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Gas Supply Management in Uzbekistan: Path for Advanced Gas Metering and Billing Technologies

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Abstract
Advanced metering is a global phenomenon spreading across countries and has been actively promoted by government authorities. Use of IT and other cutting-edge technologies are clue for gas supply management, instant billing and metering problems arising in all countries' utility provision system. Growth in arrears and number of non-compliance are main issues can be dealt by means of advanced technologies. This article is focused on recent developments in advanced gas metering and billing technologie, and examines the possibilities of introducing them into Uzbekistan's practice.
Keywords: gas supply, advanced metering, billing, Uzbekistan.

1.Introduction

In recent years smart metering has attracted attention around the world. A number of countries and regions have started deploying new metering systems; and many others have set targets for deployment or are undertaking trials (Haney et al, 2009). There is growing interest in using advanced metering and other customer feedback tools to provide customers with information to encourage shifting of loads to off-peak periods and/or to encourage lower levels of overall consumption (Ehrhardt-Martinez, 2010). Double-edged problem of energy efficiency from international energy market and public demand for natural gas by households requires the exploiting the advanced technologies to cope. Current practices in advanced countries shows that bilateral improvement in natural gas supply management have expanded the use of advanced IT. Computerized networks of gas supply management are increasingly widespread among gas supplier companies for both households and industries. Electronic metering and billing technologies add a considerable value for the further enhancement. In many developed countries advanced gas metering and billing systems are successfully operated and they are regularly investing in innovations. The widespread recent interest in smart gas metering can be understood in the context of investing in demand-side participation. Innovative forms of metering allow for more detailed information to be collected on gas consumption; communications technology facilitates greater interaction between the end-user and the rest of the natural gas supply chain; and both information and interaction allow for end-users to become more actively in responding to price signals and information on consumption patterns.

Smart meters with advanced communications are a gateway to increasing the participation of the demand-side in the natural gas consumption market through facilitating new pricing structures and overcoming information asymmetry. They can also act as a platform for automated forms of demand response by connecting with smart appliances. Improving the flexibility of network operation is likely to become even more important in the future with the further integration of intermittent resources. More responsive demand for natural gas will be important in contributing to this flexibility (Stadler, 2008); advanced communications, control methods and information technologies including more sophisticated metering will be central in achieving this goal (Strbac et al, 2006).Communications technology is central to the most advanced types of metering systems that are currently available. Adding communications capabilities to meters provides an enhanced level of functionality and allows for a greater level of interaction between the various actors in the supply chain. Meters that are not connected to a communications system require readings and any changes to the programming of the meter to be carried out manually.

2. Literature Review

Advanced utility metering and billing is a hot topic for academia, government, business rounds and individuals. But it is an issue highly debated in public authorities and utility supplier companies. Several frameworks and policies were launched to foster the spread and efficiency of modern technology-based gas metering systems around the world. However common focus areas are smaller natural gas consumers (domestic, small and medium sized enterprises (SME)) who have been the focus of smart metering policy debate around the world as these users have traditionally not been given the appropriate incentives, means or the information to become active participants. In European Union, Energy Services Directive, declared in 2006, has given fresh impetus to energy efficiency policy making. As part of this strategy, it requires member states to integrating gas metering and billing policies into their National Energy Efficiency Action Plans. Providing information on actual consumption lies at the core of this requirement and has prompted a number of EU countries to explore the costs and benefits of implementing smart metering. In the US, Japan and Korea smart grid-like systems for gas supply management were launched.

In their scheme, smart gas metering network manages the billing, switching and payment receipt operations.

3. International Experience and Developments in Natural Gas Metering and Billing.

A number of countries and regions within and outside Europe stand out because of their relatively high penetration levels of advanced metering. In Sweden, France and Finland AMR was initially implemented but plans for AMM have since developed. A large-scale pilot project is planned by EDF in France; and although legislation in Sweden only requires more frequent gas readings, AMM is increasingly being adopted by distribution companies. Technology choice is also a function of context-specific considerations. Prior to the trial and roll-out of keypad prepayment metering in Northern Ireland, basic prepayment metering was widely used by Northern Ireland Electricity. One of the main drivers for replacing the prepayment system was the decrease in operating costs. Improved functionality also allows for load to be limited rather than disconnected which was an important feature in overcoming concerns of the regulator and consumer groups over self-disconnection. The largest scale recent implementation in California offers an interesting case study in the approaches taken by utilities in the region. Southern California Edison (SCE), after its first analysis of smart metering in 2005, concluded that available technologies were not cost-effective in their present form (SCE, 2005). Since then, SCE has worked with meter manufacturers to improve functionality and to develop an open architecture information system that will allow for future communication channels, e.g. cell phones and other mobile devices. Pacific Gas & Electric (PG&E) in 2005 decided to proceed with a proprietary metering system rather than to wait for an open solution (PG&E, 2005). In the meantime PG&E has decided to upgrade its smart metering programme to allow for the integration of more advanced automation systems through home area network (PG&E, 2008).

