Appendix 12. Renewable Energy Potential

Initial Feasibility Assessment of Renewable Energy Development Within Greater Sage Grouse Habitat in Oregon

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Background

To assist in the decision making process for addressing development in sage-grouse habitat, Oregon Department of Energy with energy –related stakeholders and Oregon Department of Fish and Wildlife, examined the potential for renewable energy development in sage-grouse habitat in Oregon. ODOE worked with the energy-related stakeholders from the SageCon Partnership, including Renewable Northwest Project and others, to identify criteria useful for identifying areas where renewable energy development is *feasible* assuming the current state of technology and static broad-scale regulatory conditions. Spatial data inputs were compiled and analyzed in ArcGIS. The criteria were used to compile spatial layers representing feasible areas for development of wind, solar, and geothermal energy resources (Table 1).

Initial Feasibility Inputs

The following data sets and criteria were used to determine the amount of overlap between potential renewable energy development and sage grouse habitat.

Table 1. Datasets used to develop maps where renewable energy development was considered feasible.

Dataset	Source	Criteria
Sage Grouse Habitat	ODFW	▪ BLM Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH) for wind analysis. ▪ Include both core areas and low density areas for solar and geothermal analyses.
Transmission lines	Platts	▪ Group transmission lines into capacity classes specific to the energy resource type. Please refer to "wind resources" and "solar resources" for more information.
Wind Resources	NREL	1) Low capacity (69 - 115 kv) transmission lines: ▪ Areas with WPC >= 3 at 50 m above ground ▪ Areas with <30% slope ▪ Areas within 5 miles of 69 – 115 kv transmission lines 2) Moderate capacity (115 - 138 kv) transmission lines: ▪ Areas with WPC >= 3 at 50 m above ground ▪ Areas with <30% slope ▪ Areas within 10 miles of 115 - 138 kv transmission lines

Dataset	Source	Criteria
		3) High capacity (220 kv) transmission lines: ▪ Areas with WPC >= 3 at 50 m above ground ▪ Areas with <30% slope ▪ Areas within 20 miles of >=220 kv transmission lines
Solar Resources	NREL	▪ Select transmission line capacity >=69kv (incl. potential lines) ▪ Eliminate areas with a Direct Normal Irradiance (DNI) of <5 kwh /m^2 / day and slopes >3% ▪ Distance from transmission lines = 20 and 40 miles
Geothermal Resources	WREZ geothermal resources, DOGAMI wells	▪ Include Western Renewable Energy Zones (WREZ) wells that represent known, quantifiable resources. ▪ Include DOGAMI wells >180 deg F. ▪ Eliminate slopes >5% ▪ Transmission line capacity >=115kv (incl. potential lines) ▪ Distance from transmission lines = 20 and = 40 miles

Results

Wind: 488,616 acres of overlap between sage-grouse habitat and feasible wind energy development areas (core = 230,679 acres, low density = 158,114 acres, BLM currently occupied habitat = 99,823 acres; Figure 1). The majority of the potential overlap area is located in the southern half of the Sage Grouse habitat boundary. There are 412,299 acres feasible for wind energy development that fall outside Sage Grouse habitat (within 10 miles of analysis area boundary).

