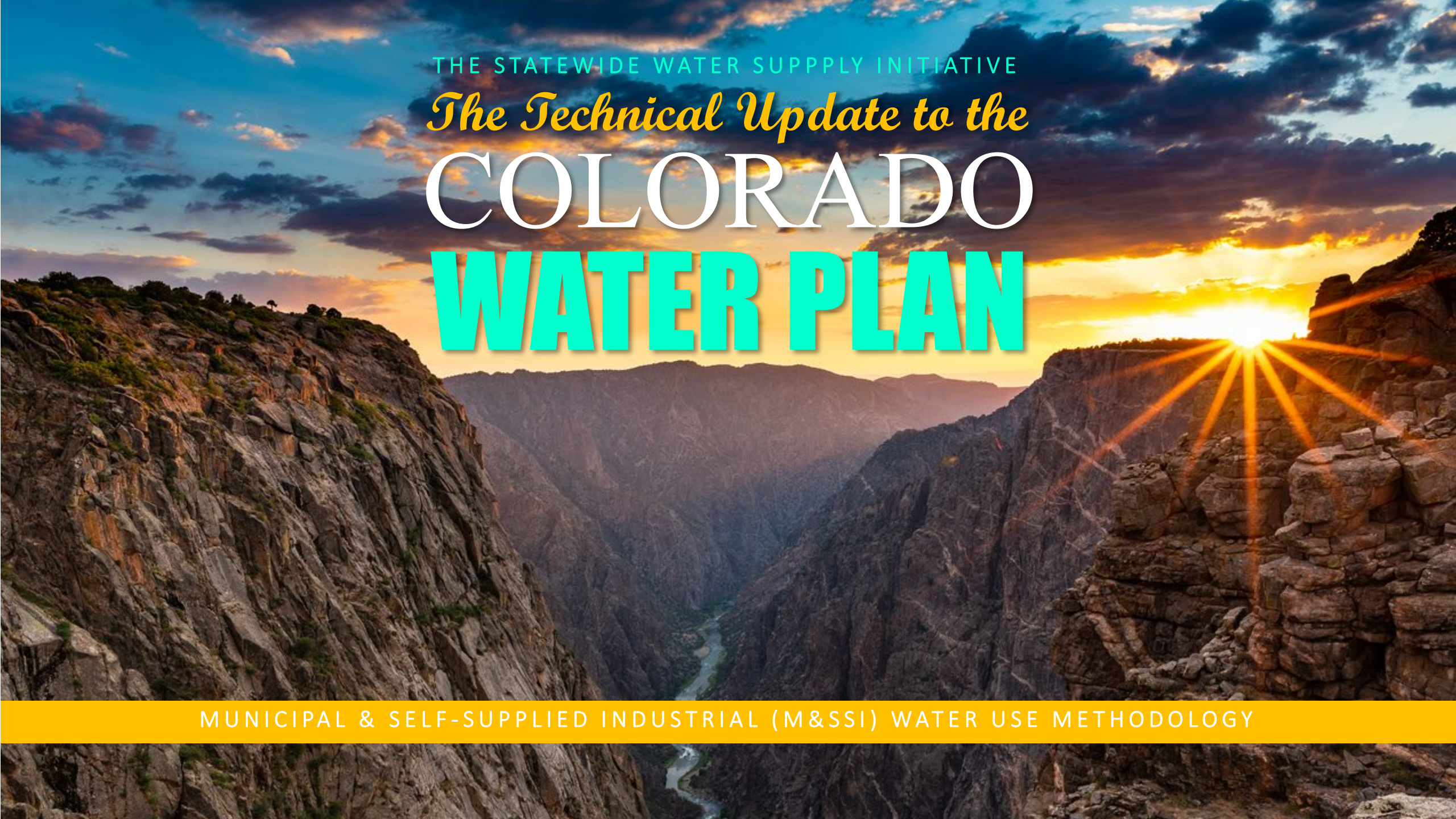


THE STATEWIDE WATER SUPPPLY INITIATIVE

The Technical Update to the

COLORADO WATER PLAN

MUNICIPAL & SELF-SUPPLIED INDUSTRIAL (M&SSI) WATER USE METHODOLOGY

PRESENTATION

AGENDA

- Background / Water Plan Goals /Methodologies
- M&SSI/ New Projections /Implications

ANALYSIS UPDATE

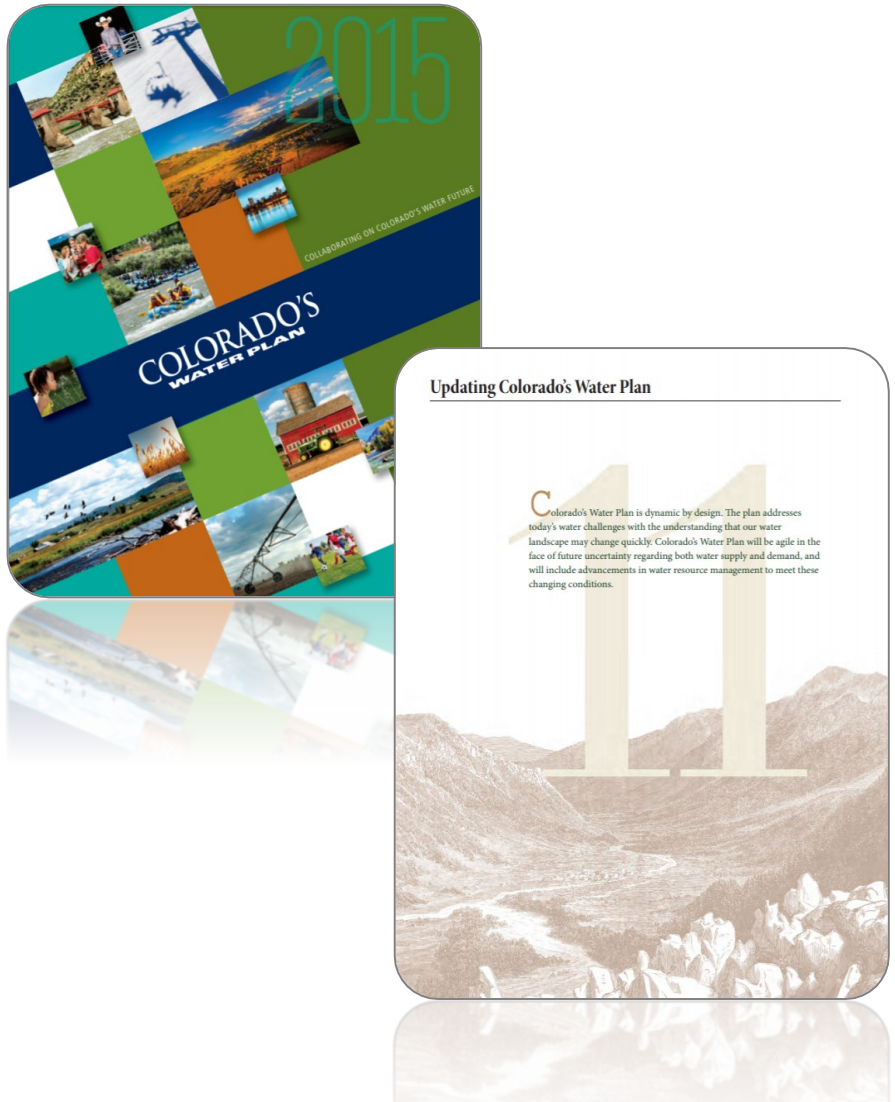


TABLE 11-1 CYCLICAL PLANNING PROCESS PROPOSED BY THE CWCB

Product	Year Initiated
Basin Implementation Plans	2013
Colorado's Water Plan	2013
Statewide Water Supply Initiative	2016
Basin Implementation Plans	2018
Colorado's Water Plan	2020
Statewide Water Supply Initiative	2022

ACTIONS

1. The CWCB will work with other state agencies, the basin roundtables, and the people of Colorado to update Colorado's Water Plan, beginning no later than 2020.
2. The CWCB will develop guidelines for Basin Roundtable WSRA grants to help facilitate the implementation of the BIPs.

