

103 Greenhouse Gas Reduction Options

Program Overview

Program Description

This program provides public- and private-sector decisionmakers with vital insights regarding the costs, availability, performance, and potential risks of greenhouse gas (GHG) emission reduction and mitigation options. It provides investment strategies for expanding these options over time and insights on how to integrate GHG policy risk management into corporate business strategies as companies respond to growing demand for electric power. This information helps members develop coherent corporate strategies to respond to climate change, and helps decisionmakers create and implement cost-effective, environmentally sound public policies.

Industry Needs and Issues Addressed

- The ongoing evolution and implementation of mandatory carbon management policies at state, regional, and national levels is forcing electric companies to evaluate potential impacts of mandatory carbon constraints on operations and financial performance and to develop CO₂ management strategies.
- Companies need to understand the costs and risks associated with new generation, delivery, and end-use technologies and to effectively communicate these insights to policymakers and state regulators.
- Companies need improved analytical approaches to support strategic decisions and consideration of generation investments and emission reduction options.
- Policymakers and companies need to clearly understand the implications of climate policy implementation choices, e.g., program scope, use of market mechanisms, and offsets.
- Clear communication about climate policy implications, potential compliance costs, and corporate strategic choices is essential.

Impact

- Climate policy designs for achieving an environmental goal can vary in cost by trillions of dollars. Sound analyses and clear communication are critical to creating effective, efficient policies.
- The return on existing capital and on new corporate investments can be significantly affected by climate policy.
- Electric Power Research Institute (EPRI) software tools and methodologies can help companies to develop least-cost approaches to achieving voluntary and mandatory GHG emissions reduction targets.

Key Accomplishments

- Launched Global Climate Policy Design Forum Series
- Informed company and Congressional discussions on emissions trading systems from domestic policy analyses
- Communicated the importance of technology innovation in addressing climate change through Global Energy Technology Strategy work
- Developed and applied frameworks for helping companies evaluate generation and emissions reduction investments
- Helped companies develop and communicate climate strategies

Current Year Objectives

- Analyses examining detailed implementation of climate policy choices, such as the interplay between market and regulatory approaches and the importance of emission offsets

- Frameworks to incorporate power market impacts into corporate business and compliance strategies
- Analyses that examine the benefits to electric utilities of new technology in a carbon-constrained business environment
- Expanded capability to analyze policy costs at state and regional levels
- Frequent domestic and international climate policy workshops and policy forums

Industry Involvement

- Estimated 2009 funding: \$3.7M

Program Technical Lead

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Summary of Projects

Project Number	Project Title	Value
P103.001	Investigate Use of Market Mechanisms and Offsets in Climate Policy Design	Market approaches to climate policy that include emissions trading and offsets can cost trillions of dollars less than more-prescriptive policies that achieve the same emissions levels. This project conducts analyses to support efficient market design, examines the interplay between market and nonmarket approaches, monitors emerging CO ₂ markets around the world, and examines approaches to moving toward an integrated, efficient global market. This project examines the offset market, including evaluations of cost and availability, emerging rules for crediting these reductions, and specific offset opportunities.
P103.002	Methods to Assess GHG Policy Market Impacts on Business Strategy and GHG Compliance	The impact of climate policy on power markets can affect the value of an electric company's existing assets, new investment choices, and strategic direction. Insights and methods developed in this project can help companies understand the implications of climate policy for their businesses, incorporate climate policy uncertainty into their business strategies and investment decisions, and develop compliance strategies in a volatile policy environment.
P103.003	Company Level Analyses of New Technologies in a Carbon-Constrained Environment	New technology plays a critical role for utilities required to dramatically reduce emissions below historical levels. This project will help companies understand the potential benefits and risks of applying new technologies that must compete in a market driven by fuel prices, construction costs, emission allowance prices, and the availability of other new technologies.
P103.004	Electric Market and Economic Implications of Climate Policy at the State and Regional Levels	Understanding regional electric market and economic implications of federal climate policy provides critical insights to decisionmakers. In addition, numerous activities to implement climate policy at state and regional levels make it critical to understand the potential consequences at the local level. This project will build and apply tools that provide insights at state and regional levels.
P103.005	Communications	This project effectively transfers research insights through easily understood, carefully targeted communication vehicles. Workshops, "Climate Briefs" and public presentations help

Project Number	Project Title	Value
		communicate the complexities of climate policy to diverse stakeholders.

