



# Siting Tool for Advanced Nuclear Development (STAND) Presentation

February 2023

*Changing the World's Energy Future*

Stephanie G Weir



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# **Siting Tool for Advanced Nuclear Development (STAND) Presentation**

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**February 2023**

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NRIC

National  
Reactor  
Innovation  
Center



# Siting Tool for Advanced Nuclear Development (STAND)

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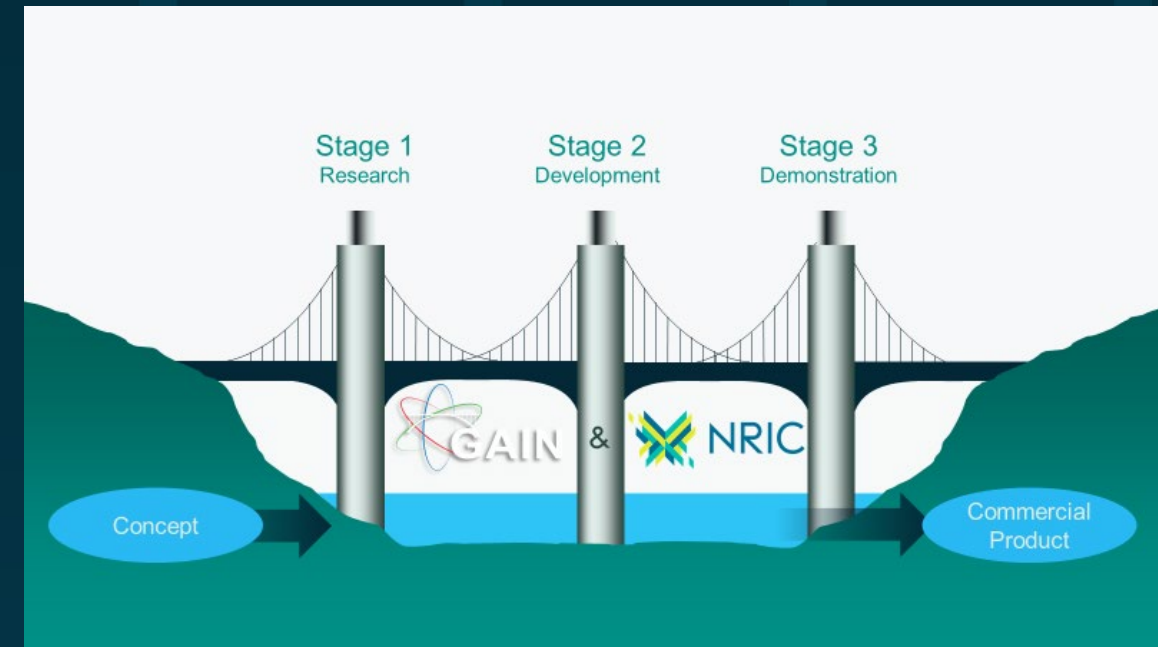


# NRIC is a DOE-NE center, launched in FY2020



## *NRIC Accelerates Nuclear Reactor Demonstrations*

- Authorized by the Nuclear Energy Innovation Capabilities Act (NEICA)
- Partner with industry to bridge the gap between research and commercial deployment
- Leverage national lab expertise and infrastructure
- Manage demonstrations to success



# NRIC Vision



Commercial Advanced Nuclear by 2030

inspire

empower

deliver

mission



NRIC

# Siting Tool for Advanced Nuclear Development STAND

## What is it?:

An integrated tool used to help identify and compare possible siting locations in the U.S. for advanced nuclear facilities based on factors related to:

- Socioeconomics
- Proximity
- Safety

A tool to help answer the question of “Where?” and “Why there?”



NRIC



FASTEST PATH TO ZERO  
UNIVERSITY OF MICHIGAN





# Siting Tool for Advanced Nuclear Development

## STAND

-

### Factors

3 categories of factors are considered based on user priorities and preferences

Factors	Definition
Socioeconomic	Social, economic, and local energy policy factors that could potentially influence state and local acceptance of construction and operation of the facility.
Proximity	Environmental and regulatory exclusion zone criteria, distances to infrastructure that could facilitate or support construction and operation of the facility.
Safety	Regulatory guidelines for environmental and geologic safety factors, safety risks, mitigation approaches.