UPDATING THE WATER PLAN

A ANALYSIS + PLANNING PHASE

B BASIN INTEGRATION PHASE

C COMPREHENSIVE UPDATE PHASE

TECHNICAL UPDATE OVERVIEW

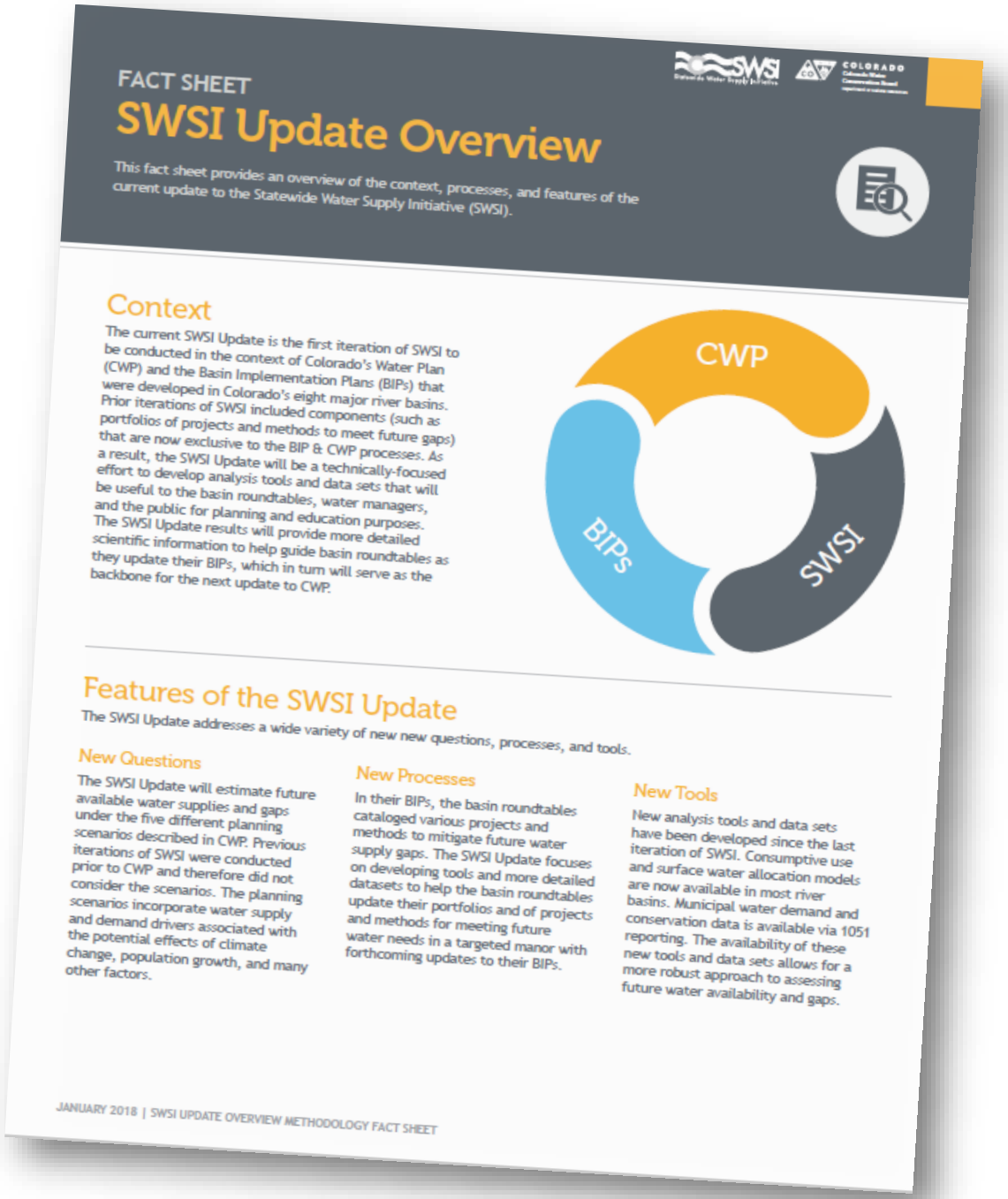
METHODOLOGY

Technical Update update goals:

1) A **consistent statewide framework** for examining future water supply and demand scenarios.

2) **Tools and data for roundtables** to update their basin plans (e.g. identify local solutions).

Visit, the water plan website for fact sheets and webinars!



FACT SHEET

SWSI Update Overview

This fact sheet provides an overview of the context, processes, and features of the current update to the Statewide Water Supply Initiative (SWSI).

Context

The current SWSI Update is the first iteration of SWSI to be conducted in the context of Colorado's Water Plan (CWP) and the Basin Implementation Plans (BIPs) that were developed in Colorado's eight major river basins. Prior iterations of SWSI included components (such as portfolios of projects and methods to meet future gaps) that are now exclusive to the BIP & CWP processes. As a result, the SWSI Update will be a technically-focused effort to develop analysis tools and data sets that will be useful to the basin roundtables, water managers, and the public for planning and education purposes. The SWSI Update results will provide more detailed scientific information to help guide basin roundtables as they update their BIPs, which in turn will serve as the backbone for the next update to CWP.

CWP

BIPs

SWSI

Features of the SWSI Update

The SWSI Update addresses a wide variety of new new questions, processes, and tools.

New Questions

The SWSI Update will estimate future available water supplies and gaps under the five different planning scenarios described in CWP. Previous iterations of SWSI were conducted prior to CWP and therefore did not consider the scenarios. The planning scenarios incorporate water supply and demand drivers associated with the potential effects of climate change, population growth, and many other factors.

New Processes

In their BIPs, the basin roundtables cataloged various projects and methods to mitigate future water supply gaps. The SWSI Update focuses on developing tools and more detailed datasets to help the basin roundtables update their portfolios and of projects and methods for meeting future water needs in a targeted manor with forthcoming updates to their BIPs.

New Tools

New analysis tools and data sets have been developed since the last iteration of SWSI. Consumptive use and surface water allocation models are now available in most river basins. Municipal water demand and conservation data is available via 1051 reporting. The availability of these new tools and data sets allows for a more robust approach to assessing future water availability and gaps.

JANUARY 2018 | SWSI UPDATE OVERVIEW METHODOLOGY FACT SHEET

TECHNICAL WEBINARS

- **February 19** SWSI Methodologies Overview and Population Data
- **March 19** Municipal and Industrial Data & Methodologies
- **April 23** Agricultural Data & Methodologies
- **May 21** Environmental Data & Methodologies
- **June 25** SWSI Tools & Next Steps

SIGN-UP FOR WEBINARS

WEBINARS

STAKEHOLDER-DRIVEN

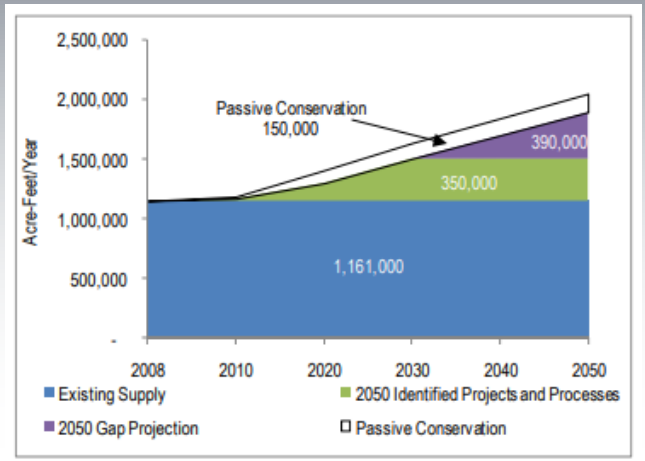
METHODOLOGIES

2050 Demand Projections

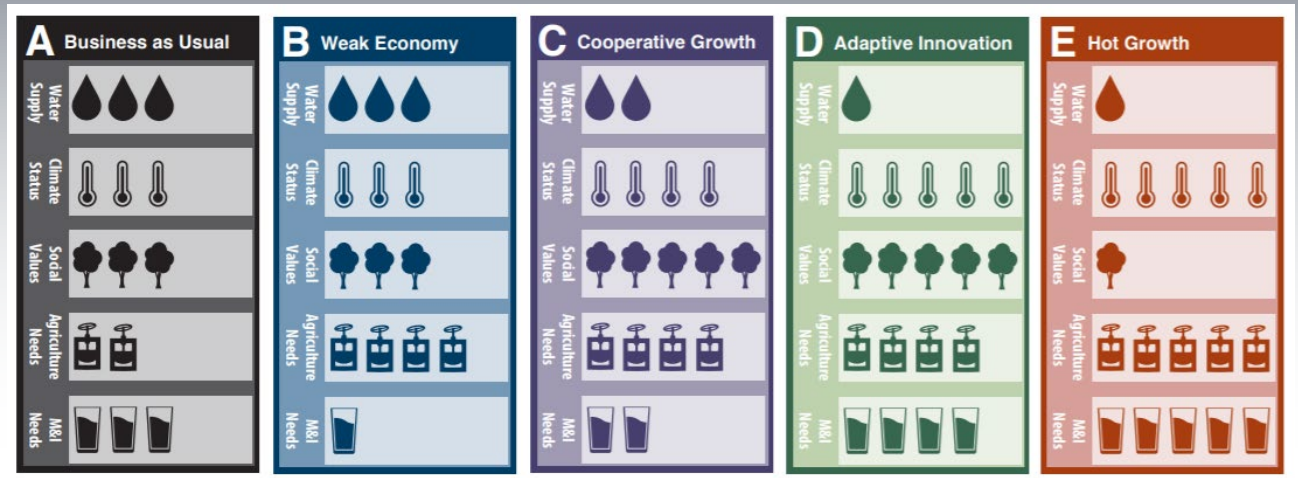
- IPPs

_____

= 2050 M&I Gap



- Hydrologic Modeling
- Municipal Modeling
- Agricultural Modeling
- Environmental Modeling
- Scenario Planning Across Major Drivers



MUNICIPAL & SSI METHODOLOGY

Presentation by

Beorn Courtney

President

ELEMENT Water Consulting

www.elementwaterinc.com

FACT SHEET

Municipal and Self-Supplied Industrial Demand Methodology

This fact sheet summarizes methodologies used to estimate municipal and self-supplied industrial demands in the SWSI Update

Overview of Municipal Demand Methodology

Municipal demands for the SWSI Update will be calculated using methodologies similar to SWSI 2010 but will utilize Planning Scenarios and will use enhanced input data. Enhanced input include data from 1051 reporting data, Water Efficiency Plans, and Basin Implementation Plans.

