
Valuing Energy Efficiency as a Hedge Against Carbon Regulatory Risk:

Current Resource Planning Practices in the West

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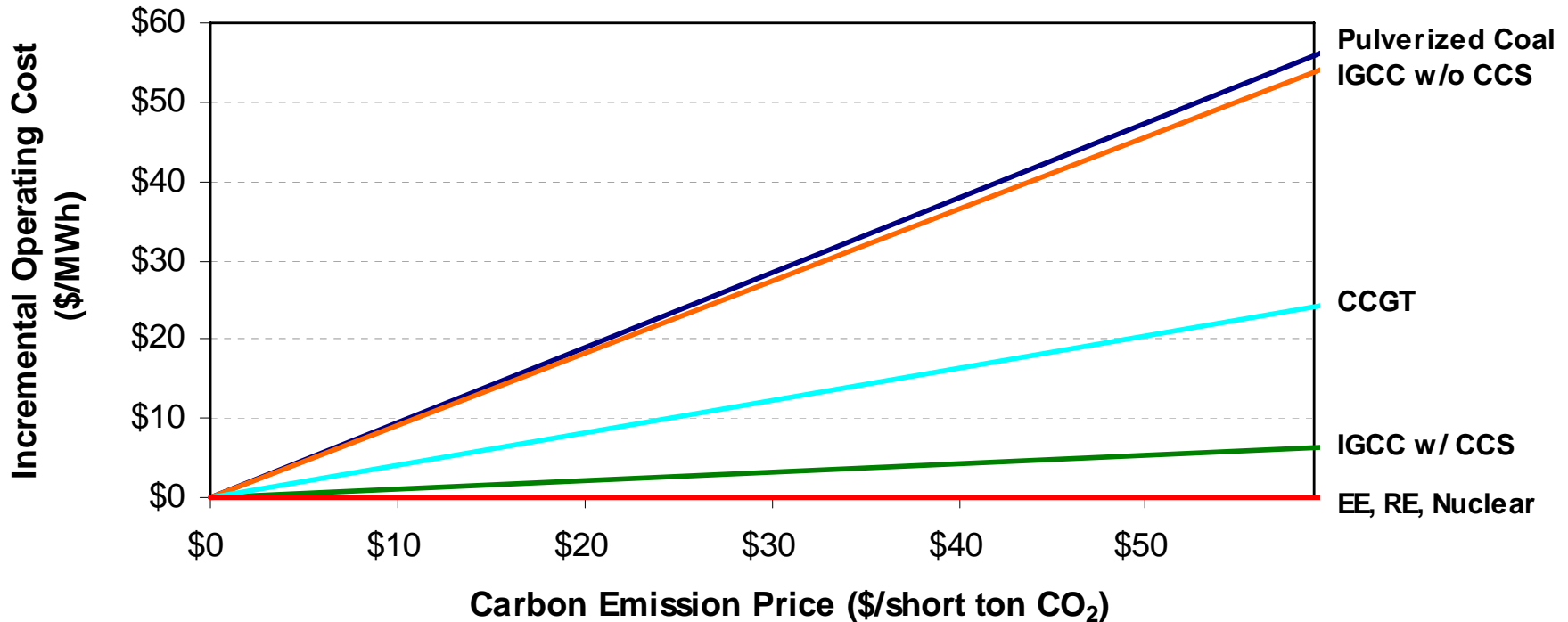
Energy Analysis Department



Carbon Regulatory Risk is a Key Issue for Long-term Resource Planning

- **Uncertainty about future carbon regulations represents a substantial financial risk for electric utilities and their ratepayers**
- **Long-term resource planning can provide a framework to assess and manage this risk**
- **Energy efficiency (EE) and other low carbon resource options offer a hedge against carbon regulatory risks**
- **How carbon regulatory risk is analyzed and the manner in which EE is integrated into this analysis can potentially affect:**
 - Whether the value of EE as a hedge against carbon risk is fully revealed
 - How much EE is acquired
 - How costly it ultimately is to comply with future carbon regulations

