

Net/Gross Billing By Florida
Public Utilities:

PURC Research Paper

SUMMARY

This study examines the question of net/gross billing by electric utilities and suggests that a cost of capital related function be employed in assessing delinquent charges. Electric utilities have in the past failed to impose charges for late payments, thereby allowing cash flows to slow down, causing reduced efficiency of operations.

Net/gross billing is examined from both a cost/benefit and income redistribution point of view. The PURC approach utilizes incremental cash flow analysis for the income redistribution question.

Informed assumptions are made when data is unavoidable. The study concludes that:

- (1) It is cost-effective for an electric utility to employ net/gross billing.
- (2) There exists no income redistribution effect in the case study examined for this paper.
- (3) Utilities should be encouraged to use a cost of capital related function when determining late charges.

Three alternative formulations of the cost equation are presented. The first is justified in a theoretical sense. The second and third represent close approximations and may prove to be beneficial for pragmatic reasons (such as computer installations). Finally an ad hoc solution is suggested.

These results are based on a case study of Gulf Power Company. However, they are derived from a generalized solution technique, thereby allowing us to make inferences about the remaining public utilities under FPSC jurisdiction.

I. INTRODUCTION

On _____, the Florida Public Service Commission (hereafter, FPSC) ruled that Gulf Power Company (hereafter, the company of Gulf), a wholly owned subsidiary of The Southern Company, would no longer be allowed to impose a 5% late fee on utility bills received later than 12 business days after the date of billing.

Although Gulf was the only utility in the State of Florida which imposed a late fee on delinquent accounts, utilities in Iowa, Kansas, Louisiana, Maryland and Nevada presently impose a penalty on late paying customers.¹

The purpose of this report is to answer two general questions:

- (1) Is it cost-effective for a public utility to bill its customers in a manner analogous to that of an industrial firm?
- (2) Is there a significant income redistribution effect between classes of customers associated with the aforementioned credit policy?

If the answers to the above questions are "yes" and "no" respectively, there exist no socio-economic reasons why public utilities should not be

¹The penalty terms ranged from 5% after 15 days (Nevada Power Company and Iowa Power Company) to 2% after due date (Potomac Edison Company) 1975 figures. We would like to thank Mr. Richard Gentry of the FPSC rate staff and Mr. Arlan E. Scarbrough of Gulf Power for much of the information contained herein.

encouraged, indeed required, to implement some type of net/gross billing procedure. The analysis will focus on Gulf for an obvious reason. It is the only utility in Florida for which information on penalty revenues and costs are available. However, given that electric utilities in Florida differ by some constant scale factor, our results can be generalized to all utilities within the jurisdiction of the FPSC.

II. BACKGROUND

GULF POWER COMPANY:

Organized in Maine on November 2, 1935, Gulf was granted the right to conduct business in Florida on January 15, 1926 and in Mississippi on October 25, 1976.

Service Area

The company services the electric needs of northwestern Florida. The service area is approximately 7,400 square miles with a population of approximately 575,000. Although these figures imply a predominately rural service area, there do exist three urban centers of more than 90,000 residents, including Panama City, Pensacola and Fort Walton Beach.

Residential and Commercial Usage. The residential usage per capita in the Gulf service area is seventh highest in the nation.² Moreover industrial and commercial usage has increased at an average annual rate of 6.5% over the period 1975 to 1977.

Ownership

Gulf is a wholly owned subsidiary of The Southern Company, a holding company originally incorporated under Delaware law on November 9, 1945. Southern owns all of the outstanding common stock of Alabama Power Company, Georgia Power Company, Mississippi Power Company and Gulf Power Company. Certain other companies, including the Southern Company Services, Inc. are wholly owned by either the parent company or its "operating affiliates".

²1977 Annual Report for Gulf Power Company and various prospectuses of Gulf Power and The Southern Company.

III. COST/BENEFIT ANALYSIS

DATA

In order to conduct a cost/benefit analysis of a utility's credit policy, the following information is needed.

Collection Period and Sales Information

Average Collection Period. Before and after the credit policy change for both residential and "other" customers (in days). "Other" customers include industrial, commercial and other miscellaneous users of electricity. Additional data is needed concerning the average collection period of those customers who do not pay the late fee and those who do pay it, when the penalty payment is applicable.