The basic equation for estimating municipal demand considers population and per-capita water use (described as gallons per capita per day or gpcd).

Demand = Population * gpcd

For the SWSI Update, five scenario-specific, county-level population estimates for 2050 will be developed along with scenario-specific per-capita water use rates.

Municipal Demand Adjustments Under Planning Scenarios

Baseline estimates of 2050 population will be based on Colorado State Demography Office economic modeling. Additional adjustments accounting for statistical and geographic variability will be made per scenario-specific considerations.

Projected Population Growth Through 2050

Future per-capita water use rates will be adjusted to reflect conditions described in each scenario and will consider economic conditions, climate, regulations and technology, and social values. Initial adjustments to future gpcd rates are shown in the table below.

Rate Adjustment Driver	Business as usual	Weak Economy	Cooperative Growth	Adaptive Innovation	Hot Growth
Population	SDO	Low	SDO, adjusted	High, adjusted	High
Climate Conditions	Current	Current	In-between	Hot and dry	Hot and dry
Initial adjustments to future gpcd rates based on drivers such as water efficiency adoption rates, future residential indoor gpcd, outdoor use, non-residential indoor use, and non-revenue water.					

Summary of municipal demand calculation process for each Planning Scenario

Quantify future population and urban growth

Apply climate impacts to outdoor water use

Adjust future gpcd rates and delivery loss assumptions

Calculate future municipal water demands

JANUARY 2018 | MUNICIPAL AND SELF-SUPPLIED INDUSTRIAL DEMAND METHODOLOGY FACT SHEET

Introduction of ELEMENT Water Consulting

- **Municipal and Self Supplied Industrial Demand projections for the Technical Update** were developed by ELEMENT Water Consulting with assistance from WaterDM

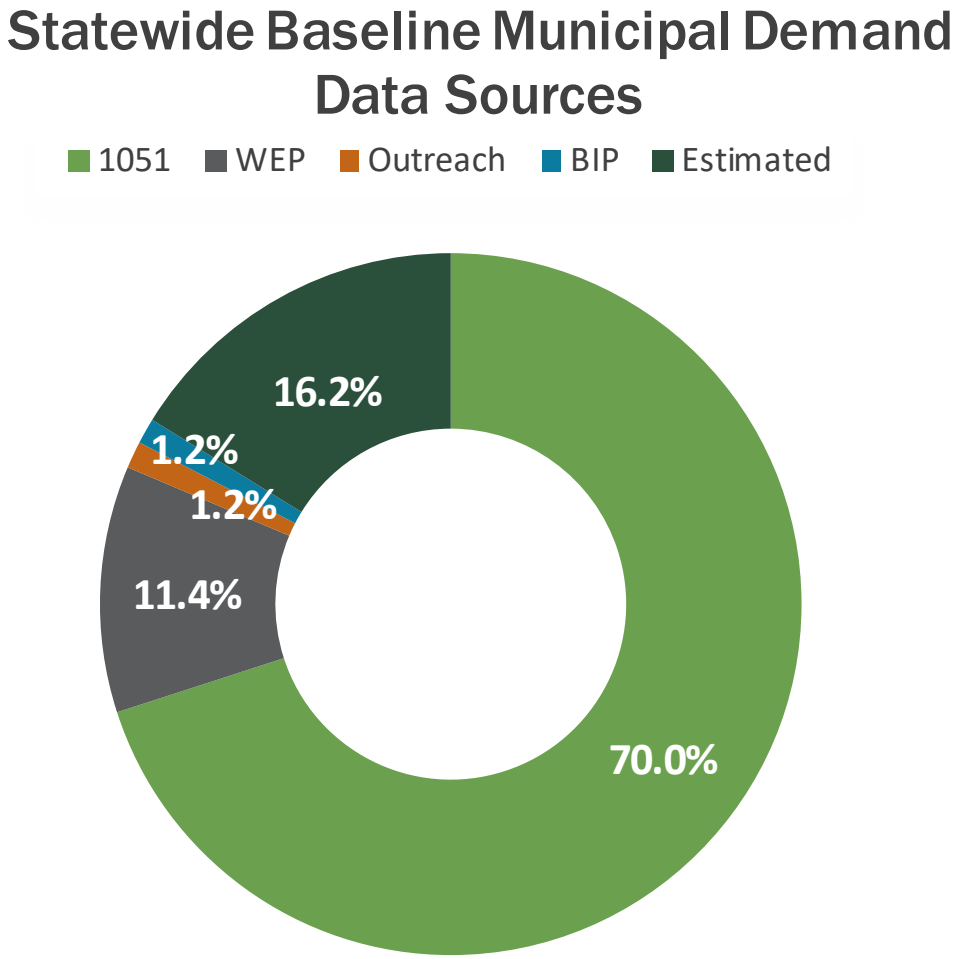
- **ELEMENT Water is a water resources consulting firm** with extensive experience in water demand projections and water-related studies, including partnering with WaterDM to prepare the projected municipal demand savings for SWSI 2010

- **ELEMENT Water's other roles in the technical update included:**
  - Contributing to the Jacobs team with the Scenario Planning Technical Advisory Group
  - Providing M&SSI-related water demand modeling recommendations to Wilson Water Group for the hydrologic modeling

ELEMENT
Water Consulting

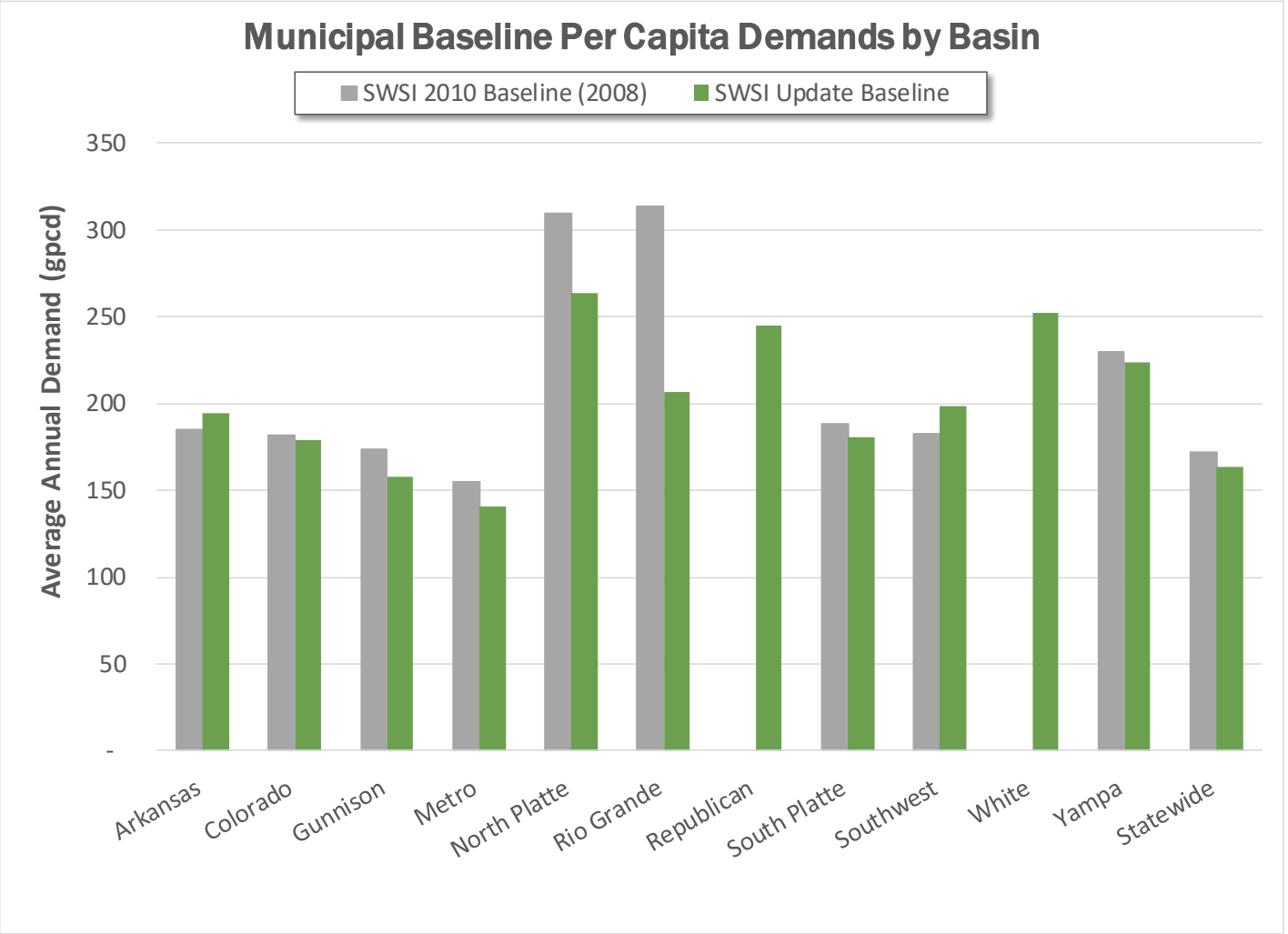
What's Changed since SWSI 2010?

