
# Distributed Generation Scenarios: Inputs and Assumptions


- Mark Palmere
- Distributed Generation Adoption Lead

- August 18, 2025

# List of Acronyms and Initialisms

**ATB –** Annual Technology Baseline

**BTM –** Behind-the-Meter

**CapEx –** Capital Expenditure

**CEC –** California Energy Commission

**CHP –** Combined Heat and Power

**CPUC –** California Public Utilities Commission

**DG –** Distributed Generation

**dGen –** Distributed Generation Market Demand Model

**DGStats –** California Distributed Generation Statistics

**IEPR –** Integrated Energy Policy Report

**ITC –** Investment Tax Credit

**MW –** Megawatt

**NEM –** Net Energy Metering

**NREL –** National Renewable Energy Laboratory

**PV –** Photovoltaics

**R&D –** Research and Development

**SGIP –** Self-Generation Incentive Program

# Forecast Framing

# Technologies & Metrics

**Technologies**

- **Solar PV**
- **Energy Storage**
- **Other Generation**

  Such as:
  - Fuel Cell CHP
  - Gas Turbine
  - Wind Turbine

**Metrics**

**Capacity**
- Future technologies adoption predicted from suite of modelling tools

**Energy**
- Annual and hourly impacts developed from technologies performance data

Source: CEC Staff

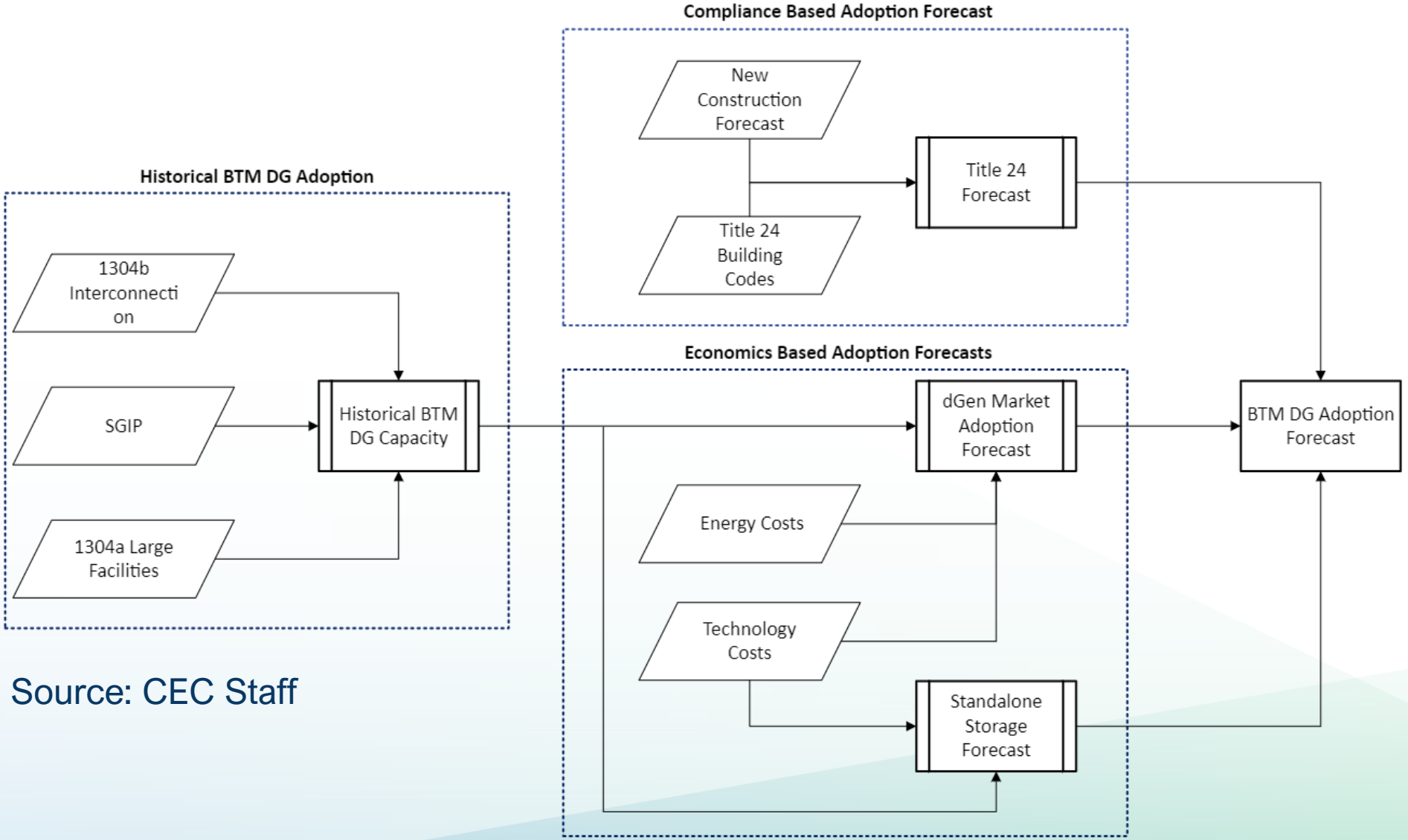
# Distributed Generation Programs

- **Economics Based Adoption Forecast**:
  - Program requirements and economics related to DG adoption are factored into the forecast
- **Compliance Based Adoption Forecast:**
  - Forecast adheres to Title 24 and does not account for program requirements, or the economics associated with DG adoption

| Renewable DG Program | Economics Based Forecast | Compliance Based Forecast |
|---|---|---|
