

# 1. PURPOSE AND NEED FOR AGENCY ACTION

## 1.1 INTRODUCTION

This environmental impact statement (EIS) assesses the potential environmental impacts of constructing and operating a power plant proposed by Southern Company, through its subsidiaries, Southern Company Services, Inc. (SCS), and Mississippi Power Company (Mississippi Power), and the opening and operating of a lignite mine proposed by North American Coal Corporation (NACC). Both facilities would be located adjacent to each other in east-central Mississippi. The proposed power plant would be built in Kemper County and would demonstrate an advanced integrated gasification combined-cycle (IGCC) generation system. The facility would convert lignite into a synthesis gas (syngas) for generating 582 megawatts (MW) (nominal capacity) of electricity, while reducing emissions of carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), mercury, and particulates compared to conventional lignite-fired power plants. New transmission lines and transmission and distribution line upgrades, a natural gas pipeline, a reclaimed water pipeline, and a CO<sub>2</sub> pipeline would be constructed in connection with the power plant. NACC's proposed lignite mine would be located on adjoining properties in Kemper County but would extend into Lauderdale County. It would supply coal to the power plant under the terms of a sales contract. The power plant project would test the same IGCC technology that was originally proposed for a project near Orlando, Florida, and was previously selected for financial assistance by the U.S. Department of Energy (DOE) under the Clean Coal Power Initiative (CCPI) program. The site in Florida became unavailable when the host utility withdrew from the project because of uncertainty regarding regulation of greenhouse gas (GHG) emissions. Southern Company then proposed to DOE that it transfer the financial assistance originally awarded to the project in Orlando to this project, already sited in Kemper County. As described in this EIS, Southern Company has included carbon capture with the sale of the captured CO<sub>2</sub> for beneficial use in existing enhanced oil recovery (EOR) operations in Mississippi in its project plans.

DOE will consider the potential environmental impacts before deciding whether to release the remaining \$270 million (of an original \$294 million) in cost-shared financial assistance under the CCPI program to the power plant project. In addition, DOE will consider the potential environmental impacts before deciding whether to issue a loan guarantee pursuant to the Energy Policy Act of 2005 (EPAct05), in response to an application from Mississippi Power, for the power plant. The U.S. Army Corps of Engineers (USACE) is a cooperating agency for this EIS (see Letter of Understanding contained in Appendix A) and will consider potential environmental impacts during its evaluation of permit applications under Section 404 of the Clean Water Act (CWA) for stream and wetland disturbances related to the proposed mine, power plant, transmission lines, and pipelines.

Accordingly, this EIS evaluates the potential impacts of the proposed power plant project, the proposed mine, other connected actions, and reasonable alternatives. This EIS was prepared by DOE in compliance with the National Environmental Policy Act of 1969 (NEPA), as amended (Chapter 42, Part 4321, *et seq.*, United States Code [U.S.C.]), the Council on Environmental Quality (CEQ) NEPA regulations (Chapter 40, Parts 1500 through 1508, Code of Federal Regulations [CFR]), and the DOE NEPA regulations (10 CFR 1021).

## 1.2 CLEAN COAL POWER INITIATIVE

Coal is an abundant and indigenous energy resource and supplies almost 50 percent of the United States' electric power (Energy Information Agency [EIA], 2009a). Vital to the nation's economy and global competitive-

ness, demand for electricity is projected to increase by more than 30 percent by 2030. Based on thorough analyses conducted by the EIA, it is projected that this power increase can only be achieved if coal use is also increased (EIA, 2007). Furthermore, nearly half of the nation's electric power generating infrastructure is more than 30 years old, with a significant portion in-service for twice as long (EIA, 2009b). These aging facilities are (or soon will be) in need of substantial refurbishment or replacement. Additional capacity must also be put in-service to keep pace with the nation's ever-growing demand for electricity. Therefore, nearly half of the nation's electricity needs will continue to be served by coal for at least the next several decades. Given heightened awareness of environmental stewardship, while at the same time meeting the demand for a reliable and cost-effective electric power supply, it is clearly in the public interest for the nation's energy infrastructure to be upgraded with the latest and most advanced commercially viable technologies to achieve greater efficiencies, environmental performance, and cost-competitiveness. However, to realize acceptance and replication of these advanced technologies into the electric power generation sector, the technologies need to be *demonstrated* first, i.e., designed and constructed to industrial standards and operated at significant scale under industrial conditions.

Public Law 107-63, enacted in November 2001, first provided funding for the CCPI. The CCPI is the current multiyear federal program to accelerate the commercial readiness of advanced multipollutant emissions control, combustion, gasification, and efficiency improvement technologies to retrofit or repower existing coal-based power plants and for deployment in new coal-based generating facilities. The CCPI encompasses a broad spectrum of commercial-scale demonstrations that target today's most pressing environmental challenges, including reducing mercury and GHG emissions by boosting the efficiency at which coal is converted to electricity or other energy forms. The CCPI is closely linked with DOE's research and development activities directed toward creating ultraclean, fossil fuel-based energy complexes in the 21<sup>st</sup> century. When integrated with other DOE initiatives, the CCPI will help the nation successfully commercialize advanced power systems that will produce electricity at greater efficiencies, produce almost no emissions, create clean fuels, and employ CO<sub>2</sub> management capabilities. Improving power plant efficiency is a potentially significant way to reduce CO<sub>2</sub> emissions in the near- and mid-term. In the longer term, CCPI technologies employing CO<sub>2</sub> capture and storage, or beneficial reuse, will remove fossil-fueled power as a potential threat to global climate change (DOE, 2008b). Accelerating commercialization of clean coal technologies also positions the United States to supply these technologies to a rapidly expanding world market.

