Geothermal Interagency Collaboration Task Force: Summary of Findings

Aaron Levine and Faith Martinez Smith

National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy
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List of Acronyms

BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
ENGO	environmental non-governmental organization
GTO	Geothermal Technologies Office
K&W	Kearns & West
IAG	interagency agreement
MOU	memorandum of understanding
NEPA	National Environmental Policy Act of 1969
NPS	National Park Service
NREL	National Renewable Energy Laboratory
RECO	Renewable Energy Coordination Office
Task Force	Geothermal Interagency Collaboration Task Force
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Executive Summary

In 2022, the National Renewable Energy Laboratory (NREL) with support from the U.S. Department of Energy (DOE) Geothermal Technologies Office (GTO) brought together federal and state regulators, geothermal industry representatives, environmental non-governmental organizations (ENGOs), and Indian Tribes for multiple meetings/forums to discuss challenges and opportunities related to geothermal regulatory approvals and permitting. This report synthesizes the views expressed during those discussions.

For context, Section 3102 of the Energy Act of 2020 established a program to improve federal permit coordination for geothermal, solar, and wind projects on federal public lands through the creation of a National Renewable Energy Coordination Office (RECO). The RECO encourages collaboration between federal, state, and Tribal authorities with the Bureau of Land Management (BLM) within the Department of the Interior serving as the lead. As part of the RECO requirements, the Secretary of Interior entered into a memorandum of understanding (MOU) with the following Secretaries: Agriculture, Energy, Defense, and the Administrator of the Environmental Protection Agency to improve renewable energy project permit coordination on public lands. This project included eleven federal agencies whose Secretaries were signatories to the MOU and in addition added state agencies in California and Nevada to form the project's Geothermal Interagency Collaboration Task Force (Task Force).

The Task Force members participated as the federal and state regulatory agency representatives in this project. The project sought additional input from other interested stakeholders through a series of forums and listening sessions. Stakeholders participating in forums and listening sessions included geothermal industry representatives, ENGOs, and Indian Tribes. The objectives of these forums or listening sessions were to collect feedback, understand perspectives, and identify opportunities and challenges for greater collaboration amongst federal and state regulators. The following high-level themes were recorded during these Task Force meetings, forums, and listening sessions: Permitting and Environmental Review (Table 1), Interagency Coordination (Table 2), Tribal Engagement (Table 3), Stakeholder Engagement (Table 4), and Agency Resources (Table 5). A full Roadmap with Subtheme Action items to address geothermal development challenges can be found in Section Four, Tables 1 through Table 5. A summary of each of these themes are highlighted below.

Permitting and Environmental Review

Many participants in this project expressed concerns when navigating geothermal development on public lands. This included a need to develop a landscape-level view of the geothermal resource potential in the United States and associated environmental, cultural, and natural resource concerns. In addition, participants illustrated the need for assistance in navigating the permitting process, including identifying potential causes for triggering multiple phases of NEPA as well determining which circumstances could require a review under NEPA, and how this could be accelerated based on existing data. The regulatory landscape is challenging to navigate, may not provide a framework to address all necessary resource issues adequately and expediently, and feels duplicative to some. Concerns were expressed that during permitting NEPA would conflict with other regulatory processes and that permittees limit development size to avoid thresholds for additional permitting.

Interagency Coordination

Improved interagency coordination could accelerate certain phases of the geothermal regulatory approval process, decrease permitting timelines (as each agency understands their roles and responsibilities in the regulatory process), assist in sharing resources, and lead to streamlined communications with the public, stakeholders, and Tribes. Each agency has different statutory mandates, which can make coordination difficult; however, agencies could improve these processes by identifying avenues to communicate more regularly and share new and existing resources.

Tribal Engagement

As sovereign nations, Indian Tribes have a right to government-to-government consultation with federal agencies throughout the regulatory and development process. Improving Tribal engagement can ensure fair representation and involvement of Tribes throughout the regulatory process, and can result in meaningful and productive relationships, enhancing the understanding between governments and the protection of sensitive cultural and historic resources.

Stakeholder Engagement

Stakeholders—from the public to highly engaged ENGOs—are eager for increased awareness into the regulatory process, would like to engage in the siting of renewable energy projects, and are interested in the evaluation of potential environmental, natural, and cultural resource impacts to avoid or minimize associated concerns. Stakeholders have varied awareness of the regulatory processes and hope that their perspective lends value to agency decisions regarding mitigation, avoidance, and monitoring measures.

Agency Resources

Staff relocation, turnover, onboarding, and training new team members are all challenging and cause impacts to an efficient geothermal permitting process. Technical staff are needed to support permitting, NEPA reviews, and project development. However, in addition to workload concerns, lack of expertise of geothermal resources and/or the geothermal technologies among some agency staff adds to existing interagency coordination challenges.

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1 Introduction

Geothermal regulation and permitting is an essential piece of geothermal development to ensure projects comply with federal and state environmental and natural resource protection laws. Geothermal development may include regulation from multiple different federal, state, and local agencies, depending on the project's specific location as well as its potential resource benefits and impacts. This project focused on convening federal and California and Nevada state agency regulators to discuss current challenges to permitting geothermal projects and avenues for improved coordination between federal agencies and state agency counterparts. As part of this study, the National Renewable Energy Laboratory (NREL) with support from the U.S. Department of Energy (DOE) Geothermal Technologies Office (GTO) convened federal and state regulators for multiple meetings to discuss challenges and opportunities for efficiency gains through coordination. The project sought additional input from other interested stakeholders through a series of forums and listening sessions. To understand diverse perspectives, stakeholders were invited to participate in the forums and listening sessions, which included geothermal developers, Indian Tribes, and environmental non-governmental organizations (ENGOs). The objectives of these forums or listening sessions were to collect feedback, understand perspectives, and identify opportunities and challenges for greater collaboration amongst federal and state regulators.

While permitting can be a major barrier to geothermal development, there are other non-technical barriers to consider, including land access, access to transmission, as well as market conditions, which can pose challenges when power purchase agreements are developed. This project analyzes permitting barriers and the associated impacts as well as land access, including leasing, and seeks to address natural and cultural resource conflicts. This work builds on previous non-technical barriers work as well as requirements laid out in the Energy Act of 2020.

Section 3102 of the Energy Act of 2020 (Energy Act) established a program to improve federal permit coordination through the creation of a national Renewable Energy Coordination Office (RECO). The RECO encourages collaboration between federal, state, and Tribal authorities, with the Bureau of Land Management (BLM) within the Department of the Interior serving as the lead. As part of the RECO requirements, the Secretary of the Interior entered into a memorandum of understanding[1] (MOU) with the following Secretaries: Agriculture, Energy, Defense, and the Administrator of the Environmental Protection Agency to improve renewable energy project permit coordination on public lands. This included the following federal agencies:

- BLM;
- U.S. Fish and Wildlife Service;
- Bureau of Indian Affairs;

[1] Available at: https://www.doi.gov/sites/doi.gov/files/mou-esb46-04208-pub-land-renewable-energy-proj-permit-coord-doi-usda-dod-epa-doe-2022-01-06.pdf

- National Park Service;
- Bureau of Reclamation;
- U.S. Geological Survey;
- U.S. Department of Agriculture through the U.S. Forest Service (USFS);
- U.S. Department of Defense (DoD) through the Military Aviation and Installation Assurance Siting Clearinghouse (DoD Clearinghouse) and the U.S. Army Corps of Engineers (USACE);
- U.S. Department of Energy (DOE); and
- U.S. Environmental Protection Agency.

The MOU is focused on prioritizing and expediting federal agency reviews. This project brings MOU signatories as well as state agencies in California and Nevada together to form the Geothermal Interagency Collaboration Task Force (Task Force). The Task Force member agencies participated as regulatory representatives in the regulatory meetings described above.

Additional requirements from the Energy Act contributing to the purpose of this project include the national goal for increasing renewable energy production on federal land. Specifically, the Energy Act requires a minimum production of 25 gigawatts (GW) of renewable energy to be permitted on public lands by 2025. Further, the California Public Utilities Commission's 2021 procurement order calling for 1 GW of firm renewable baseload electricity by 2026 as part of the state's 100% by 2045 clean energy goals encourages development of geothermal energy. These goals combined illustrate the increasing interest of geothermal development in the western United States.

This project provides stakeholder recommendations based on the analysis of the Task Force meetings, stakeholder forums, and Tribal listening sessions to improve regulatory coordination and streamline permitting for geothermal energy development. Recommendations are directed at federal agency regulators and California and Nevada state agency regulators, and are meant to inform the RECO's annual report to relevant congressional committees.

2 Background

Previous DOE and national laboratory reports have focused on a number of non-technical barriers to geothermal deployment. Geothermal non-technical barriers cover a broad set of challenges, including leasing, addressing potential natural and cultural resource conflicts, permitting and environmental review, transmission siting and access, and market conditions (including the ability to obtain a power purchase agreement). Since this project focused on federal and state regulatory processes, our discussion of previously identified challenges is limited to those related to leasing, addressing potential natural and cultural resource conflicts, permitting, and environmental review.

In 2019, DOE released the *GeoVision* report, based on a multiyear study undertaken by DOE's Geothermal Technologies Office and supported by the national laboratories. *GeoVision* and its supporting *GeoVision Analysis Supporting Task Force Report: Barriers* identified multiple non-technical barriers associated with land access/leasing, permitting, and environmental review processes (DOE 2019; Young et al. 2019). For the purposes of *GeoVision*, six areas were identified that most significantly contributed to the ability to access land: cultural and Tribal resources, environmentally sensitive areas, biological resources, land ownership, federal and state lease queues, and proximity to military installations (Young et al. 2019). For the purposes of *GeoVision,* three areas were identified that most significantly contributed to permitting and environmental review: federal and state regulatory frameworks, federal and state environmental review processes, and ancillary permits (Young et al. 2019).

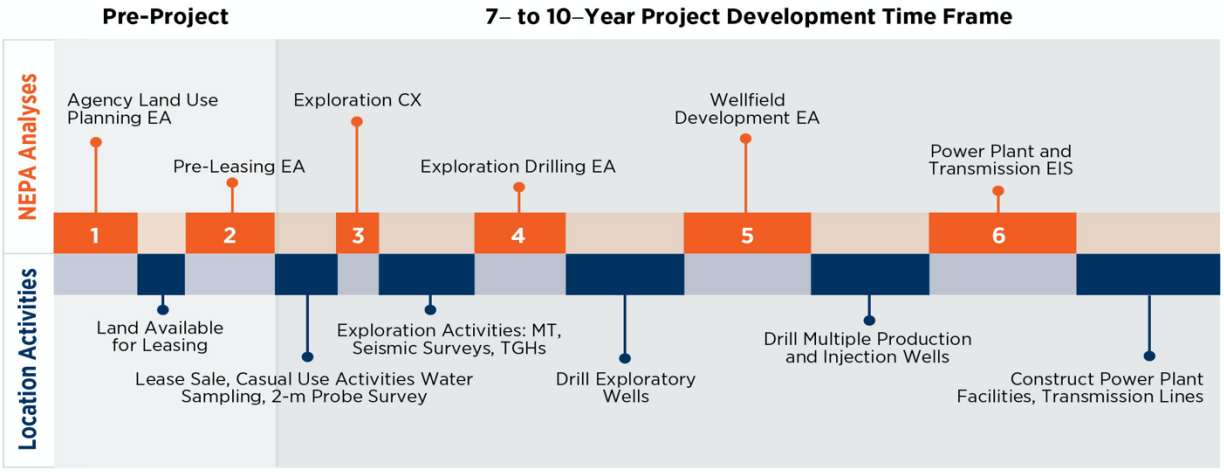
Some of the most significant barriers identified in *GeoVision* and the supporting Task Force report included:

- Barriers associated with federal lease processing, particularly in cases where the USFS is the surface management agency and must provide concurrence to the BLM prior to lease issuance. Historically, lease nominations on surface land managed by the USFS has led to backlogs in geothermal lease nominations due to limited agency staff time and budget allocations for geothermal-related approvals (DOE 2019).

- Barriers associated with geothermal permit review and processing, particularly in BLM field offices that do not have existing geothermal projects or prior experience processing geothermal permits and approvals. In other instances, limited staff availability and frequent staff turnover at the field office level have increased geothermal permit review and processing timelines (DOE 2019).

- Barriers associated with the National Environmental Policy Act of 1969 (NEPA) and often the need for multiple environmental reviews (as many as six times from agency land-use planning through construction of a power plant and associated transmission infrastructure) (see Figure 1). Environmental reviews required under NEPA help ensure protection of federally managed public lands as well as protect against or mitigate natural and cultural resource impacts. However, the number of environmental reviews required for geothermal development, due to the phased approach of geothermal exploration, wellfield development, and utilization of the resource (i.e., power plant construction)

increases the likelihood for project delays and ultimately extends project development timelines (DOE 2019).



Example timeline of a geothermal project on federal lands, illustrating that a single location could trigger National Environmental Policy Act analysis six separate times

Source: Young et al. 2014

Figure Note: EA = Environmental Assessment, EIA = Environmental Impact Statement, CX = categorical exclusion, MT = magnetotelluric, and TGH = temperature-gradient hole.

Figure 1. Geothermal permitting and environmental review timeline

Ultimately, *GeoVision* identified improvement scenarios for addressing land access/leasing barriers, including prioritizing USFS funding and staff availability, which could open up an additional 2.5 GW of geothermal resources for future deployment. In addition, *GeoVision's* modeling results revealed that under an improved regulatory timelines scenario—in which geothermal development timelines were reduced from a business-as-usual eight-year development timeline to a four-year development timeline—could result in an additional 6.7 GW of geothermal electricity on the grid by 2050 (DOE 2019).

3 Process

This project sought to develop representative recommendations to federal and state regulators as well as the RECO. The methods of stakeholder engagement were designed so that all participants could contribute equally, dialogue activities allowed for multiple methods of participation, and the groups could fulfill their purpose in a balanced and fair manner. The project team revised the format regularly in response to participant feedback to support constructive, collaborative, and productive dialogue.

This included organization of the Task Force and invitation of stakeholder and Tribal participants for forums and listening sessions. This section illustrates the processes followed throughout the course of this project to organize participation and plan successful forums and listening sessions to inform this final report and lay a foundation for the roadmap highlighted in Section 4.

3.1 Task Force Membership and Stakeholder Organization

The Task Force membership comprises MOU signatories in addition to applicable Nevada and California state regulatory agency representatives. Agency representatives were self-identified by each individual participating agency. In many cases, the federal agency representatives were also the MOU point of contact. To identify developer stakeholders, the project team worked with a geothermal industry trade association, Geothermal Rising, to ensure that a full spectrum of participants would be represented. As the main professional and education association for the geothermal community and the public, Geothermal Rising includes a large industry membership. In some cases, introductions were made by the Geothermal Rising Executive Director, the GTO, and from individuals within the Geothermal Program at NREL.

Kearns &West (K&W), a collaboration firm with more than 25 years' experience facilitating complex energy processes, was brought on to the project team as a subcontractor to facilitate all meetings and forums. For this project, K&W organized all meetings, developed agendas, drafted meeting summaries, and facilitated meetings. Based on the K&W team's experience and expertise in organizing and facilitating similar meetings, their assistance in identifying and reviewing ENGO invitees was invaluable. After forum dates were selected, upon finalization of the specific company and/or organizations to include, individual representatives received invitations to participate in either the developer forum or ENGO forum. The invitation language encouraged invitees to select a representative within their organization to participate in the forums. Task Force members were invited to join the forums as observers, in "listen-only" mode. The forums were virtually held on Microsoft Teams and Zoom to ensure equal access and to account for the ongoing COVID-19 pandemic.

Selecting Tribal representative invitees was a multistep process. An initial list of Tribal leadership contacts was found through the Bureau of Indian Affairs' (BIA) Tribal Leaders Directory. Due to the focus of this project on federal land in California and Nevada, this list was then filtered down to reflect Tribes currently based in California and Nevada. To ensure that all Tribes would be included, the project team solicited advice and input from the DOE Office of Indian Energy Policy and Programs and the BIA Branch of Renewable and Distributed Generation within the Division of Energy and Mineral Development. The purpose of these meetings was to glean best practices and lessons learned from these offices' deep expertise and

experiences working with Tribes. During these meetings, the project team discussed the "filtered" Tribal list generated from the Tribal Leaders Directory. Rather than continue filtering this list even further, both offices suggested inviting the entire list and allowing Tribes to self-select their participation in this project.

Based on these conversations, the project team decided to hold listening sessions in lieu of a more formal forum. This project's two previous forums (ENGO and developer) resembled formal Tribal consults, which typically follow specific invitation protocols. In this listening session format, only the project team were invited to participate (i.e., Task Force members were not invited to participate). The main reason for this was to encourage Tribal participants to share information, while being sensitive to and respectful of their sovereignty. K&W sent an initial email invitation to the full California and Nevada Tribal lists. Due to the size of the list and acknowledgement that Nevada and California are geographically distinct development areas, two listening sessions were scheduled, one for California-based Tribes and Tribal organizations and one for Nevada-based Tribes and Tribal organizations. Organizations based in Washington, D.C. were invited to attend either session based on their availability and interests. K&W followed up by phone to Tribes whose emails were undeliverable or with contacts without email addresses.

3.2 Meetings and Listening Sessions

Throughout the course of this project, two Task Force member meetings, two forums (one for developers and one for ENGOs), and two listening sessions were held. The goals of these forums and listening sessions were to:

- Establish a shared understanding of participants' perspectives, experiences, opportunities, and challenges related to regulating and permitting utility-scale geothermal electricity generation projects across federal and state agencies.
- Identify opportunities for greater collaboration, engagement, and efficiency toward accelerating geothermal deployment on federally managed public lands.
- Develop recommendations to accelerate permitting and associated geothermal deployment on public lands.

The developer and ENGO forums and Tribal listening sessions were similar in organizational structure. While the feedback received during these meetings was unique, there were several overlapping key themes, lessons learned, and areas for improvement and collaboration. These are shared at a high level in Section 4. For both the listening sessions and forums, participants were asked to review and provide feedback on the accuracy of the prepared meeting summaries. After review and, in some cases, following edits to the meeting summaries, the final versions were sent to the respective forum and listening session participants as well as the Task Force members. Task Force members were provided an opportunity to comment on the meeting summaries through a SurveyMonkey feedback form or via email. This feedback was recorded and incorporated into the potential solutions and project roadmap in Section 4. Final meeting summaries for all meetings, forums, and listening sessions can be found in Appendices A–E.

3.3 Task Force Meetings and Feedback

This project included two Task Force member meetings, a kick-off meeting on March 15, 2022, and a final project meeting on September 22, 2022.

3.3.1 Task Force Kick-Off Meeting

The kick-off meeting provided participants with an overview of the project's purpose and an overview of previous findings on geothermal permitting and regulation. During the kick-off meeting, Task Force members introduced their agency and its role in permitting and regulation as applicable, and provide their hopes for this project. Participants were asked virtual polling questions to allow the group to understand their experience and level of geothermal expertise, prior to a round robin conversation facilitated by K&W. This session provided each agency's spokesperson an opportunity to speak for four minutes using the following guiding questions.

- Task Force attendees were asked to consider the following questions related to general regulatory and environmental concerns and/or issues:
    - What are the most significant regulatory hurdles your agency faces in permitting (non-technology specific)?
    - What are the most significant environmental concerns/issues?
- Task Force attendees were asked to consider the following question related to interagency coordination challenges:
    - What challenges do you have in coordinating with other federal, state, Tribal, and local agencies/authorities?
- Task Force attendees were asked to consider the following questions related to geothermal knowledge and experience matters:
    - Does your agency have knowledge and expertise permitting geothermal exploration and/or development?
    - If so, what geothermal-specific concerns/challenges have occurred?

A final meeting summary from the Task Force Kick-Off meeting can be found in Appendix A.

3.3.2 Task Force Final Meeting

The final Task Force meeting had four foci:

- Share feedback received during the developer and ENGO forums and Tribal listening sessions.
- Discuss opportunities and challenges addressed in the forums and listening sessions to inform the project's final report.

- Review recently published DOE national laboratory findings on non-technical barriers for geothermal development.

- Discuss opportunities for continued engagement with Task Force members.

After reviewing the agenda and project purpose, the NREL project team provided an overview of the process and key themes recorded during the developer and ENGO forums and the Tribal listening sessions. After these presentations, K&W facilitated a discussion based on the feedback received in the forums and listening sessions to hear reactions from Task Force members. To foster the conversation, the following questions were asked:

- What are your thoughts and reflections?

- What resonated with you?

- What opportunities stood out the most?

Responses from Task Force members are recorded in Appendix E. Three presentations on recently published findings on non-technical barriers for geothermal development from NREL, the Pacific Northwest National Laboratory, and the Idaho National Laboratory followed this discussion. K&W then facilitated a discussion around revisiting interagency opportunities. This included an initial polling question to understand whether Task Force members' perspectives changed throughout the course of the project. The majority of responses indicated that their perspectives had not changed. Task Force members shared the reasons for their responses. To wrap up this discussion, K&W asked Task Force members the following questions:

- What are additional opportunities to improve the regulatory and permitting process for geothermal energy development?

- How can these potential solutions be implemented?

- What mechanisms can be utilized as part of this process?

To conclude the meeting, Task Force members discussed opportunities for future collaboration. The BLM proposed convening an interagency working group to focus on improving geothermal project permitting coordination in support of the ongoing MOU workstreams.

3.4 Stakeholder Forums

The developer forum was held on June 15, 2022, and the ENGO forum was held on July 18, 2022. Due to size and interest, the developer forum was four hours and the ENGO forum was three hours. Both forums were open for Task Force members to attend as listen-only participants. The forums allowed participants to introduce themselves, their role at their organization, and their organization's goal and/or purpose for participation in the project.

