AAEE & AAFS Draft Results

Additional Achievable Energy Efficiency & Additional Achievable Fuel Substitution

Demand Analysis Working Group (DAWG) Workshop

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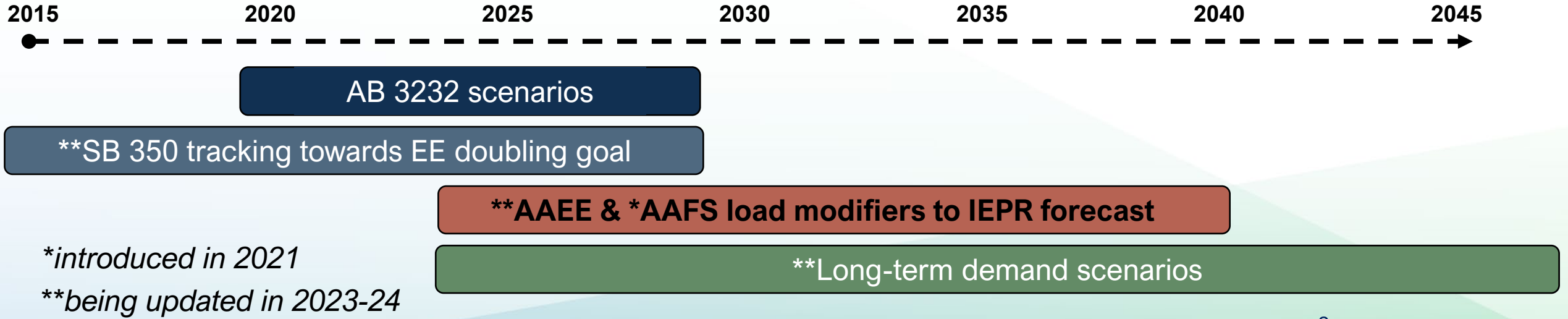
EAD Decarbonization Analysis

supports energy policy analysis & energy forecasting

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

Time Horizon for Analysis



*introduced in 2021

**being updated in 2023-24

Today focus on Forecast…

- **Six AAEE and AAFS scenarios were 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…*

- 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 has developed 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

- 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

- ***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

"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 have utilized 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 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.

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.

ADDED new workbooks

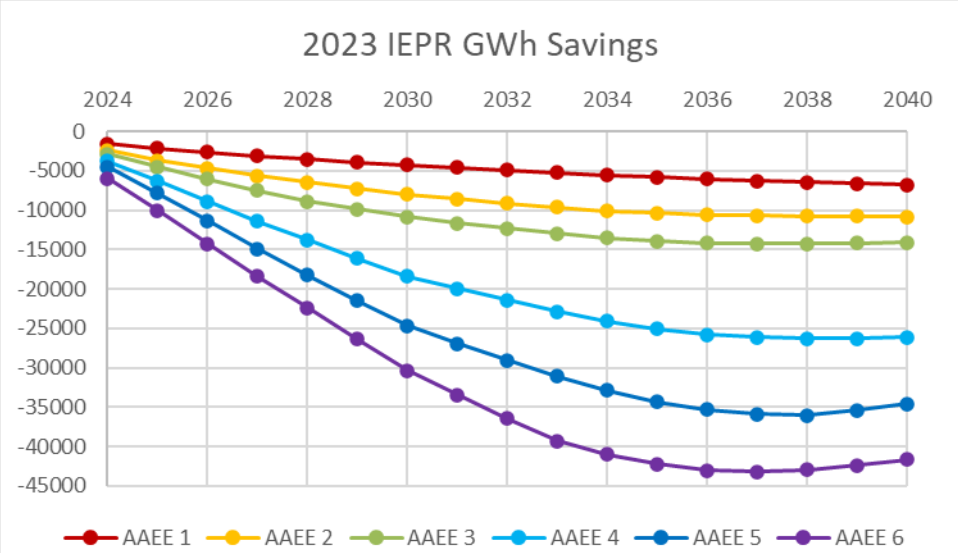
- **Equitable Electrification and Clean Energy Reliability Investment Plan funded program impacts in California. (Equitable Building Decarbonization Programs - Direct Install & Incentive)**
- **Inflation Reduction Act (IRA) High Efficiency Electric Home Rebate Act (HEERA) and whole-house Homeowner Managing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

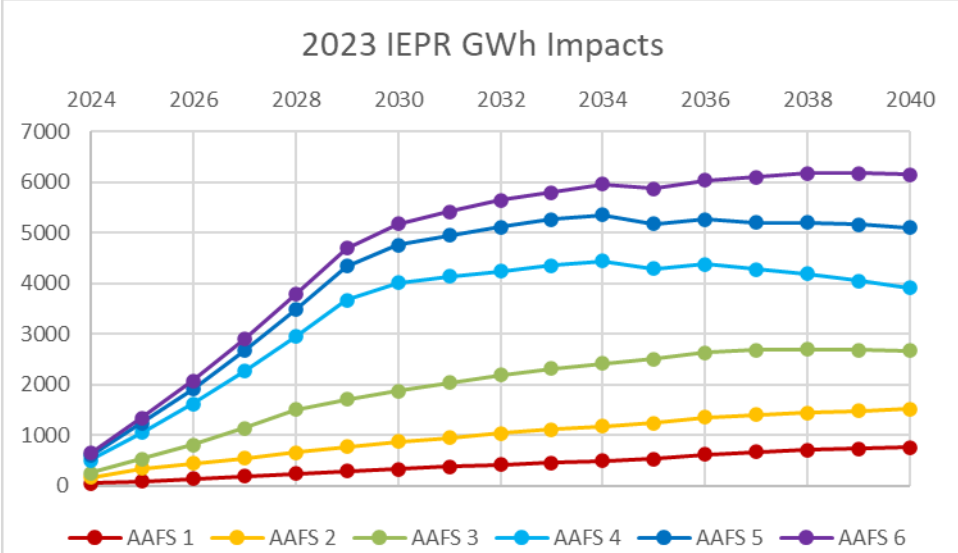
2023 AAEE & AAFS Development
Elements included

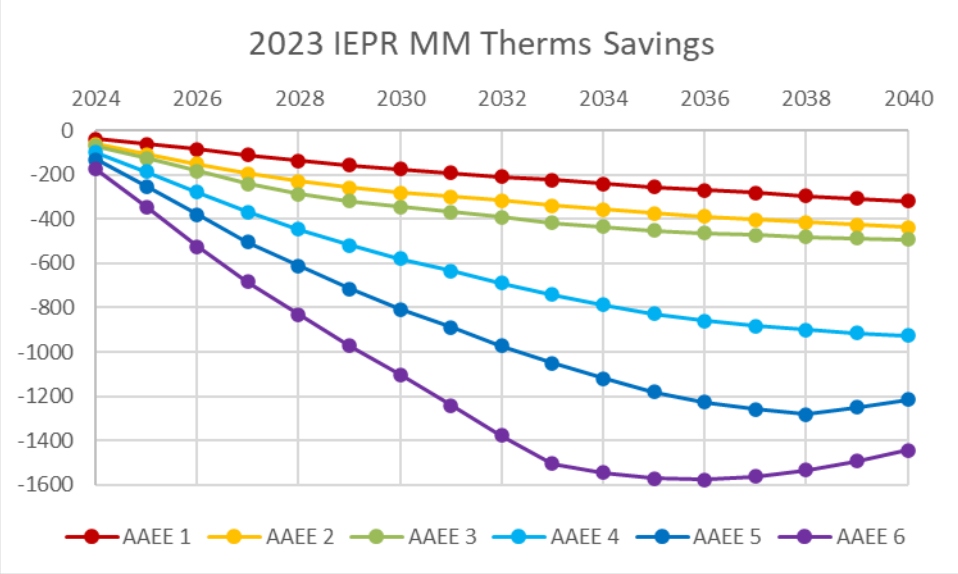
- 2023 CPUC Potential & Goals Study measures (IOU Programs)
- IOU data (CEDARS) on recent fuel substitution activities
- 2021 CMUA EE Potential Study (POU Programs)
- POU data on recent fuel substitution activities
- Future Title 20 and Federal Appliance Standards
- 2022 & future Building Standards
- 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
  - CalEHP, WNDRR, AHSC
  - IRA- HEERA & HOMES
  - EBDP- DI & Incentive
  - CERIP

