

2009 IEPR WORKSHOP

COMPARATIVE COSTS OF CALIFORNIA CENTRAL STATION ELECTRICITY GENERATION TECHNOLOGIES

Overview of the Cost of Generation Model and Recent Changes

Date: August 25, 2009

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Today

- **Definition of Levelized Cost**
- **Overview of Model Structure**
- **Overview of Changes Since IEPR 2007**

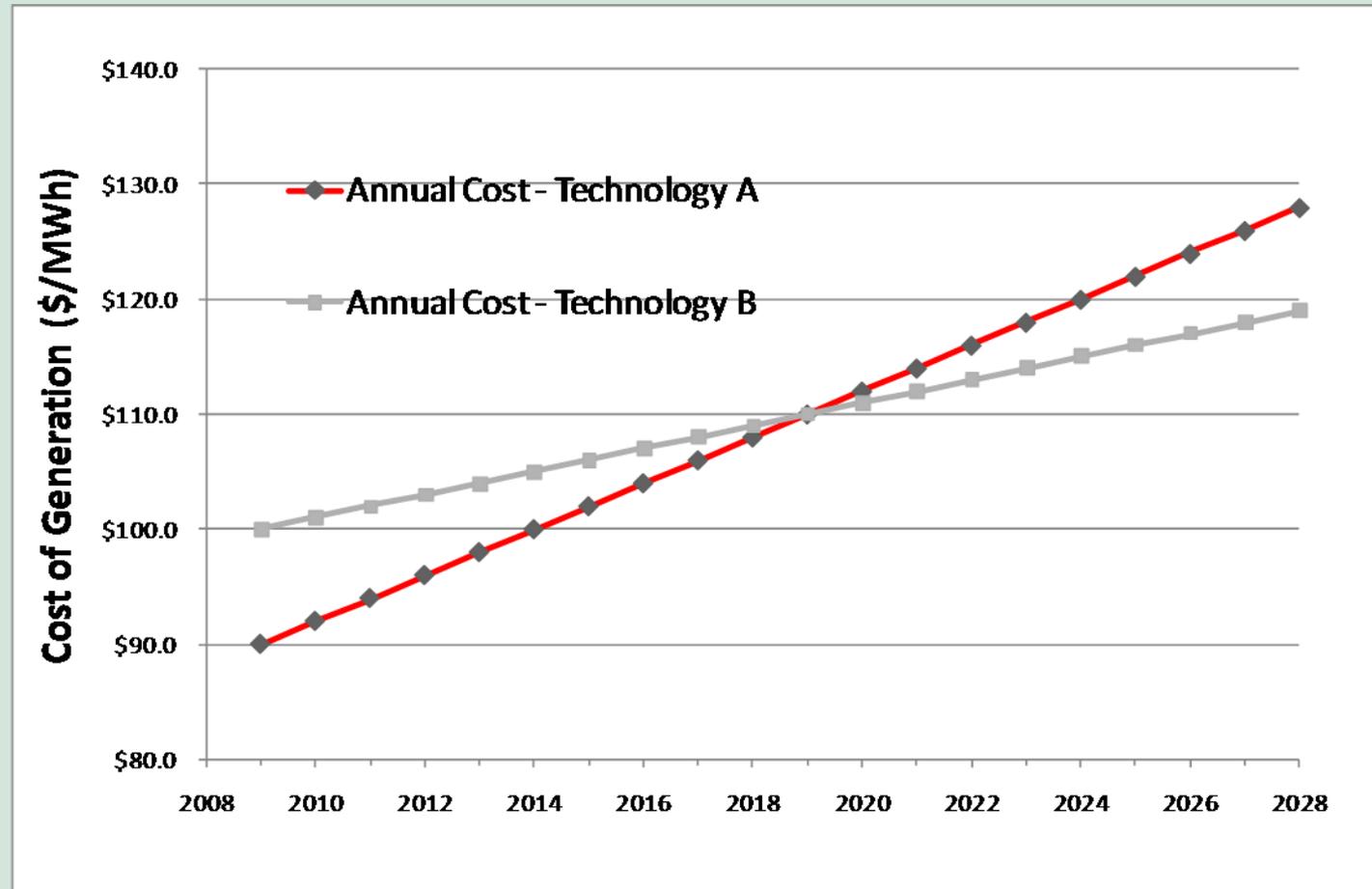
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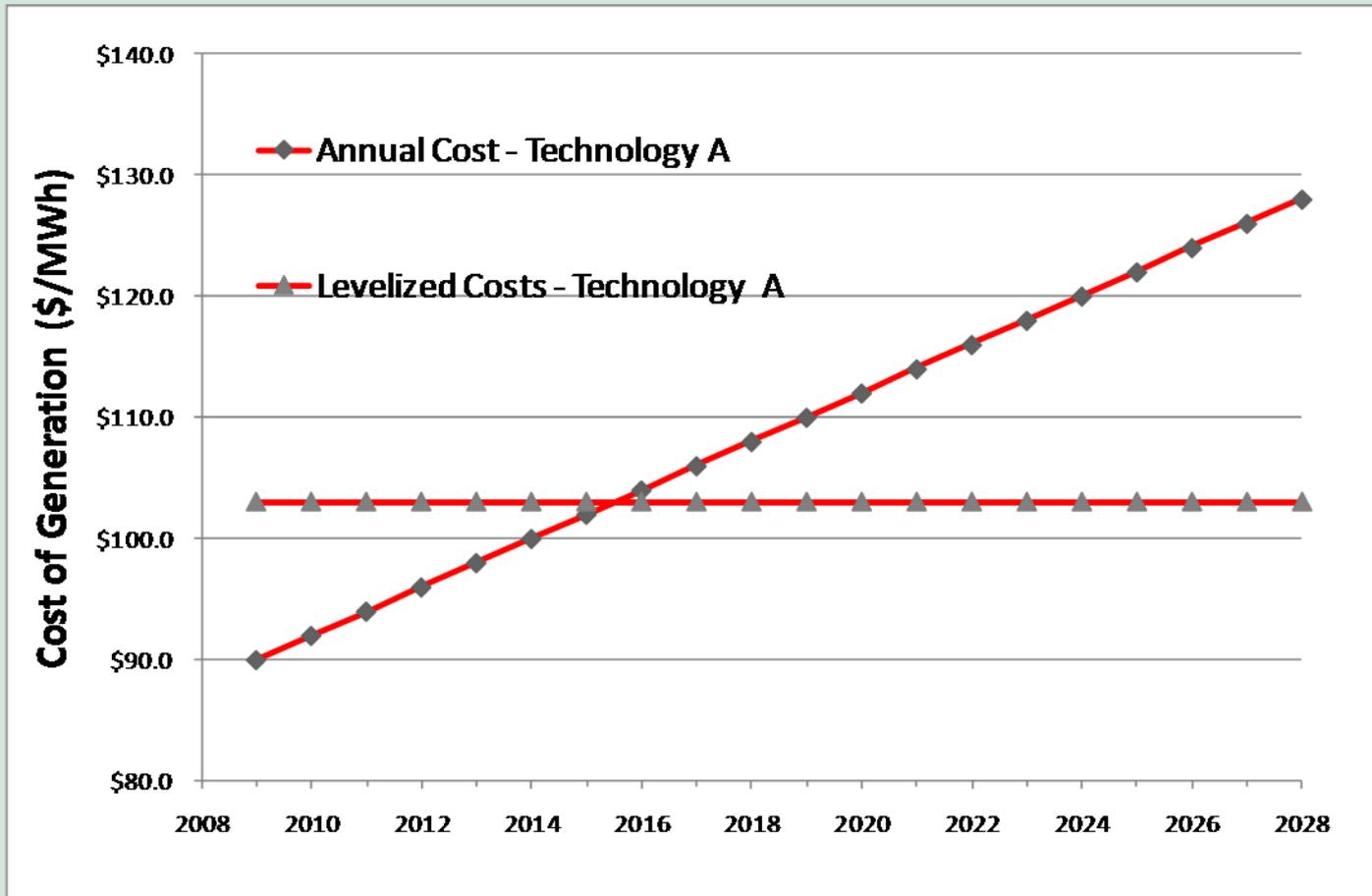
Levelized Costs