The international metering landscape is one that is constantly changing due to advances in technology and in international experience. In order to get a flavor of what lies ahead in Europe, it is helpful to look at the locations and types of technology trials that are currently being undertaken as well as the preliminary plans/ targets that have been announced by energy regulators and/or by relevant market players.

Developing metering and billing policies that are in line with the EU Energy Services Directive has been a strong driver across the European Union for trials and studies of smart metering. In countries such as Great Britain and France, the trials follow on from cost benefit analyses that have been conducted. In Great Britain in particular, the Energy Demand Reduction Pilot is under way to further inform the direction of smart metering policy and to identify if a stronger regulatory role is required.

In other countries such as Ireland and Spain, the first stages of deployment are being used as a means to inform later stages. The large-scale pilot in Ireland follows on from a qualitative review of smart metering by the regulator and is an exercise in determining meter design, system architecture and functionality through engagement with the network operator, suppliers and other stakeholders. A full cost-benefit analysis will be conducted based on the results of the pilot. The Irish regulator is working closely with the regulator in Northern Ireland to ensure that supplier competition in the all-island market will not be inhibited by a lack of interoperability (CER, 2008). In Germany, the two main trials that have been announced to date are being undertaken by two suppliers, RWE and Yello. In contrast to other European countries, the trials in Germany, Austria and the Czech Republic are taking place independently.

4. Advanced IT Systems for Utility Management in Uzbekistan: Evidence from Gas Supply Management

Advanced utility metering and payment systems are growing trend in developing countries. Advances in technologies and their cross-border transfer facilitated the spread of practices in IT based metering and utility management. Recent studies done by several researchers found that governments of developing economies strongly focused on the application of advanced metering technologies on two main utility services: gas and electricity supply. Regular developments in the gas and electricity supply in line with technological boom in all fields have brought several success factors in utility management.

The utility management technology map shows that advanced technologies and methods are transferred from developed to developing economies. Knowledge and technology transfer in utility, especially gas and electricity supply management gain the largest share in developing economies. Uzbekistan, a rapidly growing developing country, has put several forward steps towards the utility management system. Rapid population growth and resource-rich economic profile required the effective management of gas supply to households and enterprises.

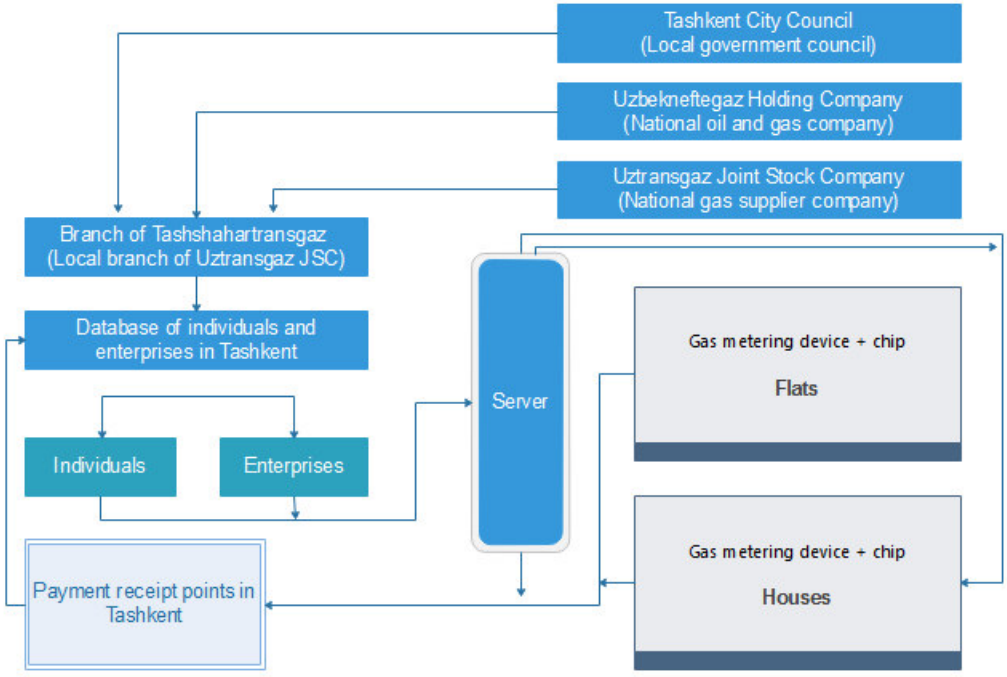
Table 1. Gas supply and consumption statistics in Uzbekistan by regions and consumer groups

