

Energy Efficiency and Sustainability for Water and Wastewater Utilities

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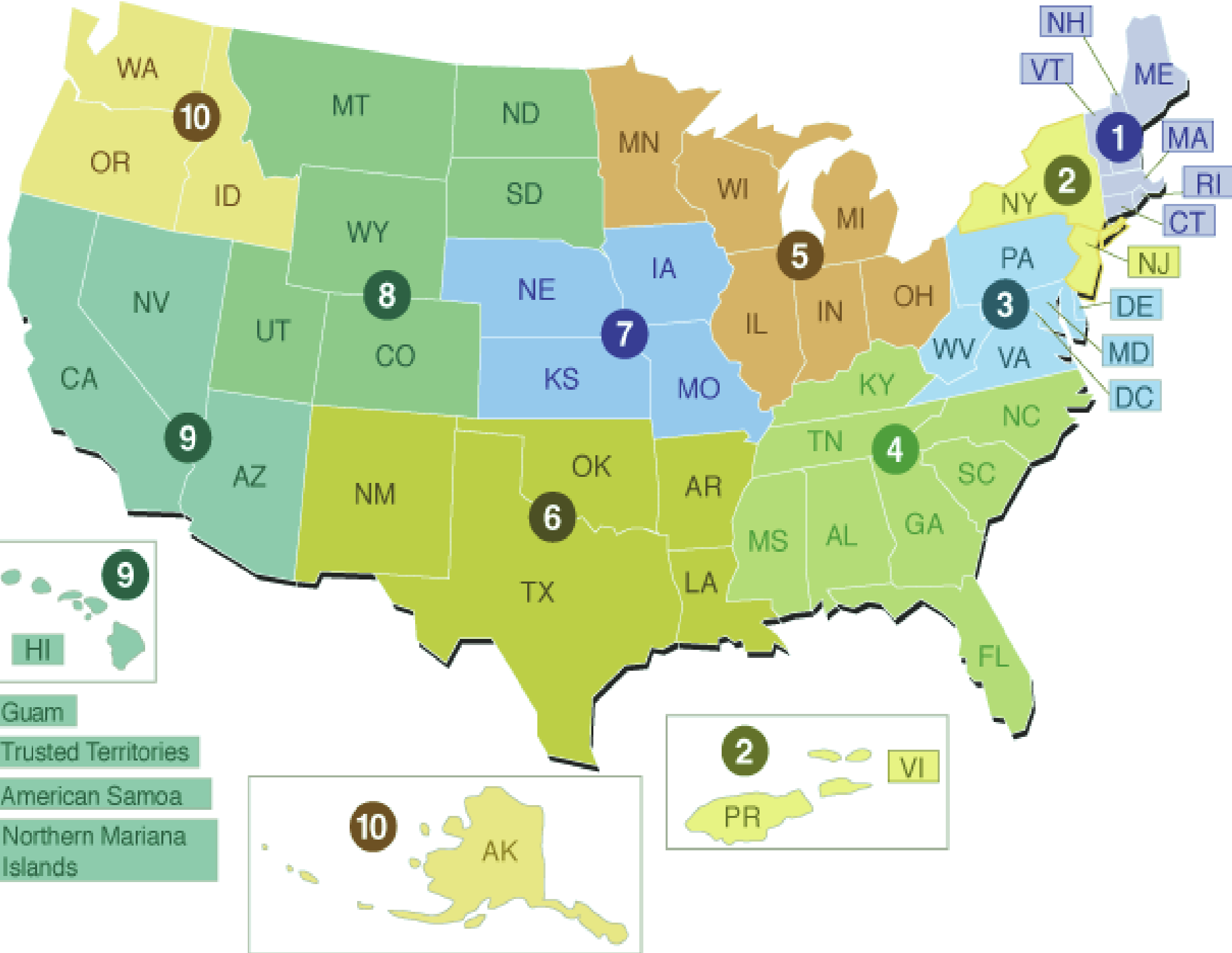
Today's Agenda

- Introductions
- Sustainability Defined
- Trends and statistics
- Implications, Challenges and Possibilities for WWWW Utilities
- Where are the opportunities
- EE and sustainability as a smart investment
- 3 part EM approach – Efficiency, Renewables, and Demand Response
- The energy efficiency lifecycle
- Solutions that work
- Kansas and Missouri Water Utility Partnerships

Environmental Finance Center Network

University-based organization creating innovative solutions to managing the costs of environmental protection and improvement. Consists of ten Environmental Finance Centers (EFCs) serving states within EPA's ten regions. By sharing and integrating information, tools and techniques, the EFCs work together and with the public and private sectors to promote a sustainable environment.





- Guam
- Trusted Territories
- American Samoa
- Northern Mariana Islands



EFCN Purpose

Creating Sustainable Communities- Bridging the gap: Providing resources to bring environmental solutions to reality, Why?

