DEFINING CUSTOMER SOLUTIONS THROUGH ELECTROTECHNOLOGIES: A CASE STUDY OF TEXAS UTILITIES ELECTRIC

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ABSTRACT

TU Electric is currently developing a strategic business plan that incorporates the promotion of electrotechnologies as an integral part of that planning process. The purpose of this project was to assess the market and program potential of electrotechnologies, in terms of energy and revenue impacts, on TU Electric's industrial and large commercial sectors. The project allowed the development of a process to assess electrotechnology potential for the near term (3-5 years) within the TU service territory. Specific process components included defining a master technology list, qualifying and market screens, application and unit impact matrices, and technical/market/program potentials. Results of the study concluded that electrotechnologies have significant potential in TU's service territory and offer sizable incremental impact to the utility's strategic load growth objectives. While the project assessed the potential of both established (commercially available) and a select few emerging technologies, quantifying impacts of emerging electrotechnologies was quite challenging, based on the fact that there is little documented information regarding their potential in the marketplace.

INTRODUCTION

This paper addresses the topic of electrotechnology market and program potential which has become an integral component of revenue enhancement strategy at Texas Utilities (TU) Electric. TU Electric has developed a marketing strategy that offers a balanced product and service offering to its customers. It consists of four key components: 1) traditional DSM, including load-retaining technologies, 2) increased community focus, 3) increased focus to commercial and industrial customers and their issues, and 4) electrotechnology focus. Electrotechnology potential is a significant component of that strategy.

Emerging and established electrotechnologies are being increasingly recognized as viable to both end users and to electric utilities. In many instances, applications of electricity are both more efficient and more responsive to customer operating and environmental drivers than their fossil-fueled counterparts. This paper reports on a study commissioned by TU Electric to assess the potential of electrotechnologies within its service territory.

This paper provides estimates of electrotechnology potential within the industrial and large commercial sectors of the TU Electric system. While expected impacts are presented in this paper, it is not expected that all impacts are to be realized. A number of customer opportunities that are not considered primary will not be pursued because of limited resources. Limited resources may be defined as lack of available capital from the customer perspective and lack of available staff resources on the utility front.

This paper first provides the methodological approach for conducting a series of electrotechnology potentials and then summarizes the main findings of the study which included the master list of technologies, a qualitative screening, and four sets of potential. The four potentials include: technical, market, naturally-occurring, and utility program.

METHODOLOGY

Emerging and established electrotechnologies are being increasingly recognized as viable to both end users and to electric utilities. In many instances, applications of electricity are both more efficient and more responsive to customer operating and environmental drivers than their fossil-fueled counterparts. Customer drivers include:

- Product quality
- Product yield
- Throughput
- Responsiveness
- Flexibility
- Environmental compliance
- Safety

The goal of this study was to assist TU Electric to determine the electrotechnology potential within its service territory and to identify the necessary level of support in terms of TU resources to achieve this potential. The estimation of potential encompassed the mapping of electrotechnology applications by respective industry and building type as well as defining market and program impact estimates by SIC code and building type. The study profiled a one-year snapshot - the year 2000 - providing energy impacts by technology and by SIC or building type.

The initial steps consisted of developing a master list of electrotechnologies and to conduct a qualitative screen. The master technology list was comprised of primarily established electrotechnologies with a few selective emerging electrotechnologies also identified. All technologies were grouped by respective end use. The master list was then run through the qualitative screen to determine the most appropriate electrotechnologies for TU service territory.

The goal of the qualitative screen was to develop a series of qualitative criteria to assess the applicability of the electrotechnologies to the unique conditions of the utility service territory. The purpose of the qualitative screening was only to eliminate those measures that are clearly inappropriate for further evaluation. Specific qualitative criteria included:

- Status of commercialization
- Better measure available
- Cost prohibitive
- Not quantifiable
- No data available
- Inappropriate for climate

Subsequent steps identified applicable customers and defined the specific unit impacts and applications of each appropriate electrotechnology in order to determine the technical potential. Once the technical potential was calculated, each technology was screened against a set of market barriers to determine the market potential per electrotechnology. The market potential was then further screened to determine the naturally occurring forecast (adoption of electrotechnologies that will occur without TU Electric influence) and the TU-induced program potential estimate. Each electrotechnology was assessed, and specific penetration factors were assigned for both the naturally-occurring and TU-induced program impact estimates.

