



Micro Hydro – Laws, Regulations, and Permits



How I will try to keep you awake for the next hour, right after lunch.

- Caffeine and sugar
- Random outbursts
- Whining, begging, and pleading
- Bribery



How I will try to keep you awake for the next hour, right after lunch.

- The economic case for small hydro
- Context: Identifying & measuring a resource
- Infrastructure: Common resources
- Big picture: Project development steps
- Laws & Regulations

How can Energy
Trust help?



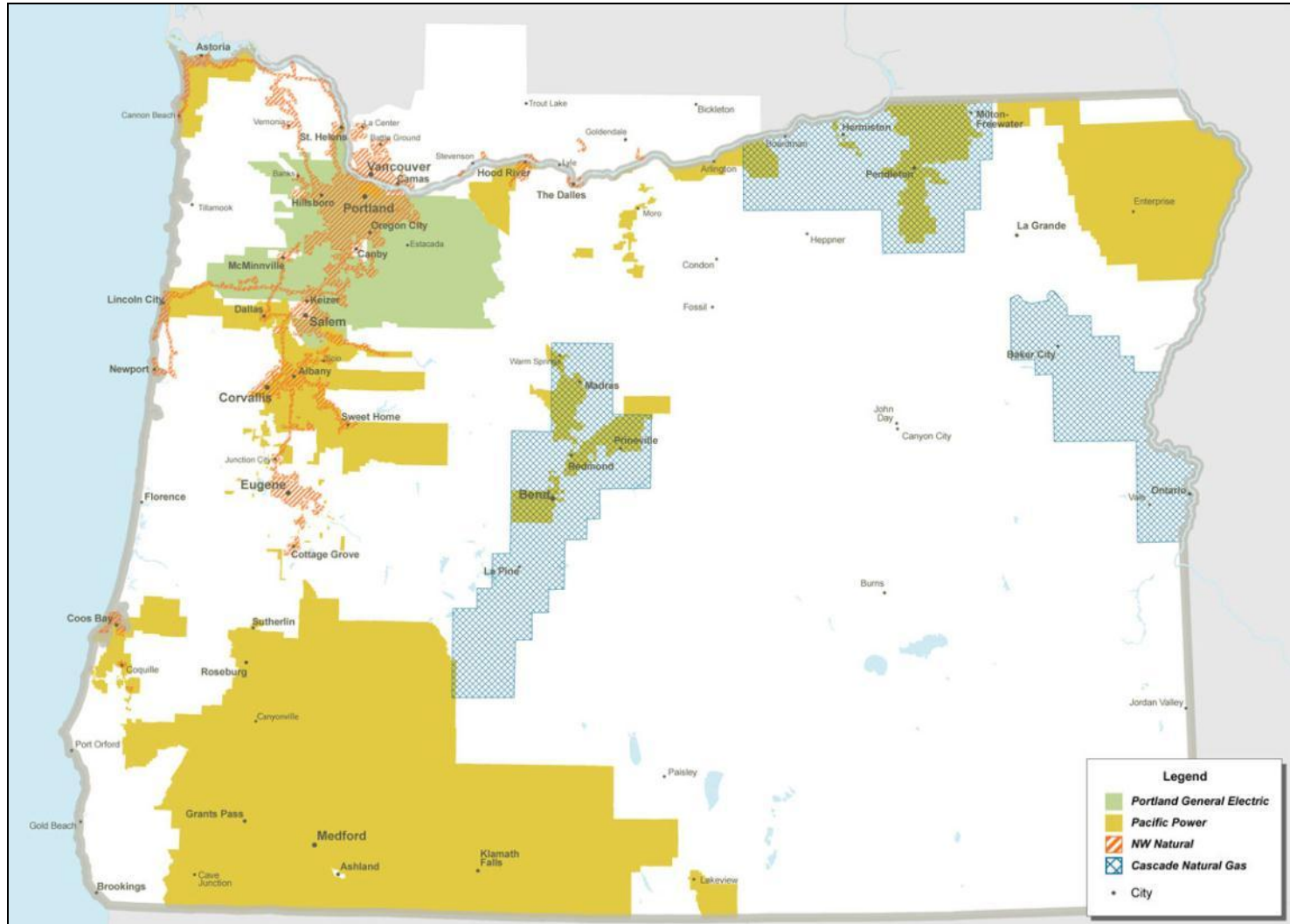
What we do at Energy Trust

Provide cash incentives, information and services to help utility customers manage energy costs, increase comfort at home, improve productivity in the workplace and protect the environment.



