Tariffs for rural grid electrification

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Tarifs pour l'électrification rurale à partir du réseau
Des variations significatives caractérisent les voies selon lesquelles les différents coûts pour la consommation d'électricité sont établis: coût pour le raccordement initial, charge fixe et charges basées sur la quantité d'électricité consommée. L'auteur soutient qu'il serait plus équitable d'instituer des tarifs, pour les populations pauvres, qui ne couvriraient que les coûts d'approvisionnement. La réussite de ces structures tarifaires dans plusieurs pays montre que cette méthode doit etre considérée comme une mesure politique visant à atteindre des objectifs techniques, financiers et sociaux clairement définis.

Charging for electricity

It is now generally accepted that charges for electricity should fully cover the capital, operating and expansion costs of the company supplying it. Within this framework, the way these charges are levied and the levels of charges within successful rural electrification programmes show major variations. Many electric companies charge new customers an initial connection fee. In addition to this connection charge, many also impose a fixed minimum charge, even for people using very small amounts of electricity. The great majority of consumers also pay a charge based on the amount of electricity they use; this is called an energy-, unit-, or kWh (kilowatt hour) charge. (A kilowatt-hour is the amount of electrical energy given out when a kilowatt of power is used for one hour.)

Connection fees and fixed or minimum charges

The connection fee is designed to pay back some or all of the initial investment made by the electricity company in the construction of the distribution system. The connection charge usually includes the cost of electricity connection up to a certain distance, often as little as 10 metres, from the nearest line. New consumers further from the distribution line are obliged to pay the additional costs involved in their connection.

The connection fee is often accompanied by a 'security deposit' to cover one or more month's bills. The security deposit is, in principle, repayable when the consumer leaves the dwelling, but since a new deposit has to be paid for the next connection, it is, in effect, a permanent payment to the supply company. A monthly minimum charge, which may or may not allow a certain amount of electricity to be used, is also levied by most utilities.

Benefits to the electricity company
The connection fee and minimum charge provide assured and early money to the electric utility on its capital investment in supplying electricity. Immediately a consumer pays the connection charge, part of the capital investment is repaid. Thereafter, with a minimum monthly charge, there is a guaranteed return to the utility that does not depend on the level of electricity consumption.

High initial payments – a major barrier to the poor
One of the major disadvantages of the initial charge system is that poor rural families often find it difficult to raise the necessary cash at the same time as they have to pay for house-wiring and electrical appliances. High initial charges can, in fact, be a major barrier to rural people taking a supply (Figure 1). Surveys in different developing countries have often found that the initial payments demanded by the utility are too great an obstacle for a high proportion of potential rural consumers to overcome. In cases where electricity is subsidised, initial charges can prevent poor families from having the low-cost electricity which the rich can obtain because they can afford the initial payment.

Unit charges

In many countries, there are strong pressures in rural areas to set charges for each unit of electricity at levels well below the supply cost. In some cases, charges are just a few cents per kilowatt-hr compared with actual costs of up to 20 cents/kWh or more. The main reason used to justify these low rural tariffs is that 'rural people are too poor to pay the true price of electricity and that they should be provided with a subsidised supply.'

Subsidised unit charges – a questionable practice
This is highly questionable. The people who connect to the electricity supply are spending significant amounts of money on electricity-using services. Obtaining a grid supply represents a major


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Figure 1: Initial charges may be a major barrier, even to those close to a grid supply

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step upward in living standards, even if they continue to pay out the same amount of money. The amount of money spent previously on batteries and kerosene would be more than enough to provide the household with a level of service considerably higher than obtained before electrification. Put simply:

One kilowatt hour of electricity from an incandescent bulb is equivalent to the amount of light coming from 12 litres of kerosene used in a kerosene wick lamp.

A kilowatt hour of electricity used in a power tool produces the equivalent of a man working for two days without the power tool.

Cost of electricity from batteries

Electricity from dry-cell batteries costs at least $100 per kWh or more. When car batteries are used, the cost is likely to be in the range $3-4/kWh. Where people depend on small-scale private suppliers (non-grid), the effective rate for restricted evening supplies can be as high as $1/kWh. Even in the poor outlying islands of the Philippines, consumers have shown they are prepared to pay rural electric co-operative tariffs in the range UScents15-20/kWh. Writing of car battery users in Uganda, an ESMAP study remarked that 'Non-grid households pay cash for every kilowatt-hour they consume, they never default, and they pay on time at 30 times the grid-connected fee' (ESMAP (1998a).

