2027 Pennsylvania Status Report Updates

Presentation to Climate Change Advisory Committee

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Agenda

1. Project Progress and Plan
2. Draft BAU Scenario
3. Electricity Modeling Approach
4. Mitigation Scenario Assumptions
5. Q&A and Discussion

Project Progress and Plan

What we've done:

- Compiled a draft report outline (shared during April CCAC meeting)
- Developed a GHG inventory for 2023 and updated historical years.
- Prepared an initial BAU scenario using publicly available datasets
- Reviewed PUC load growth and utility reporting data
- Compiled an Initial Draft Status Report with completed analyses
- Began mitigation strategy modeling

Work still to do by mid-September:

- Finalize BAU and mitigation strategy electricity load growth assumptions
- Refine BAU scenario
- Compile engagement summary chapter
- Complete mitigation scenario modeling for other sectors
- Collect and analyze other data on implementation progress (e.g., metrics, milestones, engagement findings, workforce development, co-pollutants, cost, funding)
- Develop the Updated Draft Status Report

Draft Status Report Outline – Completed in Initial Draft

Executive Summary

1. Introduction

1.1 Pennsylvania's CPRG Efforts

1.2 Relationship to Act 70 Climate Action Plan

1.3 Report Organization and Methodology

1.4 Key Updates Since the CCAP

2. Engagement Approach and Outcomes

3. Greenhouse Gas Data Updates

3.1 Updated GHG Inventory (2005-2023)

3.2 Updated BAU Emissions Projections

3.3 CCAP Implementation Scenario

4. Implementation Progress

4.1 Implementation Status of GHG Reduction Measures

4.2 Implementation Narrative

4.3 [Sector] Implementation Summary *(repeated for each sector)*

4.3.1 [Measure] Implementation Summary *(repeated for each measure)*

4.3.2 Metrics Tracking

4.3.3 Emission Reductions and Costs

4.3.4 Review of Authority to Implement

4.3.5 Intersection with Other Funding

4.3.6 Co-benefits

4.3.7 Potential Disbenefits

5. Updated Workforce Planning Analysis

5.1 Workforce Planning Update

5.2 Workforce Development Initiatives

6. Next Steps and Future Needs

6.1 Implementation Next Steps

6.2 Planning Next Steps

included in Initial Draft Status Report

Draft BAU Scenario

Initial BAU Approach (Under Development)

- Projects emissions from 2024 to 2050 using the 2023 emissions in the 2026 Pennsylvania GHG Inventory
  - Represents currently anticipated policies, market conditions, and economic trends
- Incorporates the latest available datasets and projections, including:
  - EPA's State Inventory Tool (SIT)
  - EIA Annual Energy Outlook (AEO 2026)
  - EIA Annual Electric Power Industry Report (Form EIA-860)
  - EPA MOVES (transportation model) – *not incorporated in draft BAU*
- Updates electricity demand assumptions to reflect expected growth from electrification and emerging large-load customers, including data centers – *not incorporated in draft BAU*
- Serves as a reference case for evaluating future mitigation scenarios and CCAP implementation.

BAU Policies and Assumptions

Will Include:

- **EIA's Annual Energy Outlook (AEO) 2026:** Reference Case (now called Counterfactual Baseline)
  - Projects 1.7% annual GDP Growth and reflects current laws and regulations as of Dec 2025:
    - Federal appliance efficiency standards
    - Building code assumptions
    - EPA vehicle GHG standards
    - OBBBA provisions
    - Existing power sector regulations (except the Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants)
    - State electric, hybrid, and alternative-fuel vehicle tax and other incentives
    - Continued compliance with PA's Alternative Energy Portfolio Standard (AEPS Act of 2004) and other existing PA laws
- Updated EPA MOVES5 transportation data on projected VMT and emissions (under development, informs strategy modeling)
- Updated Pennsylvania utility load forecasts and projected growth in electricity demand (under development, will be informed by final PUC report and ICF IPM)
- Existing Tax Rules

Will Exclude:

- PA Participation in RGGI
- Implementation of the Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants (Often referred to as the Clean Power Plan 2.0)
- AEPS reforms or other future policy proposals that have not passed state legislature

Electricity Modeling Approach

Electricity Modeling Approach – Integrated Planning Model (IPM)