- New and updated baseline data
  - House Bill 2010-1051
  - Municipal Water Efficiency Plans
  - Targeted Outreach
  - Basin Implementation Plans
- Demand projections for five Water Plan scenarios
  - Unique populations and/or distribution throughout the state
  - Unique levels of conservation and demand management
- Demands prepared for hydrologic modeling

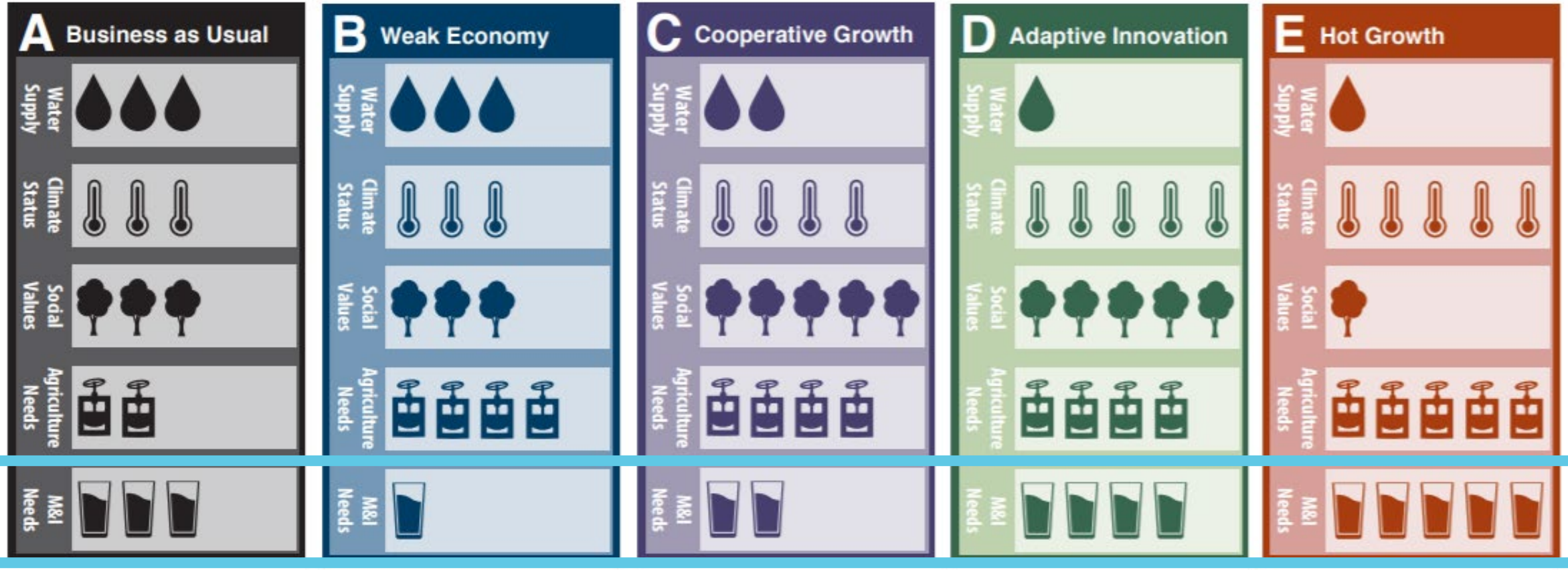


Updated Baseline Per Capita Water Use Data

- Statewide per capita demands have decreased from 172 to 164 gpcd
- Most water provider per capita demands have decreased
- The Update includes raw water and reuse demands



WATER PLAN
SCENARIOS



Revised Municipal Approach for Scenario Planning

- Driver X Rate of Use in gpcd
- SWSI 2010
  - Low/medium/high population projection
  - Future baseline demand using 2018 baseline gpcd
  - Low/medium/high levels of active savings evaluated for a medium population future only
- Technical Update Approach
  - 3 statewide population projections, **distinct county-level populations** for each scenario
  - Additional drivers: **climate, urban land use, technology, regulations, social values**
  - Unique combination of future population and gpcd for each scenario

Key Words from the Water Plan for Municipal Demands

- Recent **trends continue**
- Regular **economic cycles**
- Slow increase in **denser developments**
- Social values and regs **remain the same**
- Water **conservation efforts** slowly increase
- Climate is **similar**

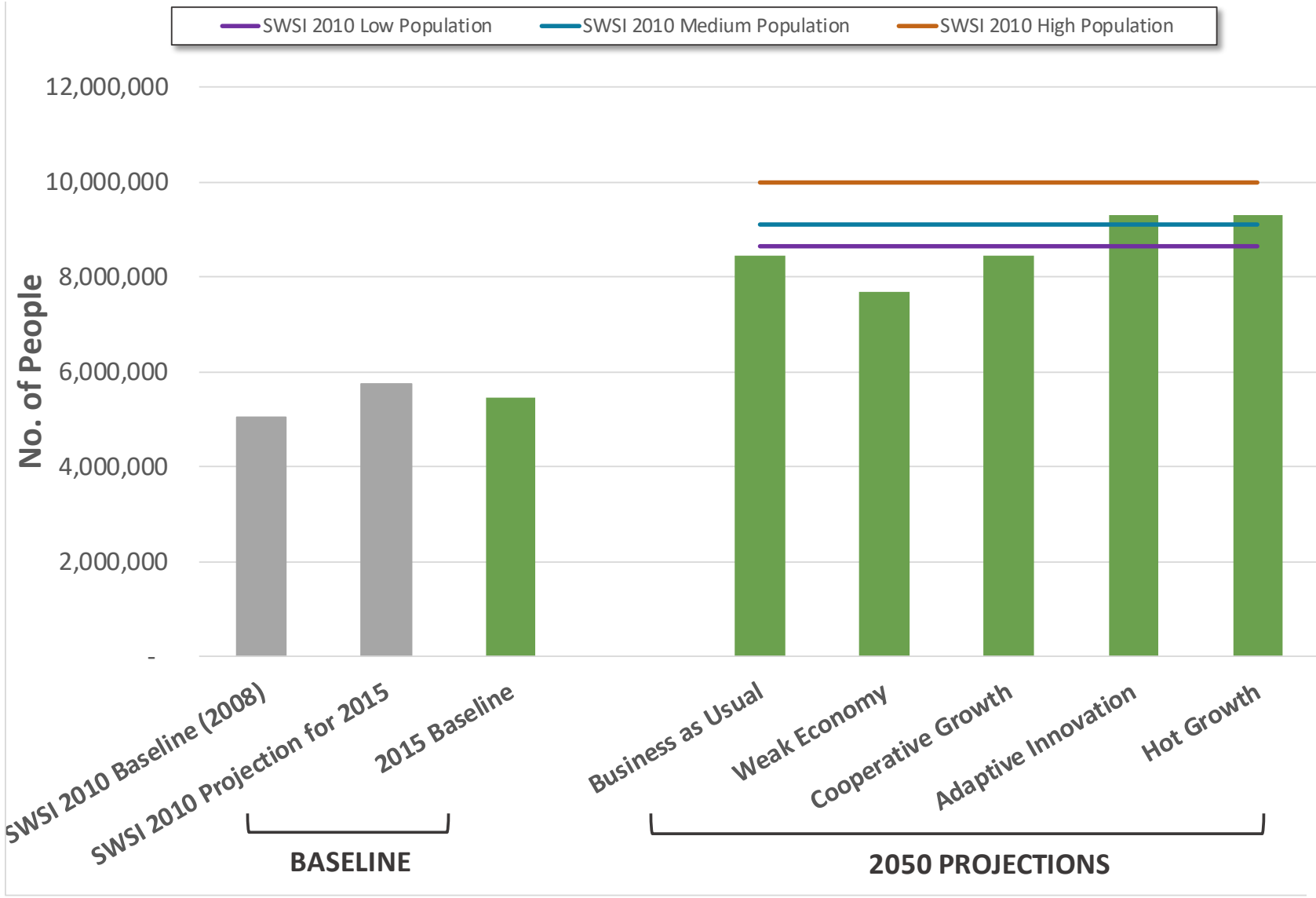
- **Population growth lower** than currently projected
- Economy **struggles**
- Maintenance of infrastructure becomes **difficult to fund**
- **Little change** in social values, levels of water conservation, urban land use patterns, and environmental regulations
- Climate is **similar**

