This presentation premiered at WaterSmart Innovations

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INNOVATIONS

M&V Guidelines, Water Retrofits, & NextGeneration PPPs for Public Sector

WaterSmart Innovations 2017

Jorge Figueroa, Western Resource Advocates

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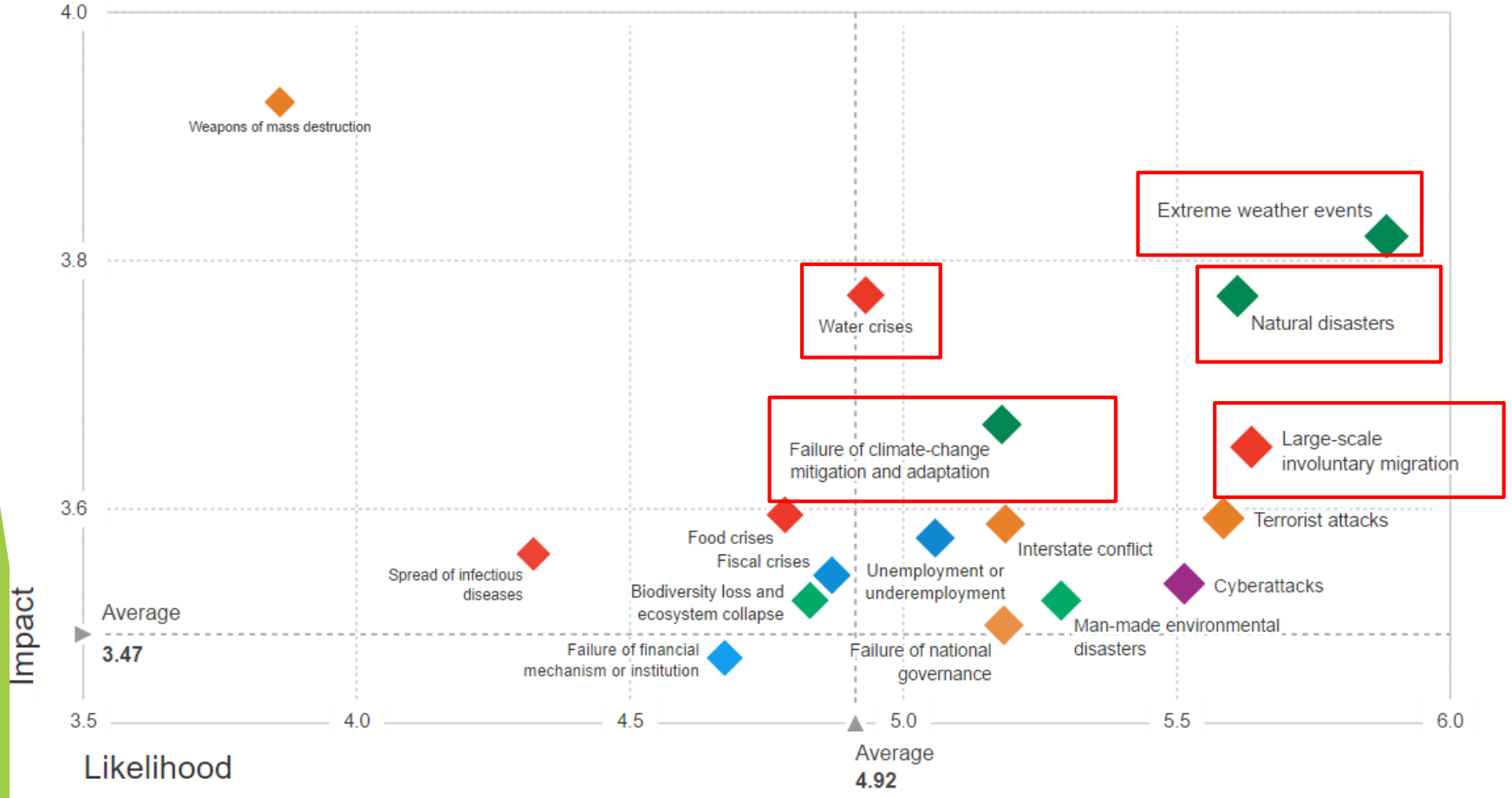
The Big Picture: Framing the Challenge

WORLD ECONOMIC FORUM

Next 10 years

The Global Risks Landscape 2017

What is the impact and likelihood of global risks?



Risks that can cause Significant negative impact to countries and industries (likelihood v. impact)