Project Descriptions

P103.001 Investigate Use of Market Mechanisms and Offsets in Climate Policy Design (057734)

Issue

Economically efficient climate policy approaches such as global emissions trading can cost trillions of dollars less than more-prescriptive regulatory policies to achieve the same emissions levels. Proposed restrictions on trade, limitations on the use of GHG offsets, and development of incompatible national and regional trading programs could dramatically reduce these potential savings. Key issues to be resolved include basic institutions, mechanisms and enforcement, point of regulation, methods for trading among gases, rationales for permit allocation, linking of divergent trading systems, and tradeoffs among economic efficiency, distributional equity, environmental effectiveness, and administrative feasibility.

In the near term, electric companies seeking to reduce direct CO₂ emissions from fossil fuel-based electricity generation have few cost-effective and large-scale options available. The opportunity to offset direct emissions by implementing off-system GHG reduction projects can have tremendous value in reducing the compliance cost of meeting GHG emissions targets, particularly in the near term before new large-scale GHG abatement technologies can be deployed. Understanding the cost and availability of GHG offsets is critically important for companies' climate strategy development and for informing policy discussions.

Description

This project provides detailed analyses of U.S. and international trading programs to promote development of environmentally effective and economically efficient market mechanisms to abate GHG emissions. The project also provides insights about the distribution of costs across companies. This work aims to help companies and others understand the implications of alternative approaches to implementing market-based climate policy. Studies and workshops will address issues such as allowance allocation, interactions between overlapping policies, cost-containment approaches, linking of trading systems, GHG emissions offsets, and frameworks for international cooperation.

GHG offsets can play a key role in helping electric companies achieve GHG reductions at lowest cost. The efficacy of different offset project types, potential eligibility criteria, and quantitative limits on their use, measurement, and verification continue to be the focus of debate as mandatory GHG emissions trading programs evolve on regional, national, and international bases. This project explores promising new types and categories of GHG offsets.

Value

- Examines emerging experience with climate policy across the United States and other countries to inform new policy implementation; identifies important lessons from early trading system experiences
- Provides clear communication regarding implications of different rules and restrictions on trading
- Develops and applies models to quantify implications of different policy implementation choices
- Evaluates and analyzes different approaches to creating GHG emissions offsets and provides insights about the expected cost and potential availability of offsets

- Conducts basic research into innovative offset ideas and helps to refine methodologies for evaluating offset projects and estimating availability
- Contributes to development of protocols designed to quantify, measure, monitor and verify GHG emissions offsets, and examines implications of different rules for crediting offset projects.

How to Apply Results

Company environmental staff can use the information to inform their company's climate strategy, help identify and evaluate possible near-term GHG emission reduction investments, and guide development of corporate policy positions. EPRI will facilitate broader use and awareness of the results by briefing key stakeholders, including policymakers and policy researchers; developing materials for the trade press/media; keeping EPRI's public web page current; presenting at meetings/seminars; and continuing service on various advisory panels.

2009 Products

Product Title & Description	Planned Completion Date	Product Type
Key Issues in Emissions Trading and GHG Offsets: With inputs from program members, EPRI will conduct analyses to address specific GHG trading issues and the use of project-based mechanisms to offset GHG emissions. The research also will highlight practical approaches that electric companies can use to begin effective participation in emerging emissions trading markets and markets for project-based offset credits.	12/31/2009	Technical Report

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Analysis of Key Greenhouse Gas Emissions Trading Issues: Future deliverables will be determined annually based on evolving climate policies. Research will continue on the general range of subjects in emissions trading and GHG offsets. Analytical tools will be developed and enhanced to allow quantitative analyses of emerging policy proposals.	2010	Technical Update

P103.002 Methods to Assess GHG Policy Market Impacts on Business Strategy and GHG Compliance (047425)

Issue

Any policy seeking to reduce CO₂ emissions below historical levels will have a dramatic impact on electric power prices, cash flows to generating assets, and incentives for new generation investment. With few options to achieve substantial short-term emission reductions, and expensive and technologically or institutionally uncertain long-term options, the costs could be problematic. A binding emissions cap with a substantial share of auctioned allowances could expose the electric sector to over \$100 billion per year in CO₂ costs in a market that is likely to be highly volatile. Electric utility decisionmakers will need new methods and analytical frameworks to navigate this sea change in their compliance and business environment.

Description

The goal of this project is to develop tools to help electric utility decisionmakers understand the implications of climate policy for their companies, incorporate climate policy uncertainty into their business strategies and investment decisions, and develop compliance strategies in a volatile policy environment. The project will develop market simulation tools, apply them to representative policy and energy market scenarios, and map the results back to the individual company level. The tools will explicitly recognize the highly integrated nature of power, fuel, and environmental markets that makes this problem so challenging. The analyses will assess impacts from the perspectives of both asset owners and electricity consumers. The results will be packaged to facilitate communication within the company and to external stakeholders.