- **Population growth consistent with current** forecasts
- **Integrated and efficient** planning/development
- More development in **urban centers and mountains**
- Embrace water and energy **conservation**
- New water-saving **technologies**
- **Moderate warming** of climate

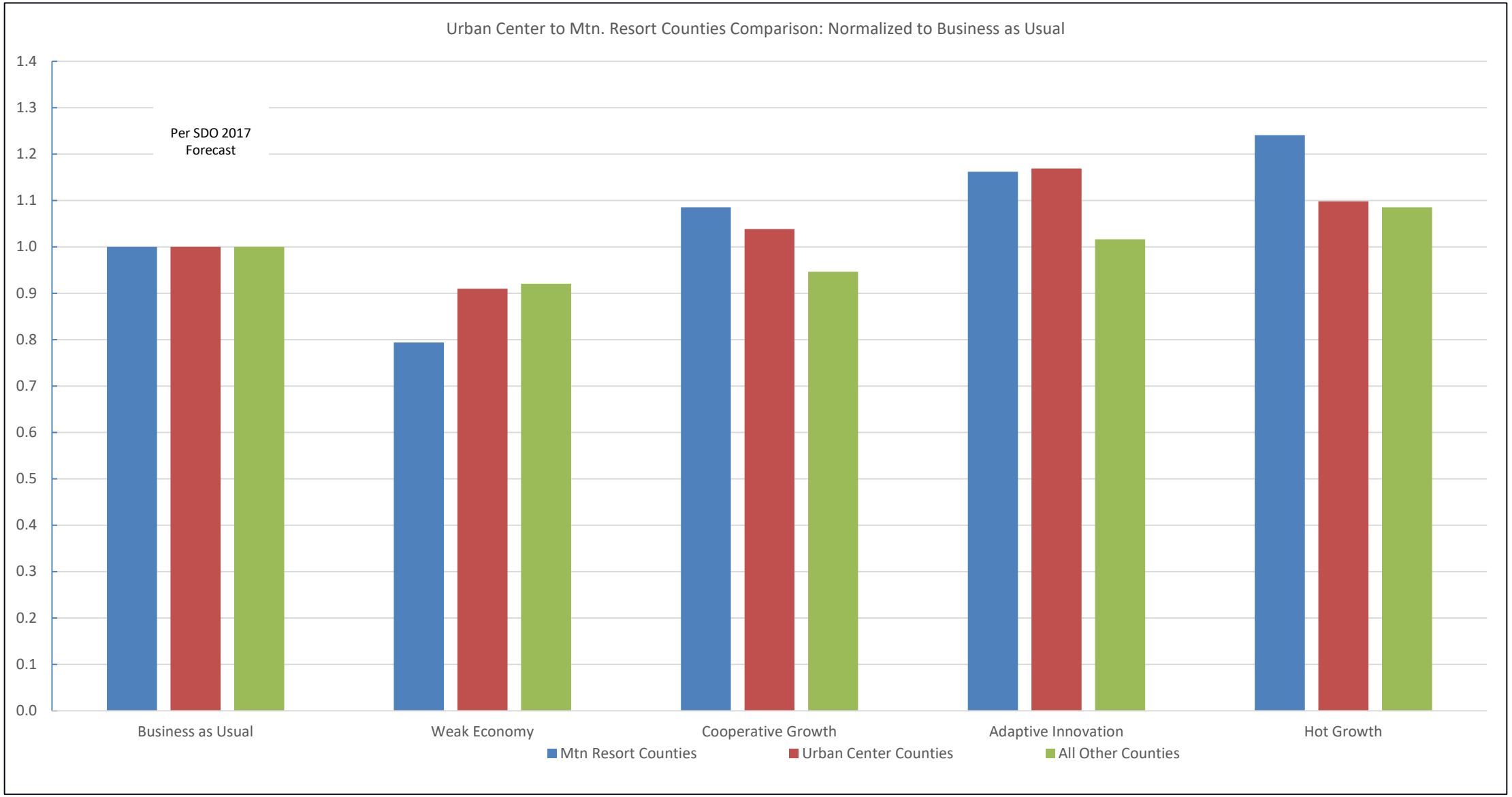
- **Population grows faster** than current
- Social attitudes shift towards **shared responsibility**
- Warmer climate increases irrigation demand, but **technology mitigates increases**
- **Higher water efficiency** helps maintain streamflows
- More **compact urban** development

- Vibrant economy **fuels population growth**
- **Regulations are relaxed**
- **Hot and dry** conditions
- Families prefer **low-density housing**

Population Projections & Comparison to SWSI 2010



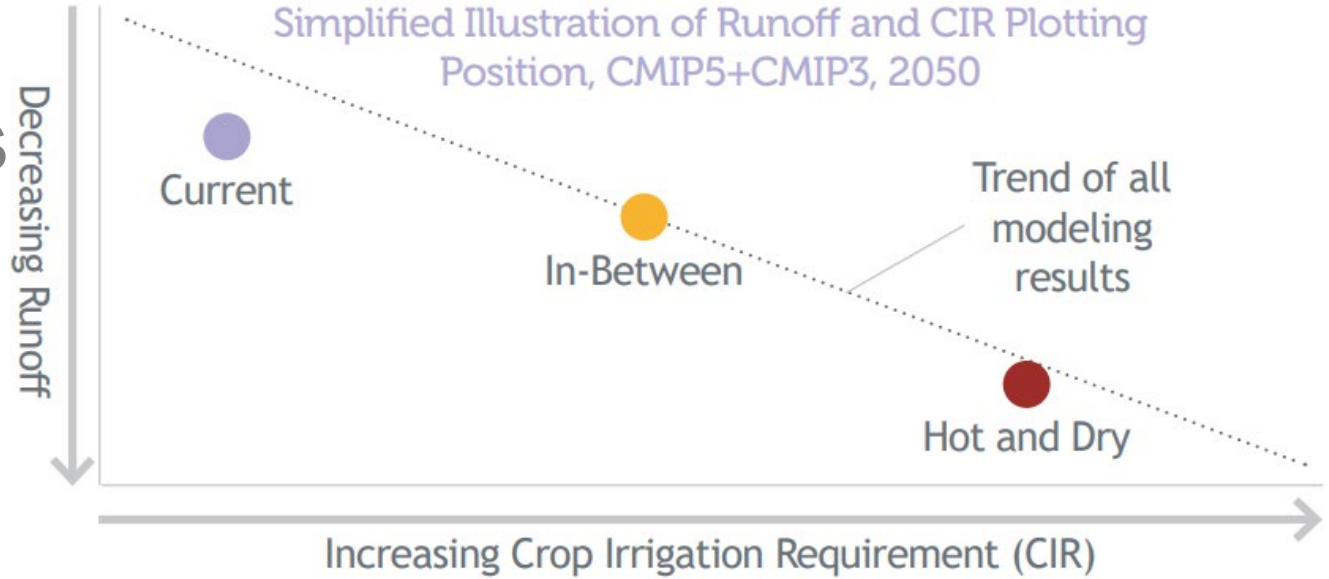
Geographic Comparisons by Water Plan Scenario



