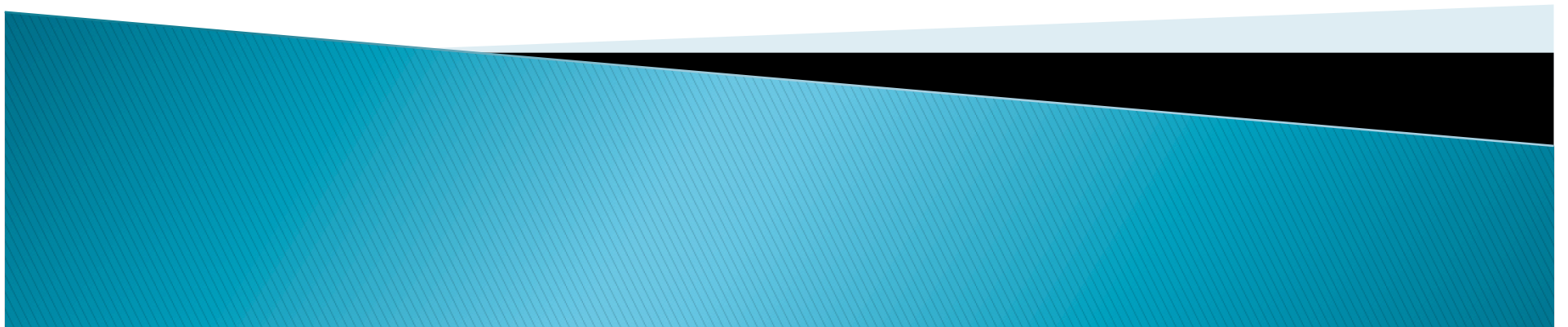


Sustainable Water Futures– Opportunities at Water and Wastewater Utilities

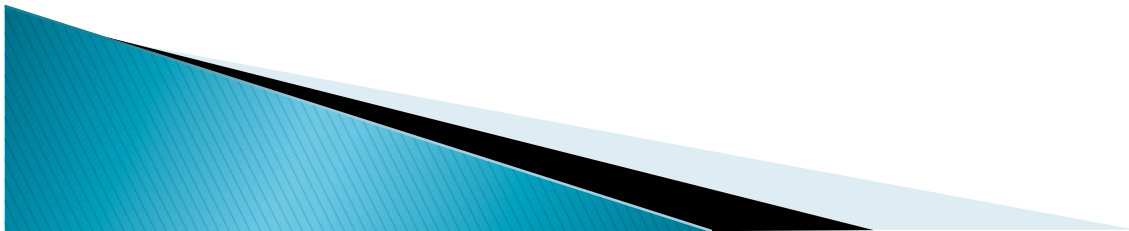
Richard Atwater, Inland Empire Utilities Agency

September 24, 2009



Agency Overview

- Regional wastewater service provider and distributor of wholesale water and recycled water
- Serving 800,000 people over 242 square miles of the Chino basin – one of the most rapidly growing regions in the U.S.
- Wastewater treatment is approximately 60 MGD
- Electric demand is approximately 13 MW
- Agency's 3 products: Renewable energy – Biosolids compost – Recycled water



Wastewater Utility Goals

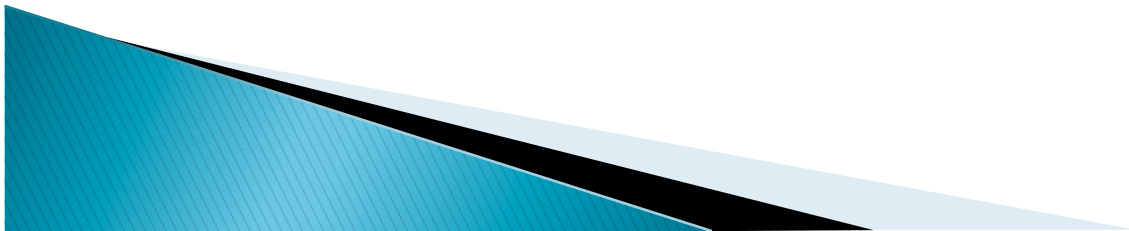
Three Products:

- ▶ Recycled Water
- ▶ Biosolids / Composting
- ▶ Renewable Energy

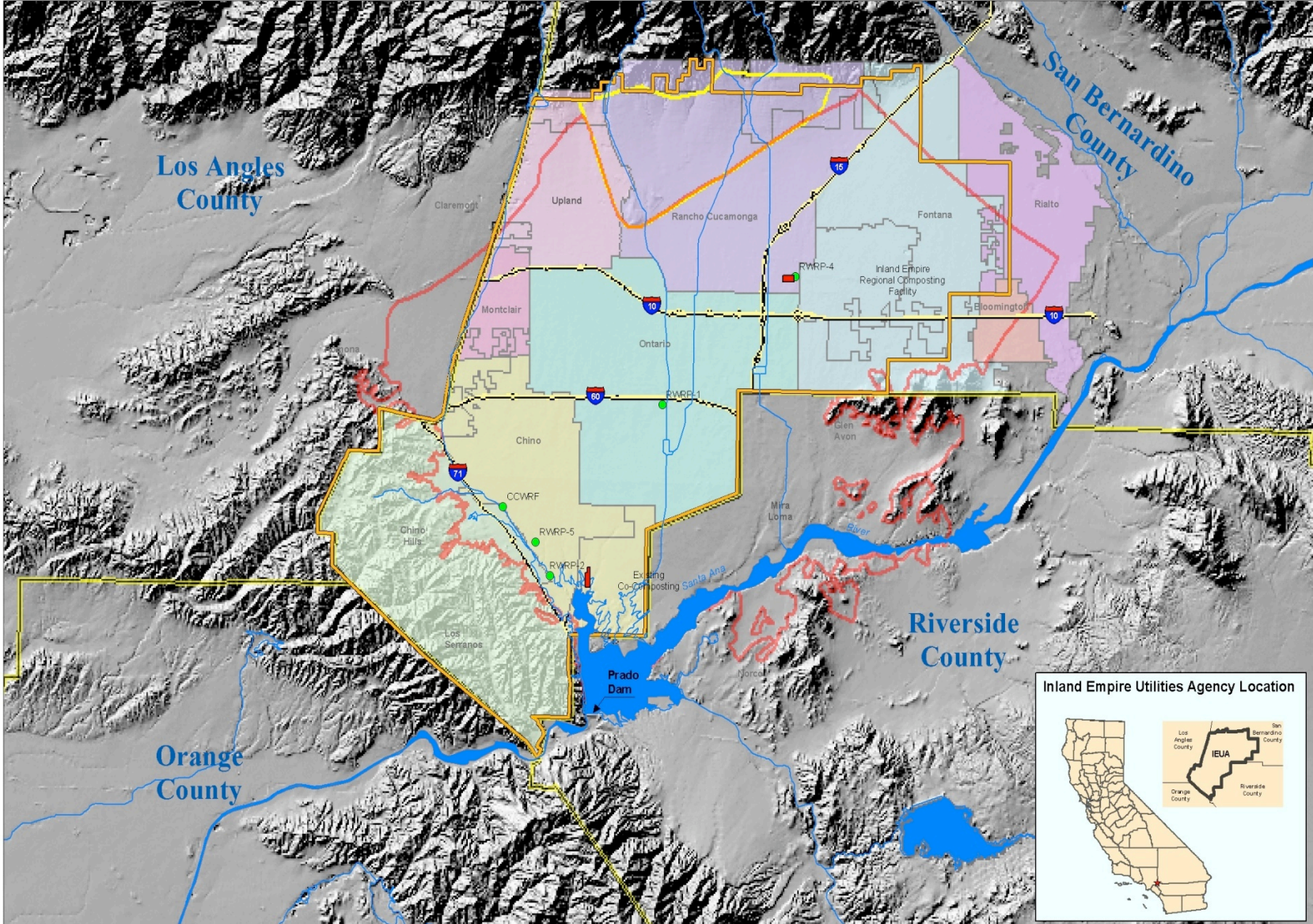


Water Utility Goals

- ▶ Statewide Drought
- ▶ Colorado River
- ▶ State Water Project – Delta Issue
- ▶ Local Supplies
 - Stormwater
 - Groundwater
 - Recycled Water



Inland Empire Utilities Agency (IEUA)



IEUA Water Recycling Facilities

- ▶ Four Water Recycling Facilities
 - Regional Plant No. 1 – Ontario
 - Regional Plant No. 4 – Rancho Cucamonga
 - Regional Plant No. 5 – Chino
 - Carbon Canyon Water Recycling Facility – Chino
- ▶ Influent Flow Levels
- ▶ Water Quality
- ▶ Recycled Water Demand



IEUA's Energy Strategy

- Since 2001, goal has been to maximize renewable energy, optimize energy usage
- Significant investments made in biogas generation, energy efficiency, green building (first platinum LEED)
- Go “100% Renewable” by 2020
- Pursue New Renewable Technologies



IEUA Innovations to Address Energy Needs

- ▶ Maximize Efficiency

Constructed the nation's first platinum LEED-rated headquarters by a public agency (2003).



- ▶ Sustainability and Diversification

Biogas production from anaerobic digesters.

