

# Energy Management & Funding Sources at Water Infrastructure Facilities



**Environmental  
Finance  
Center**  
*Syracuse University*

**Technical Assistance Partnership Forum**

**Greening the Gray:**

**Innovative Infrastructure Solutions and Funding Updates**

**March 23 2011, Syracuse University**



Central New York Regional Planning & Development Board

An Independent Contractor to:  
**nyserda**  
Energy. Innovation. Solutions.

# Presentation Outline

- Introduction
- Energy Use in the Water/Wastewater Sector
- Energy Conservation Measures
- Funding Programs and TA Resources

# What is the CNY RPDB?

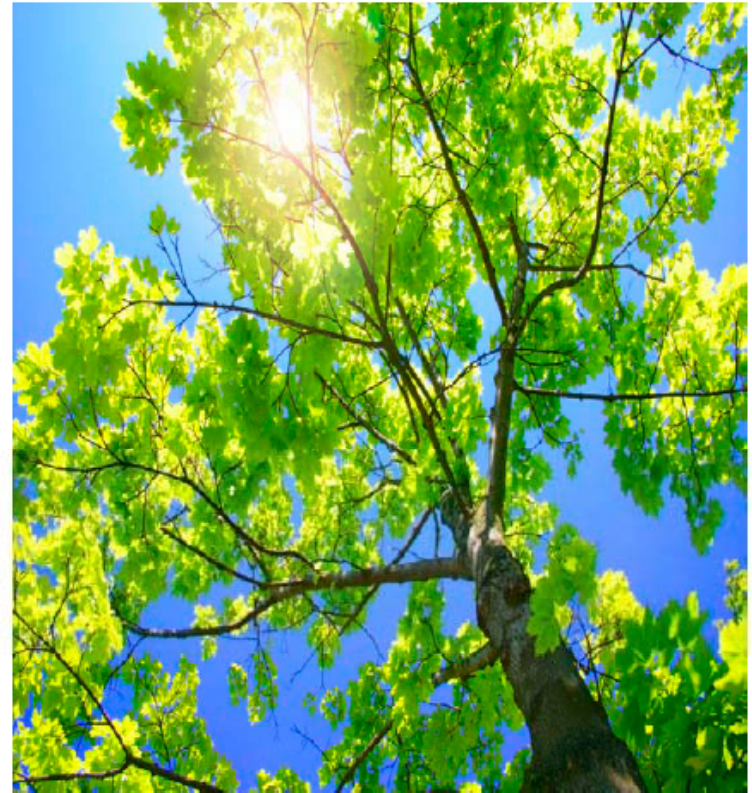
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- A public agency established in 1966 by Cayuga, Cortland, Madison, Onondaga, and Oswego Counties under the provisions of Article 12B of the New York State General Municipal Law
- Provides a comprehensive range of services associated with the growth and development of communities in Central New York with a focus on the following program areas:
  - Comprehensive Planning
  - Economic Development
  - Environmental Management
  - Information and Research Services
  - Intergovernmental Cooperation
  - Transportation Planning
  - **Energy Management**

# What is NYSERDA?

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- ❖ **Public benefit corporation established in 1975**
- ❖ **Advancing energy innovation and technology**
- ❖ **Transforming New York's economy**
- ❖ **Empowering people to choose clean and efficient energy**





# Significant Infrastructure Reinvestment is Needed

- NY's Water and Wastewater infrastructure will require an investment of **\$70+ billion** over the next 20 years (DOH & DEC)
  - Aging infrastructure
  - Increasingly stringent regulations
  - New, more energy intensive technologies will replace outdated treatment systems
- Energy costs continue to rise and no end is in sight

