



EUCI Presents a Web Conference on:

# LOAD FORECASTING TO SUPPORT UTILITY INFRASTRUCTURE INVESTMENT DECISION MAKING

March 3, 2010



2:30 – 4:30 PM Eastern Time



EUCI is authorized by IACET to offer 0.2 CEU for this program.

# LOAD FORECASTING TO SUPPORT UTILITY INFRASTRUCTURE INVESTMENT DECISION MAKING

March 3, 2010

2:30 – 4:30 PM Eastern Time

## OVERVIEW

A recent Wall Street Journal article highlights the electric power infrastructure planning problem and specifically the issue of forecasting future load conditions:<sup>1</sup>

*Falling U.S. electricity production in the past two years is frustrating the utility industry and shaking up timetables for some major infrastructure projects.*

*Electricity output decreased 3.7% last year, the steepest drop since 1938, according to federal statistics, following a nearly 1% decline in 2008.*

*The recent downward trend is making it trickier for utilities to forecast future power consumption, a critical component of planning investments in new power plants and transmission lines.*

The article points out that appropriate capacity expansion decisions depend very much on future load conditions and future conditions can be, and usually are, highly uncertain. If current load is close to existing capacity it is likely that investment will be needed in the near term. The questions are how much investment and how soon. *The answers depend on future load growth dynamics.*

A particular investment situation might face a very large number of possible future load trajectories. The possible load trajectories might be characterized using load scenarios. To illustrate, the scenarios might include: (1) load growth that is currently low and likely to continue to grow slowly over the longer term (10 to 20 years), (2) low load growth currently but with the potential for periods of rapid growth over the planning horizon, (3) moderately high current growth rates but an uncertainty about the continuation of these rates. The number of possible load trajectories can be very large. *This webinar will discuss an approach for characterizing the future load growth dynamics and will demonstrate how application of the approach can provide valuable planning information.*

In this webinar we will present a forecasting method that combines the best judgment of your planning engineers with a model of load state dynamics to produce probabilistic characterizations of longer term load conditions. In addition, based on capacity planning research, we will also explain how load dynamics affects the value of alternative infrastructure investment strategies.

## LEARNING OUTCOMES

Participants in this webinar will identify a new way of approaching infrastructure investment decision making. The new approach explicitly recognizes and accounts for future load trajectory uncertainty and the implications of the uncertainty on the riskiness of their investment choices. The participants will review:

1. The interplay between load growth, economies of scale and optimal investment strategy
2. The impact of load uncertainty on optimal investment strategy
3. A new approach for forecasting future load conditions – this new approach deals directly with a key source of investment risk – load uncertainty
4. How to integrate the new forecast information into infrastructure investment decision making

## IACET



EUCI has been approved as an

Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102. In obtaining this approval, EUCI has demonstrated that it complies with the ANSI/IACET Standards which are widely recognized as standards of good practice internationally.

As a result of their Authorized Provider membership status, EUCI is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standards.

EUCI is authorized by IACET to offer 0.2 CEU for this program.

### Requirements for Successful Completion of Program

Participants must be logged in to the web conference for its entirety to receive continuing education credit.

### Instructional Methods

Web based PowerPoint presentation and on-line interactive question/answer session.

