



The Million Metric Ton Question: Estimating National Carbon Impacts from State- Level Programs

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Discussion Overview

SEP and EECBG Overview

- Study Objectives
- Approach and Evaluation Methods

Carbon Impact Analysis

- Analysis Approach
- Selected Emission Rate Sources by Mode of Savings

Lessons Learned from Selected Approach

- Benefits
- Limitations

SEP and EECBG Overview: Study Objectives



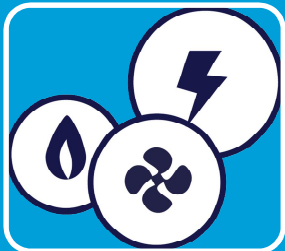
Program Objectives

- Provided over \$5 billion of ARRA funding to State Energy Offices
- SEP funding provided prior to ARRA, EECBG created for ARRA
- Funded energy efficiency, renewable energy, and conservation-related studies and projects across the US



Study Objectives

- DNV GL team evaluated the SEP program in 2008 and ARRA period, EECBG for ARRA period
- Results represent over 900 program activities and represent roughly 80% of the funding provided in each study period



Analyzed Impacts

- Energy Savings
- Job Impacts
- Carbon Emission Reductions
- Cost-Effectiveness

Evaluated Broad Program Areas Funded by SEP and EECBG

SEP: PY 2008

- Loans, Grants, and Incentives
- Building Retrofits
- Clean Energy Policy Support
- Technical Assistance

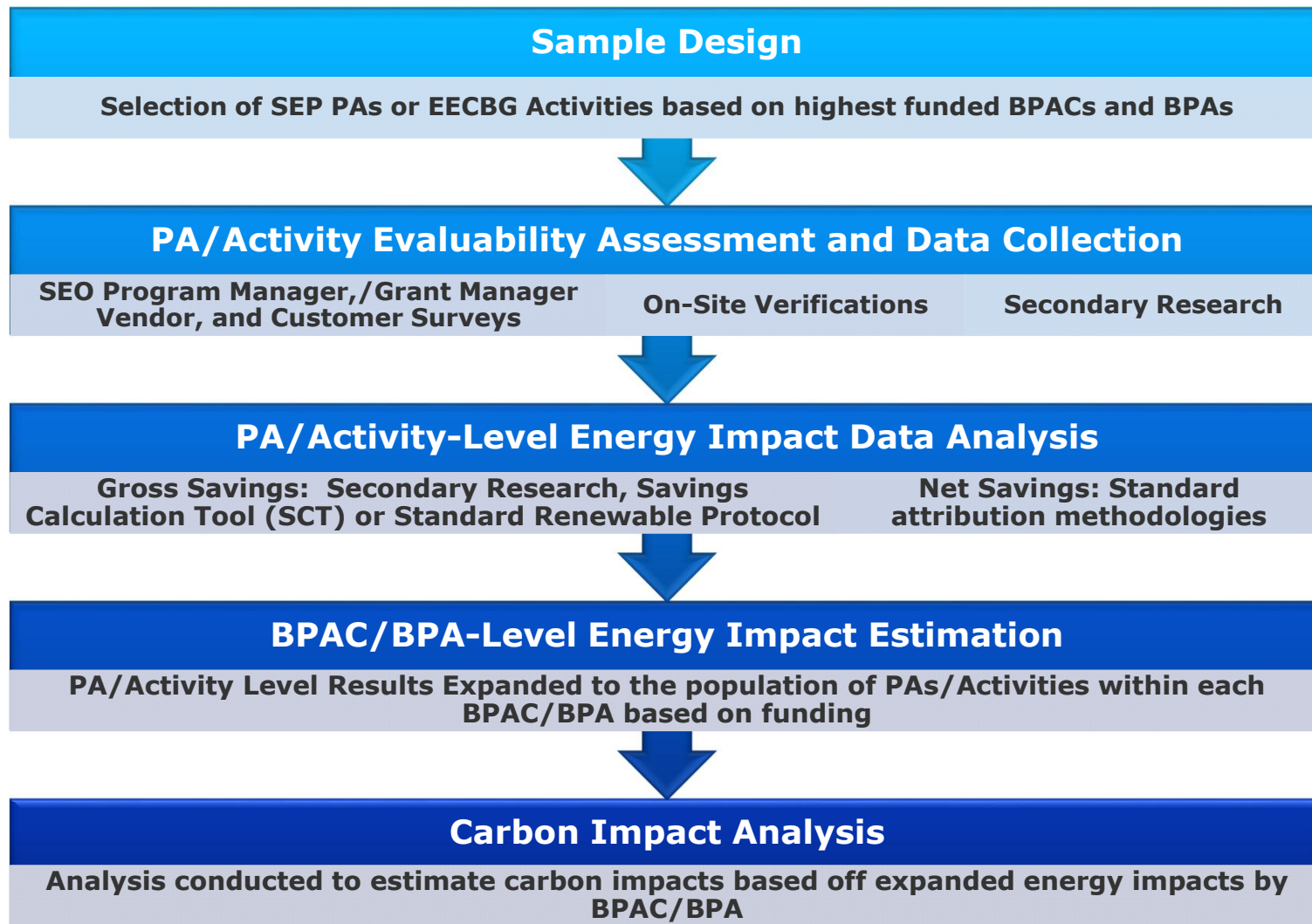
SEP: ARRA

- Loans, Grants, and Incentives
- Building Retrofits
- Building Codes and Standards
- Renewable Energy Market Development