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OAK RIDGE  
National Laboratory



# Siting Tool for Advanced Nuclear Development STAND

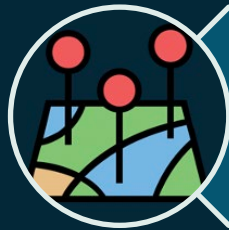
Provides a systematic way based on user siting preferences and priorities to:



**Discover** areas that may be a good fit



**Explore** areas to identify specific sites



**Compare** sites to identify an optimal option

# Meet STAND

## Siting Tool for Advanced Nuclear Development

Use STAND to identify and examine potentially feasible sites where advanced nuclear facilities might be welcomed by host communities. STAND is designed to explore and provide insight on socioeconomic, proximity, and safety data, generate county reports, review regulatory data, and complete a comparative analysis across multiple sites. However, STAND is not a substitute for the in-depth studies required to qualify a site for hosting a nuclear facility, nor is it a substitute for the necessary community engagement to build trust and seek consent. STAND is best used for the contiguous United States. Data availability is limited in Alaska and Hawaii. STAND does not currently support analysis of U.S. Territories.

### Get Started



#### Site Discovery

Start here if you want to identify counties or states that may be candidates for reactor deployment.



#### Site Exploration

Start here if you have already identified general areas for deployment but would like to explore regulatory data or drop points.



#### Site Comparison

Start here if you have identified site coordinates for deployment and would like to compare them against each other.



## Site Discovery

Set Priorities

County Analysis

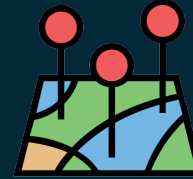


## Site Exploration

Zoom to County

View Reference Map

Add Points



## Site Comparison

Process Overview

Review Sites

Relevance Form

Significance Form

AR-RS Matrix

Results



## Site Discovery

DISCOVERY   EXPLORATION   COMPARISON

1 Set Priorities   2 County Analysis

### Priority Questionnaire

Answer the questions below to identify counties with the best conditions for deploying your advanced nuclear reactor technology. Results will be based on your priorities.

1. Which state nuclear restrictions would you consider dealbreakers for your project? ⓘ

- ☒ Moratorium (i.e. ban)
- ☒ Required approval by state legislature
- ☐ Required approval by the state Commissioner of Environmental Protection
- ☐ Voter approval
- ☐ Finding (i.e. proof) that the construction of a nuclear facility will be economically feasible for ratepayers
- ☒ Demonstrable technology or a means for high level waste disposal or reprocessing
- ☐ Finding that the proposed method for disposal of radioactive waste material (to be produced or generated by the facility) will be safe

[View Nuclear Restrictions Reference Map](#)

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2. How important is high state energy price? ⓘ

Medium ▼

[View Energy Price Reference Map](#)

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3. How important is state electricity market regulation? User can select deregulated or traditionally