Congress provided for competitively awarded federal cost-shared funding for CCPI demonstration projects. In contrast to other federally funded activities, CCPI projects are not federal projects seeking private investment; instead, they are private projects seeking federal financial assistance. Under the CCPI funding opportunities, industry proposes projects that meet its needs and those of its customers and while furthering the national goals and objectives of DOE's CCPI. Demonstration projects selected by the CCPI program become private-public partnerships that satisfy a wide set of industry and government needs. Industry satisfies its short-term need to retrofit or repower a facility or develop new power generating capacity for the benefit of its customers. By providing financial incentives to the energy sector that reduce risks associated with project financing and technical challenges for emerging clean coal technologies, the government: (a) supports the verification of commercial readiness leading toward the long-term objective of transitioning the nation's existing fleet of electric power plants to more efficient, environmentally sound, and cost-competitive facilities (National Energy Technology Laboratory [NETL], 2006a); and (b) facilitates the adoption of technologies that can meet more stringent environ-

mental regulation through more efficient power generation, advanced environmental controls, and production of environmentally attractive energy carriers and byproduct utilization.

Applications for demonstrations under CCPI Round 2 were evaluated against specific programmatic criteria, which include the following:

- Technical Merit—Scientific and engineering approach, data and other evidence to support technology claims, readiness of the technology, and potential benefits such as improved system performance, reliability, environmental performance, and costs.
- Feasibility—Appropriateness of proposed site(s), including availability and access to water, power transmission, coal transportation, facilities and equipment infrastructure, and permits; ability of the proposed project team to successfully implement the project; and soundness and completeness of the statement of work, schedule, test plan, milestones, and decision points.
- Commercialization Potential—Commercial viability relative to the scale of the project, potential for broad market impact and widespread deployment, and soundness of the commercialization plan, including experience of the project team.
- Adequacy of the Financial and Business Plan—Financial condition and capability of proposed funding sources, priority placed by management on financing the project, and adequacy of the applicant's financial management system.
- Adequacy of the Repayment Plan—Ability to repay the governments cost share.

Consistent with the CEQ NEPA regulations (40 CFR 1500 through 1508) and DOE regulations (10 CFR 1021), DOE conducts a preliminary review of the potential environmental, health, safety, and socioeconomic impacts of proposed projects during the evaluation and selection process. This is the first of two reviews of projects' potential impacts under NEPA; the review process is described in more detail in Subsection 1.7.

DOE selects projects for CCPI funding in a series of *rounds*, each of which starts with a funding opportunity announcement that asks project proponents to submit applications for federal cost-sharing for their demonstration projects. DOE issued the first CCPI funding opportunity announcement (Round 1) in March 2002. It issued a second funding opportunity announcement (Round 2) in February 2004. These funding opportunities focused on projects involving advanced coal-based power generation, including gasification, efficiency improvements, optimization through neural networking, environmental and economic improvements, and mercury control. The specific objectives for CCPI Round 2, as stated in the Financial Assistance Announcement DE-PS26-04NT42061, are as follows:

- Demonstrate advanced coal-based technologies that have progressed beyond the research and development stage to a point of readiness for operation at a scale that can be readily replicated in commercial practice within the electric power industry.
- Accelerate the likelihood of deploying the demonstrated technologies for widespread commercial use within the electric power sector.

Two technology priorities for CCPI Round 2 were gasification-based power generation systems and mercury control technology.

Thirteen applications for cost-shared demonstration projects were received in response to CCPI Round 2. Two of the 13 applicants proposed IGCC demonstrations. Four of the 13 applications were selected, including both IGCC demonstration projects, one of which was the project proposed by SCS, a subsidiary of Southern Company (NETL, 2006b). The selections were based on individual merit and represented a mix of technologies with the best potential to make progress toward the objectives of CCPI Round 2.

The project as originally proposed by SCS would have built and operated an IGCC power plant based on Transport Integrated Gasification (TRIG<sup>TM</sup>) technology at a site owned by the Orlando Utilities Commission (OUC) located near Orlando, Florida. This project successfully proceeded to initiation of construction before the OUC withdrew from the project, apparently as a result of the possibility that new coal-fueled power plants would be required to install carbon capture and sequestration. The proposed Orlando project did not include these features. Southern Company, committed to demonstrating the proposed IGCC technology, subsequently proposed to use the technology in a planned power plant in Kemper County, Mississippi. DOE agreed to consider the change in project location. The Kemper County IGCC Project would be designed, constructed, operated, and owned by Mississippi Power, with technical support from SCS.

### **1.3 FEDERAL LOAN GUARANTEE PROGRAM**

Projects selected for the CCPI program may also be eligible for federal loan guarantees. EPLaw established the Federal Loan Guarantee Program for energy projects that employ innovative technologies. Title XVII of the EPLaw authorizes the Secretary of Energy to make loan guarantees for a variety of projects, including projects that “avoid, reduce, or sequester air pollutants or anthropogenic emissions of GHGs” and “employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued” (Section 1703[a][1], 42 U.S.C. 16513). Mississippi Power submitted a pre-application to DOE and was invited to submit a formal application for a loan guarantee, which it filed on November 13, 2008.