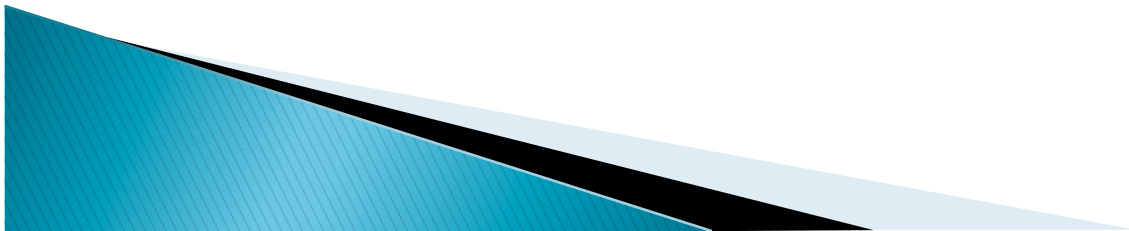
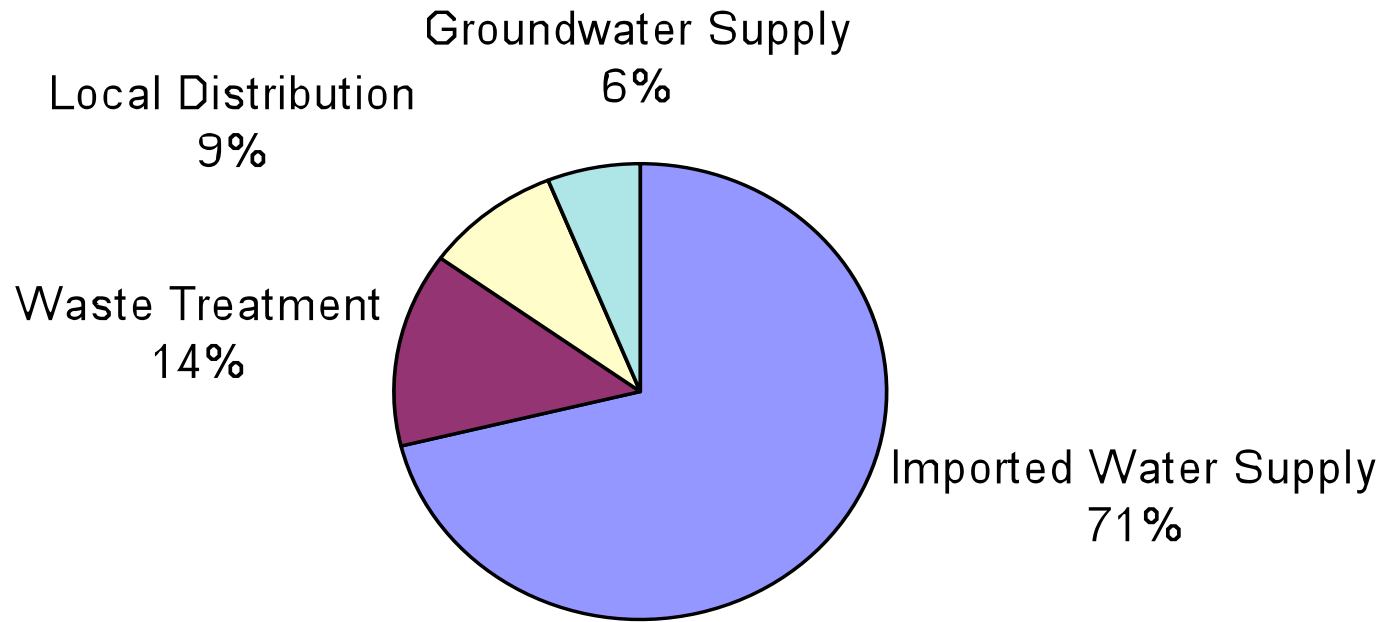
Installed a total of 16.5 acres of solar panels in 2008 on four Agency's sites.

Energy Intensity of Water Supplies

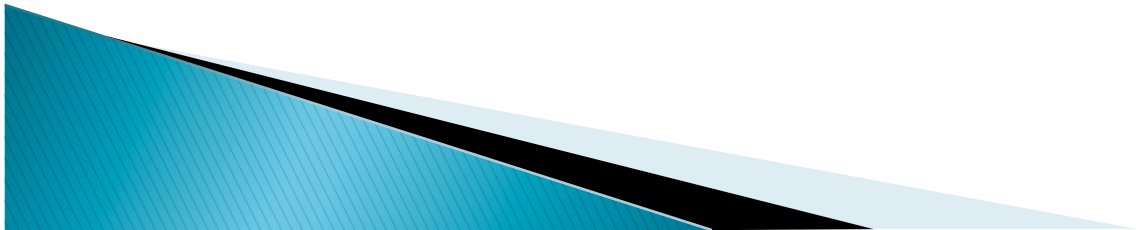
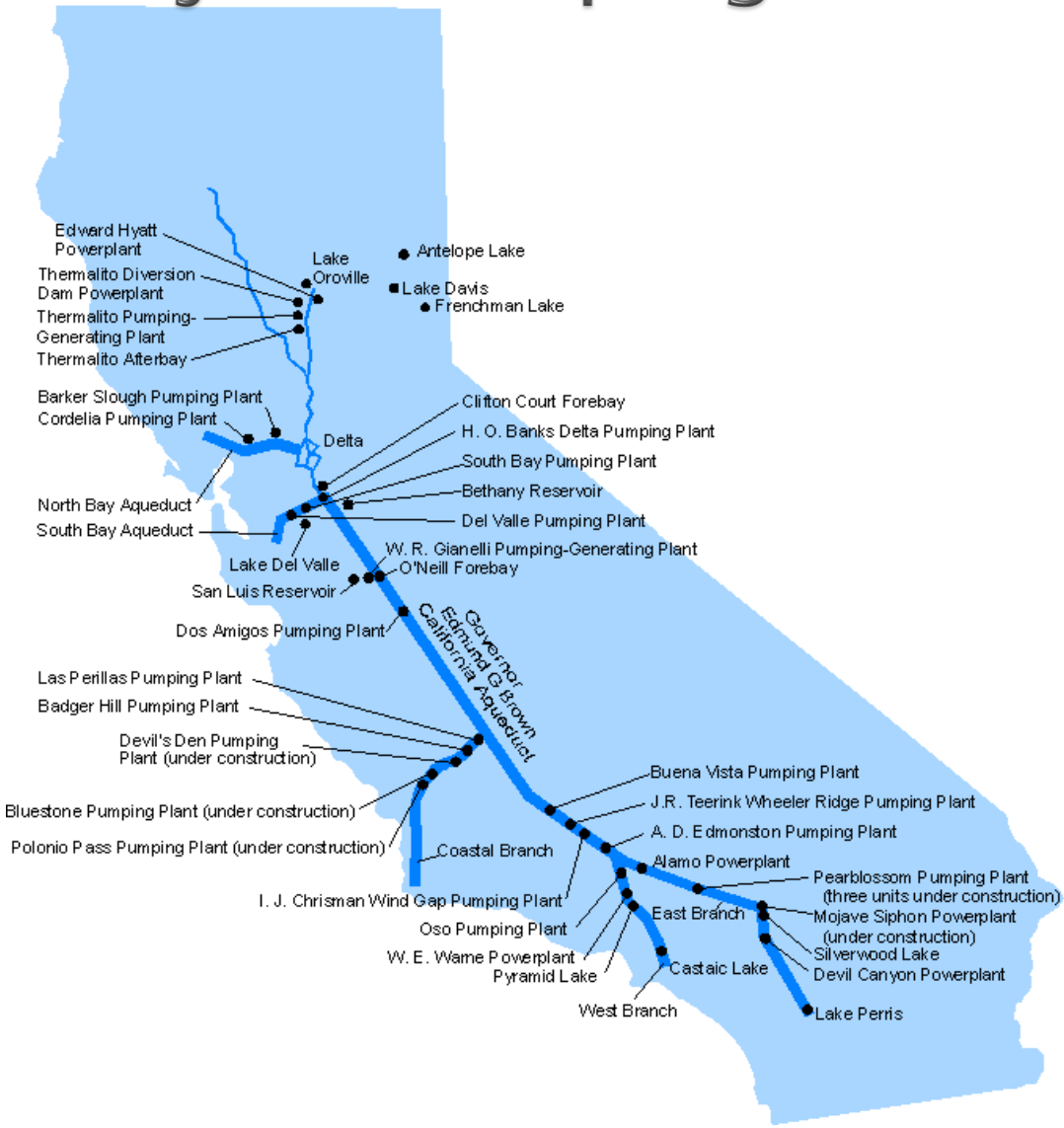
Total energy requirements for marginal (e.g. imported) supplies of water in Southern California are 3,519 kWh/acre-foot (0.01 kWh/gallon).