## Site Discovery



DISCOVERY

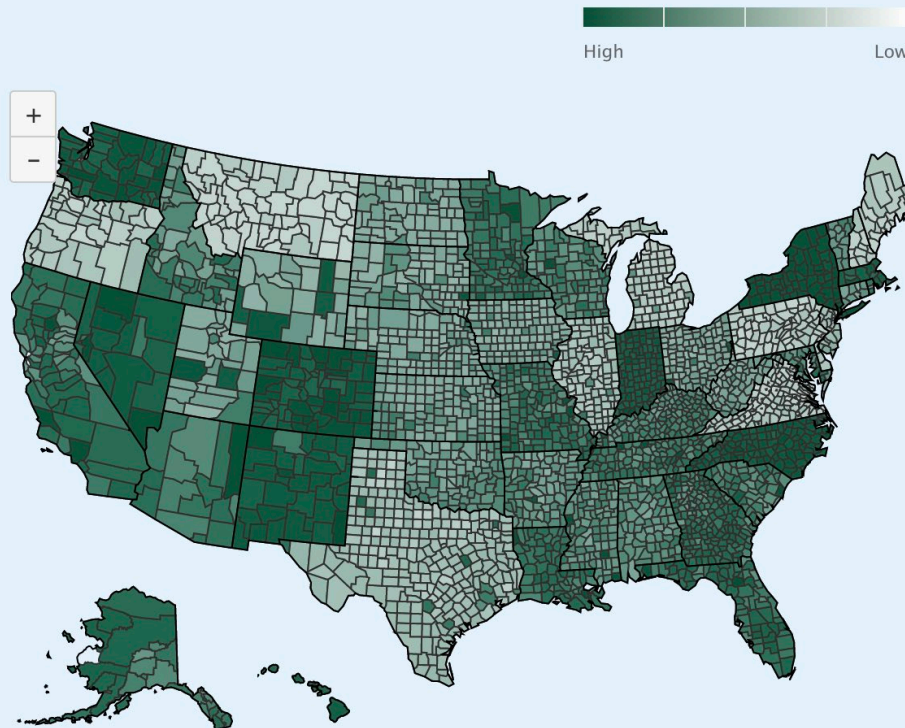
EXPLORATION

COM

### Priority Match Map

MODIFY PRIORITIES

This custom heat map shows the Development Rank for each county based on your priorities. Click a county to see ranking details, select a county to analyze, or download a report.



#### Top Matches

These are the top-ranking counties based on your priorities. Click a county name for details about its rank. Select up to five locations to analyze.

County	State	Rank ↑ ↓
<input type="checkbox"/> Lewis	Washington	1 ±
<input type="checkbox"/> Alamosa	Colorado	2 ±
<input type="checkbox"/> Lea	New Mexico	3 ±
<input type="checkbox"/> San Juan	New Mexico	4 ±
<input type="checkbox"/> Pueblo	Colorado	5 ±
<input type="checkbox"/> Cleveland	North Carolina	6 ±
<input type="checkbox"/> Clark	Nevada	7 ±
<input type="checkbox"/> Mesa	Colorado	8 ±
<input type="checkbox"/> Adams	Colorado	9 ±
<input type="checkbox"/> Gaston	North Carolina	10 ±

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Selected Counties:

Teton, ID + Kitsap, WA + Nye, NV +

PROCEED TO SITE EXPLORATION

Request access, log in, and find links to the STAND Tech Talk slides and video at: [https://nric.inl.gov/stand\\_tool-2/](https://nric.inl.gov/stand_tool-2/)