- Environmental concerns rising
- Financial resources strained
- Communities seeking innovative solutions
- Sustainability efforts = cost effective long term



Our Services

- Community Facilitation
- Asset Management and Capacity Development
- Water and Wastewater Rate Training and Analysis
- Water and Wastewater Energy Efficiency
- Applied Research

Schneider Electric is the Global Specialist in Energy Management

Our Vision A world where we can all achieve more while using less of our common planet

Our Mission Helping people make the most of their energy

By making energy Safe, Efficient,

Reliable,
Productive,
and Green



Schneider Electric

Makes energy:

Safe

Reliable

Productive

Efficient

Green

Which means:

- Protection to people & assets

- Ultra secured power for critical applications

- Automation everywhere
- Connectivity everywhere
- Services at every phase of the lifecycle

- Energy efficiency
- Open & integrated systems for optimised Capex and Opex

- Renewable energy solutions

Help our customers make the most of their energy

Six identified trends in the WWW market:

• Demand for WWWW

- Population Growth/Shifts
- Shifts slowed some with recession
- Water shortages / cyclical drought conditions

• Infrastructure Age

- Aging Infrastructure (30 yr+) driving new/retrofit opportunities

• Legislative Compliance

- System capacity issues
- Reliability and up-time of system is critical

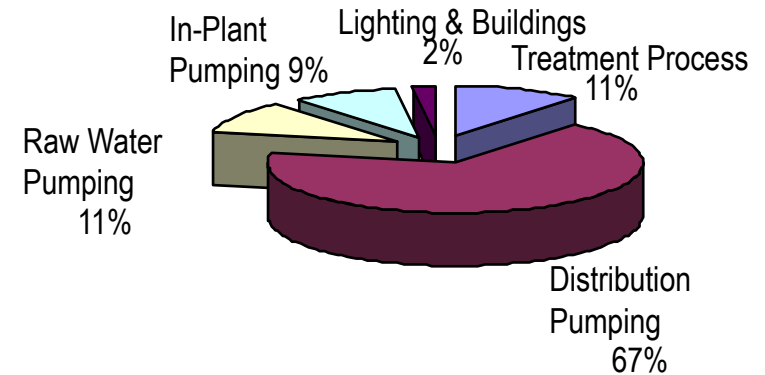
• Reduced financial resources

• Energy efficiency awareness

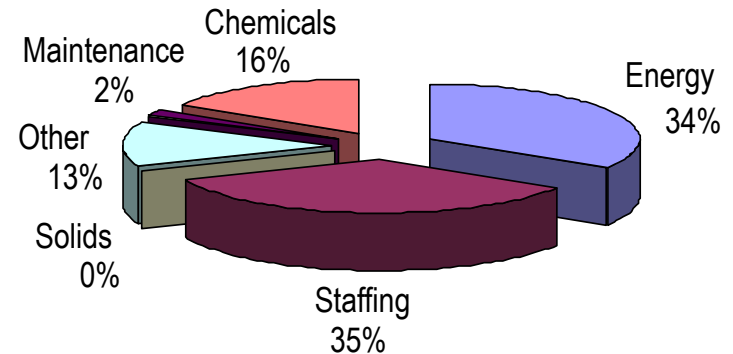
• Energy Use

- 4% of all US energy use related to W/WW
- 34% of WWWW Operating Budget is energy
- Of that 87% for Pumping

Typical Water Process Energy Usage Breakdown



Municipal Water Treatment Industry Average O&M Budgets



Water / Wastewater Competency Center

To help the industry tackle these trends/issues, we created a specialty group inside our company focused solely on the WWW industry

We call it:

The **Water & Wastewater Competency Center** (WWCC)

WWCC Objectives

1. Help municipalities complete their Capital Expenditure projects On-time and Under Budget by delivering Integrated product, system and service solutions

- Documentation/Approval Process – timely, complete and accurate
- Integration of control and automation equipment with power equipment
- “Best in Class” execution from quotation to shipment to startup and ongoing performance to extend the life of your plant

2. Assist the various companies serving the WWWW market including Consultants, ESCO's, System Integrators, Pump Suppliers, & Contractors

- Training them on industry issues and technologies
- Updated technology information exchange for Specifications
- Drawing Software Package Applications

WWCC Objectives

3. Enable Municipalities to reduce their overall energy spend by providing comprehensive Services

- Comprehensive Plan Development
- Financial Review
- Alternative Fuels investigation
- Design Functions
- Turnkey Completion
- Performance Contracts

Sustainability . . .

"meeting the needs of the present without compromising the ability of future generations to meet their own needs."

"Brundtland definition"

1987 Report of the World Commission on Environment and Development

Government Energy Consumption

- Local governments spend more than \$10 billion a year on energy to provide public services and meet constituent needs
- Energy can account for as much of 10 percent of a local government's annual operating budget
- 2010 ICMA Sustainability Survey "Energy Conservation" #2 priority for local government behind "the



