



PolicyAI

Democratizing artificial intelligence (AI) for improving permitting outcomes and efficiency

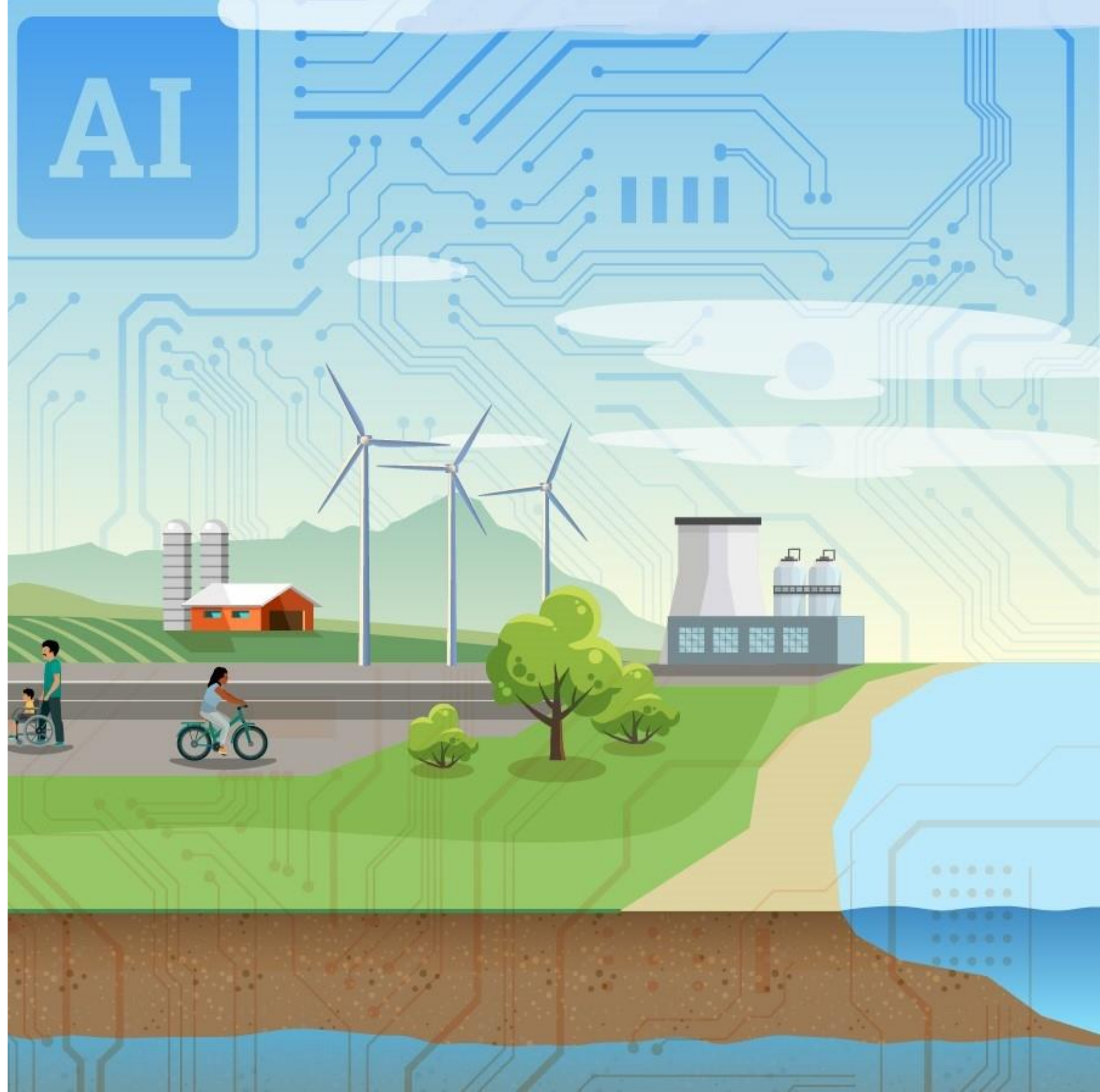
September 17, 2024

Dan Nally



PNNL is operated by Battelle for the U.S. Department of Energy

PNNL-SA-203779



Origins and Initial Steps

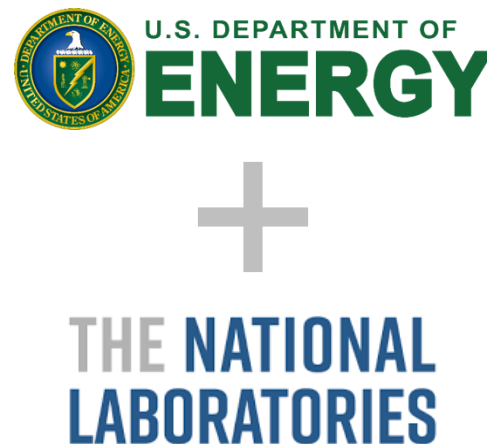
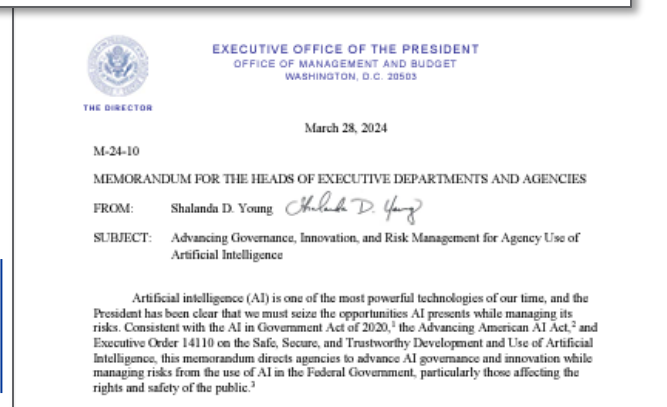
[Executive Order 14110](#)



<https://www.whitehouse.gov...>



[OMB M-24-10](#)

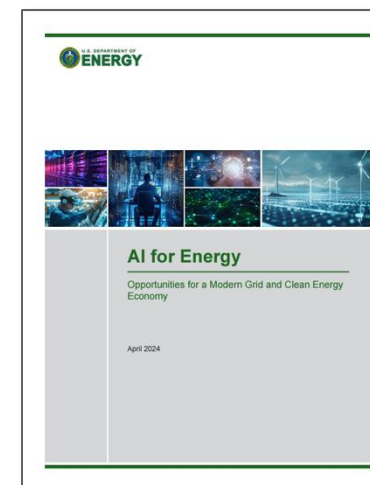


ACTIONS