3.4.1 Developer Forum

The developer forum began with a polling question to understand participants' interest in participating. This was followed by a presentation by the NREL project team on the project and context on previous related non-technical barriers work, including the *GeoVision* study. Participants could ask clarifying questions and make initial comments. K&W then facilitated a round robin discussion. The following questions were asked to foster discussion:

- What has gone well in the geothermal development permitting process?
- What existing resources are helpful in guiding the permitting and development process?
- What are knowledge, data, and/or information gaps in the permitting process?

Comments were recorded during the discussion and can be found in Appendix B. To allow developers to share more detailed responses and experiences and foster greater discussion in light of the group's size, participants were divided into two groups. The same discussion questions were used in both breakout sessions. The following questions were asked:

Stakeholder and Tribal Engagement

- What natural resource challenges has your company faced?
- Would earlier/increased environmental non-governmental organizations (ENGO) or Tribal engagement be beneficial?
- Do you have concerns around development from Tribal or ENGOs?

NEPA

- Are current application submittal and review processes easy to understand?
- What challenges has your company faced related to NEPA?
- Has your company found strategies that create efficiencies with NEPA?
- Would expanded categorical exclusions be helpful?

Siting

- Have you experienced differences in permitting and development based on the project location?
- Do you consider land ownership or management when selecting development prospects?
- Have you faced challenges with development and permitting due to transmission lines?

Coordination

- Are there state and/or federal permitting coordination challenges that impact geothermal development and/or operations?
- How would a National Renewable Energy Coordination Office be helpful?

Following the breakout sessions, the group reconvened to share key themes and experiences with one another. The full summary of these themes can be found within Appendix B. Areas of overlap among forums and listening sessions and potential solutions can be found in Section 4.

3.4.2 Environmental Non-Governmental Organization Forum

The ENGO forum began with the presentation of a GTO *Energy 101: Geothermal Energy* video to provide an overview of geothermal energy development. Technical and/or clarification questions were answered by GTO staff members present during the Forum. Forum participants were asked to participate in two polling questions to help the project team understand their level of experience and participation in geothermal energy development as well as their interest in participating in the forum. The NREL project team provided additional context regarding this project and an overview of previous non-technical barriers work. K&W then engaged participants in two main discussions—one focused on substantive issues and one focused on process concerns. K&W guided both conversations with specific questions. During the substantive discussion, the following questions were asked:

- What role(s) do you see Federal and State Agencies playing in the geothermal permitting and regulatory process?
- Do you see a path forward for geothermal development to play a larger role in the renewable energy mix? What are the biggest hurdles?
- What are outstanding substantive issues related to geothermal development?
- Is there a problem or issue around geothermal development that this group could address together?
- What are your concerns and interests?
- In your mind, are there areas that help avoid or mitigate the environmental risks of geothermal development?

The second half of the ENGO forum focused on a procedural discussion, where K&W facilitated a round robin discussion to hear participants' perspectives on communication, the NEPA process, and Tribal engagement. During this conversation, the following questions were asked:

- How do you typically communicate with agencies? What has been your experience communicating with agencies involved in geothermal permitting (development)?

    - Would earlier/increased engagement be beneficial?

- How do you feel the current NEPA process is working for early engagement to a final decision? Do you feel heard in the process?

- What additional resources (e.g., database, tools) would you find helpful?

- Do you have a recent lesson learned on coordination with Tribal interests?

Areas of overlap among forums and listening sessions and potential solutions can be found in Section 4. Both discussions were fruitful, with significant interest from participants in finding ways to work with agencies to improve the overall development processes. A final meeting summary can be found in Appendix C.

3.5 Tribal Listening Sessions

Consultations with the Bureau of Indian Affairs and the DOE Office of Indian Energy assisted in determining how to organize Tribal gatherings. The original intent was to hold a Tribal forum similar to the developer and ENGO forums. After discussion, the project team determined that a listening session would be more respectful and appropriate as well as encourage honest conversations with Tribal participants. This allowed the sessions to be less formal in nature, relaxing the standards regarding formal invitations and Tribal consultations. Task Force members were not invited to participate in the Tribal listening sessions. Both listening sessions included two GTO team members to serve as subject matter experts and answer technical questions.

Both sessions followed the same agenda, with a focus on the following goals:

- Understand Tribal priorities, needs, and issues as related to renewable energy development.

- Listen to Tribes' perspectives, experiences, opportunities, and challenges related to regulation and permitting of utility-scale geothermal electricity generation projects across federal and state agencies.

- Identify opportunities for greater collaboration, engagement, and efficiency toward accelerating geothermal deployment on federally managed public lands.

After participants introduced themselves, their role within their Tribe and/or Tribal organization, and their desired outcomes from participation in the listening session, the NREL project team provided an overview of the project's goals and previous non-technical barriers related research. Participants could ask clarifying questions and provide comments based on the information presented. The full summary of these questions and comments can be found in Appendix D.

Following the project overview and its subsequent discussion, the K&W team facilitated a round robin discussion to hear participants' perspectives regarding geothermal development, including

concerns and potential pathways to increase clean energy development moving forward. The following questions were asked to guide the conversation:

- Does your Tribe have experience with any type of energy development and its permitting process? If so, what has gone well? What about geothermal energy development specifically?
- What challenges or concerns does your Tribe have when it comes to energy development and/or geothermal energy development specifically?
- In your view, what is the role of federal and state resource agencies/regulators regarding resource stewardship and preservation of cultural resources? How can agencies improve this process?
- Can you speak to successes or challenges related to communicating and/or coordinating with federal/state agencies? What would be helpful when communicating and/or coordinating with federal and state agencies?
- Is there a compromise that would allow for protection of cultural and Tribal resources while energy is being developed? What about geothermal development specifically?
- Are there ways to improve understanding of cultural sensitivities and avoid or mitigate impacts to sensitive/sacred sites?

3.6 Analysis and Determination of Key Themes

During each meeting, forum, and listening session, the K&W team recorded key themes and overall processes unique to each event. The summaries of each Task Force meeting, stakeholder forum, and listening session can be found in Appendices A–E. These summaries include specific key themes identified in the facilitated conversations. Table 1 through Table 5 in Section 4 summarize these themes by refining these categories into five main themes: regulatory and environmental, interagency coordination, Tribal engagement, stakeholder engagement, and resources.

4 Roadmap of Future Actions to Address Geothermal Development Challenges

Input received during the two Task Force meetings, two forums, and two listening sessions can be distilled into five themes: permitting and environmental review, interagency coordination, Tribal engagement, stakeholder engagement, and agency resources. These five themes lead into subthemes and respective actions, including: potential lead agencies, intended outcome, status (exploring, planned, underway, completed), and potential next steps. Actions included in Table 1 through Table 5 aim to address the question of what a geothermal interagency working group could develop together to achieve mutual goals and address natural and cultural resource concerns.

For Table 1–Table 5 in Sections 4.1–4.5, the following key describes the *Status* of a *Subtheme Action* item identified in the first column.

Status	Description
Exploring	The *Action* item has been taken into consideration.
Planned	The *Action* item has been mapped out.
Underway	Steps have been taken in furtherance of the *Action* item.
Completed	Indicates completion of *Action* item within the Subtheme.

4.1 Permitting and Environmental Review

Many participants in this project expressed concerns when navigating geothermal development on public lands. This included a need to develop a landscape-level view of the geothermal resource potential in the United States and associated environmental, cultural, and natural resource concerns. In addition, participants illustrated the need for assistance in navigating the permitting process, including identifying potential causes for triggering multiple phases of NEPA as well determining which circumstances could require a review under NEPA, and how this could be accelerated based on existing data. The regulatory landscape is challenging to navigate, may not provide a framework to address all necessary resource issues adequately and expediently, and feels duplicative to some. Concerns were expressed that during permitting NEPA would conflict with other regulatory processes and that permittees limit development size to avoid thresholds for additional permitting.

Table 1. Subthemes and Actions Related to Permitting and Environmental Review

Subtheme	Action	Potential Lead	Intended Outcome	Status	Potential Next Steps
a. Permitting Guidance	i. Develop a "Quick Start Guide," including guidance for geothermal development on public lands, establishing rapport with Tribes and stakeholders, NEPA and permitting process steps and triggers, and fostering partnerships.	RECO	Educational Outreach	Exploring	Add to RECO quarterly meeting agenda.
	ii. Explore feasibility of developing landscape or renewable energy zone-level assessments that enable regional considerations for infrastructure development.	BLM	Regulatory Process Improvement	Planned	To be determined by BLM.
	iii. Develop a guide to explain (when possible) how to permit development in Military Land Withdrawals of public lands.	BLM/DoD	Educational Outreach	Exploring	To be determined by BLM and DoD.
	iv. Make programmatic Waters of the United States jurisdictional determinations to inform whether permitting may be required under Section 404 of the Clean Water Act.	USACE	Regulatory Process Improvement	Exploring	To be determined by USACE.
b. NEPA	i. Explore the development of an updated Geothermal Programmatic Environmental Impact Statement to reduce environmental review timelines.	BLM	Regulatory Process Improvement	Exploring	To be determined by agency.
	ii. Improve NEPA processing timelines for geothermal development by developing agency-specific categorical exclusions or other accelerated review and approval processes.	BLM	Regulatory Process Improvement	Exploring	To be determined by BLM.
	iii. Compile a "mitigation measures best practices" document for various regions analyzed under NEPA.	RECO	Educational Outreach	Exploring	Add to RECO quarterly meeting agenda.

4.2 Interagency Coordination

Improved interagency coordination could accelerate certain phases of the geothermal regulatory approval process, decrease permitting timelines (as each agency understands their roles and responsibilities in the regulatory process), assist in sharing resources, and lead to streamlined communications with the public, stakeholders, and Tribes. Each agency has different statutory mandates, which can make coordination difficult; however, agencies could improve these processes by identifying avenues to communicate more regularly and share new and existing resources.

Table 2. Subthemes and Actions Related to Interagency Coordination

Subtheme	Action	Potential Lead	Desired Outcome	Status	Next Steps
a. General Coordination	i. Leverage the RECO to clarify how agencies can improve federal permitting and decision-making and expand interagency coordination.	RECO	Interagency Coordination	Exploring	Add to RECO quarterly meeting agenda.
	ii. Create guidelines on agency coordination best practices and processing applications together.	RECO	Interagency Coordination	Exploring	Add to RECO quarterly meeting agenda.
	iii. Develop a list of significant geothermal features in National Parks and monitor protected thermal features in National Parks, consistent with the roles and responsibilities promulgated in the Geothermal Steam Act, as amended.	National Park Service (NPS) and partner agencies	Educational Outreach	Exploring	Add to RECO quarterly meeting agenda.
	iv. Host quarterly coordination calls with all geothermal permitting agencies to share "pre-information," case studies, data, and institutional knowledge.	RECO	Interagency Coordination	Exploring	Add to RECO quarterly meeting agenda.
b. Resource and Data Coordination	i. Develop a central geothermal data repository or centralized location to share information and provide regulatory resources to elevate resources or granular project-level data.	BLM	Educational Outreach	Exploring	To be determined by BLM.
	ii. Leverage USGS and USFWS science/ resources to understand	USGS/ USFWS	Educational Outreach	Exploring	Coordination between the USGS and USFWS.

Subtheme	Action	Potential Lead	Desired Outcome	Status	Next Steps
	natural and biological resource impacts.				
	iii. Share guidance on establishing baseline characterization and operational monitoring of groundwater levels and geochemistry.	BLM/State Agencies	Educational Outreach	Exploring	Add to RECO quarterly meeting agenda.
c. MOUs	i. Consider needed updates to interagency MOUs or industry advisory groups (IAGs).	RECO	Interagency Coordination	Exploring	Add to RECO quarterly meeting agenda.
	a. Create new and/or update existing state and federal coordination MOUs as relevant.	RECO/ State Agencies	Interagency Coordination	Exploring	Coordination between state and federal agencies.
	b. Update DoD and BLM roles and responsibilities regarding Military Withdrawn Lands IAG.	DoD/BLM	Interagency Coordination	Exploring	Coordination between DoD and BLM.
	c. Update NPS and BLM thermal features IAG.	NPS/BLM	Interagency Coordination	Exploring	Coordination between NPS and BLM.
	d. Update BLM & USFS roles and responsibilities MOU.	BLM/ USFS	Interagency Coordination	Underway	Coordination between BLM and USFS.
	ii. Increase awareness and public education of existing interagency MOUs or IAAs between individual agencies and where to locate this information.	RECO	Educational Outreach	Exploring	Add to RECO quarterly meeting agenda.

4.3 Tribal Engagement

As sovereign nations, Indian Tribes have a right to government-to-government consultation with federal agencies throughout the regulatory and development process. Improving Tribal engagement can ensure fair representation and involvement of Tribes throughout the regulatory process, and can result in meaningful and productive relationships, enhancing the understanding between governments and the protection of sensitive cultural and historic resources.

Table 3. Subthemes and Actions Related to Tribal Engagement

Subtheme	Action	Potential Lead	Desired Outcome	Status	Next Steps
a. Partnerships	i. Formalize a process to include federally and state-recognized Tribes early, often, and in-person in the NEPA process and in mitigation decisions; consider Tribes' historical interests and activities in a region; engage Tribal liaisons.	RECO	Interagency Coordination	Exploring	Add to RECO quarterly meeting agenda.
	ii. Foster discussion across agencies to understand and locate sensitive Tribal resources (leaning on BIA regional liaisons).	RECO	Educational Outreach	Exploring	Add to RECO quarterly meeting agenda.
	iii. Promote use of the BIA's Indian Energy Service Center to expedite leasing and provide technical assistance.	BIA	Educational Outreach	Exploring	To be determined by BIA.
b. Resource and Data Sharing	i. Include cultural monitors in early phase project-site surveys.	BLM	Regulatory Process Improvement	Exploring	To be determined by BLM.
	ii. Develop educational workshops to share technical and regulatory information and the roles of agencies in conducting oversight with Tribes.	RECO	Educational Outreach	Exploring	Add to RECO quarterly meeting agenda.
	iii. Work with Tribes to coordinate, as appropriate, visits to historical lands with Tribes to understand Tribal history and values.	BLM	Educational Outreach	Exploring	To be determined by BLM.
	iv. Share best practices and experiences of incorporating Tribes into the planning process.	RECO	Educational Outreach	Exploring	Add to RECO quarterly meeting agenda.

4.4 Stakeholder Engagement

Stakeholders—from the public to highly engaged ENGOs—are eager for increased awareness into the regulatory process, would like to engage in the siting of renewable energy projects, and are interested in the evaluation of potential environmental, natural, and cultural resource impacts to avoid or minimize associated concerns. Stakeholders have varied awareness of the regulatory processes and hope that their perspective lends value to agency decisions regarding mitigation, avoidance, and monitoring measures.

Table 4. Subthemes and Actions Related to Stakeholder Engagement

Subtheme	Action	Potential Lead	Desired Outcome	Status	Next Steps
a. Outreach	i. Develop a roadmap for stakeholders to plan and help navigate the existing engagement process early and often throughout the permitting process.	RECO	Stakeholder Engagement	Exploring	Add to RECO quarterly meeting agenda.
	ii. Develop a planning portal to allow stakeholders to identify areas of interest/subscribe to a listserv and receive notifications of proposed actions within that area.	BLM	Stakeholder Engagement	Exploring	To be determined by BLM.
b. Information Sharing	i. Share lessons learned regarding specific areas of historical knowledge (e.g., cultural or biological sensitives) prior to stakeholder engagement.	RECO	Stakeholder Engagement	Exploring	Add to RECO quarterly meeting agenda.
	ii. Develop a forum for conversations between ENGOs, developers, and regulatory agencies.	RECO	Stakeholder Engagement	Exploring	Add to RECO quarterly meeting agenda.

4.5 Agency Resources

Staff relocation, turnover, onboarding, and training new team members are all challenging and cause impacts to an efficient geothermal permitting process. Technical staff are needed to support permitting, NEPA reviews, and project development. However, in addition to workload concerns, lack of expertise of geothermal resources and/or the geothermal technologies among some agency staff adds to existing interagency coordination challenges.

Table 5. Subthemes and Actions Related to Agency Resources

Subtheme	Action	Potential Lead	Desired Outcome	Status	Next Steps
a. Staffing	i. Create onboarding and training for agency staff around geothermal permitting.	BLM	Educational Outreach	Exploring	To be determined by BLM.
	ii. Train agency staff on new geothermal technologies.	DOE	Educational Outreach	Exploring	To be determined by DOE.
	iii. Develop mechanisms to retain staff at the field office level (e.g., through relocation, salary increases, or remote work).	BLM	Regulatory Process Improvement	Exploring	To be determined by BLM.

5 References

DOE. 2019. *GeoVision: Harnessing the Heat Beneath Our Feet.* Washington, D.C.: U.S. Department of Energy Geothermal Technologies Office. DOE/EE-1306. https://www.energy.gov/sites/default/files/2019/06/f63/GeoVision-full-report-opt.pdf.

Young, Katherine, Aaron Levine, Jeff Cook, Donna Heimiller, and Jonathan Ho. 2019. *GeoVision Analysis Supporting Task Force Report: Barriers—An Analysis of Non-Technical Barriers to Geothermal Deployment and Potential Improvement Scenarios*. Golden, CO: National Renewable Energy Laboratory. NREL/PR-6A20-71641. https://www.nrel.gov/docs/fy19osti/71641.pdf.

Young, Katherine, Kermit Witherbee, Aaron Levine, Adam Keller, Jeremy Balu, and Mitchell Bennett. 2014. "Geothermal Permitting and NEPA Timelines." *GRC Transactions* 38. https://gdr.openei.org/submissions/1258.

National Renewable Energy Laboratory
Geothermal Interagency Collaboration Task Force Kick-Off Meeting
Tuesday, March 15, 2022, 10:00 a.m. - 1:00 p.m. MST

Meeting Highlights
- Defined roles and responsibilities of the Task Force and the meeting's participation ground rules.
- Engaged federal and state agencies in the discussion.
- Assisted participants in better understanding individual agency challenges and concerns.
- Brainstormed opportunities to improve Tribal engagement.
- Brainstormed best practices for interagency coordination.
- Brainstormed solutions for resource and information sharing.

Agenda and Meeting Objective
The Geothermal Interagency Collaboration Task Force (Task Force) seeks to identify pathways to accelerate permitting and associated geothermal deployment on public lands. On March 15, 2022, the National Renewable Energy Lab (NREL) hosted a virtual kick-off meeting with federal agencies who have entered into a Memorandum of Understanding (MOU) to Improve Public Land Renewable Energy Project Permit Coordination as well as relevant state agencies in the states of California and Nevada. Appendix C: Task Force Meeting Participants includes a complete list of meeting attendees.

The meeting had three objectives:
- Engage with other federal and state agencies involved in the permitting and geothermal development on public lands.
- Learn from federal and state agencies to identify general permitting issues and, if applicable, geothermal permitting issues.
- Identify ways to address issues, including opportunities for agencies to collaborate, how the National Renewable Coordination Office (RECO) could address these issues, and if other implementing mechanisms could alleviate permitting process constraints. Appendix A summarizes key discussion items and potential solutions.

Process
Jeff Winick from the Department of Energy's (DOE) Geothermal Technologies Office (GTO) provided opening remarks and welcomed attendees to the meeting. Jeff emphasized that DOE is committed to clean energy goals and is excited by the opportunity to engage with those attending the Task Force. Opening remarks concluded with Aaron Levine (NREL) reviewing the agenda for participants.

Aaron Levine (NREL) provided an overview and purpose of the Task Force, and context on how the kick-off meeting relates to the larger project goals of convening a Task Force to deliver key stakeholder recommendations directed at federal regulators, California and Nevada state agency regulators, and U.S. Congressional Committees. The Task Force plays a crucial role to facilitate conversations across agencies, provide perspective on each agency's challenges, and support the MOU to Improve Public Land Renewable Energy Project Permit Coordination.

Meeting facilitator, Angela Jo Woolcott (Kearns & West), introduced ground rules for the Task Force attendees. These ground rules encouraged attendees to be active participants, be

respectful of others, seek solutions, participate from the perspective of each one's agency, and commit to the Task Force obligations regarding upcoming meetings, feedback forms, and draft work products. Meeting attendees demonstrated agreement and understanding of their individual and agencies' roles, the purpose of the kick-off call, and the meeting's participation ground rules.

Dr. Sue Hamm, Director of the Geothermal Technologies Office, provided brief remarks and introduced video remarks from the Under Secretary of Science and Energy, Dr. Geraldine Richmond. Dr. Geraldine Richmond emphasized that the DOE is committed to tackling the climate crisis, creating an equitable economy, and meeting the Biden Administration's ambitious energy goals of clean electricity by 2035 and net-zero emissions by 2050. Additionally, Dr. Geraldine Richmond underscored the important role the Task Force serves in addressing time sensitive issues and opportunities. Geothermal offers a way to meet these needs because it is reliable, carbon-free, and a potential energy source across the country. Dr. Geraldine Richmond emphasized a streamlined permitting process that could help meet these goals and gain efficiencies within process steps.

Aaron Levine (NREL) gave meeting attendees an overview of the GTO's findings regarding the Geothermal Permitting and Regulatory Approval process. Attendees participated in a short polling activity to understand the extent of geothermal knowledge of those participating and their experience in the field.

Regarding agency, the polling emphasized that the majority of the Task Force having been with their agency six or more years with the following results:

- 87% of the Task Force have been with their agency for six or more years,
- 7% of the Task Force have been with their agency for 2-5 years, and
- 7% of the Task Force have been with their agency for 0-2 years.