Energy Consumption for Water Utilities

National Perspective

- 13-19% of total US energy use for Water treatment, distribution and heating

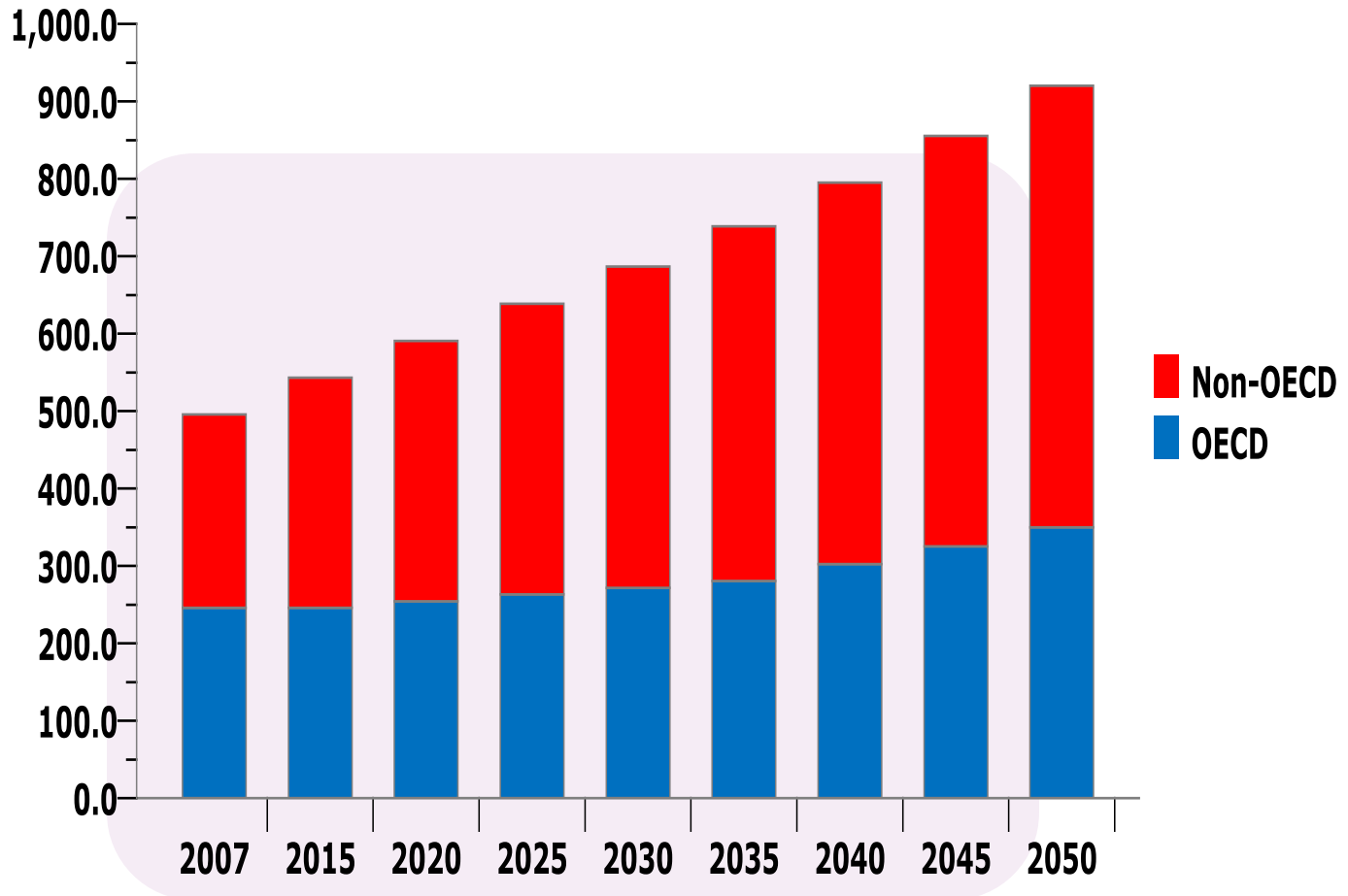
Community Perspective

- 30-40% of municipal governments' total energy costs



Our world is changing...

World marketed energy consumption (quadrillion BTUs)



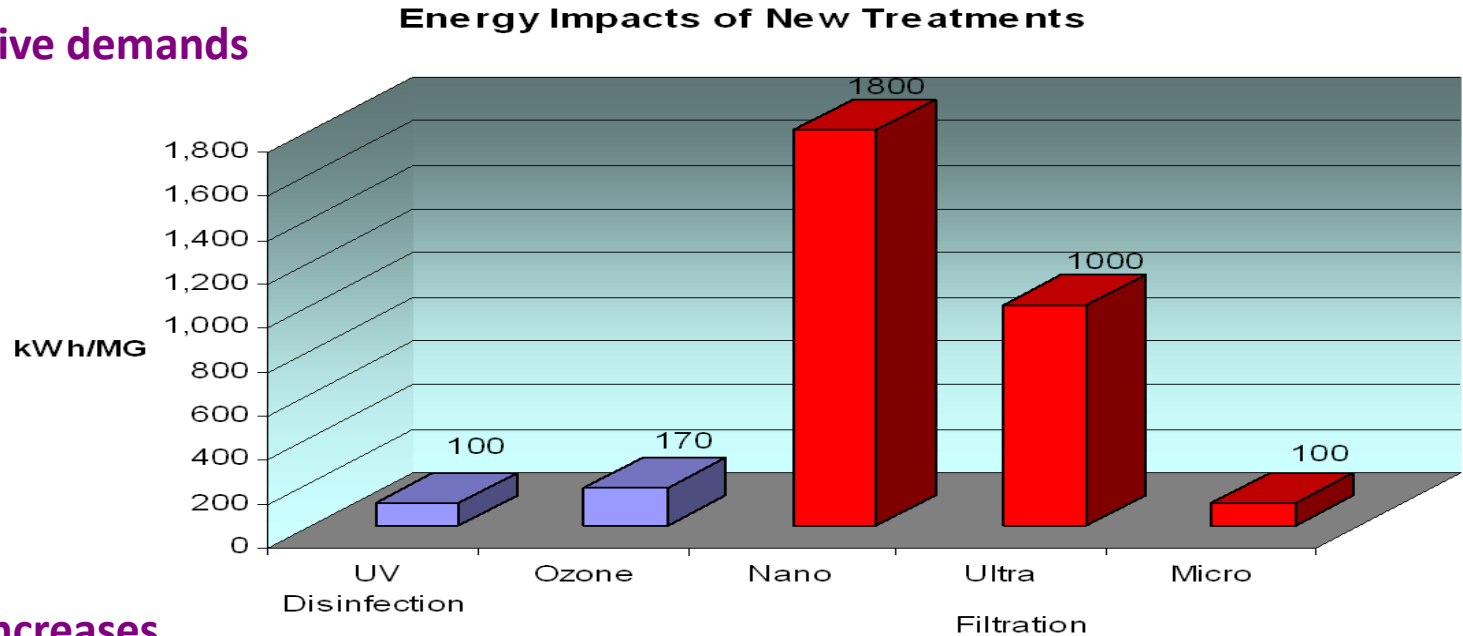
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The increase in energy consumption by 2050

