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WATER AND SANITATION FOR ALL: PARTNERSHIPS AND INNOVATIONS

New and unconventional cost recovery techniques

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SOUTH AFRICA HAS a history of water schemes in rural areas which supply "free water". As in other countries where water schemes have been built and cost recovery has not been implemented, the operation, maintenance and administration of these "free water" schemes has been poor and, as a result, the reliability of the service has declined rapidly. In addition Government is concerned that as more schemes are commissioned the increasing operation and maintenance subsidy burden will leave little or no money for the development of new schemes for those who currently have nothing (DWAF 1994).

Because of these issues and to help them develop a cost recovery policy for community water schemes, the Department of Water Affairs and Forestry appointed the CSIR to ascertain what unconventional water vending and metering devices, including prepaid meters, are available in South Africa, to evaluate their suitability for use on community water schemes and to evaluate the broad implications of the products on administrative support requirements and costs.

Community water supply cost recovery constraints

Apart from the continued presence of water schemes which supply "free water" and the need to refurbish many of the older schemes there are two further existing constraints which heighten the challenges of introducing effective cost recovery.

The first is the lack of institutional capacity at village and local government level. Therefore cost recovery techniques which require less institutional capacity to manage are to be welcomed.

The second constraint relates to affordability. Just over 50 per cent of rural households live below the Household Subsistence Level. In most villages however there are a minority of households with incomes up to about three times the Household Subsidence Level. This means, that to satisfy all sustainable customer demands and to facilitate full cost recovery, most community water supply schemes should incorporate a variety of levels of service including household connections whilst the majority are still supplied at the basic level.

In accordance with Government Policy grant finance may be made available for the initial capital cost of construction of the basic level of service but all other levels of service are to be financed by loan capital and charges calculated accordingly. But higher levels of service, including household yard taps, are substantially more costly to build, operate and maintain than basic levels of service.

In normal circumstances these additional costs are recovered by a substantial increase in demand. However when low income households obtain individual yard taps, and pay for the water**,** the demand does not increase significantly (Hazelton and Kondlo 1996). As a result the tariffs required to achieve full cost recovery become unacceptably high. There is thus a strong need to keep a tight control of all costs associated with community water schemes and to promote intermediate levels of service for customers demanding a higher level of service than public standpipes but who cannot afford traditional individual household connections or yard taps.

Techniques studied

The following techniques and systems were studied:

- hand-held meter reading route planner, recorder and data processor with an option printer attachment for field billing suitable for use with individual household and bulk service connections;
- manually filled household distributed storage tanks suitable for individual household connections with a consumption of up to 6k /mth;
- automatic regulated filling household distributed storage tanks suitable for individual household connections with consumptions up to 15 or 22.5k /mt;
- mechanically operated coupon activated water vending units with different units being offered for shared standpipe and bulk service connections;
- electronically operated prepayment systems suitable for individual household, shared standpipe and bulk service connections;
- PC based water utility management systems.

Based on submissions from local equipment suppliers, previous personal experience and a literature survey Figure 1 "a decision support diagram for choosing suitable retail cost recovery and administration support options" was drawn up. Typical average monthly charges required per house-hold to maintain a sustainable break-even situation for the different cost recovery and administrative support options presented in Figure 1 are presented in Table 1. For benchmarking comparison purposes both Figure 1 and Table 1 contain details of traditional techniques used for cost recovery from community water schemes (Evans 1992).

