



# **Federal Energy Regulatory Commission Hydropower Program Overview**



# Federal Energy Regulatory Commission



**Chairman  
Willie L. Phillips**



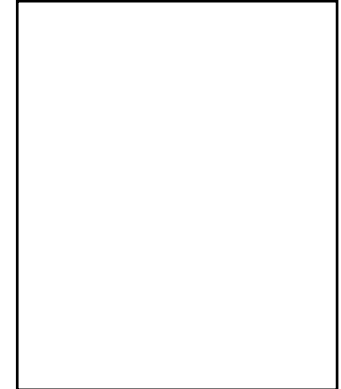
**Commissioner  
James Danly**



**Commissioner  
Allison Clements**



**Commissioner  
Mark Christie**

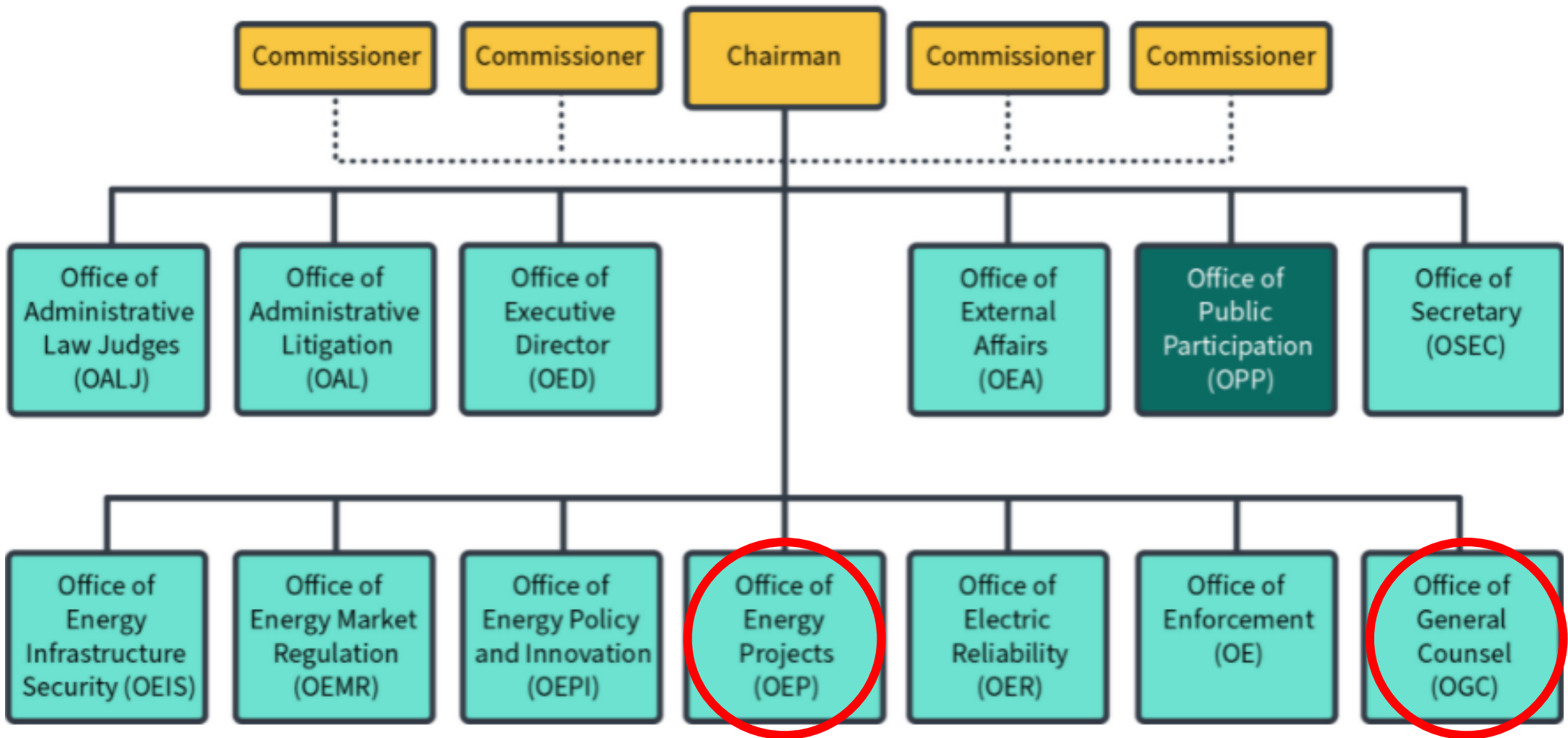


**Empty**

- Independent Regulatory Commission
- Five members - appointed by President, confirmed by Senate
  - Supported by 13 offices



# FERC Organization

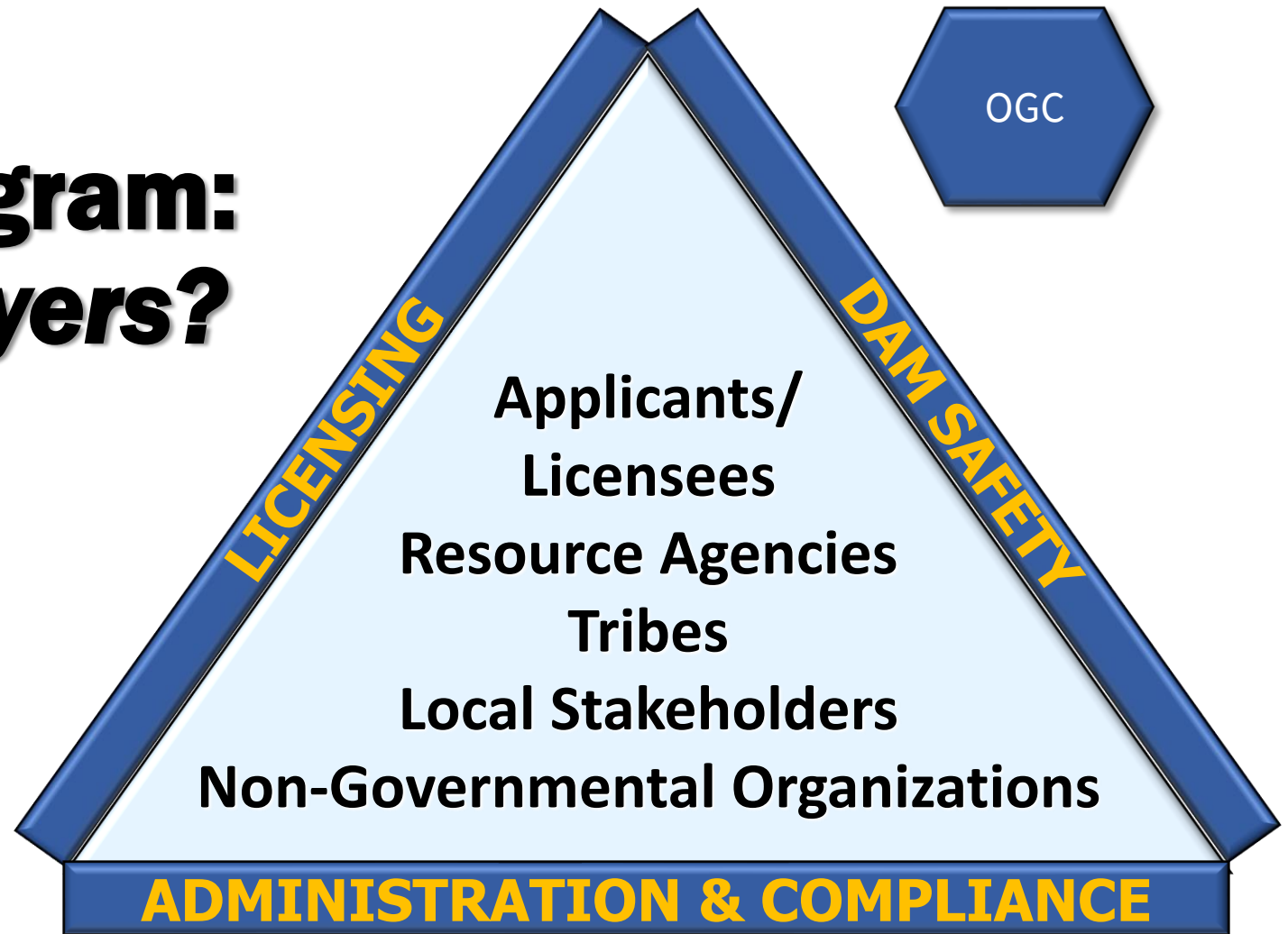


# FERC Hydropower Program Overview

- Evaluate *non-federal* hydropower projects, giving equal consideration to environmental, recreational, cultural, and developmental resources
- Provide assistance to, and foster coordination among, applicants and stakeholders
- Prepare and issue NEPA documents
- Ensure compliance with terms of Commission licenses and exemptions during construction and operation
- Ensure safety of non-federal hydropower dams

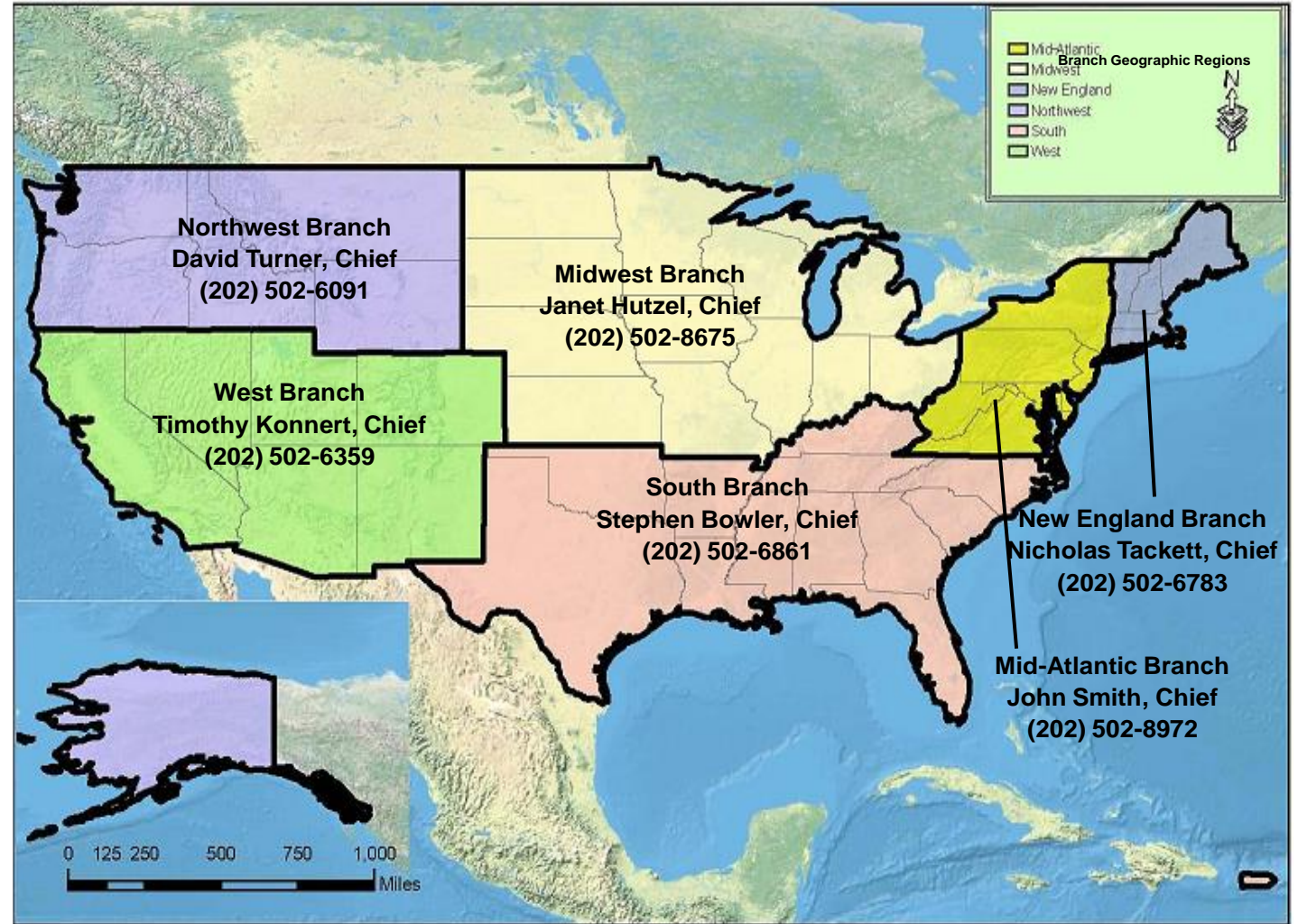


# FERC's Hydropower Program: *Who are the players?*



# Division of Hydropower Licensing (DHL)

- Process hydropower project applications
- Prepare and issue environmental documents
- Address agency, tribe, and public concerns
- Analyze recommendations and incorporate reasonable environmental conditions into licenses





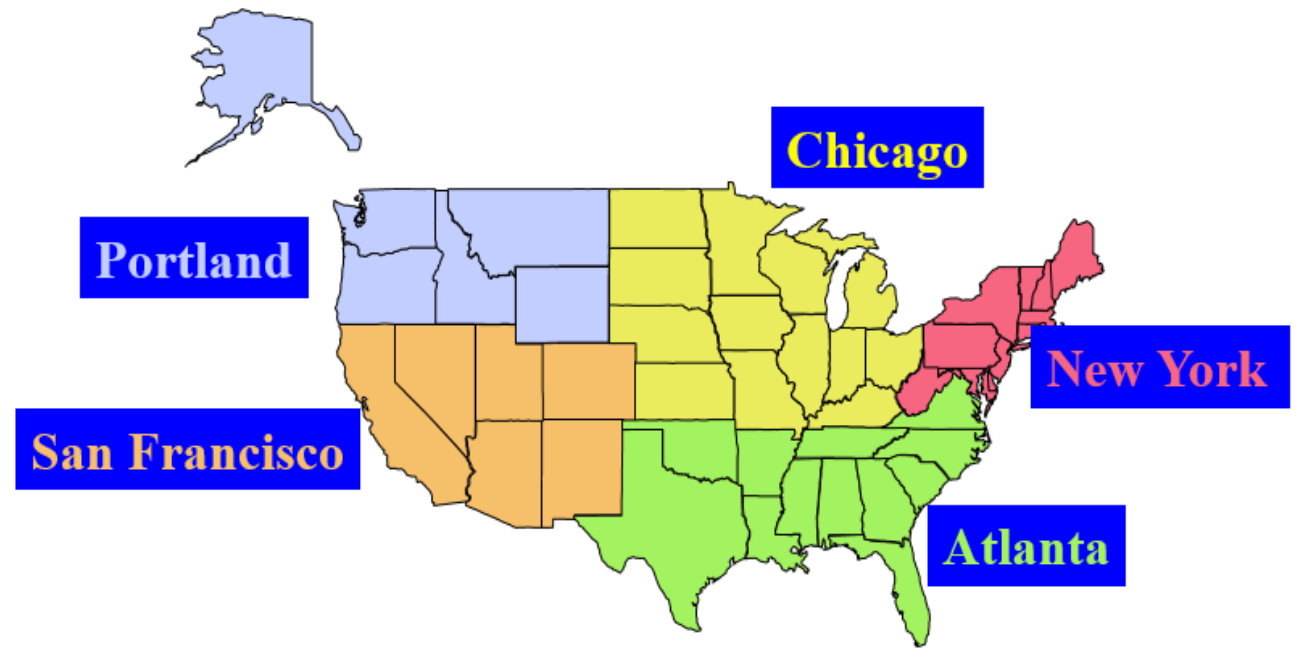
# Administration and Compliance

- Ensures compliance with license/exemption order
- Investigates non-compliance allegations
- Tracks license requirements
- Approves plans and reports
- Processes amendments to licenses
- Processes surrenders applications
- Makes jurisdictional determinations

# Dam Safety & Inspections

## Responsibilities:

- Implement dam and public safety programs
- Ensure protection of life, property, and the environment
- Develop policies, programs, and guidelines for assessing dam safety
- Assess physical and cyber security measures at hydroelectric facilities



*Headquarters: Washington, DC*







# Federal Power Act

## *Part I - Jurisdiction*

- Commission authorization is required for *non-federal* hydropower projects:
  - located on navigable waters;
  - located on federal lands;
  - using surplus water from a federal dam; OR
  - located on non-navigable waters over which Congress has Commerce Clause jurisdiction, were constructed or modified after 1935, and affect interstate or foreign commerce.
- Projects may be located at federal dams (U.S. Army Corps of Engineers or Bureau of Reclamation), but Commission only has jurisdiction over the non-federal facility (not the federal dam/project).