- **Converts unequal annual costs to a constant cost.**
 - Find present value of annual costs (Excel NPV).
 - Find constant cost that has that present value (-PMT)
- **Allows for a single value to characterize resource cost.**
- **Different technologies can be compared approximately to one another.**

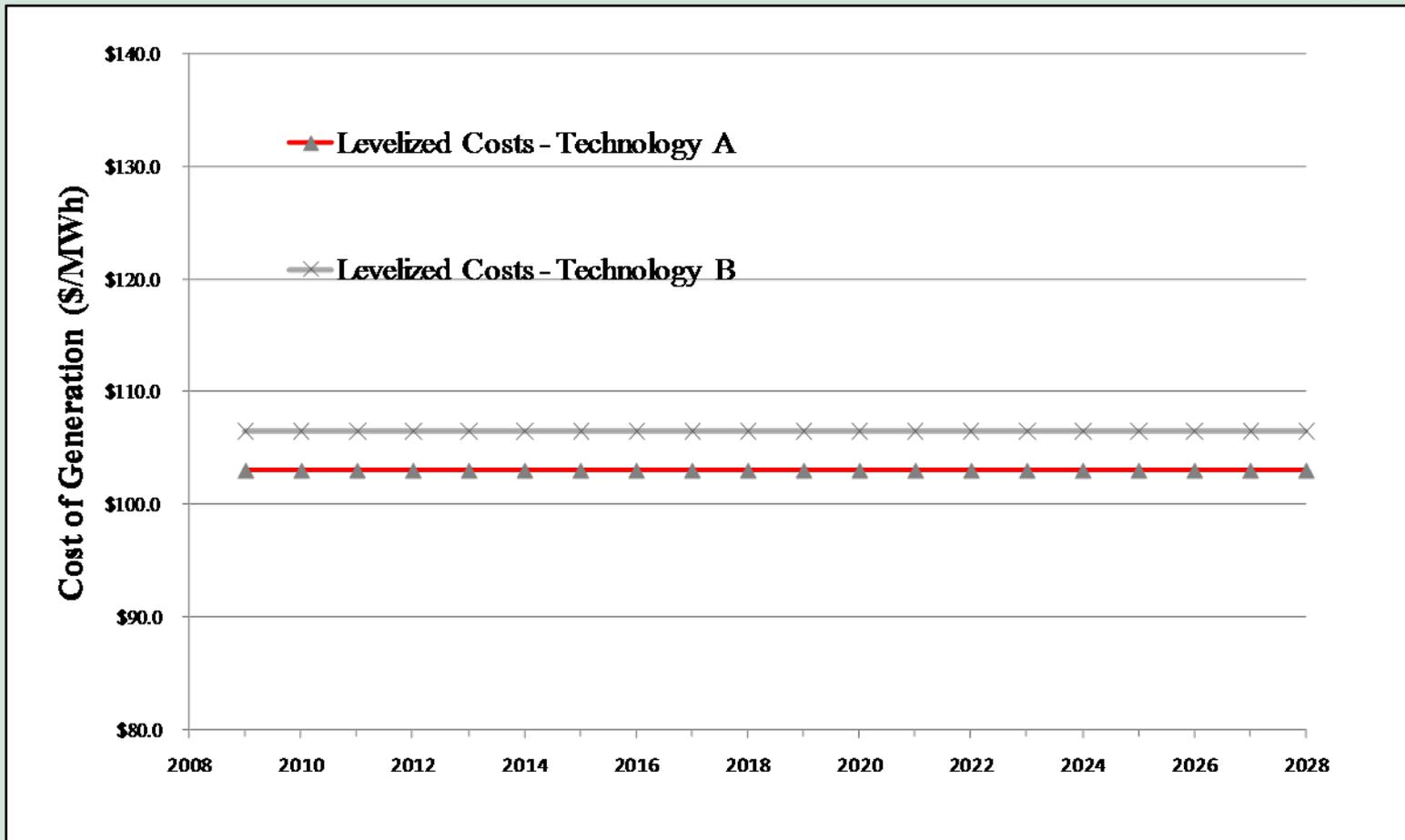
Comparing Annual Costs



Developing Levelized Cost

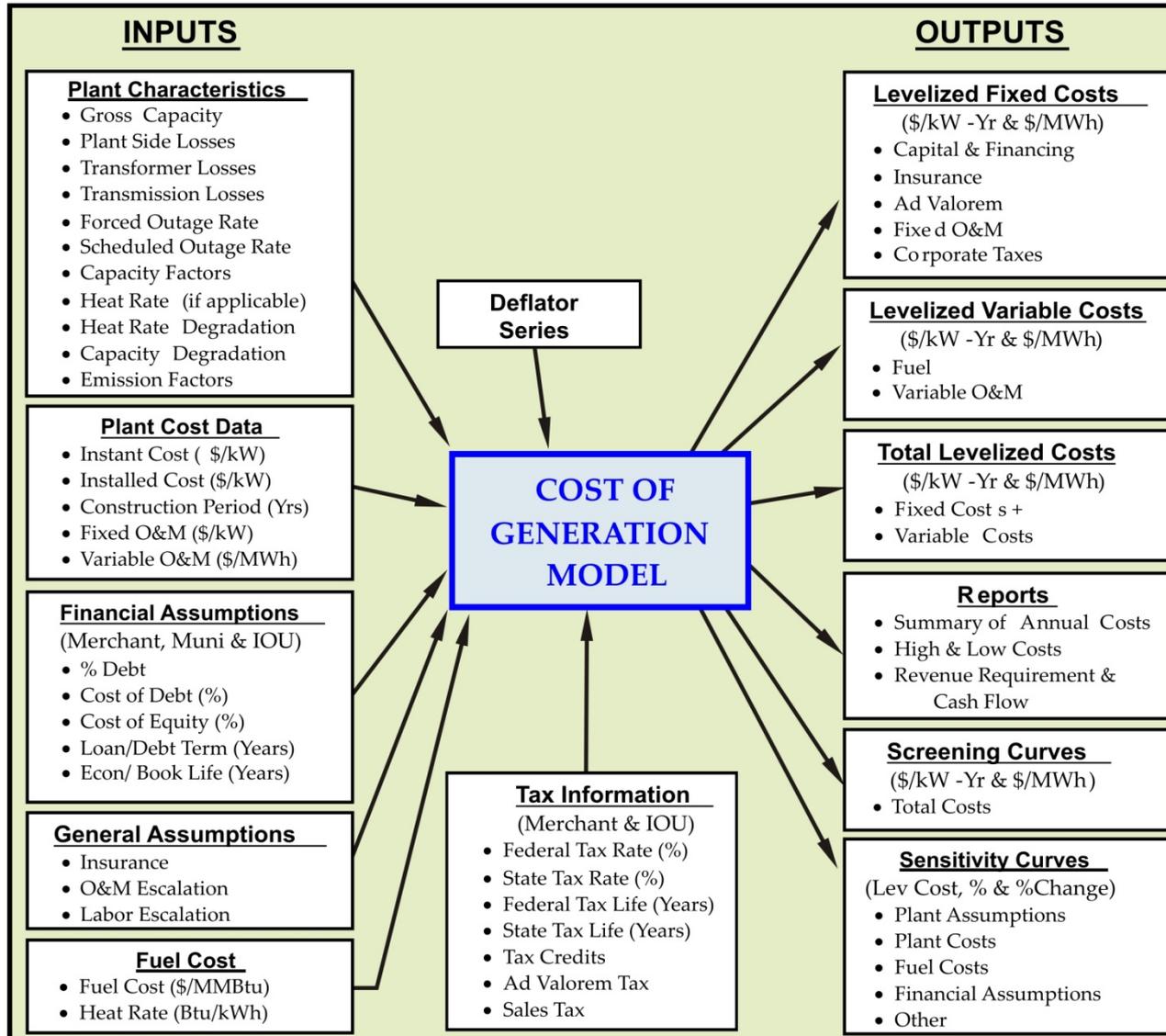


Comparing Levelized Costs



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Data Gathering Process

- **Renewables, Nuclear & IGCC – Coal**
 - Provided by PIER (previous workshop)
 - Report is online
- **Data gathered from 2007 IEPR for gas-fired generation**
 - Compared that data against various publically available data
 - Adjusted data for real inflation

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What's new in the Model Algorithm and Output

- Provide a range of levelized cost estimates (low, medium, and high).
- Provide trends in levelized costs (2009-2028).
- Separate transmission transaction costs.
- Calculate merchant levelized costs using a cash-flow accounting.
- Update taxes and incentives.
- Provide options in tax accounting.

Comparison of Accounting Methods

- **Two forms of Income Statements**
 - Revenue Requirement – For IOUs and POUs
 - Cash-Flow – For Merchants
- **Revenue Requirement imply the levelized costs up to 30% higher for merchant**

Cash-Flow Versus Revenue Requirement

➤ For Revenue Requirement

- Equity payments decrease uniformly and are calculated as percent equity times equity cost times book value.
- Revenues increase and decrease in a non-uniform manner, and are calculated to meet the debt, equity, operating expenses, and taxes.

