

Determining the True Cost of Low Income Customers

written by

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I. Introduction

A. The Changing Environment

The momentum is clearly building; momentum for deregulation of the electric utility industry. Some states have only begun to consider such changes, but others are now moving rapidly to implement them. Change is coming and while the final shape and form of a deregulated industry are still not known, one can no longer disclaim the trend.

Observers expect deregulation to open the industry to competition. What will this mean? At its simplest, competition will mean that Customers, the people who buy and use electricity, must be wooed and won; wooed and won from another electric company- down the street, in the next county, across the state line. Customers will no longer be simply assigned to the local company. And they will no longer be captive. After they have been won, Customers will have to be held; kept happy; persuaded never to buy their power from that other electric. This is the pending world of competition.

One form of competition is price competition and clearly the intent of current deregulation initiatives is to foster price competition. Under price competition, a company tries to "woo and win" customers by offering its product at a lower price than its competitors. This strategy is based on the concept that the quantity demanded of a firm's product will increase as its price drops.

Of course, a company cannot lower the prices of its products indiscriminately. Any reduction in *unit* price results in a dollar-for-dollar reduction in *unit* profit. One can maintain (or even increase) total profit in such instances by "winning" more unit volume with the price reduction. One can also maintain total profit by sufficiently reducing unit costs to preserve the original per unit margin. In truth, under price competition, a company usually employs a combination of these two strategies. In any event, the downward pressure

on costs due to price competition is unmistakable. Profitability must be preserved and decision-makers in the electric utility industry have already begun to adopt cost management as the successor to the old paradigm of cost recovery.

B. The Issue of Low Income Customers

One would think that the prospects of price competition within the electric utility industry would thrill low income customers and their advocates. One would think that the expected reductions in electric prices would make energy bills more affordable than ever for this customer segment. Upon reflection, however, many observers have concluded that deregulation and the resulting price competition might be a double-edged sword for this group.

Conventional wisdom in the electric utility industry holds that it costs more to provide electric service to residential customers than to commercial or industrial customers. Conventional wisdom further holds that, among residential customers, the Low Income segment¹ is the **most** costly to serve. Conventional wisdom explains that this circumstance is due to the high credit and collections expense associated with Low Income customers and is occasionally exacerbated by costly low income assistance programs mandated by regulators. If this is true, it would be a rational strategy for any electric to eliminate low income assistance programs and perhaps abandon the Low Income market segment altogether in its quest to improve profitability.

C. Importance of Knowing the "True Cost" of Low Income Customers

It is highly unlikely that today's "obligation to serve" will fall victim to deregulation. Someone will be required to provide electric service to Low

¹ In more recent literature, authors have drawn a distinction between "low income" customers and "payment troubled" customers. The distinction is that the vast majority of "payment troubled" customers are "low income", but not all "low income" customers are "payment troubled". The distinction is important when one is actually in the field, selecting customer records for inclusion or exclusion in a sample. For purposes of this paper, the terms are used interchangeably.

Income customers. It is thus vitally important to confirm or deny the conventional wisdom regarding the cost of providing such service. If Low Income customers are indeed more costly to serve than residential customers in general, it is likely that the "excess costs" will be borne by society as a whole rather than by an individual utility. In this case, it will not be enough just to confirm that cost differences exist. It will be necessary to reliably quantify those differences. The total dollars involved will shape the debate over precisely how society "pays" for the excess costs. A "wire's charge" is often proposed as the payment mechanism, but other alternatives are also being discussed.

Finally, it will be important for the electric utility industry to understand the true causes of whatever excess costs are identified. While society may subsidize an obligation to serve, it is unlikely that the industry will be given a blank check. It will be incumbent on individual electric utilities to provide the services required within the subsidy provided. If unable to do so, costs in excess of the subsidy will be borne by the individual utility. Limiting the services provided will not be an option available. The only means of preserving profitability that will be available is to reduce the cost of providing the required service. A utility will need both a means of identifying cost reduction opportunities and a means of quantifying their success.

