Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Rocky Mountain Region / Black Hills National Forest

June 2022

Black Hills National Forest

Draft Forest Assessment:

Renewable and Non-Renewable Energy and Mineral Resources

Gold Mountain Mine, the only gold mine left on the Black Hills National Forest with a standing mill frame (photo courtesy of the USDA Forest Service).

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov (link sends e-mail).

USDA is an equal opportunity provider, employer, and lender.

Contents

Chapter 1. Introduction

What is an Assessment Report?

The Black Hills National Forest (Black Hills NF) is managed by the United States Forest Service (USFS), an agency of the U.S. Department of Agriculture (USDA). The mission of the USFS is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The National Forest Management Act requires all National Forests to develop a land and resource management plan (forest plan) in order to guide management actions and decisions. The current Black Hills NF forest plan was approved in 1997 and has been amended twice. The National Forest Management Act requires that these forest plans be periodically updated. In order to revise the current forest plan, the Black Hills NF has identified and evaluated existing information about relevant ecological, economic, and social conditions, trends and sustainability and how those conditions relate to management direction in the forest plan. This assessment report documents that work.

Renewable and Non-Renewable Energy and Mineral Resources

This document is an assessment of the current known renewable and non-renewable energy and mineral resources and uses in the Black Hills NF, or the "plan area."

Chapter 2. Conditions and Trends

Importance of Renewable and Non-Renewable Energy and Mineral Resources

National Forest System lands provide access for commercial development of a variety of mineral resources. This includes locatable minerals (such as silver and gold), salable minerals (such as stone, sand, and gravel) and leasable minerals (such as coal, oil, and gas). In the seven counties that the Black Hills NF overlays (which includes, but is not limited to the Black Hills NF), the mining industry (including fossil fuels) has provided 1,000 to 1,500 jobs over the last two decades (U.S. Department of Commerce 2021). People benefit from opportunities for recreational mineral collection on these lands through panning, dredging, sluice-box, and metal detector use. In 2015, the top three minerals by sales value on the Black Hills NF were dimension stone; crushed stone (common variety); and construction sand and gravel (USDA Forest Service 2018). Salable minerals are the primary source of revenue from mineral production activities in the Black Hills NF, based on the available information. However, the possibility for mining remains open for all mineral resources.

National Forest System lands provide renewable and non-renewable resources used to generate energy. These include hydropower, biomass, coal, oil, and natural gas. In addition, National Forest System lands are valued for the access and leasing of lands that may provide energy generation, which include solar, and wind energy facilities.

Development of renewable energy on the National Forests will help implement Executive Order (EO) 14057 of December 8, 2021, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability.* EO 14057 was issued with the intent to help the US achieve a carbon pollution free electricity sector by 2035, and a net-zero emission economy by 2050.

Access to these renewable and non-renewable resources is important to local communities, as evidenced by public input in previous planning efforts that have indicated some concern that designations of Research Natural Areas would adversely affect access to or development of locatable mining claims or minerals leases (USDA Forest Service 2005, 2010).

Best Available Scientific Information

This assessment considers direction and requirements of applicable statutes, laws, regulations, Forest Service manuals and handbooks. Information regarding the renewable and non-renewable energy and mineral resources of the Black Hills NF is based on information from numerous sources including State of South Dakota and Wyoming data, Forest project and permit files, Forest schedule of proposed actions, Bureau of Land Management (BLM) minerals information, Office of Natural Resources Revenue (ONRR), U.S. Geological Survey (USGS) published documents and maps, and other literature. ONRR and the BLM keep official records on leasable minerals and unpatented mining claims on public lands. Current records are kept in ONRR's natural resource revenue database and the BLM's Mineral and Land Records System. These records are the source for the documentation of leasable minerals and unpatented mining claims on the Black Hills NF.

Specific files and records used for this assessment include:

- 1997 Black Hills NF forest plan, as amended (USDA Forest Service 2006) and Final Environmental Impact Statement and Record of Decision (USDA Forest Service 2005)
- USFS monitoring and evaluation reports available from https://www.fs.usda.gov/detail/blackhills/landmanagement/planning/?cid=STELPRDB5112296

- Management Direction as provided in Forest Service Manuals and Handbooks available from https://www.fs.fed.us/im/directives/
- USFS Annual Energy & Mineral Commodities Report
- Publicly available information as referenced under "Reference Cited"
- Forest Service corporate geographic information system data such as mineral rights, mineral withdrawal, and geology
- Bureau of Land Management geographic information system data such as National Land Status Database

Data Gaps Identified

A preliminary list of identified data gaps is provided below. Additional data gaps may be identified through public engagement.

