

**DOCKETED**

<b>Docket Number:</b>	23-IEPR-03
<b>Project Title:</b>	Electricity and Gas Demand Forecast
<b>TN #:</b>	253099
<b>Document Title:</b>	Presentation - 2023 IEPR Programmatic AAEE & AAFS Results
<b>Description:</b>	3. Ingrid Neumann, CEC
<b>Filer:</b>	Raquel Kravitz
<b>Organization:</b>	California Energy Commission
<b>Submitter Role:</b>	Commission Staff
<b>Submission Date:</b>	11/14/2023 10:13:08 AM
<b>Docketed Date:</b>	11/14/2023



# **2023 IEPR Programmatic AAEE & AAFS Results**

*Additional Achievable Energy Efficiency & Additional Achievable Fuel Substitution*

**IEPR Commissioner Workshop**

**November 15, 2023**

**Electricity & Natural Gas Demand Forecast: Load Modifier Results**

Ingrid Neumann, PhD

Energy Assessments Division, Advanced Electrification Analysis Branch



# 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

6

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

5

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

4

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

3

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

2

“Firm commitments”  
existing programs and standards not incorporated in baseline forecast

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# 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.*



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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 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



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- Future Title 20 and Federal Appliance Standards
- 2022 & future Building Standards
- 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



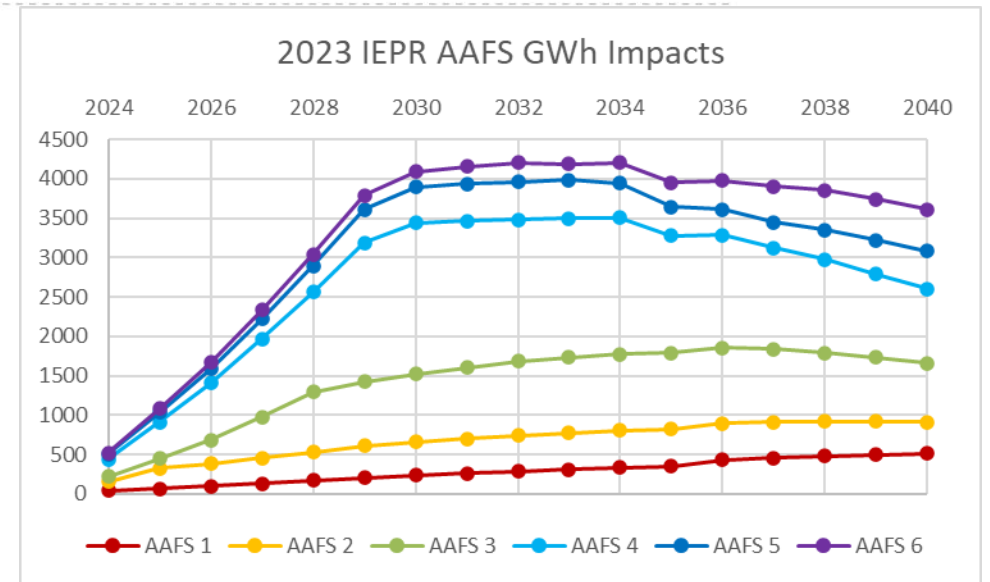
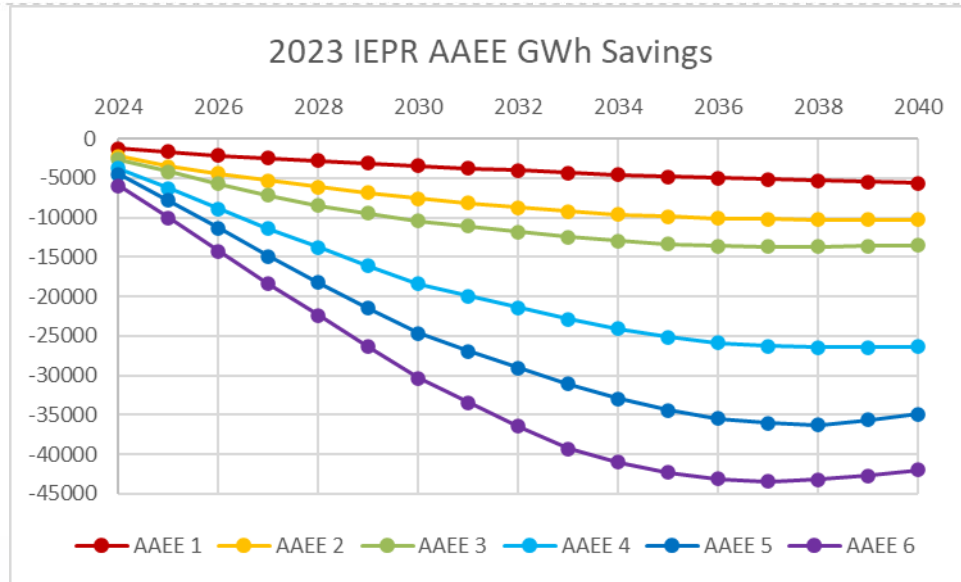
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  - EBDP- DI & Incentive
  - CERIP
- Local ordinances encouraging electrification of some or all end-uses as well as other targeted electrification including local natural gas bans
- Zero-emission appliance technology characterization (modeled via FSSAT)
  - Includes CARB SIP regulation



# Statewide Spectrum of 2023 AAEE & AAFS Scenarios

- While AAEE reduces electricity consumption, AAFS adds an incremental amount

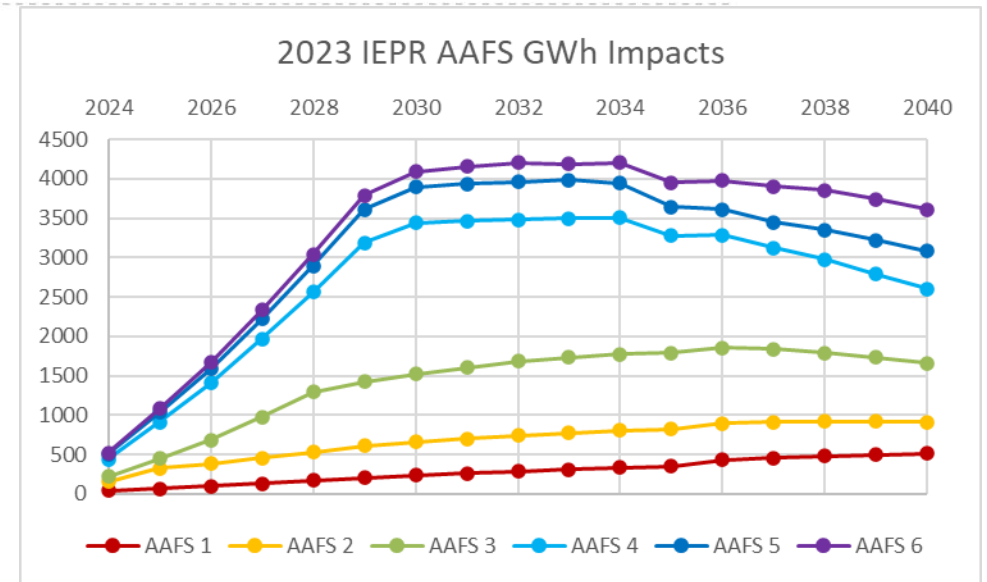
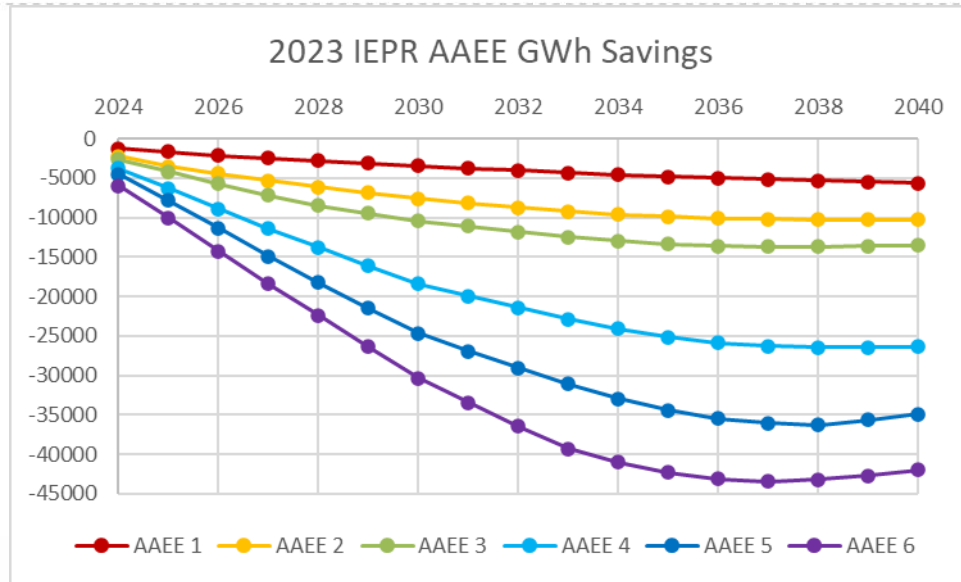


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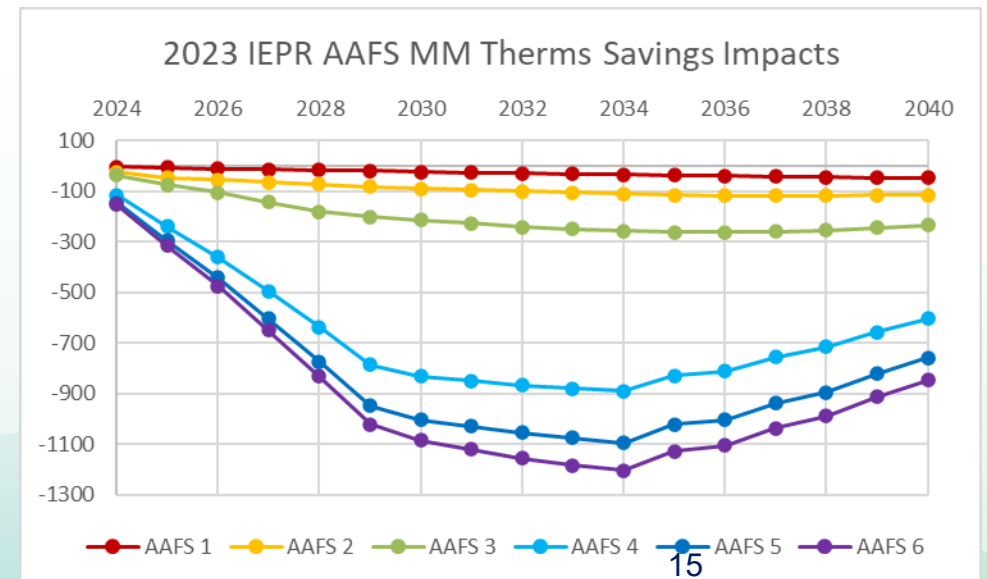
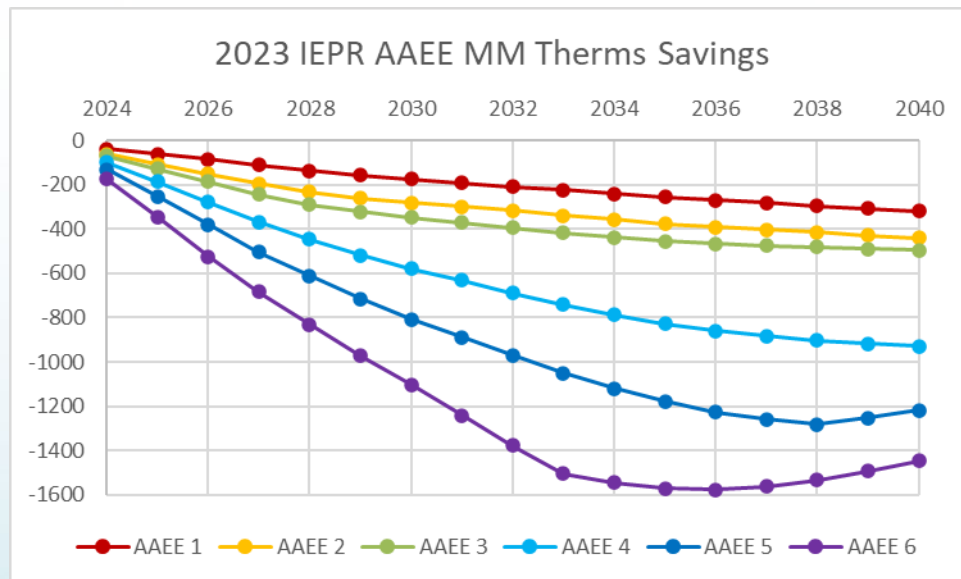


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- Both AAEE and AAFS reduce gas consumption

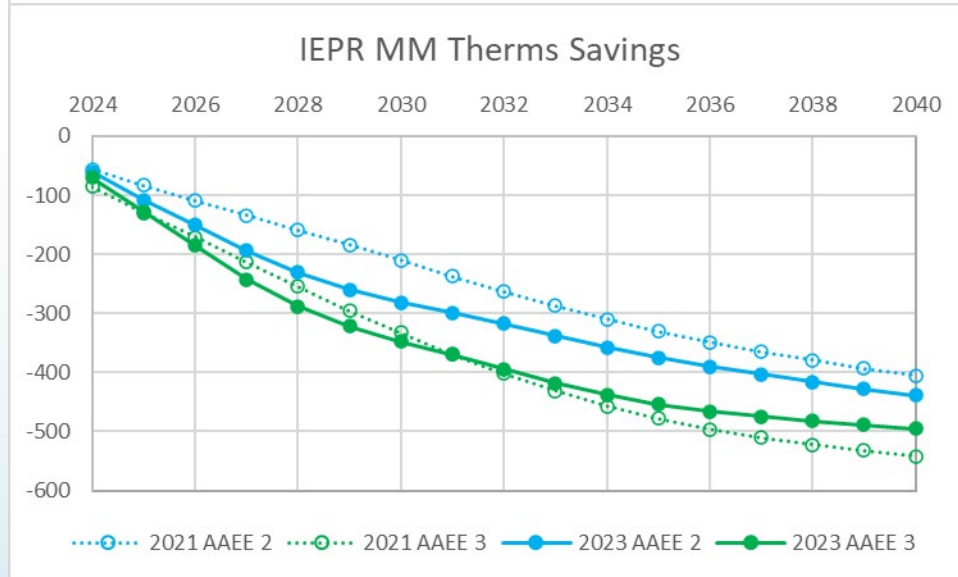
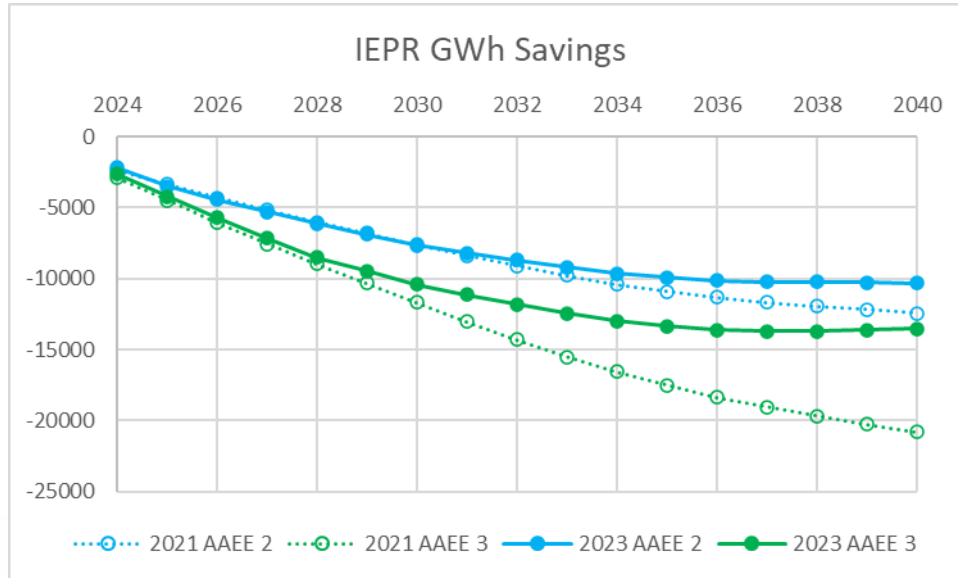






