Newton-Evans Research Company's

MARKET TRENDS DIGEST

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East Meets West in the World of Electric Power on-the-Scene Reporting from the CEPSI (China) and Cigre (France) Conferences

EAST → page 2

Chuck Newton was one of more than 2,300 attendees (a new record) who participated this October in the biennial CEPSI 2004 Conference and Exhibition held in Shanghai, China. This 15th Conference on Electric Power Supply Industry is sponsored by the Association of the Electricity Supply Industry of East Asia and the Western Pacific (AESIEAP). AESIEAP now has 97 members from 17 member countries and regions.

WEST → page 3

Gerry George, UK Research Associate of Newton-Evans Research Company, attended CIGRE's 40th Biennial General Session held in Paris in August 2004. The session has been held every two years since its formation in France 83 years ago to develop technical knowledge and international exchange of knowledge with regard to the production of electricity and transmission of energy.

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TABLE OF CONTENTS

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Shanghai and CEPSI ….. More Than You Might Expect!

by Chuck Newton

While the majority of electric power professionals at CEPSI 2004 were from China, 16 other Asia-Pacific and South Asian member countries had substantial delegations of electric power officials and energy ministry or regulatory affairs officials in attendance.

Westerners in attendance (aside from New Zealanders and Australians) tended to be associated with exhibiting vendors or were from the consultant and research communities. Two North American utilities (Arizona Public Service and Manitoba Hydro) made presentations.

North American companies exhibiting at CEPSI 2004 included Black & Veatch, GE Energy, Itron, S&C Electric, Schweitzer Engineering Labs, and Shaw Power Technologies. Zachry Construction Company of Texas exhibited services of its Saudi subsidiary, Zachry Remediation Services.

European firms represented included global companies ABB, Alstom, Areva T&D, Siemens, and Voith Turbo. Also present were: Baur, KEMA, Maschinenfabrik Reinhausen, Sensa, and STRI.

Exhibitors from Japan included Kyushu Electric Power, Meidensha, Mitsubishi, TM T&D, and Tokyo Electric Power. Australia was represented by TransGrid Business Catalyst, Talgentra's GenTrack business, and Microsol-Australia.

More than one dozen Chinese firms had grouped together some exceptional exhibits on the whole range of electric power topics, from generation to transmission, distribution, and capital investment.

Presentation discussions ranged from generation topics through transmission, distribution, retailing, standard market design options, regulatory trends, alternative power sources, restructuring, pricing, metering, and more than 300 other detailed topics.

The social side of the CEPSI 2004 conference was outstanding – *the norm for CEPSI conferences* – making visitors and delegates from 40 countries feel welcomed. We were imbued with the host country's culture, music, dance and food at several well-planned events during the week.

Some of the sessions I attended were particularly relevant to issues confronting North American utility managers today, from increased reliability demands and reliability measurement techniques to competition, control center operations, and the need for standard market designs.

More than 20 of the world's TOP 100 utilities were present, including China L&P, Thailand's EGAT and MEA, Hong Kong Electric, Philippines' Meralco and NAPACOR, India's National Thermal Power Corp., Indonesia's PLN, Japan's TEPCO, New Zealand's TransGrid, TNB of Malaysia, Koreas's KEPCO and KOSPO, and Singapore's Tuas Power Supply. Many leading Chinese research institutes were represented, as well as regional, provincial and municipal utilities, including the host, Shanghai Municipal Electric.

The highlight of the week for me was meeting with scores of young conference volunteers who kept the delegates comfortable, kept us going on the right shuttle buses, and generally from getting lost. The volunteers were comprised of electric power engineering graduate students, and young professional engineers already working to help keep the lights on throughout China to meet the growing electricity needs among its 1.3 billion citizens and millions of businesses, large and small.

Shanghai itself is worth a visit to see what can result from effective planning. The Pudong area is a fine example of 21st century construction and engineering technology as growth continues in this huge city of more than 16 million residents. Part of the technical tour included a visit to People's Square to see a huge underground substation, as well as the Shanghai Museum, a world-class facility that contains the best of Chinese art and cultural items from ancient times to the present.

Planning for the next CEPSI Conference, to be held in Agra, India (site of the Taj Mahal) during 4-8 December 2006, is well underway.

More than 2,300 Delegates and a Record Number of Exhibitors Attend CIGRÉ's 2004 Conference & Exhibition

by Gerry George

With members from around the world, the Study Committees and Working Groups of CIGRE are able to examine the complete spectrum of technical issues facing the industry. This structure has enabled CIGRÉ to move forward to examine 21st century challenges, e.g. deregulation, environmental issues, dispersed generation, etc. CIGRÉ is an organization with over 5,000 members that strives to ensure that the industry's leaders and professionals are able to share their technical expertise especially with younger engineers entering the industry.

The CIGRÉ 2004 General Session held in Paris started on Sunday 29th August 2004 and the six-day conference and exhibition program was attended by delegates from 80 countries.

The Keynote Address on 'The Benefits and Challenges of Power Market Reform: A Key Role for Transmission' was given by Claude Mandil (Director, International Energy Agency). This address, which summarized the effect of market reforms on the investment in transmission, started with a reminder of the large blackouts in 2003 and the dependence of modern society on a reliable supply of electricity. The positive benefits of energy market reforms identified are three-fold: Economic – arising from greater economic efficiency and lower wholesale prices; Consumer – ability to select the supplier offering better goods and services, and, Political – as among government, regulatory authority and system operators.

Creating a framework that provides clear signals and efficient incentives for investments has proven to be a major challenge in electricity market reform. Between 2001 and 2030 it is estimated that the power industry will need to invest some US$ 10 trillion worldwide. The investment in OECD countries is estimated at US$ 4 trillion, for generation (US$2 trillion), transmission (US$ 600 million) and distribution (US$ 1.4 trillion). In developing countries the proportionate investment on transmission and distribution will be slightly higher. An IEA Study in 2002 highlighted concerns regarding the transmission system capacity in most IEA countries, especially the level of investment on regional interconnections. This view is supported by the North American Reliability Council's reliability assessment that has noted a real drop-off in investment in transmission systems in North America since the late 1990's.

Based on the investigations undertaken by the relevant authorities following the major system blackouts in 2003, it appeared that electricity market reforms were not the root cause. An IEA workshop conducted in Spring 2004 concluded that the major causes were 3T's - Tools (lack of), Training (lack of) and Trees (lack of cutting) and for system reliability 3C's - Cooperation, Coordination and Communication. In conclusion, Mr. Mandil referred to the unique challenges faced by each country in seeking the benefits of market liberalization and regulatory reform. He acknowledged the crucial role that CIGRÉ plays by bringing all the stakeholders in electricity networks together to share knowledge so that the challenge of providing adequate and reliable electricity supplies in the future can be met.

Topics for the five-day Technical Program presentations were: transmission systems and deregulation; large system disturbances, electric power engineering education, emerging technologies; system control and operations; system environmental performance; substations; overhead lines; high voltage equipment; distribution systems and dispersed generation; HVDC and power electronics; IS and telecommunications; system technical performance; transformers; electricity markets and regulation; insulated cables; protection and automation; system development and economics; and rotation electrical machines.

The large system disturbances workshop discussed the post-fault analysis conducted following each of the major system outages recorded during 2003 (US/Canada, Finland, London, Sweden/Denmark, and Switzerland/Italy). Information on other workshops and on the Technical Exhibition will be incorporated into the next issue of *MTD*.

North American Market for Electromechanical & Solid State Relays Refuses to "Go Away"

In July 2004, Newton-Evans completed a three-month research study and survey of protective relay usage patterns in the North American electric power business. The number of North American utility protection and control engineers and engineering managers participating in the Newton-Evans protective relay study series continues to increase from a total of 64 utilities in 1999 to 79 utilities in the 2002 study, to 102 utilities in this current 2004 study.

North American utilities participating in the 2004 study of protective relay usage and trends account for more than 30% of all customers and industry revenues, far exceeding the participation levels in earlier studies conducted in 1996, 1999 and 2002. American and Canadian utilities participating in the earlier 2002 survey represented approximately 17% of the estimated total of North American customers, and 15.6% of North American-wide electric utility revenues.

The participating utilities in this current study have relay purchase plans that indicate as many as 13,350 relays will be purchased over the 2004-2006 time frame. It appears that investor-owned utilities will dominate purchases of relays in somewhat lower rates (60%-70% of utility industry totals) than one would expect, given that this group dominates the power supply industry generally (73-77% of total utility customers, revenues, production capacity, transmission lines, etc.)

This survey of North American utilities included more than 20 detailed product functionality and related technical questions, incorporating more than 250 items of information from each participant. Maintenance-related topics were included.