<sup>1</sup> Turmoil in Power Sector, WSJ, January 14, 2010, Rebecca Smith

# LOAD FORECASTING TO SUPPORT UTILITY INFRASTRUCTURE INVESTMENT DECISION MAKING

March 3, 2010

2:30 – 4:30 PM Eastern Time

## AGENDA

1. The infrastructure investment problem – Generation, transmission, distribution – and the risk created by load growth uncertainty
  - a. Forecasts of load growth, technology economies of scale and optimal investment strategy
  - b. Modular technologies as a hedge against load growth uncertainty
  - c. Economies of scale for generation, transmission and distribution
  - d. Need for explicit quantification of load growth uncertainty
2. A new approach to long-term load growth forecasting
  - a. Load growth scenarios and the problem with scenario planning
  - b. Load growth trajectory dynamics
    - i. Key observation: load follows trends & trends can be describe by growth rate and average duration
    - ii. Forecasting load trajectory dynamics requires modeling trends over time – how long does a trend persist and when growth change what is the new load growth state?
  - c. A practical approach to forecasting load trajectory dynamics - Using load growth scenarios to create load growth trend states and transition likelihoods
  - d. Example load trajectory forecast
3. A case study example
  - a. Problem setting – Current capacity and growth situation
  - b. Scenarios about possible future load trajectories
  - c. A forecast:
    - i. How long to the next decision
    - ii. How risky is the decision and why
4. Next steps – What you need to do to adopt the new planning approach
  - a. Developing a capability to forecast load trajectory dynamics
  - b. Developing a capability to incorporate the forecasts into your investment decision making

## INSTRUCTORS

**Stephen Chapel** manages **S.Chapel Associates**, a private consulting firm that specializes in utility planning and asset management. Chapel has more than 30 years experience in electric utility planning and asset management including engineering-economic decision making, financial valuation, and capital budgeting. His current focus is on infrastructure asset management. From 1980 through mid 2003 he was a senior project manager with the Electric Power Research Institute. While at EPRI Chapel focused in utility infrastructure decision making and developed tools and methods for managing the risk associated with operational and long-term planning uncertainties. Chapel managed many highly successful projects including (1) a scenario based process for strategic decision Making, (2) a forecasting and investment decision making method that integrates load uncertainty forecasting with infrastructure investment strategy, (3) a method for quantifying the value of distributed generation, and (4) a method for project valuation and project portfolio optimization.

Before joining EPRI, Mr. Chapel spent four years with the Rand Corporation as a senior economist. While there, he carried out research on economic, financial, and institutional issues associated with the development of advanced technologies. Previously, Mr. Chapel was the Deputy Director for the Department of Energy's Office of Economic Impact. From 1968 to 1974, he worked for the Office of Systems Analysis in the Department of Defense.

Mr. Chapel is trained in applied mathematics and economics and has specialized in mathematical modeling, statistics and decision making under uncertainty. Chapels has extensive experience and training in software engineering and has developed programs for load forecasting, optimal dispatch of power plants, optimal repair / replace strategy, and optimal equipment testing that uses Bayesian updating of equipment condition and failure probabilities based on diagnostic tests. Besides several journal articles and white papers he is also a co-author (with Mukund Thapa) of a soon to be published book on programming using C and C++ Pointers.

# LOAD FORECASTING TO SUPPORT UTILITY INFRASTRUCTURE INVESTMENT DECISION MAKING

March 3, 2010

2:30 – 4:30 PM Eastern Time

## INSTRUCTORS (CONTINUED)

**Charles D. Feinstein, Associate Professor of Operations and Management Information Systems, Leavey School of Business, Santa Clara University.** Dr. Feinstein is Co-Founder of VMN Group LLC, a quantitative consulting company. He also teaches in the Department of Management Science and Engineering at Stanford University and in the Department of Industrial Engineering and Operations Research at the University of California, Berkeley. Dr. Feinstein has over 25 years of experience in research, teaching and application of mathematical methods and modeling. His areas of expertise include optimization, decision analysis, system dynamics, and systems analysis. His previous employment includes positions as a Senior Decision Analyst at Applied Decision Analysis, Inc. and as a Research Engineer at Xerox Palo Alto Research Center (PARC). He has been active in the academic and professional communities and has published more than fifty technical papers and reports (including several EPRI reports) as well as presented many lectures on both theoretical and applied research. His current interests include investment planning and risk analysis, with particular application to the electric power industry. He has written and presented extensively on managing aging infrastructure, project prioritization methodologies, and electric power distribution system risk analysis.

## LOGGING IN TO THE WEB CONFERENCE

After registration, each registrant will receive a confirmation of payment or an invoice, depending on method of payment. Each registrant will also receive an e-mail with appropriate login information and more information regarding the event 24 hours prior to the start of the event. To log on, you will need a broadband connection and audio system.