Climate Driver

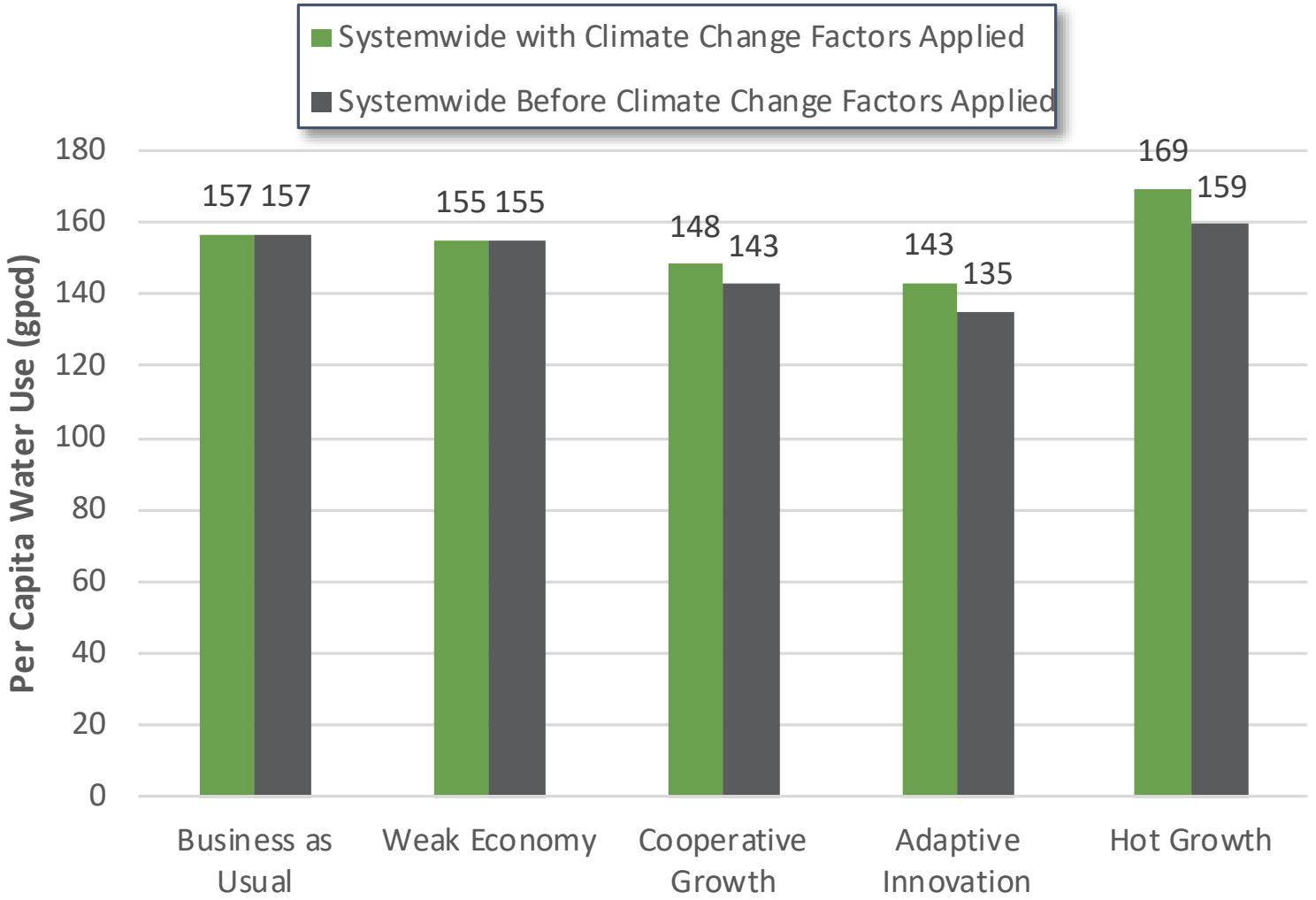
- Current
- Current
- In Between
- Hot and Dry
- Hot and Dry

- The Colorado Water Plan identified climate projections to incorporate in the 2050 Projections:
  - Current, In Between, & Hot and Dry



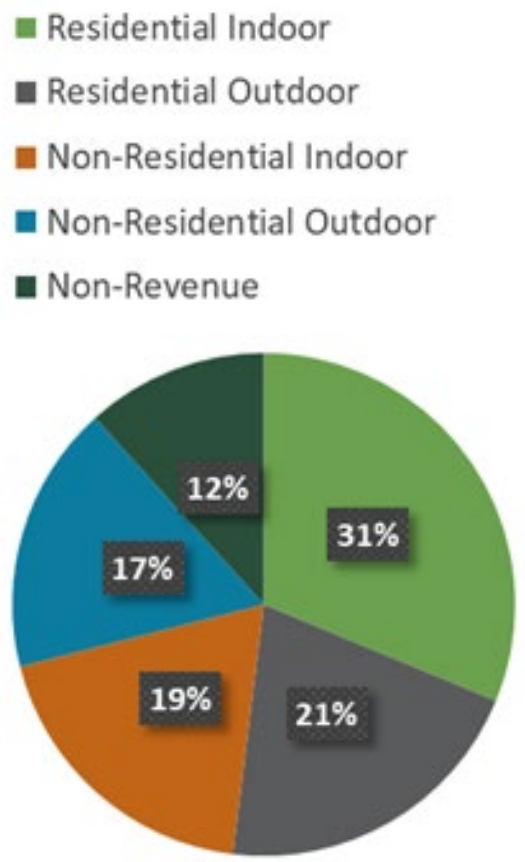
Climate Effects on Municipal Demand Projections

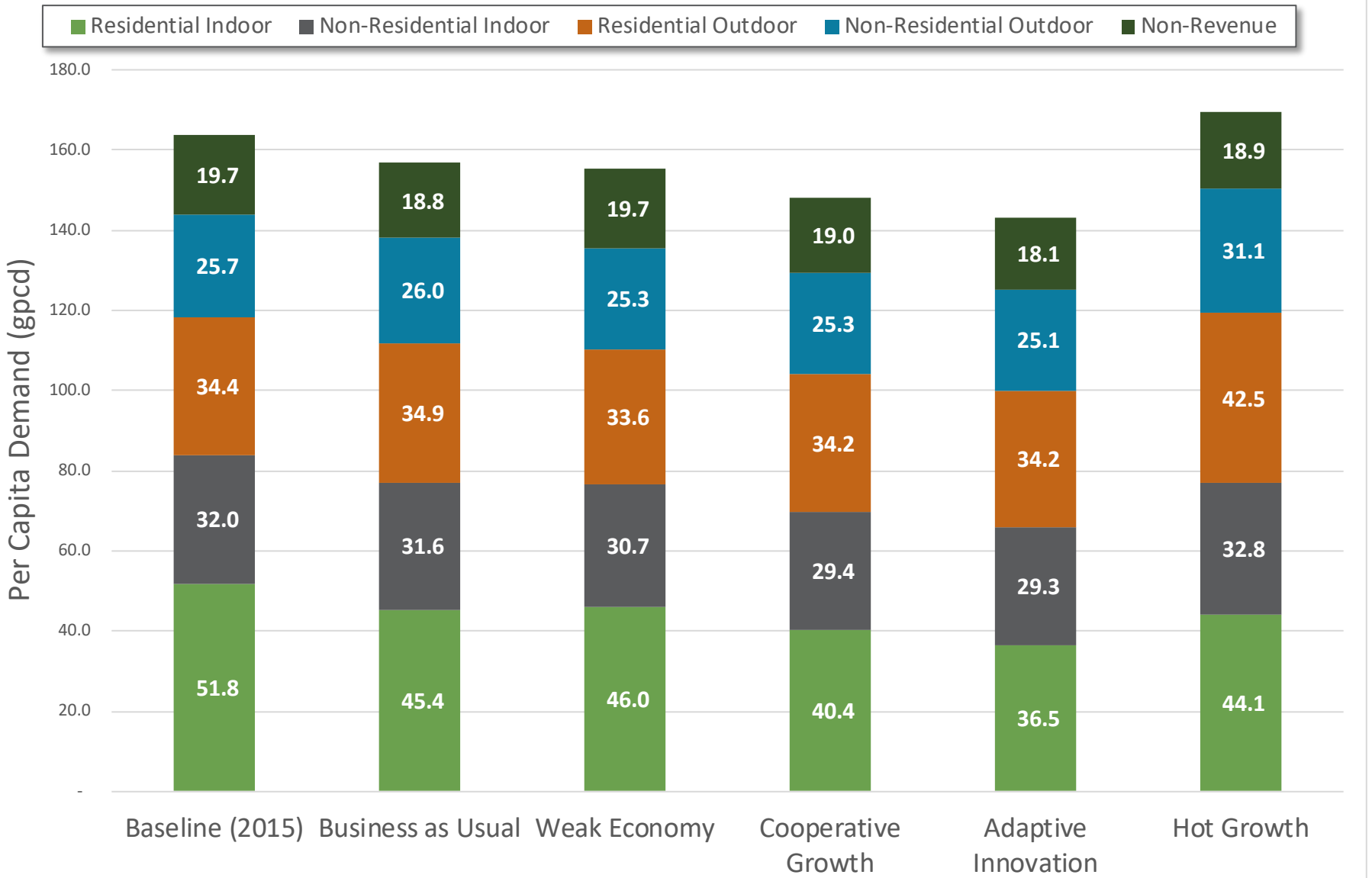
- The Climate driver increases county-level demands by 4% to 22% for the In-Between adjustments and 11% to 37% for the Hot and Dry adjustments



