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AAEE & AAFS Updates

Additional Achievable Energy Efficiency & Additional Achievable Fuel Substitution

August 18, 2023, IEPR Commissioner Workshop

Electricity & Natural Gas Demand Forecast: Inputs and Assumptions

Ingrid Neumann, PhD
Energy Assessments Division, Advanced Electrification Analysis Branch

EAD Decarbonization Analysis

supports energy policy analysis & energy forecasting

- Energy Efficiency (EE) tracking/projections
- Building Electrification/Fuel Substitution (FS) tracking/projections
    - ***Varying time horizons***
    - ***Varying uncertainties***
    - ***Varying uses***

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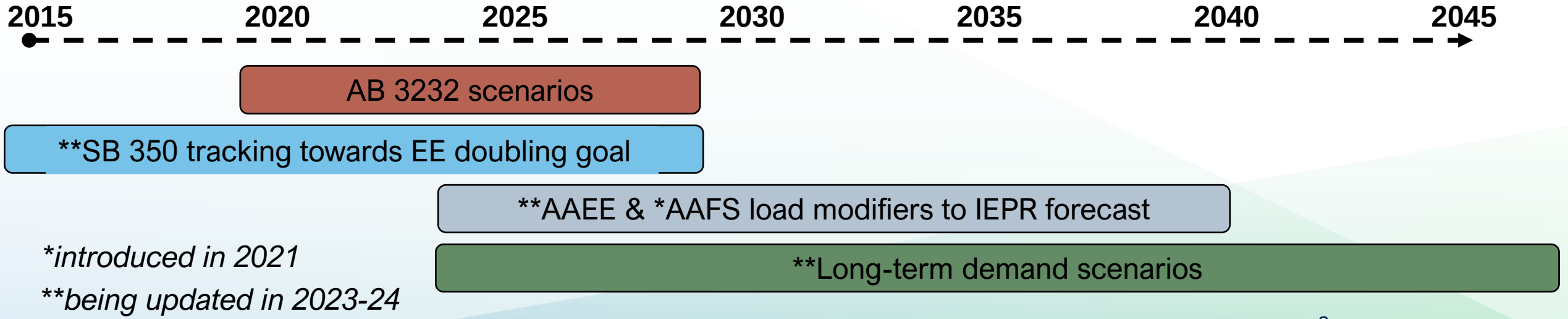
Time Horizon for Analysis



*introduced in 2021

**being updated in 2023-24

Today focus on Forecast…

- **Six proposed AAEE and AAFS scenarios are being developed for the 2023 IEPR ranging from conservative to optimistic (1-6)**
- **Scenario 3 is designed to be a Business-As-Usual/Reference or current “most probable” case**
- *Note: The single forecast set is in fact a portfolio of scenarios for each load modifier and the baseline forecast…*

Today focus on Forecast…

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- *Note: The single forecast set is in fact a portfolio of scenarios for each load modifier and the baseline forecast…*

- Two sets of AAEE & AAFS will be used in combination as load modifiers in the managed demand forecast for 2023:
  - **one set for the statewide planning scenario, and**
  - **another set for the local reliability scenario**

What are AAEE & AAFS?

- **The objective of these load modifiers is to continue to focus on firm programs and projections since the core scenarios will be used for planning and procurement purposes**

- **As in previous iterations, staff will develop variations around these most probable futures to show other possible outcomes given less or more effort and ability to realize the potential of existing or proposed EE and FS programs**

- *AAFS continues to be conceptualized separate from AAEE*

How do AAEE & AAFS work?

- Any overlap between these load modifiers as well as the baseline energy demand forecast are accounted for; only achievable EE savings or FS impacts above and beyond that which is already incorporated in the baseline energy consumption forecasts are retained

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- **Both AAEE and AAFS reduce gas consumption**
- **While AAEE also reduces electricity consumption, AAFS increases it**
  - **Thus AAEE "savings" and AAFS "impacts"**
  - **Both load modifier increments and decrements are relative to baseline electricity and gas consumption on an annual basis**
  - **Electricity consumption is also modified by both AAEE & AAFS on an hourly basis**