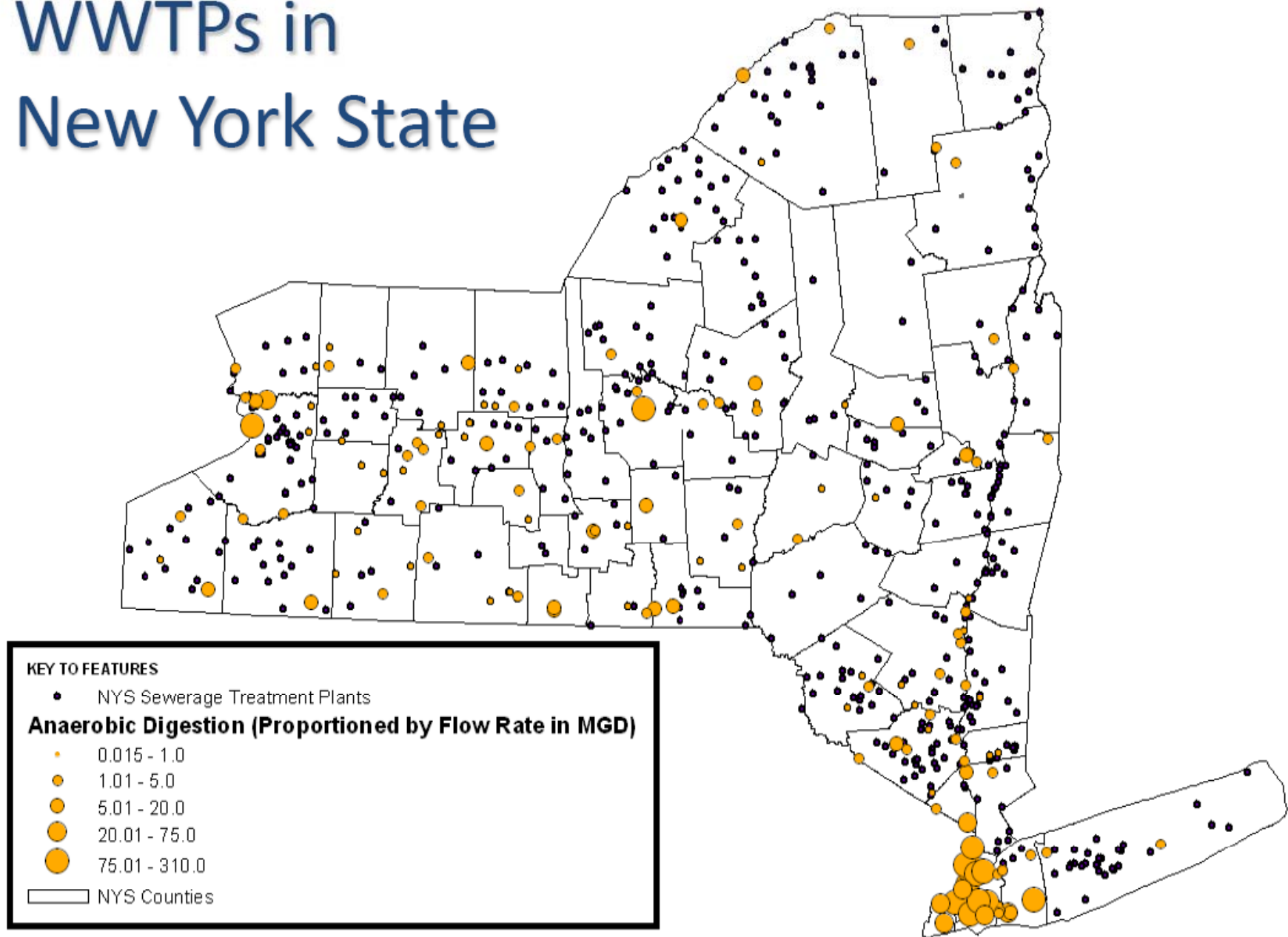


# NY's Water/Wastewater Sector

- Includes approximately 700 WWTPs with a combined design capacity of 3.7 billion gallons per day (NYSDEC, 2004)
- Includes approximately 2,860 community water supply systems with an estimated production of 3.1 billion gallons per day (NYSDOH)
- Includes roughly 7,000 additional non-community water supply systems (NYSDOH)



# WWTPs in New York State



# Electricity Use in the Wastewater Sector is Significant

- NYSERDA Statewide Energy Assessment
- Baseline Energy Use:
  - Drinking Water Sector – 0.75 to 1.0 billion kWh/year
  - Wastewater Sector – 1.75 to 2.0 billion kWh/year
  - Consumes as much electricity as 500,000 NY households
  - \$250-300 million per year in electricity costs

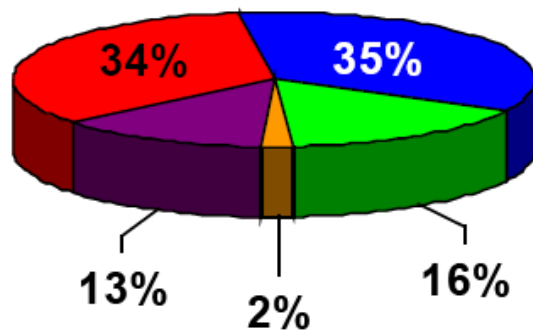




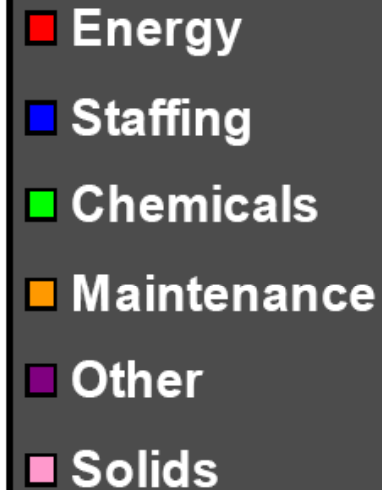
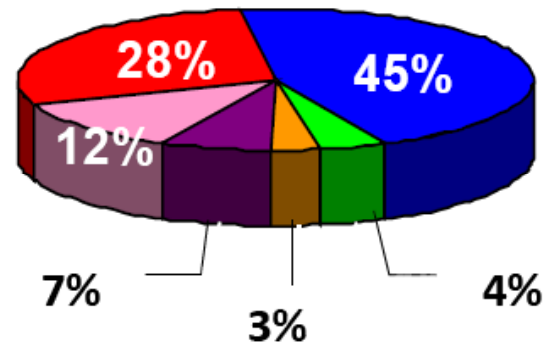
# Typical Operation and Maintenance Budget Breakdown

Energy accounts for a significant portion of utility O&M budgets.

Water Utility



Wastewater Utility



Source: Jones, Ted. "Municipal Water/Wastewater Breakout Session." CEE. 18 January 2007.