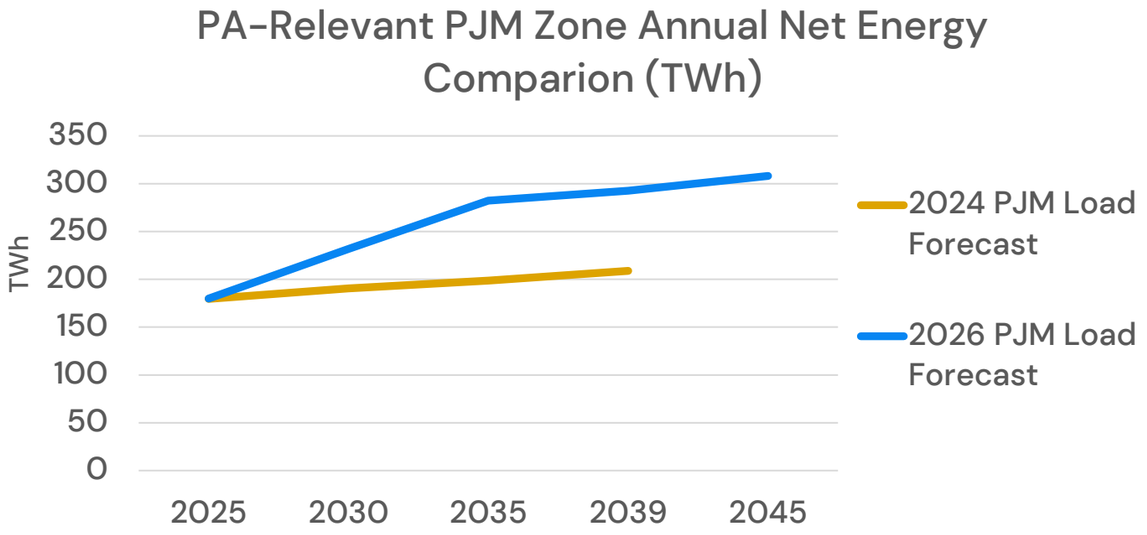
- **IPM is a cost-optimized power sector planning model** used by utilities, state agencies, EPA, and regional planning organizations
- **Projects future generation, capacity, emissions, and system costs in 5-year increments** under specified market, policy, and operational conditions
- **Identifies the least-cost resource mix** needed to meet future electricity demand while maintaining reliability and complying with environmental and operational constraints
- **Evaluates electricity-sector impacts of load growth**, including transportation and building electrification, as well as data center development
- **Supports both Business-as-Usual (BAU) and mitigation scenario analysis** by translating load growth assumptions into projections of generation, capacity needs, and emissions
- **Excludes** distribution-level results

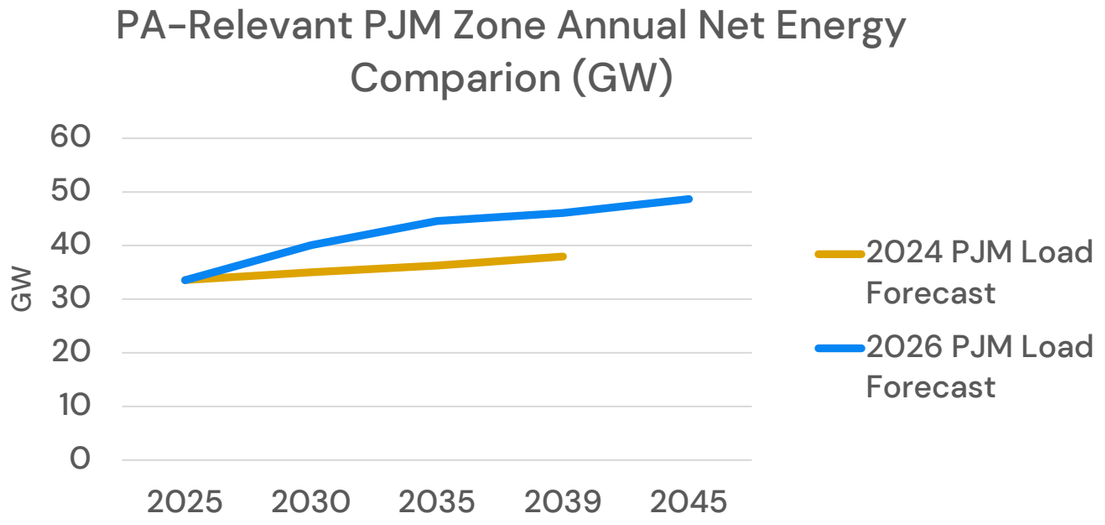
Electricity Modeling – Load Forecasting Approach

Recommended modeling approach:

- **Use the 2026 PJM Load Forecast** as the primary source for electricity load growth assumptions.
  - Scenario modeling will build from BAU and adjust load assumptions for sector-specific changes, including transportation and building electrification.
- **PUC utility-reported load growth and data center assumptions were reviewed** to understand the range of possible Pennsylvania demand growth. Substantial variation in utility reporting methods, timing, and adjustments was identified.
- **PJM avoids inconsistencies** in utility zone forecasts that could distort statewide results.
  - PJM uses an independent, PJM-wide load forecasting process rather than simply aggregating utility forecasts.
  - Utility-provided data are used to identify large load changes, including data centers, that may not be fully captured in historical/economic model inputs.
  - PJM screens these inputs for evidence of certainty, timing, magnitude, customer commitment, and potential double counting.
  - This provides a more consistent basis for incorporating data center load than relying directly on utility-by-utility PUC submissions.