Source: World Economic Forum, 2017

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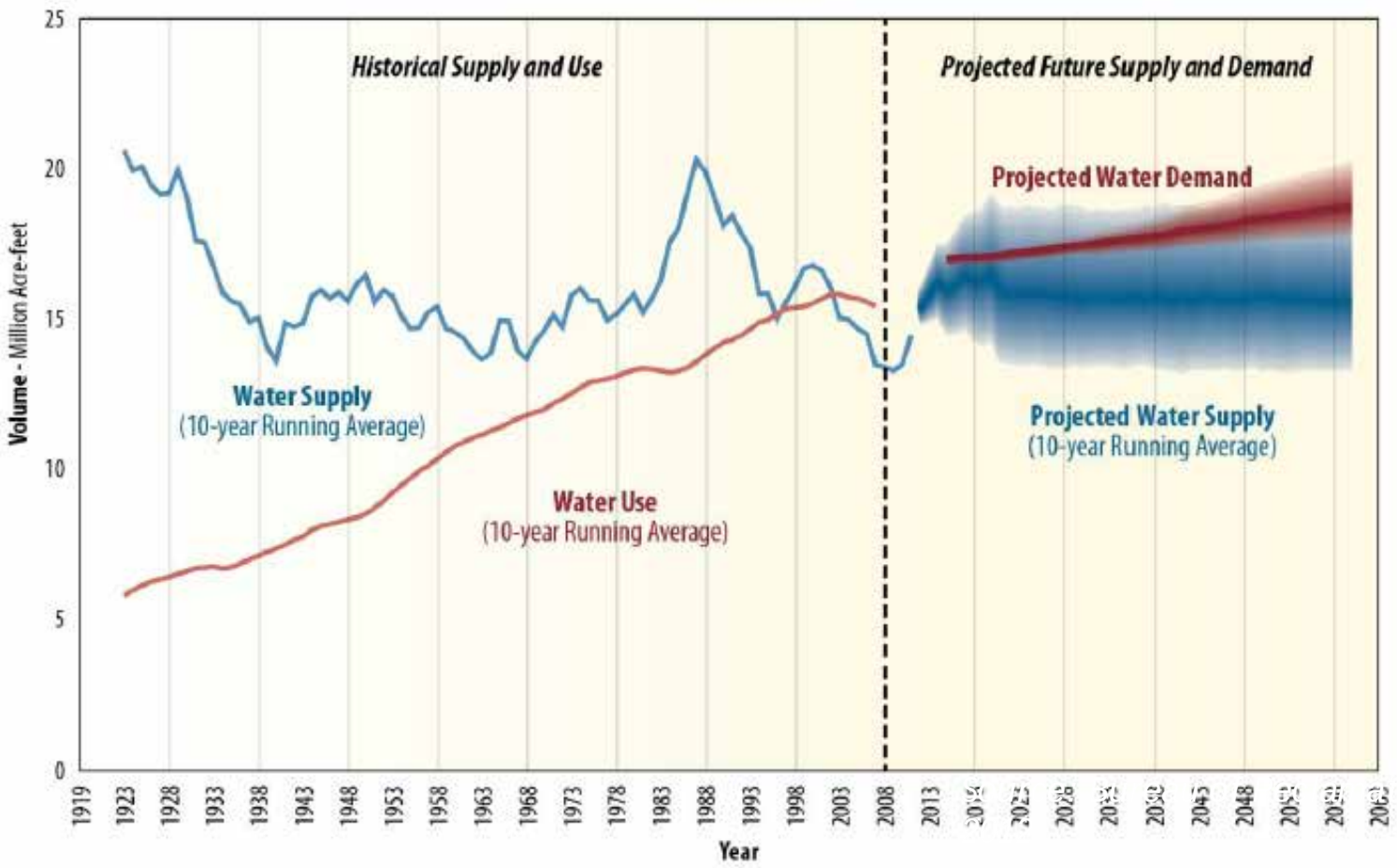
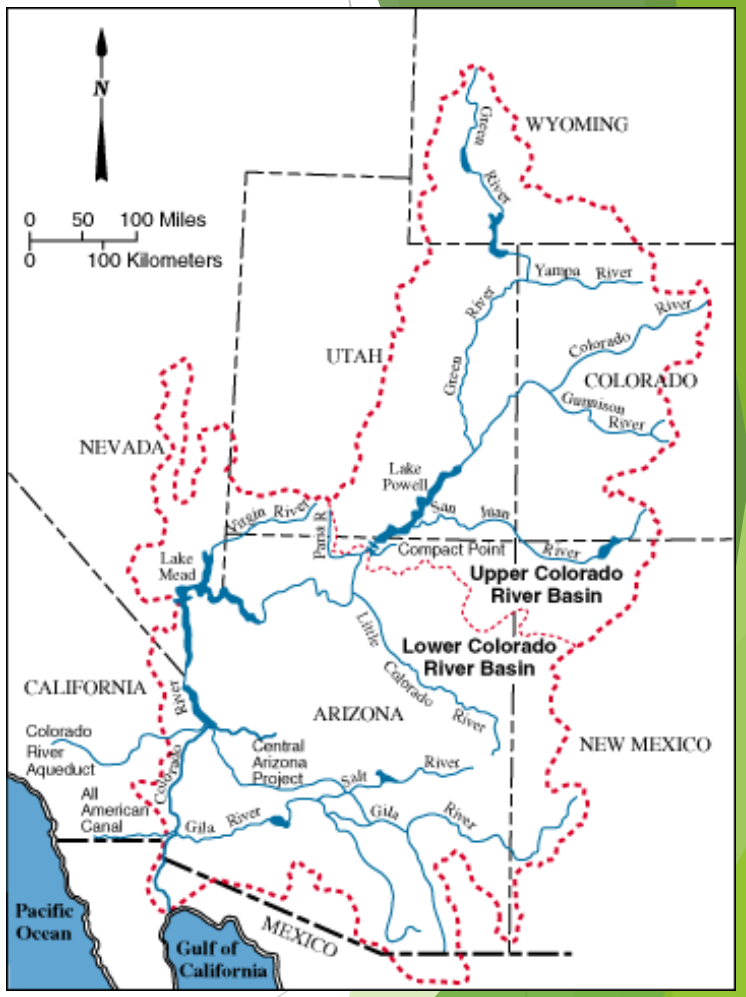
The Perfect Storm: Water Scarcity and the Great and Growing Cities of the West

