHALLENGE



# UTILITY & REGULATORY INTEGRATION: THE TRUE CHALLENGE



# UTILITY & REGULATORY INTEGRATION: THE TRUE CHALLENGE



CONTACT

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QUESTIONS?



# INTEGRAL GROUP

## Revolutionary Engineering

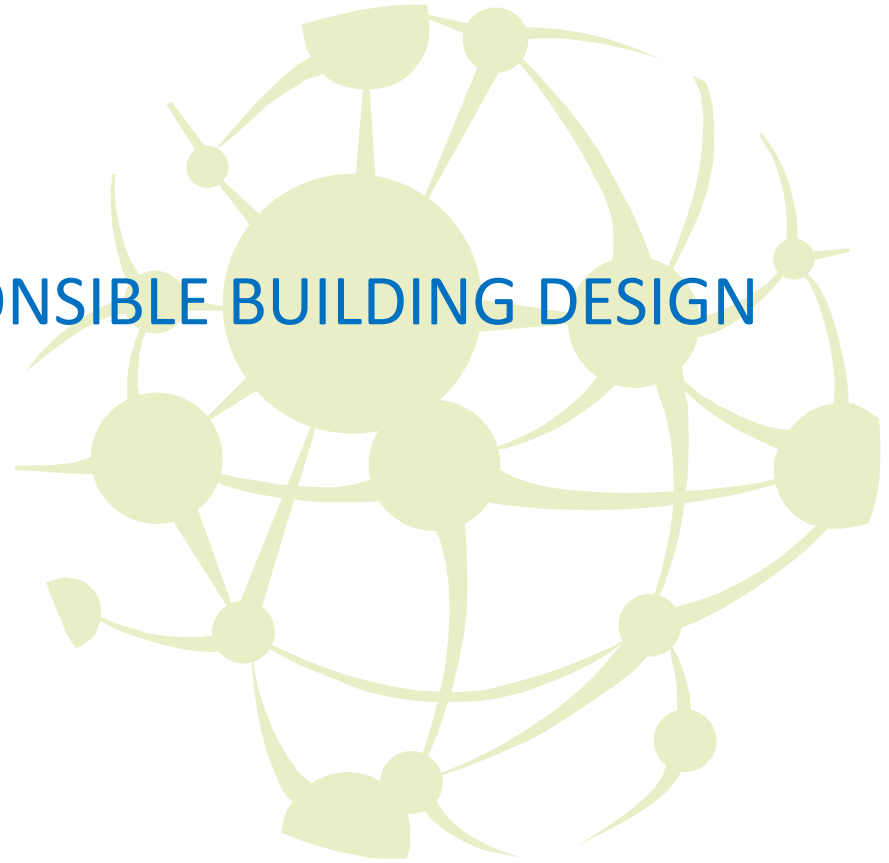
