Sustainable Water Supplies for Natural Gas Development

Ken Nichols/CH2M HILL
Bruce Thomas-Benke/CH2M HILL
Matt Mantell/Chesapeake Energy
What is Sustainability?

“...a concept and strategy by which communities seek economic development approaches that benefit the local environment and quality of life.”

www.austin.tx.us/zoning/glossary.htm

“..Leave the world a better place than you found it, take no more than you need, try not to harm life or the environment, make amends if you do.”

Natural Gas Industry

- Natural gas is a clean burning, water efficient fuel that belongs in our energy portfolio
- Extraction of finite volumes of natural gas is a temporary operation
- The industry is applying sustainability goals throughout its operations
Presentation Objective

- Highlight components of a model for water resources planning that:
  - Incorporate important aspects of sustainability
  - Have been successfully implemented in adjacent utilities and industries in Texas
  - Have application to the oil and gas upstream E&P industry
Initial Feedback

- “I don’t have months to plan and years to implement – I need the water now!”
- “The rules are changing all the time – any plan created now will surely be obsolete before we can implement it.”
- “This ain’t Texas!”
Current Water Management

- Current water supply approach:
  - Satisfies near-term requirements
  - Is operations driven
- Emerging Risks
  - Increasing demand
  - Increasing stakeholder interests
  - Permitting uncertainty
  - Increasing competition for supplies
- Potential Outcome
  - Supply interruption
  - Increasing costs
  - Schedule delays
Sustainable Water Resources Planning

- Step 1 – Estimate demands
- Step 2 – Inventory sources
- Step 3 – Identify deficits
- Step 4 – Identify new strategies
- Step 5 – Criteria and ranking
- Step 6 – Detailed feasibility
- Step 7 – Field Investigations
- Step 8 – Implementation
Identify New Strategies

- Conservation – Demand Reduction
- Water Supply Trading
- Recycled Water
- Seawater Desalination
- Brackish Groundwater Desalination
- Local Groundwater
- Imported Groundwater
- Surface Water and Groundwater
- Surface Water with an Off-Channel Reservoir
- Surface Water and Aquifer Storage and Recovery
- Acid Mine Drainage Water
Criteria and Ranking

- Sustainable economics
  - Capital and operational costs
  - Implementation schedule
- Sustainable environmental impacts
  - Minimize adverse effects
  - Environmental mitigation
- Sustainable quality of life
  - Community partners
  - Site selection
  - Visual mitigation
Example Strategy - ASR System

- Store when excess surface water is available
- Recover during peak demand periods
- 22,400 acft/yr
- 30 mgd peak
- 20 mgd average
- 72 months
- 30 year life
- $7.75/1,000 gal
- $2,530/acre-ft

Note this figure is schematic and was developed for the purpose of creating order of magnitude cost estimates. It is not based on an actual planned project.
Sustainable Operations – ASR System

![Graph showing monthly demand and surface water diversions for Sustainable Operations – ASR System.](Image)

- **Volume (acre-feet)**: The graph shows the monthly volume in acre-feet for each month from January to December.
- **Monthly Demand**: A line graph indicating the demand for each month.
- **Surface Water Diversions**: Bars representing the surface water diversions for each month.

The graph illustrates the variability in volume and demand, with notable peaks and troughs throughout the year.
Mitigation Programs

- Detailed studies
- Communications with Stakeholders and Partners
- How can the impact to local resources be documented?
- Develop monitoring plans, sampling plans, and databases
  - Existing wells and equipment
  - Water Levels
  - Water Quality
Reduce, Reuse, Recycle

- Sustainable water supply plans start with the “3 R’s”
  - Reduce, Reuse, Recycle
- Flowback and produced water can meet a portion of the water demand
- Effectively turns a difficult to manage waste into an asset
- Begin with a detailed regulatory review for all operational areas including:
  - Storage
  - Treatment
  - Transport
  - Disposal
Summary

- Consider “outside the box” options for water supply
- Use operator-specific criteria to rank alternatives
  - Sustainable Economics
  - Sustainable Environmental Impacts
  - Sustainable Quality of Life for neighboring communities
- Start planning during the project development phase
- Incorporating sustainability concepts can yield operational benefits
Questions