| Net Billing Tariff | ✓ | ✓ |
| Virtual Net Energy Metering | x | ✓ |
| Net Energy Metering Aggregation | x | ✓ |

Source: CEC Staff

# Adoption Modelling Architecture




Source: CEC Staff

# Forecast Updates

# Drivers of Forecast Uncertainties

- Investment Tax Credit (ITC)
  - Eliminated in recent federal legislation
- Tariffs
  - Not expected to be included in forecast due to significant uncertainty
- NREL's Annual Technology Baseline (ATB) for BTM PV and storage

**NREL ATB CapEx Forecast Scenarios**

| Cost Scenario | Technology | R&D Investment Levels |
|---|---|---|
| Conservative | Comparable to today | Decreasing |
| Moderate "Expected Level" | Current innovations widespread | Constant |
| Advanced | Theoretical innovations successful | Increasing |

Source: CEC Staff

# Tariff-Related Uncertainty

- **Volatility**
  - Proposed federal tariffs on materials used in DG technologies are frequently changing, creating costs uncertainty
- **Legal Uncertainty**
  - Enforceability unclear without Congressional approval
- **Operational Adaptation Challenges**
  - Not clear how companies would adapt to new tariffs
- **Supply Chain Dependence**
  - Companies rely on raw materials from China, especially for energy storage
  - Much solar manufactured in U.S. and less likely impacted by tariffs
    - As of 2024, annual domestic solar module manufacturing capacity > 26 GW

# Distributed Generation Adoption Scenarios

| Scenario | CapEx Costs | Storage Retrofit | ITC |
|---|---|---|---|
| **Low** | Conservative | None | None |
| **Mid** | Moderate | None | None |
| **Mid (Plus ITC)** | Moderate | None | Reinstituted in 2030 |
| **High** | Advanced | NEM contract turnovers | None |

