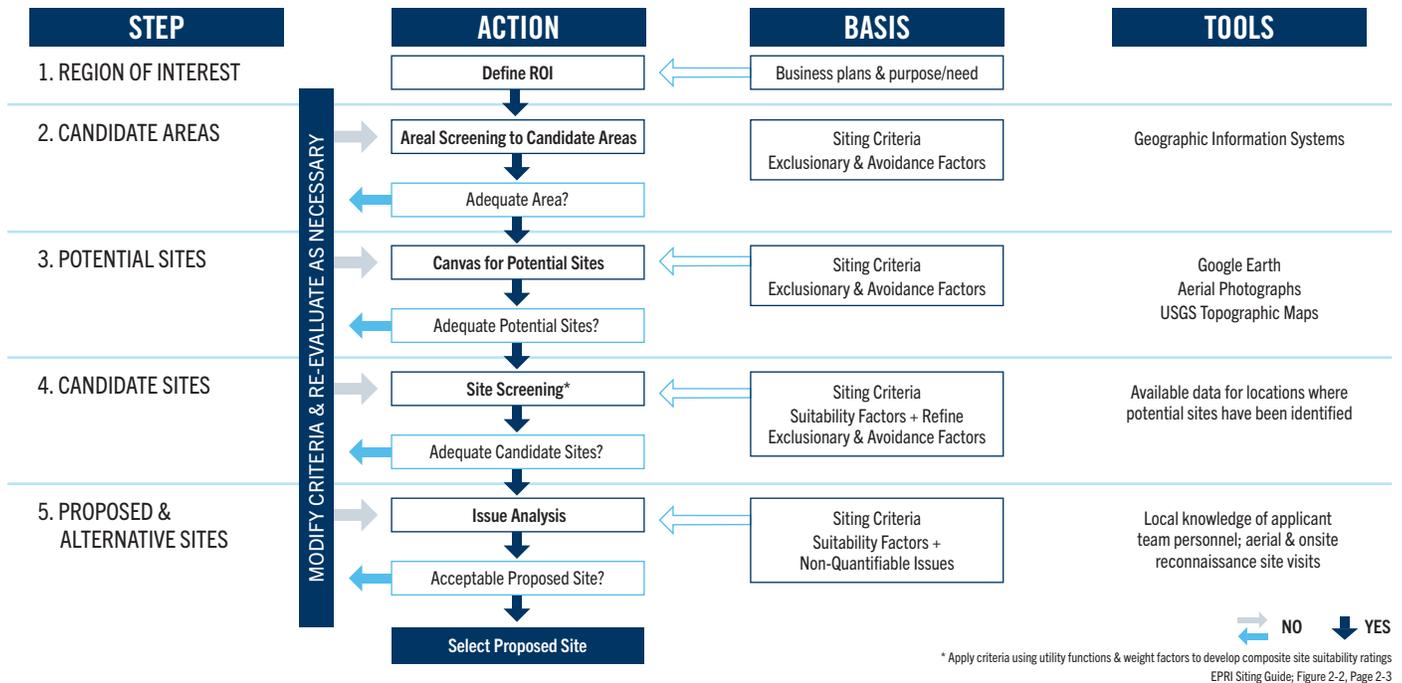


NUCLEAR POWER GENERATION SITING PROCESS & GUIDELINES

PROCESS DISCUSSION

EPRI's Siting Guide defines a step-by-step procedure for nuclear plant site selection and evaluation. This is the process to be followed and documented for NRC application approval.



REGION OF INTEREST

The first step in selecting a nuclear plant site is to identify a business purpose for nuclear energy. If there is a need to supply an individual load center, such as a new industry, then that industry should be involved in selecting the larger Region of Interest (ROI). This is the largest area to review that will include an area where individual sites could be that would accomplish the project objectives.