D. Purpose of this Paper

The purpose of this paper is to describe a methodology for identifying the "true costs" of providing service to the Low Income customer segment of an electric utility by using the techniques of Activity Based Costing. More specifically, this paper will do four things:

- (1) Introduce the principles of Activity Based Costing and describe how ABC can be used in a market segment cost analysis;
- (2) Describe how to structure an Activity Based Costing project;

- (3) Recommend techniques for using the data generated by an ABC project to answer public policy questions about the cost of providing electric service to Low Income customers; and
- (4) Explain how an Activity Based Costing project can serve as the foundation for Activity Based Continuous Improvement, also under the Activity Based Management umbrella. Activity Based Continuous Improvement is used to help individual electric companies improve internal processes and thereby reduce the cost of serving Low Income customers.

II. The Theoretical Framework

A. Introduction to Activity Based Costing

Activity Based Costing, or ABC as it is known, is a method of assigning costs to products and services on the basis of the activities they consume. Douglas Hicks of D. T. Hicks & Co., a Michigan based consulting firm defines ABC this way:

Activity Based Costing is a concept. Its basic premise is that a company's outputs (its products and services) give rise to the need for operating, management and administrative activities, which, in turn, make it necessary that costs be incurred in providing those activities. ...these operating, management and administrative costs can be assigned to the outputs that caused them to be incurred by routing them first to the activities that made them necessary and then to the outputs that made the activities necessary.²

ABC gained prominence in the late 1980's through the work of Professors Robin Cooper and Robert S. Kaplan of the Harvard School of Business. The new techniques were first used in manufacturing settings to successfully

² Hicks, Douglas T., "Special Edition", (Farmington Hills, MI: D.T. Hicks & Co., Autumn, 1994), 4.

reevaluate the reported costs of tangible products. Those same techniques were then successfully applied in settings where the primary market offerings were services, such as banks and insurance companies. Today, the techniques of ABC are recognized as applicable to tracing an organization's costs to *any* cost objective³.

B. Using ABC in a Market Segment Cost Analysis

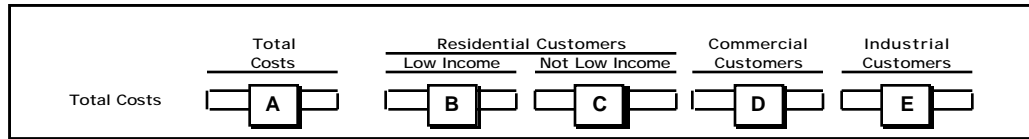
Activity Based Costing is characterized by a two-step process regardless of the objective of the analysis- (1) The costs incurred by an organization are first assigned to activities based upon each activity's consumption of resources, and then (2) Activity costs are traced to final cost objectives based upon consumption of those activities. The following paragraphs describe how this two-step process is applied, in this instance, to the objective of determining the "true costs" of providing electric service to the Low Income customer segment of an electric utility.

The objective of determining the cost of serving a specific market segment is an exercise in distributing⁴ a utility's total incurred cost to all of its market segments. Figure 1 illustrates the concept. In Figure 1, "A" labels the grand total of costs incurred (in dollars). Letters "B", "C", "D", and "E" mark the total dollars assigned to each respective market segment. In an ABC cost analysis, there are no unassigned costs; i.e., in Figure 1, "A" is the sum of "B", "C", "D" and "E". Also note that "B" is the total cost of the Low Income market segment, the purpose of this exercise.

³A "cost objective" is any organizational endeavor for which a *separate* measurement of cost is desired.

⁴ There is great confusion in the literature over use of the terms "allocate," "associate," "assign," "identify," "apportion," and "trace" as they refer to the distribution of costs. See Bronbright, James C., *Principles of Public Utility Rates* (Arlington, VA: Public Utilities Reports, Inc., 1988), 118. For purposes of this paper, these terms are interchangeable. The basis of the cost distributions described is inherent in the Activity Based Costing methodology, not in the term chosen to describe it.

