Renewable Energy Potential for Brownfield Redevelopment Strategies

Renewable energy resources are available throughout the United States. The National Renewable Energy Laboratory (NREL) performs analysis to identify high-potential sites for renewable energy technologies and can help determine those technologies most suitable for a brownfield site.

### Renewable Energy Resource Availability

#### Wind

- **Parabolic trough:** 240+ GWh/year
- **Parabolic dish:** 20+ GWh/year
- **Linear Fresnel:** 35+ GWh/year
- **Wind turbine:** 30+ GWh/year

#### Concentrating Solar Power (CSP)

- **Parabolic trough:** 150+ GWh/year
- **Parabolic dish:** 150+ GWh/year

#### Photovoltaics (PV)

- **Current year:** 120+ GWh/year
- **Future year:** 180+ GWh/year

#### Biomass

- **Crop residues:** 40+ GWh/year
- **Biomass to electricity:** 150+ GWh/year

### Process to Identify Suitable Renewable Energy Technologies for a Brownfield

1. **Evaluate the Renewable Energy Resource.** Renewable energy resources are widely available throughout the United States. Considering the quality of the resource is the first step in determining the potential for redevelopment using a renewable energy technology.
2. **Consider Renewable Energy Technology-Specific Criteria.** Each renewable energy technology has specific criteria (such as minimum parcel size and shape) that must be met to determine its suitability to a brownfield.
3. **Determine the “Community” Factors.** Considerations such as economic, environmental, and social benefits are also key. These can include local revenue, applying non-emitting “green” technologies, and neighborhood revitalization.

#### Economic and Environmental Benefits

- **Economic benefits:** Revenue generation, job creation, and energy cost savings for local businesses.
- **Environmental benefits:** Reduced greenhouse gas emissions, improved air quality, and reduced water consumption.

#### Social Benefits

- **Community engagement:** Increased public awareness and support for renewable energy projects.
- **Neighborhood revitalization:** Improved aesthetics and property values.

### Technology-Specific Criteria

<table>
<thead>
<tr>
<th>Technology</th>
<th>Minimum Parcel Size</th>
<th>Maximum Distance to Transmission</th>
<th>Maximum Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSP</td>
<td>&gt;= 200 acres</td>
<td>&lt;= 50 miles</td>
<td>&lt;= 20%</td>
</tr>
<tr>
<td>Wind</td>
<td>&gt;= 50 acres</td>
<td>&lt;= 200 miles</td>
<td>&lt;= 20%</td>
</tr>
<tr>
<td>PV</td>
<td>&gt;= 50 acres</td>
<td>&lt;= 50 miles</td>
<td>&lt;= 20%</td>
</tr>
</tbody>
</table>

### Example: Florida's Brownfield Sites

- **Wind power:** 32 sites are suitable for grid-connected applications with varying suitability.
- **Solar power:** 12 sites are suitable for on-site systems.
- **Biomass:** 25 sites are suitable for biofuel applications.

### Conclusion

The available biomass resource makes Florida a promising state for biomass applications. The process to any area of the United States that has brownfields that are within a reasonable distance to existing transmission, and to sites that have larger footprints to allow for a sufficient-size system for economic feasibility. The quality of the CSP resource is critical to the southwest United States (see Figure 2). The ideal brownfield for CSP redevelopment must at least meet the below criteria:  
  - At least 40 acres
  - Less than 1% slope
  - Located within 25 miles to existing transmission and roads.

### Figures

1. **Wind Resource Availability**
2. **Concentrating Solar Power (CSP) Resource Availability**
3. **Photovoltaics (PV) Resource Availability**
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5. **Location of Florida’s Brownfield Sites**
6. **PV Resource Availability with All Brownfield Sites**
7. **Concentrating Solar Power (CSP) Resource Availability with All Brownfield Sites**
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9. **Biomass Resource Availability of Crop Residues with All Brownfield Sites**
10. **Biomass Resource Availability of All Residues with All Brownfield Sites**

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**National Renewable Energy Laboratory**

Innovation for Our Energy Future

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**Process Illustration**

Our illustration of this process is an analysis that was conducted in Florida, where NREL looked at applications for both PV and biomass. Although we use this site as an example, we can apply this process to any area of the United States that has adequate data. The following maps show the results of one-state evaluation.

**Process to Any Area**

After applying screening criteria outlined in the biomass table, 25 brownfield sites in Florida may be considered ideal locations for biomass applications.