Electricity Use for Water System Components in Southern California

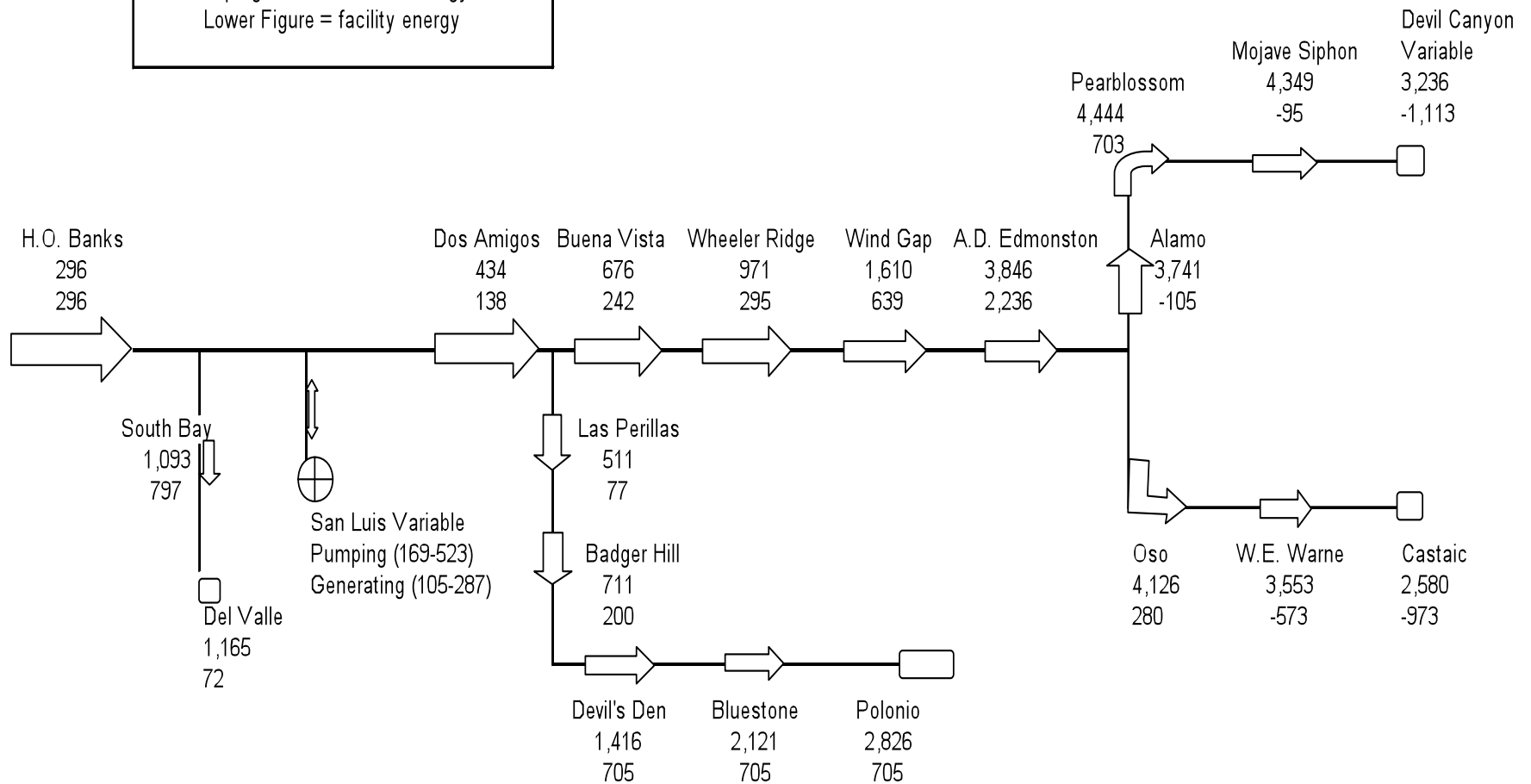


State Water Project Pumping Facilities



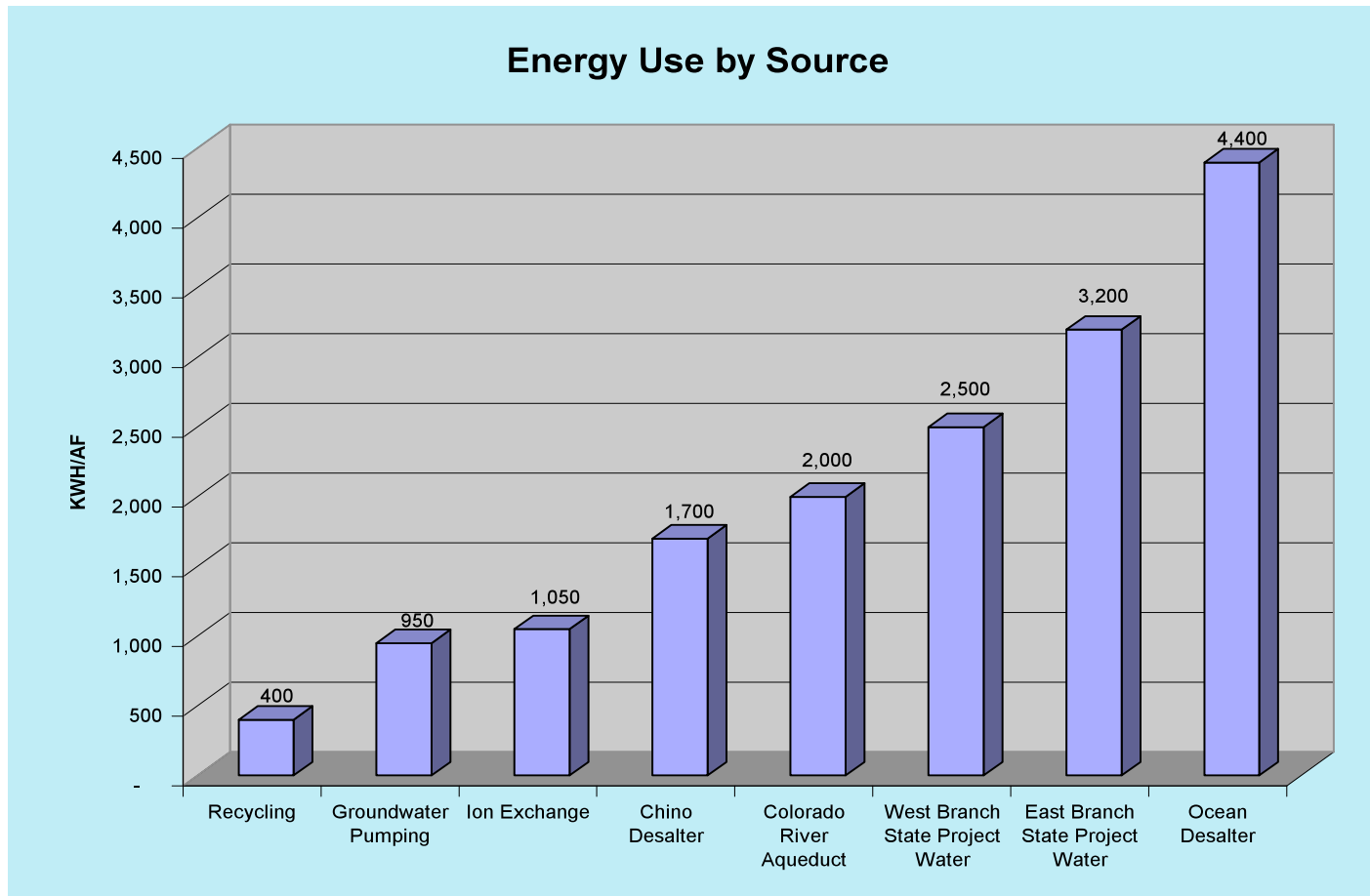
State Water Project Pumping Energy

All figures: kWh/AF
 Top figure = cumulative energy
 Lower Figure = facility energy



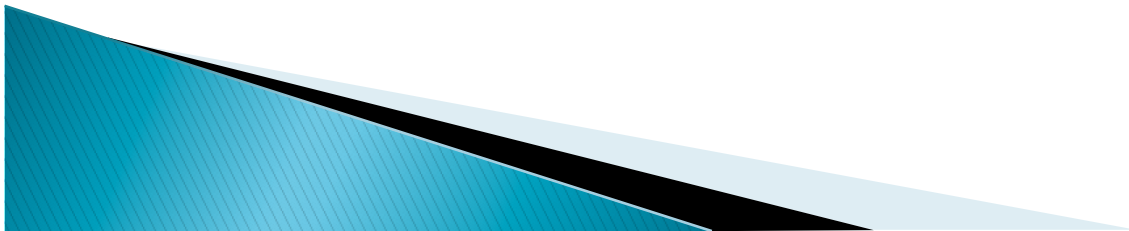
(Includes Energy Recovery and Transmission Losses)