Projected Colorado River Supply-Demand Imbalance:
greater than 3.2 million acre-feet by 2060





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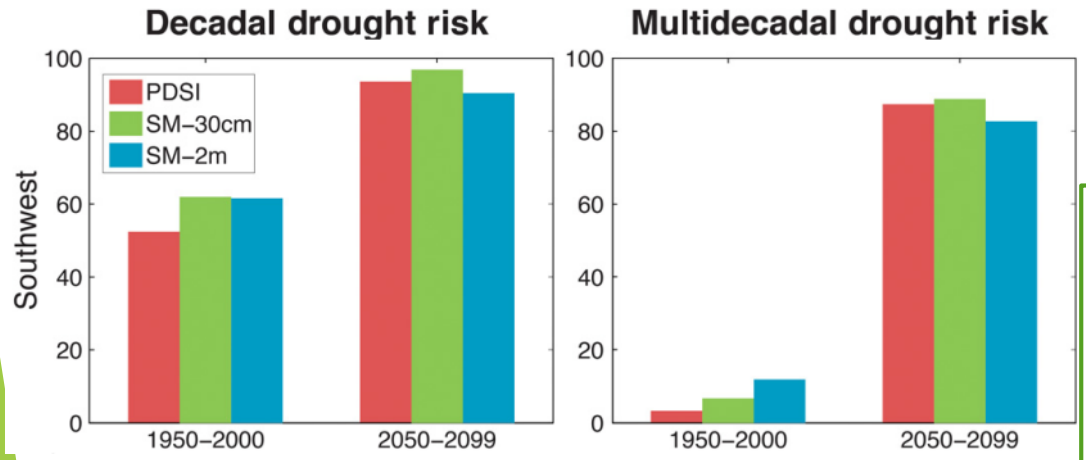
The Perfect Storm: Colorado River Water Supply and Demand Imbalance

STATE	POPULATION (JULY 2008)	POPULATION GROWTH (2000-2008)	RANK	PRECIPITATION (INCHES)	RANK
Nevada	2,600,167	30%	1	9.5	50
Arizona	6,500,180	27%	2	13.1	48
Utah	2,736,424	23%	3	11.9	49
Colorado	4,939,456	15%	7	15.5	45
New Mexico	1,984,356	9%	17	13.9	46
U.S. Average		8%		34.3	

Source: Western Resource Advocates, 2009



2050 and beyond

NASA: "Unprecedented Drought Risk in the American Southwest"

Source: Cook et al., 2015

Water Security

"The availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies."

Source: Grey and Sadoff, 2007

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Historical Trends

Long-term data reveals:

- **Prices for water and sewer maintenance continue to rise at rate much higher than overall rate of inflation (CPI)**
- **Recent price trends for electricity generally tracking overall rate of inflation**
- **Recent price trends for natural gas fallen below the overall rate of inflation**

Source:
Janice Beecher, Michigan State University,
Trends in Consumer Prices (CPI) for Utilities

