

ENERGY AND WATER PRODUCTION TRENDS IN THE POWDER RIVER BASIN

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ABSTRACT

Energy extraction and water are intrinsically linked. Quantifying this relationship is critical in order to devise effective management techniques that minimize adverse environmental impacts and potentially reduce production costs. The objective of this study was to assess the spatiotemporal variability in water use and production through hydrocarbon extraction from conventional and unconventional reservoirs using data from the Powder River Basin in Wyoming as a case study. A detailed well-by-well analysis was conducted to quantify the spatiotemporal variability of oil and gas volumes and the corresponding co-produced and used water from conventional oil reservoirs, coal bed methane (CBM) reservoirs, and unconventional shale reservoirs. Results show conventional and CBM resources historically produce larger volumes of water relative to unconventional resources produced within the last decade. Unconventional oil and gas production has increased since 2011 with water usage per unconventional well doubling and produced water volumes remaining steady. CBM produced water is typically fresh and largely disposed of in surface impoundments or released into streams. Because of their continued production of large water volumes that are applied beneficially elsewhere, CBM wells in proximity to new unconventional well development may be a source of water needing minimal treatment for growing hydraulic fracturing water demands.

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