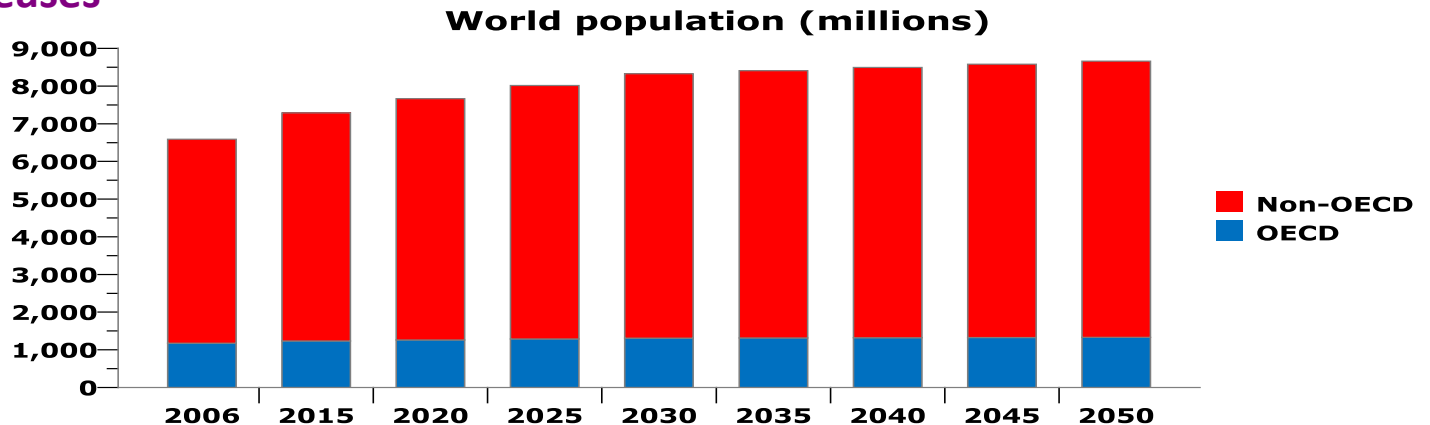
Source: Energy Information Administration. www.eia.doe.gov

