



U.S. Forest Service

Strategic Energy Framework

Strategic Energy Framework

The Forest Service Strategic Energy Framework sets direction and proactive goals for the Agency to significantly and sustainably contribute toward resolving U.S. energy resource challenges, by fostering sustainable management and use of forest and grassland energy resources.

January 2011

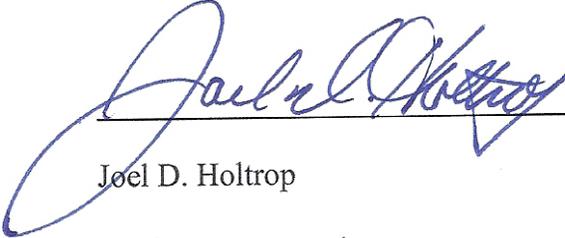


U.S. Department of Agriculture, Forest Service



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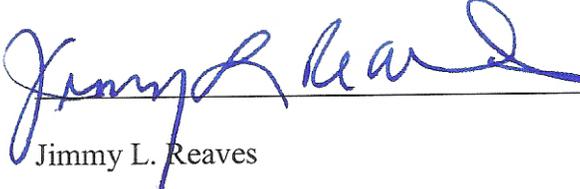
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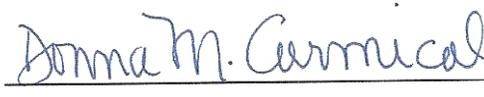
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Introduction

The sustainability and security of the Nation's energy resources are defining and immediate issues. The **Forest Service Strategic Energy Framework** sets direction and proactive goals for the Agency to play a significant and long-term role in resolving challenges to our energy resources, on which our environment and quality of life depend.

This **Framework** fosters the sustainable management and use of forest and grassland energy resources to contribute to national energy security, environmental quality, and economic opportunity. The Framework is part of a suite of efforts that the Forest Service has undertaken over the past 2 years to address such emergent issues as climate change (USDA Forest Service 2010), woody biomass utilization (USDA Forest Service 2008c) and sustainability (EO 13514). This effort also links to U.S. Department of Agriculture efforts and to other U.S. Government efforts in climate change and energy (BRDB 2008, USCCSP 2008).

The Forest Service mission—to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations—is global and complex in its scope and influence. The Forest Service manages 193 million acres of National Forest System lands; assists States, Tribes, and private landowners with technical and financial assistance; provides international technical assistance; and develops and disseminates applicable science and technology to improve the health and use of America's forests and grasslands.

The rapidly changing natural, economic, and geopolitical landscape is reducing access to traditional energy resources, increasing costs to produce and deliver them, and threatening national energy security. Emerging demands for non-petroleum-based energy sources are focused on domestic coal and natural gas as well as on renewable and alternative energy resources such as biomass, wind, solar, geothermal, hydrogen, and hydropower and nuclear.

The United States is actively responding to these pressures by developing alternative energy sources, improving the efficiency of energy use and delivery, investing in scientific research, and developing and deploying innovative technologies. The Nation will increasingly develop, acquire, and deploy competitive technologies and processes that reduce the cost, minimize environmental effects, and increase the effectiveness of locating and delivering energy.

The America's forests and grasslands are important sources of clean, renewable energy that can help offset fossil energy and emissions. These both public and private forests can host diverse kinds of energy production, including from conventional sources and from robust transmission efforts. These energy resources—along with the science, technology, creativity, and innovation to make them sustainably and cost-effectively available—are expected to be a major key

to satisfying the Nation's energy demands and will create energy-related jobs into the future.

Appendix 1 (see page 12) provides a list of additional opportunities to support the Strategic Energy Framework Goals.

Appendix 2 (see page 16) provides recommendations that are responsive to OIG Audit Report No. 08601-52 – August 2008.

Vision

The Forest Service envisions a future where:

- America's forests and grasslands are managed to significantly contribute to U.S. energy security while maintaining and enhancing overall environmental quality, sustainability, and economic opportunities.
- Citizens are knowledgeable about Agency energy initiatives and participate in decisions and actions affecting national forests and grasslands.

Achieving this Vision relies on acknowledging the continuing value of fossil-based energy while providing an Agency framework that supports the development and production of new energy solutions. These new energy solutions will integrate strategies for achieving land management objectives, mitigating and adapting to climate change, and providing goods and services. The Forest Service encourages outreach efforts to help citizens gain a better understanding of the energy value of America's forests and grasslands.

Forest Service Role

Implicit in the Forest Service mission is that energy is both a need and a benefit that can be sustainably provided from America's forests and grasslands. The Agency's management of energy resources is based on a systematic, active, and adaptive approach to changing conditions and demands for energy production, use, transmission, and distribution.

The key Forest Service energy role is to effectively contribute to the sustainable development and use of energy resources for present and future generations through land management, technical and financial assistance, research and development, and energy conservation.

While fulfilling this goal, the Forest Service will:

- Proactively further the transformation of the Nation's energy supply and use of renewable energy and other alternative fuels for addressing national energy security needs while maintaining and enhancing the productivity and health of the Nation's forest and grassland resources;
- Advance the Agency's energy policy and energy-related activities to alleviate the impact of high energy costs, to develop long-term sustainable energy solutions, and to mitigate climate change; and
- Carry out its commitment to the Nation's quest for energy security, energy education initiatives, energy conservation, and climate change solutions through renewable energy activities and technologies.