Carbon Regulations Improve the Economics of Energy Efficiency



2010-2030 levelized carbon prices (2007\$/short ton) under several legislative proposals:

- ~ \$43: McCain-Lieberman 2003 bill (EIA projection)
- ~ \$20: McCain-Lieberman 2007 bill (EIA projection)
- ~\$12: Bingaman-Specter “safety valve”

LBNL Review of Western Resource Plans

Project scope: A comparative analysis of the most recent resource plans issued by utilities in the Western U.S., focusing on issues related to carbon regulatory risk

- Builds upon previous LBNL analyses of utility resource plans in the Western U.S. that examined treatment of renewables (Bolinger & Wiser 2004) and energy efficiency (Hopper, Goldman & Schlegel 2005)

Two elements:

1. Compare/assess approaches to key methodological issues related to carbon regulatory risk
 - **Identify emerging best practices**
2. Compare the preferred resource portfolios identified in these resource plans and their carbon intensities
 - **Benchmark against EIA projections of resource additions in the West under several federal climate policy proposals**

Our Sample of Resource Plans

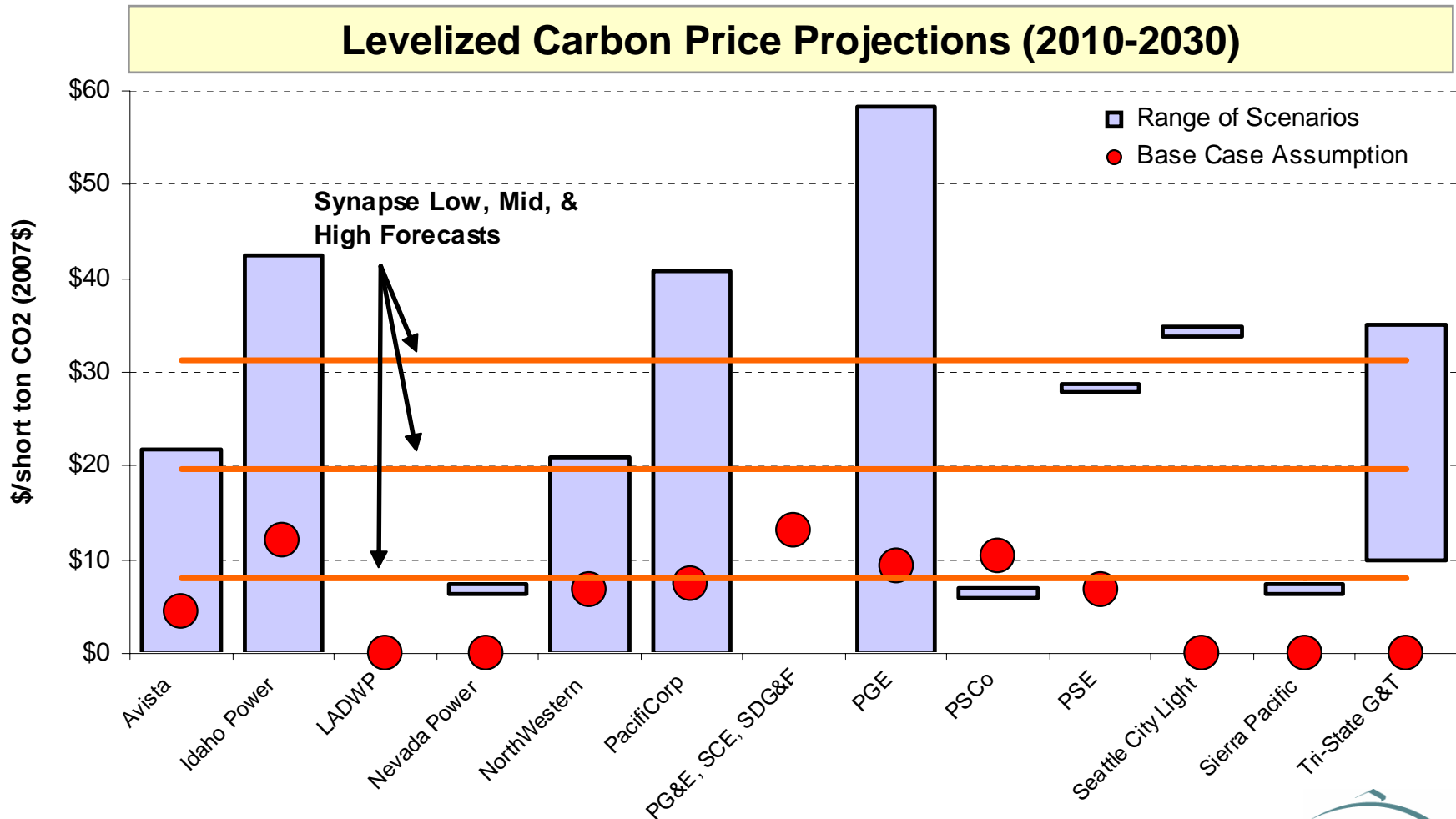
- **The most recent resource plans issued by 15 Western state utilities**
- **Represents ~60% of Western utility sales**
- **No utilities from Arizona or Wyoming (no IRP in those states) or New Mexico (IRP just getting started)**