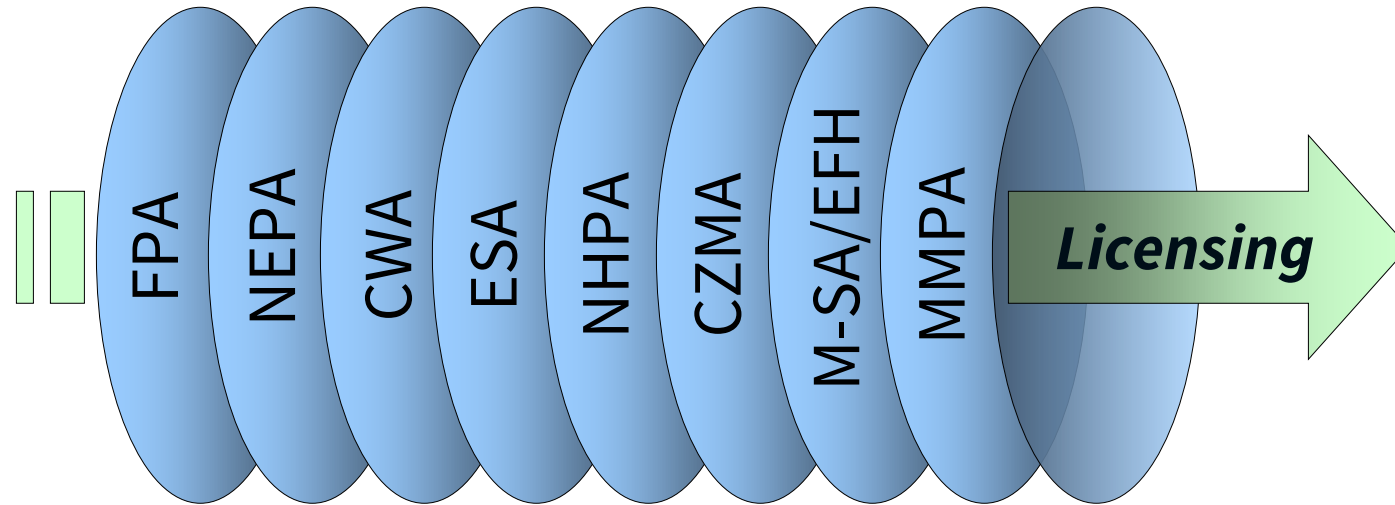
# **Federal Power Act**

## ***Licensing Standards***

- Section 4(e) - Equal Consideration
- Section 10(a) - Comprehensive Development
- Section 10(j) - State and federal fish and wildlife agency recommendations
- Section 10(a)(2) - Consistency with comprehensive plans
- Mandatory Conditions
  - Section 18 - Fishway Prescriptions
  - Section 4(e) – Reservations (i.e., NFSL)



# Other Laws and Regulations



- National Environmental Policy Act (NEPA)
- Clean Water Act (CWA)
- Endangered Species Act (ESA)
- National Historic Preservation Act (NHPA)
- Fish and Wildlife Coordination Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Marine Mammals Protection Act
- Pacific Northwest Power Planning and Conservation Act
- Coastal Zone Management Act (CZMA)
- Wild and Scenic Rivers Act
- Bureau of Reclamation Statutes



# Balancing



Environmental Concerns vs. Developmental Concerns



# Types of Authorizations

## Preliminary Permit

- **Does NOT authorize construction or operation**
- Maintains priority of application for 4 years with option to extend an additional 4 years
- Requires feasibility studies and pre-filing activities

## License: Original or Relicense, or Pilot

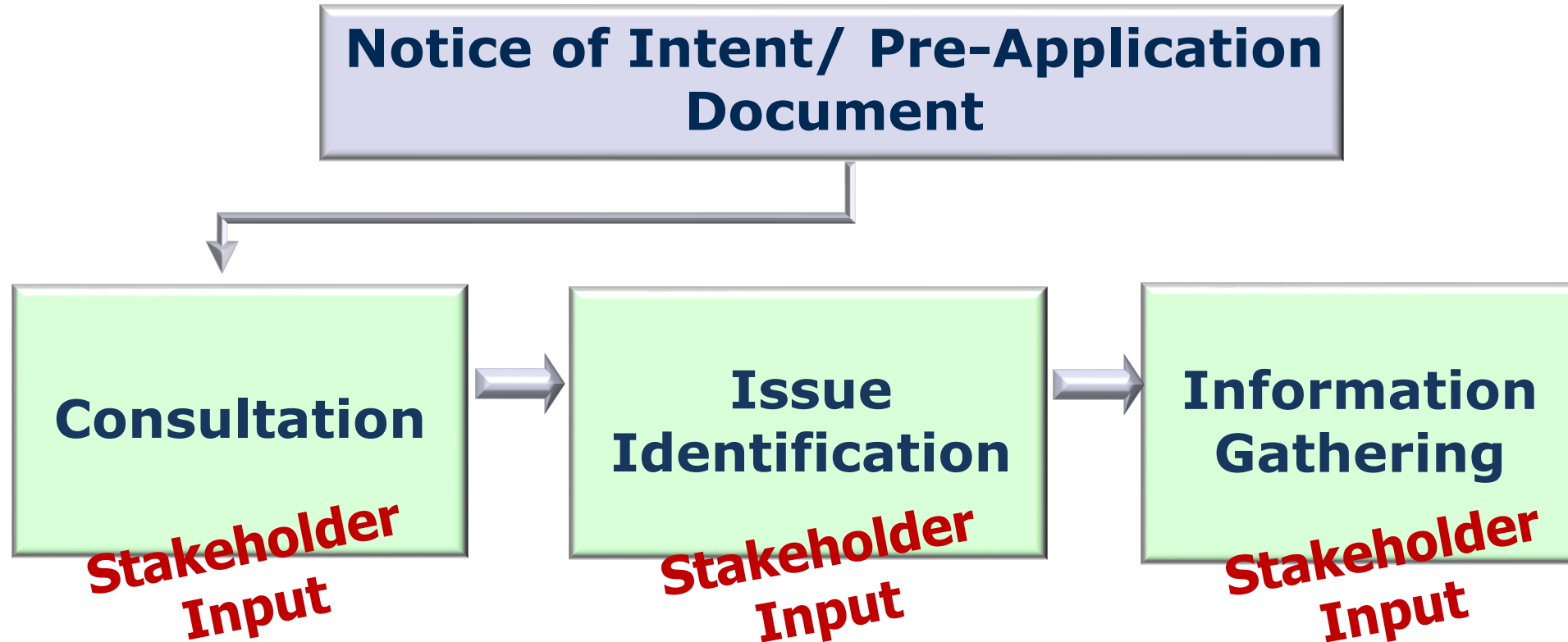
- **Authorizes construction and operation**
- Issued for 30-50 years (default is 40 years)
- *Exception:* Pilot licenses are issued for 8-10 years

## Exemptions: Conduit and 10 MW

- Authorizes construction and operation
- Issued in perpetuity

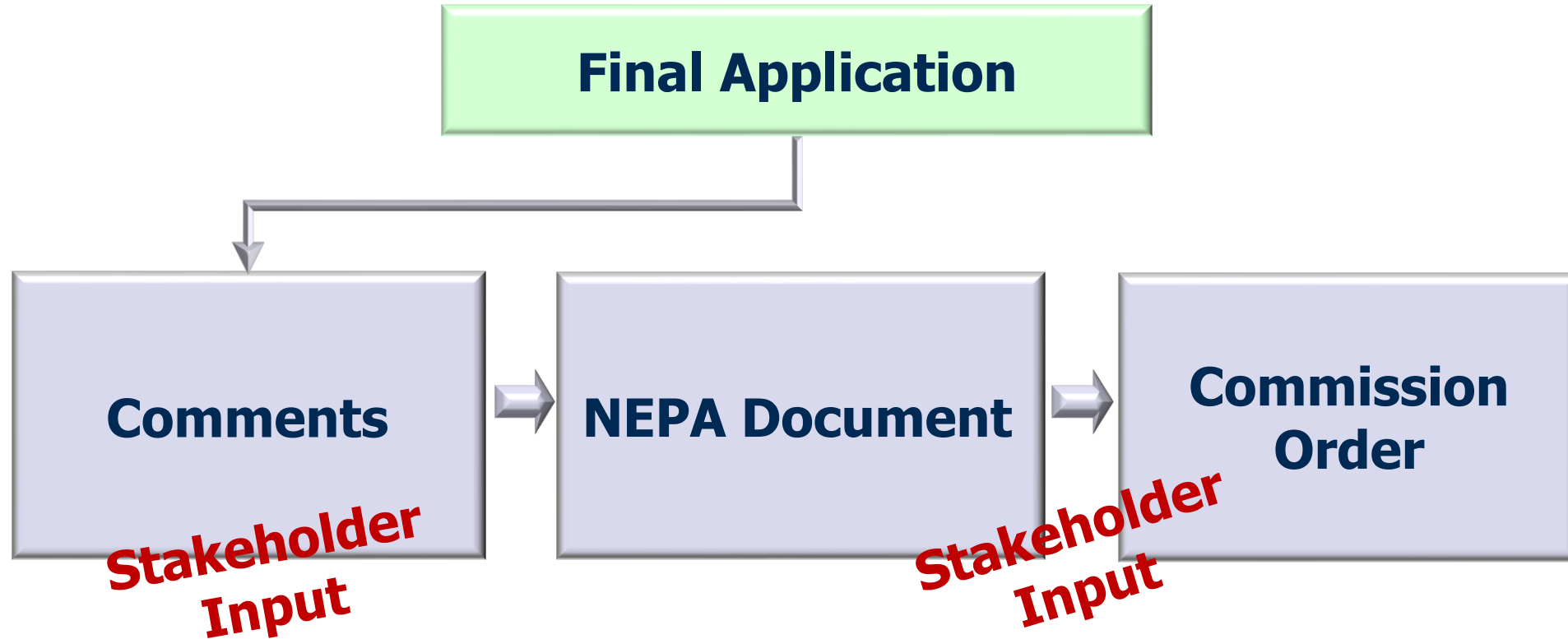
# Basic Licensing Steps

## Pre-filing



# Basic Licensing Steps

## *Post-filing*



# Licensing Process Comparison

Process	Consultation	FERC Involvement	Deadlines	NEPA Scoping	Study Plan Development	Study Dispute Resolution	Additional Study/ Information Requests	Timing of Resource Agency Terms & Conditions
<b>Integrated Licensing Process (ILP)</b> <i>DEFAULT</i>	Collaborative	Pre-filing: Sustained	Apply to all participants throughout process, including FERC	Pre-filing	Study plan meetings  FERC-approved	<b>Formal: Mandatory agencies</b>  Informal: Yes	Pre-filing  No Post-filing study requests	60 days after REA  Modified 60 days after due date for comments on draft NEPA document
<b>Traditional Licensing Process (TLP)</b>	Mostly Paper	Post-filing (Pre-filing if Requested)	<u>Pre-filing</u> Some <u>Post-filing</u> Defined by FERC	Post-filing	Led by Applicant  Limited FERC involvement	<b>Formal: Advisory</b>  Informal: No	Post-filing	60 days after REA  Schedule for final
<b>Alternative Licensing Process (ALP)</b>	Collaborative	Pre-filing: Requested	<u>Pre-filing</u> Collaboratively defined <u>Post-filing</u> Defined by FERC	Pre-filing	Collaborative group  FERC assistance	<b>Formal: Advisory</b>  Informal: Yes	Pre-filing  Post-filing limited	60 days after REA  Schedule for final