### **1.4 PROPOSED ACTIONS**

#### **1.4.1 DOE**

DOE proposes to provide an additional \$270 million in cost-shared financial assistance under the CCPI program to the Kemper County IGCC Project. DOE’s proposed action encompasses those activities that are eligible for cost-shared funding, including the construction of the onsite power plant components, such as the gasification island, the combined-cycle unit, and the auxiliary facilities (cooling tower, switchyard, syngas cleanup, and lignite handling after receipt from NACC). DOE has already provided a portion of the original funding (\$24.4 million of an original \$294 million) to Southern Company for cost sharing in the preliminary design and definition of the previous project near Orlando. In addition, DOE may issue a loan guarantee pursuant to the EPLaw.

The financial assistance would apply to the planning, design, permitting, equipment procurement, construction, startup, and a 4.5-year demonstration of the power plant technology. The loan guarantee would apply to the planning, design, permitting, equipment procurement, construction, and startup of the power plant. If approved for DOE loan guarantee, a portion of the power plant’s construction costs would be funded through the U.S. Treasury Department’s Federal Financing Bank. The loan would then be guaranteed by DOE, resulting in

interest expense savings for Mississippi Power. DOE's remaining funding, estimated to be \$270 million (approximately 15 percent or less of the total project cost, which is currently projected to be greater than \$2 billion) would be applied under the terms and conditions of a negotiated modification to the original cooperative agreement between DOE and SCS. Because DOE's primary role would be to provide cost-shared financial assistance and a loan guarantee as circumscribed by the two federal programs described previously, the range of reasonable alternatives for meeting the programs' purpose and needs are limited in comparison to a situation in which DOE would own or control the project. The enabling legislation for CCPI did not grant DOE the programmatic authority to substitute its judgment for that of project proponent with regard to selecting alternative power plant sites or selecting alternative power plant technologies for a particular project. Under these constraints, DOE's reasonable alternatives are limited. First, it is limited to the projects that applicants propose. For purposes of NEPA, DOE evaluates the potential impacts of proposed projects pursuant to 10 CFR 1021.216. After selecting which proposals to pursue from all the applications received, DOE's alternatives are limited to *project-specific* alternatives that the applicant is considering for aspects such as facility location, pipeline routes, capture technologies, and sequestration sites, and to DOE's decision on whether or not to fund the project. The alternatives that DOE evaluated are described in Chapter 2, and their potential impacts are analyzed in remainder of this EIS. DOE will make its decisions on providing financial assistance, a loan guarantee, or both based on these analyses and other factors.

#### **1.4.2 USACE**

USACE is considering whether to issue Department of the Army permits pursuant to Section 404 of the CWA for proposed stream and wetland impacts resulting from the construction and operation of the power plant, mine, and other related facilities. The regulatory process would include the review and consideration of least environmentally damaging and practicable alternatives that would reduce the impacts to waters of the United States, over which USACE has jurisdiction. USACE will also consider compensation for unavoidable impacts on wetlands and streams or those resources known as waters of the United States. This, in turn, may include evaluating the effects of the anticipated activities on Okatibbee Lake and Wildlife Management Area (WMA), as well as any other federal interests located within and downstream of this EIS study area. In addition to this NEPA process, there will be separate reviews, consideration, and opportunities for public participation before USACE decides whether to issue any Department of the Army permits allowing impacts to waters of the United States, including wetlands and streams.

#### **1.4.3 INDUSTRY PROPONENTS**

Southern Company, through its subsidiaries Mississippi Power and SCS, proposes to plan, design, construct, and operate (for the 4.5-year demonstration period) a new coal-fueled power plant. In a connected action, NACC proposes to open and operate a lignite mine that would supply fuel to the power plant under the terms of a sales contract. Both the power plant and the mine would be located at a site in east-central Mississippi. The proposed power plant would demonstrate an advanced IGCC generation system and would be constructed in Kemper County; hence, it would be known as the Kemper County IGCC Project. New power transmission lines and power transmission and distribution line upgrades, a natural gas pipeline, a reclaimed water pipeline, and a CO<sub>2</sub> pipeline would be constructed in connection with the power plant project. NACC's proposed lignite mine would be located on adjoining properties, mostly in Kemper County but extending also into Lauderdale County. The proposed

power plant would include carbon capture and would sell the captured CO<sub>2</sub>, to a company in the oil and gas industry for use in EOR. The lignite mine and the power plant would be expected to have a commercial life of approximately 40 years.

The Kemper County IGCC Project would be constructed on a portion of an approximately 1,650-acre undeveloped site. The proposed facilities would demonstrate IGCC technology in a power plant consisting of two lignite gasifiers with gas cleanup systems, two gas combustion turbines (CTs), two heat recovery steam generators (HRSGs), a single steam turbine, and associated power plant facilities. Reclaimed municipal effluent from the city of Meridian would constitute the plant's principal source of water required for cooling tower makeup, steam cycle makeup, and other processes. One or more onsite deep wells would provide a maximum of 1 million gallons per day (MGD) of nonpotable ground water at times when supplies of reclaimed water were insufficient. The IGCC facility would produce syngas from lignite and use this syngas to fuel the two CTs. Hot exhaust gas from the CTs would generate steam from water in the HRSGs to drive the steam turbine. All three turbines would generate electricity. The CTs would be capable of operating on either syngas or natural gas. At full design capacity, the two new coal gasifiers are expected to use approximately 13,800 tons per day (tpd) of lignite to produce syngas. Combined, the three turbines would have a nameplate output of approximately 800 MW and generate a net summer peaking capacity of approximately 582 MW of electricity when duct firing natural gas in the HRSG. This combined-cycle approach of using gas turbines and a steam turbine in tandem increases the amount of electricity that can be generated from a given amount of fuel input.