Increased demand for energy

New legislative demands



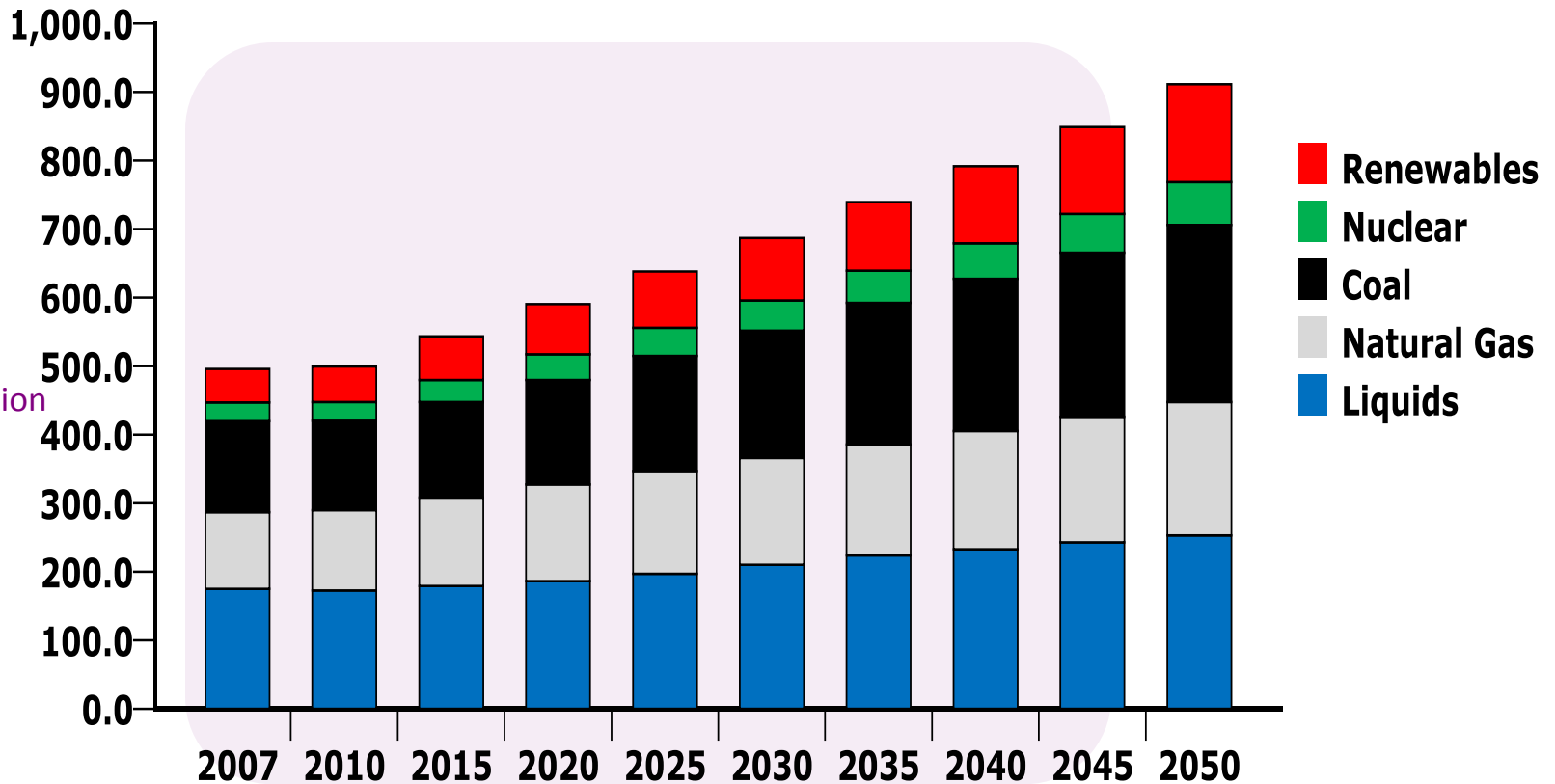
Population Increases



Source: Energy Information Administration. www.eia.doe.gov

Limited Natural Resources

World marketed energy use by fuel type (quadrillion BTUs)



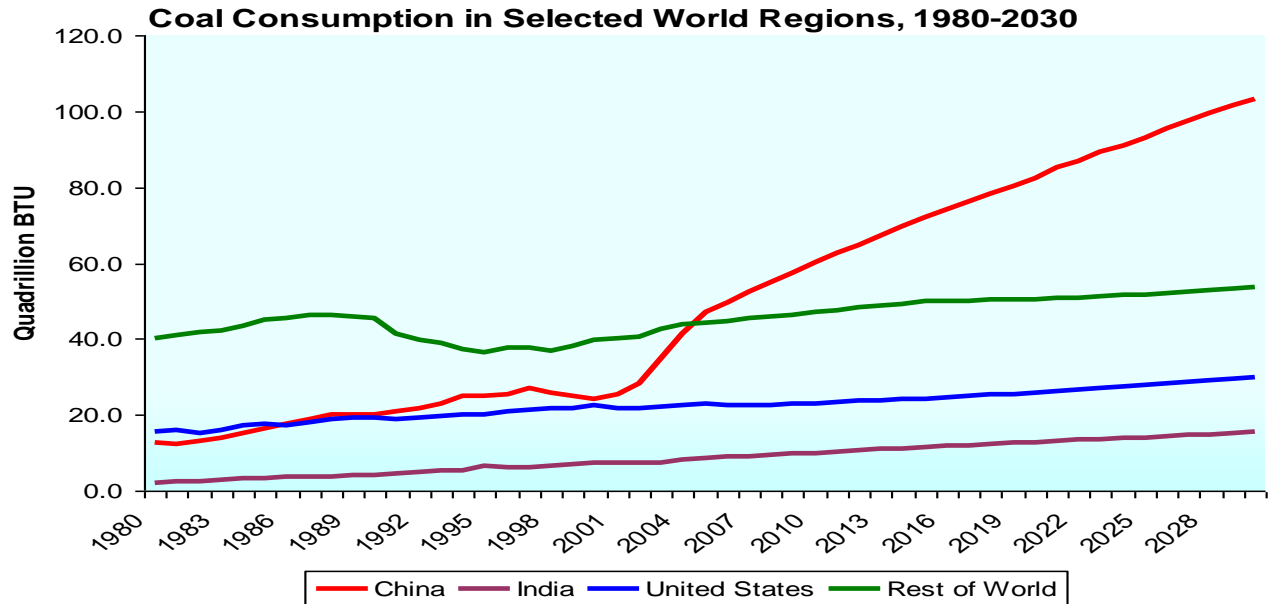
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Source: Energy Information Administration. www.eia.doe.gov

Limited Natural Resources

Global Competition

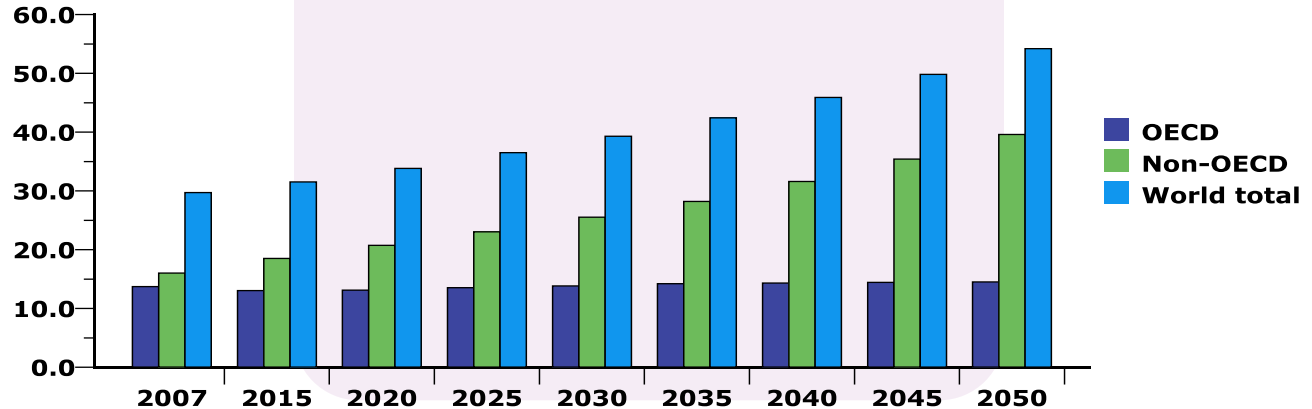


Environmental Concerns

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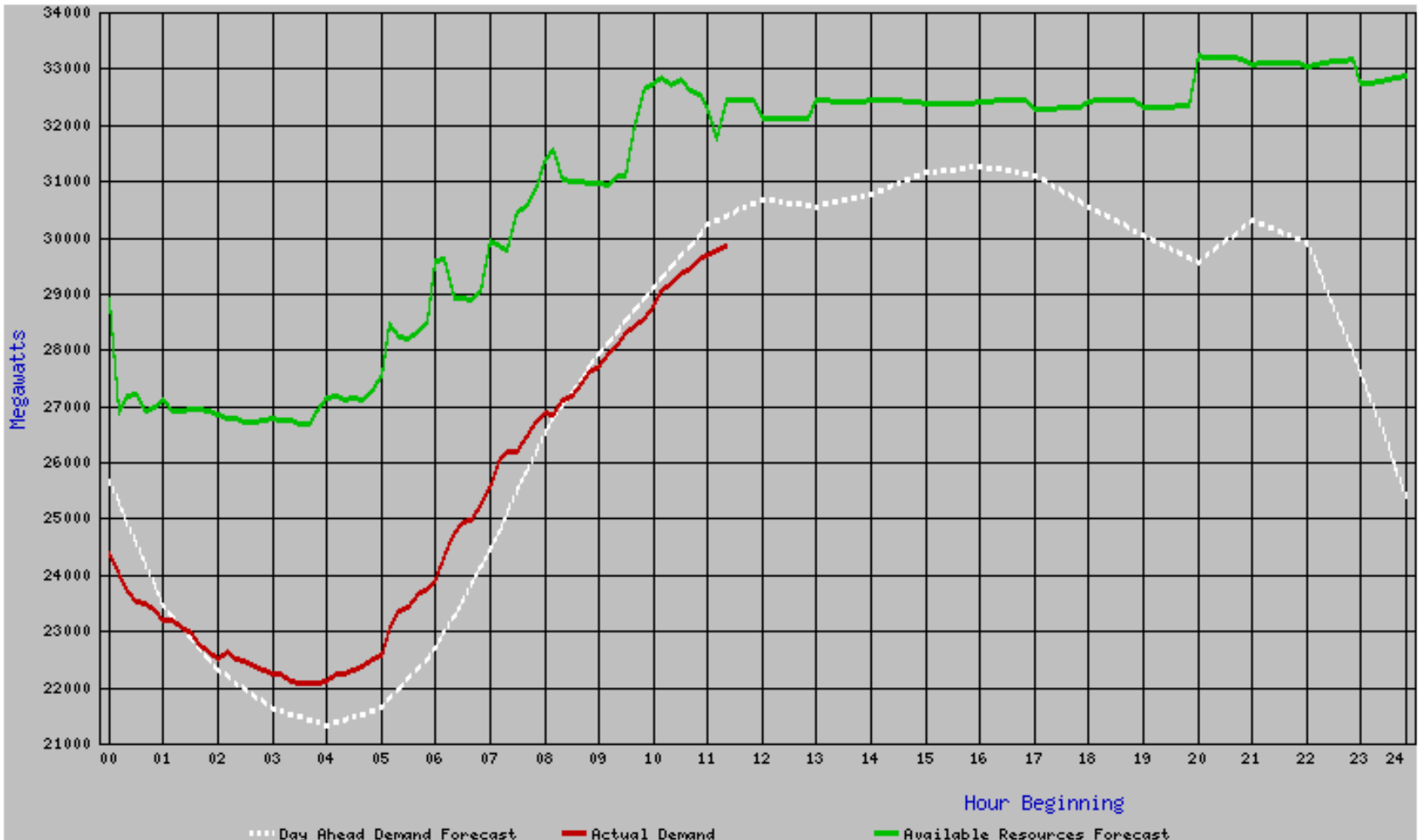
The CO2 emissions reduction to avoid dramatic climate changes by 2050

World energy related carbon dioxide emissions (billion metric tons)



Limited Capacity

Load Graph (Click graph for details)