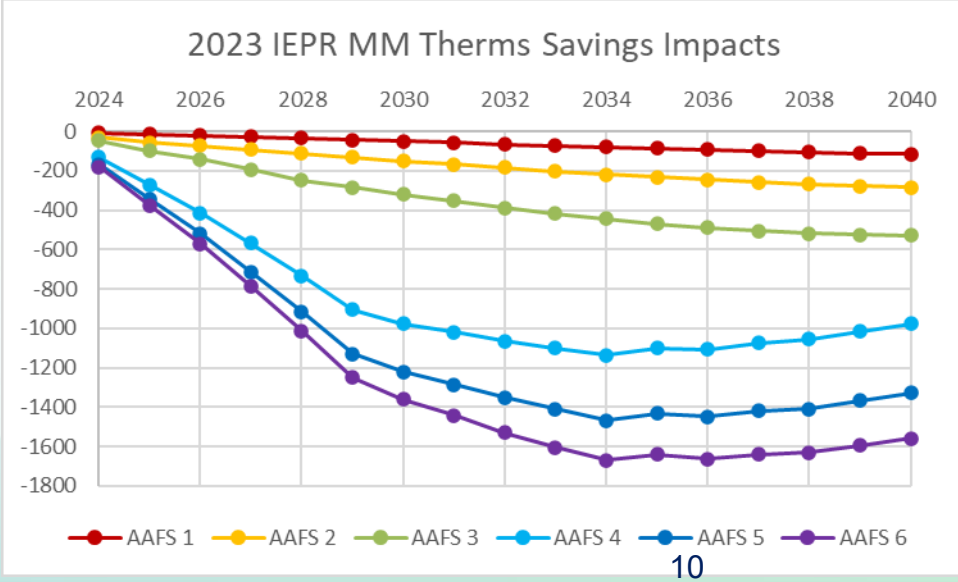
Statewide Spectrum of 2023 AAEE & AAFS Scenarios

- **While AAEE reduces electricity consumption, AAFS adds an incremental amount**
- **Both AAEE and AAFS reduce gas consumption**





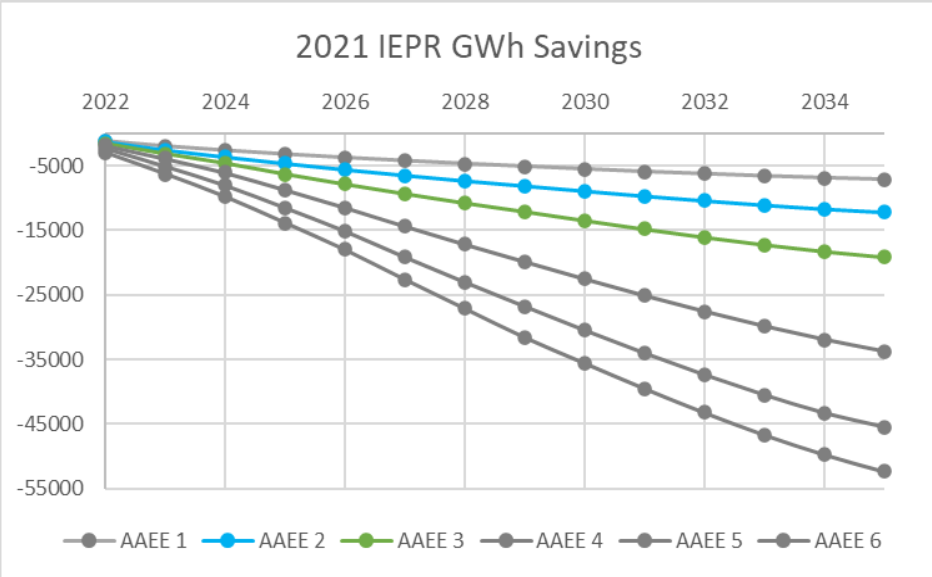


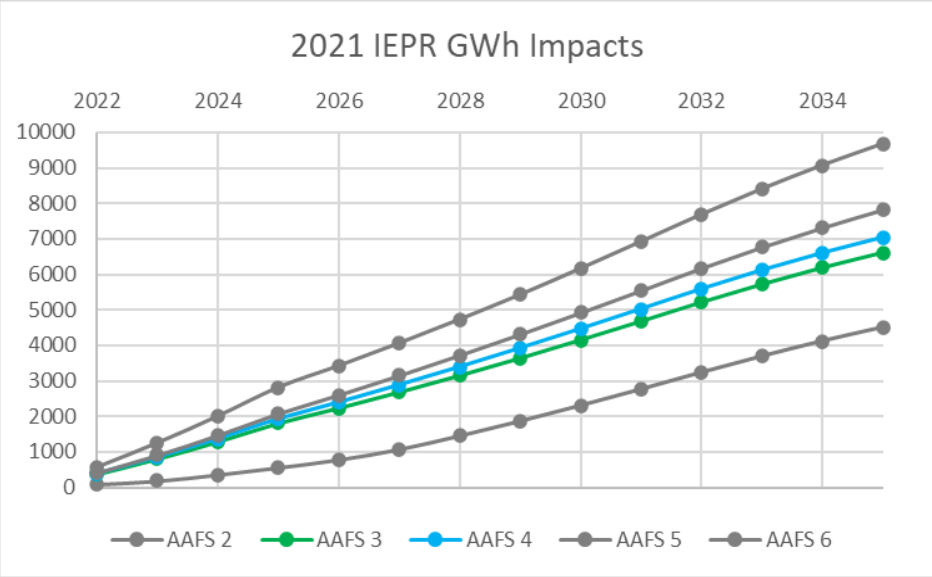


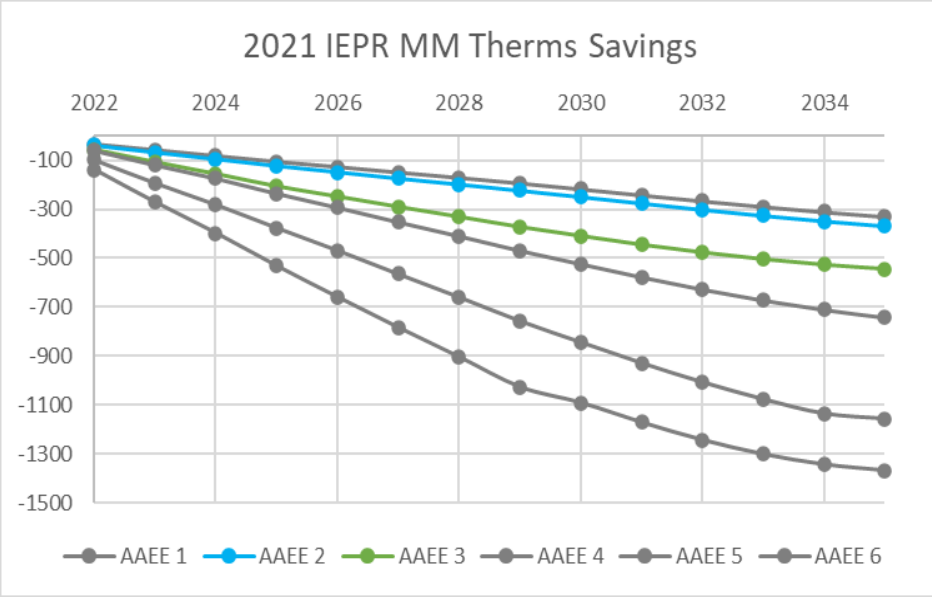
Statewide Spectrum of 2021 AAEE & AAFS Scenarios