While DOE proposes to partially finance a technology demonstration project that would consist of the gasifiers, syngas cleanup systems, CO<sub>2</sub> capture systems, two CT/HRSGs, a steam turbine, and supporting onsite facilities and infrastructure, this EIS also addresses the opening and operation of the neighboring lignite surface mine that would supply the project with fuel, a reclaimed water supply pipeline, associated transmission lines (and substations), CO<sub>2</sub> pipeline, and a natural gas pipeline as connected actions (i.e., closely related activities).

## **1.5 PURPOSES AND NEEDS FOR AGENCY ACTIONS**

### **1.5.1 DOE**

The purpose of DOE's action under the CCPI program is to demonstrate the feasibility of this selected IGCC technology at a size that would be attractive to utilities for commercial operation. The gasifier design is based on a technology that Southern Company, Kellogg Brown & Root LLC (successor in interest to Kellogg Brown & Root, Inc. [KBR]), DOE, and other industrial proponents have been developing since 1996 at the Power Systems Development Facility (PSDF) near Wilsonville, Alabama. The proposed TRIG<sup>TM</sup> IGCC technology is cost-effective when using low-heat content, high moisture, or high-ash content coals, including lignite. These coals constitute approximately one-half of the proven United States' and world's coal reserves.

The existing gasifier at the PSDF research facility is the largest of the type to be demonstrated, with a maximum coal-feed rate of 5,500 pounds per hour (lb/hr) or 66 tpd. The design and operating parameters of the basic technology are well understood from the experience gained during this gasifier's operation, and its potential advantages to the power industry have been well established. The technology is now ready to be demonstrated in a commercial-scale power plant to confirm these advantages, after which it would be expected to be widely deployed.

A successful demonstration would generate technical, environmental, and financial data from the design, construction, and operation of the facility to confirm that the technology can be implemented at a commercial scale. The cost-shared financial assistance from DOE would reduce the risk to the Southern Company team in demonstrating the technology at the level of maturity needed for decisions on commercialization.

The purpose of DOE's action with regard to the proposed issuance of a federal loan guarantee is to encourage early commercial use in the United States of new or significantly improved energy technology and reduce or eliminate emissions of GHGs pursuant to Title XVII of the EPAct05.

There are two principal needs addressed by DOE's proposed action. First, the project would satisfy the responsibility Congress imposed on DOE to demonstrate advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States (Section 1.2). Second, with regard to the proposed issuance of a federal loan guarantee, this action would fulfill DOE's mandate under the EPAct05 to issue loan guarantees to eligible projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of GHGs" and "employ new or significantly improved technologies as compared to technologies in service in the United States at the time the guarantee is issued."

### 1.5.2 USACE

The purpose of USACE's proposed action is to fulfill its Congressionally mandated responsibilities related to dredging and filling wetlands and other waters of the United States under the Section 404(b)(1) Guidelines of the CWA.

When considering USACE's purpose and need for issuing a permit, USACE looks to the purpose and need for the project in terms of benefits to society based on approximately 21 public interest factors. In compliance with applicable regulations, USACE would consider the following, for both the power plant facility and the mine, before issuance of a Department of the Army permit pursuant to the Section 404(b)(1) guidelines:

- Basic Project Purpose—The basic project purpose serves as a basis for determining water dependency. For this action, the basic project purpose is to construct a coal-powered electrical facility connected with a mine, neither of which must be sited within or adjoining an aquatic environment. Therefore, the project may be considered non-water-dependent. Additionally, there appears to be no requirement for the project to be located in a special aquatic site in order to meet the basic project purpose.
- Overall Project Purpose—The overall project purpose is used as a basis for assessing the practicable alternatives for the proposal pursuant to the regulations. For this action, the overall project purpose is to construct and operate an IGCC power plant facility co-located with a lignite fuel supply (for purposes of fuel diversity and controlling the costs of electricity for the customers) and situated where projected future demands for electricity from the applicant can be met. In alignment with the applicant's project siting analysis, the lignite mine would be opened and operated in Kemper and Lauderdale Counties, Mississippi. In accordance with 33 CFR 320.4(q), "...when private enterprise makes application for a permit, it will generally be assumed that appropriate economic evaluations have been completed, the proposal is economically viable, and is needed in the market place..." Therefore, for the purpose of the permitting process, USACE's need, as stated by the overall project purpose, may be considered to be met. Mississippi Power and NACC will apply for Department of

the Army permits in accordance with 33 CFR 325. The mere fact that the project is economically viable does not guarantee the issuance of Department of the Army permits.

## **1.6 POTENTIAL PROJECT BENEFITS**

Lignite coals provide attractive alternatives to bituminous coals for power generation because they have lower sulfur contents and lower costs and because they offer diversity in fuel supply to a power company that has other plants using bituminous coals. IGCC technology for power generation is expected to provide the industrial proponents with a power plant design that is reliable, low-cost, and environmentally cleaner compared to conventional lignite-fueled plants. The principal objectives of the industrial proponents are to: (1) demonstrate high availability, high thermal efficiency, low costs, and low emissions from the IGCC technology at a commercial scale; and (2) design, construct, and operate an advanced syngas cleanup system that includes sulfur removal and recovery; high-temperature, high-pressure particulate filtration; ammonia recovery; mercury removal; and carbon capture. The industrial proponents view the ability to use various types of coal while reducing emissions of pollutants and wastes as an integral part of a strategy to control costs and meet increasingly stringent environmental standards.