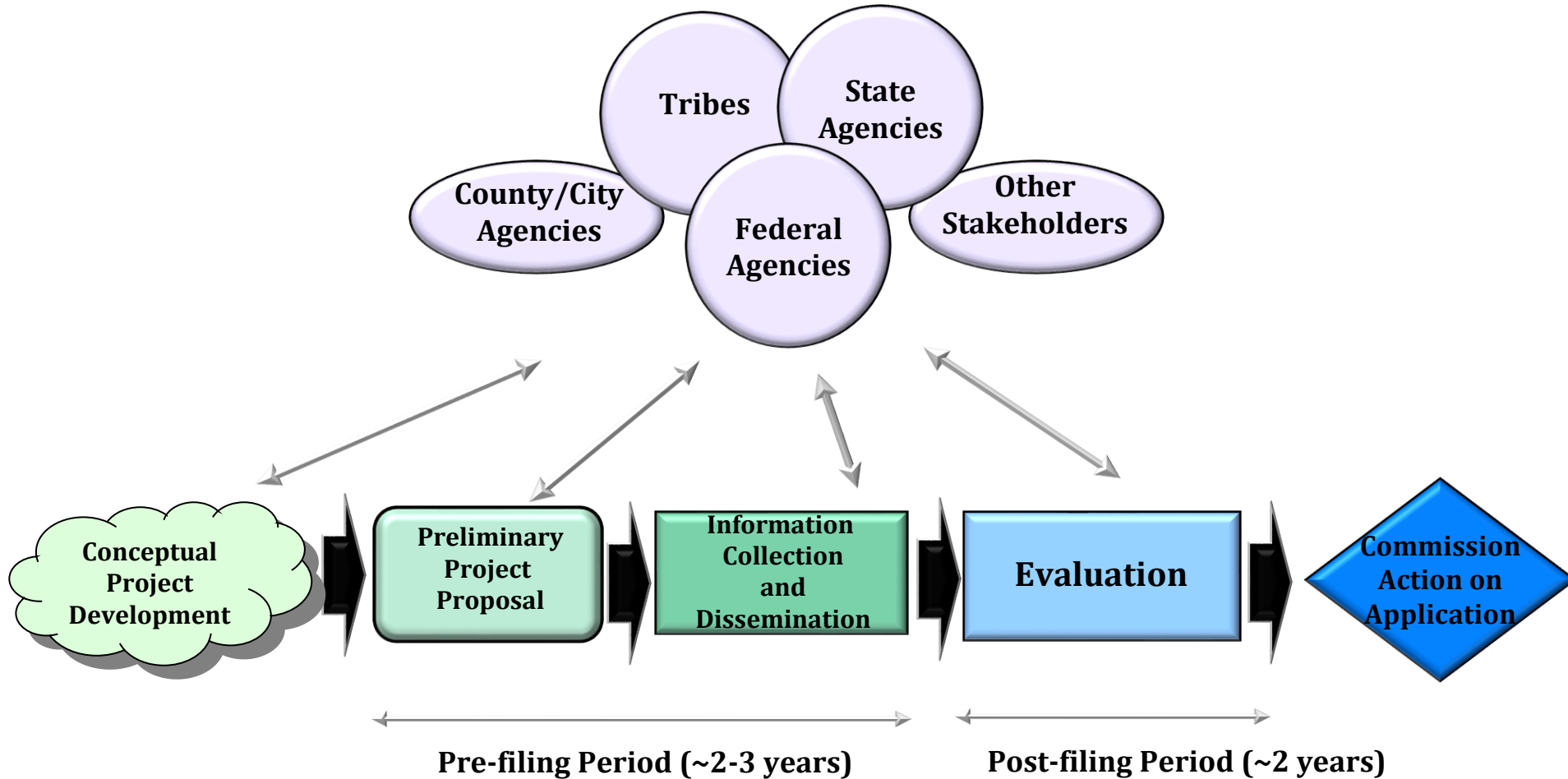


# Process Selection

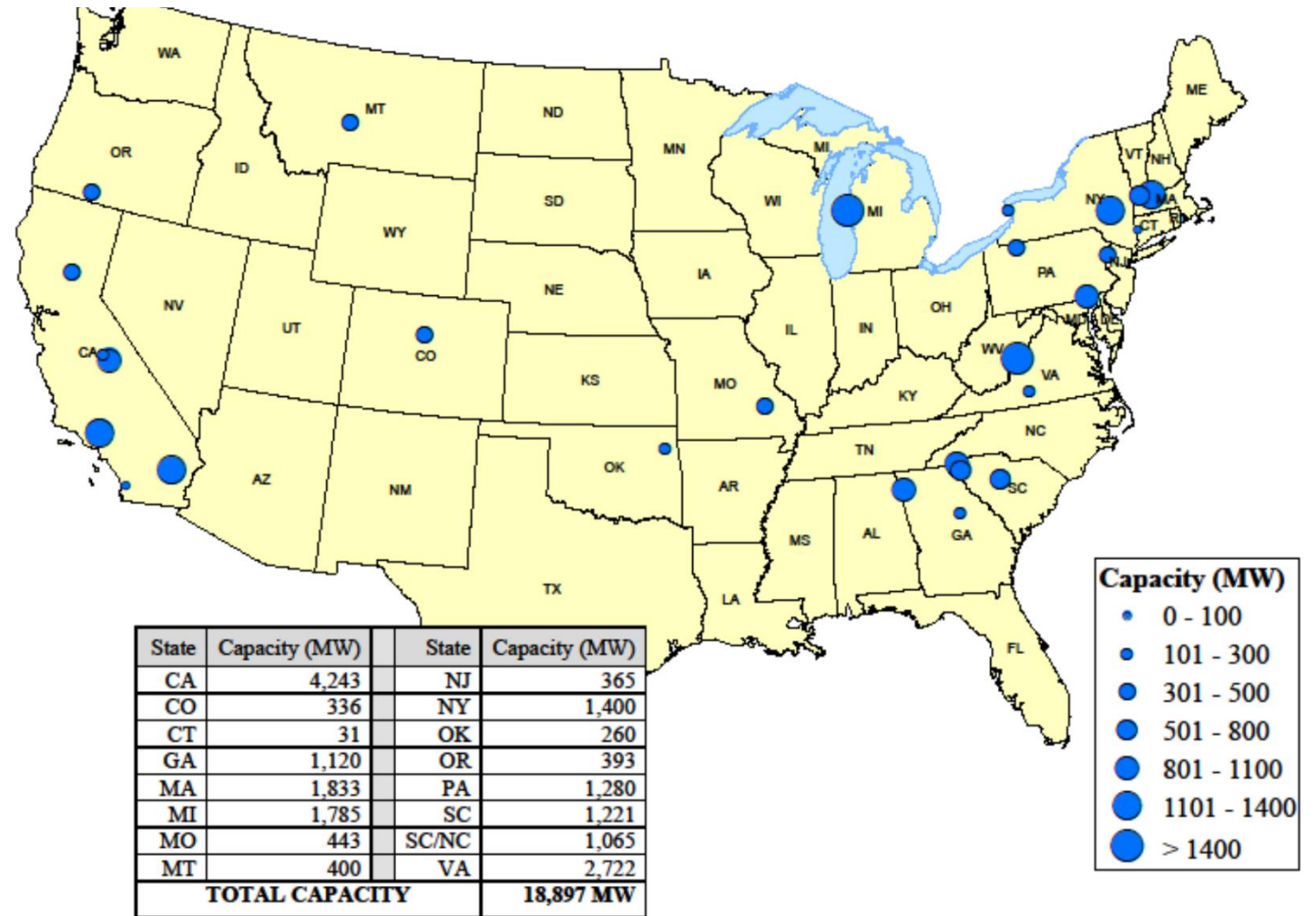
ILP	TLP	ALP
Default process	Available upon request and FERC approval	Available upon request and FERC approval
Projects with complex issues and study needs; FERC oversight in pre-filing	Projects with less complex issues and study needs; limited FERC oversight in pre-filing	Projects that effectively promote a self-driven collaborative pre-filing process; some FERC involvement
Predictable scheduling in both pre-filing and post-filing stages; FERC-approved study plan	Paper-driven process; few set timeframes	Collaboratively-determined schedule in pre-filing stage
Post-filing elements of each process very similar		



# Pathway to Licensing



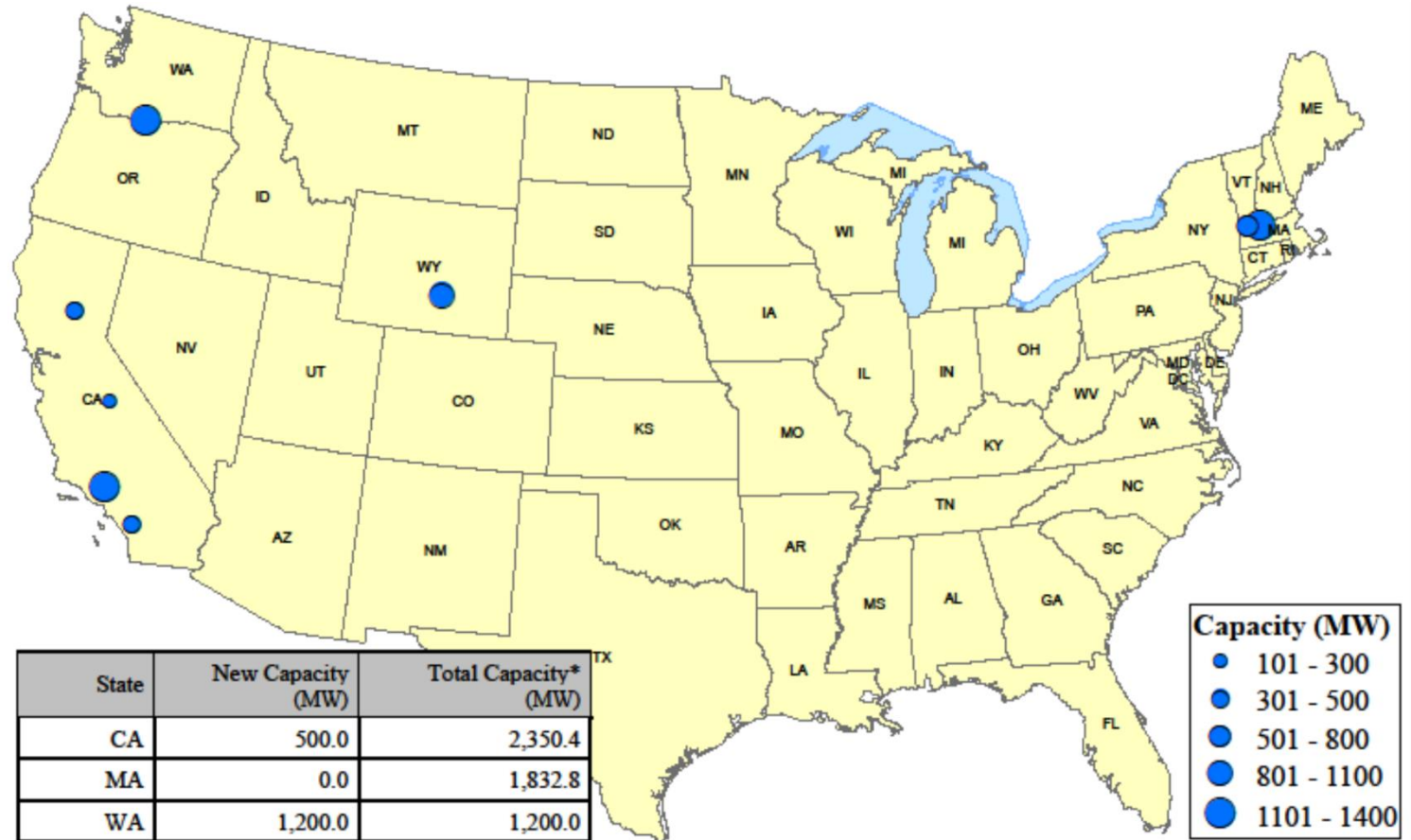
# Licensed Pumped Storage Projects



Source: FERC Staff, January 30, 2023

Source: <https://www.ferc.gov/media/licensed-pumped-storage-projects-map-1>

# Pending Pumped Storage Project Licenses and Relicensed



State	New Capacity (MW)	Total Capacity* (MW)
CA	500.0	2,350.4
MA	0.0	1,832.8
WA	1,200.0	1,200.0
WY	972.0	972.0
<b>TOTAL CAPACITY</b>	<b>2,672.0 MW</b>	<b>6,355.2 MW</b>

\*Includes 3,683.2 MW of pumped storage capacity in relicensing.

Source: FERC Staff, January 30, 2023

Source: <https://cms.ferc.gov/media/pending-licenses-and-relicenses-pumped-storage-projects-map-0>

# Pending Original Pumped Storage Projects

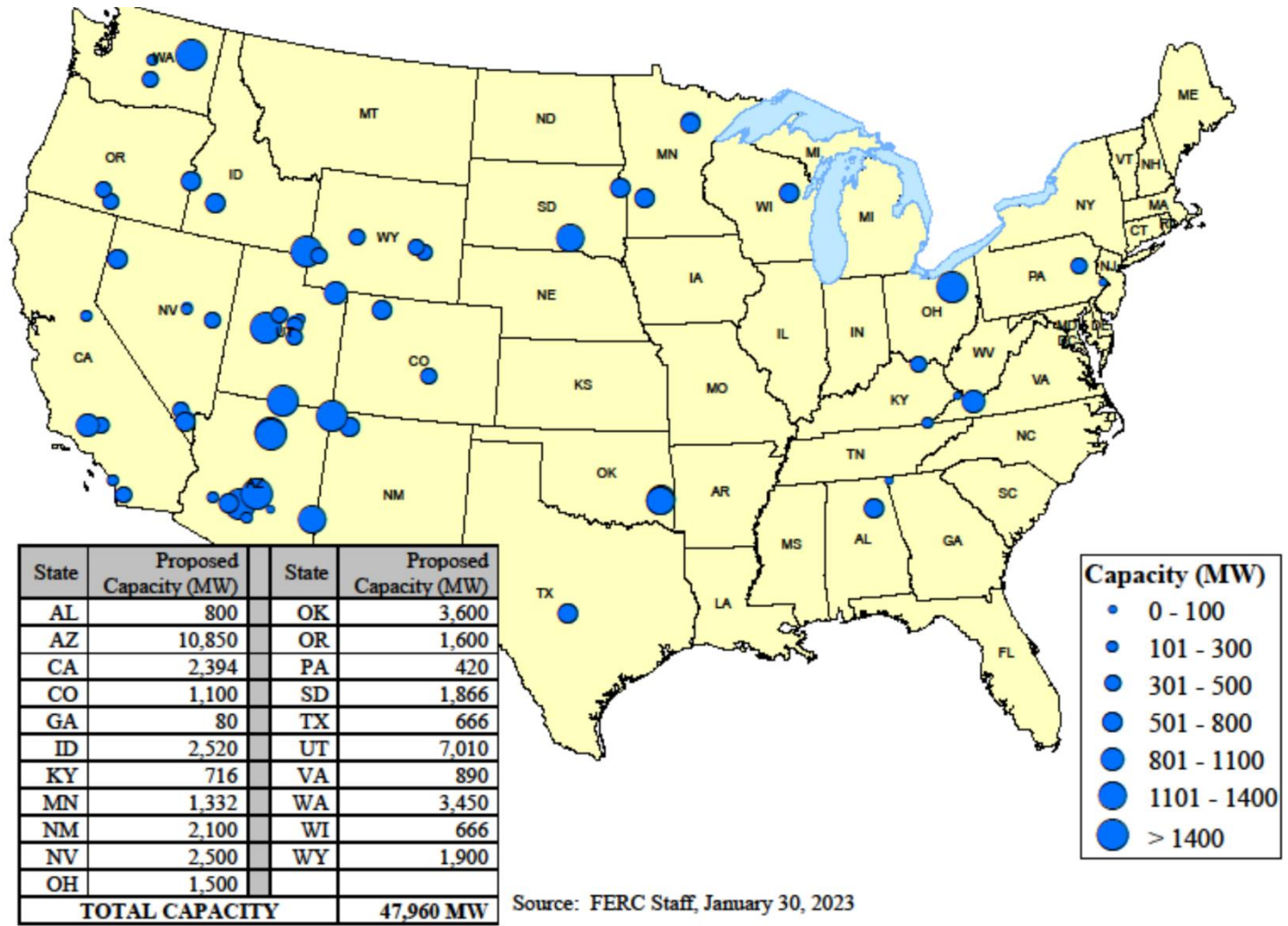
## Western PSH Projects in Pre-Filing (Filed NOI/PAD)

Licensing Process	Project No.	Project Name	Applicant	State	MW	NOI/PAD	Notes
TLP	P-14642	San Vicente Pumped Storage Project	San Diego Water Authority and City of San Diego	CA	500	7/28/2015	TLP approved 9/28/2015.
ILP	P-14804	Blue Diamond Advanced Pumped Storage Project	Control Technology, Inc.	NV	450	8/18/21 (revised)	FERC's Study Plan Determination issued 11/2/22.
ILP	P-14655	Cat Creek Pumped Storage Project	Cat Creek Energy, LLC.	ID	720	1/3/2022	Comments on Proposed Study Plan due 4/26/23. Revised Study Plan due 5/26/23. Comments on RSP due 6/10/23. FERC Study Plan Determination due 6/25/23.
ILP	P-14796	Mokelumne Pumped Storage Project	GreenGen Storage, LLC	CA	400	4/8/2022	FERC's Study Plan Determination issued 2/13/23.

## Western PSH Projects in Post-filing (Filed License Applications)

Licensing Process	Project No.	Project Name	Applicant	State	MW	License Application	Notes
TLP	P-14861	Goldendale Pumped Storage Project	FFP Project 101, LLC	WA/OR	1,200	6/23/2020	DEIS issued 3/31/23; comments due 6/6/23.
TLP	P-14787	Seminole Pumped Storage Project	Black Canyon Hydro, LLC	WY	972	1/18/2023	Notice of Anticipated Schedule issued 3/31/23: REA in August 2023, DEIS in May 2024, and FEIS in November 2024.
TLP	P-14851	White Pine Pumped Storage Project	White Pine Waterpower, LLC	NV	500	2/27/2023	Reviewing application

# Issued Preliminary Permits for Pumped Storage Projects



Source: <https://www.ferc.gov/media/issued-preliminary-permits-pumped-storage-projects-map>