➤ For Cash-Flow

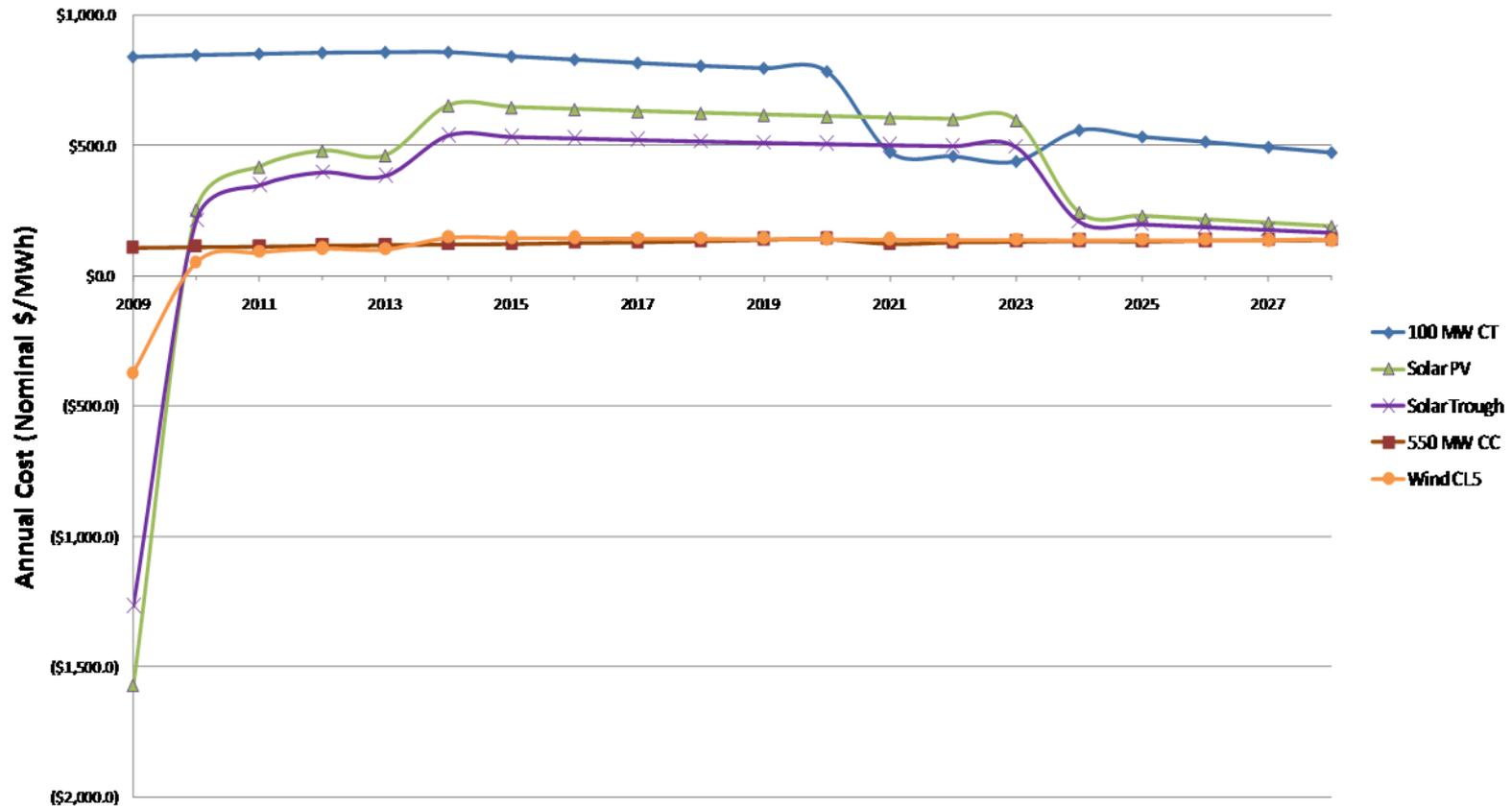
- Equity payments are quite variable and are set by the cash-flow function to create an uniformly increasing stream of revenue.

