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Reducing the Costs of Meeting Regional Water Demand Through
Risk-based Transfer Agreements
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ABSTRACT

Transfers of treated water among inter-connected utilities is becoming more common as
the cost of developing new supplies grows, and transfer agreements require well
developed rules describing when and how much water will be transferred. The nature of
the decision rules governing an agreement must also be coordinated with respect to the
treatment and conveyance capacity required to execute the transfers. This study explores
different combinations of infrastructure and agreement type that define three different
transfer programs, describing the frequency and volume of transfers associated with each,
as well as its costs. The agreements are described in terms of the type of decision rule
employed: Take-or-Pay, with the timing and quantity of transfers fixed; Days of Supply
Remaining (DSR), which uses a static hydrologic indicator to trigger transfers; and Risk-
of-Failure, a probability-based decision rule that involves consideration of both supply
and demand. The analysis is applied to the Research Triangle area of North Carolina
(USA), a rapidly growing area that is beginning to approach the practical limits of water
resource development. The Risk-of-Failure agreement reduces the average volume of
transfers by over 80% compared to a Take-or-Pay agreement and by roughly half relative
to the DSR agreement, leading to significant cost reductions. A utility's willingness to
accept something less than guaranteed access to a specified quantity of water (i.e. an
interruption) also has a significant impact on cost. Interruptions do not necessarily lead
to lower reliability, but rather to the purchasing utility acquiring more water during off-peak
periods when the seller has excess treatment capacity available, and the lowest cost
guaranteed agreement is 40% to 50% more expensive than the lowest cost interruptible
contract.

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