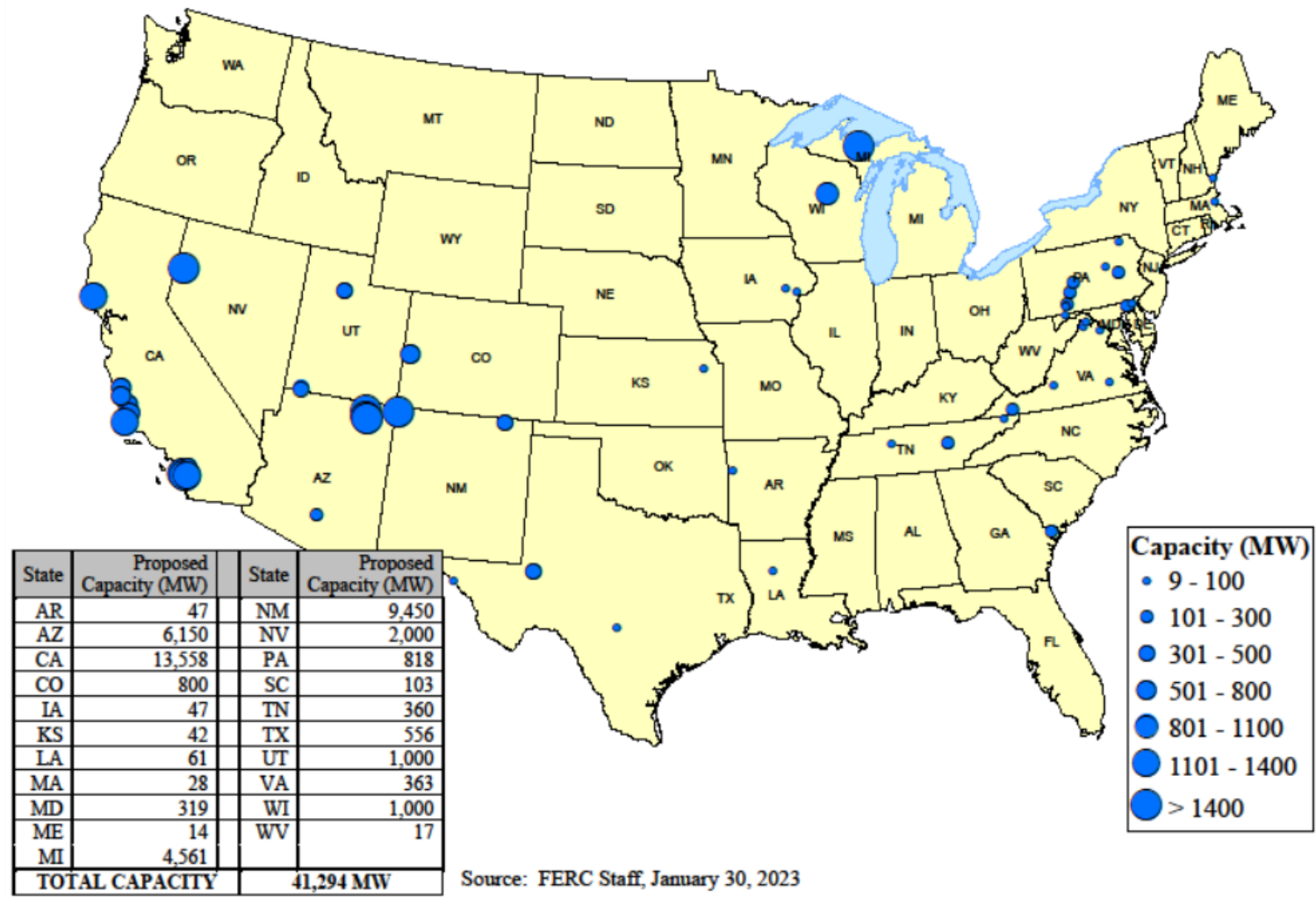
Project Number	Project Name	Permittee	Issue Date	Expiration Date	Authorized Capacity (kW)	State	Waterway	Description
P-14742	Ute Pumped Storage Project	Ute Mountain Ute Tribe	03/02/2020	02/28/2024	1,000,000	UT	Green River Lake	Pumped Storage
P-14796	Mokelumne Pumped Storage	GreenGen Storage LLC	12/21/2017	11/30/2024	400,000	CA	Bear River	Pumped Storage
P-14804	Blue Diamond Pumped Storage	Control Technology, Inc.	06/22/2017	05/31/2024	450,000	NV	None	Pumped Storage
P-14850	Bison Creek Pumped Storage	Covington Mountain Hydro, LLC.	03/12/2018	02/28/2024	480,000	CA	None	Pumped Storage
P-14851	White Pine Pumped Storage	White Pine Waterpower, LLC.	10/25/2017	09/30/2024	500,000	NV	None	Pumped Storage
P-14876	Gregory County Pumped Storage	Western Minnesota Municipal Power	09/07/2018	08/31/2025	1,200,000	SD	Missouri River	Pumped Storage
P-14956	Granite Falls County Pumped Storage	Midwest Energy Recycling, LLC.	05/28/2019	04/30/2023	666,000	MN	Minnesota River	Pumped Storage/Conventional
P-14957	Camp Pendleton	Boyce Hydro Power, LLC.	07/17/2019	06/30/2023	300,000	CA	Pacific Ocean	Pumped Storage/Conventional
P-14983	Tomlin Pumped Storage Plant No. 2	Tomlin Energy, LLC.	10/17/2019	09/30/2023	1,200,000	OK	Kiamichi River	Pumped Storage/Conventional
P-14989	Montezuma Pumped Storage	Pumped Hydro Storage LLC	04/02/2020	03/31/2024	2,100,000	AZ	None	Pumped Storage
P-14990	Indian Spring Pumped Storage	Pumped Hydro Storage LLC	01/17/2020	12/31/2023	1,500,000	AZ	Alder Creek	Pumped Storage
P-14992	Salt Trail Canyon Pumped Storage	Pumped Hydro Storage LLC	05/21/2020	04/30/2023	1,500,000	AZ	Little Colorado Riv	Pumped Storage
P-14993	Intermountain Pumped Storage	Premium Energy Holding, LLC.	12/18/2019	11/30/2024	2,000,000	UT	Sevier River	Pumped Storage/Conventional
P-14994	Little Colorado River	Pumped Hydro Storage LLC	05/21/2020	04/30/2023	3,200,000	AZ	Little Colorado Riv	Pumped Storage
P-14995	San Francisco River Pumped Storage	Pumped Hydro Storage LLC	02/18/2021	01/31/2024	1,250,000	AZ, NM	San Francisco Riv	Pumped Storage
P-15001	Energy Storage Station	Navajo Energy Storage Station LLC	02/18/2021	01/31/2024	2,210,000	UT	None	Pumped Storage
P-15006	Owyhee Pumped Storage	Owyhee Energy Storage, LLC	01/31/2020	12/31/2023	600,000	OR	Lake Owyhee	Pumped Storage/Conventional
P-15008	Sweetwater Pumped Storage	Sweetwater Hydro, LLC.	04/09/2020	03/31/2024	600,000	NM	San Juan River	Pumped Storage
P-15009	JD Sky Pumped Storage	Renewable Energy Aggregators	03/30/2020	02/28/2024	800,000	AZ	Colorado River	Pumped Storage
P-15010	Casa Grande Pumped Storage Project	Renewable Energy Aggregators	10/21/2021	09/30/2024	2,400	AZ	None	Pumped Storage
P-15011	Delaney Pumped Storage	Renewable Energy Aggregators	09/24/2020	08/31/2024	200,000	AZ	None	Pumped Storage
P-15020	Eldorado Pumped Storage	El Dorado Pumped Storage, LLC.	01/27/2021	12/31/2024	750,000	NV	None	Pumped Storage
P-15029	Itasca County Pumped Storage	SV Hydro, LLC	10/28/2020	09/30/2024	666,000	MN	None	Pumped Storage
P-15031	Ruby Hill	Nevada PSH Energy Storage LLC	12/17/2020	11/30/2024	200,000	NV	None	Pumped Storage
P-15034	Beclabito Storage Center	Kinetic Power, LLC	01/12/2021	12/31/2024	1,500,000	NM	None	Pumped Storage
P-15043	Craig-Hayden Pumped Storage	Craig-Hayden PS, LLC	03/11/2021	02/28/2025	600,000	CO	None	Pumped Storage
P-15088	Halverson Canyon Pumped Storage	Daybreak Power, Inc.	06/28/2021	05/31/2025	2,650,000	WA	Lake Roosevelt	Pumped Storage
P-15090	Bigstone Pumped Storage	Energy Recycling Company, LLC	07/12/2021	06/30/2025	666,000	SD	None	Pumped Storage
P-15104	Tehachapi Pumped Storage	Premium Energy Holdings, LLC	12/01/2021	11/30/2025	1,000,000	CA	None	Pumped Storage
P-15105	Llano County Pumped Storage	Solia 9 Hydroelectric, LLC	09/23/2021	08/30/2025	666,000	TX	None	Pumped Storage
P-15227	Phantom Canyon Pumped Storage	Ortus Power Resources, LLC	05/24/2022	04/30/2026	500,000	CO	None	Pumped Storage
P-15228	Pond Peak Pumped Storage	Pond Peak Energy Storage LLC	11/01/2022	10/31/2026	600,000	NV	None	Pumped Storage
P-15237	Barn Canyon Pumped Storage	PacifiCorp	08/10/2022	07/31/2026	300,000	UT	None	Pumped Storage
P-15238	Box Elder Pumped Storage	PacifiCorp	10/19/2022	09/30/2026	500,000	WY	None	Pumped Storage
P-15239	Crooked Creek Pumped Storage	PacifiCorp	05/19/2021	04/30/2026	500,000	OR	None	Pumped Storage
P-15240	Dry Canyon Pumped Storage	PacifiCorp	01/27/2022	12/31/2025	1,800,000	ID	None	Pumped Storage
P-15241	Long Ridge Pumped Storage	PacifiCorp	08/10/2022	07/31/2026	500,000	UT	None	Pumped Storage
P-15242	Electric Lake Pumped Storage	PacifiCorp	11/01/2022	10/31/2026	500,000	UT	None	Pumped Storage
P-15243	Rock Canyon Pumped Storage	PacifiCorp	08/10/2022	07/31/2026	500,000	UT	None	Pumped Storage
P-15244	Rocky Ridge Pumped Storage	PacifiCorp	04/07/2022	03/31/2026	500,000	WY	None	Pumped Storage
P-15245	Saddle Mountains Pumped Storage	PacifiCorp	04/11/2022	03/31/2026	500,000	WA	None	Pumped Storage
P-15246	Winter Ridge Pumped Storage	PacifiCorp	05/19/2022	04/30/2026	500,000	OR	None	Pumped Storage
P-15247	South Fork Pumped Storage	PacifiCorp	05/24/2022	04/30/2026	500,000	WY	None	Pumped Storage
P-15253	Great Divide Closed Loop Pumped Sto	Great Divide Energy Park, LLC	03/31/2022	02/28/2026	399,000	WY	Sheep Creek	Pumped Storage
<b>Total</b>		<b>44</b>						



Active PSH Preliminary Permits as of 3/21/23 (Western States)

Source: [https://www.ferc.gov/sites/default/files/2023-04/ActivePrelimPermits\\_3.21.2023.xlsx](https://www.ferc.gov/sites/default/files/2023-04/ActivePrelimPermits_3.21.2023.xlsx)

# Pending Preliminary Permits for Pumped Storage Projects



Source: <https://cms.ferc.gov/media/pending-permits>



Project Number	Project Name	Water Body	State	Applicant	Proposed Capacity (kW)	File Date	Description
P-15024	BIG CANNON PUMPE	NONE	AZ	Pumped Hydro Storage, LLC	3,600,000	03/12/20	PUMPED STORAGE
P-15108	San Onofre Ocean P	Pacific Ocean	CA	PREMIUM ENERGY HOLDING, LLC	150,000	03/10/21	PUMPED STORAGE
P-15146	Camp Pendleton Pui	Pacific Ocean	CA	Hydropower Highway, LLC	5,287,000	05/13/21	PUMPED STORAGE
P-15194	Bedrock Quarry	NONE	TX	Hydropower Highway, LLC	23,000	07/27/22	PUMPED STORAGE
P-15195	Big Springs Quarry	NONE	KS	Hydropower Highway, LLC	42,000	07/27/22	PUMPED STORAGE
P-15207	U.S. Border Patrol	NONE	TX	Hydropower Highway, LLC	43,000	07/27/22	PUMPED STORAGE
P-15214	Klien Quarry	NONE	IA	Hydropower Highway, LLC	30,000	07/27/22	PUMPED STORAGE
P-15215	Make One Here Qua	NONE	TX	Hydropower Highway, LLC	469,000	07/27/22	PUMPED STORAGE
P-15218	Moscow Pumped Str	NONE	IA	Hydropower Highway, LLC	17,000	07/27/22	PUMPED STORAGE
P-15222	Preston Quarry	NONE	AR	Hydropower Highway, LLC	47,000	07/27/22	PUMPED STORAGE
P-15232	Unawep Pumped S	NONE	CO	Public Service Company of CO.	800,000	08/23/21	PUMPED STORAGE
P-15233	Black Messa Pumpe	NONE	AZ	Nature and People First Arizona PHS, LLC	2,250,000	10/05/21	PUMPED STORAGE
P-15234	Black Messa Pumpe	NONE	AZ	Nature and People First Arizona PHS, LLC	1,500,000	10/05/21	PUMPED STORAGE
P-15235	Black Messa Pumpe	NONE	AZ	Nature and People First Arizona PHS, LLC	2,250,000	10/05/21	PUMPED STORAGE
P-15248	Sacton Energy Stora	NONE	AZ	RAMM Power Group, LLC	150,000	11/18/21	PUMPED STORAGE
P-15255	Oquirrh Pumped Sto	NONE	UT	Oquirrh Energy Storage, LLC	500,000	01/25/22	PUMPED STORAGE
P-15261	Lake Elsinore Adva	Lake Elsinore	CA	Navada Hydro Company, Inc.	500,000	02/08/22	PUMPED STORAGE
P-15265	Winnfield Rock Qua	NONE	LA	Hydropower Highway, LLC	13,000	07/27/22	PUMPED STORAGE
P-15269	Nacimiento Pumpec	Lake Nacimiento	CA	PREMIUM ENERGY HOLDING, LLC	600,000	03/31/22	PUMPED STORAGE
P-15270	Santa Margarita Pur	Santa Margarita Lake	CA	PREMIUM ENERGY HOLDING, LLC	600,000	03/31/22	PUMPED STORAGE
P-15271	Twitchell Pumped S	Santa Maria River	CA	PREMIUM ENERGY HOLDING, LLC	600,000	03/31/22	PUMPED STORAGE
P-15272	Whale Rock Pumpec	Whale Rock Reservoir	CA	PREMIUM ENERGY HOLDING, LLC	600,000	03/31/22	PUMPED STORAGE
P-15274	Hurricane Cliffs Purr	NONE	WA	Hurricane Cliffs PSH, LLC	500,000	04/22/22	PUMPED STORAGE
P-15284	Vandenberg Pumpe	Pacific Ocean	CA	HGE Energy Storage 1, LLC	1,351,000	08/18/22	PUMPED STORAGE
P-15286	Camp Pendleton Pui	Pacific Ocean	CA	HGE Energy Storage 2, LLC	1,270,000	09/22/22	PUMPED STORAGE
P-15287	Fort Ross Hydro Proj	Pacific Ocean	CA	HGE Energy Storage 3 LLC	1,250,000	09/27/22	PUMPED STORAGE
P-15291	Pyramid Lake Pumpe	Pyramid Lake	NV	PREMIUM ENERGY HOLDING, LLC	2,000,000	11/04/22	PUMPED STORAGE
P-15293	Chuska Mountain Pt	San Juan River	NM	Nature and People First New Mexico PHS,	9,000,000	12/09/22	PUMPED STORAGE
P-15294	Juan Torres Mesa Pt	NONE	NM	JT Mesa Hydro, LLC	450,000	12/14/22	PUMPED STORAGE
P-15304	Corral Summit Pump	Big Lost River	ID	Cat Creek Energy, LLC	200,000	02/16/23	PUMPED STORAGE
P-15305	Twentymile Pumpec	None	CO	Twentymile Pumped Storage, LLC	250,000	03/10/23	PUMPED STORAGE
P-15306	Isabella Pumped St	Kern River	CA	Premium Energy Holdings, LLC	12,000	03/15/23	PUMPED STORAGE
P-15307	Haiwee Pumped Stc	Haiwee Creek	CA	Premium Energy Holdings, LLC	1,600,000	03/17/23	PUMPED STORAGE
<b>Total</b>	<b>33</b>						



Pending PSH Preliminary Permits as of 3/21/23 (Western States)

Source: [https://www.ferc.gov/sites/default/files/2023-04/ActivePrelimPermits\\_3.21.2023.xlsx](https://www.ferc.gov/sites/default/files/2023-04/ActivePrelimPermits_3.21.2023.xlsx)

# Opportunities to Participate in the Commission's Review Process

- Submit written comments during the Commission's proceedings.
- Attend public meetings.
- Request to be a cooperating agency or an intervenor in a proceeding.

What is an Intervenor?

<https://www.ferc.gov/frequently-asked-questions-faqs>

How to Intervene

<https://www.ferc.gov/how-intervene>

Staff will accept and consider all comments filed during a proceeding.



# Tips for Getting and Staying Involved

- **START EARLY!**
- Stay informed (i.e., eSubscribe)
- Participate in pre-filing
  - Review filings and file comments
  - Participate in meetings, study development, and working groups
- Participate in post-filing
  - Review application
  - Review NEPA document
  - File comments and recommendations



# Tips for Filing Comments

- ✓ State your objectives early and concisely
- ✓ Be as clear and specific as possible
- ✓ Provide adequate support and justification for recommendations (substantial evidence)
- ✓ Be consistent
- ✓ Focus on project nexus

Watch FERC WorkshOPP on Powerful Comments:

<https://www.youtube.com/live/P12Y7FeUcJw?feature=share>



# FERC's Electronic Systems

- eLibrary
- eRegister
- eFiling
- eSubscription
- eService
- eComment

<https://www.ferc.gov/ferc-online/overview>

All services are free and available via any internet connection (no installation required)



## FERC Online

### Overview

Filing Fees

Filing Forms

Notice Formats

How To Guides

Company Registration

Frequently Asked Questions (FAQs)

Comment Policy

[HOME](#) > [FERC ONLINE](#) > FERC ONLINE

## FERC Online



### Login

Login to your FERC Online account or create a new one.

### eComment

eComment is limited to individuals filing comments on their own behalf in the following proceeding

- Hydroelectric License/Re-license Proceedings (P - Project Number),
- Pre-Filing Activity for Planned Natural Gas Projects (PF Docket),
- Applications for Authorization to Construct a Natural Gas Pipeline,
- Liquefied Natural Gas (LNG) or Other Facility (CP Dockets),
- Pre-Filing Activity for Permits to Site Interstate Electric Transmission Lines (PT Dockets), and
- Applications for a Permit to Site Interstate Electric Transmission Lines (ET Dockets).

**TIP: Your system must not block emails from ferc.gov.** After you submit an eComment request, you will receive an email from ferc.gov with a link to the comment system.

**TIP: The application will time-out after 35 minutes of inactivity.** Create a Word or Text file (up to 100KB) and then copy/paste them in the eComment Text Box to avoid time-out limits.