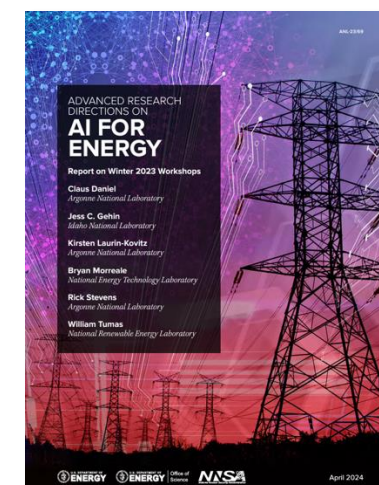
The U.S. Department of Energy (DOE) [has announced many actions](#) to assess opportunities and challenges of AI for purposes of accelerating deployment of clean energy and managing growing energy demand.

These actions include coordination with regulators, researchers, utilities, clean energy developers, data center owners and operators, and other interested parties.

REPORTS

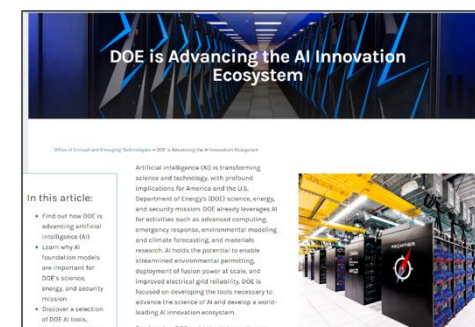


[DOE 2024](#)

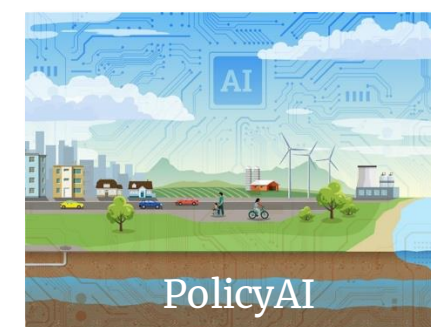


[DOE 2024](#)