Figure 1. The Objective- Total Cost by Customer Segment



The exercise would be remarkably easy if customer segments were cost objectives in a utility's accounting system. Unfortunately, they're not. Most electric utilities subscribe to the Uniform System of Accounts for Public Utilities as specified in 18 CFR 101. These accounts are the cost objectives within a utility's accounting system and were developed to provide insight into costs for ratemaking, i.e., cost recovery, purposes. These Accounts will be the source of information about the utility's incurred costs.⁵ Figure 2 illustrates how the sum of the costs that have been collected in the Uniform System of Accounts (marked "A1", "A2", "A3", "A4",

Figure 2. Source of Cost Information

FERC Chart of Accts	Total Costs
Power Prodn Exp	
500	A1
...	
557	A2
Transmission Exp	
560	A3
...	
574	A4
Distribution Exp	
580	
...	
598	
Customer Accts Exp	
901	
...	
905	
Customer Service & Information Exp	
906	
...	
910	
Sales Expense	
911	
...	
917	
Admin & General Expense	
920	
...	
935	
Total Costs	A

⁵Regulators of public utilities must frequently deal with conflicts between the economic and accounting definition of "cost." The issue normally arises in discussion of whether a particular "cost" should be included or excluded in the "cost of service" for ratemaking. In this paper, the distinction between economic costs and accounting costs is irrelevant. This paper describes a method for distributing costs and *whatever* costs are included can be so distributed. For ease of demonstration, however, an accounting definition of cost is adopted so that a utility's accounting system can be cited as the source of cost information.

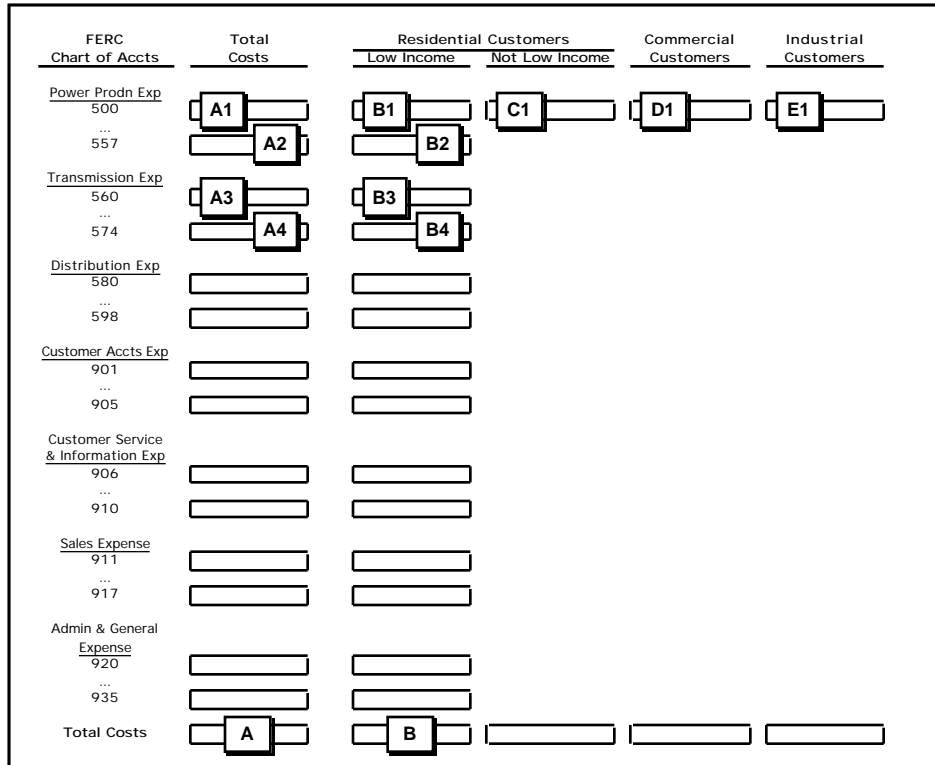
etc.) equals the total incurred cost ("A").

One might think it a simple matter to combine the one-dimensional tables shown in Figures 1 and 2 and create the two-dimensional table shown in Figure 3. One might further think that the required cost analysis has thus been reduced to completing this table; to distributing the costs collected in each Account across the various market segments and then totalling each segment's portion of costs. In Figure 3, for example, it might appear to be a matter of distributing the costs collected in Account 500 (labelled "A1") across the market segments as depicted by labels "B1", "C1", "D1" and "E1". Once the costs in each account were so distributed, it might appear that the cost of the Low Income market segment, marked as "B", could be calculated by summing its portion of each account (labeled "B1", "B2", "B3", "B4", etc.). The methodology just described is the basis of ratemaking in electric utilities across the country.