- An updated Analysis of Renewable Energy Potential on U.S. National Forest Lands (Zvolanek et al. 2013) would provide a more current assessment of renewable energy potential. Since the evaluation was done in 2013, nearly a decade ago, it would be informative to re-evaluate the renewable energy potential now given improved remote sensing and imaging capabilities along with updated information on land use and other projects that have begun or been completed since this study was done.
- There was no information about hydropower projects or the potential for hydropower on the Black Hills NF.
- Periodic monitoring is required by the forest plan. While several elements relating to commodity production are included in the monitoring plan (Monitoring Items 13-17), the most recent effort did not include any renewable or non-renewable energy or mineral resources development sites (USDA Forest Service 2013).
- The future need or demand for development of renewable and non-renewable energy and mineral resources on and near the Forest is uncertain.

The following additional resources exist or may exist but were not summarized at this time:

- The Forest is currently developing an expanded database of abandoned mine lands and hazards that was not complete at the time of this report.
- More recent than 2017 mineral sale values.
- The volume or value of free use materials to local governments.
- Recent LiDAR may provide information about AML Hazards but was not ready in time for this report.

Current Conditions and Trends

Type And Location of Non-renewable Energy and Minerals Activities

A variety of mining activities occurs within the Forest-administrative boundary (including on the Black Hills NF), ranging from recreational gold panning and sluicing to open-pit mines with either heap-leach or conventional milling to recover precious metals or minerals (USDA Forest Service 2005). Future exploration and development of currently unknown mineral resources salable may occur on the Black Hills NF.

Locatable Minerals

Locatable minerals and products are those that are subject to exploration, development, and production. The Mining Law of 1872 (The Mining Law) is the major Federal law governing locatable minerals. It allows U.S. citizens the opportunity to explore for, discover, and purchase certain valuable mineral deposits on Federal lands that are open for mining claim location (public domain lands). These mineral deposits include most metallic mineral deposits and certain nonmetallic, and "uncommon variety" industrial minerals. Where these minerals occur on acquired lands, they are considered leasable minerals. The law sets general standards and guidelines for claiming the right to possess a valuable mineral deposit discovered during exploration. The Mining Law allows for the enactment of state laws governing location and recording to mining claims and sites that are consistent with Federal law.

Some lands have been subject to mineral withdrawal and are not available for mineral entry under The Mining Law. Withdrawals may be permanent or temporary. Notably these include lands to preserve the unique cave resources surrounding Jewel Cave National Monument; in the Sturgis watershed, in Inyan Canyon, at developed recreation areas, in the Norbeck area, and in the Upper Pine Creek Natural Area. Other withdrawals for U.S. Bureau of Reclamation projects, such as roadside zones, and power-generating purposes may also affect mineral development.

Locatable minerals are an important source of history and economic activity in the Black Hills (USDA Forest Service 2006). Locatable mineral resources include gold, silver, quartzite, uranium, feldspar, beryl, and mica, among others (Dewitt et al. 1986). As of the last publicly produced Mineral Summary (Holm et al. 2008), a report on the production, exploration, and environmental issues in South Dakota, gold and silver are still the primary mineral commodities. Mining claims for metals such as gold and silver have historically been and continue to be located over large areas in the northern half of the Forest. In more recent years, rare earth minerals (e.g. thorium & cerium) are under location over large areas, as well.

Exploration is also ongoing and the number of authorizations for exploration varies from year to year. It is unknown how many explorations projects may develop into production or when and where new projects may be proposed because locatable mineral development is proponent-initiated. It is expected that mineral production will continue in accordance with The Mining Law. A review of the Black Hills NF Schedule of Proposed Actions (USDA Forest Service 2021a) shows continued interest in the exploration and development of locatable and other minerals. Between July and September 2021, there were seven projects listed on the Schedule of Proposed Actions list for Minerals and Geology for prospecting and mining purposes (USDA Forest Service 2021a).

Leasable Minerals

The United States Department of Interior (USDOI) BLM manages the Federal mineral estate leasable mineral resources and has specific authorities and expertise in managing Federal minerals. Depending on the type and amount of the mineral resource occurrence in the plan area, coordination with BLM during the assessment is warranted.

According to the Black Hills National Forest Land and Resource Management Plan (USDA Forest Service 2006), the only known leasable minerals on the Black Hills NF are oil and gas. Currently, there are no producing wells on National Forest System lands in the Black Hills. Oil and gas exploration occurred in the southern portion of the Black Hills NF in Fall River County and southern Custer County, but all wells are currently plugged or inactive (South Dakota Department of Agriculture and Natural Resources 2022). There are no current leases issued by the BLM for leasable minerals on the Black Hills NF (USDOI BLM 2022). Based on current, available resources, oil and gas are not in great abundance in the Black Hills NF, but exploration is ongoing.