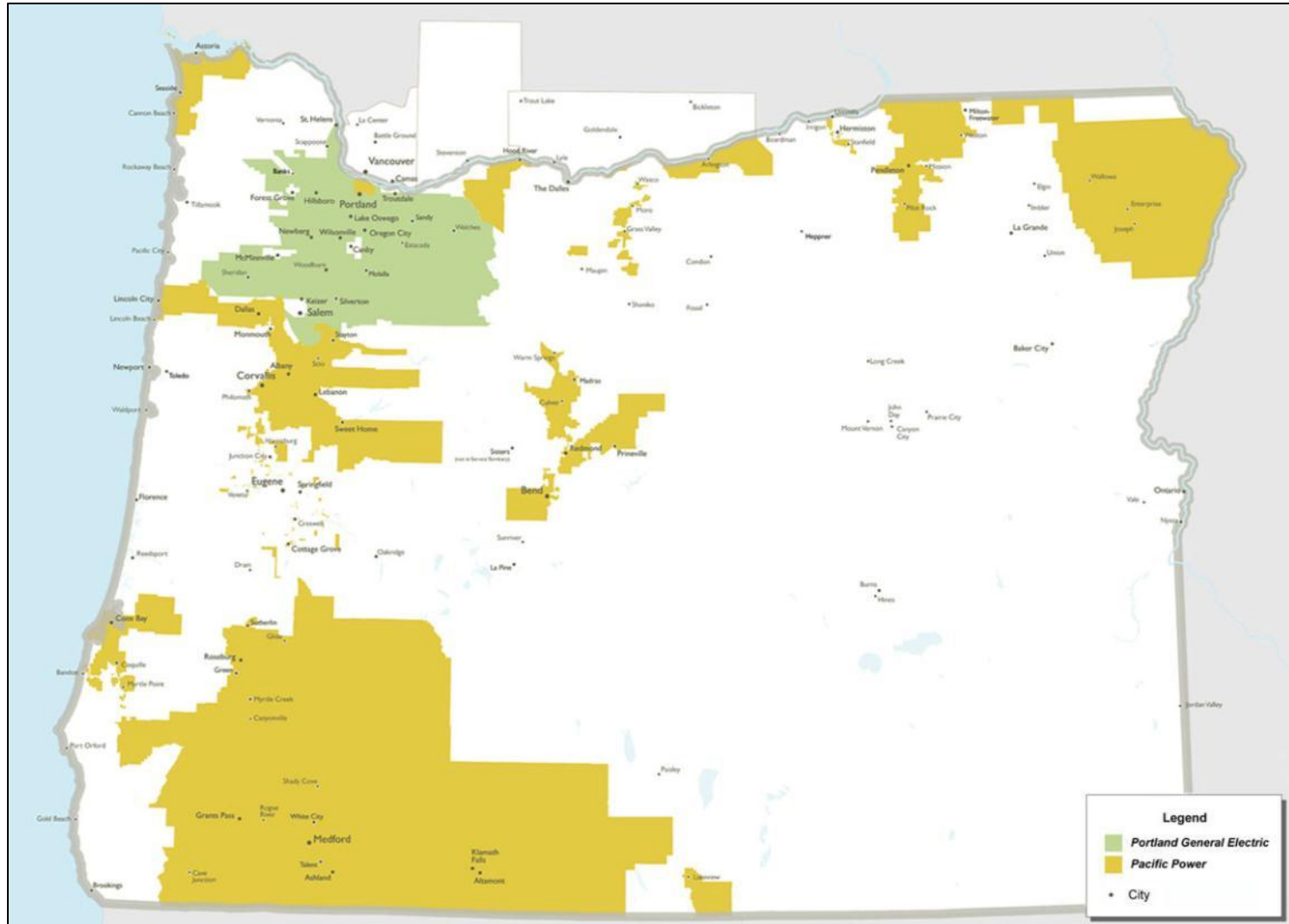


Energy Trust service territories





Energy Trust service territory-electric only





What we offer

- **Project development assistance**
 - Grant writing, feasibility, design, interconnection, permitting, etc.
 - 50% cost share up to \$40,000
 - Paid as reimbursement
 - Email or call me for the forms (or go online)



What we offer

- **Project Incentives**
 - Based on “Above Market Costs”
 - Energy Trust takes % of project’s Renewable Energy Certificates for the ratepayers which fund our programs.

The economic case for small hydro



Why should you consider hydro?

- Proven technology
- Long operational life
- Capacity factor
- Capacity factor
- Capacity factor

Identifying a
resource



Hydro is a combination of two things

- A quantity of water (flow)
- Gravity acting on the water (head)

Theoretical:

Watts = flow (liters) x head (meters) X 9.81 (acceleration of gravity)