Utility	IRP Year
Avista	2007
Idaho Power	2006
LADWP	2006
Nevada Power	2006
NorthWestern Energy	2005
PacifiCorp	2007
PG&E	2006
PGE	2007
PSCo	2003
PSE	2007
SCE	2006
SDG&E	2006
Seattle City Light	2006
Sierra Pacific	2007
Tri-State G&T	2007

Utilities Are Increasingly Incorporating Carbon Costs in their Portfolio Analyses

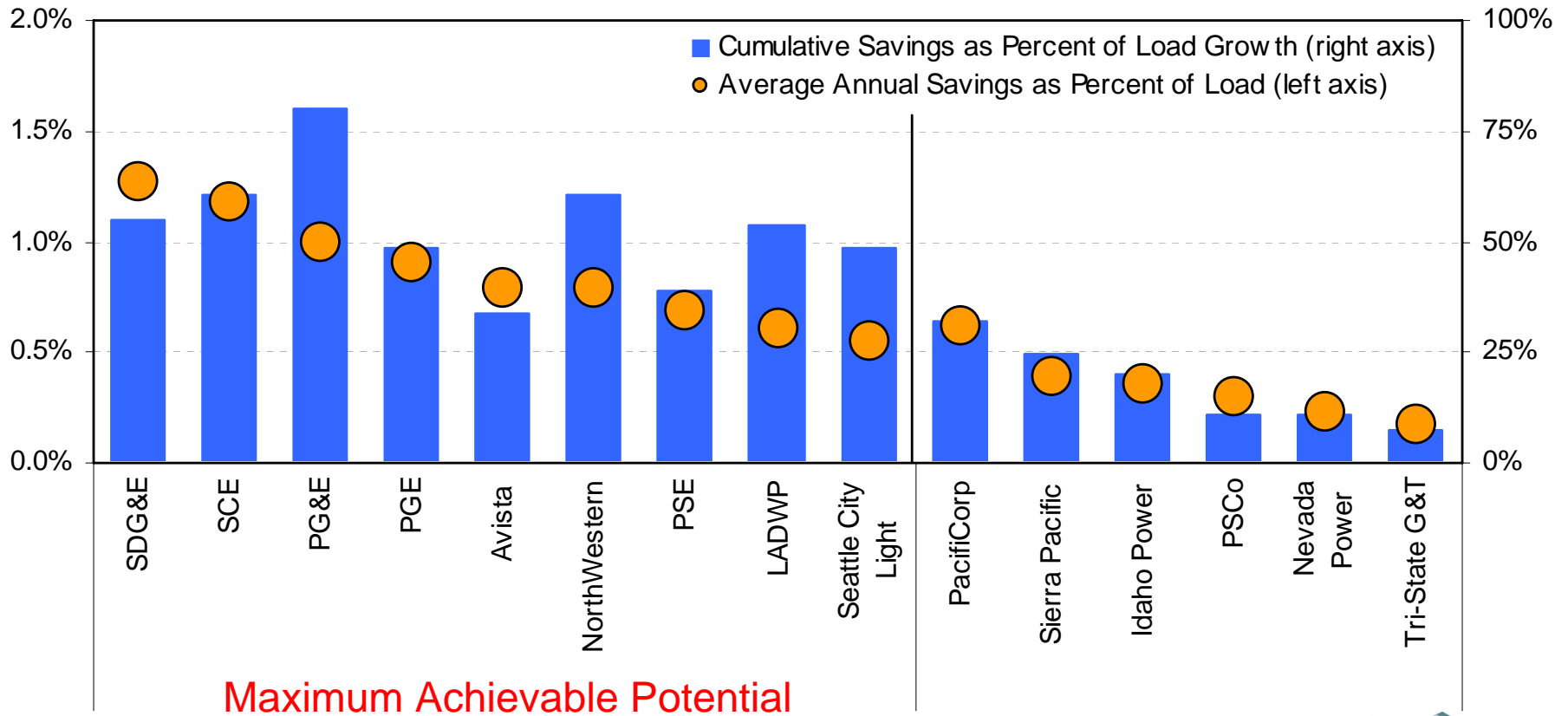
- **All utilities except LADWP modeled portfolio costs if subject to carbon regulations**
- **Ten utilities assume carbon regulations in their base case**
- **Eight utilities evaluated multiple carbon regulations**
 - Typically done through scenario analysis; Avista also modeled carbon costs stochastically
- **Carbon regulations modeled as a carbon tax or cap-and-trade**
 - PacifiCorp also considered a multi-state generator emission performance standard
- **Specific carbon price projections based on:**
 - PUC rules (OR, CA, NM)
 - Legislative proposals (e.g., NCEP recommendations, McCain-Lieberman)

