Constructing Scenarios: Qualitative – Quantitative Assessment

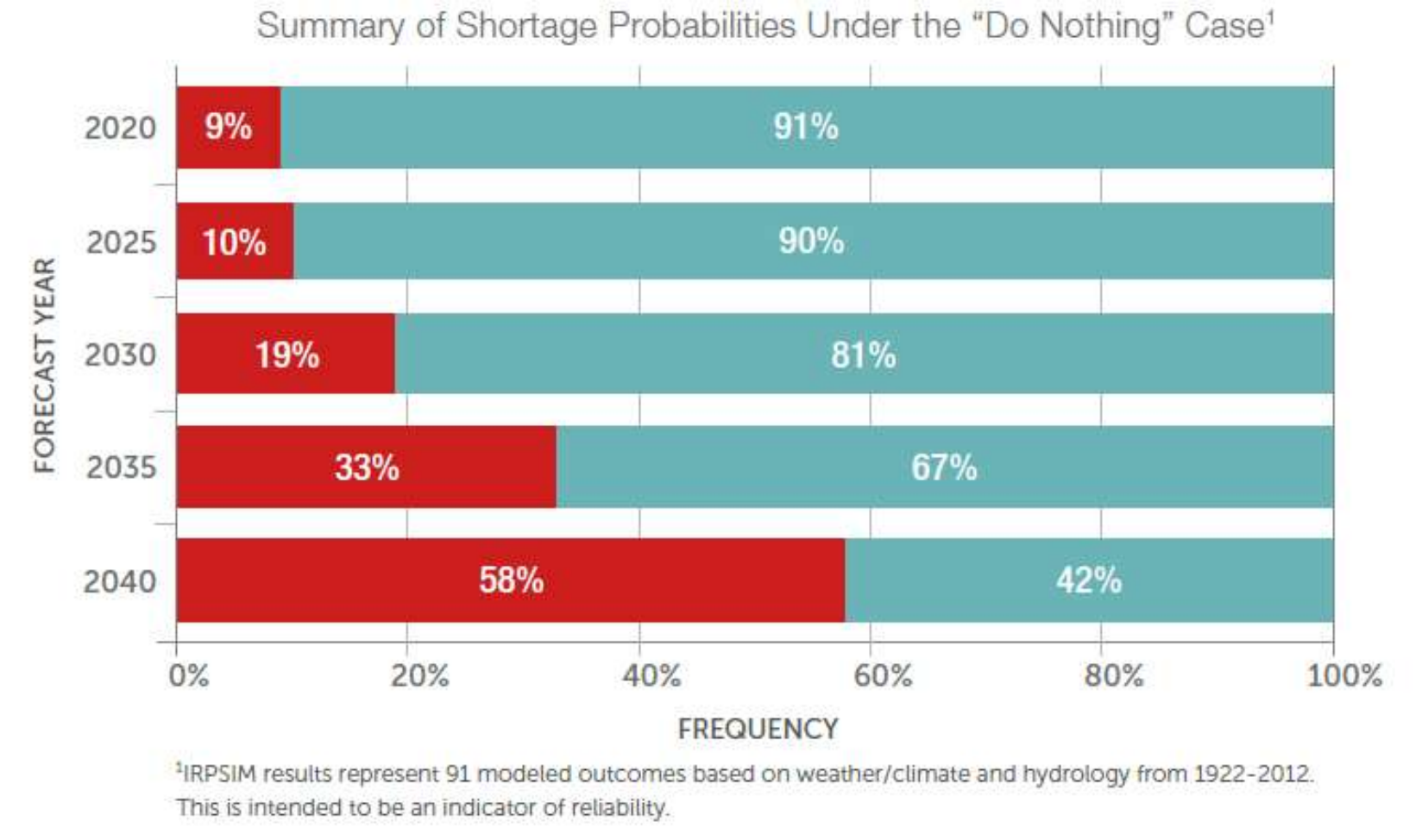
Integrated Resources Plan Special Committee
Item 6a
July 28, 2020

Discussion of Single Scenario vs. Multiple Scenario Approach

Analysis from 2015 IRP Update

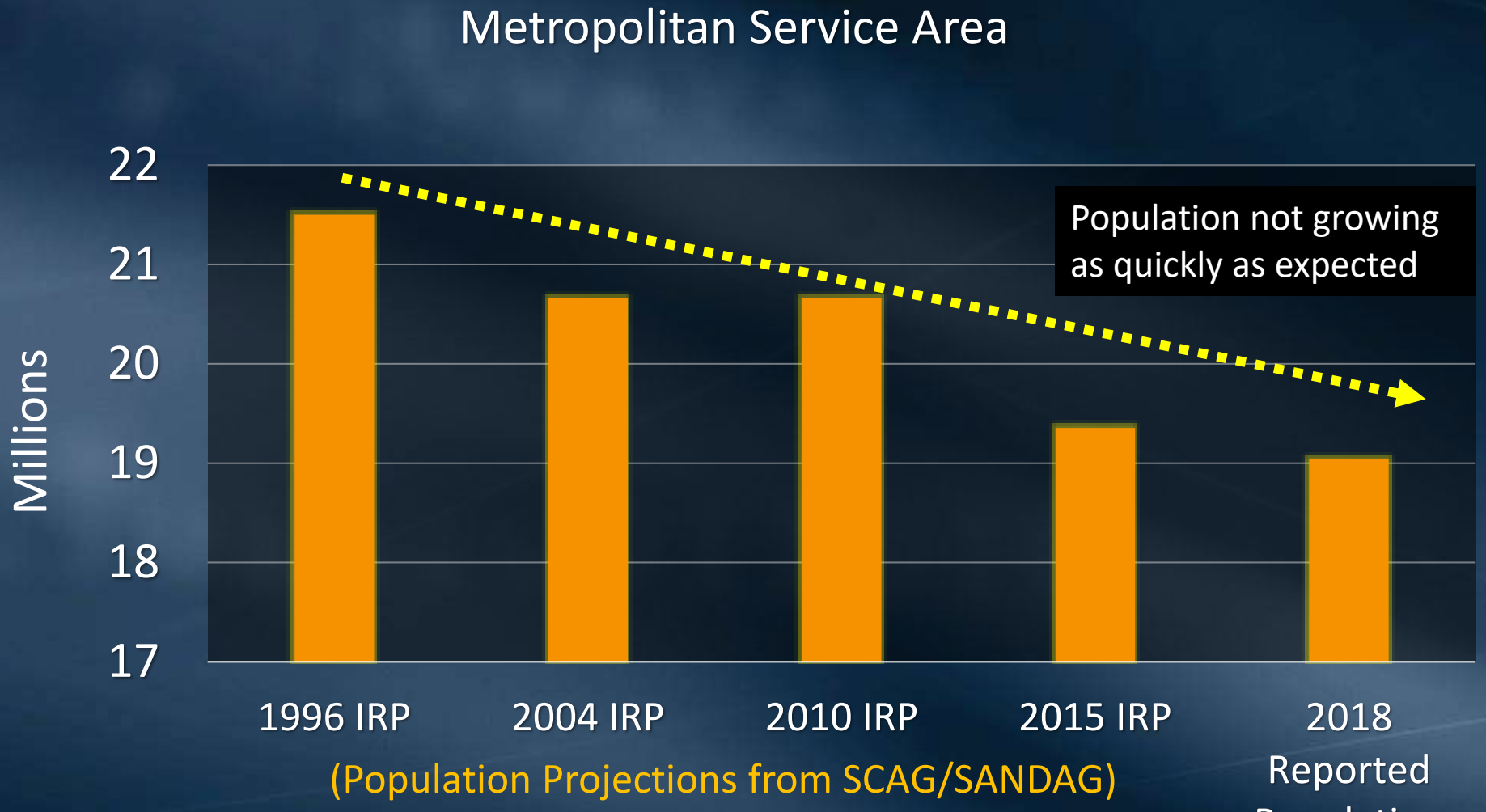
- 2015 IRP (and previous IRPs) identified resource development needs under fixed assumptions and hydrologic uncertainty
  - SCAG/SANDAG demographic forecasts
  - SWP and CRA under specified operational and regulatory conditions
  - Local Supplies from MA survey
  - Hydrology/Climate based on 1922-2012 historical sample (no climate change)
- Resource portfolios identified to cover the gaps

The 2015 IRP Identified a "Gap Analysis" Under a Single Scenario



Population Projections for 2020

Using a Single Forecast has Risk



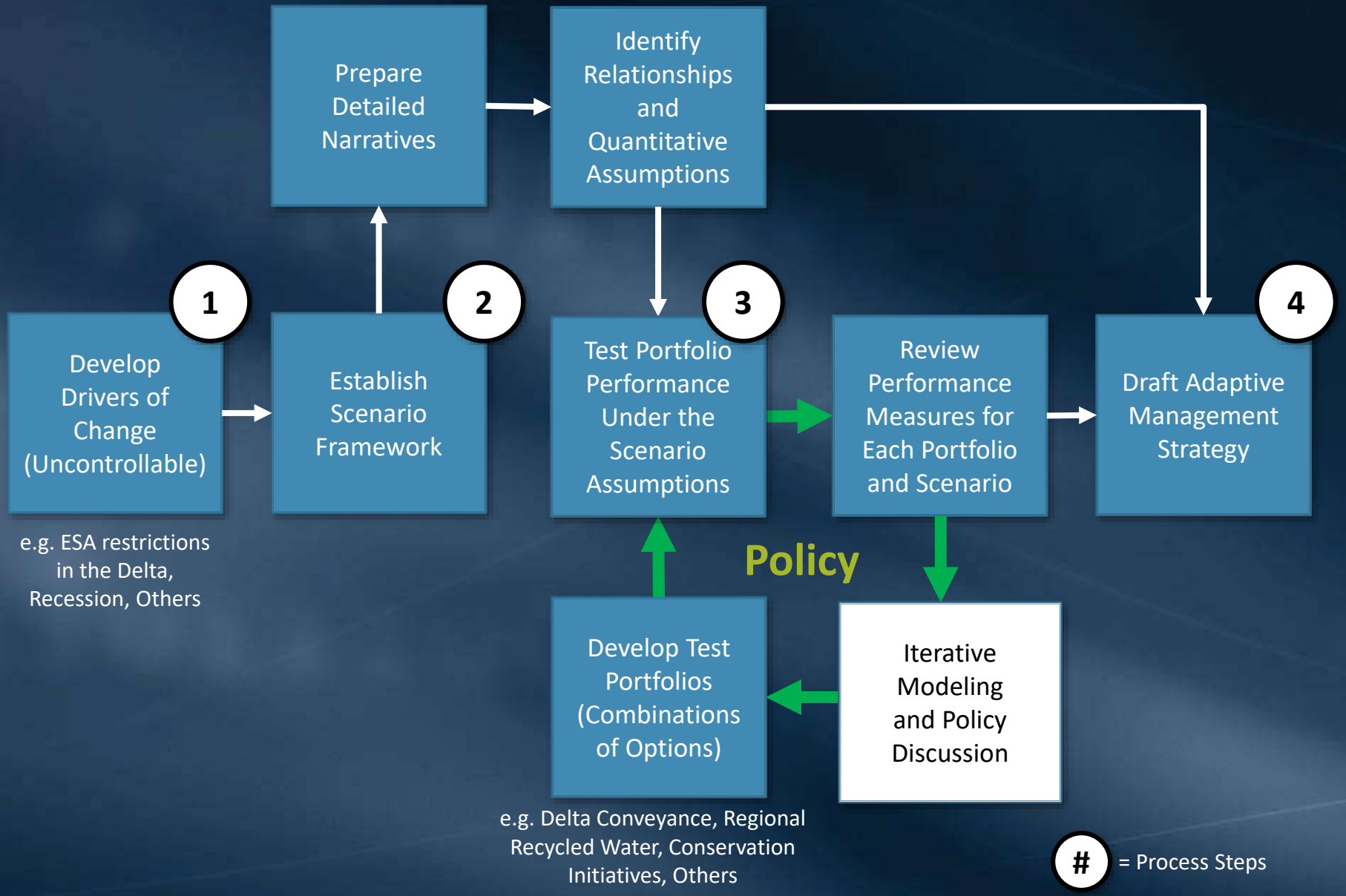
2020 IRP Increases Robustness from the 2015 IRP Update

