

84 Renewable Generation

Program Overview

Program Description

This program assesses the status, performance, and cost of non-hydro renewable generating technologies and provides a single guide in which technology characteristics can be compared. Analyses apply different modeling tools to explore the potential of these technologies to reduce CO₂ emissions from generation and respond to renewable portfolio standards (RPS) and related policies. Current renewable technology issues are examined, providing information and perspectives members can use in their resource planning and developing renewable deployment strategies for sustainable generation portfolios. Specific technology projects and field evaluations help gauge the cost and performance of generation resources including wind, photovoltaic, solar thermal, biomass, and geothermal power.

Industry Needs and Issues Addressed

- Strategic information for generation portfolio planning, acquiring renewable energy resources, and related decisionmaking on topics such as ownership versus power purchase agreements
- Emerging environmental regulations with renewable energy requirements (26 states as of December 2007, with federal legislation on RPS and carbon allowances pending)
- Changing public preferences for electricity from clean and diversified generation sources
- New opportunities and challenges for deployment, operation and maintenance of renewable generation as part of the overall low-carbon generation mix

Impact

- Avoid mistakes and quickly capitalize on market opportunities for renewable compliance and power purchases, resulting in improved revenues and portfolio-wide profitability
- Identify the appropriate role of diverse renewable resources in expanding new and sustainable generation capacity.
- Provide forums for exchanging information and collaboration, considering new renewable resources, and optimizing maintenance and operation of existing facilities
- Modeling, simulation, and future energy scenario analyses that will help guide utility investments in renewable energy

Key Accomplishments

- Renewable Energy Technical Assessment Guide (TAG-RE) provided unbiased and up-to-date information on renewable energy status, performance, cost, installed capacity, and markets
- Expanded interest group activities in biomass and solar, including plant tours and overview of biomass and solar thermal technologies, and created new interest group website
- Modeling and analysis to forecast the role of renewables in different environmental policies, effects of a federal RPS, and possible future energy scenarios
- Completed workshop and round-up report/conference proceedings on how waterpower in a carbon-constrained future adds new opportunities and challenges for the industry

Current Year Objectives

- Renewable TAG Update 2009: performance and cost data, expansion of e-media version, development of detailed engineering and economics data on technology costs.
- Examination of, and, strategic information on, the role of renewable energy in renewable portfolio standards (RPS) and CO₂ costs or constraints, with products including periodic intelligence reports, EPRI perspectives and technical updates, presentations, and seminars.

- Expanded renewable technology interest group activities in photovoltaic, solar thermal, biomass, and geothermal areas.

Industry Involvement

- Estimated 2009 funding: \$2.2M

Program Technical Lead

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Summary of Projects

Project Number	Project Title	Value
P84.001	Technical Assessment Guide -- Renewable Energy (TAG-RE)	TAG-RE provides technology status, installation history, comparative performance and cost-reference information for renewable energy technologies, including solar photovoltaic, solar thermal, wind, biomass, geothermal, and emerging ocean energy power, as well as grid integration technologies. In 2009, storage technologies for renewables will be added. The TAG-RE consists of an annual report, electronic media to provide easy access to information and data, software calculation tools, renewable energy information newsletter, and EPRI perspective reports.
P84.002	Renewable Energy Analysis and Strategy	This project provides engineering and economic evaluations of renewable energy generation technologies, strategic information on current renewable technology issues, and modeling and analysis to better define the role of renewable energy in future generation portfolios. Results are intended to support strategic planning for renewable portfolio standards and analysis of CO ₂ emissions costs and related constraints. Products include economic and energy scenario analysis, and topical reports on renewable technology issues.
P84.003	Renewable Technologies (Wind, Solar, Biomass, Geothermal)	Participation in this project includes all renewable interest group activities and access to study results on specific renewable technology deployment issues, such as solar thermal siting and performance, wind turbine condition monitoring, biomass co-firing practice and assessment of available resources for geothermal and biomass energy. Products include topical workshops and reports, technical tours, and other renewable interest group activities, as well as opportunities to formulate R&D projects specific to individual utility technology deployment interests, such as collaboration in plant feasibility studies, pilot demonstration projects, and seminars and workshops.