Carbon Price Projections in Utility Resource Plans



Many Utilities Included Aggressive Levels of EE in Their Candidate Portfolios

Maximum Quantity of EE Included in Candidate Portfolios
(utility-funded programs over the planning period)



Portfolio Analyses Often Do Not Assess the Full Value of EE as a Hedge Against Carbon Risks

Two Separate Issues:

1. Utilities often don't vary EE quantities across candidate plans or carbon scenarios

- Thus, no ability to show, within the resource plan, how additional levels of EE would reduce portfolio risk
- A greater amount of EE will be cost effective with higher carbon prices

2. Utilities often don't fully account for the effect of carbon regulations on avoided costs

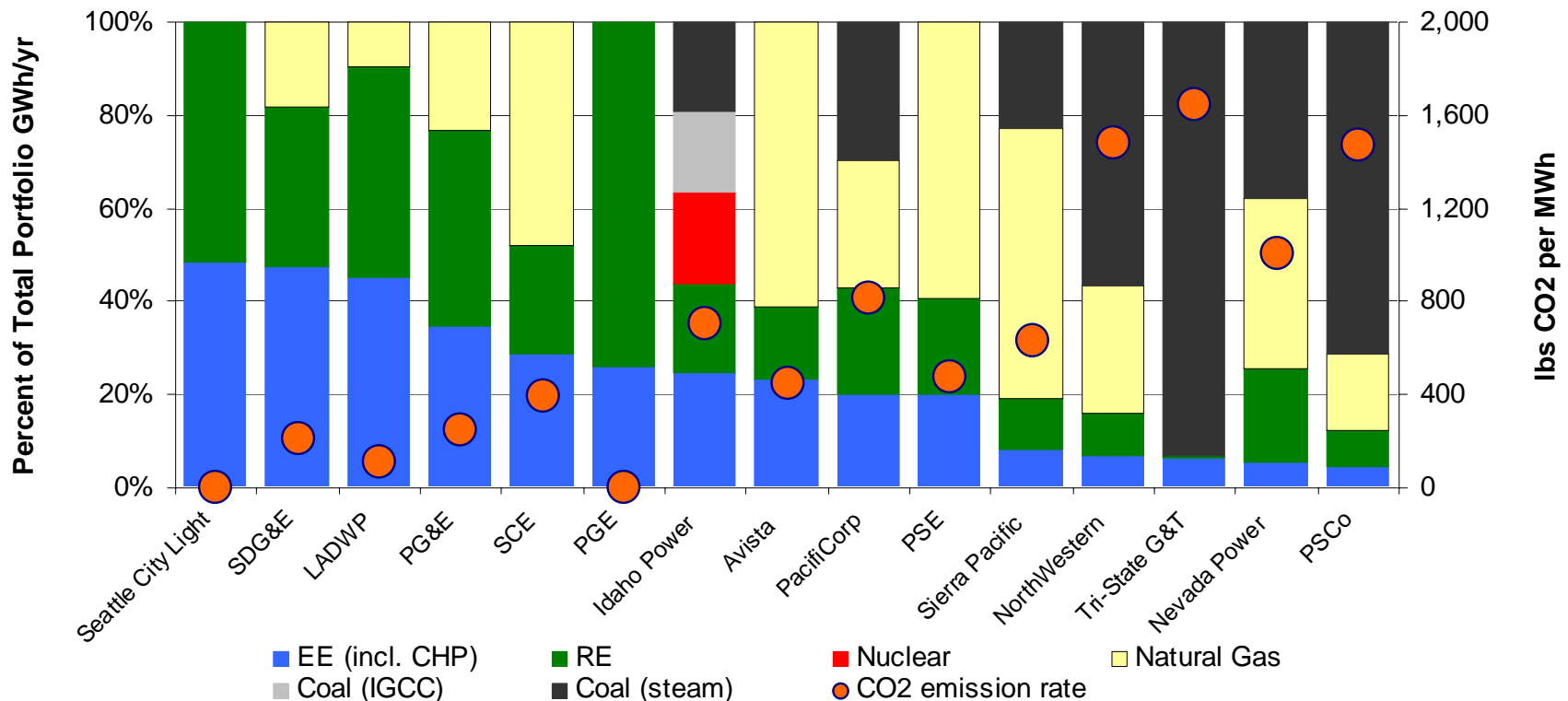
- Avoided costs are higher as result of carbon emission costs AND increased natural gas prices
- Estimates of gas price impacts vary widely, but in some cases are quite large

It Is Often Unclear How or Whether Carbon Risk Informs Selection of the Preferred Portfolio

- Of the eleven utilities that evaluated carbon cost scenarios, only four explicitly relied upon the results from these scenarios in selecting their preferred portfolios
- Partly symptomatic of more general issues:
 - utilities often provide little explanation of their rationale for selecting a particular candidate portfolio as the preferred portfolio
 - and tend to rely mostly (if not exclusively) on base case results
- Potential approaches to incorporating carbon risk into the decision-making process
 1. **Risk metric:** Quantify “carbon risk” or incorporate it into an overall measure of portfolio risk, and answer the question: *Is it worth an X increase in expected cost to reduce risk by Y amount?*
 2. **Threshold analysis:** Identify the carbon price that triggers a change in the least cost portfolio, and answer the question: *Is the probability that carbon prices will exceed that level sufficiently low to accept the potential downside?*

Portfolios with the Greatest Reliance on EE Generally Have the Lowest Carbon Intensity