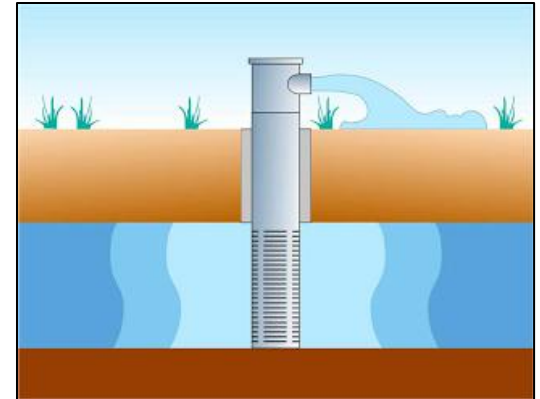
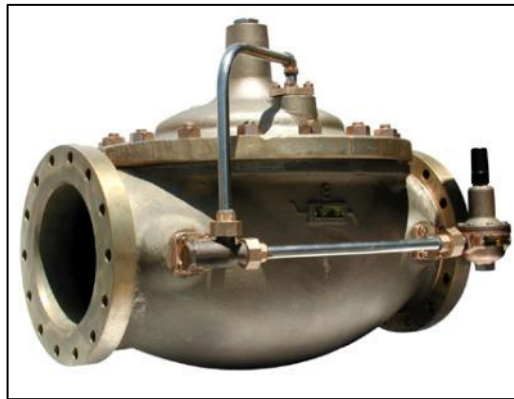
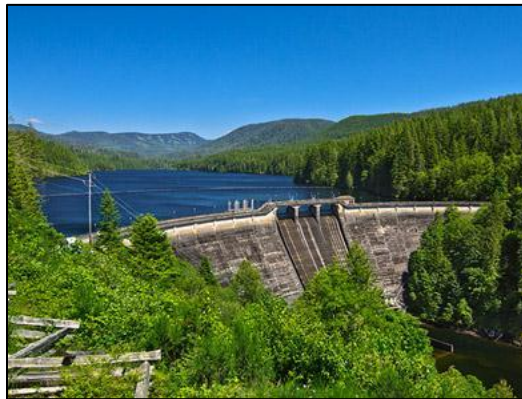
Kilowatts = ((flow (cfs) x head (ft)) / 11.81) * efficiency



Common infrastructure types

Hydroelectric projects

- Storage facilities
- Pressure reduction valves
- Aquifer storage and recovery





Project development steps

- Feasibility work
- Decide project ownership structure
- Secure site control
- Design & engineering / Equipment selection & procurement
- Permitting
- Power purchase / off take agreement
- Utility Interconnection
- Financing
- Construction and inspection
- Commissioning
- Ongoing Operations & Maintenance



Feasibility study

- Resource evaluation
- Generation estimate
- Preliminary design for costing
- Estimate of cash flows
- Fatal flaw or risk assessment



Site control

- Underlying land: ownership or lease
 - Potentially multiple agreements
 - private parties and/or state/federal entities
- Water rights: ownership or lease
- Bureau of Reclamation (if applicable)
 - Lease of Power Privilege



Design & engineering

- Civil, hydraulic, and electrical work.
- Can be multiple stages as project designs are refined, equipment is selected and cost estimates are tightened.
- Equipment and interconnection decisions may require design changes.



Equipment selection / procurement

- Turbine / Generator / Controls selection
 - Deposit usually required for manufacturing... sometimes before manufactures will supply specs needed for other design decisions.
 - Turbines may require a long lead time.
 - Some manufacturers package generator and controls, others don't.



Power purchase / offtake

- Net metering agreement
- Qualifying Facility (PURPA) PPA
- Negotiated PPA



Interconnection

- Process may vary based on size of system, technology, and power sales arrangement:
 - Net metering: Usually faster and cheaper but may require specific equipment
 - Wholesale power plants: Typically require studies and can be more costly.
- Professional help is recommended!



Financing

- Cash
- Grants
 - Reclamation (WaterSMART)
 - OWEB
 - USDA
 - Energy Trust
- Tax credits
- Loans
 - OR state energy loan, private lenders