Figure A outlines the framework and the ten-step approach used to calculate the electrotechnology potentials. Certain fundamental equations were used to calculate each of the potential estimates. It should be noted that the methodology used to calculate technical potential varied between sectors. This is further explained within the sector-specific methodology description outlined below.

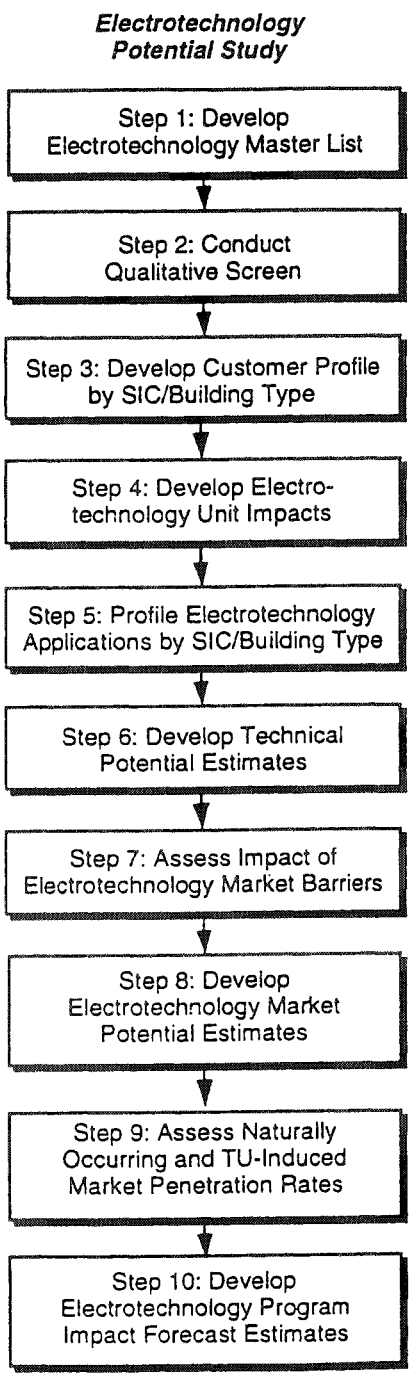
INDUSTRIAL SECTOR

Three levels of potential were estimated for the industrial sector, which was defined as the manufacturing sector (SICs 20-39) and Oil & Gas Extraction (SIC 13). The first level of potential is the technical potential, which represents a somewhat unattainable forecast based on successfully introducing an electrotechnology installation at each applicable customer site. This forecast provides a starting point from which more realistic estimates of the true marketplace can be made. TU Electric provided a list of applicable customers by two-digit SIC code that focused primarily on the largest and industrial customers. We modified that list to include both medium and medium-large industrial customers (minimum demand of 100 kW). This expanded list of applicable customers allows TU Electric maximum opportunity for electrotechnology penetration within its service territory.

The second level of electrotechnology potential is termed the market potential. In this step, several customer considerations or screens are introduced which reduce market potential to a more realistic level of penetration. The market barriers assessed included:

Figure A

Electrotechnology Potential Study Framework



- Status of commercialization
- Competitive technology impact (inter-fuel)
- Competitive technology impact (intra-electric)
- Industry vitality
- Procurement cycle
- Availability of capital
- Payback criteria
- Level of risk
- Available infrastructure

Each market barrier is assigned a weight. The weights of applicable market barriers will be summed up to reflect the total impact of market barriers to the market potential. The impact is defined in terms of a percentage. Subsequently, this percentage reduction is applied to the calculated technical potential value, with the remaining portion of the technical potential becoming the market potential. In simple terms, the technical potential minus the market barrier impacts equates to the market potential.

The market potential of each electrotechnology is segmented to reflect the primary and secondary applications by two-digit SIC. Each application is assigned a unit impact that assumes a typical impact of the electrotechnology within that specific industry group. Subsequently, higher weights for penetration were assigned to primary applications while lower weights were assigned to secondary applications. The entire weighting process relied on our informed judgment coupled with existing applications for established technologies and applied technology demonstrations for emerging technologies.