## Site Discovery

Set Priorities

County Analysis

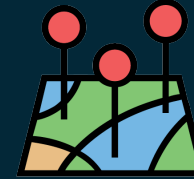


## Site Exploration

Zoom to County

View Reference Map

Add Points



## Site Comparison

Process Overview

Review Sites

Relevance Form

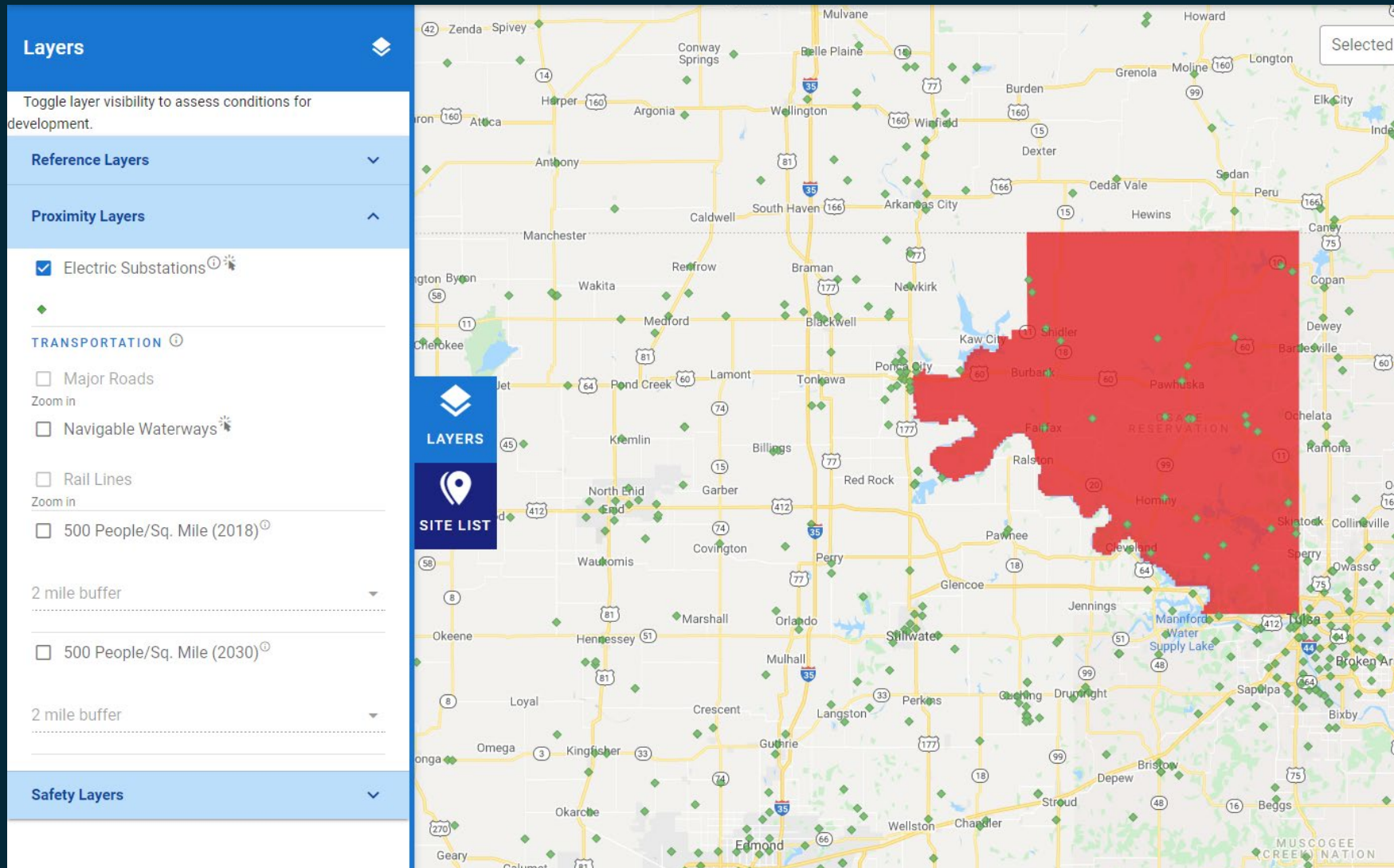
Significance Form

AR-RS Matrix

Results



## Site Exploration



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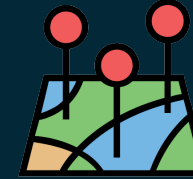
## Site Discovery