Figure 1

Approximate Budget Allocation for Maintaining Protective Relays

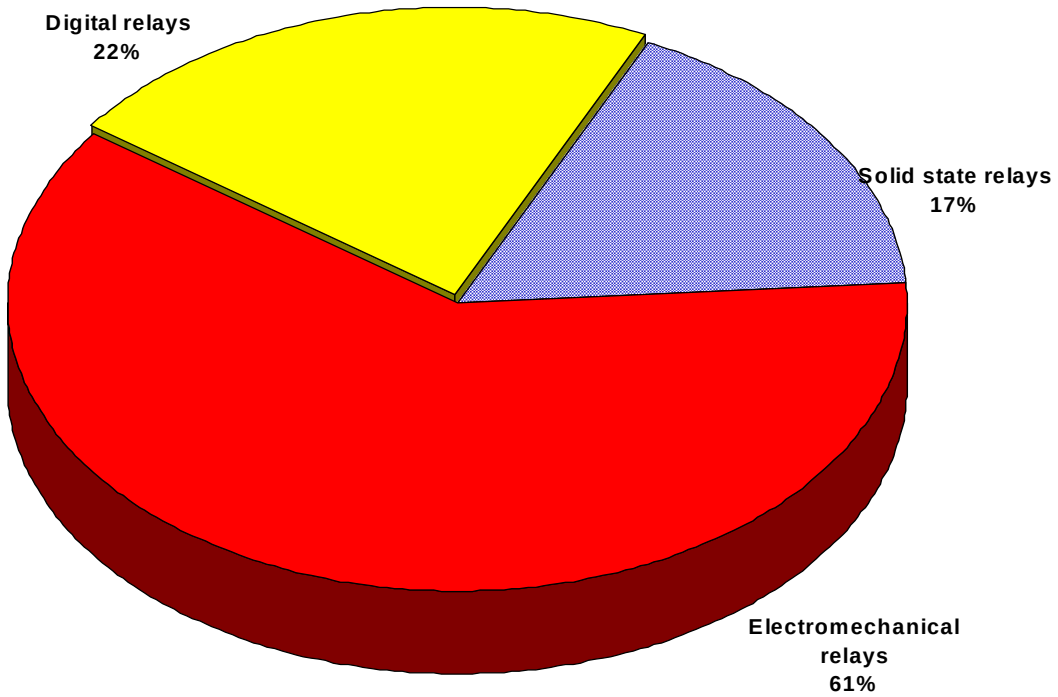
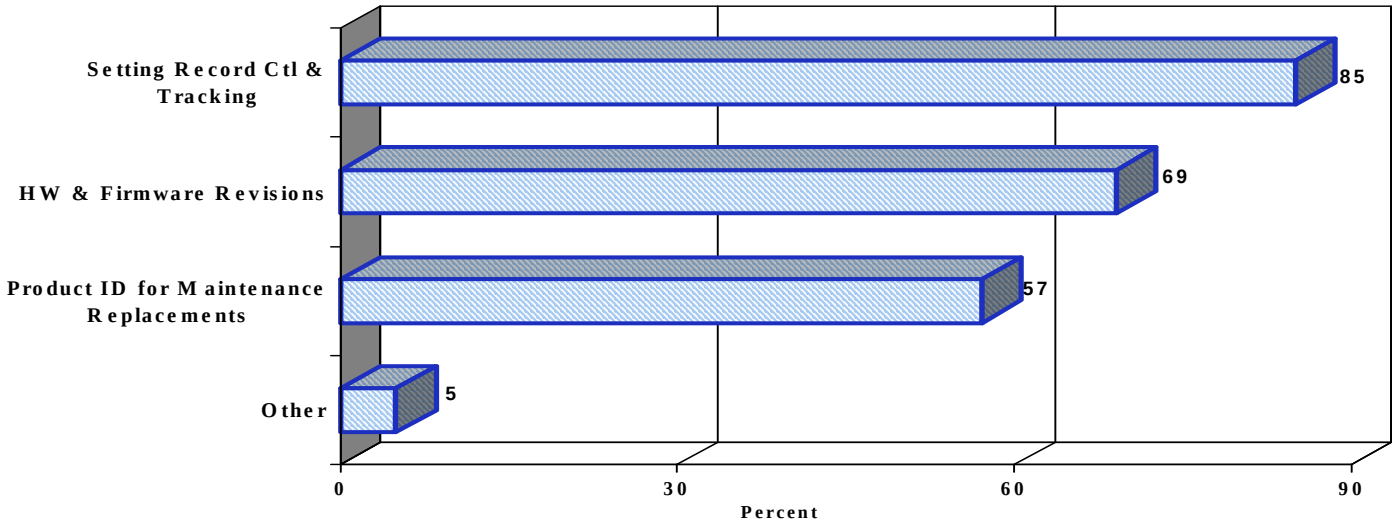