In terms of role, the polling demonstrated a fairly even distribution of how long the Task Force members have been in their respective roles with the following results:

- 32% of the Task Force have been in their role for six or more years,
- 38% of the Task Force have been in their role for 2-5 years, and
- 29% of the Task Force have been in their role for 0-2 years.

The polling highlighted the diversity of the Task Force attendee's knowledge on the general environmental impacts of geothermal development with the following results:

- 12% of the Task Force had no experience
- 26% of the Task Force had heard a little about them
- 38% of the Task Force have experience working with them
- 18% of the Task Force have years of experience, and
- 6% of the Task Force consider themselves to be an expert.

Lastly, the Task Force was asked about their experience on geothermal projects. While some members of the Task Force did not have experience working on a specific geothermal project, other members have diverse experiences. Task Force members experiences range from federal geothermal leasing, geothermal permitting, environmental permitting, policy development, national-level coordination, and program oversight.

Angela Jo Woolcott (Kearns & West) facilitated a Round Robin session that allowed each agency's spokesperson four minutes to answer questions regarding their general regulatory and environmental concerns and issues, interagency coordination challenges, and geothermal knowledge and experience matters. Task Force members received the questions outlined below prior to the kick-off meeting.

1) Task Force attendees were asked to consider the following questions as it relates to general regulatory and environmental concerns and/or issues:
   a) What are the most significant regulatory hurdles your agency faces in permitting (non-technology specific)?
   b) What are the most significant environmental concerns/issues?

2) Task Force attendees were asked to consider the following question as it relates to interagency coordination challenges:
   a) What challenges do you have in coordinating with other federal, state, tribal, and local agencies/authorities?

3) Additionally, Task Force attendees were asked to consider the following questions as it relates to geothermal knowledge and experience matters:
   a) Does your agency have knowledge and expertise permitting geothermal exploration and/or development?
   b) If so, what geothermal specific concerns/ challenges have occurred?

During this discussion, comments were recorded on a digital whiteboarding tool known as Miro. These comments were arranged by themes that informed the topics explored during the meeting's brainstorming session on best practices, approaches, and ways to streamline the permitting process. The comments recorded in Miro will be summarized and presented below in Appendix B. Additionally, a summary table presenting key themes from this conversation will be presented in Appendix A.

Round Robin Key Themes

General Regulatory and Environmental Concerns & Issues

The following themes around regulatory hurdles:

- Need for additional information and understanding of projects including impacts and permitting boundaries.
- Regulatory processes and layers, including general permitting framework in addition to National Environmental Policy Act (NEPA) review.
- Lack of public awareness of the permitting process as a whole, including the NEPA process due to the complexities and multiple layers of federal and state involvement.
- Need to complete NEPA and, in some cases, the California Environmental Quality Act (CEQA) multiple times for a single geothermal project.

The following themes emerged in relation to environmental hurdles:

- Concerns about protecting natural and cultural resources.
- Concerns about protecting biological resources, including the greater sage grouse, desert tortoise, and horned lizard.

- Concerns about water quality.

Interagency Coordination Issues
Agencies identified the following interagency coordination needs:

- Updated MOUs and interagency agreements to improve coordination and define agency roles.
- Additional staffing to support changing agency priorities.
- Discussions on topics of military withdrawn lands to increase understanding and cooperation.

Despite these challenges, agencies acknowledged that their experiences collaborating across agencies have been positive, although there remains room for improvements.

Geothermal Knowledge & Experience Issues
When discussing agency geothermal knowledge and experience challenges, agencies raised the following needs:

- Knowledge and staff to support geothermal permitting and project development.
- Onboarding new team members, especially in cases of high staff turnover.
- Additional training and shared subject matter experts.
- Involving all relevant agencies in the early stages of project development.

Large Group Discussion Key Themes

During the meeting's group discussion portion, the focus was on understanding the challenges raised by agencies and offering solutions, opportunities, and recommendations to improve the permitting process. **Please see Appendix A. Table of Discussion Themes and Appendix B: Screenshots of Miro Board.** The themes discussed during this portion included:

- Opportunities for improved Tribal engagement.
- Best practices to increase agency coordination and outdated agencies' MOUs and interagency agreements (IAGs).
- Approaches to overcome staffing, resource, and knowledge shortages.

Opportunities for Better Tribal Engagement
Agencies indicated that engaging indigenous and Tribal populations around permitting and geothermal technologies remain a challenge, specific to:

- Including Tribal communities in the permitting process.
- Engaging with both federally and state-recognized Tribes.
- Increasing Tribal capabilities for geothermal permitting and projects.

Agencies acknowledged this as a bi-lateral problem and offered the following as suggestions to improve Tribal engagement:

- Incorporate Tribes early in the project development phases due to their relationship with the country's public lands.
- Share best practices and experiences of incorporating Tribes into the planning process.
- Support Tribes in their development of geothermal technologies
- Engage with the Bureau of Indian Affairs (BIA) to learn more about Tribes and the agency's regional liaisons.

Best Practices to Increase Agency Coordination & Outdated MOUs
Agencies engaged with each other to learn how they could work together on geothermal issues and how to increase interagency coordination.

Agencies suggested the following improvements to increased agency coordination:

- Update agreements and existing MOUs and IAGs.
- Create clear guidance on best practices for MOUs and IAGs.
- Incorporate specific language on how agencies can work together by defining each agency's roles and responsibilities.
- Understand the benefits of coordination to improve the decision and permitting processes.

Approaches to Overcoming Staffing, Resource, and Knowledge Shortages
A prominent theme throughout the meeting was the need to provide ways for agencies to share their expertise to bridge knowledge and resource gaps.

Agencies suggested the following approaches to improving knowledge sharing:

- Share specific case studies, scientific data, training, and institutional knowledge.
- Create a collective database of information.
- Involve the United States Geological Survey (USGS) to provide standardized data.

Agencies suggested the following approaches to staffing shortages:

- Foster better onboarding and training for agency staff.
- Allow geothermal experts to be "shared" across agencies.

Agencies suggested that establishing cooperating agreements, collaborative workflows, and commonly agreed definitions across agencies could benefit all.

Next Steps, Recommendations, & Action Items

Aaron (NREL) reminded attendees that the work completed in Task Force meetings will inform the questions posed to the three stakeholder forums to be held with geothermal development interests, environmental non-governmental organizations (NGOs), and Tribal / indigenous stakeholders. Following the completion of the three stakeholder forums, the Task Force will meet again to discuss overall project findings and recommendations.

Appendix A. Summary Table of Discussion Themes

National Renewable Energy Laboratory (NREL)
Geothermal Interagency Collaboration Task Force Kick-Off Meeting
Tuesday, March 15, 2022

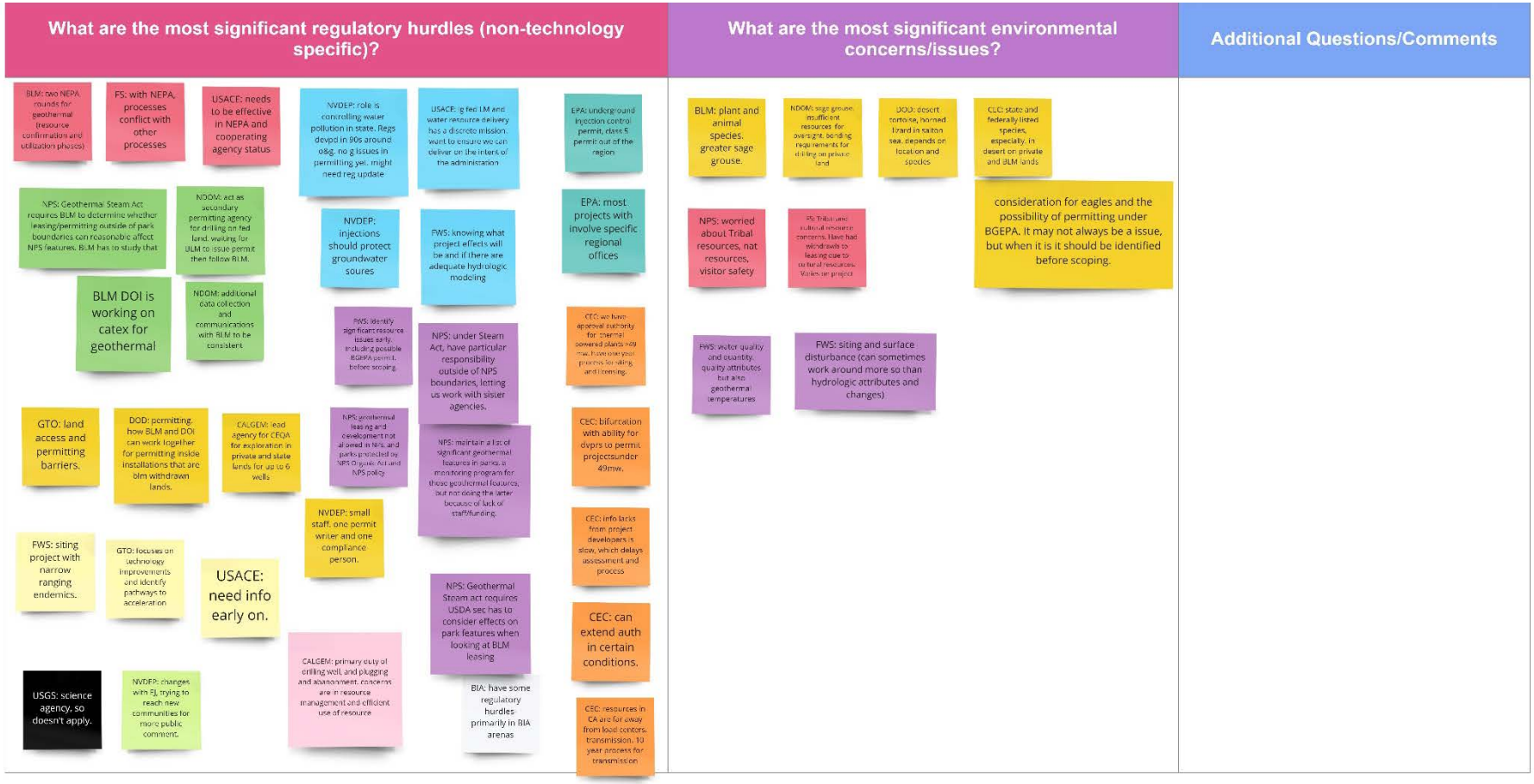
Regulatory and Permitting Themes	
Challenges	**Potential Solutions**
• **NEPA:** Navigating multiple phases of NEPA - both the resource confirmation and utilization processes - are inefficient. NEPA can conflict with other regulatory processes. There's a lack of public awareness of NEPA. Issues need to be outlined prior to scoping (i.e. identify resource issues early in the process). • **Outdated regulations:** Regulations need to address water quality with geothermal development, not just oil and gas. • **Regulatory framework:** In California, permittees will limit development size to avoid what are perceived as more onerous permitting requirements that are triggered once the 50MW threshold is crossed. • **Permit applications:** Project developers need to provide complete application packages with all required documents and the correct level of detail up front. Data collection for permitting needs to be standardized. • **NPS-specific issues: The 1988 amendments to the** Geothermal Steam Act requires studies to determine whether geothermal leasing/permitting outside of NPS boundaries affects National Park thermal features. • **BLM-specific issues:** Data collection methods need to be consistent with BLM permit requirements. • **DOD-specific issues:** Guidance is needed on how to permit development in BLM withdrawn lands (e.g. military lands). • **USACE-specific issues:** Ensuring project development is compatible with water resource projects. Section 404 Clean Water Act jurisdictional waters determinations. • **General issues include:** land access and permitting barriers, lengthy transmission siting processes, bonding requirements for drilling on private land, ensuring that fluids permitting follows due processes.	• Evaluate the permitting process after the review to inform future projects. • Disseminate lessons learned in geothermal permitting. • Determine which agency considers the adverse effects of the Geothermal Steam Act. • Administrative or legislative created categorical exclusions. • Early communication of information relative to proposed development project. • Maintain a list of significant geothermal features in National Parks. Establishing partnerships or obtain funding for monitoring programs of protected thermal features in National Parks. • Create a mechanism for knowledge transfer. • Share subject matter experts to support analyses for agencies that do not have sufficient staffing.

Environmental Themes	
Challenges	**Potential Solutions**
• **Species:** Some species, including the greater sage grouse, desert tortoise, horned lizard, and eagles require special attention. Special consideration should also be put on endemic species with narrow habitat ranges (e.g. single spring source fish or amphibians), wildlife habitat within a project area, and state and federally listed species. Petitions for emergency Environmental Species Act listing can result in longer approval timelines. • **Wildlife habitat hydrology:** Water quality and quantity, including temperature and withdrawals as well as the quality of hydrologic modeling data are items of concern. • **Hydrogeology:** Preservation of surface and groundwater sources. Protection of groundwater with respect to underground injection control program. • **Siting and surface disturbances** need to be mitigated. • **General issues include** abandonment concerns and resource identification.	• Continue existing and expand on future interagency coordination regarding species and hydrologic issues. • Non-permitting agencies with relevant expertise could provide technical support to permitting agencies and developer's application review prior to submission. • Creation of standardized and robust data collection methods.
Interagency Coordination Themes	
Challenges	**Potential Solutions**
• **Staffing:** Technical staff are needed to support permitting and project development. In addition to workload concerns, lack of expertise in geothermal in some field-level offices adds to coordination challenges. There's uncertainty of what the workload will be. Staff relocation, turnover, onboarding, and training new team members is challenging. • **Funding:** Need base funding to support decisions. • **Formal agreements:** Some MOUs and IAAs are outdated. • **Coordination:** Various agencies have different mandates that are difficult to coordinate. Agencies need to communicate more regularly and share resources.	• Use the RECO as a resource to clarify how agencies can together improve federal permitting and decision making, including defining charter structure and how to build that framework with Task Force input. • Update or establish new interagency MOUs or IAAs. • Host quarterly coordination calls with partner agencies to share "pre-information," case studies, data, and institutional knowledge. • Create guidelines on coordination best practices. • Host a monthly call with the Office of Natural Resources Revenue. • Use USGS and USFWS science/resources to understand resource impacts. • Conduct landscape-level planning for projects permitted in the same area. • Allow agencies to process applications together. • Coordinate on meeting FAST-41 thresholds to determine if any projects can be covered. • Develop a Central Data Repository or a similar collective database of information, to serve as a centralized location to share information. • Pilot BLM offices to speed up permit processing, with interagency representation. Create a link of communication between agencies, can process more efficiently working together than apart. • Improve communication between agencies.

	• Foster better onboarding and training for agency staff and perform succession planning. • Add staff to support changing agency priorities and cost transfer funding. • Develop training on new geothermal technologies. • Address permitting on military withdrawn lands.
Tribal Involvement Themes	
Challenges	**Potential Solutions**
• **Outreach:** Reaching tribal communities and encouraging public involvement is time consuming. • **Funding:** Tribes face steep costs to coordinate with agencies. • **Cultural resources:** Tribal cultural resources need to be protected. • **Coordination:** Agencies have varying tribal consultation processes, and CEQA and NEPA processes vary. • **Royalty Structure:** Tribes may not collect royalties on public lands.	• Coordinate with both federally and state-recognized tribes early and often in the project development phases for resource knowledge. • Foster discussion across multiple agencies to understand and locate sensitive tribal resources (especially with the BIA to learn about cultural activities and meet BIA regional liaisons) and share best practices and experiences of incorporating tribes into the planning process. • Offer funding opportunities for tribes looking to develop geothermal on their lands, to participate in permitting processes, to gain geothermal expertise, and/or to mitigate potential impacts. • Use the Indian Energy Service Center to expedite leasing and permitting.

Appendix B. Screenshots of Miro Boards

This appendix features notes taken during the Geothermal Interagency Collaboration Task Force meeting on Tuesday, March 15, 2022. Notes were taken on a virtual whiteboarding tool, known as Miro. Sticky notes included on boards reflect notes taken during



the round robin and open discussion portions of the meeting.

Figure 1: Miro board screenshot sorted by themes related to general regulatory and environmental concerns.

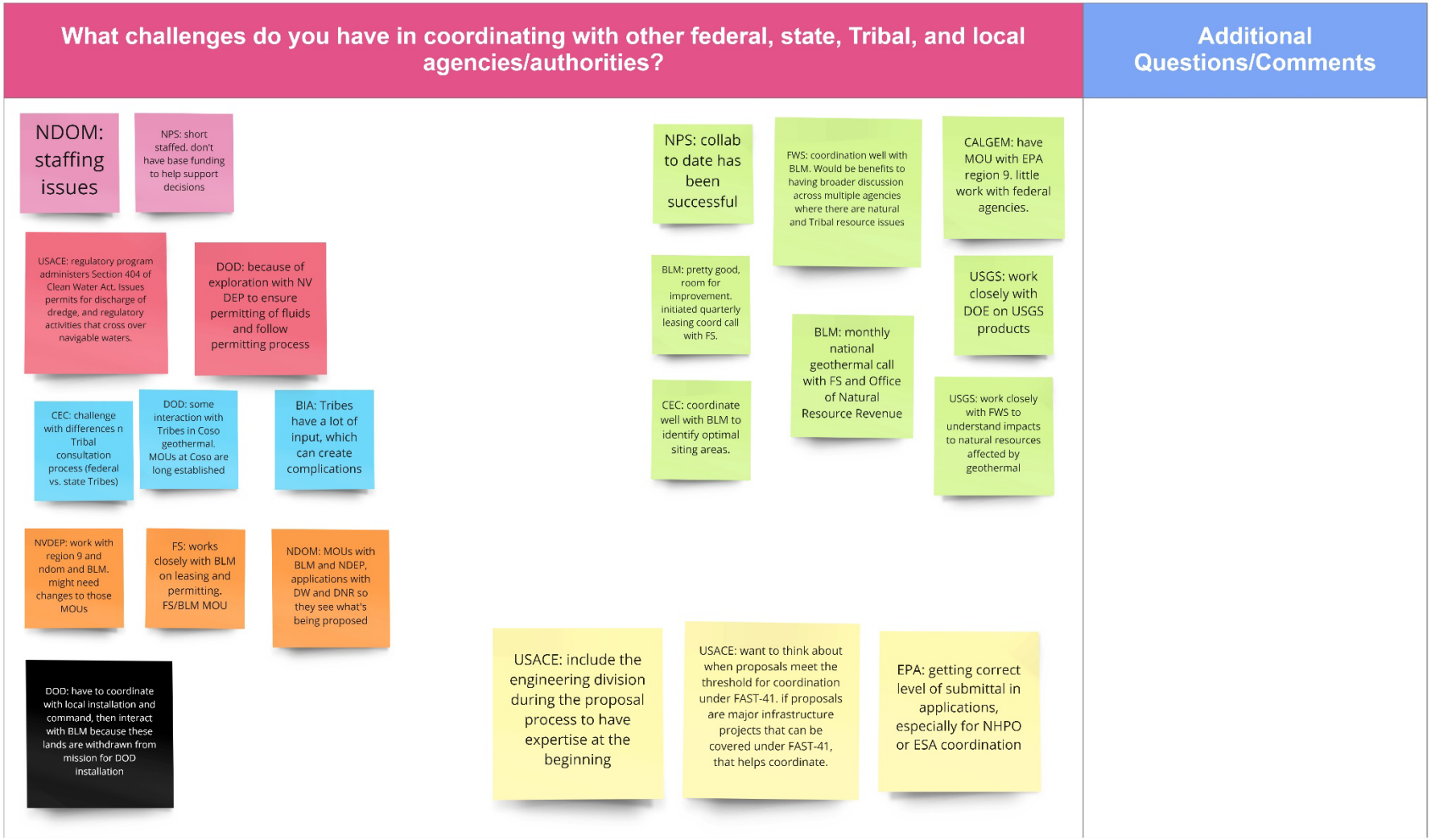


Figure 2: Miro board screenshot sorted by themes related to interagency coordination issues.