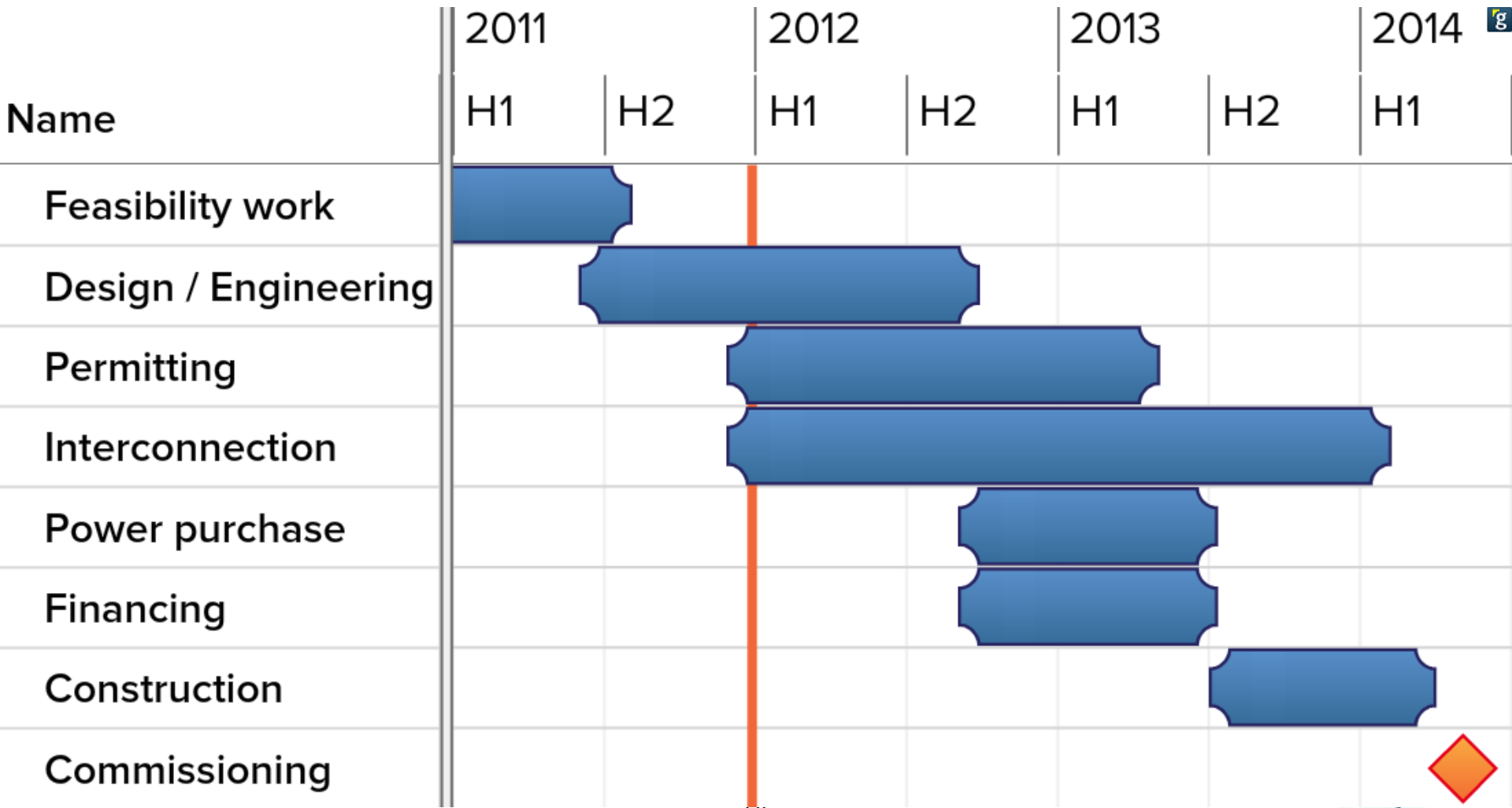
Operations and maintenance

- Somebody has to run the thing...
- There will be maintenance costs...

- Plan ahead for success!



Idealized development timeline



Now would be a
good time to get that
cup of coffee.



Federal permitting

- Federal Energy Regulatory Commission (FERC) or Bureau of Reclamation
- Differing processes, both NEPA based
- Substantial time (6 months, minimum, for projects with 'no issues')



FERC Licenses & “Exemptions”

- Exemptions:
 - Conduit (existing water conveyances)
 - Smaller than 40MW for municipalities (15MW for others)
 - Powerhouse cannot be on federal land
 - 5 MW (existing dams or natural water features)
 - Non-federally owned dam
 - Lands can be federally owned or owned by applicant
- License
 - All other situations



Conduit Exemption Process

- Two stages of “Consultation”
- Application submittal to FERC
- Additional comments or T&C’s from agencies (3rd stage of consultation)
- FERC environmental analysis
- Exemption granted or denied



5MW Exemption Process

- First part same as Conduit Exemption
- But after the application is filed...
 - Agencies can request additional studies
 - FERC can request more information
 - Agencies also provide comments and mandatory Terms & Conditions
 - FERC prepares an Environmental Assessment
- Exemption granted or denied



License Process

- Multiple processes to choose from:
 - Simple projects can sometimes use the “Traditional Licensing Process” – similar to a conduit exemption
 - Projects with environmental issues use the “Integrated Licensing Process”
- Seek professional help



Conduit / 5MW Exemption Tips

- Understand the process and plan ahead
 - Permitting Guidebooks
 - FERC: <http://www.ferc.gov/industries/hydropower.asp>
- Use templates
- Make it easy to get comments



Electric

Hydropower

Annual Charges

Dam Safety and Inspections

Environment

Industry Activities

General Information

Licensing

Administration and Compliance

Comprehensive Plans

Handbooks

Guidelines

Workshops

Regulation

Natural Gas

Oil

Industries >> Hydropower >> General Information >> **Licensing**



Small/Low-Impact Hydropower Projects

TEXT SIZE S M L

Tips to Develop a Complete Application

Including the information identified below will provide a more complete application that will help staff expedite the licensing or exemption process by reducing or eliminating deficiencies or additional information requests.

Complete Consultation and Provide Study Results

- Complete first and second stage consultation, including audio recordings or transcripts, and letters received from the joint public meeting ([4.38\(b\)](#) )
- Complete all necessary studies and file the study report(s), including the results from all studies, with the application ([4.38\(c\)](#) )

Provide Documentation Indicating that the Project Qualifies for a 5-MW Exemption

- To qualify for a 5-MW exemption for a project with an existing dam, clearly show that a significant amount of the water power potential would be created by the dam.
- Clearly indicate the distance between the proposed powerhouse and the downstream face of the dam.
- Clearly indicate that there will be an increase in generation at the existing dam.
- If utilizing a natural water feature, clearly show the project uses a natural lake, waterfall, or the gradient of a natural stream, without the need for a dam or man-impoundment and that it does not retain water behind any structure for the purpose of a storage and release operation.
- Confer with Commission staff if you are unsure whether or not your proposed project qualifies for a 5-MW exemption.