Grid electricity gives good value to the consumer

At these, and indeed higher, price levels, electricity from the grid therefore represents extremely good value for consumers who have been using kerosene or batteries. Not only is the electricity much cheaper, it is far more effective and versatile than the energy sources they have been using previously.

Electricity should cover supply costs

The case for setting electricity tariffs at levels which are sufficient to cover supply costs is fairer to poor people because, where electricity is supplied at less than its cost, it is the better-off consumers, rather than the poor, who benefit the most. In addition, there is a risk to the electricity supplier that it will not be able to stay in business.

Tariff structures

A wide variety of tariff structures (ways for charging for electricity) are used throughout the developing world. In Costa Rica, there are sixteen different consumer categories with substantial differences between their charges. In the Philippines, the system is much simpler and there is little difference between consumer categories.

Charges also vary with the amounts consumed. Two opposite approaches are in common use. One, which is used for example in Costa Rica, is the rising block tariff, which charges progressively higher rates for increasing consumption. The other, the declining block tariff, charges progressively less per unit for higher consumption levels.

Rising block tariff

The rising block tariff assumes that those using the largest amounts of electricity are better off and more able to contribute to the running costs of the utility. This tariff is, in effect, a subsidy from the heavily consuming, and presumably better-off, customers to the poor. The rising block tariff, by acting as a progressively stronger deterrent to increased consumption, can be a useful component in an energy conservation strategy.

The element of fairness of the rising block tariff system is seen most clearly when a lifeline tariff at a specially low rate is provided for the first block of consumption. This allows poor people, who would not otherwise be able to afford it, to benefit from an electricity supply. However, since it is the initial block of consumption, enabling people to shift to electricity from expensive and inefficient kerosene lamps and batteries which provides the greatest benefit to consumers, even at UScents20/kWh, poor consumers are benefiting greatly from an electricity supply, so subsidising these benefits is unnecessary. Equity (fairness to all) is more likely to be served by using the same resources to reduce or eliminate the connection fee.

Declining block tariff

The declining block tariff is based on commercial logic. The fixed costs to the supply company are the same whether a consumer uses a small amount of electricity or a great deal per month. The cost of supplying each kilowatt-hour therefore goes down with increasing consumption. Where there is more energy available in the supply system than is needed, the reducing price encourages increased consumption and therefore profit, but lowers the incentive to energy conservation among large consumers. On the other hand, where there is a shortage of available electricity the declining block tariff gives the wrong price signal to consumers.

Single price per kilowatt hour

The simplest tariff of all sets a single price per kilowatt hour to cover the electric company's full operating and capital expenses. As well as its simplicity, this has a number of important equity advantages. It completely removes the problems created by the connection fee and initial deposit system, so that poor families are not barred from obtaining a supply. It also means that the capital investment and fixed charges for the network are shared between users in proportion to the use they make of the system. This system is coming into widespread use in South Africa where it has the additional advantage of being ideally suited to the system of prepayment cards promoted by the national utility, Eskom.

Load-limited tariff

Another approach sometimes used is the load-limited tariff. This requires a specially designed connection into the house which only allows a certain level of current to trickle through to the consumer. A two-amp connection, for example, will only be sufficient for lighting and TV; if the consumer tries to operate a kettle or electric iron, the connection will cut out. The consumer pays a fixed fee, based on the level of electricity they are allowed, irrespective of the amount of electricity consumed.

The advantage of the system is that the amount of energy used does not have to be measured and bills do not have to be sent. The disadvantage is that there is no incentive for the consumer to switch off appliances or economise in any way. The higher the allowable electrical load, the greater the amount of electricity the consumer can use. One problem is that there is little to prevent consumers bypassing the system and using whatever appliances they wish, while paying the fee for the lowest level connection. This tends to make most electrical supply companies rather wary of the load-limited approach. It has, however, a long record of use in some countries, among them Zimbabwe, and may deserve to be considered in some cases.

In summary

The successful application of quite different tariff structures in various countries shows that there is no one universally applicable or 'correct' system. The particular method adopted should be seen as a policy measure adopted to achieve a clear set of technical, financial and social objectives. The most important objective has to be a structure that allows the electric utility to cover its full operating costs and pay its debts. Once the objectives have been clearly defined, the technical exercise of developing the most effective tariff structure to achieve them can be undertaken.

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