Energy Intensity of Water Supplies for IEUA

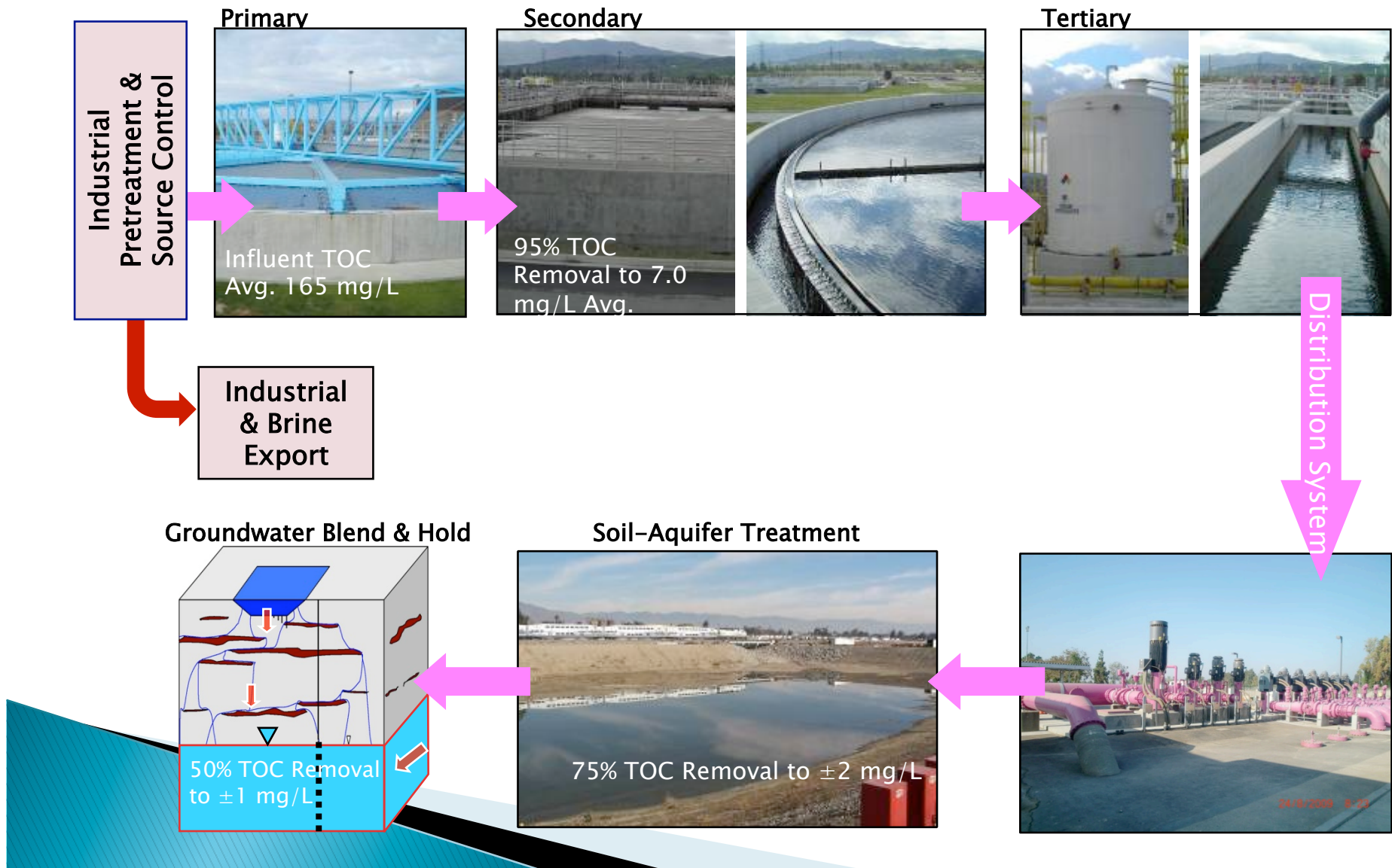


IEUA's Expanding Energy Project Portfolio

- ▶ Renewable Energy Programs
 - Three-Phase Thermophilic Digestion
 - Digester Optimization
 - Combined Heat and Power
 - Food Waste Additions
 - Flared Biogas Recovery (conversion to pipeline quality gas)
 - Solar Power
 - Wind Power
 - Fuel cells
 - Algae

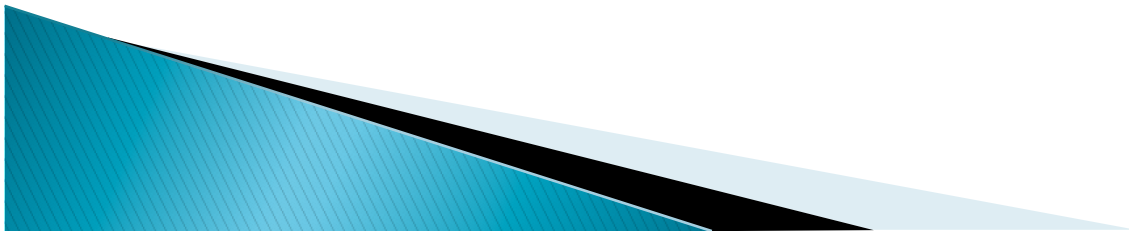


IEUA Recycled Water Production Cycle

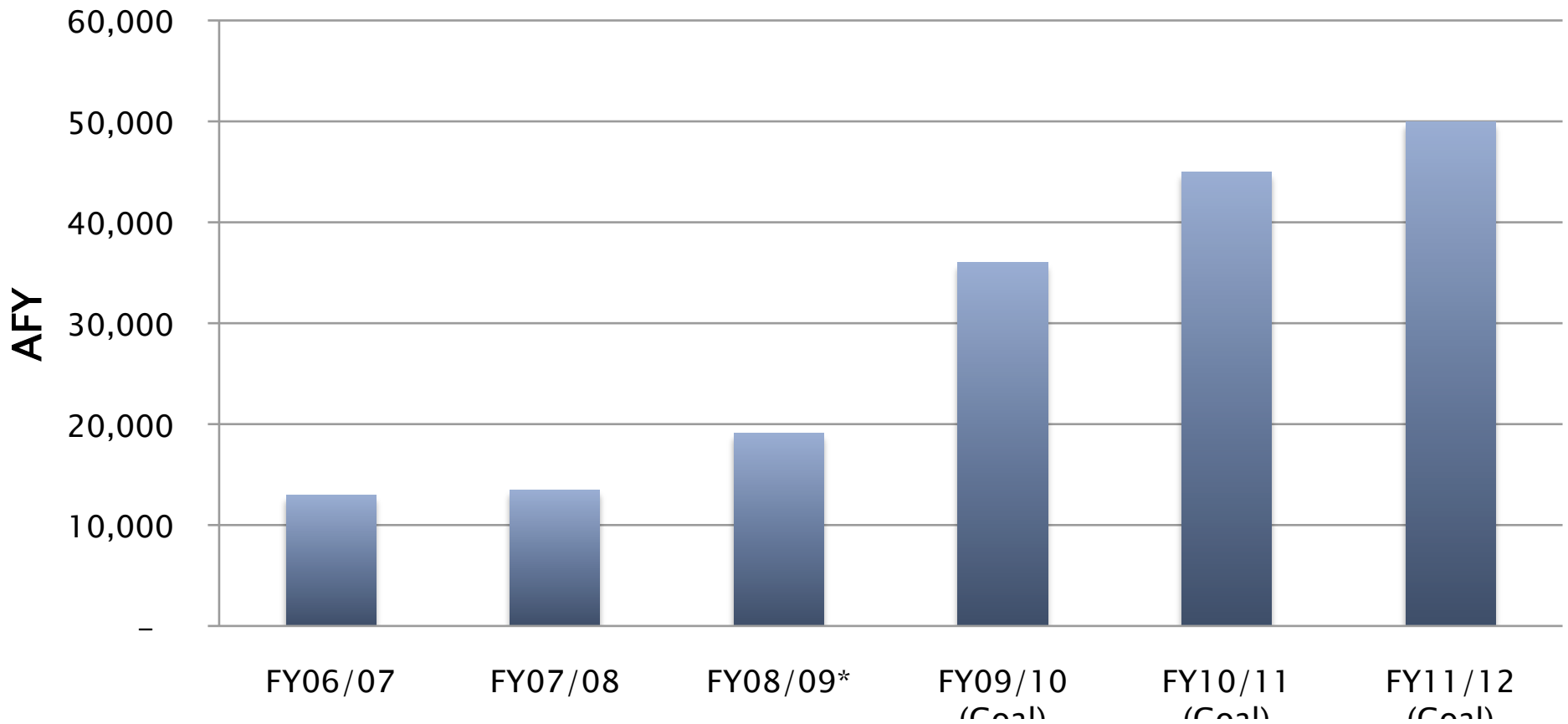


Exceptional Recycled Water Quality

- ▶ Pre-Treatment Program
 - Manages Significant Industrial Users (SIU)
 - No Drugs Down the Drain Program
 - Industrial & Brine Export to NRWS
- ▶ Longstanding Treatment Facility Performance
 - Outstanding NPDES & T-22 Compliance Record
 - 100% Compliant for 2008
 - Exceptional Nitrogen and TOC Removal
 - No Issues with Emerging Constituents of Concern



