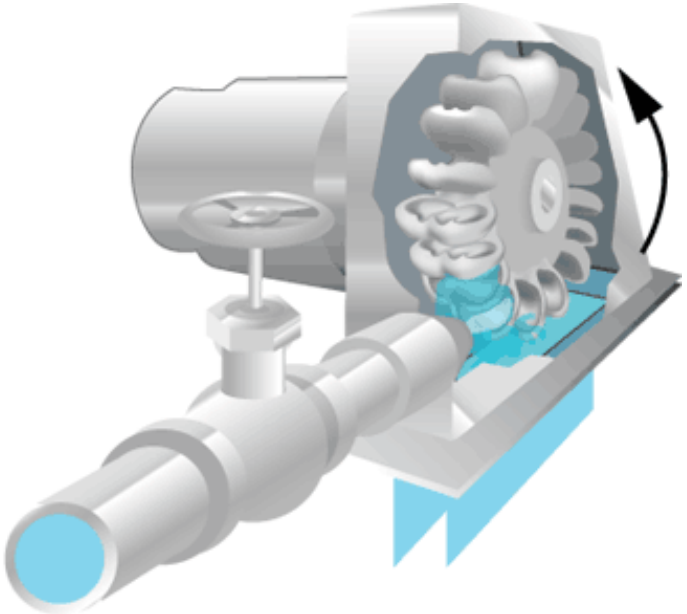
City of Pendleton

Permitting for ASR Hydro-Electric Production

General Concept

- Generate energy from existing infrastructure:
  - No adverse environmental impacts
  - Works in conjunction with Aquifer Storage & Recovery (ASR)
  - Works in conjunction with distribution system pressure zones
  - Works with wastewater outfall piping



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Pendleton ASR

- ASR Project began in December 2003
- 7 ASR “cycles” have been completed
- Native groundwater decline reduced
  - From 3.4-feet per year to 1.5-feet per year
  - Hydraulically connected to west county declines

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Lost Energy at Wellhead

- Distribution system pressure varies from about 100 psi to 125 psi at the ASR wells
- During storage, wellhead pressure is maintained at about 40 psi using a pressure reducing valve (PRV) for controlling injection flow rate
- About 60 psi to 85 psi of head loss is dissipated through PRV – lost energy to be recovered

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Energy Generation Options

- Hydro generation micro-turbines
  - PRV pressure drop
- Regenerative drives using VFDs
  - Total dynamic head
- Turbine motor generator w/governor
  - Total dynamic head

Micro-turbine

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Phase I – Current ASR Wells

Stillman Well # 5

Well # 14

Byers Well # 1

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Phase I Energy Analysis Report

	Well # 1	Well # 5	Well # 14
Estimated Recharge Time (days)	150	70	145
Annual Operating Hours	3,600	1,680	3,480
Estimated Turbine Output (kW)	26	30	7
Estimated Generator Efficiency	92%	92%	92%
Estimated Generated Power (kW)	23.9	27.6	6.4
Estimated Annual Energy (kWh/year)	**86,112**	**46,368**	**22,411**

- Cascade Energy Engineering (ETO Study) estimated total annual energy production at 154,891 kWh/yr for Phase I
- $9,295: Annual energy payback @ $0.06 per kWh
- Based on micro-turbines
- Regenerative drive option: estimates to be developed

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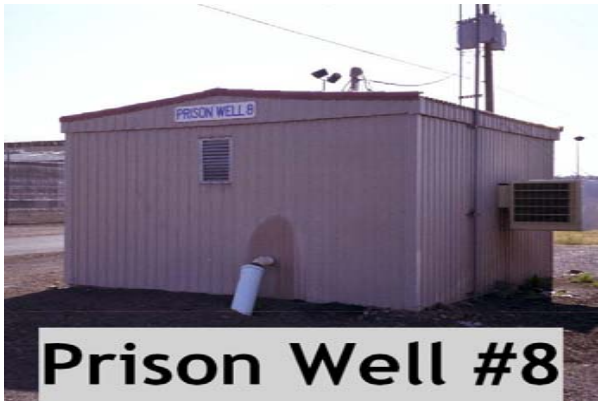
Phase II – Future ASR Wells



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Phase II Energy Analysis Report

