



## Project Profile

### A Framework Methodology for Estimating the Impact of Household Metering on Consumption

#### Background

In April 2000, UK households became entitled to a free meter, so that they could switch from tariffs based on Rateable Value to a volumetric charge. There was no consensus as to what the effects of this policy would be on companies' revenue bases and demand levels.

NERA was commissioned by UK Water Industry Research (UKWIR), an industry body jointly funded by all UK water companies, to produce a framework methodology for them to estimate the impact of household metering on consumption. The objective of the project was to produce a robust set of guidelines, which would provide the water companies with a clear procedure for determining the impacts of differing household metering programmes on various customer groups. The project was also required to identify the information it would need to make such determinations. The methodology differentiated between the propensity to opt for measured charging ('switching effects'), and any consequent behavioural changes ('demand effects'), and quantified both at an industry level. The methodology was designed to be acceptable to both the industry and the regulatory agencies.

#### NERA's Role

NERA's study included a number of elements which fed into the development of the framework methodology. We began with a survey of the published literature on the demand effects of household metering (and simultaneous charging by volume). The review considered empirical evidence on optant and other water metering programmes in the UK and the rest of the developed world, as well as the literature on the possible hardship and health effects of metering on low-income households. We found a body of literature on the

demand effects of compulsory metering, both in the UK and abroad. However, no literature was found which offered a theoretical treatment of the optional water metering decision and only very limited empirical evidence was found on the effects of opting on demand.

The second element of research feeding into the framework methodology involved two empirical analyses. For these, NERA assembled a unique panel dataset combining data on 8,600 households from eight UK water companies' consumption monitors, covering the period July 1996 to December 2001.

The first empirical analysis explored the determinants of the household decision to opt voluntarily for a metered charge. We developed a model of the opting decision, in which the decision to switch was considered in a survival model framework, and accordingly in which a number of factors influencing the decision were treated as 'hazards'. Using an econometric technique specifically suited to the estimation of survival models with discrete time observations, we derived estimates of the proportional influences of a range of factors on the decision to opt for measured charging. The results derived from this approach could be interpreted naturally.

The second empirical analysis investigated the impact of optional metering on consumption. For this analysis, we estimated a household water demand function that captured the effect of metering on consumption as the sum of an initial effect, itself a function of the measured volumetric charge, plus a post-opting trend effect, which captured the differences in trend water use behaviour over time between measured and unmeasured households.

The final element of research feeding into the development of the framework methodology was a review of company practices in estimating the effects of metering on consumption, and a survey of the types of data holdings that companies maintained.

### **Six-Stage Process**

The framework methodology set out a number of options for companies to choose between to evaluate the impact of household metering on consumption depending on the availability of data. The core of the framework methodology was a six-stage process by which changes in the charging base—such as compulsory and optant metering—and demand effects could be consistently projected as a function of the given company starting position and a set of influencing factors. For each stage, the framework presented a range of approaches companies could take, along with the required data.

Stage One of the framework was to describe the ‘initial’ customer base and the related initial demand. Stage Two took account of the change in the charging base arising from net changes in numbers of properties and growth or decline of the population. Stage Three considered the effects of property turnover, ie the movement of households. Stage Four applied company metering policies and so derived the numbers of selective metered properties (including new properties and those metered on change of occupier). Stage Five then took account of customer driven or voluntary changes in charging status. Having established the projected changes in the customer and charging base, the final stage of the framework methodology, Stage Six, was to estimate the resulting impact on consumption.

### **The Result**

This work has helped the water companies to forecast the number of optants, and the impact of optant metering on consumption, which has made their regulatory submissions and business planning more robust. The framework methodology developed by NERA has become the best practice standard for the UK water industry in this field.

### **Further Analysis of the Impact of Household Metering on Consumption**

The success of this project, and in particular its empirical component, led to NERA being commissioned by UKWIR for a follow-on study to undertake substantial further analysis of the unique panel dataset constructed from companies’ consumption monitors. In this follow-on study, NERA undertook further analysis of the household decision to opt for a meter by collecting and analysing data on

companies’ publicity campaigns to encourage households to switch to a measured charge. NERA also examined the impact of opting on consumption further by investigating post-opting consumption trends, and comparing optants’ and unmeasured households’ consumption patterns in peak periods and in different weather conditions. These refinements substantially added to the knowledge base of the industry as a whole.

### **Expert Involved**

Dr William Baker (Bill Baker) specialises in the economic and financial analysis of regulatory and privatisation issues in network industries and leads NERA’s Water Practice. In his twelve years at NERA Dr Baker has worked closely with many clients, in many countries, to successfully complete projects ranging across sector reform, introduction of competition, development of regulatory frameworks, privatisation by sale and by concession, price control mechanisms, cost and tariff studies, demand and willingness-to-pay analysis, financial modelling and cost of capital studies.

### **About NERA**

NERA Economic Consulting ([www.nera.com](http://www.nera.com)) is a global firm of experts dedicated to applying economic, finance, and quantitative principles to complex business and legal challenges. For half a century, NERA’s economists have been creating strategies, studies, reports, expert testimony, and policy recommendations for government authorities and the world’s leading law firms and corporations. We bring academic rigor, objectivity, and real world industry experience to bear on issues arising from competition, regulation, public policy, strategy, finance, and litigation.

NERA’s clients value our ability to apply and communicate state-of-the-art approaches clearly and convincingly, our commitment to deliver unbiased findings, and our reputation for quality and independence. Our clients rely on the integrity and skills of our unparalleled team of economists and other experts backed by the resources and reliability of one of the world’s largest economic consultancies. With its main office in New York City, NERA serves clients from more than 20 offices across North America, Europe, and Asia Pacific.

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