Source: CEC Staff

# Evaluating ITC Policy Shift

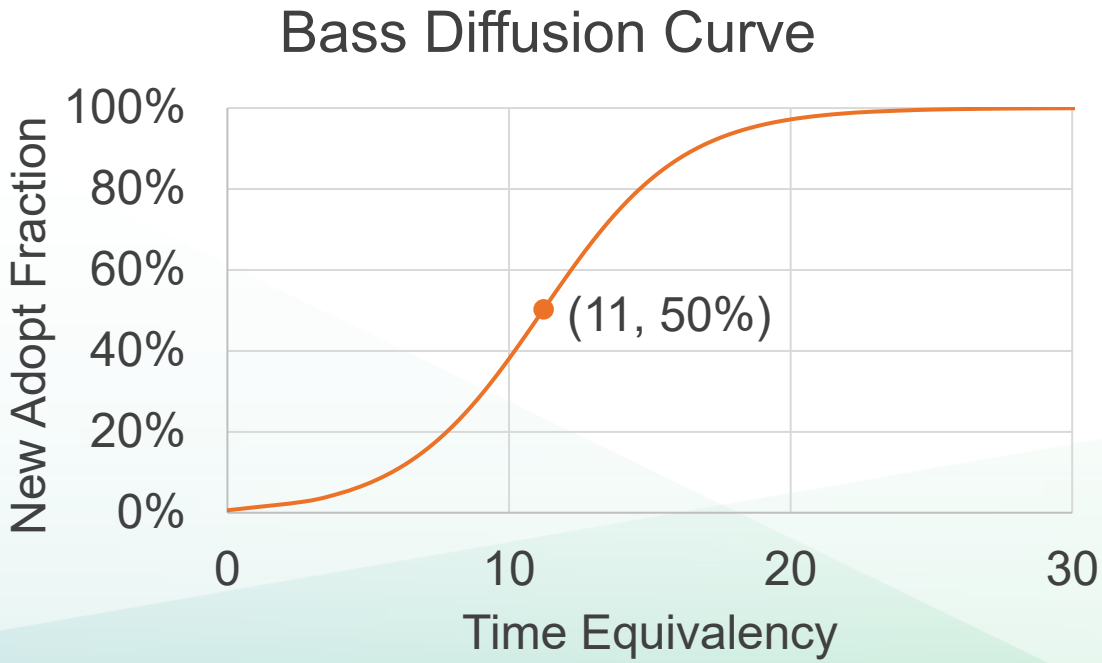
# ITC Testing Methodology

- Tested effect of ITC elimination using dGen model
- Model inputs unchanged from 2024 IEPR mid-case except for ITC-related inputs
  - ITC for non-residential storage included
- One of many changes for 2025 IEPR forecast
  - **Draft 2025 IEPR BTM DG forecast will be presented in October**

# Calculating Adopters

- dGen determines max market share from payback period
- $r$ = last year's market share ÷ max market share
  - $r$ used to determine time equivalency
- Bass diffusion output is new adoption fraction
- Market share = new adoption fraction ∗ max market share
- Δmarket share = market share – last year's market share
- Adopters = Δmarket share ∗ potential adopters