Set Priorities
County Analysis



## Site Exploration

Zoom to County
View Reference Map
Add Points



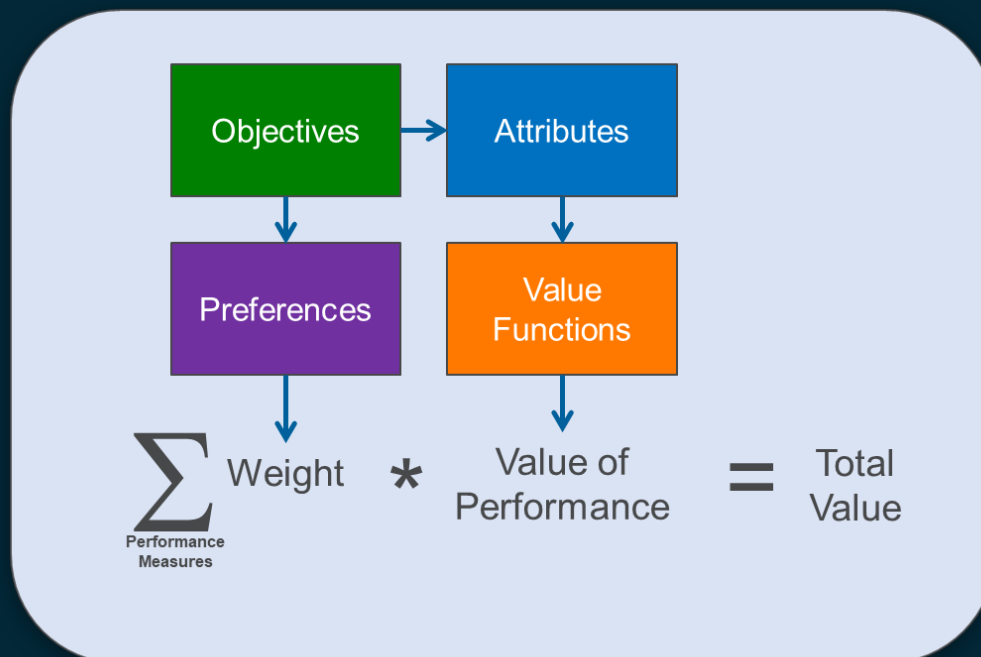
## Site Comparison

Process Overview
Review Sites
Relevance Form
Significance Form
AR-RS Matrix
Results



## Site Comparison

Site comparison uses a multi-objective evaluation model as a structured framework for identifying which proposed sites best maximize the attributes that the user values.





Site Comparison

✓ Process Overview — ✓ Review Sites — ✓ Relevance Form — 3 Significance Form — 4 AR-RS Matrix — 5 Results



SOCIOECONOMIC

SAFETY

PROXIMITY

SUBMIT

	Best	Worst	Site Avg	National Avg	Best - Worst	
Nuclear Restrictions ⓘ	0 relevance sum	35 relevance sum	8.75 relevance sum	10.384 relevance sum	35 relevance sum	Not Significant <a href="#">View Nuclear Restrictions Reference Map</a>
Energy Price ⓘ	19.186 cents/kWh	8.075 cents/kWh	11.073 cents/kWh	11.502 cents/kWh	11.11 cents/kWh	Very Low  <div><div></div></div> <a href="#">View Energy Price Reference Map</a>
Net Electricity Imports ⓘ	75504 million kWh/year	-23073 million kWh/year	12638.5 million kWh/year	765.509 million kWh/year	98577 million kWh/year	High  <div><div></div></div> <a href="#">View Net Electricity Imports Reference Map</a>
Nuclear Sentiment ⓘ	0.443 percentile	0.392 percentile	0.413 percentile	0.422 percentile	0.05 percentile	High  <div><div></div></div> <a href="#">View Nuclear Sentiment Reference Map</a>
Nuclear Inclusive Policy ⓘ	Yes	No	N/A	N/A	N/A	Very High  <div><div></div></div>