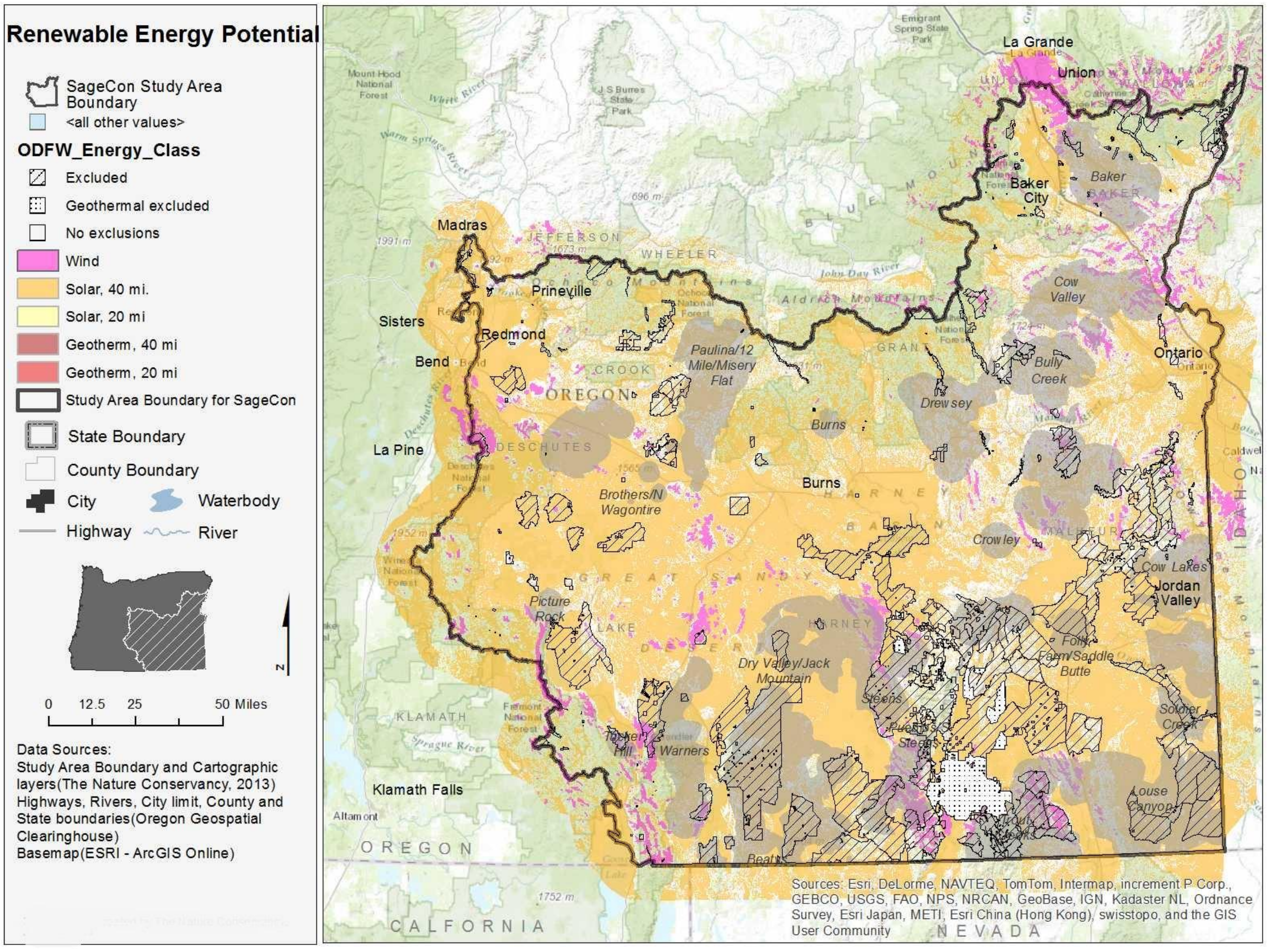
Solar: 3,952,201 acres of potential overlap between sage-grouse habitat and feasible solar energy development areas (Figure 1). The majority of the land within the Sage Grouse habitat boundary was identified as feasible for solar development. This creates both a high potential for overlap as well as the flexibility to avoid habitat.

Geothermal: 59 acres of potential overlap between sage-grouse habitat and feasible geothermal energy development areas (Figures 1 and 2). There were only two identified wells where geothermal development could impact sage grouse habitat.

Discussion

The analysis suggested that the total land area feasible for solar development is much greater than the total land area feasible for wind and geothermal. Land area considered feasible for geothermal development is very small and likely influenced by the use of datasets representing existing, known, and quantifiable resources. These datasets reflect existing and abandoned developed resources or proposed developments as opposed to overall environmental potential for geothermal energy development. For a broader depiction of land areas with potential for geothermal development, please refer to the BLM Final Programmatic Environmental Impact State for Geothermal Leasing in the Western US (2008; http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide.html). Wind energy development feasibility was largely driven by the somewhat more restrictive combination of topographic and distance-to-transmission-line criteria used relative to the analysis of solar resources. Large expanses of relatively flat and open landscape also contribute to the widespread development feasibility of solar resources.