Leasable minerals also include coal and geothermal resources, for which potential is low (see the *Geothermal Energy* section). Geothermal energy is a renewable energy resource that makes up only about 2% of renewable energy sources and 0.2% of the energy used in the U.S. annually. While the overall use of geothermal energy is low, it can still provide a valuable source of renewable energy. The Black Hills NF has 122,200 acres of land with medium to high potential for geothermal energy (Zvolanek et al. 2013).

Salable Minerals

Salable minerals, also referred to as mineral materials, include resources such as gravel, crushed rock, landscape material, rip rap, and clay. Salable minerals are governed by the Federal Materials Act of 1947. Since July 23, 1955, common varieties of sand, gravel, and stone were removed from the Mining Law and placed under the Materials Act of 1947. Use of salable minerals requires either a sales contract or a free-use permit. In 2015, the top three minerals by sales value on the Black Hills NF were dimension stone, valued at $38,000, crushed stone (common variety) valued at $3,000, and construction sand and gravel valued at $200 (USDA Forest Service 2018). In 2017, mineral material sale included dimension stone, valued at $30,900, rip rap, valued at $21,500 landscape rock, valued at $2,854, and sand and gravel, valued at $250. Additionally, the Forest provides free salable minerals, such as crushed stone to local governments under “free use” permits.

Renewable Energy

Renewable energy projects that may be developed on national forest lands include hydroelectricity (hydropower), wind power, solar power, geothermal energy, or energy derived from biomass. None of these resources are currently being developed on the Black Hills NF.

Non-Renewable Energy

Non-renewable energy sources include coal, oil, and gas. These are discussed above under leasable minerals.

Non-energy Leasable Minerals

Non-energy leasable minerals include minerals such as gilsonite, phosphate, sodium, potassium, and sulfur. Valuable hardrock minerals like those described above under locatable minerals are considered leasable when they are located outside of public domain lands on acquired lands. The likelihood of development of non-energy leasable minerals is low and expected to remain low in the near future.

Potential for Renewable Energy

Renewable energy includes solar power, wind power, hydropower, biomass, and geothermal energy. In cooperation with the Forest Service, the Argonne National Laboratory completed an assessment of solar, wind, biomass, and geothermal energy resources on public lands managed by the Forest Service (Zvolanek et al. 2013). The analyses used available GIS data and included relevant factors for evaluating the usable amount of each resource as well as minimum levels of each resource to be considered viable. The primary criteria for determining a site as having potential for a given renewable resource is the availability and quality of the given resource. For example, solar energy is more available in locations such as the southwestern United States where there are more clear sky days throughout the year compared to the northwestern United States.

The amount of land area determined by Zvolanek et al. 2013 with potential for each renewable resource was compared to a previous analysis performed by the National Renewable Energy Laboratory (NREL 2005). The land areas with potential determined by Zvolanek et al. 2013 were generally much fewer than the land areas with potential determined by NREL 2005 because of the additional suitability criteria used by Zvolanek et al. 2013, such as access to roads and powerlines, and buffers around waterways. Because of the additional criteria used by Zvolanek et al. 2013, the land area estimates are on the low side, but are more realistic for estimating the potential land area that could be developed to provide renewable energy.

There is potential for renewable energy sourced from wind power, biomass, and geothermal energy within the plan area. Currently, however, there are no renewable energy projects on the Black Hills NF (United States Energy Information Administration [USEIA] 2021a).

Solar Power

Solar power is generated by solar collectors, including photovoltaic (PV) cells, which collect solar energy and convert it directly into electricity. Several PV technologies exist including solar cells made from silicon, thin-film, and III-V (made from gallium, indium, arsenic, and antimony), with more technologies in development to help improve cost, efficiency, and longevity. In 2020, solar power accounted for 11% of renewable energy and 2.3% of total energy used (USEIA 2021b).

The criteria used for determining solar potential for PV cells included factors such as areas that receive greater than 5.8 $kWh/m^2/day$, flat (less than 1% slope), proximity to transmission lines, roads, contiguous land area, open and not heavily forested, and not on protected lands or within floodplains or wetlands. Given these criteria, Zvolanek et al. 2013 did not find any significant potential for solar power in the Black Hills NF.

Wind Power

Wind power is generated by turbines that convert the kinetic energy from the velocity of the air (wind) to mechanical energy to electricity. Commercial wind turbines are defined as those that generate 100 kilowatts of electricity or more, while small scale wind turbines generate 100 kilowatts of electricity or less. In 2020, wind power accounted for 26% of renewable energy and 8.4% of total energy sources used (USEIA 2021b).

The criteria used to determine wind power suitability included wind power class, less than 20% topographic slope; near transmission lines and access roads; and outside of urban and protected lands. The analysis performed by Zvolanek et al. 2013 determined that Black Hills NF is among the USFS lands with the most total land area for wind power potential with an estimated 28,000 acres having potential.

