



# Emerging Energy Strategies

## ENERGY SOLUTIONS FOR TODAY'S CHALLENGES

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# EMERGING ENERGY STRATEGIES & TRENDS

1. Energy Efficiency & Energy Performance Contracting (EPC)
2. Energy Enterprise Zones
3. Micro and Co-Generation
4. Renewable Resources
5. Thermal Energy Storage
6. Grid & Device Intelligence

# STRATEGY 1: THE CASE FOR ENERGY EFFICIENCY

- **Lowest Cost Per kWh Implemented:**
  - Efficiency Projects: \$0.04 - \$0.06 per kWh
  - On-Site Generation: \$0.10 - \$0.25 per kWh
  - Green Power/Wind: \$0.11 - \$0.22 per kWh
  - Solar (PV): \$0.35 - \$0.60 per kWh

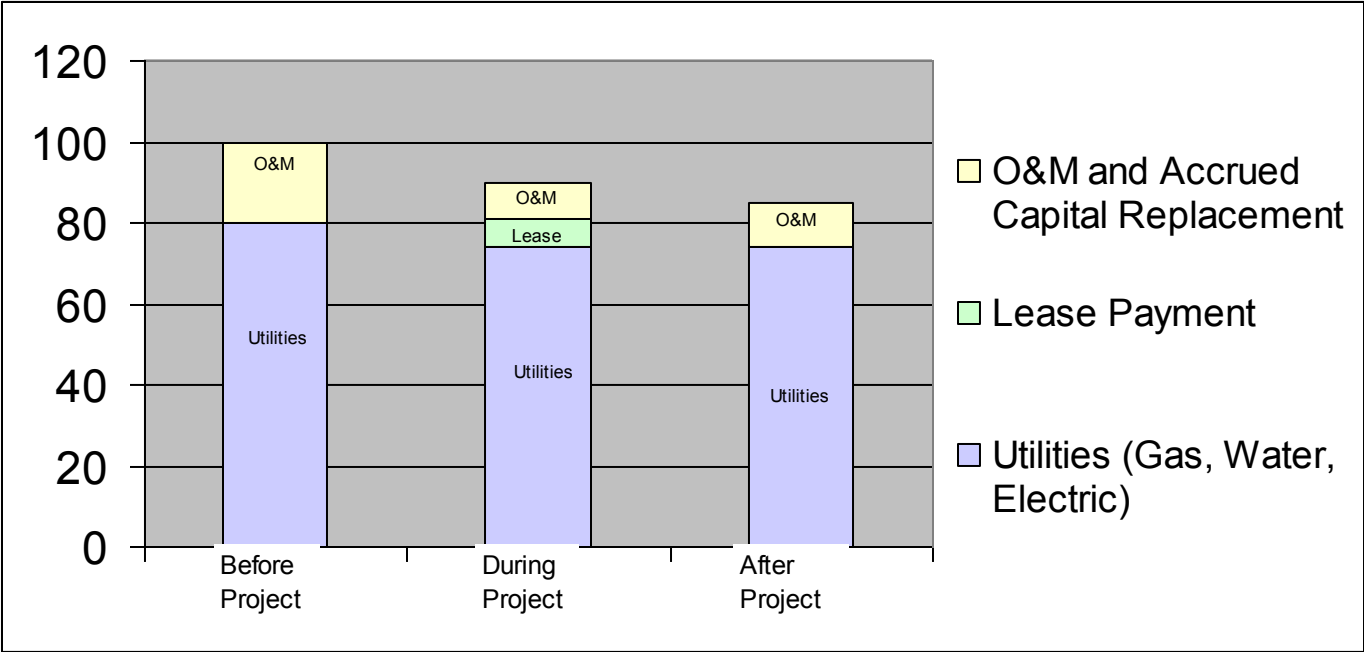


It also tends to be the Greenest due to avoided generation...

# STRATEGY 1: EFFICIENCY & EPC

- A self-funding, fixed-term procurement process
- Energy savings fund for Energy Conservation Measures (ECMs)
- A budget-neutral way for private and publicly funded institutions to procure needed energy improvements
- 42 states and the Federal Government employ Performance Contracting as a routine means of implementing Efficiency

# ENERGY PERFORMANCE CONTRACT – HOW IT WORKS



- Many Projects Can Be Self-funded by the Utility Savings They Identify
- Energy Savings Identification Goal of 20% - 50% over 10 - 15 year payback term

# EXISTING BUILDINGS - ENERGY OPTIMIZATION

- Must embrace optimization as the ongoing process of review and adjustment in order to improve infrastructure while reducing costs
- The Facility energy plan is that which helps sustain this effort going forward
- Need Organizational Commitment to look beyond just a few years...