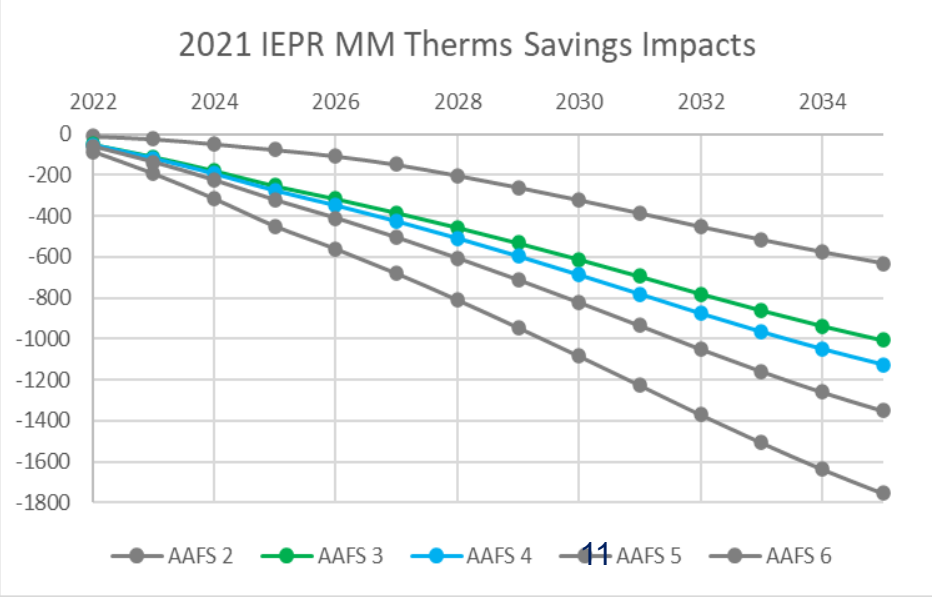
Green are Planning Forecast Components ***Blue are components of the Local Reliability Scenario***

- **While AAEE reduces electricity consumption, AAFS adds an incremental amount**
- **Both AAEE and AAFS reduce gas consumption**