SMALL HYDROELECTRIC PERMITTING HANDBOOK

FEDERAL PERMITTING PROCESSES



INTERCONNECTION GUIDEBOOK

FOR DEVELOPERS OF SMALL SCALE
RENEWABLE ENERGY GENERATION SYSTEMS

Go to: <http://energytrust.org/hydro>

EnergyTrust
of Oregon

Home About News Events Libr

RESIDENTIAL BUSINESS INDUSTRY + AG PUBLIC + NONPROFIT

Find other solutions ▶

Home : Business : Other Businesses : Hydroelectric Power

Hydroelectric Power

If your property features flowing water across a drop in elevation, you may have the capacity to generate hydropower—clean renewable electricity produced when moving water turns a turbine that spins a generator. While it's rare for commercial sites to have adequate resources—and the state and federal permitting processes are complex and lengthy—hydroelectric projects have been successfully installed in a variety of locations in Oregon.

We're here to assist with your hydroelectric project and answer any questions you may have. Call us at 503.445.7611 or contact [Jed Jorgensen](#).

[Details](#) [Eligibility](#) [Steps](#) [Forms](#) **Resources**

Learn more about the basics of hydropower

Not sure if you have enough head (pressure) and flow (moving water) to generate hydroelectricity? Unsure what those terms mean? Take a few minutes to learn the basics of hydropower.

Evaluate Your Business

Energy Calculators

Find a Contractor

Find Forms

Renewable Energy

Building Energy Simulation Forum

Find Development & Design Professionals

Other Businesses

- Biopower
- Display Cases
- Geothermal Electricity
- Heating + Cooling
- [Hydroelectric Power](#)
- Insulation

Click on
“Resources”
Tab

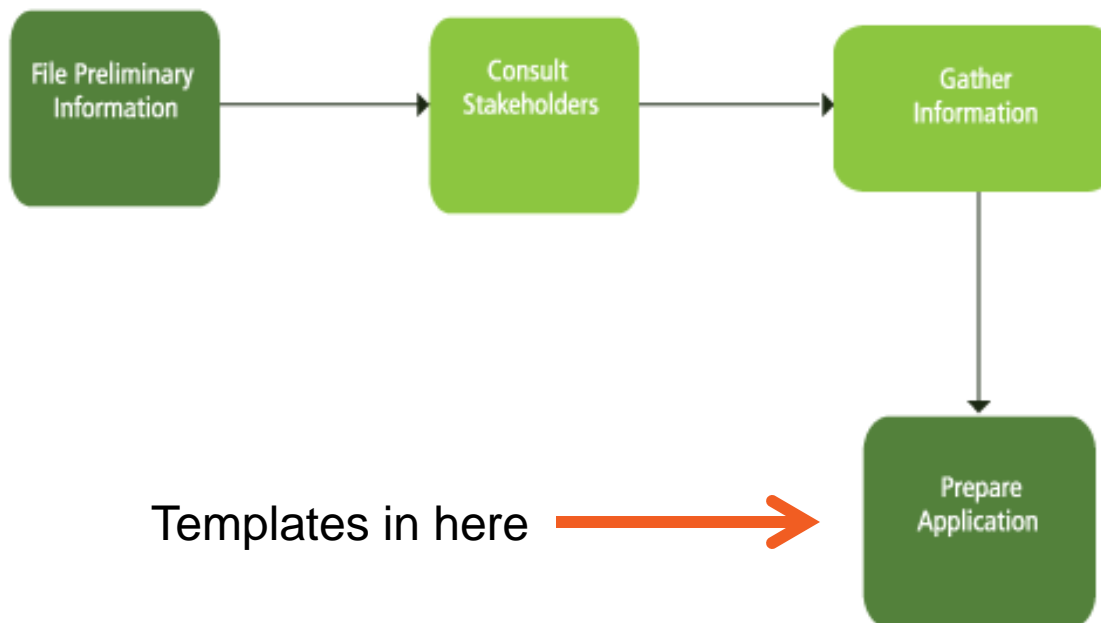


Small/Low-Impact Hydropower Projects

TEXT SIZE S M L

Process Overview

In preparing conduit and 5-MW exemption applications, applicants should follow section [4.38\(b\)](#) of the Commission's regulations. If applying for a license, there are three processes available: Integrated Licensing Process (ILP), Traditional Licensing Process (TLP), and the Alternative Licensing Process (ALP). Many small hydropower developers prefer to use the Commission's TLP because the TLP has fewer defined pre-filing steps and deadlines than the ILP, has a more informal study development process than the ILP, and does not require the formation of a collaborate workgroup like the ALP. For further information click each box:





Example comment template

Subject: Initial Consultation Package, Small Conduit Hydroelectric Facility
Proposed Project
Located at _____

Dear _____:

Our organization/agency has reviewed the FERC Conduit Application for Exemption from Licensing for Small Conduit Hydroelectric Facility for the above referenced project and has the following comments (*Please check one of the boxes below*):

- We have the following concerns or issues (*describe below, include any applicable fees*):

- We have no concerns or issues at this time and waive the requirement for a (second and third) stage of consultation. There are no fees required for this review.