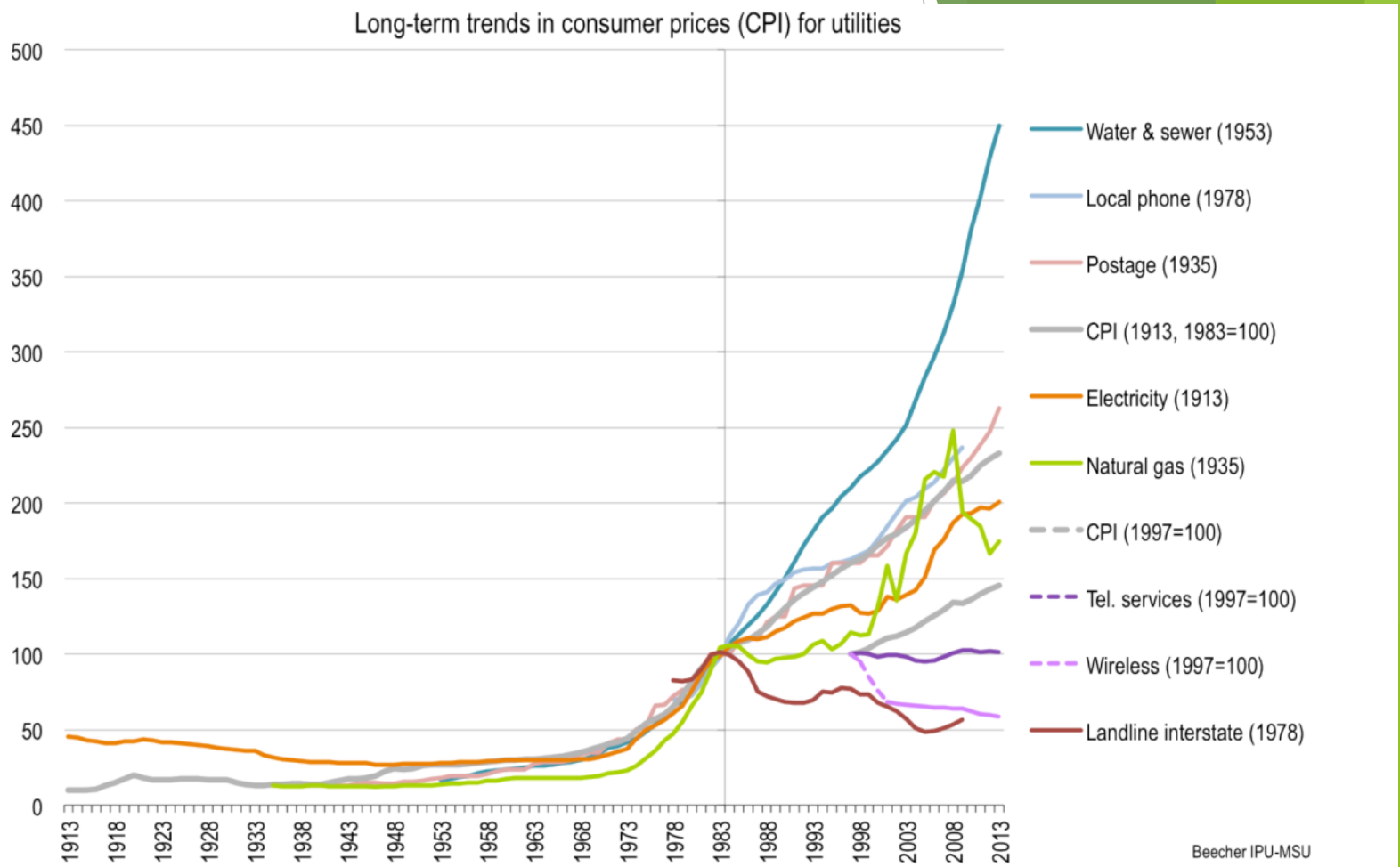

Exhibit 1. Long-term trends in the Consumer Price Index (CPI) for utilities (1913-2013). The index is set to 100 for 1982-1984 except for telephone and wireless services, where the index is set to 100 for 1997. Year (*) indicates start of series.

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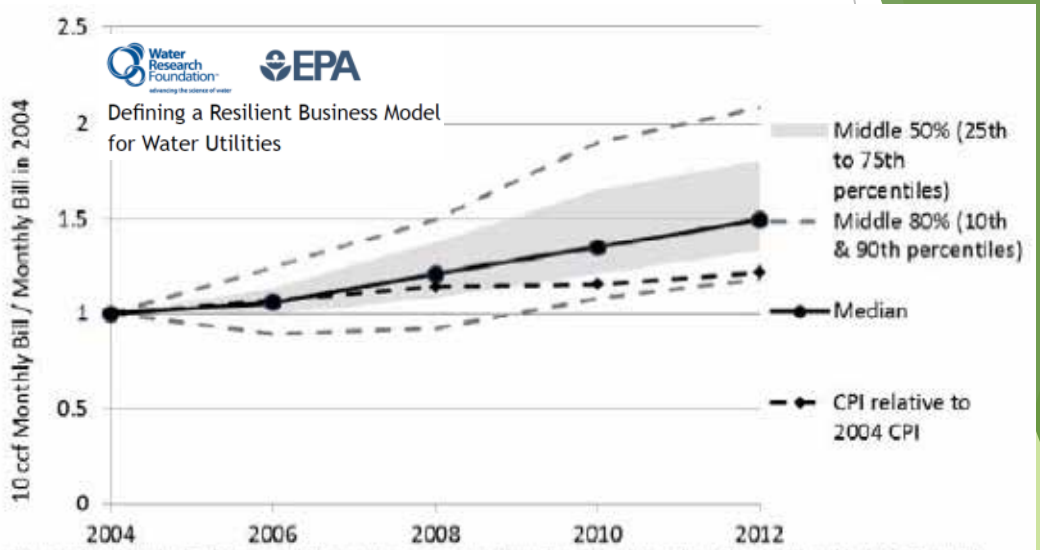
Current and Future Municipal Water Market Trends

Recent Trends

Water Research Foundation, 2014

Median increase in nominal monthly bills 2004-2012 was 50%, compared to cumulative increase in CPI of 22% in same period



Monthly charge for 10 ccf relative to 2004 charge for 72 nationwide utilities

Next 25 Years

American Water Works Association, 2012

Buried No Longer Report's Key Findings,

1. **Nationally, investment needs for water infrastructure more than $1 trillion over next 25 years.**
2. **Water bills will go up**