Hydropower

Hydropower is a long-established technology that converts the energy of water into electricity. According to the U.S. Energy Information Administration, hydropower accounted for 7.3% of the total energy generation in the United States, and 22% of the total renewable electricity generation in the United States in 2020. (USEIA 2021b). The amount of energy in water is based on its fall (potential energy) and/or velocity (kinetic energy). Hydropower that is generated from the fall potential of water is generated when water is stored behind a dam, enters a penstock, and as it flows through the penstock its energy turns a turbine which spins a generator. From the generator electricity can be sent to a transmission line. Hydropower can also be generated by the velocity of water, also called hydrokinetic, when the velocity of water is extracted from turbines (similar to the way wind turbines collect energy

from the velocity of air). Hydrokinetic systems are typically used on marine systems to harness energy from tidal and wave flow, or on smaller rivers.

Zvolanek et al. 2013 did not evaluate the potential for areas to support hydropower because the complexity of the evaluation was beyond the data available for a GIS analysis and would include factors such as surface water flow and flow changes, elevation differentials, and geologic setting. According to the U.S. Department of Energy's U.S. Energy Mapping System (USEIA 2021a), there are no hydropower facilities or projects in the Black Hills NF, but because the Zvolanek et al. 2013 report could not evaluate potential for hydropower, the potential for this source of energy in the Black Hills NF is unknown.

Biomass

Biomass is matter from plants and animals that can be used for energy production (Zvolanek et al. 2013). Trees and woody crops are traditional materials used for biofuel, but other growing sources include crop residue, landfill waste, manure, sanitary wastewater, animal waste from slaughterhouses, grease from restaurants, and forest residue (Zvolanek et al. 2013). Sometimes crops are grown specifically for biofuel, either to make biofuels or to be converted into biodiesel. Corn and sugarcane are examples of crops that are used to make biofuels, while soybeans, sunflowers, rapeseed, and castor beans are among the crops used to create biodiesel (Zvolanek et al. 2013). In 2020, biomass accounted for 39% of renewable energy and 1.4% of total energy used (USEIA 2021b).

Areas with biomass potential were designated using county level biomass estimates and areas with topographic slopes less than 12%, proximity to roads or water ways, and outside of protected areas and wetlands. Areas with biomass potential were also given a ranking of high, medium, and low. The Black Hills NF is among the Forest Service lands in the nation with the largest total land area suitable for biomass with 68,000 acres of low suitability, 611,000 acres of land with medium suitability, and 324,000 acres of land with high suitability (Zvolanek et al. 2013).

Geothermal Energy

Geothermal energy is typically heat energy derived and harnessed from the earth's naturally occurring heat sources (Zvolanek et al. 2013). Steam vents, geysers, mud pots, and hot springs are some sources of naturally occurring heat energy that are found close to the earth's surface. Geothermal energy found deeper than one mile below earth's surface is called a geothermal reservoir. Typically, wells are drilled to access hot water from geothermal reservoirs and the heat energy is used to spin turbines and drive generators that generate electricity (Zvolanek et al. 2013). In 2020, geothermal power accounted for 2% of renewable energy and 0.4% of total energy used (USEIA 2021b).

Areas with geothermal energy potential were defined by the National Renewable Energy Laboratory (NREL, NREL 2009) as areas with topographic slope less than 12%, proximity to roads, outside urban or densely populated areas, outside of protected areas, and within 20 miles of a surface water source. Lands with potential for geothermal development were further classified into suitability of low, medium-low, medium, medium-high, and high. The Black Hills NF was determined to have 78,500 acres with medium suitability, 32,000 acres of medium-high suitability, and 11,700 acres of high suitability for geothermal energy development (Zvolanek et al. 2013).

The Economic Contribution of Renewable and Non-renewable Energy and Minerals

In the seven counties[1] that the Black Hills NF overlays, the mining industry (including fossil fuels) has provided 1,000 to 1,500 jobs over the last two decades (U.S. Department of Commerce 2021). Between 2010 and 2020, there was an increase of 26 mining jobs in the seven counties (U.S. Department of Commerce 2021). In 2020, mining accounted for 1.1 percent of the total employment (U.S. Department of Commerce 2021).

The BLM states that in 2015 oil and gas leased on 3.5 million acres in the BLM's Missouri Basin Region (Region 5), which includes Montana, North and South Dakota, Nebraska, and Kansas, yielded $200 million for federal, state, and tribal economies (USDOI BLM 2021). There was no data specifically for the Black Hills NF.

Renewable and Non-renewable Energy and Mineral Resources

Since the 2006 update to the 1997 forest plan, the Forest Service has developed National Core BMP guidance (USDA Forest Service 2012). forest plan Chapter 2, Conformance with Guidance, could be updated to refer to the "National Best Management Practices for Water Quality Management on National Forest System Lands Volume 1: National Core BMP Technical Guide" (USDA Forest Service 2012).