TOOLS

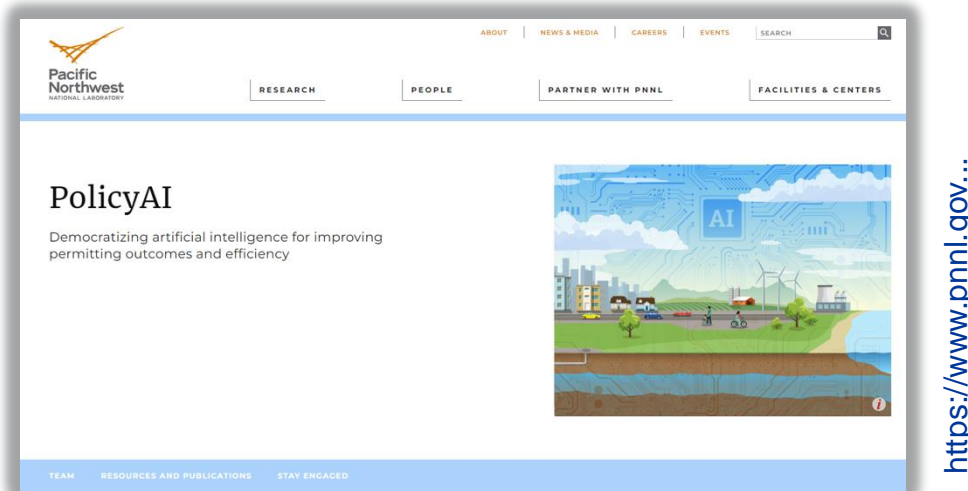


<https://www.energy.gov...>



<https://www.pnnl.gov...>

PolicyAI Overview



Timeline

Current status: Research and development, pilot and v1 applications, interagency agreements and feedback

1–2 years

AI-enabled pilots improving permitting workflows

5 years

Operationalized AI models streamlining permitting

- PolicyAI is the anchor project in DOE's \$20 million VoltAIc Initiative that includes support from the Permitting Council
- DOE partnered with the Pacific Northwest National Laboratory (PNNL) to develop PolicyAI
- Includes coordination with the Council on Environmental Quality (CEQ), various federal agencies, and industry
- PolicyAI tools are intended to be adaptable for use by multiple federal agencies

Guiding Principles

**PolicyAI is a policy-specific multimodal large language model (LLM)
test bed seeking to...**

Judiciously apply artificial intelligence (AI) to improve permitting outcomes and efficiencies, particularly for National Environmental Policy Act (NEPA) and related reviews

Introduce AI features that improve accessibility and transparency of permitting processes and information to the public

Thrust Areas

Data Collection, Standardization, Management, and Governance

Optimize processing and storage of permitting documents in an AI-compatible format (i.e., NEPATEC dataset)

AI Model Prototyping and Benchmark Development

Fine-tune LLMs with NEPA knowledge and evaluate (e.g., NEPAQuAD benchmark)

User Discovery and Rapid Application Development

- **Document Search (SearchNEPA)**
- **Comment Analysis**
- Drafting Assistant
- *and more to come*

