

OECD-EUROPE NATURAL GAS CONSUMPTION AN OUTLOOK TO 2020

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OVERVIEW

This research investigates the relationship between OECD-Europe¹ natural gas consumption, GDP, natural gas prices and the underlying energy demand trend (UEDT) in order to forecast future European natural gas demand. To achieve this, a natural gas demand function for Europe is estimated by applying the structural time series technique to annual data over the period 1978 to 2007. This technique, uncovers the underlying energy demand trend for the OECD-Europe that arguably should be taken into account when considering the future for energy policy decisions. The results suggest that GDP, natural gas prices and the underlying energy demand trend all have an important role to play in driving European natural gas consumption. Consequently, they should all be incorporated when modelling European natural gas demand. It is therefore found that the income elasticity and price elasticities are 0.95 and -0.18 respectively, with an increasing and decreasing underlying energy demand trend over the estimation period. Based on the estimated equation, and different forecast assumptions, it is predicted that European natural gas consumption will be somewhere between 294,660 and 468,338 ktoe by 2020.

METHODS

Therefore, within the STSM framework, it is assumed that OECD-Europe natural gas demand is identified by:

$$E_t = f(Y_t, P_t, \mu_t) \quad (1)$$

Where: E_t = OECD-Europe total natural gas demand;

Y_t = GDP (US Dollar 2000=100 PPP)

P_t = OECD Europe natural gas price index (2000=100); and

μ_t = level of UEDT at period t.

For the econometric estimation of equation (1), the dynamic autoregressive distributed lag specification is utilised as follows:

$$A(L)e_t = B(L)y_t + C(L)p_t + \mu_t + \varepsilon_t \quad (2)$$

$$e_t = \ln(E_t);$$

$$y_t = \ln(Y_t);$$

$$p_t = \ln(P_t);$$

$B(L)/A(L)$ = the long run income elasticity of natural gas demand;

$C(L)/A(L)$ = the long run price elasticity of natural gas demand; and

ε_t = a random error term.

The level of UEDT (μ_t) is stochastic with the following formulation:

$$\mu_t = \mu_{t-1} + \beta_{t-1} + \eta_t \quad ; \quad \eta_t \sim \text{NID}(0, \sigma^2_\eta) \quad (3)$$

$$\beta_t = \beta_{t-1} + \xi_t \quad ; \quad \xi_t \sim \text{NID}(0, \sigma^2_\xi) \quad (4)$$

¹ OECD Europe includes Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

RESULTS

After eliminating the insignificant variables and including a level break intervention for 1988 in order to maintain the normality of residuals and auxiliary residuals, the preferred estimated equation is given by:

$$e_t = 0.94665y_{t-1} - 0.17585p_{t-1} - 0.07612Lv188 + \mu_{2007} \text{ where } \mu_{2007} = 4.53230$$

Three scenarios are implemented with different assumptions namely high case, reference and low case. In the high case and the low case scenarios, combinations of economic variables (price, GDP and UEDT) are chosen that 'maximize' and 'minimize' the natural gas consumption respectively. In the reference scenario, what is seen as the 'most probable' outcome for these economic variables is assumed (Figure-1). The three scenarios up to 2020 are illustrated in Figure 2. These show that OECD Europe natural gas consumption will grow to 294,660 , 356,922 and 468,338 ktoe by 2020 according to the low reference and high case scenarios respectively.

Figure-1: Forecast Scenarios

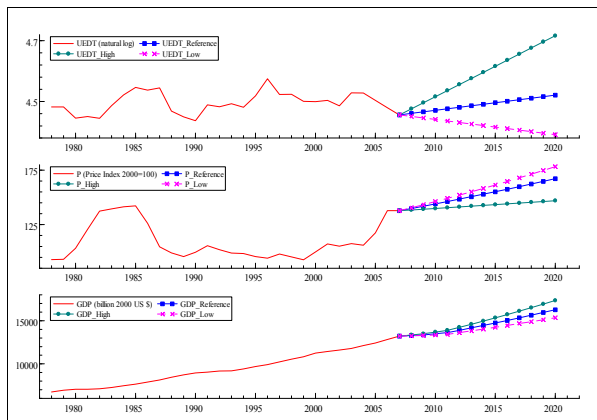
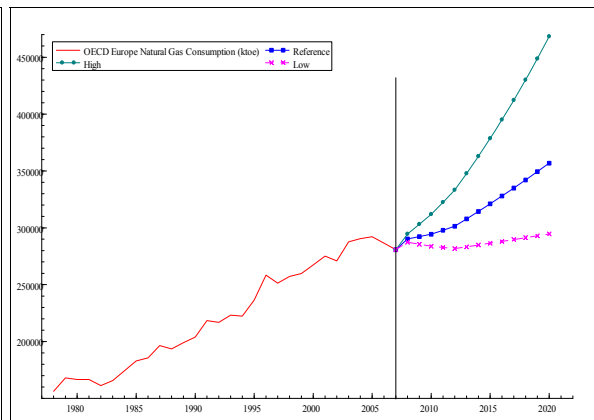


Figure-2: Forecast Results



CONCLUSION

GDP, natural gas prices and the UEDT are all important factors that shape European natural gas demand. The income and the price elasticities are 0.95 and -0.18 respectively. Income has a greater impact on European natural gas demand than price which is consistent with previous studies. The UEDT has a stochastic process, increasing and decreasing over the estimation period; however starting from 1996 it follows a generally decreasing path (except 1998, 2001 and 2003). It might be because of improved energy efficiency standards. However the environmental concerns make natural gas a popular choice rather than other fossil fuels, therefore it is expected that power sector will widely use natural gas as a fuel, which might change the direction of UEDT. The OECD-Europe natural gas consumption is expected to be 294,660 , 356,922 and 468,338 ktoe by 2020, according to the generated low, reference and high case scenarios.

REFERENCES

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