Sincerely,

Consultee
Organization

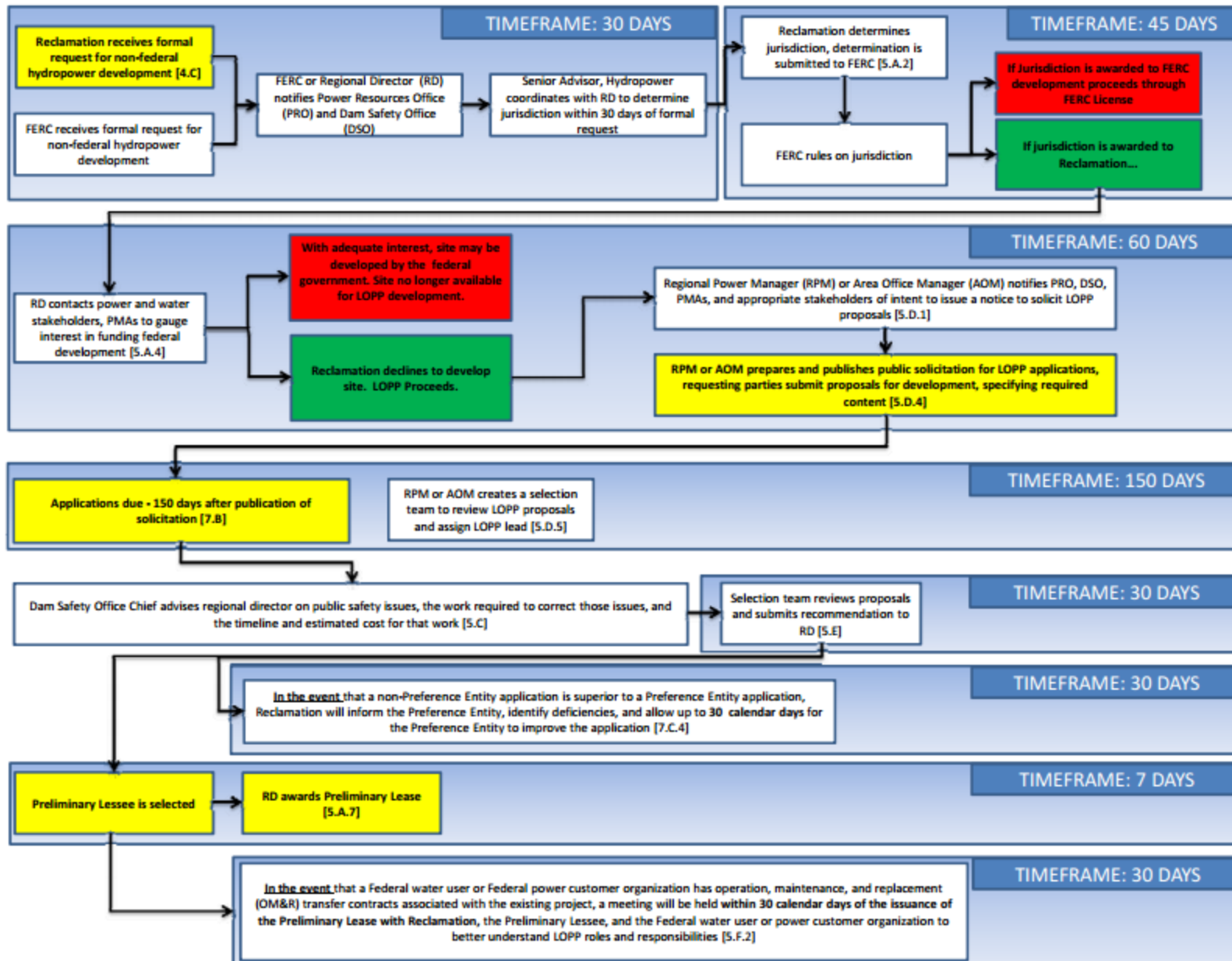


Bureau of Reclamation

- Lease of Power Privilege
- Different from FERC process but accomplishes the same thing

