Place-based renewable energy infrastructure at scale

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Overview

Renewable Energy Landscapes: DESIGNING PLACE-BASED INFRASTRUCTURE FOR SCALE

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https://www.pnnl.gov/projects/renewable-energy-landscapes
The Challenge: A Development Dichotomy?

- Community place-based development
- Unstructured, optional, and early-stage activity
- Local (tax base, workforce, construction, environmental, property values)
- Uncompensated (community preferences in cultural significance, social value)
- Holistical local paradigms

- Approaches to Development
- Process
- Effects
- Attributes
- Project Development

- Scaled, urgent, and national deployment
- Regulatory requirements
- System (reduction in GHG, cleaner resources, economic investment)
- Compensated (energy services, cheaper resources, incentives)
- Development through consumer developer decisions & market diffusion
Meeting the Moment: Creating Synergy

Renewable Energy Landscapes
A landscape whose physical characteristics have been significantly transformed by renewable energy infrastructure

Place-Based at Scale
Deployment of infrastructure systems in a way that balances the ability to be replicated widely (at scale), with careful attention to unique local character of specific places

Image Credit: Yeongseo Yu, University of Oregon
Pathways for Renewable Energy Landscapes

- Energy Justice
- Multifunctionality
- Natural Capital
- Resilience to Climate Disruption
- Generating Local Value
- Decentralization

PATHWAYS TO PLACE-BASED RENEWABLE ENERGY LANDSCAPES AT SCALE
Multifunctionality

Concept: Collocating renewable energy technologies with other technologies and land uses

Considerations
- Land-use efficiency vs. generation efficiency
- Type of site and renewable energy
- Existing land-use regulations
Natural Capital

**Concept:** Leveraging natural resources that generate the ecosystems on which communities depend to provide societal and economic benefits

**Considerations:**

- Potential for infrastructure to create positive and negative effects on ecosystems and the benefits they contribute to society
- Meeting community objectives that serve people and nature

Image Credit: Yeongseo Yu, University of Oregon, adapted from Olander et al. 2018.
Generating Local Value

Concept: Responding to the needs and goals of local communities and landscapes

Considerations:
• New stakeholders and sustained partnerships
• Understanding local goals, challenges, and values
• Monetary vs. nonmonetary value
• More accessible infrastructure
Decentralization

**Concept:** Transitioning from large, centralized plants to smaller-scale renewable energy generation located closer to where energy is consumed

**Considerations:**
- Integrating technologies into communities and built environments
- Making energy technologies something communities want nearby
Resilience to Climate Change

**Concept:** Addressing community vulnerabilities that arise from climate-driven, extreme weather events

**Considerations:**
- Mitigating blackouts and loss of critical services
- Resilience hubs and microgrids
- Diverse set of energy technologies and demand-side management

Energy Justice

Concept: Fairly distributing the costs and benefits created by the energy system while enabling impartial decision making and equitable participation

Considerations:

• Sensitive energy development and thoughtful decommissioning
• Countering legacies of harm
• Prioritizing development in communities facing disproportionate energy insecurity or energy burden
• Understanding historical and cultural context
Lessons from History

• Achieving multifunctionality through appropriate and controlled public access
• Enhancing natural and cultural landscape features through infrastructure siting and placement
• Eliminating exclusionary, unequal, and prejudiced energy practices
Final Thoughts

Take-Aways

• Infrastructure leaves a legacy over time and space
  ▪ How can we enable people, animals, industries, and the environment to thrive alongside one another?

• Now is the time for innovation
  ▪ How can our existing landscapes intersect with renewable energy infrastructure and the loads they serve?

What’s next?

• Quantifiable benefits under each pathway
  ▪ Innovating policies and incentives to include non-traditional benefits

• Testing pathways in practice

• Virtual Regional Workshops
  ▪ University of Arizona
    ✓ January 9th, 2023
  ▪ University of Oregon
    ✓ January 10th-11th, 2023
Thank you
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