SearchNEPA

Home

Version 1.0

 PNNL An official website enabled by the Pacific Northwest National Laboratory

SearchNEPA  AI For U.S. Environmental And Permitting Reviews



Ask Themis.ai

Help me learn about RNG projects

Renewable Natural Gas

List all NEPA documents

National Environmental Policy Act

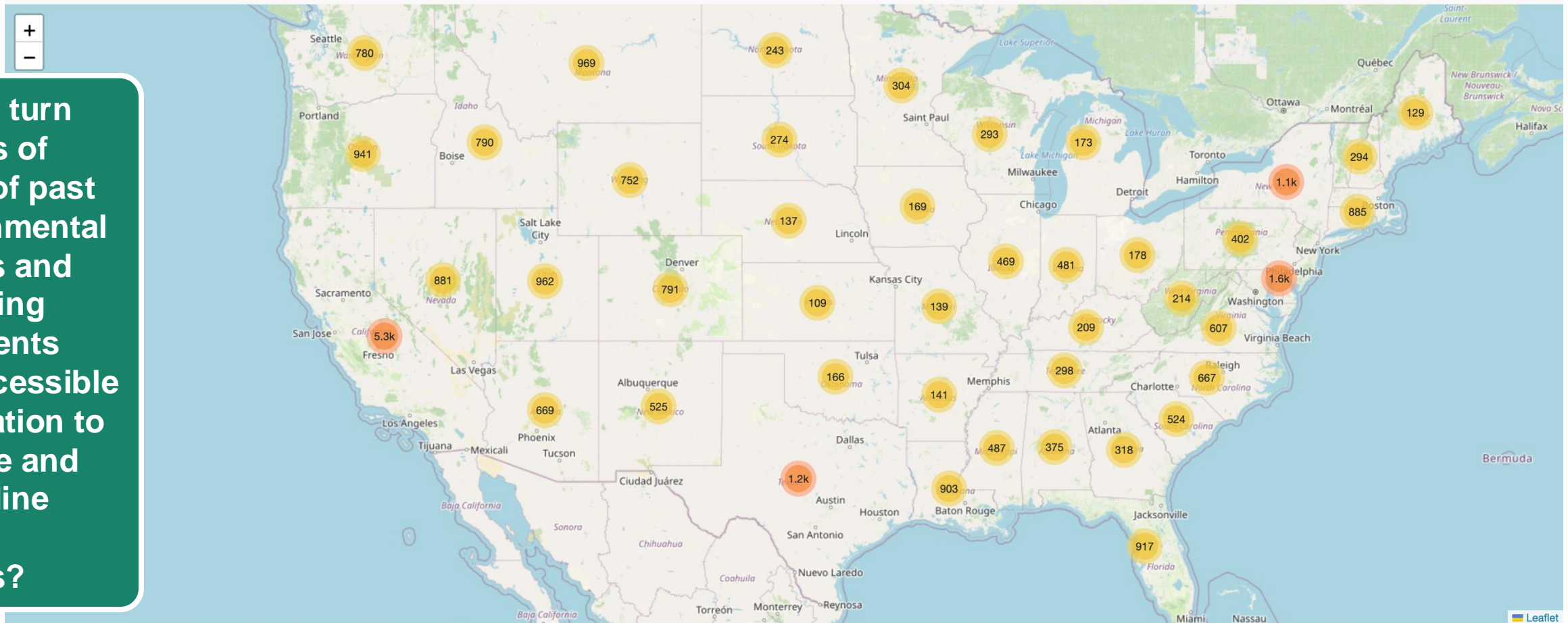
List all documents in California


California

List all EPA documents

Environmental Protection Agency

Can we turn millions of pages of past environmental reviews and permitting documents into accessible information to improve and streamline current reviews?