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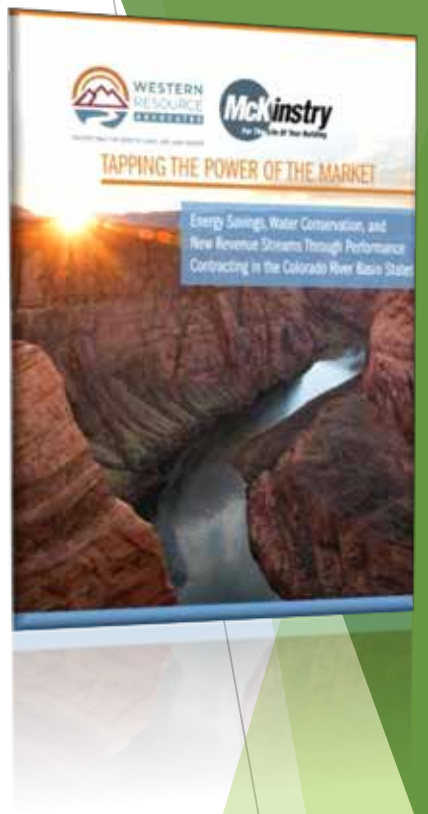
Water and Energy EPC Market Study Results

Potential Savings via Market-Based Solutions in the Colorado River Basin States*

Savings Type	Total Savings Potential
Electricity	6,400,000 MWh
Natural Gas	4,200 MCu. Ft
Water	104,000 AFY
$$$	$975,000,000

Public Facilities
Public Water Systems
Public Wastewater Systems

*Calculations from Western Resource Advocates and McKinstry, Inc. 2015, and subsequent ground-truthing verifying the study's data and assumptions.



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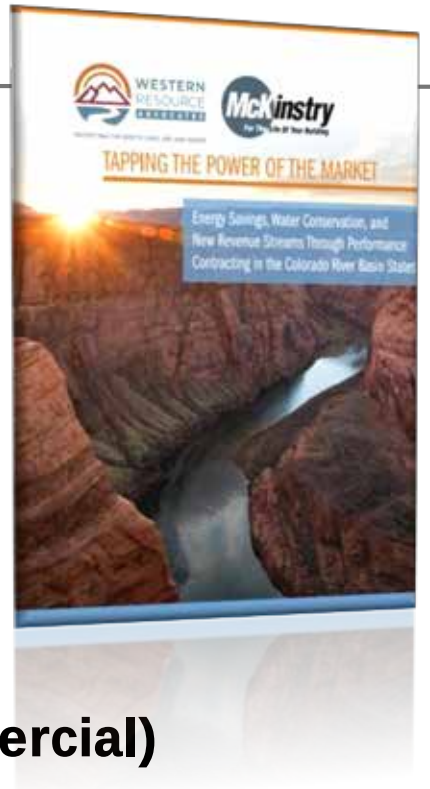
Justification

Potential savings in public buildings via water efficient retrofits*

State	Acre-feet/yr	$/yr
Colorado	6,840	$8,400,000
Nevada	4,680	$7,800,000
New Mexico	2,280	$2,800,000
Total	**13,800**	**$19,000,000**

*Calculations from the *Tapping the Power of the Market* study, and subsequent ground-truthing verifying the study's data and assumptions



Potential savings in Colorado via turf replacement (residential), cooling towers (commercial), and irrigation audits and upgrades (commercial)

