

12/13/05

Group D Facilitator Jack Whittier

Note taker: D. French

Breakout Session 1 Problem Area: Energy Supply

- R. Nicholson, President, Solar Power Int'l, LLC
- Wade Miller, Exec. Dir. Water Reuse Foundation
- Michael P. O'Neill, USDA, National Program Leader, state research education & extension services, membrane work, executive committee
- Herb Nadler, SEPA
- Robert Renner, Exec. Dir. AWWA Research Foundation, working with drinking water issues, quality & quantity, treatment processes
- Dale Bucks, USDA, Labs that deal with water resources, 69 labs in US, look at quality and quantity, Irrigation Engineer
- Jeff Hoffmann, DOE NETL, office of systems analysis & planning
- Camilla Whitehead, LBNL, max efficiency and conservation
- Joan Pope
- J Gasper, work on energy water nexus for the last three years
- Gene Gibson, TVA Manager, Water Supply, River Operations
- Kathy O'Conner, NYSERDA, NY state
- Brennan Smith, ORNL, Water Resources Engineer, Environmental Science, PhD, PE

EXTRACTION

--- Over pumping of aquifers, Memphis is pumping too much, area where we need additional research on water in aquifers. Development of energy is dependent on water availability

--- With our major policy change for pricing for bio-based fuels, need cost pt where bio-based becomes econ viable. Water limits

--- Alt energy, issues with productivity,
ISSUE Renewables: Long-term new technology
Tidal/wave/OTEC
Near shore impact on coastal circulation, recreational, navigation, water production OTEC

--- ISSUE: Extraction NG western Colorado, fracture,
Coal Bed methane issue
Water quality from mining is low, with large quantity, quality varies widely
Econ market is west but maybe not in east in near term
Geothermal – more efficient processes, high heat geo with surface water as heat sink, technology is not fully developed, need to get econ viability done.

--- What is the nexus for water? Government has policies to discourage conservation of water, where is demand coming from? Where do we get demand?

--- Wells in East of Mississippi
40K in number w/ high water output per barrel of oil/gas\
Cost to clean up and use
Water reuse – for Ag efficiently with lower quality and econ issue
Ag – good [knowledge] of water quality requirements and regulatory dependent
Re use of water for energy is [known] water quality
Quality of water while impaired is still usable from econ stand pt

--- What are we going to use water for? Priority of use
People who have the water, have the water
How do we want to use the water?

- Produced water probably not sufficient
 - Main use of water is irrigation & power
 - More efficient Ag then may lose water in stream
 - Barren land is more of a problem
 - [Environmental] protection is key issue
 - Energy production is not like water because water is used for other demands, timing, quality, quantity, recreation, ESA
 - The above limit power production.
- National Issue
 - Grow food v power v. Ag
 - Land resources v. eco system/ [environment]
- You can't manage what you don't [know].
 - USGS does not have data on all water used in US
 - D/n have data on riparian use (USDA)
 - D/n have data on overall energy costs for pumping water
 - On farm v off farm (no good data)
 - D/n have energy cost for water in Ag, municipality
 - What does water cost in terms of energy costs
- Energy interface
 - Upgrading hydro to increase energy efficiency
 - Can get better energy production efficiency from current water
 - When you use the water during peak power demands
 - When we use the water needs to be better understood
 - Weather forecasting to help increase efficiency
 - Use water per scheduling forecasting
- Need to keep [lights] on during peak energy demands
 - Water resources not used to max energy production
 - Interconnection between compacts must be addressed, must address stakeholder concerns because 1 lawyer can stop the ops.
- Rules of reference do not reflect water availability relative to climate variability and current demands, hydro was the main purpose but has changed.
- Recreation is a major consideration
- Major users have not been categorized and understood
 - Priority given to flood control and power production
 - Move to different newly understood demands by the public
 - Are the tools available to do this analysis?
 - Modeling is available, but legal, political will and data to drive it are missing or at issue
 - Water data, ecological, [environmental] data not sufficient because of the inherent complexities of the aquatic environment
- Never get another lg res
 - Growing cotton in the desert
 - Save 5% in Ag water by being more efficient
 - Think we can Engineer our way out, but faulty b/c does not address the whole problem
- Eastern water leakage is very large and not a problem being address
 - Is it a distribution problem? Demand side?
 - NYC is losing Million gallons per day due to leakage
 - Eliminate leakage then reduce water demand to be pumped thus less energy needed

Unaccounted for water is major issue, cost to figure out, cont to pay pumpage costs v cost to fix leaks, v. where the dollars come from and who allocates the funds to correct the problem (out of sight and out of mind)

Infra structure costs a lot to reduce

Aging infra structure problem - Who is going to pay the cost? Short term fixes may not be best for long term problems, tie to energy is pumping energy consumption for water lost (need to capture costs in energy spent that could be saved

\$280 B in aging water AW need citation

Need small water storage upgrades, small dams are being wasted but

--- Need holistic problem solution rather than separate problems

--- Ground W/Surface interface

Local data/technology uncertainty

How much is available?