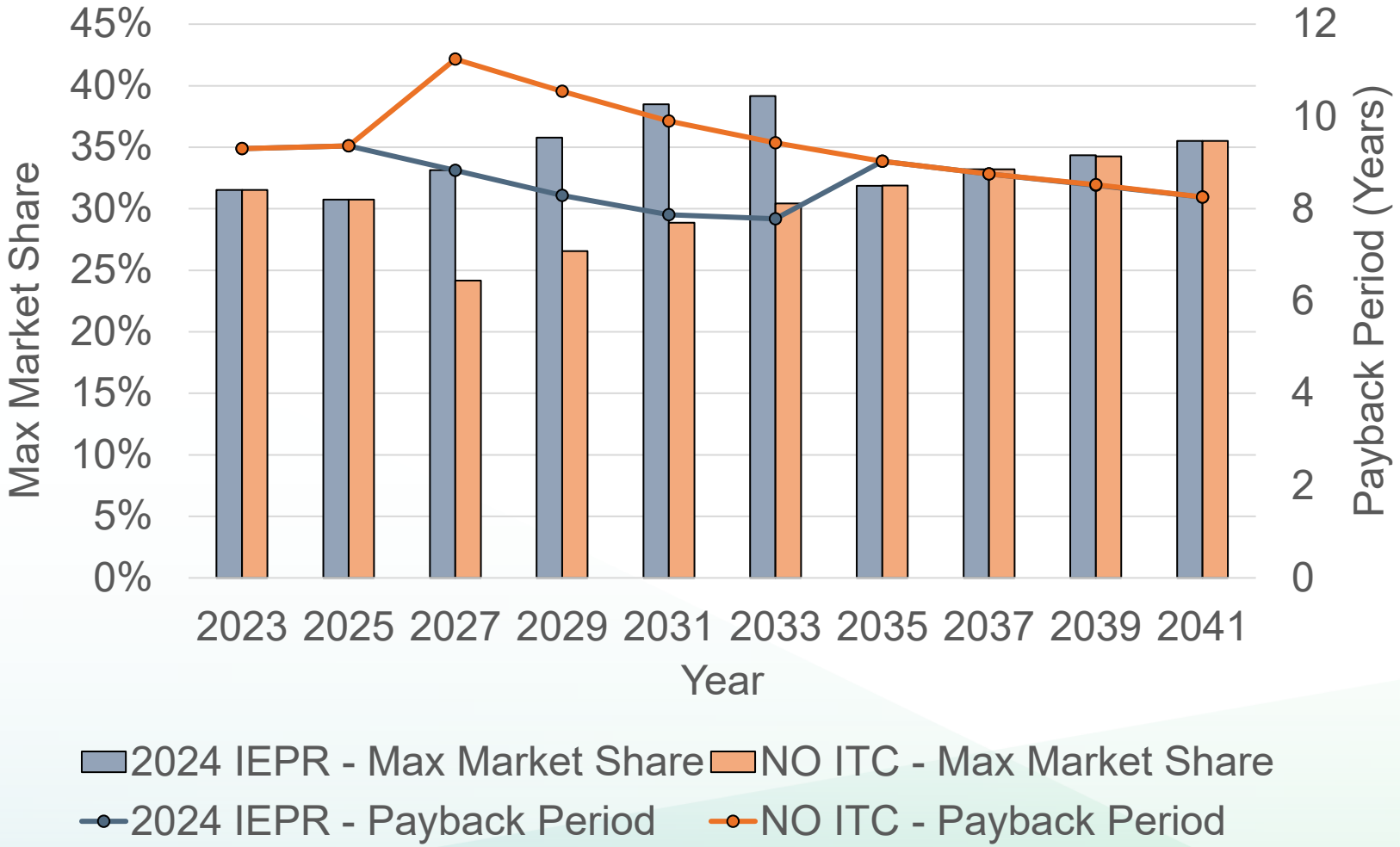
| Time equivalency | Bass diffusion |
|---|---|
| $t = \frac{\ln\left(\frac{1-r}{1+\left(r*\frac{q}{p}\right)}\right)}{-(p+q)}$ | $b(t) = \frac{1-e^{(-(p+q)*(t+2))}}{1-\left(\frac{q}{p}\right)e^{(-(p+q)*(t+2))}}$ |