Electricity Modeling – PJM 2026 Load Forecast Comparison





The 2024 PA CAP analysis leveraged the PJM 2024 Load Forecast for baseline data. The charts compare the 2024 and 2026 PJM Load Forecast peak and energy projections for zones relevant for Pennsylvania.

The 2026 Forecast projects a 19% increase in peak by 2030, 33% by 2035, and 37% by 2039 for these zones from 2025 levels.

- In the 2024 Forecast, these zones saw an 8% and 13% increase in summer peak demand by 2035 and 2039 from 2025 levels, respectively.

Compared to a 6% increase in net annual energy demand by 2030 in the 2024 Forecast, the 2026 Forecast projects a 29% increase by 2030 from 2025, meaning retail sales may increase from ~143 TWh to 185 TWh by 2030 and increase to ~225 TWh by 2035 (57%) and ~245 TWh by 2045 (71%).

- The 2024 Forecast showed a 16% increase by 2039, or ~210 TWh in sales.

PJM and PUC Comparison

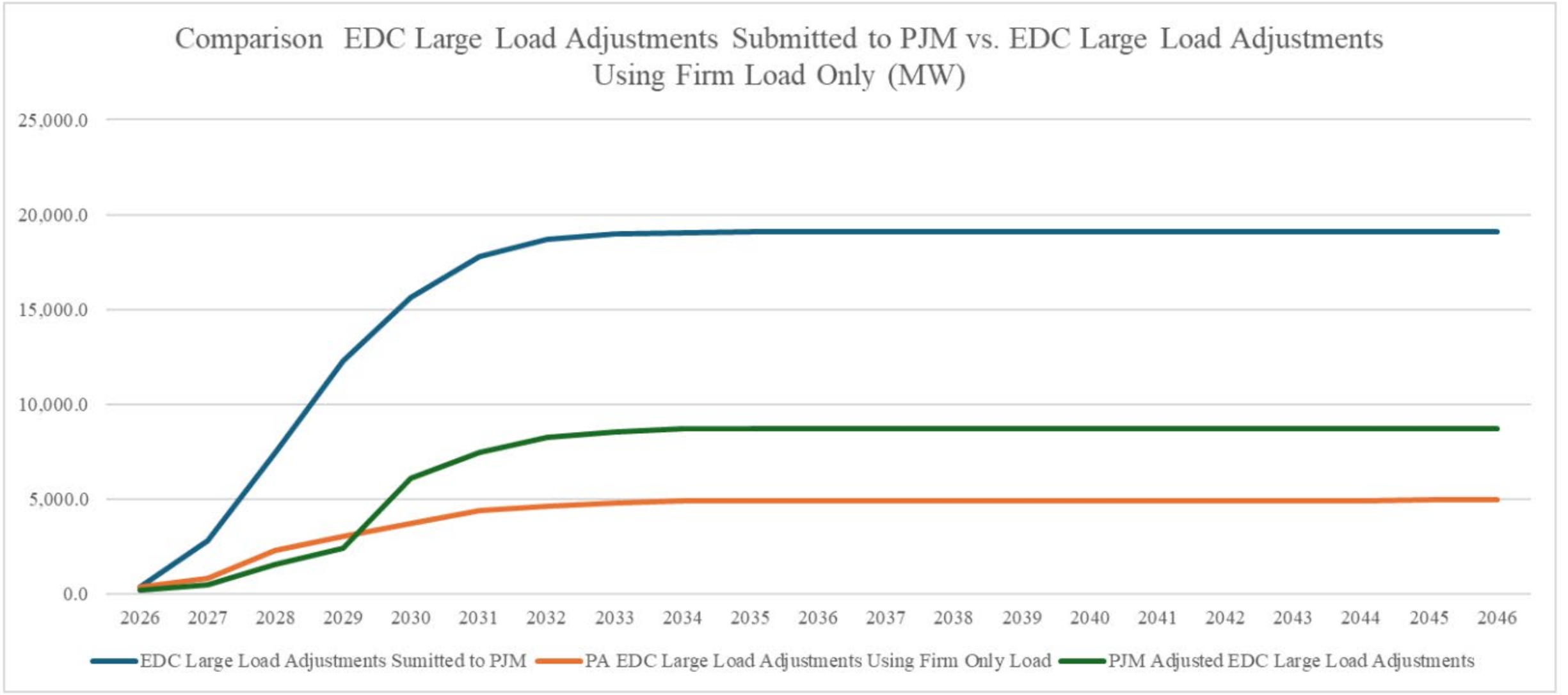
- In June 2026, the PUC submitted its first Electricity Load Forecast Accountability Report
  - PUC gathered load forecasts from utilities and summarized data submissions by the utilities
  - The data from the utilities with the largest large load adjustments is **largely consistent between the PJM submissions and submissions to the PUC.**