# Compare 2021 vs 2023 IEPR Vintages for Statewide Planning Scenario and Local Reliability Scenario

AAEE



Source: CEC/EAD Staff

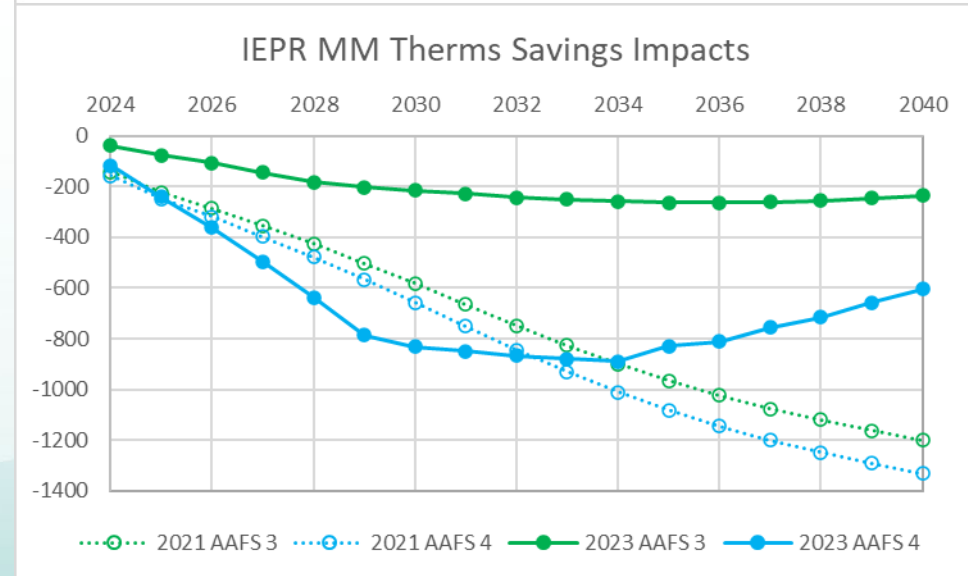
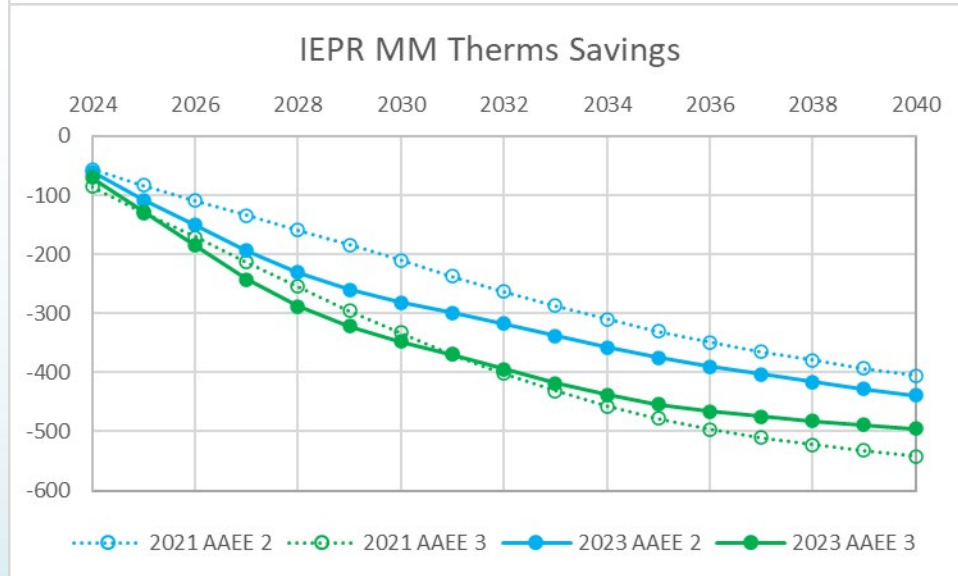
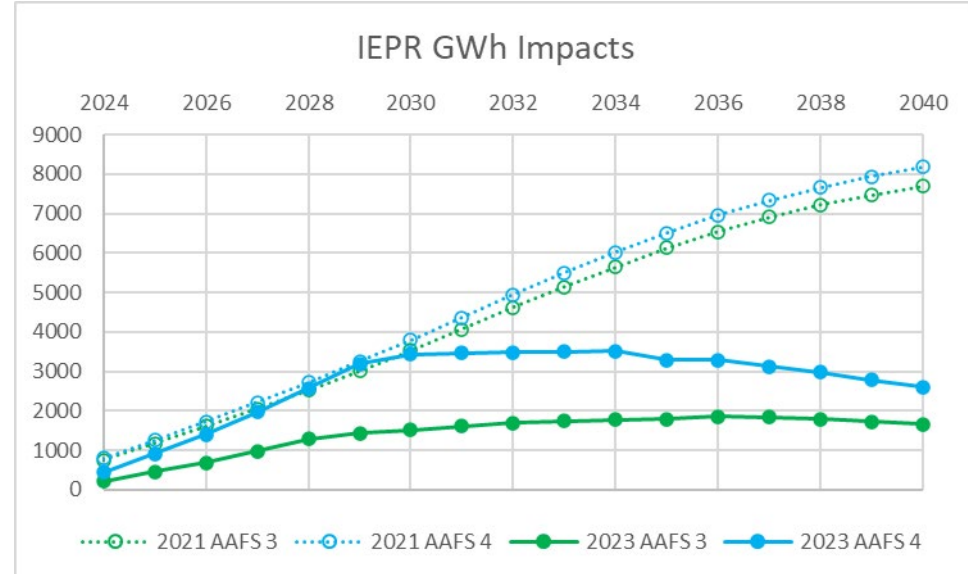
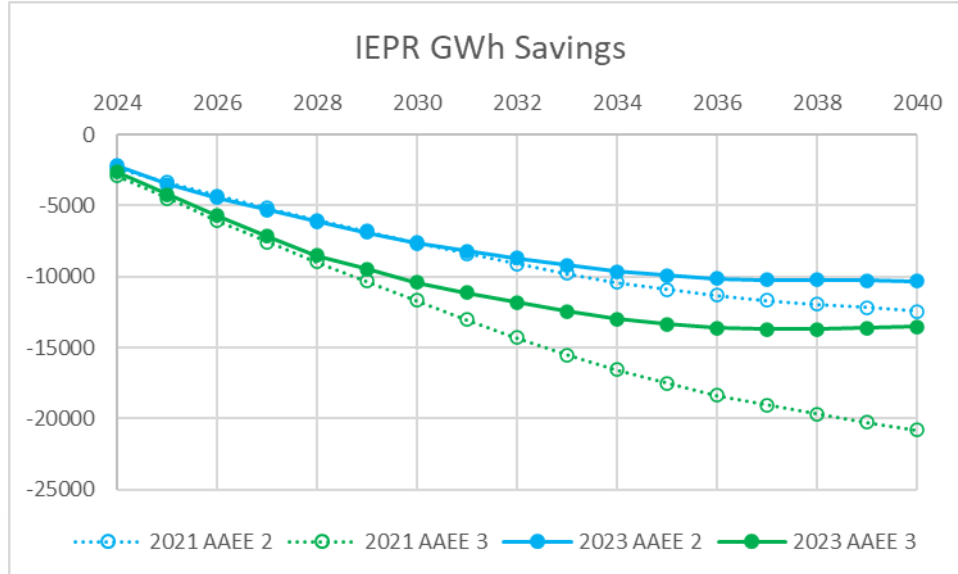


# Compare 2021 vs 2023 IEPR Vintages for Statewide Planning Scenario and Local Reliability Scenario

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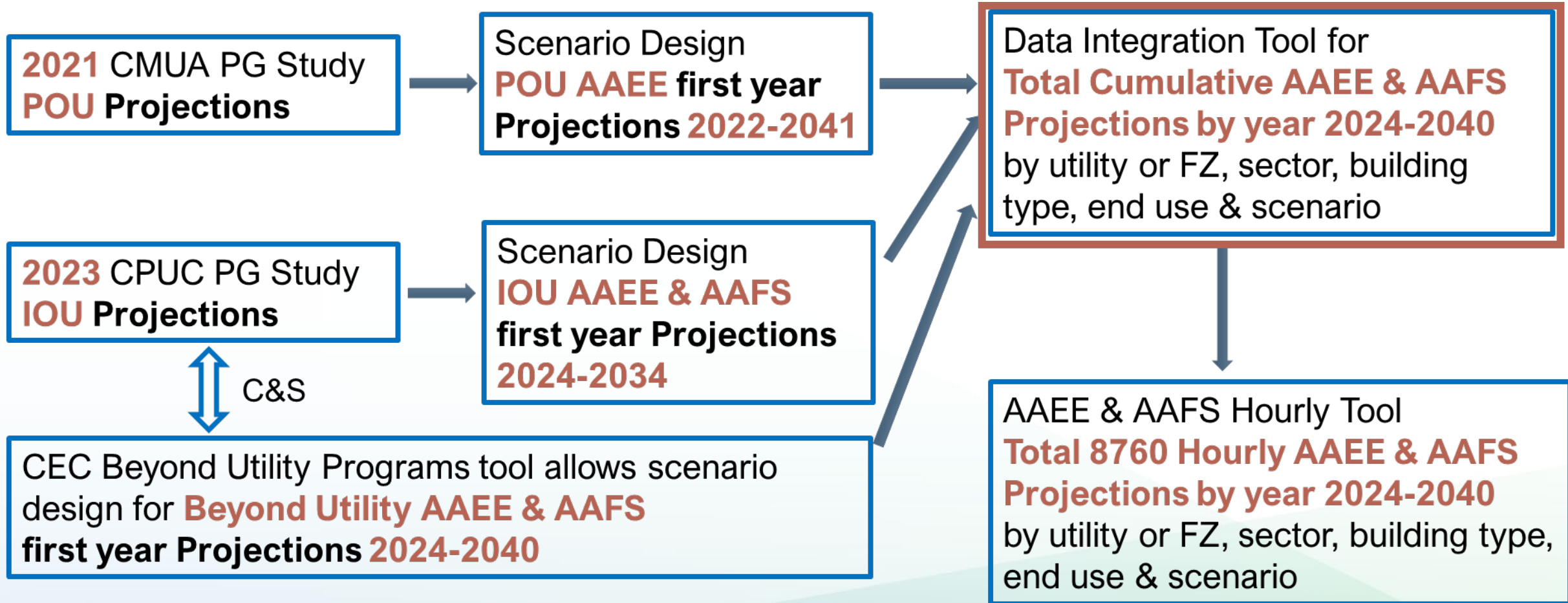
AAEE

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 Substitution; 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