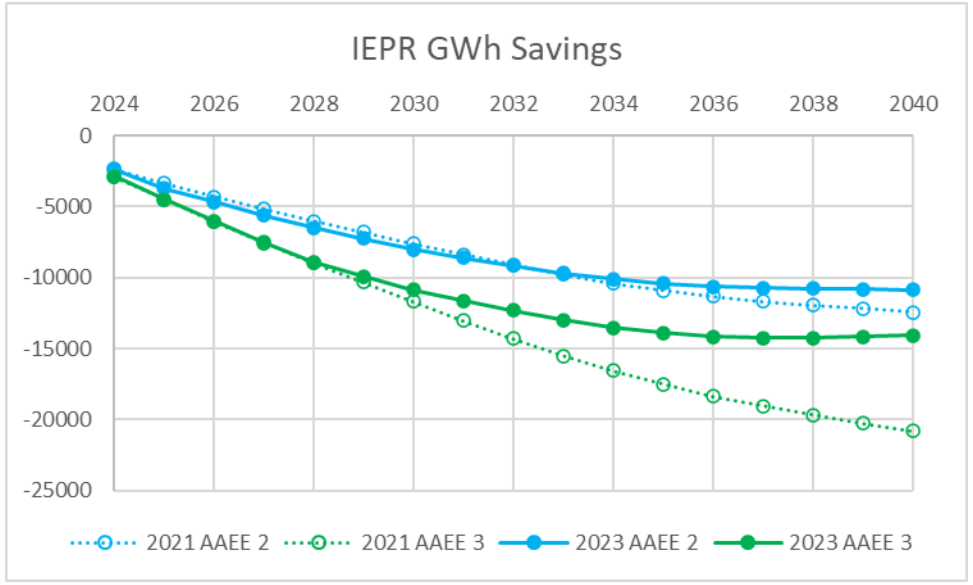


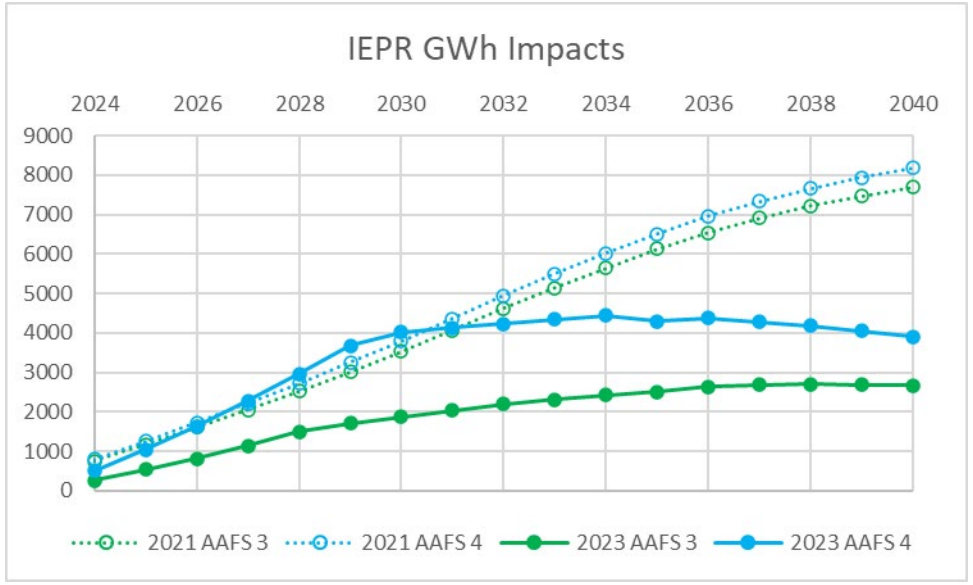


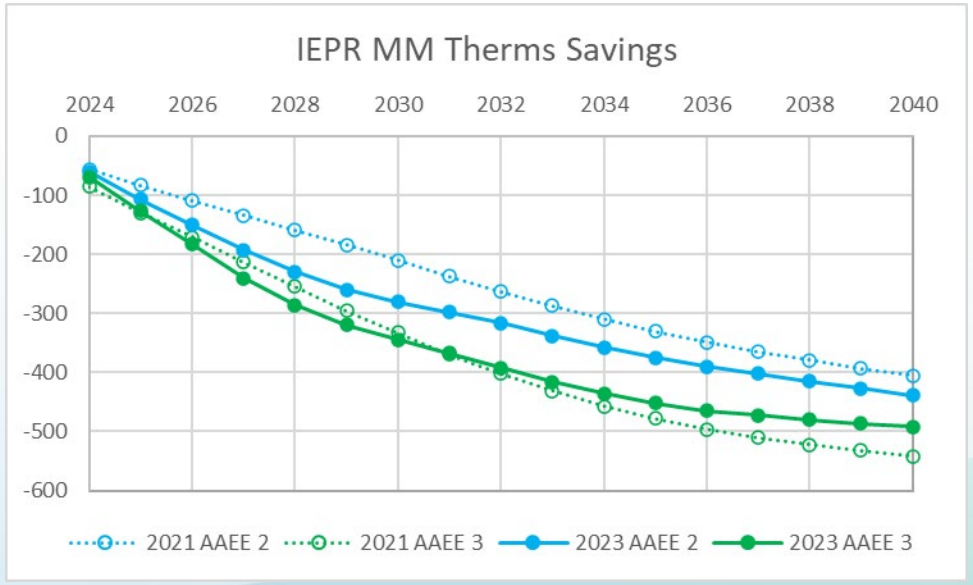


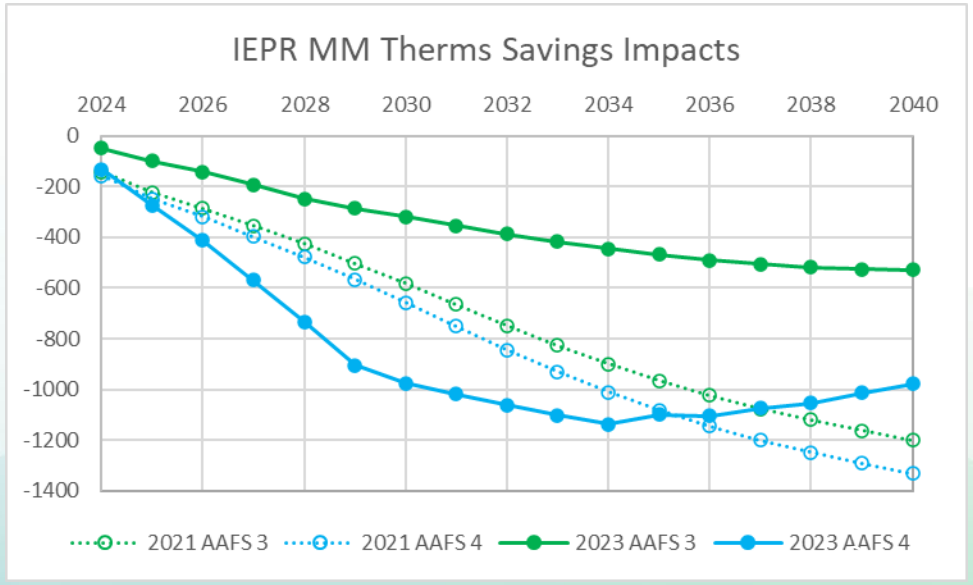
Compare 2021 vs 2023 IEPR Vintages for Statewide Planning Scenario and Local Reliability Scenario

AAEE



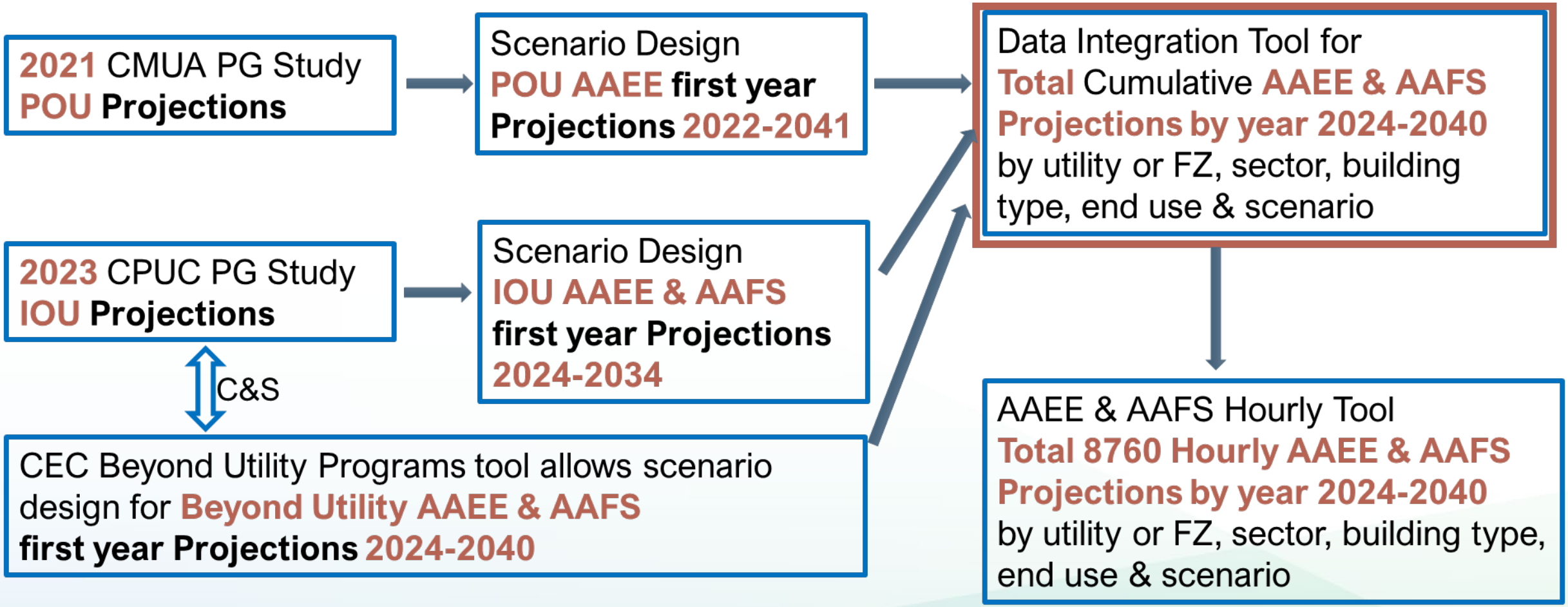






AAFS

2023 Programmatic AAEE and AAFS Process Flow Overview



2023 Planning Scenario AAEE 3 & AAFS 3

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

- IOU Programs including Low Income & Fuel Substituion; PG Study Goals
- POU Programs EE only, reference as submitted in 2021
- Title 24 2022 Building Standards reference
  - Title 24 2025 Building Standards proposed conservative
- Title 20 and Federal Appliance Standards add near term new measures in a conservative view
- Beyond Utility Programs included in a reference modeling view
  - DGS
  - ECAA
  - CCA RENs
  - LGO
  - PACE
  - POU Fuel Sub
  - GGRF WEG & LIWP
  - Targeted Electrification
  - TECH
  - BUILD
  - AHSC
  - CAIEHP
  - WNDRR
- Beyond Utility Programs included in a conservative modeling view
  - Asset Rating
  - Smart Meter
  - SGIP HPWH
  - FPIP
  - EBDP Direct Install
  - IRA HEEHRA & EBDP Incentive
  - IRA HOMES