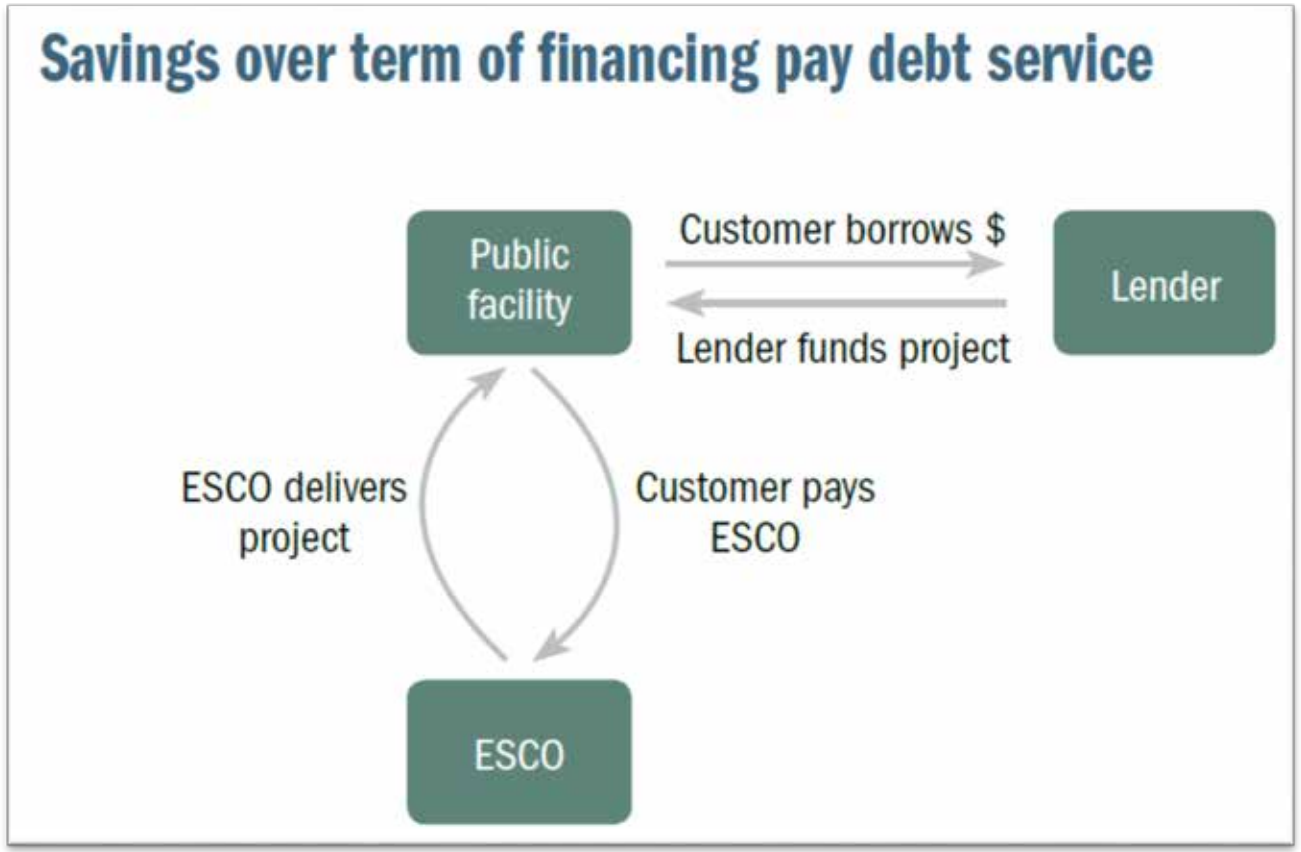
Measure	Penetration Level	Potential Savings (AFY)
Turf Replacement	25% of single family homes, ≤ 60% turf	125,800 to 211,700
Cooling Towers--increased cycle concentration	50% by 2030	3,100 to 24,500
Commercial landscape audits w/ irrigation upgrades	25% commercial irrigators	1,500 to 5,800

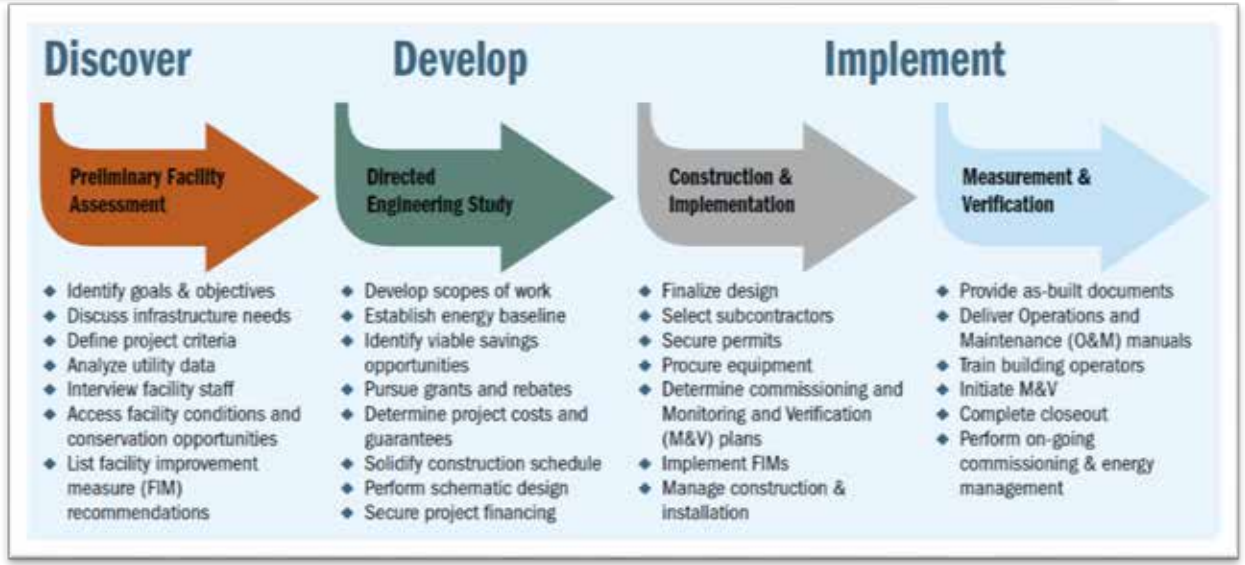
Source: Colorado SWSI Phase 2 Conservation Matrix

Financing and Paying

Performance Contracting Projects

Major Steps





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Water Measurement and Verification (M&V) Project

Drivers

- Lack of M&V guidelines for consumptive use reduction measures
- Lack of water efficiency investments through state EPC programs
- Questionable quality of data currently reported on water savings that limits the ability for states to compare savings across projects

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Water Measurement and Verification (M&V) Project

Vision

Bring uniformity to the way states, utilities, performance contractors, and water efficiency engineering consultants calculate water savings