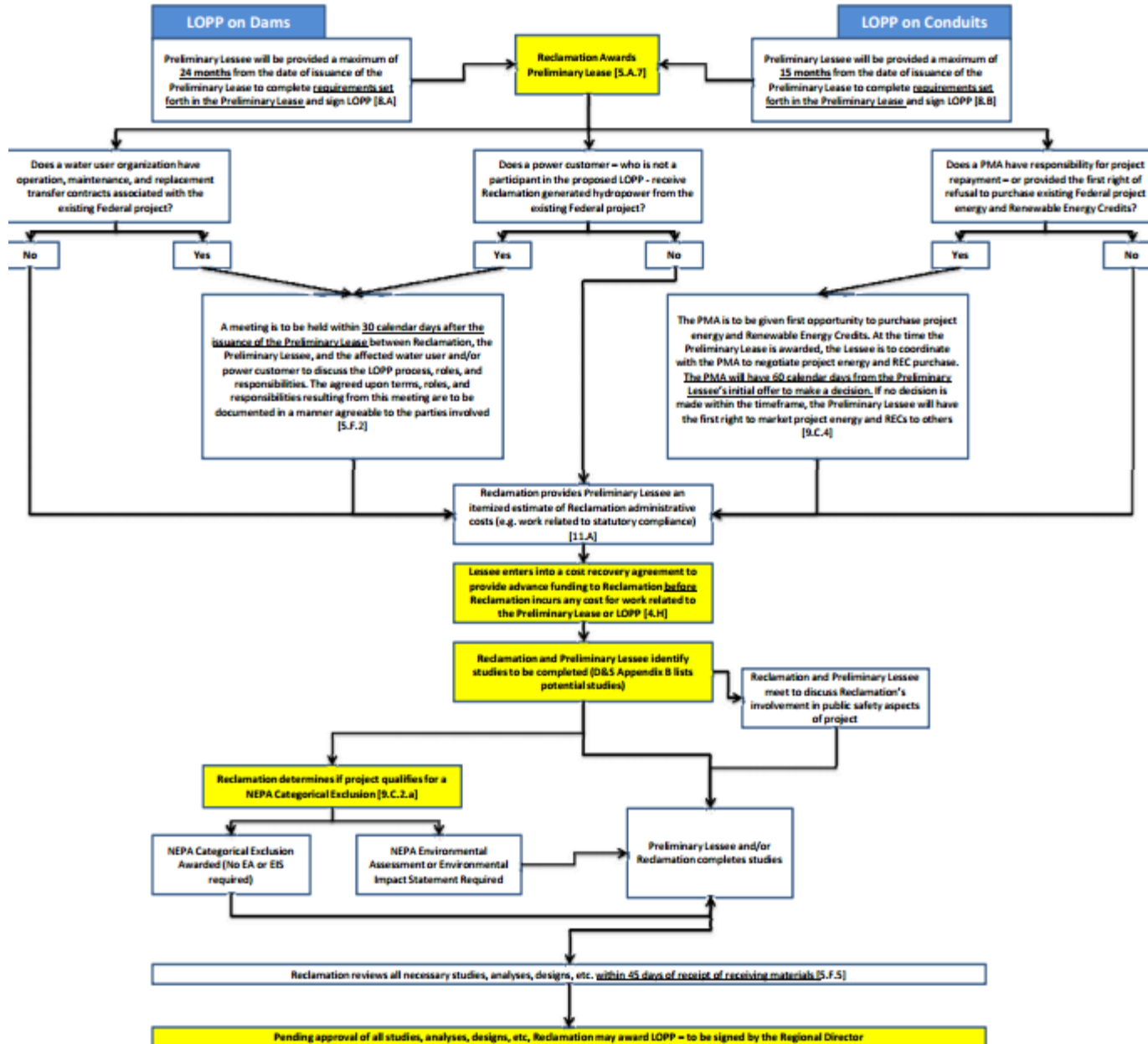
Lease of Power Privilege (LOPP) Flowchart: Request Through Award of Preliminary Lease

Click yellow boxes to access supplemental documents. LOPP D&S (FAC 04-08) references are bracketed.



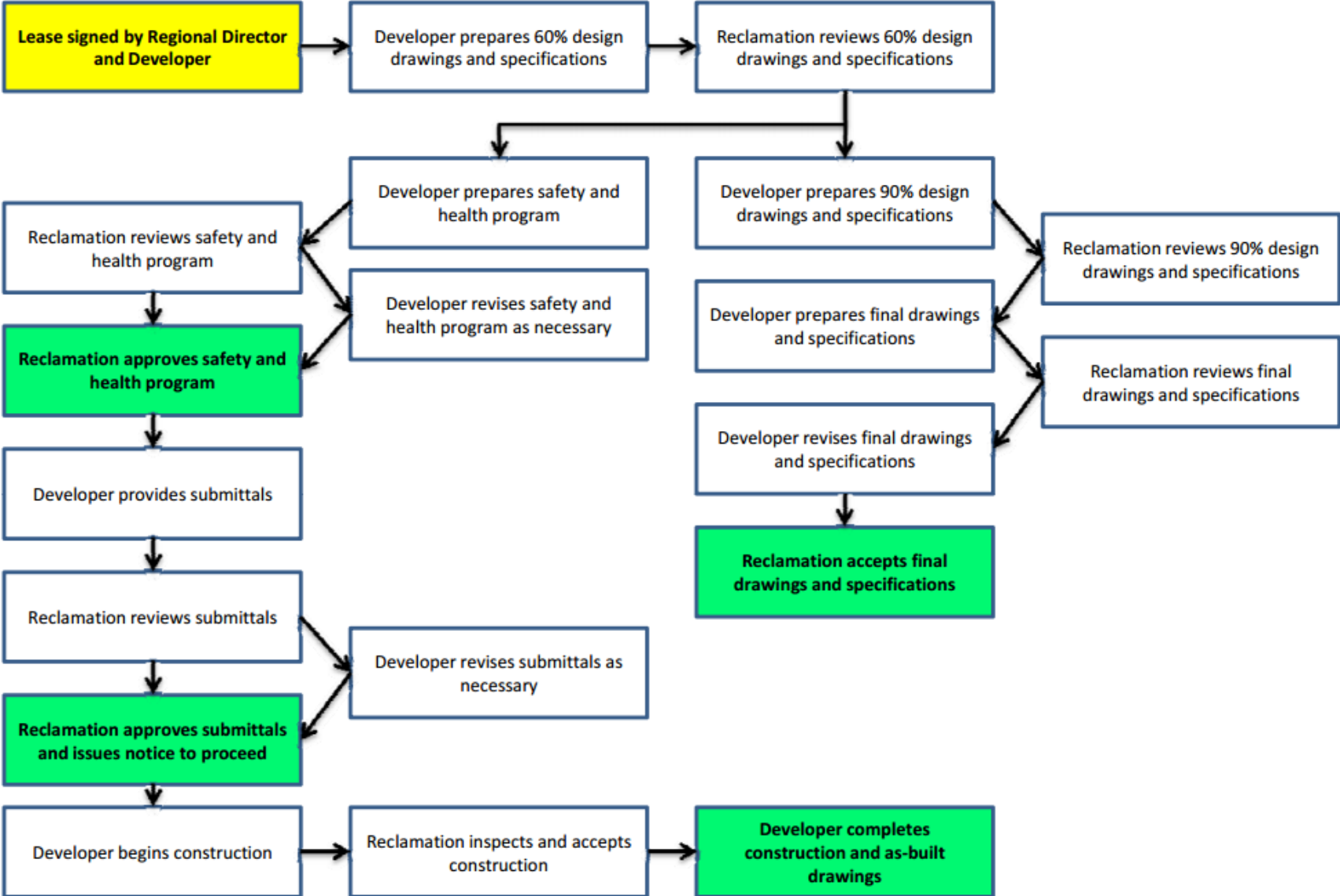
Lease of Power Privilege (LOPP) Flowchart: Preliminary Lease Through Award of LOPP