Minerals

Mining on National Forest System lands is governed by regulations found at 36 CFR 228. Subpart A deals with locatable minerals. In 2020, the Forest Service announced its intent to revise its regulations at 36 CFR 228, Subpart A. However, this has been put on hold and it is unknown if or when it may be resumed. No change is recommended at this time.

Renewable and Non-Renewable Energy

Planning for development of renewable resources, including renewable energy resources would be consistent with the goals of the Forest Service's Strategic Energy Framework (USDA Forest Service 2011) and direction in the 2012 Planning Rule (36 CFR 219 Part A, 291.10(2)).

The Black Hills NF has a high potential for wind energy development. Wind energy is generally good for multiple use areas because land can be used for any number of other activities in addition to wind energy. Care should be taken when considering any additional roads that may be necessary for a wind farm and the increased erosion risk that could result, as well as the potential fire hazard of additional transmission lines.

Biomass should be considered for developing integrated resource management planning. The extent to which biomass provides economic benefit and renewable energy should be weighed against forest health and fire reduction initiatives. The amount of traditional biomass sources on the forest, such as trees and woody debris, is currently greater than it was pre-fire suppression, but could decrease in order to increase forest health. However, currently the cost of hauling biomass to facilities is a major factor in the viability of using forest biomass versus other materials. If woody debris biomass decreases and biomass is considered a desired renewable energy source it could, perhaps, be developed

[1] Crook County, WY; Weston County, WY; Custer County, SD: Fall River County, SD; Lawrence County, SD; Meade County, SD; Pennington County, SD.

from crops, forest waste, animal waste, sanitary wastewater, or another organic waste source rather than the traditional form of trees and woody debris.

Noncommercial Mineral Collecting Activities

Collection of small rocks and minerals (including those that may contain fossils) termed "rockhounding", is permitted in the Black Hills NF without a formal permit, so long as it is for personal use and collection is not on historical sites within the National Forest. People benefit from opportunities for recreational mineral collection on these lands through panning, dredging, sluice-box, and metal detector use (USDA Forest Service 2018). The Black Hills and surrounding area are home to numerous fossils and paleontological discoveries which serve as an attraction to the Black Hills NF and surrounding areas. Within miles of the Black Hills NF boundaries are the Petrified Forest, near Piedmont, SD, and the Mammoth Site, an active paleontological dig site and natural National Landmark located in Hot Springs, SD. In general, if a person has questions about where rockhounding is permitted, he or she should contact the local Ranger District office.

What If?

- There are few non-renewable resources in production, most of which are mineral resources. As these are developed into the future, continued vigilance should be taken to follow established mining laws especially regarding containment and mine reclamation activities.
- Renewable and non-renewable and mineral operations on the Forest are driven by market conditions and proponent developed plans of operations or lease applications. These can be expected to change over time and may increase or decrease development of these resources. Both renewable and non-renewable energy sources can still be valuable; since market conditions can fluctuate, it may be important to keep options for exploration or development open.
- Climate Change. There is a high probability that extreme events, especially drought and wildfire, will become more common in future decades (Timberlake et. al. 2021). Climate change has the potential to affect management and development of energy and mineral resources, but less so than biological and social resources.
  - Climate change may affect availability of resources, such as water for processing minerals, and climate change induced effects could contribute to the cumulative effect of renewable and non-renewable energy and mineral projects.
  - The availability and usability of renewable resources could be impacted by forest fires. For biomass, this could mean an inconsistent availability of biomass if fires become more prevalent or burn large areas where biomass potential exists. Likewise, changes to water availability may affect the vegetation that can grow or be grown for biomass. Historical accounts indicate that biomass is greater now than it was before fire suppression, and some initiatives to reduce fire risk include thinning and prescribed burning which would reduce biomass. In the near term, biomass production could be a means to reduce fire hazards and restore the historic conditions while also developing energy and economic benefits.
  - Wind energy potential could increase or decrease as a result of climate change and any associated wind patterns; however, the historical variability of extreme wind events is large and there is uncertainty in projected increase of extreme wind events (Timberlake et. al. 2021). This means, that the wind energy potential on the Black Hills NF is high despite historically high extreme wind variability. Since there is high potential for wind energy development on the Black Hills NF, if its development is desired, the potential effects of

climate change should be a research focus to help understand whether or not wind energy will remain a strong option for renewable energy into the future.

- Energy demand is likely to continue to grow and the level of interest in developing renewable resources on the forest can also be expected to grow. This development should be planned for.
- If renewable energy development becomes more prominent, the mineral resources they rely on could be in higher demand (solar cells, metals for various building materials) and extraction activities for these minerals may increase on the forest. Increased mining activities may result in a strain on the potential for renewable energy production could result. However, with constant technological advancements, this is unlikely because new, diverse technologies will likely keep renewable energy prospects high.

