

a presentation to the City of Charleston Green Committee
Energy Subcommittee



City of Charleston and Johnson Controls Partners in Sustainability

February 20, 2008



Agenda

- Brief Overview of Green Committee Objectives
- Overview of City of Charleston Project
- Benefits of Project to the City of Charleston
- Discussion and Questions

Charleston Green Committee Objectives

- Energy
 - Improve Efficiency
 - Education
 - Establish Codes & Citywide goals
- Transportation
 - Fleet Management
 - Vehicle efficiencies, Alternative fuels
 - Public Transportation/Carpooling
- Recycle, reuse, waste management
 - Paper
 - Construction materials
 - Water
- Land Use and Planning

The City of Charleston and Johnson Controls

Johnson Controls has been privileged to support the City of Charleston's operational and efficiency needs since 1968.

Energy Performance Contract Phase I in 2001 which included 22 facilities with improvement measures of:

- Energy efficient lighting
- Water conservation systems
- Major mechanical system upgrades
- New HVAC controls and automation



Phase I Results To Date

Financial

To date, (year 5 of the 15-yr contract), the Phase I scope has generated:

- over \$500,000 in annual savings that pays for the \$3.9M in improvement measures
- a cumulative actual savings of \$3.1M to date (this exceeds the cumulative project guarantee of \$2.9M)
- reduced City's energy and gas usage by 7%

Environmental

To date, reduction of greenhouse gases and other pollutants:

- CO₂ 19,095 tons
- VOC 391 pounds
- NO_x 65,584 pounds
- CO 3,248 pounds
- SO₂ 148,665 pounds
- Particulates 6,683 pounds
- Hg 196,685 Mg

Phase II Project Scope

- Install high efficiency LED fixtures in parking garages (better light/ lower wattage/longer life)
- Lighting upgrades in city facilities with sensors (better light/ lower wattage/longer life)
- Install renewable energy solar heating at 4 city pools (extend season / lower gas usage)
- Replace 10 air handling units and associated dampers at Gaillard Auditorium (end of useful life / improved comfort and energy efficiency)

- Install new WeatherTrak irrigation system throughout the city (reduce the city's current water usage by 30 to 40%/ protect both landscape and hardscape / automated leak detection / reduce non-point source runoff pollution /optimize operations)
- Implement water conservation measures at James Island Recreation, Joseph P. Riley Jr. Baseball Park, Martin Park, and Hampton Park (water conservation and utility savings)

LED Parking Garage Fixture

Lower wattage by 40%

Longer life of at least 70,000 hours, less maintenance

Whiter light than HPS, reduce light pollution



Before: Raleigh garage with high-pressure sodium lighting



After: Raleigh garage after installation of LED lights

Solar Pool Heat

Martin Pool, W.L. Stephens

- Reduce current fossil fuel usage

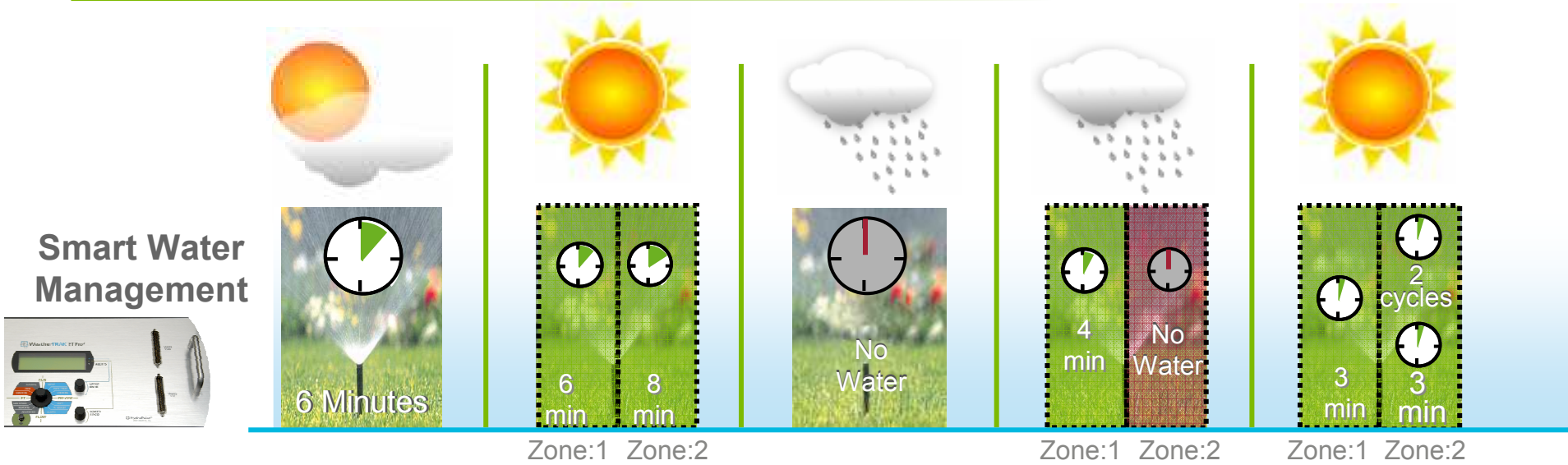
James Island Recreation Center, Herbert Hasell

- Avoid addition of fossil fuel source by using solar to extend swim season





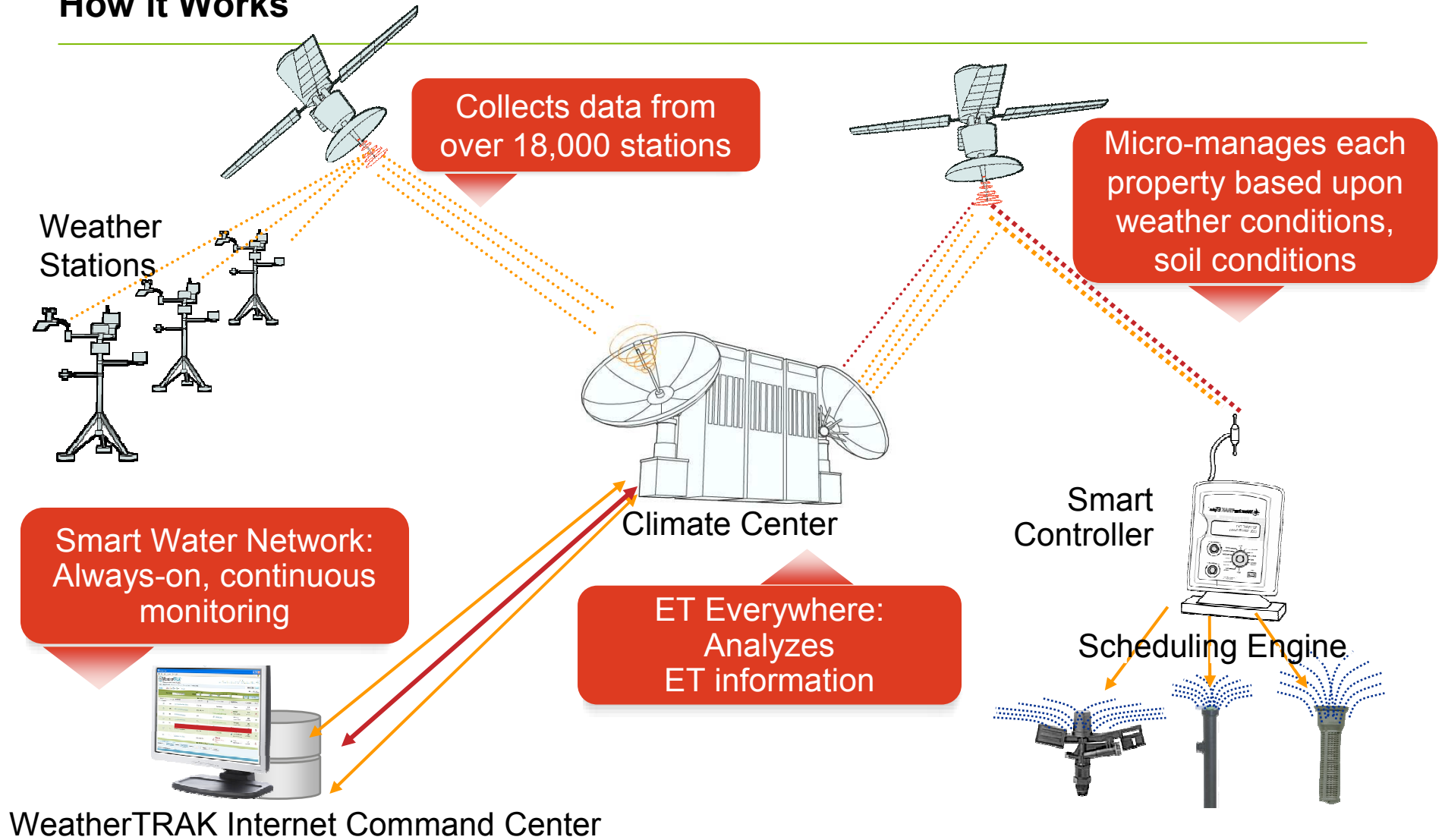
The Answer: Shift to Smart Water Management