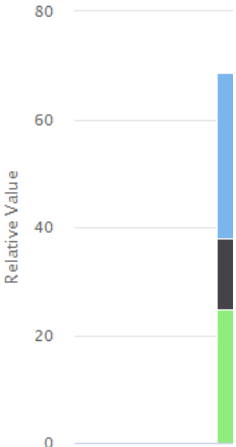


Site Comparison

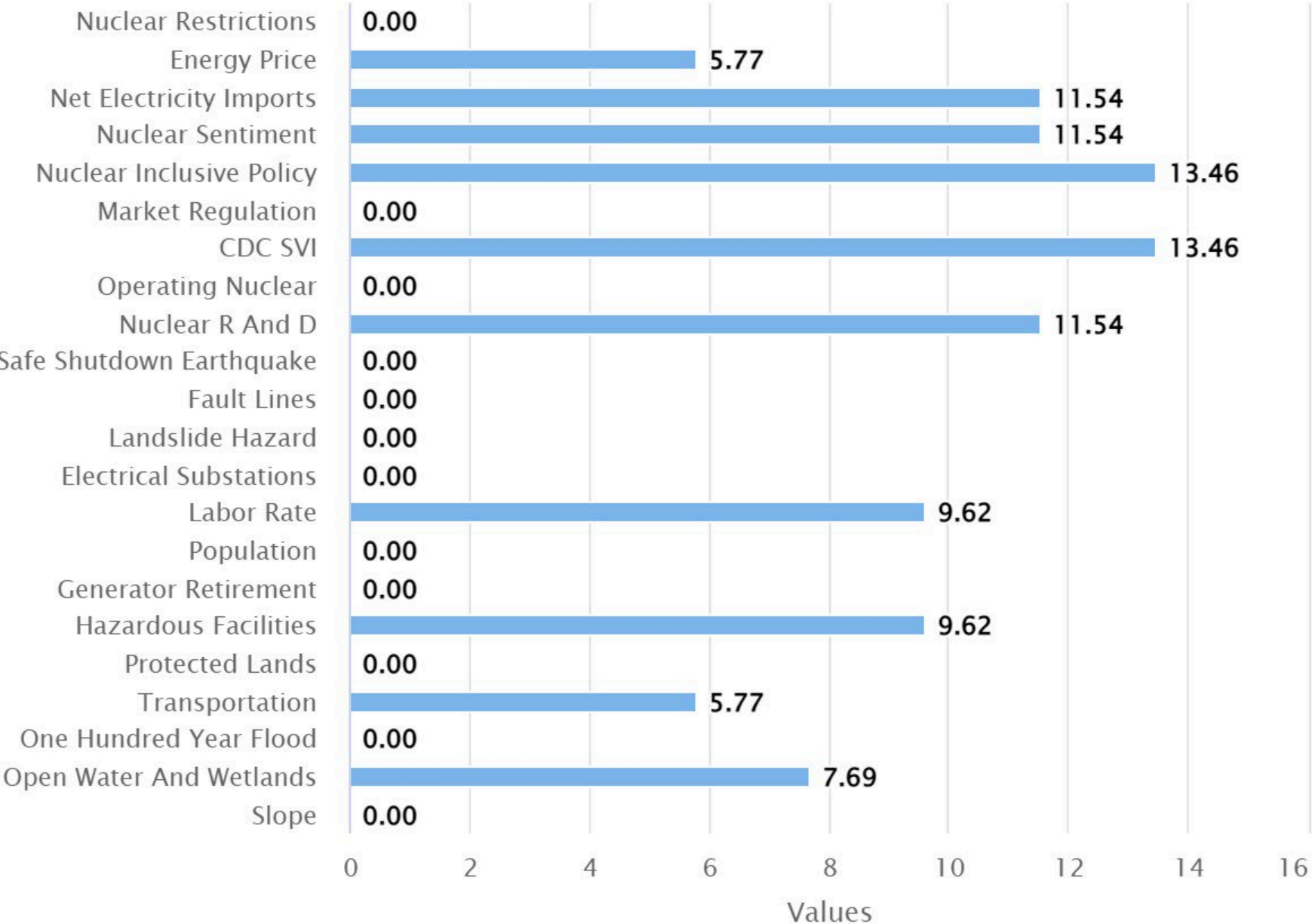
Download Result I

[Result Data \(CSV\)](#)