- Create four scenarios to provide a wider view of the future
  - Conduct four gap analyses
  - Identify resource portfolios that cover the four gap analyses
- Guide decision-making under a more comprehensive adaptive management strategy using information gleaned from the scenarios
- Single scenario approach limits awareness of potential risks and needs

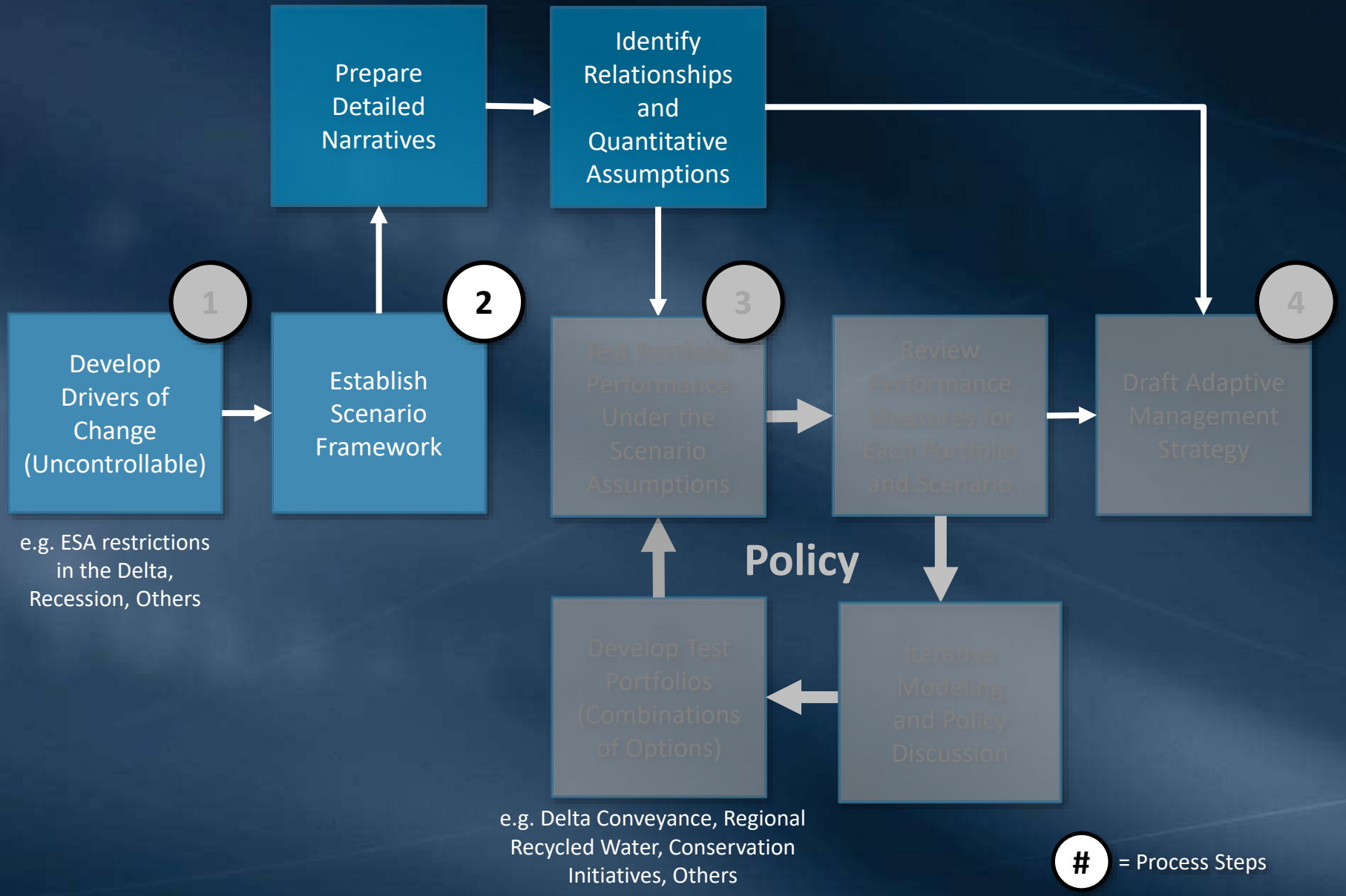
Overview

- Process Recap
- Qualitative – Quantitative Assessment
  - Linking the Drivers to supply/demand impacts
- Collaborative Process

2020 IRP Process Flow Chart



2020 IRP Process Flow Chart



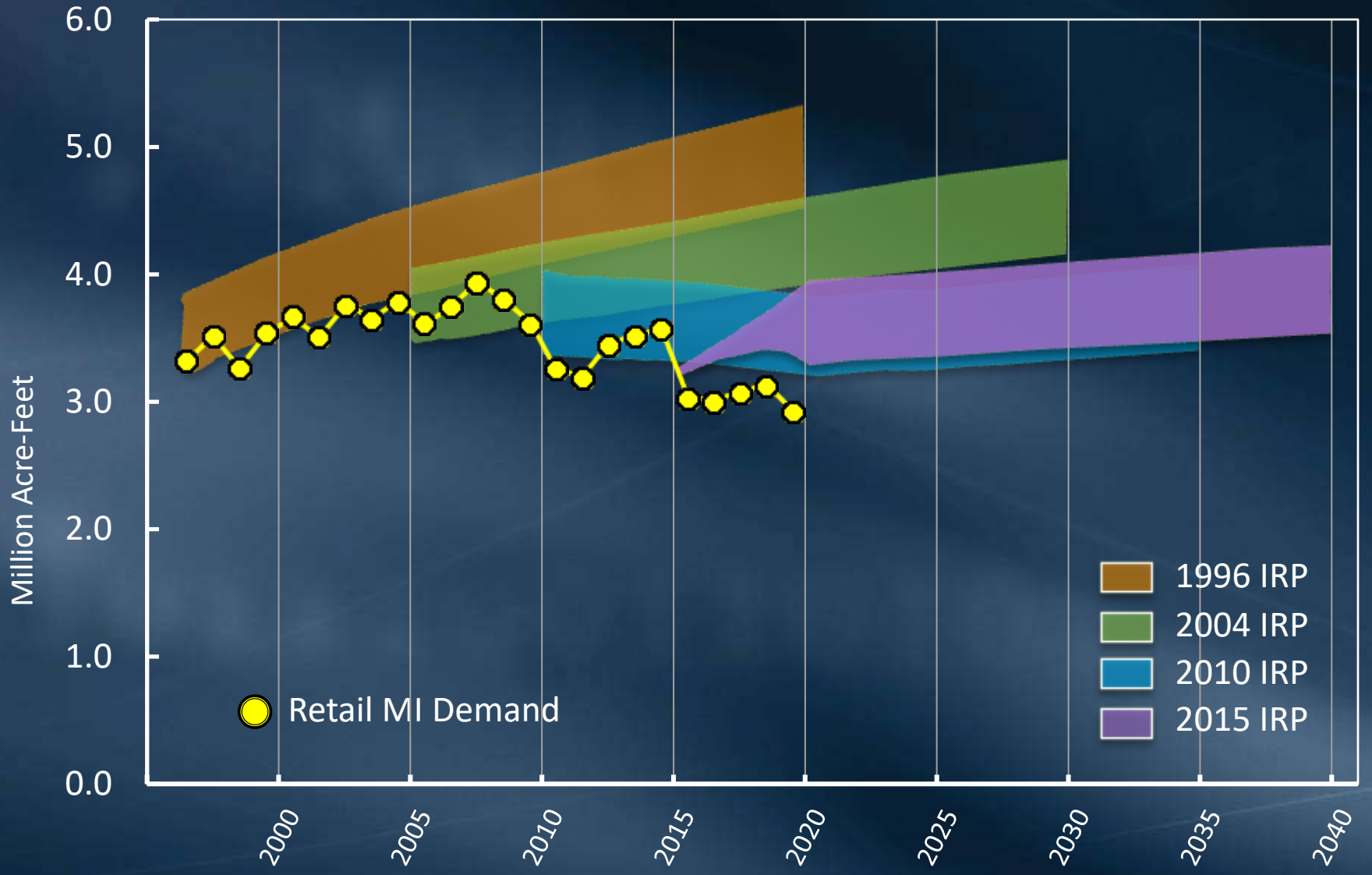
Why Scenario Planning?

Scenario planning allows the IRP to continue Metropolitan's strategy for navigating the challenges facing our water future

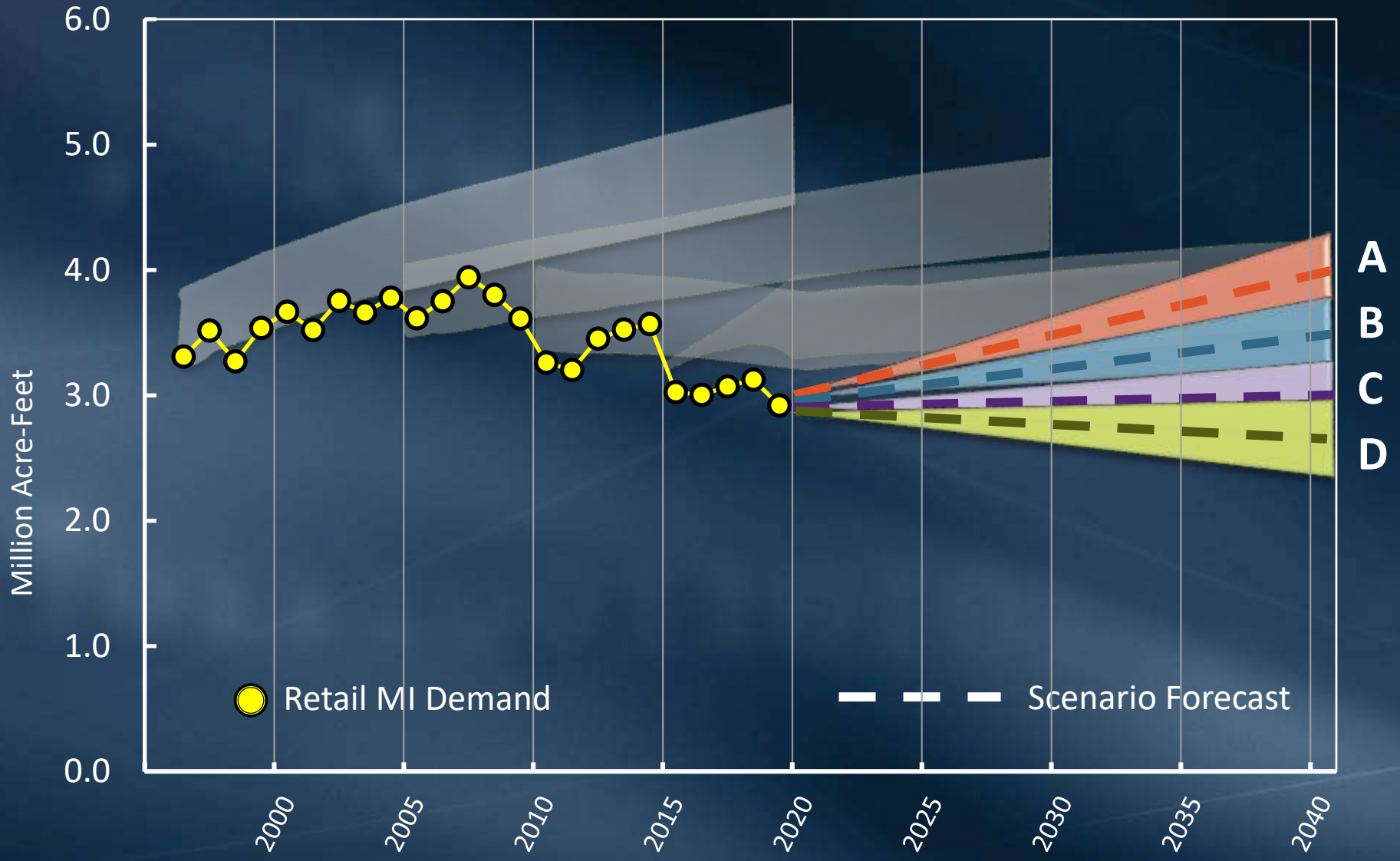
The IRP provides the vision for adaptively managing through the change that is coming

