



US Power Industry and Incentive Based Mechanisms - Focus on Water Issues

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“Markets for Carbon and Ecosystem Services:
The Business Case”



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Options for Environmental Improvement

- Command and Control
- Direct Payment
 - Conservation Reserve Program
- Incentive Mechanism
 - SOX trading
- Unregulated market
 - Ecotourism
 - Certification

Principles of Incentive

- Environmental 'externality' is 'internalized' by a cap - like regulation
- Flexibility is achieved under the cap
- Each unit of improvement has a market value
- Buyers are those who would pay more to achieve the cap on their own

Current US Incentive-based activities

- Wetlands mitigation
- Stream impact mitigation
- Conservation banking for endangered species
- CO2 trading
- Water quality and quantity trading

Water issues related to electricity

- Overall, approx. 38% of freshwater resource in US is used by electricity generation
 - Cooling water withdrawal
 - 20-50 gal/kWh for steam plants
 - 7.5-20 gal/kWh for combines cycle plants
- Water temperature
 - Heat from the condensor is absorbed
- Water treatment
 - Chlorine for microbe control
- Aquatic population impacts
 - Cooling water intake impingement and entrainment

Water management and compliance options

- Water rights transfers
- Total Maximum Daily Load (TMDL) programs
- Clean Water Act Section 316

Water Rights Transfers

- In the western U.S., transfers are based on existing water rights
- Transactions done on a willing seller - willing buyer basis
- Types of transactions
 - Permanent acquisition
 - Short-term lease (< 2 years)
 - Options Contracts

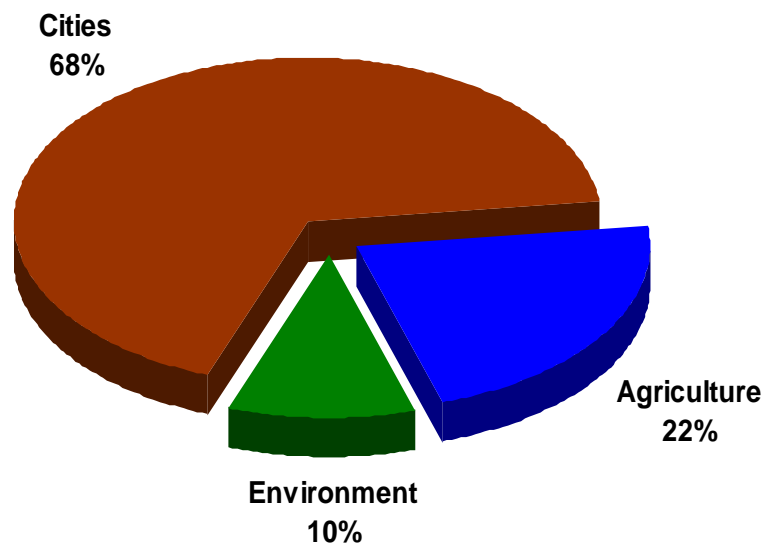
Benefits of Water Transfers



- Provides price signals that encourage more efficient resource use and conservation
- Alternative to costly new dams & storage project
- Makes it possible to acquire environmental water supplies to restore & protect river ecosystems
- Creates economic incentive for private water rights holders to reduce water use and sell or transfer conserved water

Water Market Activity in the Western U.S.

Water Purchasers Western States (1990-2000)



Skyline Ranch Water Lease: A Model Acquisition of Instream Flows (1)



- Participants
 - BPA (Buyer)
 - Skyline Ranch Farms (Lessor)
 - Environmental Defense (Broker)

- Lease Terms
 - Up to 16,000 acre-feet annually
 - \$7-11 per acre-foot
 - Water source -- land following

Skyline Ranch Water Lease: A Model Acquisition of Instream Flows (2)



■ Results

- ~40,000 acre-feet transferred instream (1994 - 1996)
- USBR exercised option to purchase water right

■ Benefits

- Increased instream flows for salmon
- Hydropower revenues helped to offset acquisition cost

TMDL (Total Maximum Daily Load)

- Water quality trading programs
 - market-based approach that can be used to reduce water pollution and enhance water quality in a flexible and cost-effective manner.
- Addresses 'non-point source' pollutants
 - Phosphorus and Nitrogen
 - Sediment
- Watershed based

TMDL (2)

- For each pollutant affecting an impaired water body, the state is required to establish a total maximum daily load (“TMDL”).
- TMDLs are water quality assessments
 - the sources of pollutants of concern for a particular waterbody are determined
 - consider the maximum amount of pollutants the waterbody can assimilate, and then
 - allocate to each source a set level of pollutants that it may discharge without exceeding the applicable limitations (i.e., a “wasteload allocation”).