Note for eComment: (P, PF, PT and CP Dockets only; eRegistering is not required)

### eFiling

You must have or create a full eRegistration account (not limited to eSubscription) and use the Comment system if you are filing:

- On behalf of a company, agency, organization, association, or other non-individual

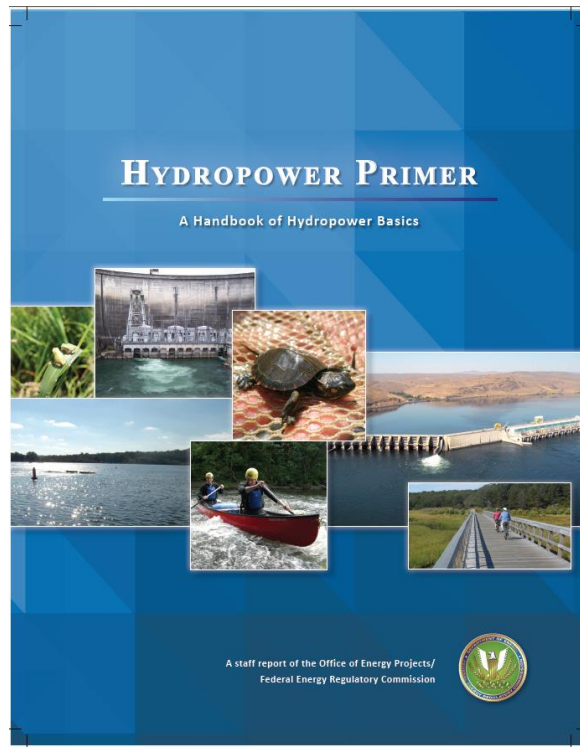
# Web Resources

[www.FERC.gov](http://www.FERC.gov)

## Hydropower Page

(<https://www.ferc.gov/industries-data/hydropower>)

Overview of licensing, compliance, and dam safety programs.



### Division of Hydropower Administration & Compliance



### COMPLIANCE HANDBOOK



### Office of Public Participation (OPP)

#### Overview

- How to Participate
- Contact FERC
- Intervene
- File a Comment
- Request a Rehearing
- Frequently Asked Questions (FAQs)

### About OPP

Pursuant to [Section 319](#) of the Federal Power Act, as amended on November 15, 2021, in [Public Act 117-58](#) of the Infrastructure Investment and Jobs Act the Commission has established the the Office of Public Participation (OPP) to assist the public with Commission proceedings. The Commission has produced a [public report](#) to guide the development of the office based on [stakeholder feedback](#) during listening sessions, a full-day workshop, and a written comment period.

The public can contact OPP now for assistance navigating Commission proceedings of all types. Examples include questions on when and how to intervene, comment, file motions, or seek rehearing. OPP will not assist in the actual drafting of pleadings and other submissions.

OPP is beginning operations with limited staff, so we appreciate the public's understanding and patience if OPP cannot immediately respond. Ongoing and additional support will be further determined and established by the incoming OPP Director.

**Office of Public Participation**  
(<https://www.ferc.gov/OPP>)





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[www.FERC.gov](http://www.FERC.gov)



— BUREAU OF —  
RECLAMATION

# Bureau of Reclamation - Non-Federal Hydropower Development

Permitting and Processes for New Pumped Storage Hydropower Systems

Western States Federal Agency Support Team (WestFAST)

April 12, 2023



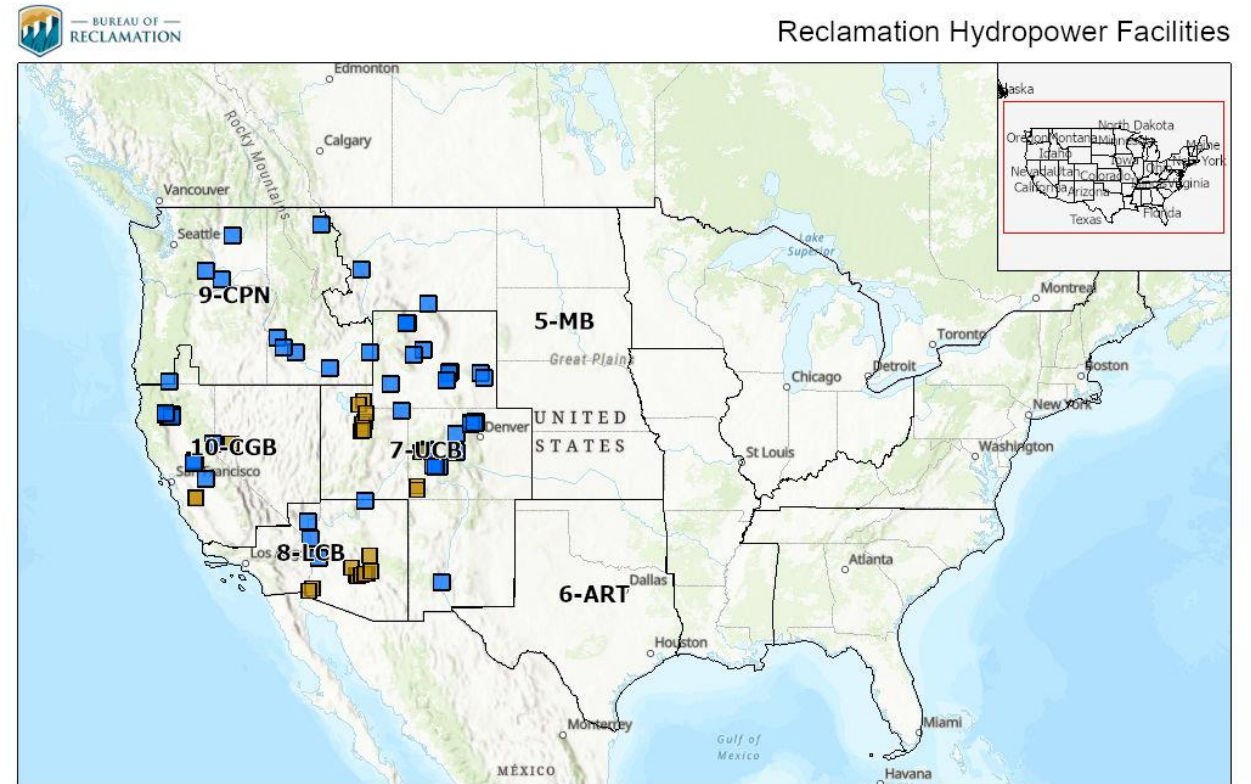
# Presentation Agenda

- US Bureau of Reclamation Overview
- Non-Federal Hydropower Development on Reclamation Projects Primer
- Non-Federal Pumped Storage Development Considerations
- Lease of Power Privilege Process



# Reclamation Overview

- **#1 US Water Wholesaler**
  - ~ 187 Water Resource Projects
  - ~ 337 Reservoirs
  - ~ 476 Dams
- **#2 US Hydropower Generator**
  - 77 Reclamation-Owned Facilities
  - 53 Reclamation-Owned/Operated
  - ~ 14,750 MW
  - ~ 40,000,000 MWh/Year



**Legend**  
■ Reserved  
■ Transferred  
□ Interior Regions

0 490 980 mi

DISCLAIMER: This map and data are intended for general reference only. No representation is made that the data are complete and accurate.



# Reclamation Overview

Reclamation Region	Facility (#)	Unit (#)	Capacity (MW)	Net Generation (MWh)
Columbia-Pacific Northwest	10	56	7,537	21,826,975
California-Great Basin	10	26	1,910	3,706,946
Lower Colorado Basin	3	28	2,454	5,067,122
Upper Colorado Basin	9	22	1,816	4,814,686
Missouri Basin	21	44	1,041	2,795,884
<b>Reclamation Total</b>	<b>53</b>	<b>176</b>	<b>14,758</b>	<b>38,211,614</b>

- Facility: Reclamation owned, operated, and maintained (“reserved works”) power facilities.
- Net Generation: Ten-year rolling average.
- [https://www.usbr.gov/power/facil/Reclamation\\_Hydroelectric\\_Powerplants\\_Summary\\_Table\\_12\\_22.pdf](https://www.usbr.gov/power/facil/Reclamation_Hydroelectric_Powerplants_Summary_Table_12_22.pdf)



# Reclamation Overview



Facility Type	Facility	State	Capacity (MW)
Reserved	Grand Coulee (Keys)	Washington	314
	Mt. Elbert	Colorado	200
	Flatiron (Unit 3)	Colorado	9
Transferred	San Luis	California	424
	O'Neill	California	25
	Horse Mesa	Arizona	129
	Mormon Flat	Arizona	60
	New Waddell	Arizona	45
	Senator Wash	California	7
			1,213



# Non-Federal Development

- Reclamation encourages non-federal hydropower development sited within existing Reclamation Projects – provided:
  - Development operates in harmony with the Reclamation Project
  - Development does not conflict with authorized Reclamation Project purposes
  - Development does not impair the safety, security, and reliability of the Reclamation Project
  - Development does not have significant adverse environmental, cultural, or historical impacts

See: Reclamation Manual Policy, *Hydroelectric Power* (FAC P04)

<https://www.usbr.gov/recman/policies.html>



# Non-Federal Development

- Permitting processes for non-federal hydropower development sited within a Reclamation Project:
  - Reclamation Lease of Power Privilege (LOPP) Contract; or
  - Federal Energy Regulatory Commission (FERC) License
- Jurisdiction is dependent upon Reclamation Project authorizations, in accordance with a 1992 Memorandum of Understanding



# Non-Federal Development

- LOPP and FERC processes provide Reclamation oversight/controls to ensure the non-federal project operates in harmony with the underlying Reclamation Project
- Non-federal projects may be subject to dual jurisdiction/dual permitting processes (i.e., LOPP and FERC) – e.g.,:
  - Pumped storage development utilizing a Reclamation Project reservoir within Reclamation LOPP jurisdiction and a second, non-federal reservoir within FERC jurisdiction



# Non-Federal Pumped Storage Development

- Considerations re: the use of Reclamation Projects for non-federal pumped storage development
  - **Potential Opportunities –**
    - Leverage existing infrastructure
    - Proximity to requisite resources
    - Access to local expertise/support
  - **Critical Considerations –**
    - Requirement to operate within Reclamation Project parameters
    - Potential for dual jurisdiction, dual permitting requirements





# Non-Federal Pumped Storage Development

Facility Type	Facility	State	~ Capacity (MW)
FERC	-	-	-
LOPP	Banks Lake Pumped Storage Project (Lake Roosevelt)	Washington	500
FERC/LOPP	Seminoe Pumped Storage Project (Seminoe, P-14787)	Wyoming	972
	Cat Creek Energy and Water Storage Project (Anderson Ranch, P-14655)	Idaho	400
	Halverson Canyon Pumped Storage Project (Lake Roosevelt, P-15088)	Washington	2,650
	Navajo Energy Storage Station (Lake Powell, P-15001)	Utah	2,210
			6,732



# Lease of Power Privilege

“A LOPP is a contractual authorization issued by Reclamation to a non-Federal entity to use a Reclamation facility for electric power generation consistent with Reclamation project purposes”

- LOPP process is defined in RM D&S, *Lease of Power Privilege (LOPP) Processes, Responsibilities, Timelines, and Charges* (FAC 04-08)
- See: <https://www.usbr.gov/power/LOPP/>



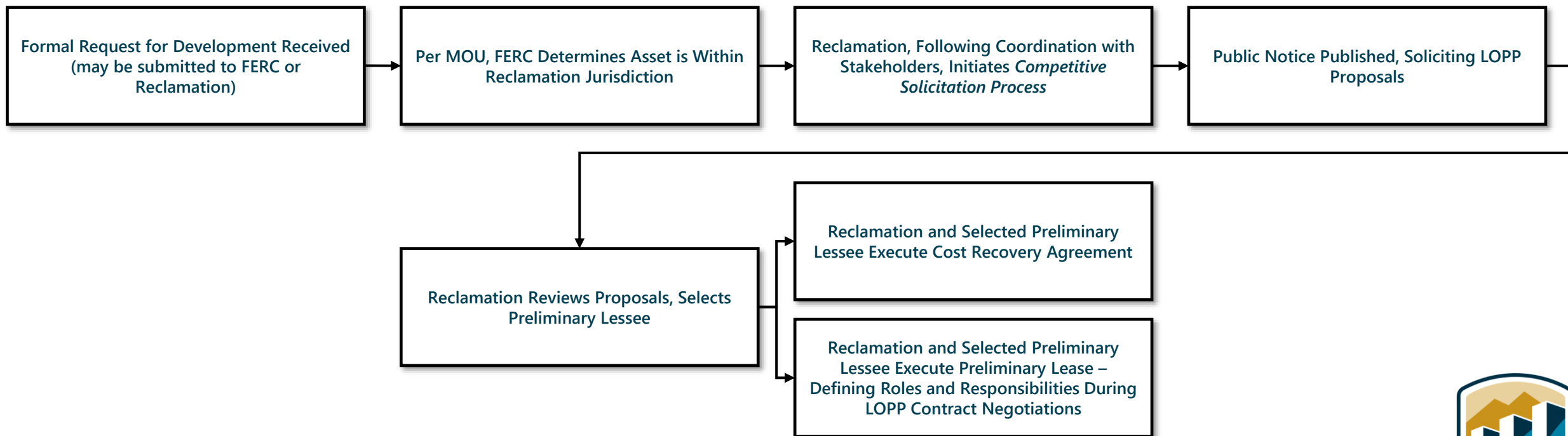
# Lease of Power Privilege

- Process consists of three general phases:
  - Formal Request for Development - Award of Preliminary Lease
    - Process dependent upon asset type (e.g., dam/reservoir or conduit)
  - Award of Preliminary Lease – Award of Lease of Power Privilege Contract
  - Award of Lease of Power Privilege Contract – End of Construction



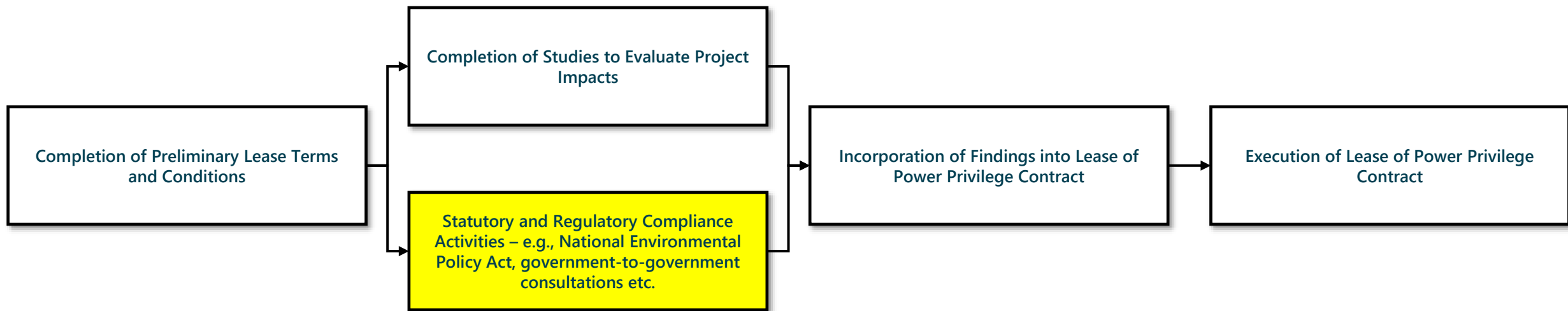
# Lease of Power Privilege

## Formal Request for Development - Award of Preliminary Lease (Dam/Reservoir) – *Major Milestones*



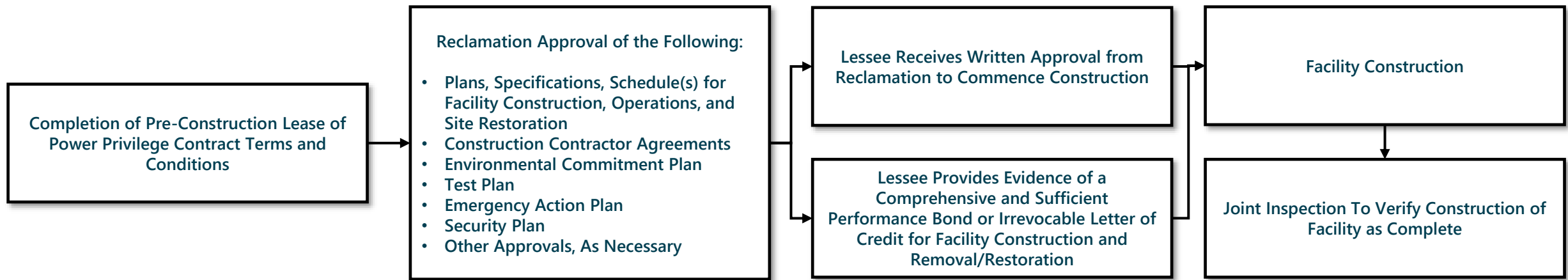
# Lease of Power Privilege

## Award of Preliminary Lease – Award of Lease of Power Privilege Contract – *Major Milestones*



# Lease of Power Privilege

## Award of Lease of Power Privilege Contract – End of Construction – *Major Milestones*



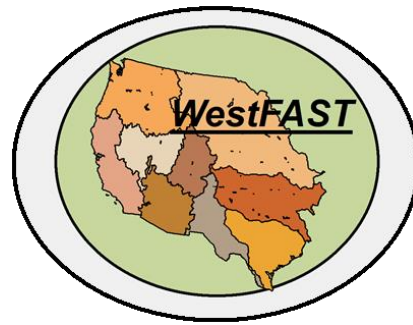
Clark Bishop

[cbishop@usbr.gov](mailto:cbishop@usbr.gov)