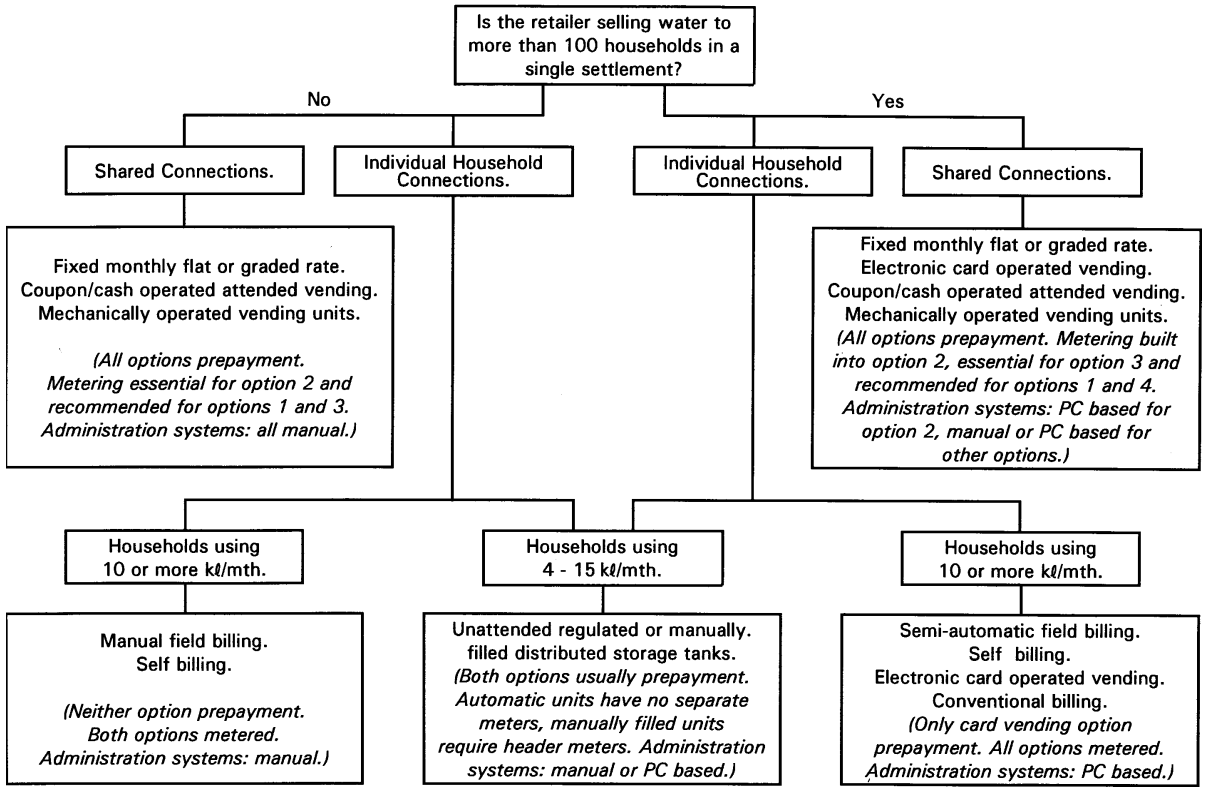

Figure 1. Decision support diagram for choosing suitable retail cost recovery and administration support options

Site inspections are essential to verify the suitability of the electronic card and mechanical operated vending systems. Cost recovery options are listed in order of likely total present value implementation costs and therefore likely acceptability to the selling authority. Acceptability to the customer has not been taken into consideration and this aspect must be checked before implementing any particular option.

Actual water scheme costs vary considerably from community to community being dependent on the availability of exploitable resources, the nature of the scheme constructed and on the cost effectiveness of the operation and management system in place. Therefore, Table 1 should not be used for tariff setting and some care should even be exercised in using it to compare different cost recovery options without checking actual costs applicable to the scheme being examined.

The charges in the Table 1 are divided into four columns as follows:

1 Water used - the customer has control over this item.
2 Current charges comprising salaries, unaccounted for water, maintenance and, for some cost recovery methods, an allowance for non-payment write-offs - all items the water service provider has some control over.
3 Loan repayments - the water service provider has no day to day control over this item as it became fixed during the design and construction phases of the project but good care of the infrastructure means it will be possible to use the infrastructure after the loan repayments are complete and this charge becomes zero.
4 Total charges - the addition of the first three columns

The figures in Table 1 are based on the assumptions which follow. (R 7-25 = 1 UK£ R 4-47 = 1US$).