The Forest Service has identified specific tactical areas that will help achieve energy security while protecting the National Forest System. These include:

- Renewable energy—Contribute to both energy security and mitigation of greenhouse gas emissions through planning and administration of renewable energy resource management on National Forest System lands and through development and transfer of science and technology for renewable energy production from all lands;
- Fossil fuel energy—Contribute to energy security as a bridge to a low-fossil-fuel energy future through production of fossil fuels from National Forest System lands, supported by land management plans that balance this activity with other multiple uses and production of ecosystem services;
- Energy delivery—Contribute to the movement of energy from production sources to the places where people use energy, and confine delivery methods to existing or newly designated “corridors” as a way to minimize the proliferation of rights-of-way across the landscape;
- Energy conservation—Reduce the Forest Service footprint (USDA Forest Service 2008a) related to water use, energy use, purchasing, and waste management, by integrating energy conservation, green purchasing, recycling, and efficiency into daily operations as directed by EOs 13423 and 13514 while fully delivering mission results.

Challenges

Numerous challenges will arise in shifting from long-standing Forest Service energy management policies and procedures to new policies and procedures that are based on the recognition of energy as a critical national resource that is closely linked to the Nation’s energy security and climate change. A fresh approach to energy resources will be needed to promote flexible, versatile, sustainable, and agile management policies that use creative solutions to:

1. Foster innovation and action to secure and sustain appropriate uses of energy resources;
2. Adjust management processes and actions to address the full spectrum of energy resources supplied by forests and grasslands;
3. Develop, deploy, and disseminate best management practices for use by Federal, State, tribal, and private landowners in managing energy resources at local, regional, and landscape levels;
4. Develop, acquire, and deploy science and technology to effectively integrate energy production and conservation with production of goods and services;
5. Balance the social, environmental, and economic variables influencing and influenced by energy supply; and
6. Increase the Agency’s institutional capacity with the specialized skills necessary to assess the effects of existing and new technologies that affect America’s forests and grasslands.

Guiding Principles

These principles guide the Forest Service in developing and implementing creative ways to fulfill the Agency's role in the Nation's sustainable energy future. The Forest Service will:

1. Consider a full range of energy opportunities—including renewable and non-renewable energy sources, geological sequestration, energy corridors, and energy efficiency and conservation—as an integral part of our multiple-use mission.
2. Recognize that science is a foundation for decisions and actions and that new knowledge will be communicated as it evolves.
3. Encourage responsible and transparent development of energy resources and associated energy corridors while conserving and enhancing the health and productivity of America's forest and grassland resources.
4. Recognize the role of energy in the sustainability of communities, and work with public and private interests to encourage timely and responsible development of energy resources and energy corridors.
5. Recognize that partnerships are essential to our success as we work with new and existing partners to develop, introduce, and use innovative, leading edge technology and scientific information in energy production and management.
6. Acknowledge that the Agency mission is best accomplished by integrating a life-cycle analysis of all activities.

Tactical Principles

These principles provide specific tactics to help the Forest Service implement the guiding principles. The Forest Service will:

1. Foster innovation and action to achieve the outcomes in this Framework.
2. Provide programmatic analyses and decisions that will guide energy development on National Forest System lands, especially for use in amending local unit plans.
3. Ensure a knowledgeable, professional workforce to support expanded energy activities in an environmentally sound manner.
4. Use electronic information and delivery systems for Agency energy resources and activities to achieve transparency and accountability.
5. Integrate strategies, policies, and actions for addressing energy and climate change (needs, resources, and issues) across all deputy areas at all levels of the Forest Service.
6. Use all existing authorities and means to facilitate a long-term, sustainable, and predictable supply of renewable energy.

Goals—Overview

The overarching goal (**Goal 1**) of the **Forest Service Strategic Energy Framework** is to significantly contribute to national energy security, environmental quality, and economic opportunities through sustainable land management, energy production, and conservation.

As work on the *Action Plan* (Appendices 1 and 2) progresses, the Agency will have an integrated approach toward energy resource knowledge, best practices, lessons learned, policies, program guidance, tools, decision-making, partnerships, communication, and outreach.

Four key goals (**Goals 2 through 5**) will help the Forest Service achieve the overall goal noted above. Success can be achieved only through collaboration and partnership with the Agency's broad network of States, Tribes, other Federal agencies, communities, private landowners, conservation and other organizations, and the public at large and internationally. The Forest Service must also work across organizational boundaries and functional areas to achieve these goals.

Successfully meeting the four key goals will enable the Agency to achieve its broad role in meeting the Nation's energy challenges.

Science (Goal 2)—Produce, acquire, disseminate, and effectively use science and technology to: (a) sustainably produce and transform America's renewable and abundant forest biomass resources into cost-competitive, high-performance biofuels, bioproducts, thermal energy, and biopower and combined heat and power; and (b) integrate energy production into sustainable forest and grassland management in conjunction with management goals and ownership objectives.

Alliances (Goal 3)—Build strong alliances and partnerships with energy interests in other Federal agencies, State and local governments, Tribes, private landowners, non-governmental organizations, and international partners to sustainably provide and enhance the goods and services from America's forests and grasslands.

Education (Goal 4)—Promote and provide problem-solving, energy awareness, sustainable resource conservation, and energy-related assistance to States, Tribes, and local communities through a variety of educational outreach efforts.

Decision-making (Goal 5)—Ensure that life-cycle analysis of the energy and environmental impacts of Forest Service decisions and actions is standard operating procedure throughout the organization and that broad policy decisions are made in the context of accomplishing the Agency mission as a whole rather than as unrelated actions.

Goals—Description

Goal 1: National Energy Security, Environmental Quality, and Economic Opportunities

Contribute to National energy security, environmental quality, and economic opportunities through sustainable land management, energy production, and conservation. As work on the *Action Plan* progresses, the Agency will have an integrated approach toward energy resource knowledge, best practices, lessons learned, policies, program guidance, tools, decision-making, partnerships, communication, and outreach.

For more than a century, the Forest Service has contributed to the Nation’s energy supply and transmission. As the Nation designs and implements a new energy future that addresses climate change and ensures national energy security, the Forest Service—through management of National Forest System lands; State, tribal, and private landowner assistance programs; and development and transfer of new science, technology, and decision support tools—will proactively contribute to sustainable production of renewable and non-renewable energy, energy transmission and distribution, and increased Forest Service energy efficiency.

Historically, energy contributions of the Forest Service included subsistence use of fuel wood from National Forest System lands for communities and railroads. Special-use administration of National Forest System lands has facilitated energy rights-of-way for power transmission and fuel pipelines, hydroelectric development in forest watersheds, and private development of energy resource deposits beneath National Forest System lands. Research on wood chemistry has contributed to the scientific understanding needed to produce cellulosic biofuels, while research on silviculture, timber harvest and collection, and transportation has provided scientific knowledge for sustainable production and utilization of forest biomass for energy.

The Forest Service will facilitate the use of renewable forest-based biomass, wood residues and wood energy crops to contribute to the US goals of 16 billion gallons of advance biofuels by 2022. A recent USDA report (USDA 2010) indicated that logging residues alone could currently provide at least 2.8 billion gallons per year. Sustainably produced woody biomass will contribute to US energy goals, producing additional biofuels, and renewable electricity and thermal energy in heat and power systems scaled to biomass supply and energy demand. Landowner assistance programs will promote forest crop production and utilization that includes biomass energy and low-energy-content building materials.

Policies are being developed for authorization of private solar and wind energy facilities on National Forest System lands. Forest Service Urban and Community Forestry program assistance promotes optimal tree location to reduce power consumption for heating and cooling of buildings. Focused management on

sustainable operations is reducing Agency energy consumption. The Research and Development program is continually improving methods for conducting inventories and assessment of resource conditions, improving biomass energy production, and developing knowledge and tools for forest and grassland managers to sustain and enhance the provision of goods and services for the benefit of present and future generations.

Energy security is also an urgent national concern. The Nation will require fossil fuels to meet our energy requirements as a bridge to the new energy future. Production from domestic energy sources is critical, and extraction of energy minerals from National Forest System lands while sustaining other resource values will be an important Forest Service contribution.

Goal 2: Science

Produce, acquire, disseminate, and effectively use science and technology to: (a) sustainably produce and transform the Nation's renewable and abundant forest biomass resources into cost-competitive, high-performance biofuels, bioproducts, thermal energy, biopower and combined heat and power; and (b) integrate energy production into sustainable forest and grassland management in conjunction with management goals and ownership objectives.

The Forest Service will produce, acquire, disseminate, and effectively use science and technology to integrate energy production into sustainable forest and grassland management. Appropriate life-cycle tools and models will be used to integrate energy conservation and efficiency into daily operations without compromising mission outcomes.

Capturing the potential of forest biomass resources requires addressing major challenges such as: reliability and sustainability of feedstock supply; land use change and resource competition; and reducing costs for growing, recovering, transporting, and converting biomass to energy and substitutes for fossil-fuel intensive products.

Integrated research and development on biobased products and bioenergy considers a full range of sustainable production, management, harvest, delivery, and conversion and utilization studies extending from molecular to global analyses. Such research operates across the supply chain of forest bioenergy and bioproducts with the goal of ensuring productive, sustainable, efficient, and affordable forest bioenergy systems and options. Research and development will provide landowners and land managers with science and technology based options for sustainable and economical forest biomass management and production systems; efficient, competitive conversion technologies for biofuels, biopower, and bioproducts; and information and tools for decision-making and policy analysis.

The Forest Service will work with partners to use emerging knowledge when siting wind, solar, and conventional energy installations. Decision support tools will be used to understand effects of expanded interstate electric transmission on wildlife and plant populations, and to inform future decisions on transmission siting, including the design of appropriate mitigation options.

Goal 3: Alliances

Build strong alliances and partnerships with energy interests in other Federal agencies, State and local governments, Tribes, private landowners, non-governmental organizations, and international partners to provide sustainable forests and grasslands for present and future generations.