Unfortunately, no matter how elaborate or sophisticated the formulae for "assigning", "apportioning", and/or "allocating"⁶ the costs collected in Accounts, the results will not be as useful for management decision-making as results generated using Activity Based Costing. This is true for the simple reason that market segments don't consume resources directly. Market segments don't cause costs. Market segments consume **activities** and the activities consume resources (costs). The lack of direct causal links between the costs collected in Accounts and the costs distributed to market segments is the inherent weakness in the approach illustrated in Figure 3.

⁶See footnote 3.

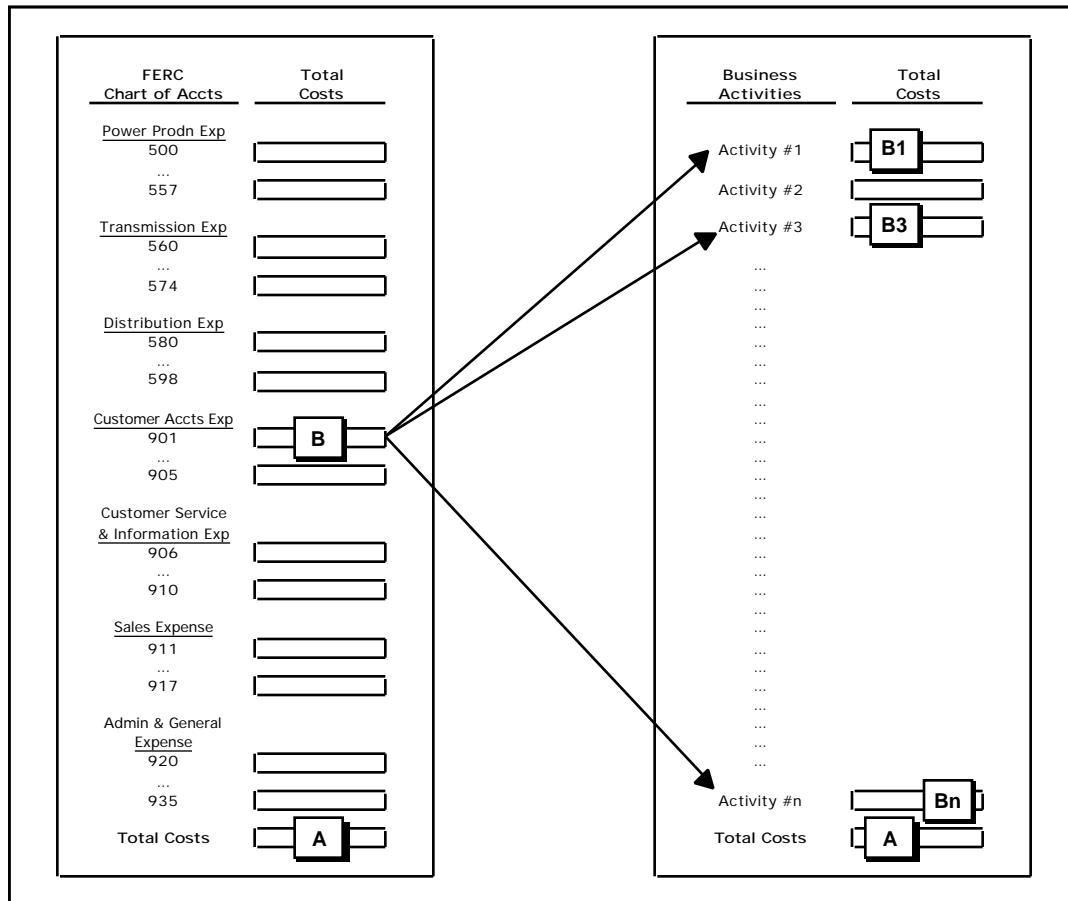
Figure 3. What NOT To Do



The causal links are established in Activity Based Costing by first assigning costs to activities based upon each activity's use of resources. (The methodology for accomplishing this task this is set forth in Section III of this paper.) Figure 4 illustrates the idea. In Figure 4, cost has been accumulated in Account 901, Customer Accounts Expense- Supervision (labeled "B"). It is then distributed to Activity #1, Activity #3 and Activity #n in the different amounts marked "B1", "B3", and "Bn". The sum of "B1", "B3", and "Bn" equals "B". None of the costs from Account 901 are distributed to Activity #2. This would happen, for example, if Activity #1, Activity #3 and Activity #n were different Credit and Collections activities and Activity 2 concerned maintenance of a generating plant. Note that activities are only identified generically in Figure 4 (Activity #1, Activity #2, etc.) because specific activities

are unique to how an individual utility does business. One of the primary tasks of the ABC methodology is identifying and understanding an organization's activities.⁷ Note also that in Figure 4 the total incurred costs that have been collected in Accounts ("A") are all consumed by activities. In other words, the sum of all the activity costs is also "A".

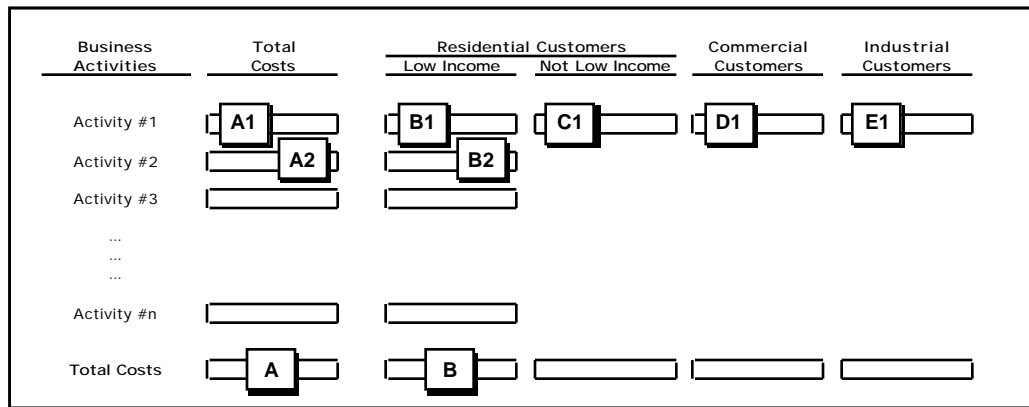
Figure 4. First Identify Costs of Activities



