E³A: Exploring Energy Efficiency & Alternatives

2nd Tuesday Technical Shorts

Episode 1: Federal Small Hydropower Regulations

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Why this matters…feasibility

- Lowers the cost of hydropower feasibility and construction
  - Increases competiveness
- Revenue “stream” for water users
  - Working waters

Key Players

- Federal Energy Regulatory Commission (FERC)
  - Focus on “Qualifying Conduit Facilities” and “Exemptions” for small projects, also grant licenses for large projects
- Bureau of Reclamation (Reclamation)
  - Provides “Lease of Power Privilege (LOPP)” for Reclamation projects (only)

Size – What is “Small”

- Less than 5 megawatts* for both FERC and Reclamation
  - Micro-hydro (100 kW or less)
    - Focus on even smaller systems (~1-25 kW) that supply energy for one home or farm
  - Small hydro (100 kW to 5 MW)
    - Selling electricity into the retail market

*Could be 10 MW or 40 MW for FERC depending on project structure

Where – What is a viable site?

- Existing conduit and infrastructure
  - Dams
  - Canals
  - Pipelines
  - Center pivots
  - Wastewater treatment plants
- Remember other key characteristics
  - Head, flow, seasonality, electricity prices, distance to transmission/load, etc.

Irrigation districts, ditch companies, and municipal water systems

Key Legislation

- *Bureau of Reclamation Small Conduit Hydropower Development and Rural Jobs Act of 2013*
  - "…expedites small hydropower development at existing Bureau of Reclamation-owned canals, pipelines, aqueducts, and other manmade waterways."
- *Hydropower Regulatory Efficiency Act* of 2013
  - "…promotes the development of small hydropower and conduit projects and aims to shorten regulatory timeframes of low-impact hydropower projects, such as adding power generation to the nation's existing non-powered dams and closed-loop pumped storage."

Passed Senate unanimously!?!

Reclamation LOPP

- Contractual right given to non-federal entity
- Must not interfere with primary Reclamation project purposes
- Given at facilities authorized for Federal hydropower developments
  - Feds just have not developed them…
- Strong preference for existing water users

FERC – Qualifying Conduit Facility

- Criteria
  - A conduit is any tunnel, canal, pipeline, aqueduct, flume, ditch, or similar manmade water conveyance that is operated for the distribution of water for agricultural, municipal, or industrial consumption, and is not primarily for the generation of electricity.
  - The facility generates electric power using only the hydroelectric potential of a non-federally owned conduit.
  - The facility has an installed capacity that does not exceed 5 megawatts
  - The facility was not licensed or exempted from the licensing requirements of Part I of the FPA on or before August 9, 2013.

No FERC Exemption or License Required!

FERC Exemption (10 MW or less)

- Exemption from licensing
  - Licensing more costly, complicated, and requires renewals
- Still under FERC jurisdiction
  - Process is simpler and potentially less expensive

FERC Preliminary Permit

- Provide exclusive 36-month right to develop hydroelectric project
- Only necessary if think their will be a competing “claim”
- Can now be extended for an additional 24 months

FERC vs. Reclamation

- Only need one!
- FERC and Reclamation have agreements to determine who has jurisdiction

How – Where to start

- Determine pre-feasibility
  - Contact Extension for assistance
  - Numerous tools available
- Federally supported/controlled water project
  - Contact Reclamation
- Non-federal project
  - Contact FERC

How – Agencies are making the process approachable

- Reclamation LOPP
  - Right of first refusal to existing water users
  - Numerous templates, guides, flowcharts, etc.
  - Recent assessments show potential in West
- FERC Qualifying Facility Guidance
  - Submit plans and template for notice of intent
  - Currently average 63 day decision time

Thank You for Attending

www.E3A4U.info

Webinars: Two per month

Technical Shorts Webinars

- second Tuesday of every month – 1:00-1:30 Mountain Time

- April 8 - USDA Incentives for Energy Efficiency & Renewable Energy
- May 13 - Variable Frequency Drives (VFDs)
- June 10 – TBD

Program Resource Sharing Webinars

- 4th Friday of every month – 1:00-2:00 Mountain Time

- March 28 – Feature of State Extension Energy Programs
- April 25 - Agricultural Energy Audits
- May 23 - Overview of new E3A Curriculum
- June 27 - Agency Partnership Opportunities