Regions	Number of gas consumer households	Gas consumption, mln. metric cube	Including		
			For house-hold	For utility	For other consumers
Karakalpakstan	253710	1088,9	923,8	65,1	100,0
Tashkent City	546929	3410,5	1313,2	146,7	1950,6
Tashkent Region	487208	3425,5	2019,2	1141,8	264,4
Andijan	374966	902.6	751,2	151,4	-
Bukhara	301218	1228,5	960,6	60,8	207,2
Djizak	142379	698,9	638,5	60,3	-
Kashkadarya	243367	766,9	448,2	137,3	181,4
Navoi	133473	537,3	325,9	182,3	29,1
Namangan	449599	906,7	725,3	35,8	145,5
Samarkand	448038	1431,3	1170,1	230,5	30,7
Surkhandarya	200431	450,6	365,8	57,3	27,5
Syrdarya	117572	532,4	463,8	65,9	2,7
Fergana	538755	1441,6	1161,2	280,4	-
Khorezm	253061	1093,6	904,9	178,4	10,4

Source: Author's data compilations from official releases, 2016.

Utility management system improvement actions were conducted on gradual basis deriving from two key aims: convenience for consumers and reduction of utility payment arrears. Initial phase was automated pipeline and gas flow management module launched in 2002 which was aimed at instant data provision. The next phase was a great leap to advanced utility billing and metering. "UzTransGaz" joint stock company – main provider of gas supply – introduced a automated gas billing and metering system to monitor the efficiency of gas supply and billing through running an individual consumer accounts (subscription accounts), gas supply service management for consumer status, consumed gas metering, recording diverse payment forms and options for each consumer, setting payment bills, controlling the payables and receivables of a consumer, statistical data provision and analysis in individual, organization, regional and country levels. However, there is a growing need for more sophisticated technologies and tools for gas supply management in order to keep pace with international practice and regular improvement. As outlined above, smart metering practices are in wide international application which can be transferred to national gas supply management procedures with particular modifications and country-specific attributes as shown in Illustration 1.

Illustration 1. A model for gas utility management system in the exemplary of Tashkent city



Source: Umarov, 2016.

Working procedure of modified smart gas supply management system roots from up-to-date technologies and tools in consistent with international practice. A chip with an individual accounts connected to the supplier company will be installed to the gas metering device of each household and enterprise which controls and counts the consumed gas volume and total price should be paid to the supplier. Basing on prepaid system, consumers should pay in advance for the gas they consume. When consumers pay for their account, supplier sends a signal to transfer gas to the consumer. The gas meter device starts to change automatically at fixed tariffs provided by suppliers. When the money in the account runs out, gas transfer to the consumer is stopped and a limited volume of gas transfer is permitted.

5. Conclusion

This small scale research examined the opportunities of introducing advanced IT based gas metering and billing technologies in Uzbekistan based on the comparative and retrospective analyses of successful international practices. Considering the outweighting empirical aspect of the study, research findings reflected the adoption and further improvement issues and ensured empirically-rooted conclusions and recommendations as mentioned:

1. Government policy for expansion of advanced technology-based industrialization and modernization should focus on aligning with international best practices;
2. Innovative methods and approaches for utility metering and billing systems should be introduced due to growing volume utility payment of arrears and non-compliance;
3. Automated distant gas metering and billing software should be created, spread across the country and provided at each payment points for full implementation;
4. A single gas supply monitoring network operator should be launched. It should be provided with access to instant balance sheet of each consumer and should take network volatility and regime limitations into account.

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