# 2023 Planning Scenario AAEE 3 & AAFS 3

*“reasonable to occur with greater uncertainty about penetrations/volume of impact”  
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- 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

## AAFS 4

- IOU Fuel Substitution 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



# 2023 Local Reliability Scenario AAEE 2 & AAFS 4

## 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

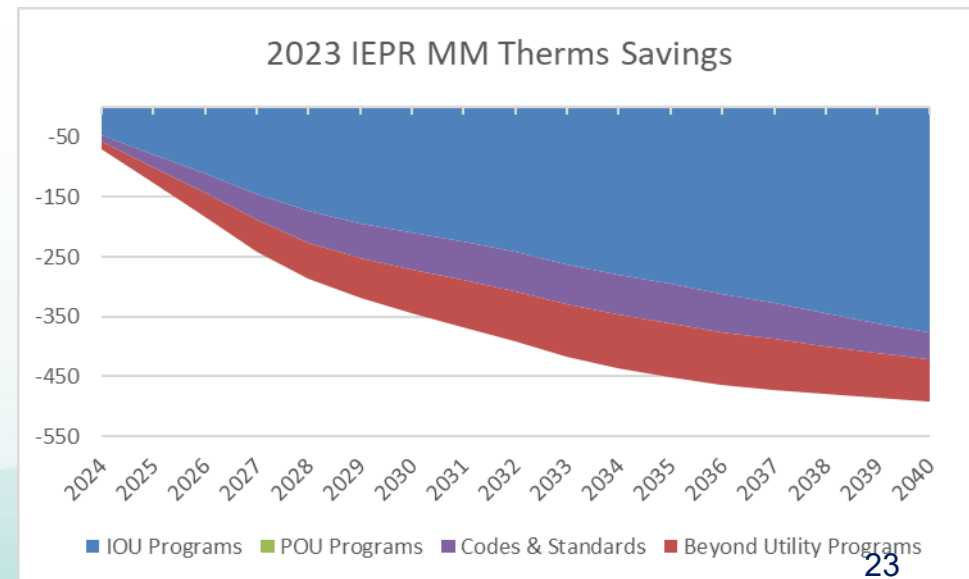
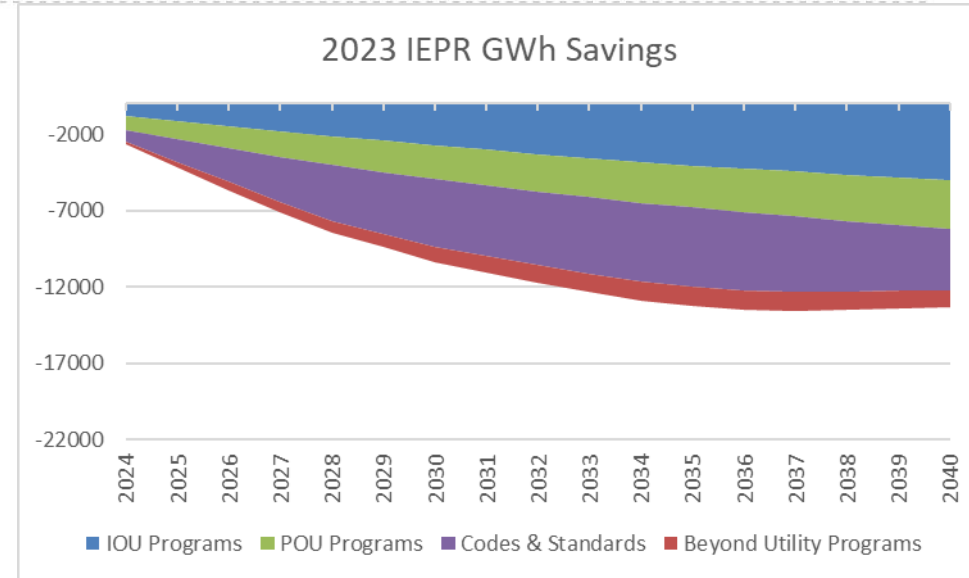
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# 2021 vs 2023 Planning Scenario AAE 3

Source: CEC/EAD Staff

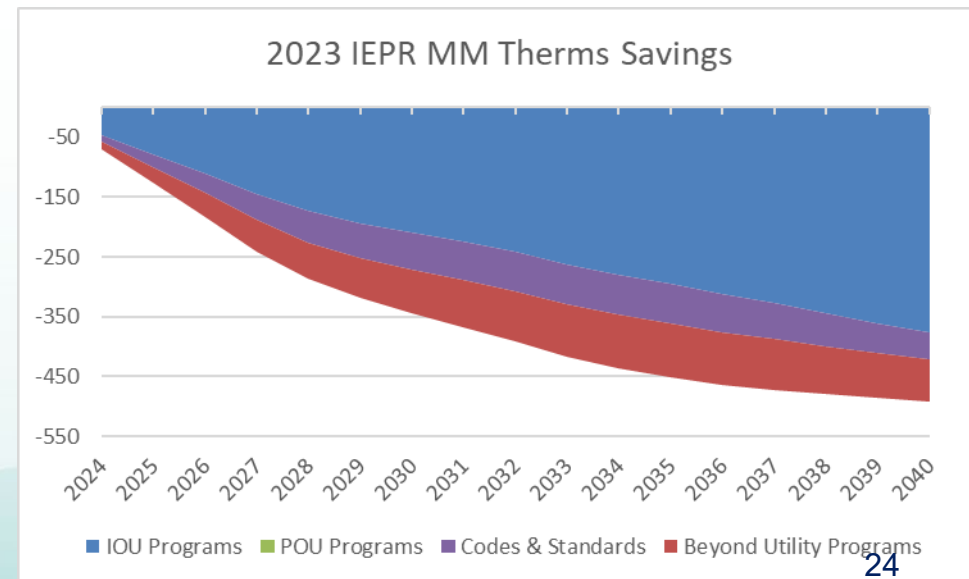
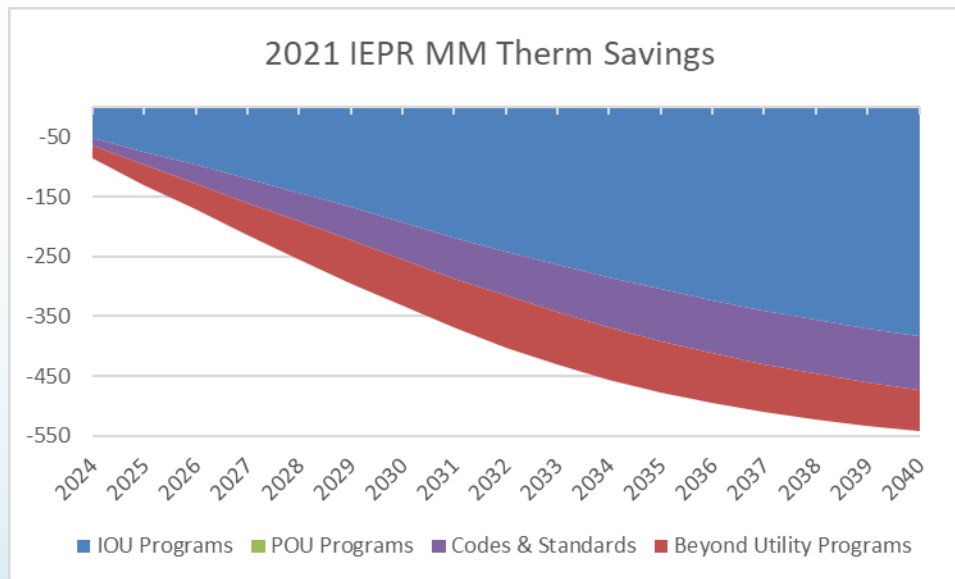
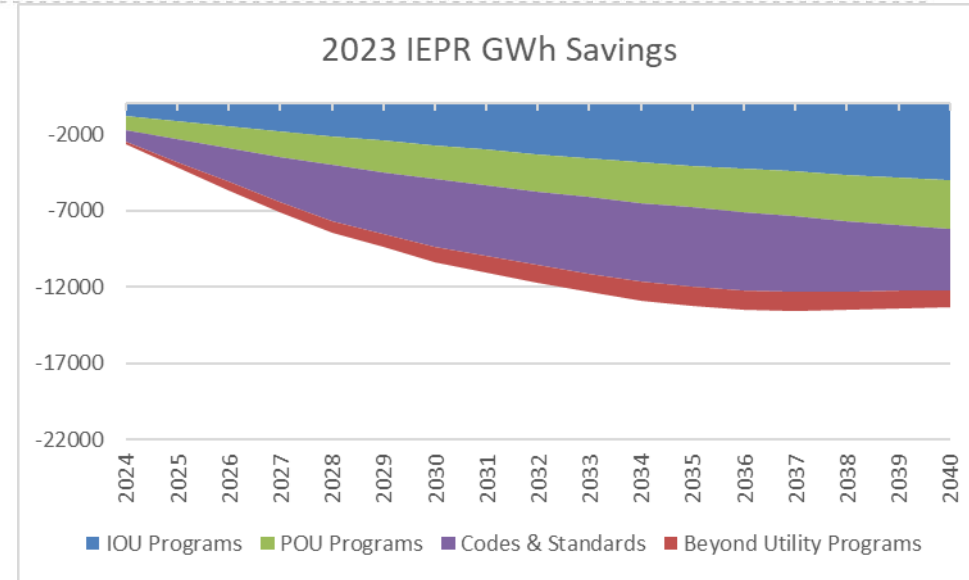
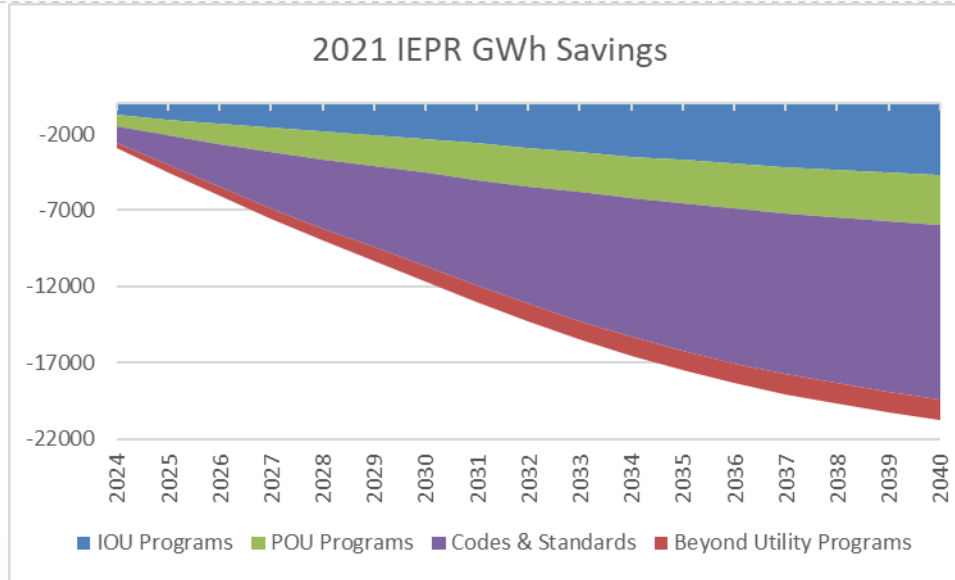






