DN 02 04-23

Presentation @ 9/4/02 Mtg.

The NU Forecasting Process and Southwestern Connecticut

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September 4, 2002

A. Alternative Forecast Methodologies

Models

1. Time Series	2. Econometric	3. End-Use/Engineering
Simple historic growth rates, time driven, extrapolation	Statistical relationship between dependent and independent variables based on economic logic	Models or logic based on measured/estimated parameters
Sales=f(Time)	Sales=f(Price, Income, etc.)	Sales=f(Appliances*KWH)
Advantages	**Advantages**	**Advantages**
-Inexpensive	-Relatively inexpensive	-Strong explanatory power
-Easy to understand	-Explanatory power	-Regulatory acceptance
-Reasonable under stability	-Universally accepted	-Handles technological change
Disadvantages	**Disadvantages**	**Disadvantages**
-No explanatory power	-Poor supporting data	-Very expensive to develop, maintain, supporting data
-Prone to abuse	-Need relatively few accurate independent variable forecasts	-Difficult to understand
-No regulatory standing	-Used as a substitute for real understanding	-Prone to preconceptions and bias of the model builder or forecaster
	-Cannot handle technological change	

Selection of a methodology:

a. Periodicity?
b. Data quality and definitions?
c. Short or long run?
d. What is the appropriate level of accuracy for the cost?
e. Forecast application?
f. Credibility and/or regulatory review?
g. Scenarios and uncertainty?

B. The Forecasting Process

B-1. Guidelines

1. Meet regulatory requirements.

2. The forecast should be the "most likely" outcome because it is used for revenue planning. Sensitivity tests and scenarios, however, have almost no restrictions applied to them.

3. Forecasts and plans should be consistent across Company departments.

4. Basic Assumptions:

a. Electric demand is a "derived demand" so electric sales are totally dependent on the local economic conditions, weather, appliance purchases, etc.

Residential Class--Housing Construction and Income
Commercial Class--Employment which is heavily insurance dependent
Industrial Class--Industrial Output which follows the business cycle/defense

b. Electricity is a necessity, has few substitutes, and is a small share of most budgets. Therefore, price elasticities are very low (-0.1 to -0.2 in the short run).

c. The stock of appliances and electric equipment changes very slowly, so residential and commercial electric sales don't have wide cyclical swings.

B-2. The Layers

Step One

Economic and Load Forecasting (ELF) develops a "trend" or business-as-usual forecast that does not reflect the impact of company-sponsored marketing initiatives.

Sources:
Economic Outlook--ELF

Price of Electricity--ELF & Pricing Strategy and Administration

End-Use Assumptions--ELF and Conservation and Load Management

Step Two

The "trend" is adjusted to reflect NU-sponsored economic development, market retention rates, DSM, self-generation losses and major customer changes. This is the "reference plan" that is the official forecast used throughout the Company.

Sources:
Economic Development Adders-- Economic and Community Development

Market Retention Adders--Pricing Strategy and Administration

DSM Deduct--Conservation and Load Management

Self-Generation Deducts--Account Executives

Major Customer Change--Account Executives

Fuel Switching-- ELF

B-3. Sales, Output, Hourly Loads and Peak Demand

1. Sales are forecast first.

2. Output is forecast by applying loss factors to sales.

3. Hourly loads are created by spreading output with load shapes and normal hourly weather.

4. The peak is the highest hourly load.

B-4. The Budget

The budget is the short-run forecast used to forecast the next year's revenue. Budget variances receive a great deal of attention with recurring presentations on budget performance given to Senior Management.

Methodology

Sales are forecast by company and class with econometric models.

Applications

Revenue Forecast--Pricing Strategy and Administration
Financial Planning--Business Strategic Planning and Treasury
Financial Performance--Management Information and Budgeting Services
Regulatory Filings--Rates, Regulatory Affairs and Compliance
Financial Presentations--Investor Relations
Performance Goals--Retail Business Units
Hourly Load Forecast--Standard Offer Providers
Energy & Peak Forecasts--Transmission Planning

B-5. The Long-Run Forecast

The long-run forecast is filed with regulatory bodies and is based on extensive end-use, building-type and SIC detail. This detail lends itself to planning applications.

Methodology

Sales are forecast by company and class with end-use (engineering) models. Hourly loads are forecast based on forecast sales and load profiles.

Applications

Resource Planning--Transmission Resource Planning
DSM Planning--Conservation and Load Management
Business Plans--CL&P, WMECO & PSNH

C. Forecast Accuracy- CL&P

1. Total retail variances are often within 1%. There is a tendency for forecasts to be slightly high during recessions and slightly low during expansions. This occurs because the forecasts are heavily influenced by the trend.

2. Residential variances are random - a desirable variance.

3. Commercial forecasts often slightly underestimate growth, but variances are small. Employment growth frequently exceeds forecasted growth.

4. Industrial variances indicate a recurring bias towards high forecasts. Employment growth is frequently below forecasted growth. Also large customer losses are not replaced with large customer additions.