<https://www.usbr.gov/power/>



— BUREAU OF —  
RECLAMATION



# WestFAST Pumped Storage Hydropower Webinar Series

## Permitting and Processes for New Pumped Storage Hydropower Systems

### Considering the Environmental Effects of New Pumped Storage Hydropower

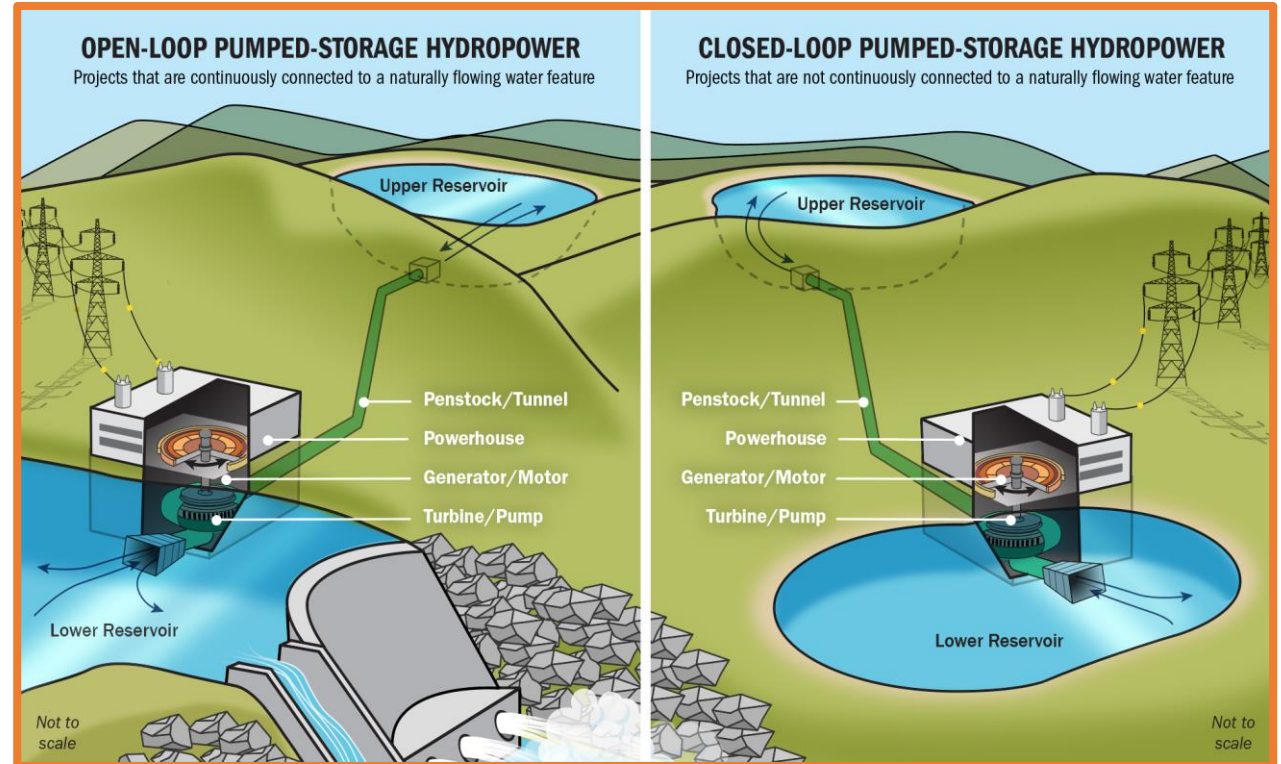
April 12, 2023

Bo Saulsbury

PNNL-SA-182981



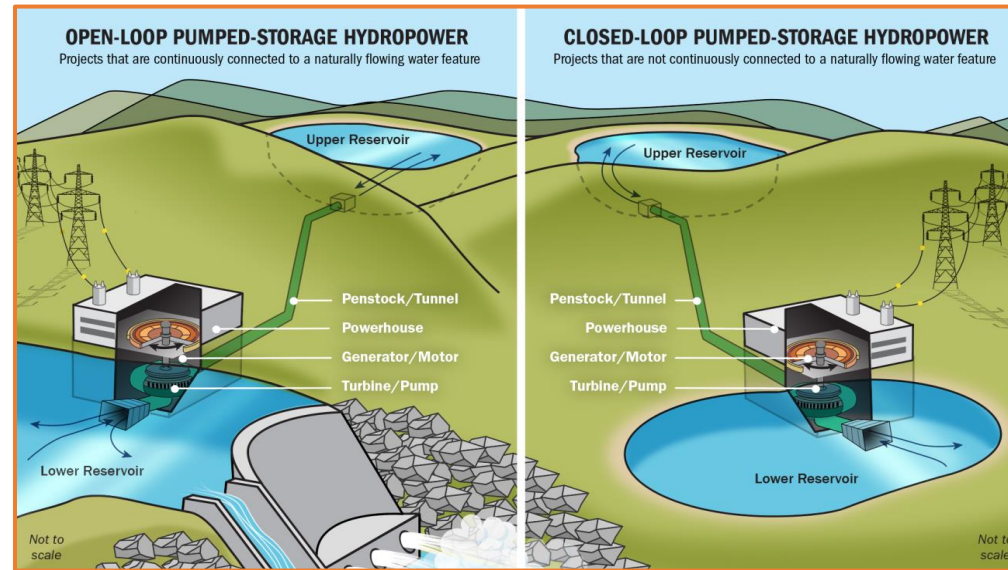
PNNL is operated by Battelle for the U.S. Department of Energy





# Open-Loop vs. Closed-Loop

- Pumped storage hydropower (PSH) is generally characterized as either:
  - Open-loop: continuously connected to a naturally flowing water feature; or
  - Closed-loop: not continuously connected to a naturally flowing water feature.



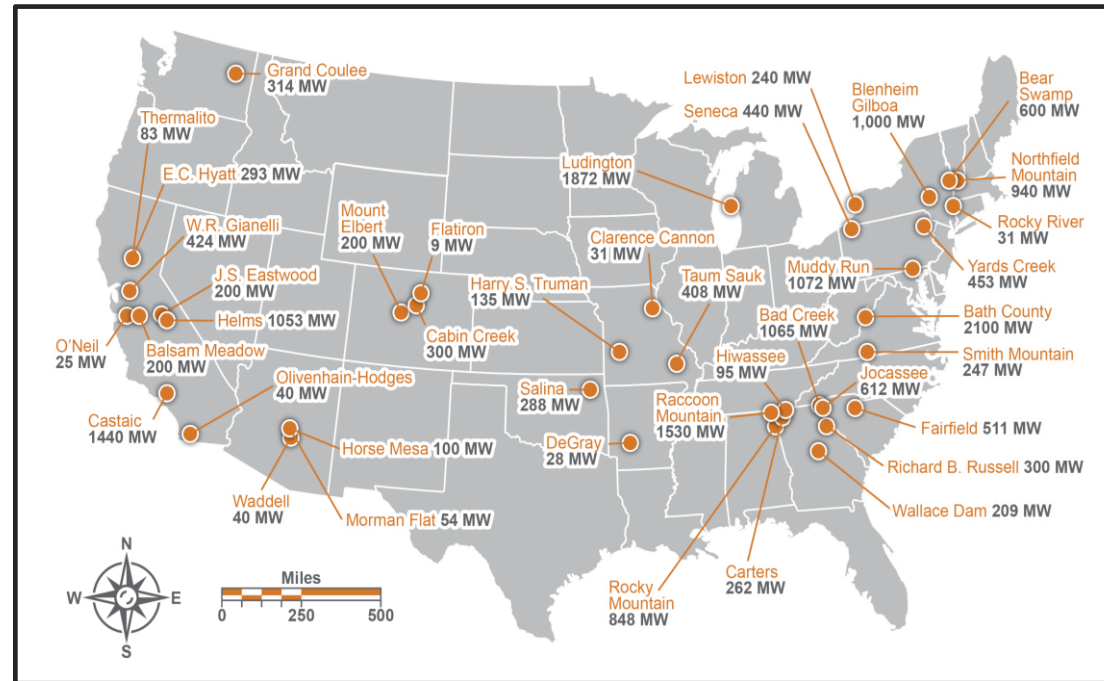
A word about this figure—where does the “closed-loop” water come from?

DOE 2019

- **Continuously** is key: some PSH projects are closed-loop even though they withdraw water from a natural water feature *initially* to fill reservoirs and *periodically* to replace evaporative/seepage losses.
- In contrast, open-loop projects typically dam a natural water feature to create a lower reservoir and have a *continuous* connection based on the pumping/generating cycle.

# PSH in the USA

All 43 PSH projects (21.6 GW capacity) in the U.S. are open-loop\* and almost all were constructed more than 30 (40?) years ago. So, the environmental effects of closed-loop projects are not well-documented in the U.S.

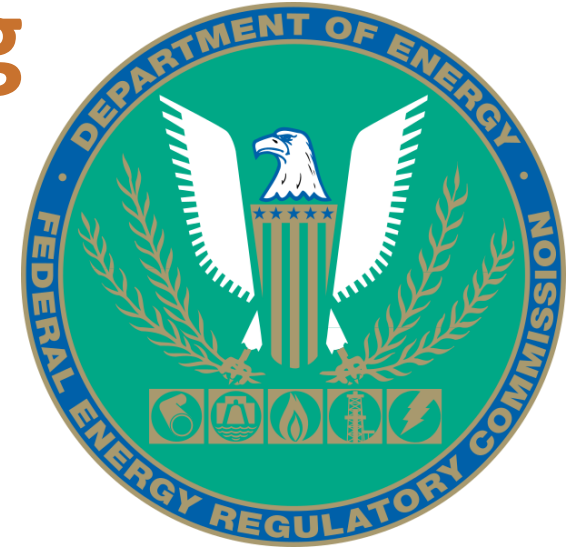


Existing PSH projects in the United States

(Source: Modified from [MWH 2009](#))

\*Some consider the Olivenhain-Hodges Project in California to be closed-loop because it has a FERC conduit exemption. However, its lower reservoir (Lake Hodges) was created by damming the San Dieguito River, so Lake Hodges inflows and outflows are from and to the San Dieguito River.

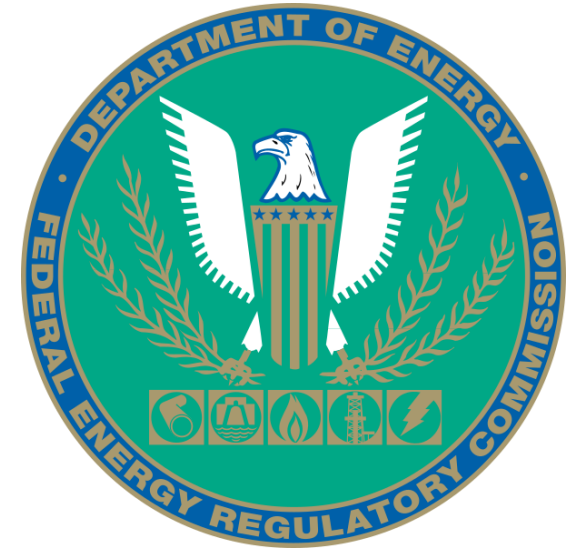
# Closed-Loop PSH is Growing



- FERC is seeing an increase in preliminary permit and license applications for closed-loop PSH. Since 2014, FERC has issued only four original licenses for new PSH:
  - one open-loop (Iowa Hill in California)
  - three closed-loop (Eagle Mountain in California, Gordon Butte in Montana, and Swan Lake North in Oregon).
- In 2019, FERC issued [final rule](#) establishing criteria for a 2-year expedited license process for *qualifying* closed-loop projects that:
  - cause little to no change to existing surface and groundwater flows and uses;
  - unlikely to adversely affect species listed as a threatened species or endangered species, or designated critical habitat of such species, under the Endangered Species Act of 1973;
  - utilize only reservoirs situated at locations other than natural waterways, lakes, wetlands, and other natural surface water features; and
  - rely only on temporary withdrawals from surface waters or groundwater for the sole purposes of initial fill and periodic recharge needed for project operation.

# Closed-Loop PSH is Growing

- Three recent FERC decisions on closed-loop PSH indicate that a project that uses only groundwater “will not require FERC licensing if the project does not trigger other jurisdictional tests” under FPA Section 23(b) ([Gerard and Hites 2018](#)) ([Swiger et al. 2017](#)).
- The three projects in these FERC decisions would be closed-loop PSH systems using groundwater and reclaimed surface mine pits on private land in Pennsylvania; they did not meet any of the FPA Section 23(b) jurisdictional requirements.
- However, all projects are still be subject to environmental review and permitting approval by other federal, state, and local resource agencies.



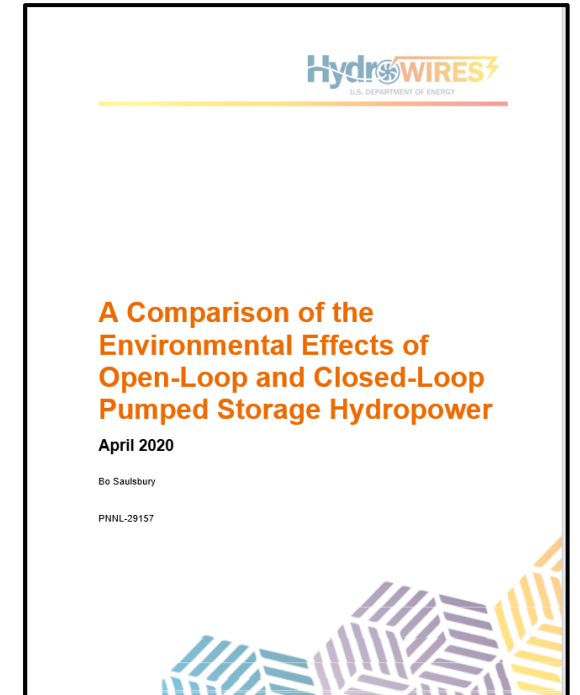
# 2020 DOE Report



- With the potential growth in closed-loop PSH, the expedited FERC licensing process, and no FERC licensing for some projects using groundwater, it is important that all stakeholders understand the environmental effects of closed-loop when compared to open-loop.
- The environmental effects of closed-loop projects are not well-documented; conventional wisdom says “closed-loop better than open-loop” on environmental factors.
- To address this knowledge gap, the DOE Water Power Technologies Office prepared a report to:
  - compare the potential environmental effects of open-loop with those of closed-loop; and
  - describe how these effects are being avoided, minimized, or mitigated at existing projects in other countries and proposed projects in the U.S.

Report available at: [DOE PSH Report 2020](#)

\*We’re currently doing a follow-on report focused solely on closed-loop impacts and mitigation. Details on an upcoming webinar will be provided to this group when available.