Per Capita Demand Projections

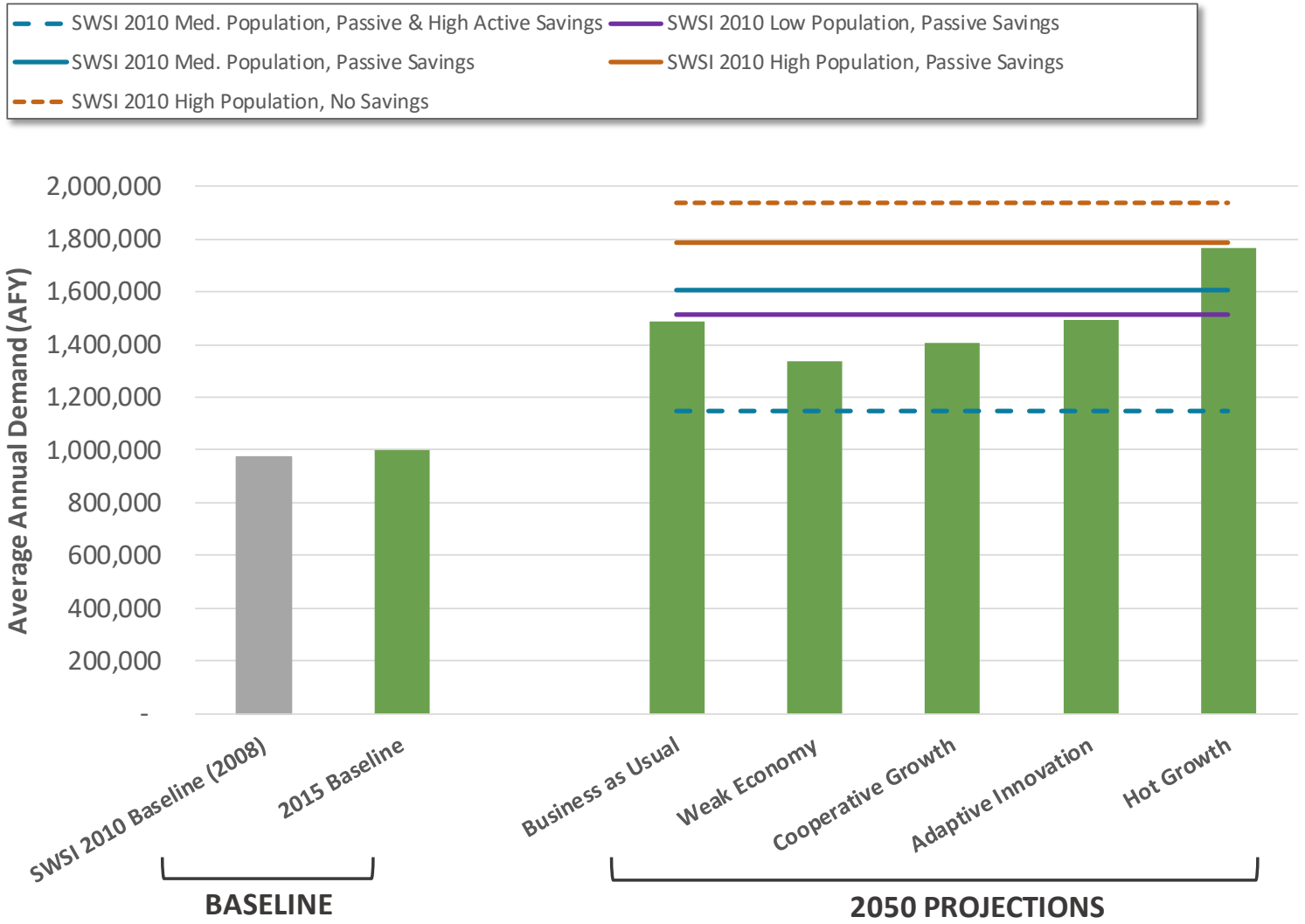
Baseline Distribution





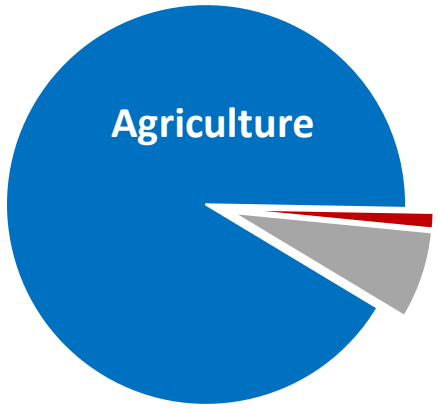
Municipal Statewide Baseline and Projected Demands

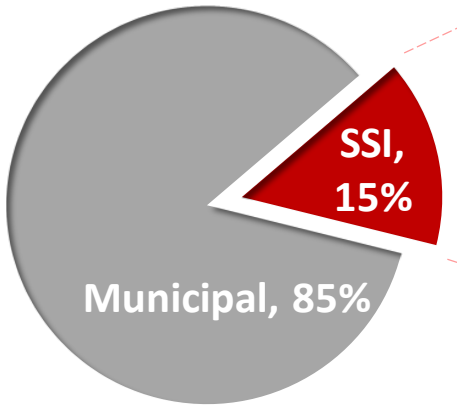
- Baseline is slightly higher than SWSI 2010
- Scenarios fall within the highest and lowest SWSI 2010 projections
- Hot Growth stands out as the high
- Weak Economy stands out as the low
- Business as Usual and Adaptive Innovation are similar



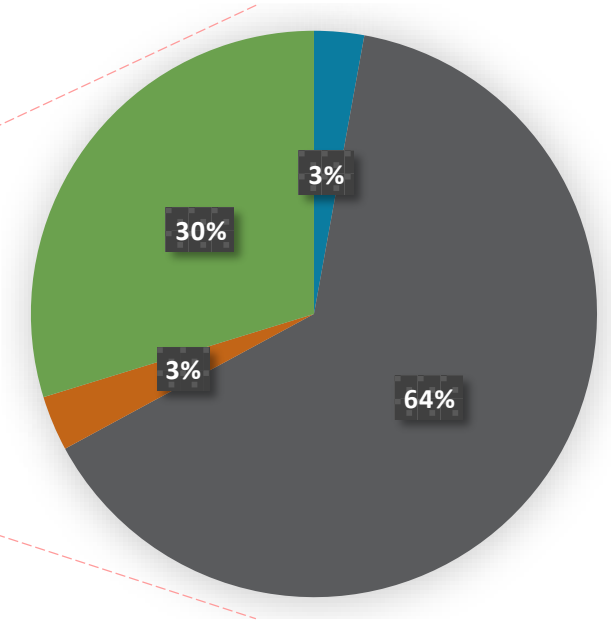
Revised SSI Approach for Scenario Planning

- SWSI 2010
  - 4 SSI categories
  - Low/medium/high projections
- Technical Update Approach
  - New data from targeted outreach and BIPs
  - 5 projections varied by scenario descriptions