Contact Information

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Recent Studies of Potential

- Department of Energy
  - Five unpowered dams in Wyoming
  - http://energy.gov/articles/powering-america-s-waterways
- Bureau of Reclamation
  - *Hydropower Resource Assessment at Existing Facilities* (March 2011)
    - Four unpowered dams
  - *Site Inventory and Hydropower Energy Assessment of Reclamation Owned Conduits* (March 2012)
    - 121 Wyoming sites

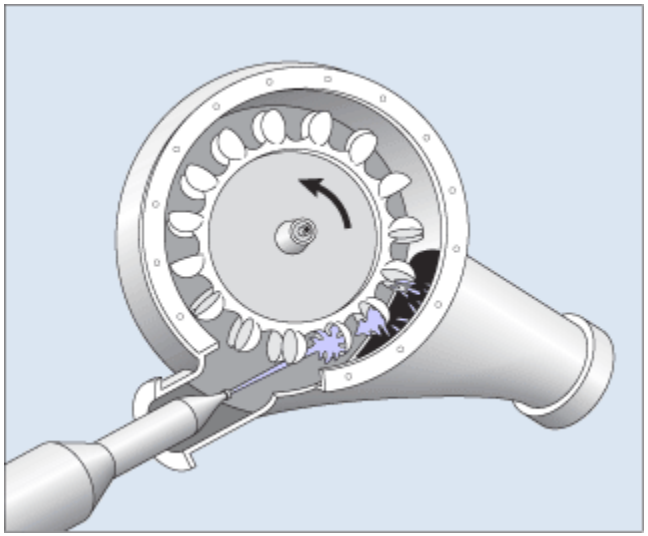
Activity Time – Virtual Hydro Prospector

- Idaho National Lab (INL)
  - GIS-based tool that looks at natural waterways
    - No irrigation canals

http://hydropower.inel.gov/prospector/index.shtml

Equipment

- Impulse turbines
  - Use the velocity of water
- Reaction turbines
  - Use the pressure of water



Both types can be used in micro-hydro installations, although impulse turbines are more common, especially in high head situations.

Source: United States Department of Energy: Energy Efficiency and Renewable Energy. Small Hydropower Systems. DOE/GO-102001-1173: July 2001

Equipment – Cost

- Very site specific but can be the lowest cost renewable energy system compared to wind, solar electric, etc.
- Estimates provided by National Sustainable Agriculture Information Service
  - $21,450 for a 3.5 kW system

Source: Kindberg, Leif. *Micro-Hydro Power: A Beginners Guide to Design and Installation*. National Sustainable Agriculture Information Service. February 2011. Available at < http://attra.ncat.org/attra-pub/farm_energy/hydropower.html>.

Incentives – Micro-hydro

- Relatively few
  - Eligible for net metering if under 25 kW
  - Non-residential system can apply for USDA Rural Development, Rural Energy for America Program (REAP)
    - 25% grant
  - Ag producer could explore the

Incentives – Small hydro

- A few more…for businesses
  - USDA Rural Development REAP Grant/Loan
    - Same as micro-hydro
  - Renewable Energy Production Tax Credit (PTC)
    - Currently 1.1¢/kWh
- Feasibility studies…
  - Value Added Producer Grant
    - Farmer/Rancher controlled corporations are eligible
    - 50% grant w/ in-kind eligible as match
    - Feasibility/Business Plan/ Marketing Plan
      - No engineering costs
  - REAP Feasibility
    - 25% grant
    - Available to non-ag producers
    - Resource assessment/transmission access/business plan
      - No engineering costs

Regulation – Avoiding a fight

- Establish water right
  - Non-consumptive use, but still need to receive water right from State/County Engineers
- Federal Energy regulatory Commission (FERC)
  - Reviews **all** grid-connected, non-federal systems

Regulation– Permitting

- Wyoming State Engineer's Office
  - Non-consumptive use, but still requires permit
  - Requires application for new use, as opposed to irrigation, municipal water, or domestic water

Necessary for both micro-hydro and small hydro!