Recycled Water Usage Actual and Planned



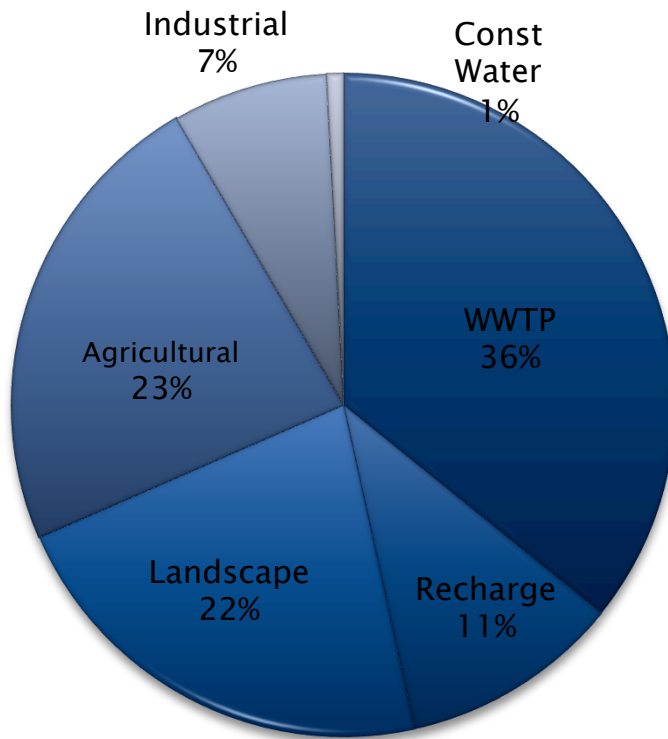
Actual RW Use

Projected RW Use

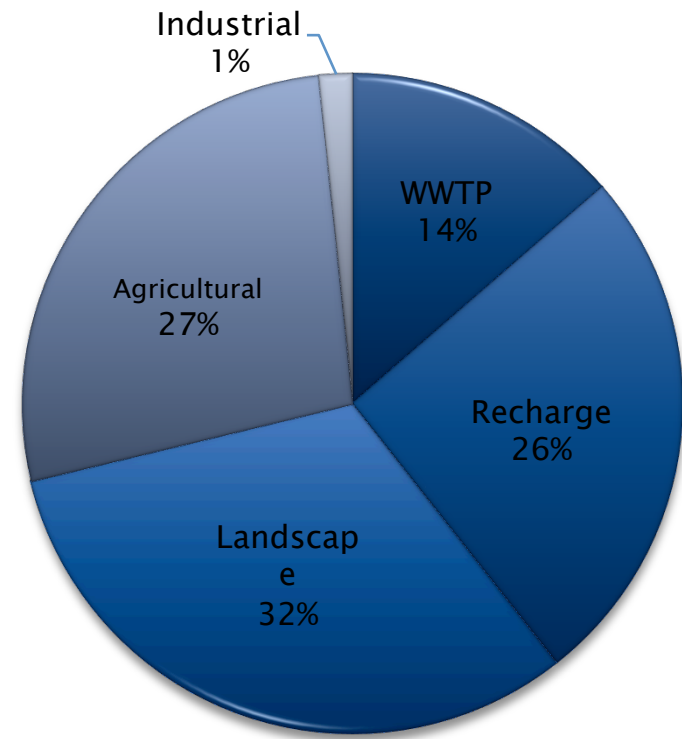
* FY08/09 Projected Actuals

Recycled Water Use

▶ FY08/09

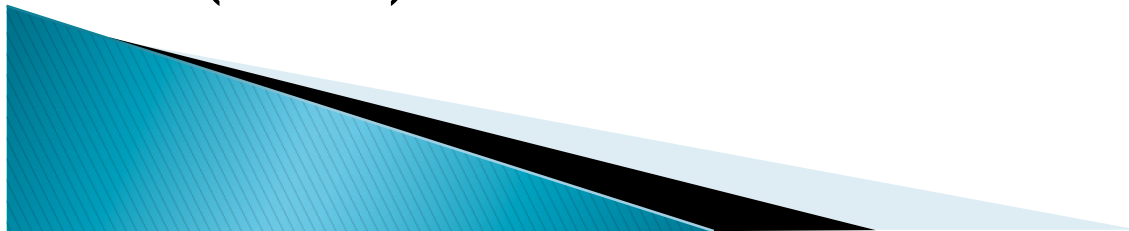


▶ Projected FY11/12 ▶ (3-Year RW Business Plan)



Groundwater Recharge

- ▶ Recharge Sites
 - 19 Sites throughout Chino Basin
- ▶ Sources of Water
 - Stormwater & Local Runoff
 - Imported Water (MWD)
 - Recycled Water
- ▶ Natural Soil Aquifer Treatment (SAT)
- ▶ Confidence of Regulators
- ▶ Recharge Basin Operations & Maintenance (O&M)



Different Systems for Separate IEUA Sites

Tracker T-0

- Area reqmts: 5 acres for 1MW
- Energy production 23% greater than fixed-tilt



Fixed T-10

- High density coverage: 10.5Watts/SqFt. Good for constrained areas

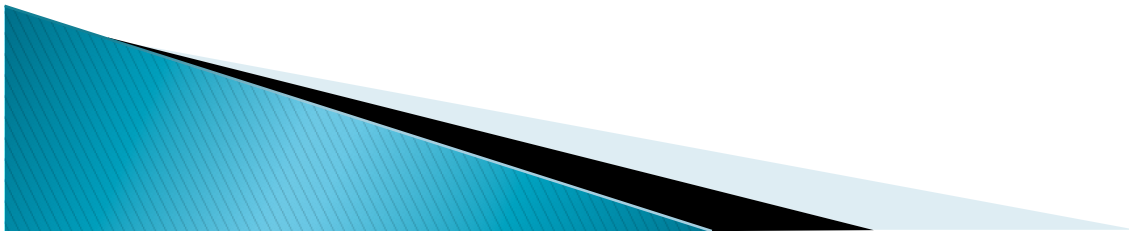


Tracker T-20

- All modular system - no in-ground foundations
- Tilted single-axis provides energy production 30% greater than fixed-tilt
- Lowest cost per kWh technology



Zero to 1 MW Solar in 4 Months!



Solar System at IEUA Water Recycling Plant (Went live 11 / 28 / 08 at 1300 hours)



Solar Project Numbers

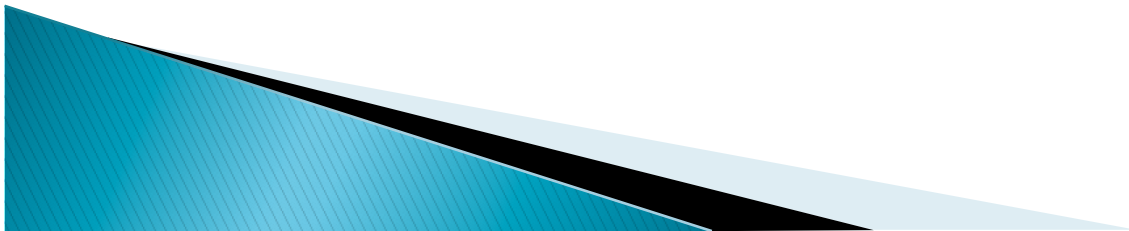
Facility Type	Type	Capacity [KW-AC]	Projected Annual Production [MWH]	Area [Acres]	Completion Date
Water Recycling Plant RP 1 Area 4	T-0	694	1.8	4.0	Dec 2008
Water Recycling Plant RP 1 Area 5	T-10	137			Nov 2008
Water Recycling Plant RP 5	T-20	1,000	2.4	7.0	Nov 2008
Recycling plant CCWRF	T-10	625	1	1.5	Dec 2008
Composter Plant IERCF	T-10	335	2	4.0	Nov 2008
	T-10	665			