Goals

- Provide clear, accessible, step-by-step methods to determine water savings
- Create consistency and enhance transparency in how water savings are calculated that allows for comparison of savings across similar efficiency programs and measures
- Strengthen the credibility of water efficiency savings and reduce M&V costs
- Model and reference for future protocols in analogous water efficiency markets, e.g.
  Property Assessed Clean Energy Programs (PACE M&V),
  Water Utility Demand Management Programs (EM&V)

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Water Measurement and Verification (M&V) Project

Process

- Engaging performance contracting industry stakeholders and key subject matter experts is essential to the process
- Develop a usable product within less than a year
- Adopted by
  - State EPC programs
  - Steering Committee member organizations
  - Technical Advisory Groups (TAGs) participants

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Water, State EPCs, and M&V Project (2017) | Steering Committee

State Officials

- Harold Trujillo, New Mexico Energy Technology and Engineering Bureau Chief, New Mexico EPC Program
- Kelly Thomas, Energy Program Manager, Nevada Governor's Office of Energy, Nevada EPC Program
- Taylor Lewis, Program Engineer, Colorado Energy Office Colorado EPC Program

Utilities

- Patrick Watson, Conservation Services Administrator, Southern Nevada Water Authority (SNWA)
- Carlos Bustos, Water Conservation Program Manager, Albuquerque Bernalillo County Water Utility Authority
- Frank Kinder, Senior Conservation Specialist, Colorado Springs Utilities

Stakeholder-Based Organizations

- Donald Gilligan, President, NAESCO
- Mary Ann Dickinson, President and CEO, Alliance for Water Efficiency
- William D. Taylor, Private Sector Co-Chair, ESC Nevada Chapter
- Oscar Rangel, Private Sector Co-Chair, ESC Nevada Chapter
- Scott Griffith, Private Sector Co-Chair, ESC Mexico Chapter

Federal Officials

- Paul Matuska, Water Accounting and Verification Group Manager, US Bureau of Reclamation

Performance Contracting Consultants

- John Canfield, President, Trident Energy Services
- Chris Halpin, President, Celtic Energy

Project Organization

Purpose and Objective

Transparency, feedback on draft protocols, buy-in

Stakeholder Review Process (Energy Service Coalition)

Feedback on process and work plan; high-level review; education and buy-in

Steering Committee

Protocol Development

Measure Protocols

Usability ***Validity***

Usability, validity, consensus

TAG 1: Outdoor | **TAG 2: Turf Conversion** | **TAG 3: Cooling Towers**

Technical Advisory Groups

Co-Leads and Facilitators
WRA
Colorado EPC Program

Technical Lead
PNNL

TAG Facilitator
WRA

Senior Advisors of Project
NREL
9Kft Strategies in Energy

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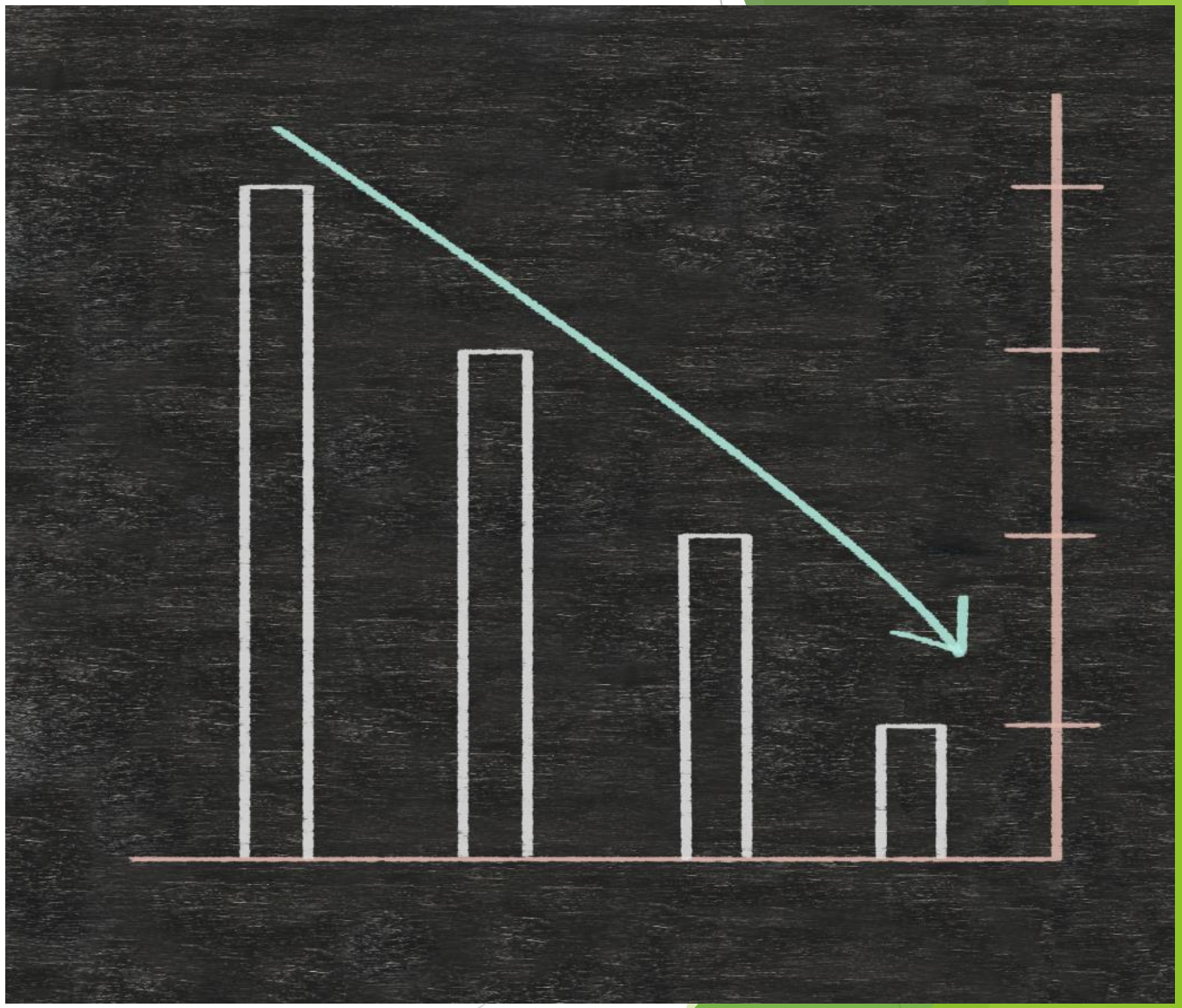
M&V Protocols:
(1) Outdoor Irrigation
(2) Turf Conversion
(3) Cooling Tower (Evaporative Cooling System) Retrofits