- **Key comparison points – 2037 submitted summer peak EDC forecast adjustment**
  - PPL Example: 14,950 MW (PUC) vs. 15,095 MW (PJM); 1% difference
  - PECO Example: 1,610 MW (PUC) vs. 1,698 MW (PJM); 5% difference

- PJM established a process to adjust load forecasts received from utilities to apply a level of uniformity and consistency to the types of load from utility large load adjustments to include in its forecast.
  - **Given this more established load adjustment process and the overall consistency between data submitted by the utilities to PJM and the PUC, ICF recommends proceeding with the adjusted PJM load forecast.**

- PJM forecast represents a middle-ground between the unadjusted data submitted to the PUC (which can include non-firm loads), and the firm-only load submitted to PJM as an additional data point.
  - Additions in PA would amount to over 19 GW as early as 2032 without PJM's adjustment (generally consistent with the PUC data), and only just under 5 GW with firm loads only.
  - PJM data presents a middle-ground at just under 9 GW.

Figure 14: EDC Large Load Adjustments Compared to Large Load Adjustments Using Firm Load Only and PJM's Adjustments



Mitigation Modeling Approach

Mitigation Modeling Approach

- Emission mitigation modeling is designed to illustrate what it would take for Pennsylvania to achieve deep decarbonization and move toward long-term carbon neutrality goals.
- The analysis is intentionally structured around maximizing feasible emissions reductions across sectors, but results are constrained by realistic stock turnover of equipment and availability of technologies, rather than limiting the modeling to currently adopted policies.
- Approach is not intended to prescribe specific policy decisions, technology types, or recommend a single pathway.
  - Provides a directional view of the scale, pace, and types of actions that could be needed to close the gap between projected emissions and emission targets

Mitigation Modeling Approach (Under Development)

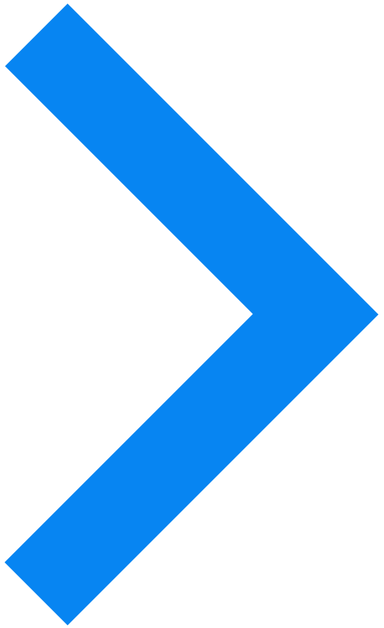
- Electricity
  - Uses IPM and shows path to carbon neutrality; includes 100% Carbon Free Grid by 2050
- Industrial
  - Uses ICF CO2Sight Industrial Tool to show facility-level mitigation considering sector-specific levers including energy efficiency, electrification, low-carbon fuels/feedstocks, CCUS, and more building from the DOE Industrial Decarbonization Playbook
- Buildings
  - Uses ICF's Distributed Energy Resource Planner tools with separate strategies for new and existing buildings that considers building codes, electricity and gas efficiency, building electrification, on-site solar, and more
- Transportation
  - Uses vehicle stock turnover and adoption of mode shift changes, including updated MOVES5 VMT data (CAP and CCAP used MOVES4 previously)
- Agriculture and Land Use
  - Uses updated assumptions on acres of forest preserved, assumptions on projected new growth, and increases of tree canopy due to strategy implementation and adoption rates.
  - Uses the latest practice-specific emission and sequestration factors from USDA, EPA, IPCC, and other updated agricultural literature sources
- Waste
  - Uses waste characterization reports to determine diversion rates (no updates since the 2025 CCAP)

Questions for CCAC

- Are there upcoming or recently updated datasets, studies, reports, or literature sources that should be considered as we refine the BAU scenario, or sector-specific mitigation assumptions?
  - Are there any key Pennsylvania-specific data sources we should consider for coal mine methane mitigation, transportation, building electrification, industrial decarbonization, agriculture/land use, or waste?

- Are there specific sector-level assumptions, feasibility constraints, technology adoption assumptions, or implementation considerations that CCAC members think should be considered for mitigation modeling?

- Are there any existing assumptions that appear unclear, incomplete, or potentially inconsistent with current implementation conditions in Pennsylvania?



Status Report
Q&A and Discussion