### WHAT IS A SINGLE SITE CONNECTION?

A site connection allows a single connection to the web conference. That connection is open to any number of users in a collaborative setting. Because there are no travel expenses and only a single registration fee is required, each additional participant lowers the cost per participant significantly.

By purchasing a site connection, you can invite as many people as you would like to view and participate in the session from a single location. Set up the session in a conference room and project the presentation and chat on a large screen. You also have rights to distribute copies of the presentation materials to everyone involved. Please note that audio is received via the computer sound system and must be broadcast to your group.

If for any reason a relevant stakeholder cannot co-locate for the session, we encourage you to include that person by purchasing an additional connection at the reduced fee of US \$195 per session. This will ensure that every member of a team receives the same relevant, timely information in the most efficient way.

If you have any technical or purchasing questions, please contact us at (303) 770.8800.

Start Time: 2:30 PM Eastern Time

United States Regional Start Times:

11:30 AM Pacific :: 12:30 PM Mountain :: 1:30 PM Central :: 2:30 PM Eastern

Use the time zone converter (<http://www.timezoneconverter.com/cgi-bin/tzc.tzc>) to find your correct start time.

# LOAD FORECASTING TO SUPPORT UTILITY INFRASTRUCTURE INVESTMENT DECISION MAKING

March 3, 2010  
2:30 – 4:30 PM Eastern Time

## REGISTRATION INFORMATION

Mail or fax this form along with payment. You will receive a confirmation and/or invoice within 48 hours. Make checks payable to EUCI.

### MAIL DIRECTLY TO:

EUCI  
4643 S. Ulster St., Ste. 350  
Denver, CO 80237, USA

### ONLINE:

www.euci.com

### FAX TO:

(303) 741.0849

### PHONE:

(303) 770.8800

## REFUND / CANCELLATION POLICY

All cancellations received prior to February 12, 2010 will be subject to a US \$50 processing fee per web conference per registrant. Written cancellations received after this date will create a partial credit of the tuition good toward any other EUCI conference, publication or web conference. This credit will be valid for six months. No refunds will be given after February 12, 2010 in any case. In case of conference cancellation, EUCI's liability is limited to refund of the conference registration fee only.

## PLEASE REGISTER THE FOLLOWING

- Load Forecasting to Support Utility Infrastructure Investment Decision Making, March 3, 2010, Single Site Connection: US \$345  
**Early Bird on or Before March 2, 2010: US \$295**

- Additional Connection: US \$245,  
**Early Bird on or Before March 2, 2010: US \$195 each**  
Number of additional connections: \_\_\_\_\_

- Web Conference Presentations Available on CD:**  
CDs are available 48 hours after the web conference is complete. The cost per CD is US\$295 [add US\$50 for international shipments]. Upon receipt of order and payment the CD will be shipped to you.

NOTE: All presentation CD sales are final and are non-refundable.

### ENERGIZE WEEKLY

When you sign up for "Energize Weekly" you will receive a new conference presentation each week via email on a relevant industry topic. The presentations are selected from a massive library of over 1000 current presentations that EUCI has gathered during its 22 years organizing conferences.

- Sign me up for "Energize Weekly"**

How did you hear about this event?  
(Direct email, Colleague, Speaker(s), etc.)

\_\_\_\_\_

Name \_\_\_\_\_ Job Title \_\_\_\_\_

E-Mail \_\_\_\_\_

Company \_\_\_\_\_ Telephone \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

## PAYMENT METHOD

Please charge my credit card:  Visa  MC  AMEX  Discover Security Code \_\_\_\_\_  
Visa and MC cards have a 3 digit code on the signature panel on the back of the card, following the account number. American Express cards have a 4 digit code on the front of the card, above the card number.

Name on Card \_\_\_\_\_ Signature \_\_\_\_\_

Account Number \_\_\_\_\_ Exp. Date \_\_\_\_\_

Card Holder Phone Number \_\_\_\_\_

Billing Address \_\_\_\_\_ Billing Zip Code \_\_\_\_\_

Or enclosed is a check for \$ \_\_\_\_\_ to cover \_\_\_\_\_ connections.

W864