Management

In addition to federal and state mining and environmental laws and regulations, management of mineral resources on the Black Hills NF is directed by the 1997 forest plan, as revised. The forest plan recognizes that the Forest is the "setting for some of the richest mineral deposits in the world" and that trends in minerals prices may affect management and use of the Forest.

Relevant Goals and Objectives for minerals management include:

- Goal 1: Protect basic soil, air, water and cave resources.
  - Objective 113. Apply for mineral withdrawals to protect significant cave ecosystems and resources. (I-4)
- Goal 3: Provide for sustained commodity uses in an environmentally acceptable manner.

  "The Forest Service is committed to multiple use management while being sensitive to the environmental effects when commodities are produced. Commodities, including wood products, livestock, minerals, and other products, contribute to the economies of local and regional communities Ecosystem management can be more cost-effective when commercial benefits can result.

  Sustainable economic activity depends upon sustainable ecosystems. Attention is focused on providing an acceptable combination of resources and management practices, including the amount of clearcutting and road construction, the management of livestock grazing, mine waste clean-up and mined land reclamation.

  Congress has recognized the importance of sustainable commodity use in laws including the Multiple-Use, Sustained-Yield Act, the National Forest Management Act, the Organic Act, and the 1872 Mining Act." (I-13)

  - Objective 308: Mineral exploration, development, and production is facilitated in accordance with regulations in 36 CFR 228.

Chapter 2 of the forest plan requires conformance with direction, specifically naming BMPs for South Dakota, BMPs for Wyoming, Best Mineral Management Practices, and Oil and Gas, Surface Operating Standards for Oil and Gas Exploration and Development (Gold Book, USDOI and USDA 2007).

Forest-wide Mineral and Energy direction (Chapter 2, Standards and Guidelines 1501 through 1521) are applied to projects as they are proposed by those seeking to develop mineral and energy resources.

When mineral or energy projects are proposed in certain management areas, specific management guidance is applied based on the management area direction. Additional limitations are applied when required. These may include mineral withdrawal, prohibitions or limitation on surface occupancy,

prohibition of mineral material sales, or more restrictive requirements to protect resources. These are defined in Chapter 3 of the forest plan.

Additional Forest Service management direction can be found in the Forest Service's Strategic Energy Framework (USDA Forest Service 2011) and Forest Service Handbook and Manual Direction[2].

Actions of Others

Renewable and non-renewable and mineral and energy operations on the Forest are driven by market conditions and proponent developed plans of operations or lease applications. These can be expected to change over time and may increase or decrease development of these resources.

Likewise, it is uncertain how renewable and non-renewable and mineral operations will be developed outside of the Forest and how development of those projects will affect the demand or need for these resources on the Forest.

[2] Forest Service manuals and handbooks are available online at: https://www.fs.fed.us/im/directives/

Chapter 3. Public Participation in the Planning Process

This section may have some placeholders until after the public has had chance to review the assessment reports and the Black Hills NF has completed other public engagement activities.

Public Interest

Those that are those currently engaged in activities involving minerals or energy on the Black Hills NF or those who may wish to pursue these activities in the future are the most likely to be interested in this topic. Pending additional outreach, this section will be revised to reflect current interest and comments.

Future Involvement

Pending additional outreach, this section will answer how do stakeholders want to be informed about this topic as the planning process proceeds.

Public Information Needs

Pending additional outreach, this section will answer what is confusing to the public about this topic and what follow-up could improve understanding?

Chapter 4. Conclusions

Where it occurs, current or future development of renewable and non-renewable energy and mineral resources can occur sustainably, recognizing the extraction of non-renewable minerals is inherently consumptive. Implementation of future development of renewable energy resources on the Forest could offset the loss of non-renewable energy resources such as coal, oil, and gas (through extraction and use or loss due to economic constraints).

Updates to the forest plan could include developing plan components specific to renewable and non-renewable energy development and identifying lands that are suitable or not suitable for such uses. Forest plan Chapter 2, Conformance with Guidance, could be updated to refer to the "National Best Management Practices for Water Quality Management on National Forest System Lands Volume 1: National Core BMP Technical Guide" (USDA Forest Service 2012) that was implemented after the 2006 update to the 1997 forest plan.

While not directly related to renewable and non-renewable energy and minerals management; other potential updates to the Forest Plan identified through internal review and discussion related to geology and paleontology include:

National Landslide Preparedness Act of 2021 (P.L. 116-323). The National Landslide Preparedness Act established a national program to identify and reduce losses from landslide hazards and established an interagency committee including the Department of Agriculture, among other actions. It also requires the Departments of Interior, Commerce and Homeland Security to expand the early warning system for post-wildfire debris flow to include recently burned areas across the western United States, such as National Forest System lands.