TMDL (3)

Land management activities eligible:

- protecting sensitive areas (including wetlands);
 - riparian zone preservation;
 - maximization of open space;
 - wet ponds to store runoff;
 - grassy swales;
 - filter strips;

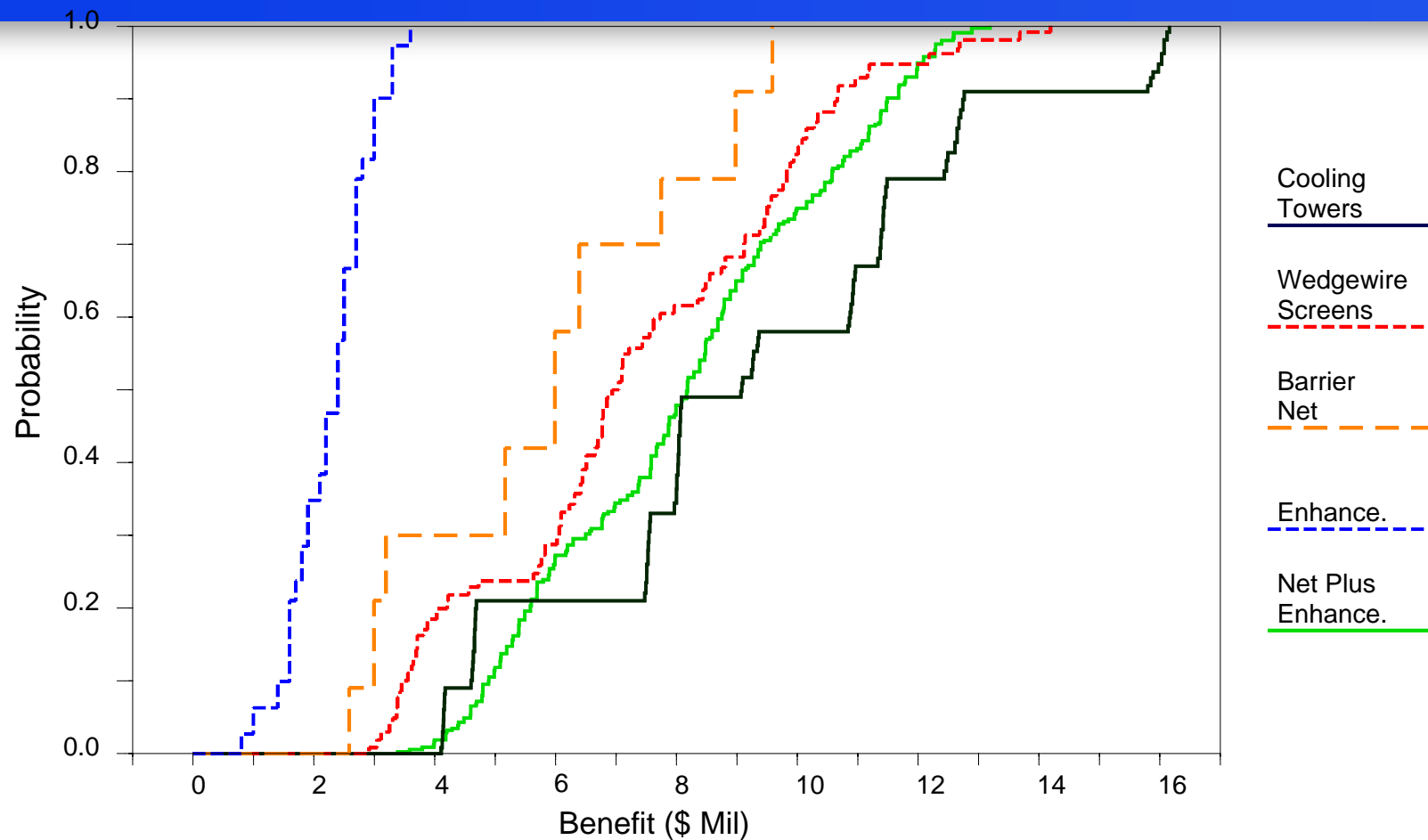
Section 316 of the Clean Water Act

- Requires reduction of impacts to aquatic populations (80 - 90%)
- Cooling water intake at power plants can exceed 1M gallons/minute
- Both existing and new power plants may use of restoration measures in combination with, or as an alternative to Best Technology Available (BTA) for compliance.

Evaluating Restoration Measure Opportunities

- Direct Replacement (e.g. Aquaculture)
 - Replacement of species lost
 - Replacement of species lost with more desirable species
- Indirect Replacement
 - Habitat Creation (wetlands, structures, substrates)
 - Making unavailable habitat available (obstruction removal or increasing D.O.)

Cumulative Probabilities of Benefits



Conclusions

- Incentive or 'market' based solutions to a number of environmental issues
- Water, biodiversity, air, and climate impacts are included
- Many projects address more than one type of impact
- These solutions need to address 'working' landscapes - not just conservation