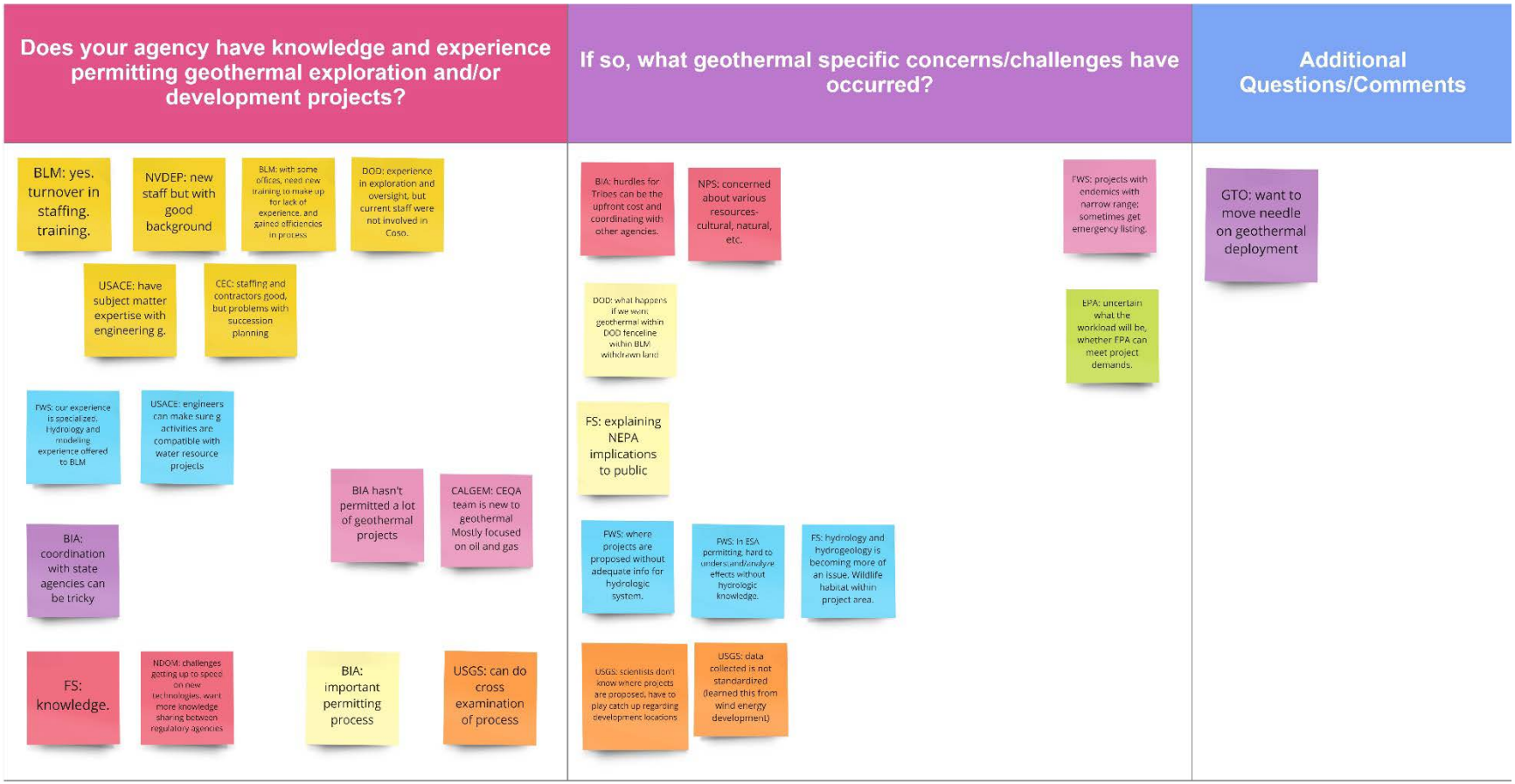


Figure 3: Miro board screenshots sorted by themes related to geothermal knowledge and experience issues.

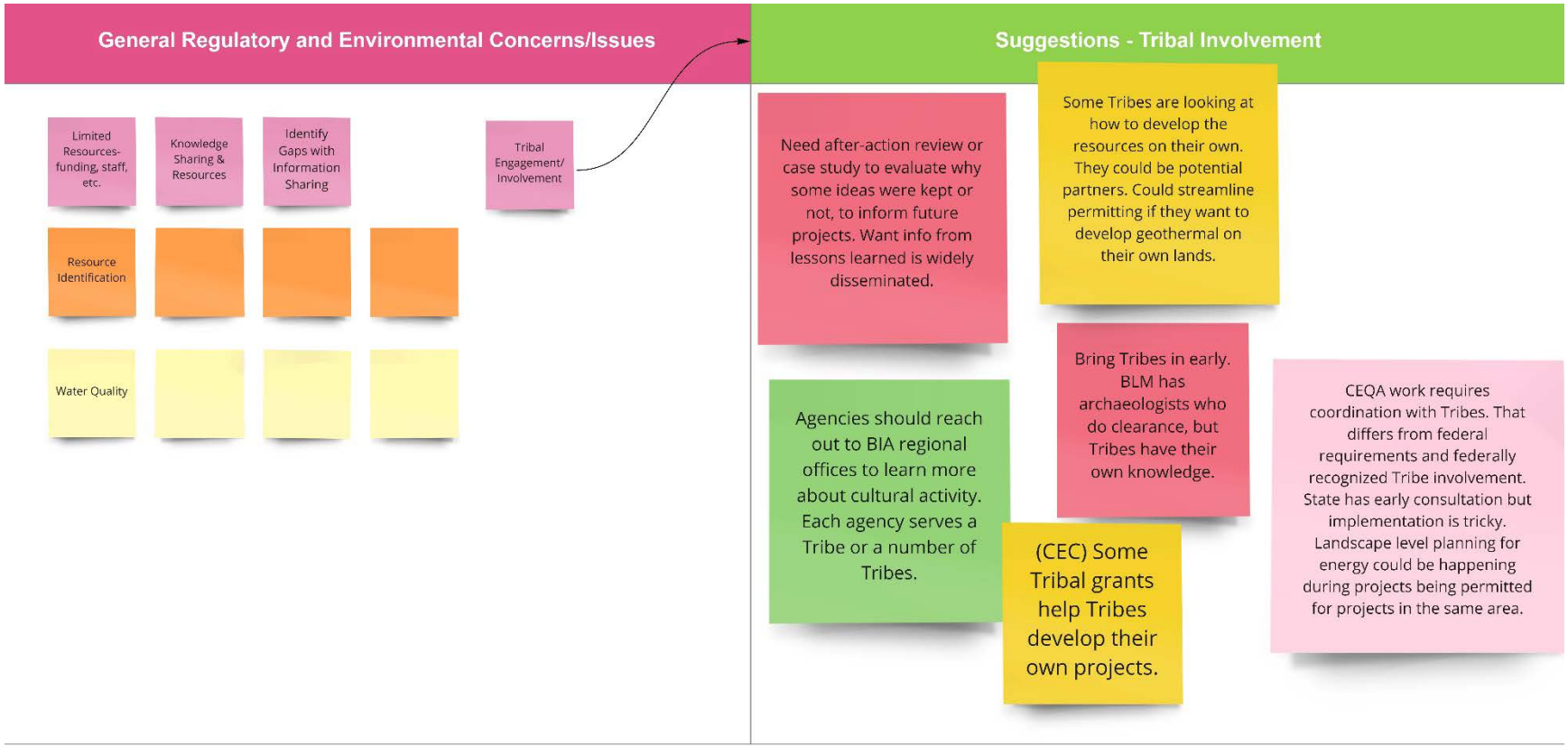


Figure 4: Miro board screenshots with potential solutions to increase tribal involvement in the geothermal permitting process.

Figure 5: Miro board screenshots with potential solutions to increase agency coordination/outdated MOUs.

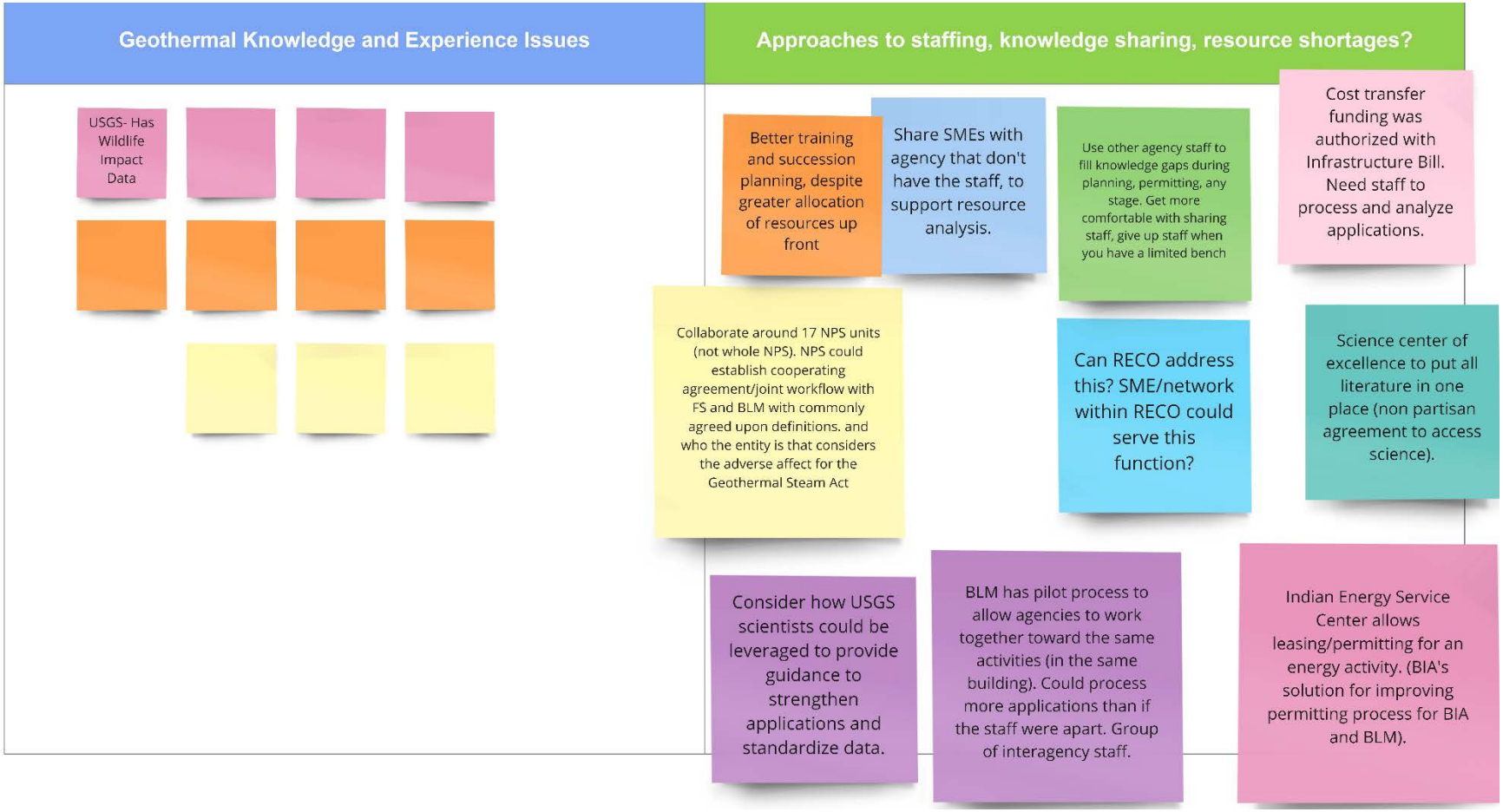


Figure 6: Miro board screenshots with potential solutions to staffing, knowledge sharing, and resource shortages.

Appendix C. Meeting Participants

Geothermal Interagency Collaboration Task Force Kick-off Meeting Participants

Federal Agency Participants		
Name	**Organization**	**Title/Role**
Brian Wilson	Army Corps of Engineers	National Environmental Sustainability Program Manager
Ann Marie DiLorenzo	Army Corps of Engineers	Environmental Compliance and Sustainability Program Biologist
Meg Smith	Army Corps of Engineers	Deputy of Operations and Regulatory
Joe McMahan	Army Corps of Engineers	HQ Regulatory Program Manager
Sierra Squire	Bureau of Indian Affairs	Natural Resource Specialists Office of Trust Services
Jennifer Reimann	Bureau of Indian Affairs	Branch Chief for Renewable Energy
Rebecca Good	Bureau of Land Management	Acting Deputy Division Chief for BLM's Fluid Minerals
Lonny Bagley	Bureau of Land Management	Acting State Director
Jeremy Bluma	Bureau of Land Management	Renewable Energy Program Lead for Wind and Solar
Lorenzo Trimble	Bureau of Land Management	Geothermal Program Lead with HQ Fluid Minerals Division
Doug Herrema	Bureau of Land Management	HQ Lands, Realty, and Rights-of-Way for Renewable Energy
Justin Abernathy	Bureau of Land Management	Deputy State Director for Energy and Minerals NV
Stephen Allen	Bureau of Land Management	Program Lead, Geologist
Kelly Blake	Department of Defense	Division Director
Casey Strickland	Department of Energy	NEPA Lead
Susan Hamm	Department of Energy	GTO Director
Jeff Winick	Department of Energy	Technology Manager
Jennifer Livermore	Department of Energy	Geothermal Project Analyst
Barbara Rudnick	Environmental Protection Agency	Permitting Policy Division
Prasad Chumble	Environmental Protection Agency	Director of Permitting Policy Division
Emily French	Environmental Protection Agency	Permitting Policy Division
Bruce Kobelski	Environmental Protection Agency	Underground Injection (UIC) Program Geologist and Senior Advisor
Scott Bowles	Environmental Protection Agency	Director, Office of Environmental Innovations
Kyle Carey	Environmental Protection Agency	Underground Injection Program
William Bates	Environmental Protection Agency	Prevention Branch Chief

Federal Agency Participants		
Name	**Organization**	**Title/Role**
Robert Tomiak	Environmental Protection Agency	Director, Office of Federal Activities
Chad Mellison	Fish and Wildlife Service	Wildlife Biologist
Michael Senn	Fish and Wildlife Service	Deputy Assistant Regional Director of Ecological Services
Sarah Lessard	Fish and Wildlife Service	Migratory Bird Program
Bud Cribley	Fish and Wildlife Service	Energy Advisor to Directors Office D.C.
Thomas Leeman	Fish and Wildlife Service	CA/NV Deputy Chief for Migratory Birds
Daniel Blake	Fish and Wildlife Service	Regional Migratory Bird Program Chief
Sarah Lessard	Fish and Wildlife Service	Biologist- Division of Bird Conservation, Permits, and Regulations
Jeff Salow	Forest Service	Minerals and Geology Management Lead for Geothermal
Reginald Woodruff	Forest Service	Energy Program Manager
Mona Khalil	Geological Survey	Energy and Wildlife Specialist
Julia Brunner	National Parks Service	Manager- Energy and Minerals Branch; Geologic Resources Division
Aaron Levine	National Renewable Energy Laboratory	Senior & Legal Regulatory Analyst
Faith M. Smith	National Renewable Energy Laboratory	Market and Policy Analyst III
State Agency Participants		
Name	**Organization**	**Title/Role**
Scott Flint	California Energy Commission	Office Chief for Energy Resource and Infrastructure Planning Office Division of Environmental Protection
Charlene Wardlow	California Geologic Energy Management Division	Geothermal Program Manager
Andrew Kowler	Nevada Division of Environmental Protection	Environmental Scientist (UIC Permit Writer)
Jocelyn Moran	Nevada Division of Environmental Protection	Technical Staff
Elizabeth Kingsland	Nevada Division of Environmental Protection	Bureau Chief, Water Pollution Control
Katrina Pascual	Nevada Division of Environmental Protection	Water Pollution Control Branch Supervisor
Michael Visher	Nevada Division of Minerals	Geothermal Program Administrator

National Renewable Energy Laboratory
Geothermal Interagency Collaboration Task Force - Developer Forum
Meeting Summary
Wednesday, June 15, 2022
11 a.m. - 3 p.m. MST

Agenda and Meeting Objectives

The Geothermal Technologies Office's (GTO) *GeoVision* Analysis illustrated significant reductions in development timelines could be achieved through improvements in permitting, interagency coordination and streamlined environmental review procedures.[1] This project is focused on identifying pathways to accelerate permitting and geothermal development on public lands by bringing together federal and California and Nevada state agency regulators to discuss existing challenges and find opportunities to improve coordination among agencies. These agency members make up the Geothermal Interagency Task Force (Task Force).

This project will support requirements laid out in the Energy Act of 2020, including the 25+ gigawatts of permitting renewable energy production on federal land as well as reporting requirements for the National Renewable Energy Coordination Office (RECO) in describing 'any problems related to leasing, permitting, siting, or production' of geothermal energy.[2] Additionally, this project aims to support the California Public Utilities Commission's 2026 procurement order calling for 1,000 megawatts of geothermal energy projects.[3]

This project is administered by NREL with funding support from GTO. As part of this project and in support of the Task Force, NREL is convening three forums (one with geothermal developers, one with environmental non-governmental organizations, and one with Tribal Nations) to identify opportunities and challenges associated with regulation and permitting of utility scale geothermal electricity generation projects on public lands, with specific interest in California and Nevada.

The Task Force will incorporate feedback provided in the forums into the final project deliverable, which will include a set of stakeholder and agency recommendations directed toward federal agency regulators, California and Nevada state regulators, the National Renewable Energy Coordination Office, and relevant Congressional Committees on pathways to accelerate geothermal permitting and deployment on public lands.

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[1] U.S. Department of Energy (DOE). 2019. *GeoVision: Harnessing the Heat Beneath Our Feet*. Washington D.C.: U.S. Department of Energy. DOE/EE-1306.

[2] US House of Representatives. 2020. "Energy Act of 2020." US House of Representatives Committee on Science, Space, & Technology. December 21. Accessed 12 2021. https://science.house.gov/imo/media/doc/Energy%20Act%20of%202020.pdf.

[3] Public Utilities Commission of the State of California. 2021. "Decision Requiring Procurement to Address Mid-Term Reliability (2023 - 2026)." CPUC. June 24. Accessed 12 2021. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K155/389155856.PDF.

The goals of the forums are to:

- Establish a shared understanding of the geothermal industry's perspectives, experiences, opportunities, and challenges related to regulation and permitting of utility scale geothermal electricity generation projects across federal and state agencies.
- Identify opportunities for greater collaboration, engagement, and efficiency toward accelerating geothermal deployment on federally managed public lands.
- Develop recommendations to accelerate permitting and associated geothermal deployment on public lands.

Process

Aaron Levine (National Renewable Energy Laboratory (NREL)) welcomed participants, reviewed the agenda, and shared the purpose of the forum. The forum had four focuses:

- Identify opportunities and challenges associated with regulation and permitting of utility scale geothermal electricity generation projects on public lands, with specific interest in California and Nevada.
- Establish a shared understanding of the geothermal industry's perspectives, experiences, opportunities, and challenges related to regulation and permitting of utility scale geothermal electricity generation projects across federal and state agencies.
- Identify opportunities for greater collaboration, engagement, and efficiency toward accelerating geothermal deployment on federally managed public lands.
- Develop recommendations to accelerate permitting and associated geothermal deployment on public lands.

The Meeting facilitator, Angela Jo Woolcott (Kearns & West), introduced ground rules for the forum. These ground rules encouraged attendees to be active participants, be respectful of others, seek solutions, and participate from the perspective of participants' respective company. State and federal regulators involved in permitting and licensing geothermal projects in California and Nevada, making up the Geothermal Interagency Collaboration Task Force, participated as observers. Appendix A: Developer Forum Participants includes a complete list of meeting attendees, including Task Force observers.

After introductions, participants were asked to share, via a virtual poll, why they were here today (Figure 1).

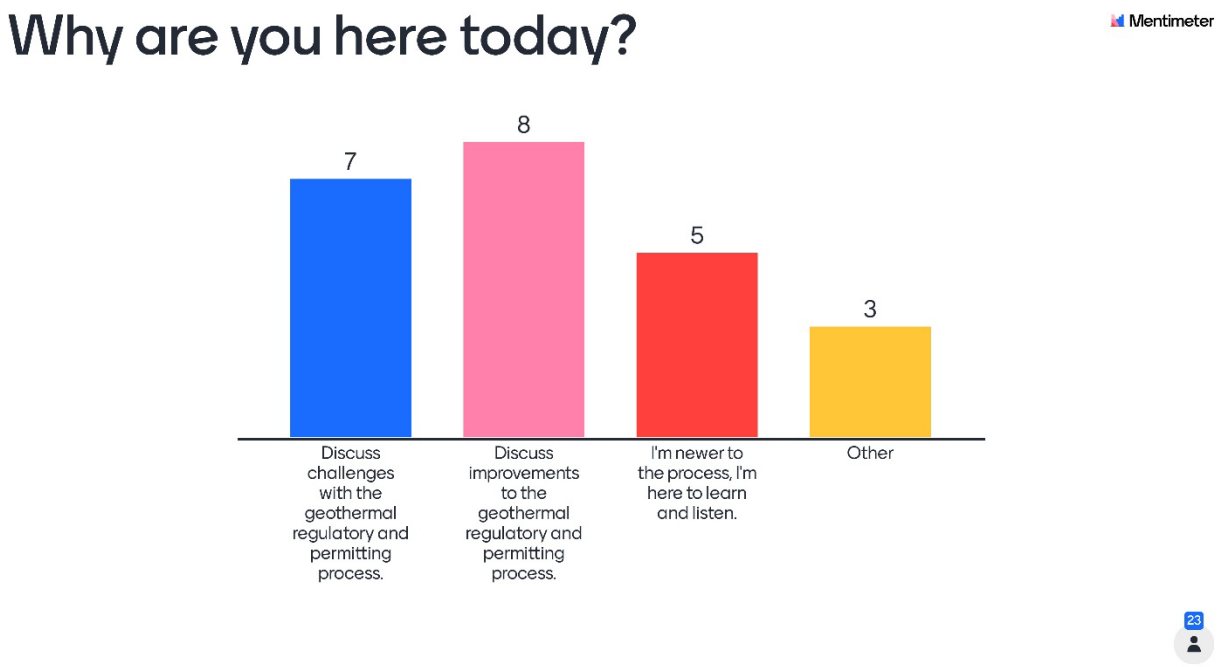


Figure 1 Ice Breaker Poll Results

Project Background

Aaron Levine (NREL) provided additional context around the Geothermal Developer Forum. The forum supports the Geothermal Interagency Collaboration Task Force (Task Force) which seeks to identify pathways to accelerate permitting and associated geothermal deployment on public lands. On March 15, 2022, NREL hosted a virtual kick-off meeting with Task Force members (Appendix B). Task Force members include federal agencies that entered into a Memorandum of Understanding (MOU) to Improve Public Land Renewable Energy Project Permit Coordination as well as relevant California and Nevada state agencies. The Task Force plays a crucial role to facilitate conversations across agencies, provide perspectives on each agency's challenges, and support the goals and purpose of the MOU to implement requirements set forth by the Energy Act of 2020.

The *GeoVision* study and its supporting technical and non-technical reports, suggest significant reductions in development timelines could be achieved through improvements to permitting, interagency coordination, and streamlined environmental review procedures. The work of this project will support the National Renewable Energy Coordination Office (RECO), which is administered by the Department of Interior (DOI) Bureau of Land Management (BLM), the goals of the MOU, as well as the Biden-Harris Administration goal of permitting 25 Gigawatts (GW) of renewable energy projects on public lands by 2025. Additional information on the *GeoVision* study and its findings may be found on the Department of Energy's Geothermal Technologies Office webpage.