Consumption use v [withdrawal?]

--- Cooling tower tech is a major area to conserve water

--- Thermo Electric

Open cycle v closed cycle?

Which is better, what is best use for the locale?

Once through is ok if you can tolerate heat into stream

Trade offs of location of power plant, water source, and fuel resources

Use of state's natural resources is for the state and state's do not like to ship power out of the state

Save resources to higher employment in state

Market distortions because of econ issues, power sold to highest bidder causes problems

--- Three most pressing problems

Value of water for different uses

Who sets values

Insufficient science and data

Not investing enough in science & tech in alt energy technologies

Short term v. Long term technology investment

High risk v. high payoff

DOE investment strategy in future energy development technologies

Improve communication between industry and DOE

For alt energy, no support for alt energy development

Lack of adequate interest and investment in developing innovative energy technology

Need to look beyond conventional applications

Invest in developing innovative energy technology

Need to look beyond conventional US applications

BREAKOUT SESSION 2 (Group D) PROBLEM AREA: WATER SUPPLY

- Do not [know] how much water we have available (allocatable) to support energy production
 - Problem is allocation of water resources from state to state
 - Interbasin transfers

- Value of energy/water
 - Who sets the value?
 - Water is cheap

- Allocation of water over extreme ranges
 - draught conditions
 - flooding conditions

- How much efficiency/conservation is possible?
 - Technology Contribution – How much?

- Groundwater data
 - Groundwater understanding and census
 - Synthesis of data
 - USGS cost
 - Quality and Quantity

- Urban Issues
 - Mgmt of storm & waste water
 - Efficient use of storm water
 - Who pays?
 - Regulatory environment
 - Energy consumption increases w/increased water treatment

- Increase degradation of water (first surface then GW)
 - Increase in energy consumption due to treatment

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BREAKOUT SESSION 3 (Group D) NEEDS IDENTIFICATION

--- Energy Needs

Need to capture Waste heat
Quality system studies of options
Need 75% reduction of imported oil within 40 yrs.
Need to Increase nuclear power to 80% of total energy production in US
Need less water intensive thermal electric technology

--- Goal

Power w/ 50% less consumptive use of water

--- People have been using less water in Denver, but [the] cost of water has gone up so the same amount of water costs more

---Tax incentives for power producers to use less water or generate more power for the water used

--- Government needs to put a policy in place for power generation

--- Cost of water is not really passed on to the consumer

Without a regulatory threshold the minimum water quality will not be met

--- [Do you] change water consumption by behavior, by incentives, or regulatory [policy]?

If costs are passed on to consumer then we will price ourselves out of the markets

--- Incentives – both regulatory and non-regulatory to encourage reduced in energy/water use

--- Supply side or demand side incentives

--- Incentives where are they best applied, consumer or producers

--- The amount of treatment is dependent on the quality that can be released

IF you need drinking water then more treatment

Waste assimilation into the stream, as quality decreased the quantity of quality water is reduced

Pollution is cheaper then cleaning up the water to downstream user needs

--- Need sound science for rational policy

--- Value of water

Water utilities need to increase rates

85% owners are PUC owned and need approval for rate increases

--- The water laws need to be changed to reflect reality

--- How do you make the public understand the value of water and make relative choices?

--- [We] do not know the value of water for users; [we] do not know values for other water uses

--- [There is a] difference between cost and price

Public has ability to pay the price for a product
Government intervention has distorted value of the water in west (340+ dams in west since 1902)
Treated water as public good rather than commodity
Let water become a commodity then private sector will operate efficiently

--- Do utilities consume that amt of water in the east?
Irrigation water d/n go through water utility