**Paramount to Bringing Buildings into the 21<sup>st</sup> Century is  
Upgrading the Energy Infrastructure**

# ENERGY ACCOUNTING

- Review Historical Energy Consumption
- Identify Energy Mix & Don't Forget Water!
- Method to Record, Analyze, Track and Report Use and Costs
- Need is based on the premise that you “cannot manage what you cannot measure”
- Be prepared to slay a few sacred cows...



# DEVELOP THE TEAM

- Energy Optimization is a Team Sport
- Team Should Reflect the Entire Organization
- Appoint a Strong Leader
- Set Goals
- Engage the Entire Organization in the Implementation





# DEVELOP A TOOL KIT

- Benchmarking
- Training
- Audits
- Software
- Models
- Energy Education
- Other:
  - Financing, Purchasing Options, Promotions, Grants



# CREATE AN ENERGY PROFILE

## Detailed Understanding Key Facility Energy Assets:

- ✓ Lighting
- ✓ Water
- ✓ Motors and Pumps
- ✓ Generators
- ✓ Direct Digital Controls- Web based with remote
- ✓ Plug Load survey
- ✓ Building Envelope
- ✓ Demand Response
- ✓ Maintenance Costs



# BEGIN WITH AN ENERGY AUDIT

- **Preliminary Audits ~**

- Help Locate Your Quickest Payback Items

- **Detailed Audits**

- Fine Tune Recommendations and Require Organizational Input and Assistance



# GOAL – A SUCCESSFUL PROJECT- EXAMPLE

## ROANOKE COUNTY PUBLIC SCHOOLS

This project for the last 3 years has exceeded savings projections by a large margin. Last year savings were 35% greater than the base year.



ECM #	ECM Description	Cost	Annual Savings	Simple Payback
1	Lighting	\$ 1,281,341	\$ 189,365	6.8
2	Water	\$ 493,844	\$ 49,087	10.1
3	EMCS Upgrade	\$ 2,026,914	\$ 129,501	15.7
4	Plug Load	\$ 152	\$ 24,147	0.01
5	Vending Miser	\$ 28,293	\$ 6,216	4.6
<b>TOTAL PROJECT</b>		<b>\$ 3,830,545</b>	<b>\$ 398,316</b>	<b>9.6</b>



# STRATEGY 2: ENERGY ENTERPRISE ZONES

- Centralized Thermal and Power Generation Plant
- Plant Capacity
  - Chilled Water: 53,800 tons
  - Steam: 840 mmBtu/hr
  - Serves 8 Commercial Clients
  - Adding 7MW of Onsite Power Generation
- Stand-Alone Facilities
  - Atlantic City Convention Center
  - Trump Marina Casino Resort
  - Trump Taj Mahal



# STRATEGY 3: MICRO & CO-GENERATION

- Commercial, Industrial, Public and Private...
- All can Benefit from Decentralized Generation...
- Example NIH: One of the Largest Co-generation Power Plants ever Built for the Federal Government
  - \$55 million of Cost Savings Over 15 Years
  - 75 Buildings – Over 300-acres
  - 23-megawatt Gas-fired Co-generation Plant and Substation
  - Provides 180,000 pph of Dry, Saturated SteamCut Energy Costs by \$55 million Over 15 Years



# STRATEGY 4: RENEWABLE RESOURCES

- Example Biomass: Methane Gas is Harvested from Landfill
  - Gas is processed to purify
  - It is then burned to produce electricity
- Considered a Renewable Source
- 5MW in Operation
- 6MW in Construction
- 14MW in Development throughout Mid-Atlantic



