Q. What rate structure would be appropriate for a situation where the average energy cost is 3¢/kWh, the incremental fuel cost is 5¢/kWh, the average demand cost is $10/kW/month and the class load factor is 60%?

A. From the information given, it is not possible to adequately choose the most appropriate rate structure. A knowledge of the current rate, the long-run incremental costs, the frequency of bills in various consumption blocks, and the rate design objectives would also be required. Subject to those caveats, the following trail rates should be examined:

At 60% load factor, 1 kW x 720 hours/month x 0.60 = 432 kWh per month will be the average consumption. If serving the load at embedded cost is an objective (as it usually is), the rate must recover $10/kW/month (i.e., the demand cost), plus $0.03/kWh x 432 kWh = $12.96 for the class. Total average revenue for each kW of load in the class is thus $22.96 per month.

For efficiency's sake, we would like to make sure the tail-block on energy is as close as possible to the incremental fuel costs, because the tail or end block is where consumption decisions can affect customer costs. We would probably try to set the tail-block to 5 cents per kWh for this class.

If we also want this to be a demand/energy rate, we would probably try to set the demand charge to $10/kW/month.

We must now choose the rate for energy in the first block (assuming we don't have to deal with customer charges here and that we want only two blocks in the energy charge). No frequency distribution data on how many kWh would be billed in each consumption block was given, so it is not possible to actually design this rate completely, but lets assume that 80% of the consumption is in the first energy blocks. Eighty per cent of the 432 average kWh per month would give a first block size of 345 kWh. To determine the price for the first block, we solve the following equation to get the proper energy revenue:

(Rate1 x 345 kWh) + ($0.05 x 87 kWh) = $12.96

Solving this equation gives us $0.025/kWh for the first block charge. A possible rate structure might then be:

Demand charge - $10/kw/month
Energy charge (first 345 kWh/month) $0.025/kWh
Energy charge (above 345 kWh/month) $0.05/kWh

This rate has the advantage of having an energy tail-block that encourages efficient energy consumption, and a demand charge that reflects the (embedded) cost of demand.

It has the possible disadvantage of being perceived as unfair to large customers, who pay a higher effective rate than smaller customers on the rate. Depending on the cost of demand meters it may also not be cost-effective. It is also possible that coincident demand is less highly correlated to billing demand in the class than energy, in which case an energy-only rate may be more appropriate.

If it was decided that this was not an appropriate class for demand charges, we might roll the demand related revenue into the first block energy charge for a resultant rate of:

Energy charge (first 345 kWh/month) - $0.0539/kWh
Energy charge (over 345 kWh/month) - $0.05/kWh.

This rate looks completely different than the previous design, but collects the same revenue and has the same effect on marginal energy consumption in the tail-block. It could be perceived as more fair by some. It might even reflect costs better than a demand rate, depending on the characteristics of the class.

If we decided that neither a demand charge nor a block structure was required, the resulting simple energy-only rate would be $22.96 divided by 432 kWh, or $0.0531 per kWh.

Without knowing more information about history of the rate, the characteristics of the class, and the rate design goals it is not possible to judge which of these rate designs (if any) is the most appropriate one. Any one of them could be adequate depending on the situation.