Sales Revenue. Information concerning total sales revenue per year (in dollars) is needed. Sales revenue should be broken into residential and "other" categories. Further, it should be divided into sales revenue per year on which penalties are not assessed and revenue per year on which penalty charges are imposed.

Other Information

Net Uncollectibles. We have information relating bad debt expense to total sales revenue. Before and after percentages are required.

Terms of the Penalty. The terms of the penalty in this case are 5% if paid more than 12 business days after the billing date, no penalty otherwise.

Average Cost of Capital. One should use the most recent allowed rate of return as a proxy for the average cost of capital.

Average Monthly Bills. These averages are needed for customers who do and do not pay the late fee, when applicable.

Some of the needed data are available from sources such as the FPSC rate staff and/or the company.³ Other items are not readily available from any source. We recognize that much of the information we seek is costly to obtain and serves no essential bookkeeping service. However, these data are necessary for both a theoretical understanding of credit policy and a pragmatic solution to the cost/benefit question. The alternative available to us under these circumstances is to make analytically sound judgements concerning the unknown parameters. Hopefully, the feedback obtained from managers who are much closer to the situation will help us refine our estimates and narrow the range of quantitative solutions. With this caveat in mind, we proceed with a general solution technique.

COMPARATIVE STATISTICS

A typical billing cycle for the major electric utilities in the state is shown in Exhibit (1).⁴ Day #51 represents the final day a Gulf Power customer could pay his (her) bill without being assessed a late fee. The actual "net" due period in this case is 18 days, not 20. We feel that if the FPSC has determined that a customer be allowed 20 days before his account becomes delinquent, a penalty charge should be imposed on payments made after day #53.

Tables 1,2 and 3 give an indication of how Gulf compares with the other electric utilities in Florida with respect to net uncollectibles, average collection periods and percent of total bills delinquent.

³1977 Annual Report for Gulf Power Company, Gulf Power-Statistical Review 1966-1976 and correspondence between Gulf Power and the FPSC with regard to the question of revised delinquent dates.

⁴Original provided by FPSC rate staff.

Table (1)
 Net Uncollectibles as a Percentage of Total
 Sales Revenue (1976)⁵

Florida Power and Light	.526%
Gulf Power Company	.378%
Tampa Electric Company	.324%
Florida Power Corporation	.199%
Unweighted average	.357%

Table (2)
 Average Collection Period (in days)-Estimated (1977)⁶

Florida Power and Light	18
Gulf Power Company	24
Tampa Electric Company	30
Florida Power Corporation	17
Unweighted average	22.25

⁵Calculated from data supplied by the utilities.

⁶The average collection period is calculated for 1977 by taking the average accounts receivable balance for 1976 and 1977. Assuming sales are uniform and a 360 day year we calculated sales per day by dividing total sales revenue for the year 1977 by 360 and then dividing this figure into the average accounts receivable balance: (Sales revenue/360) x average collection period = average accounts receivable balance.

Table (3)
Total Delinquent Bills as a Percentage of Total Bills (1976)⁷

Tampa Electric Company	10%
Gulf Power Company ⁸ (estimated)	20%
Florida Power and Light	N.A.
Florida Power Corporation	N.A.

N.A. - not available

⁷Tampa Electric considered a bill to be delinquent if it received later than 20 calendar days after the billing date. The estimates for Gulf (based in part on data available from the company, see footnote(8)) were based on an 18 calendar day delinquency period.

⁸Estimated from information provided by Gulf Power.

Interpretation of Tables. The evidence does not appear to indicate that the penalty plan allowed Gulf to reduce its net uncollectibles or average collection period below the average for electric utilities as a whole. Nor does it seem reasonable to assume that the penalty plan reduced the percentage of total bills which were delinquent. It should be noted that the pre-delinquent period was somewhat shorter for Gulf (see footnote 7).

Although these statistics, when considered in isolation, might lead one to conclude that the penalty plan was not effective with respect to increasing Gulf's cash flow, this is not necessarily the case. Since each electric utility provides service to areas which differ in socio-economic characteristics, the focus of any analysis should concentrate on the incremental cash flow associated with the credit policy change for each individual utility.

INCREMENTAL ANALYSIS OF CASH FLOWS

Benefits

Gulf received two important benefits from the penalty plan.

Fortified Discounts. The fortified discounts or penalty payments collected were a direct contribution to operating revenues. When the penalty was curtailed, these cash flows had to be raised through an increase in rates, thus causing prompt paying customers to subsidize delinquent accounts.

Decrease in Average Collection Period. We assume (and will later show this a reasonable assumption) that the average collection period will be shorter with the penalty plan in effect. This is a well tested economic principle. The additional funds accrued from the reduction in

accounts receivable are invested, earning some rate of return. This income, coupled with the direct penalty payment receipts enabled Gulf to earn its allowed rate of return without adding these direct and opportunity costs to the rate base.

QUANTITATIVE SOLUTION

More formally, we can calculate the estimated change in accounts receivable (ΔI) and the change in pre-tax profits (ΔP) resulting from the penalty plan by utilizing the following equations.

$$(1) \quad \Delta I = (Cn_R^* - Co_R)(S_R^*/360) + (Cn_R - Co_R)[(S_R - S_R^*)/360] \\ + (Cn_0^* - Co_0)(S_0^*/360) + (Cn_0 - Co_0)[(S_0 - S_0^*)/360]$$

$$(2) \quad \Delta P = (Bo - Bn)S + P(S - S^*) - K(\Delta I)$$

where Cn_R^* ; Cn_0^* = average collection period (in days) for residential (R) and "other" (O) accounts who avoid the penalty payment when it is applicable. We know that Gulf requires payment before the nineteenth calendar day after billing and recognize that consumers have a financial incentive to pay as late as possible without incurring the late charge. Therefore, the most conservative estimate possible would be $Cn_R^* = Cn_0^* = 18$ days.

→ Cn_{Ri} , Cn_0 = average collection period for residential and "other" customers who do not avoid the late payment when it is applicable.

→ Co_{Rj} , Co_0 = average collection period for residential and "other" accounts when the penalty plan is not in effect (we will obviously have to estimate these numbers, since the penalty plan was in effect until mid-1978).

→ $S^* = S_R^* + S_0^*$ = total sales revenue per year on which penalty payments are avoided, divided into residential and "other" accounts.

→ B_0 ; B_n = net uncollectibles as a percentage of sales revenue with (n) and without (0) the penalty plan in effect.

→ K = average cost of capital

P = penalty percent (=5%).

We know S, S_R, S_0, B_n, K and P from published sources. We have already made estimates of Cn_R^* and Cn_0^* (18 days). We can estimate the total sales on which penalties were avoided (S^*) by estimating the total sales on which penalties were paid. Using 1977 data¹⁰, the total penalties collected were equal to \$1,068 (000's omitted here and hereafter). By definition, this is approximately equal to 5% of the total revenue received from delinquent payments. Total operating revenues (S) were \$183,929. Therefore, $(\$183,929 - S^*)(.05) = \$1,068 \Rightarrow S^* = \$162,569$. We need to break S^* into S_R^* and S_0^* . We also need estimates of Cn_R and Cn_0 . Let us assume that the percentage breakdown of delinquent revenue has approximately the same distribution as the percentage breakdown of net uncollectible accounts per class of customer. This is intuitively appealing since the percentage breakdown of net uncollectibles (in dollars) is for all practical purposes exactly equal to the percentage breakdown of the number of delinquent accounts. Approximately 80% of the net uncollectible revenue and 80% of the number of delinquent accounts are attributable to residential customers.¹¹ Since the total amount of delinquent revenue ($S - S^*$) is \$21,360,

¹⁰ Information supplied by Mr. Richard Gentry, FPSC rate staff.

¹¹ Calculated from information provided by Gulf Power to Mr. Richard N. Tudor, Director, Rate Department, FPSC.

the total delinquent revenue attributable to residential customers is $(\$21,360)(.8) = \$17,088$. Total sales revenue for residential accounts was $\$78,397$, thus $(\$78,397 - \$17,088) = \$61,309 = S_R^*$, is the approximate dollar amount of revenue received from residential accounts on which penalties were not paid. The same method yields a figure of $S_0^* = \$101,260$ for "other" accounts.