trust | nurture | inspire

John Andary, PE, LEED AP

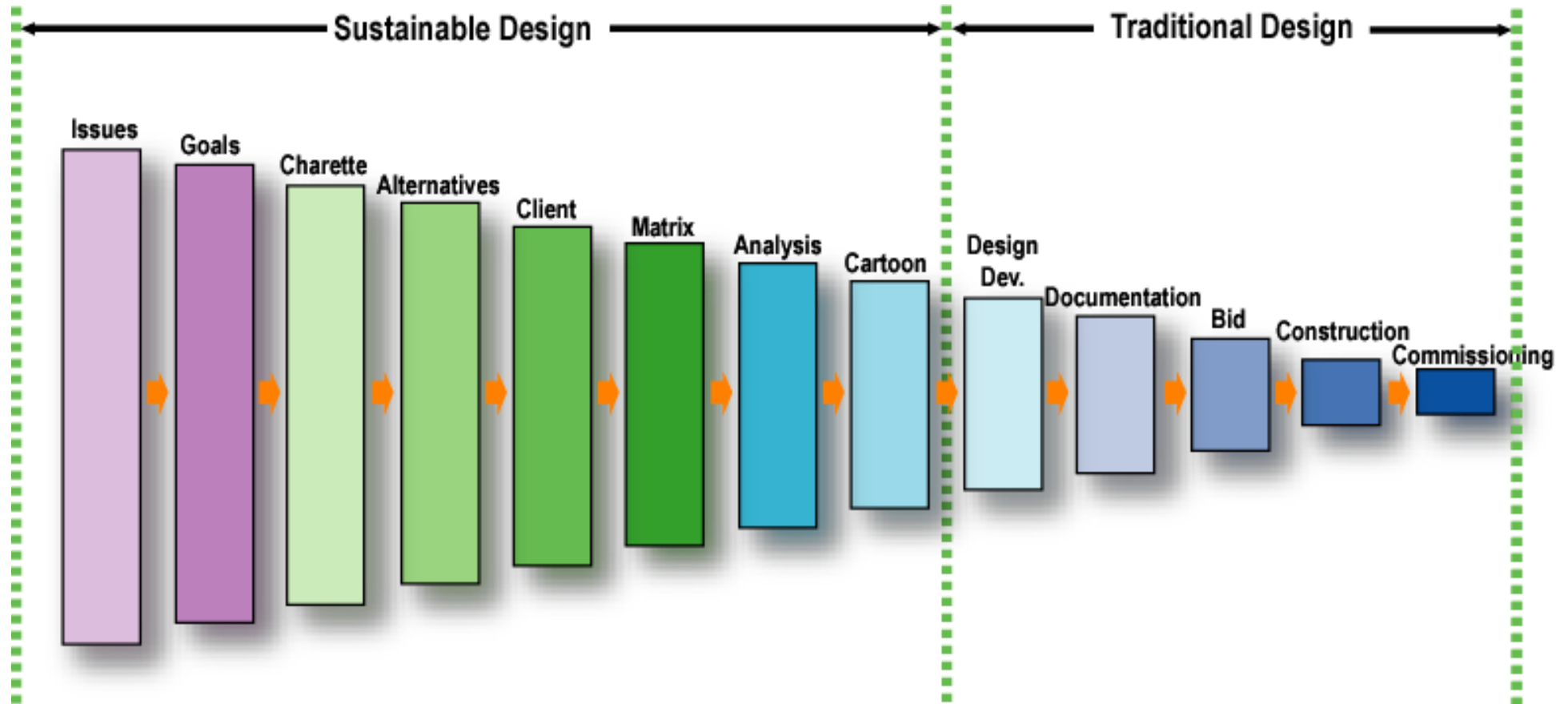
Principal :: Bioclimatic Design Leader



# INTEGRATING ENVIRONMENTALLY RESPONSIBLE BUILDING DESIGN

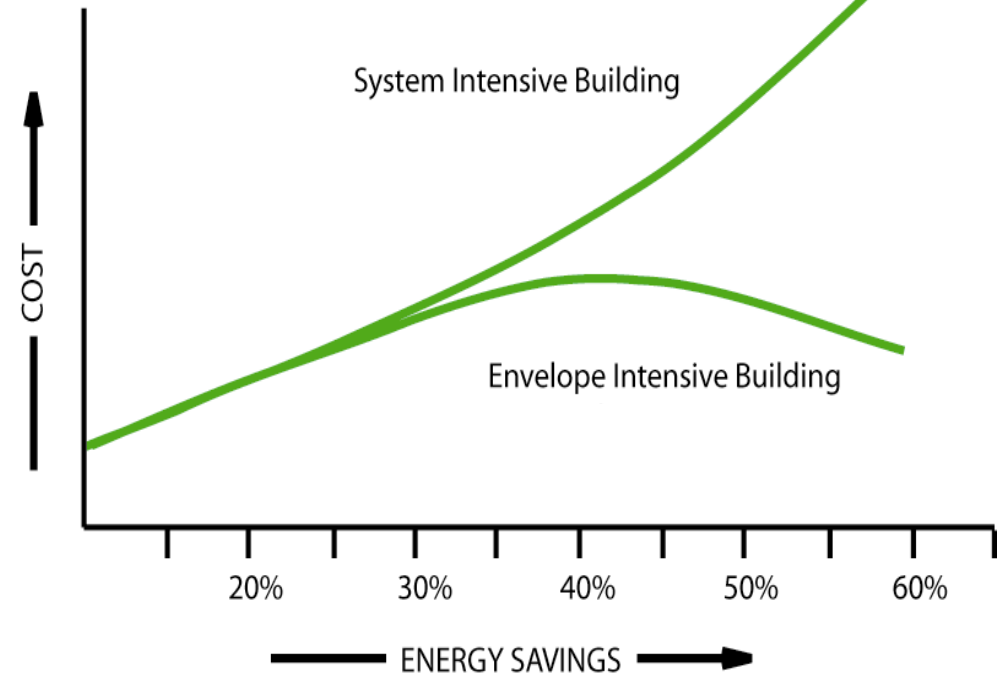
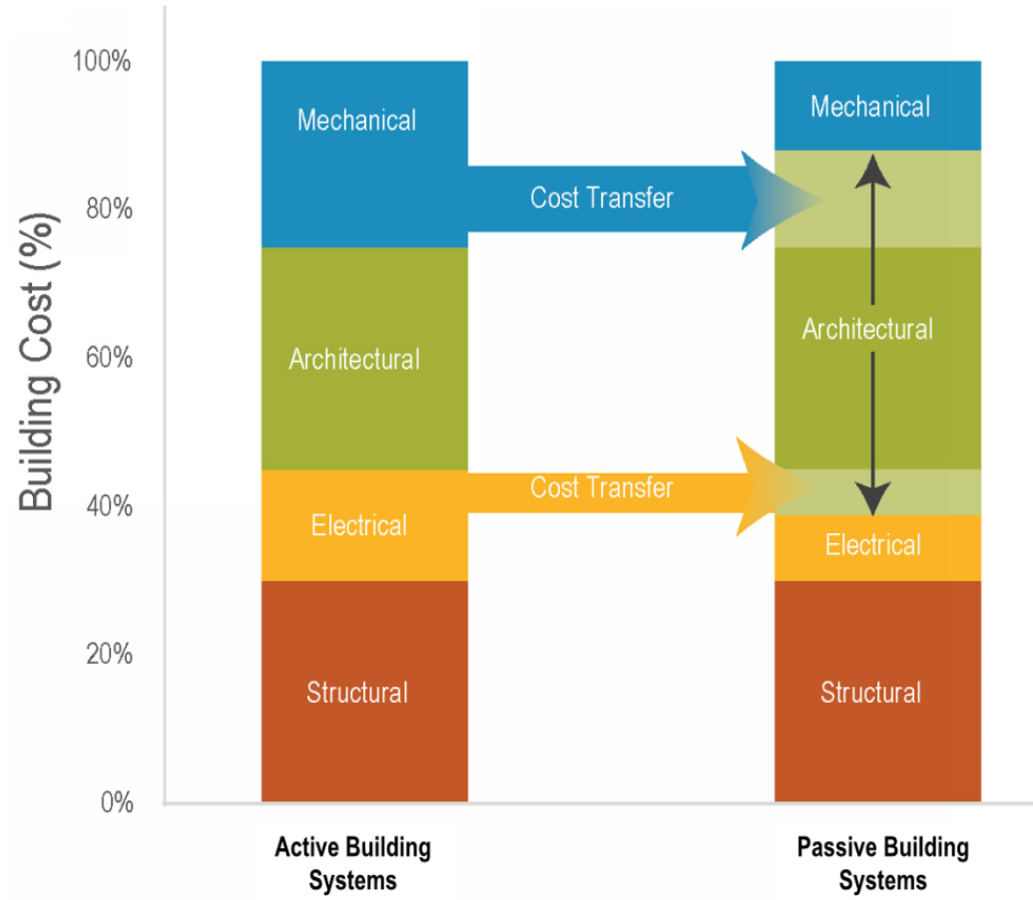