Cash-Flow Compared To Revenue Requirement

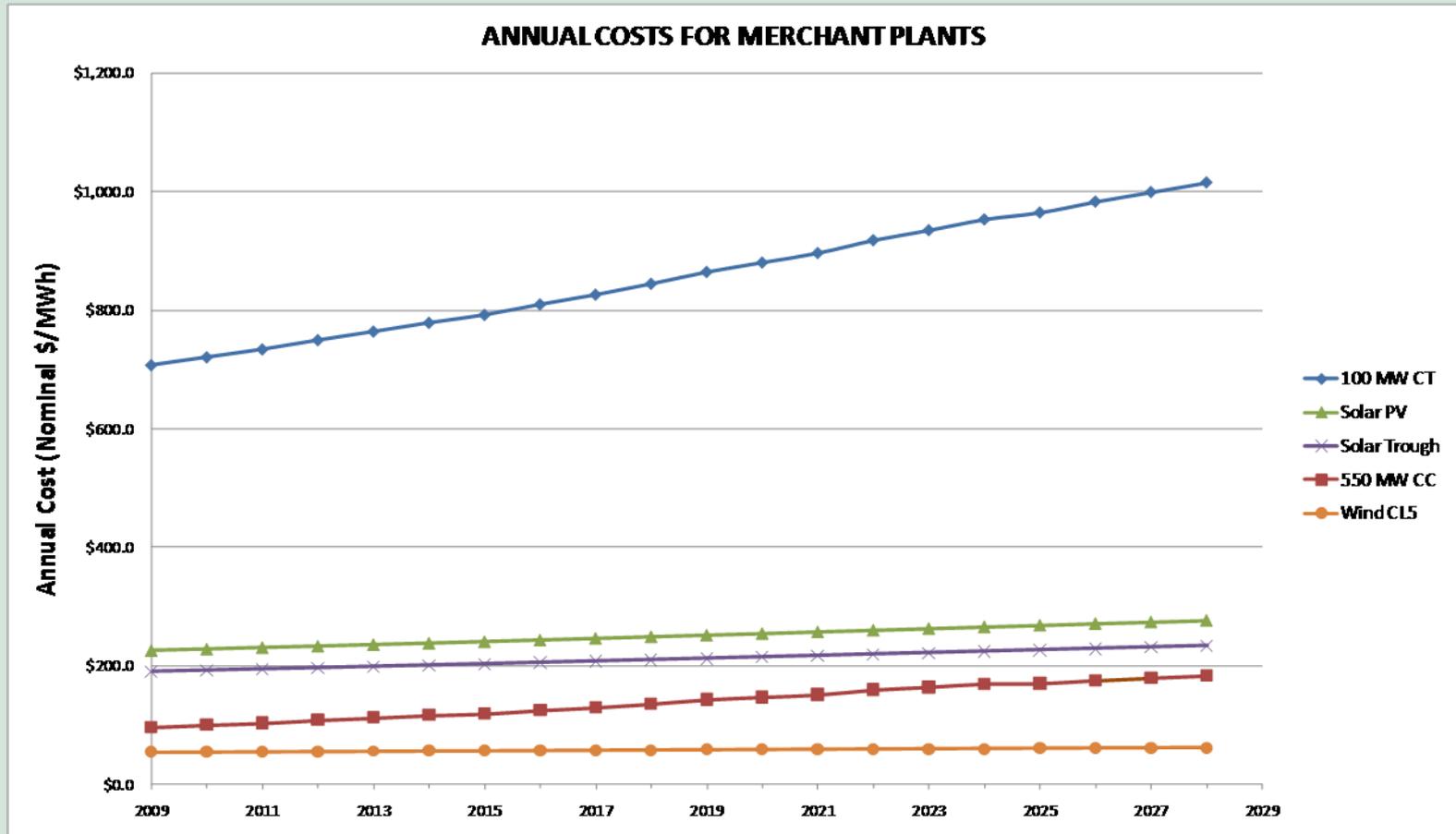
- **In both cases: Debt and operating expenses are calculated the same.**
- **Revenue, taxes and equity payments are different.**