2023 Local Reliability Scenario AAEE 2 & AAFS 4

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

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

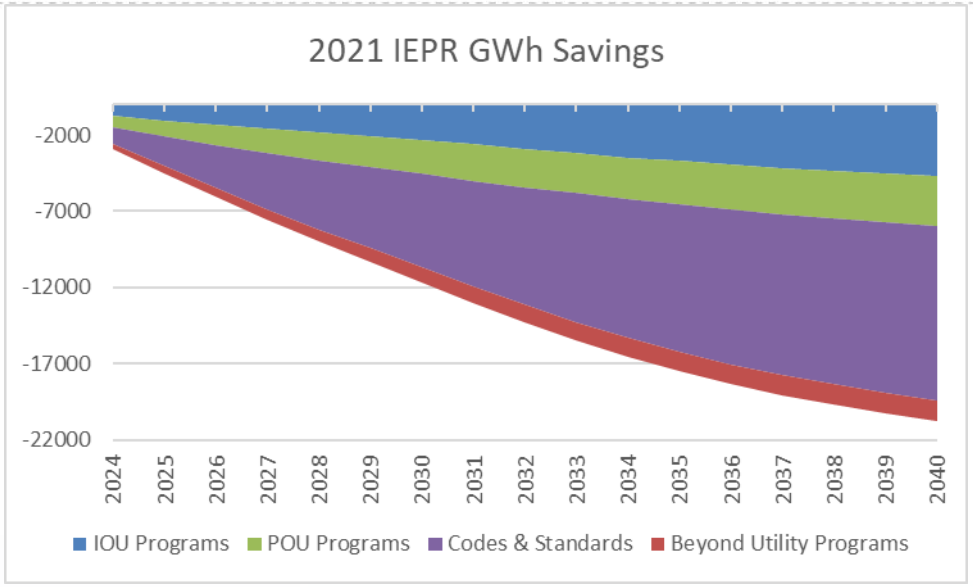
AAEE 2

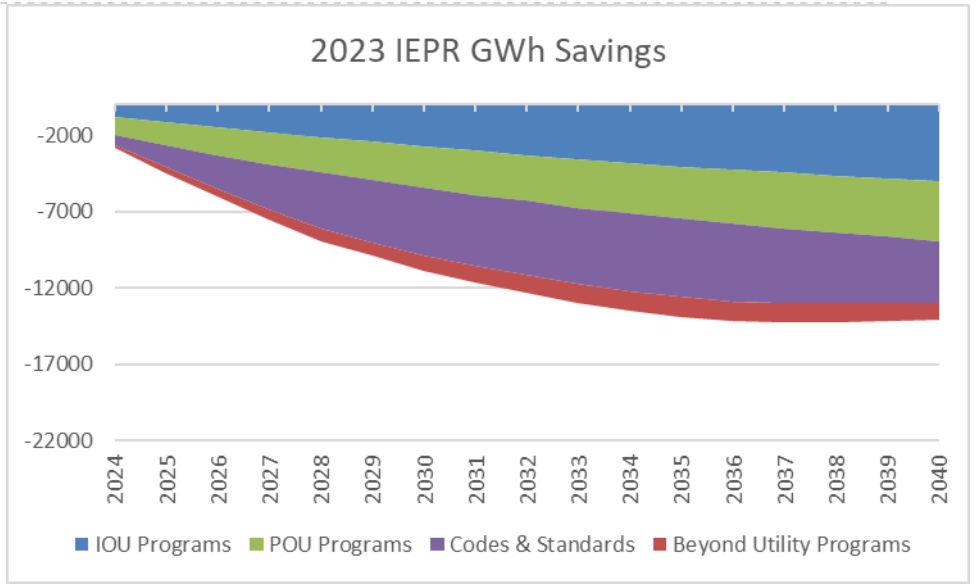
- IOU Programs including Low Income; less than PG Study Goals
- POU Programs EE only, conservative view
- Title 24 2022 Building Standards conservative view
- No additional Title 20 and Federal Appliance Standards
- Beyond Utility Programs included in a reference modeling view
  - DGS, ECAA
- Beyond Utility Programs included in a conservative modeling view
  - CCA RENs
  - GGRF WEG & LIWP
  - LGO
  - PACE
  - FPIP
  - BUILD

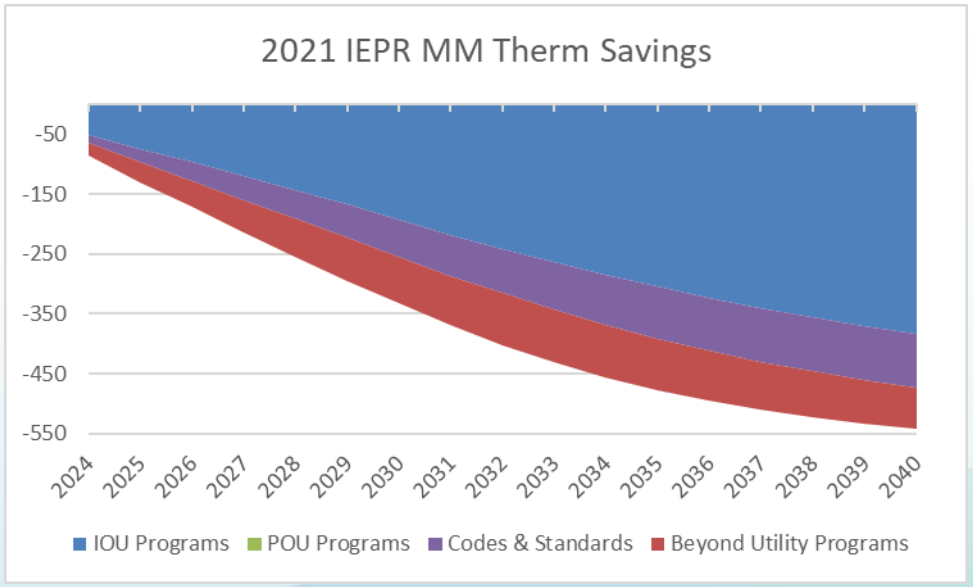
AAFS 4

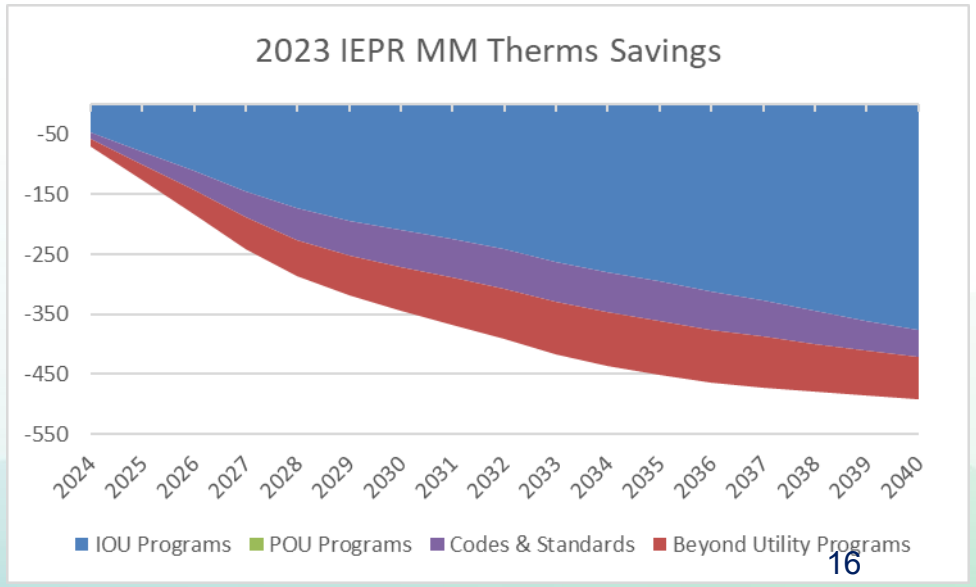
- IOU Fuel Substituion Programs ; greater than PG Study Goals
- Title 24 2022 Building Standards reference
  - Title 24 2025 proposed reference
  - Title 24 2028 proposed conservative
- Beyond Utility Programs included as in AAFS 3 plus...
  - Now at reference instead of conservative
    - SGIP HPWH
    - FPIP
    - EBDP Direct Install
    - IRA HEEHRA & EBDP Incentive