# Key Energy Statistics for Sector

- NY WWTPs use more electricity than the national average
  - More stringent effluent limits and greater use of activated sludge
- NY WTPs use less electricity than the national average
  - Availability of high quality water sources and presence of large gravity systems
- Smaller systems use more kWh/MG than larger systems



# Additional Findings

- When energy usage for WWTPs is evaluated based on Biochemical Oxygen Demand (BOD) removal instead of flow, the largest plants are no longer the most efficient size category
  - In part due to combined sewers
- Advanced treatment requirements have a significant effect on energy usage
  - 30 to 100% more energy usage for the same size category



# New Regulations Will Increase Electricity Use in the Sector

- Swimmable Hudson Initiative
  - Seasonal effluent disinfection
- Increased Focus on Advanced Treatment
  - Phosphorus removal
  - Nitrogen removal
  - Microfiltration in NYC Watershed
  - Emerging Contaminants
- Increased Focus on CSOs/SSOs
  - Maximize flow through WWTPs

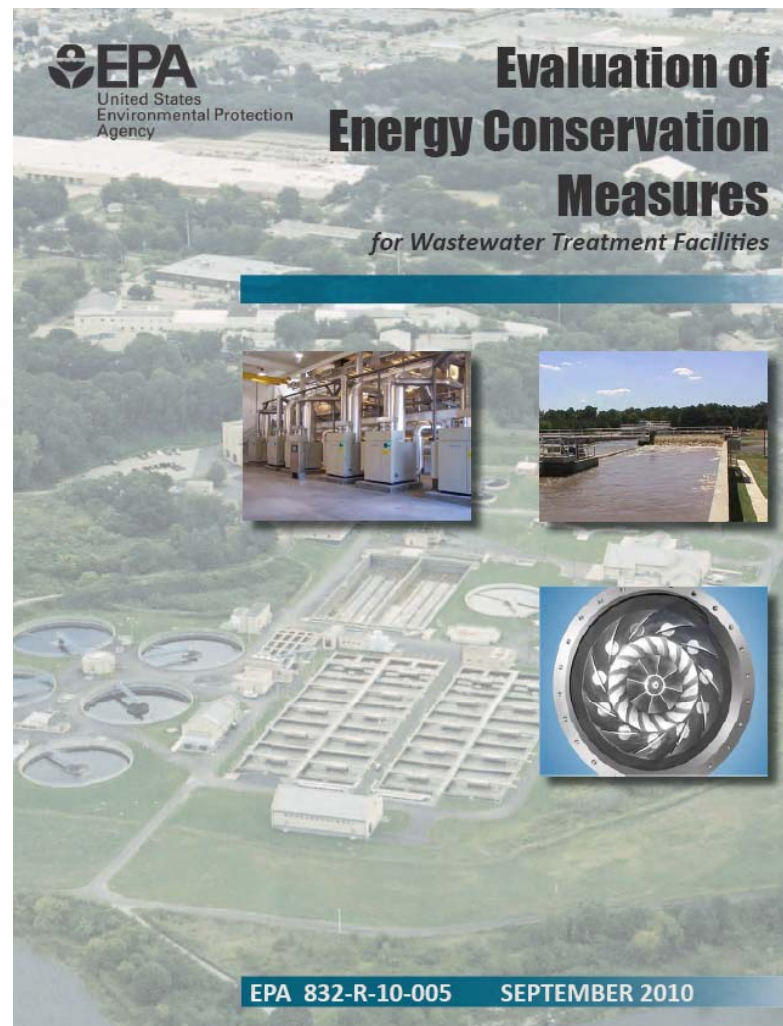
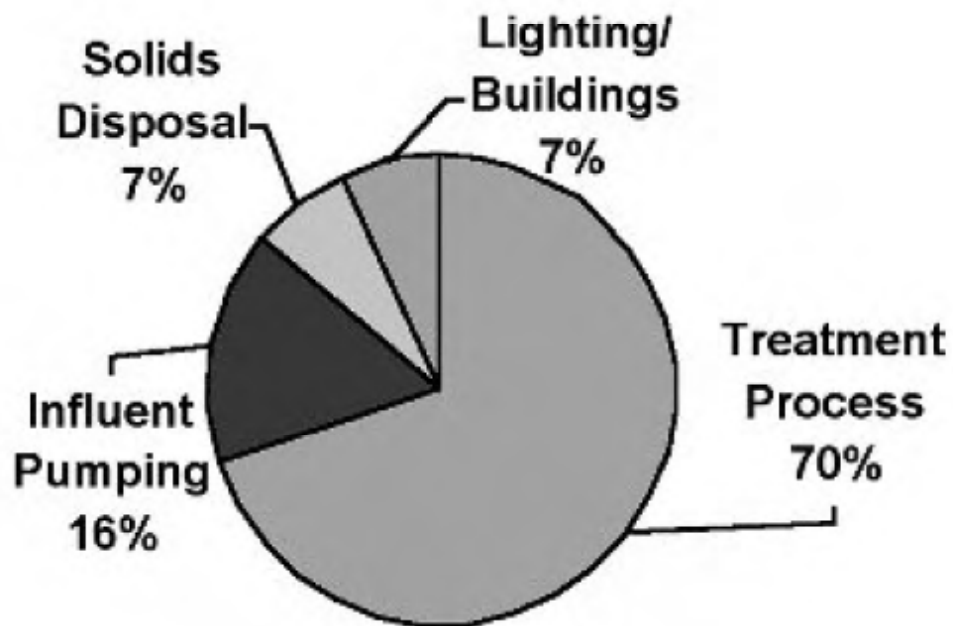