As a public utility, Mississippi Power has an obligation to provide reliable and economical electric power to its existing and future customers at the lowest reasonable cost. To meet this obligation, Mississippi Power conducts continuous long-range planning to predict its future power supply needs and evaluate available options, including conservation, to meet those needs. This planning effort considers a broad range of options in a fair and balanced manner to ensure reliability, minimize costs (and thereby minimize rates), and address key uncertainties faced by the company while meeting all environmental regulatory requirements and standards (Mississippi Power, 2009a).

The latest load forecast for Mississippi Power identifies an additional generation need of between 318 and 601 MW of base-load power beginning during the summer season of 2014. This Kemper County IGCC Project is intended to meet that generation need while demonstrating the proposed technology and a viable use of lignite as a fuel source. In addition, Mississippi Power and South Mississippi Electric Power Association (SMEPA) have signed a Letter of Intent to explore the acquisition of an interest in the proposed IGCC project by SMEPA. “The companies are negotiating a combination of a joint ownership arrangement and a purchase power agreement, which would provide [SMEPA] with up to 20 percent of the capacity and associated energy output from the plant” (Meridian Star, 2009).

The determination of a need for a new generation facility was the result of Mississippi Power’s ongoing integrated resource plan (IRP) process. This process includes forecasting customer load and energy requirements; evaluating the capacity available to meet the load; developing, evaluating, and implementing efficiency and conservation programs; and, when a need is identified, evaluating the resources available to reduce or meet such need.

With regard to energy efficiency and conservation programs, also known as demand-side management (DSM) programs, Mississippi Power continuously seeks to expand or add DSM programs when it is in the best interest of its customers. *Active* DSM programs, such as the GoodCents® program and interruptible contracts for commercial customers, are those that are directly controlled by Mississippi Power and are currently used to defer approximately 76 MW of additional capacity. Mississippi Power expects to defer 96 MW by 2020 through exist-



ing and new DSM programs. DSM programs associated directly with changing customer energy use patterns are called *passive* programs and currently defer approximately 24 MW of additional capacity. These passive programs include providing advertising and collateral materials to customers as well as Mississippi Power's Energy Audit Program, where customers are offered personalized energy advice/assistance through either an in-home or Web-based audit.

The Kemper County IGCC Project would provide Mississippi Power with a cost-effective power plant to generate baseload electricity and meet growing customer needs. In addition to meeting Mississippi Power's generation need, the proposed project would also address several risks and strategic considerations identified in the IRP process. The first and foremost of these is fuel diversity. The Kemper County IGCC Project would enhance the fuel diversity and asset mix of Mississippi Power's generating fleet by mitigating the supply and price volatility risks associated with the predominant use of any one fuel source. Specifically, the proposed TRIG<sup>TM</sup> IGCC technology would allow Mississippi Power to use an additional fuel source: lignite, the cost of which is both lower and less volatile than that of natural gas and higher-ranked coals. The long-term lignite supply agreement associated with the project would provide a lower and more stable fuel price over the life of the plant for Mississippi Power's customers.

Other energy supply risk areas that would be potentially mitigated by the Kemper County IGCC Project include maintaining sufficient generation capacity to avoid shortages; geographic diversity to prevent excess damage and service reliability issues that can arise from natural disasters such as tropical storm events; and the possible loss of existing generating capabilities due to future climate change legislation.

To most economically serve its customers' needs, Mississippi Power's generation fleet must provide for a mix of generating capacity that best matches its customers' demand. Since demand fluctuates over the course of a day and varies greatly by day and by season, the appropriate mix of capacity contains baseload, intermediate, and peaking capacity. Baseload units (e.g., coal [including IGCC] and nuclear) are typically more expensive to build, maintain, and staff as compared to intermediate and peaking units but have a much lower fuel cost and are designed to operate most economically when operated continuously. They also require longer construction lead times. The intermediate and peaking units are less expensive to build and have more operational flexibility but are more expensive to operate, largely because of their much higher fuel cost. They are designed to serve the shorter daily periods of higher peak demands and to be operated only in those hours when loads are extremely high. Natural-gas-fueled combined-cycle and simple-cycle units typically fall into this category.

The geographic location of generating units is important in support of voltage regulation, security, and area protection. It is also important to consider locating units away from the coastal area to mitigate damage from severe tropical weather events. As Mississippi Power's experience after Hurricane Katrina showed, it is increasingly important to ensure service to important regional and national energy infrastructure such as the Chevron refinery in Pascagoula, Mississippi, and the numerous pipelines and compression stations throughout its service area.

Existing and anticipated environmental standards will require either significant investments in environmental control retrofits or the retirement of some of Mississippi Power's units. The likely capital-intensive environmental controls that may be needed include selective catalytic reduction (SCR), flue-gas desulfurization (FGD) systems (scrubbers), baghouses, and cooling towers. A lead time of 3 to 5 years is required to design and construct these controls, which means that decisions to commit to adding them need to be made over the course of the next few years.