# Integrated Design Process





# Tunneling Through The Cost Barrier





- EHDD ARCHITECTS
- 2007 AIA COTE TOP 10
- NIGHT SKY COOLING
- NO COMPRESSORS
- NATURAL VENTILATION
- COOL TOWER
- RADIANT FLOORS



# PACKARD FOUNDATION HEADQUARTERS



- EHDD ARCHITECTS
- 2014 AIA COTE TOP 10
- ILFI NET ZERO ENERGY
- LEED PLATINUM
- SUPERB DAYLIGHT
- NATURAL VENTILAION
- CBE TOP IEQ BUILDING





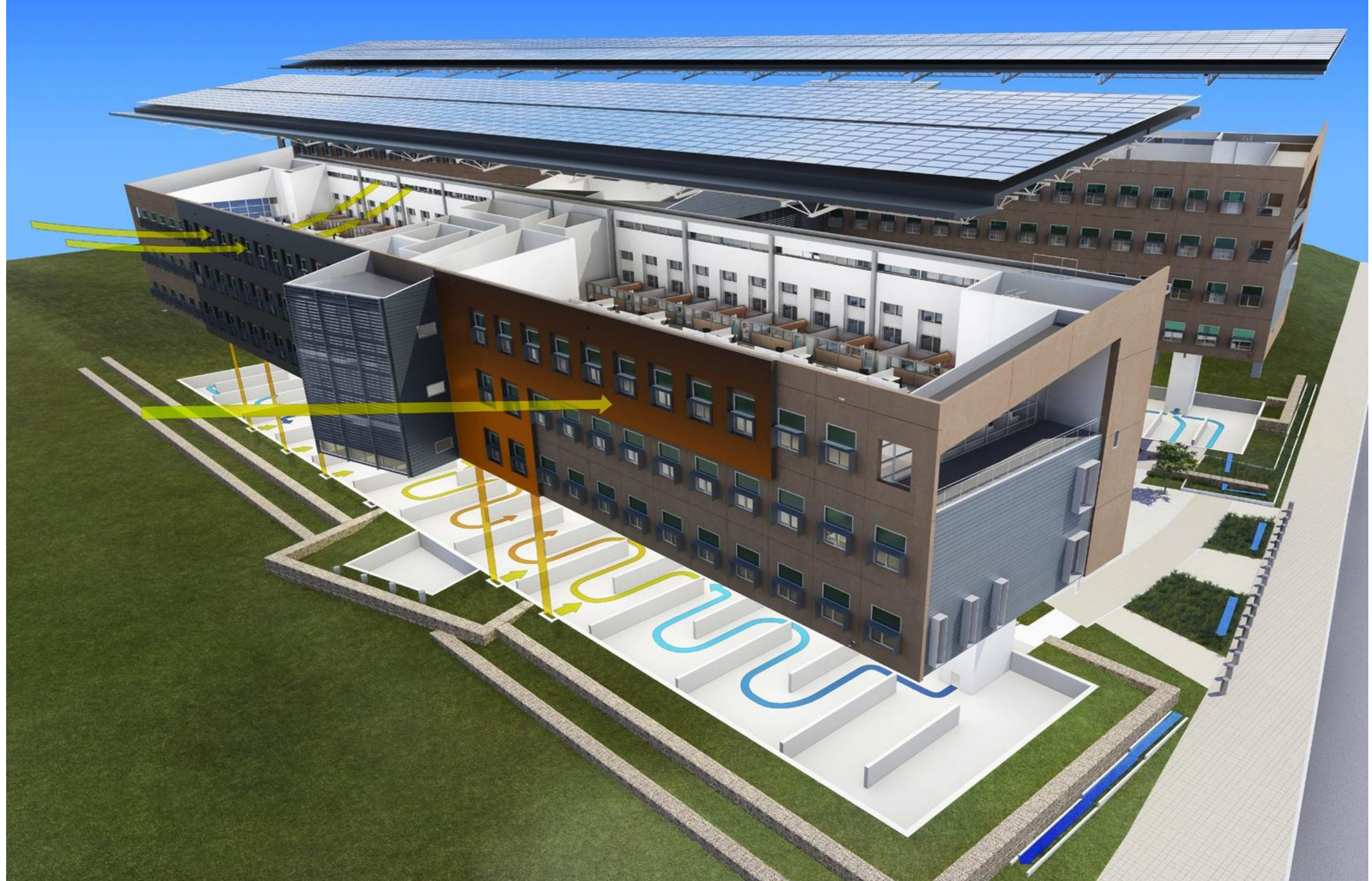


# NATIONAL RENEWABLE ENERGY LABORATORY :: RESEARCH SUPPORT FACILITY

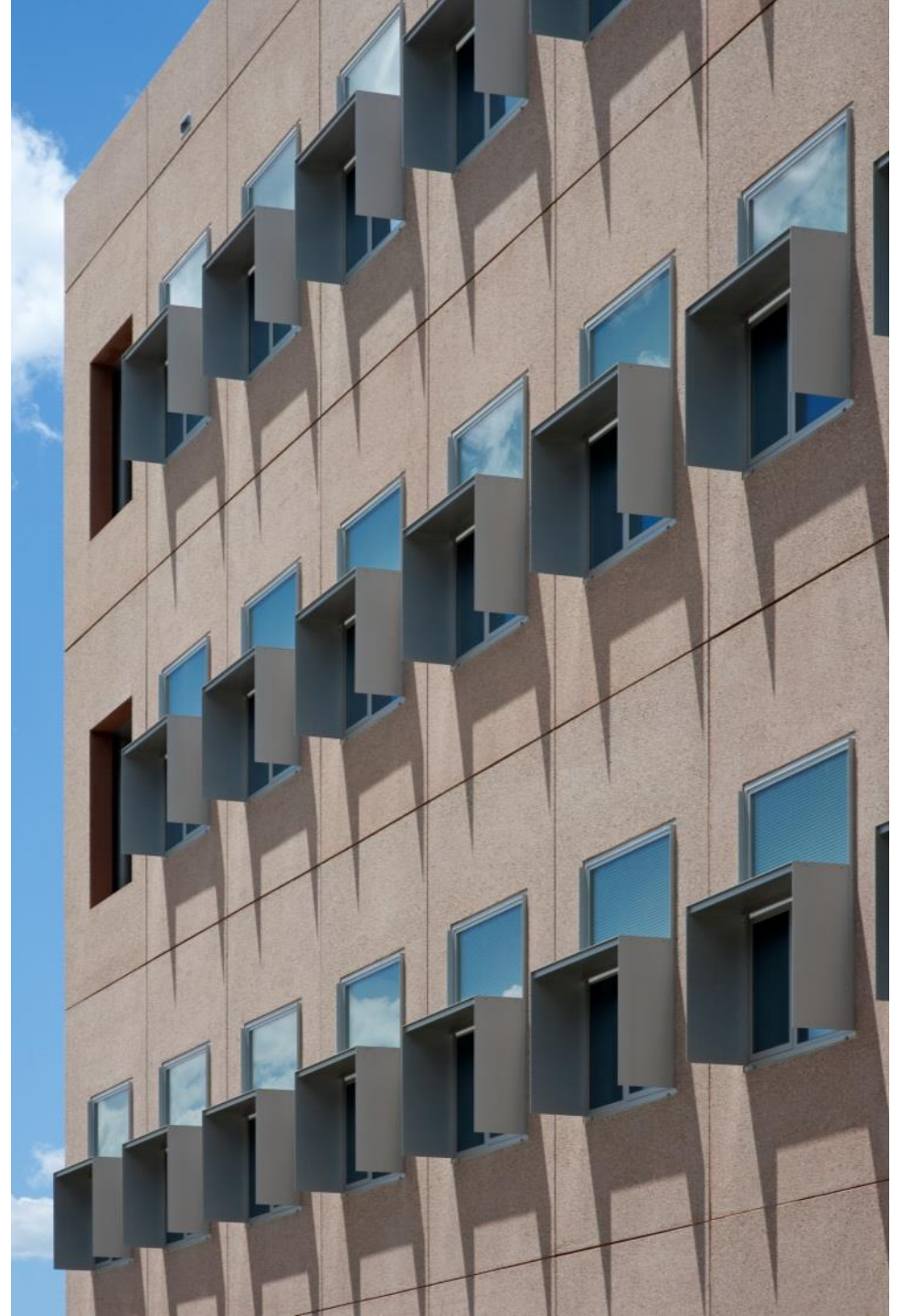
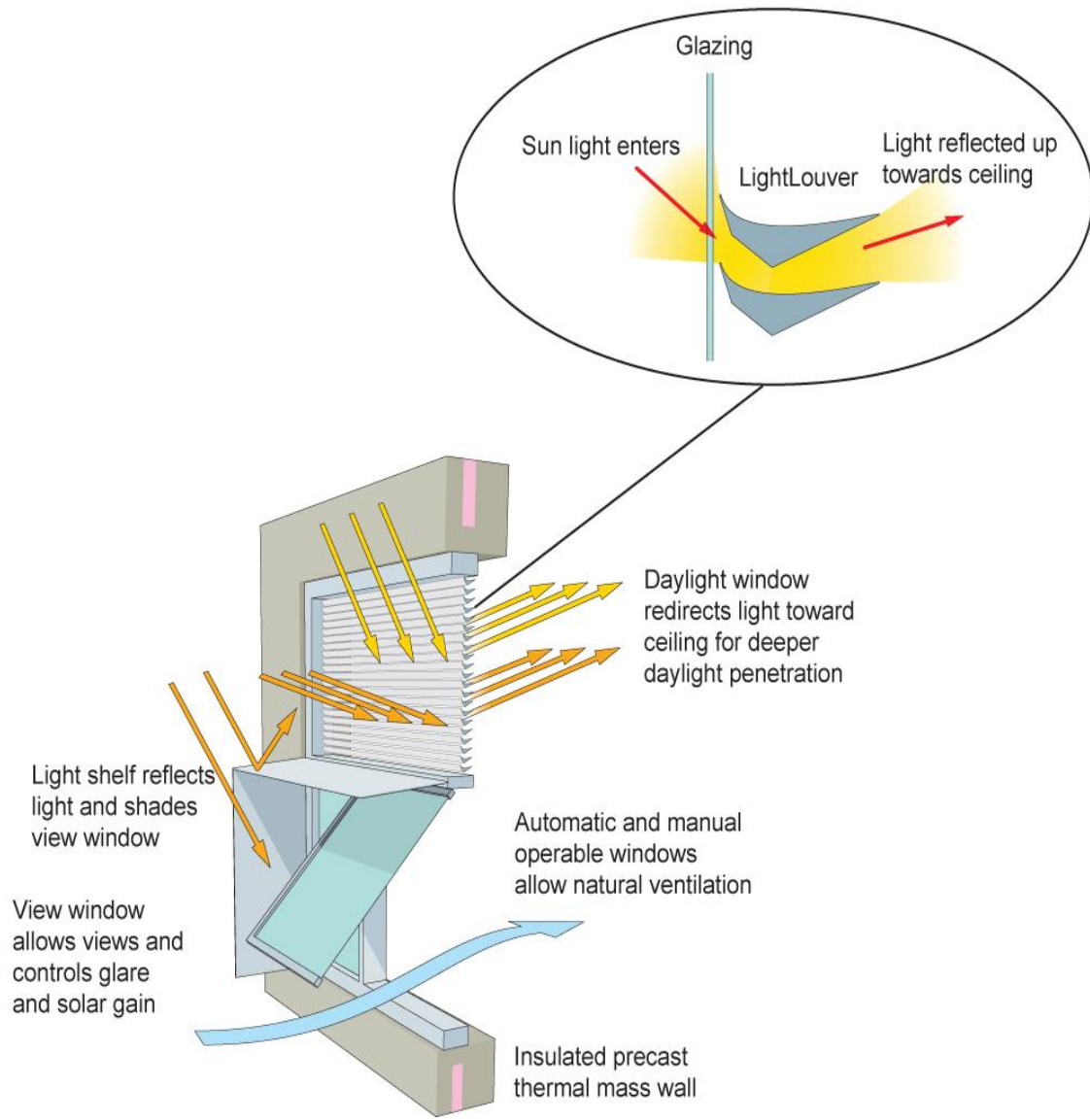