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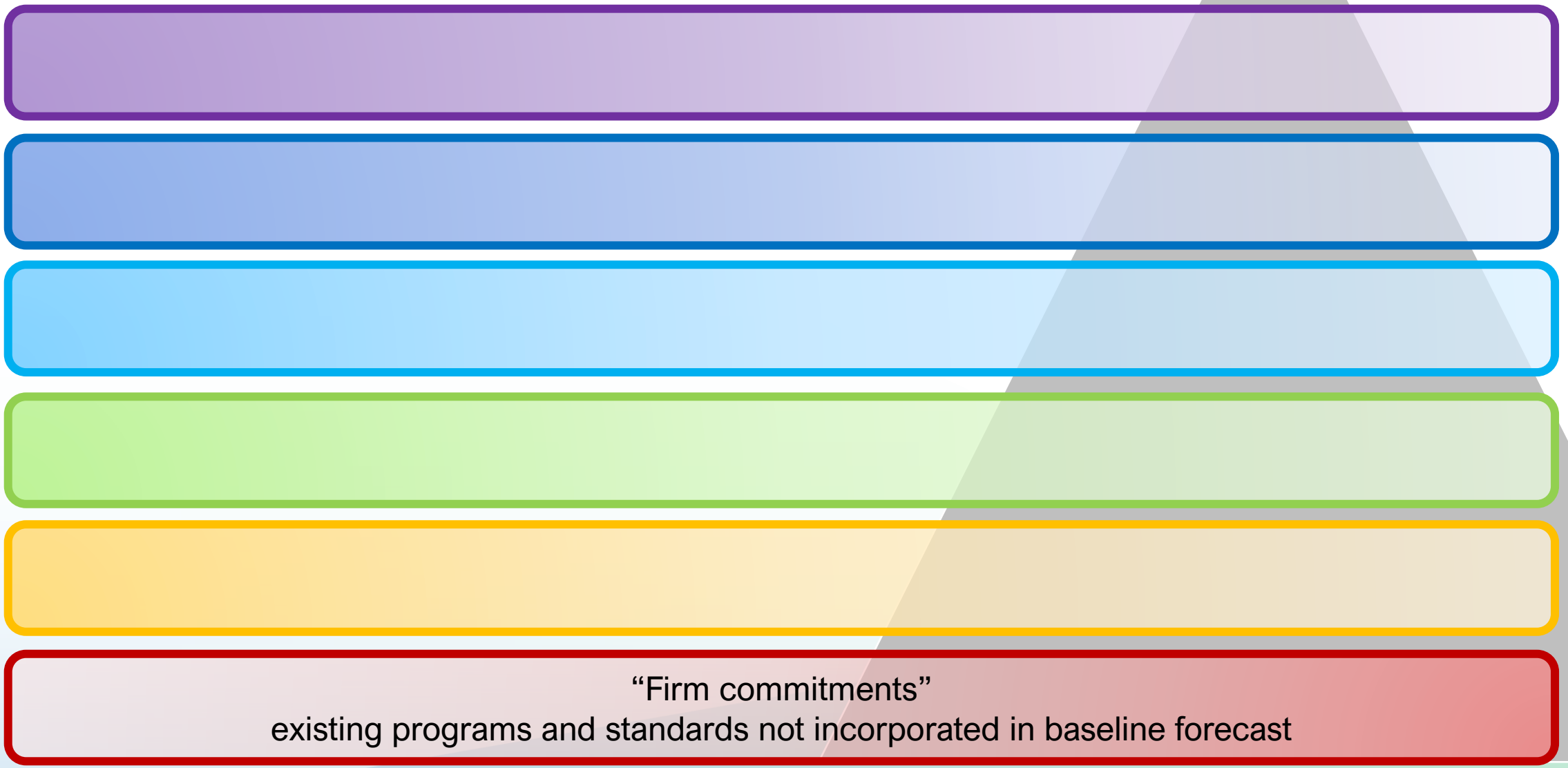
- ***AAFS may contain both programmatic inputs as well as technology-based FS modeled by the FSSAT, this will be described in the subsequent presentation!***

2023 AAEE & AAFS Development
General approach to Scenarios



2023 AAEE & AAFS Development
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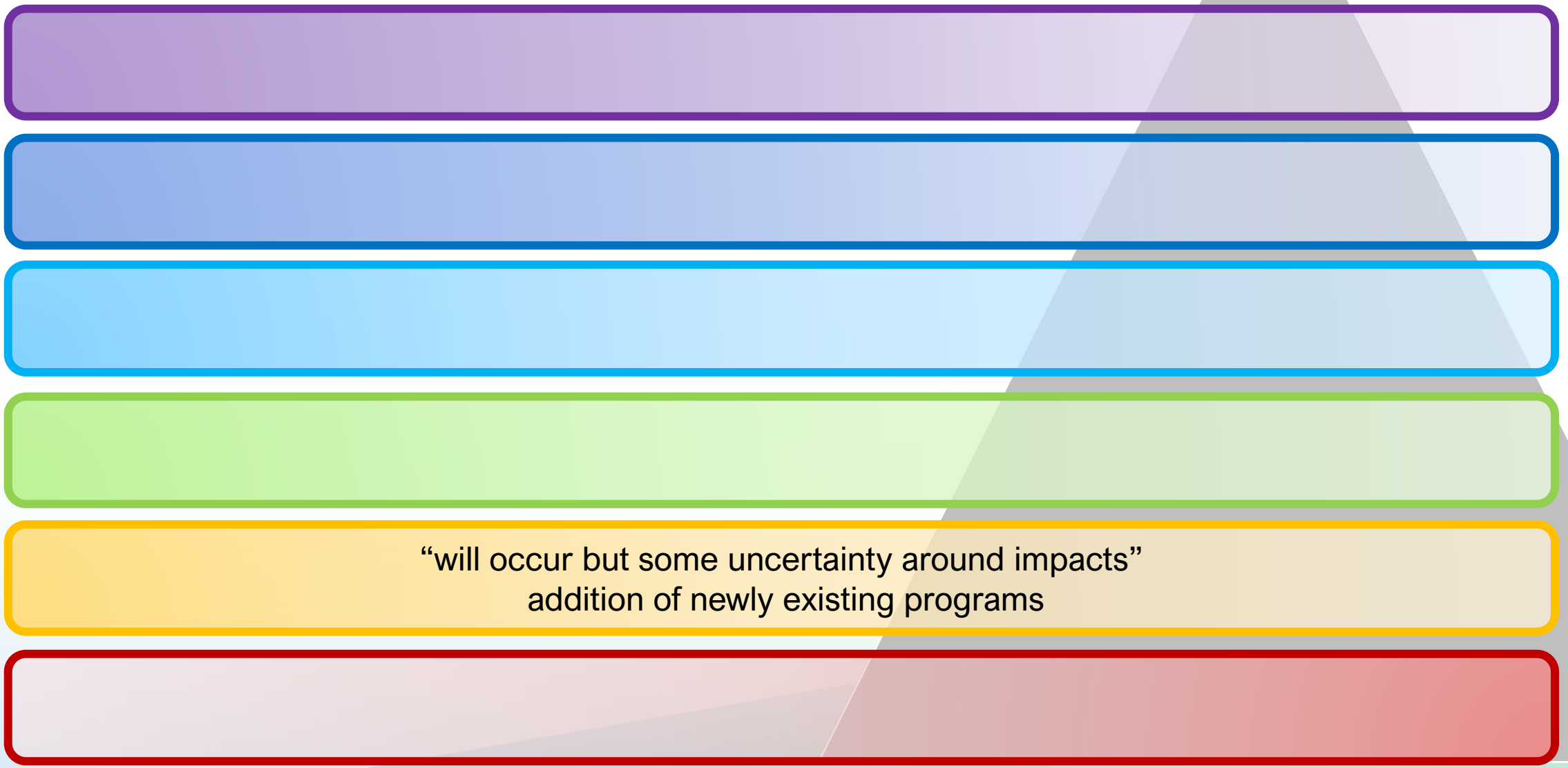