The Paleontological Resources Preservation Act. The primary legislation pertaining to fossils from National Forest System and other federal lands is the Paleontological Resources Preservation Act of 2009 (16 U.S.C. § 470aaa 1-11). The Department of Agriculture implemented direction in the act by promulgating the Paleontological Resources Preservation rule at 36 CFR 214, 261, and 291. This rule provides for the preservation, management, and protection of paleontological resources on National Forest System lands and ensures that these resources are available for current and future generations to enjoy as part of America's national heritage. The rule addresses the management, collection, and curation of paleontological resources from Forest Service lands including management using scientific principles and expertise, collecting of resources with and without a permit, curation in an approved repository, maintaining confidentiality of specific locality data, and authorizing penalties for illegal collecting, sale, damaging, or otherwise altering or defacing paleontological resources.

Compliance with the Paleontological Resources Preservation Act and its implementing regulations should be considered for addition to the Forest Plan where it discussed conformance with laws and regulations (currently Chapter 1) and the current forest-wide standards and guidelines for paleontological resources should be reviewed and, if needed, expanded to include plan components consistent with Paleontological Resources Preservation Act.

References Cited

Dewitt, E., J.A. Redden, A. Burack Wilson, and D. Buscher. 1986. Mineral Resource Potential and Geology of the Black Hills National Forest, South Dakota and Wyoming. U.S. Geological Survey Bulletin 1580. U.S. Department of the Interior, U.S. Geological Survey.

Holm, E.H., T. Cline Jr., and M. Lees. 2008. South Dakota – 2008 Mineral Summary Production, Exploration and Environmental Issues. South Dakota Department of Environment and Natural Resources Minerals and Mining Program. Available from: https://danr.sd.gov/Environment/MineralsMining/docs/publications/2008stat.pdf. Accessed January 2022.

National Renewable Energy Laboratory (NREL). 2009. Geothermal Prospector, Online Map. https://maps.nrel.gov/geothermal-prospector/?aL=0&bL=clight&cE=0&lR=0&mC=43.929549935614595%2C-100.667724609375&zL=6

South Dakota Department of Agriculture and Natural Resources. 2022. Oil & Gas Map-based Data Source. Available from: http://www.sdgs.usd.edu/OnlineMaps/maps.aspx. Accessed January 11, 2022.

South Dakota Department of Environment and Natural Resources (SDDENR). 2011. Summary of the Mining Industry in South Dakota. Prepared by the Minerals and Mining Program, SD Department of Environment and Natural Resources. May 2012. Available from: https://danr.sd.gov/Environment/MineralsMining/docs/publications/Goldrpt11.pdf. Accessed January 2022.

SDDENR. 2021. Drinking Water Program. Map application available at https://danr.sd.gov/OfficeOfWater/DrinkingWater/default.aspx. Accessed January 2022.

Timberlake, T.J., J.E. Halofsky, L.A. Joyce, and D.L. Peterson. 2021. Climate change vulnerability in the Black Hills National Forest. U.S. Department of Agriculture, Forest Service, Western Wildland Environmental Threat Assessment Center. Unpublished report.

United States Department of Agriculture (USDA) Forest Service. 2005. Final Environmental Assessment and Record of Decision for Black Hills National Forest Phase II Amendment to 1997 Land and Resource Management Plan. Available from: https://www.fs.usda.gov/detail/blackhills/landmanagement/planning/?cid=fsm9_012673. Accessed January 2022.

USDA Forest Service. 2006. Black Hills National Forest Land and Resource Management Plan, 1997 Revision with Phase II Amendment. Available from: https://www.fs.usda.gov/detail/blackhills/landmanagement/planning/?cid=STELPRDB5112303. Accessed December 2021, January 2022.

USDA Forest Service. 2010. Black Hills National Forest Travel Management Plan Final Environmental Impact Statement and Record of Decision. Available from: https://www.fs.usda.gov/nfs/11558/www/nepa/41877_FSPLT1_026126.pdf. Accessed January 2022.

USDA Forest Service. 2011. Strategic Energy Framework. Washington D.C. January 2011. Available from: https://www.fs.fed.us/energy/. Accessed January 2011.

USDA Forest Service. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide (FS-990a). April

2012. Available from: https://www.fs.fed.us/biology/resources/pubs/watershed/index.html. Accessed January 2022.

USDA Forest Service. 2013. Black Hills National Forest FY 2012 Monitoring and Evaluation Report. Available from: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5436659.pdf. Accessed January 2022.

USDA Forest Service. 2018. Benefits to the People, Black Hills National Forest. Available from: https://www.fs.fed.us/emc/economics/at-a-glance/benefits-to-people.shtml. Accessed January 2022.