An additional uncertainty is the anticipated imposition of standards to address climate change through reduction of GHG emissions, which primarily consist of CO<sub>2</sub>. Although no such national standards have been imposed yet, the potential impact on Mississippi Power's customers could be significant, depending on their timing and requirements. Combined-cycle generating units that produce electricity with natural gas combustion produce less CO<sub>2</sub> than those that use traditional coal combustion. However, all plants might be expected to purchase allowances or pay carbon taxes proportional to their respective emission rates. Additionally, in planning for possible climate change standards, utilities with an existing coal fleet face two expensive options: (1) install costly CO<sub>2</sub> capture retrofits using technology still under development; or (2) retire existing coal generation and build new generating units.

The additional cost associated with climate change standards, coupled with the near-term decisions concerning additional environmental controls, require that Mississippi Power continue to monitor new developments closely and examine all of the possible impacts in an effort to make prudent decisions about its continued investment in its baseload coal fleet. These same considerations influence decisions on the type of units that Mississippi Power should select to meet its future generation needs.

As part of its initial economic evaluation of the project, in June 2006, Mississippi Power applied for certification by the Internal Revenue Service (IRS) for certain clean coal investment tax credits. The application for these tax credits described in some detail the specific IGCC technology to be constructed and identified lignite as the feedstock. Ultimately, in November 2006, DOE certified, and the IRS qualified, the Kemper County site, technology, and lignite feedstock under the Energy Policy Act for clean coal investment tax credits.

## **1.7 NEPA**

In compliance with NEPA, DOE prepared this EIS for the Kemper County IGCC Project to inform its decisions regarding whether to provide financial assistance for project activities beyond preliminary design (including detailed design, construction, and operation of the proposed facilities) and whether to provide a loan guarantee to the project. In addition, this EIS will assist USACE in fulfilling its responsibilities for determining whether to grant permits under the CWA for stream and wetland impacts that would result from the project. DOE's policy is to comply fully with NEPA, giving early consideration to environmental values and factors in federal planning and decision-making. This EIS evaluates the environmental impacts of alternatives and connected project actions and facilitates public participation. DOE's actions with regard to any proposal, including financial awards, is limited prior to completion of the NEPA process (i.e., it will not provide funds or loan guarantees for project activities that could either have an adverse impact on the environment or limit the choice of reasonable alternatives).

DOE has developed an overall strategy for compliance with NEPA for the CCPI program consistent with CEQ regulations (40 CFR 1500 through 1508) and DOE regulations (10 CFR 1021). This strategy has two principal elements. The first element involved an open solicitation and competitive selection process to obtain a set of projects that best meets program needs. Applications are screened for compliance with a number of basic eligibility requirements that are defined by the program. The applications that meet the mandatory eligibility requirements constitute the range of reasonable alternatives available to DOE to meet the program's purpose and needs. These applications were evaluated more comprehensively. This comprehensive evaluation focused on the technical description of the proposed project, financial plans and budgets, potential environmental impacts, and other information that the applicants were requested to submit. Following reviews by technical, environmental, and financial

panels, and a comprehensive assessment by a merit review board, DOE officials selected those projects that they concluded best met the program's purposes and needs. To aid in the environmental evaluation, the applicants provided information on the site-specific environmental, health, safety, and socioeconomic issues of their project. By broadly soliciting proposals to meet the programmatic purposes and needs for DOE action and by evaluating the potential environmental impacts associated with each proposal before selecting projects that would go forward to the second step in the NEPA process, DOE considered a reasonable range of alternatives for implementing CCPI.

The second step in the NEPA process consists of preparing more detailed NEPA analyses for each selected project. For this project, DOE determined that providing financial assistance or a loan guarantee (or both) to the proposed project would constitute a major federal action that may significantly affect the quality of the human environment. Therefore, DOE has prepared this EIS to assess the potential impacts on the human environment of the proposed action and reasonable alternatives. DOE has used information provided by Southern Company and NACC for the proposed project, as well as information provided by state and federal government agencies, subject-matter experts, and others. This EIS has been prepared in accordance with Section 102(2)(C) of NEPA, as implemented under regulations promulgated by CEQ (40 CFR 1500 through 1508) and as provided in DOE regulations for compliance with NEPA (10 CFR 1021). This EIS is organized according to CEQ recommendations (40 CFR 1502.10).

A Notice of Intent (NOI) to prepare this EIS and hold a public scoping meeting was published by DOE in the *Federal Register* (FR) on September 22, 2008 (73 FR 54569 through 73). The NOI invited comments and suggestions on the proposed scope of this EIS, including environmental issues and alternatives, and invited participation in the NEPA process. The NOI and other information to announce the public scoping meeting were sent to ten media outlets (seven newspapers, one television station [WTOK], and two radio networks) in six Mississippi counties. An advertisement publicizing the public scoping meeting was printed in the following newspapers: *Kemper County Messenger* (Thursday, October 9); *Meridian Star* (Wednesday, October 8, and Sunday, October 12); *Clarke County Tribune* (Wednesday, October 8); and *Jasper County News* (Wednesday, October 8). An information packet including the NOI was delivered to 171 stakeholders including federal, state, and local agencies and environmental groups to announce the meeting and solicit comments on the proposed project. Postcards publicizing the meeting were mailed to 1,440 residents and businesses within a 3-mile radius of the proposed power plant site and all landowners within both the life-of-mine area and the rights-of-way within 200 feet (ft) of the centerline of the proposed linear facilities for which routes were planned.