2021 vs 2023 Planning Scenario AAEE 3

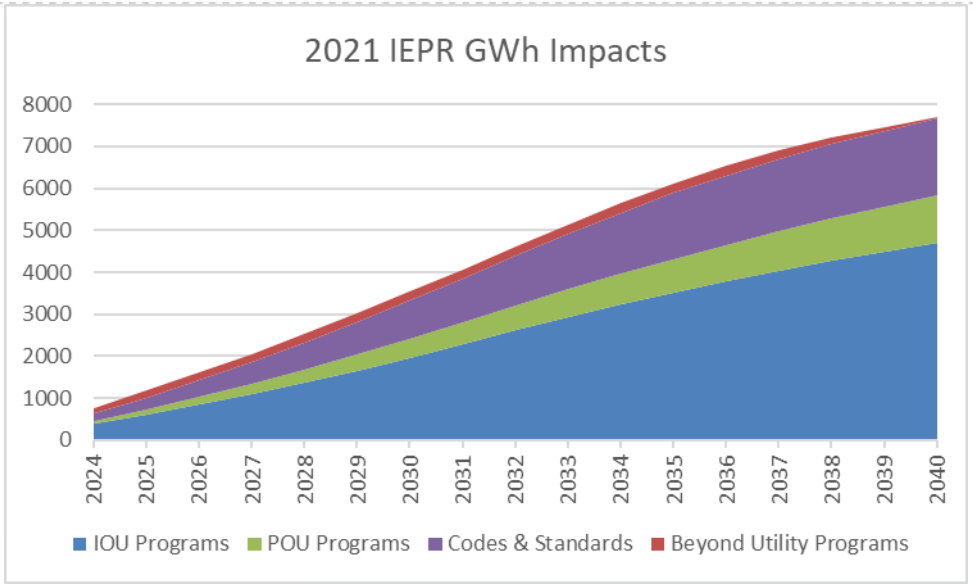


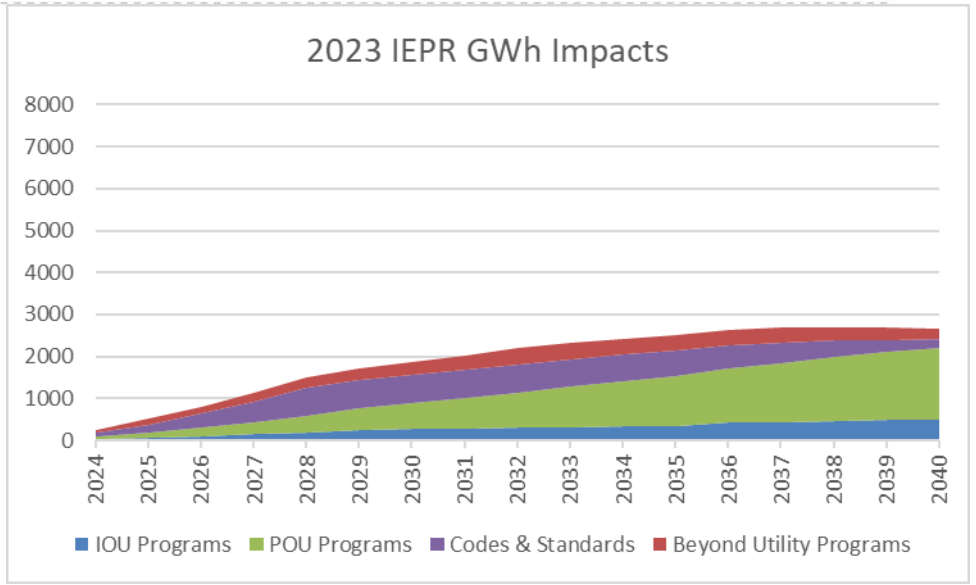


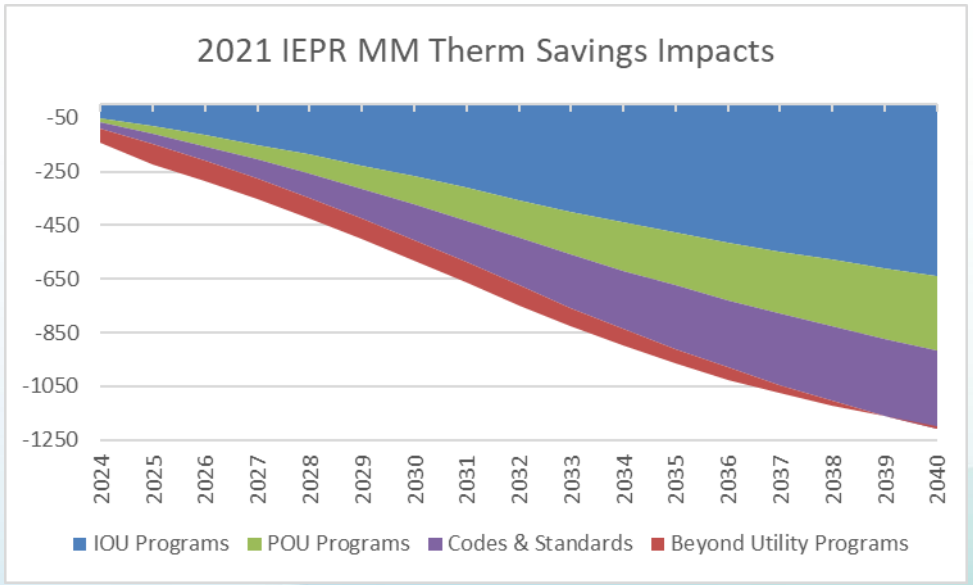


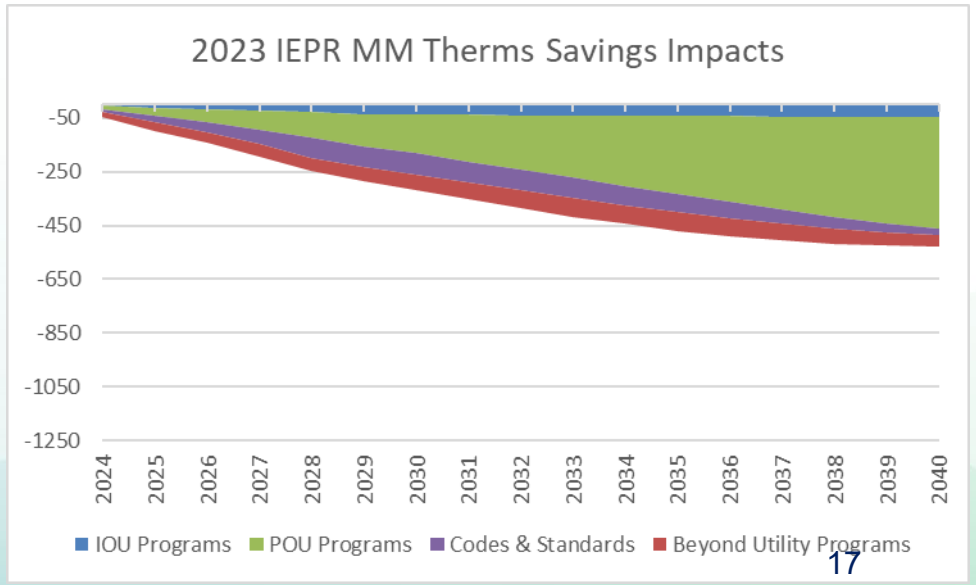


2021 vs 2023 Planning Scenario AAFS 3

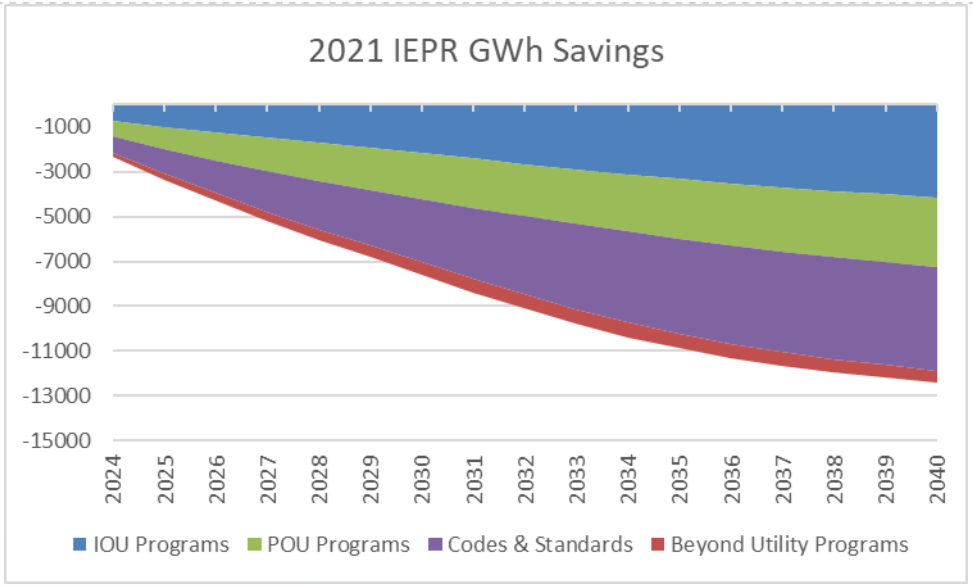


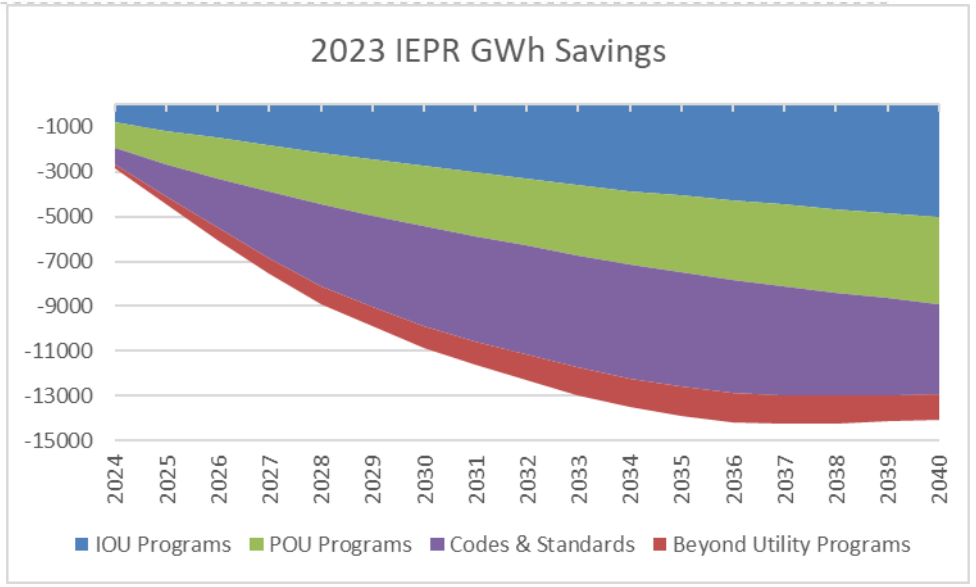


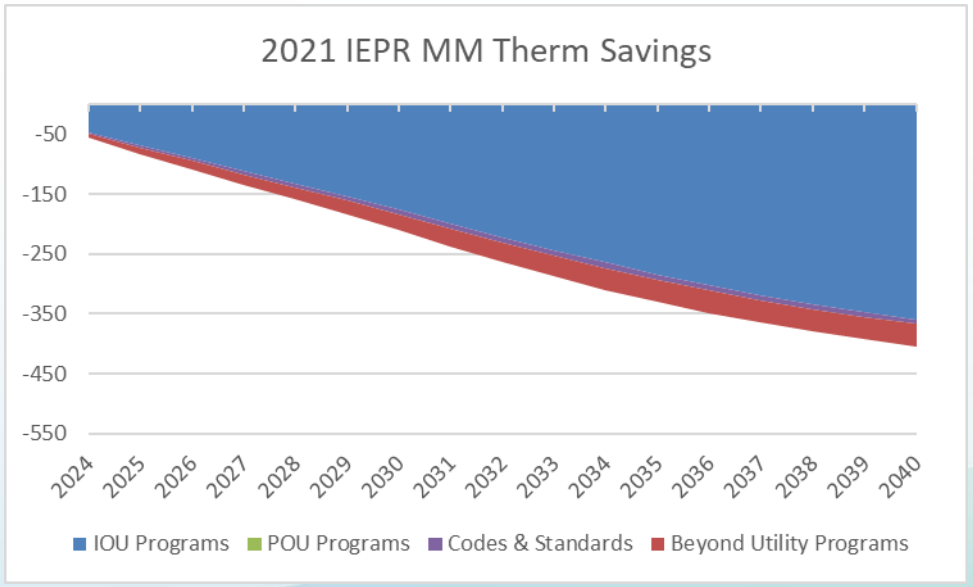


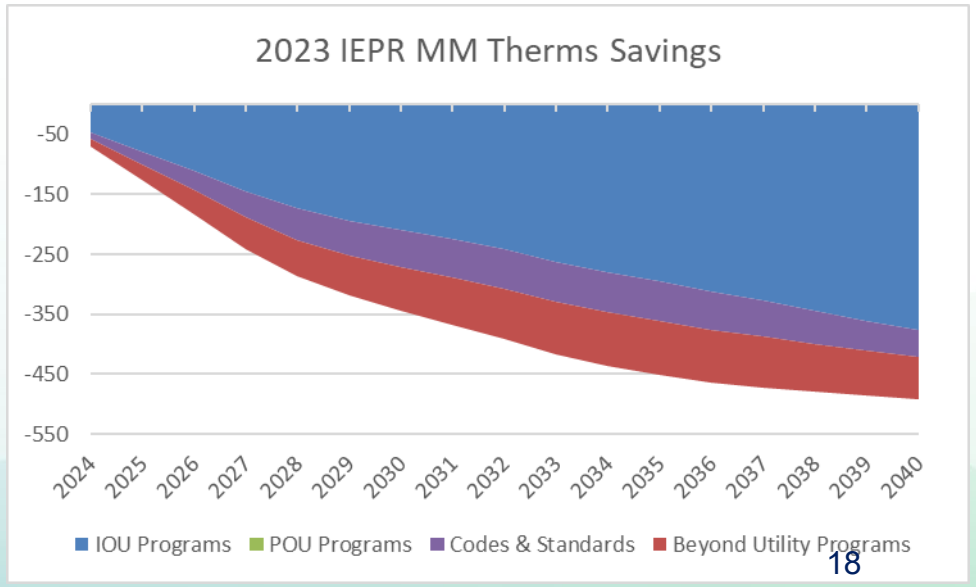


