Check proposal type: Typical Concurrent Paper_X__ Extended Presentation Paper___

HEAT POVERTY IN KAZAKHSTAN

[Zauresh Atakhanova, Nazarbayev University, +7 7172 705914, zatakhanova@nu.edu.kz]
[Peter Howie, Nazarbayev University, +7 7172 705790, peter.howie@nu.edu.kz]

Keywords

Energy poverty, energy policy, residential coal use

Overview

Price liberalization, privatization and the associated decline in income levels in the former centrally planned economies significantly increased the burden of energy expenditures for households in Eastern Europe and the Former USSR. Various studies (Energy Policy, 2012) demonstrated that lack of access to clean energy is an impediment to social and economic development. The harsh climatic conditions and the wide-spread use of coal for heating purposes add complexity to the issue of energy poverty in Kazakhstan. Forty per cent of Kazakhstan's housing stock is based on central heating supplied by coal-fired cogeneration facilities and another 40 per cent of the housing stock relies on small low-efficiency coal furnaces. Central heating prices are subsidized, most residential consumers cannot adjust their use of central heating, and its consumption is not metered. These factors complicate the analysis of heat poverty among residential central heat consumers. As a result, this study is concerned with estimating the heat poverty line of residential coal consumers and identifying the socio-economic factors that increase the likelihood of a household being in heat poverty.

Kazakhstan experienced a sharp reduction in income levels as a result of the breakup of the Soviet Union. However, rapid development of its oil fields and strong demand for other minerals that represent the bulk of Kazakhstan's exports contributed to economic recovery. Saving of oil revenues by the public sector allowed the government to mitigate the effects of the world financial crisis in 2008 and 2009. Our research question is to study whether fuel poverty affects a significant number of households in Kazakhstan and what policies are likely to reduce the likelihood of a household being in fuel poverty. Specifically, we are interested in evaluating the patterns of fuel poverty among users of coal. We use household budget survey data for 2009 of more than 4,600 residential consumers of coal.

Methods

Our modeling framework follows the approach of Barnes et al. (2010) and Khandker et al (2012) where household energy demand the beyond minimal consumption level depends on income, energy prices, access to specific types of energy, and household characteristics such as education, size, and location. We use "Consumption Expenditures of Households" net of purchases of durables as a proxy for household income. Our consumption expenditures variable includes the value of consumption of home-produced food which is calculated as quantities of consumed home-grown food items multiplied by their respective median price in a given oblast. Our coal consumption data is available in the form of household monetary expenditures on coal. Therefore, household expenditures on coal beyond subsistence level of coal consumption should increase with higher income level, higher coal prices, and greater inefficiency of the house and heating equipment. An empirical analysis incorporates a two-step process. At first, regressing coal expenditures on income deciles and household characteristics will allow us to determine the basic needs of a household in coal heat. This level of coal consumption will be used to differentiate between heat-poor and non-heat-poor households. Thereafter, a logit model will be applied to regress the status of a household with respect to heat poverty on a number of socio-economic factors.

Results

Due to the low variability in coal expenditures between households belonging to second to ninth income decile, we do not use the a specific level of coal as an indicator of subsistence consumption. Instead, we use the third decile budget share of coal expenditures as an indicator of threshold budget share separating fuel poor and non-fuel poor households. Consequently, fuel poverty may be defined as spending more than 17 percent of equivalized income per capita on coal. According to this definition of fuel poverty, a third of coal consumers are fuel poor compared to eight percent of households who are income poor. Fuel poverty is closely associated with low income and energy inefficient housing. One of the two relevant social welfare programs reduces the likelihood of fuel poverty.

The analysis of income poverty by regions indicates a wide disparity between urban and rural income poverty defined as having per capita income level below the official income poverty line. Overall, rural income poverty tends to be higher in southern and western regions. In contrast, fuel poverty is somewhat equally distributed among all regions, even including the western region where use of coal is less common. Fuel poverty affects at least 30 per cent of households in eight out of fifteen jurisdictions in Kazakhstan.

Conclusions

Given its geographic expanse, the recommended approach to addressing fuel poverty in the rural areas is through (i) funding energy efficiency improvements of the existing housing stock owned by the fuel poor and (ii) supporting of alternative energy. Our modeling results suggest that improvement in efficiency of the housing stock, fuel burning and heat distribution equipment have considerable potential in reducing heat demand and the incidence of fuel poverty. According to Herrero and Urge-Vorsatz (2012), refurbishment with passive house elements was found effective in addressing fuel poverty in apartment buildings in Hungary. The existing system of the Housing Benefit could be used to allow energy retrofit of individual housing to be an eligible type of expense for this benefit. It should be supplemented by increasing the awareness of households regarding available technology options that would allow families to economize their fuel consumption while keeping their thermal comfort in the winter unchanged on increasing it.

Regarding alternative heating systems, the successful experience of the Chinese government with respect to its coal-to-electricity program implemented in Beijing's coal-burning neighborhoods points out a feasible way of switching away from low-efficiency residential coal use. A UNDP (2011) study estimates the potential wind resource in Kazakhstan to be 929 billion kWh per annum i.e. a wind energy capacity of 354 GW (compared to a total installed capacity on the national grid of 19 GW). Kazakhstan government is working on addressing the institutional and financial barriers to wind power development in Kazakhstan.

References

Barnes, D. F., Khandker, S. R., Samad, H. A., 2010. Energy Access, Efficiency, and Poverty. How Many Households are Energy Poor in Bangladesh? Policy Research Working Paper 5332, World Bank.

Energy Policy, Special Section: Fuel Poverty Comes of Age: Commemorating 21 Years of Research and Policy, Edited by Christine Liddell, Volume 49, Pages 1-148 (October 2012).

Herrero, S. T., Urge-Vorsatz, D., 2012. Trapped in the Heat: A Post-Communist Type of Fuel Poverty. Energy Policy (49), 60-68.

Khandker, S. R., Barnes, D. F., Samad, H. A., 2012. Are the Energy Poor also Income Poor? Evidence from India. Energy Policy 47, 1-12.

UNDP, 2011. Lessons Learnt from the UNDP-GEF Project. Kazakhstan Wind Power Development Initiative.