radioactive waste x

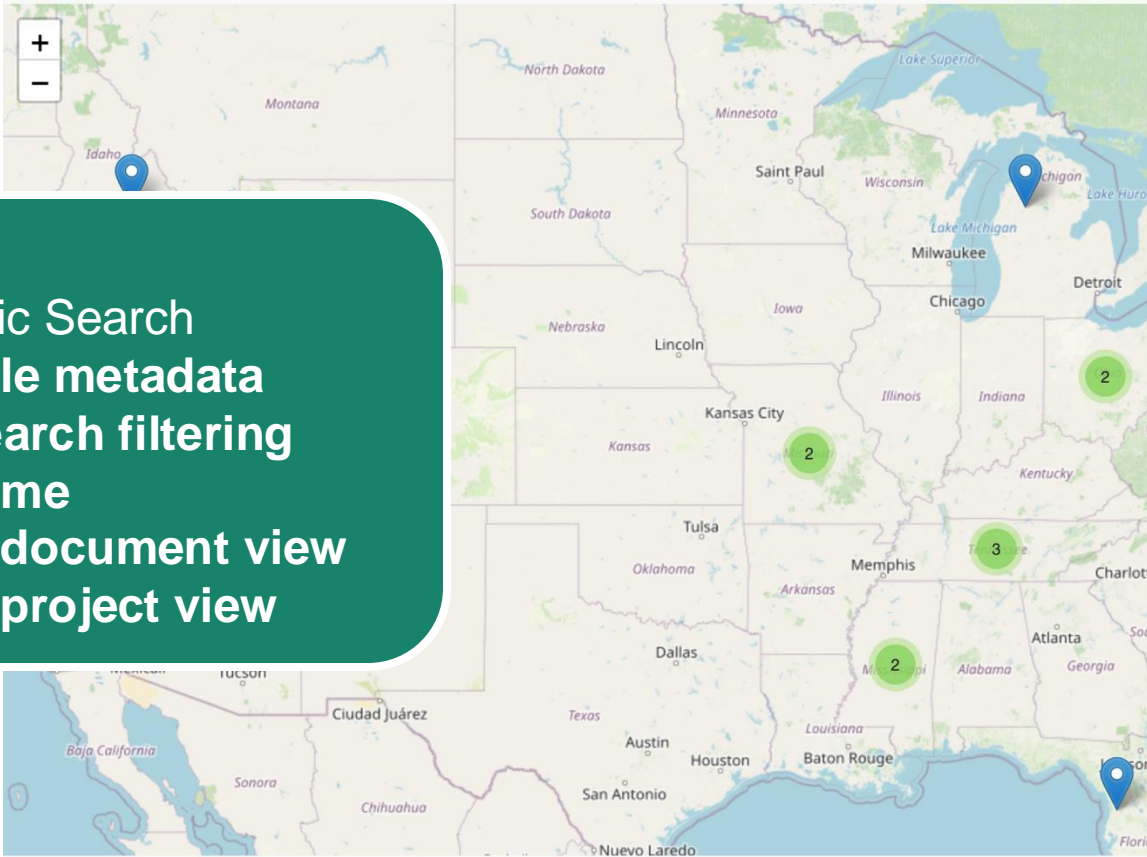
high-level waste disposal x

Help me learn about RNG projects
Renewable Natural Gas

List all NEPA documents
National Environmental Policy Act

List all documents in California
California

List all EPA documents
Environmental Protection Agency



Document Results

EIS-0542 Volume 3 Comment Response Document > 3 pages
Draft Versatile Test Reactor Environment Impact Statement
South Carolina, Tennessee, Idaho Department of Energy Map It

Generic Environmental Impact Statement for License Renewal of Nuclear Plants Vol 2 > 2 pages
GENERIC - License Renewal of Nuclear Plants (NUREG-1437)
Nuclear Regulatory Commission Map It

Generic Environmental Impact Statement for License Renewal of Nuclear Plants Vol 1 > 2 pages
GENERIC - License Renewal of Nuclear Plants (NUREG-1437)
Nuclear Regulatory Commission Map It

Generic Environmental Impact Statement for License Renewal of Nuclear Plants Vol 3 > 2 pages
GENERIC - License Renewal of Nuclear Plants (NUREG-1437)
Nuclear Regulatory Commission Map It

GGNS DSEIS Supplement 50 to the GEIS > 2 pages
Generic - License Renewal of Nuclear Plants Supplement 50 Regarding Grand Gulf Nuclear Station Unit 1
Mississippi Nuclear Regulatory Commission Map It

20 Documents

> AGENCIES

- Nuclear Regulatory Co
- Department of Energy

> STATES

- Michigan
- Florida
- California
- Mississippi
- South Carolina
- Tennessee
- Virginia
- New Hampshire
- Maryland
- Missouri
- Pennsylvania
- Idaho
- Ohio

Features

- Semantic Search
- Clickable metadata
- Post-search filtering
- Map frame
- Link to document view
- Link to project view

SearchNEPA

GenAI Search

Version 1.0

PNNL An official website enabled by the Pacific Northwest National Laboratory

SearchNEPA AI For U.S. Environmental And Permitting Reviews

SearchNEPA.ai

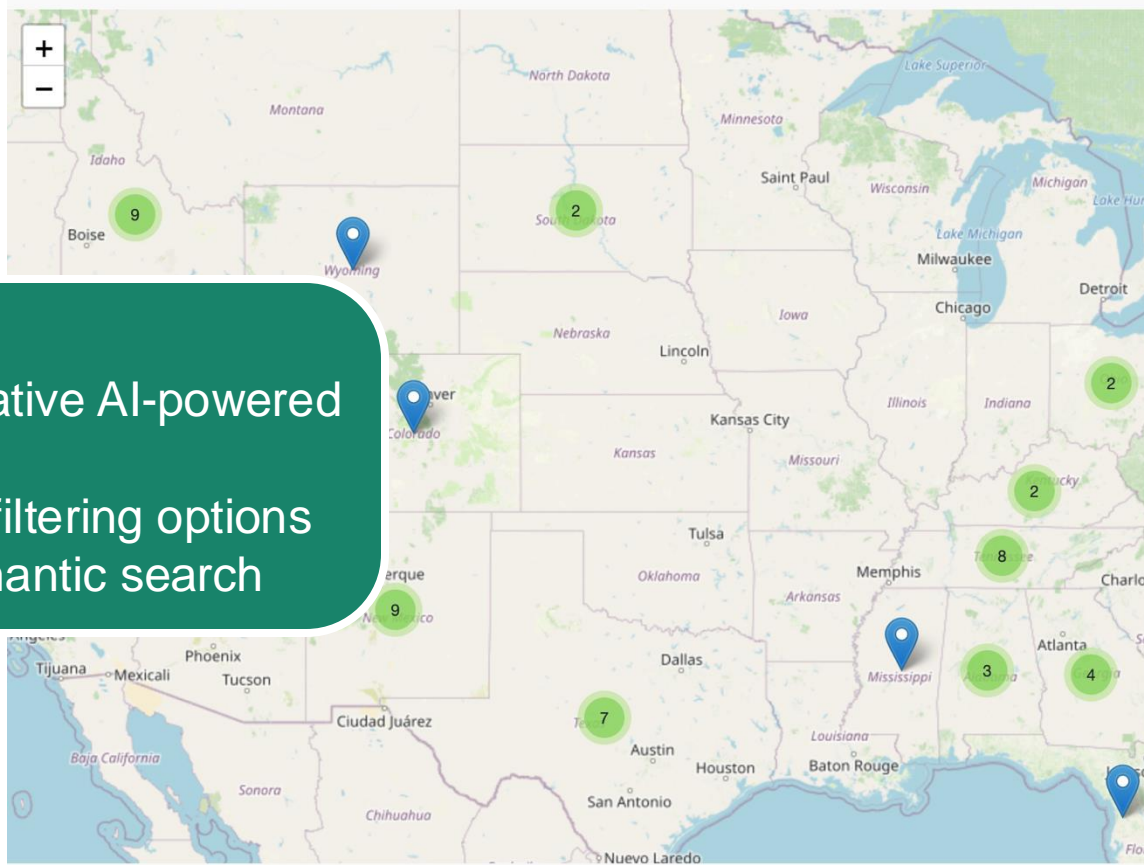
Provide information about interim storage of radioactive waste