Forum participants were provided the opportunity to ask clarifying questions (Q) and share initial comments (C) on Aaron Levine's presentation. Below is a summary of their questions, comments, and corresponding responses (R).

Project Background	
Question or Comment	**Response**
1. Does this effort plan, collect, or analyze data on permit processing times between oil and gas and geothermal projects? 2. BLM recently proposed revised fees for solar and wind projects, based on MW at the site rather than footprint. This approach ultimately increases the levelized cost of energy for geothermal projects since the footprint is much smaller. Will this effort identify ways to levelize the economic requirements of permitting for geothermal? It would be helpful if the fees geothermal developers pay are made up in the levelized cost of energy. 3. Was the analysis for permitting timelines based on new-drill geothermal development or the repurposing of old geothermal or oil and gas developments? 4. Does NREL intend to conduct an analysis of permitting timelines on the repurposing of old geothermal or oil and gas developments? 5. Are there any insights to share on how the impacts to labor and supply-chain affect the permitting timelines shared?	1. The data collected for the Task Force is qualitative in nature. NREL completed data analysis on permitting timelines and drivers. The focus of this forum and effort is to hear challenges, best practices, and ultimately policy initiatives that the industry is interested in seeing. BLM tracks development timelines and statistics and the National RECO is reviewing this data. 2. This effort is focused on permit streamlining and coordination, and issues related to geothermal rentals, royalties, and overall fees. To date, there has not been analysis on the proposed cost reductions for wind and solar deployment, and how that could impact geothermal development, but your comment will be documented and provided to BLM. 3. The *GeoVision* analysis only considered new-drill geothermal development. 4. There has been some interest shared in the analysis and it may occur in the future, but not currently. For example, the Energy Act of 2020 allows for non-competitive leasing for geothermal wells at existing oil and gas fields. The U.S. Department of Energy (DOE) Geothermal Office (GTO) released several funding opportunity announcements for geothermal development at existing gas wells, which may allow for that analysis to occur. 5. There is no plan to update the “business as usual” case for the current supply chain and labor climate. NREL shares an Annual Technology Baseline (ATB) with updated costs and deployment projections for each technology (geothermal, solar, wind, etc.). The *GeoVision* study has not be revisited, but BLM is tracking data through various mechanisms and with the nascency of geothermal, the data collection is relatively easy compared to other technologies.

Perspectives Related to Geothermal Permitting and Development Best Practices and Challenges

Angela Jo Woolcott (Kearns & West) facilitated a Round Robin session that allowed each participant to answer the following questions:

1) What has gone well in the geothermal development permitting process?
2) What existing resources are helpful in guiding the permitting and development process?
3) What are knowledge, data, and/or information gaps in the permitting process?

During this discussion, comments were recorded on a digital whiteboarding tool known as Miro. These comments were arranged by question. The comments recorded in Miro are summarized and presented below in Appendix C.

What has gone well

- Several participants stated that both federal and state regulators in California and Nevada are aware of the permitting process and are active collaborators with developers.
- Closed-loop geothermal development does not require all the permits that traditional geothermal does.
- Communication with regulators while wells are being drilled is efficient and results in less down time.
- Having earlier and more frequent meetings with regulators has helped the process.
- Interagency meetings with all permitting organizations lead to efficiencies in coordination.
- Having a broad project envelope increases the flexibility for deployment details and the surveys required.

Existing resources

- Previous collected data shared by NREL has been helpful in the permitting and licensing process.
- Knowledgeable partners within the industry share 'lessons learned' from their experiences.
- Best practices to create efficiency, especially related to communications with agencies, have been helpful in agency coordination.
- BLM resource management plans are extremely helpful to identify the current use of public lands as well as any constraints, which improves the process of siting potential developments.
- The Desert Renewable Energy Conservation Plan Gateway (https://databasin.org) is helpful for understanding biological and other constraints for siting.

Gaps in information, data, or knowledge

- General education on the process and understanding how it interacts with the environmental review process, and how to streamline the two, are not readily available. In addition, there are not enough helpful resources for new developers, which can lead to the time-consuming review of statutory language.
- Developing a programmatic environmental impact statement (PEIS) may address some challenges.

- Lack of knowledge from industry and regulators on the process and the implications of repurposing of old oil and gas or geothermal wells for new projects.

Challenges with existing geothermal permitting and regulatory process

- BLM staff capacity combined with the difficulty of the agency to backfill staffers has created delays.
- Inconsistent communication requirements between state and federal agencies, including those between regional and HQ federal offices, create delays in the permitting process.

Additional feedback shared

- Engagement within the industry has been successful and will be needed more in the future.
- The creation of the Task Force will be helpful for the industry.
- The [geothermal] community, including industry and regulators, are headed in the right direction to solve current challenges and foster future opportunities, but deploying new projects is required to continue progress.
- Clear and discrete actions for regulators and developers are needed to sort and address challenges.

Breakout Rooms

Angela Jo Woolcott (Kearns & West) introduced the next exercise to hear participants' perspectives on detailed topics. Participants were divided into two breakout rooms and asked to share their perspectives on Stakeholder and Tribal Engagement, the National Environmental Policy Act (NEPA), Siting, and Agency Coordination. To guide the conversation, participants were asked the following guiding questions.

Stakeholder and Tribal engagement

- What natural resource challenges has your company faced?
- Would earlier/increased environmental non-governmental organizations (ENGO) or Tribal engagement be beneficial?
- Do you have concerns around development from Tribal or ENGOs?

NEPA

- Are current application submittal and review processes easy to understand?
- What challenges has your company faced related to NEPA?
- Has your company found strategies that create efficiencies with NEPA?
- Would expanded categorical exclusions be helpful?

Siting

- Have you experienced differences in permitting and development based on the project location?
- Do you consider land ownership or management when selecting development prospects?
- Have you faced challenges with development and permitting due to transmission lines?

Coordination

- Are there state and/or federal permitting coordination challenges that impact geothermal development and/or operations?
- How would a National Renewable Energy Coordination Office be helpful?

During the discussion, notes for each group were taken in a PowerPoint slide and summarized by project team members for reporting out. The following themes were shared.

Stakeholder and Tribal engagement

- Tribal engagement is complex and requires workforce resources. It is sometimes unclear which appropriate Tribal representative to engage for early discussions.

- Multiple Tribes may have interest in a project and in some cases, they may have independent goals or interests. Initially meeting Tribes in groups can be helpful, however, individual Tribal meetings may be easier and more productive.

- Early conversations, prior to the publication of the draft environmental review document, allow for developers to understand existing arrangements among Tribes, avoid future issues in the process, and develop relationships. However, some participants noted that due to Tribes coordinating several different inquiries for projects, their participation in early engagement is difficult. Understanding alliances and if existing groups are formed is essential.

- BLM Archaeologists are great resources to understand existing Tribal dynamics.

- Developers may be able to use existing relationships between Tribes and oil and gas developers, ENGOs, or state agencies to engage Tribes more effectively.

- Gathering several stakeholders and stakeholder groups for large meetings is more efficient and seems to be appreciated by stakeholders.

- While some ENGOs work closely with Tribes, it is important to understand they do not represent Tribal perspectives.

- Engaging stakeholders may become challenging in a regulatory framework with changing rules. For example, sage grouse can be very tricky – new listings of species add a level of complexity as the rules are changing and not determined until finalized.

- Improving the public comment periods within the environmental review process helps prevent issues from coming up later in the process. One participant suggested that public comment needs to be offered at every major milestone and commenters should have additional opportunities, outside of a large public meeting, to provide comment.
    - The process as a whole would be easier if there was a stage gate, where the company would know they have passed every potential hurdle and/or issue that could occur. t Our City Fort Collins’

- Learning from other industries stumbling blocks, pitfalls, or lessons learned will ultimately advance the geothermal industry.

- State or federal assistance in facilitating the process is helpful but a quick start guide on a regional basis would be helpful. Additionally, a clearinghouse of resources would be helpful. One participant shared guidance from California on the requirements of the California Environmental Quality Act.

NEPA

When asked about best practices with the NEPA process, there were no comments from participants.

The following comments are from the discussion of challenges in the NEPA process.

- Clear guidelines on the review process for baseline environmental surveys to identify sensitivities are needed. Ideally this would include how long baseline surveys are valid for, as well as what existing surveys meet NEPA requirements.

- Multiple interpretations of revised NEPA guidance creates uncertainty.

- Limited agency staff with multiple NEPA requests can impact development timelines. This has increased with Covid-19 and created difficulties communicating.

- Delays early in a project (when the Notice of Intent is published) can grow into much larger and impactful delays.

- Developing a programmatic environmental impact statement (PEIS) for geothermal may provide long-term efficiencies for conducting the NEPA process on individual projects. This would not immediately resolve NEPA issues, though.

- It is difficult to understand the discrepancies between the oil and gas industry and the geothermal industry. Particularly, the oil and gas industry has better clarity on how NEPA applies in the event of a developer submitting to two separate BLM offices. Oil and gas developers on public lands may also drill multiple wells from an existing pad without an additional NEPA review process.

- There is a lack of continuity between the percentage of a project on public lands and the requirement of NEPA. For example, a project that consists of 20% of total land coverage on public lands still requires a full NEPA process (100%) rather than a smaller effort. Unfortunately, this makes development on private land much more enticing when available.

- NEPA guidelines for projects on both private and public lands impact project footprints and therefore the energy exported from the project.

- Guidelines and clarity on the process when something is found during a survey is necessary. Currently there is no standard on how to respond to that situation without having to reset the process each time.

- Guidance or analysis on the value proposition of the Fast41 Program based on project factors or characteristics would be helpful in identifying when projects can use the program to improve coordination.

- Endangered species offer the greatest challenge to permitting and licensing.

The following information is specific to the discussion of categorical exclusions:

- All participants agreed that expanding categorical exclusions (CXs) would be incredibly beneficial to the industry.

- Additional CXs to the permitting process would be helpful to clarify timeline commitments. Some agencies tried applying CXs from the oil and gas industry but a category for geothermal-specific drilling would be helpful.

- A CX (or framework for a fast-track review) to enable early exploration like drilling a temperature gradient well would be beneficial. This may also be expanded to include wells that intersect geothermal resources, wells for sampling, and wells with minor surface disturbance (small well pad).

- Guidelines for the NEPA process and any triggers are needed to clarify guidance and improve transparency.

- Different agencies have different CXs, which can prove difficult for projects with several agency stakeholders.

- A CX should be developed for operations that are just increasing equipment on the well pad but not increasing the current disturbed footprint.

- A CX or determination of NEPA adequacy should be allowed if there is an existing NEPA document and no new impact.

Overall, participants felt that the focus should be on expanding CXs rather than pursuing a programmatic EIS.

Siting

- There is a vast difference between California and Nevada siting processes, including but not limited to:
    - Timelines
    - Number of permits and permit requirements, including how permits and NEPA are processed.
    - Ability to reduce risk and planning for a project, including when a project can begin drilling.

    - Some of the differences and issues are discovered late in coordination, creating large delays.

- Access to transmission, land ownership or management, and endangered species are major factors in the siting process for a geothermal project. These factors impact timelines, cost, and required permits for projects.

- Permitting approval for a project on private land can take as little as two months while the same project on public lands would take roughly two years. Development timelines for projects on federal lands generally equate to the number of years when compared to months for a project on private land.

- Depending on the site, a project may require more local permit requirements or points of compliance.

- The distance to access a transmission line or substation interconnect can increase the timeline of project by years, depending on the complexity of land ownership and their interests.

Coordination

- Coordination with stakeholders seems better in Nevada.

- Some disagreements exist between state and federal agencies, namely the California Department of Wildlife, on mitigation implementation, which can impact project development.

- Agencies with the same requirements should coordinate granting a permit or submitting feedback collectively or combine the review processes.

- Staff turnover at agencies creates coordination issues as developers have to retrain new staff on project details in the middle of the process.

- Developers appreciated the current RECO setup with a headquarters for coordination but much of the coordination being between regional or local staff.

- BLM's initiative to appoint staff committed to reviewing renewable energy projects for their agencies and others needs to be shared and celebrated more. Within the BLM specifically it is unclear how well priorities percolate from the federal level to state and/or local offices.

Breakout Room Report Outs and Discussion

Zach Barr (Kearns & West) and Caitlin Sheridan (Kearns & West) provided an overview of each breakout room. Angela Jo Woolcott (Kearns & West) then summarized the feedback received in the breakout rooms, below.

- **Developing better guidelines or a "Quick Start Guide" for permitting and licensing engagement**

    - Developers need help facilitating discussion around development of public lands with Tribes and stakeholders, and guidance on how to establish partnerships.

    - This guidance could include a frame of reference for current processes, which steps to follow, and how to get started, as well as:
        - Contacts (generalized to title/position, who possesses decision making power)
        - State/federal agencies and their jurisdictions
        - Flowcharts of the complete process (including state and federal review processes)
        - Parties interested in baseload renewable energy development

- **Providing clearer guidance on NEPA timelines and trigger points:**
    - More certainty in the guidelines would be helpful but it is hard to discuss at a national level.
    - Identifying ways to reduce the number of times a developer must go through NEPA or review NEPA adequacy.

- **Fast-tracking the NEPA process (development of categorical exclusions, a PEIS, and fast-tracked approval processes)**
    - A faster timeline would make it more accessible to prove a resource prior to completing NEPA.
    - A categorical exclusion seems more realistic than developing a PEIS and therefore should be prioritized.

- **Increasing data availability and accessibility**
    - Developers would benefit from enhanced data or a clearinghouse of existing information on topics such as average processing times and key performance indicators to processing time.

- **Improving the siting process**
    - Allow drilling on already existing pads on private lands (like oil and gas requirements) would accelerate project deployments.
    - Improving the ability to identify cultural resources would benefit developers.
    - Reducing the number of times a project must conduct a NEPA analysis would also accelerate deployment.

- **Coordination**
    - A single joint agency permit (one single permit a developer fills out that goes to multiple agencies) may help streamline coordination.

Next Steps

Aaron Levine (NREL) reviewed the next steps before adjourning the meeting. A draft meeting summary will be shared with Developer Forum participants and Task Force members for review. An ENGO Forum and a Tribal Forum will be convened in July and August, respectively, followed by a final Task Force Member Forum before a final report is drafted. The final report will be shared with participants from all Forums in addition to Task Force Members.

Appendix A. Meeting Participants

Geothermal Developer Forum Participants

Developer Participants		
Name	**Organization**	**Title/Role**
Alex Fitzsimmons	ClearPath	Senior Director
Danny Rehg	Criterion Energy Partners	CEO
Bertha Nefe	Criterion Energy Partners	Regulatory Consultant
Joe Bannon	Cyrq Energy	Vice President – Environmental and Utility Relations
Monte Morrison	Cyrq Energy	Vice President – Geothermal Technology
Sheldon Byde	Cyrq Energy	Permitting Manager
Christian Gradl	Fervo Energy	Drilling and Completion Manager
Laura Singer	Fervo Energy	Senior Policy and Regulatory Affairs Associate
Sarah Jewett	Fervo Energy	Director of Strategy
Will Pettitt	Geothermal Rising	Executive Director
Andy Van Horn	GreenFire Energy	Advisory Board
Marcus Oesterberg	Ignis	COO
Robin Zuza	Ormat	Director of Global Exploration
Toby Marble	Ormat	Director of Drilling Engineering and Operations
Morgan Melenderz	Ormat	Business Analyst
Susanne Heim	Panorama Environmental	Principal
Johanna Ostrum	Transitional Energy	COO
Federal Agency Participants (Observers)		
Name	**Organization**	**Title/Role**
Ann Marie DiLorenzo	Army Corps of Engineers	Environmental Compliance and Sustainability Program Biologist
Archana Kumari	Bureau of Indian Affairs	
Lonny Bagley	Bureau of Land Management	Acting State Director
Jeremy Bluma	Bureau of Land Management	Renewable Energy Program Lead for Wind and Solar
Stephen Allen	Bureau of Land Management	Program Lead, Geologist
Dr. Susan Hamm	Department of Energy	GTO Director
Casey Strickland	Department of Energy	NEPA Lead
Melissa Pauley	Department of Energy	NEPA Compliance Officer
Sean Porse	Department of Energy	GTO Data, Modeling, and Analysis Lead

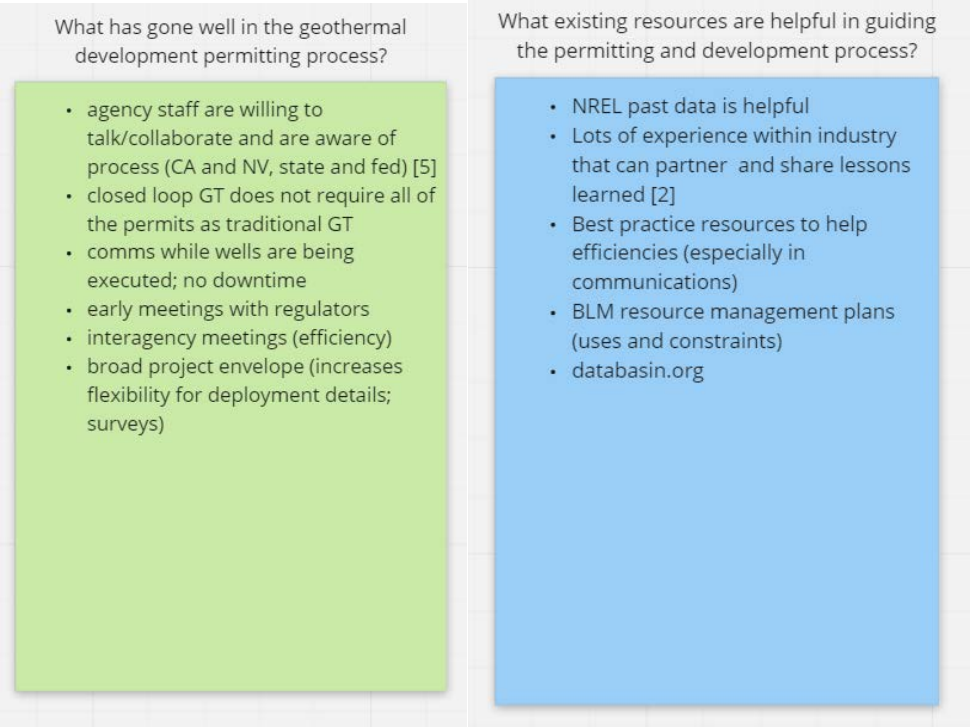
Developer Participants		
Name	**Organization**	**Title/Role**
Jon Payne	Department of Energy	Support Service Contractor
Jennifer Livermore	Department of Energy	Geothermal Project Analyst
Barbara Rudnick	Environmental Protection Agency	Permitting Policy Division
Chad Mellison	Fish and Wildlife Service	Wildlife Biologist
Reginald Woodruff	Forest Service	Energy Program Manager
Bethany Kunz	Geological Survey	Biologist at the Columbia Environmental Research Center
Ghanashyam Neupane	Idaho National Laboratory	Staff Researcher
Jeff Hughes	National Parks Service	Hydrologist – Water Rights Program
Aaron Levine	National Renewable Energy Laboratory	Senior & Legal Regulatory Analyst
Faith M. Smith	National Renewable Energy Laboratory	Markets and Policy Analyst III
State Agency Participants		
Name	**Organization**	**Title/Role**
Charlene Wardlow	California Geologic Energy Management Division	Geothermal Program Manager
Andrew Kowler	Nevada Division of Environmental Protection	Environmental Scientist (UIC Permit Writer)
Jocelyn Moran	Nevada Division of Environmental Protection	Technical Staff
Katrina Pascual	Nevada Division of Environmental Protection	Water Pollution Control Branch Supervisor
Michael Visher	Nevada Division of Minerals	Geothermal Program Administrator

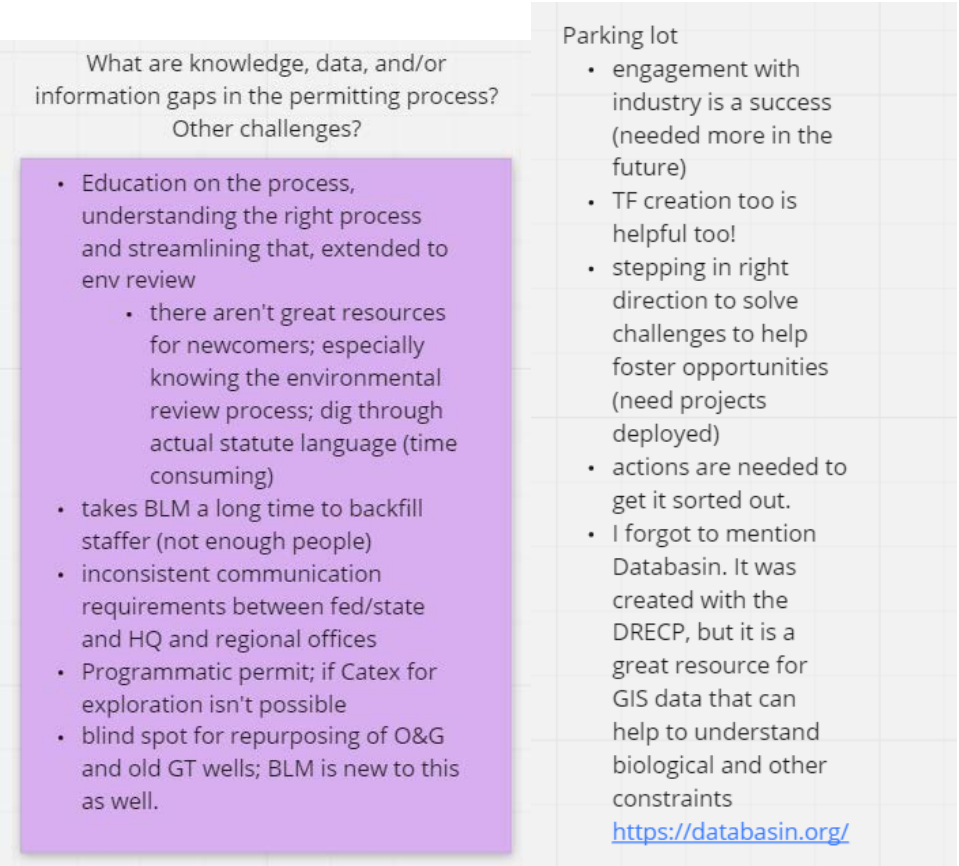
Appendix B. Task Force Member Agencies

Table of Task Force Member Agencies

Federal Agencies
Department of Energy (Geothermal Technologies Office)
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
Department of Defense (Navy)
Environmental Protection Agency
Fish and Wildlife Service
Forest Service
National Park Service
U.S. Army Corps of Engineers
U.S. Geological Survey
State Agencies
California Energy Commission
California Geologic Energy Management
Nevada Division of Environmental Protection
Nevada Division of Minerals

Appendix C. Plenary Discussion Notes from Miro Board





National Renewable Energy Laboratory
Geothermal Interagency Collaboration Task Force
Environmental Non-Governmental Organization Forum

Meeting Summary

Monday, July 18, 2022
10 a.m. - 1 p.m. MT

Agenda and Meeting Objectives

The Geothermal Technologies Office's (GTO) *GeoVision* Analysis illustrated significant reductions in development timelines that could be achieved through improvements in permitting, interagency coordination, and streamlined environmental review procedures.[1] This project is focused on identifying pathways to accelerate permitting and geothermal development on public lands by bringing together federal and California and Nevada state agency regulators to discuss existing challenges and find opportunities to improve coordination among agencies. These agency members comprise the Geothermal Interagency Task Force (Task Force).