- Applies...**
- Precipitation Rate
 - Rainfall
 - Solar Radiation
 - Temperature
 - Humidity
 - Wind
 - Soil Condition
 - Sprinkler Type
 - Slope
 - Plant Type
 - Exposure

WeatherTRAK Smart Water Management Network

How it Works



Water Irrigation Control

- Save 30 - 40% of current water usage
- Reduce non-point source runoff pollution
- Control water usage by Weather Satellite data
- Automated controls will increase efficiencies improving leak detection and maintenance
- Protect landscape and hardscape investments

Proposed Phase II Project Scope

- HVAC upgrade/redesign
 - Civic Design Center
 - James Island Recreation Center
 - 50 Broad Street
 - Parks Department
 - Joseph P. Riley Jr. Baseball Park
 - Police Headquarters
 - Fire Stations 4 and 5
(improved comfort / energy efficiency / end of useful life)
- Install programmable thermostats at multiple locations (improved comfort and energy efficiency)
- Install VendingMiser® technology on cold beverage and snack machines throughout city (energy efficiency)
- Install Maximizer on ice machines at Maritime Center and Joseph P. Riley Jr. Baseball Park . (energy efficiency)
- Provide full electrical analysis at Joseph P. Riley Jr. Baseball Park (safety and efficiency)
- Expand full service contract for HVAC and controls to 7 City facilities (operational reliability)

Mechanical Upgrades

Charleston Maritime Center – HVAC Set Point adjustment

Civic Design Center – HVAC replacement

Fire Station 4 & 5 – Replace 1 AC unit

Gaillard – Replace air handling units and outside air dampers

James Island Recreation Center – Redesign/Implementation of new HVAC system

Greenburg Lockwood Municipal – Install/repair rain deflection system

Parks Building – Replace roof top units

Police Headquarters – Repair dual duct air handling unit

Joe Riley Stadium - Replace 21 split system DX units

Stephens Pool - Motor replacement

50 Broad St – Redesign/Implementation of new HVAC system

Mechanical Upgrades

Charleston Maritime Center – HVAC Set Point adjustment

Civic Design Center – HVAC replacement

Fire Station 4 & 5 – Replace 1 AC unit

Gaillard – Replace air handling units and outside air dampers

James Island Recreation Center – Redesign/Implementation of new HVAC system

Greenburg Lockwood Municipal – Install/repair rain deflection system

Parks Building – Replace roof top units

Police Headquarters – Repair dual duct air handling unit

Joe Riley Stadium - Replace 21 split system DX units

Stephens Pool - Motor replacement

50 Broad St – Redesign/Implementation of new HVAC system

Additional Facility Measures

Vending Misers - occupancy sensor equipment

- Lighted cold drink and snack machines will only cycle when someone is in front of the equipment or to maintain temperature.

Ice Machines

- Shortens ice making cycle times which produces more ice
- Optimizes ice availability in the bin
- Saves electricity by filling the bin faster and allowing the ice machine to shut off
- Extends the life of the ice machine by lowering compressor head pressure
- Reduces air conditioning costs (for air-cooled ice machines)

Phase II Benefits

- Over \$834,000 annual energy and operational savings
- These savings will pay for the \$9.7M in improvements over the term of the agreement
- Will reduce the City's energy and gas usage by an additional 9%
- Supports Mayor Riley's Climate Protection Agreement signed in 2000
- Will result in annual reductions of:
 - 5,238 tons CO₂
 - 16,946 lbs NO_x
 - 61,081 lbs SO₂
 - 65,051 mg Hg



Combined Impact of Phase I and Phase II

- \$18.4 M in combined energy and operational savings
- \$13.6 M of self-funded improvement measures
- a 16% reduction in the City's current energy and gas usage
- Achieving financial benefit by using current lower interest rate and refinancing phase I (3.85% vs. original 5.39%)
- Supports City's sustainability initiatives in cooperation with the Green Committee



Combined *Annual* Environmental Benefits of Phase I and Phase II

- 8,417 tons of CO₂ removed
- 27,318 lbs of NO_x removed
- 99,697 lbs of SO₂ removed
- 106,178 mg of mercury removed

This is the equivalent of

- 4,742 cars removed from the road,
or
- 6,474 trees planted @ 200 per acre,
or
- 106,094 gallons of gas saved



Questions / Discussion