

**AN INTEGRATED FRAMEWORK FOR TREATMENT AND MANAGEMENT  
OF CBM PRODUCED WATER – A MICROSOFT EXCEL®-BASED TOOL  
TO HELP BRING PRODUCERS AND BENEFICIAL USERS TOGETHER**

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The Colorado School of Mines (CSM) in collaboration with the Argonne National Laboratory (ANL) and Kennedy/Jenks Consultants has launched a research program entitled “An Integrated Framework for Treatment and Management of Produced Water” funded by the Research Partnership to Secure Energy for America (RPSEA). An output of this research program is a tool that allows producers, potential beneficial users, and various other stakeholders to identify the technical, logistical, regulatory, legal, and other institutional issues that can inhibit the beneficial use of produced water. Due to these institutional issues, a traditional linear problem-solving framework is not ideal for assisting energy companies and the water industry to develop beneficial use partnerships. In contrast, a bi-directional, or “matchmaking”, approach has been developed. This approach allows the stakeholders to consider the institutional complexity and the economic viability of multiple beneficial uses, either locally or outside of the basin and/or state. This framework also identifies the participation of third parties, or “brokers”, if needed, to help resolve key institutional issues, uncertainties and risk.

The tool is comprised of three parts: 1) Water Quality module, 2) Treatment Technology Selection module, and 3) Key Elements modules. The completed tool will allow a stakeholder to use the first two modules independently or use the overall tool, which entails the three modules interacting with each other. The contents of the first two modules will be the focus of other presentations; this presentation will introduce the objectives and utility of the Key Elements module.

The Key Elements module utilizes the outputs of the first two modules (i.e., a complete estimated produced water quality profile, and preferred treatment process trains for each beneficial use, respectively). In addition, user-specific inputs relating to water quantity, supply timing and reliability, and duration of supply are used to qualitatively determine the feasibility of different beneficial use scenarios. A feasibility ranking is accompanied by a listing of institutional issues that include resources for stakeholder education. Estimated capital, O&M, and life cycle cost curves are developed for preferred treatment processes and conveyance systems. Stakeholders can compare the cost of treatment and recovered cost of beneficial use to determine traditional economic viability. Triple bottom line (TBL) benefits are also presented to help stakeholders recognize the complete economic viability of the beneficial use of produced water. A hypothetical case study will be included in the presentation to illustrate the outputs of the Key Elements module.

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