Project Descriptions

P84.001 Technical Assessment Guide -- Renewable Energy (TAG-RE) (065781)

Issue

The principal drivers for renewable generation include government-mandated production goals, customer preference, and environmental regulations. Examples include RPS, system benefit charges, and net metering laws in the United States, and the goal in Europe of up to a 32% future share of renewables in overall electricity generation. It is increasingly important for energy providers to have the best available information about cost and performance of renewable generation options for use in corporate planning and strategy.

Description

This project provides technology status, installation history, and performance cost information for a range of renewable energy technologies. Project activities include production of the annual edition of the EPRI Renewable Energy Technical Assessment Guide (TAG-RE) in both CD-ROM and electronic format; an eMedia renewable technology newsletter, and perspective reports that address market, regulatory, and other renewable energy issues.

Value

- Conduct effective resource planning, avoid deployment mistakes, capitalize on market opportunities, lower O&M costs, and improve plant availability
- Increase revenue while maintaining a balanced generation portfolio that includes appropriate deployment with effective maintenance and reliable operation.

How to Apply Results

Members will apply the resulting renewable energy information and data to

- Assess the status and potential of renewable generation technologies
- Forecast the penetration of renewable energy into the generation portfolio mix for a range of scenarios, and
- Estimate the incremental impacts of adding renewable generation on fuel requirements, capital and O&M costs, and greenhouse and other pollutant emissions.

2009 Products

Product Title & Description	Planned Completion Date	Product Type
Renewable Energy Technical Assessment Guide, CD: The annual TAG-RE report provides the latest information and perspectives on the status, performance, cost, and markets for renewable energy technologies. These include wind, biomass, solar photovoltaic, solar thermal, geothermal, low-impact hydro, emerging ocean energy, and renewable integration technologies.	12/31/2009	Technical Report
Renewable Energy Technical Assessment Guide, Electronic Media Update: The annual TAG-RE electronic media is updated twice yearly and provides the latest information and perspectives on the status, performance, cost, and markets for renewable energy technologies. These include wind, biomass, photovoltaic, solar thermal, geothermal, low-impact hydro, emerging ocean energy technologies.	12/31/2009	Technical Resource

Product Title & Description	Planned Completion Date	Product Type
Renewable Energy Electronic Media Newsletter: The renewable energy eMedia newsletters provide ongoing market updates and intelligence on technologies, customers, competitors and regulatory issues. The newsletter is delivered four times annually in electronic format.	12/31/2009	Technical Resource
Renewable Energy Electronic Media Perspective Report: The renewable energy eMedia perspective report covers a current high-interest topic or issue with perspective relevant to the utility industry. The report is delivered in electronic format.	12/31/2009	Technical Resource

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Renewable Energy Technical Assessment Guide CD: The annual TAG-RE CD report provides the latest information and perspectives on the status, performance, cost, and markets for renewable energy technologies. These include wind, biomass, solar photovoltaic, solar thermal, geothermal, low-impact hydro, emerging ocean energy technologies.	2010	Technical Report
Renewable Energy Technical Assessment Guide Electronic Media Update: The annual TAG-RE electronic media is updated twice yearly and provides the latest information and perspectives on the status, performance, cost, and markets for renewable energy technologies. These include wind, biomass, solar photovoltaic, solar thermal, geothermal, low-impact hydro, emerging ocean energy technologies.	2010	Technical Resource
Renewable Energy eMedia Newsletters: The Renewable Energy eMedia Newsletters provide detailed ongoing market updates and intelligence on technologies, customers, competitors, and regulatory issues. The newsletter is delivered four times annually in electronic format.	2010	Technical Resource
Renewable Energy eMedia Perspective Report: The renewable energy eMedia perspective report covers a current high-interest topic or issue with perspective relevant to the utility industry. The report is delivered in electronic format.	2010	Technical Resource

P84.002 Renewable Energy Analysis and Strategy (065782)

Issue

All utilities face the question of exactly where renewable energy will fit in their future low-carbon and diversified choices for electricity generation. There is a significant level of business and technical uncertainty as to which emerging renewable technologies will be most cost effective, reliable, and durable in the long run. Utilities need a clearer understanding of the opportunities and risks of relying on renewable generation and how this likely will affect the bottom line.