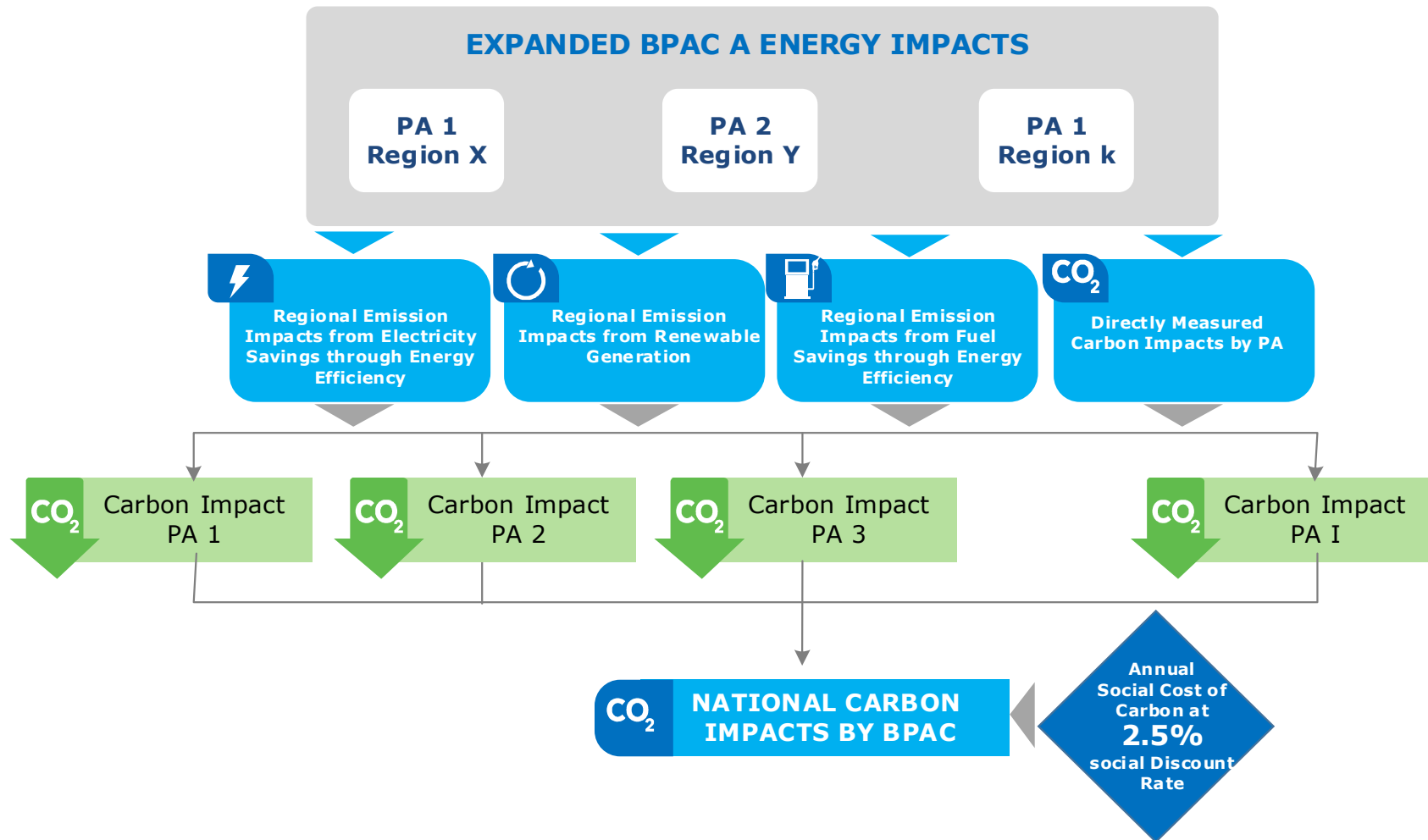
EECBG

- Financial Incentives
- Energy Efficiency Retrofits
- Buildings and Facilities
- Lighting
- On-Site Renewables
- Energy Efficiency and Conservation Strategy

SEP and EECBG Overview: Evaluation Methodology



Carbon Impact Analysis: Approach



Carbon Impact Analysis: Selected Electricity Emission Rate Sources



Electricity Savings from Energy Efficiency

- EPA's 2009 Emissions & Generation Resource Integrated Database (eGRID)
- EPA's Greenhouse Gas Reporting Program
- U.S. Energy Information Administration 2010 International Energy Statistics



Fuel Savings from Energy Efficiency

- EPA's Climate Leaders Greenhouse Gas Inventory Protocol
- U.S. Energy Information Administration, Annual Energy Review



Renewable Energy Generation

- EPA's 2009 Emissions & Generation Resource Integrated Database (eGRID)



Directly Measured Carbon Impacts

- Argonne National Laboratory Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model
- DOE National Energy Technology Laboratory Unit Process Library

Monetizing the Carbon Impacts

Social Cost of Carbon: Assumptions

- 2010-2050: Technical Support Document- Technical Update of Social Cost of Carbon for Regulatory Impact Analysis- Under Executive Order 12866
- Developed through a modelling process which considers economic impacts associated with increases in temperature due to incremental carbon emissions
- Increases over time due to increased strain on the environment from each additional metric ton of CO₂

Social Cost of Carbon (\$2009/MMTCO ₂)	
Year	2.5% Discount Rate
2008	50
2009	51
2010	52
2015	58
2020	65
2025	70
2030	76
2035	81
2040	87
2045	92
2050	98

Lessons Learned: Benefits and Limitations of Selected Approach

Benefits



- Systematic way to estimate carbon and social cost impacts across multiple states and fuels
- Selected data sources were best available data from federal agencies and national laboratories
- The tool is scalable and can be customized to include more specific data such as time-of-use rates or additional fuels

Lessons Learned: Benefits and Limitations

Limitations



- Did not evaluate time-of-use rates
- Assumed renewable generation replaced marginal generating unit
- Emission data per state based on in-state generation, does not address import/export of electricity
- Emission rates from 2009



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