⁷The terms "task", "activity", and "process" are frequently defined in terms of a hierarchy. At the top of this hierarchy are processes (often called *business* processes). Processes are made up of activities and activities in turn consist of tasks. Unfortunately, in describing business endeavors, one frequently uses a hierarchy that is deeper than three levels. In these situations, there is no common definition of which middle levels are "activities" rather than "processes" or "tasks". Note that even with this confusion, the hierarchial relationships survive. The challenge in an ABC project is to define activities at a level low enough to produce the distinctions sought, but not at a level so low that the project becomes buried in detail.

Once an organization's costs are assigned to activities, the second (and final) step is to distribute the activity costs to each market segment. (The methodology for accomplishing this task this is set forth in Section III of this paper.) This is shown in Figure 5. For example, the total cost assigned to activity #1 is labelled "A1". These costs are shown distributed to market segments as depicted by labels "B1", "C1", "D1" and "E1". Once the cost of each activity is distributed, the cost of the Low Income market segment, marked as "B", is calculated by summing its portion of each activity (labeled "B1", "B2", "B3", "B4", etc.).

Figure 5. Then Trace Activity Costs to Cost Objectives



One might note that Figure 5 looks very similar to Figure 3 and one might wonder if the intermediate step of assigning costs to activities before distributing those costs to market segments is really necessary. The answer is a resounding "YES". The power of Activity Based Costing is its grounding in the process model of organizational activity. In that model, every organizational endeavor, from a top-level business-process to the lowest level work-task, is considered a "process", a group of actions that consume resources and convert measurable inputs into measurable outputs.⁸ The

⁸Examples of measurable outputs germane to this paper could include (1) completed LIHEAP

outputs of a given "process" are delivered either to a downstream "process" or to the end customer. The measurable outputs that are delivered to Low Income customers are the causal link between resources consumed (costs) and that market segment.