In order to simplify the analysis let us assume as a first approximation that the average collection periods for residential and other accounts that do not avoid the late payment are equal ($Cn_R = Cn_0$). We can solve for this unknown with previous information. The overall average collection period is 24 days (see table 2). Also we have determined that $Cn_R^* = Cn_0^* = 18$ days. Since we know that 80% of all customers pay before the late period we have:

$$(18)(.8) + (X)(.2) = 24 \text{ days} \rightarrow X = Cn_R = Cn_0 = 48 \text{ days.}$$

The next step is to estimate what the average collection period would be if the penalty plan were not in effect. Gulf could provide us with this figure if a long enough time period had elapsed between the discontinuation of the penalty plan and the present. Unfortunately, this is not the case. Therefore, we will make a conservative judgement. The customers presently paying on or before the eighteenth day will pay on or before the next billing date (a thirty day period) and the customers who are presently delinquent will remain so (i.e. pay on an average 48 days after the initial billing date). Thus our estimates of Co_R and Co_0 (assuming they are equal) can be found as follows:

$$(30)(.8) + (48)(.2) \approx 34 \text{ days} = Co_R = Co_0.$$

plan, hence we let $B_0 = B_N$ and the first term in equation (2) drops out.

We now have

$$\begin{aligned}(\Delta P) &= P(S - S^*) - K(\Delta I) \\ &= (.05)(\$183,929 - \$162,529) - .0832(-\$6,395) \\ &= \$1,070 + \$532 \\ &= \$1,602\end{aligned}$$

as our estimate of the before-tax change in profits directly attributable to the penalty plan in 1977.

Note that the reduction in accounts receivables provided the company with additional income above the amount received from penalty receipts (about \$532,000).

Effect on Kilowatt-Hour Cost. The estimated average revenue per kilowatt-hour was 3.4¢ for all classes of customers in 1977. If the penalty plan had not been in effect during this period the estimated average revenue per kilowatt-hour would have been approximately 3.43¢, if the company were allowed to generate the same operating revenues.¹² This represents a .9% increase in revenue per kilowatt-hour that the average customer would have been required to pay. Since 80% of the customers paid on or before the delinquent date, we see no reason why these consumers should be required to subsidize the 20% who were habitually delinquent.

¹²Estimates made by dividing Total Operating Revenue by Total Electric Sales, with and without the estimated additional pre-tax profits included in operating revenue.

Conclusion-Part III. We have shown that given the information available and our assumptions, which we deem conservative in light of the data, it is in the economic interest of Gulf and the majority of its customers to follow some type of net/gross billing procedure. Moreover, a significant portion (about 35%) of the additional revenue received by the company was not attributable to the receipt of late payments per se, but in fact was a result of the minimization of accounts receivables and the income earned on these additional funds.

IV. INCOME REDISTRIBUTION

In order to more closely study the question of income redistribution associated with the penalty plan we need to know the average bill per residential customer and "other" customer. These figures are readily available from information contained in the balance sheet and statistical review.

Averages and Inferences Concerning Redistribution

The average residential bill was about \$40 per month in 1977. The average "other" bill was about \$420 per month. Ideally, we would like to compare these figures with the average bill of those customers who are assessed the late payment. However, these figures are not available for Gulf. Figures are available on the gross uncollectible amount per delinquent account for each class from 1972 through 1976.¹³ A linear trend analysis provides a good estimate of the 1977 figure. These estimates are \$107 and \$322 for residential and "other" categories respectively. Exhibit (1) shows that an average Florida utility will allow about 60 calendar days to elapse between the first billing date and the date of discontinuation of service. When one considers the ramifications of such an action, a longer average period estimate is called for. Let us say that on average a utility will allow about three months to elapse between the first billing date and the cutout date. It follows that the average gross uncollectible accounts mentioned earlier (\$106 and \$322)

¹³ See footnote 11 for source.

represent about three months of utility service. The overall average residential bill for three months is $(\$40)(3) = \120 , while for "other" accounts it is $(\$420)(3) = \$1,260$. It should be immediately evident that the average bills for collectible and uncollectible residential customers are very similar, while the average collectible "other" account is almost four times as large as its uncollectible counterpart.

We admit that no statistical study has been conducted with regard to the correlation between income and dollar amount of utility bill. However, one would intuitively suspect that there does exist some positive correlation.

Conclusion - Part IV. We have studied the nebulous question of income redistribution and have found no evidence contained in the sparse data to indicate that the vast majority of residential customers do not benefit from the penalty plan, vis a vis "other" customers. Further, within the residential category we have supplied evidence to suggest that income redistribution between residential customers is not a significant problem.