- RNL DESIGN
- 2011 AIA COTE TOP 10
- LEED PLATINUM
- FAST TRACK D/B
- LARGEST ZNE : 360K SF
- FIRM FIXED PRICE
- MARKET RATE BUDGET













# THANK YOU

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*Check out our book.*

INTÉGRAL

Revolutionary  
Engineering



MOLLY MILLER

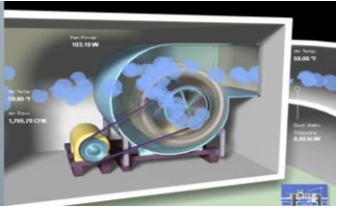
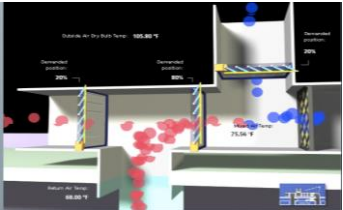
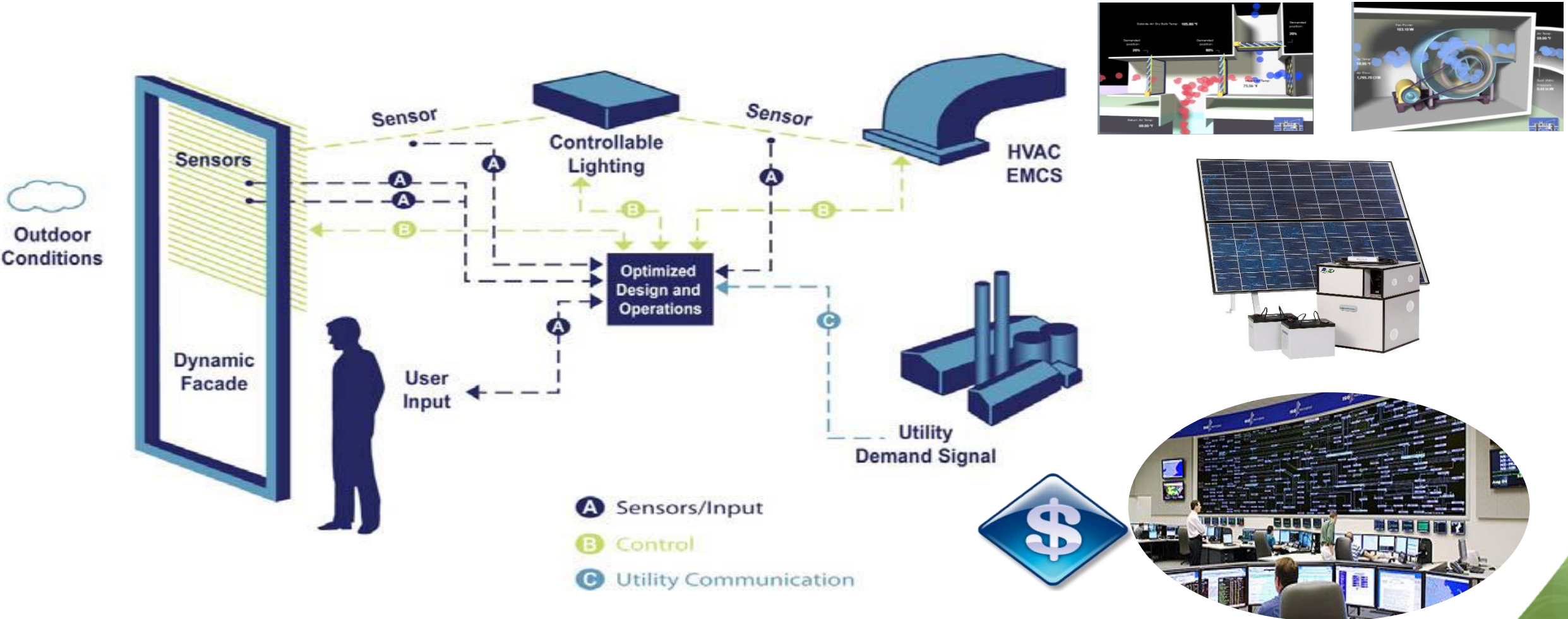
# Linking Energy Efficiency and Demand Response

## *Demystifying Integrated Solutions*

Mary Ann Piette  
Lawrence Berkeley National Laboratory  
Demand Response Research Center  
Emerging Technologies Summit – April 2017