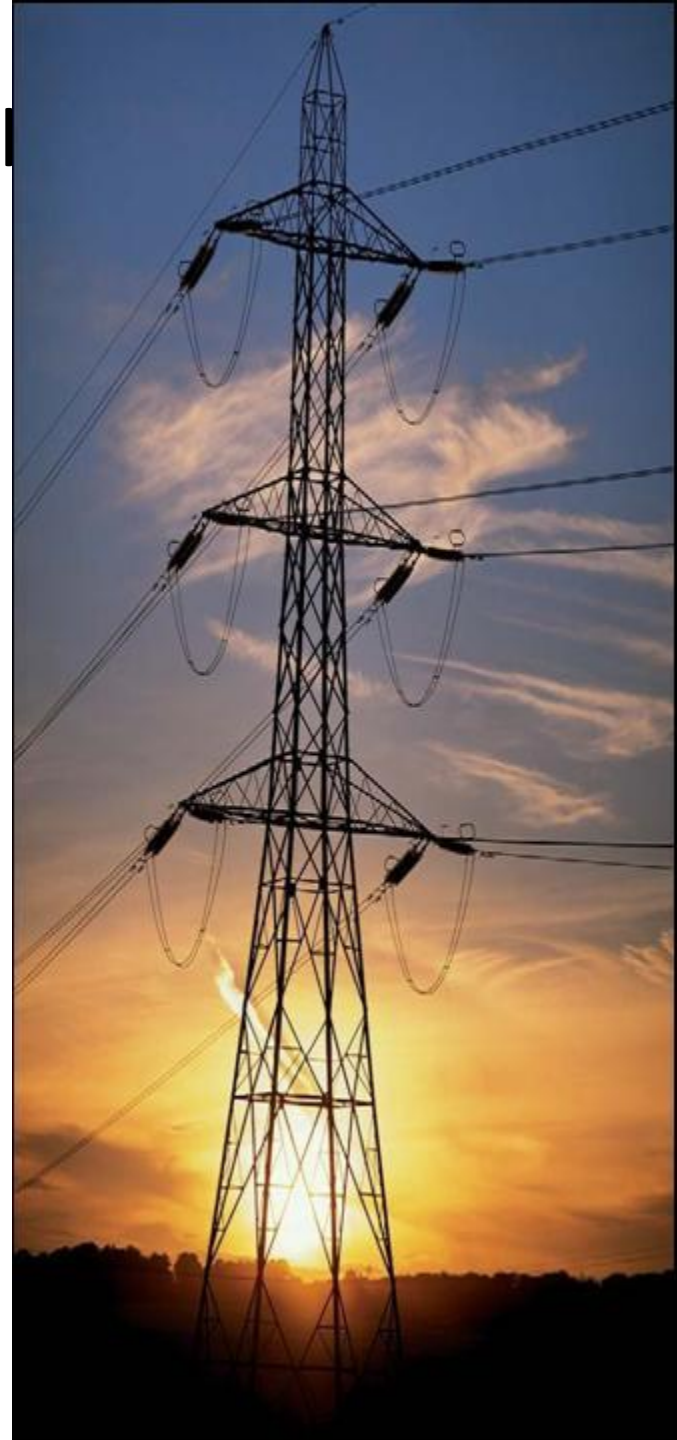
Challenges for Water Utilities

U.S. Drinking Water and Wastewater System Challenges

- Water Scarcity** At least 36 states anticipate local, regional, or statewide water shortages by 2013.
- Climate Change** Changing precipitation patterns, shrinking snow packs, increasing runoff, rising sea levels, and greater saltwater intrusion will likely result in significant adaptation efforts to maintain water resource and infrastructure services.
- Increasing Population** Between 1950 and 2000, U.S. population nearly doubled while the demand on public supply systems more than tripled. Increased demands are depleting aquifers at rates exceeding their recharge.
- Energy Uncertainty** Fewer sources of conventional fuels and increasingly expensive extraction costs are driving up oil prices, destabilizing the economy and causing global shortages and uncertainty for utility operating budgets.
- Aging Infrastructure** **Repairing, replacing, and upgrading aging infrastructure will cost between \$300 billion to \$1 trillion over the next 20 years. Operation expense rising, funding decreasing**

Implications for Water Util

- Increases in operation expenses
- Required Curtailment
- Degradation of services



Possibilities for Water Utilities

- Increases in water and sewer rates
- Reduction in maintenance budgets
- Reduction in upgrade funding
- Water rationing
- Fines
- Critical peak pricing
- Public relation concerns

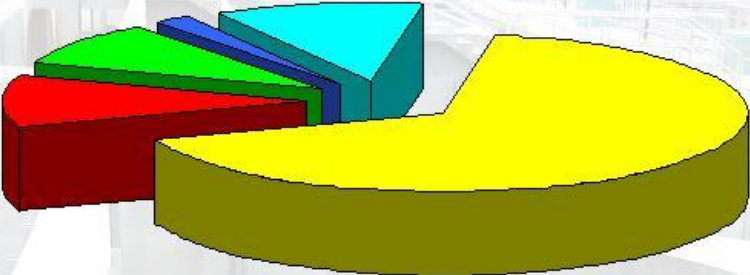


Opportunities for Water Utilities

- Sustainability assessments
- Energy efficiency enabling products
- Energy management solutions
- Sustainable solutions

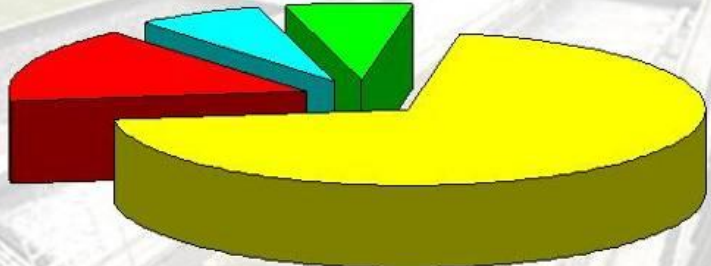


Water energy use



- Treatment Process
- Raw Water Pumping
- Lighting & Buildings
- Distribution Pumping
- In-Plant Pumping