- IRP Goal:
  - Regional Water Reliability
- How do we measure reliability?
  - Evaluating whether or not we have enough water to meet demands

Retail M&I Demand Forecasts Evolved



Retail M&I Demand Forecasts Evolved

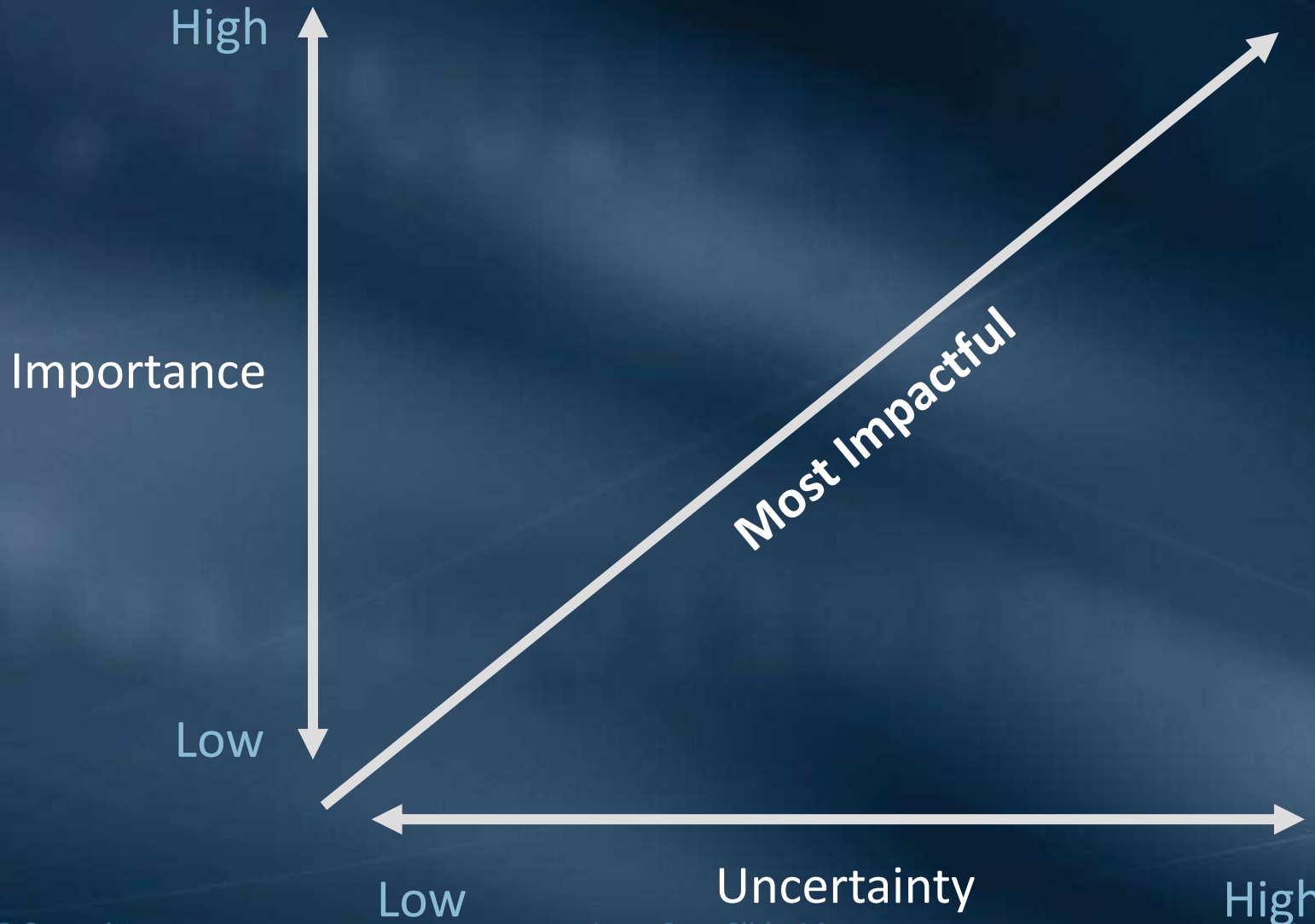


The Scenario Framework Bounds our View of the Future

A Broad View Will Better Prepare us for the Future

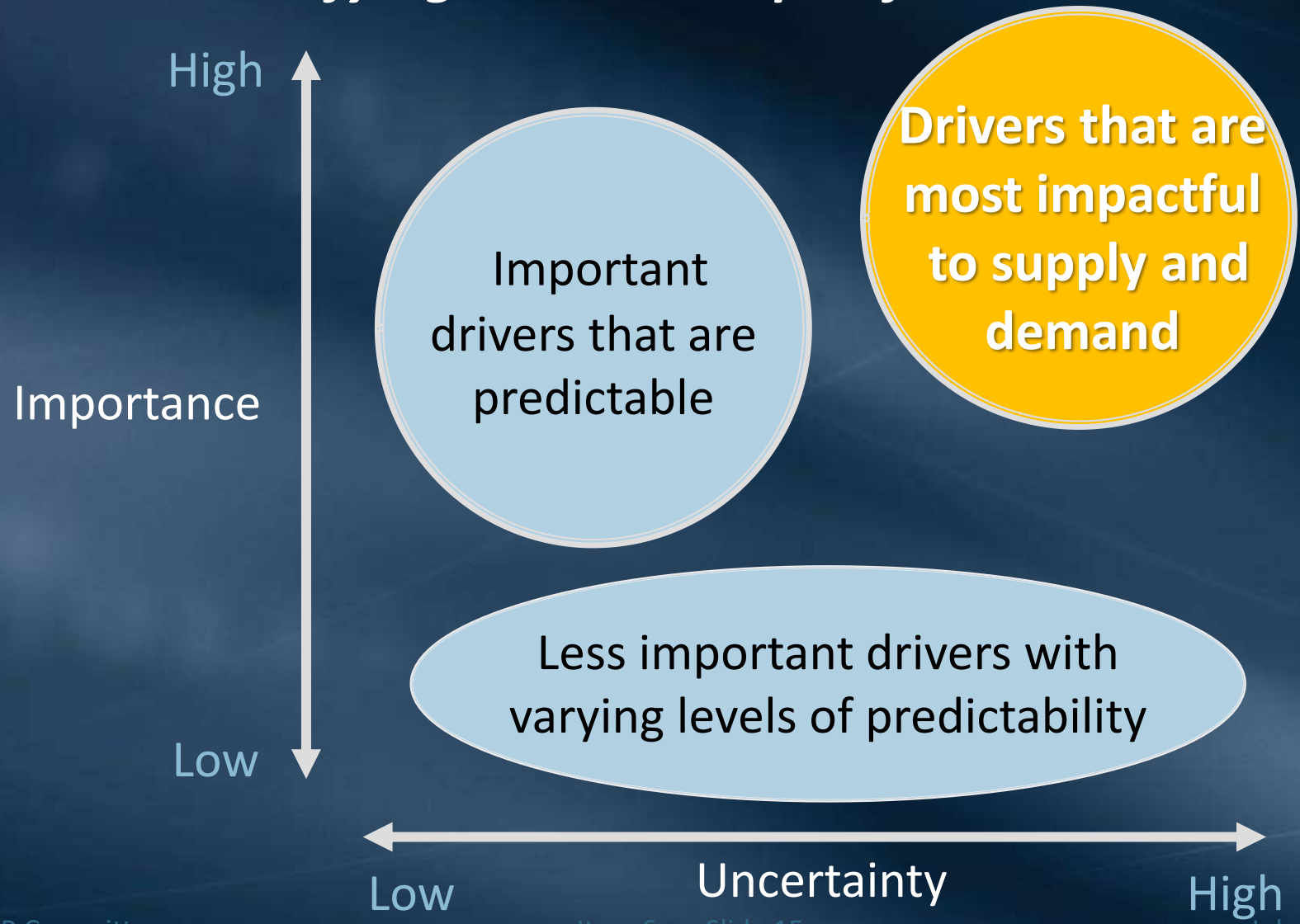
Establishing the Scenario Framework

How Do We Get a Broad View?