This project supports requirements outlined in the Energy Act of 2020, including permitting 25+ gigawatts of renewable energy production on federal land, as well as creating a National Renewable Energy Coordination Office (RECO) to report on problems related to leasing, permitting, siting, or production of geothermal energy.[2] Additionally, this project aims to support the California Public Utilities Commission's 2026 procurement order calling for the development of 1,000 megawatts of geothermal energy projects.[3]

NREL administers this project with funding support from GTO. As part of this project and in support of the Task Force, the National Renewable Energy Laboratory (NREL) is convening three forums (one with geothermal developers, one with environmental non-governmental organizations, and one with Tribal Nations) to identify opportunities and challenges associated with the regulation and permitting of utility-scale geothermal electricity generation projects on public lands, with a specific interest in California and Nevada.

The Task Force will incorporate feedback received in the forums into the final project deliverable, which will include a set of stakeholder and agency recommendations directed toward federal agency regulators, California and Nevada state regulators, RECO, and relevant Congressional Committees on pathways to accelerate geothermal permitting and deployment on public lands.

The goals of the forums are to:

- Establish a shared understanding of environmental non-governmental organizational perspectives, experiences, opportunities, and challenges related to regulating and

[1] U.S. Department of Energy (DOE). 2019. *GeoVision: Harnessing the Heat Beneath Our Feet*. Washington D.C.: U.S. Department of Energy. DOE/EE-1306.

[2] US House of Representatives. 2020. "Energy Act of 2020." US House of Representatives Committee on Science, Space, & Technology. December 21. Accessed 12 2021. https://science.house.gov/imo/media/doc/Energy%20Act%20of%202020.pdf.

[3] Public Utilities Commission of the State of California. 2021. "Decision Requiring Procurement to Address Mid-Term Reliability (2023 - 2026)." CPUC. June 24. Accessed 12 2021. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K155/389155856.PDF.

permitting utility-scale geothermal electricity generation projects across federal and state agencies.

- Identify opportunities for greater collaboration, engagement, and efficiency toward accelerating geothermal deployment on federally managed public lands.
- Develop recommendations to accelerate permitting and associated geothermal deployment on public lands.

Meeting Process

Aaron Levine (NREL) welcomed participants, reviewed the agenda, and shared the forum's purpose. The forum goals were to:

- Establish a better understanding of environmental non-governmental organizations' (NGO) perspectives, experiences, and challenges related to geothermal development and engagement with federal and state regulators as well as geothermal developers.
- Identify opportunities for greater collaboration and engagement when geothermal development is proposed on federally managed public lands.

To start the meeting, Angela Jo Woolcott (Kearns & West), meeting facilitator, asked participants, via a virtual poll, about their familiarity with geothermal technology (Figure 1).

Figure 1: Icebreaker Poll Results

Introduction to Geothermal Energy

Aaron Levine (NREL) introduced the Department of Energy's Geothermal Technologies Office's *Energy 101: Geothermal Energy* video to provide environmental NGO (ENGO) participants an understanding of geothermal energy development. Participants asked questions or provide comments on the goals, the forum's schedule, and the geothermal introductory video. After the video, the following questions or comments were addressed:

Introduction to Geothermal Energy	
Question or Comment	Response
1. Is the goal to focus on utility-scale geothermal energy development? Will the forum discuss geothermal development for residential and community development? 2. How did the Jersey Valley Hot Springs in Nevada become dry? It appears to be the result of the McGinnis Hills geothermal power plant. Can you explain how this happened and how it can be prevented? 3. In some sites, mitigation is considered only after damage occurs. Mitigation for the Jersey Valley Hot Springs has not been approved and the spring is still dry.	1. Today's forum focuses exclusively on utility-scale geothermal development on public lands and the "25+ gigawatts by 2025" goal. This forum will not cover the direct use application at the district heating or ground source level, but on the electricity generation side. 2. After the Jersey Valley Hot Springs dried up, efforts were made to recharge and preserve the hot spring. The goal of this forum is not to be promotional in nature but to understand the environmental impacts of geothermal development. 3. This comment is part of the discussion we would like to have during the first discussion portion of our agenda that focuses on the substantive side of geothermal development. We want those in attendance to share their perspectives so we can understand lessons learned and best practices in the future.

Introductions & Ground Rules

Angela Jo Woolcott (Kearns & West) introduced forum ground rules to encourage attendees to be active participants, be respectful of others, seek solutions, and participate from the perspectives of their respective organizations. State and federal regulators involved in permitting and licensing geothermal projects with a specific focus in California and Nevada, making up the Task Force, participated as observers. *Appendix A: Meeting Participants* includes a complete list of meeting attendees, including Task Force observers.

Angela Jo Woolcott (Kearns & West) facilitated Round Robin introductions to understand more about each ENGO and each organization's goals and mission. After introductions, participants were asked to share, via a virtual word cloud, "why are you here and what do you hope to get out of this forum?" (Figure 2).

Figure 2: Word Cloud Results

Project Background

Aaron Levine (NREL) provided additional context around the Geothermal ENGO Forum. The forum is intended to identify opportunities for greater collaboration and engagement with ENGOs throughout the geothermal energy project development process. As such, the forum supports the Task Force, which seeks to identify pathways to accelerate permitting and associated geothermal deployment on public lands. On March 15, 2022, NREL hosted a virtual kick-off meeting with Task Force members (listed in Appendix B). Task Force members include federal agencies that entered into a Memorandum of Understanding (MOU) to Improve Public Land Renewable Energy Project Permit Coordination and relevant California and Nevada state agencies. The Task Force plays a crucial role in facilitating conversations across agencies, providing perspectives on each agency's challenges, and supporting the MOU's goals and purpose to implement requirements set forth by the Energy Act of 2020. To support the efforts of the Task Force, NREL is convening three virtual forums with the Geothermal Industry, ENGOs, and Tribes before reconvening with the Task Force members in the fall. The initial forum was with the Geothermal Development Community on June 15, 2022 and the Tribal Forums, one for California stakeholders and a second for Nevada stakeholders, will be held in August.

Environmental NGO Forum Substantive Discussion

Angela Jo Woolcott (Kearns & West) facilitated a Round Robin discussion to hear participants' concerns with geothermal development, how to mitigate the environmental risks of geothermal development, and to understand potential pathways forward within the renewable energy development space. To guide this conversation, participants were asked the following questions:

1) What role(s) do you see Federal and State Agencies playing in the geothermal permitting and regulatory process?

2) Do you see a path forward for geothermal development to play a larger role in the renewable energy mix? What are the biggest hurdles?
3) What are outstanding substantive issues related to geothermal development?
4) Is there a problem or issue around geothermal development that this group could address together?
5) What are your concerns and interests?
6) In your mind, are there areas that help avoid or mitigate the environmental risks of geothermal development?
7) Is there potential to preserve or boost habitat in other areas as part of geothermal development?

During the discussion, the following themes were recorded.

Cultural and Environmental Concerns

- Concern was expressed about the number of species affected by geothermal development and impacts on adjacent ecosystems, particularly water resource availability and the significance of the geochemistry of existing resources.
- Concerns were discussed regarding potential long-term impacts on hot springs historically utilized as a cultural resource with intrinsic value.
- Direct concerns with the NEPA review process and associated agencies tasked with conducting neutral, scientifically driven review processes.
- Some organizations felt that agencies should be held responsible for how they are conducting NEPA reviews and the lack of taking a more life-cycle approach when considering environmental impacts such as water consumption and loss.

Programmatic Analysis

- There is a desire for a better understanding of environmental impacts before a renewable energy project's development begins, potentially even before the leasing process begins.
- Programmatic analyses should examine geothermal holistically, rather than specific sites. Large-scale analyses could include a mapping effort to better understand where geothermal opportunities are and where there are potential environmental conflicts.
    - Several individuals discussed how this has been successful for solar development on federally-managed public lands.

Habitat Mitigation & Enhancement

- Environmental impacts should be avoided if/when possible, but at the very least, the best course of mitigation should be prioritized.
    - This should not only include surface impacts but potential impacts associated with drilling or impacts on ground water resources.
- Biodiversity cannot always be replicated in specific habitats or ecosystems, particularly in hot springs or wetlands.
    - In geothermal environments, some species are highly dependent on the current conditions, which are difficult to replicate elsewhere.
- Environmental review processes should evaluate potential alternative actions that could avoid environmental conflicts with geothermal development and evaluate whether

renewable energy goals could be achieved with another renewable energy technologies (i.e., solar or wind).
- Mitigation planning should evaluate the impacts on each site and how an agency could boost or limit activity elsewhere on public lands to minimize environmental conflict.

Role of Geothermal Development

- Participants shared the desire to have non-biased conversations that did not directly promote geothermal development.
- There was a general interest in learning more about how geothermal energy could assist with decarbonization goals and about geothermal technology in general.

Environmental NGO Forum Procedural Discussion

Angela Jo Woolcott (Kearns & West) facilitated a Round Robin discussion to hear participants' perspectives related to communication, the NEPA environmental review process, and Tribal engagement. To guide this conversation, participants were asked the following questions:

1) How do you typically communicate with agencies? What has been your experience communicating with agencies involved in geothermal permitting (development)?
    a. Would earlier/increased engagement be beneficial?
2) How do you feel the current NEPA process is working for early engagement to a final decision? Do you feel heard in the process?
3) What additional resources (e.g., database, tools) would you find helpful?
4) Do you have a recent lesson learned on coordination with Tribal interests?

The following themes were recorded.

Coordination & Communication

- There is a strong desire for non-biased conversations from the development community and regulatory agencies alike.
- Similarly, individuals echoed a desire for agencies to assign relevant experts the appropriate portion of the NEPA process, including pre-project analyses through power plant construction.
    - The following examples were given to illustrate this:
        The project should not be assigned to a geologist to review cultural and environmental impacts.
        Instead, organizations felt biologists, hydrologists, and archaeologists for example, should be assigned to review in its entirety as a project manager or at the very least appropriate portions of the review to ensure neutrality and accuracy.
- Paper trails are beneficial (e.g., submitting public comments, writing letters or emails, legal communication, etc.) to guarantee that feedback is part of the administrative record.
- Opportunities to meet with agencies in person create relationships and shared understanding between all parties.

Accountability

- Agencies should be held accountable throughout the geothermal development process.

- Agencies must remain neutral and respond to public comment as required by law.
- The geothermal permitting and decision-making process should be more transparent and driven by technical analyses.
- There should be more open communication between agencies and environmental NGOs.

NEPA Process

- The NEPA process should be managed by a neutral facilitator to allow better dialogue, particularly during scoping.
- Participants would like to be involved in NEPA early in the process.
- Organizations would appreciate direct follow-up from agencies to ensure that they feel heard.

Tribal Coordination

- It is not enough to consult with Tribal nations on a single basis – agencies and developers need ongoing dialogue to hear Tribal concerns. Tribal consultations should be outcome-oriented rather than process-oriented.
- Tribal engagement is more than consultation, being respectful of Tribes and their interests must be prioritized.
- Tribal engagement should be conducted face-to-face on or near Tribal land – traveling to them is a must.
- To have meaningful dialogue with Tribes, agencies should acknowledge cultural sensitives throughout the engagement process.

Priority Recommendation- Programmatic Analysis

Angela Jo Woolcott (Kearns & West) asked participants to consider whether a holistic or larger geothermal development framework would be beneficial. Participants referenced the Desert Renewable Energy Conservation Plan (DRCP), as model for a landscape-scale geothermal mapping process. Participants appreciate that it examines the renewable energy resource from a high level while identifying areas of environmental conflict and areas that would benefit from additional conservation. A DRECP-type plan can identify an extra layer of protection from unintended or overlooked impacts. Due to the nature of geothermal development, programmatic analysis seems to be lagging.

Next Steps

Aaron Levine (NREL) reviewed the next steps before adjourning the meeting. A draft meeting summary will be shared with environmental NGO participants and Task Force members for review. Two Tribal Forums will be convened in August, followed by a final Task Force Member Forum convening before the final report is drafted. The final report will be shared with participants from all Forums and Task Force Members.

Appendix A. Forum Participants

Environmental NGO Participants		
Name	**Organization**	**Title/Role**
Kevin Emmerich	Basin and Range Watch	Director
Patrick Donnelly	Center for Biological Diversity	Great Basin Director

Environmental NGO Participants		
Name	**Organization**	**Title/Role**
Jeff Aardahl	Defenders of Wildlife	Senior California Representative
Steve Bardwell	Morongo Basin Conservation Association	President
Alejandra Mejia Cunningham	Natural Resources Defense Council	Advocate
Jaina Moan	The Nature Conservancy	External Affairs Director
Stacy Tellinghuisen	Western Resource Advocates	Climate Policy Manager
Alex Routhier	Western Resource Advocates	Senior Clean Energy Policy Analyst
Federal Agency Participants (Observers)		
Name	**Organization**	**Title/Role**
Lorenzo Trimble	Bureau of Land Management	Geothermal Program Lead with HQ Fluid Minerals Division
Jeremy Bluma	Bureau of Land Management	Renewable Energy Program Lead for Wind and Solar
Jason Kirby	Bureau of Reclamation	Chief Realty Officer
Casey Strickland	Department of Energy	NEPA Lead
Melissa Pauley	Department of Energy	NEPA Compliance Officer
Jeff Winick	Department of Energy	Technology Manager, Data Modeling & Analysis
Jennifer Livermore	Department of Energy	Geothermal Project Analyst
Jacob Davidson	Environmental Protection Agency	Biologist
Bud Cribley	Fish & Wildlife Service	Senior Advisor, Energy
Chad Mellison	Fish & Wildlife Service	Wildlife Biologist
Jeff Hughes	National Park Service	Hydrologist, Water Rights Program
Julia Brunner	National Park Service	Branch Lead, Energy and Minerals Branch
Aaron Levine	National Renewable Energy Laboratory	Senior & Legal Regulatory Analyst
Faith Smith	National Renewable Energy Laboratory	Markets and Policy Analyst III
Dave Goodman	Pacific Northwest National Laboratory	Senior Regulatory Analyst
State Agency Participants (Observers)		
Name	**Organization**	**Title/Role**
Charlene Wardlow	California Geologic Energy Management Agency	Geothermal Program Manager
Mike Visher	Nevada Division of Minerals	Administrator
Jocelyn Moran	Nevada Division of Environmental Protection	UIC Compliance

Appendix B. Task Force Member Agencies

Federal Agencies
Department of Energy (Geothermal Technologies Office)
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
Department of Defense (Navy)
Environmental Protection Agency
Fish and Wildlife Service
Forest Service
National Park Service
U.S. Army Corps of Engineers
U.S. Geological Survey
State Agencies
California Energy Commission
California Geologic Energy Management
Nevada Division of Environmental Protection
Nevada Division of Minerals

National Renewable Energy Laboratory
Geothermal Interagency Collaboration Task Force
Tribal Community Listening Sessions – California and Nevada

Meeting Summary

Tuesday, August 23, 2022
Nevada: 11 a.m. – 1 p.m. MT
California: 2 p.m. – 4 p.m. MT

Agenda and Session Objectives

The Geothermal Technologies Office's (GTO) *GeoVision* Analysis illustrated significant reductions in development timelines that could be achieved through improvements in permitting, interagency coordination, and streamlined environmental review procedures.[1] This project is focused on identifying pathways to accelerate permitting and geothermal development on public lands by bringing together federal and California and Nevada state agency regulators to discuss existing challenges and find opportunities to improve coordination among agencies. These agency members comprise the Geothermal Interagency Task Force (Task Force).

This project supports requirements outlined in the Energy Act of 2020, including permitting 25+ gigawatts of renewable energy production on federal land, as well as creating a National Renewable Energy Coordination Office (RECO) to report on problems related to leasing, permitting, siting, or production of geothermal energy.[2] Additionally, this project aims to support the California Public Utilities Commission's 2026 procurement order calling for the development of 1,000 megawatts of geothermal energy projects.[3]

The National Renewable Energy Laboratory (NREL) administers this project with funding support from GTO. As part of this project and in support of the Task Force, NREL is convening four forums (one with geothermal developers, one with environmental non-governmental organizations, and two with Tribal Nations) to identify opportunities and challenges associated with the regulation and permitting of utility-scale geothermal electricity generation projects on public lands, with a specific interest in California and Nevada.

The Task Force will incorporate feedback received in the forums into the final project deliverable, which will include a set of stakeholder and agency recommendations directed toward federal agency regulators, California, and Nevada state regulators, RECO, and relevant Congressional Committees on pathways to accelerate geothermal permitting and deployment on public lands.

Meeting Process

Aaron Levine (NREL) welcomed participants, reviewed the agenda, and shared the listening session's purpose. The listening session(s) goals were to:

- Understand Tribal priorities, needs, and issues as related to renewable energy development.
- Listen to Tribes' perspectives, experiences, opportunities, and challenges related to regulation and permitting of utility scale geothermal electricity generation projects across federal and state agencies.
- Identify opportunities for greater collaboration, engagement, and efficiency toward accelerating geothermal deployment on federally managed public lands.

Introductions

Angela Jo Woolcott (Kearns & West) introduced guidelines to encourage attendees to be mutually respectful, actively listen, allow time for everyone to share, and review the listening session summary to ensure it accurately represents the discussion. To provide an open and encouraging space for Tribal members and organizations to speak freely, Task Force observers were not invited to attend either Listening Session as observers. *Appendix A: Meeting Participants* includes a complete list of meeting attendees.

To start the meeting, Angela Jo Woolcott (Kearns & West), meeting facilitator, explained her role as a third-party neutral facilitator, introduced the subject matter experts attending the meeting from the U.S. Department of Energy (DOE) GTO, and asked participants to introduce themselves by sharing what they were hoping to discuss during the listening sessions. The following interests were shared.

Nevada:

- Leilah Shepard: As the Fallon Paiute-Shoshone Tribe's Tribal Historic Preservation Officer and starting in this position in April 2022, she was interested in discussing the communication issues I have encountered during the process, especially when it comes to the exact location of projects, or the number of wells intended in a project.
- Russell Dyer-Redner: As the Fallon Paiute-Shoshone Tribe's American Rescue Plan Act Manager and as a member of the tribe, his role is to bridge the gap of why certain resources are important to tribes and to share their desire to be involved. He emphasized that some Tribes may want to participate, they may lack staffing and capacity to participate.
- Rupert Steele: As Chairman of the Confederated Tribes of Goshute Reservation, he was interested in discussing the dynamics of the geothermal projects, how long projects may last, and the possible degradation of the natural resources.
- Randi Lone Eagle: As Chairwoman of the Summit Lake Paiute Tribe, she was most interested in building relationships through engagement and consultation to ensure their voice and issues with environmental and cultural resources are not only recognized but understood.

California:

- Sally Manning: Has served as Environmental Director of the Big Pine Paiute Tribe of the Owens Valley for many years. She wanted to discuss how to best ensure engagement is focused on understanding tribes' point of view and not just a procedural "check of the box," so that potential consequences for cultural and environmental resources are fully understood.
- Daniel Salgado Sr.: As Chairman of the Cahuilla Band of Indians, he wanted to listen and gather background information on geothermal energy so that in the future he could have meaningful conversations to collaboratively partner with developers.
- Will Micklin: As Chief Executive Officer of the Ewiiaapaayp Band of Kumeyaay Indians, he was interested in understanding the potential of geothermal energy to help power their rural and hard to reach community.
- Kimberly Miller: As the Environmental Specialist of the Morongo Band of Mission Indians, she wanted to collect background information and was interested in various

approaches to balance the need of clean and/or renewable energy as well as ensure cultural/environmental resources remain protected.

Project, Task Force, and Geothermal Background

Aaron Levine (NREL) provided additional context around the Geothermal Tribal listening session. The listening session is intended to understand tribes' priorities related to renewable energy development and ways the permitting process could be approved. The listening session supports the Task Force, which seeks to identify pathways to accelerate permitting and associated geothermal deployment on public lands.