Source: CEC Staff

# Residential Adoption Factors

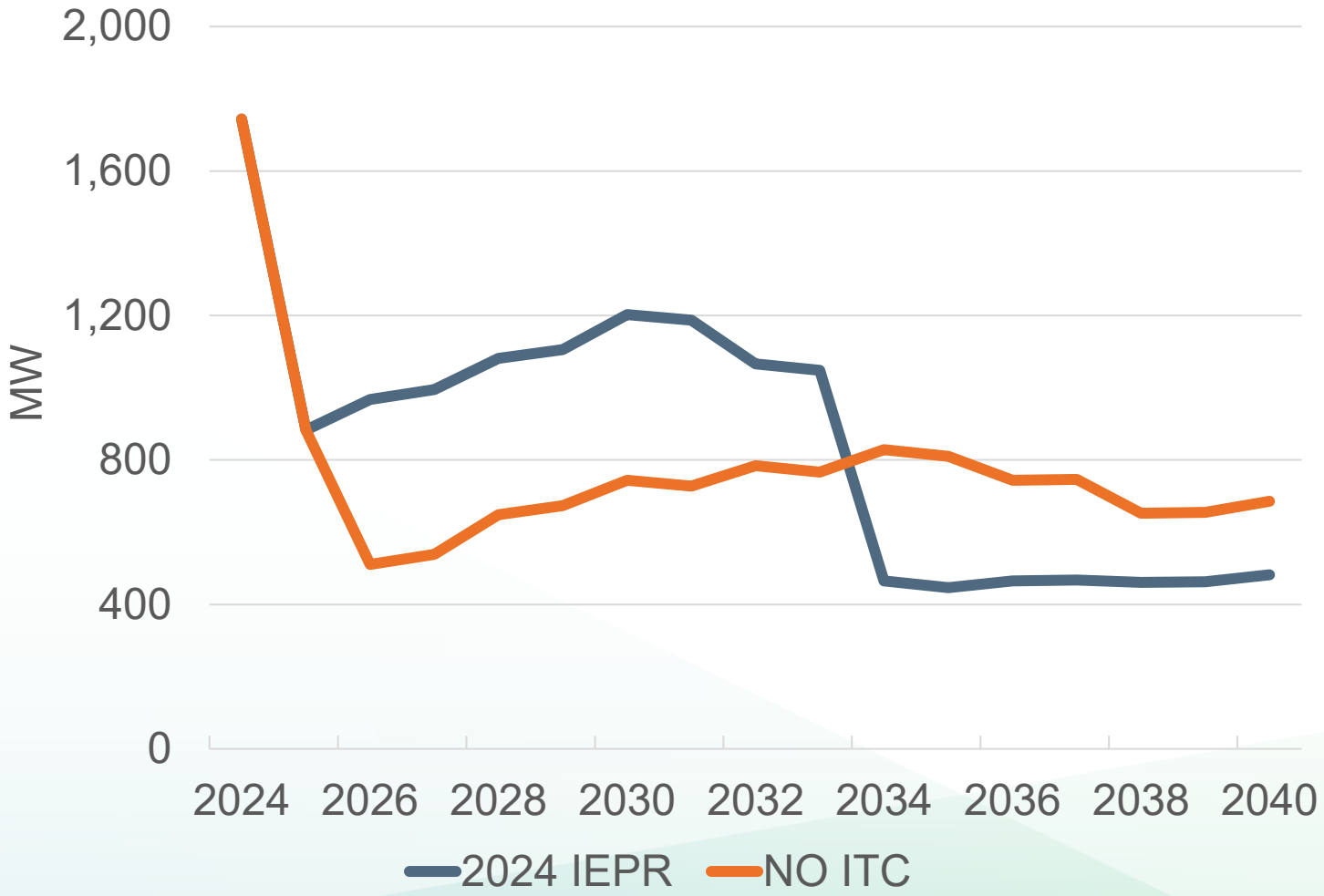
- Max market share:
  - Nears 40% in 2024 IEPR
  - As low as 25% in No ITC run
- Discontinuation of ITC increases payback periods
  - Reduces max market shares and adopters
  - Payback period increases by ~2 years between 2025 and 2027




