

# Reconciling Geothermal Resource Extraction with Western Water Law

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Two adults discussing water rights.

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# Prior Appropriation, the Basics

- All waters are the property of the public
- Beneficial Use - Use it or lose it
- Priority - First in time is first in right
- No diversion without approved permit or application

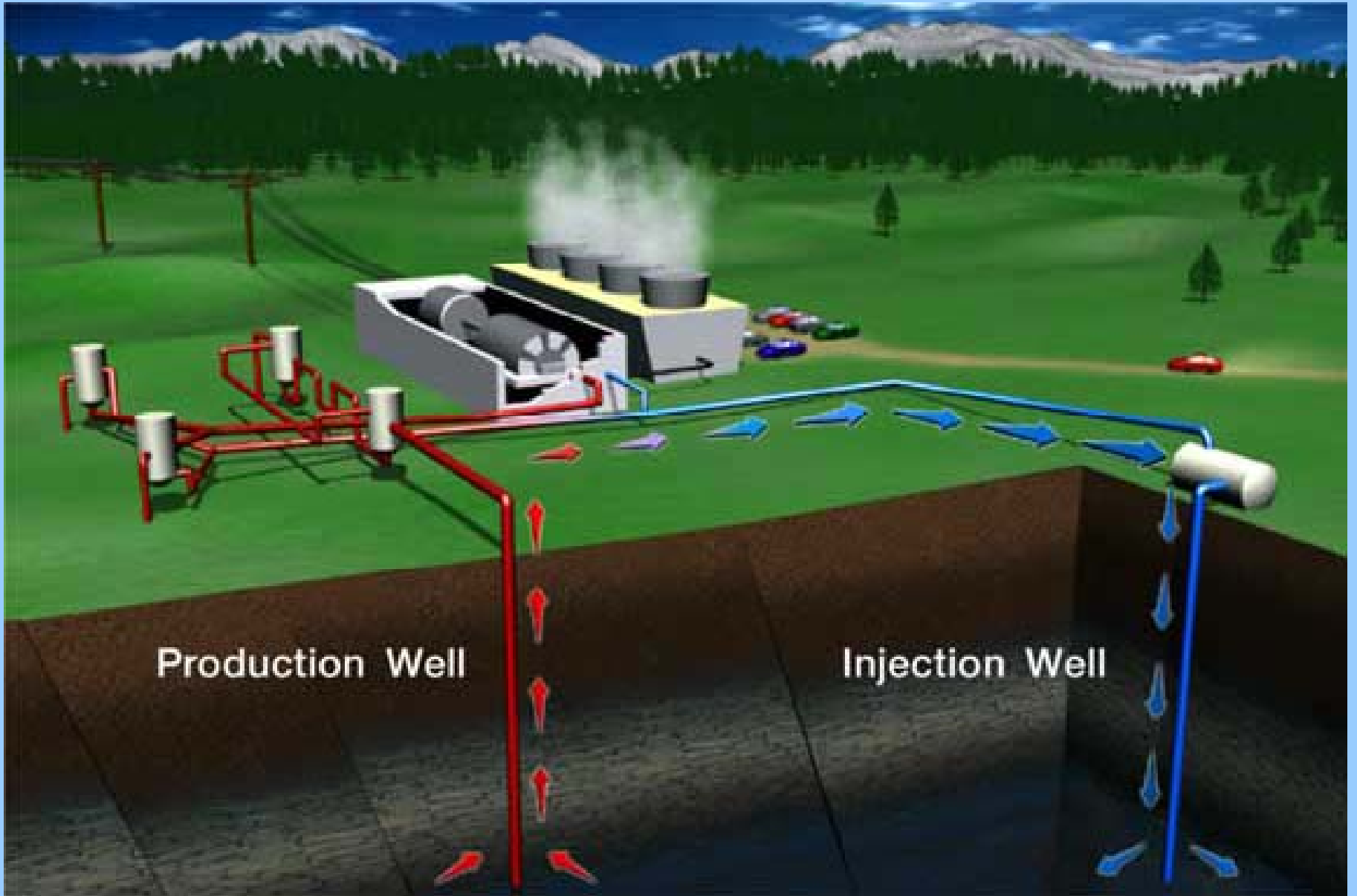


Image courtesy of the Geothermal Education Office

# Water Use in Geothermal Development, Cont.

- Construction and Development
  - Minimal use for drilling and testing
- Power Plants (Dry Steam, Flash, Binary)
  - Significant nonconsumptive use
  - Air Cooled Binary (no consumptive use)
  - Water Cooled (50%+ Evaporative Losses)
  - Minimal consumptive use for culinary purposes
- Enhanced Geothermal Systems (EGS)
  - Imported water + uses described above

# Water Use in Geothermal Development

Geothermal power plants have no smoky emissions. They emit water vapor.