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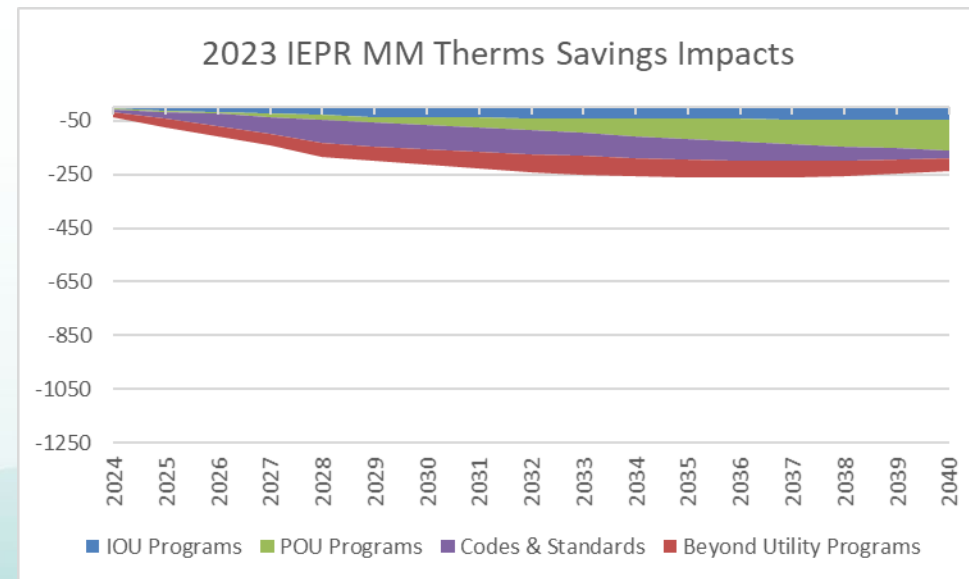
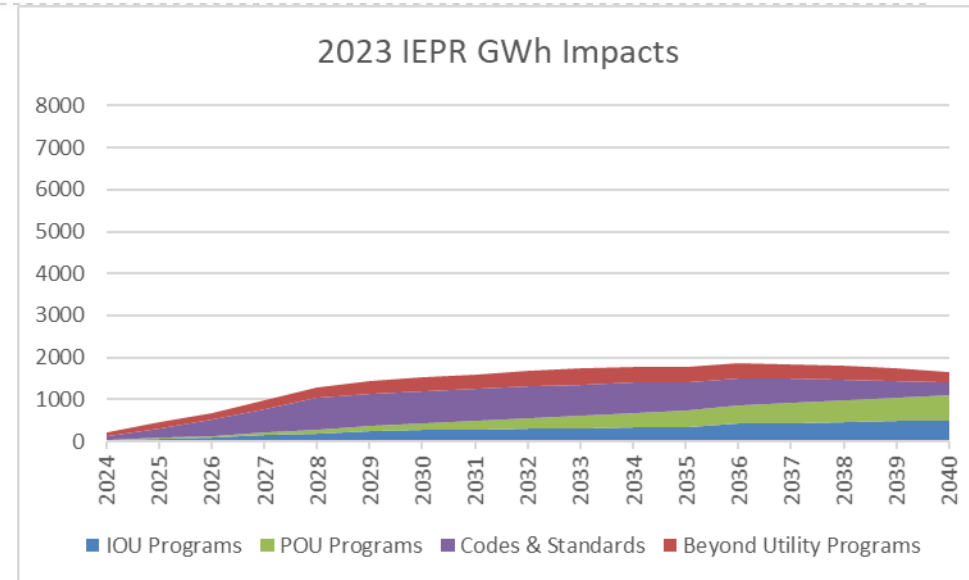
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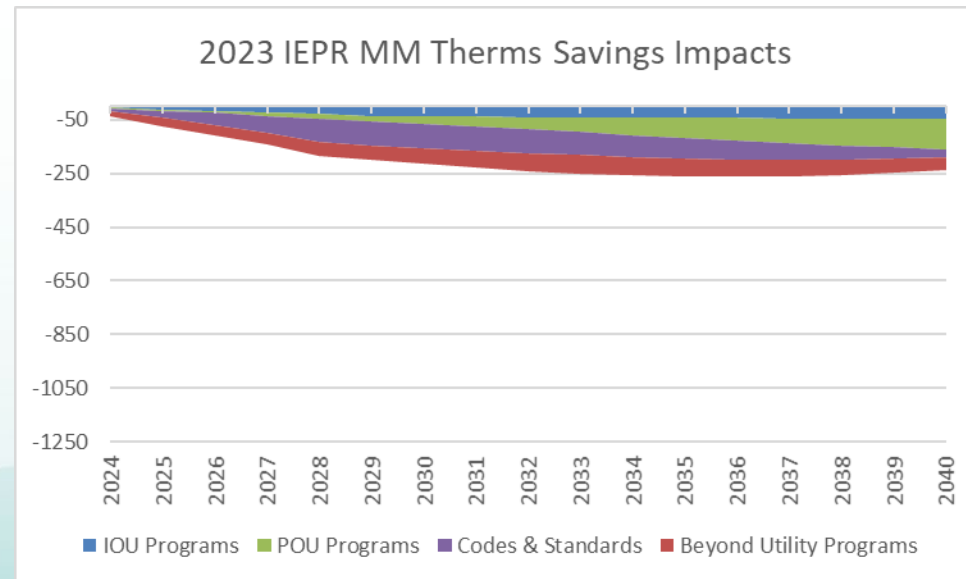
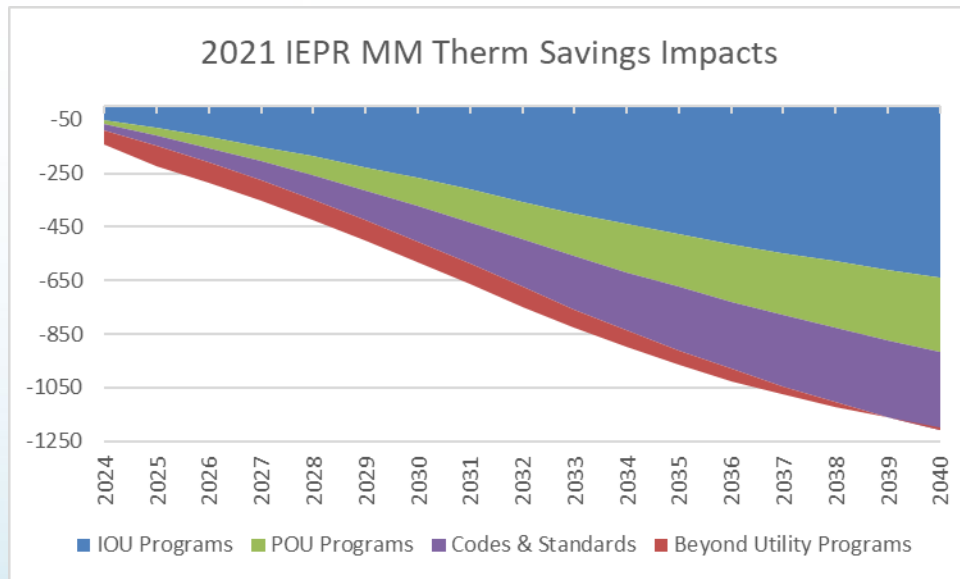
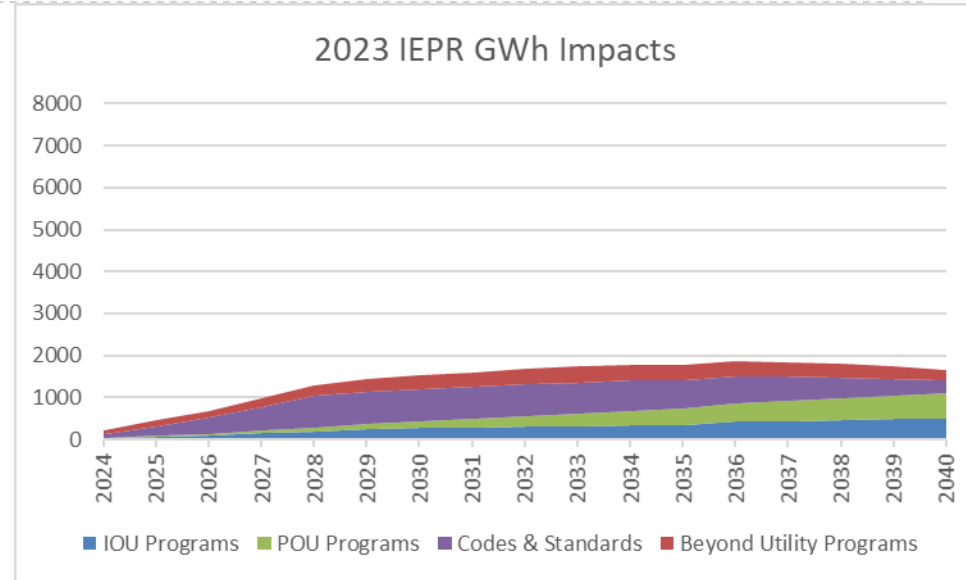