On March 15, 2022, NREL hosted a virtual kick-off meeting with Task Force members (listed in Appendix B). Task Force members include federal agencies and California and Nevada state agencies that entered into a Memorandum of Understanding (MOU) to Improve Public Land Renewable Energy Project Permit Coordination. The Task Force plays a crucial role in facilitating conversations across agencies, providing perspectives on each agency's challenges, and supporting the MOU's goals and purpose to implement requirements set forth by the Energy Act of 2020.

To support the efforts of the Task Force, NREL is convening four virtual forums with the Geothermal Industry, environmental non-governmental organizations (ENGOs), and Tribes before reconvening with the Task Force members on September 22, 2022. The initial forum was with geothermal developers on June 15, 2022, and the ENGO forum was held on July 18, 2022.

Listening session participants asked questions or provided comments on the information presented, which is summarized below.

Project Overview – Nevada	
Question or Comment	Response
1. Are members of the Task Force from agency headquarters or regional offices? 2. Once the RECOs are established, how easy will it be to provide information to them as new projects arise?	1. The Task Force includes a mix of staff from agency headquarters as well as state and regional offices in California and Nevada. The RECO will have state level organizations with offices in California, Nevada, and other western states. 2. The plan is to staff the RECOs with some of the personnel working on individual projects to discuss issues but also coordinate with other projects within the state.

Project Overview – California	
1. What is the general infrastructure of a geothermal facility? 2. Is there any effort to convert old flash power plants into binary closed-loop systems to help reduce concerns of water consumption? 3. Is geothermal energy development allowed in national parks? 4. Is there a requirement for geothermal energy facilities to be connected to the power grid, and can these facilities be islanded?	1. The Geothermal Technologies Office's Technical Staff provided the following response: a. Modern geothermal projects are called binary closed-loop systems, which consist of a well field to extract heat through the surface of a hydrothermal fluid resource (typically water) which is run through a turbine. The water is then reinjected into the field in an iterative process. Older facilities are called flash power plants, which include cooling towers that are used to dissipate additional thermal energy after extraction. Flash power plants do not reinject fluid into the geological formation. 2. The Geothermal Technologies Office's Technical Staff provided the following response: a. Yes, this current approach is driving technology selection at power plants. There have not been any flash power plants developed recently. 3. Geothermal energy development is not allowed in national parks. The National Park Service (NPS) is required to protect their geothermal features. If a development borders a national park, the NPS has a role in protecting the thermal feature within the National Park unit. That is why the NPS is a Task Force member. 4. The Geothermal Technologies Office's Technical Staff provided the following response: a. Geothermal facilities can be fully islanded or off-grid. The facilities can also provide black start, so if they are grid-connected and the grid is down, the plant will still be operable, providing electricity. For islanded facilities, the project developer would still need to be incentivized to develop the project if it is not grid-connected, but there is no requirement that geothermal facilities be grid-connected.

Aaron Levine (NREL) then provided an overview of the findings from the 2019 *GeoVision* report. The report analyzed both technical and non-technical barriers and how they are impacting the development of geothermal energy as well as scenarios that could improve development. Additional information on the report's findings is available on GTO's website. The following questions and comments were shared by participants.

Previous Findings and Background Information – Nevada	
Question or Comment	Response (if applicable)
1. What was the source of information on the tribal and cultural resources? 2. It is important to consider the water-level in mountainous regions due to burial and ceremonial sites that would require surveys. 3. Discussion and communication with tribes is extremely important. Some developers base their projects on data from 20 years ago. In the desert, a lot changes, which will uncover cultural and burial sites. Consulting with tribes on siting geothermal projects is extremely important. A current project is 20 feet from a cultural site, which is not acceptable. If there were discussions before "boots were on the ground," resistance from the tribe could have been avoided and additional surveys could have been conducted by the tribes to share information on location with the developer. 4. In previous experience with projects in the desert, the tribe did not feel fully heard by developers. Developers met questions about their full project plan with comments such as "we're going to do our project and seek BLM approval. Reaching out to you is a formality." There was no listening, but strife and defensiveness. Tribal engagement should not be procedural.	1. The information used to analyze land that may have cultural resource conflicts was from existing tribal resources, not specific cultural surveys. Areas identified were provided a 50-mile buffer to develop the map shared in the meeting presentation. 2. Yes, at the project level, surveys will be needed. The *GeoVision* report was a qualitative exercise to understand the potential area of concerns. 3. This comment is part of the reason we convened this listening session. GTO and NREL are interested in hearing about your experiences with projects and lessons learned about how to improve the process. 4. No additional comments or response from Project Team. 5. No additional comments or response from Project Team. 6. The Geothermal Technologies Office's Technical Staff provided the following response: a. Other wells shouldn't impact potable water wells in the area because the geothermal resource is contained within a separate geological formation. During permitting required under the National Environmental Policy Act (NEPA), the BLM evaluates impacts with an interdisciplinary team of hydrologists. It is helpful to know that those studies are a priority for tribes.

Previous Findings and Background Information – Nevada	
Question or Comment	Response (if applicable)
5. In cases where engagement went well, the project developer ensured advanced communications and collaboration. The developer was willing to set up a zoom one-on-one to discuss the project and share information and invited the tribe on a site tour. 6. Some tribes with geothermal energy projects on their reservation had wells on their land that were low, which prevented ceremonial activities due to the lack of water. Water table testing is extremely important during the process to determine how the project would impact the water table. The tribes need more information related to these tests and potential impacts of geothermal energy development. For example, if one well is geothermal, how are other wells monitored to confirm they are not impacted? 7. If a geothermal project is on tribal land, cultural sites, or tribal trust land, is there a way that tribes can benefit from it? In typical discussions with developers, there doesn't seem to be a benefit to the tribe.	7. Yes, tribes may benefit from geothermal energy projects. The Bureau of Indian Affairs (BIA) must approve projects on tribal trust lands. Depending on how the development is structured, past projects (non-geothermal) have seen tribes lease the land to developers, which may furnish royalties (a percentage of revenue) or rentals (a fee for leasing the right to develop the project). There is a potential for tribes to be partners in developing these projects. In those cases, the tribe maintains an ownership stake of the project. This would come with additional risk as opposed to just leasing or renting tribal lands. The BIA Division of Energy and Mineral Development, DOE Office of Indian energy Policy and Programs, and DOE Loan Programs Office Tribal Energy Loan Guarantee Program have funds set aside for tribes to co-own projects as well as additional tools for tribes to use during the process. The recently ratified Inflation Reduction Act also sets aside additional funds specifically for tribes to provide low-interest loans/agreements for tribes to undertake development.

Previous Findings and Background Information – California	
Question or Comment	Response (if applicable)
1. Are there any concerns for users of an aquifer in a lower elevation? For instance, the Ewiiaapaayp Band of Kumeyaay Indians is in a mountainous region, which has hard to reach fractured rock believed to contain geothermal resources?	1. The Geothermal Technologies Office's Technical Staff provided the following response: a. Geological conditions are site-specific and further evaluation of the site may be required to directly answer the question. Broadly, proper development and management of the resource means that wells are properly designed, engineered, and cased to protect shallow and deep groundwater resources. There are valid concerns related to potential impacts on groundwater but it's not clear that there's a connection between the geothermal resource and other groundwater resources because they are held in distinctly different geological units. From a procedural standpoint, during environmental review under NEPA, the hydrological impacts are reviewed. BLM has hydrogeologists on staff to analyze those impacts. Typically, the chemistry and pressure of groundwater aquifers are monitored to establish a baseline pre-development and inform the basis of the monitoring scheme to evaluate potential impacts of any geothermal development.

Tribal Listening Session Discussion

Angela Jo Woolcott (Kearns & West) facilitated a round robin discussion to hear participants' concerns with geothermal development and their thoughts on how to mitigate potential cultural and environmental risks typically associated with geothermal development, and to understand potential pathways forward within the broader energy development space. To guide this conversation, participants were asked the following questions.

1. Does your tribe have experience with any type of energy development and its permitting process? If so, what has gone well? What about geothermal energy development specifically?
2. What challenges or concerns does your Tribe have when it comes to energy development and/or geothermal energy development specifically?

3. In your view, what is the role of federal and state resource agencies/regulators regarding resource stewardship and preservation of cultural resources? How can agencies regulators improve this process?
4. Can you speak to successes or challenges related to communicating and/or coordinating with federal/state agencies? What would be helpful when communicating and/or coordinating with federal and state agencies?
5. Is there a compromise that would allow for protection of cultural and tribal resources and while energy is being developed? What about geothermal development specifically?
6. Are there ways to improve understanding of cultural sensitivities and avoid or mitigate impacts to sensitive/sacred sites?

Nevada

Cultural Surveys

- It is extremely important to, at the very least, have a tribal representative present at project-site surveys. Ideally, there would be a cultural monitor to help identify plant or animal resources, but any representative from a tribe can help identify areas with resources or places of concern.
- Prior to surveys, developers, agencies, and other stakeholders should visit historic lands with tribes to understand Tribal appreciation, history, and importance within a potential project area.

Communicating with Tribes

- Straightforward communication is always helpful for tribes. Project developers are often trying to "sell" a tribe on a project and only provide the positives of a project, not necessarily an honest representation of the situation. Sharing all information helps build trust with the tribe, helps identify potential impacts to biological and cultural resources, and records potential impacts.
- Tribes are interested in understanding both the pros and cons of a project as well as the full project picture or plan. For example, if a developer is planning multiple sites or wells for a project, that should be shared as soon as possible with tribes.
- Tribes want early communication from agencies and developers in the process.
- All tribes that are close to an area being considered for a project must be engaged. For example, there was a project in Lakar Pass that only consulted four tribes when there were a total of 28 tribes near the project site. Communicating with all tribes may also provide opportunities for tribes to collaborate and increase efficiency of communication in the process. By expanding communication to all nearby tribes, it allows for the consideration of Tribes that may have historical interests or activities in the region as well.

Cultural Use of Geothermal Resources

- Some tribes have used historical geothermal resources, called "Gosa" or heating water, for healing and replenishing the body. Sites like the Ruby Valley and Spring Valley hot springs are important to tribes and are used to this day.

Tribal Engagement, Involvement, and Collaboration

- It is important for all stakeholders to understand the ways tribes' needs and priorities are different, not just with respect to the technical impacts of a project. It is important to understand the history of a tribe and how the reservation was developed during engagement, involvement, and collaboration.
- As sovereign nations, Tribes are interested in maintaining a mutually respectful working relationship with the U.S. federal government, but it is important to involve tribes as collaborators early in the process.
- The required consultation process should be used appropriately to collaborate with tribes in an honest manner and not just use it as a procedural box to check.
- Several tribes shared a desire to have the option serve as a formal cooperating agency within the NEPA process.
- Some federal agencies have a more relaxed approach to engaging tribes and have deprioritized tribal engagement. Ideally, tribes would be engaged as partners to ensure that cultural resources are considered.
- Tribal engagement should be more substantive than just sending letters. Developers and other stakeholders should take the initiative to meet in-person and have meaningful engagement with tribes, viewing them as partners that can improve projects.

Role of Federal Agencies

- Some agencies have helped identify cultural and environmental resources within a project area but not necessarily to preserve the resources.
- Federal agencies are typically not at the table in meetings with developers.

Previous Challenges

- The Ruby Pipeline development was a challenging experience for the Fallon Paiute-Shoshone Tribe. The tribe did not have enough resources to challenge the project in court but was also not invited to thoroughly engaged in the process.

California

Tribal Engagement Challenges, Experiences, and Improvements

- The current consultation process with tribes seems meaningless. Meeting with a tribe is different than listening to them. Project developers and agencies should try to gain consent from a tribe before development.
- Tribes must be involved in the discussions on how to mitigate impacts, especially if a project can't be stopped.
- Some tribes feel that they are never heard during engagement and their expertise and knowledge is overlooked by developers and agencies.
    - For example, the Big Pine Paiute Tribe of the Owens Valley, and several other tribes, used the Coso Hot Springs before the U.S. Navy acquired China Lake and developed geothermal energy. Tribes were very concerned that the geothermal energy project would be detrimental to the Coso Hot Springs. A memorandum of understanding was signed between the elders of several tribes and the Navy, stating that if the Coso Hot Springs were impacted, the energy project would cease. However, when the geothermal energy development began in about 1989, the temperature of Coso Hot Springs increased to the point that Tribes feel

it is no longer usable. While concerns were expressed by Tribes, the Navy never halted geothermal facility operations.

- Some tribes feel that it is hard to endorse or get behind geothermal energy development since development carries many unknowns.
    - For example, the owners of the Navy geothermal energy facility at China Lake began to pump groundwater from nearby Rose Valley to improve the geothermal energy production, but addition of imported water has not improved production. Pumping and exporting the water resulted in hydrologic and other impacts to Rose Valley.
- Some tribes feel that in the current engagement and consultation process, the tribal or historical office "win" is simply getting a cultural monitor to watch for historical artifacts during the exploration process. The tribes feel that this is unacceptable and that more should be done.
- Some tribes described a difficult dynamic between tribes and other stakeholders because often the developer will say, "we looked in the records and nothing is there." This is inherently flawed because some tribes view the whole landscape as tied to their cultural heritage. Some stakeholders do not demonstrate an understanding of that viewpoint.
- Some tribes noted that it is important to have a neutral third-party facilitator to foster engagement and collaboration with tribes. For example, some meetings between agencies and tribes have been awkward, as agencies do not know how to start the discussion.

Permitting Challenges

- Some tribes have struggled to work with local municipalities to develop renewable energy (e.g., solar).
    - For example, the Big Pine Paiute Tribe of Owens Valley identified community-scale solar as an option while working with Los Angeles Department of Water and Power (LADWP). The original buy back rate was 11.5 cents per kWh but was reduced late in the process, which made it uneconomical to carry forward the project.
- Some tribes shared frustration with the permitting process, noting that there always seems to be a reason not to build the project on their land and/or in a remote area which could benefit the tribe (e.g., providing electricity).
    - For example, the Ewiiaapaayp Band of Kumeyaay Indians were prevented from permitting a wind project on their land. The permitting agency said their decision was due to protecting the Tribe's cultural resources, despite multiple tribes supporting the project.
- Some tribes feel that the mechanisms that exist to facilitate permitting (e.g., executive orders, memoranda of understanding, etc.) are not always effective, but there have been no alternatives to improve the permitting process.
    - For example, a 2011 Executive Order aimed to improve permitting of broadband projects for tribes. When delays arose, no additional measures were put in place to improve the permitting process.

Communication

- Tribes receive a lot of written mail but prefer a phone call to kick off consultation and build relationships.
- Often in the permitting process, tribal feedback is superseded by experts.
- It is important for stakeholders to understand that each tribe is unique and has their own needs, priorities, and cultural heritage. Communication, engagement, and outreach for one tribe may not work best for another, so it is important to engage early to set expectations and work with tribes effectively.
- Some tribes do not understand the terms streamlining, efficiency, or fast paced within the context of permitting and licensing. There is a mutual understanding to increase clean energy and decarbonize, however, they do not feel this process should be rushed or have steps overlooked.

Opportunities for Collaboration

- Some tribes feel that there are many opportunities for collaboration between stakeholders and tribes, but tribes are not viewed as potential partners.
    - For example, the Ewiiaapaayp Band of Kumeyaay Indians engaged directly with Southern California Edison (SCE) about a potential interconnection project on their land. SCE said that the tribe should consult their vendors due to the intense topology of the location. The vendors did not engage or appear to see the benefit.
- Participants shared the following topics for potential collaboration opportunities with tribes, noting the tribe's long history of dealing with these issues.
    - Climate change
    - Habitat restoration
    - Water and drought issues
    - Wildland fire risk
    - Improved interconnection and grid resiliency

Next Steps

Aaron Levine (NREL) reviewed the next steps before adjourning the meeting. A draft meeting summary will be shared with tribal participants and Task Force members for review. The Task Force will convene on September 22, 2022, before the final report is drafted. The final report will be shared with participants from all forums and Task Force members.

Appendix A. Forum Participants

Tribal Participants		
Nevada		
Name	**Organization**	**Title/Role**
Rupert Steele	Confederated Tribes of Goshute Reservation	Chairman
Leilah Shepard	Fallon Paiute-Shoshone Tribe	Tribal Historic Preservation Officer
Russell Dyer-Redner	Fallon Paiute-Shoshone Tribe	ARPA Manager
Cathin Tuni	Fallon Paiute-Shoshone Tribe	Chairwoman
Randi Lone Eagle	Summit Lake Paiute Tribe	Chairwoman
California		
Sally Manning	Big Pine Paiute Tribe of the Owens Valley	Environmental Director
Daniel Salgado Sr.	Cahuilla Band of Indians	Chairman
Will Micklin	Ewiiaapaayp Band of Kumeyaay Indians	CEO
Kimberly Miller	Morongo Band of Mission Indians	Environmental Specialist

Appendix B. Task Force Members

Federal Agencies
Department of Energy (Geothermal Technologies Office)
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
Department of Defense (Navy)
Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
National Park Service
U.S. Army Corps of Engineers
U.S. Geological Survey
State Agencies
California Energy Commission
California Geologic Energy Management
Nevada Division of Environmental Protection
Nevada Division of Minerals

National Renewable Energy Laboratory
Geothermal Interagency Collaboration Task Force Final Meeting
Thursday, September 22, 2022, 11 a.m. - 2 p.m. MT

Background
The Geothermal Interagency Collaboration Task Force (Task Force) seeks to identify pathways to accelerate permitting and associated geothermal deployment on public lands. On March 15, 2022, the National Renewable Energy Lab (NREL) hosted a virtual kick-off meeting with federal agencies who entered into a Memorandum of Understanding (MOU) to Improve Public Land Renewable Energy Project Permit Coordination as well as relevant state agencies in California and Nevada. On September 22, 2022, NREL hosted a second and final virtual meeting with Task Force members. This document provides a summary of the September 22, 2022, Task Force meeting.

A summary of the key themes, challenges, and potential solutions discussed in the Task Force kick-off meeting, and a list of both meeting attendees are provided in Appendix A and Appendix B, respectively.

Meeting Objectives
- Share feedback received at the developer and environmental non-governmental organization (ENGO) forums, and Tribal listening sessions.
- Engage federal and state agencies in a discussion around opportunities and challenges addressed in the forums to inform the project's final report.
- Review previous Department of Energy national laboratory findings on non-technical barriers for geothermal development.
- Discuss opportunity for continued engagement with the Task Force members and agree on next steps.

Meeting Overview
Aaron Levine (NREL) welcomed Task Force members and reviewed the purpose of the meeting. Angela Jo Woolcott (Kearns & West), meeting facilitator, introduced ground rules for the Task Force attendees, encouraging attendees to be active participants, be respectful of others, seek solutions, participate from the perspective of each one's agency, and commit to the Task Force obligations regarding the upcoming Meeting Summary and draft work products review.

Stakeholder Forum Overview and Feedback
Aaron Levine provided a high-level overview of the developer and ENGO forums and Tribal listening sessions hosted since the Task Force kick-off meeting. Task Force members could attend the developer and ENGO forums as observers. Tribal listening sessions were closed, to provide an open and engaging environment for Tribal participation. Task Force members received summaries of the forums and listening sessions and could provide written feedback through a digital survey.

Total attendance for the forums and Tribal listening sessions is provided in the table below.

Forum or Listening Session	Attendees	Task Force Attendees
Developer (June 15)	17 (from 10 companies)	22
ENGO (July 18)	8 (from 7 organizations)	16
Tribal (August 23)	NV: 5 (from 3 Tribes) CA: 4 (from 4 Tribes)	N/A, closed listening sessions

Shared Themes
The common themes heard across the forums and listening sessions included:

- Long-term or long-range planning for geothermal energy development on public lands.
- Programmatic National Environmental Policy Act (NEPA) reviews for geothermal energy development.
- Early and often engagement and collaboration throughout the permitting process.
- Transparency and access to information or data from agencies, for example:
    - Allowing for full understanding of an action and data used.
    - Providing an overview of the regulatory process for new developers.
    - Providing data and information for review by all Stakeholders.

After Aaron Levine's review, Faith Smith (NREL) reviewed key themes from the feedback provided at each forum and listening session.

Developer Forum Key Themes
Feedback provided at the developer forum primarily consisted of best practices and suggested improvements.

Best Practices Themes

- Federal and state regulators in California and Nevada are well versed in the permitting process and are active collaborators with developers.
- Having earlier and more frequent meetings with regulators has improved the overall permitting process.
- Interagency meetings with all permitting organizations have led to efficiencies in coordination.

Improvement Themes

- Develop better guidelines or a "Quick Start Guide" for permitting and licensing engagement, including, but not limited to guidance for development on public lands, establishing rapport with Tribes and stakeholders, and fostering partnerships.
- Provide clearer guidance on NEPA timelines and potential trigger points.
- Reduce the number of times NEPA must be conducted.
- Fast-track the NEPA process by developing categorical exclusions, a programmatic EIS, or other fast-tracked approval processes.
- Increase data availability and accessibility.
- Address coordination issues, specifically with the high staff turnover at federal agencies.

ENGO Forum Key Themes
Feedback provided at the ENGO forum consisted of concerns related to historical and environmental impacts, coordination, communication, and the NEPA process.

Historical and Environmental Impact Themes
- Species can be affected in adjacent ecosystems.
- There are long-term impacts on hot springs with intrinsic historical value.
- Habitat mitigation should consider impacts on groundwater resources near hot springs.
- Biodiversity cannot always be replicated through mitigation efforts.

Coordination and Communication Themes
- Hold non-biased conversations between ENGOs, developers, and regulatory agencies.
- Create opportunities to meet with agencies in person to foster relationships and establish a shared understanding between all parties.