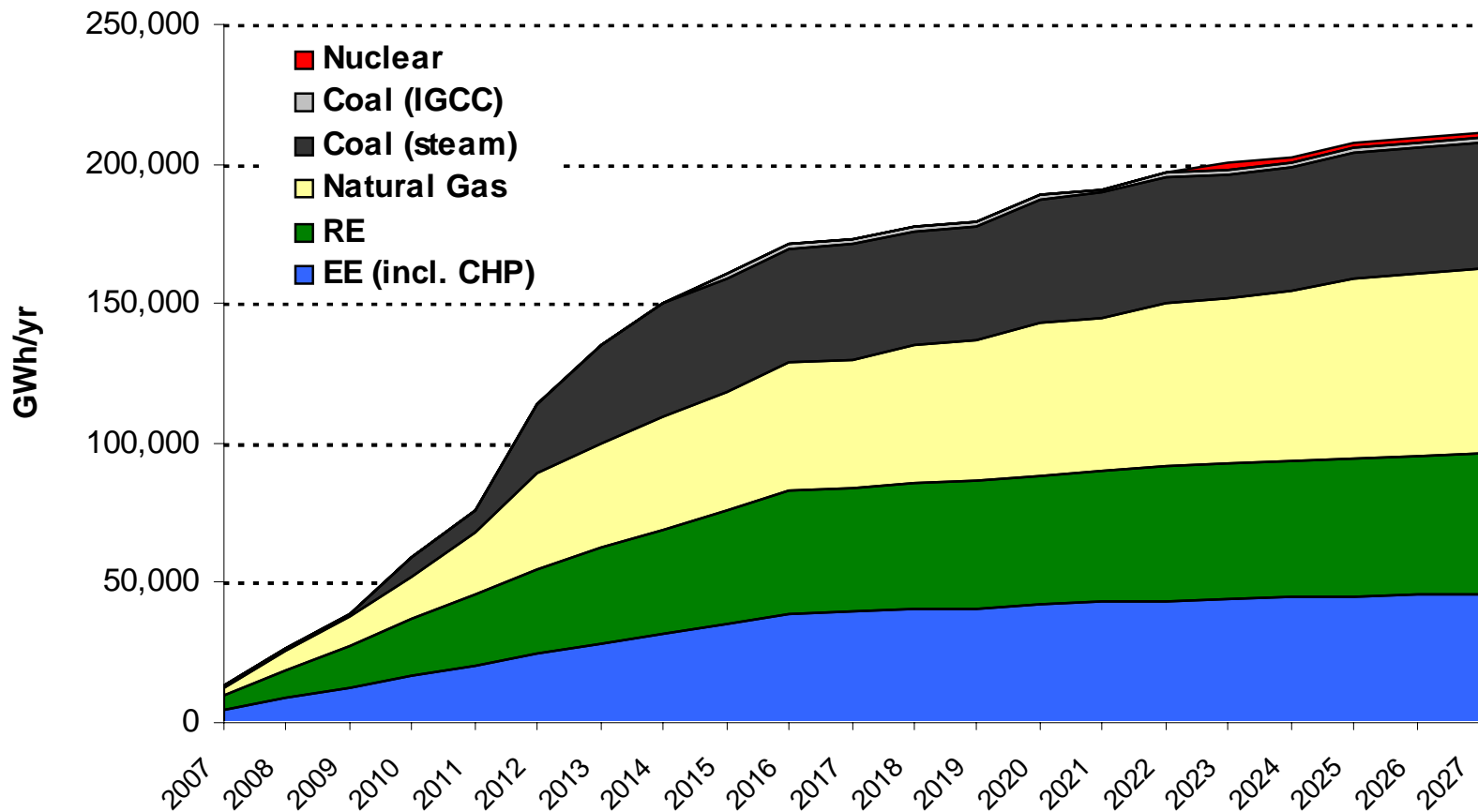
The Composition and Composite CO₂ Emission Rate of Utilities' Preferred Portfolios



Note: The figure reflects new, long-term resources in utilities' preferred portfolios (i.e., excludes contract renewals and short/medium-term market purchases) in the last year of their planning periods

EE Projected to Provide ~20% of Incremental Resource Needs in Aggregate

Aggregate Resource Additions in Utilities' Preferred Portfolios



Valuing EE as a Hedge Against Carbon Regulatory Risks: Emerging Best Practices

- 1. Assume carbon regulations in the base case, and evaluate a reasonably broad range of carbon price projections**
- 2. Construct candidate portfolios with the maximum achievable EE potential**
- 3. Account for the impact of carbon regulations on EE cost-effectiveness and the size of the achievable potential**
 - Larger EE potential at higher carbon prices**
 - Indirect effects on natural gas prices**
- 4. Develop transparent methods for incorporating information about carbon risk into the process of selecting the preferred portfolio**