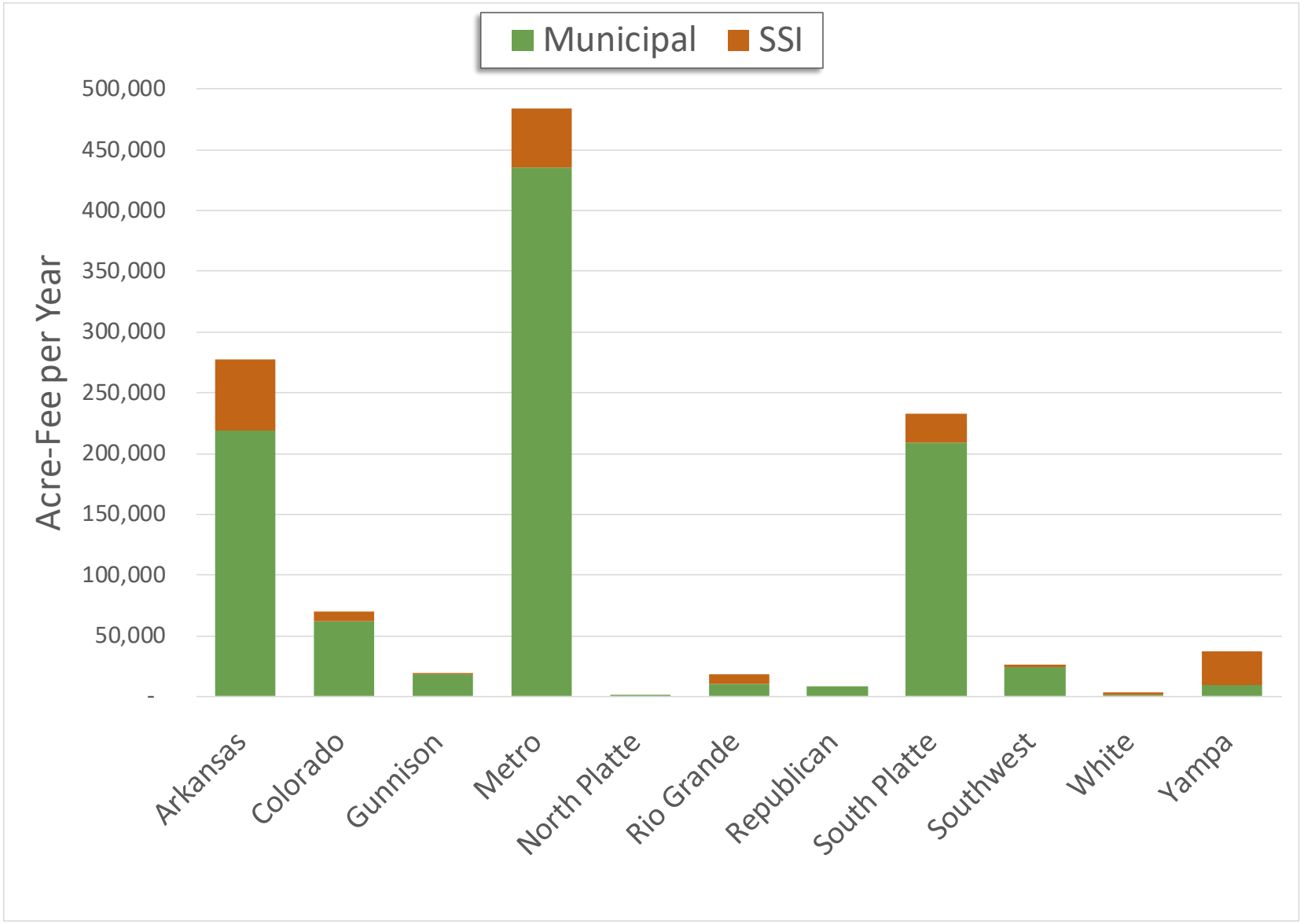


SSI Sub-Sectors



2015 Statewide Municipal and SSI Baseline Demands

- SSI is small relative to Municipal in many Basins



Key Words from the Water Plan for SSI Demands

A Business as Usual

- Recent **trends continue**
- Regular economic cycles
- Social values and regs **remain the same**
- Oil-shale development continues to be researched

B Weak Economy

- Economy **struggles**
- Greenhouse gas emissions **do not grow as much**

C Cooperative Growth

- Embrace water and energy **conservation**
- Widespread **water efficiency** and increased environmental protection

D Adaptive Innovation

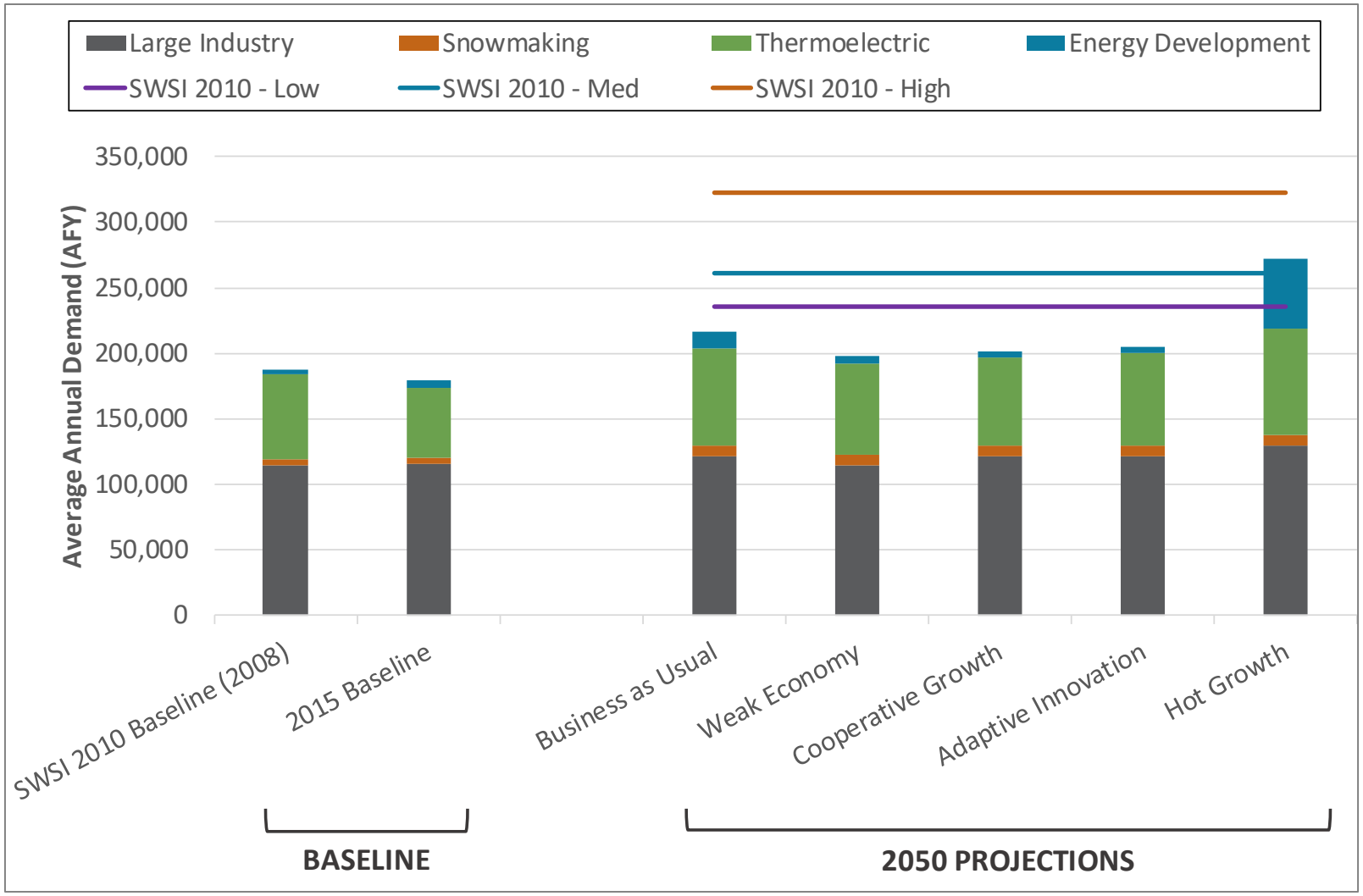
- Renewable and clean energy **become dominant**

E Hot Growth

- Vibrant economy **fuels population growth**
- **Fossil fuel** is the dominant energy source
- **Large production** of oil shale, coal, natural gas, and oil

SSI Statewide Baseline and Projected Demands

- Hot Growth stands out from the other scenarios and is similar to SWSI 2010 Medium
- All other scenarios are lower than the SWSI 2010 Low



Combined M&SSI Baseline and 2050 Demand Projections

- Hot Growth stands out from the rest

Summary

- The Technical Update incorporates new demand projections
  - Utilizes new baseline data
  - Alternative projections based on Water Plan scenario descriptions
- Population and climate are key drivers of M&SSI demand projections
  - Others include varying levels of municipal water use efficiency and changes in SSI


THOUGHTS, COMMENTS OR
QUESTIONS?
CO
COLORADO

Methodology Details

Demand Category	A. Business as Usual	B. Weak Economy	C. Cooperative Growth	D. Adaptive Innovation	E. Hot Growth
Residential Indoor	42.4	42.4	36.4	33.3	42.4
Non-Residential Indoor	0%	-5%	-10%	-10%	+5%
Outdoor	0%	-5%	-15%	-20%	+5%
Non-Revenue Water	0%	+5%	0%	-5%	0%

Scenario:	A. Business as Usual	B. Weak Economy	C. Cooperative Growth	D. Adaptive Innovation	E. Hot Growth
Adoption Rate	50%	40%	60%	70%	60%

SSI Category	A. Business as Usual	B. Weak Economy	C. Cooperative Growth	D. Adaptive Innovation	E. Hot Growth
Large Industry*	-	-10%	0%	0%	10%
Snowmaking	-	0%	0%	0%	0%
Thermoelectric	-	-5%	10%	-5%	10%
Energy Development**	SWSI 2010 - Medium	SWSI 2010 - Medium	SWSI 2010 - Low	SWSI 2010 - Low	SWSI 2010 - High