- Bulk water costs R1-50/k .
- Each shared standpipe has only one water collecting point.
- Water losses from the reticulation system are equivalent to 4k /mth per access point which equals a R6-00k /mth charge per access point.
- R0-75/k of water sold has been allowed for general reticulation maintenance, repair and long-term replacement.
- The capital cost for reticulation is based on the estimated peak demand for the situation being examined. **No allowance** has been allowed for any growth in demand. Where the level of service does not exceed the basic service provision policy, as defined in DWAF 1994, it is assumed that grant finance has been obtained to pay the capital cost of the reticulation and no allowance has been made to pay for the reticulation capital cost or to build up a sinking fund to replace it when required. In all other cases a 25 year payback period and 10 per cent/year compound interest rate has been allowed - this corresponds to collecting R9-09 per month for each R1000-00 borrowed.

Table 1. Typical average charges required per household per month to maintain a sustainable break even situation for the different cost recovery options and administration support systems Note: (R 7-25 = 1 UK£ R 4-47 = 1US$)

Type of Scheme and Cost Recovery Method	Typical Average Charges per Household: R-c/mth			
	Water Used	Current	Loan	Total
Average water consumption: 4kl/mth per household with 15 households sharing each standpipe:				
Prepayment by electronically stored credit at an unattended vending device	6-00	5-40	2-94	14-34
Prepaid fixed monthly payment flat flat rate	6-00	9-50	0-00	15-50
Prepaid fixed monthly payment graded flat rate	6-00	10-00	0-00	16-00
Prepayment by coupons at an attended standpipe	6-00	11-20	0-43	17-63
Prepayment by coupons at an unattended mechanical vending device	6-00	8-40	8-50	22-90
Average water consumption: 6kl/mth per household with 4 households sharing each yard tap:				
Prepayment by electronically stored credit at an unattended vending device	9-00	8-00	21-25	38-25
Average water consumption: 6kl/mth per household from individual household yard taps or house connections:				
Prepayment for automatically filled regulated distributed storage tank	9-00	16-65	17-30	42-95
Prepayment for manually filled distributed storage tank	9-00	19-50	19-57	48-07
*Prepayment by electronically stored credit	9-00	12-50	41-22	62-72
Average water consumption: 14kl/mth per household from individual household yard taps or house connections:				
Prepayment for automatically filled regulated distributed storage tank	21-00	23-67	18-67	63-33
*Semi-automatic meter reading with field billing and centralised payment	21-00	27-39	29-45	77-84
*Self meter reading and billing with centralised payment	21-00	33-13	29-09	84-22
*Prepayment by electronically stored credit	21-00	18-50	45-58	85-08
*Conventional meter reading with centralised billing and payment	21-00	39-45	29-09	89-54
Average water consumption: 34kl/mth per household from individual household yard taps or house connections:				
*Prepayment by electronically stored credit	51-00	33-50	51-49	135-99
*Conventional meter reading with centralised billing and payment	51-00	60-11	35-00	146-11
* At the project design stage, the loan charges for these options could be reduced by approximately R6-00/mth through installing partially-regulated storage tanks.				

- To maintain cost recovery hardware and software and to replace them long-term money is to be collected on the basis of paying back loan capital over a period of 10 years at 15 per cent/year compound interest - this corresponds to collecting R16-00 per month for each R1000-00 spent on cost recovery hardware and software. The amounts of money required to purchase central system management items, credit vending terminals and access point hardware have all been accounted for, as applicable.

Conclusions

Of the five new or unconventional cost recovery techniques studied, electronic prepayment systems appear to have widest applicability for both shared and individual household connections. Acceptability to both the service provider and service user is expected to be high. They are particularly attractive for shared connections in settlements with more than a 100 households where the capital cost can be shared by a number of users. When used for individual household connections electronic prepayment systems do not overcome the problem of high unit costs associated with low consumption levels, but they are still competitive with conventional metered billing systems. Electronic prepayment systems have proved themselves in the electricity supply industry. Their worth to the water supply industry still has to be verified.

The need to promote intermediate levels of service has been noted. Automatic regulated filling distributed storage tanks for individual household connections and privately operated shared yard taps linked to an electronic prepayment system are two possible options which may be offered to customers to choose from. Distributed storage tanks are easy to administer because the customer pays a fixed monthly charge. A disadvantage of these units is that they cannot supply a sudden unusually high daily demand without prior special arrangements being made. Such a demand can occur during funerals for example.

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