	Well # 2	Well # 4	Well # 8
Estimated Recharge Time (days)	150	150	150
Annual Operating Hours	3,600	3,600	3,600
Estimated Turbine Output (kW)	32	8	18
Estimated Generator Efficiency	92%	92%	92%
Estimated Generated Power (kW)	29.4	7.4	16.6
Estimated Annual Energy (kWh/year)	**105,840**	**26,640**	**59,760**

- Total annual energy for Phase II production was estimated at 192,240 kWh/yr
- $11,535: Annual energy payback @ $0.06 per kWh
- Based on micro-turbines
- Regenerative drive option: estimates to be developed

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What are the Challenges?

- Oregon Water Resources Department (OWRD) requires an <u>Application to Develop Hydroelectric Use</u>
  - $500 fee
  - Water rights must be certificated
    - 1885 – 2.0 cfs – 900 gpm – 1.3 MGD
    - 1890 – 0.5 cfs – 224 gpm – 0.3 MGD
    - 1910 – 7.2 cfs – 3,225 gpm – 4.6 MGD – Completed in 2010
    - 1929 – 3.8 cfs – 1,700 gpm – 2.5 MGD – Completed in 2009
    - 1941 – All water of the North Fork Umatilla River
      - Legislative (not certificated) right
  - Process is very doable
  - OWRD staff are very helpful

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What are the Challenges?

- Pacific Power requires a net metering agreement
  - $50 base fee plus $1 per every kW per site
  - Process is very doable
  - Net metering installed at City's third-party solar installations
  - Pacific Power staff are very helpful

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What are the Challenges?

- Federal Energy Regulatory Commission (FERC) requires an application for exemption of a small conduit hydro-electric facility, i.e. a conduit exemption
- Requires perseverance

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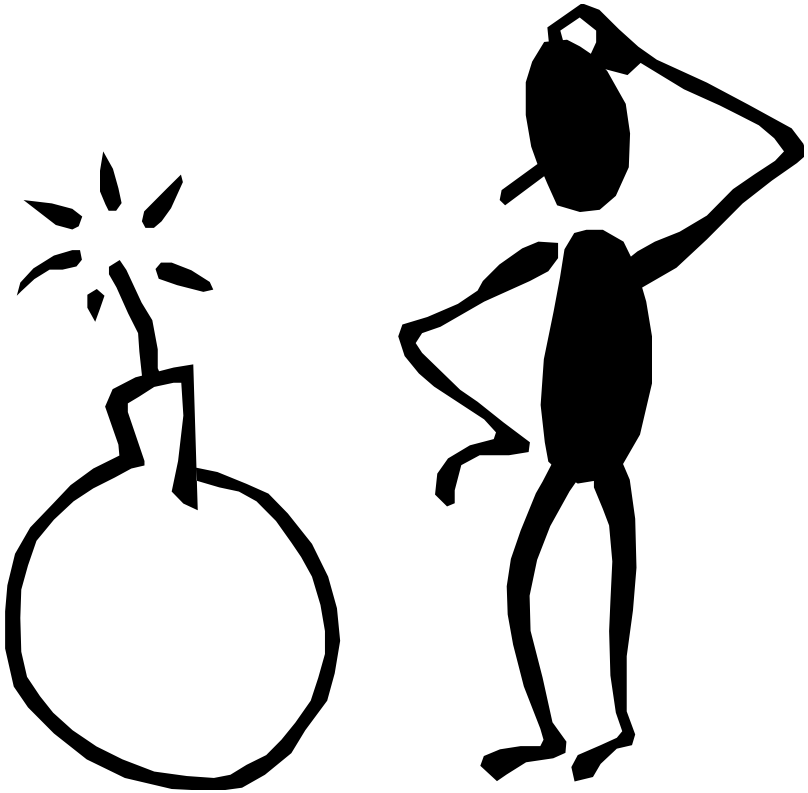
FERC Process

- Detailed instructions located in Schedule A of 18 CFR § 4.92
- Enjoy the read



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FERC Environmental Report

- Vegetative Cover
- Fish & Wildlife Resources
- Water Quality & Quantity
- Land & Water Uses
- Recreational Uses
- Socio-Economic Uses
- Threatened & Endangered Species