# SOLAR PROJECTS

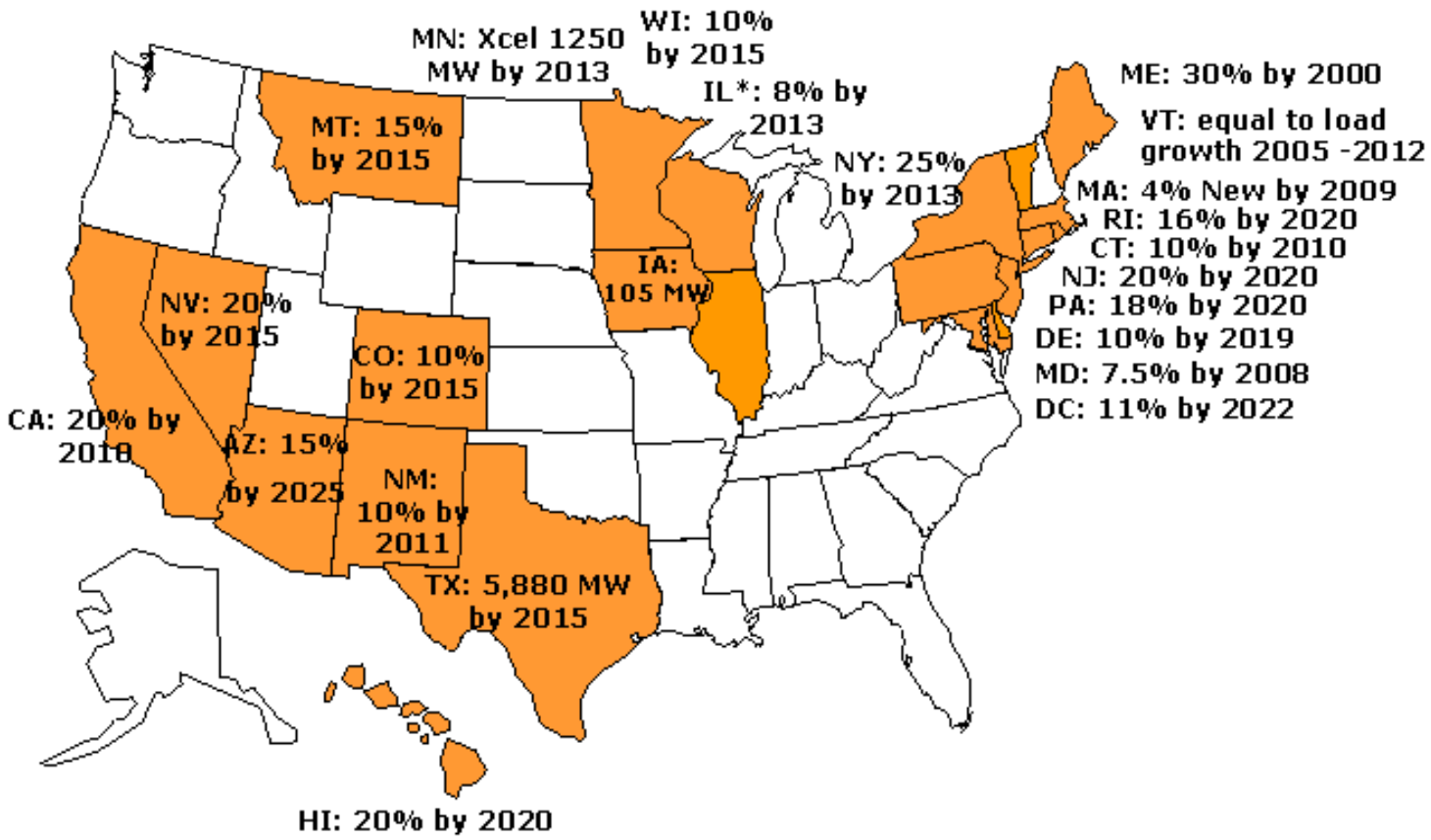
## Renewable Energy Project

- 20-year power purchase agreement (PPA)
- Installation of a 2.37 MW rooftop solar power system
  - Among Largest Solar Rooftop Installations in US
- 13,486 monocrystalline solar panels covering two-thirds of the main roof, or approximately 266,000 square feet
  - Capable of producing 26 percent of the convention center's annual electrical consumption
  - Zero emissions solar technology
- A web-based communications kiosk located in the main lobby of the Convention Center
  - Remote Monitoring of System Performance





# RENEWABLE PORTFOLIO STANDARDS



\* IL implements its RPS through voluntary utility commitments

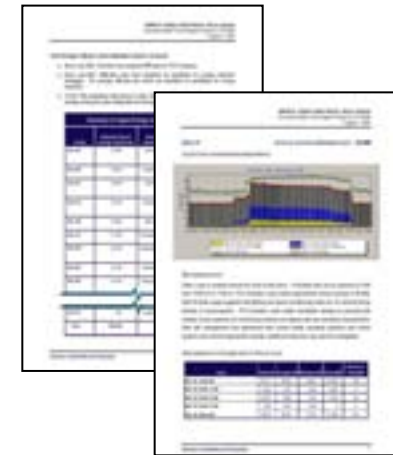
# STRATEGY 5: ENERGY STORAGE

- Example NC State: Largest EPC Ever Awarded by State of North Carolina
- Shifts large Demand from Day to Night
- Serves 22 Buildings
- Generates \$25 Million in Utility Savings Over 12 Years
- Re-commission and Expand District Cooling System
- 3,000 Tons of New Cooling Capacity
- 3 Million Gallons of Thermal Storage
- System Recharges at Night and Circulates cool water during the day



# STRATEGY 6: GRID & DEVICE INTELLIGENCE

- Improved Grid Power Monitoring & Management
- Smart Meters for Utilities monitoring & Control
- Standby Generation
  - Remotely control generation and control systems for Demand load-shedding operations and routine exercising
- Client / Server Solutions – customer owned server and software for site power management



While we are waiting for that next great energy source, there are many strategies we can we can employ....

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