Publication of the NOI initiated the EIS process with a public scoping period for soliciting input to ensure that: (1) significant issues are identified early and appropriately addressed, (2) issues of little significance do not consume time and effort, and (3) delays occasioned by an inadequate EIS are avoided (40 CFR 1501.7). DOE held a scoping meeting in DeKalb, Mississippi, on October 14, 2008. The public was encouraged to provide oral comments at the scoping meeting and submit additional comments in writing to DOE by the close of the scoping period on October 23, 2008.

DOE received oral comments at the meeting and other comments via attendance registration cards, postal mail, e-mail, and telephone calls from members of the public, interested groups, and federal, state, and local officials. Appendix A contains correspondence with regulatory agencies. The responses assisted in considering additional issues to be analyzed in this EIS and in determining the level of analysis required for each of the issues. Issues raised during public scoping are identified in Subsection 1.8.2.

## 1.8 SCOPE OF THE EIS

This section summarizes the issues and alternatives identified and considered during the preparation of this EIS.

### 1.8.1 ISSUES IDENTIFIED PRIOR TO SCOPING PROCESS

The following issues were initially identified as requiring analysis and assessment in this EIS and were included in the NOI:

- Atmospheric Resources—Potential air quality impacts resulting from emissions during construction and operation of the proposed Kemper County IGCC Project and the connected actions (e.g., effects of ground-level concentrations of criteria pollutants and trace metals, including mercury, on surrounding areas and resource areas of special concern, such as Prevention of Significant Deterioration [PSD] Class I areas). Potential effects of GHG emissions.
- Water Resources—Potential effects of ground water withdrawals and discharges of effluents to surface waters. Potential water resources impacts resulting from construction and operation of the connected actions.
- Infrastructure and Land Use—Potential effects on existing infrastructure and land uses resulting from the construction and operation of the proposed Kemper County IGCC Project and connected action facilities. For example, potential traffic effects resulting from the proposed project and potential land use impacts of committing land to power plant use or temporary land use impacts of mining.
- Solid Wastes—Pollution prevention and waste management, including potential solid waste impacts caused by the generation, treatment, transport, storage, and management of ash and solid wastes.
- Visual Impacts—Potential aesthetic impacts associated with new stacks, mechanical draft cooling towers, two flare derricks, and other plant structures included in the IGCC plant and from the connected actions.
- Floodplains—Potential impacts (e.g., impeding floodwaters, redirecting floodwaters, onsite property damage) of siting structures and infrastructure within a floodplain.
- Wetlands and Streams—Potential effects to wetlands and streams due to construction and operation of the power plant and the connected action facilities.
- Ecological Resources—Potential onsite and offsite impacts to vegetation, terrestrial wildlife, aquatic wildlife, threatened and endangered species (other than broadly distributed and wide-ranging species such as the bald eagle and red-cockaded woodpecker; Price's potato bean is known to occur in the region), and ecologically sensitive habitats due to the construction and operation of the power plant and connected actions.
- Safety and Health—Construction-related safety, process safety, and management of process chemicals and materials.
- Construction—Potential impacts associated with noise, traffic patterns, and construction-related emissions.

- Community Impacts—Potential congestion and other impacts to local traffic patterns, socioeconomic impacts on public services and infrastructure (e.g., police protection, schools, and utilities), noise associated with project operation, and environmental justice with respect to the surrounding community.
- Cultural and Archaeological Resources—Potential impacts to such resources associated with construction of the project and connected actions.
- Cumulative Effects—The incremental impacts of the proposed project (e.g., incremental air emissions affecting ambient air quality) when added to other past, present, and reasonably foreseeable future actions, including the connected actions. This analysis includes potential impacts on global climate change.

## 1.8.2 ISSUES IDENTIFIED DURING SCOPING PROCESS

During the scoping process, comments received from the public expressed concerns relating to potential environmental, social, and other impacts that could result from the project, while others expressed a desire for consideration of alternatives to the proposed project, including technology alternatives and conservation. The comments on alternatives suggested considering alternatives to coal-based technologies (e.g., solar energy), as well as whether there is really a need for the project (i.e., consideration of the no-action alternative). The potential effects that the public expressed the most concern about were: (1) impacts on surface water and ecological resources (which would result primarily from construction and operation of the neighboring surface mine); (2) impacts on ground water resources that would be caused by ground water withdrawals by the generation facility; (3) air quality impacts due to air emissions from the proposed facilities, including criteria pollutants and hazardous air pollutants such as trace metals (e.g., mercury); (4) impacts (i.e., climate change) due to GHG emissions from the project; and (5) exacerbation of existing local traffic congestion. Other concerns that were expressed during the scoping process included potential human health risks due to air emissions including carcinogens from the proposed facilities; solid wastes, including disposition of ash and hazardous wastes; floodplain impacts, including flooding and drainage issues; protection of wetlands; ecological impacts, including potential loss of habitat and impacts to protected species; options to mitigate ecological and other impacts; impacts of temporary coal transport; social and economic impacts (positive and negative), including environmental justice; noise impacts; construction impacts; regulatory requirements; indirect (induced) impacts; cumulative effects; mitigation measures, including incorporation of carbon sequestration as part of proposed operations; construction of a proposed CO<sub>2</sub> pipeline in the vicinity of existing energy-related facilities and practices associated with operation of the existing facilities; and the use of alternative feedstock (e.g., biomass) by the proposed facilities.