III. Structuring an ABC Project

A. The General Approach

The typical ABC project is facilitated by an outside consultant or a full-time internal project leader and consists of three distinct phases.

1. Planning and Pre-Workshop Data Analysis;
2. A Sequence of Workshops; and
3. Post-Workshop Analysis.

Each of these phases is discussed in more detail below.

B. Project Planning and Pre-Workshop Data Analysis

The Project Planning phase encompasses a broad range of decisions that must be made concerning the scope and duration of the project. Project goals and objectives are identified. A project "scoreboard" is created, project performance measures communicated and success criteria pre-determined. A management steering team is recruited. Workshops are scheduled and the participants identified. When project planning is completed, the organization knows WHAT is supposed to happen with the project, WHEN it is supposed to happen and HOW one will know if it was successful.

Preliminary data analysis is performed during this phase to determine the availability of data to support the sequence of workshops. The existing financial reporting system and budgets are assessed and selected financial data are consolidated and summarized. Decisions are also made as to how

applications, (2) negotiated payment plans, (3) monthly billing statements, and (4) past due dollars collected.

confidential information including salaries and fringe benefits will be managed in the workshops.

C. The Sequence of Workshops

Interactive workshops with cross-functional participation have replaced management interviews as the technique of choice for performing the first step of an ABC project; that step depicted in Figure 4 above. The power of such workshops is that they leverage the knowledge and experience that an organization's people have of their own tasks, activities and processes.

Typically, two workshops are required:

Workshop 1

The objectives of Workshop 1 are to identify the ACTIVITIES that generate the OUTPUTS of the participants' daily tasks and then to define MEASUREMENTS for those OUTPUTS. The most effective facilitators use an interactive, storyboarding approach for identifying activities. A blizzard of work tasks is generated in the workshop through brainstorming and those tasks are then gradually grouped and consolidated into ACTIVITIES by the participants.

Workshop 2

The objective of Workshop 2 is to trace RESOURCES to the ACTIVITIES identified in Workshop 1. Most frequently, this is an exercise in sorting-out how much TIME is spent by WHOM on each ACTIVITY. This process is also frequently facilitated with a participative, visual procedure.

D. Post-Workshop Analysis

Once an organization's costs have been assigned to activities through the sequence of workshops, the next (and final) step is to distribute those activity costs to each market segment. This is the step depicted in Figure 5 and is typically performed by the external consultant or internal project leader. Since measurable outputs for each activity were identified in the workshops, this phase consists of collecting data on how much of each activity's output is

consumed by each market segment. Once the data is collected, the "allocation" calculations are straight-forward.

IV. Using the ABC Data

A. Total Cost of the Market Segment

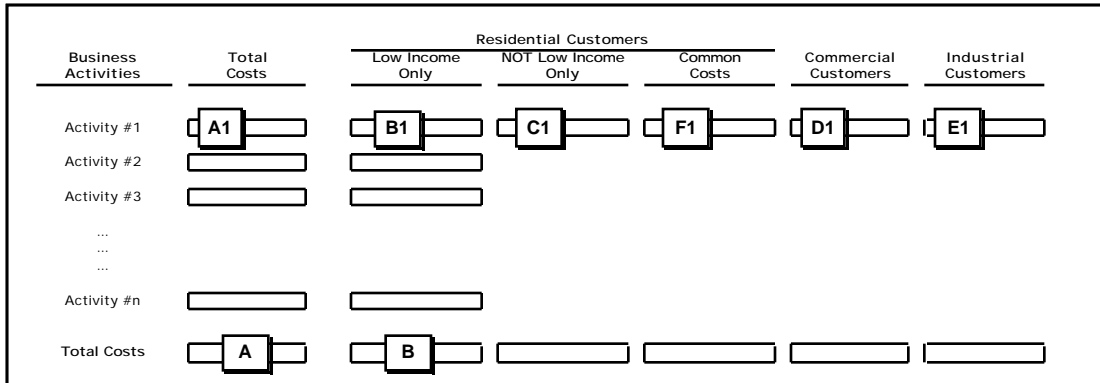
As stated earlier, the objective of the Activity Based Costing project described is a single number, the total cost of providing electric service to Low Income customers. This is the number labelled as "B" in Figures 1 and 5. This "total dollars" answer is valuable input into the public policy deliberations described and with additional analysis, its usefulness can be enhanced further.