As a national and international leader in forest and grassland conservation, the Forest Service has a responsibility to share information and expertise on energy issues related to forests and grasslands. The Forest Service has extensive experience in working with diverse partners to achieve shared objectives. The mission of the State and Private Forestry program extends the Agency's responsibility to provide technical, financial, and educational assistance to State, tribal, and private forest lands. The mission of the Research and Development program clearly extends the Forest Service's responsibility and ability to provide knowledge, tools, and assistance applicable to all forests and grasslands.

The Nation's significant energy challenge means building on the Agency's collaborative experience and making proactive, integrated efforts to expand existing partnerships and actively seek new ones to address common energy-related objectives, such as Job Corps training for renewable energy. Many Federal agencies—along with numerous local conservation groups and other non-governmental organizations—are addressing energy and carbon emissions and are positioning themselves to develop energy strategies for the Nation's energy security and carbon markets. The Forest Service's aim is to identify these Federal agencies and non-Federal partners and to work in cooperation, collaboration, and partnership with them to maximize overall Federal energy results.

Goal 4: Education

Promote and provide problem-solving, energy awareness, sustainable resource conservation, and energy-related assistance to States, Tribes, and local communities through a variety of educational outreach efforts.

Understanding the full range of energy opportunities is critical to supporting communities that seek a sustainable supply of renewable energy while conserving and enhancing the health and productivity of the Nation's forest and grassland resources.

The Forest Service can play an important role in accelerating the understanding, transfer, and adoption of science and technology. This knowledge will help to reduce the risk of investments by both public and private enterprises while ensuring that a balance between affordable energy and the use and health of natural resources is not impaired.

Renewable energy is a topic that is of great interest across generational boundaries, and the use of natural resources in a sustainable manner to meet the Nation's renewable energy goals will require a working knowledge of ecological systems. The Forest Service's priority of "Kids in the Woods" is an excellent

entry point for the larger inter-generational discussion that is needed around forest and rangeland health and management.

The Forest Service in partnership with other organizations will support a variety of educational outreach efforts such as on-site demonstrations, knowledge fairs, collaborative Web- and social-media-based knowledge sharing, and classroom instruction.

Goal 5: Decision-making

Ensure that life-cycle analysis of the energy and environmental impacts of Forest Service decisions and actions is standard operating procedure throughout the organization and that broad policy decisions are made in the context of accomplishing the Agency mission as a whole rather than as unrelated actions.

Appropriate life-cycle tools and models will be used to integrate energy conservation and efficiency into daily operations without compromising mission outcomes. The Agency will conduct complete and relevant life-cycle assessments of different forest management scenarios. Additionally, the Forest Service will promote development of methods, operational processes, and decision support tools to incorporate life-cycle analyses into resource management decision-making for all forms of energy development and transmission. This includes the capturing and sharing of lessons learned and best practices as well as any emergent knowledge on energy resources.

Mission-consistent information for reducing individual environmental footprints—such as recycling, telecommuting, and video conferencing—will be provided to employees. Life-cycle assessments will also inform energy efficiency and conservation, facility upgrades, and other major decisions and investments.

Next Steps

The next step is to implement concrete actions to achieve the vision and goals of this **Framework**. See Appendices 1 and 2 for goals and recommendations.

Agency actions to implement this **Framework** will be incorporated into planning, budgets, and the annual programs of work of Agency units, where appropriate, nationwide. When the Forest Service strategic plan is updated, it will provide the basis for future budget and performance integration that will call for sustainable production and transmission of renewable and non-renewable energy and reduction in Agency energy consumption. The strategic plan will also significantly enable the implementation of this **Forest Service Strategic Energy Framework**.

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Appendix 1

Additional Opportunities to Support Strategic Energy Framework Goals

#	Goal	
1	<p>NATIONAL ENERGY SECURITY, ENVIRONMENTAL QUALITY, ECONOMIC OPPORTUNITIES – Contribute to National energy security, environmental quality, and economic opportunities through sustainable energy production, conservation, and efficiency. As work on the <i>Action Plan</i> progresses, the Agency will have an integrated approach toward energy resource knowledge, best practices, lessons learned, policies, program guidance, tools, decisionmaking, partnerships, communication, and outreach.</p>	<p>1.1 Revise Forest Service Manual Chapter 1920, Land Management Planning, to provide direction and policy for production and delivery of renewable energy across National Forest System lands.</p> <p>1.2 Include evaluation and implementation of increased renewable energy production and transmission in regional strategic business plans developed as part of budget and performance integration.</p> <p>1.3 Implement integrated efforts to achieve national energy security, environmental quality, and economic opportunities:</p> <ul style="list-style-type: none"> • Create zone energy teams to work cooperatively with similar Department of the Interior units and share expertise on the processing of permits and assessing the effects of the siting, operation, and maintenance of energy facilities on forested lands and leadership across the 11 Western states. • Identify and market the most promising suitable locations for renewable energy resources on National Forest System lands and grasslands. • Improve energy efficiency in Agency facilities by 2015 to meet the intent of EO 13514. • By 2013, complete CROP Studies on national forests for potential wood-to-energy investors. • Promote e-Government solutions for all minerals and clean energy resources. • Promote minerals resources practices and technologies that least affect natural and human resources. • Expand the concept of oil and gas leasing analysis to an “energy analysis” model to include all energy and associated infrastructure needs. • Integrate energy efforts to meet Executive Order 13514, Federal Leadership In Environmental, Energy and Economic Performance. <p>1.4. Recruit, hire, train, and support employees to improve the Agency’s ability to incorporate increasingly sophisticated and vital clean energy resources and their purpose, use, and results into communication, management, technical assistance, and research and development programs.</p> <p>1.5 Balance the benefits of renewable energy resource development with the need to protect fish and wildlife and the habitats needed</p>