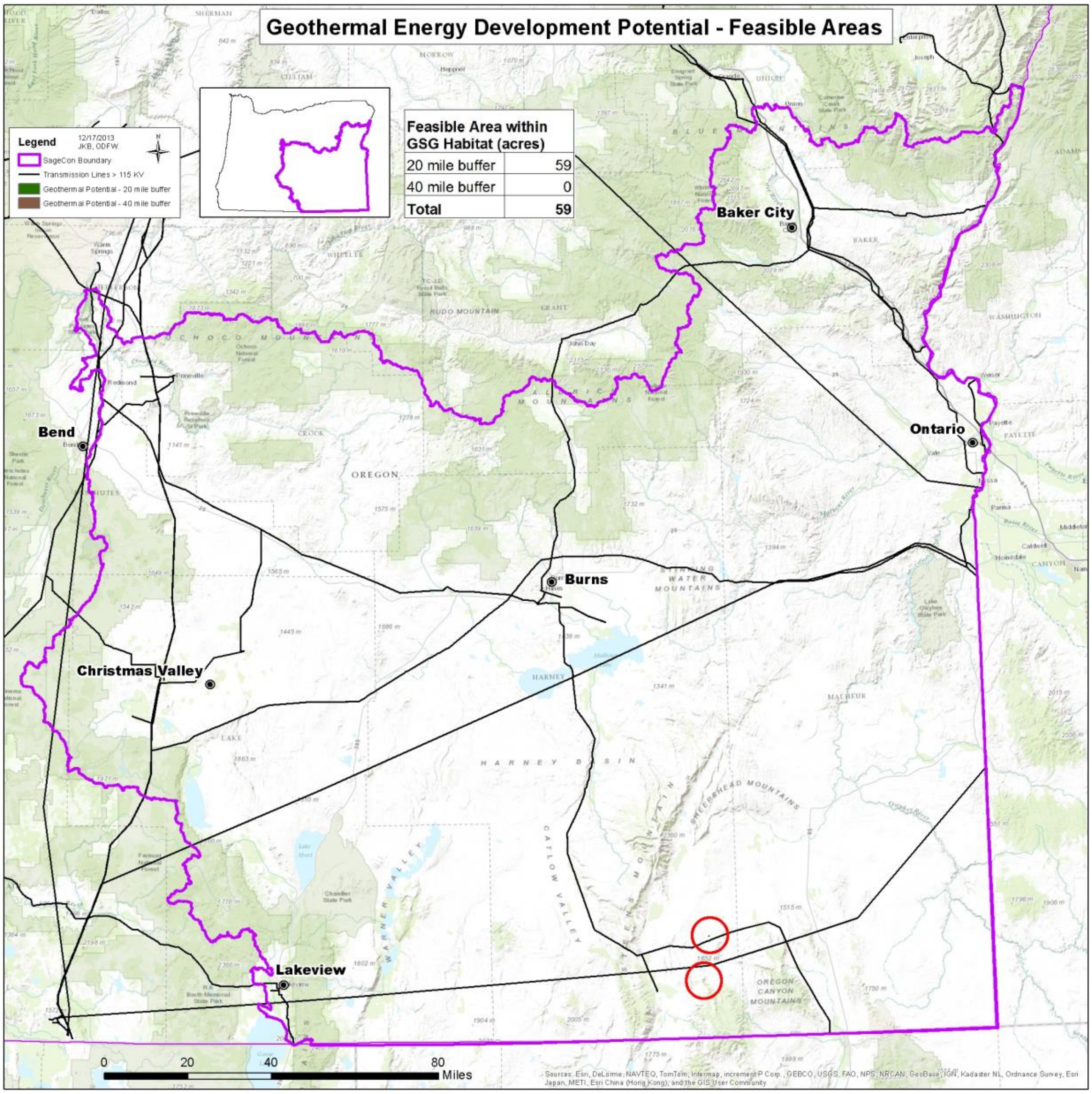
Figure 1. Feasible areas for renewable energy development were constructed for the Oregon sage-grouse planning area to support decision making and planning related to sage-grouse.



Several questions were raised that warrant additional examination should this preliminary analysis be expanded. These questions include:

- Is the wind class threshold correct? Should it be modified given developing technologies and industry drivers?
- Has the analysis appropriately captured the scale of current projects?
- Is the distance from transmission lines reasonable? Should it be modified?
- Can existing transmission line capacity data be obtained? Where are tie-in locations? Where is additional capacity likely to be developed in the future?
- What are the temporary (i.e., construction) and permanent footprint/uses associated with development?
- What are the general concerns around the avoidance and mitigation considerations for siting in and around sage grouse habitat?
- How is the BLM handling energy development in Oregon and other western states?
- Are there other factors that should be considered in the analysis?

Figure 2. Geothermal resources revealed by this analysis were very limited. Areas identified as feasible for geothermal energy development are circled in red. The veracity of several transmission lines depicted in this map were questioned by reviewers of the data and present a source of error in the final feasibility layers that incorporated them. The lines were typically identified as proposed and their quality was described as "unverified within 1 mile."



The above questions suggest several potential refinements for future work such as:

<u>Evaluate transmission line capacity</u>: No evaluation has been done to determine if there is capacity for additional tie in with any of the identified transmission lines.

Include ID, NV &CA transmission lines: Transmission lines have been clipped to the Oregon state boundary. Transmission lines that exist near the border of Idaho or Nevada could influence the potential for energy development within Oregon sage grouse habitat.

Utilize finer resolution criteria and datasets: Increased resolution of the datasets could eliminate additional areas of overlap based on slope and orientation.

Factor in areas where development is excluded: Federal, state and local renewable energy development exclusion areas (e.g., protected land) could be used to reduce the land area with potential for renewable energy development. This may result in a smaller area of overlap between potentially developable areas and sage-grouse habitat.

Account for project size / configuration needs: Some areas identified through this analysis may be insufficient in size for the development of a full scale wind, solar or geothermal project. A minimum project area (by type) could be identified in order to address this limitation.

Include more specificity in the criteria used to define feasibility: This analysis was undertaken to broadly identify where existing sage-grouse habitat overlaps with areas considered feasible for renewable energy development based on environmental conditions and proximity to resources and infrastructure. The results indicated areas of potential conflict for sage-grouse and energy development. The analysis did not consider indirect impacts of energy development to sage-grouse. Indirect effects distances vary considerably among the types of human disturbances that accompany renewable energy projects. Consideration of the various indirect effects distances has the potential to change the spatial distribution of areas feasibility for renewable energy development by increasing the amount of overlap between energy development areas and sage-grouse habitat.

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