# Electricity Use Impacts – Nutrient Removal Requirements

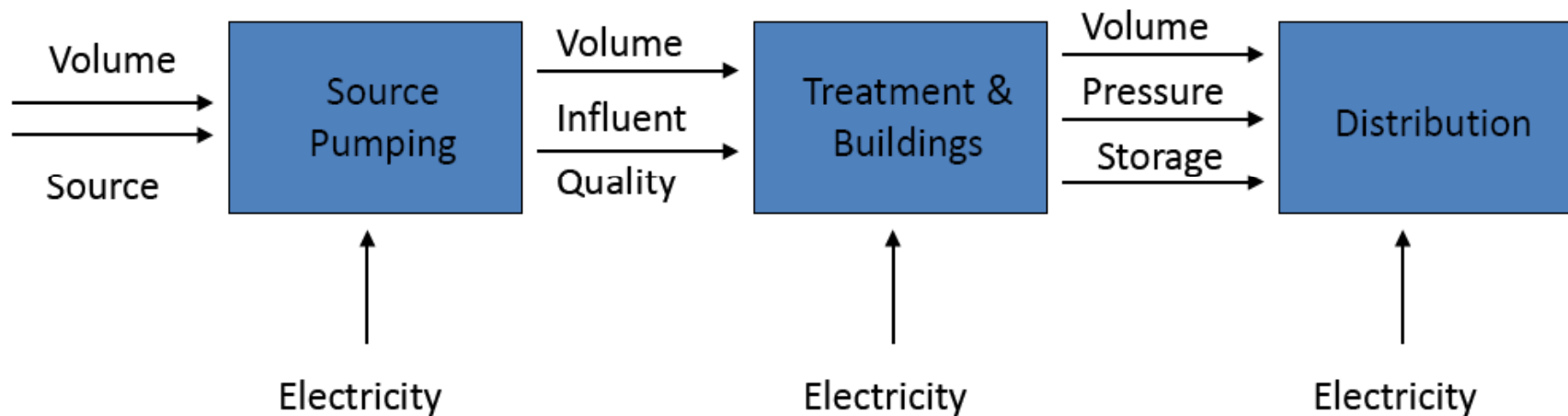
- Electricity use at affected WWTPs may increase 30 to 80 percent
- Watershed Initiatives:
  - Long Island Sound
  - Chesapeake Bay
  - Great Lakes
  - Lake Champlain
  - Onondaga Lake
  - Others...
- Advanced Treatment at WWTPs >75MGD
  - Electricity use – 200,000 to 500,000 MWh/yr
  - Impact to sector-wide energy use is 10 to 25 percent

Figure 1. Average Percentage of Energy Use by Process in Wastewater Treatment Facilities



# Water Treatment Process

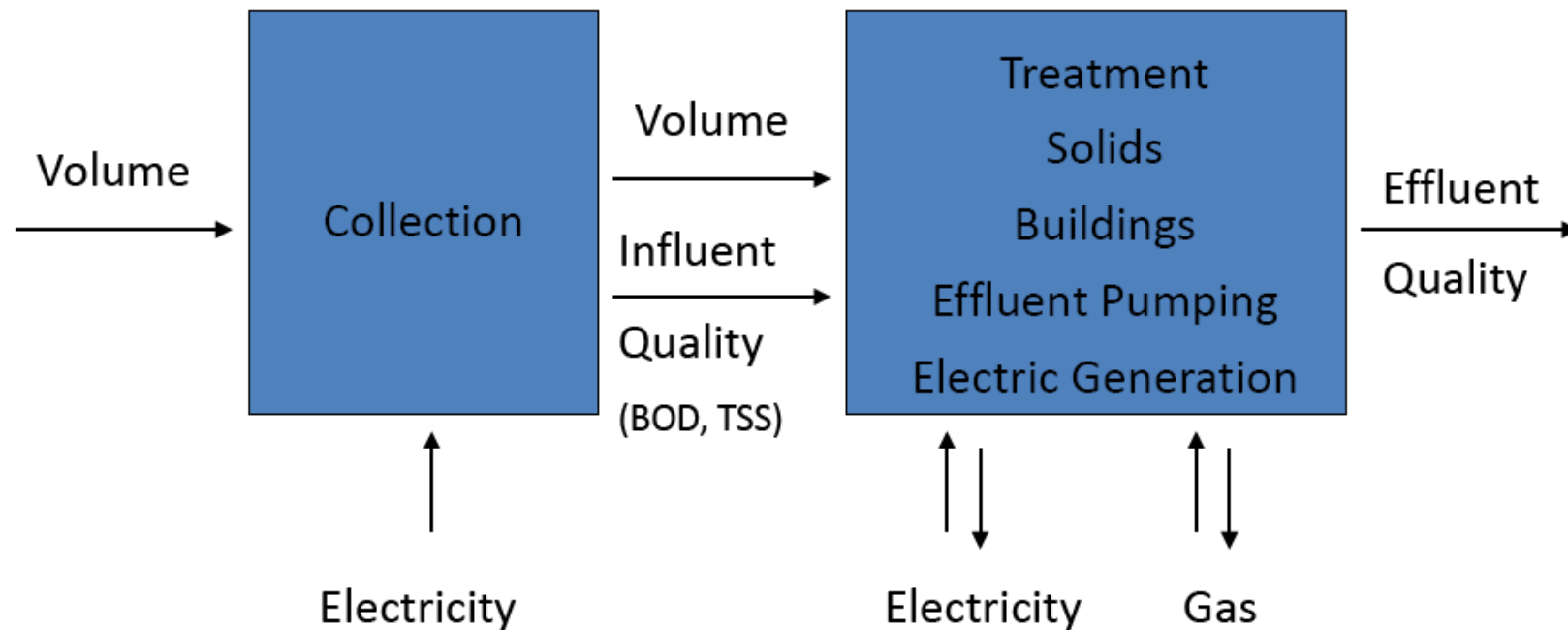
## Factors Affecting Energy Consumption



Source: Carlson, Steven. "Water and Wastewater Utility Energy Index Project Overview." CDH Energy.