--- [It is a matter of] public good vs. commodity

--- Water has more value for drinking vs electric production
--- In Atlanta people d/n want treated water pumped back into the lake
Florida wants the water to flow down to it
Hydro power loss can be compensated
--- Need to educate consumer to understand water reuse is ok.
--- [By the] time water gets to consumer, [it] may have gone through 7 recycles
--- Technology is not the problem, education of public is the problem
Some technologies c/n be implemented b/c political issues
Public wants government run water utilities
--- Public has expectation that water will flow when needed at little or no cost
People d/n always make rational decisions
Changing behavior needs to be recognized

--- Water use criteria from the EPA, is there any sci or tech
--- Water reuse is not regulated, but Calif has state requirements/guidelines, also in FL and TX
NRC states that 80,000 trace compounds in water
World wide issue, d/n have tech to detect, need analytical tools at ppb detection limits
EDCs and PhAcS
Public needs some confidence with water quality, are there sci and tech for continuous monitoring and compliance
Tech exist but for Safeguard and security

--- NEED – Remote continuous monitoring of water quality for waste water treatment, and chemicals from industrial plants.

Technology need to develop cheap remote water monitoring

--- NEED predictive models what water supply will be for the year based on needs and quality required and timing. Total predictive models (for water) are fairly slim in the West and do not exist for the East.

---Power plants need 30 –40 years worth of water supply

The numbers USGS puts out, once through cooling systems with small evap losses and replace with wet cooling then consumptive loss from that water basin

--- NEED Eastern Predictive Tools
Network of monitors
D/n know water supplies in the East

Aging infrastructure needs seasonal and annual predictive models

--- Ag will not change to lower water use crops b/c cost to change equipment to new crop is too large.
Predictive side and trading of water is needed

--- Utilities look at historical records for determining whether there will be enough water

---If we had better predictive tools then able to make better decisions

---Predictive tools need to account for long term cycles

--- Supply predictive tools and demand predictive tools and tools to move water to the markets (market based tools) [are needed]

Creation of water markets in the east, selling water rights by farmers out of basin not allowed by various states.

--- Water Treatment

- Need R&D membranes
 - Lower energy use
 - Concentrate disposal
 - Lower pressure membranes
 - Increase lifetime
 - Fouling - reduce

- UV/O Zone disinfect
 - Lower energy use

- Brackish / desal
 - Membranes

--- Old water delivery infrastructure

- Needs improvements
- Water storage
- Leakage detection
- Leakage correction
- Replacement of piping/upgrades
- Meters on sewage out falls will influence consumer thinking
- Ag water used for alfalfa
 - Water intensity of the crop prime factor in water use
 - Cotton grown in west done by subsidies, better to grow cotton in SE
- USDA found biotech will give 5 – 10% savings in water consumption
- Price of corn has not move much in last 50 years
- Soy beans price have gone up (significantly)
- Change in Ag will come from sale of land to houses, take land out of Ag
- Leased land in Ag big and d/n care about land or water quality
- Less people will grow Ag in US, est. of 33% reduction in Ag production in US in the next 20 yrs
- Ag is biggest consumer of water. Ag consumes 20X amt of water compared to Energy production consumption
- No new surface water supplies being developed, GW is now being developed
- Need to change demand side of equation

--- Hurdle rates

- What rate influences consumer actions
- When does it become worthwhile to make a change

--- Incentives

- National water tax increase 3X

--- Issues becomes a local issue based, need to focus on regional issues and regional solutions

- Policy includes pricing, technology, consumption and we are focusing on technology

Eastern Region Energy-Water Needs Assessment Workshop Real Time Note

Government is doing [something about] water in many area but is not a comprehensive program by the government, thus \$ are being wasted. Water is the oil of the 21st century, and everyone is jumping on the boat. [There are] 25 agencies in government [that] deal with water.

--- Demand side

- Quit growing food in US because not water efficient
- Government needs to increase incentives b/c govt d/n see the water consumption as significantly important
- Education program is that you have a product that really works,
- Are there tech/sci [mechanisms] that influences demand?

--- Consumers

- Need education backed by cost-effective technology
- Marketing incentives
- Decentralize water storage
 - Trapped water influences downstream flows
- Take Ag out then downstream users will have less flow
- Need for better water balances data
- Home owners have small fraction of water
- Home owners have larger fraction of energy as compared to water consumption
- Urban water balance, are there impact or models out there that allow analysis of various changes in the urban water balance (such as reuse, gray water use)
- Pricing is based on competition; incentives are part of a pricing structure that will influence usage.
- Gray water usage will increase, but will be regional issues and will drive consumption or technologies that could be used.
- Both energy and water issues
 - In San Diego in desal with ammonia production

--- Mandate for 4M gallons ethanol from corn