Download the objective va



Normalized Weights



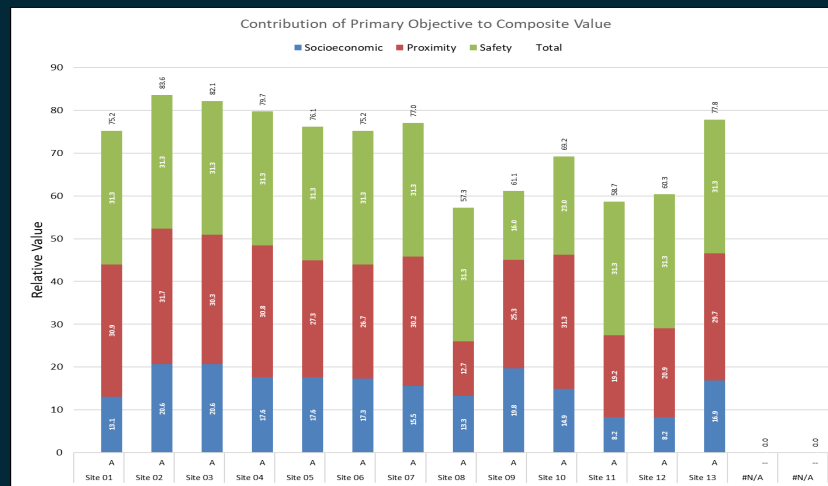
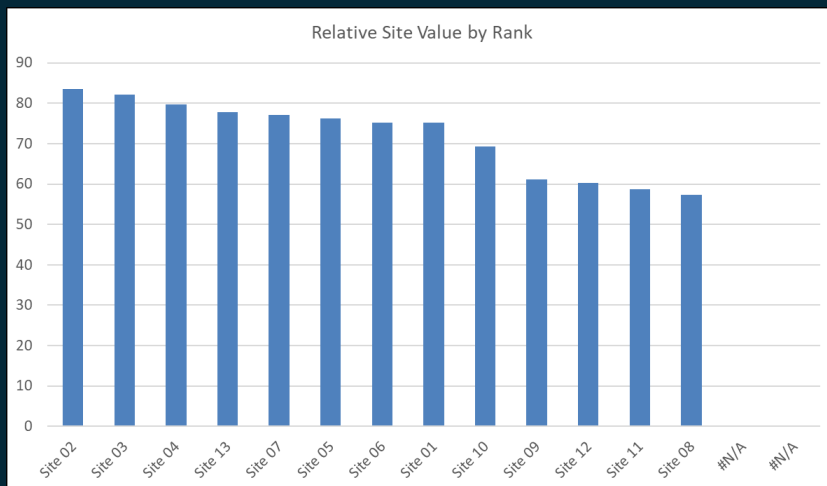
y ● Socioeconomic





# Site Comparison Results

Site comparison results are displayed in various graphical forms that enable the user to easily understand the results.



Request access, log in, and find links to the STAND Tech Talk slides and video at: [https://nric.inl.gov/stand\\_tool-2/](https://nric.inl.gov/stand_tool-2/)