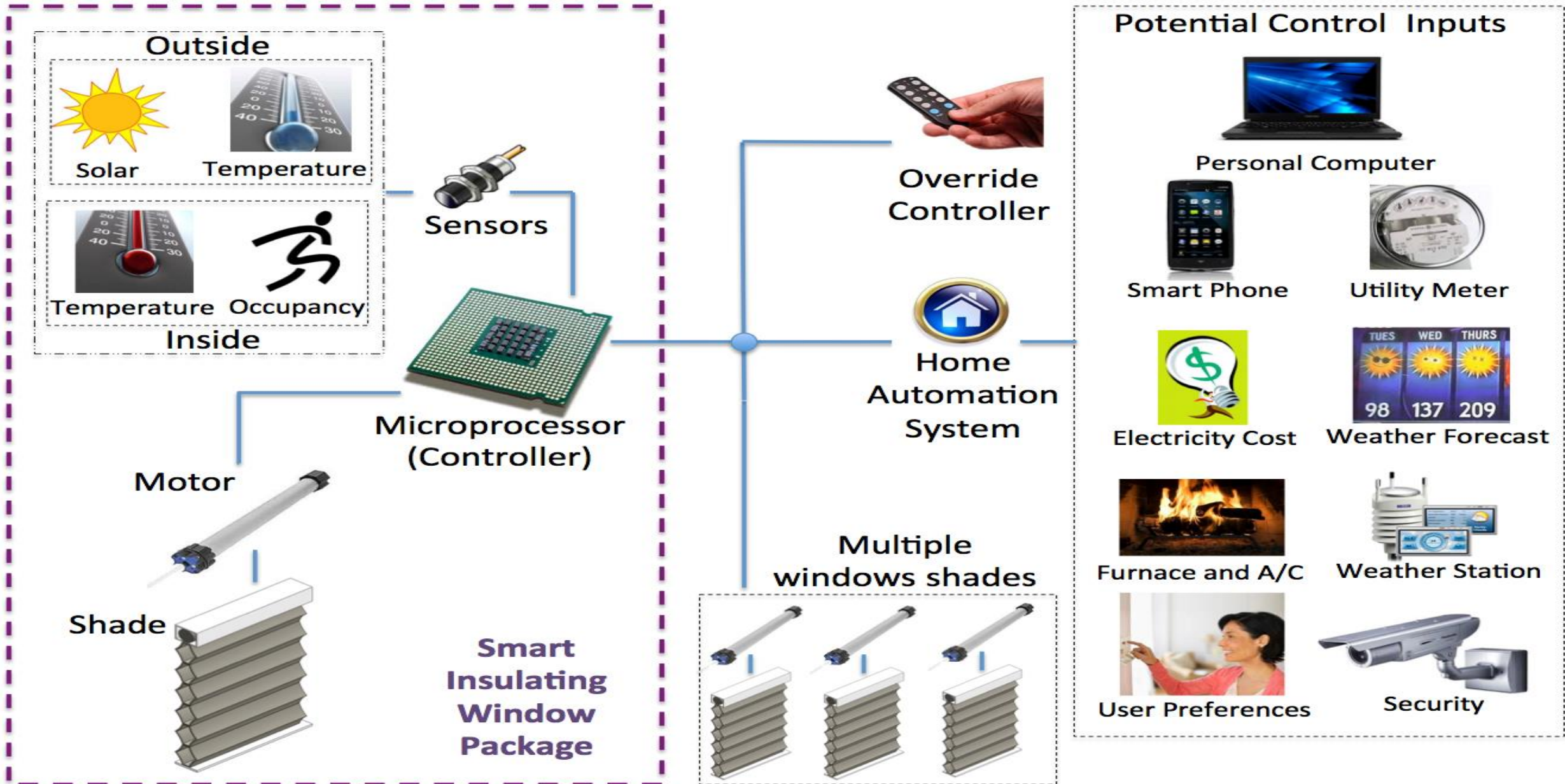


# Accelerate Integration of Systems for Interoperable, Grid Responsiveness with Continuous Efficiency Analysis





# Dynamic Control in Homes and Small Buildings



# Continuous Control, Measurement and Verification

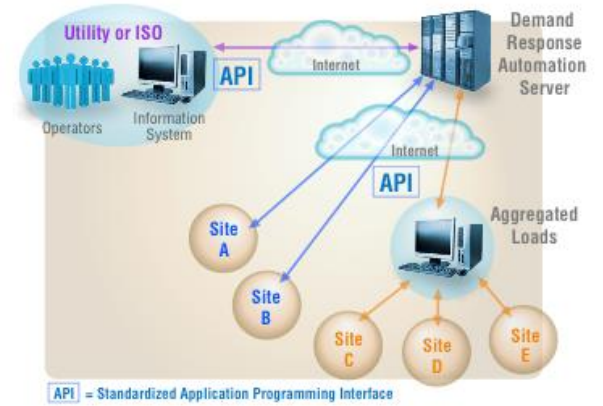
**Demand Response and Price Response Scheduler** coordinate DR and price signals from outside server with available resources

**Baseline Load Shape** provides basis for measuring change in peak demand and energy use

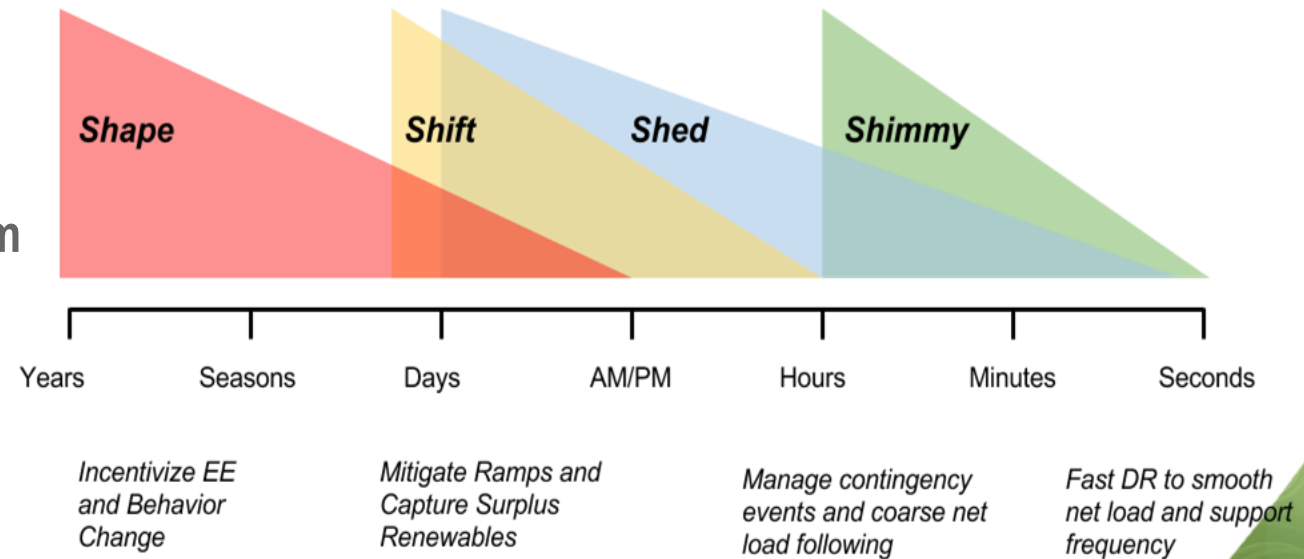
**Demand Response Measurement** quantifies change in load for each event

