

WinMon—and the Capacitor Bank Optimization Toolkit

With stretched system reserves and power costs at all-time highs, it is critical to have your distribution capacitors working properly. Without frequent site inspections and periodic maintenance, how can you be sure your banks are available when needed? The answer is the WinMon® Graphical User Interface and IntelliCAP PLUS® Automatic Capacitor Controls.

WinMon is S&C's powerful GUI software that runs on PCs. It gives authorized users on-line access to the configuration, real-time, and historical data in IntelliCAP PLUS Capacitor Controls and other distribution automation equipment. With WinMon, utility personnel can know if a specific capacitor bank is functioning properly without visiting the site. Problems such as blown fuses, stuck or failed switches, bad control cables, and programming errors can be found quickly and repaired. Using WinMon, data from IntelliCAP PLUS Controls can be analyzed to fine-tune capacitor-bank control set points to increase efficiency. With real-time system monitoring, you can *guarantee* the availability of each capacitor bank.

IntelliCAP PLUS Capacitor Controls can maximize the return on your capacitor bank investment by automating capacitor bank switching based on local conditions, and immediately communicating system problems.

And to further optimize capacitor bank performance on your system, S&C now offers the EnergyLine Capacitor Bank Optimization Toolkit. This kit includes two programs:

- **Cost/Benefit Tool.** This tool helps you calculate your return on investment for capacitor automation.
- **CapSite™.** This tool helps you optimize the size and location of distribution capacitor banks on your system.

Cost/Benefit Tool

Originally developed with Kansas City Power & Light Company, the S&C EnergyLine Cost/Benefit Tool helps you calculate the benefit-to-cost ratio for capacitor automation. By adjusting the values in the model to reflect your particular system, you can analyze the advantages of installing capacitor banks and controls, and examine the impact of all available options. The values included in this model have been generalized and are *not* specific to KCPL.

The spreadsheet consists of five sheets:

- **Energy Savings.** This sheet identifies the costs associated with the energy wasted in heating conductors due to poor power factor. It estimates total-area energy losses based on typical distribution circuits—before and after implementing the program. The present worth of the loss savings is totaled for the study period.
- **System Capacity Savings.** This sheet captures the value of capacity released by improving system power factor. The released capacity can be used to serve additional revenue-producing load and may defer major capital expenditures. Improving the power factor releases transmission and generation capacity as well as distribution capacity. This sheet accumulates the capacity savings over the study period and attaches a dollar value based on in-house cost studies. The value of capacity can also be approximated by estimating the present-day cost/kW of installing new distribution, transmission, or generation.
- **Operation and Maintenance Savings.** This sheet captures the operation and maintenance labor savings resulting from the installation of upgraded controls with SCADA capabilities. For example, capacitor bank inspections can be greatly reduced because bank status can be verified in real time. Capacitor banks can be switched on- or off-line remotely. And historical information on VAR flow, voltage, and current is available in real time.
- **Costs and Credits.** This sheet lists engineering, installation, and operating costs, and various credits over the study period. Charges include capital and O&M indirect costs. Credit for the avoided future purchase of new capacitor banks (due to the increased efficiency of the new capacitor control system) is accounted for, as is the credit for a portion of the electromechanical capacitor controls that were replaced. (The old controls could be either junked or returned to stock for use in other areas.)
- **Economic Analysis Summary.** This sheet presents the calculated present worth dollars from the various sheets for the fifteen-year study period as a Benefit-to-Cost-Analysis.



CapSite

Wouldn't it be great if you could simply enter circuit information, try a few locations for capacitor banks, and find the best place for them? With a cost analysis to back you up? Now you can—with S&C's CapSite.

CapSite helps you optimize the size and location of distribution capacitor banks for the best performance and economic benefit for your system.

After entering the circuit parameters and loading into the spreadsheet in Microsoft® Excel, CapSite produces circuit-voltage and load profiles, line losses, and a rough cost/savings comparison. If desired, you can modify the input to evaluate other problems and solutions.

The basic model is a three-phase distribution circuit, described by line section from the substation to the "end-of-line." Each line section has attributes such as electrical characteristics, length, and block and distributed loads. The circuit loading in kW, kVARs, and amperes is calculated and totaled at each node.

CapSite also calculates and totals the line losses for each section. Based on the value of the "Cost of Losses/kW," the program calculates the annual cost of these losses. By generating a model under existing conditions and comparing it with the model utilizing additional capacitor banks, you can estimate the annual savings. The program lets you change estimated costs to reflect local conditions.

To run the Cost/Benefit Tool:

1. Start your PC.
2. Insert the Toolkit disk into the floppy drive (for example, drive A).
3. Start Microsoft Excel (version 5.0 or later).
4. Select File > Open, then select *captool.xls* from the floppy drive. Click OK.
5. Follow the instructions to enter values appropriate to your system.

To run CapSite:

1. Start your PC.
2. Insert the Toolkit disk into the floppy drive (for example, drive A).
3. Start Microsoft Excel (version 5.0 or later).
4. Select File > Open, then select *capsite.xls* from the floppy drive. Click OK.
5. Follow the instructions to enter values appropriate to your system.