#	Goal	
		<p>to sustain viable populations of native biota.</p> <p>1.6 Actively use green teams in fostering place-based efforts across environmental footprint areas to achieve greater energy efficiency, conservation, sustainable buildings, and a green organization.</p> <p>1.7 Identify the impacts of development and operations of solar, wind, and geothermal energy on recreational facilities [summer homes, ski areas, resorts, etc] and forests and grasslands resources.</p> <ul style="list-style-type: none"> • Undertake a programmatic environmental impact statement on solar, wind and geothermal development. <p>1.8 Create new knowledge and decision support tools on the siting, design, and operations of hydropower facilities to mitigate the effects of climate change on the distribution of native aquatic-dependent biota on national forests and grasslands.</p>
2	<p>SCIENCE – Produce, acquire, and use science and technology (a) to sustainably produce and transform the Nation’s renewable and abundant forest biomass resources into cost-competitive, high performance biofuels, bioproducts, thermal energy, biopower and combined heat and power; and (b) to integrate energy production into sustainable forest and grassland management in conjunction with management goals and ownership objectives..</p>	<p>2.1 Provide the Nation with science and technology for sustainable and economical forest biomass management and production systems:</p> <ul style="list-style-type: none"> • Develop sustainable management and utilization systems that integrate bioenergy feedstock production with biomass and residue management, forest health, fuels reduction and restoration treatments, and production forestry. • Provide the science and technology for short-rotation woody cropping systems that use a variety of tree species. • Develop forestry best management practices for sustainable expanded biomass removal. • Develop new varieties of woody crops that are fast growing, high-yielding, pest-resistant, and water- and nutrient-use efficient. • Synthesize environmental outcomes of forest biomass production approaches. • Develop improved harvest, collection, handling, and transportation systems for woody biomass. • Provide cost and equipment information and options for field biomass processing to improve efficiency and mitigate impacts. • Develop strategies to integrate forest systems into agricultural landscapes to provide services as well as income. <p>2.2 Provide the Nation science and technology for competitive biofuels, thermal energy, and biopower conversion technologies and bioproducts that reduce greenhouse gas emissions and fossil fuel use:</p> <ul style="list-style-type: none"> • Develop wood-based biofuels, chemicals, and products that economically substitute for petroleum-based and other fossil fuels intensive materials. • Develop economically efficient bio-refinery pathways and processes.

#	Goal	
		<ul style="list-style-type: none"> • Produce feedstock characteristic database. • Develop integrated bioenergy and biofuels production processes to diversify product lines, expand markets, and provide value-added energy options for conventional wood-processing facilities. • Produce efficient biomass deconstruction techniques for chemical and fuels production through fermentation and improved fermenting organisms. • Develop robust bio-refining technologies that can use a variety of lignocellulosic feedstocks. • Develop value-added chemicals and fuels from thermochemical platforms including pyrolysis and gasification <p>2.3 Provide the Nation information and tools for decision-making and policy analysis:</p> <ul style="list-style-type: none"> • Develop higher resolution, consistent national and regional tools for more accurate assessment of forest bioenergy resources. • Provide mapping products to identify potential sites for short-rotation woody energy crops. • Create models to assist with identification of opportunity zones and site selection for bioenergy facilities considering supply, competition, transportation, water, and infrastructure. • Develop sustainability criteria for forest bioenergy feedstocks. • Provide life-cycle analysis and assessment tools for all aspects of forest bioenergy/bioproducts, including carbon and greenhouse gas accounting. • Develop integrated models of future land use patterns, goods and services delivery, and markets as influenced by expanded bioenergy production. • Provide logistics and decision support tools to reduce costs of treatments involving biomass removal and to improve harvest and transport efficiency. <p>2.4 Collaborate on research to understand and mitigate the impacts of wind turbines, solar arrays, geothermal energy, hydropower, fossil fuel development, distributed wood fuel combustion, and rights-of-way on animal and plant populations.</p> <p>2.5 Periodically, review and adjust priorities for the most critical focus areas for Forest Service energy and bioproduct research, development and application activities.</p> <p>2.6 Effectively move science into application, including synthesis of current science and technology, developing and using decision support tools, disseminating new knowledge to users, integrating tools into common data and analysis structures, and acquiring and deploying information by users.</p> <ul style="list-style-type: none"> • Develop feedstock selection, sorting, and preprocessing technology optimized for various biofuels conversion technology platforms.