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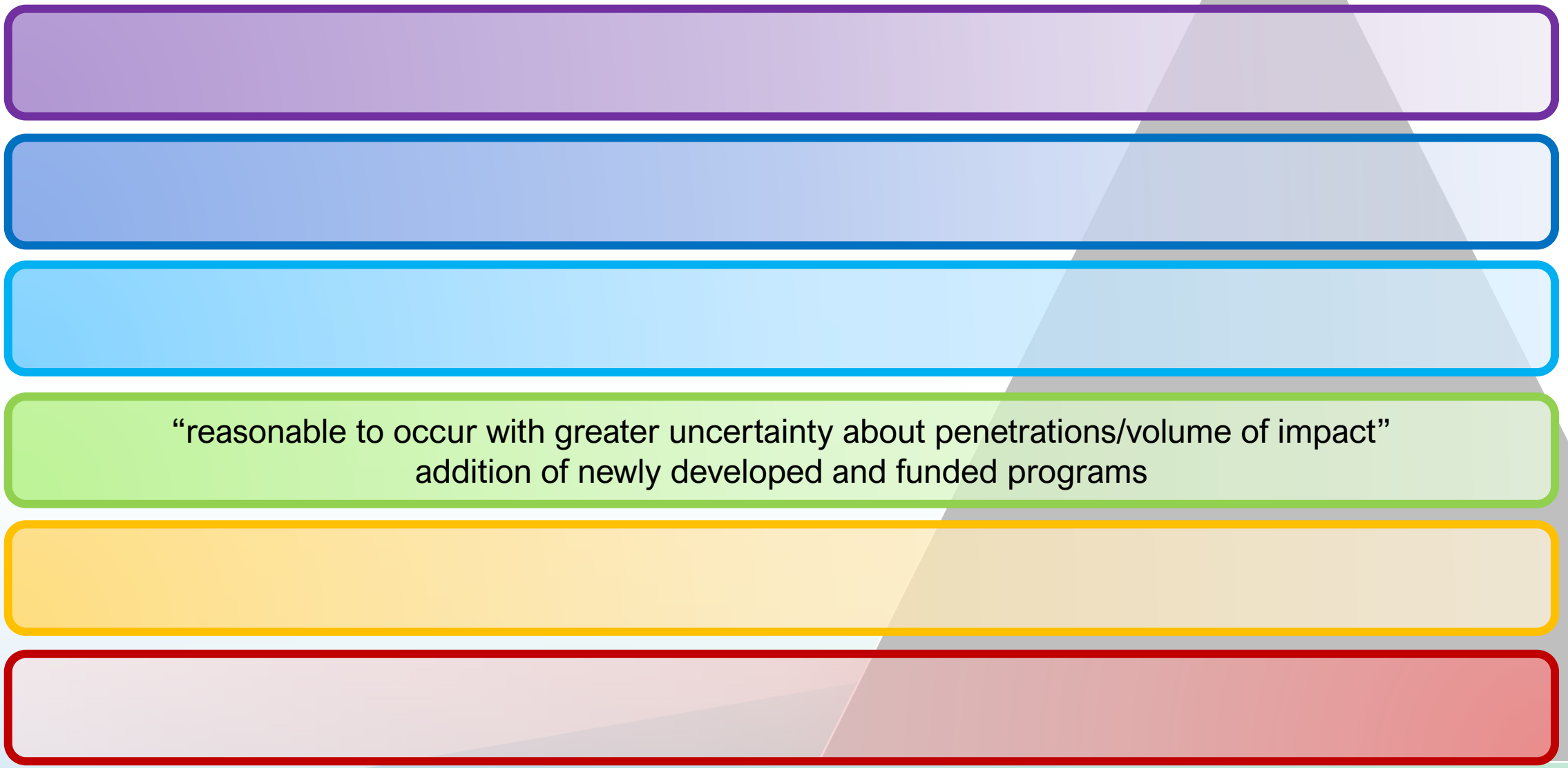