# Wastewater Treatment Process

## Factors Affecting Energy Consumption



Source: Carlson, Steven. "Water and Wastewater Utility Energy Index Project Overview." CDH Energy.



# Development of Energy Efficiency Plan

1. Understand Your Energy Use
2. Evaluate the System
3. Identify Energy Efficiency Opportunities
4. Prioritize Opportunities for Implementation
5. Implement Measures
6. Monitor Results

# Monitoring Energy Performance

- External benchmarking
  - Compare yourself to your peers
  - Consider process differences
- Internal benchmarking
  - kWh/MG treated or pumped
  - kWh/pound BOD removed
  - kWh/pound biosolids produced
  - Peak KW
  - Air supplied/pound BOD removed



# Typical Areas of Opportunity

## WTPs Areas for Savings

- pumps
- motors
- rapid mixing of coagulant chemicals
- lighting and HVAC
- disinfection
- water distribution system
- load shifting
- filter backwashing

## WWTPs Areas for Savings

- pumps
- motors
- lighting, HVAC and odor control
- primary clarifiers
- secondary process
- plant water systems
- anaerobic digestion
- biosolids thickening and dewatering
- load shifting

# Other Opportunities

- Water conservation
  - Demand and supply side
- Peak shaving
- Industrial pretreatment





# O&M Improvements

- Equipment maintenance
  - Pumps
  - Blowers
- Waste pretreatment or segregation
- Sensor/control equipment calibration
- Process optimization
- Peak flattening



# Asset Management

- Equipment/motor inventory
- Minimum efficiency standards
- End of life replacement with more efficient equipment
- Infrastructure condition assessment



# Capital Projects

- Regulatory compliance
- Capacity adjustment
- Equipment/process age

**Make Energy Efficiency a Consideration for  
All Capital Projects**

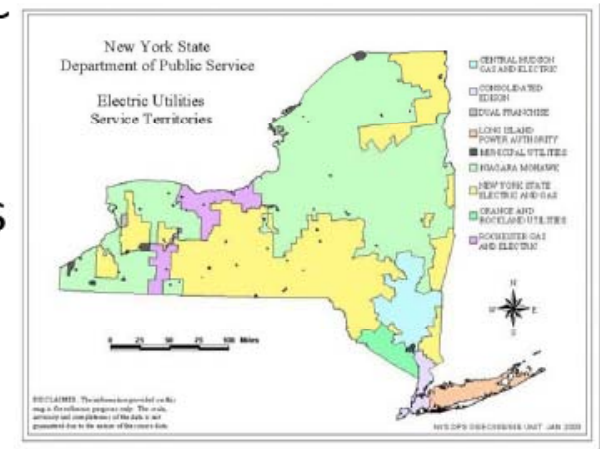
**Use Life-Cycle Costs to Select Preferred  
Alternatives**

# Funding

## Systems Benefit Charge (SBC) Energy Efficiency Portfolio Standard (EEPS)



Central Hudson Gas & Electric  
Con Edison  
New York State Electric & Gas  
National Grid  
Orange and Rockland  
Rochester Gas and Electric  
New Gas SBC





# NYSERDA & Water and Wastewater

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# NYSERDA & Water and Wastewater

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## Focus on Municipal Water & Wastewater

Program Focused on the over 2,700 Municipal Water Facilities and 700+ Wastewater Facilities in New York State

Provides Outreach, Education and Marketing for energy efficiency awareness



# Resources for Municipal Water and Wastewater Facilities

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Focus on Water and Wastewater