Total		3.5 MW	7.2	16.5	
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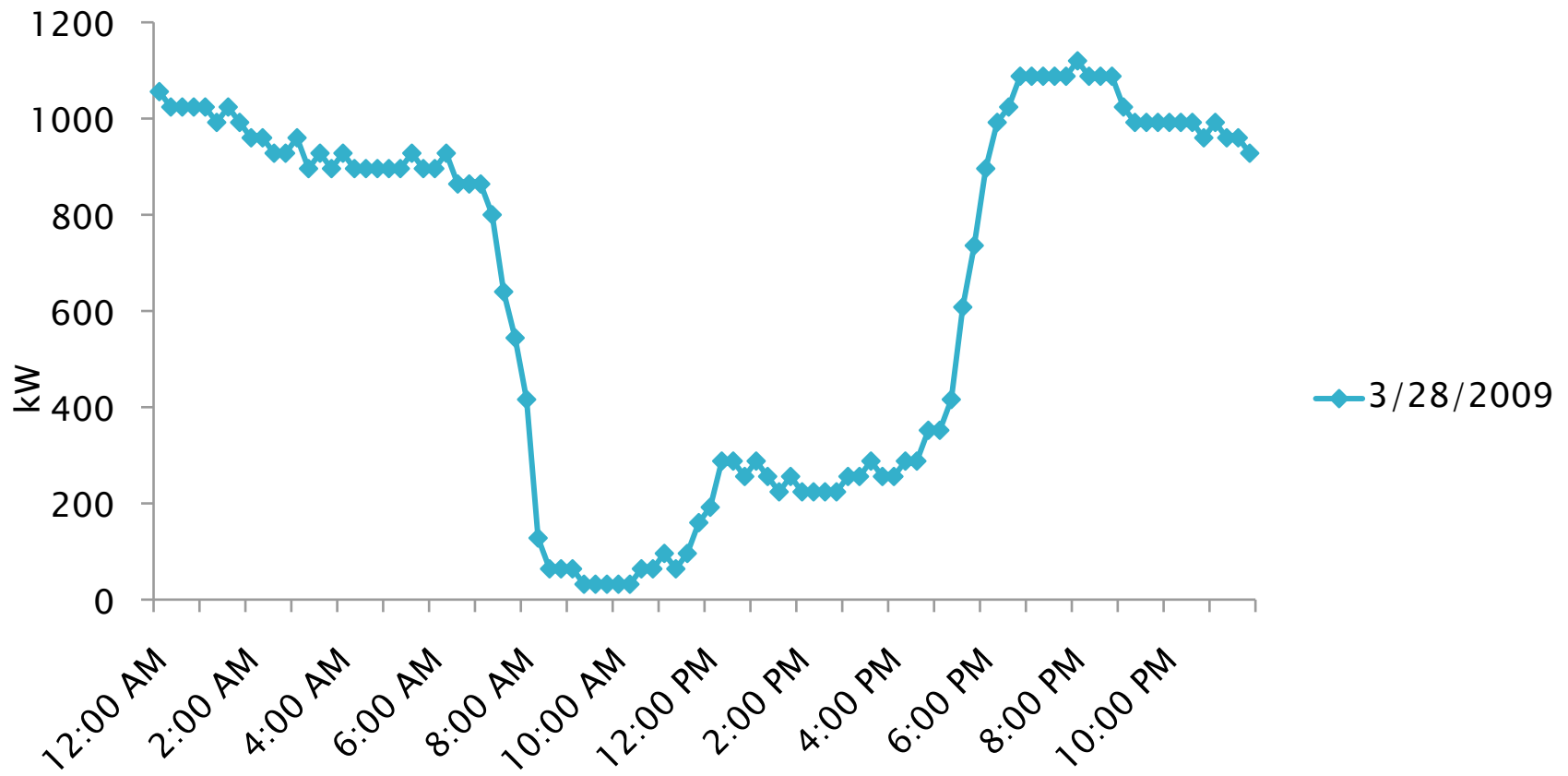


Solar Summary

- ▶ 3.5 MW of Solar installed at 4 sites in just 4 months
- ▶ Financing – Power Purchase Agreements (PPA) used – No capital burden on Agency
- ▶ No maintenance responsibilities for IEUA
- ▶ Great Environmental Benefits