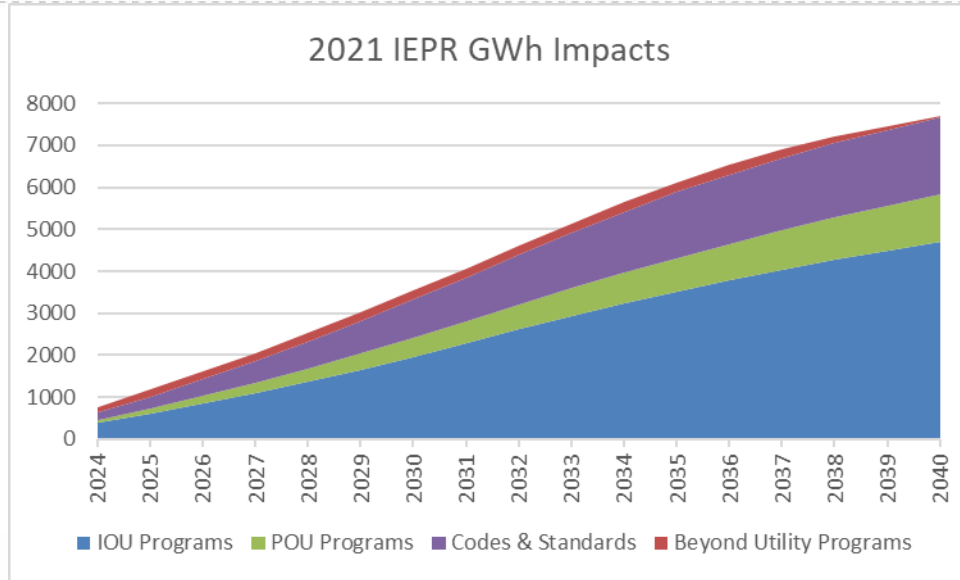
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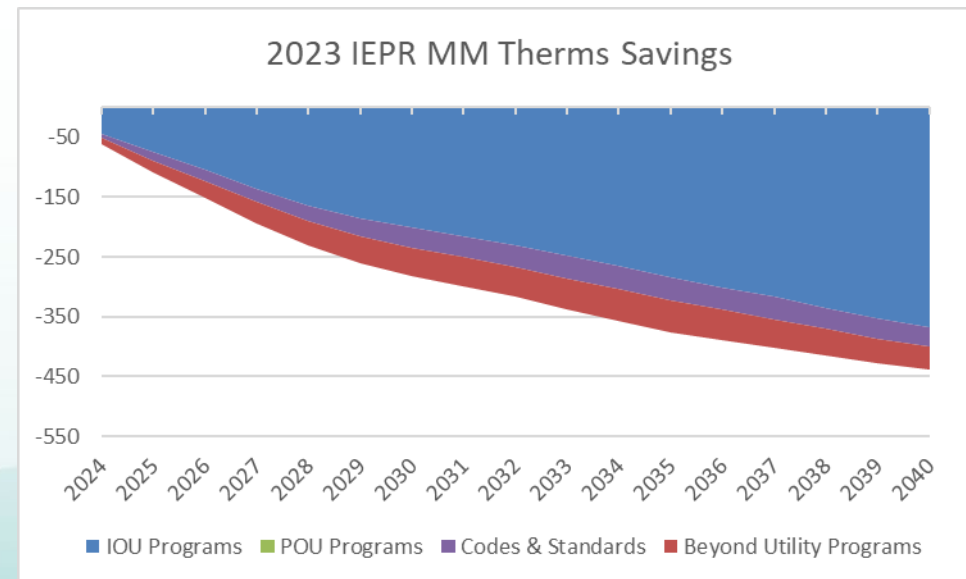
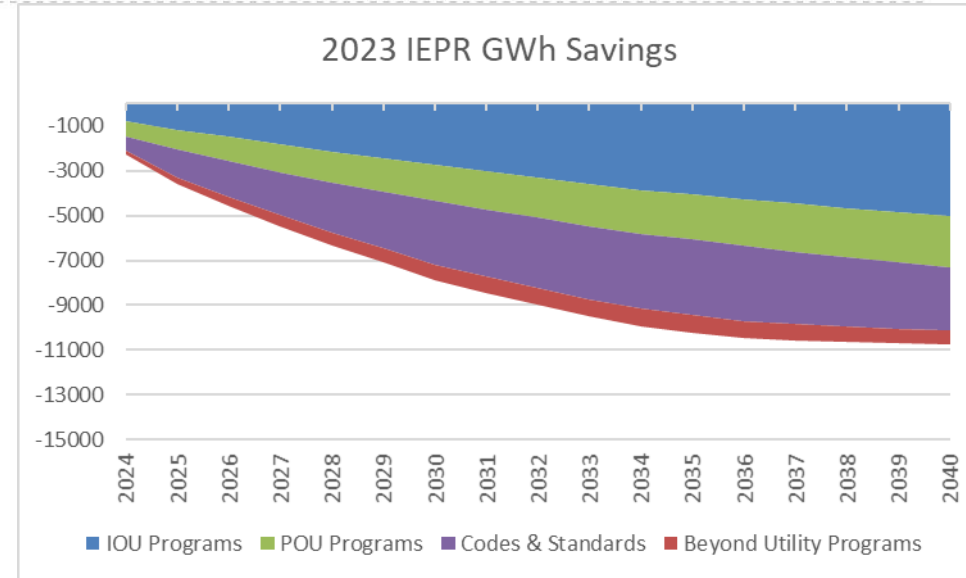
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# 2021 vs 2023 Local Reliability Scenario AAEE 2