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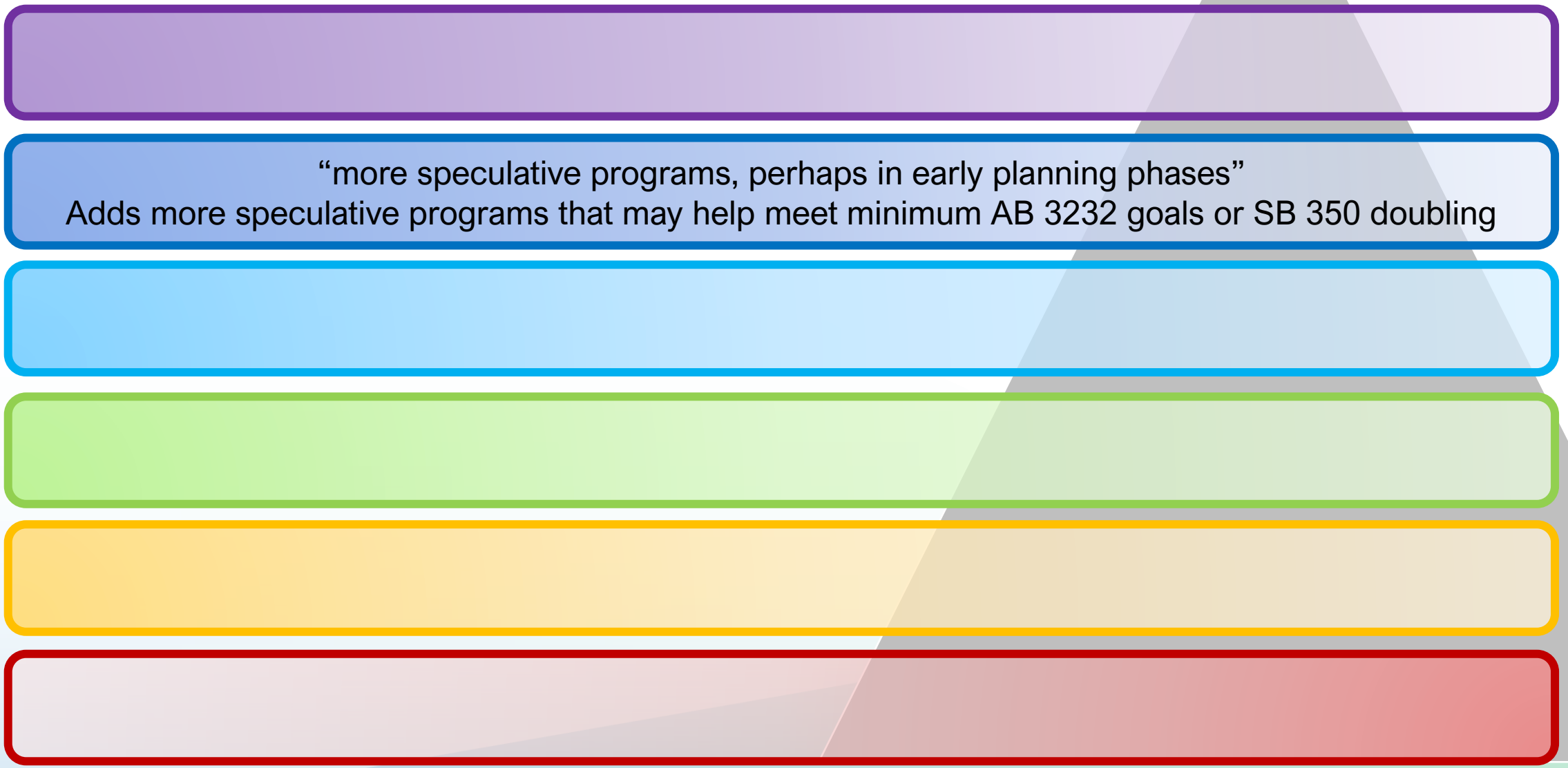

