Energy-Water West Region Workshop

Salt Lake City, UT
January 9-11, 2005

Group E Notes

Facilitator: Marilyn O'Leary
Notetaker: Cliff Ho

Participants:

1. John Maulbetsch, Maulbetsch Consulting (present)
2. Greg Petruska, Fidelity Exploration & Production (present)
3. Katharine Jacobs, University of AZ (present)
4. Debbie Cook, City of Huntington (present)
5. Mark Glauth, N. Arizona University (present)
6. Elizabeth Burton, LLNL (present)
7. Ken Mortensen, SPX Cooling Tech (present)
8. Cathy Wilson, LANL (present)
9. Steve Billingsley, Inland NW Research All (present)
10. Michael Campana, OR State University (present)
11. Donna Cosgrove, U. of Idaho-IWRRI (present)
12. Don Halffield, Xcel Energy (present)
13. James McMillan, USACE (present)
14. John Shomaker, John Shomaker Assoc. (present)
15. Samantha Updegraff, Utton Center (present)
16. Andrea Coon, Utah Division of Public Utilities (present)
17. Martha Krebs (present)
18. Mike Hamman (present)

Not present

- Carmine Iadarola, Aquasan Network
- Larry Anderson, Utah Division Water Resources
- Paul Rusanowski, The Shipley Group
- Craig Smith, Trihydro Corporation
- Michael Gabaldon, Bureau of Reclamation
- John Kounts, WA Public Utilities
- Karl Kumli, Dietze & Davis, P.C.
- Kerry McCalman, Bureau of Reclamation

Session 1: Water Problems with Energy Supply & Production

Extraction

- **Oil and gas production: Main concern is what you are going to do with the water**. Usually not interested in re-injecting the water.
    - Quality and quantity.
    - They have to build storage ponds.
    - **Treatment is necessary before it can be discharged into the river**.
    - Estimate of 2-3% of powder-river basin in Wyoming and Montana is withdrawn over the life of the well. This is a concern for water-rights groups.
        - Haven't seen any impact on withdrawal availability from water wells.
        - 13,000 wells; 150 barrels of water per well per day over 10 years (life time).
        - Up to 10 barrels of water produced for every barrel of oil
    - **Need to inject up to 7 barrels of water per barrel of oil to maintain pressure of oil field**
    - Water is considered a byproduct of gas production.
    - **Cost of treating water may be prohibitive to oil and gas production**
- **For coal beds**, you need to extract the water before you can reduce the pressure to get the gas adsorbed to the coal to flow out.
- **Trying to get produced water from gas/oil wells to power plants is difficult (costly and distance).** Building the infrastructure is a problem, and the power to pump the water is a huge cost.
- Because of short life cycle, it is difficult to find a customer.
- **Production of oil from oil shale requires a lot of water**. 20 years ago, people were saying that we wouldn't be able to get enough water to use oil shale. One estimate is millions of acre-feet per year to extract oil from oil shale.
    - Opportunity: look at tar sands.
- **Geothermal energy production:** after you extract heat from geothermal wells, you need to do something with the water that is produced. It may contain sulfur, arsenic, and other bad things.
- **In all of these extraction technologies, subsidence may be a problem.**
- **Severe water rights conflicts** between impact of groundwater withdrawal on surface water withdrawal. Impact of groundwater withdrawal may take decades.
- **Coal Extraction**
    - **Coal slurries use** lots of water.
    - **Coal gasification has** a lot of consumptive water use.
    - Extraction of coal needs water and impacts water quality.

Alternative Fuel Production and Biomass Production

- Production of biofuels will require more water.
- Cooling water is also needed for electricity generation from methane.

Regulatory/Economic Issues

- Regulatory inequities across state boundaries allow for water-quality and water-supply issues.
- Externalities: benefit and burden are remote from each other
- Same issues for U.S./Mexico border
- Patchwork of regulatory issues also leads to water problems
- No sufficient language in regulations to allow regulators to assign **cost of water** to convince use of dry-cooling, which requires more capital.
    - **Regulatory treatment of water costs is an issue**
    - **"We're not paying enough for our water"**
- **Water-quality discharge/disposal requirements may impact cost and supply of water.**

Electricity Production

- Thermoelectric cooling requires significant water withdrawals (up to 40% of freshwater withdrawals)
    - "Price of water never had any impact on why power plants went to dry cooling"
        - Using dry cooling just got the water issues off the table and allowed faster siting.
    - Real-world example: 750 MW coal-fired power plant in Colorado
        - Air permitting and water permitting are the two big issues
        - Arkansas river basin
        - **Decision to go with parallel cooling was more political than because of cost of water**.
        - Up to $10,000 per acre-foot of water; cost is an issue.
        - **Treatment/quality of water is an issue.**
- Nuclear energy production
    - Cooling water requirements are slightly higher than for coal plant.
- Hydrogen generation will require lots of water
- **Hydroelectric production**
    - Climate change will affect this and thermo-electric cooling

Other Renewables

- Wind and solar power requires storage capabilities because it does not operate all the time.
- Peaking and Timing
- Hydrogen electricity production may require more electricity than it produces.