Value

- Helps companies assess climate policy risks and opportunities and develop strategies to manage both
- Provides methods for evaluating new capital investments given policy uncertainty
- Provides methods for comparing emission reduction investments on a consistent basis
- Helps companies communicate the implications of climate policy for stakeholders

How to Apply Results

Company environmental and planning staff can learn from reports, presentations, and workshops about how to consider climate policy uncertainty for planning and operational activities. Some key insights may be communicated to a broader stakeholder audience in order to widen understanding of the drivers and dynamics of electric company decisionmaking.

2009 Products

Product Title & Description	Planned Completion Date	Product Type
Methods to Understand the Effects of Climate Policy on Investment Decisions and Compliance Strategy: Project results will be delivered primarily through a technical report providing methodological insights and results concerning the impact of stringent climate policy on power markets, the consistent assessment of emission reduction options, and the challenge of complying in a market environment. Insights will be shared with program members and other stakeholders through presentations and workshops.	12/31/2009	Technical Report

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Development of Methods to Understand the Effects of Climate Policy Uncertainty on Investment Decisions: Future deliverables will be determined in consultation with members. Topics will depend, in part, on whether climate legislation has been passed in the United States. There is likely to be an ongoing need to understand new generation choices, given continuing uncertainty about climate policy, fuel prices, capital costs, and public acceptance of technology.	2010	Technical Report

P103.003 Company Level Analyses of New Technologies in a Carbon-Constrained Environment (067508)

Issue

In a carbon-constrained policy environment, companies will face tremendous pressure to reduce CO₂ emissions. While there are some opportunities to reduce emissions at low cost, few of those opportunities result in the high-volume reductions needed to meet a national cap that ratchets down year by year. This need will drive electric utilities to aggressively evaluate deployment of new generation technologies, often before there is solid information on the cost to construct and operate the technologies and on their performance in an operating environment. Further, the benefits of the technologies will depend on CO₂ price, fuel prices, and the success of competing technologies, all of which will be highly uncertain given the long lead times for bringing new generation technologies to market. Utilities need analytical frameworks and insights to address the complex set of decisions leading to the adoption of new technologies, both to inform those decisions and to help communicate to stakeholders and policymakers the challenges and tradeoffs between the risks and opportunities.

Description

This project will develop spreadsheet models to evaluate investments in new technology under uncertainty. These analytical frameworks enable EPRI to help members understand the potential benefits and risks of applying new generation technologies. The frameworks will also help members adapt software they are currently using for investment analysis to incorporate climate policy uncertainty more effectively. These analyses will facilitate communication to stakeholders and policymakers about the potential benefits and risks. The analytical frameworks will integrate the operation of new technologies with the existing fleet to show the overall benefit to the adopting utility and its customers. The frameworks will be applied across a range of scenarios to capture the technological uncertainties, as well as critical uncertainties affecting market success, such as CO₂ and fuel prices. While the primary focus of the frameworks will be new generating technologies, the project will also represent potential opportunities from adopting demand-side technologies that limit loads or change distribution over time.

Value

- Help utility decisionmakers better understand the opportunities and risks in adopting new generating technologies
- Help communicate the balance of opportunities and risks to stakeholders seeking to deploy new technologies before full information on their costs and performance is available
- Provide insights on development of strategies for deploying new technologies, i.e., mapping out the decisions and sequence of commitments for deployment as technological and market information is clarified over time

How to Apply Results

Company environmental and planning staff can learn from reports, presentations, and workshops about how to consider climate policy uncertainty in their activities. Some key insights may be communicated to a broader stakeholder audience in order to widen understanding of the drivers and dynamics of electric company decisionmaking.