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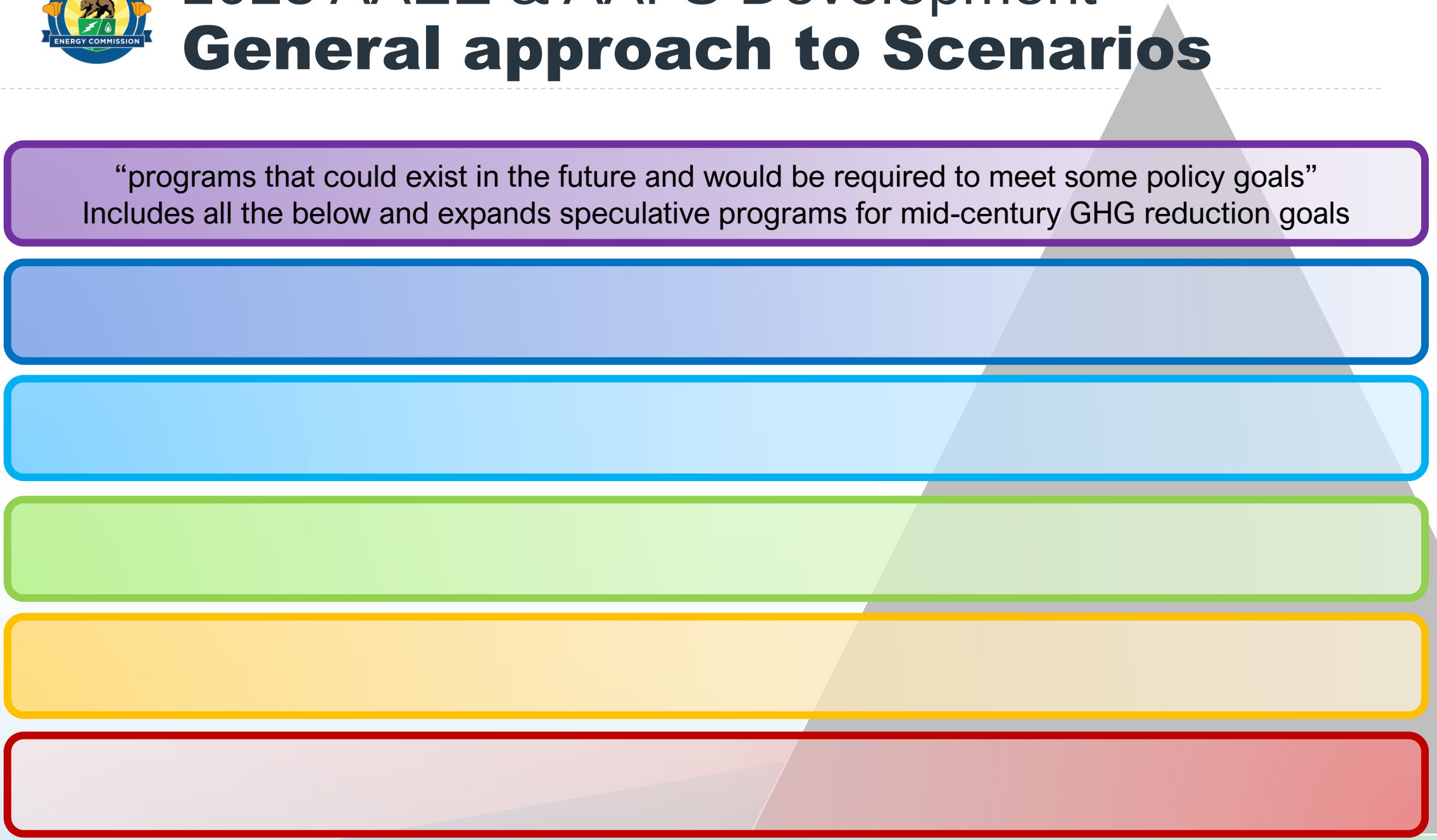


2023 AAEE & AAFS Development
General approach to Scenarios

"programs that could exist in the future and would be required to meet some policy goals"
Includes all the below and expands speculative programs for mid-century GHG reduction goals

"more speculative programs, perhaps in early planning phases"
Adds more speculative programs that may help meet minimum AB 3232 goals or SB 350 doubling

"likely to occur but still in planning phases"
Ratchets the below elements up to compliance rates, participation, market adoption and funding.

"reasonable to occur with greater uncertainty about penetrations/volume of impact"
addition of newly developed and funded programs

"will occur but some uncertainty around impacts"
addition of newly existing programs

"Firm commitments"
existing programs and standards not incorporated in baseline forecast

Development of 2023 Programmatic Components of AAEE & AAFS

- ***For 2023 we will utilize updated & enhanced versions of the saving accounting, aggregation, and extrapolation methodology & tools previously employed for 2021***

- Historical data and potential savings projections were updated in all existing workbooks
- New workbooks were added based on recent programmatic activities
- Building Type Disaggregation and Forecast Zone Output capability was added
- Addition of basic cost calculations for each scenario so the value of various EE & FS impacts can begin to be quantified.
- Enhancement of input data as well as software tools to allow for better extrapolation of potential savings to midcentury.