Figure 2
Non-Testing Requirements for Maintenance Management



Respondents were asked to indicate the periodic testing intervals in years for electromechanical, solid state and digital relays. The average testing interval for electromechanical relays was three and one-third years, shorter for public and Canadian utilities, and somewhat longer for investor-owned utilities. The average interval between relay tests for solid state relays was 3.85 years, with IOUs reporting longer intervals. For digital relays, the average interval was just over five years, with IOUs stretching the interval to 5.88 years, and public power utilities tightening the interval to just under four years. There is also a correlation between size of utility and the corresponding length of the interval between tests.

The percentage of the responding utility's approximate budget allocation for maintaining protective relays based on the same three relay types was the next maintenance-related question asked in the survey. The 83 officials replying to this indicated that the majority of the maintenance budget goes to electromechanical units (61%), with digital units using about 22% of the budget, and solid state units using about 17% of the budget.

Figure 1 represents this information.

The final maintenance question centered on non-testing product requirements for maintenance management. There were several items that are viewed as non-testing requirements for relay maintenance management activities. Settings record control and tracking was cited by 85% of the group, while hardware and firmware revisions were mentioned by 69%. Product identification for maintenance replacements was checked by 57%.

Figure 2 contains the summary information.

There was not much of a variance regarding the requirement for settings record control and tracking, based on the type of utility responding, However, hardware and firmware revisions were required by 82% of the investor-owned utilities, while on 58% of the public power respondents and 61% of the rural electric cooperative respondents noted a requirement in this area. Product ID for maintenance replacements requirement was also indicated by a larger percentage of IOUs.

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Transmission Function Served by Back-up Control Centers of All Responding Utilities

Determining the current use of back-up operations control centers in large electric utilities in the United States was the focus of a proprietary study completed by Newton-Evans in the first half of 2004.

Utility officials who responded to this survey were asked to indicate the level of functionality of their back-up control center (BUCC). The choices were:

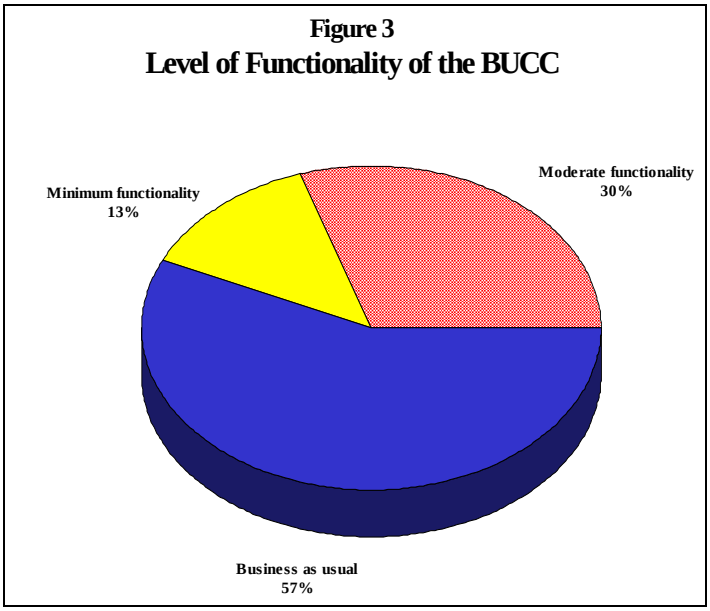
o Business as usual (all control center functions);

o Moderate functionality (full SCADA and minimum applications); and

o Minimal functionality (subset of SCADA only).