REVENUE REQUIREMENT

ANNUAL COSTS FOR MERCHANT PLANTS



Cash-Flow Accounting Revenue Stream



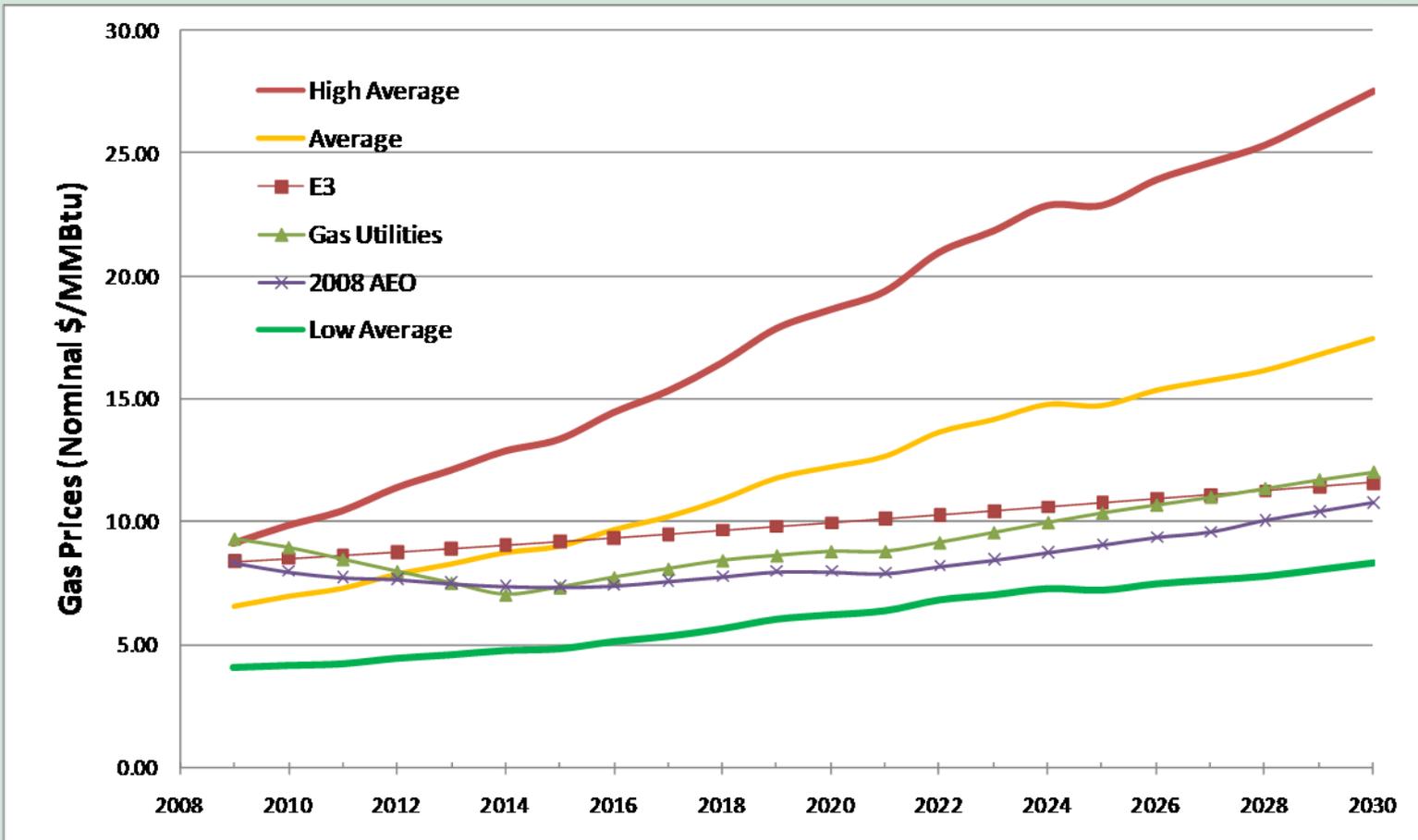
Transmission Costs

- **Transmission Connection Costs**
 - Cost to connect the plant to the existing transmission system
 - Included in the Capital Costs
- **Transmission Transaction Costs**
 - Transmission Access Costs
 - Transmission Interconnection Costs
 - Estimated from CAISO Tariffs and *2007 IEPR Scenarios Analysis*

What's New in Inputs and Assumptions

- Updated renewable and alternative technology costs and included trends (*to be discussed later*)
- Updated gas-fired technology costs
- Ranges for gas price forecasts
- Updated and differentiated financing assumptions

Range of Gas Forecasts



Increases in Capital Cost Gas-Fired Technologies Average Case

Gas-Fired Technology	MW	2007 IEPR	2009 IEPR	Increase
Combustion Turbine - 49.9 MW	49.9	\$1,100	\$1,484	35%
Combustion Turbine - 100 MW	100	\$1,045	\$1,416	36%
Combustion Turbine - Advanced	200	\$858	\$991	15%
Combined-Cycle – No Duct Firing	500	\$876	\$1,346	54%
Combined-Cycle - Duct Firing	550	\$901	\$1,329	47%
Combined-Cycle Advanced (H Frame)	800	\$865	\$1,225	42%