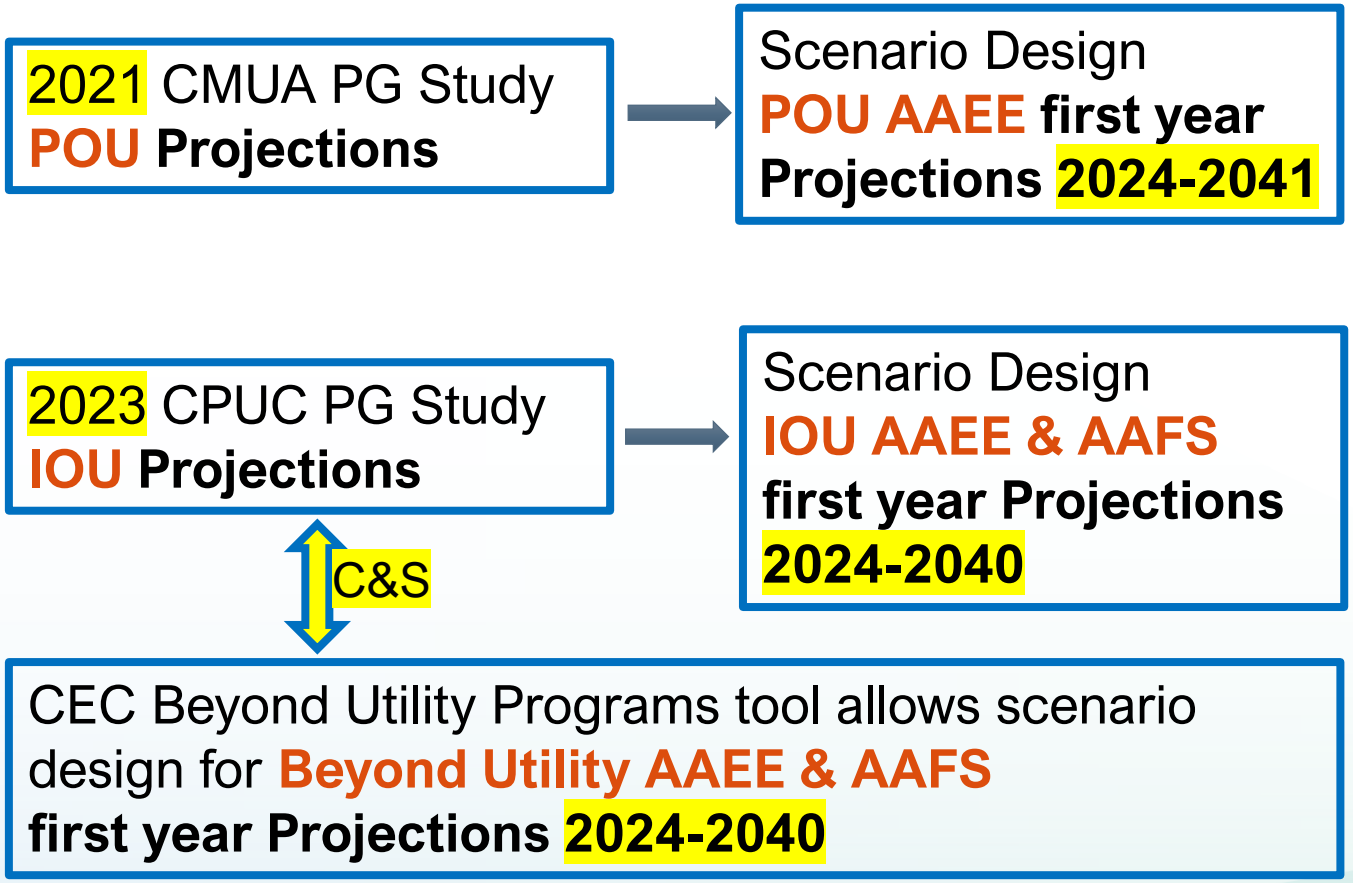
2023 Programmatic AAEE and AAFS
Process Flow Overview

2021 CMUA PG Study
POU Projections

2023 CPUC PG Study
IOU Projections

CEC Beyond Utility Programs tool allows scenario design for **Beyond Utility AAEE & AAFS**
first year Projections 2024-2040