2021 vs 2023 Local Reliability Scenario AAEE 2

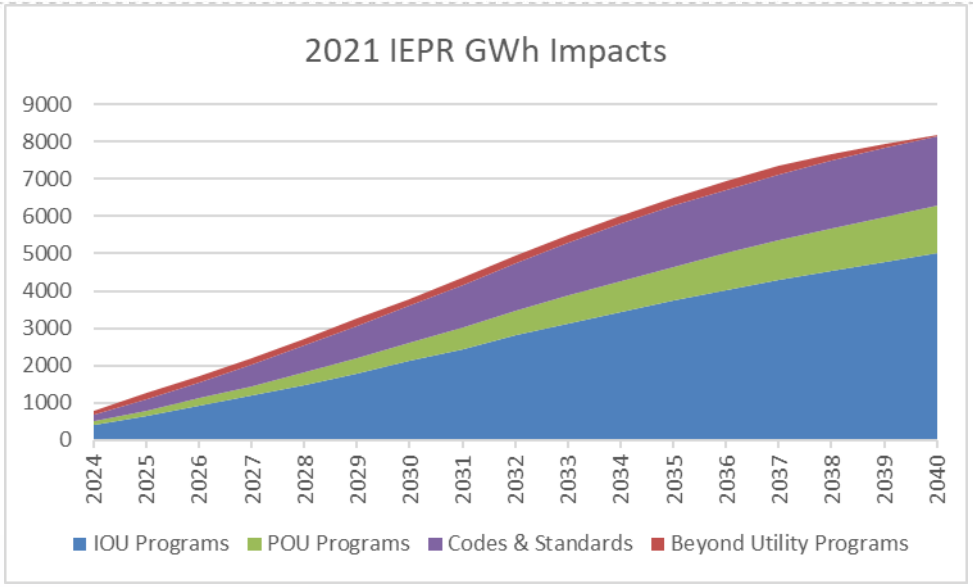


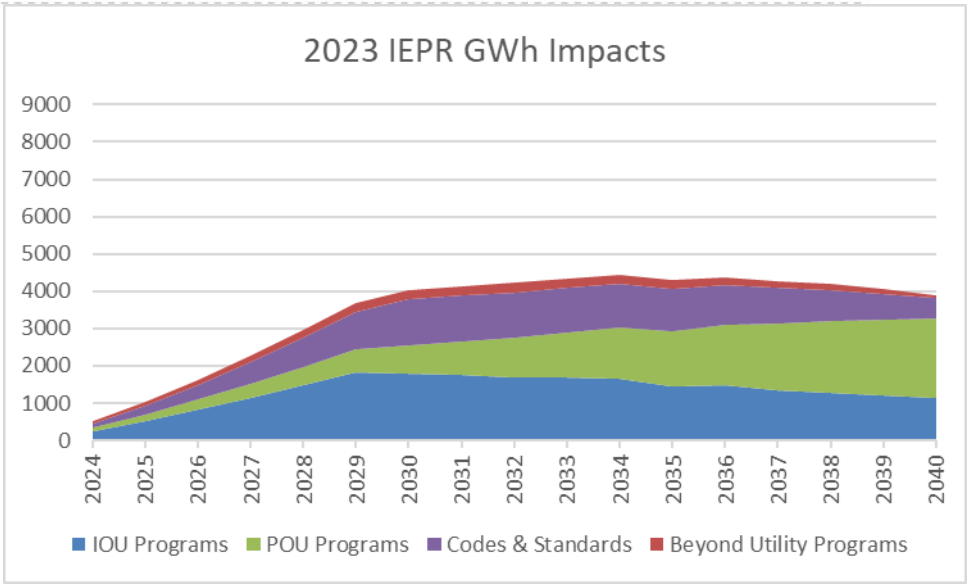


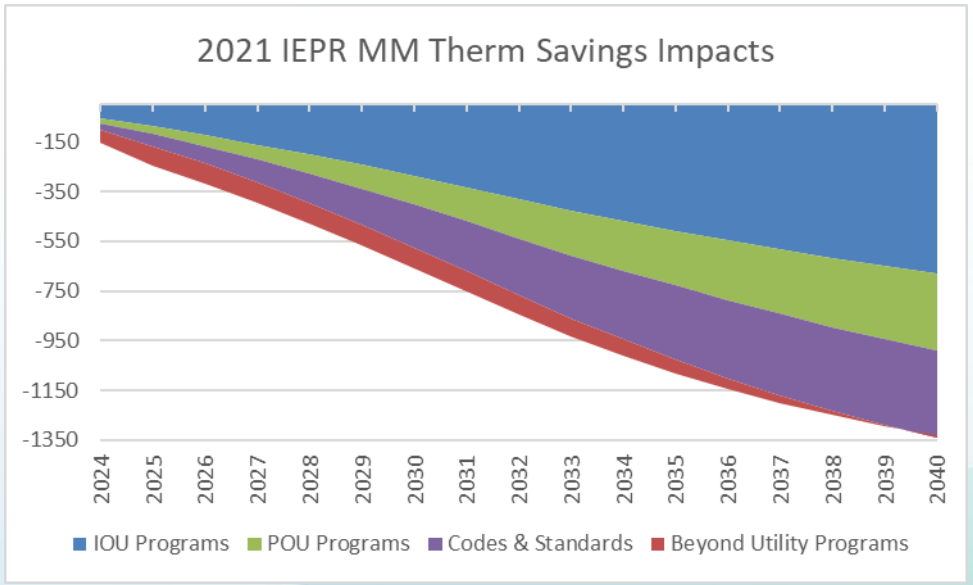


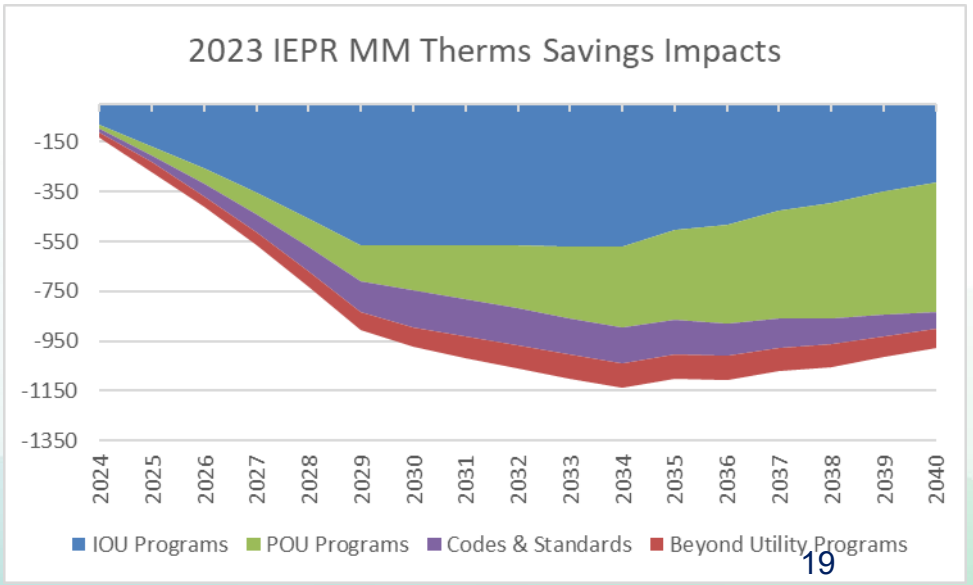


2021 vs 2023 Local Reliability Scenario AAFS 4









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

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**

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 modeling)**

2023 AAEE & AAFS in Demand Forecast Scenarios

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

** Four FSSAT Scenarios*
"Zero-Emissions Appliance Standards"
modeled as part of AAFS 3-6

- AAEE electricity and gas may be separated
- 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

Thank you!

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