References:
Peaking of World Oil Production: Impacts Mitigation, and Risk Management, Hirsch et al., Feb 2005, www.projectcensored.org. Link also from www.globalpublicmedia.com

Session 1 Distilled and Prioritized Problems

Extraction

- Treatment/disposal of produced water
- Water rights conflicts (impairment of existing senior rights) **5**
- Collection/transmission of produced water–costly, requires energy and infrastructure **5**

Electricity Generation

- Current thermoelectric cooling technologies are still water intensive **7**
- Water quantity (temperature) is impaired

Renewable Sources

- Production of biomass/fuels requires large water supply **2**
- Solar and wind require storage that uses water
- Hydrogen energy production is not energy/water efficient **1**
- Hydropower is impacted by climate change **4**

Regulatory and Economic

- Cross-boundary regulatory conflicts impede water transfer and use **8**
- Externalities: benefit and burden are remote **2**
- Lack of water valuation and regulatory treatment of water costs **11**
- Water quality and discharge requirements impact cost and supply of water and energy **3**

Session 2: Problems with Water Supply

Transportation of Water

- Transporting water to where it's needed is a problem.
- California has a huge transportation problem; cost is a problem.
- Piping infrastructure is costly and difficult.

Groundwater/Surface Water

Urban Use

- Groundwater and surface water are interconnected. **Overdrawing groundwater will impact surface water supplies.**
- Tributary groundwater is legally surface water
- In Idaho, groundwater wells for urban use (3% of water use) have been protested by senior water-rights permit holders. There is no common understanding of the total water availability.
    - **Lack of regional planning for integrated water use**.
- In Arizona, lots of people are able to drill wells and the states are unable to do anything about it because surface water and groundwater are separated and domestic wells are not regulated.
    - Institutions do not match what is going on with current requirements (endangered species act, tribal, etc.)
- Regulations have unintended consequences.
- Lack of transparency in market issues for water use.
- Water quality groups are trying to prevent water transfer.
- In Colorado
- Urban use is going to dry-up farmlands. **Ag water is being used for cities**
- **Pumped groundwater is not sustainable**.
    - **Domestic use of pumped water is not regulated**
- **No policy driver to economize**
- **Lots of urban run-off to ocean in CA**
- **Urban use causes a water-quality threat as much as a consumptive threat.**
- Urban use is ~20% of water use in CA; up to ~25% in Arizona.
- **Treatment for urban water use is expensive.**
- **Unmanaged riparian vegetation takes a significant amount of water**.

Agricultural

- Agricultural efficiency is site specific. May actually be quite good.
- **Evaporation of irrigation is a huge problem for center-pivot irrigation**
    - **However, improved efficiency upstream means depletion in water rights downstream. "One man's waste is another man's water"**
    - Drip irrigation takes away from recharge from ditches and riparian sources.
- Discharge water quality will damage agricultural irrigation

- **Ag is a big user and big source of contaminated water**.
    - Non-point source pollution.
- Larger populations cause Ag-water users to lose their water to urban uses.
- How much more land is available for **bio-mass growth**? Poor soil quality? Fertilizer growth is expensive.
    - Perhaps the question is aesthetics. Currently, potato growers are trying to grow the perfect looking potato. For biomass, more potatoes could be grown in smaller areas since they don't have to look as good.

Recreational and Environmental

- People want water supplies for beachfront properties, fishing, rafting, etc.
- **Habitat protection is in conflict with human use**
    - Flow augmentation to mitigate declining salmon population: no willing buyers or sellers
    - Timing of releases from dams for species cause consequences to competing uses.
    - What flow do you use as a benchmark to restore "natural" habitats
- Conflicts between flat-water community, rafting community, and hydropower community.
- Recreation of historic flow regimes competes with all existing uses.
- Rivers are being depleted for human use

Policy

- Lack of public knowledge leads to poor policy decisions regarding water use and supplies.

Session 2 Distilled and Prioritized Problems

Transportation

- Getting available water to where it's needed **2**

Urban

- New water permits protested
- Pumped groundwater not sustainable **2**
- Lots of non-regulated groundwater pumping and use **1**
- Rate structures don't properly value water **6**
- Unmanaged riparian vegetation uses water
- Urban uses are wasteful and contaminate water

Agriculture

- Non-point source pollution of ag. not regulated **2**
- Unsustainable groundwater pumping **2**
- Evaporative losses are significant in center-point irrigation
- Ag efficiencies not well understood by public and have unintended consequences **2**

Recreation/Environmental

- Habitat protection conflicts with human use (e.g., recreation of historic flow regimes competes with all other uses and thus is difficult to protect ecosystems) **4**
- Rivers are being dried up for human use with significant ecosystem implications **1**

Water Policy

- Institutions don't match changing demands **7**
- Lack of public knowledge leads to poor policy decisions regarding water use and supplies **2**
- Lack of interdisciplinary knowledge **2**
- Unresolved tribal claims **2**
- Fragmented ground and surface water management/lack of regional planning for integrated water use **9**
- Need for response to climate change **3**

Session 3: Needs Identification

Agricultural Use of Water

- Need way to treat and recapture use of contaminated water

Session 4: Solutions Identification

Pumped Storage

- Pump water to higher elevations for use with hydroelectric production when needed.
- Biomass can be a source of water.

Storage

- Pumped storage from wind and solar
- Wind energy for hydrogen production.