2009 Products

Product Title & Description	Planned Completion Date	Product Type
Framework for Evaluating Benefits and Risks of Adopting New Generation Technologies in a Carbon-Constrained Business Environment: Project results will be delivered primarily through a technical report, focusing on in-depth assessments of investments in new technologies. Methodological insights and results concerning the potential benefits and risks of deploying new technologies will be shared with program members through presentations and workshops.	12/31/2009	Technical Report

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Framework for Evaluating Benefits and Risks of Adopting New Generation Technologies in a Carbon-Constrained Business Environment: Future deliverables will be determined in consultation with members. Topics will depend, in part, on whether climate legislation has been passed in the United States. There is likely to be an ongoing need to understand new generation choices, given climate policy uncertainty.	2010	Technical Report

P103.004 Electric Market and Economic Implications of Climate Policy at the State and Regional Levels (067509)

Issue

From California to the Northeast, there are numerous proposals to implement climate policy at regional and state levels. Some of these policies are already in force, and others are under active consideration and may become law. Unless a possible future federal climate policy clearly preempts these activities, many are likely to continue in parallel with climate policy at the federal level. One issue is what impact these regional policies will have on emissions, given the many opportunities for leakage of economic activity across state lines or even abroad. Another issue is whether the economic consequences are minor, as was initially suggested in California, for example, or whether policies that limit emissions within the region have serious economic consequences. Electric utilities and their customers are key stakeholders in these debates, and thus they have a strong need to understand the efficacy and consequences of policy proposals and to effectively communicate that understanding in the policymaking process. As federal policies evolve, policymakers and companies will be interested in their regional impacts.

Description

This project will develop and maintain a suite of modeling frameworks that provide insights into policy discussions at state, regional, and national levels. A diverse set of models is needed to effectively address the wide range of emerging policy ideas and questions. The project will apply these models in generic analyses to promote general understanding of the issues and advance methodological foundations where needed.

Value

- Help clarify and communicate regional-level climate policy impacts on national and global emissions given the opportunities for relocation of economic activity and trade
- Help assess the effects of regional and state climate policy on regional electricity markets and economic activity
- Increase capability to support electric utilities that are participating in policymaking processes

How to Apply Results

The project models and internal capabilities may be applied in supplemental projects in support of program members seeking to apply these capabilities in their regions or states. In addition, company environmental and planning staff can learn from reports, presentations, and workshops about how to consider the implications of climate policy at the regional level and effectively communicate those implications in the policymaking process.

2009 Products

Product Title & Description	Planned Completion Date	Product Type
Assessment and Enhancement of Capabilities to Evaluate Regional Climate Policy: Presentations, workshops, and informal reports assessing the state of the art for modeling the impact of regional policies to limit greenhouse gases.	12/31/2009	Technical Resource

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Assessment and Enhancement of Capabilities to Evaluate Regional Climate Policy: Future deliverables will be determined in consultation with members. Topics will depend, in part, on whether climate legislation has been passed in the United States. There is likely to be an ongoing need to understand new generation choices, given climate policy uncertainty.	2010	Technical Resource

P103.005 Communications (067510)

Issue

EPRI climate research produces numerous insights for policymaking at a variety of levels. It is essential that these insights be effectively communicated to various stakeholder groups if the results are to help inform relevant policy discussions. Much of this material is rooted in economic theory or based on implementations of climate policy in distant international venues, making it difficult to access and interpret.

Description

This project effectively transfers research insights through easily understandable content and targeted communication channels such as workshops, two-page “Climate Briefs,” and public presentations to help members communicate climate policy complexities to diverse stakeholders. The enhanced communications supported by this project will be directed primarily at member staff and management. However, the materials will be packaged to support communications to broad audiences with varying backgrounds, so that members can use the materials in their own communication efforts with stakeholders and policymakers.

Value

- Improved understanding of issues critical to the design and implementation of cost-effective climate policy
- Better understanding of how climate policy affects electric power markets and the implications for investment and operating decisions
- Better understanding of the potential opportunities and challenges for electric companies in meeting compliance goals
- Increased effectiveness in communicating the important details of climate policy design and critical trade-offs to investors, electric company customers, policymakers, and other stakeholders

How to Apply Results

Company environmental staff can use the information to inform company climate strategy, help identify and evaluate possible near-term GHG emission reduction investments, and guide development of corporate policy positions. EPRI will facilitate broader use and awareness of the results by briefing key stakeholders, including policymakers and policy researchers; developing materials for the trade press/media; keeping the program public web page current; presenting at meetings/seminars; and continuing service on various advisory panels.

2009 Products

Product Title & Description	Planned Completion Date	Product Type
Communication Activities and Materials: Deliverables will include papers, research summaries, webcasts, the program web site, briefings, and presentations, supplementing the EPRI reports and/or peer-reviewed literature created by each of the other projects in the program.	12/31/2009	Technical Resource

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Communication Activities and Materials: Future deliverables will be determined in consultation with members. Topics will depend, in part, on whether climate legislation has been passed in the United States. There is likely to be an ongoing need to understand new generation choices, given climate policy uncertainty.	2010	