Wastewater energy use

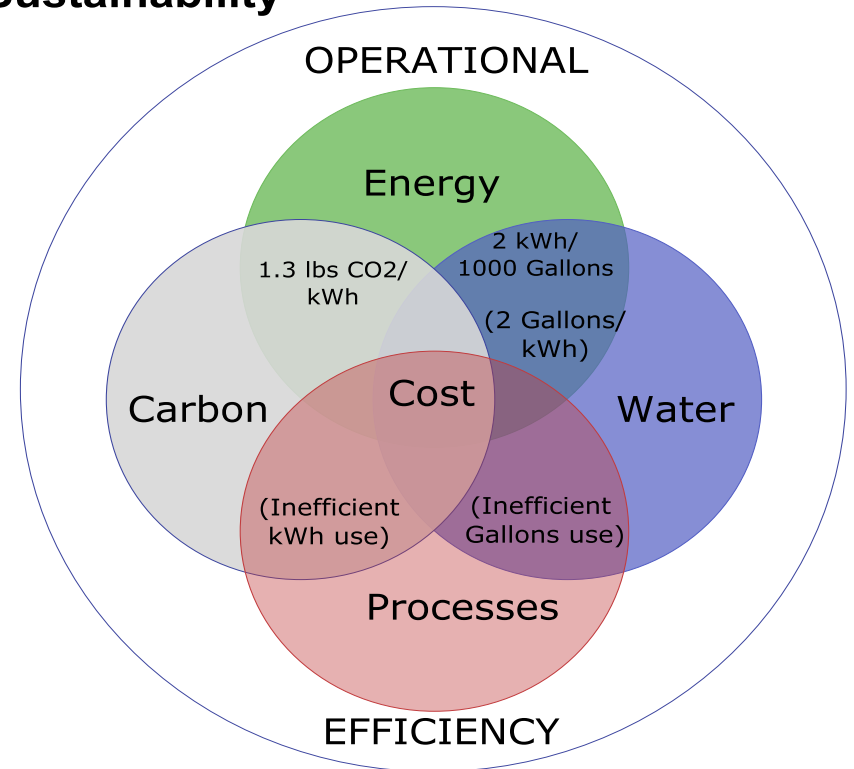


- Treatment Process
- Solids Disposal
- Influent Pumping
- Lighting/Buildings

Operational Efficiency Components

- Increased efficiency of any component will decrease operational expenditures.
- Energy efficiency is key to operational efficiency.
- Operational efficiency is an investment with a higher than average return.
- Infrastructure funding is obtained with operational efficiency gains.

Sustainability



Annual cost of doing nothing

**Total site
consumption**

**Energy
inefficiently
used**

**Energy
efficiently
used**

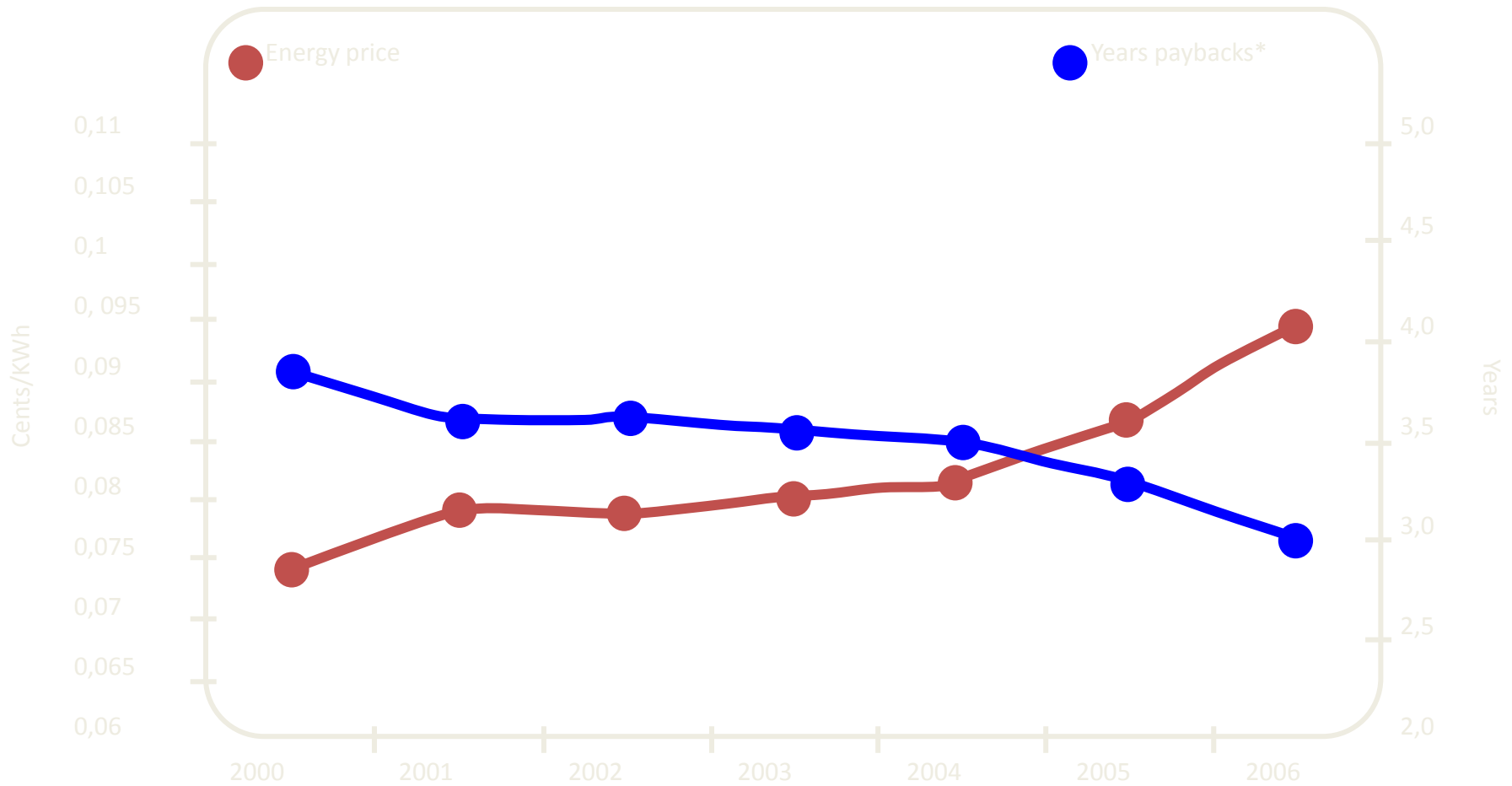


Save or buy?

You can use the savings to:

- finance energy efficiency projects
- finance infrastructure upgrades

Energy saving ROI improves as energy prices rise



Payback time decreased **30% over 5 years** due to increase in energy prices

- Example based on a US commercial building project
- DOE -US Average Retail Cost of Electricity 1993 thru 2007