Help me learn about RNG projects
Renewable Natural Gas

List all NEPA documents
National Environmental Policy Act

List all documents in California
California

List all EPA documents
Environmental Protection Agency



Document Results

NUREG-2239 Draft Report for Comment

Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas

Texas Nuclear Regulatory Commission Map It

36 of 40 Final TCWM EIS Section 3 Part 2 of 5

Hanford Site Tank Closure and Waste Management Project Implementation Richland Benton County WA

Washington Department of Energy Map It

Appendix B 03 Addendum to the Geotechnical and Hazardous Materials Tech Report

ADOPTION - Westside Purple Line Extension Section 4(f) Evaluation

California U.S. Army Corps of Engineers, Department of Veteran Affairs, Federal Transit Administration Map It

EIS-0542 Volume2 FrontMatterandTableofContents

Draft Versatile Test Reactor Environment Impact Statement

South Carolina, Tennessee, Idaho Department of Energy Map It

Enivronmental Impact Statement for the Reno Creek In Situ Recovery Project

Reno Creek In Situ Recovery Project

Wyoming Nuclear Regulatory Commission Map It

50 Documents

AGENCIES

- Department of Veteran
- Department of Defense
- Bureau of Land Manage
- Nuclear Regulatory Co
- Federal Transit Admin
- United States Navy
- National Nuclear Secu
- U.S. Army Corps of En
- Department of Energy

STATES

- California
- District of Columbia
- Washington
- Wyoming
- Idaho
- New Mexico
- Colorado
- Georgia
- Mississippi
- South Dakota
- Texas

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Features

- Generative AI-powered search
- Same filtering options as semantic search

The screenshot displays the SearchNEPA web application interface. At the top, there's a green header bar with the "SearchNEPA" logo and the text "AI For U.S. Environmental And Permitting Reviews". Below this, the main content area is divided into three vertical sections. The leftmost section, titled "NUREG 2239 Draft Report for Comment", features the Nuclear Regulatory Commission logo and a map of Texas with a location pin. The middle section contains a sidebar menu listing various report components like "AVAILABILITY OF REFERENCE MATERIALS IN NRC PUBLICATIONS", "COMMENTS ON DRAFT REPORT", "ABSTRACT", "3 DESCRIPTION OF THE AFFECTED ENVIRONMENT", "2 BACKGROUND", "1 INTRODUCTION", "2 PROPOSED ACTION AND ALTERNATIVES", and "13 Comparison of Predicted Environmental Impacts". The rightmost section shows the full text of the "2 BACKGROUND" section, detailing the history of the license application for a consolidated interim storage facility (CISF) for spent nuclear fuel (SNF) in Andrews County, Texas. On the far right, a dark blue overlay box highlights the application's "Features": displaying document and associated metadata, and linking to project views. The bottom of the page has a footer with links for privacy policy, terms & conditions, and funding information.

SearchNEPA – Planned Updates

Project View page
with GenAI summary

A permitting schedule
showing permits and
progress associated
with the project

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SearchNEPA AI For U.S. Environmental And Permitting Reviews

UN

Home Map Maker Schedule Analytics Stories Help

RNG

Rio Grand Forest Plan Revision

Short Description Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod.