V. RECOMMENDATIONS

A significant economic injustice will result if the present directive of no net/gross billing remains in effect. Receivers of credit, regardless of the source, must be given some incentive to pay on time (see Exhibit 2). Presently the only available alternative to the regulated firm is one which not only fails to speed up cash flows, it impairs them by discontinuing an essential consumer service. A less drastic measure is obviously called for. However, the Gulf plan entails both too high a percentage and cost and further, is out of line with present FPSC directives as to what constitutes a "delinquent" payment.

COST RELATED BILLING

Economic theory suggests that the cost of collecting overdue accounts be represented by a continuous cost curve, adjusted for additional fixed costs as they occur.

Application to Public Utilities:

Theoretically the public utility customer should be billed according to the following equation:

$$\text{gross bill} = \sum_{i=T_0}^{T_2} B_0 e^{r(ti - T_0)} + \sum_{j=T_1}^{T_2} (C_{T_1}) e^{r(tj - T_1)} + C_{T_2}$$

where B_0 = net bill, to be paid before the delinquent date (T_0)

r = the average cost of capital or allowed rate of return.

C_{T_1} = fixed cost of sending out a delinquency notice.

C_{T_2} = fixed cost of sending out a final notice of termination plus the cost of disconnection.

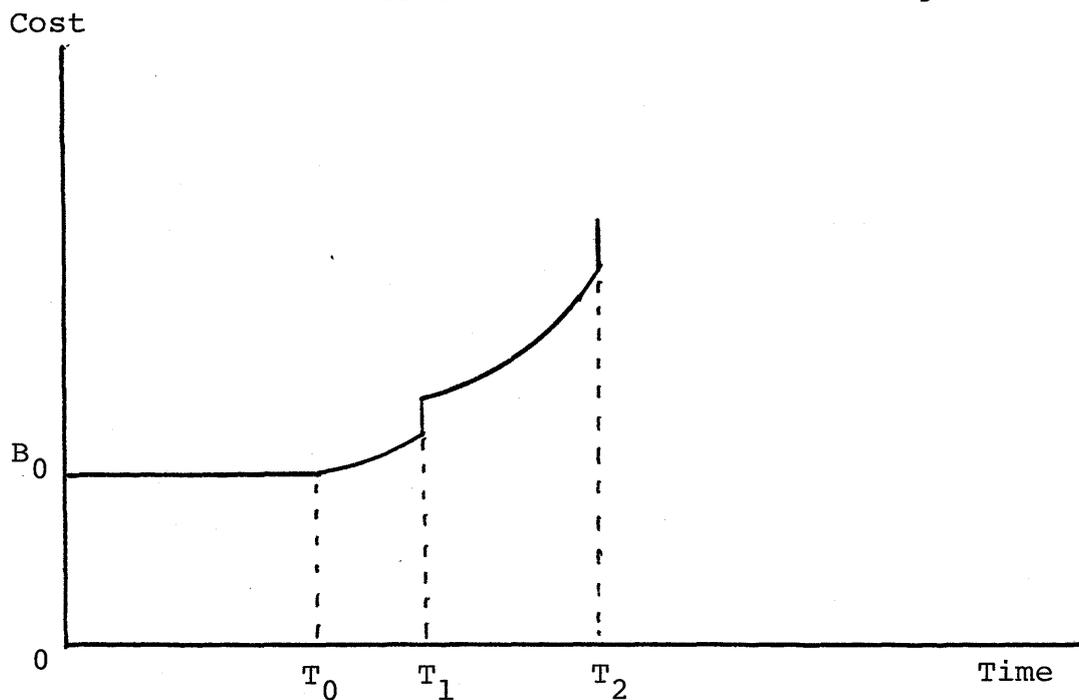
$e^{r t_i}$ = the value of \$1, compounded continuously at the rate r over time t_i , where t_i is represented as a percentage of a year.

A typical cost curve would look like Figure 1. The bill would be a fixed amount (B_0) until time T_0 . If the bill was not paid by T_0 , the opportunity cost of the principal would be compounded continuously at the cost of capital until the bill was paid or service discontinued. At T_1 , a fixed cost, C_{T_1} , is added to the principal. At T_2 a fixed cost is added in order to cover the final termination notice plus the cost of terminating service.