<http://water.nyserda.org>

**Bench Marking  
Tools**

**Water and  
Wastewater  
Energy  
Management  
Best Practices  
Handbook**

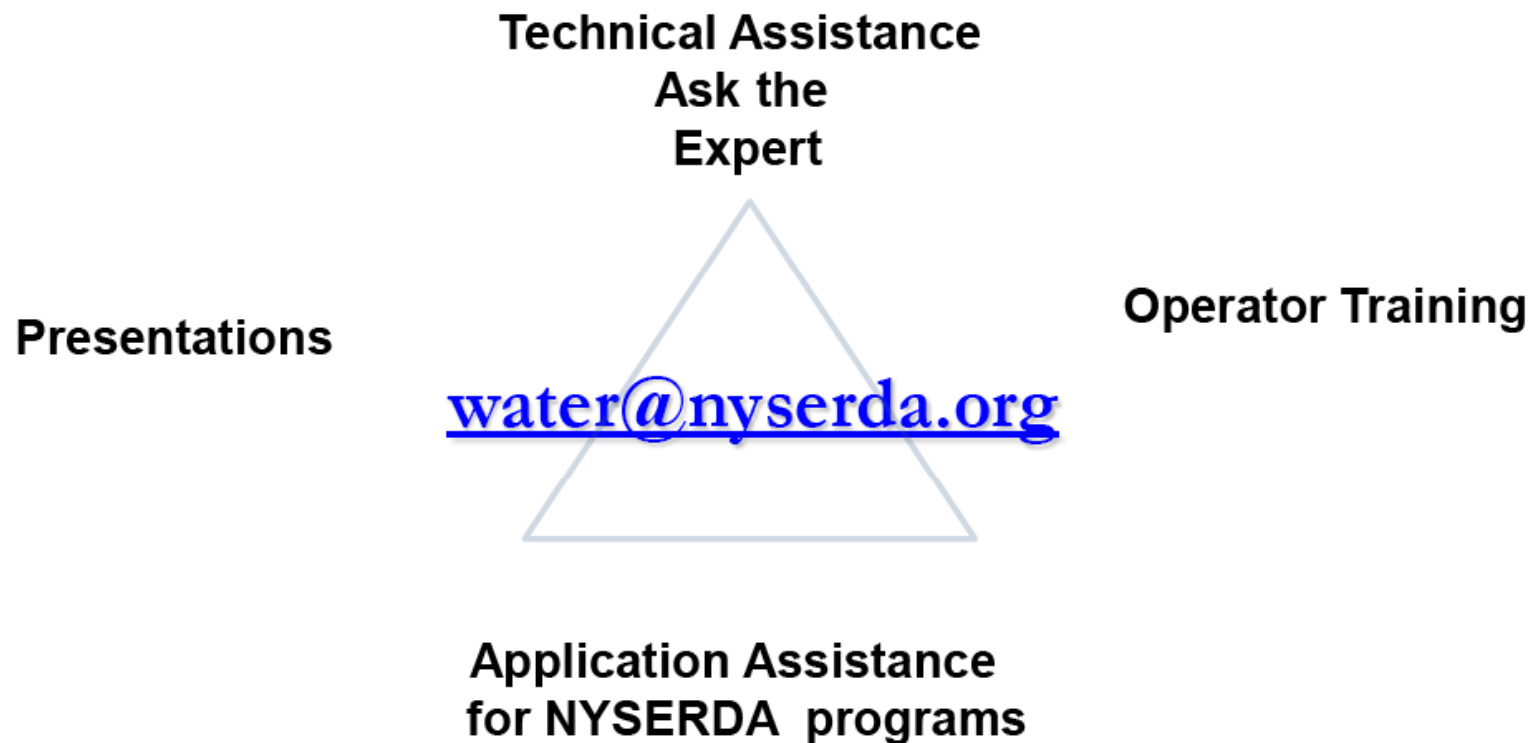
**Self Assessment  
Check List**

**Pay Back  
Analysis  
Tool**

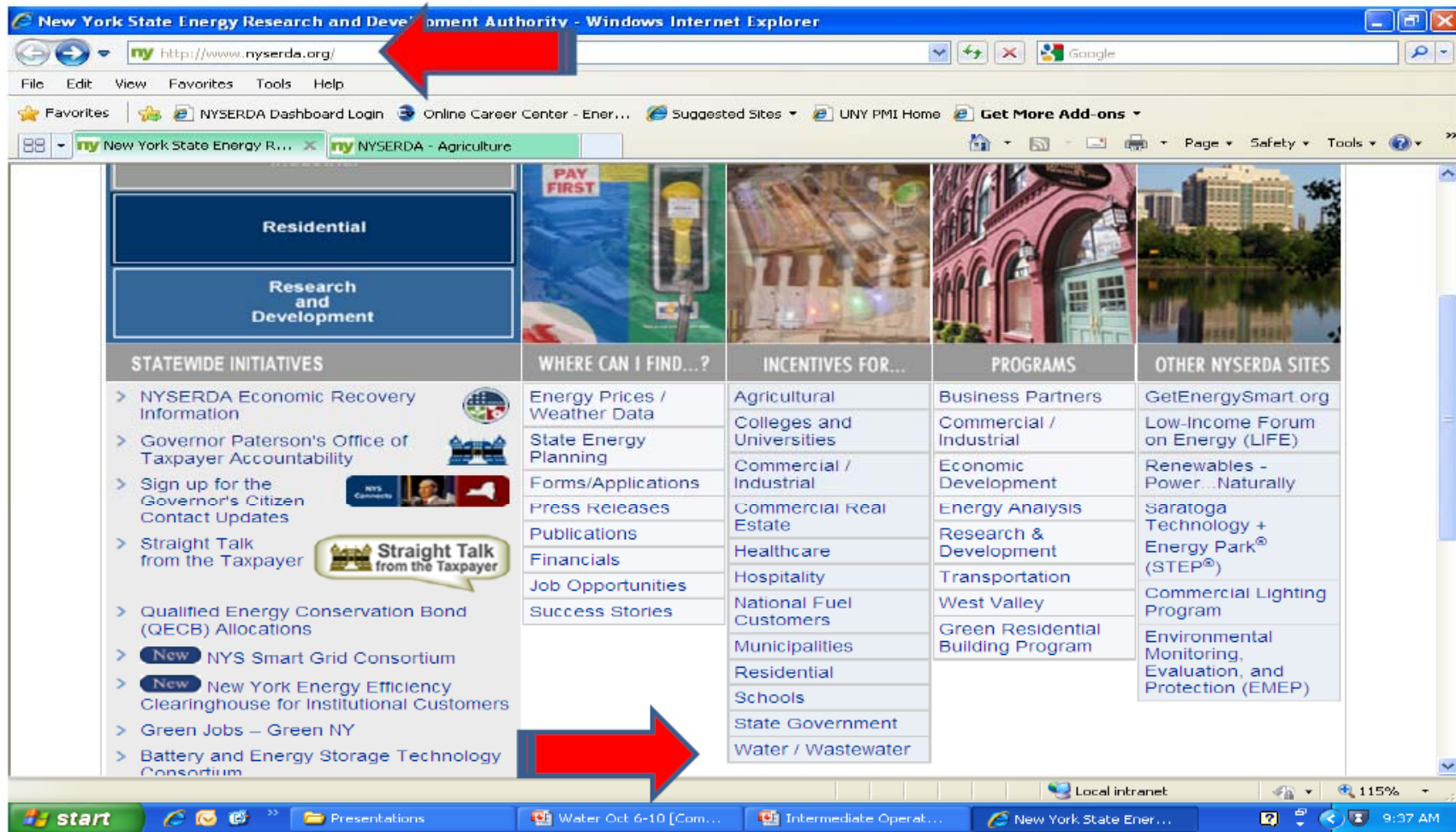
**Case Studies  
&  
Reports**

# Services for Municipal Water and Wastewater

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# WWW.NYSERDA.ORG





# Major Program Areas

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- **Energy Efficiency Services**
- Residential Energy Affordability
- Research and Development
- Marketing and Economic Development
- Energy Analysis
- West Valley Management

# Energy Efficiency Services

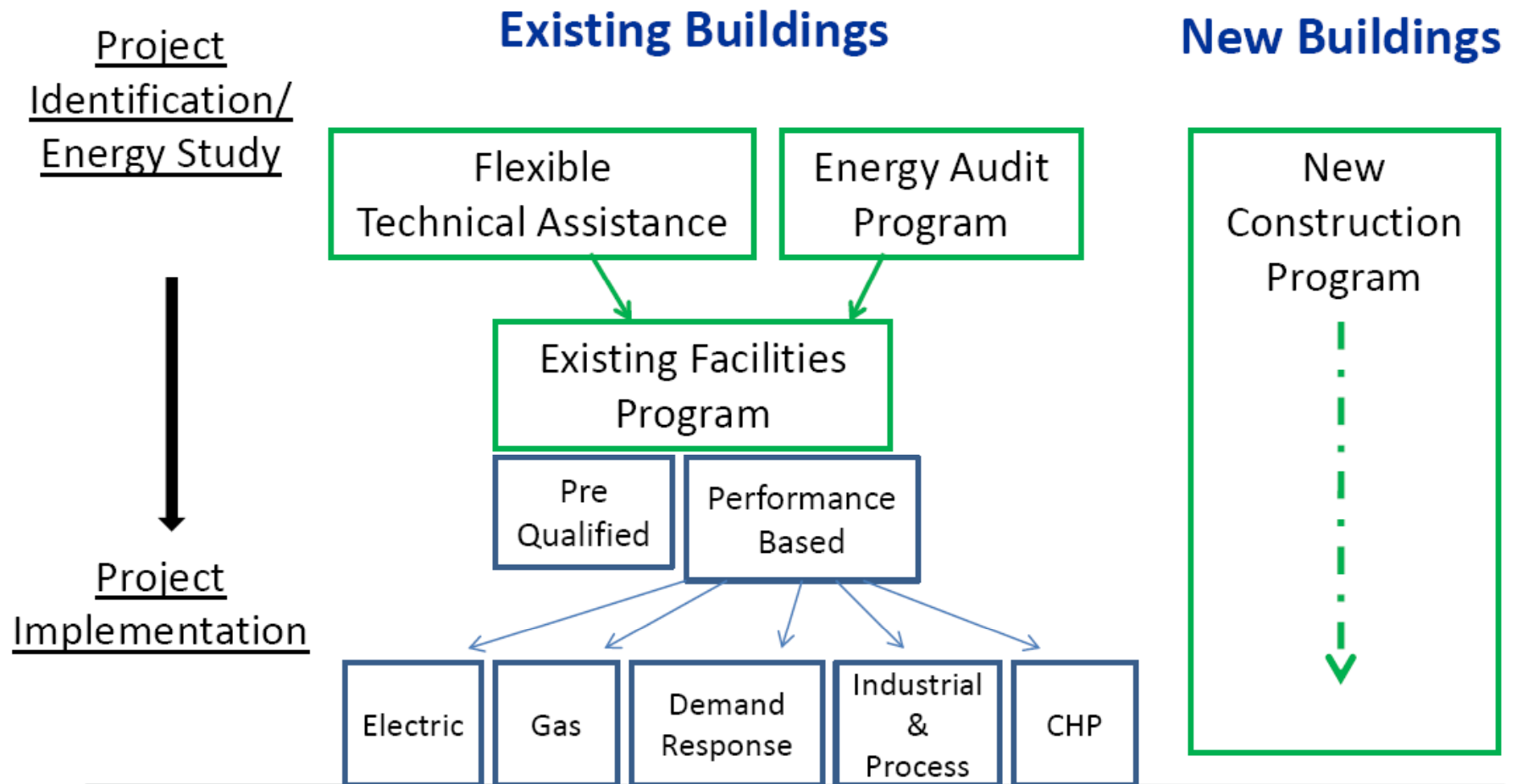
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Provides service to:

- Commercial, industrial, institutional, **municipalities**
- Colleges, universities, not for profits and K-12 schools



# Commercial & Industrial Programs



# Energy Studies and Audits

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## ❖ Flexible Technical Assistance

### FlexTech

- ❖ NYSERDA Consultant
- ❖ Independent Consultant

## ❖ Energy Audit Program

- ❖ Building Envelope

# NYSERDA Flexible Technical Assistance Program

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## Identification of Energy Efficient Opportunities

**Objective:** *Provide comprehensive, customized cost-shared energy studies*

NYSERDA will cost-share comprehensive **energy studies** on a **50:50 basis**.