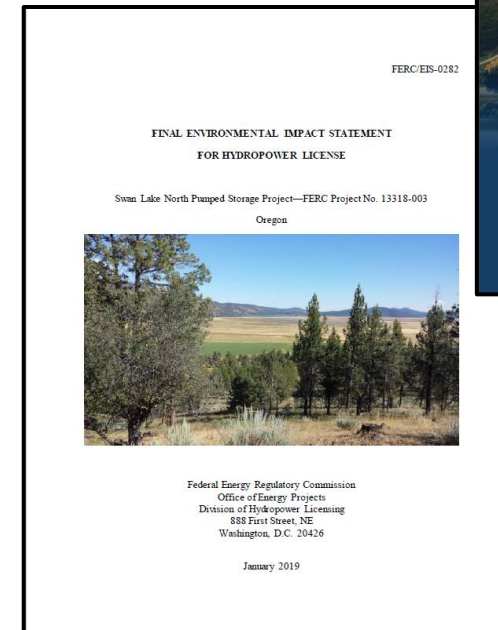
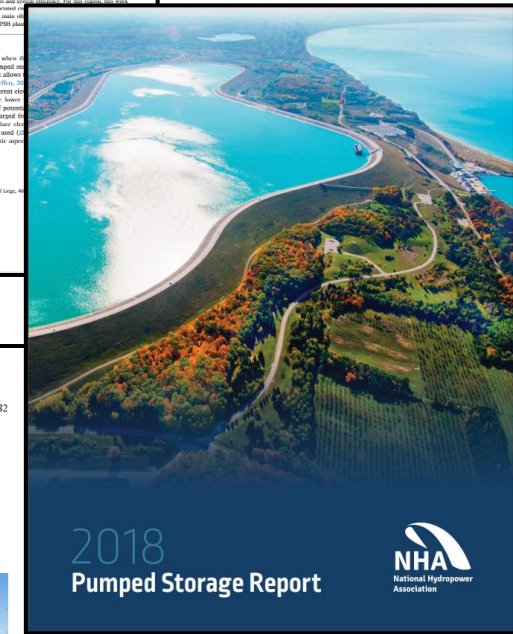


Report available at: <https://www.energy.gov/sites/prod/files/2020/04/f73/comparison-of-environmental-effects-open-loop-closed-loop-psh-1.pdf>

# Methodology

## Comparison of environmental effects based on two reviews:

- Literature review of journal articles, technical reports, and presentations from the U.S. and from countries where closed-loop PSH has been constructed.
- Review of FERC licensing record [e.g., National Environmental Policy Act (NEPA) documents and license orders] for:
  - (1) environmental effects anticipated and mitigation measures proposed for six closed-loop projects licensed or permitted.
  - (2) environmental effects and mitigation measures for four open-loop projects proposed or currently operating.



# Methodology

## Projects included in FERC records review.

Project Name State Capacity	Project Type	Current Status	Primary Data Sources
<b>Eagle Mountain</b> California 1,300 MW	Closed-Loop (groundwater)	Proposed; Licensed	FERC Final Environmental Impact Statement (FEIS) (2012); FERC License Order (2014)
<b>Mineville</b> New York 240 MW	Closed-Loop (groundwater)	Proposed; License Application Dismissed	MHC license application (2015); FERC Draft Environmental Impact Statement (DEIS) (2019)
<b>Swan Lake North</b> Oregon 393 MW	Closed-Loop (groundwater)	Proposed; Licensed	FERC FEIS (2019); FERC License Order (2019)
<b>Big Chino Valley</b> Arizona 2,000 MW	Closed-Loop (groundwater)	Proposed; Preliminary Permit	ITC - Big Chino Valley Pumped Storage pre-application document (2018); FERC letter approving use of traditional licensing process (2018)
<b>Gordon Butte</b> Montana 400 MW	Closed-Loop (surface water)	Proposed; Licensed	FERC Environmental Assessment (2016); FERC License Order (2016)
<b>Parker Knoll</b> Utah 1,000 MW	Closed-Loop (surface water)	Proposed; Preliminary Permit; Canceled	Parker Knoll Hydro license application (Symbiotics, LLC 2011)
<b>Iowa Hill</b> California 400 MW	Open-Loop	Proposed; Licensed; Canceled	FERC FEIS (2008); FERC License Order (2014)
<b>Bath County</b> Virginia 3,003 MW	Open-Loop	Existing	FPC License Order (1977)
<b>Big Creek 2A, 8, and Eastwood</b> California 373 MW	Open-Loop	Existing	FERC FEIS (2009)
<b>Smith Mountain</b> Virginia 636 MW	Open-Loop	Existing	FERC License Order (2009)

# Resources Affected

For each project type, focus on impacts of both construction and operations on the environmental resources most often discussed in the literature and FERC documents.

- Aquatic Resources:

- Surface water quality and quantity. Impacts primarily related to 1) initial withdrawal of surface water for reservoir fill and 2) movement of water between and within project water bodies.
- Groundwater quality and quantity. Projects using groundwater for initial reservoir fill and to replace evaporative and seepage losses (typically closed-loop) have the potential to impact to both groundwater quality and quantity.
- Aquatic ecology. Impacts on fish and other aquatic ecology primarily related to instream construction of dams (for open-loop projects), initial withdrawal of surface water for reservoir fill, and movement of water between and within project water bodies, especially naturally flowing lakes or rivers.

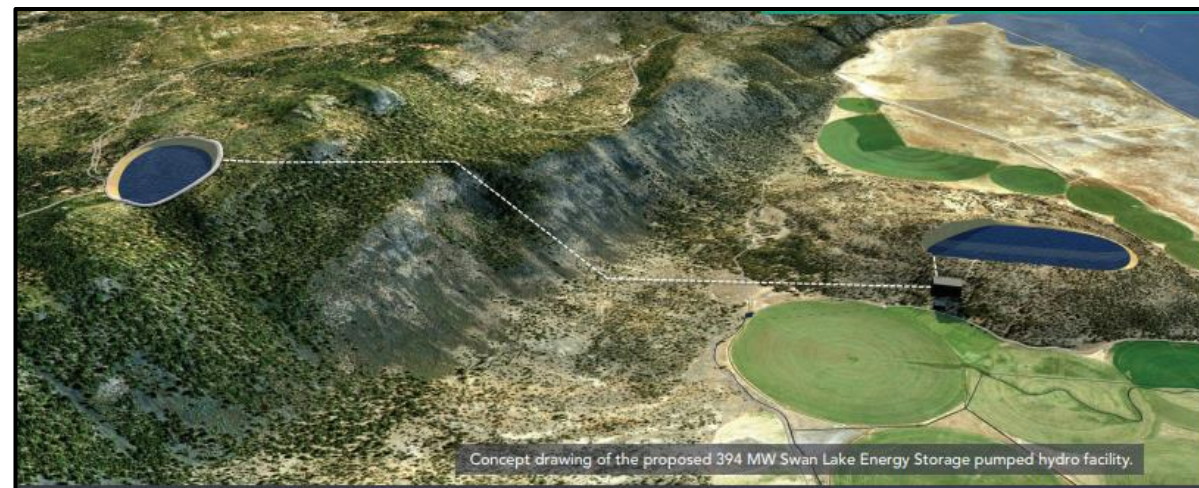


Proposed Eagle Mountain PSH Project, California



# Resources Affected

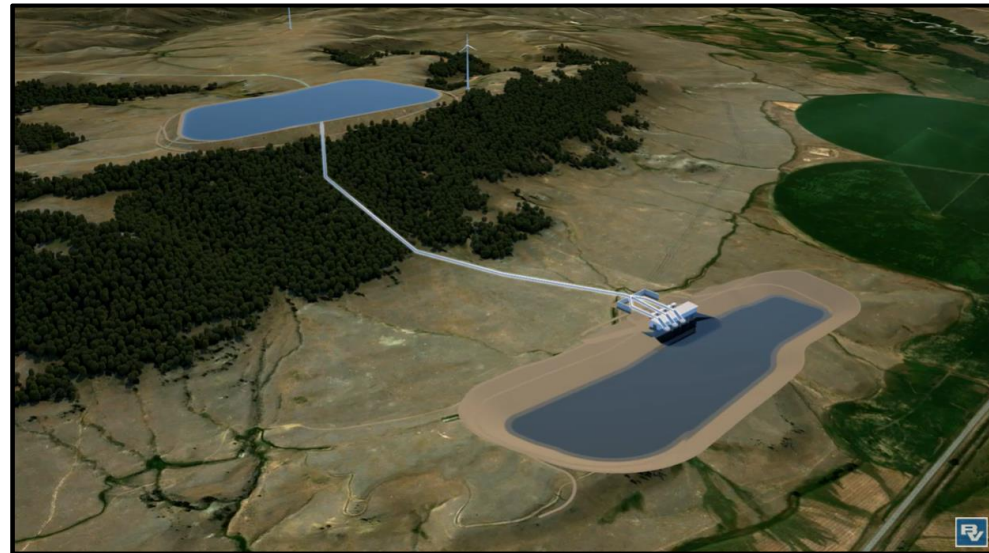
- Terrestrial Resources
  - **Geology and soils.** Construction impacts as project reservoirs and related facilities require large-scale excavation and tunneling. Operations impacts from reservoir shoreline erosion.
  - **Terrestrial ecology.** Construction impacts as project reservoirs and related facilities require clearing and/or inundating large land areas that provide wildlife habitat.
  - **Land use, recreation, visual resources, and cultural resources.** Construction requires clearing and/or inundation of large land areas, especially for project reservoirs. Committing large land areas to PSH development can impact existing and planned land uses, recreation, visual resources, or cultural resources at the project site and in the vicinity.
- Comparison often focuses on impacts to aquatic resources because they are typically the resources for which differences between open-loop and closed-loop PSH systems are most apparent.



Proposed Swan Lake North PSH Project, Oregon

# Some Caveats

- Report is a literature/records review. Not field work. Not rocket science.
- Comparison of effects:
  - based on both spatial (location) and temporal (duration) factors and reflects both the likelihood and severity of impacts.
  - relative--characterizes impacts of each project type as generally lower than, similar to, or higher than another project type.
  - reflects general trends among project types; there are sometimes exceptions to the examples cited.



Proposed Gordon Butte PSH Project, Montana

# Summary of Findings

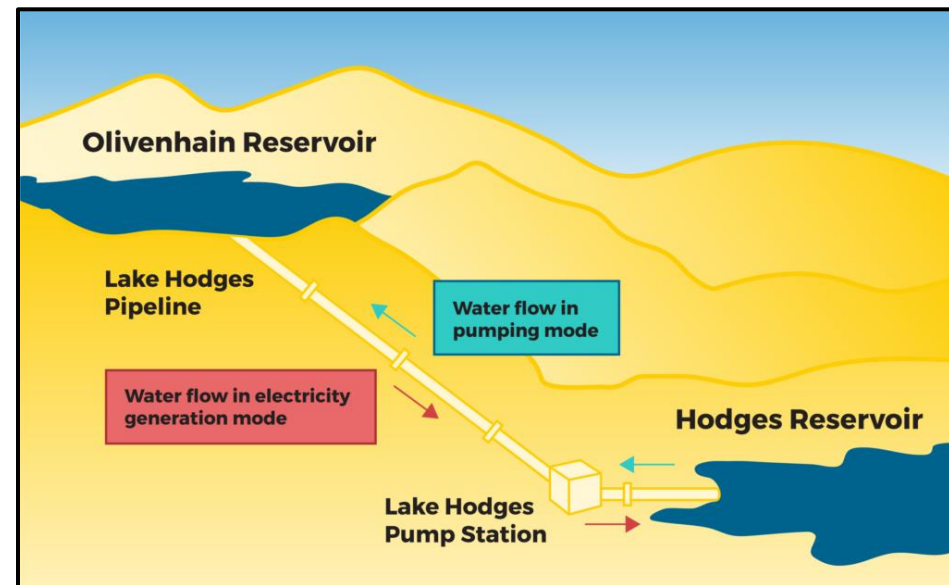
- Conclusions tend to support conventional wisdom about open-loop vs. closed-loop.
- Environmental effects of closed-loop generally *lower* (i.e., more localized and of shorter duration) than those of open-loop because they:
  - are located “off-stream,” minimizing aquatic and terrestrial impacts, and;
  - often have greater siting flexibility than open-loop projects.
- However, some impacts of closed-loop can be *higher* than those of open-loop, particularly for geology and soils and groundwater. This can be due, for example, to the impacts of constructing two above-ground reservoirs rather than one or the impact of groundwater withdrawal or circulation.



Bath County PSH Project, Virginia

# Summary of Findings

- One circumstance where impacts of constructing a new upper reservoir and power generation facilities for an open-loop project could be lower than those of constructing a new closed-loop project: open-loop projects where the lower reservoir was already constructed for other purposes and an upper reservoir is added later for PSH operations (i.e., an “add-on” project).
- Such “add-on” open-loop projects comprise 12 of the 43 existing PSH projects in the U.S. (including the newest, Olivenhain-Hodges in California, which began operations in 2012).
- However, the impacts of add-on project operations are still likely higher than those of closed-loop because the add-on project’s lower reservoir is still continuously connected to a natural water feature.



Olivenhain-Hodges Project, California



# Thank you!

## Bo Saulsbury

[james.saulsbury@pnnl.gov](mailto:james.saulsbury@pnnl.gov)

Report available at: [DOE PSH Report 2020](#)

# **Additional slides on relative impact comparisons**

# Construction: Aquatic Resources





















## Surface Water Quality

- Impacts typically higher for open-loop because construction and initial reservoir fill commonly requires damming a natural water feature to create the lower reservoir (rather than constructing an artificial lower reservoir). Such damming may inundate a large land area and have adverse effects on water quality.

## Surface Water Quantity

- Impacts could be similar for either project type, resulting in a consumptive water use that could reduce the supply for other uses such as irrigation, recreation, industrial, and municipal. This could be exacerbated by evaporative and seepage losses of surface water from above-ground reservoirs.
- Consumptive use impacts might be higher in closed-loop because they could hold the surface water in a closed system, but the water could be returned to the original source if needed.

Relative comparison: **Construction** impacts on aquatic resources open-loop vs. closed-loop

Aquatic Resource	Open-Loop PSH Impacts	Closed-Loop PSH Impacts	
	Surface Water (Construction and Initial Fill)	Groundwater (Construction and Initial Fill)	Surface Water (Construction and Initial Fill)
<b>Surface Water Quality</b>			
Surface water temperature	 Higher	 Lower	 Lower
Reduced dissolved oxygen in surface water	 Higher	 Lower	 Lower
Alterations in sediment transport processes and connectivity	 Higher	NA	 Lower
Transfer of underground leachate contaminants to surface water	 Lower	 Higher	 Lower
<b>Surface Water Quantity</b>			
Surface water supply for other uses (e.g., irrigation, recreation, municipal)	 Similar	 Lower	 Similar
<b>Groundwater Quality</b>			
Groundwater temperature and chemistry (e.g., water/ore-body interactions)	 Lower	 Higher	 Lower
Groundwater circulation and flow patterns	 Lower	 Higher	 Lower















# Construction: Aquatic Resources

## Groundwater Quality and Quantity

- For projects not connected to groundwater, potential impacts are generally limited to the effects of underground construction or tunneling or reservoir seepage.
- Closed-loop projects using groundwater for initial reservoir fill have the potential for relatively higher impacts to both groundwater quality and quantity.

## Aquatic Ecology

- Open-loop projects have relatively higher impacts because of initial effects on the ecology of the natural water features that are dammed and inundated for their lower reservoirs.
- Closed-loop projects using surface water for initial reservoir fill may have similar impingement and entrainment impacts during the initial withdrawal period, but these impacts are of shorter duration than at open-loop projects.

Relative comparison: <b>Construction</b> impacts on aquatic resources open-loop vs. closed-loop (continued)			
Aquatic Resource	Open-Loop PSH Impacts	Closed-Loop PSH Impacts	
	Surface Water (Construction and Initial Fill)	Groundwater (Construction and Initial Fill)	Surface Water (Construction and Initial Fill)
<u>Groundwater Quantity</u>			
Groundwater supply for other uses (e.g., irrigation, recreation, municipal)	 Lower	 Higher	 Lower
Groundwater recharge of surface waters	 Lower	 Higher	 Lower
<u>Aquatic Ecology</u>			
Loss of riverine habitat	 Higher	NA	 Lower
Loss of littoral habitat	 Higher	NA	 Lower
Impingement and entrainment of fish and other aquatic species	 Similar	NA	 Similar
Migration delays or losses in sediment transport or river connectivity due to hydraulic changes	 Higher	NA	 Lower



# Construction: Terrestrial Resources



























## Geology and Soils

- Impacts primarily due to large-scale excavation for above-ground reservoirs and project facilities and excavation/tunneling for underground project facilities and pipelines.
- Because closed-loop typically involves excavating two artificial reservoirs (upper and lower), initial impacts may be relatively higher than those of open-loop, which typically involves excavating only one artificial reservoir (upper).

## Terrestrial Ecology, Land Use, Recreation, Visual Resources, and Cultural Resources

- Open-loop projects generally have higher impacts because they have less flexibility in facility siting. That is, open-loop is typically sited on a natural water body, which serves as the project's lower reservoir. It is difficult to avoid disturbing the sensitive terrestrial resources around these natural water bodies.