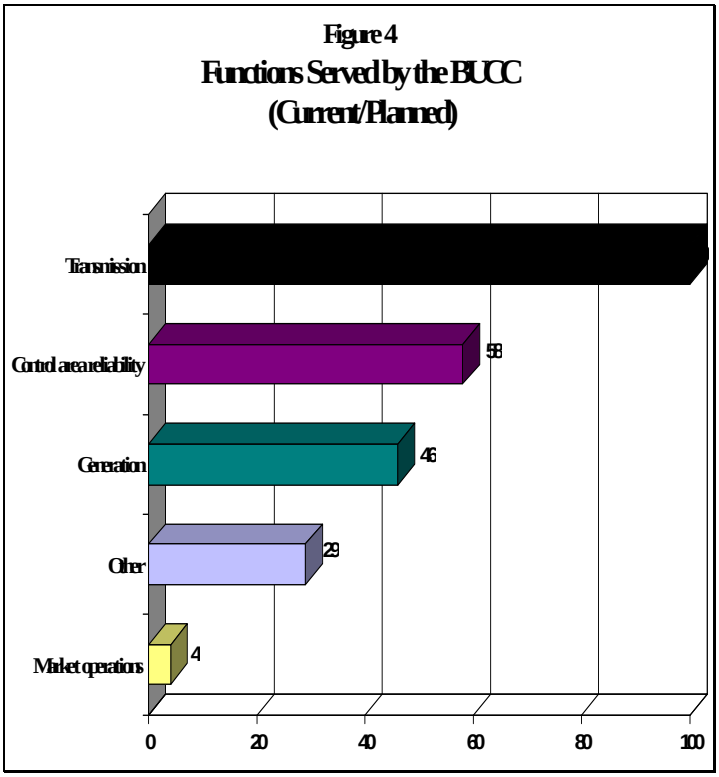
Fifty-seven percent indicated 'business as usual" and 30 percent said "moderate functionality." The remaining 13 percent replied with "minimal functionality." See Figure 3.

Figure 3
Level of Functionality of the BUCC



Respondents were also provided with a list of four functions that could be served by the utility's back-up control center. The functions were transmission, generation, control area reliability, and market operations. Space was provided for respondents to specify any other function.

Figure 4
Functions Served by the BUCC
(Current/Planned)



Every one of the utilities participating in the study indicated that transmission was one of the functions served (to be served) by the BUCC. Fifty-eight percent also cited control area reliability, and 46 percent indicated generation functions. One respondent replied that market operations was being served by the back-up control center. Seven functions written in by respondents centered on distribution operations. See Figure 4.

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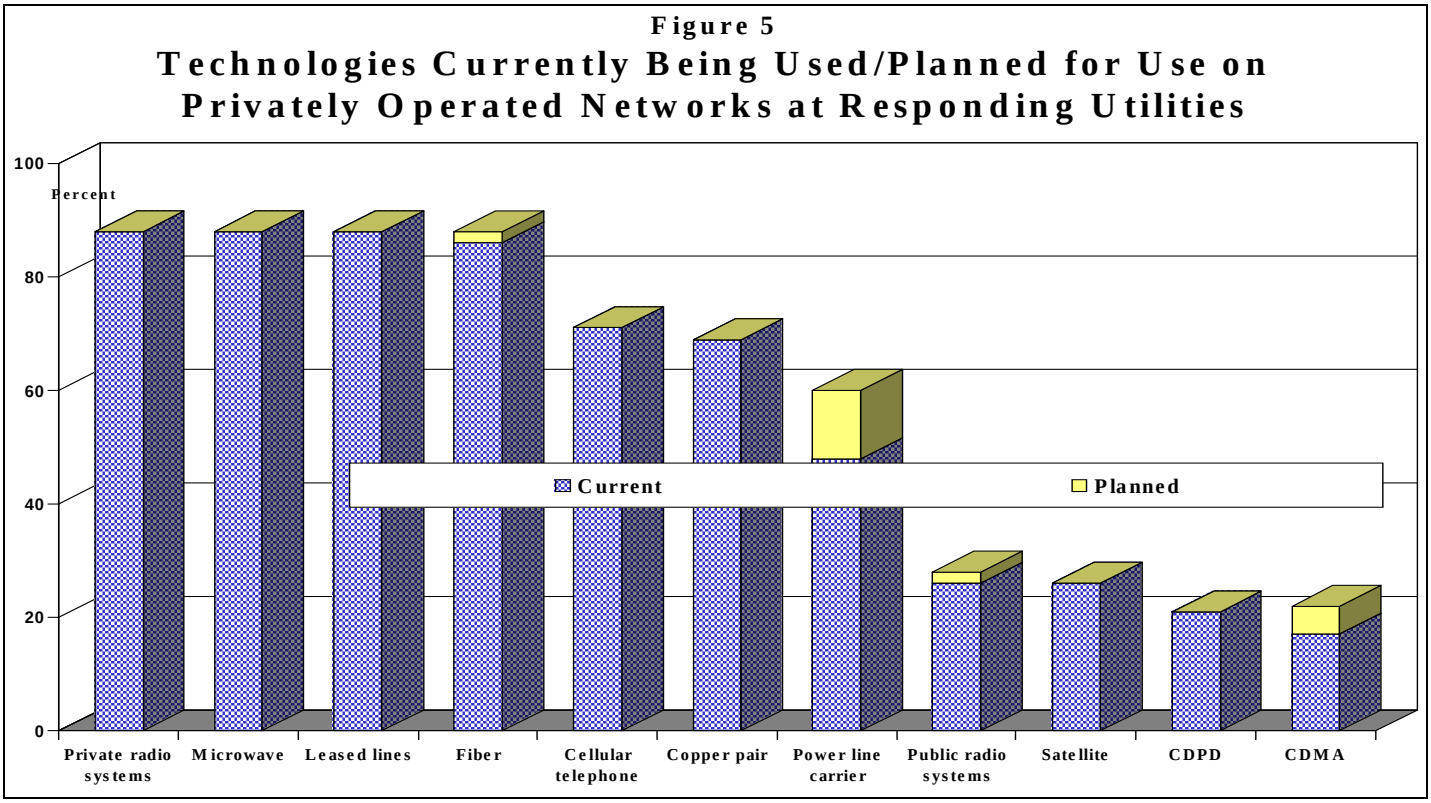
Four Communication Technologies Widely Used on Privately Owned Utility Telecom Networks



