Bioenergy with Carbon Capture and Storage (BECCS) in the Western United States

in Collaboration with Carbon Containment Lab and Energy Futures Initiative

Introduction to Forest Management

- In the United States, forests represent the greatest source of carbon storage, holding 49% of land-based carbon.
- 47.2 billion tons of carbon are stored by the Forest Inventory and Analysis (FIA), including 5.7 billion tons in Oregon/Washington and 2.6 billion in California.
- Forest restoration for wildlife hazard reduction through mechanical thinning or prescribed burning reduces fuel loads and makes forests less severe.
- Biomass can be safely removed to reduce fire risk and avoid associated economic damage.
- This removed biomass can then be used in carbon storage.
- It is crucial to determine where and how to integrate these strategies, and to validate economic viability.

Key Carbon Storage Opportunity

- Western U.S. has several major geologic formations capable of sequestering CO2 through deep saline aquifer trapping. These formations include soluble, minimal, structural, and residual trapping.
- Potential geologic formations include Jurassic, Cretaceous, and Eocene formations.
- Injection, large pools of low- to mid-grade coal and other accessible carbon can be identified and evaluated for transportation and storage, or as fuel for power generation.
- Helps to safely remove and reduce some of the 831 million metric tons of CO2 released by forest fires in California alone.

Objectives

- Create a web-based user interface for visualization of scenario assumptions based on research-driven questions, where users are fed into query intelligently constructed remaining concerns.
- Generate a server for calculation and visualization on an R-Shiny web application that returns set of key figures and tables under set of assumptions.
- Quantify and report biomass availability in units of boreal-ton of carbon.
- Scope economic viability of different approaches to identify key problems and benefits of different techniques.

Table 1. Grid intensity of different regions with wind and solar power generation.

| Region          | MW (953) | % of total
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>953</td>
<td>100%</td>
</tr>
<tr>
<td>Arizona</td>
<td>105</td>
<td>11%</td>
</tr>
<tr>
<td>Nevada</td>
<td>747</td>
<td>8%</td>
</tr>
<tr>
<td>Oregon</td>
<td>514</td>
<td>6%</td>
</tr>
<tr>
<td>Washington</td>
<td>200</td>
<td>2%</td>
</tr>
</tbody>
</table>

Table 2. Comparison of biofuel treatment alternatives.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescribed fire</td>
<td>$550,000</td>
<td>$750,000</td>
<td>Low cost</td>
<td>Yes</td>
</tr>
<tr>
<td>Mechanical treatments</td>
<td>$100,000</td>
<td>$125,000</td>
<td>Low cost</td>
<td>Yes</td>
</tr>
<tr>
<td>California State</td>
<td>$184,000</td>
<td>$210,000</td>
<td>Off-site costs</td>
<td>Yes</td>
</tr>
<tr>
<td>California State</td>
<td>$348,000</td>
<td>$400,000</td>
<td>High cost, low value</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Bioenergy with Carbon Capture and Storage (BECCS) in the Western United States

in Collaboration with Carbon Containment Lab and Energy Futures Initiative

Conclusion

- The Federal Renewable Fuel Standard to reflect the modern-day threat of catastrophic wildfire in the west so that emphasis is placed not only on ongoing potential but also on potential.
- Implement existing and appropriate future Department of Energy funding to support BECCS projects.
- Enhance USDA’s BECCS portfolio in 2023 to accommodate the economic benefits of reduced fuel costs.
- Support market development and enhancement within the U.S. Forest Service to increase economic viability of BECCS projects.
- Enhance federal policy stability and coherence.
- Expand federal funding procurement policy to grow market pull regionally in the Pacific Northwest.

Limitations

- Update the Federal Renewable Fuel Standard to reflect the modern-day threat of catastrophic wildfire in the west so that emphasis is placed not only on ongoing potential but also on potential.
- Implement existing and appropriate future Department of Energy funding to support BECCS projects.
- Enhance USDA’s BECCS portfolio in 2023 to accommodate the economic benefits of reduced fuel costs.
- Support market development and enhancement within the U.S. Forest Service to increase economic viability of BECCS projects.
- Enhance federal policy stability and coherence.
- Expand federal funding procurement policy to grow market pull regionally in the Pacific Northwest.

References