AI Writer

PERMITTING TIMETABLE

6/6

Environmental Review and Permitting Process Completed

AGENCIES

Department of U.S. Army Corps of Engineers - Regulatory

Department of the Interior, Fish, and Wildlife Service

Document Overview

Rio Grand Forest Plan Revision

EPA Map It

Short Description Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod.

| Chapter | Section | Page Range |
|--------------|---|------------|
| Chapter I | Federal Energy Regulatory Commission | 1 - 399 |
| Subchapter A | General Rules | 1 - 3c |
| Subchapter B | Regulations Under the Federal Power Act | 4 - 50 |
| Subchapter C | Accounts, Federal Power Act | 101 - 125 |

Permitting Schedule

2020 2023

| Step | Start Date | End Date |
|--------|------------|------------|
| Step 1 | 2020-01-01 | 2020-06-01 |
| Step 2 | 2020-06-01 | 2020-12-01 |
| Step 3 | 2020-12-01 | 2021-06-01 |
| Step 4 | 2021-06-01 | 2021-12-01 |
| Step 5 | 2021-12-01 | 2022-06-01 |
| Step 6 | 2022-06-01 | 2023-01-01 |

Total Documents: 11

Total Projects: 1

WASHINGTON OREGON IDAHO NEVADA San Francisco

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GenAI integration for "chatting" with the document

PNNL

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SearchNEPA

AI For U.S. Environmental And Permitting Reviews

UN

Aiya Solar Project

Summary Documents Comments Map Permitting Schedule

EIS Volume 1 Chapter 1-8

Comments 1/12

EXECUTIVE SUMMARY

The following sections summarize the Draft Environmental Impact Statement (DEIS) for the Aiya Solar Project. This information is provided as an overview for the public, but is not a substitute for review of the complete DEIS.

This executive summary provides a general overview of the Proposed Project and its purpose and need. It also briefly describes the Proposed Actions by the Bureau of Indian Affairs (BIA) as the lead agency and the U.S. Bureau of Land Management (BLM) as a cooperating agency who will both use this EIS to make their respective decisions. The Moapa Band of Paiutes (Tribe), U.S. Environmental Protection Agency (EPA), and the US Fish and Wildlife Service (USFWS) are also cooperating agencies on this EIS. The USFWS will use this information to render their decision under Section 7 of the Endangered Species Act (ESA).This executive summary also outlines the Proposed Project and alternatives considered in this EIS as well as the environmental impacts that would occur if they were implemented.

Aiya Solar Project, LLC (Aiya Solar or Applicant) has entered into an agreement with the Tribe to lease land, for up to 30 years, on the Moapa River Indian Reservation (Reservation) for the purposes of constructing, operating, and maintaining the Aiya Solar Project and associated infrastructure. The Proposed Project would generate electricity using photovoltaic (PV) technology and would generate up to 100 megawatts (MW).

The Tribe is federally recognized and has a Constitution approved by the Secretary of the Interior on April 17, 1942. The tribal lands originally set aside in 1874 consisted of two million acres, but in 1876 it was reduced to a thousand acres. In December 1980, Congress added approximately 70,000 acres to the Tribal land base. The stated purpose of the restoration of these Tribal lands was to provide economic development opportunities. The current

What is a summary of the project?

The Aiya Solar Project is a significant solar power initiative aimed at boosting renewable energy production. Here's a summary of its key points:

1. Location and Scale:

The project is based in a specific region, often aiming to utilize a large area of land to install solar panels. It is designed to generate a substantial amount of electricity, contributing significantly to the local or national grid.

2. Objectives:

The primary goals are to increase the share of renewable energy, reduce dependence on fossil fuels, and lower greenhouse gas emissions. This aligns with broader sustainability and environmental goals.

3. Technology:

The project typically involves the use of advanced solar photovoltaic (PV) technology to convert sunlight into electricity. It may also incorporate innovations like solar trackers or energy storage systems to enhance efficiency.

4. Economic and Environmental Impact:

The Aiya Solar Project is expected to create jobs, stimulate local economies, and provide a cleaner energy source. The reduction in carbon emissions and other pollutants is a significant benefit, contributing to climate change mitigation efforts.

5. Timeline and Development:

The project might be implemented in phases, with planning, construction, and operational stages spanning several years. Key milestones include securing permits, completing construction, and commencing energy generation.

Can summarize all comments?

Annotating features with commenting and highlighting

Draft EIS Volume 1

Draft EIS Volume 2 Append.