At this point, the team should include:

- Owner-Operator
- KY CED
- Potential Industry

CANDIDATE AREAS

Once a Region of Interest has been identified, it needs to be narrowed down. This is done by screening the area with exclusionary factors. Areas near large population centers, areas far from water sources, areas with nearby hazardous land uses, hydrogeology/geology and seismology concerns, or important species that would be disrupted can be excluded at this time, and only the remaining areas proceed in the screening process. At this point, local, state, and federal regulators should be involved. A consultant who specializes in nuclear plant development and engineering should be brought onto the team to assist in these discussions, as well as in the data/screening process.

Meetings should be scheduled with the following regulators:

- Kentucky Division of Water & USACE – Discuss water and wetlands related issues.
- Kentucky Public Service Commission – Discuss need for energy, why nuclear.
- Nuclear Regulatory Commission – Discuss process and permitting.

At this point, the team should include:

- Owner-Operator
- KY CED
- Experienced Nuclear Consultant

POTENTIAL SITES

Next, the areas are screened for potential site locations. Typically, this step of the evaluation should narrow down to 10-20 sites. The Criteria section of this document contains the factors to consider. Sections 2.2-2.4 of EPRI's Siting Guide explains in greater detail how to apply the siting criteria, and which criteria are more important.

At this point, the team should include:

- Owner-Operator
- KY CED
- Experienced Nuclear Consultant

CANDIDATE SITES

After this, the remaining sites should be screened in greater detail and scored against each other as Table 2-1 of EPRI's Siting Guide shows. The top 3-5 scoring sites can be considered candidate sites.

At this point, the team should include:

- Owner-Operator
- KY CED
- Experienced Nuclear Consultant

PROPOSED SITES & ALTERNATIVE SITES

At this point, the owner-operator has the final decision to make, weighing all factors, on which site will be the proposed site to apply to the NRC with. Other sites should still be considered as alternative sites for NRC Application. The NRC and USACE will require alternative sites to have similar levels of detail to the proposed site, including conceptual layouts.

PERMITTING

Various permits are required for construction of a nuclear plant. EPRI's Single Site Evaluation Guide (Page 41) lists the following potential necessary permits:

AGENCY	PERMITS
U.S. FAA	- Construction notice, aircraft hazards (i.e., for tall structures)
State Public Utilities Commission	- Certificate of Public Convenience and Necessity
U.S. ACE	- Federal Water Pollution Control Act - Section 404 permit for protection of wetlands
U.S. Coast Guard	- Private aids to navigation (if project affects a navigable waterway)
U.S. ACE/State Regulator	- Rivers and Harbors Act
U.S. Fish and Wildlife Service	- Endangered Species Act - Migratory Bird Treaty Act
State Department of Environmental Quality	- Hazardous waste and mixed waste in accordance with the Resource Conservation and Recovery Act - Clean Air Act, operating permit, air pollution control and abatement, and construction equipment air emissions - Drinking water - Withdrawal of groundwater - General permit to discharge stormwater during construction and after completion - National Pollutant Discharge Elimination System (NPDES) - Permit for liquid discharges to surface waters - Solid waste
State Department of Historic Resources	- Cultural survey, etc.
State Department of Transportation	- Transport of hazardous material - Transport of radioactive material - Equipment transport routes for oversize or overweight loads
State/DOE Permit	- Water supply, wetlands
Local agencies	- Certificate of occupancy for buildings

These permits are site-specific, and some may not be required for a final site. Clearly the full NEPA process will be necessary and the AHJ will need to be determined specific to the process.

The NRC permit that is ultimately required for construction and operation of a nuclear plant can be applied for in three different ways:

- 10 CFR Part 50 – Two step licensing process
- 10 CFR Part 52 – Combined licensing process
- Early Site Permit – Allows for site construction prior to completion of reactor design.

CRITERIA

18 Siting Criteria are listed in *Advanced Nuclear Technology: Single Site Evaluation Guide*, 2.3.2.3, Table 3. Also, see Table 2-4 for application of these criteria to the siting process.