Objective

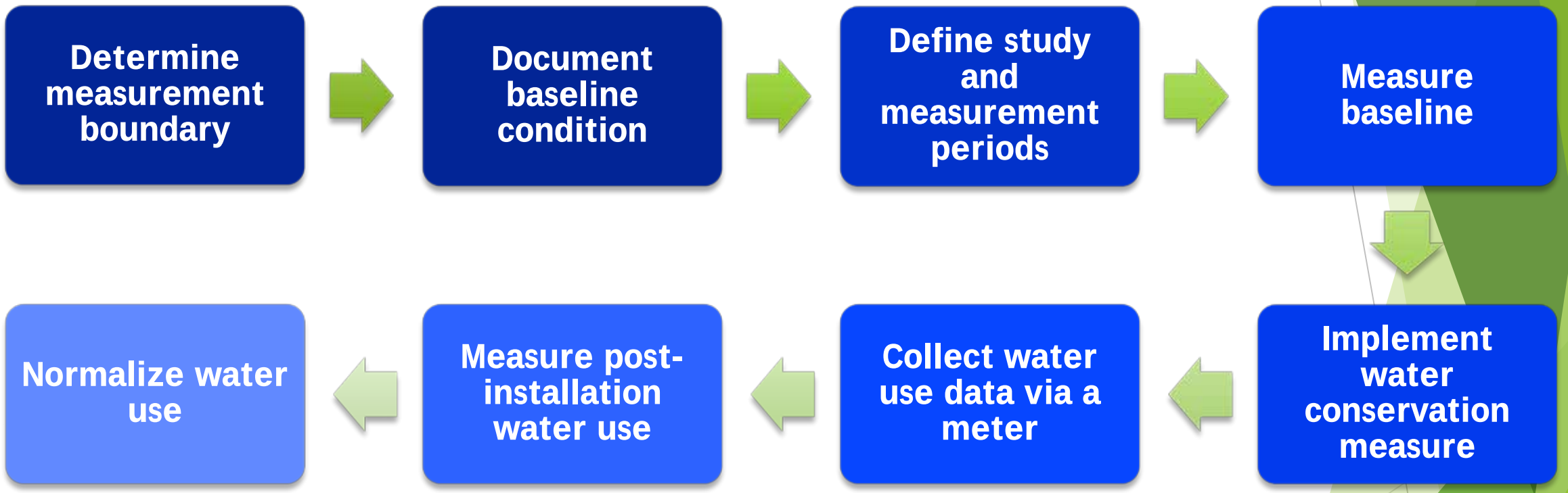
- Designate a ***performance-based*** protocol that specifies direct measurement of water use

Structure of M&V Protocols

- M&V Plan Elements
- Baseline and Post Installation Water Use Determination
- Data (Weather) Normalization
- Commissioning Protocol



M&V Process


Determine measurement boundary
Document baseline condition
Define study and measurement periods
Measure baseline
Implement water conservation measure
Collect water use data via a meter
Measure post-installation water use
Normalize water use

Water Use Estimate and Normalization

Water Use Determination

Preferred method: Continuous measurement with dedicated meter

Acceptable method: Short term measurement with temporary meter

Normalization

Develop a ratio of historic weather conditions to current conditions

E.g., Historic Net ET/Current Net ET

Adjust water use by multiplying by this ratio

M&V Protocols

RESULTS

- Create consistency and enhance transparency in how water savings are calculated

- Increase confidence in water efficiency investments for public sector clients, lenders, performance contractors, state EPC programs, and water utilities

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Thank You!

For questions and/or copies of protocols:

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