NEED AREA: Water Treatment Technologies/Disposal and Use Approaches				
	Today's performance	Near-term Goals	Mid-term Goals	Long-term Goals
Produced water: Treatment technologies	$0.10-0.50/bbl $0.10-$1.5/1,000 gal. for CBM produced water. $1.00-$2.00/1,000 gal. for mine water.	R&D: Develop processes to remove chlorides and other ions from produced water, thus upgrading it for energy facility use	T&E: Establish pilot tests to assess new materials and processes for utilizing produced water and identify costs and performance **GOAL: Reduce cost per gallon treated by 50%.**	I: Implement new standards for use of materials compatibility with produced or impaired waters for use in power plant cooling and other beneficial uses. **GOAL: Increase direct reuse of produced water by 100%**
		T&E: Review, prove in-field novel treatment techs developed in past DOE work; create water for beneficial use • R&D: Develop/optimize treatment plant to produce water for livestock/wildlife	R&D: Small scale treatment system for oil wells that have small volumes of produced water.	
Produced waters: Quantifying quality needs for utilization	While general data exists, consistent data collection is lacking at regional scales	R&D: Identify zero discharge energy sector applications (hybrid cooling systems, oil shale use?) R&D: Create specialized, centralized, sharable database on CBM produced water quantities. (USGS) R&D: Quantify extent of consumptive use R&D: Establish water quality metrics for a variety of proposed reuse techniques.	T&E: Develop pilot efforts to assess impacts of use of produced water for energy development and other uses (collect cost and performance data) (DOE)	**GOAL: Establish opportunities for energy sector and other sector use of produced water and treatment needs required for use**
Produced waters: Improved disposal and management technologies	Lack of cost-effective treatment and disposal technologies at small-scale	R&D: Investigate water reinjection for enhanced Coal Bed Natural Gas (CBNG) production • Research enhanced bioactivity for CBNG production; identify test operators		
Thermoelectric plants: Treatment technologies		R&D: Conduct research on membranes for use with waste heat desal processes for upgrading non-traditional waters • Ceramics, crystalline clays R&D: Need to identify polishing systems to combat WQ problems associated with scrubber water reuse; demonstrate same.	R&D: Cycles of concentration—characterization of waters, new treatment techs to increase number of cooling cycles.	

Comment [C1]: I have deleted all of the energy-for-water sub-groups as (a) they get away from the water-for-energy angle, and (b) much of the topic is covered in the desal roadmap/implementation plan.

Topic 1. Produced water treatment technologies
GOAL: Reduce cost per gallon treated by 50%.
GOAL: Increase direct reuse of produced water by 100%

- Develop processes to remove chlorides and other ions from produced water, thus upgrading it for energy facility use
- Implement new standards for use of materials compatibility with produced or impaired waters for use in power plant cooling and other beneficial uses.
- Review, prove in-field novel treatment techs developed in past DOE work; create water for beneficial use
  - Develop/optimize treatment plant to produce water for livestock/wildlife
- Mid-Term activity: Establish pilot tests to assess new materials and processes for utilizing produced water and identify costs and performance
- Mid-Term activity: Small scale treatment system for oil wells that have small volumes of produced water.

Topic 2. Thermoelectric plants, treatment technologies

- Conduct research on membranes for use with waste heat desal processes for upgrading non-traditional waters
  - Ceramics, crystalline clays
- Need to identify polishing systems to combat water quality problems associated with scrubber water reuse; demonstrate same.
- Mid-Term activity: Cycles of concentration—characterization of waters, new treatment techs to increase number of cooling cycles.

Topic 3. Produced waters: Quantifying quality needs for utilization
GOAL: Establish opportunities for energy sector and other sector use of produced water and treatment needs required for use

- Identify zero discharge energy sector applications (hybrid cooling systems, oil shale use?)
- Create specialized, centralized, sharable database on CBM produced water quantities.
- Quantify extent of consumptive use
- Establish water quality metrics for a variety of proposed reuse techniques.
- Mid-Term activity: Develop pilot efforts to assess impacts of use of produced water for energy development and other uses (collect cost and performance data)

Topic 4. Produced waters: Improved disposal and management technologies

- Investigate water reinjection for enhanced Coal Bed Natural Gas (CBNG) production
  - Research enhanced bioactivity for CBNG production