B. Differential Cost of the Market Segment

One way of enhancing the total cost answer is to highlight those costs that were incurred just because the Low Income market segment is "low income". The total cost of providing electric service to a utility's Low Income customers includes costs that are not unique to the Low Income segment. For example, the total cost number includes costs of generation even though the cost of generating one kWh for a Low Income customer is the same as the cost of generating one kWh for any other residential customer. To identify costs that are unique to providing service to the low income segment an adjustment is made in how data is collected in the third phase of the project, the Post-Workshop Analysis phase.

To review, the goal of the Post-Workshop Analysis phase is to distribute the costs that have been assigned to activities to each market segment. This is done by collecting data on how much of each activity's measurable output is consumed by each market segment. The required adjustment is to redefine the target market segments as shown in Figure 6.

Figure 6. Determining the Differential Cost



In this figure, the Residential Customer market segment has been subdivided into three: Low Income Only, Not Low Income Only and Common Residential. With this scheme, the total cost assigned to activity #1 (labelled "A1") can be distributed as a unique cost to Low Income customers or as a unique cost to Non Low Income customers or as a cost common to all Residential customers. Once the cost of each activity is distributed, the cost of the Low Income Only column, marked as "B", is calculated by summing its portion of each activity.

The differential cost of providing electric service to Low Income customers is another valuable input into the public policy debate. It is recommended that the differential cost of this market segment be calculated **in addition to the total cost originally described.**⁹ Note that without normalization, differential cost is also of little comparative value to an analyst.

⁹Other additional analyses are possible that would provide valuable information. For example, the Low Income market segment could be subdivided into two categories: (1) Low Income customers in assisted housing, and (2) Low Income customers NOT in assisted housing. Both the total costs and the differential costs of these further subdivisions could be developed using the techniques described.

C. Normalization

A utility's total cost (or differential cost) of serving Low Income customers is of little value if one is seeking to make comparisons. Comparison with the total cost or the differential cost numbers of another utility has no meaning. Standing alone, the total cost of serving Low Income customers cannot even be compared with the total cost of other market segments within the same company. To be useful for comparisons, the cost numbers generated in this project must be normalized with respect to some base. Two examples of normalization are examined below.

1. Market Segment Cost Ratio

One means of creating a more valuable metric is to normalize either cost number with respect to revenue. This analysis would involve collecting revenue data by customer segment (over a period consistent with the cost data) and then calculating the cost ratio. The formula is:

$$\text{Rate} = \text{Cost of Low Income Segment} / \text{Revenue of Low Income Segment}$$

This ratio is similar to the profit rate or gross margin rate familiar to both accountants and economists. It is a metric that is comparable across market segments and between different electric utilities. It enables meaningful comparisons between Low Income and Non Low Income customers.

If cost ratios were calculated for both Low Income and Non Low Income customers, one could also calculate the cost reductions needed to make the two profit rates equal. This analysis would not indicate where cost reductions could be made; it would simply yield a total dollar target for such reductions.

2. Cost per Customer and A Caution

Another means of normalizing either the total cost of serving Low Income customers or the differential cost is to calculate a dollar cost per customer. To perform this analysis, one would need to collect the total number of Low Income customers as an additional datum. Cost per customer is a metric that

should also be comparable across market segments and between electric utilities.

One must exercise extreme caution in using either the cost per customer or the cost per revenue dollar metric. There is frequently a rush to use such ratios in predictive models, i.e., to predict how much total cost would change if the number of customers changed by 'x' or if total revenue changed by 'y'. The number of customers and the dollars of revenue were chosen as cost normalization bases because they are very simple surrogates for the multitude of causal links embedded in the cost numbers. This is not intended to imply, in any manner, that costs vary directly with either the number of customers or the dollars of revenue. It would be wrong to conclude that costs would increase or decrease proportionately with either a change in the number of customers or a change in the dollars of revenue. These normalization bases simply make two incomparable numbers more comparable.