Relative comparison: **Construction** impacts on terrestrial resources open-loop vs. closed-loop










Terrestrial Resource	Open-Loop PSH Impacts	Closed-Loop PSH Impacts	
	Surface Water (Construction and Initial Fill)	Groundwater (Construction and Initial Fill)	Surface Water (Construction and Initial Fill)
<u>Geology and Soils</u>			
Surface excavation and increased erosion and spoils	 Lower	 Higher	 Higher
Tunneling and increased spoils	 Similar	 Similar	 Similar
Surface land subsidence	 Lower	 Higher	 Lower
Induced seismicity	 Lower	 Higher	 Lower
<u>Terrestrial Ecology</u>			
Vegetative clearing	 Higher	 Lower	 Lower
Wildlife habitat disturbance	 Higher	 Lower	 Lower
<u>Land Use</u>			
Existing and planned uses, especially in sensitive areas	 Higher	 Lower	 Lower
<u>Recreation</u>			
Recreational fisheries and boating	 Higher	NA	 Lower
Recreational access	 Higher	 Lower	 Lower

# Construction: Terrestrial Resources

## Terrestrial Ecology, Land Use, Recreation, Visual Resources, and Cultural Resources

- **Above-ground closed-loop projects can be sited further from their water source, and water can be delivered to the project by pipeline. Given this siting flexibility, they can also be sited closer to residential, commercial, and industrial energy consumers, thereby shortening transmission line corridors and reducing related impacts to terrestrial resources.**
- **Underground closed-loop projects typically have the smallest impacts on these resources because they disturb smaller land surface areas.**

**Relative comparison: Construction impacts on terrestrial resources  
open-loop vs. closed-loop (continued)**

Terrestrial Resource	Open-Loop PSH Impacts	Closed-Loop PSH Impacts	
	Surface Water (Construction and Initial Fill)	Groundwater (Construction and Initial Fill)	Surface Water (Construction and Initial Fill)
<b>Visual Resources</b>			
Construction activities viewed from sensitive areas	 Higher	 Lower	 Lower
<b>Cultural Resources</b>			
Surface excavation and underground tunneling	 Higher	 Lower	 Lower
Access to cultural sites and practices	 Higher	 Lower	 Lower

# Operations: Aquatic Resources

## Surface Water Quality

- Open-loop typically has more widespread and longer-lasting impacts due to the regular (typically daily) pattern of withdrawal from/discharge to natural water bodies.
- Closed-loop with above-ground reservoirs typically has lower impacts because it does not have regular (only initial and periodic) withdrawals from/discharge to natural water bodies.

## Surface Water Quantity

- Both open-loop and closed-loop with above-ground reservoirs experience evaporation and seepage, the rates of which depend on local atmospheric and geologic conditions, the use of reservoir liners, and other factors.
- Consumptive use impacts might be higher in closed-loop because it holds surface water in a closed system, but the water could be returned to the original source if needed.

Relative comparison: **Operations** impacts on aquatic resources open-loop vs. closed-loop

Aquatic Resource	Open-Loop PSH Impacts	Closed-Loop PSH Impacts	
	Surface Water (Operation; Daily Withdrawal/Discharge)	Groundwater (Operation; Periodic Withdrawal from Source)	Surface Water (Operation; Periodic Withdrawal from Source)
<b>Surface Water Quality</b>			
Sedimentation due to reservoir shoreline erosion	H Higher	L Lower	L Lower
Changes in sediment transport	H Higher	L Lower	L Lower
Surface water temperature	H Higher	L Lower	L Lower
Reservoir water circulation patterns	H Higher	L Lower	L Lower
Concentration of dissolved solids, nutrients, and heavy metals in surface water due to evaporation	H Higher	L Lower	L Lower
Decreased reservoir light penetration	H Higher	L Lower	L Lower
<b>Surface Water Quantity</b>			
Reservoir evaporative losses	S Similar	S Similar	S Similar
<b>Groundwater Quality</b>			
Groundwater temperature and chemistry (e.g., water/ore-body interactions)	L Lower	H Higher	L Lower
Groundwater circulation and flow patterns	L Lower	H Higher	L Lower

# Operations: Aquatic Resources











## Groundwater Quality and Quantity

- For open-loop and closed-loop not connected to groundwater, potential impacts are generally limited to the effects of reservoir seepage.
- Closed-loop using groundwater for periodic replenishment of evaporative and seepage losses has the potential for relatively higher impacts to both groundwater quality and quantity.

## Aquatic Ecology

- Open-loop has more widespread and longer-lasting impacts because of ongoing (rather than initial and periodic) effects on the ecology of the natural water feature.
- Similar types of impacts could occur at closed-loop using surface water, but they could be less widespread and of shorter duration because of no continuous withdrawal from/discharge to a surface water source.
- Also, artificial reservoirs constructed for closed-loop support fewer aquatic ecological resources (at least initially) than the natural water bodies affected by open-loop.

**Relative comparison: Operations impacts on aquatic resources**  
open-loop vs. closed-loop (continued)

Aquatic Resource	Open-Loop PSH Impacts	Closed-Loop PSH Impacts	
	Surface Water (Operation; Daily Withdrawal/Discharge)	Groundwater (Operation; Periodic Withdrawal from Source)	Surface Water (Operation; Periodic Withdrawal from Source)
<u>Groundwater Quantity</u>			
Groundwater supply for other uses (e.g., irrigation, recreation, municipal)	 Lower	 Higher	 Lower
Groundwater recharge of surface waters	 Lower	 Higher	 Lower
<u>Aquatic Ecology</u>			
Impingement and entrainment of fish and other aquatic species	 Higher	NA	 Lower
Migration delays or losses in river connectivity due to hydraulic changes	 Higher	NA	 Lower

# Operations: Terrestrial Resources




























## Geology and Soils

- Both open-loop and closed-loop pumping and generating operations may have impacts primarily due to large and frequent reservoir water-level fluctuations and resulting shoreline erosion.
- Impacts may be relatively higher at open-loop because of the potential effects of shoreline erosion and sedimentation on natural water bodies.

## Terrestrial Ecology, Land Use, Recreation, Visual Resources, and Cultural Resources

- Open-loop tends to have more widespread and longer-lasting impacts because it lacks siting flexibility and has ongoing impacts on the water quality and quantity and aquatic ecology of the natural water source.

Relative comparison: Operations impacts on terrestrial resources open-loop vs. closed-loop







Terrestrial Resource	Open-Loop PSH Impacts	Closed-Loop PSH Impacts	
	Surface Water (Operation; Daily Withdrawal and Discharge)	Groundwater (Operation; Periodic Withdrawal from Source)	Surface Water (Operation; Periodic Withdrawal from Source)
<b>Geology and Soils</b>			
Reservoir shoreline erosion	 Higher	 Lower	 Lower
Surface Land Subsidence	 Lower	 Higher	 Lower
Induced seismicity	 Lower	 Higher	 Lower
<b>Terrestrial Ecology</b>			
Water quality impacts on wildlife	 Higher	 Lower	 Lower
<b>Land Use</b>			
Existing and planned uses, especially in sensitive areas	 Higher	 Lower	 Lower
<b>Recreation</b>			
Recreational fisheries	 Higher	 Lower	 Lower
Recreational access	 Higher	 Lower	 Lower
<b>Visual Resources</b>			
Project facilities viewed from sensitive areas	 Higher	 Lower	 Lower
Views of reservoir shoreline erosion	 Higher	 Lower	 Lower

# Operations: Terrestrial Resources

## Terrestrial Ecology, Land Use, Recreation, Visual Resources, and Cultural Resources

- One possible exception is due to an operational benefit of closed-loop: essentially an unlimited ramping rate for pumping/generating because of no fish impingement concerns.
- However, while this would not affect fish because it's a closed-loop system, it could affect avian or terrestrial species due to rapid reservoir fluctuations that might not occur with an open-loop system.
- Closed-loop with underground reservoirs (especially those located in abandoned underground mining sites) typically have the smallest operational impacts on terrestrial resources.

**Relative comparison: Operations impacts on terrestrial resources  
open-loop vs. closed-loop (continued)**

Terrestrial Resource	Open-Loop PSH Impacts	Closed-Loop PSH Impacts	
	Surface Water (Operation; Daily Withdrawal and Discharge)	Groundwater (Operation; Periodic Withdrawal from Source)	Surface Water (Operation; Periodic Withdrawal from Source)
<b>Cultural Resources</b>			
Shoreline erosion exposing resources	 Higher	 Lower	 Lower
Access to cultural sites and practices	 Higher	 Lower	 Lower

# **RAPID** *Regulatory and Permitting Information Desktop Toolkit*



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RAPID Toolkit Overview

## Regulatory Processes for Renewable Energy and Bulk Transmission Projects

The Regulatory and Permitting Information Desktop (RAPID) Toolkit offers a solution to navigating the complex system of federal and state regulations necessary to secure project approval. The RAPID Toolkit provides easy access to federal and state permitting information, best practices, and reference material for renewable energy and bulk transmission project development.



**Bulk Transmission**  
Regulations & Permitting



**Geothermal**  
Regulations & Permitting



**Hydropower**  
Regulations & Permitting



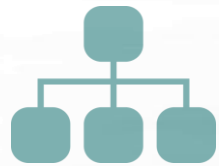
**Solar**  
Regulations & Permitting



# OVERVIEW

The Hydropower RAPID Toolkit provides easy access to permitting information from one online location.

## FEATURES



### Regulations and Permitting

Regulatory and permitting information by jurisdiction, including comparisons between jurisdictions



### Reference Library

A collection of links to regulatory and permitting documents, regulations, and tools available on other websites



### Best Practices

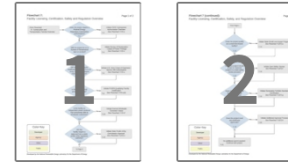
A collection of best practices for efficiently permitting renewable energy and bulk transmission projects

## Features:

- Ability to sort regulatory and permitting processes by hydropower sub-type (e.g., NPD, PSH, conduit)
- Project dashboard to save and track required permits and approvals

### Determine Which State and Federal Permits Apply

Use this overview flowchart and following steps to learn which federal and state permits apply to your projects.



Narrow your results (by hydropower project type)

all  conduit  conventional  non-powered dam  pumped storage

7.1 to 7.2 – Does the Project Require a Federal Energy Regulatory Commission Authorization?

+ 7.3 to 7.4 – Will the Project Be Located on a Bureau of Reclamation (BOR) Dam Reserved for Non-Federal Hydropower Development or a BOR Conduit?

+ 7.5 to 7.6 – Will the Project Require Modification to or use of a U.S. Army Corps of Engineers Managed Structure?

+ 7.7 to 7.8 – Is the Facility a Small Power Production Facility?

+ 7.9 to 7.10 – Is the Facility an Independent Power Producer That Exclusively Sells to Wholesale

#### - 7.9 to 7.10 – Does the Developer Seek a Preliminary Permit?

A developer may apply for a Preliminary Permit with FERC to establish priority for their application for a license while the developer obtains data and performs the acts required to determine the feasibility of the project and to support an application for a license. [18 C.F.R. § 4.80](#). [FPA Part 1\(f\)](#). Each preliminary permit will maintain priority of application for a maximum of four years. [16 U.S.C. § 798](#). For more information, see:

FERC Preliminary Permit:  
7-FD-h

  
Add to Project

### My Projects

Create a project and manage tasks in the RAPID Toolkit. [Learn more about how to use the project](#)

Colorado River  
Project

5 items

  
Create Project

# Hydropower Reference Library

The RAPID Toolkit reference library is a collection of links to regulatory and permitting documents - including permits, guidance, manuals, applications, tools, regulations, statutes, and rules - that are available on other websites.

Explore the reference library using the search options below or [upload a reference](#).

**View by Jurisdiction**

2 jurisdiction types selected [show all](#)

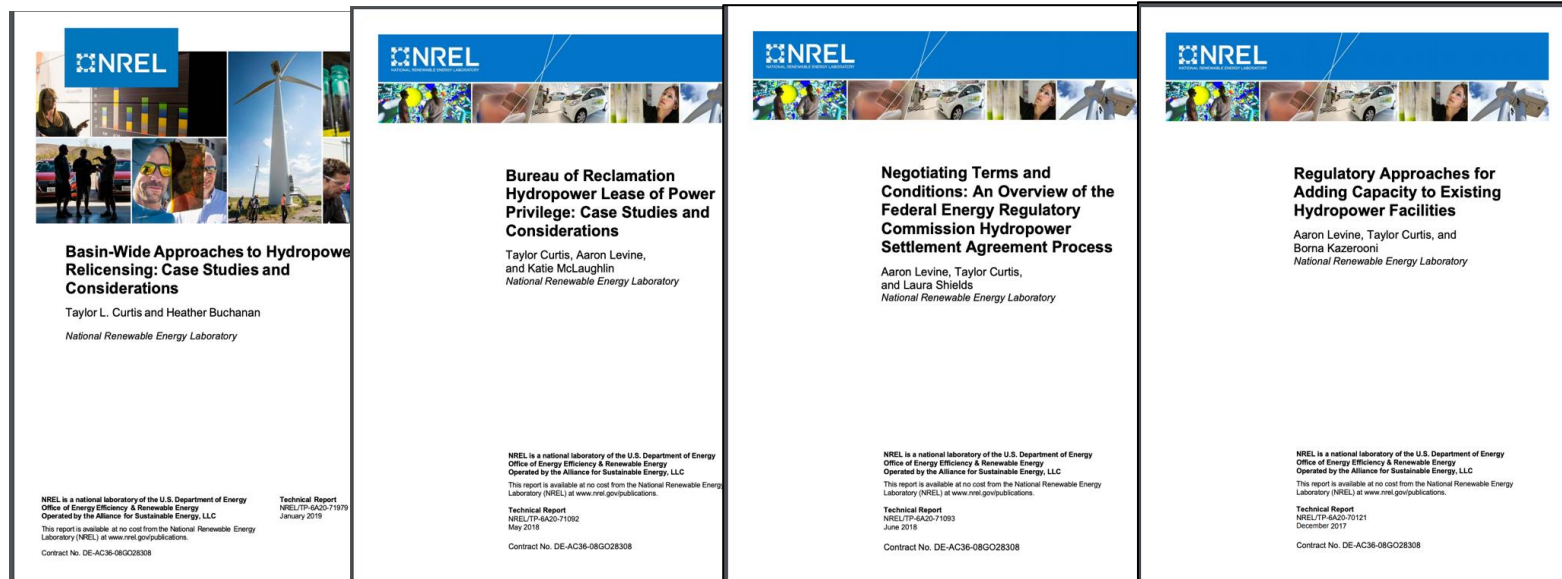
- Federal
- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Hawai'i
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana

Title	Technology	Jurisdiction	Topic
<a href="#">16 U.S.C. §§ 791 - 828c, Federal Regulation and Development of Power</a>	<ul style="list-style-type: none"> <li>▪ Hydropower</li> </ul>		
<a href="#">16 USC 1246 – Administration and Development of National Trails System</a>	<ul style="list-style-type: none"> <li>▪ Hydropower</li> </ul>		
<a href="#">16 USC 797</a>	<ul style="list-style-type: none"> <li>▪ Hydropower</li> </ul>		
<a href="#">16 USC 797a - Congressional Authorization for Projects Within National Parks or Monuments</a>	<ul style="list-style-type: none"> <li>▪ Hydropower</li> </ul>		
<a href="#">16 USC 797c – Dams in National Park System Units</a>	<ul style="list-style-type: none"> <li>▪ Hydropower</li> </ul>		
<a href="#">16 USC 799 License duration, conditions, revocation, alteration, or surrender</a>	<ul style="list-style-type: none"> <li>▪ Hydropower</li> </ul>		
<a href="#">1981 Memorandum of Understanding between the Federal Energy Regulatory Commission and the Water and Power Resources Service</a>	<ul style="list-style-type: none"> <li>▪ Hydropower</li> </ul>		
<a href="#">1992 Memorandum of Understanding between FERC and BOR</a>	<ul style="list-style-type: none"> <li>▪ Hydropower</li> </ul>		<ul style="list-style-type: none"> <li>▪ Land Access</li> </ul>



## Development of Best Practices, Lessons Learned, Regulatory Analysis Publications

- Collect input from hydropower stakeholders to identify best practices, lessons learned, and/or other substantive legal, regulatory, and policy issues.
- Review and prioritize list with DOE-WPTO
- Research and analyze issues (including extensive interviews, dialogue, and review with hydropower industry stakeholders).
- Publish as NREL Technical Reports
- Post to the RAPID Toolkit Best Practice Library with a high-level summary and link to full report.



# Thank You

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comments,  
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RAPID Toolkit developments.

[rapidtoolkit.org](https://rapidtoolkit.org)