# Thank you!

## Questions?



## Data Availability by Geography

Layer	Variable	CONUS	AK	HI	Source
<b>EJ40</b>	CEJST Climate	X	X	X	Council on Environmental Quality (CEQ)
	CEJST Energy	X	X	X	
	CEJST Health	X	X	X	
	CEJST Housing	X	X	X	
	CEJST Pollution	X	X	X	
	CEJST Transit	X	X	X	
	CEJST Water	X	X	X	
	CEJST Workforce	X	X	X	
<b>Construction Mean Annual Wage By State</b>		X	X	X	Bureau of Labor Statistics
<b>Electric Energy Generators</b>		X	X	X	EIA
<b>Electricity Market Type By State</b>		X	X	X	EPA
<b>Electric Retail Service Territories</b>		X	X	X	Homeland Infrastructure Foundation Level Data (HIFLD)
<b>Electric Substations</b>		X	X	X	Homeland Infrastructure Foundation Level Data (HIFLD)
<b>Energy Intensive Facilities</b>	Food Industry	X	X	X	HSIP 60LD 2015
	Manufacturing	X	X	X	
	Mining	X	X	X	
<b>Fault Lines</b>		X	X	X	USGS Quaternary Fault and Fold Database
<b>Hazardous Facilities</b>	Airports	X	X		HSIP 60LD 2015
	Biodiesel Plants	X			
	Biological Products Manufacturing	X	X	X	
	Chemical Manufacturing	X	X	X	
	Ethanol Plants	X			
	Explosives Manufacturing	X	X	X	
	Liquefied Natural Gas Import Terminals	X	X		
	Lubricating Oils and Grease Plants	X	X	X	
	Natural Gas Compressor Stations	X			
	Natural Gas Import/Export Locations	X			
	Natural Gas Processing Plants	X			
	Natural Gas Storage Facilities	X			
	Nitrogenous Fertilizer Plants	X	X	X	
	Nuclear Fuel Plants	X			
	Oil Refineries	X	X	X	
	Petroleum Pumping Stations	X	X	X	
	Pharmaceutical Preparations Manufacturing	X	X	X	
	Phosphatic Fertilizer Plants	X	X	X	
	POL Terminals, Storage Facilities, Tank Farms	X	X	X	
<b>Landslide Hazard</b>		X			USGS, Source from report
<b>NERC Regions</b>		X			Homeland Infrastructure Foundation Level Data (HIFLD)
<b>Net Electricity Imports By State</b>		X	X	X	EIA Net Interstate Flow of Electricity, EIA Electricity Net Imports
<b>Nuclear Facility Summary By County</b>		X	X	X	EIA
<b>Nuclear Inclusive Policy By State</b>		X	X	X	NCSL, DSIRE
<b>Nuclear R And D By County</b>		X	X	X	FPTZ
<b>Nuclear Restriction By State</b>		X	X	X	NCSL
<b>Nuclear Sentiment By County</b>		X			University of Oklahoma Center for Risk and Resilience & FPTZ
<b>One Hundred Year Flood</b>		X		X	ORNL collected from state and county level floodplain data.
<b>Open Water And Wetlands</b>		X	X	X	NLCD 2016 Land Cover (CONUS)



Continued..

<b>Population</b>	2018	X				
	2020		X		X	ORNL Landscan data and US Census data
	2030	X				
<b>Protected Lands</b>	American Indian reservations	X	X			
	Correctional facilities	X	X			
	Critical habitat	X	X			
	Forests	X	X			
	Hospitals	X	X			USFWS Critical Habitat, Wild and Scenic River Lines (ArcGIS),
	National monuments	X	X			USFWS National Cadastral Data, US Census, HIFLD Hospitals,
	National, state, and local parks	X	X			HIFLD Prison Boundaries, HIFLD Colleges and Universities, USDA
	Schools/colleges	X	X			2001 Roadless Rule GIS Data, BLM Navigator
	Wild and scenic rivers	X				
	Wilderness areas	X				
<b>Retail Energy Price By State</b>		X	X		X	EIA
<b>Retiring Generator Summary By County</b>		X	X		X	EIA
<b>Safe Shutdown Earthquake</b>	0.3g	X				
	0.4g	X				
	0.5g	X				
	0.6g	X				USGS National Seismic Hazard Mapping data
	0.5g				X	
	10g				X	
	15g			X		
<b>Slope</b>	12%	X	X		X	Digital Terrain Elevation Dataset National Geospatial Intelligence Agency
	18%	X	X		X	
<b>Social Vulnerability Index By County</b>		X	X		X	CDC
<b>Streamflow</b>	15kgpm	X				
	20kgpm		X			
	50kgpm	X				Low-flow statistics (7-day, 10 year) calculated from USGS National Water Information System (NWIS) and USGS/EPA National Hydrologic Dataset Plus
	65kgpm	X				
	84kgpm			X		
<b>Transmission Lines</b>		X	X		X	Homeland Infrastructure Foundation Level Data (HIFLD)
<b>Transportation</b>	Major Roads	X	X		X	
	Navigable Waterways	X	X		X	HSIP GOLD 2015
	Rail Lines	X	X		X	
<b>Utility Nuclear Experience By County</b>		X	X		X	EIA augmented by additional FPTZ research. See documentation for more information.





# Advanced Nuclear Technology: Owner-Operator Reactor Technology Assessment Guide

2022 Version

<https://www.epri.com/research/programs/065093/results/3002025344>