V. Implementing Activity Based Continuous Improvement

Earlier it was stated that if a utility's cost of serving Low Income customers exceeds society's subsidy, the only means of preserving profitability available will be to reduce the cost of providing the required service. The ABC project described in this paper will directly help an individual utility address this need by serving as the foundation for implementing Activity Based Continuous Improvement.

As the first step of the ABC methodology, an organization's activities were identified and costs assigned to those activities. With that information, two techniques of ABCI can be used to identify opportunities for process improvement and cost reduction. Those techniques are Non-Value Added analysis and Root Cause analysis.

When using Non-Value Added analysis, an organization seeks to minimize or eliminate tasks and even entire activities that do not add value to the end Customer, in this case the Low Income customer segment. Error corrections and rework are obvious non-value added tasks, but tasks involving words like "reconciliation" or "approval" are also frequently non-value added. Examples of non-value added tasks in the Credit and Collections arena might include supervisory approval of a negotiated payment plan and correction of a mis-applied customer payment.

When using Root Cause analysis, an organization seeks to identify and then minimize the Root Cause of the large-dollar, Value Added activities. The idea is that even if an activity adds value to the end customer, if it consumes many resources (is high cost), it offers the greatest opportunity for cost reduction. An example might be this: A large dollar activity in the Customer Service department is responding to telephone inquiries from customers with questions about their bill. There is no doubt that this activity is Value Added to the end customers. In searching for the Root Cause of this activity, however, it became apparent that customers had questions about their bill because the layout of the bill was confusing. The answer to a customer's question was usually on his statement. It was just hard to find. Redesigning the layout of the monthly billing statement reduced the confusion, reduced the number of telephone inquiries and consequently reduced the need for the activity of responding to those inquiries. As the activity shrank, so did its consumption of resources. In other words, costs were reduced.

VI. Summary and Conclusions

- The primary conclusion of this paper is that the techniques of Activity Based Costing can be used to determine the "true cost" of providing electric service to Low Income customers which is an important input into the public policy deliberations about electric deregulation.

- The two-step ABC process of assigning incurred costs to activities before tracing those costs to final cost objectives results in a superior causal link between the incurred cost and market segments.
- The required ABC cost analysis is accomplished with a three-phase project.
- The ABC project results in both total cost and differential cost numbers which are valuable to the policy debates.
- The total cost and differential cost numbers must be normalized with respect to dollars of revenue or number of customers before comparisons across market segments or between electric companies can be made.
- The costs assigned to activities during the ABC project can provide the foundation for implementing Activity Based Continuous Improvement.
- The techniques of ABCI can be used to identify opportunities for process improvement and to quantify subsequent cost reduction. They are invaluable in transforming an organization from one rooted in a cost recovery mentality to one focused on creating competitiveness through advanced cost management.

About the Author

Stephen D. Colton is President and founder of Accounting INSIGHTS, an independent management accounting firm based in Plymouth, Minnesota. Colton has over seventeen years of experience as a management accountant and has developed a unique expertise in understanding and estimating costs. His work has been in industries ranging from the fabrication of integrated circuits to the assembly of wooden cabinets and fixtures to gas and electric utilities. While some accountants specialize in taxes and others in software, Colton specializes in costs. The mission of Accounting INSIGHTS is to help companies and organizations better understand and manage their costs of doing business. Colton's recent publications include "The ABC's of Understanding Costs," *Minnesota Business and Opportunities* (Sept., 1995) and "Controlling Labor Costs," *Minnesota Business and Opportunities* (July, 1995).

In addition to this treatise, Colton has applied the principles of Activity Based Management to other issues concerning deregulation and restructuring of the public utility

industry. His article "A Model for Assessing the Interaction of Rate and Service Changes in a Mergers & Acquisitions Environment" has been accepted for publication in *Electricity Journal* later this year.