The third level of potential was the TU-induced program potential forecast. This estimate assumes that TU Electric will pursue and promote electrotechnologies in an aggressive fashion. As part of this determination, we attempted to phase in the impacts of the adoption of electrotechnologies in this step to more closely match what takes place in the real world. Penetration rates were developed to determine both the naturally occurring forecast (adoption of electrotechnologies without TU influence) and the TU-induced program potential forecast. Values were assigned in a high/medium/low approach. These penetration rates were developed based on our knowledge of electrotechnology market potential and the electrotechnology national outlooks developed by EPRI and its research network.

COMMERCIAL SECTOR

The commercial sector methodology for estimating electrotechnology potential was slightly different from the industrial sector. Differences were due mainly to the reliance on baseline information from TU's end use forecast model COMMEND. Use of the COMMEND data in effect allowed for a "bottom-up" development of the potential estimates. COMMEND specifies forecasts of energy use intensities (EUIs) (kWh per square foot), floorstock (million square feet) and electric fuel shares (percent electric). This information was provided for each of the following ten building types:

- Large Office
- Small Office
- Educational
- Retail
- Grocery Store
- Restaurant
- Lodging
- Warehouse
- Hospital
- Miscellaneous

Three main attributes were characterized for the specific commercial electrotechnologies. These attributes included applicability, end use intensities (EUIs), and fuel shares. Electrotechnologies were identified as either primary or secondary applications. A primary application is one where customers are familiar with the technology choices and where the utility will have the most success in marketing those technologies. Secondary applications are those where customer knowledge is considered lower and where the utility will have a more difficult time marketing the technologies. In all, four data sources were used to determine applicability: 1) our internal technology database and familiarity with these markets, 2) national data sources, and 3) insights from TU's Technical Services staff.

Energy intensities were developed to characterize energy consumption from the ETs. Data was assembled regarding energy intensities drawing upon a number of sources including our secondary data sources and energy intensities provided by TU's Technical Staff. TU-specific intensities pertain largely to cooling technologies.

Penetration rates used to determine the naturally occurring forecast and the TU-induced program potential forecast were assigned to each electrotechnology in a high/medium/low approach. These rates were developed based on our knowledge of electrotechnology market potential and the national outlooks developed by EPRI and its research network.

RESULTS

The electrotechnology potential analysis yielded a total TU-induced program impact forecast of 1,885 GWh for the year 2000 (a one-year snapshot). This forecast was comprised of the following components:

- Industrial: 971 GWh
- Commercial: 781 GWh
- Medical Waste Treatment: 122 GWh
- Transportation: 11 GWh

Figure B outlines the respective energy shares per component.

The program impact forecast is indicative of a high level of marketing activity by TU staff. This estimate assumed three key assumptions: 1) there will not be significant staffing additions, 2) current customer support strategies will be maintained in the promotion of electrotechnologies, and 3) the economic vitality in the region continues. To achieve this aggressive marketing campaign for electrotechnologies, it will require TU to establish this campaign as a top priority, potentially redirecting staff and resources from existing TU program activities.

The industrial program potential was estimated to be 971 GWh, approximately 52% of the total forecast. Figure C outlines the electrotechnology potential by industry group.

The primary opportunities for electrotechnologies focused in six industrial segments:

- Primary Metals (SIC 33)
- Fabricated Metals (SIC 34)
- Transportation (SIC 37)
- Electronics (SIC 36)
- Industrial Machinery (SIC 35)
- Chemicals (SIC 28)

Oil & Gas Extraction, which represents approximately 22% of TU's industrial sector energy consumption, had very limited opportunities.

Concerning the commercial program potential, it was estimated to be 781 GWh, approximately 41% of the total forecast. Figure D profiles the electrotechnology potential by building type.

The majority of this commercial potential resided within the cooling technologies. The primary opportunities were focused in the following building types:

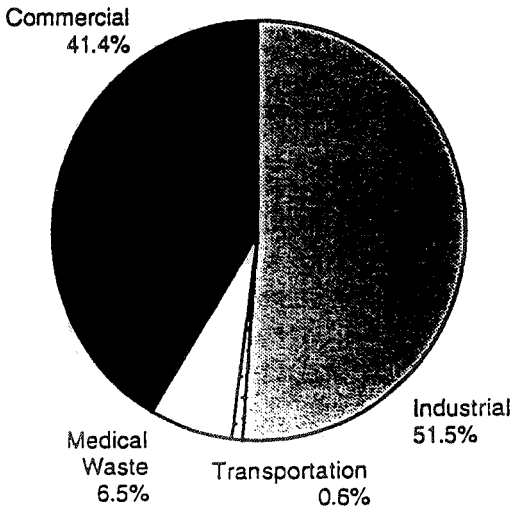
- Large Office
- Educational
- Miscellaneous
- Warehouse
- Retail

A key electrotechnology opportunity exists within the treatment of medical waste. The program potential for these electrotechnologies was estimated to be 122 GWh, approximately 6.5% of the total forecast.