Click yellow boxes to access supplemental documents. LOPP D&S [FAC 04-08] references are bracketed.



Lease of Power Privilege (LOPP) Flowchart: Award of LOPP Through End of Construction

Click yellow boxes to access supplemental documents.





Pending Federal Legislation

- H.R. 267 / S. 545
 - Hydropower Improvement Act of 2013
 - Passed House 422-0 on February 13th
- S. 306 / H.R. 678
 - Bureau of Reclamation Small Conduit Hydropower Development and Rural Jobs Act
 - Passed House 416-7 on April 10th



State / local permitting

- Oregon State Hydroelectric Water Right
 - Three different processes depending on water right status and project size.
 - OR Water Resources Dept. manages process.
- Land use, construction, and code permits
 - County permitting rules vary
- **Rules in other states may vary significantly**



OR Hydro Water Right Processes

- “Expedited” – for conduit exemptions
- “Minor” – for projects $< \sim 73\text{kW}$
- “Major” – for projects $> \sim 73\text{kW}$



A Challenge for Conduits in Oregon

- Fish passage and screening are required at the water diversion --- even if the project is located elsewhere.
- SB837 could provide alternative compliance method via a “fish passage fund” fee.

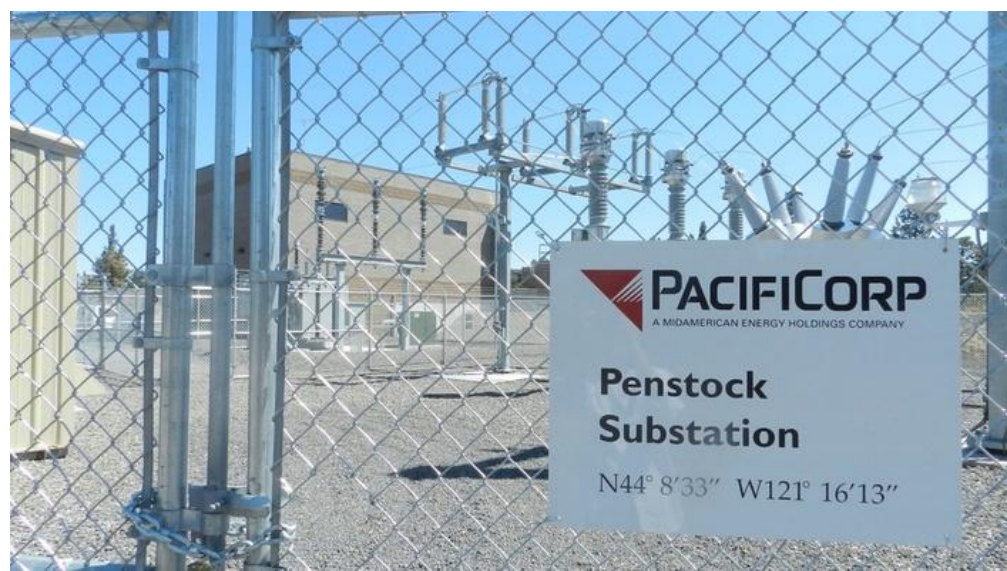
Projects are being
built. You can do it!

Ranch hydro using irrigation water
11kW plant
~\$100,000





Central Oregon Irrigation
District Juniper Ridge
5MW Hydro Plant
\$22 million



PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

**Penstock
Substation**

N44° 8'33" W121° 16'13"



Let's Keep in Touch!

Jed Jorgensen

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