Facility Must Pay  
Systems Benefit Charge

**Gas Studies  
Now Available**





# Flexible Technical Assistance Program

## Flexible

- Feasibility Studies
- CHP/Renewables
- Load Curtailment
- Retro commissioning
- Energy Procurement
- Energy Master Plans
- Energy Advisor Consulting

## PON 1746

### Eligibility:

>\$75,000 in Annual ELECTRIC Bills

### Cost Share

50/50 – on energy related measures

### Incentive Cap

\$1,000,000 per Project  
10% total annual energy  
costs

# Flexible Technical Assistance (FlexTech)

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1. Customer chooses from FlexTech Consultant list or uses their own service provider (Independent Consultant)
2. NYSERDA Project Manager & Consultant site visit
3. Create site-specific, customized proposal (scope of work)
4. Consultant performs the Study
5. NYSERDA Final Report close out meeting

# Flexible Technical Assistance Program

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## HOW TO APPLY

- Visit <http://www.nyserda.org/funding/1746pon.asp>
- Download the application PDF.
- Fill out the application with basic contact and utility information.
- E-mail completed form to NYSERDA
- Assistance available at [water@nyserda.org](mailto:water@nyserda.org)



# NYSERDA Existing Facilities Implementation Incentives

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## Implementation of Energy Efficiency Projects



### Program

**Pre-Qualified Incentives:** Incentives for the purchase and installation of pre-qualified electric and gas energy efficiency measures/equipment.



**Performance-Based Incentives:** Incentives for energy efficiency improvements based upon a technical engineering analysis. Certain projects will require measurement and verification of savings.



# Existing Facilities Programs

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## ❖ Pre-Qualified Incentives

- “Rebates” for energy efficient equipment

## ❖ Performance Based Incentives

- Electric Efficiency
- Gas Efficiency
- Energy Storage
- Demand Response
- Combined Heat and Power (CHP)
- Data Center Efficiency (also available for New Construction)
- **Process and Industrial Efficiency**





# Existing Facilities Program

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## Pre-Qualified Incentives

### Rebate Type Program

- Applicants can receive incentives (\$/unit) for pre-qualified energy-efficient measures.
- Projects can receive up to **\$30,000** through pre-qualified incentives.
- Pre-qualified Incentives are available for:
  - Lighting
  - HVAC
  - Chillers
  - Motors
  - Refrigeration
  - Interval Meters
  - Variable Frequency Drives (VFDs)
  - Commercial Kitchen Equipment and Washers



# Existing Facilities Program

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## Performance Based Incentives

- Incentive is paid based on the annual energy savings
- \$.12 per kWh saved
- Larger energy efficiency projects
  - Must qualify for at least \$10,000 in incentives(83,333kWh/yr)
- Cap:
  - 50% of project cost,
  - \$5 million per site (Water Wastewater)
- All projects will include a detailed engineering analysis to determine savings

[http://www.nyserda.org/programs/Existing\\_Facilities/default.html](http://www.nyserda.org/programs/Existing_Facilities/default.html)

# Existing Facilities Programs

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## HOW TO APPLY

- Visit [http://www.nyserda.org/Programs/Existing\\_Facilities/default.asp](http://www.nyserda.org/Programs/Existing_Facilities/default.asp)
- Download the Pre Qualified or Performance Based application PDF.
- Fill out the application with basic contact and utility information.
- E-mail completed form to NYSERDA
- Assistance available at [water@nyserda.org](mailto:water@nyserda.org)



# New Construction Program

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- New Buildings
- Substantial Renovations

# New Construction Program

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## Objective

*Transform the way buildings  
are designed and built.*

## Services

- Energy Modeling
- Capital Cost Incentives
- Commissioning
- Green Building Planning Assistance
- “Bonus” Incentives for LEED Certification
- Data Center Efficiency

\*\*\*Apply Early in Process\*\*\*

*Design Intent is **Ideal***





# New Construction Program

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## HOW TO APPLY

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# NYSERDA & Water and Wastewater

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## Programs

**FlexTech**

**Existing Facilities**

Pre Qualified      Performance

[www.nyserda.org](http://www.nyserda.org)

**Water Focused  
Resources**

Best Practices Handbook  
Benchmarking

**Focus On Water**

[water@nyserda.org](mailto:water@nyserda.org)

**Water Focused  
Services**

Ask the Expert  
Application Assistance

# Conclusions

- Our water and wastewater infrastructure remains the backbone of our communities
- New regulations and aging infrastructure will require significant reinvestment over the next decade
- With increasing energy costs and an emphasis on sustainability, energy efficiency must be a consideration with all infrastructure investment
- Resources and funding are available...get engaged in New York's energy culture!

*Energy efficiency is the key to compliance,  
sustainability & savings*

# Questions and Discussion



## NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY'S Focus on Water and Wastewater

For more information,  
visit <http://water.nyserda.org>  
or email [water@nyserda.org](mailto:water@nyserda.org)

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