DOE considered input obtained during the scoping process to add to the list of issues to be analyzed and to provide additional focus to analysis of previously identified issues. Table 1.8-1 lists the composite set of issues identified for consideration in this EIS (i.e., issues identified in the NOI and additional relevant issues identified during public scoping). Issues are analyzed and discussed in this EIS in accordance with their level of importance. The most detailed analyses focus on issues associated with air quality, water resources, and ecological resources.

**Table 1.8-1. Issues Identified for Consideration in this EIS**

<i>Issues identified in the NOI</i>			
Atmospheric resources	Visual impacts	Ecological resources	Community impacts
Water resources	Floodplains	Safety and health	Cultural resources
Infrastructure and land use	Wetlands	Construction	Cumulative effects
Solid wastes			
<i>Additional issues identified during public scoping that expanded the scope of the assessment</i>			
Impacts on Lake Okatibbee operations		Options for CO <sub>2</sub> capture, transport, and beneficial use and geologic storage	

Source: DOE, 2009.

### 1.8.3 ALTERNATIVES CONSIDERED

An EIS must analyze the range of reasonable alternatives to DOE's proposed action. The purpose of and need for the proposed action determines the range of reasonable alternatives. In this case, the purpose of and need for DOE action is defined by the CCPI program (and enabling legislation, Public Law 107-63) and the federal loan guarantee program (and enabling legislation, EPL95). Given these programmatic purposes and needs, the reasonable alternatives prior to selection of this project would have been to select another project that applied to and met the eligibility requirements of the CCPI and loan guarantee programs. For these programs, other applications (and their potential environmental impacts) were considered during the evaluation and selection process. Given the selection of this project under both programs, DOE's decision is whether or not to provide financial assistance, a loan guarantee, or both. Therefore, this EIS analyzes in detail the project as proposed (proposed action), the proposed action as modified by the applicant or in response to conditions such as mitigation and the no-action alternative.

Under the no-action alternative, DOE would provide neither further financial assistance under the cooperative agreement nor a loan guarantee to the project. In the absence of this assistance, Mississippi Power could pursue two options. These options are analyzed under the no-action alternative. First, the gasifiers, syngas cleanup systems, and CT/HRSGs and supporting infrastructure could be built as proposed without DOE funding; this option is essentially the same as the proposed action. The connected actions would remain unchanged. However, this option is not likely given the cost and financial risk associated with such large-scale demonstration projects. Second, Mississippi Power could choose not to pursue the Kemper County IGCC Project. None of the connected actions would likely occur. This option would not contribute to the goal of the CCPI program, which is to accelerate commercial deployment of advanced coal technologies that provide the United States with clean, reliable, and affordable energy. Similarly, the no-action alternative would not contribute to the loan guarantee program's goals of facilitating energy projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of GHGs" and "employ new or significantly improved technologies."

Project-specific alternatives considered by Mississippi Power in developing the proposed project are presented in this EIS. These alternatives include possible water supply sources and routes of linear facilities (transmission lines and pipelines) and alternative levels of CO<sub>2</sub> capture. Alternative analyses are described in Chapter 2 (Section 2.7), and their comparative impacts are presented in Chapter 4 (Section 4.4).

Several alternatives to the proposed project that were considered initially as candidates for analysis in this EIS (i.e., approaches that could be practical or feasible both technically and economically) have been dismissed from further consideration. These include alternative sites, alternative project size, alternative fuels, alternative plant layout on the site (the location of the plant footprint within the site boundaries), alternative power generation technologies, alternative mining methods and mine development plans, and options for CO<sub>2</sub> sequestration (e.g., saline aquifers versus sale of CO<sub>2</sub> for use in EOR operations). Each of these alternatives is described in Section 2.7.

This EIS describes and considers the site selection process, based on an analysis that was conducted by Mississippi Power. Mississippi Power found that the only reasonable site is the Kemper County site, based on location of accessible lignite reserves near Mississippi Power's service territory, proximity to infrastructure, topography, including avoidance of floodplains and wetlands, and available open space. The proposed project could be demonstrated at another site; however, site selection was governed primarily by benefits that could be realized by the companies participating in the project. The site selected for the project had to meet the project's technical needs. This EIS does not analyze in detail the alternative sites considered by Mississippi Power, because DOE agrees with Mississippi Power's conclusion that other sites are not reasonable alternatives.

Alternatives evaluated by NACC when developing the mine proposal are presented in the EIS and include potential alternative mine locations; avoiding disturbance of Okatibbee Creek and the USACE Okatibbee Lake WMA; mining methods, including overburden removal, lignite removal, lignite loading, and lignite transport; and reclamation methods in terms of topsoil removal and replacement. Additional mine-related alternatives evaluated by DOE include avoidance and minimization of mining and mine support facilities in floodplains and wetlands as required by DOE regulations.

The proposed project could be demonstrated using a smaller-sized plant. However, this alternative would not meet the project's purpose (Section 1.5) of demonstrating the transport gasification technology at a full commercial size. A smaller-sized plant would not be sufficiently large to achieve economies of scale and demonstrate the commercial viability of the technology. Furthermore, it would not meet the projected future peak demand for electricity.

DOE could demonstrate other technologies. However, these technologies would not demonstrate advanced power generation systems using IGCC technology for low-rank coals and would not meet DOE's need to demonstrate advanced coal utilization technologies with potential to address domestic energy needs (Section 1.5). Alternatives and the basis for their consideration or dismissal are discussed in detail in Chapter 2.

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