RP-5 Load Profile

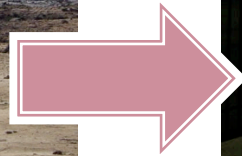


IEUA Biosolids Management

- ▶ Existing IEUA Composting Facility
- ▶ Decommissioned in 2006



- ▶ IERCF – Constructed to Meet Rule 1133.2
- ▶ Commissioned in 2007





I-15

IERCF

**WEST VALLEY
DETENTION CENTER**

**Inland Empire Utilities Agency
Water Reclamation Plant**

**RELIANT ENERGY
POWER PLANT**

6TH ST

1.4 MILES TO I-10

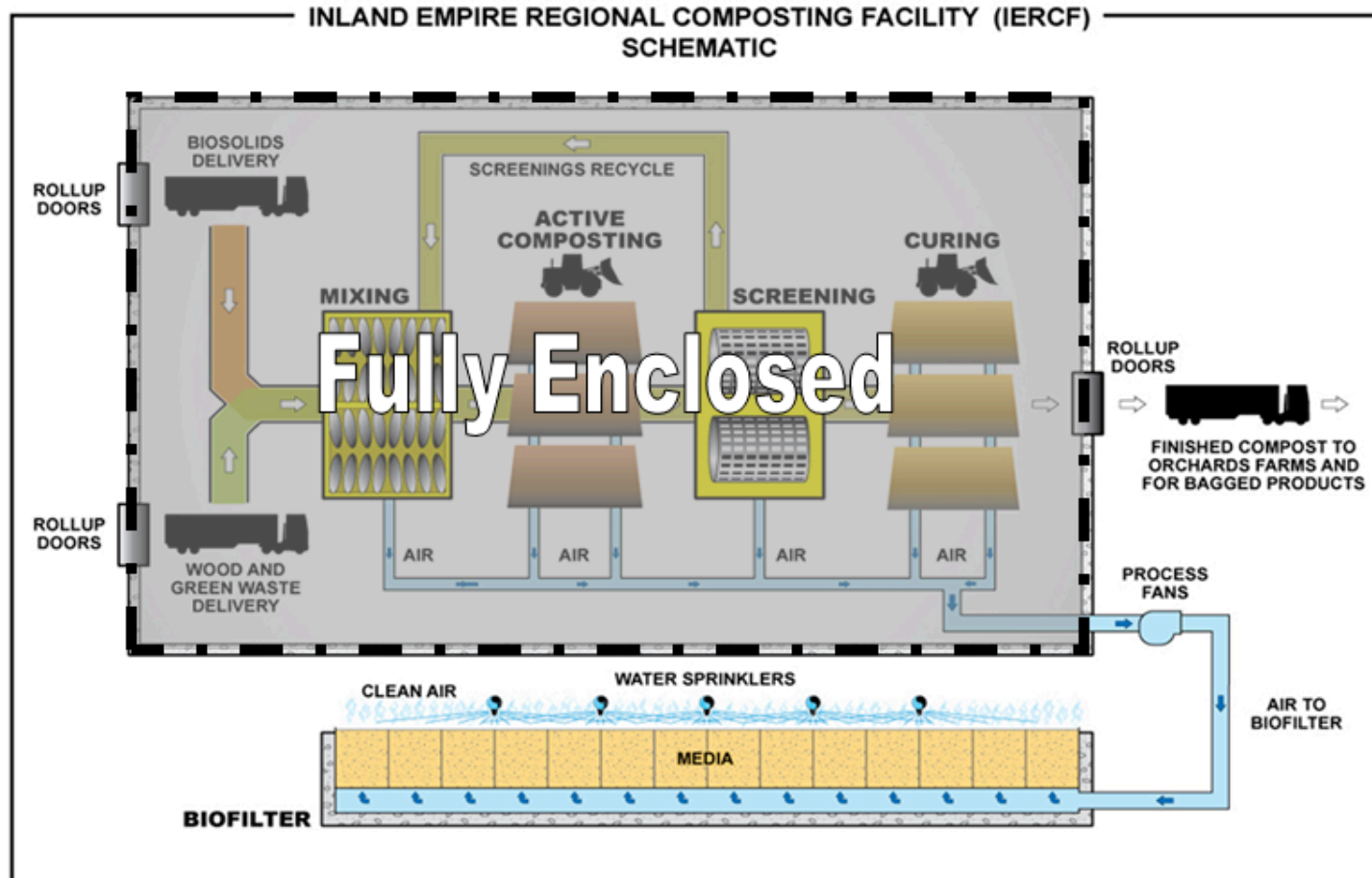
ETIWANDA BLVD

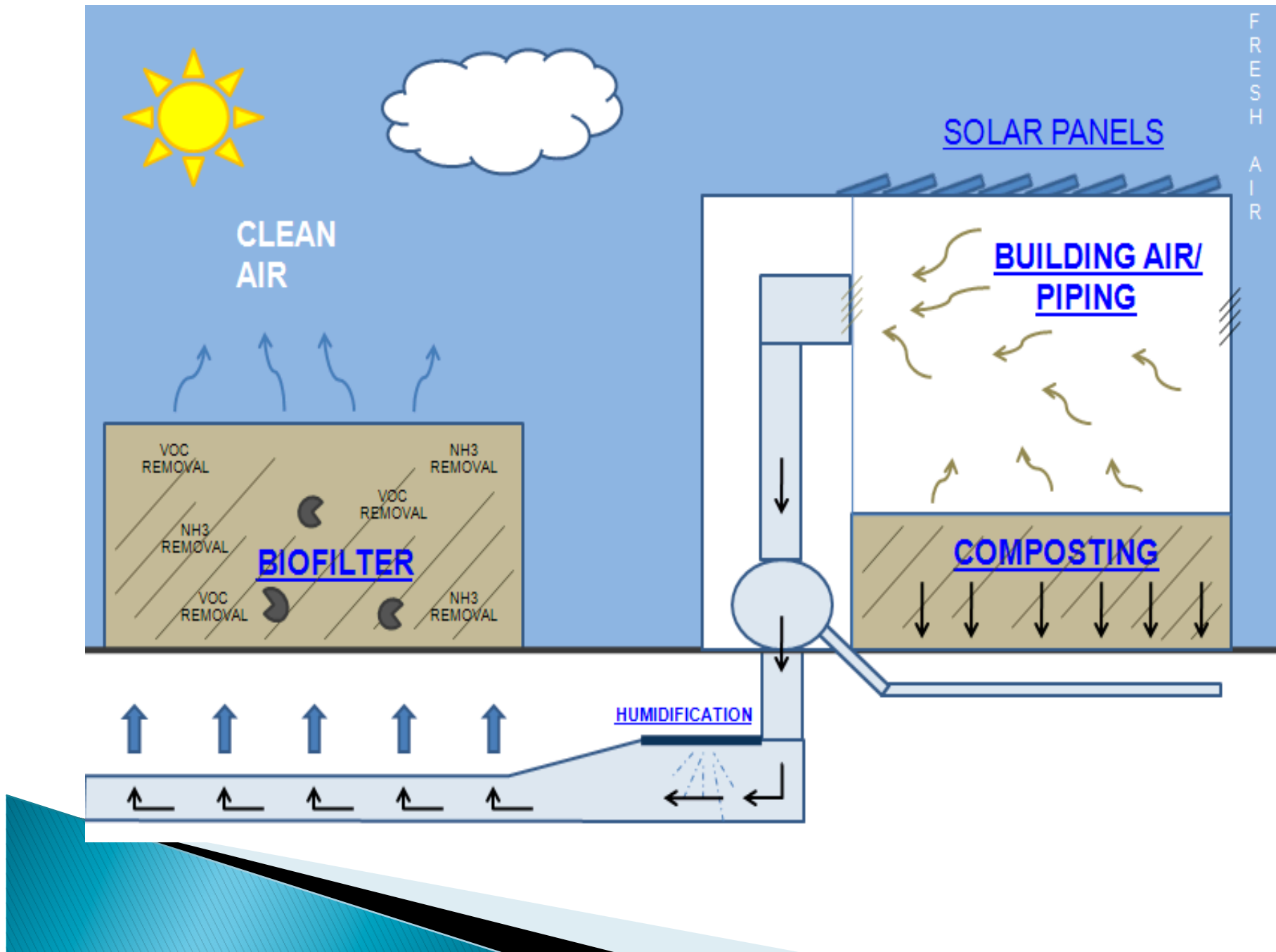


IERCF

Biofilter

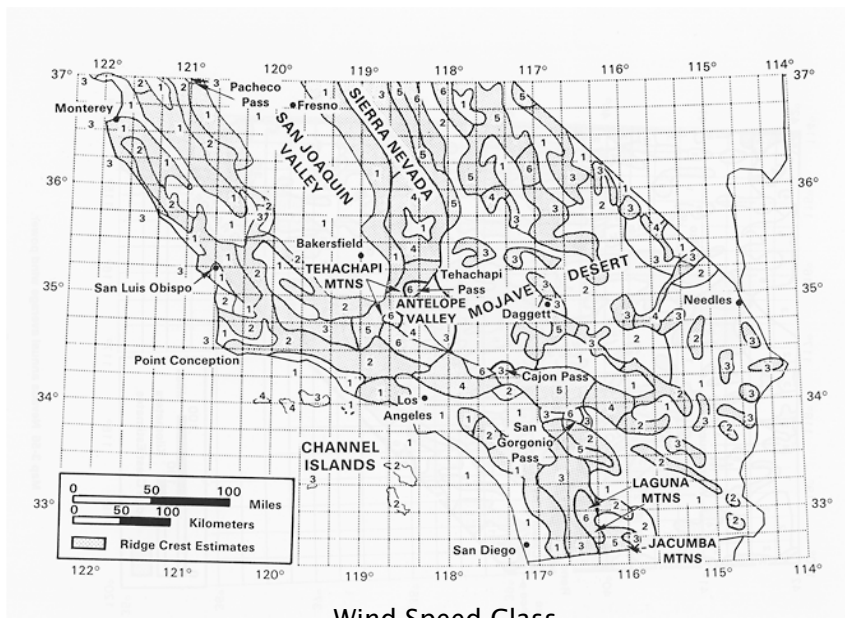
Facility Description



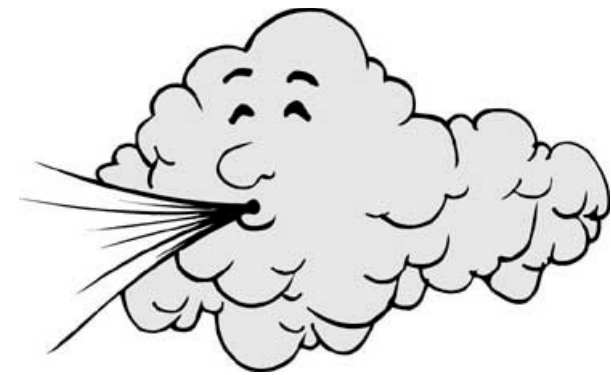


Wind Power

- ▶ Minimum cut-in wind speed 8 mph for turbine power generation
- ▶ Local area wind speed averages 13 mph



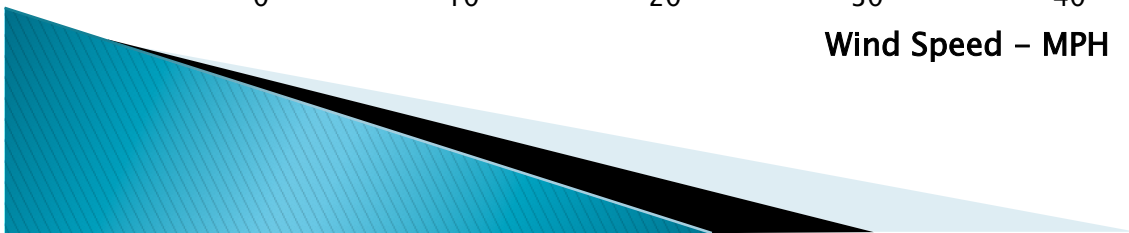
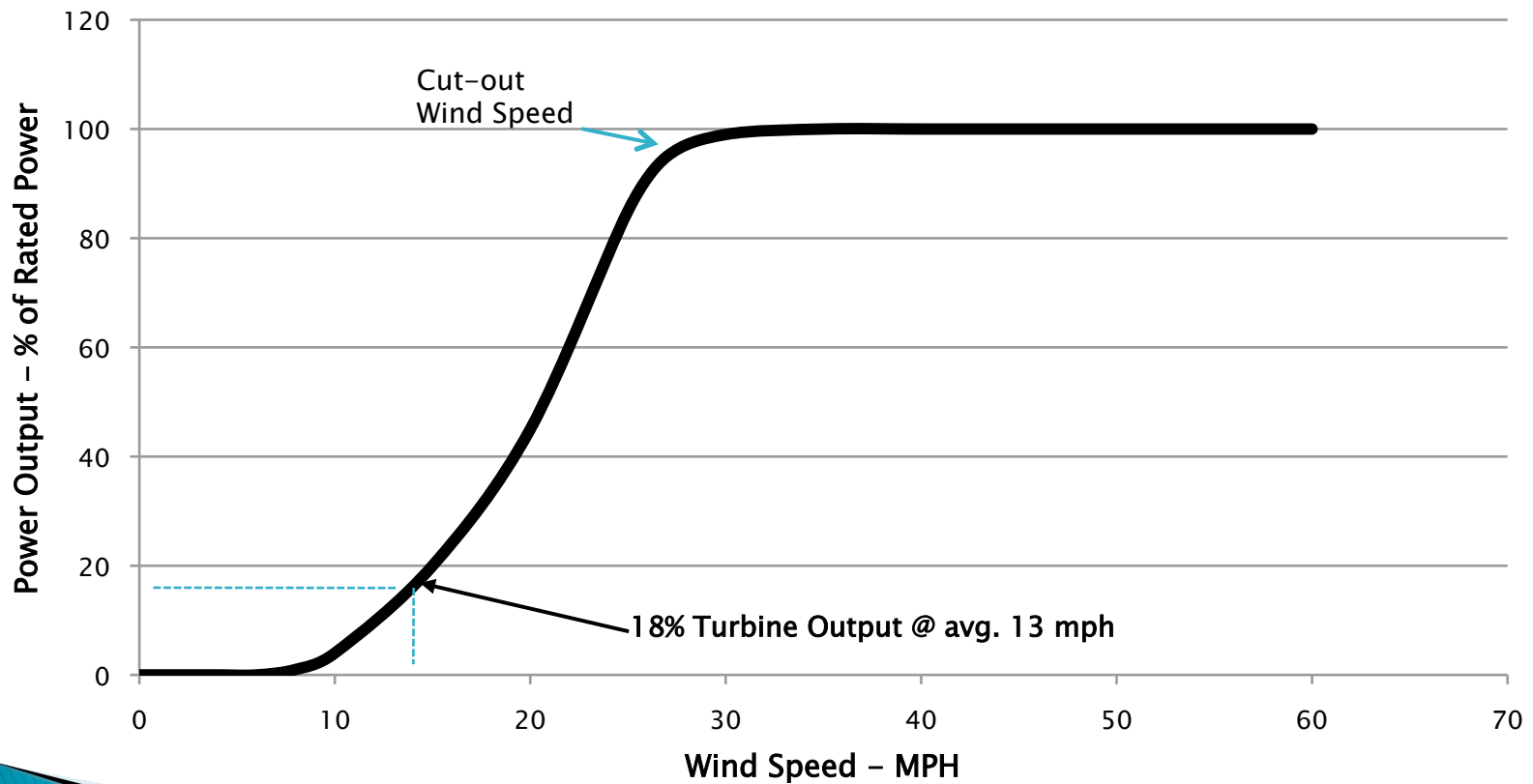
Wind Speed Class
National Renewable Energy Laboratory Map