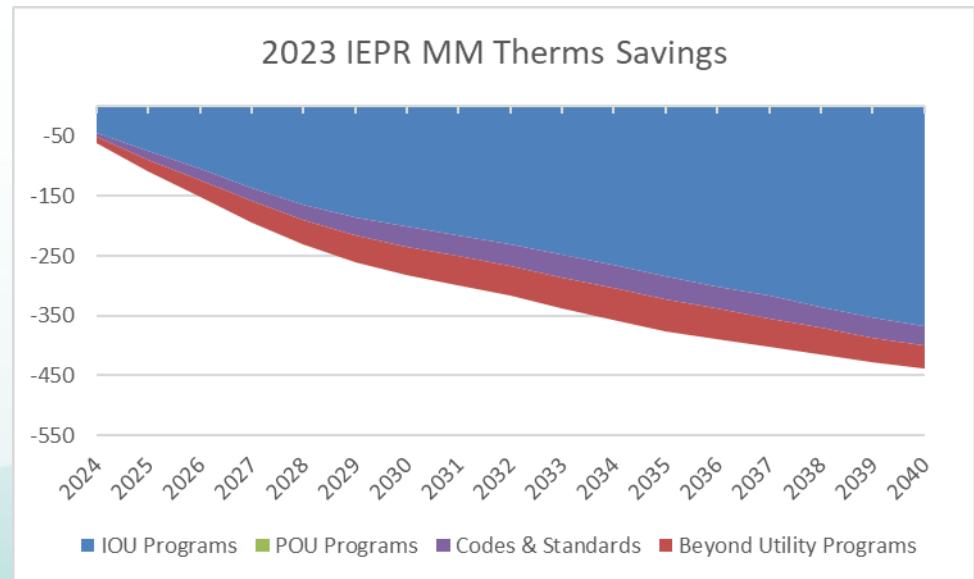
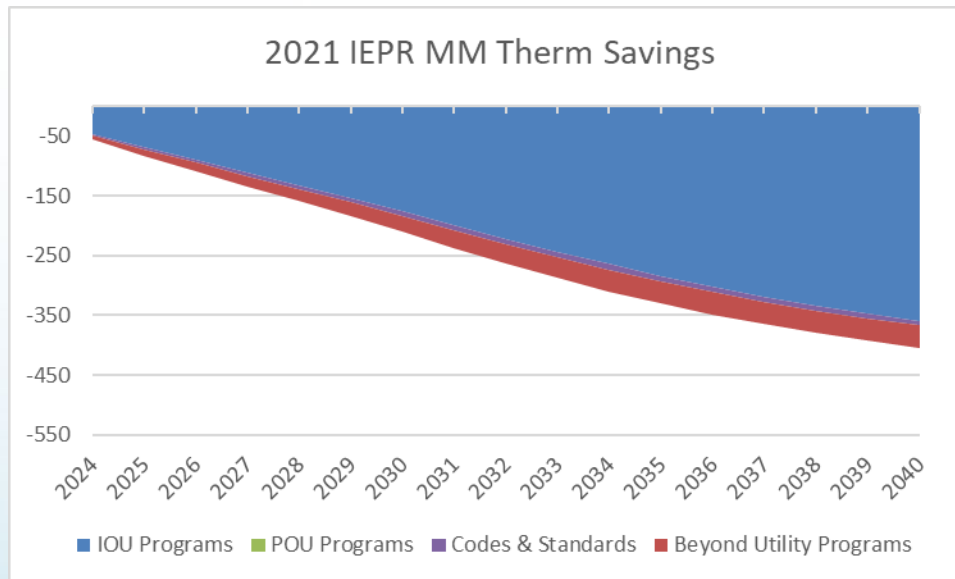
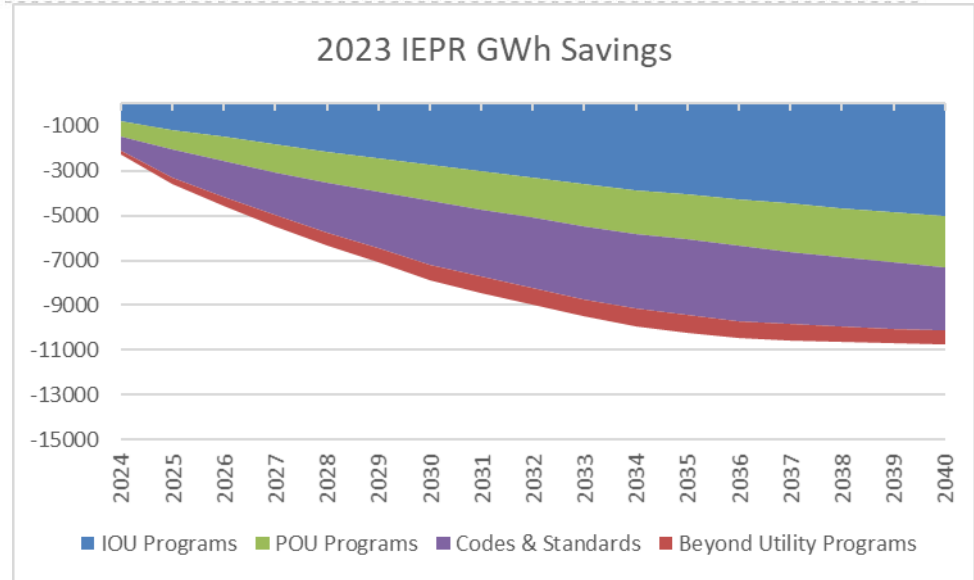
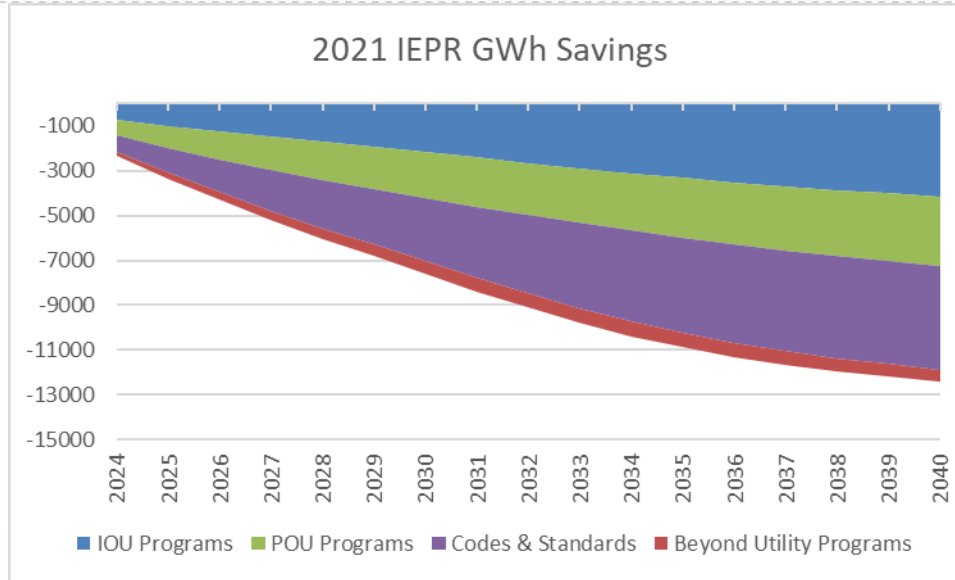
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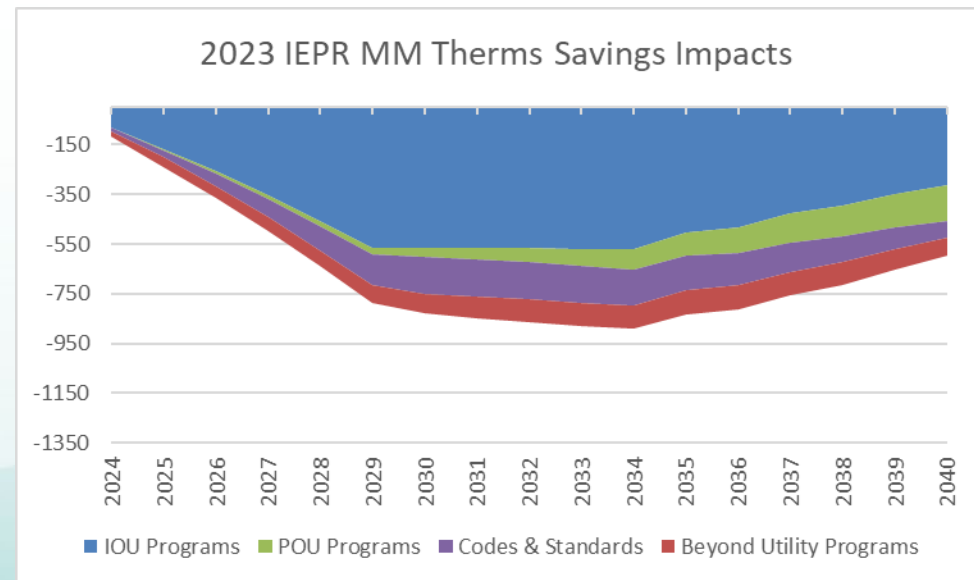
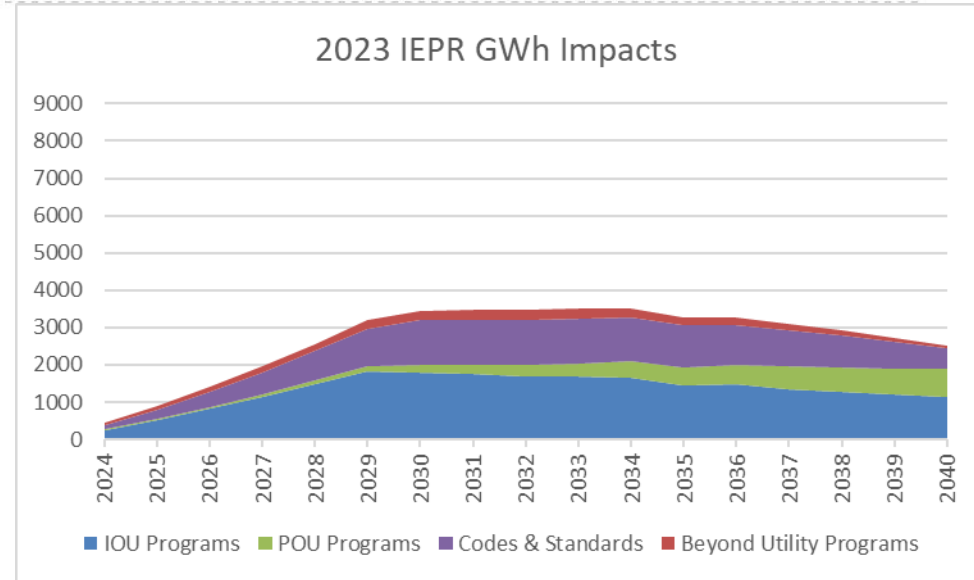
Source: CEC/EAD Staff