2023 Programmatic AAEE and AAFS
Process Flow Overview



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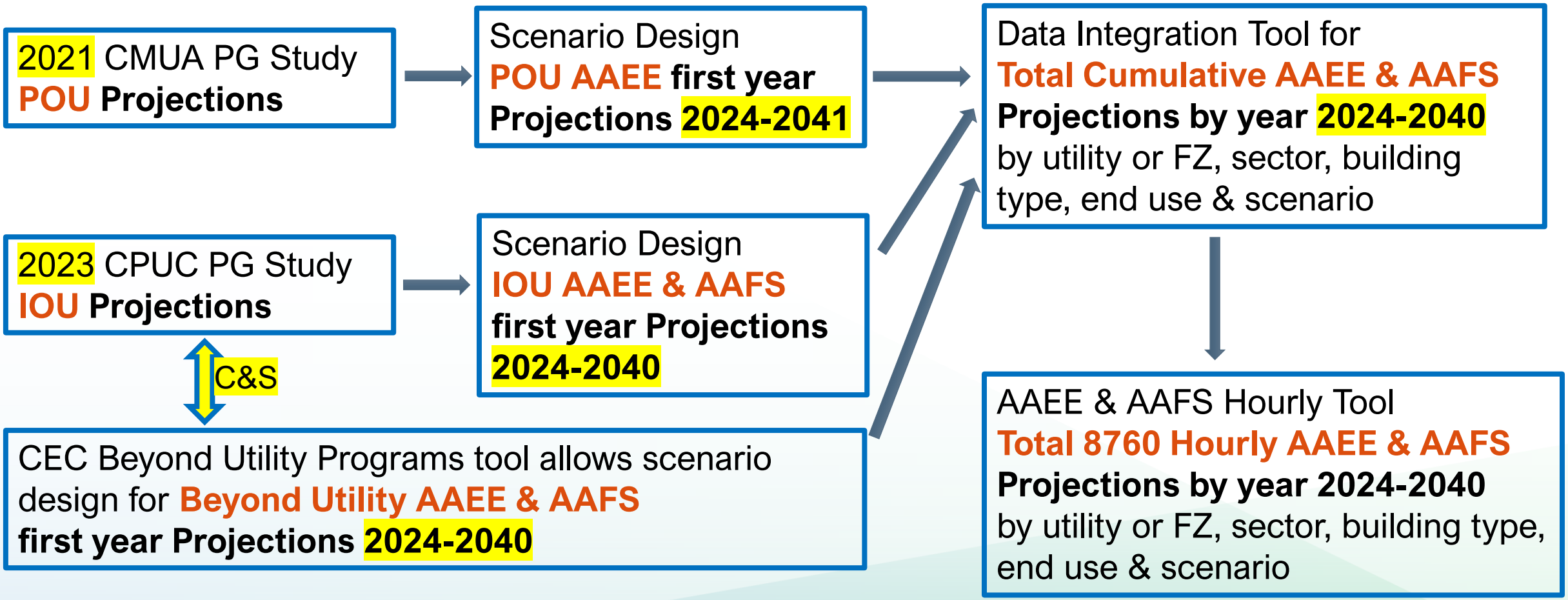

2023 Additions and Enhancements

A more robust analysis of beyond utility programs (programs not run by IOUs or POUs or not reported by them) that were originally evaluated in the 2021 IEPR (such as the Technology and Equipment for Clean Heating [TECH] program), as well as consideration of additional programs not included in the 2021 IEPR.

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Reworked Title 24 Analysis

Revision of the Title 24 Building Energy Efficiency Standards analysis to be based directly on the measures at the sector and segment level. This measure-based analysis can then be rolled forward as specific measures are likely to be adopted for future code cycles rather than the original "percent better than" a previous code cycle approach.

Update of the compliance pathway most likely to be chosen by builders to meet the 2022 Title 24 requirements. The options are either 1) enhanced energy efficiency measures via a performance calculation or 2) electrification measures based on building climate zone as delineated in the Title 24 Building Energy Efficiency Standards analysis.

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ADDED new workbooks

- **Equitable Electrification and Clean Energy Reliability Investment Plan funded program impacts in California. (Equitable Building Decarbonization Programs - Direct Install & Incentive)**
- **Inflation Reduction Act (IRA) High Efficiency Electric Home Rebate Act (HEERA) and whole-house Homeowner Managing Energy Savings (HOMES)**
- **Locally targeted electrification impacts driven by Local Government Ordinances or Load Serving Entity decarbonization programs.**

2023 AAEE & AAFS Development
Elements to be included

- 2023 CPUC Potential & Goals Study measures (IOU Programs)
- IOU data (CEDARS) on recent fuel substitution activities
- 2021 CMUA EE Potential Study (POU Programs)
- POU data on recent fuel substitution activities
- Future Title 20 and Federal Appliance Standards
- 2022 & future Building Standards
- Zero-emission appliance technology characterization (modeled via FSSAT)
  - Includes CARB SIP regulation
- Local ordinances encouraging electrification of some or all end-uses as well as other targeted electrification including local natural gas bans
- Plethora of Programs operating outside of Utility EE Portfolios
  - Collection of traditional EE programs
  - BUILD/TECH programs run as per SB 1477
  - CERIP
  - CalEHP, CalSHAPE, WNDRR, AHSC
  - IRA- HEERA & HOMES
  - EBDP- DI & Incentive