EIS Volume 1 Chapter 1-8

EIS Volume 2 Append. A-L

EIS Volume 2 Append. M-P

Expand Help

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SearchNEPA

Ongoing Improvements

- Continued collection and processing of existing NEPA documents
- Continued coordination with CEQ on a standardized data ontology for NEPA documents
- Fine-tune generative AI chat and summarization capabilities

Planned Future Enhancements

- Use AI to generate geospatial information from past projects for more detailed locational searches
- Develop analytics platform for multi-document statistical and trend analysis
- Develop public comment feature enabling precise comment placement within document, and rapid intake and summarization with AI

Comment Analysis



This correspondence document contains quotes that will be used to populate a NEPA scoping summary report. That report will be organized by resources areas (e.g., Environmental Justice, NEPA Policy, Air Quality). With that in mind, I need this correspondence to be broken into discrete delineated quotes by NEPA-relevant resource areas. All narrative content should be delineated, and if a quote does not fit any category, list that quote at the beginning under the heading "Not Applicable". The content should be formatted as a table where column 1 would have a relevant category, column 2 the name of the commenter (if known), and column 3 would contain the quote from the correspondence that fits in that section. The table should be sorted in the order comments appear in the correspondence. The scoping summary report we're writing includes the following sections, separated by semicolons: Postulated Accidents; Alternative – No-Action; Alternatives - Replacement Power; Environmental Justice; Geologic Environment; Greenhouse Gas Emissions and Climate Change; Historic and Cultural Resources; Human Health - Microbiological Hazard; Human Health - Radiological; Hydrology; Meteorology and Air Quality; Socioeconomics; Uranium Fuel Cycle; Waste Management - Radioactive Waste; General Comment: comments general in nature that do not convey significant information for environmental review; NRC Review Process NEPA, 10 CFR 51, and 10 CFR 54; Emergency Preparedness; Peripheral or Outside of Scope Miscellaneous; Aging Management; Safety; Security and Terrorism; Energy Costs; Need for Nuclear Power.



Here is the correspondence reformatted into a table with columns for category, commenter name, and quote, sorted by the order the quotes appear in the document, and categorized under relevant NEPA resource areas:

| Category | Commenter Name | Quote |
|--------------------------------------|----------------|---|
| Waste Management - Radioactive Waste | [REDACTED] | Further, these containers, designed only for temporary storage, had been used for storage for up to 14 years. Though this incident appeared in the Environmental Assessment, WEC's failure to disclose the site and existing contamination showed lack of attention to proper site management and disclosure. |
| Waste Management - Radioactive Waste | [REDACTED] | Intermodal containers. The damaged and leaking trailers and their contents are currently being remediated under the Southern Storage Area Operable Unit Intermodal Container Work Plan, details of which appear in the Final Interim Remedial Investigation Summary Report developed as part of Westinghouse's February 2019 Consent Agreement with SCDHEC. Under the negotiated work plan, Westinghouse has been required to test soil underneath the containers for radionuclides, empty the containers of their barrels, properly dispose of the barrels and their contents, and ship the containers off-site (some as low-level radioactive waste). Contaminated soil beneath the containers was removed and subsequent tests found no further evidence of contamination. |
| NRC Review Process NEPA | [REDACTED] | Unfortunately, the Communications Protocol prepared as part of the Consent Agreement leaves too many reporting decisions to WEC's discretion. Given WEC's history, we are not confident that future incidents will be disclosed in a timely manner. We request that the Communications Protocol be revisited as part of the Environmental Impact Statement. |

Prompt

Result

- Experimentation with copilot applications to bracket, categorize, and summarize comments by subject matter
- Developing experimental design to test AI performance through retrospective comparison to human-prepared comment analyses
- Risk-informed human decision making, validation of results, information security, and transparency remain paramount

Potential NRC Use Cases for PolicyAI Tools



Improve **public access** to and understanding of NRC NEPA documents with the SearchNEPA platform and its associated GenAI features.



AI-enhanced search, chat, and analytics to more efficiently **retrieve insights** from existing NEPA documents and inform development of future documents. Potentially adaptable to other collections of large, technical, and unstructured data (e.g., ADAMS).



Screening of pre-application reviews for new licensing applications to offer guidance and to identify and **resolve potential issues** early in the licensing process.



Greater efficiency and consistency **processing and summarizing public comments** using AI-powered comment processing applications that leveraging historical comment summary and response data.

Thank you

To learn more about our PolicyAI team, resources, and publications, visit pnnl.gov/projects/policyai or email us at policyai@pnnl.gov

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Project Manager

Energy and Environment Directorate

Pacific Northwest National Laboratory

dan.nally@pnnl.gov

PNNL-SA-203779