USDA Forest Service. 2021a. Schedule of Proposed Actions 07/01/2021 to 09/30/2021 on the Black Hills National Forest. Available from: https://www.fs.fed.us/sopa/components/reports/sopa-110203-2021-07.html. Accessed January 2022.

USDA Forest Service. 2021b. BKH_AbandonedMineLands_20211118. GIS file provided in November 2021 by the USDA Forest Service.

United States Department of Commerce. 2021. Bureau of Economic Analysis, Regional Economic Accounts, Washington D.C., as reported in Headwaters Economics' Economic Profile System (headwaterseconomics.org/eps). Accessed January 7, 2022.

United States Department of Interior (USDOI) Bureau of Land Management. 2021. BLM Montana-Dakotas Oil and Gas. Available from: https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/about/montana-dakotas. Accessed on January 4, 2022

USDOI Bureau of Land Management. 2022. BLM National Data Viewer. Oil and Gas Active Leases data. Accessed January 10, 2022.

USDOI and USDA. 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. BLM/WO/ST-06/021+3071/REV 07. Bureau of Land Management. Denver, Colorado. 84 pp.

United States Energy Information Administration (US EIA). 2021a. U.S. Energy Mapping System. Available from: https://www.eia.gov/state/maps.php?v=Renewable. Accessed on 1 December 2021.

US EIA. 2021b. U.S. Renewable Energy Consumption by Source and Sector, 2020. Available from https://www.eia.gov/energyexplained/renewable-sources/types-and-usage.php. Accessed 30 November 2021.

United States Environmental Protection Agency. 2017. Third Five-Year Review Report for Gilt Edge Mine Superfund Site Lawrence County, South Dakota. Prepared by U.S. Environmental Protection Agency Region 8, Denver, Colorado. June 2017.

Zvolanek, E.; Kuiper, J.; Carr, A.; Hlava, K. 2013. Analysis of Renewable Energy Potential on US National Forest Lands. Prepared by Argonne National Laboratory. Prepared for US Department of Agriculture – Forest Service Lands and Reality Management Washington, DC. December 2013.

Appendix A: Definitions

Geothermal Resources. Resourcing consisting of or relating to the heat of the earth's interior.

Leasable Minerals. Those minerals or materials designated as leasable under the Minerals Leasing Act of 1920. They include coal, phosphate, asphalt, sulfur, potassium, sodium minerals, and oil and gas. Geothermal resources are also leasable under the Geothermal Stream Act of 1970.

Locatable Minerals. Minerals or mineral materials subject to claim and development under the Mining Law of 1872, as amended. Generally, includes metallic minerals, such as gold and silver, and other materials not subject to lease or sale, like some bentonites, limestone, talc, zeolites, etc.

Location (Minerals). Perfecting the right to a mining claim by discovery of a valuable mineral, monumenting the corners, completing discovery work, posting a notice of location, and recording the claim.

Mineral Development. The activities and facilities associated with extracting mineral deposits.

Mineral Entry. Claiming public lands administered by the Forest Service under the Mining Law of 1872 for the purpose of exploiting minerals. May also refer to mineral exploration and development under the mineral leasing laws and the Material Sale Act of 1947.

Mineral Withdrawal. The exclusion of locatable mineral deposits from mineral entry on areas required for administrative sites by the Forest Service and other areas highly valued by the public (e.g., research natural areas, national recreational areas, special interest areas such as "scenic", "botanical", and "geologic", national historical sites, and "scenic" and "recreation" segments of wild and scenic rivers). Public lands withdrawn from entry under the General Mining Laws and/or the Mineral Leasing Laws.

Mining Claims. That portion of the public estate held for mining purposes in which the right of exclusive possession of locatable mineral deposits is vested in the locator of a deposit.

Mining Law of 1872. Provides for claiming and gaining title to locatable minerals on public lands. Also referred to as the "General Mining Law" or "Mining Law."

Non-energy leasable minerals. Certain solid minerals such as phosphate, sodium, potassium, sulfur, and gilsonite on public and other Federal lands. In addition, some hardrock minerals, depending on their location, may be considered leasable. The BLM may also lease these minerals on certain private lands, provided the mineral rights are owned by the Federal government. Most of the minerals leased under this program are used to make fertilizer or feed stock (mineral supplement for livestock) or have other industrial processes.

No Surface Occupancy (NSO) (Oil and Gas). Stipulation A fluid mineral leasing stipulation that prohibits occupancy or disturbance on all or part of the land surface to protect special values or uses. The NSO stipulation includes stipulations that may have been worded as "No Surface Use/Occupancy," "No Surface Disturbance," "Conditional NSO" and "Surface Disturbance or Surface Occupancy Restriction by Location." The lessee may exploit the oil-and-gas or geothermal resources under leases restricted by this stipulation through use of directional drilling from sites outside the no-surface-occupancy area.