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Strategic Energy Framework**

#	Goal	Recommendation to Achieve Goal
3	<p>ALLIANCES – Build strong alliances and partnerships with energy interests in other Federal agencies, State and local governments, Tribes, private landowners, non-governmental organizations, and international partners to provide sustainable forests and grasslands for present and future generations.</p>	<p>3.1 In collaboration with partners and stakeholders, carry out integrated regional and sub-regional landscape-scale assessments of: (a) the multiple implications of climate change, to improve adaptation, mitigation, and conservation activities on forest and grassland ecosystems; and (b) the values, outputs, and ecosystem services provided by national forests and grasslands.</p>
4	<p>EDUCATION – Promote energy awareness, sustainable resource conservation education, and energy-related assistance to States, Tribes, and local communities through a variety of educational outreach efforts.</p>	<p>4.1 Develop a communications plan for this Framework that emphasizes collaboration, social networking, success stories, best practices, and lessons learned in concert with such partners as States, Tribes, and local communities; and that results in easily understood products aimed at appropriate audiences, including visitors to national forests and grasslands.</p> <p>4.2 Develop and sustain a regular exchange of information through quarterly conference calls, webinars, email, and other social media.</p> <p>4.3 Encourage and enable diverse participation in demonstration projects; pilot programs; and national and regional conferences, workshops, and training sessions.</p> <p>4.4 Produce Web-based (including social media-based) and hard-copy information to document successful energy-related projects and facilitate an exchange of the latest renewable research findings.</p> <p>4.5 Collaboratively produce a reference that identifies both technical and financial assistance available for renewable energy projects from public sources.</p> <p>4.6 .Sponsor an energy resource knowledge fair at conferences, special events, the Capitol Rotunda, National Mall, and the USDA Display to share new research and practices and continue to promote awareness</p>
5	<p>DECISIONMAKING – Ensure that life-cycle analysis of the environmental impacts of Forest Service decisions and actions is standard operating procedure throughout the organization and that broad policy decisions are made in the context of the whole rather than as unrelated actions.</p>	<p>5.1 Promote development of methods, operational processes, and decision support tools to enhance the capacity of bioenergy and bioproducts to offset fossil fuel emissions and to sequester carbon.</p> <p>5.2 Promote efficiency, transparency, security, and compliance as standard operating practices when addressing multiple challenges and investment opportunities in support of sustainable land management.</p> <p>5.3 Update Forest Service handbooks and manuals to reflect appropriate use of life-cycle analysis for Agency planning and analyses.</p>

Appendix 2

Recommendations Responsive to OIG Audit Report No. 08601-52-SF, August 2008

#	Goal	Recommendation to Achieve Goal
1	<p>NATIONAL ENERGY SECURITY, ENVIRONMENTAL QUALITY, ECONOMIC OPPORTUNITIES – Contribute to National energy security, environmental quality, and economic opportunities through sustainable energy production, conservation, and efficiency. As work on the <i>Action Plan</i> progresses, the Agency will have an integrated approach toward energy resource knowledge, best practices, lessons learned, policies, program guidance, tools, decisionmaking, partnerships, communication, and outreach.</p>	<p>1.4 Create a National Energy Working Group composed of appropriate directors to better coordinate Agency energy actions and over-see implementation of Strategic Energy Framework.</p> <p>1.5 Support identification of woody biomass utilization and bioenergy opportunities in State Forest Assessments and Response Strategies.</p> <p>1.6 Implement integrated efforts to achieve national energy security, environmental quality, and economic opportunities:</p> <ul style="list-style-type: none"> • Facilitate the use of renewable forest-based biomass, wood residues and wood energy crops to contribute to the US goals of 16 billion gallons of advance biofuels by 2022, with expected contributions from woody biomass in the order of 2.8 billion gallons, primarily from private forest lands. • Facilitate sustainably produced woody biomass contributing to energy goals in the US producing renewable electricity and thermal energy, in distributed heat and power systems that are scaled and suited to use small diameter material from forest restoration treatments. • Identify Forest Service facilities for biomass pilot projects. • Collaboratively develop and bring to operation bioenergy facilities by 2014 to meet intent of EO 13514. • Construct bioenergy R&D facility at the Forest Products Lab. <p>1.4. Provide policy and guidelines addressing the development of renewable energy resources on National Forest System lands:</p> <ul style="list-style-type: none"> • Wind, solar, geothermal, hydropower, and other renewable energy; • Collaborate in broad-scale analysis to assess effects of potential low flow hydropower development on aquatic resources, especially native aquatic dependent biota; and • Planning and development of energy analysis at the forest level tiering to broad-scale assessments.
2	<p>SCIENCE – Produce, acquire, and use science and technology (a) to sustainably produce and transform the Nation’s renewable and abundant forest biomass resources into cost-competitive, high performance biofuels, bioproducts, thermal energy, biopower and combined heat and power; and (b) to</p>	<p>2.7 Provide the Nation with science and technology for sustainable and economical forest biomass management and production systems.</p> <p>2.8 Provide the Nation with science and technology for competitive biofuels, thermal energy, and biopower conversion technologies and bioproducts that reduce greenhouse gas emissions and fossil fuel use.</p> <p>2.9 Provide the Nation information and tools for decision-making and</p>

