ESRI
RESEARCH
BULLETIN
MARCH
2018

ADOPTION OF NATURAL GAS FOR RESIDENTIAL HEATING

DAIRE MCCOY AND JOHN CURTIS

ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE

Adoption of natural gas for residential heating[1]

Daire McCoy (Grantham Research Institute, LSE, ESRI), John Curtis* (ESRI, TCD)

ESRI Research Bulletins provide short summaries of work published by ESRI researchers and overviews of thematic areas covered by ESRI programmes of research. Bulletins are designed to be easily accessible to a wide readership.

INTRODUCTION

The focus of this research is the adoption of gas central heating in Ireland, in particular understanding the time-lag of adoption of more efficient heating methods, once available. Public policy interest in residential fuel choice centres on encouraging fuel switching away from carbon intensive fuels, such as peat and coal, to less carbon intensive fuels, such as gas or renewables. The residential sector accounts for approximately one-quarter of final energy consumption in Ireland, while within the residential sector space and water heating account for approximately 80% of energy use. Reducing the carbon intensity of residential energy is particularly important given Irish and EU targets for greenhouse gas emissions as a means of contributing to international efforts to limit global warming below 2°C.

DATA AND METHODS

Two primary data sources are used in the analysis. One is detailed information on the geographic location of the gas network, as well as the date when each segment of the gas network was installed. We combined that with data from the Central Statistics Office (CSO) 'Small Area Population Statistics', which contains information on central heating fuel type (e.g. gas, coal, etc.), building characteristics (e.g. apartment, etc.), and socio-demographic characteristics of the occupants. Small Areas generally comprise between 80 and 120 dwellings and are the smallest geographical areas that the CSO publish information from the Census of Population, in line with data protection and confidentiality safeguards.

Using statistical methods we estimate how much building and occupant attributes contributed to the proportion of gas users within each Small Area. In particular we examine how long of a time-lag exists before households adopt natural gas, once it becomes available in an area. These results are then used to simulate residential uptake of future gas network expansion.

[1] This Bulletin summarises the findings from: McCoy, D., Curtis, J. "Exploring the spatial and temporal determinants of gas central heating adoption", *Resource and Energy Economics*, https://doi.org/10.1016/j.reseneeco.2017.12.004

*john.curtis@esri.ie

RESULTS

There was a rapid expansion in the gas network beginning in the 1990s compared to a relatively static network in previous decades. When we focus the time horizon on the past 20 years, each additional year the network has been in place in an area is associated with approximately a 12 percentage point increase in gas customers, though this rate abates over time.

Even in areas that are relatively close to the network, distance to connection still matters. A one percent increase in average distance to the network is associated with a 13 percentage point reduction in the proportion of households connected within a Small Area.

The ban on the sale and burning of bituminous fuel appears to have had an effect on the level of gas network connection. All else being equal, these areas have an 11 percentage point higher proportion of gas users.

Areas with high proportions of young families and elderly people are also associated with greater gas connections, compared to those with high proportions of 25–44 year olds. Areas that are more socially deprived, with fewer 'working' households or lower levels of education, have lower rates of network gas connection. Small Areas with higher proportions of outright homeowners and private renters are less likely to have gas connections than those with high proportions of mortgage holders.

The results from the model were used to simulate expected residential uptake following network expansion to a typical Irish town. Wexford town was chosen as an example. The level of connections increases quite rapidly over the first 8 years following network expansion reaching a plateau just below 60% mean share of gas connections by Small Area (assuming the network is widely installed across the town), though the share of connections differs substantially between Small Areas. The projected reduction in greenhouse gas emissions associated with fuel switching is projected at 70 $ktCO_2$ per annum after ten years, or approximately 1% of emissions from the Irish residential sector.

POLICY IMPLICATIONS

Domestic gas network connections are neither uniform nor instantaneous following network expansion. However, connections do occur relatively rapidly reaching a plateau within 10 years. Network expansion in socially deprived areas may be unprofitable or have longer pay-back periods and accordingly if gas network expansion is considered socially desirable public subvention may be necessary in some instances.

Proximity to the network is an important determinant of the level of connections. Connection fees of €250 flat rate up to 15 metres connection plus €51/metre beyond 15 metres appear to be a significant deterrent to connection. Fuel switching to gas has substantial benefits in terms of greenhouse emissions reductions. An arguable case can also be made that public subvention towards network connection fees is merited to encourage fuel switching away from carbon intensive fuels.

Whitaker Square,
Sir John Rogerson's Quay,
Dublin 2
Telephone **+353 1 863 2000**
Email **admin@esri.ie**
Web **www.esri.ie**
Twitter **@ESRIDublin**

ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE