Multi Utility Meter Report

Ed 4 2005

Multi Utility Meter Market - Ed 4 2005

Electricity - Gas - Water

There are 2.2 billion meters in the world with a total demand of 178 million meters both new and installed. Global demand is expected to rise to 213 million meters by 2010, with an annual growth of 3.7%. The new ABS Multi Utility Meter Market Report has been updated and expanded. It is a comprehensive study of the world market and contains demand forecasts for 184 countries; detailed meter market surveys of the 15 largest markets in Europe, Asia and the Americas; a survey of AMR deployment and trends by sector; a survey of metrology regulations for the meter industry.

Outline of the Report

Market analysis and meter types

- Analysis of the installed base of electricity, gas and water meters by country
- Analysis of meters by type- watt-hour meters: electromechanical/solid state, gas flowmeters: mechanical/turbine/orifice/ ultrasonic, water flowmeters; mechanical (volumetric/velocimetric)/electromagnetic/ultrasonic
- Future trends of electromechanical/solid state meter deployment
- Meter deployment by 2010, with country analysis
- Development of new electronic meter production in each sector. electricity, gas, water

Market shares

- Company mergers and consolidations
- Global shares of top meter companies
- Major new players identified, “the dark horses”
- The development of the Chinese and Japanese meter companies
- Electricity meter company shares in EU
- Electricity meter company shares in each of 15 EU countries
- Market leaders in each sector (electricity, gas, water) identified in major markets
- Credit and prepayment meters in the UK

AMR (Automatic Meter Reading) and AIM (Advanced Infrastructure Management)

- Survey of global AMR and deployment, analysis by utility sector (electricity, gas, water)
- Development of advanced meter infrastructure
- Future trends and deployment projections
- Major AMR suppliers identified with market share for leader
- Analysis of specific conditions for AMR in the water sector

Detailed surveys of each sector in 15 largest electricity meter markets, 70% of the world market volume (44 market profiles) in (France, Germany, Italy, Spain, Sweden, UK, USA, Canada, Mexico, Argentina, Brazil, Japan, China, India, Russia)

- Number of electricity, gas, water customers
- Water connections and metering incidence
- Annual meter demand for each sector
- Analysis on meter type for each sector
- Market trend
- AMR deployment and development
- Type approval and certification, together with significant changes which are driving market development
- Market participants
- Utility background and market characteristics

Tables and spreadsheets for electricity, gas, water separately containing:

- Global analysis and forecasts for every market, for each of 184 countries
- Meter population and annual demand
- Market analysis by production, imports, exports and demand, for every country
- Market size and forecast for each year 2005 to 2010 for every country, units and $ value
- Historical export data from 1997 to 2004

Meter Manufacturing Companies

- Major meter companies identified and consolidations and mergers outlined
- Directory of 520 electricity meter manufacturers

Metrology

- Outline of global metrology institutions and standards, procedures for type approval and meter verification
- Regional details and cooperation arrangements
- Methodology changes which are driving meter market developments

Database

The database includes:

- The tables from the report
- Current demand in units and value
- Forecasts 2005-2010
- Export analysis
- Spreadsheet of exports by country of origin and importing country for the year 2004

Price £2,850
Price of report and database £3400
Price of database only £1150
***For US Dollar prices and Euro prices please consult our website www.absenergyresearch.com**

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12. Canada - Meter Market Profile

Electricity meters

Table 12.1: Meter demand per year Canada

	2005	2006	2007	2008	2009	*2010*
Units	982,000	967,300	1,573,532	1,529,954	1,486,579	1,443,418
Value $(2005) million	48	47	77	75	74	70

Customers
12 million domestic
750,000 C&I

Annual demand

982,000 meters

Demand includes 400,000 meters a year in 2006 and 2007 due to the replacement of electromechanical meters with electronic meters in Ontario and a target of 5 million by 2010. Demand will fall back to 2004 levels of about 700,000 meters thereafter unless other provinces in Canada follow Ontario's example (See below).

Meter types - electromechanical, electronic

Electromechanical meters single phase meters

There are roughly 10.5 million single-phase electromechanical meters currently in service in Canada. All existing and new purchases are electromechanical.

Electromechanical polyphase kWh/Network mechanical meters

There are about 1.5 million polyphase meters presently in service in Canada today. Roughly half of this population is electromechanical polyphase kWh and network meters.

Electronic meters polyphase electronic meters

There are roughly 750,000 electronic meters in service today.

All new meters for the C&I segment are electronic.

Meter life

In Canada electromechanical meters have service lives exceeding 40 years.

Market trend

For regulatory reasons, as described below, the Canadian domestic market has effectively been restricted to electromechanical meters.

In Ontario, which accounts for 5 million out of 12 million domestic meters, there will be a conversion to electronic meters by 2010.

The regulatory procedures changed in 2004 and it is now anticipated that there will be a growing conversion to electronic meters in other parts of Canada apart from Ontario.

AMR

Widespread use of AMR has been slowed by the regulations for type approval of electronic meters but this is being addressed.

Currently, there is extensive use of AMR for large C&I customers, primarily monitored through MV-90 software using dial-up connections. There are also a variety of small AMR pilot projects for residential customers. Various communication media are being used, the most common being drive-by radio communications and power line carrier applications.

Up until very recently, regulatory policy made wide deployment of residential electronic meters uneconomical compared to the old electromechanical meter technology which does not have any of the functionality required for advanced metering and system control. As a consequence, Canadian utilities did not rush to adopt the new technology.

Under these rules, Measurement Canada required 100% sampling of electronic meters, which meant that deployment of single phase electronic meters would be at 128 times the cost of deploying electromechanical meters. Conversion of the electromechanical meter population to electronic would have added $192 million per year to the cost of meter maintenance, exclusive of acquisition, initial verification and installation costs. Verification costs would have risen by 750,000 x ($25.00 - $0.94) = $18 million per year.

Ontario Province in Canada has opted to shut down its coal generation by 2007 and to reduce its dependence on hydropower. To achieve this, Ontario has to replace 25,000 MW of capacity by 2020. Without the coal plants, and with the forecasted growth in demand, it is critical for Ontario to embrace energy efficiency and reduce peak usage.

Residential and small business customers in Ontario will be offered a standard rate plan to ensure that consumers can take advantage of time-of-use rates and so that they will have the opportunity to shift consumption from periods of high demand and prices, to periods of lower demand and prices. The Ontario Government has an interim target for the installation of 800,000 smart electricity meters by 2007 and installation of smart meters for all Ontario customers by 2010.

Electricity standards

Canada uses the AINSI C12 standards for electricity meters.

Type approval and certification

At present, a mix of federal and provincial regulation governs the Canadian electrical industry. Canada has federal regulations with uniform requirements for type approval and certification and verification of electricity meters. The Electricity and Gas Inspection Act & Regulations (EGIA) and Weights and Measures Act & Regulation (W&M) are two federal regulations governing electricity metering.

For over 100 years, the Canadian electric utility industry has had the highest level of regulatory intervention for measurement accuracy. The occurrence and severity of Measurement Canada's interventions and policies and in particular the requirement to verify every electronic meter before it enters into service, places a heavy burden on the utilities' ability to optimise their processes, reduce their costs, introduce new technologies and meet escalating customer expectations.

Measurement Canada recognised that this situation had to change and carried out a series of pilot projects to compare the results of sample testing. These projects were completed in 2004 and sample testing of electronic meters is now being trialled after a 6 year period in service.

Single phase electromechanical meters are currently verified using sample testing at a cost of about $0.13 cents per meter, per year. The seal period is 12 years when reverification is required.

The cost of verifying polyphase mechanical meters under present Measurement Canada regulations and specifications, which allow sample testing, is $0.94 cents per year. The seal period is 8 years when reverification is required.

Electronic single phase and polyphase meters are sealed for 6 years and can now be reverified by sample testing. Historically, Measurement Canada required Canadian Government inspectors to perform all the sealing and inspection of gas and electricity meters for Canadian markets. However, in the last two years, the Canadian Government modified the conditions for accreditation allowing metering manufacturers outside Canada to be accredited. This has effectively opened up the Canadian market for electronic meters.

In August 2004 Itron Inc received accreditation from Measurement Canada to inspect and seal electricity and natural gas meters at the company's Oconee S.C. factory for direct shipments to Canadian utilities. Itron is the first company outside of Canada to gain such accreditation.

In addition, Canada has granted the CENTRON electronic singlephase meter a 10-year initial seal period allowing the meter to remain in the field for 10 years prior to sampling for accuracy. The CENTRON is the first electronic meter to be granted an extended initial seal period.

The following meter manufactures are listed as manufacturers of "conforming meters" i.e. those that are permitted as main meters:

- Elster Metering and ex-ABB
- GE Canada Inc.
- PML
- Itron Canada, ex-SchlumbergerSema and ex-Schlumberger

- Itron Canada/Square D and ex-Schlumberger/Square D
- Landis & Gyr (Siemens)

Implications for manufacture

The US market does not have federal regulations that inhibit new technology. As the US market moves away from mechanical meters, availability of these meters will decrease. Eventually manufacturers will not be able to sustain the production of obsolete mechanical meters for the Canadian market alone. When this occurs, Canadian utilities will be forced to use electronic meters and their maintenance costs will increase dramatically. Canadian customers are disadvantaged both in terms of costs and new value-added services. Given the huge extra cost imposed, it is not surprising that electronic meters have not been adopted in significant numbers by utilities in Canada.

Market participants and manufacturers

- Itron
- Elster
- GE
- PML
- Landis & Gyr

Utility background

A key feature of the Canadian electricity market is its regional diversity, as indicated by the differences in fuels used for power generation, the market structure, the regulation and pricing. While hydro accounts for 61% of Canadian electricity generation, there is pronounced diversity, with generation coming from a number of other sources.

Canadian electricity is generally cost competitive with other North American jurisdictions. Due to the operations of hydraulic systems, most hydro-rich provinces have surplus energy available for domestic and international trade. Canadian legislation requires that exports must be authorised by the NEB, and that interested Canadian electricity buyers be provided with the opportunity to purchase the electricity, for use in Canada, on similar terms and conditions as the proposed export sale. Exports to the US have generally accounted for less than 9% of domestic generation in recent years.

The electricity transmission interests in several provinces are considering membership in regional transmission organizations (RTOs) which are expected to facilitate access by Canadian exporters to US markets and access by Canadians to US supplies. RTO formation could lead to more north-south trade and further integration of US and Canadian electricity markets. To the extent that Canadian competitiveness can be maintained, higher export revenue would result. Market integration could also result in an upward movement of prices. Under Canada's constitution, the electricity regulatory authority falls under the jurisdiction of the provinces. In most provinces, a few dominant utilities provide the bulk of generation, transmission, and distribution. Although some of these utilities are privately owned, the majority are owned by the provinces. There is also some IPP generation.

Table 12.2: Canada ESI summary

Generators Verticall integrated utilities in all provinces, with some IPPs. Alberta is fully open and Ontario is in transition.
ISO Alberta - ESB Alberta Ltd Ontaior - Hydro One Inc Elsewhere by vertically integrated utiilties
DNOs – Alberta c. 10 municipal, Ontario - 92 municipal

Source: ABS ESI 2004 Edition 10

Gas meters

Table 12.3: Meter demand per year Canada

	2005	2006	2007	2008	2009	2010
Units	426,670	450,137	474,894	501,014	528,569	557,641
Value $ million	19	20	21	23	24	25

22. Consolidated world tables

23. Sector world tables, electricity, gas and water meters

TECHNICAL NOTES AND METHODOLOGY

This is the 4th Edition of the ABS World Utility Market Report and the data now available far exceeds what has been uncovered for previous reports. ABS has built up a database for every major country, filling in essential modules of information for each. The methodology of this study was complex and involved three different processes running in parallel, to compile the database for analysis.

Literature search
Compilation of official production and trade statistics
Industry interviews

Literature search

An extensive literature search was carried out investigating a number of different avenues. This literature search has delivered 106 notes providing information on installed meter bases, annual demand and brand shares, some of which is in extraordinary detail. For confidentiality reasons we cannot release these endnotes but they have made a significant contribution in upgrading the quality of this report. We will continue this process of search and will continually augment this invaluable databank.

Regulators

Some regulators publish comprehensive information about the subject of metering. The British electricity and gas regulator, Ofgem and the three British water regulators publish extensive figures on metering as well as analysis of costs and revenue, together with some forecasts of metering take up. Ofgem has also published figures for their estimates of annual demand for electricity and gas meters. Where this data exists it is robust. We also carried out a good deal of correspondence with regulators asking specific questions. We found them universally helpful and in some cases they obviously appointed staff to investigate issues for us.

National energy projections and demand forecasts

ABS has filed the official national energy demand forecasts produced by 113 countries. The have been used to evaluate future demand for meters.

Government enquiries

We have uncovered a new source has which is yielding unique data. Governments and organisations in several countries have conducted investigations following accusations of monopolies and cartels. These investigations are based on information given by suppliers under oath to a parliamentary commission or in court and contain sales figures because the enquiries are concerned with markets. Similar information can be found in the routine enquiries conducted by government commissions to approve mergers or acquisitions. Some of these reports contain market share data provided by the manufacturers. In at least six such reports this data is extensive and as far as we are aware probably not available anywhere else. One of these reports provides market shares for all manufacturers in the EU, for each country individually and overall for the EU. We have located similar reports in the USA and Japan. We have so far uncovered six of these reports and they have probably made the most valuable contribution to the study of any source. This data is robust because of the nature of its submission and compilation.

Metrological Bureaux

Some of the Metrological Bureaux publish reports on metering in addition to information on type approvals and verification requirements in their countries. Several have conducted studies of their industries in preparation for issuing new standards and these sometimes include detailed analysis of the existing meter park. In several cases these include population data for different meter types where there are issues about changing usage patterns for types of meter such electromechanical and solid state meters.

Trade Associations

Some Trade Associations provide industry wide data gathered from members.

Socio/economic studies

A number of studies of metering have been conducted by international bodies like the World Bank. These studies are mostly concerned with issues such as energy conservation, fuel theft, investment in water infrastructure and the measurement of energy or water is crucial to them. They are valuable because they often survey countries in the developing world for which data is sparse.

Company reports and presentations

Companies have vastly different approaches to the release of market information. Some companies provide only very general data but others are very open. Three leaders in the industry have published information about revenue, market sizes and company shares, while other have provided isolated items of information. This has enabled us to calculate total market sizes from company data and to validate our estimates against these independent figures.

Useful sources, which involve a lot of internet trawling, are presentations made by industry executives to conferences and seminars. By definition these presenters are people who know a great deal about their markets and they sometimes provide market sizes, growth and share analysis.

Statistics

Two sets of official statistics are particularly useful, production and trade statistics.

Production statistics

Production statistics are extremely valuable where they exist, but unfortunately few countries publish them in sufficient detail to be helpful. The most helpful are the US Census Bureau production statistics, which account for an important segment of the world meter market and provide the necessary breakdowns. Organisations in several other countries have published production data in trade or industry association reports.

Import/export statistics

International trade has been recorded in two ways. Import/export figures are available in summarised totals for each type of meter, in units and $ value. These record simply the total exports or imports of meters reported per year.

Country of origin or destination, as appropriate, is available for every country individually. A complete record of this data would involve creating a database for each year containing over 200,000 cells of data, many of them zero value or so small as to be insignificant. However, 13 countries account for 95.8% of global trade in meters and since they include all the large producers an even higher proportion of production. A database of this information has been created for each sector separately, electricity, gas and water.

We have reservations about the accuracy of the import/export figures and have not relied on them n making demand estimates. We know of cases where they do not reflect the actual situation. There are discrepancies in the classifications. Another problem is that there is an element of double counting because meter components or unverified metres are imported, verified and re-exported in some cases. The main use of the trade data is to see overall patterns, not to produce accurate analysis.

Industry interviews and discussions

We conducted two field exercises and use the terms “interview” and “discussion” separately to describe two different exercises. We carried out formal market research using questionnaires, with interviews among 110 utility executives, using trained interviewers.

We also conducted a series of discussions with meter industry executives. These were carried out by senior ABS personnel, who telephoned industry representatives around the world. Although some were more open than others, in only a few cases did we encounter a refusal to answer at least some questions. In many cases respondents were extremely helpful and even volunteered personal introductions to other informants.

Analysis

Relatively few countries provide usable production data, often quoting so-called “strategic” reasons for not doing so. We cannot measure demand by adding together production and imports and subtracting exports. Therefore we have to start from the other direction, by modelling the market and estimating production by adding demand and exports and subtracting imports.

The stages in modelling the market

The installed bases of meter connections in each sector; electricity, gas, water is available or was calculated from different sources for each sector.

The first step was to establish the number of households and commercial/industrial units in each country. Counts of households are not as widely available as might be imagined but population counts are. Household sizes are estimated in probability surveys by a number of government statistics units and demographic agencies, principally WHO, UNICEF, UNHCS and it is possible to estimate the numbers of households from this data.

The best data is the number of meter connections by utilities and where available we have used these figures. The World Bank and the UN have also conducted surveys of metering incidence in a number of countries. UNEP have published water meter penetration figures for the OECD countries, differentiating between single households and apartments.

Press

There is an increasing volume of information about the meter market in the press, notably the magazine Metering International.

Electricity

The USA and the European countries are well served with data from the EIA in the US and Eurelectric for Europe. We acknowledge the valuable contribution of both of these two bodies in helping us to create these market models. Both organisations publish numbers of consumers by category, residential and industrial.

It was more difficult in the rest of the world. With some exceptions such as Japan, Hong Kong, South Korea, Taiwan, Israel, Singapore, Brazil, South Africa and a few other well documented countries it is difficult to piece together an installed base of meter connections by category. This is often because a country has a large number of distribution companies and no central body consolidates the records. In these cases we have used numbers of households by electrification. Note that the definitions of electrification differ from country to country. For example, in the two biggest countries, China and India, the definitions are not comparable. China uses a straightforward measurement, the percentage of households with access to electricity but India does not. A village or area is counted as electrified in India if there is an electrical connection within the boundaries of the area and the people dwelling within those boundaries are regarded as having access to electricity. This is similar to the definition of having access to water if the people in question live within 20 metres of a standpipe, which is a frequently used measurement. The definition of electrification in India was tightened up in 2001 but it still does not tell us how many households have electric power connections. Taking account of these limitations we have produced estimates of the numbers of electricity meter connections in every country.

Applying ratios from the countries where we have precise data we have estimated the numbers of industrial/commercial meter connections.

Gas

Whereas every country uses electricity and water, not all use gas. The EIA provides natural gas consumption data for all countries and it is possible to eliminate the non-using countries. Consumer figures are provided by category for the US. Some individual countries publish national figure, such as the UK and some other European countries. There are large variations in the usage patterns.

It is necessary to distinguish between piped gas and LPG. Piped gas is now nearly all natural gas, which in many countries supplies the feedstock which is fed into the old city gas system. Some countries with extensive use of natural gas, notably Japan and Mexico use LPG deliver to homes in cylinders, in parallel with piped supply.

The International Gas Union publishes a report with the numbers of customers in the different categories, residential and industrial and power generators in member countries. There are some gaps in this information and the data is now rather old but it is a useful start.

Where data is not available we have estimated the figures. There are some countries, notably in Eastern Europe and the CIS, where gas is incorporated with heating and sometimes metered centrally and billed as part of a service charge.

Water

In the past, the water sector has proved more difficult to estimate than electricity or gas, for three reasons. As in the other two sectors, the first stage is to estimate the number of water connections. It is essential to define what is meant by a "connection". Does it mean a household connection or proximity to a source of supply?

Secondly, some countries do not meter domestic water supply. For example, in the UK there are only 6 million domestic water meter connections, in Canada only 55% of households are metered, and in Iceland and Ireland there are no domestic water meters. In such countries, water is charged as part of the local rates or taxes. In many former socialist countries it was not charged as political policy and this remains the case, although many studies have established that charging a full commercial rate for water is the most viable way to provide an economic water service. The outcome is that the rate of water metering is increasing in many countries.

Thirdly, it is common practice for water to be metered centrally in apartment blocks and for the cost to be passed on to apartment occupiers as a service charge.

Despite these gaps, there is more data available now from published reports and this study has benefited accordingly.

Demand components

Demand is composed of two components; new additions due to growth and replacement of the existing installed base. Both of these have to be estimated on a different basis.

New additions are the difference between the installed bases of each year and it is a simple subtraction when the forecasts of annual growth have been made.

Replacements are the dependent on the size of the installed base in the past and on the rate at which it has grown. Meters have different service lives depending on the regulators' and type and amortisation policy. There are also divergences from legal metrology law in many countries and companies are required to replace meters before the end of their designed life. In practice the differences from country to country are large. Large meters have a shorter life than domestic meters, because of the high voltage of pressure strains and the requirement for greater accuracy in view of the sums of money involved. Electricity and gas meters range from 5-10 years for larges meters and from 15 to 25 years for domestic meters, traditionally even to 30 years.

OFWAT, the UK water regulator cites 8 years as the life for domestic water meters. Japan law specifies the same, Singapore 7 years for domestic water meters and 4 years for large meters. At the other end of the scale, Macao claims 15 years and the US an average of 17 years.

Some changes in Metrology, outlined in the report are among the most significant market drivers.

Growth

Growth has been estimated with several different measures. The UNCHS publishes estimates growth in the numbers of households for some but not all countries. These have been used where available to estimate growth in the numbers of new domestic meter installations. Where not provided, growth in population has been used. Household sizes are decreasing, with the result that numbers of households are increasing faster than population but in the space of five years, which is the timescale of this report, that difference is minimal. Industrial meter growth has been estimated form predicted GNP growth. Replacement growth has been estimated on the growth of the installed base at the time of installation.

Import and export data

The discrepancies between imports recorded by receiving countries and the total of exports from the exporting countries are sometimes enormous and it is impossible to reconcile them. For this reason we have used the combined exports of the producing countries to every country in the world as the measure of their imports. Note that Hong Kong and Singapore show as major exporters but this is because of their role as entrepots supplying neighbouring countries. For this reason imports recorded by China are much higher than the total form the producing countries because they show exports to Hong Kong, which are shipped on to China.

The exports recorded in Sections 6, 7 and 8 are for the years 1997 to 2004, with a few gaps. In the overall market summary in Section 2, exports are the average for the years 2004. We used to use average exports for three years, because individual year figures vary substantially due to exceptional contracts. We have now departed from this method because the market is evolving so rapidly that a three year average was misleading.

Imports are less regular and the 2002 figures were not all available when this report was compiled. The averages for 1999, 2000 and 2001 imports were used in Section 2 amended where possible for the major countries with 2002 data. We hope to expand this in the fourth edition of this report. The trends in imports are less dramatic than in exports.

In some case unit exports are not provided but volume is recorded in kilograms. In these cases we estimated unit volume by averaging unit costs (FOB or CIF) for the major importing partner countries, either importers or exporters and the case may be and applying these to the value.

We would comment that the import/export data is only of general use and the variations and discrepancies are so large that it is dangerous to rely on them too precisely.