**U.S. Forest Service
Strategic Energy Framework**

#	Goal	Recommendation to Achieve Goal
	integrate energy production into sustainable forest and grassland management in conjunction with management goals and ownership objectives..	policy analysis.
3	ALLIANCES – Build strong alliances and partnerships with energy interests in other Federal agencies, State and local governments, Tribes, private landowners, non-governmental organizations, and international partners to provide sustainable forests and grasslands for present and future generations.	<p>3.2 Regional Office State and Private Forestry directors will work with State agencies to expand expertise in woody biomass utilization, bioenergy, biomass, feedstock collection, harvesting, storage, and transport.</p> <p>3.3 Regional foresters will promote biomass energy agreements with Tribes of their regions as pilot efforts to find common ground in support of regional tribal leaders committees such as the Alaska Tribal Leaders Committee.</p> <p>3.4 Collaborate with State and regional energy transmission planning efforts to effectively incorporate National Forest System lands into new energy facility siting and transmission strategies.</p>
4	EDUCATION – Promote energy awareness, sustainable resource conservation education, and energy-related assistance to States, Tribes, and local communities through a variety of educational outreach efforts.	<p>4.7 Conduct regular on-site national and regional meetings, including a “Renewable Energy Resources Summit,” to exchange information, examine project outcomes, and develop future strategies among various partners and interest groups</p> <p>4.8 Sponsor and encourage formal educational courses and other related training for employees, Job Corps participants, and partners that further the Agency’s mission in renewable energy as part of building a new energy workforce for the future</p>
5	DECISIONMAKING – Ensure that life-cycle analysis of the environmental impacts of Forest Service decisions and actions is standard operating procedure throughout the organization and that broad policy decisions are made in the context of the whole rather than as unrelated actions.	5.1 Develop improved and integrated life-cycle analysis of bioenergy and bio-products from forests and grasslands.

Appendix 3

Key Terms

Airshed – A geographical area in which atmospheric characteristics, such as mixing height and transport winds, are similar.

Alternative energy – Energy derived from non-fossil sources.

America's forests – Include all Federal, State, tribal and private forested lands.

Bioenergy – Renewable energy made available from organic sources; comes from any fuel that is derived from biomass (recently living organisms or their metabolic byproducts).

Biofuels – A fuel produced from dry organic matter or combustible oils produced by plants; examples of biofuels include alcohol (from fermented sugar), black liquor (from the paper manufacturing process), wood, and vegetable oil.

Biomass – Organic matter available on a renewable basis; includes forest and mill residues, agricultural crops and wastes, wood and wood residues, animal wastes, livestock operation residues, aquatic plants, fast-growing trees and plants, and municipal waste and industrial residues; can be used to produce liquid transportation fuels, chemicals and other bioproducts, electric power, steam, and heat. Also refers to the total mass of living organisms in a given area or volume; recently dead plant material is often included as dead biomass.

Biopower – Power, including electricity and heat, produced from biomass; includes biopower from self-generation in pulp and paper facilities, and biopower facilities that produce power and frequently also heat for on-site use and/or for the power grid. Biopower provides the most non-hydroelectric renewable energy in the United States.

Bioproducts – Products made from renewable resources of agriculture, forestry, and aquaculture; a key aspect of bioproducts is that they are renewable and sustainable.

Carbon markets – Function like a financial market in which carbon credits (also called pollution credits)—representing the right to emit a specific quantity of greenhouse gases (such as carbon dioxide, methane, nitrous oxide, or other greenhouse gases), measured in carbon equivalents—are bought and sold. Carbon credits are used to manage a cap on allowable emissions from specific facilities; within the market, polluters that are below the cap can sell the “excess” emissions rights as credits, or shares, to others who are above the limit. One goal of the carbon market is to create a scarcity of shares; the scarcity drives up the cost of emitting into the atmosphere greenhouse gases that were generated through the direct combustion of (or use of energy derived from) conventional fossil fuels, which encourages further emission reduction and investment in alternative energy sources and increased energy efficiency and conservation.

Cap and trade (similar to carbon markets, above) – A regulatory framework in which a maximum allowable rate of emission of a particular pollutant is established for facilities; a given facility that emits less than its cap can sell the difference as a pollution credit to another facility that exceeds its cap. A cap-and-trade system for climate change sets allowable emissions rates for greenhouse gases in carbon equivalents; facilities can trade credits if their emissions are less than their cap and must purchase enough credits to offset their emissions to their maximum allowed emissions rate.

Cellulosic biofuels – Liquid transportation fuels produced from wood, grasses, or the non-edible parts of plants.

Climate change – Any long-term change in the patterns of average weather of a specific region or the earth as a whole. Climate change affects average temperatures and temperature extremes; timing and geographical patterns of precipitation, snowmelt, runoff, evaporation, and soil moisture; the frequency of disturbances, such as drought, insect and disease outbreaks, severe storms, and forest fires; atmospheric composition and air quality; and patterns of human settlement and land use change. Leads to direct and indirect effects on ecosystems.

Cofiring – Is a low-cost option for efficiently converting biomass to electricity by adding biomass as a partial substitute fuel in high-efficiency coal boilers.

Cogeneration (also combined heat and power, CHP) is the use of a heat engine or a power station to simultaneously generate both electricity and useful heat.

Ecosystem – A system formed by the interaction of a community of organisms with their physical and chemical environment functioning together as a unit; made up of plants, animals, microorganisms, soil, rocks, minerals, water sources, and the local atmosphere.

Ecosystem services – Ecological processes or functions that have value to individuals or society.

Energy efficiency – The ratio of energy output of a conversion process or of a system to its energy input.

Energy security – A resilient energy system capable of withstanding threats through a combination of active, direct measures including fuel diversity and reliance on less vulnerable sources; policy that considers not only the risk of dependence on fuel sources located in remote and unstable regions of the world, but also the benefits of domestic and diverse fuel sources.

Environmental footprint – The impact on the land resulting from human consumption.

Environmental footprint area – The amount of land area required to both support the resource demands and absorb the wastes of an individual, group of individuals, or business, as calculated by a formal foot print analysis.

Environmental quality – Set of properties, characteristics, or standards of the environment (such as air or water purity) that affect the lives of humans and other organisms; often expressed in terms of indicators or indices.

Feedstocks – A substance used as a raw material in an industrial process.

Fossil energy – Energy from fossil carbon deposits, including coal, oil, and natural gas.

Fossil fuels – Hydrocarbons found within the top layer of the earth's crust; produced from oil, gas, and coal residues of the conversion of once-living organisms; considered non-renewable energy sources because they take millions of years to form.

Geological sequestration – Also known as “carbon dioxide capture and storage,” whereby carbon dioxide (CO²) is trapped in flue gas and injected into geologic formations including oil and gas reservoirs, unmineable coal seams, and deep saline reservoirs. Research is being done to understand the behavior of CO² when stored in geologic formations to ensure that sequestration will not impair the geologic integrity of an underground formation, and that CO² storage is secure and environmentally acceptable.

Geothermal energy – Energy derived from the heat in the interior of the earth; can be used for heat and electricity generation.

Green purchasing – The purchase of products that are sourced and/or manufactured in an environmentally benign way; includes the acquisition of recycled content products, environmentally preferable products and services, biobased products, energy- and water- efficient products, alternative fuel vehicles, products that use renewable energy, and alternatives to hazardous or toxic chemicals.

Greenhouse gas – A gas that absorbs long-wave radiation from the earth, thereby heating the earth's atmosphere and potentially leading to global climate change. Greenhouse gases include, but not limited to carbon dioxide, nitrous oxide, methane, nitrous oxide, ozone, and water vapor.

Lignocellulosic – Any of several closely related substances constituting the essential part of woody cell walls and consisting of cellulose intimately associated with lignin.

Life-cycle analysis – Evaluation of the environmental impacts of products, processes, and services—from resource extraction through use and disposal—based on life-cycle inventory data; also includes examination of energy used and pollution created. Interpretation of a life-cycle analysis evaluates the specific processes and impact indicators to determine how to reduce environmental burdens.

Mitigation – Actions or interventions to reduce net emissions of greenhouse gases and encourage the development of renewable, sustainable energy.

National Forest System – Comprises 193 million acres; the system is made up of 155 national forests and 19 national grasslands in 41 States and Puerto Rico.

Non-renewable energy – Energy sources that come out of the ground as liquids, gases, and solids; includes resources such as coal, oil, gas, and uranium.

Pyrolysis – The thermal decomposition of biomass at high temperatures (greater than 400 degrees Fahrenheit [200 degrees Celsius]) in the absence of air. The end product of pyrolysis is a mixture of solids (char), liquids (oxygenated oils), and gases (methane, carbon monoxide, and carbon dioxide) with proportions determined by operating temperature, pressure, oxygen content, and other conditions.

Renewable energy – Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include: biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.

Silviculture – The branch of forestry dealing with the development and care of forests to meet human needs.

Small diameter – Timber that is usually 4 to 8 inches in diameter, which traditionally has not been economical to remove for commercial timber production.

Solar array – Linked collection of photovoltaic modules, which are in turn made of multiple interconnected solar cells that convert solar energy into direct current electricity.

Solar energy – Energy from the sun that is converted into thermal or electrical energy.

Special use authorizations – Documents (issued by a Forest Service line officer in compliance with national policy and Federal land laws) authorizing special uses on National Forest System lands that provide a benefit to the general public while protecting public and natural resource values; includes such uses as: water energy transmission, research, road and utility rights-of-way, and others.

Sustainability – The creation and maintenance of conditions under which humans and nature can exist in productive harmony and which permit fulfilling the social, economic, and other requirements of present and future generations.

Sustainable development – Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Transmission (electric) – An interconnected group of lines and associated equipment for the movement or transfer of electric energy between points of supply and points at which it is transformed for delivery to customers or is delivered to other electric systems.

Thermal energy – Energy in the form of heat, in the case of biomass is generally from biomass combustion for facility or process heat, hot water, or steam.

Wind energy – The conversion of wind into a useful form such as electricity or motive power, using wind turbines.

Woody biomass — Derived from any and all parts of trees and woody plants; includes boles, limbs, tops, roots, and foliage; insect-, disease-, or fire-damaged or killed material; purpose-grown wood; wood from conventional or other forestry operations; pre- and post consumer paper and wood products; and pulping liquors.

Woody biomass utilization – The harvest, sale, offer, trade, or utilization of woody biomass to produce bioenergy and the full range of biobased products including lumber, composites, paper and pulp, furniture, housing components, round wood, liquid transportation fuels, chemicals, and energy feedstocks.

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