Source: CEC Staff

# Statewide Annual PV Capacity Additions

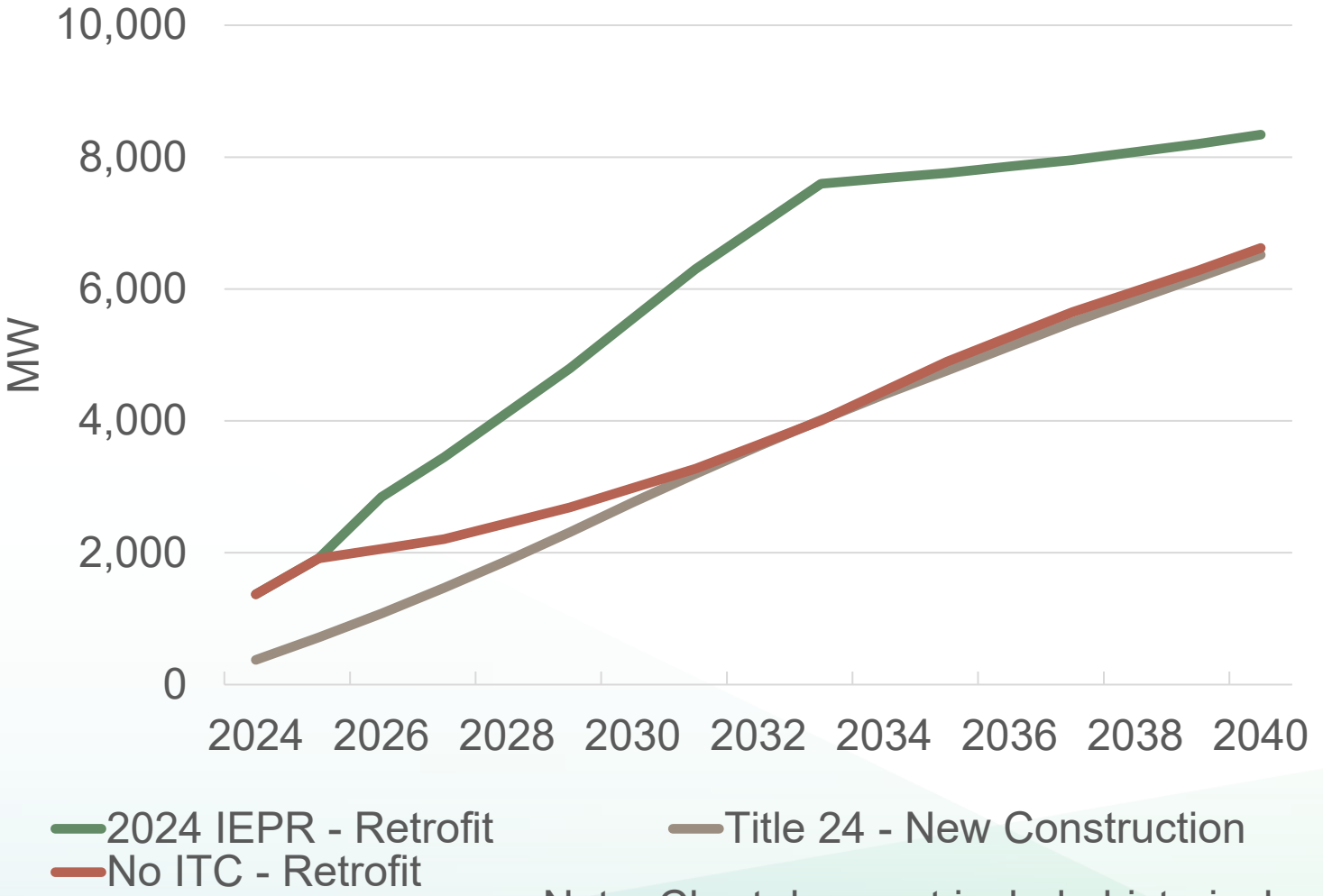
- Installations drop by 40% of 2024 IEPR until 2030
  - Decrease from retrofit installations
  - Title 24 installations remain constant




Source: CEC Staff

# Statewide Cumulative PV Capacity Forecast

- In 2024 IEPR forecast, 55% of PV capacity attributed to retrofits
  - Without ITC, retrofit share drops to 50%
- Tests effect of ITC change
- **Not the 2025 IEPR forecast**




Note: Chart does not include historical capacity

Source: CEC Staff

# PV Adoption Comparison

## Capacity Reduction in No ITC Scenario

| Year | Cumulative Capacity Reduction | Cumulative Forecast Capacity Reduction |
|---|---|---|
| 2028 | 7.3% | 27.9% |
| 2034 | 11.1% | 26.7% |
| 2040 | 5.4% | 11.6% |

**Note:** Left column includes hist. capacity; right does not

Source: CEC Staff

## Annual PV Growth Rate

| Time Frame | 2024 IEPR | No ITC |
|---|---|---|
| 2025-2033 | 5.2% | 3.5% |
| 2034-2040 | 1.6% | 2.9% |

Source: CEC Staff

# Thank You!

mark.palmere@energy.ca.gov