*IEUA in Class 3 Area
(Avg. speed 13 mph)*

Wind Speed to Energy

-Relative Turbine Power Output vs. Wind Speed-



Potential Sites

**IEUA Headquarters
RP-5 Complex**



RP-1 Facility



**RP-4/IERCF
Complex**



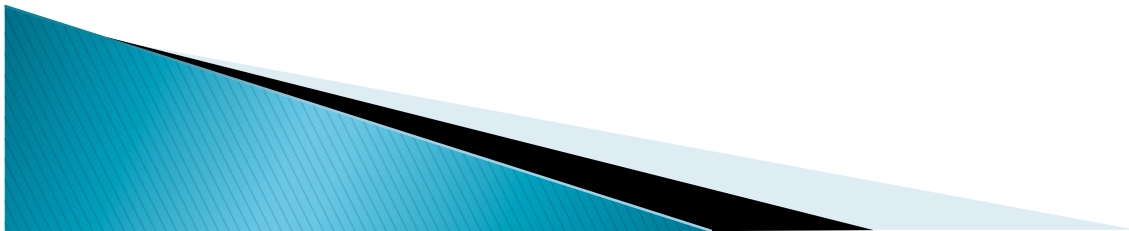
Considerations

- ▶ Suitability of site
- ▶ Environmental Esthetics
- ▶ Permitting

Wind Power – Next Steps

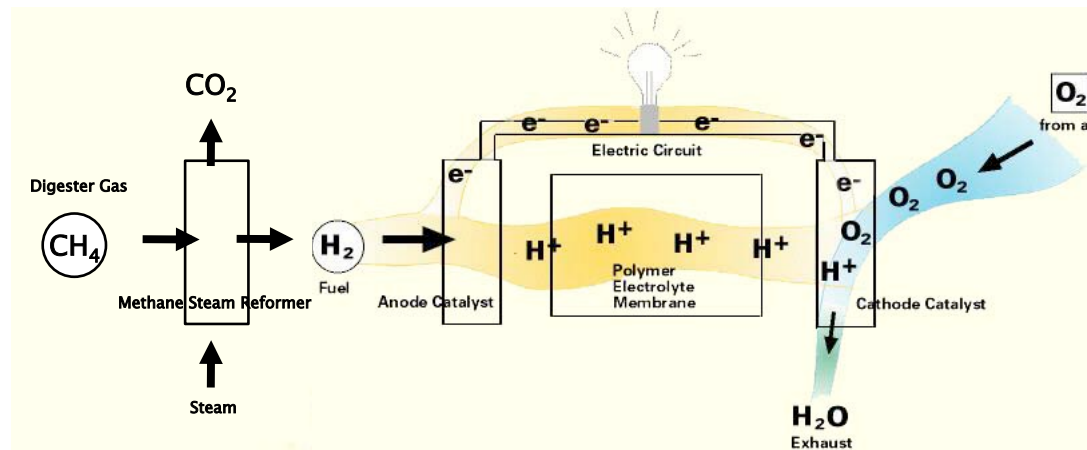
▶ Options

- Pursue demonstration project at RP5 site to gain first hand experience with wind power permitting, procurement, operation and maintenance
- Evaluate actual performance and output
- Evaluate other sites



Fuel Cells

- ▶ Is an electrochemical process that generates electricity, water and heat.
- ▶ Can utilize hydrogen from any hydrocarbon fuel
 - Digester Gas, Natural gas, methanol, gasoline
- ▶ Relies on chemistry and not combustion
 - Low emissions



Fuel Cells Benefits

- ▶ Low air emissions
- ▶ High Efficiency
- ▶ High Reliability/High Quality Power
- ▶ Fuel Flexibility (Digester Gas and/or Natural Gas)
- ▶ Quiet Operation



Water Assets of the Chino Basin

- ▶ Groundwater
 - 5–7 Million Acre–feet of Storage – one of the largest groundwater basins in southern California
 - 1 million acre–feet of unused storage capacity currently
 - Safe Yield of 140,000+ Acre–feet per year with capacity to increase
 - Over 800 Active Wells
- ▶ High quality Recycled Water
 - Over 90,000 Acre–feet of water available for reuse
- ▶ Storm Water Capture
 - Region now loses over 40,000 acre–feet per year on average of water that historically recharged the Chino Groundwater Basin
- ▶ Opportunities for Water Efficiency
 - Over 60% of water use within region is for outdoor irrigation
- ▶ Regional Partnerships
 - Outstanding collaboration and cooperation among local governments and agencies providing water services



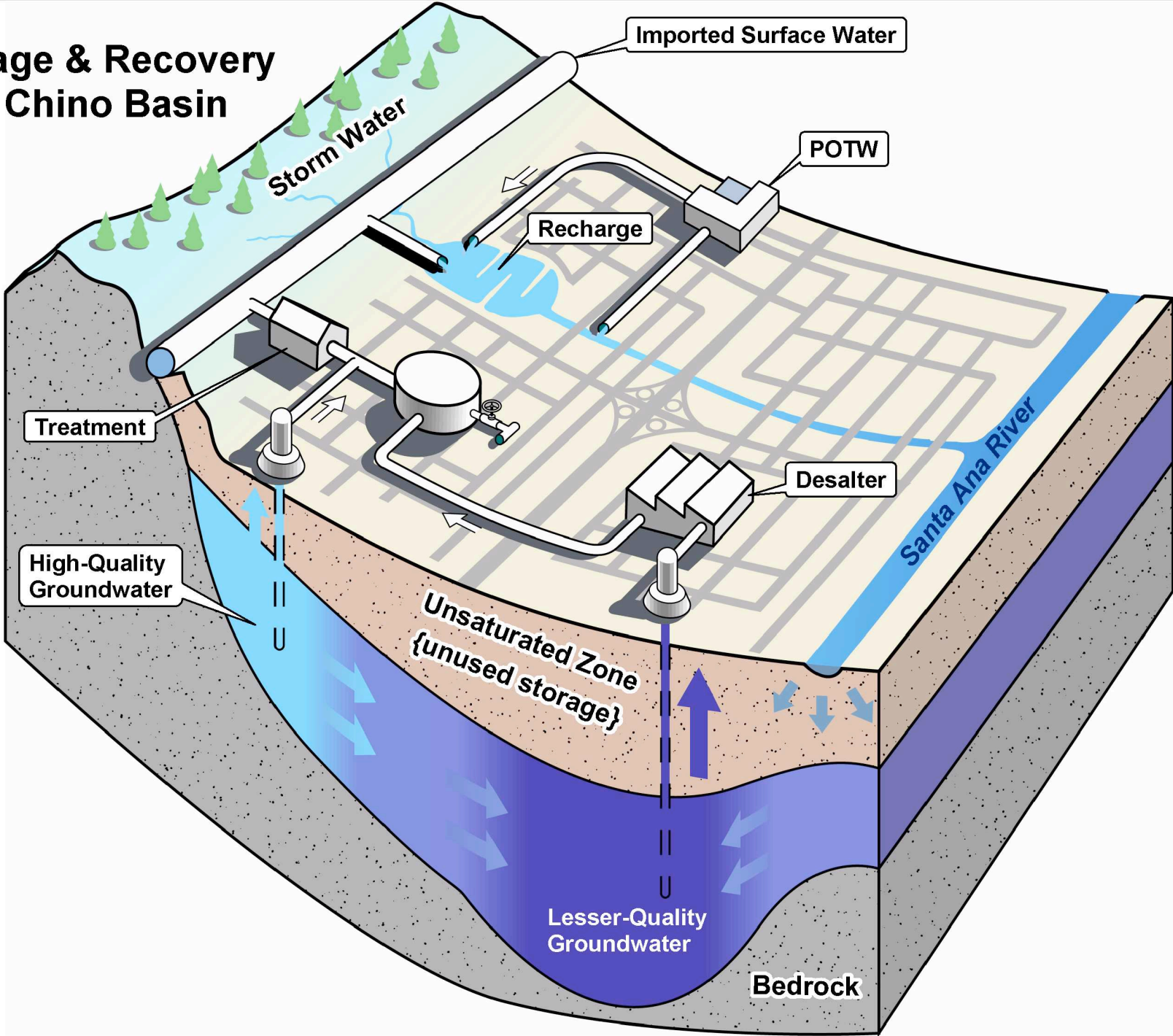
Water Resources Capital Improvement Program

\$350 Million in Capital Projects

- ▶ **Chino I/II Desalters**
 - 25,000 AF/Yr yield
 - \$68 Million
- ▶ **Recharge Master Plan**
 - 23,000 AF/Yr Storm water
 - 20 – 40 AF/Yr Recycled Water
 - 80 – 120,000 AF/Yr Imported Water
 - \$40 – \$50 million
- ▶ **MWD Conjunctive Use**
 - 100,000 AF, 33,000 AF/yr yield
 - \$28.5 million
- ▶ **Recycled Water**
 - 90,000 AF/Yr
 - \$200 million
- ▶ **Conservation**
 - 25,000 AF/Yr
 - \$10 million



Storage & Recovery in Chino Basin



Projected Chino Basin Imported Water Demands

- ▶ Without the Integrated Water Management Strategy, the need for expensive imported water is expected to increase from 60,000 acre-feet to over 150,000 acre-feet
- With the implemented of the planned water initiatives, the region will significantly reduce its need for imported water and during dry years almost completely roll off imported water supplies