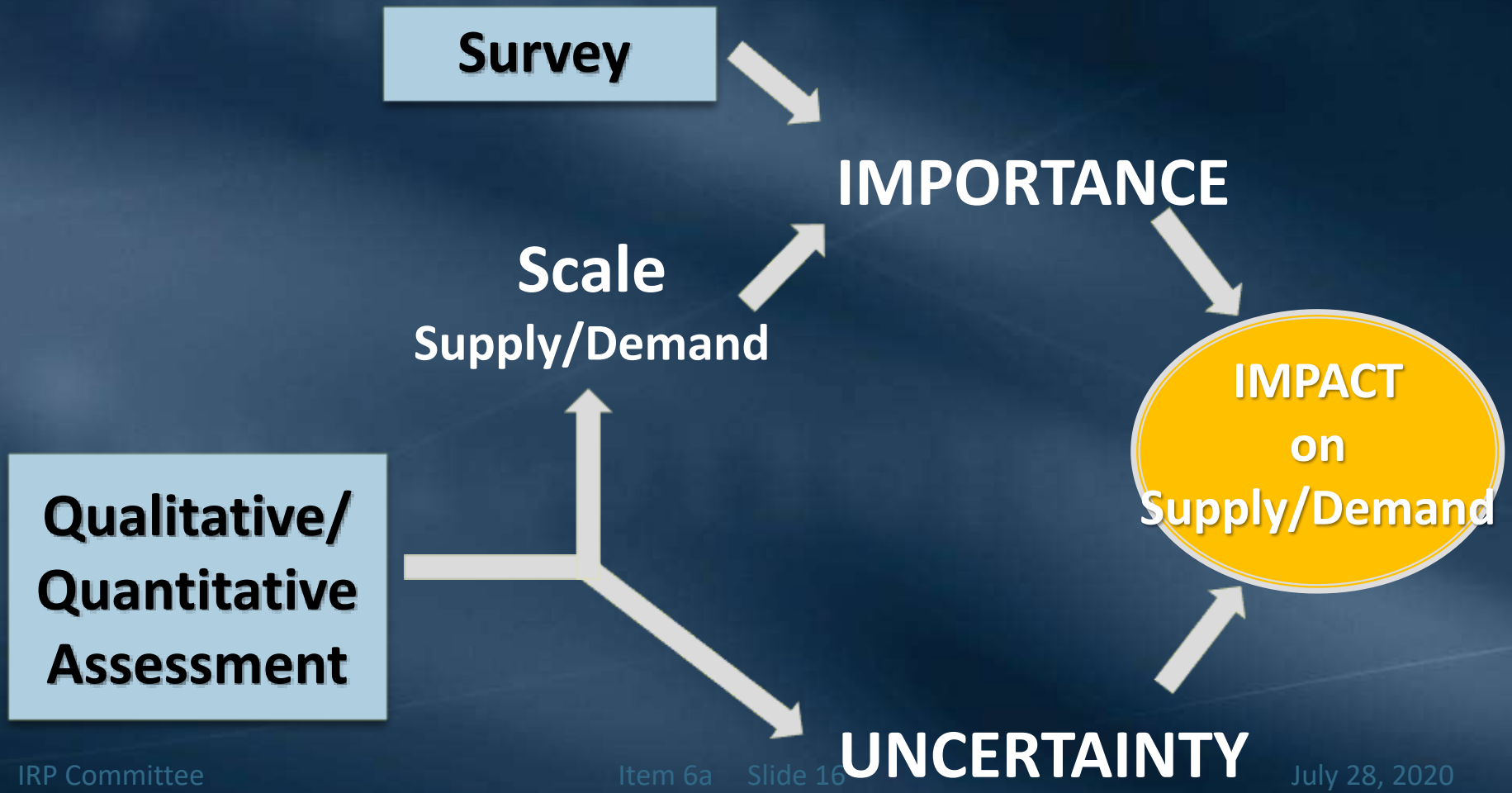
Establishing the Scenario Framework

Identifying the most impactful Drivers



Work Effort to Establish Scenario Framework

Inclusive Process with Member Agency Feedback



CONSTRUCTING SCENARIOS - QUALITATIVE/ QUANTITATIVE ASSESSMENT

Qualitative-Quantitative Assessment Objectives

- Examine and organize the drivers
- Determine supply and demand links to the drivers
- Identify methods and tools to quantify the links to the drivers
- Identify data and input needs
- Open and iterative process

Connecting Drivers to the Analysis: *Supply – Demand Links*

- Purpose of drivers is to recognize outside factors that affect supply and/or demand
- IRP analysis makes explicit how these drivers affect supply/demand by assessing **Supply-Demand Links**

- Which drivers are quantifiable
- How can we quantify?
  - Calculate with existing models, OR
  - Approximate where models are not available or not flexible
- Relates with geographic location

Quantifying Drivers Using Models

Model Parameters

INPUT

Change to Reflect:

- Economic Outlook
- Demographic Changes
- Climate Outcomes
- Outdoor Water Use

OUTPUT

Outcomes Reflect:

- Demand Impacts
- Supply Impacts

Change to Reflect:

- Behavioral Change
- Response to Price
- Regulatory Outlook
- Operational Requirements
- System Changes

Qualitative - Quantitative Assessment Process

- Initial Scre… Supply–Demand Links

For each "Yes"

- How does it affect supply/demand?
- What is the scale of the effect?
- Can we quantify the effect?

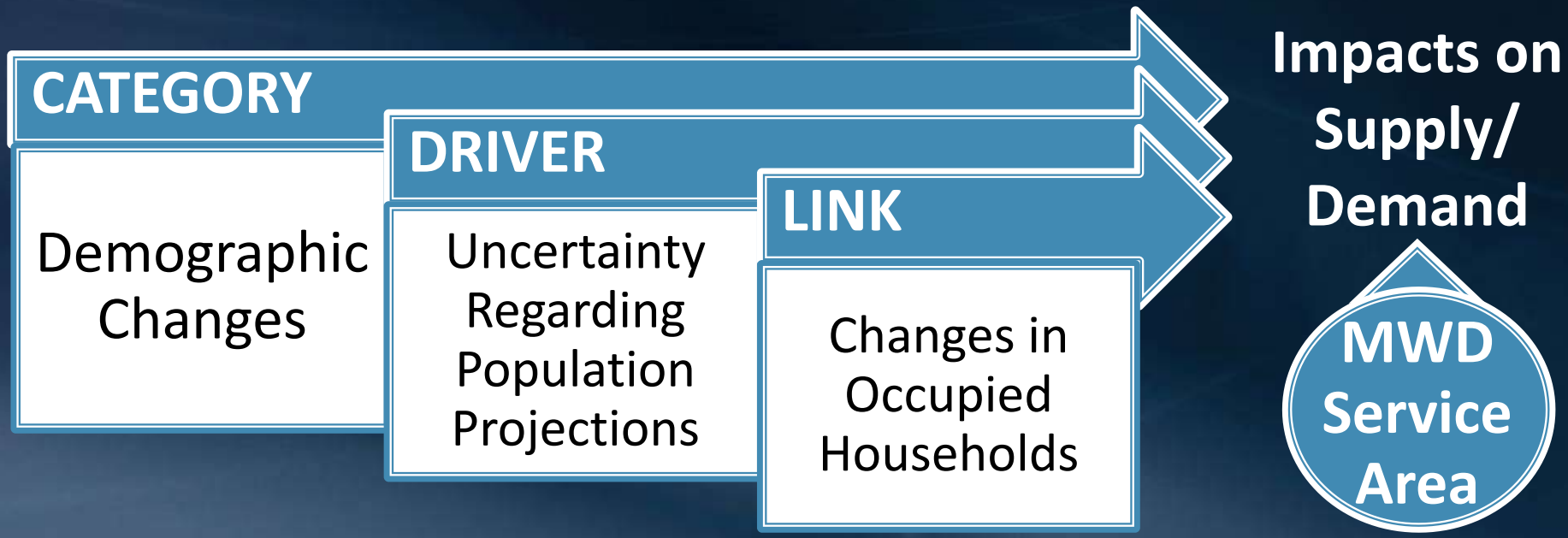
These are the Supply–Demand Links

EXAMPLES

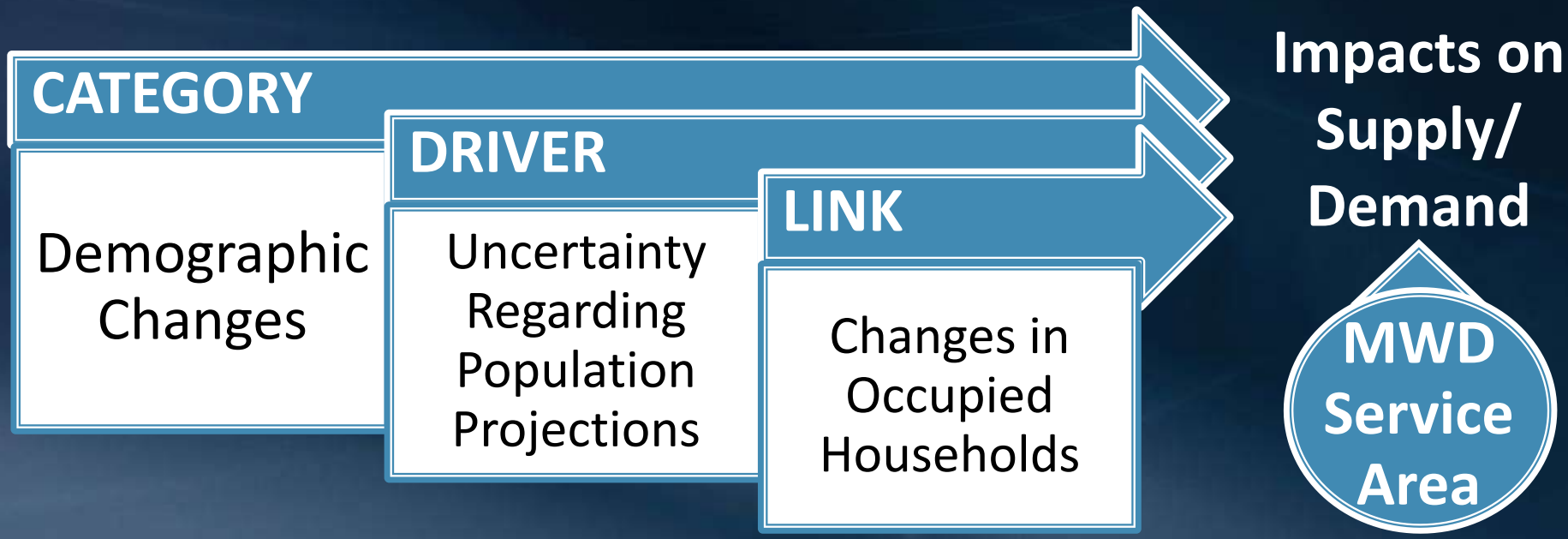
Examples

- Demographic Changes - Uncertainty Regarding Population Projections
- Climate Change – Warming Temperatures
- Legislative and Regulatory – Emerging Regulatory Requirements

Example 1:


CATEGORY
Demographic Changes
DRIVER
Uncertainty Regarding Population Projections
LINK
Changes in Occupied Households
Impacts on Supply/ Demand
MWD Service Area

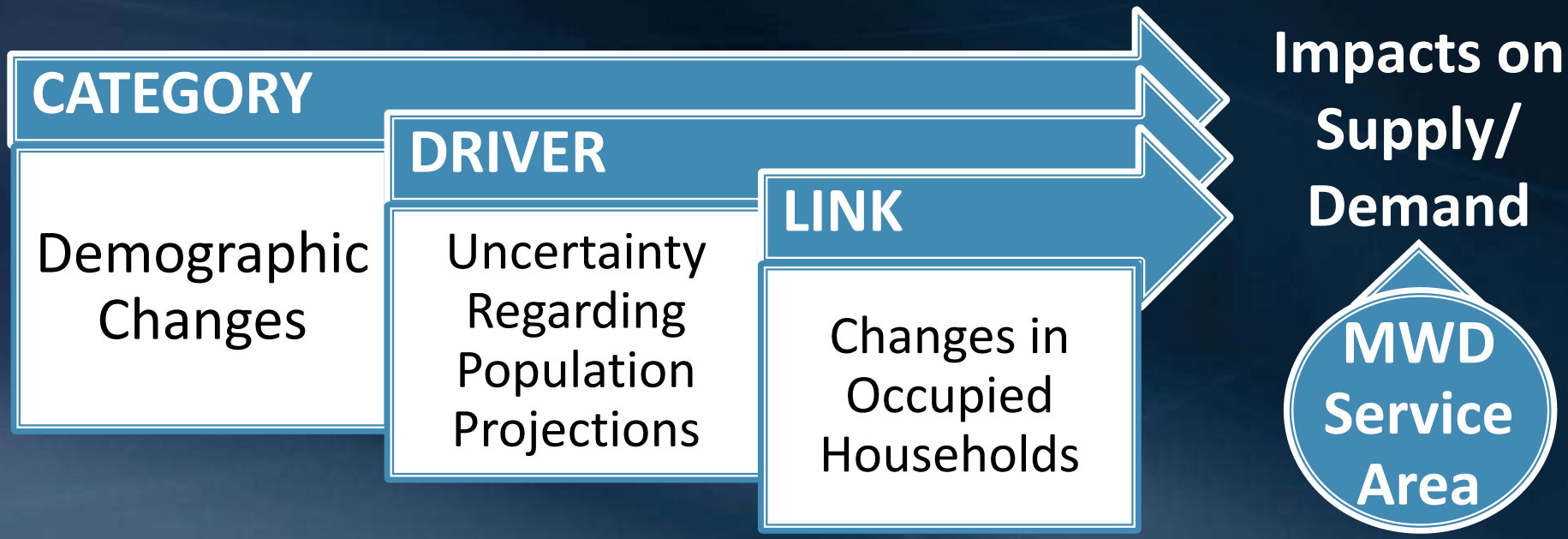
Example 1:



SUPPLY

- Does this driver affect supply? **NO**
- What is the scale of effect? **N/A**
- Can you quantify the supply effect? **N/A**

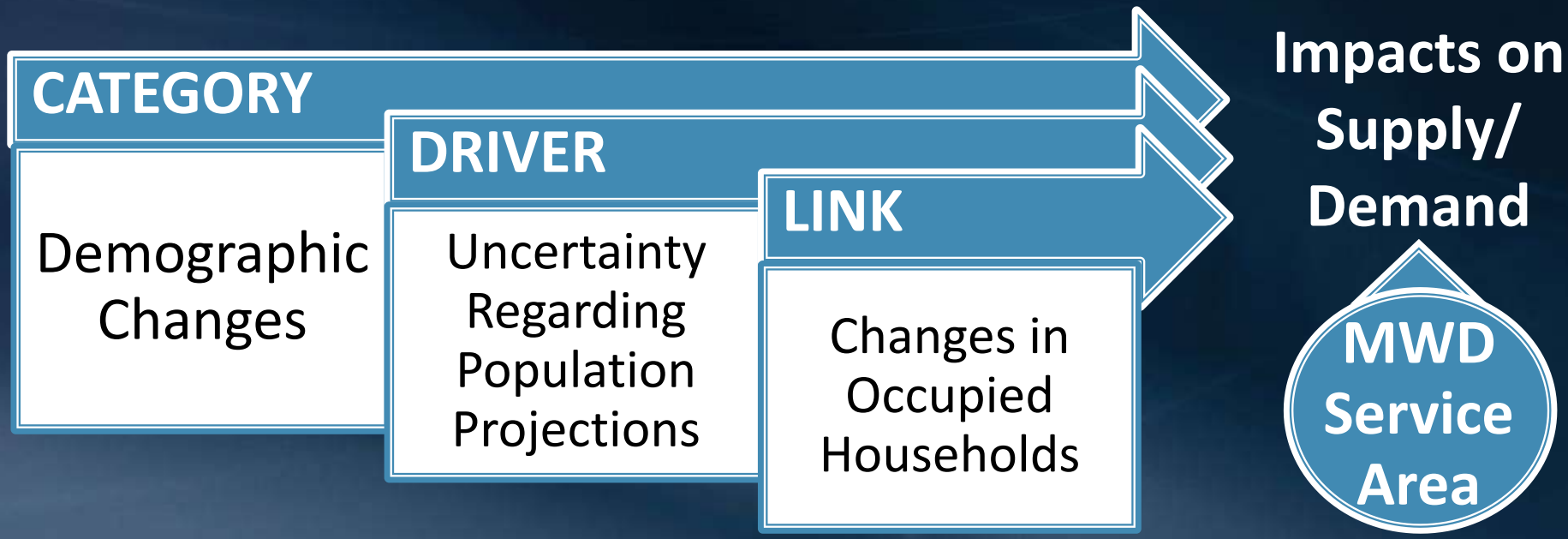
Example 1:



REPLENISHMENT DEMAND

- Does this driver affect demand? **NO**
- What is the scale of effect? **N/A**
- Can you quantify the demand effect? **N/A**

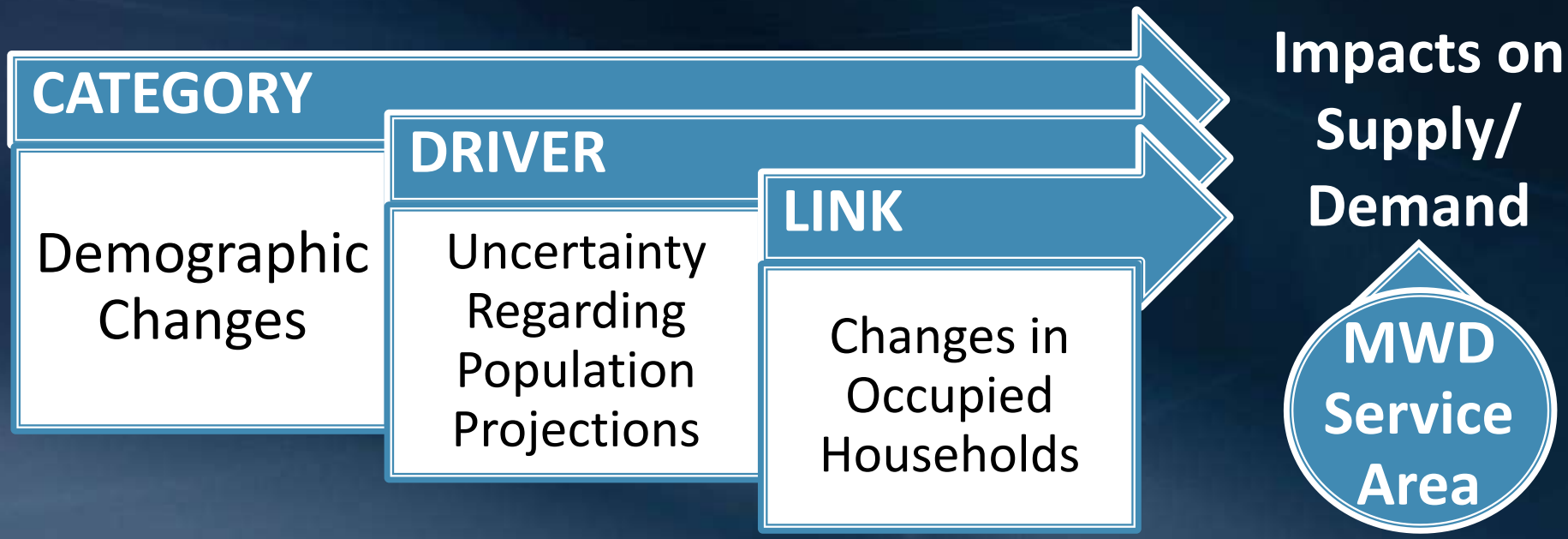
Example 1:



CONSUMPTIVE DEMAND

- Does this driver affect demand? **YES**
- What is the scale of effect? **Large**
- Can you quantify the demand effect? **YES**

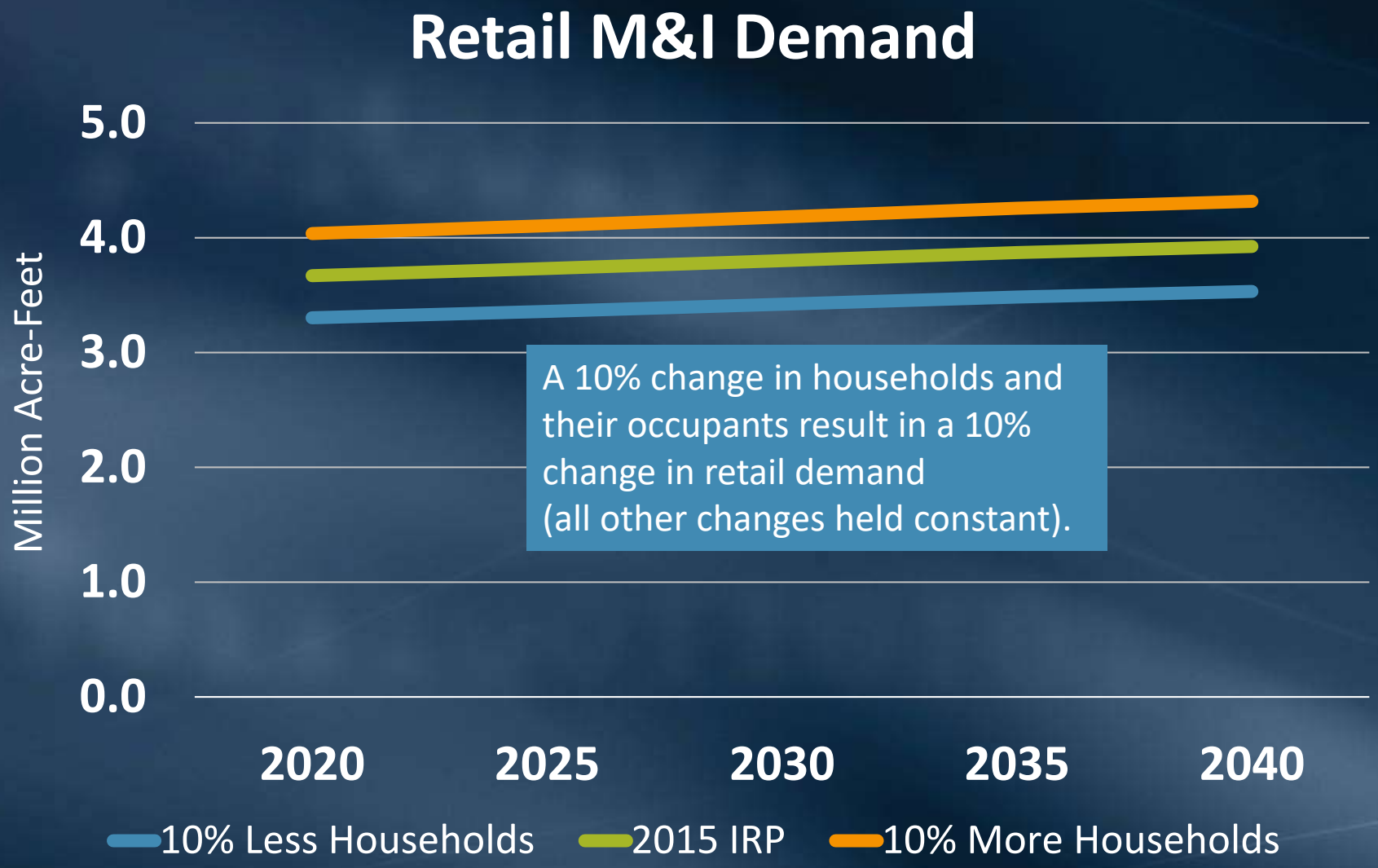
Example 1:



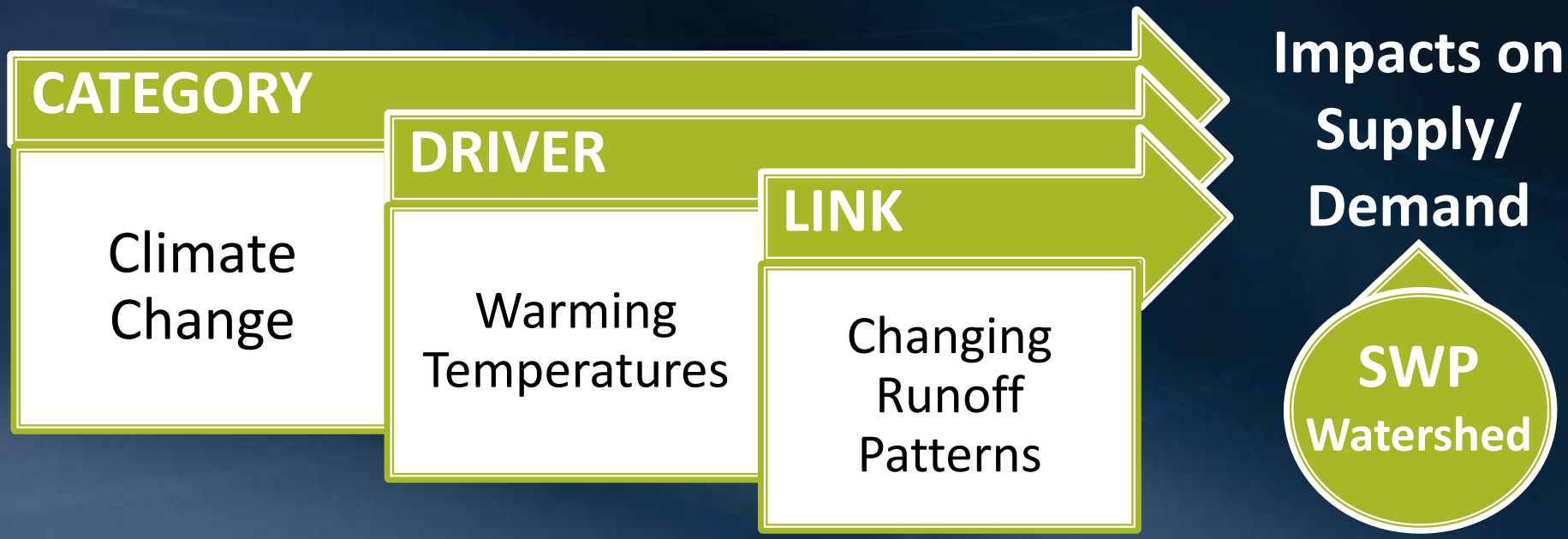
CONSUMPTIVE DEMAND

How does it affect demand?	What is the Scale Effect?	How can you quantify the demand effect?
Changes in number of households	Large	Econometric model
Changes in number of people per household	Large	Econometric model

Example 1:


Retail M&I Demand
5.0
4.0
3.0
2.0
1.0
0.0
Million Acre-Feet
2020
2025
2030
2035
2040
A 10% change in households and their occupants result in a 10% change in retail demand (all other changes held constant).
10% Less Households
2015 IRP
10% More Households

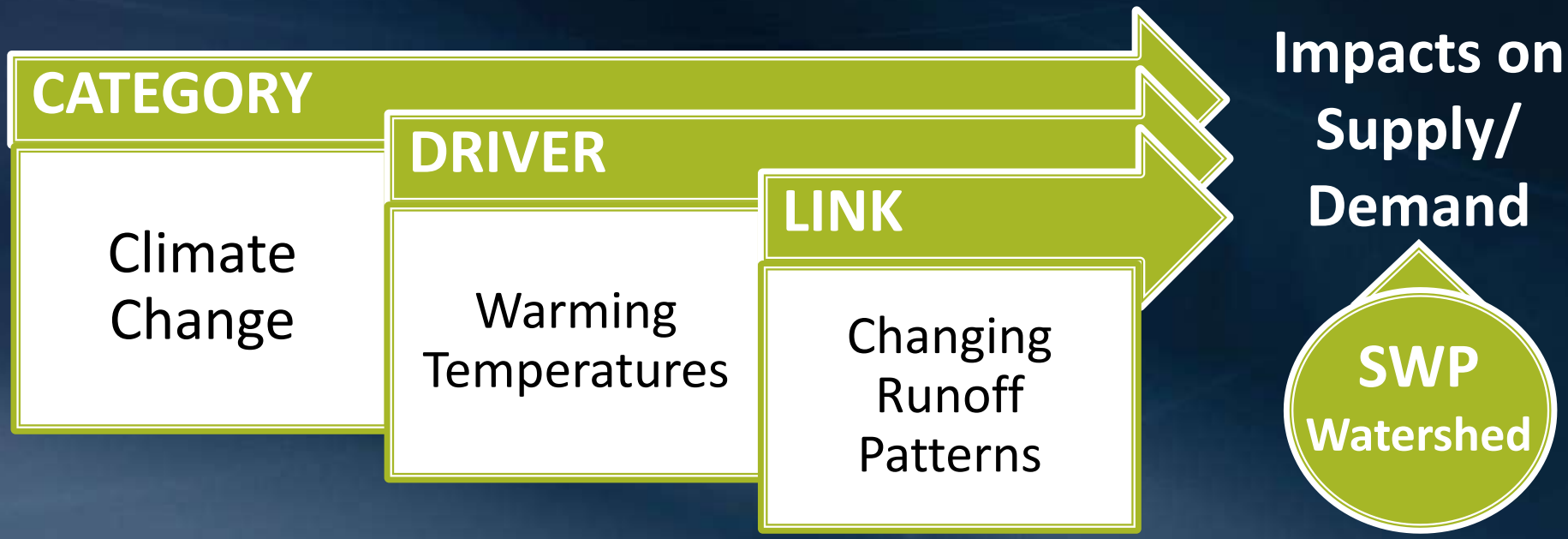
Example 2:



CONSUMPTIVE DEMAND

- Does this driver affect demand? **NO**
- What is the scale of effect? **N/A**
- Can you quantify the demand effect? **N/A**

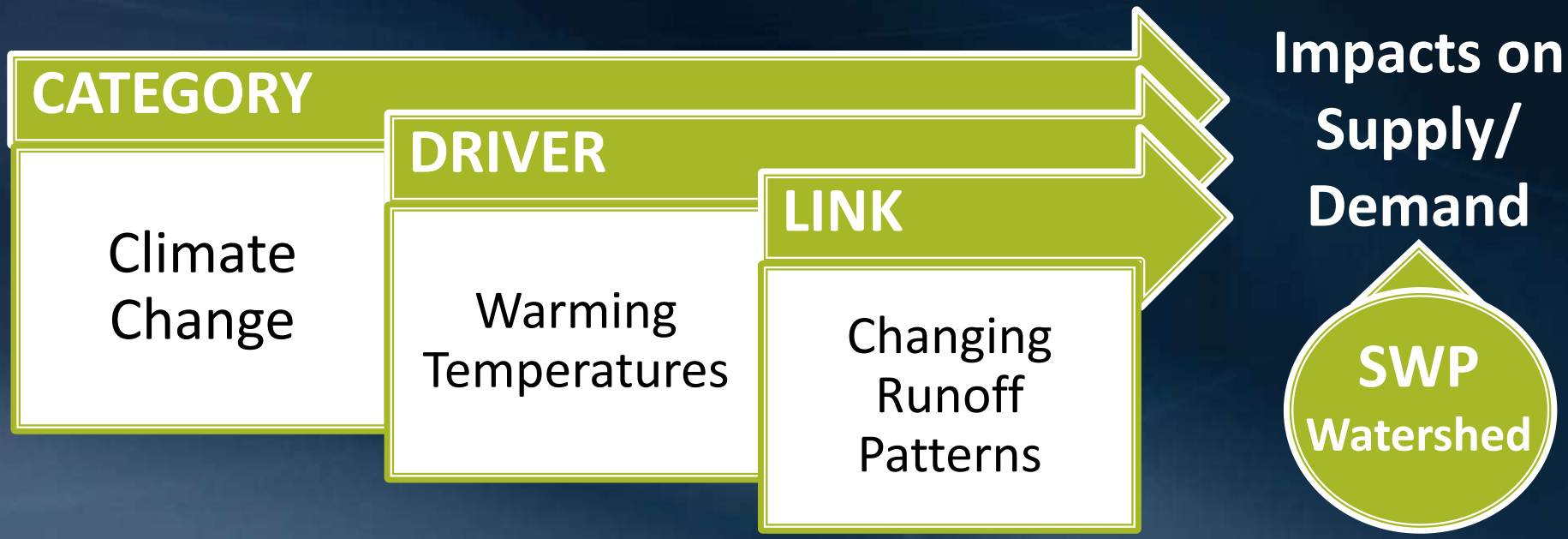
Example 2:



REPLENISHMENT DEMAND

- Does this driver affect demand? **NO**
- What is the scale of effect? **N/A**
- Can you quantify the demand effect? **N/A**

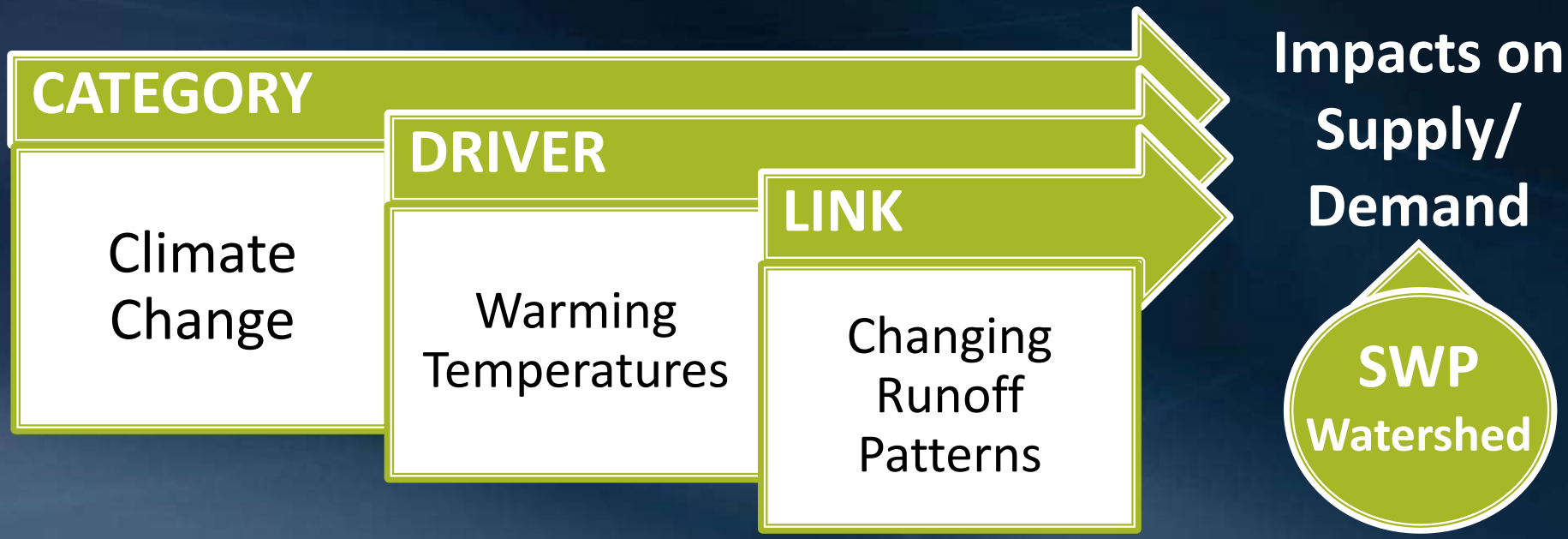
Example 2:



SUPPLY

- Does this driver affect supply? **YES**
- What is the scale of effect? **Large**
- Can you quantify the supply effect? **YES**