Description

The analysis and strategy project provides engineering and economic evaluations of renewable energy generation technologies, strategic information on current renewable technology issues, and modeling and analysis to better define the role of renewable energy in future generation portfolios. Results are intended to support strategic planning for renewable portfolio standards, CO₂ emissions costs, and related constraints. Products include analysis of the future generation mix in addition to costs of energy and related emissions for different economic and energy scenarios. Engineering and economic evaluations for specific renewable technologies are conducted to provide detailed data on technology costs.

Value

- Provides a comparison of how different policies, fuel prices, CO₂ costs, and technology advancement scenarios will affect the electricity sector and the role of renewables.
- Results help guide and provide analytical support for EPRI's renewable energy and climate change programs, as well as members' resource planning and renewable strategy development.
- Close cooperation with other R&D organizations and energy modeling efforts such as those at NREL and EIA enhances information available to EPRI members and policymakers.

How to Apply Results

Members will apply the resulting renewable energy information and data to

- Assess the status and potential of renewable generation technologies
- Forecast the penetration of renewable energy in the generation portfolio mix for a range of scenarios, and
- Estimate the incremental impacts of adding renewable generation on fuel requirements, capital and O&M costs, and greenhouse and other pollutant emissions of the generation portfolio.

2009 Products

Product Title & Description	Planned Completion Date	Product Type
<p>Update on Engineering and Economics of Utility-Scale Wind Power Technology: This Technical Update provides engineering and economic evaluations of utility-scale wind technology selected in collaboration with members. It will include deployment status, performance, O&M requirements, and economics. The main objective is to update cost and performance data for expected large wind deployments. These results also will be used to prepare the annual updates of related sections in EPRI's Renewable Energy Technical Assessment Guide (TAG-RE).</p>	12/31/2009	Technical Update
<p>Update on Engineering and Economics of Utility-Scale Solar Power Technology: This Technical Update provides an economic evaluation of a solar thermal or solar electric technology selected in collaboration with members. It will include deployment status, performance, O&M requirements, and economics. The objective is to update cost and performance data for expected large solar plant deployments. These results also will be used to prepare the annual updates of related sections in EPRI's Renewable Energy Technical Assessment Guide (TAG-RE).</p>	12/31/2009	Technical Update

Product Title & Description	Planned Completion Date	Product Type
<p>Modeling and Analysis of Climate Policy Scenarios – Renewable Resource Limits: This report continues the development and application of EPRI’s National Electric System Simulation Evaluator (NESSIE), providing a flexible tool for examining capacity expansion and electric system operation in various technology and policy scenarios. The update report will examine the role of renewable resources in the overall generation portfolio using the latest technology estimates, energy resource data, and policy expectations.</p>	12/31/2009	Technical Update
<p>Addressing Biomass Supply Security Issues: There is a considerable supply of biomass currently available for power generation, but it is not clear how biomass markets will respond to increasing demand for cellulosic ethanol feedstocks or ongoing tensions between food supply, land, and water use. This update will quantitatively assess scenarios for future biomass use, allowing utilities to make more confident decisions about biomass power projects.</p>	12/31/2009	Technical Update
Future Year Products		
Product Title & Description	Planned Completion Date	Product Type
<p>Geothermal Power Technology Economic Evaluation and Deployment Update: This Technical Update provides engineering and economic evaluations of the deployment status and O&M requirements of specific geothermal technology selected in collaboration with members.</p>	2010	Technical Update
<p>Modeling and Analysis of Renewable Generation in a Sustainable Portfolio: An update of the NESSIE model, including the latest generation cost, performance, and resource data, regional supply and demand requirements, and climate and environmental policies/incentives that affect the deployment and generation mix. Modeling and analysis results will be provided as an annual update, as well as results from coordination with EIA and NREL modeling efforts.</p>	2010	Technical Update
<p>Solar PV Technology Economic Evaluation and Deployment Update: This Technical Update provides engineering and economic evaluations of deployment status and O&M requirements of the specific solar technology selected in collaboration with members.</p>	2010	Technical Update
<p>Biomass Co-Firing Engineering and Economic Evaluation: This Technical Update provides engineering and economic evaluations of deployment status and O&M requirements of co-firing biomass technologies selected in collaboration with members.</p>	2010	Technical Update

P84.003 Renewable Technologies (Wind, Solar, Biomass, Geothermal) (067362)

Issue

The future electric system is likely to use far more renewable energy in the form of wind, solar, biomass and geothermal power. This will be a new experience for most utilities, which will face many questions about procurement, PPA versus ownership, REC trading, resource forecasting, RPS best practices, and exactly where renewable energy will fit into their futures. As renewable deployments increase, there is significant potential for sharing experiences, lessons learned, and new operating practices with others in the utility industry.