**Energy Savings Measurement** determines total energy savings benefit over time

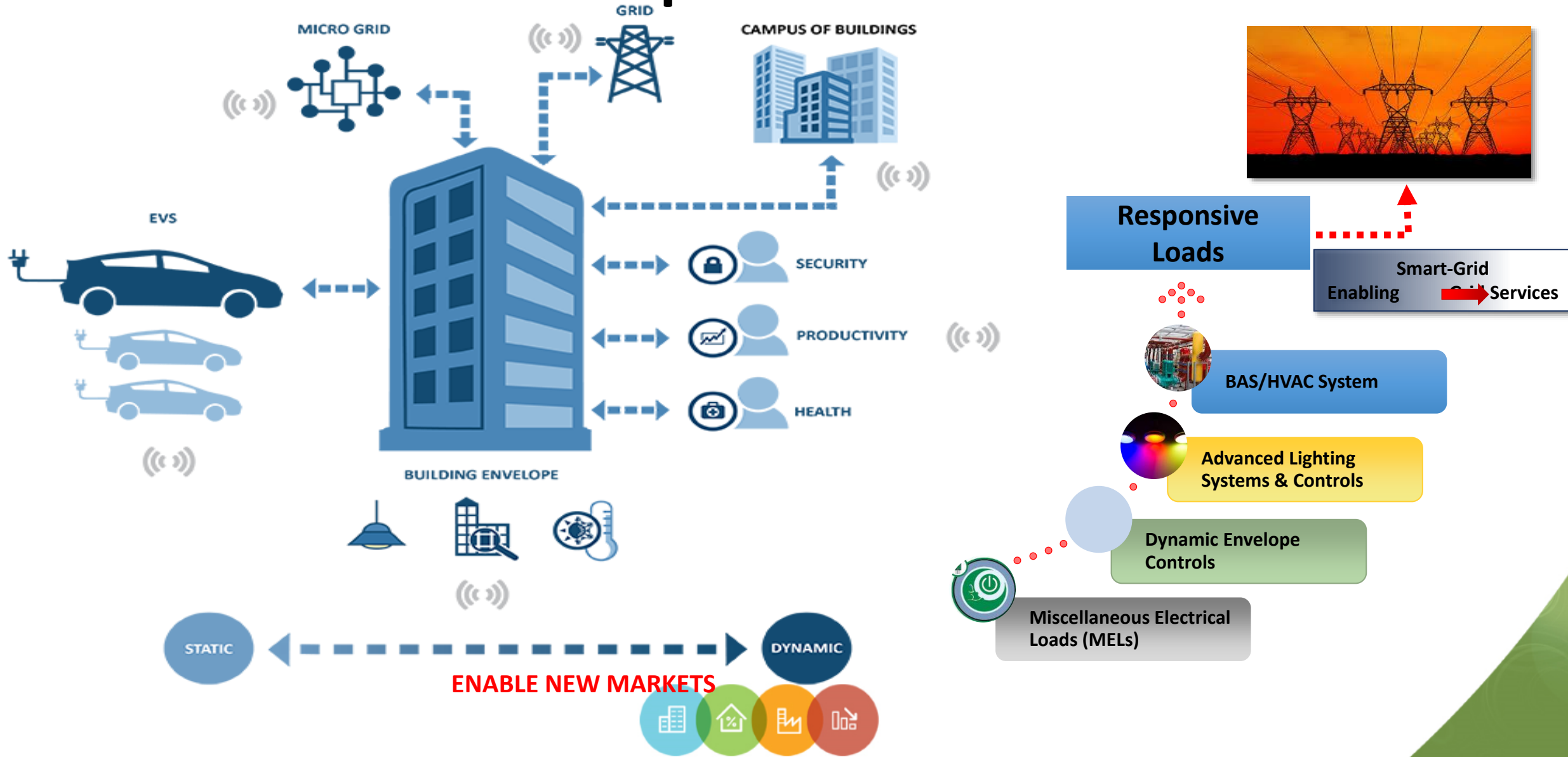
**Economic Savings Measurement** translates results from measurement applications to financial savings (\$)



Open Automated Demand Response



# Dynamic Communication, Control & Aggregation with Responsive Loads





# **CREATING INTEGRATED ENERGY AND WATER SOLUTIONS THROUGH UTILITY PARTNERSHIP**

**ETCC Summit – 2017  
MUGI LUKITO – SOCALGAS**

# SoCalGas' Vision on Integrated Demand Side Management & Customer Programs

W  
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- Integrate SoCalGas portfolio of programs/services internally and externally to better serve customers
- Create a one-stop gas, electric and water efficiency point-of-service for customers

W  
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Y

- Improve program participation
- Increase customer satisfaction
- Reduce program costs

H  
O  
W

- Partner with municipal utilities and other IOUs to jointly deliver programs and services
- Minimize customer touch points through a single-point-of-contact service, especially in the multifamily sector

# Master Partnership – Municipal Utilities

- » Joint Energy (Gas & Electric) and Water Program Administration with LADWP, Riverside, Pasadena, Anaheim and MWD
- » Total Number of Programs = 27
- » Total Operating Budget = \$85 million in 2016
- » Energy Savings (2013-16) = 1.1 million Therms
- » Political Benefits = Access to large cities and drought response/water integration



Municipality	Launch	Expiration	No of Programs
LADWP	Sep 2012	Dec 2017	18
Riverside	Nov 2013	Dec 2023	3
Anaheim	Nov 2013	Dec 2015 (Renewable until Dec 2016)	1
MWD	Dec 2014	Dec 2019	3
Pasadena	Feb 2015	Dec 2019	2