1. LAND AREA

2022 EPRI Siting Guide Table 1-1: Typical Plant Land Area vs. Size					
SIZE	OPERATING (MWt)	OUTPUT (MWe)	TYPICAL LAND AREA NEEDED (Acres)		
			PLANT FOOTPRINT	OVERALL SITE	ADDITIONAL CONSTRUCTION
Micro	<=150	<=50	0.1 – 4	1 – 8	2 – 10
Small (SMR)	150>=900	50>=300	25 – 200	50 – 500	50 – 100
Medium	900>=1800	300>=600	60 – 250	250 – 800	75 – 200
Large	>1800	>600	100 - 400	500 - 2000	100 - 500

2. GEOLOGY / SEISMOLOGY

- Seismic Hazard: Peak ground acceleration less than 0.3g for large designs and 0.5g for smaller designs.
- Proximity to Fault Lines:

10 CFR 100 Appendix A, Table 1	
Distance from the site (miles)	Minimum Length (miles)
0 - 20	1
20 - 50	5
50 - 100	10
100 - 150	20
150 - 200	40

3. COOLING WATER SUPPLY

- Sited near higher flow reaches of cooling water source.
- Sources can be surface waters, groundwater, or reclaimed water (for example, water treatment plant effluent)
- Evaluate flow at seven-day, 10-year low flows and historical drought stages/elevations to ensure they meet design flow requirements.
- Evaluate effects of cooling water withdrawal on water quality.
- Evaluate pumping distance. Should be within 5 miles or less of a water source.

4. FLOODING

- Avoid 100-year floodplain area. Flood protection would have to be constructed.

5. NEARBY HAZARDOUS LAND USES

- Avoid land within 10 miles of major airports and military installations.
- Identify potentially hazardous facilities and activities within 5 miles of a proposed site.

6. POPULATION

- Less than 500 people/sqmi within 20-mile radius. Use 300 people/sqmi to account for growth.
- Population center of 25,000 people or more should be no closer than 4 miles from the reactor.

7. ATMOSPHERIC DISPERSION

- Avoid areas in valleys or surrounded by large hills where short-term atmospheric dispersion would be limited.

8. GROUNDWATER RADIONUCLIDE PATHWAY

- Avoid regions where EPA Class I groundwater resources or sole source aquifers have been identified.

9. DISRUPTION OF IMPORTANT AQUATIC SPECIES/HABITATS

- Exclude areas designated as critical habitat.
- Exclude areas where threatened and endangered species are known to be present.

10. DISRUPTION OF IMPORTANT TERRESTRIAL SPECIES/HABITATS

- Exclude areas designated as critical habitat.
- Exclude areas where threatened and endangered species are known to be present.

11. DISRUPTION OF WETLANDS

- Avoid wetlands when possible.

12. LAND USE

- Exclude protected/dedicated lands.
- Previous land use type.

13. PUMPING DISTANCE

- Distance from water source for cooling.
- Typically, water source should be at least within 5 miles of plant.
- Further away increases costs.

14. RAILROAD ACCESS

- Access to railroad and its ability to support transport of plant components.

15. HIGHWAY ACCESS

- Access to highways and their ability to support transport of plant components.

16. TRANSMISSION

- Proximity to existing transmission infrastructure and ability to access it.

17. TOPOGRAPHY

- Evaluate area topography.

18. LAND RIGHTS

- Evaluate land rights and ownership.

SUMMARY

To develop nuclear power in Kentucky, a business case must be identified. Once this has been identified, a region of interest for site location should be created, driven by the business case. An expert in nuclear development should be hired to lead the team.

Following the identification of the desired region or regions, the team would then follow the process described in this document and in EPRI's Siting Guide to narrow down the area into potential sites, documenting the entire process to be prepared for ultimate permit application to the NRC. Local, state, and federal regulators should be engaged early in this process to understand their concerns and processes clearly. Ultimately, the owner-operator/developer will select the proposed alternative sites and develop the proper regulatory applications.