Numerical Example of Billing Procedure. Suppose a customer receives a bill for \$50, due 20 days from the billing date. No additional charges are incurred if the bill is paid before the due date. However, suppose the bill is actually paid 50 days after it is mailed. For illustrative purposes we will assume that the utility has a 10% cost of capital and further, incurs a \$2 cost each time it sends out a delinquency notice. Our hypothetical customer should be charged the following amount (assuming a delinquency notice or duplicate bill is sent two days after the delinquent date - see Exhibit 1).

$$\begin{aligned} \text{gross bill} &= \$50C \cdot 10\left(\frac{50-20}{360}\right) + \$2C \cdot 10\left(\frac{50-22}{360}\right) \\ &= \$50.42 \qquad \qquad \qquad + \$2.02 \\ &= \$52.44 \end{aligned}$$

FIGURE 1 Cost Related Billing Function



0 = Billing date

T_0 = Due date

T_1 = First notice

T_2 = Second notice and/or termination of service

In this case the customer did pay the bill, hence C_{T_2} would be 0. By charging a \$2.43 late fee, the company has recovered both its opportunity cost of outstanding credit and the compounded cost of sending out a delinquency notice. This procedure is easily computerized. The collection department would receive a bill for \$50, note the date that payment was received, have the computer calculate the opportunity and collection costs (if any) and include this figure on the next bill.

Alternative Solution - 1. The company could calculate an average percentage collection cost and note on the bill that this percentage cost plus a pro-rated fix cost should be included with any bill paid 20 days after the billing date. Following the time frame in Exhibit 1, this cost would be:

$$\begin{aligned} \text{average percentage} &= \frac{e^{.10\left(\frac{60-20}{360}\right)} - 1}{2} \\ \text{cost} & \\ &= .56\% \text{ of net bill} \end{aligned}$$

$$\begin{aligned} \text{pro-rated fixed} &= \frac{\$2e^{.10\left(\frac{60-22}{360}\right)} + \$2}{2} \\ \text{cost} & \\ &= \$2.01 \end{aligned}$$

In this case the customer would be required to include .56% of his net bill plus a \$1.01 fixed charge with any bill received after the due date.

Alternative Solution - 2. A maximum collection cost is calculated. This percentage, plus applicable fixed costs is noted on the customer's bill. Following our example this cost would be:

$$\begin{aligned} \text{maximum} & \\ \text{percentage} & = [e^{.10(\frac{60-20}{360})} - 1] \\ \text{cost} & \\ & = 1.12\% \text{ of net bill} \end{aligned}$$

$$\begin{aligned} \text{maximum} & \\ \text{fixed} & = [\$2e^{.10(\frac{60-22}{360})}] + \$2 \\ \text{cost} & \\ & = \$4.02 \end{aligned}$$

Both the percentage cost and fixed cost are twice the amounts calculated under alternative solution #1. The entire collection period cost is charged under this plan.

Alternative Solution - 3. It behooves us to emphasize the importance of employing some economic incentive when a company, regulated or private, formulates a financially sound credit policy. We recognize that the solutions provided may be rejected on grounds that they are too difficult to understand and/or program, although this need not be the case. Therefore, we propose that if the first three solutions are rejected, a flat 3% late charge be required on any bill received after the due date. This percentage charge would generate approximately the same revenue as alternative solution #1 on a \$40 bill (the average residential bill in the Gulf Service area, for example). It provides a fair and just compromise between our theoretical solution and the 5% charged by Gulf Power. However, we recommend that this percentage be used as a compromise solution only.

VI. Conclusion

The goal of this paper was to answer two general questions.

- 1) Is it cost-effective for an electric utility to employ a net/gross billing procedure?
- 2) Does there exist a significant income redistribution effect when net/gross billing is employed?

We have employed incremental cash flow analysis and, at least for our case study, can answer the first question with an unequivocal "yes". The second question can only be answered with a tentative "no", as we lack information concerning many of the important parameters.

Our recommendations call for implementing some type of cost-related billing procedure for delinquent accounts. Hopefully, the actual policy will closely follow one of the first three solutions outlined in section V. However, our main consideration is that some type of equitable policy be implemented within the near future.

EXHIBIT 1

TYPICAL

ELECTRIC COMPANY

CHART OF BILLING SEQUENCE

60 DAY CYCLE