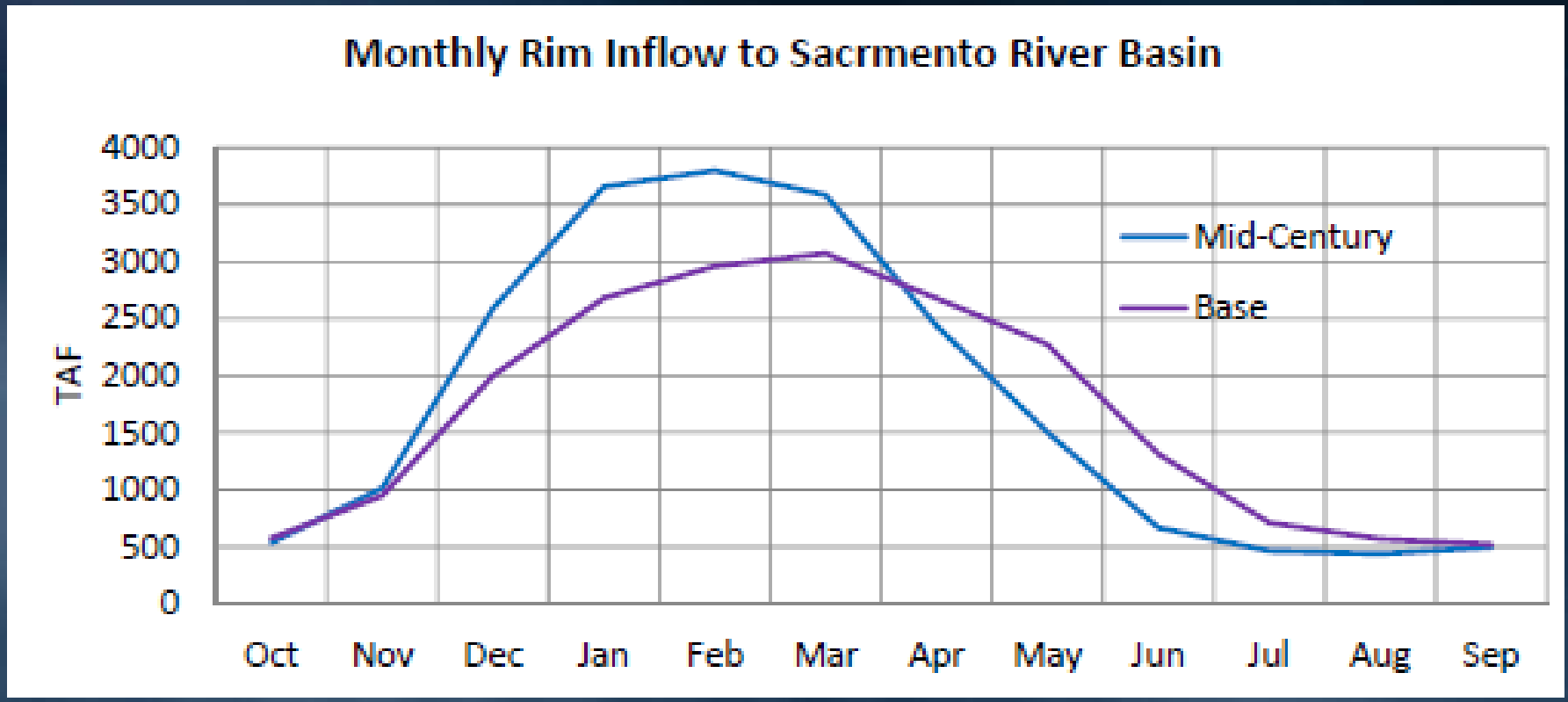
Example 2:



SUPPLY

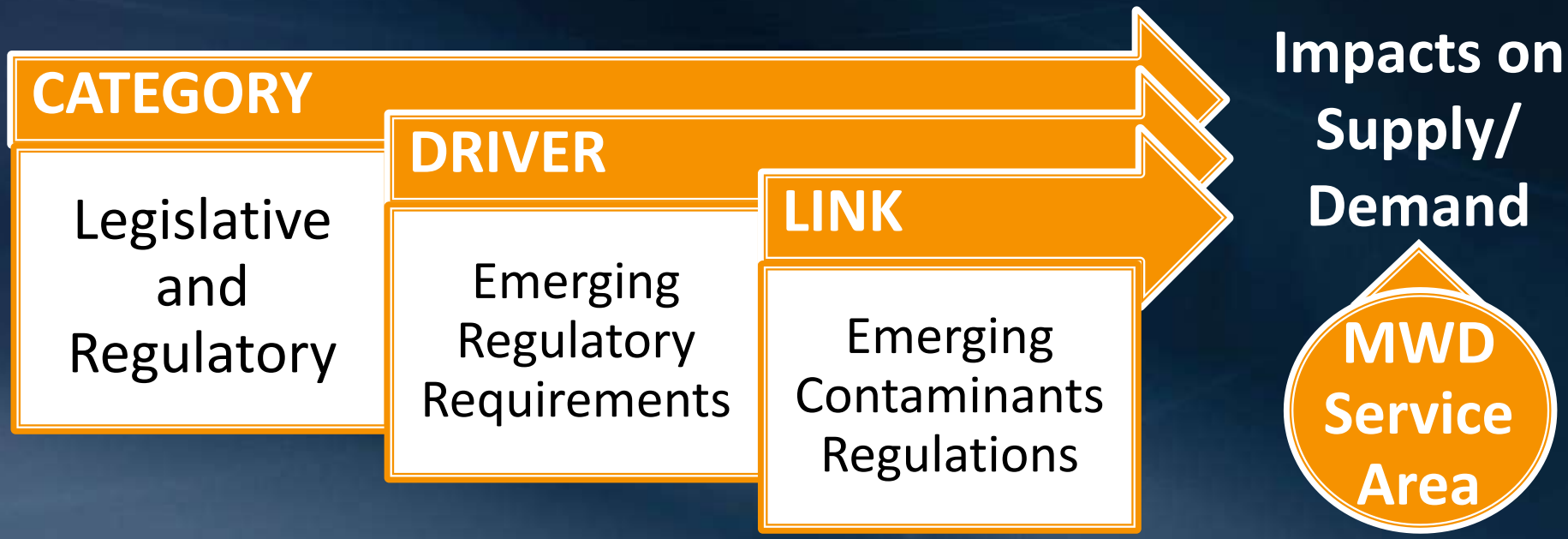
How does it affect supply?	What is the Scale Effect?	How can you quantify the supply effect?
Changes in Delta inflow	Large	CalSIM model
Changes in regulatory needs	Small	CalSIM model

Example 2



Wang & co-workers (2018). Mean and Extreme Climate Impacts on the State Water Project. Department of Water Resources

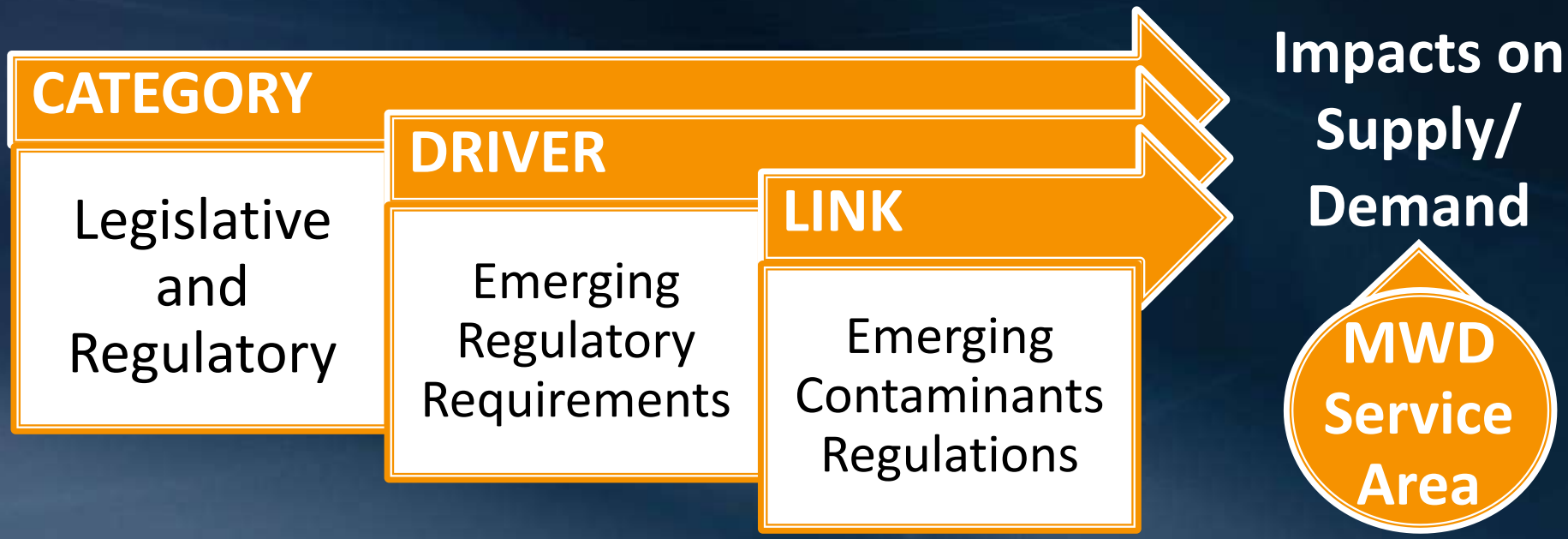
Example 3:



CONSUMPTIVE DEMAND

- Does this driver affect demand? **NO**
- What is the scale of effect? **N/A**
- Can you quantify the demand effect? **N/A**

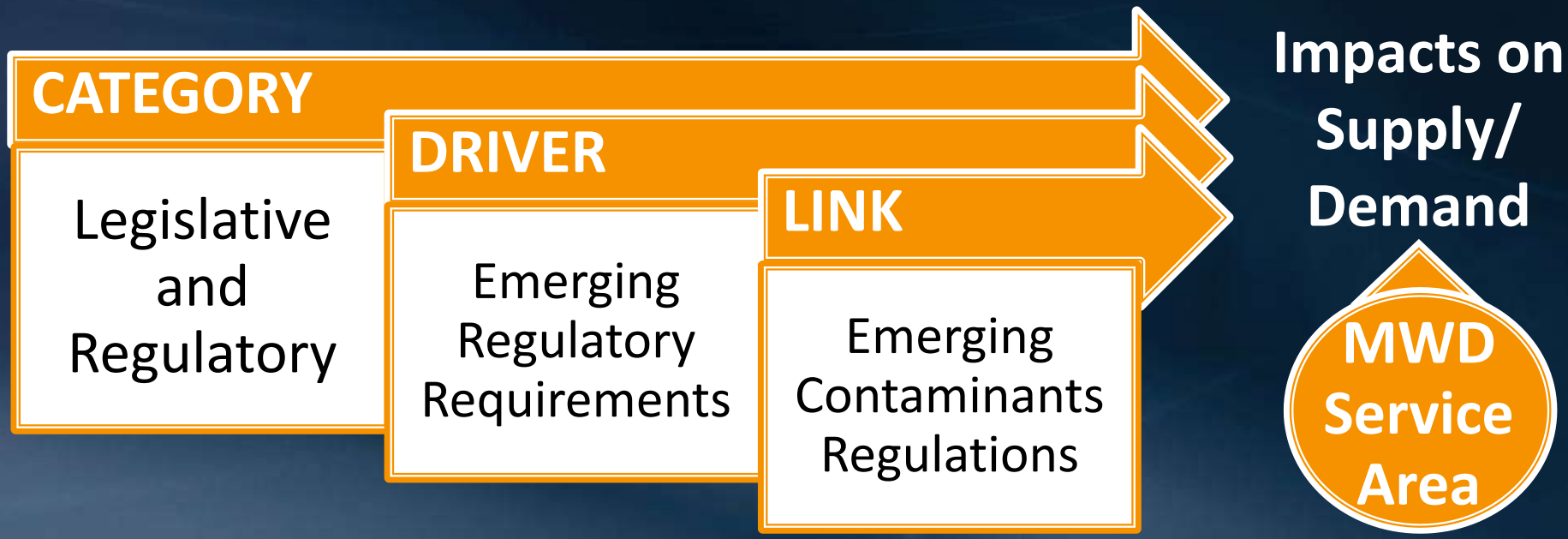
Example 3:



SUPPLY

- Does this driver affect supply? **YES**
- What is the scale of effect? **Large**
- Can you quantify the supply effect? **YES**

Example 3:



SUPPLY

How does it affect supply?	What is the Scale Effect?	How can you quantify the supply effect?
Loss of groundwater production without additional treatment	Large	Estimate by monitoring data

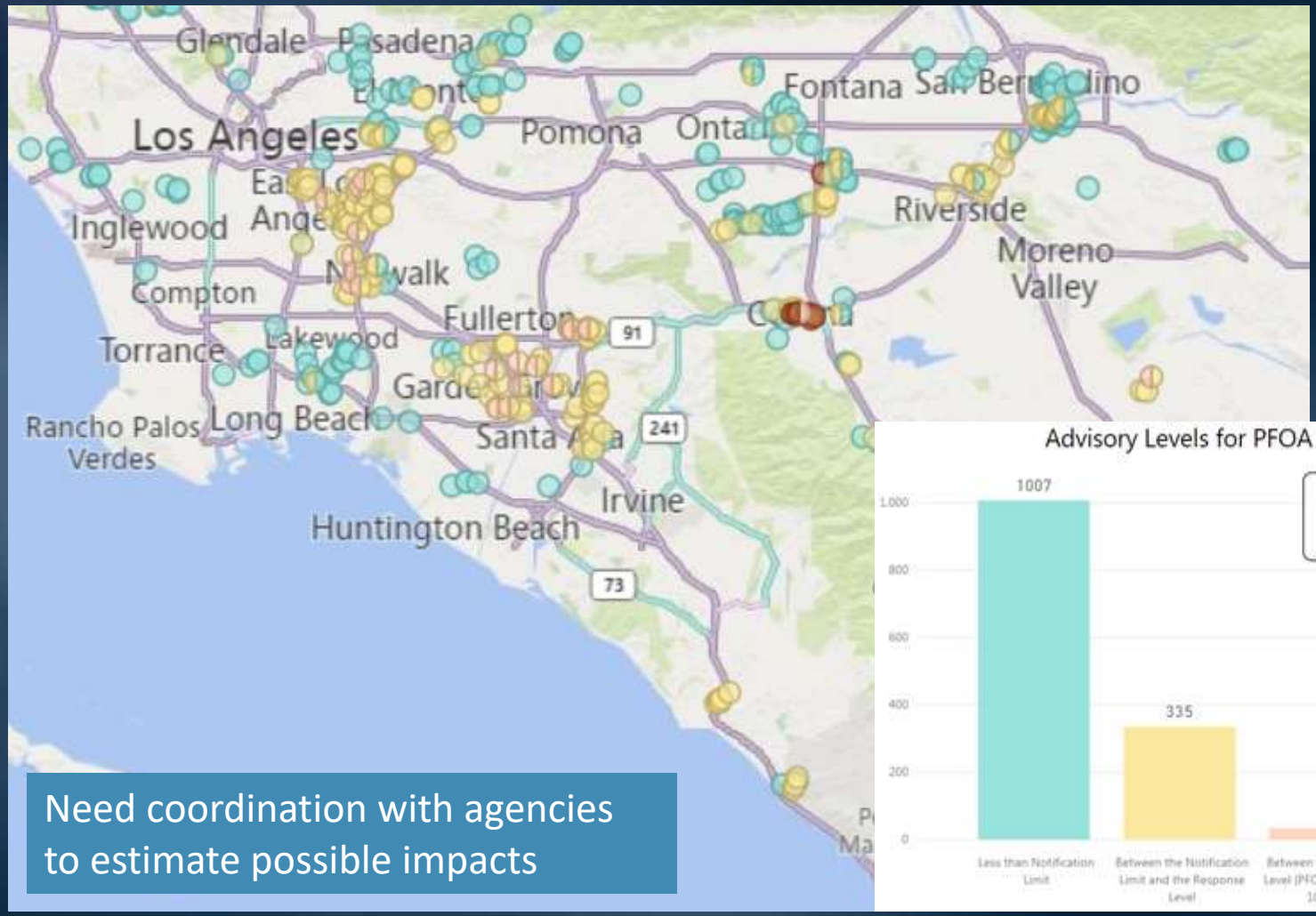
Example 3:

Total Groundwater Production (MWD Service Area 2019)

1.06 MAF

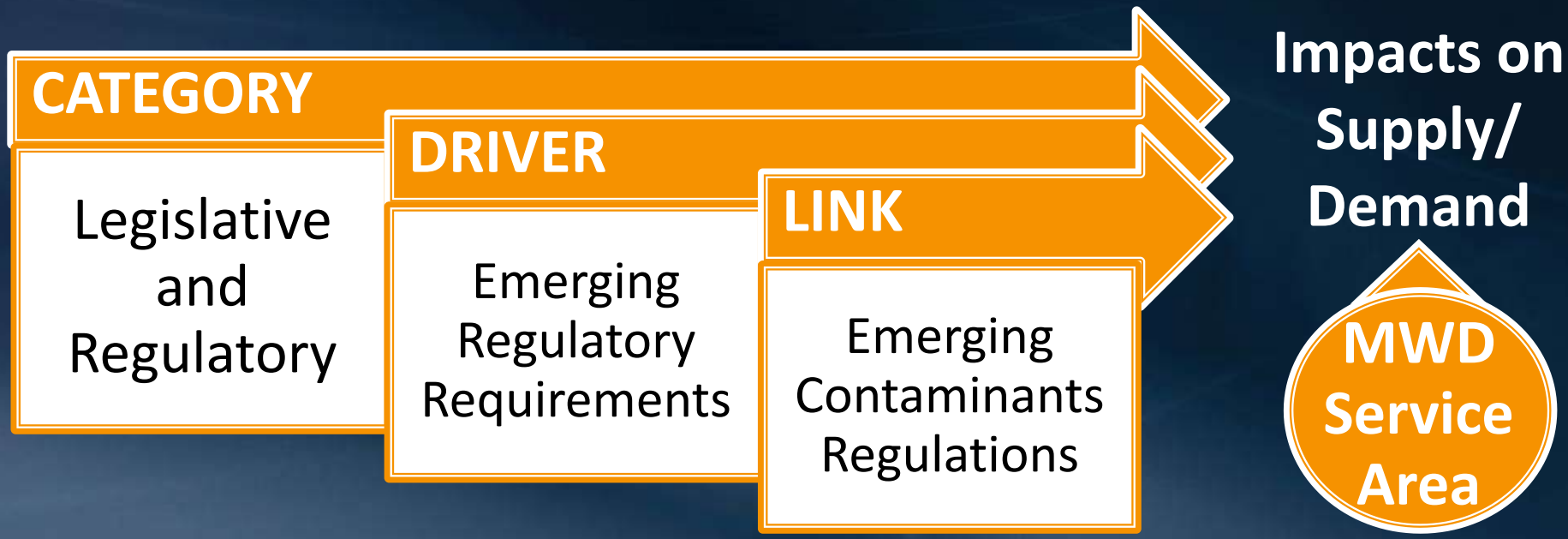
Example 3: Possible Groundwater Production Impact

PFOA and PFOS detections (SWRCB, 2020)



Need coordination with agencies to estimate possible impacts

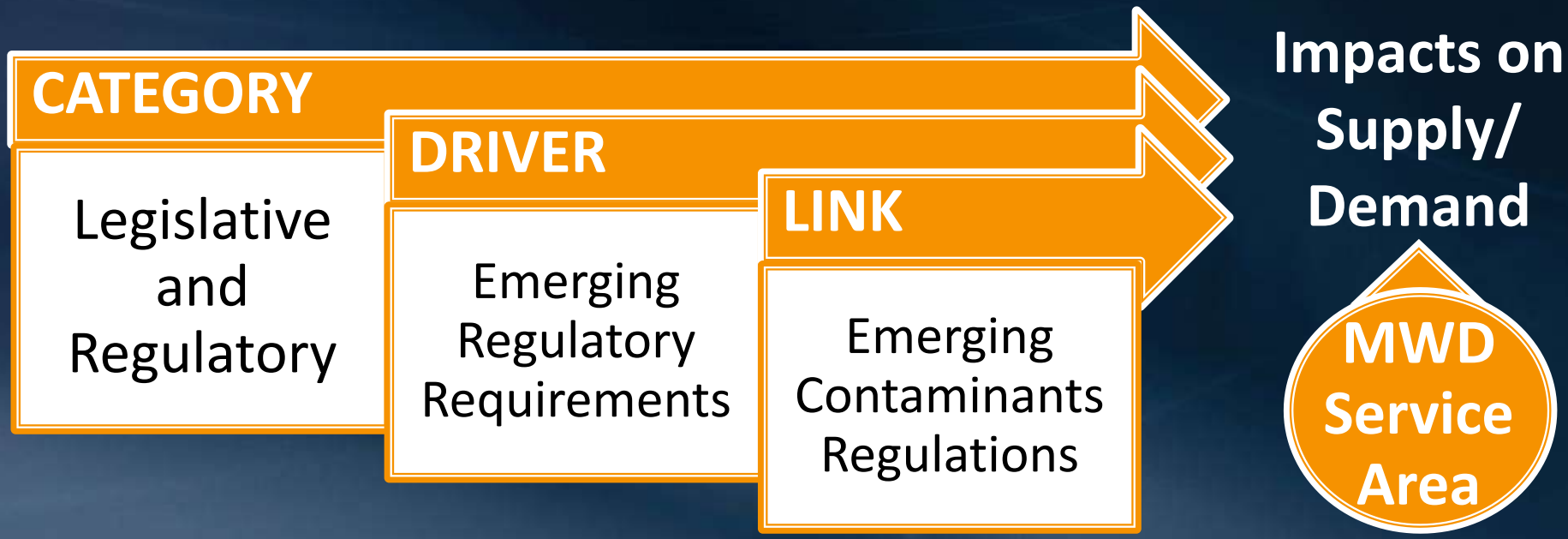
Example 3:



REPLENISHMENT DEMAND

- Does this driver affect demand? **YES**
- What is the scale of effect? **Small**
- Can you quantify the demand effect? **NO**

Example 3:



REPLENISHMENT DEMAND

How does it affect demand?	What is the Scale Effect?	How can you quantify the demand effect?
Changes in replenishment needs/quantity	Small	N/A

Working with Member Agencies and their Technical Staff

- Sending a detailed spreadsheet to review potential impacts to supply/demand
- Help identify modeling tools to better quantify local impacts
- Help with assumptions to approximate impacts where quantification is difficult
- Identify and provide data

IRP Process Schedule

What's Next

- Construct scenarios
  - Continue qualitative and quantitative assessment of drivers
  - Collaboratively identify scenarios helpful for policy discussions
- August meeting
  - Review current conditions
  - Discuss purpose and use of IRP
  - Present a scenario and gap analysis for discussion


THE METROPOLITAN WATER DISTRICT OF
SOUTHERN CALIFORNIA
1928