With the massive changes in communication technology allowing utilities to diversify their telecom operations, Newton-Evans recently contacted utilities in the United States that own/operate their own telecom systems in order to obtain a broader perspective. The study determined how utilities use their telecom systems and whether they have plans to expand or consolidate their operations.

One topic dealt with the technologies currently being used or planned for use on privately operated networks at responding utilities. Technologies being utilized on these utility networks include four major media - fiber, leased lines, microwave and private radio. Each of these four is used by 86 percent or more of these utilities. Sixty-nine percent continue to use copper pairs (wired) and 71 percent also make use of cellular telephone. Nearly one-half of the respondents are making use of power line carrier.

Few of the utilities surveyed mentioned the use of public radio systems (25 percent), satellite (26 percent), CDPD (21 percent) or CDMA (17 percent) at this time.

Plans for adding new technologies were minimal, with power line carrier receiving the most mentions.

GPRS (general packet radio service) was also written in by four companies as being in a preliminary stage for future use.

NOTE: Please visit our website at Newton-Evans.com for color charts of this edition of *MTD* and previous issues.

Power Metering - Most Important Recloser Control Feature

In first quarter 2004, Newton-Evans Research completed a proprietary research study of market trends regarding recloser usage in U.S. utilities.

A list of seven recloser control features was included in this survey of electric power distribution officials. The features listed were:

Automatic network reconfiguration (ANR) logic or loop-scheme logic
Power calculation for reporting
Power elements
Over-under voltage elements/load shedding
Under frequency load shedding
Harmonic analysis/reporting
Power metering.

Based on responses from 99 utility officials, power metering was indicated as the most important of these listed recloser control features, cited by 58 percent of the group. Next was power calculations for reporting, mentioned by one-half of the group.

Power elements were a close third. Less than one-third of the respondents indicated current use of under frequency load shedding, as well as harmonic analysis/reporting. Less than one-quarter of the respondents noted ANR logic/loop-scheme logic and over-under voltage elements/load shedding.

By 2007, an additional 46 percent indicated that ANR logic or loop-scheme logic would be important to their utility. An additional one-third of the respondents noted that over-under voltage elements/load shedding would become important to their utility by 2007.

When the information is categorized on a utility-type basis, investor-owned utilities are much more likely to indicate current importance of ANR logic or loop scheme logic (40 percent) than are municipals (11 percent), rural electric cooperative (nine percent) or other public power (no mentions). The non-IOU utilities did indicate a future importance of this feature.

Current power calculations for reporting were particularly important to municipals, as mentioned by 63 percent of this group, followed by fifty percent of both the rural electric cooperative and other public power groups. Forty-five percent of the investor-owned utilities indicated current usage of power calculations.

Figure 6
Importance of Features
Currently and by Year-End 2007