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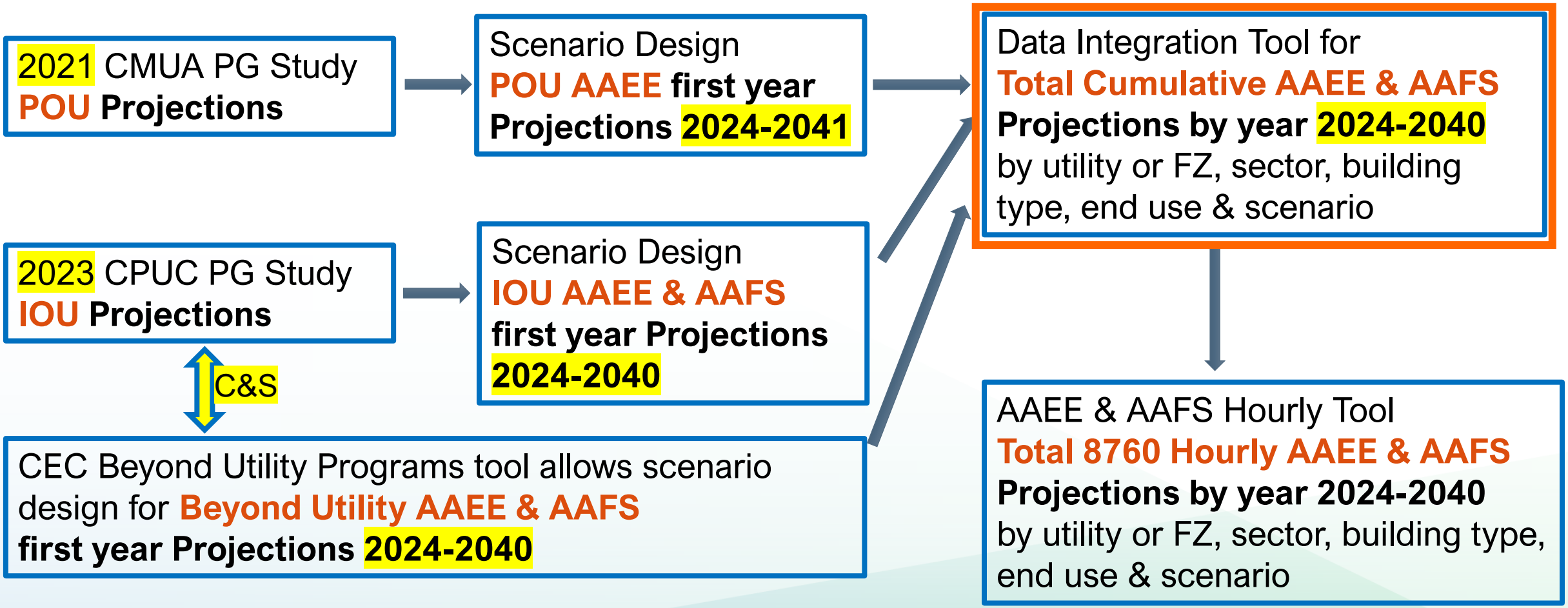

Scenario Development for 2021 AAEE

Lever	Mid - Very Low (Scenario 1)	Mid - Low (Scenario 2)	Mid - Mid (Scenario 3)	Mid - High (Scenario 4)	Mid - Very High (Scenario 5)	Mid - High Plus (Scenario 6)
Building Stock	2019 IEPR Mid-Case					
Retail Prices						

IOU Potential Program Savings

POU Potential Program Savings

Codes and Standards Savings

Beyond Utility Program Savings

Scenario Development for 2021 AAFS

				actually more conservative planing scenarios >		
		less FS penetration	*reference BAU*	*more FS penetration*		
Lever		**Mid - Low (Scenario 2)**	**Mid - Mid (Scenario 3)**	**Mid - Mid Plus (Scenario 4)**	**Mid - High (Scenario 5)**	**Mid - High Plus (Scenario 6)**
Building Stock	**2019 IEPR Mid-Case**					
Retail Prices						

IOU Potential Program Impacts

POU Potential Program Impacts

Codes and Standards Impacts

Beyond Utility Program Impacts

Incorporating AAEE & AAFS into the managed demand forecasts

2021

- Six 2021 AAEE Scenarios (1-6)
- *New* Five 2021 AAFS Scenarios (2-6)

- 2021 Statewide Planning Forecast
  - AAEE 3
  - AAFS 3
- 2021 Local Reliability Scenario
  - AAEE 2
  - AAFS 4

Incorporating AAEE & AAFS into the managed demand forecasts

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- Six 2021 AAEE Scenarios (1-6)
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2022

– update no new AAEE/FS Scenarios

- Six 2021 AAEE Scenarios
- Five 2021 AAFS Scenarios

- 2022 Statewide Planning Forecast
  - AAEE 3
  - AAFS 3
- 2022 Local Reliability Scenario
  - AAEE 2
  - AAFS 4
  - FSSAT modeling of SIP

Incorporating AAEE & AAFS into the managed demand forecasts

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- 2022 Statewide Planning Forecast
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proposed for 2023

- Six 2023 AAEE Scenarios (1-6)
- Six 2023 AAFS Scenarios (1-6)
- **2023 Statewide Planning Forecast**
  - **AAEE 3**
  - **AAFS 3 (inclusive of FSSAT SIP modeling)**
- **2023 Local Reliability Scenario**
  - **AAEE 2**
  - **AAFS 4 (inclusive of FSSAT SIP modeling)**

2023 Managed Demand Forecast Scenarios

- 2023 Statewide Planning Forecast
  - AAEE 3
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** Four FSSAT SIP Scenarios*
"Zero-Emissions Appliance Standards"
modeled as part of AAFS 4-6

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- AAFS electricity and gas are joined
- **We prioritize FS over EE** because the GHG impacts are approximately four times greater for FS than for EE

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Baseline Gas Demand → Remove gas displaced by programmatic FS (AAFS) → Apply Speculative FS via FSSAT (SIP Scenario) → Allow for gas AAEE on any remaining gas consumption

Thank you!

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