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Smart Meter Enabled Dynamic Pricing of Water

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Abstract: The advent of smart metering is set to revolutionize many aspects of the relationship between water utilities and their customers. Smart-metered data supports enhanced customer interaction, enables linking to social media and paves the way for dynamic tariffs (prices that change over time). For dynamic pricing, metering must have sufficiently high frequency and enable billing users individually; smart metering enables this. Dynamic tariffs aim to either reduce demand or shift it in time and can be designed for revenue neutrality with the wider aim of increasing economic, social or environmental benefits. Two dynamic water pricing schemes are described here: scarcity and peak pricing. Scarcity pricing reduces demand by setting prices nearer to the marginal economic value of water, which is closely related to water scarcity in the basin which varies over time. Scarcity pricing aims to send users a signal of water's value in connection with its scarcity to promote more efficient water use. Peak pricing uses demand displacement tariffs, sometimes combined with demand reduction tariffs, to lower and maybe shift the peak demand to off-peak hours. The aim is to reduce leakage and decrease future network expansion and maintenance costs while potentially lower pumping energy costs. The proposed analysis estimates the potential economic and engineering benefits of dynamic tariff designs. These benefits are assessed for the Greater London area in the United Kingdom and its 15 million inhabitants. Scarcity pricing is implemented by equating the marginal value of residential demands with the estimates of the marginal economic values of environmental flows derived from tourism, property values, etc. Over the 85-year historical period, scarcity pricing during droughts resulted in a 70% reduction in environmental flow shortage volumes whilst residential prices rose above twice the base rate only 3% of the time. The net present value of estimated savings from peak pricing was evaluated approximately at £30 million for each of the initial percentage points in peak usage reduction. The talk also discusses the wider implications, challenges and benefits of dynamic pricing, and its potential links to customer interaction, social media, and to the SmartH2O project more generally.

Keywords: Smart metering; Residential water tariffs; Scarcity pricing; Daily peak pricing; Greater London