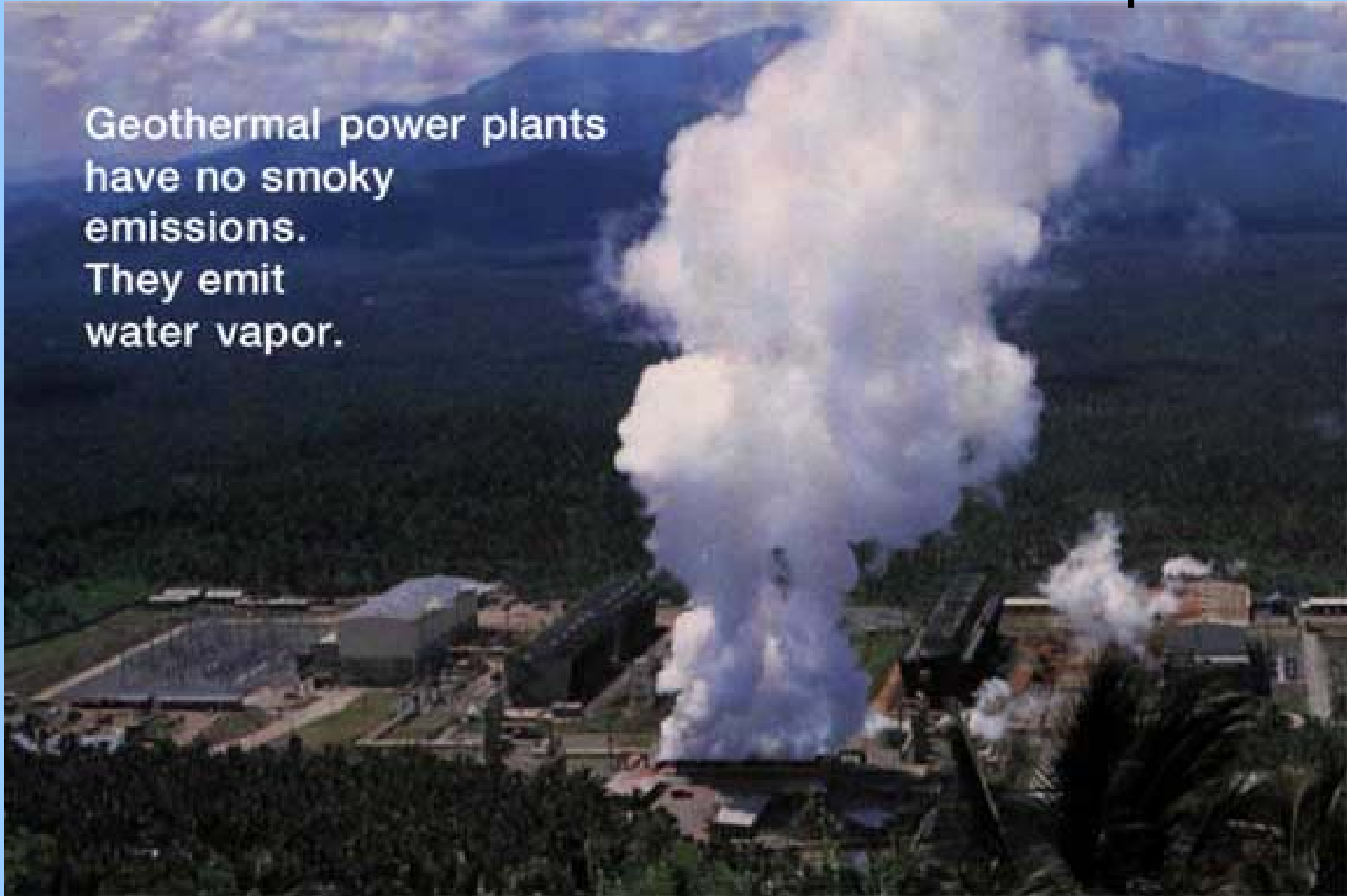


Image courtesy of the Geothermal Education Office

# Geothermal Reservoir

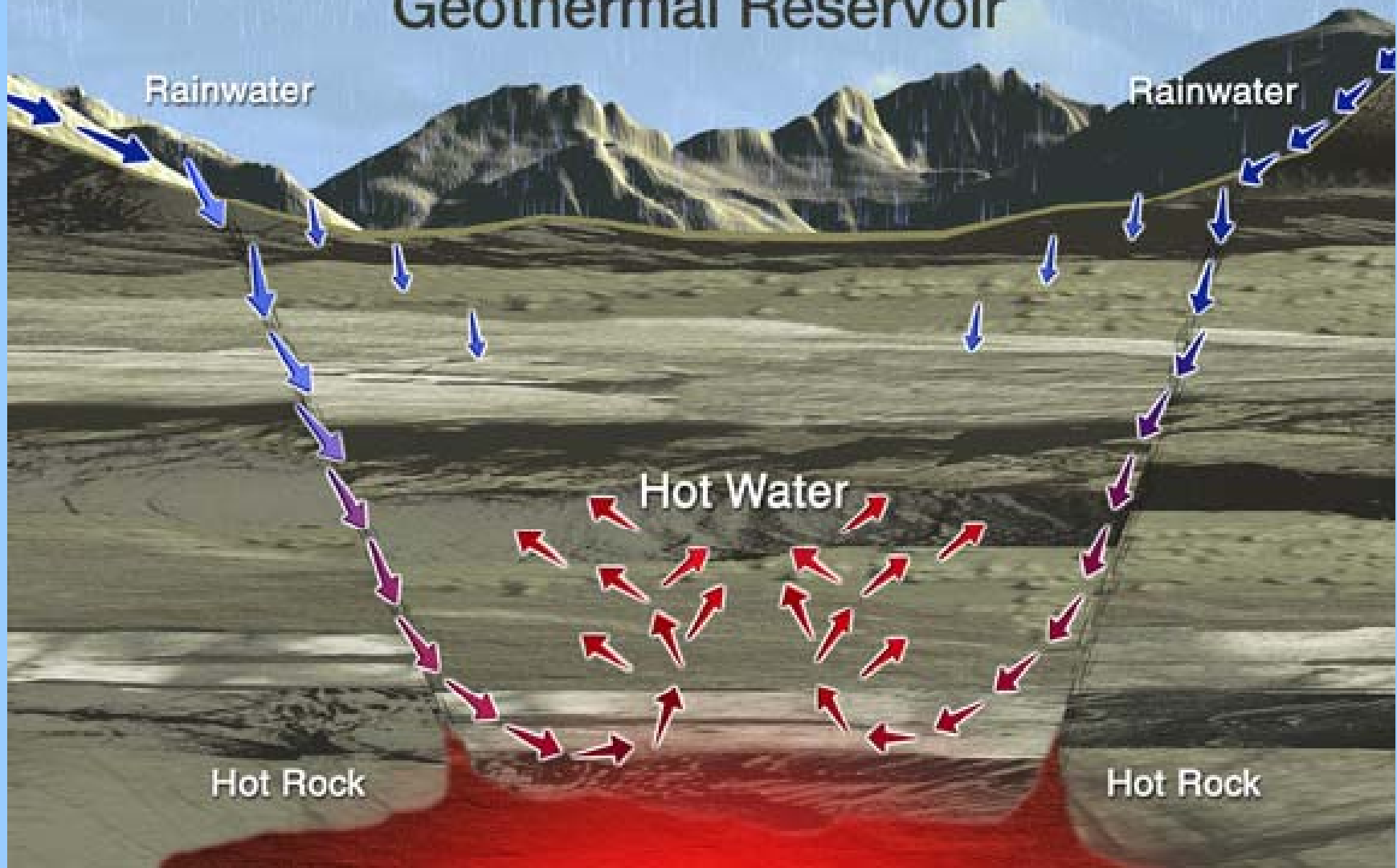


Image courtesy of the Geothermal Education Office

# How does geothermal fluid fit into western water law?

- What is considered a geothermal resource?
- Who owns the right to extract the geothermal resource?
- Is diversion of geothermal fluids subject to water laws?
- Which state agency regulates withdrawal of geothermal fluids?



# What is considered a geothermal resource?

- Hot rocks, steam, hot water, and hot brines.
  - Arizona, California, Colorado, Montana, Nebraska, Nevada, New Mexico, North Dakota, Texas
- Hot rocks, groundwater above a certain threshold temperature.
  - Alaska (248°F), Idaho (212°F), Oregon (250°F), Washington (moving target)
- Hot rocks
  - Utah (248°F)

# Who owns the geothermal resource?

- Surface Estate Owner Unless Severed
  - Arizona, California, Idaho, Nevada, New Mexico, Oregon, Texas, Utah, Washington
- Water Appropriator
  - Colorado, Wyoming

# Is diversion of geothermal fluids subject to prior appropriation?

- Largely Exempt from Water Law
  - California, Idaho\*, Nevada\*, Oregon
- Subject to Water Law
  - Colorado, Montana, Utah, Wyoming
- Other
  - Arizona

\*Assuming no consumptive use of fluids.

# Which state agency regulates diversion of geothermal fluids?

- Mineral Agency
  - Arizona, California, New Mexico, Texas
- Water Agency
  - Colorado, Idaho, Oklahoma, Nebraska, Utah, Wyoming
- Both
  - Nevada

# Policy Considerations

- Clarity
- Promotion of Clean Energy
- Protection of Groundwater Resources
- Protection of Property Rights
- Ability to Adapt to Technological Advances
- Institutional Competence

# Questions?