http://seo.state.wy.us/

Regulation – Exemptions/Licensing

- Federal Energy Regulatory Commission (FERC)
  - Authority over **any** non-federal hydroelectric facility
    - Mechanical hydropower (e.g. center pivots) is exempt
- FERC Preliminary Permits
  - Provide exclusive 36-month right to develop hydroelectric project
  - Only necessary if think their will be a competing "claim"
- FERC Exemption
  - Quicker and issued into perpetuity
    - Conduit
    - 5-MW or less
- FERC License
  - Longer process and must be renewed every 30-50 years

Regulation – Exemptions/Licensing Tips

- Pursue exemption first
  - Must have real property rights
  - Easier on non-federal land
    - Conduit exemption cannot be issued on federal lands
  - Remember that transmission lines are part of the project!
- Apply as soon as possible
  - Must have project design finalized, but lag time of up to 12 months for exemptions and 18 months for licenses is possible

Finding a Market

- Micro-hydro – Less than 25 kW
  - Reduce costs "behind-the-meter"
    - Not designed to create a new revenue "stream"
    - Sell at low avoided cost rates
  - Effective net metering
    - Allows you to "bank" electrons
    - Annual "true-up" on January 1st
    - Can help mitigate seasonality of production
      - E.g. produce more in summer than can use
    - Important to match production with consumption
- Small hydro – Greater than 25 kW
  - Generate revenue
  - Must be able to sell electricity to an electric utility

Finding a Market – Small Hydro

- Power Purchase Agreements (PPAs)
  - Contract to buy the electricity generated by a power plant
  - Energy must be able to get to market
  - Need willing buyer and adequate electric transmission
- Binding contract
  - Promise to deliver energy at a promised price
  - Generally 10-25 years in length

PPA needed to obtain financing!

Integral part of feasibility!

Finding a Market – Small Hydro

- PacifiCorp (Rocky Mountain Power)
  - Avoided Cost Purchases from Qualifying Facilities: Schedule 37
    - Based on Public Utilities Policies Act of 1978 (PURPA)
    - P.S.C. Wyoming No. 12
  - Provides defined payments for energy and capacity for firm resources, such as small hydro
  - Limits to amount of energy provided under Schedule 37
- Contact PaciCorp for Information
  - Manager, QF Contracts
    825 NE Multnomah Street, Suite 600
    Portland, OR 97232
    (503) 813-5218

Finding a Market – Small Hydro

- Selling to your Rural Electric Cooperatives
  - Members of Tri-State Generation and Transmission Association
  - Must buy their electricity from Tri-State, but…
- Tri-State allows local cooperatives to but up to 5% of energy locally
  - Policy No. 115 and 117
  - Local cooperatives are **not** required to buy locally
- Provide prescribed rates for purchases
  - Energy credit and demand credit available for hydro
- Can sell Renewable Energy Credits (RECs) to Tri-State at a prescribed rate
  - Also can be marketed independently

Contact your local electric cooperative for more details!

Business Structure – Small Hydro

- Micro-hydro
  - Not as important for cost reducing systems
  - Will it serve a residential or commercial electric meter?
    - Important for incentives
- Small hydro
  - Public ownership (nontaxable)
    - Irrigation districts
    - Municipalities
  - Private ownership (nontaxable)
    - Cooperative
  - Private ownership (taxable)
    - LLC or other

Business Structure – Small Hydro

- Publicly owned (including irrigation districts)
  - Advantages –
    - Limited tax liability, potential access to public loan funds (limited), and simple as no new structure required
  - Disadvantages –
    - Unable to obtain chief federal incentives
- Cooperative (e.g. rural electric cooperative)
  - Advantages –
    - Existing structure, access to USDA Rural Development grants and loans, limited tax liability
  - Disadvantages –
    - Cannot use Production Tax Credit, generally do not control resources (must pay for lease), unknown desire to be system owner

Business Structure – Small Hydro

- For-profit (LLC, Corporation, etc.)
  - Advantages
    - Access to all federal incentives, including USDA grants, guaranteed loans, and PTC, may protect against liability for individuals
  - Disadvantages
    - Require additional paperwork to organize, must pay taxes (offset with incentives)

Structure will vary, but for-profit may deliver the lowest cost option via incentives for most small hydro installations.

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http://renewables.uwyo.edu

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