Description

Participation in this project includes all renewable interest group activities and access to study results that address specific renewable technology deployment issues, such as solar thermal siting and performance, wind turbine condition monitoring, biomass co-firing practice, and assessment of available resources for geothermal and biomass energy. Products include topical workshops and reports, technical tours, and other renewable interest group activities, as well as opportunities to formulate R&D projects specific to individual utility technology deployment interests, such as collaboration in plant feasibility studies and pilot demonstration projects as well as seminars and workshops.

Value

- Access to up-to-date information, best practices, state-of-the-art developments, and information sharing via participation in interest groups and R&D projects
- Collaborative R&D activities: exchange information and share experiences and best practices related to emerging renewables technologies issues, applications, and opportunities, both utility-owned and via power purchase agreements.
- Address current renewable power generation technical issues through industry surveys, case studies, and topical reports.

How to Apply Results

Members will use information about the cost-effectiveness and performance of renewable generation for generation planning. Results are delivered via technical reports and technical updates on current high-interest topics, as well as interest group meetings and workshops. Information helps members benchmark themselves against their peers and benefit from a broader set of experiences and lessons learned, reducing the cost of obtaining that knowledge. Activities facilitate peer-to-peer communications and create a sustaining knowledge base, leading to technical problem-solving and O&M optimization.

2009 Products

Product Title & Description	Planned Completion Date	Product Type
Biomass Interest Group (BIG) Activities and Deployment Update: Biomass Interest Group (BIG) includes participation in all meetings, webcasts, technical tours, and workshops. Results include future plans, findings from site visits, discussions of biomass R&D topics, deployment issues and project developments, and summary materials from any workshops.	12/31/2009	Assembled Package
Wind Power Deployment Update: Evaluation of wind power options based on the availability of wind resources on a regional and state level.	12/31/2009	Technical Update

Product Title & Description	Planned Completion Date	Product Type
<p>Geothermal Interest Group (GIG) Activities and Deployment Update: Geothermal Interest Group (GIG) includes participation in all meetings, webcasts, technical tours and workshops. Results include future plans, findings from site visits, discussions of biomass R&D topics, deployment issues, and project developments, and summary materials from any workshops.</p>	12/31/2009	Assembled Package
<p>Solar Electric Interest Group (SEIG) Activities and Deployment Update: Solar Electric Interest Group (SEIG) includes participation in all meetings, webcasts, technical tours and workshops. Results include future plans, findings from site visits, discussions of biomass R&D topics, deployment issues, and project developments, and summary materials from any workshops.</p>	12/31/2009	Assembled Package
Future Year Products		
Product Title & Description	Planned Completion Date	Product Type
<p>Biomass Interest Group (BIG)Activities and Deployment Update: Biomass Interest Group (BIG) includes participation in all meetings, webcasts, technical tours and workshops. Results include future plans, findings from site visits, discussions of biomass R&D topics, deployment issues, and project developments, and summary materials from any workshops.</p>	2010	Assembled Package
<p>Geothermal Interest Group (GIG) Activities and Deployment Update: Geothermal Interest Group (GIG) includes participation in all meetings, webcasts, technical tours and workshops. Results include future plans, findings from site visits, discussions of biomass R&D topics, deployment issues, and project developments, and summary materials from any workshops</p>	2010	Assembled Package
<p>Solar Electric Interest Group (SEIG) Activities and Deployment Update: Solar Electric Interest Group (SEIG) includes participation in all meetings, webcasts, technical tours and workshops. Results include future plans, findings from site visits, discussions of biomass R&D topics, deployment issues, and project developments, and summary materials from any workshops.</p>	2010	Assembled Package
<p>Wind Condition Monitoring and Failure Analysis Collection of turbine component field monitoring data and available turbine failure analysis from utility-owned wind plants. This is a continuation of the 2009 supplemental project on wind turbine condition monitoring.</p>	2010	Assembled Package