Electric transportation, including both fleet and personal vehicles, was also included within this study. Program potential impacts were estimated at 11 GWh, approximately 0.6% of the total forecast. This conservative forecast is

Figure B

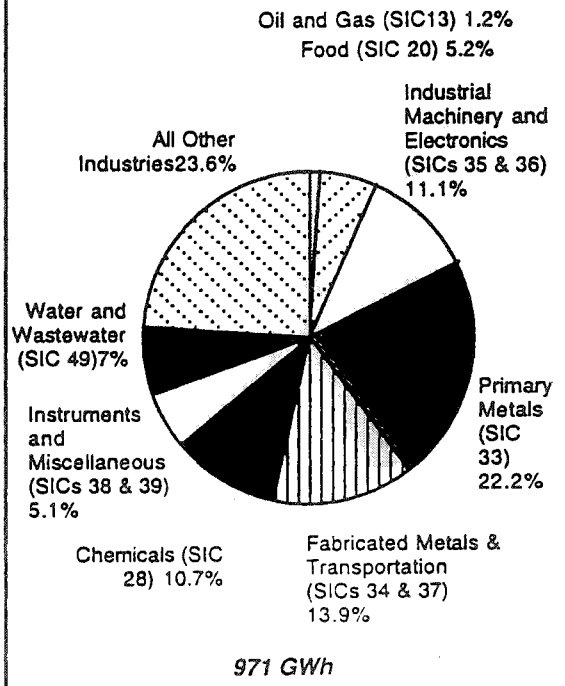
Electrotechnology Total Program Impact Estimates TU–Induced, Year 2000



1,885 GWh

Figure C

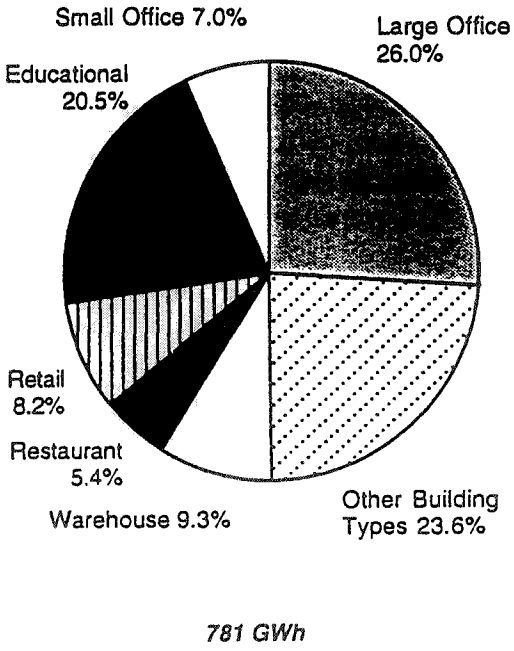
Electrotechnology Industrial Program Impact Estimates TU–Induced, Year 2000



971 GWh

Figure D

Electrotechnology Commercial Program Impact Estimates TU–Induced, Year 2000



781 GWh

attributable to the fact that electric vehicles will not have a substantial impact on the marketplace until beyond the year 2000.

CONCLUSIONS

The electrotechnology potential study indicates that there is significant opportunity to promote and install electrotechnologies within the TU Electric service territory. The study identified key opportunities by both industry segment and building type that will allow TU staff to prioritize the delivery of applicable electrotechnologies to these key customer segments. The study allows TU staff to consider the bundling of electrotechnologies into segment-specific or end-use specific programs.

With the increased understanding of benefits and key applications of electrotechnologies, TU Marketing and Sales staff, assisted by the Technical Services organization, will be able to provide value-added customer service. This effort will respond to customer drivers and the customer's changing needs and issues (competitiveness, quality, reliability, environmental compliance) while positioning those customers for long-term sustainability in the local, national, and global marketplaces.