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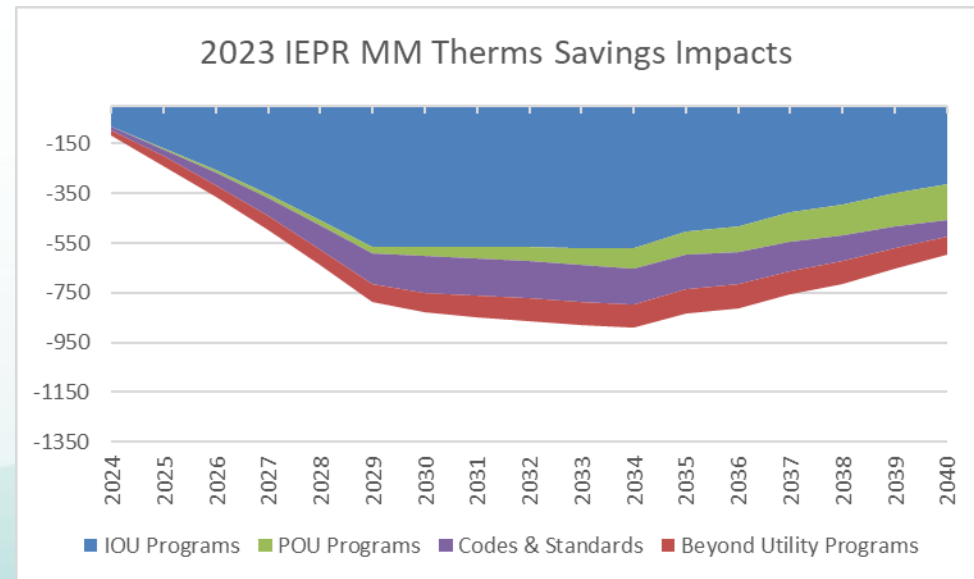
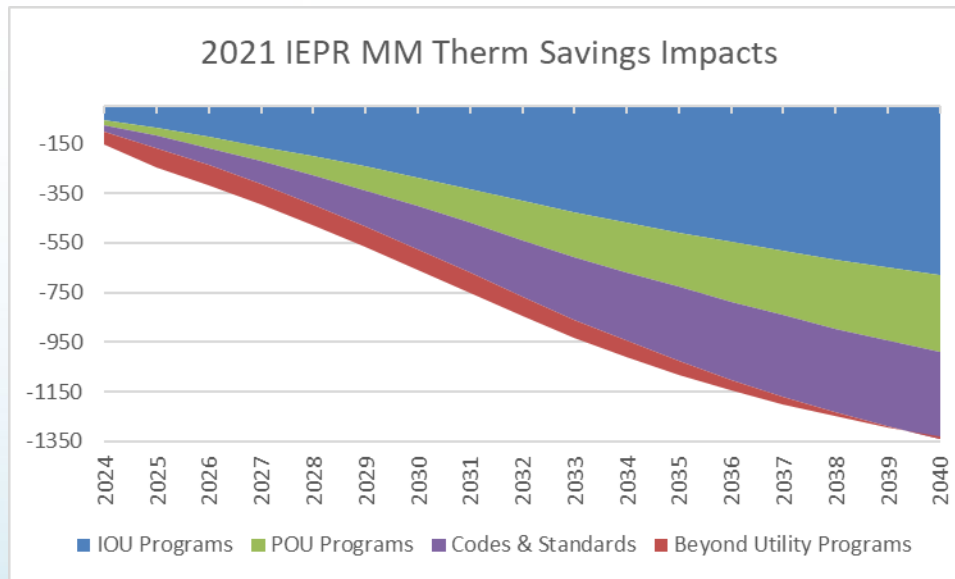
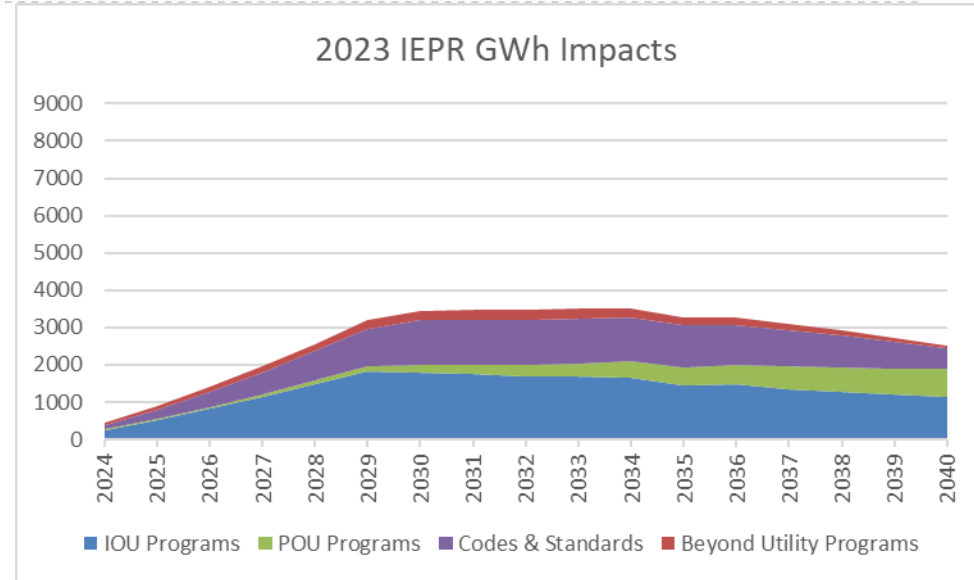
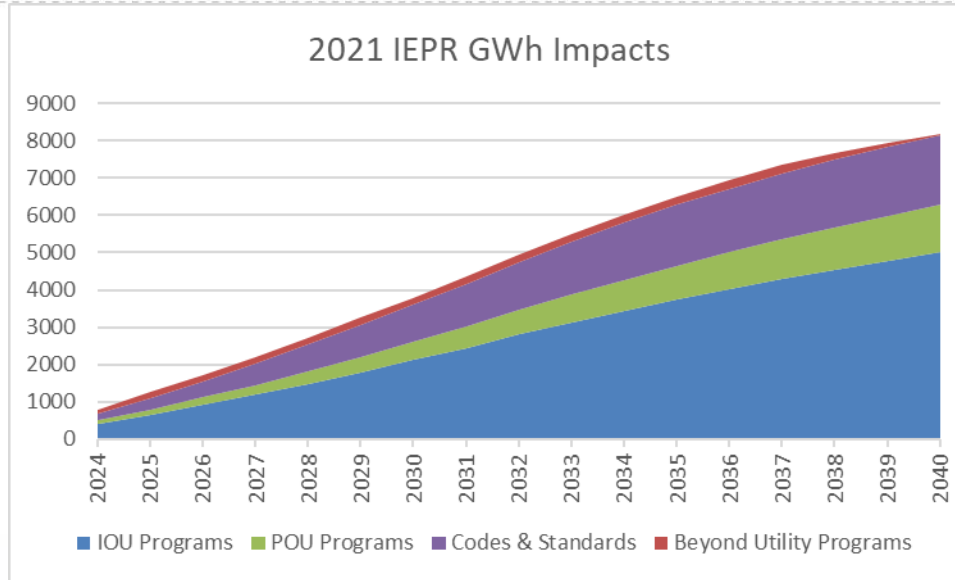
Source: CEC/EAD Staff





# 2021 vs 2023 Local Reliability Scenario AAFS 4

Source: CEC/EAD Staff





# 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**
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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**



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## 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)
- 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



# 2023 AAEE & AAFS in Demand Forecast Scenarios

- 2023 Statewide Planning Forecast
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    - AAFS 3 (inclusive of FSSAT modeling)
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- AAEE electricity and gas may be separated
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Baseline Gas Demand



Remove gas displaced by programmatic FS (AAFS)



Apply Technology Based FS via FSSAT (*Zero-Emissions Appliance Standards*)



Allow for gas AAEE on any remaining gas consumption



# 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)

- AAEE electricity and gas may be separated
- AAFS electricity and gas are joined

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

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Baseline Gas Demand



Remove gas displaced by programmatic FS (AAFS)



Apply Technology Based FS via FSSAT (*Zero-Emissions Appliance Standards*)



Allow for gas AAEE on any remaining gas consumption



**Thank you!**



[Ingrid.Neumann@energy.ca.gov](mailto:Ingrid.Neumann@energy.ca.gov)