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Cover ALL Your Bases

- SHPO—Section 106 Documentation and Level of Effect Forms filed with SHPO; No effect determination
- Consultation with any affected Indian tribes is required
- ETO guidance document for FERC process: *Guide Book for Obtaining FERC Conduit Exemption* (draft form)
- Discussion with Senator Wyden / Senator Merkley local staff

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FERC Drawings

- Detailed guidance provided in *Managing Hydropower Project Exhibits*, a guidance document
- Requires at least 2 views of each facility with dimensions & scale; and
- Final drawings must have a 5” X 7” title block in the lower right corner, the bottom half of which is blank

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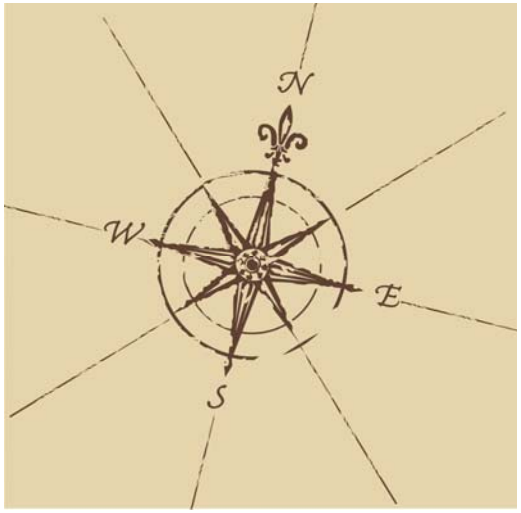
FERC Map Requirements

- Refer to guidance document
- Project boundary geo-referenced with at least 3 points shown
- Initial map may be 11” X 17”; final map must be larger
- If approved by FERC, map must be converted to aperture card (microfilm) and electronic card (TIFF) format



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FERC Additional Requirements

- Stage 1 Consultation—includes mailings to all local, state, and federal pertinent agencies;
- Request waiver of Stage 2 Consultation;
- Public Hearing with option to tour facilities required;
- 60-day comment period after the public hearing;
- Mail completed packets to FERC—allow 2-6 months for their review

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FERC Timeline Overview

- May 2008: Initiated ETO Study
- June 2008: Initial FERC Contact (Robert Bell) / OWRD
- December 2008: Draft ETO Study
- February 2009: Conduit Exemption Packages Delivered to FERC
- March 2009: Final ETO Study
- March 2009: FERC Letter: “Patently Deficient” Application
- April 2009: Oregon Department of Energy
- June 2009: New FERC Contact (Jeremy Jessup)
  - Phase I (Existing) and Phase II (Future)
- October 2009: Begin Consultation with CTUIR
- December 2009: Initial Presentation to CTUIR Water Commission
- March 2010: CTUIR Board of Trustees – Letter of Support
- April 2010: City Council Support – Resolution #2406
- May 2010: Meet with US Senators Local Staff

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FERC Timeline Overview

Future:

- Additional Energy Evaluation for Regenerative Drives (?)
  - Higher head, lower efficiency
  - Potential for 2 to 4 times the power production of micro-turbines installed at wellhead
  - Other benefits
- Congressional Change (?)
- Mail Packages to Agencies
- 30-Days: Public Meeting / Optional Tour of Facilities
- 60-Days: Reply by Public Agencies and Citizens
- Final Completed Packages to FERC for Approval

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It’s Not a Good Fit!!

- The FERC process is not designed for small hydro projects within existing distribution system
- Cumbersome, time-consuming & expensive
- Locally renamed FERC to “Ferking” FERC

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Conclusion

- Legislative changes must occur to make this green energy concept truly cost effective, appealing, and reasonable:
  - Federal level: allow State determination for small hydro generation projects under 1 megaWatt (?) in size, using existing conduits within existing distribution system; and
  - State: in addition to certificated water rights, allow permitted and legislative water rights to be used
  - State: revise partial perfection requirements from 25% increments to a much lower percentage
- Questions (?)
- Contacts: Karen King, Regulatory Specialist, 541.966.0249

  Tim Smith, Control Systems Manager, 541.966.4518

  Bob Patterson, Public Works Director, 541.966.0241

  www.pendleton.or.us

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