NEPA Process Themes
- Involve all participants early in the NEPA process, especially scoping.
- Provide direct follow-up to organizations to ensure they feel heard.
- Incorporate a life-cycle approach in NEPA reviews.
- Ensure that programmatic analyses are holistic rather than site specific (e.g., solar project development).
- In environmental reviews, consider whether geothermal is the best option to meet clean and/or renewable energy goals.

Tribal Listening Sessions Key Themes
Feedback provided at the Tribal listening sessions focused on the role of Tribes in the NEPA process and understanding cultural importance of the resources that could be impacted by a project.

Shared Themes from California and Nevada Tribes
- Tribal engagement currently feels like a “checking the box,” exercise rather than a true attempt to hear Tribal needs and perspectives.
- Tribes would like to be considered partners and be more included in the NEPA process as well as any potential mitigation decisions.
- Face-to-face engagement and discussion early and often during a project should include a full analysis of the proposed project impacts and benefits.
- Federal agencies should be present during discussions between developers and Tribes.

California Tribal Listening Session Themes
- Communicate with Tribes early and frequently.
- Seek consent from Tribes before pursuing a project.
- Don’t rush the permitting process or overlook Tribal involvement, despite the mutual desire to decarbonize the grid and increase clean energy.

Nevada Tribal Listening Session Themes
- Coordinate visits to historical lands with Tribes to understand Tribal history and the intrinsic value of potential project areas to Tribes.
- Include cultural monitors in project-site surveys.
- Foster open and honest communication to illustrate the pros and cons of a project. Do not try to “sell” only the benefits.

- Include all nearby Tribes in the process and consider their historical interests or activities in a region.
- Maintain a mutually respectful relationship between Tribes, as sovereign nations, and with the U.S. government.

Forum and Listening Feedback Discussion

Angela Jo Woolcott facilitated a discussion on the feedback received at the forums and listening sessions. To encourage participation, Task Force members were asked the following questions:

- What are your thoughts and reflections?
- What resonated with you?
- What opportunities stood out the most?

Task Force members provided the following feedback.

Programmatic EIS

- Both developers and ENGOs are interested in reducing uncertainty related to geothermal energy development.
    - Developers are interested in a programmatic EIS to reduce permitting timelines.
    - ENGOs are interested in a programmatic EIS to provide a more comprehensive view of a region under consideration for development.
- A prime example of a programmatic EIS is from Imperial County, California. The Bureau of Land Management (BLM) conducted a programmatic EIS to streamline the process by "tiering" individual EISs based on the programmatic EIS.
- A second example discussed was when the BLM and United States Forest Service (USFS) developed a geothermal leasing Programmatic EIS in 2008. That programmatic EIS, along with regional land use plans, are now used to "tier" off individual project-level NEPA documents.

Comparison with Other Renewable Energy Processes

- Geothermal energy development includes leasing, exploration, and development and is more complicated than other renewable energy development processes, which can confuse the public and stakeholders.
- Long-term planning for geothermal development is challenging due to the nature of the energy resource. Geothermal energy resources are unseen and as the resource is explored, more information is uncovered, which can change the aspects of a project.
- Developers need more flexibility in the process when compared to wind and/or solar development (e.g., related to the number of well pads needed for development).
- Other renewable energy development processes can easily identify priority areas. However, known geothermal resource areas are identified by the United States Geological Survey (USGS). The first assessment dates back to 1975 with the most recent update occurring in 2008. USGS' Geothermal Energy Resources Program is currently updating the resource assessment, including the Great Basin region. Assessing additional known geothermal energy resources will take time and resources, both of which are limited.

Mitigation

- Best practices and additional knowledge exist to mitigate the impacts around drilling and development, but not at a resource-specific level.
- Compiling a mitigation measures best practices document for various regions analyzed under NEPA would be helpful.

Implementing Recommendations or Solutions

- Some recommendations or solutions may require Congress to update existing laws.
- Some legislative proposals to expedite the NEPA process are under development, including development of an administrative categorical exclusion.
- The Enhancing Geothermal Production on Federal Lands Act is being updated to include a categorical exclusion so that wells can be drilled without the development of roads while allowing soil and vegetation disruption or removal for access.
- Assessing the known geothermal resources was mandated by the Energy Act of 2020, but has not been appropriated funds, which is problematic.

Technical Information, Education, and Best Practices

- Some stakeholders are unaware that binary powerplants can be air cooled to reduce water consumption, which can reduce impacts on local environments.
- There is a general misunderstanding of the hydrological connectivity between geothermal resources and groundwater resources. There may be an interagency role in providing case studies that depict this relationship.
- 75% of geothermal resources are currently undiscovered. Of the 25% that are discovered, only a small subset are hot springs.
- Stakeholders can be risk adverse. The systems being used for energy development are dynamic and it's challenging for agencies to assert that all impacts are predictable. It is important to express agencies use currently available technology.
- Interagency collaboration could play a role in sharing guidance on establishing baseline characterization and operational monitoring of surrounding groundwater levels and chemistry.
- Sharing with developers in the early stages of a process the landowners or interests bordering public lands may shed light on potential development challenges.
- A planning portal could allow stakeholders to identify areas of interest and notify them of a proposed lease in their selected area. This portal could also connect stakeholders to a process before NEPA, to allow early engagement and dialogue.
- Agencies could provide educational workshops to Tribes and stakeholders to share technical and regulatory information and the roles of agencies in conducting oversight. This may require more resources for agencies.
- Improved timelines and increased certainty require additional resources (primarily capacity) for all stakeholders.

Tribal Engagement and Opportunities

- Tribes feel excluded from engagement in all energy development processes. Tribal liaisons should be engaged to identify issues earlier in the process.
- If a Tribe receives royalties or economic uplift from a project, it changes their role.
- Engaging state Tribal Resource Centers may be helpful to educate Tribes on the process, clarify where and how they can participate, and clarify the NEPA notification process.
- Some Tribes lack the resources or technical knowledge of geothermal energy to fully engage in the process. Agencies could provide technical resources to Tribes to fully understand proposals and engagement mechanisms.
- NEPA analyses of geothermal development could be developed for Tribes, free of charge, to identify potential issues.

Known Tribal Sensitivities

- Tribes are governments with limited resources due to the minimal tax income they receive.
- Tribes' historic range is as important as the land they reside on now.

Agency Roles

- Agency roles and responsibilities in the NEPA process can be complicated and difficult to convey and can delay coordination.

National Laboratory Presentations

Following this discussion, Aaron Levine (NREL) provided an overview of NREL, Pacific Northwest National Laboratory (PNNL), and Idaho National Laboratory (INL) projects investigating state and local environmental management issues, including regulatory and permitting issues. Projects were funded through a lab call issued by the U.S. Department of Energy (DOE) Geothermal Technologies Office (GTO). NREL, PNNL, and INL collaboratively conducted qualitative interviews with federal, state, and local agencies as well as project developers.

Aaron Levine reviewed key findings from the NREL project, which analyzed coordination, environmental, and resource issues in California and Nevada geothermal energy development. There are numerous federal, state, Tribal and local agencies involved in permitting and regulating geothermal energy development that need to coordinate through multiple mechanisms. Key environmental and resource issues include Waters of the United States (WOTUS) jurisdictional determinations, water quality analyses, and potential impacts to biological species and cultural and Tribal resources. NEPA and state environmental review processes play a significant role in documenting these environmental and resource issues. The study found programmatic environmental reviews and landscape level surveys could increase certainty around development potential and associated natural and cultural resource conflicts, including reducing time of WOTUS determinations on a case-by-case basis. The final report summarizing the findings is being developed and will be available soon.

David Goodman (PNNL) reviewed the PNNL effort, which reviewed the levelized cost of energy (LCOE) of geothermal development. Power purchase agreements (PPAs) and the LCOE for geothermal energy are generally more expensive than other renewable energy sources. However, the LCOE may not consider additional benefits of geothermal energy such as high-capacity factor, grid stability and flexibility, reduced plant footprint, plant life cycle, workforce benefits, lower emissions than other renewables, and potential compatibility with habitat and land use restoration goals. A model analyzed various factors affecting geothermal LCOE to determine sensitivities. The following factors were analyzed (listed from least to most sensitive):

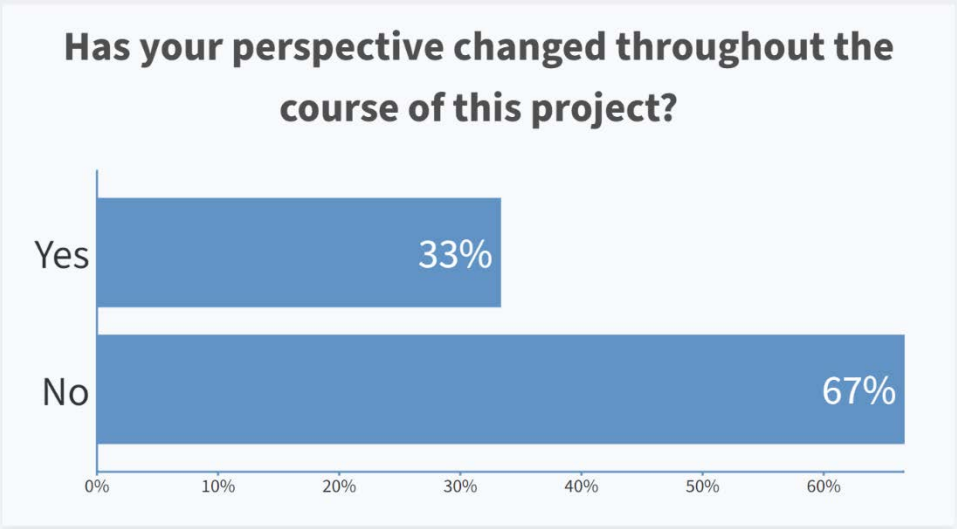
- Permitting costs
- Permitting timelines
- Exploration costs
- Capital subsidies
- Construction timelines
- Operating costs
- Capital costs
- Discount rate
- Lithium extraction

The co-location of geothermal energy development with lithium extraction, specifically in the Salton Sea, could increase revenue and profit potential, which would decrease geothermal LCOE. A full report of the findings can be accessed on PNNL's website.

Ghanashyam "Hari" Neupane (INL) reviewed the findings from an INL assessment of economic impact of permitting timelines on produced geothermal power in Imperial County, California. The assessment sought to quantitatively analyze the impact of permitting timelines on produced electricity using data from five existing geothermal projects in the Salton Sea known geothermal resource area. The assessment produced five types of projects and scenarios related to regulatory and permitting requirements. The shortest timeline would lead to project completion in six years. The longest timeline would lead to project completion in thirteen years. LCOE values are 4-11% higher in the longest permitting timelines. The potential loss of revenue from the delayed completion of the project would range from $64 to $227 million. A full report of the findings can be found on INL's website.

Revisiting Interagency Opportunities and Discussion

Angela Jo Woolcott (Kearns & West) presented a poll asking Task Force members how their perspectives have changed throughout the project. Task Force members provided the following responses.



Task Force members were asked why their perspectives on the challenges and potential solutions did or did not change throughout the course of the project. Task Force members shared that their perspectives had not changed for the following reasons:

- The issues and hurdles that geothermal energy development on public lands face seem to be well understood.
- There are clear actions that agencies and the Task Force can take to address some concerns.
- Some of the issues shared are common issues that Task Force members have already heard.

Angela Jo Woolcott (Kearns & West) led a facilitated discussion around the following questions:

- What are additional opportunities to improve the regulatory and permitting process for geothermal energy development?
- How can these potential solutions be implemented?

- What mechanisms can be utilized as part of this process?

Task Force members shared the following feedback:

- Developing a process that engages all stakeholders interested in permitting requirements would address concerns around coordination.
- Developers should be provided a clear roadmap of the regulatory process.
- The Task Force should continue to find ways to address, respond to, and foster communication between stakeholders.

Future Task Force Collaboration

Following this discussion, Jeremy Bluma (BLM) presented potential ideas for potential future engagement and continued collaboration of Task Force members. BLM proposed an interagency working group focused on improving geothermal project permitting coordination to accompany the ongoing MOU work. The working group would meet bi-annually or quarterly to discuss "big picture" items. The BLM would chair the working group and the DOE GTO would co-chair. Members would include geothermal permitting staff from participating agencies signatory to the MOU and other state agency staff. The first meeting could be as early as December 2022 to inform the National Renewable Energy Coordination Office (RECO) report due to Congress in February 2023 and evaluate the findings and recommendations from NREL's final technical report.

Potential working group discussion topics include:

- Identifying potential improvements to the federal agency review process and geothermal permitting decision-making on eligible projects and determining how to implement changes (MOU section V.A.2).
- Building and maintaining partnerships and coordination to increase certainty in geothermal energy project timeframes and enhance consistency within and among the agencies conducting reviews (MOU section V.A.9).
- Contributing to the Secretary of Interior's annual report to Congress on implementing the MOU.

Angela Jo Woolcott facilitated a discussion about the proposed working group. The Task Force provided the following feedback:

- USGS is happy to support the working group with a wide range of technical capabilities.
- The working group can maintain momentum to identify key action items to implement to facilitate more geothermal energy development on public lands.
- Quarterly meetings may be the most appropriate cadence for convening. A majority of Task Force members supported a first meeting in December.
- Working group meetings or activities should align with the Geothermal Rising conference for additional stakeholders to attend and build relationships.
- The working group should host workshops on geothermal energy for field offices that are key stakeholders in the NEPA process but do not have subject matter expertise.
- The working group should coordinate with the Western Governors' Association, which is currently holding meetings to increase deployment of geothermal energy.
- The working group should apply lessons learned from other DOE offices' efforts related to working groups for other renewable energy sources.
- The working group may eventually attract other stakeholders (e.g., academic researchers) to further its efforts.
- The working group should be facilitated and coordinated by a neutral third party.

Next Steps and Adjournment

Aaron Levine thanked participants and closed the meeting by reviewing immediate next steps. The project team will complete the synthesis of the feedback provided and draft the Final Report in October, and Task Force members will receive the Draft Final Report for feedback and review in November. The final report will be published in December.

Appendix A. Summary of Themes Discussed at the Task Force Kick-Off Meeting

Regulatory and Permitting Themes	
Challenges	**Potential Solutions**
• **NEPA:** Navigating multiple phases of NEPA - both the resource confirmation and utilization processes - are inefficient. NEPA can conflict with other regulatory processes. There's a lack of public awareness of NEPA. Issues need to be outlined prior to scoping (i.e., identify resource issues early in the process). • **Outdated regulations:** Regulations need to address water quality with geothermal development, not just oil and gas. • **Regulatory framework:** In California, permittees will limit development size to avoid what are perceived as more onerous permitting requirements that are triggered once the 50MW threshold is crossed. • **Permit applications:** Project developers need to provide complete application packages with all required documents and the correct level of detail up front. Data collection for permitting needs to be standardized. • **NPS-specific issues: The 1988 amendments to the** Geothermal Steam Act requires studies to determine whether geothermal leasing/permitting outside of NPS boundaries affects National Park thermal features. • **BLM-specific issues:** Data collection methods need to be consistent with BLM permit requirements. • **DOD-specific issues:** Guidance is needed on how to permit development in BLM withdrawn lands (e.g., military lands). • **USACE-specific issues:** Ensuring project development is compatible with water resource projects. Section 404 Clean Water Act jurisdictional waters determinations. • **General issues include** land access and permitting barriers, lengthy transmission siting processes, bonding requirements for drilling on private land, ensuring that fluids permitting follows due processes.	• Evaluate the permitting process after the review to inform future projects. • Disseminate lessons learned in geothermal permitting. • Determine which agency considers the adverse effects of the Geothermal Steam Act. • Administrative or legislative created categorical exclusions. • Early communication of information relative to proposed development project. • Maintain a list of significant geothermal features in National Parks. Establishing partnerships or obtain funding for monitoring programs of protected thermal features in National Parks. • Create a mechanism for knowledge transfer. • Share subject matter experts to support analyses for agencies that do not have sufficient staffing.
Environmental Themes	
Challenges	**Potential Solutions**
• **Species:** Some species, including the greater sage grouse, desert tortoise, horned lizard, and eagles require special attention. Special consideration should also be put on endemic species with narrow habitat ranges (e.g., single spring source fish or amphibians), wildlife habitat within a project area, and state and federally listed species. Petitions for emergency Environmental	• Continue existing and expand on future interagency coordination regarding species and hydrologic issues. • Non-permitting agencies with relevant expertise could provide technical support to permitting agencies and developer's application review prior to submission.

Regulatory and Permitting Themes	
Challenges	**Potential Solutions**
Species Act listing can result in longer approval timelines. • **Wildlife habitat hydrology:** Water quality and quantity, including temperature and withdrawals as well as the quality of hydrologic modeling data are items of concern. • **Hydrogeology:** Preservation of surface and groundwater sources. Protection of groundwater with respect to underground injection control program. • **Siting and surface disturbances** need to be mitigated. • **General issues include** abandonment concerns and resource identification.	• Creation of standardized and robust data collection methods.
Interagency Coordination Themes	
Challenges	**Potential Solutions**
• **Staffing:** Technical staff are needed to support permitting and project development. In addition to workload concerns, lack of expertise in geothermal in some field-level offices adds to coordination challenges. There's uncertainty of what the workload will be. Staff relocation, turnover, onboarding, and training new team members is challenging. • **Funding:** Need base funding to support decisions. • **Formal agreements:** Some MOUs and IAAs are outdated. • **Coordination:** Various agencies have different mandates that are difficult to coordinate. Agencies need to communicate more regularly and share resources.	• Use the RECO as a resource to clarify how agencies can together improve federal permitting and decision making, including defining charter structure and how to build that framework with Task Force input. • Update or establish new interagency MOUs or IAAs. • Host quarterly coordination calls with partner agencies to share "pre-information," case studies, data, and institutional knowledge. • Create guidelines on coordination best practices. • Host a monthly call with the Office of Natural Resources Revenue. • Use USGS and USFWS science/resources to understand resource impacts. • Conduct landscape-level planning for projects permitted in the same area. • Allow agencies to process applications together. • Coordinate on meeting FAST-41 thresholds to determine if any projects can be covered. • Develop a Central Data Repository or a similar collective database of information, to serve as a centralized location to share information. • Pilot BLM offices to speed up permit processing, with interagency representation. Create a link of communication between agencies, can process more efficiently working together than apart. • Improve communication between agencies. • Foster better onboarding and training for agency staff and perform succession planning. • Add staff to support changing agency priorities and cost transfer funding. • Develop training on new geothermal technologies. • Address permitting on military withdrawn lands.

Regulatory and Permitting Themes	
Challenges	**Potential Solutions**
Tribal Involvement Themes	
Challenges	**Potential Solutions**
• **Outreach:** Reaching Tribal communities and encouraging public involvement is time consuming. • **Funding:** Tribes face steep costs to coordinate with agencies. • **Cultural resources:** Tribal cultural resources need to be protected. • **Coordination:** Agencies have varying Tribal consultation processes, and CEQA and NEPA processes vary. • **Royalty Structure:** Tribes may not collect royalties on public lands.	• Coordinate with both federally and state-recognized Tribes early and often in the project development phases for resource knowledge. • Foster discussion across multiple agencies to understand and locate sensitive Tribal resources (especially with the BIA to learn about cultural activities and meet BIA regional liaisons) and share best practices and experiences of incorporating Tribes into the planning process. • Offer funding opportunities for Tribes looking to develop geothermal on their lands, to participate in permitting processes, to gain geothermal expertise, and/or to mitigate potential impacts. • Use the Indian Energy Service Center to expedite leasing and permitting.

Appendix B: Task Force Meeting Participants

Federal Agency Participants		
Name	**Organization**	**Title/Role**
Jennifer Reimann	Bureau of Indian Affairs	Branch Chief for Renewable Energy
Sierra Squire	Bureau of Indian Affairs	Natural Resource Specialists Office of Trust Services
Jeremy Bluma	Bureau of Land Management	Renewable Energy Program Lead for Wind and Solar
Lorenzo Trimble	Bureau of Land Management	Geothermal Program Lead with HQ Fluid Minerals Division
Kelly Blake	Department of Defense	Division Director
Susan Hamm	Department of Energy	GTO Director
Jennifer Livermore	Department of Energy	Geothermal Project Analyst
Casey Strickland	Department of Energy	NEPA Lead
Jeff Winick	Department of Energy	Technology Manager
Jacob Davidson	Environmental Protection Agency	Permitting and Policy Division
Barbara Rudnick	Environmental Protection Agency	Permitting Policy Division
Chad Mellison	Fish and Wildlife Service	Wildlife Biologist
Jeff Salow	United States Forest Service	Minerals and Geology Management Lead for Geothermal
Reginald Woodruff	United States Forest Service	Energy Program Manager
Erick Burns	United States Geological Survey	National Geothermal Resources Investigations Project Leader
Mona Khalil	United States Geological Survey	Energy and Wildlife Specialist
Ghanashyam Neupane	Idaho National Laboratory	Geochemist
Aaron Levine	National Renewable Energy Laboratory	Senior & Legal Regulatory Analyst
Faith M. Smith	National Renewable Energy Laboratory	Market and Policy Analyst III
Dave Goodman	Pacific Northwest National Laboratory	Senior Regulatory Analyst
State Agency Participants		
Name	**Organization**	**Title/Role**
Charlene Wardlow	California Geologic Energy Management Division	Geothermal Program Manager
Andrew Kowler	Nevada Division of Environmental Protection	Environmental Scientist (UIC Permit Writer)
Jocelyn Moran	Nevada Division of Environmental Protection	Technical Staff
Michael Visher	Nevada Division of Minerals	Geothermal Program Administrator