# SoCalGas & Municipal Utilities

- » SoCalGas is taking the leadership in EE administration by leading 22 out of 27 programs with municipal utilities
- » Through the partnership programs, SoCalGas has:
  - Led joint programs with millions of dollars in customer incentive payments (CAHP, SBD);
  - Processed and paid electric rebates on behalf of electric utility (Food Service); and
  - Led the technical reviews of large electric and gas custom project applications (Engineering Calc. Support)
- » SoCalGas has billed over \$12.1M to municipal partners since 2013, typically paid within 60 days (on time billing and payment). No outstanding receivables!
- » On average, SoCalGas is launching 5 new joint programs per year with municipal utilities

# SoCalGas/LADWP Programs Before & After

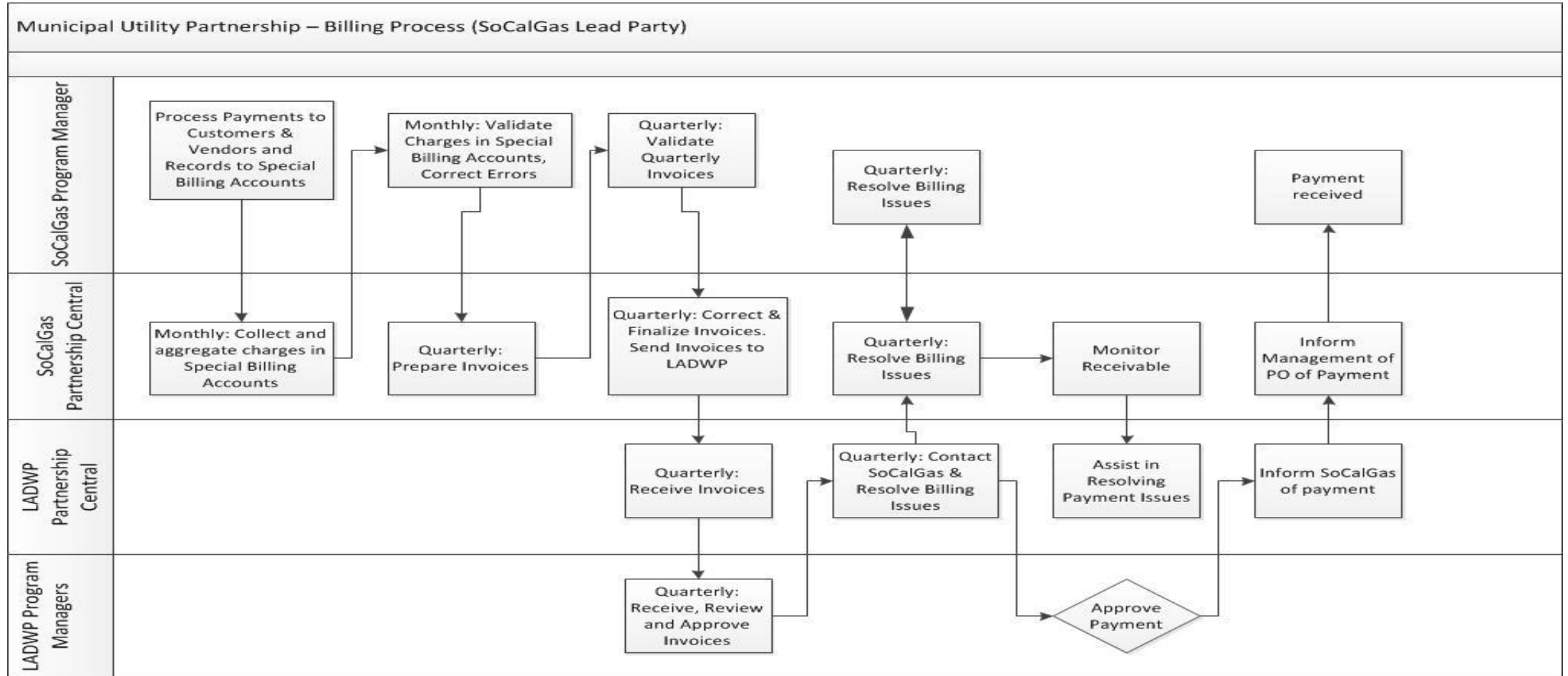
Program	Baseline Period	Baseline Production	Post Partnership Period	Post Partnership Production	Increase (%)
Residential New Construction (California Advanced Homes)	April 2011-March 2013	233 units enrolled	April 2013-Now	12,224 units enrolled	<b>2,511%</b>
Commercial New Construction (Savings By Design)	Pre April -2013	0 projects	April 2013-Now	41 projects enrolled	<b>New Opportunity</b>
Multifamily Direct Install	2013 (Normalized)	42,026 water devices	2014	47,539 water devices	<b>13%</b>
Energy Upgrade California	2013 (Normalized)	94 projects	2014-Now	1,625 projects	<b>430%</b>
LA Better Buildings Challenge	Pre 2013	0 sq ft enrolled	Post 2013	>100 million sq ft enrolled	<b>New Opportunity</b>



# Keys to Success

- Be flexible!
- Think long term – a marriage, not a fling!
- Negotiate with an open mind, everyone has needs and wants
- Centralize redundant tasks, minimize burden on program managers/operation
- Dedicate resources to the partnership
- Ensure timely reporting and billing
- Be disciplined, introduce processes and controls

# Partnership Billing Flow Chart



# Case Study - Playa Vista Development

- Master-Planned Development - 2,800 residential units enrolled in California Advanced Homes, 5 commercial buildings enrolled in Savings By Design in partnership with LADWP
- Inter-utility collaboration led by SoCalGas with comprehensive energy modelling analysis and sustainable guidelines during design phase – 13 new home projects currently under construction
- Community Center Case Study Project - Joint SoCalGas/LADWP NZNE project. ET program helped fund a 75 kW Tecogen cogeneration system and a 46 kW PV system.
- SoCalGas held an onsite project showcase in August 2015
- Published in an ACEEE paper. Project Awarded LEED Platinum in January 2016



# Questions?

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