5. Tenth-year forecast variances have improved over time.

6. Peak variances are significantly affected by the weather.

7. First year variances are summarized as follows:

Absolute First-Year Variances, 1984 - 2001

Actual CL&P Variances

	High Variance	Average Variance	Low Variance
Residential	**4.0%**	**1.9%**	**0.2%**
Commercial	**4.7%**	**1.5%**	**0.1%**
Industrial	**6.3%**	**2.4%**	**0.7%**
Total Retail	**3.5%**	**1.3%**	**0.1%**
Summer Peak	**8.7%**	**4.0%**	**0.4%**

D. Southwestern Connecticut Overview

1. Data Sources
   - Some Economic History, but Limited Area Forecasts
   - Excellent CL&P Town-by-town Electric Data
   - CMEEC & UI Forecasts
   - Historic Peak Loads

2. Methodology
   - In the SWCT forecast we used a trended share approach of CL&P to forecast SWCT sales and peak demand.
   - CMEEC & UI forecasts were used as given.
   - The SWCT forecast is a summation of CL&P, CMEEC and UI.

3. Weather Sensitivity
   - The Reference Plan assumes average weather, but average weather occurs randomly. Please recall that the 2000 summer was cold.
   - The summer peak forecast includes a forecast based on 2001 weather because heat storms are recurring events.

4. Forecast Summary
   - SWCT grows faster than Connecticut because of economic trends.

Peak Forecast (MW)
Consistent with the 2002 Ling-Run Forecast
Filed with the Connecticut Siting Council March 1, 2002.

	Southwestern Connecticut		Norwalk-Stamford	
	Based on Actual 2001 Peak Day Weather	Based on Average Historic Peak Producing Weather (1970 - 2000)	Based on Actual 2001 Peak Day Weather	Based on Average Historic Peak Producing Weather (1970 - 2000)
2002	3389	3127	1216	1122
2003	3414	3150	1227	1132
2004	3455	3187	1246	1149
2005	3473	3204	1252	1155
2006	3497	3227	1261	1163

Note: The preliminary 2002 Summer Peak for southwestern Connecticut was 3265 MW. Adjusted for normal weather the preliminary peak was 3142 MW.

Southwestern Connecticut Sales and Peak Forecast Scenarios

	2010 Sales (GWH)	10-Year Growth Rate	Sales Difference From Filed Forecast	2010 Summer Peak (MW) **	Peak Difference From Filed Forecast
1. Filed Forecast	16841	1.1%		3353	
2. Simple Extrapolation (CL&P Portion)	16861	1.1%	0.1%	3361	0.2%
3. DRI Economics (CL&P Portion)	16756	1.1%	-0.5%	3340	-0.4%
4. RTEP Economics (CL&P Portion)	16749	1.1%	-0.5%	3338	-0.5%
5. Econometric Models, DRI Economics (CL&P Portion)	17119	1.3%	1.6%	3412	1.8%
6. Simple Extrapolation (Total SWCT)	17400	1.5%	3.3%	3380	0.8%
7. DRI Economics (Total SWCT)	17235	1.4%	2.3%	3346	-0.2%
8. Econometric Models, DRI Economics (Total SWCT)	17529	1.5%	4.1%	3402	1.5%

** Based on Average Historic Peak Producing Weather (1970 - 2000).

COMPARISON OF 1999 - 2001 ANNUAL PEAKS AND 2002 DAILY PEAK DAYS

The July 3, 2002 Peak Exceeded the Forecasted 2011 Reference Plan Peak Forecast.

ACTUAL PEAKS (MW) — PEAK DAY WEATHER

		BRADLEY FIELD Peak Hour		
	CL&P	Mean Temp	Temp	Max THI
1999	4750	86	95	85
2000	4433	76	88	81
August 8, 2001	5058	86	96	84
August 9, 2001	5126	88	100	87

ESTIMATED PEAKS (MW) — PEAK DAY WEATHER

		BRADLEY FIELD Peak Hour		
	CL&P	Mean Temp	Temp	Max THI
June 26, 2002 *	4710	78	94	83
June 27, 2002 *	4763	82	91	81
July 1, 2002 *	4510	81	93	82
July 2, 2002 *	5001	84	96	85
July 3, 2002 *	5183	85	96	85
July 4, 2002 *	4481	85	97	85
July 18, 2002 *	4915	82	94	82
July 23, 2002 *	5119	83	95	85
July 29, 2002 *	4973	84	95	83
July 30, 2002 *	4994	82	92	81
July 31, 2002 *	4854	80	93	81
August 1, 2002	4914	82	93	81
August 2, 2002	4962	80	92	83
August 12, 2002	4854	81	94	82
August 13, 2002	4933	82	97	84
August 14, 2002	5102	84	99	85
August 15, 2002	4980	83	94	83
August 16, 2002	4927	86	95	83
August 19, 2002	4673	81	92	79

* Actual Peaks from RAPS

FORECAST PEAKS (MW)

	CL&P
2002	4757

NORMAL PEAK DAY WEATHER
BRADLEY FIELD
Peak Hour

Mean Temp	Temp	Max THI
83	93	83

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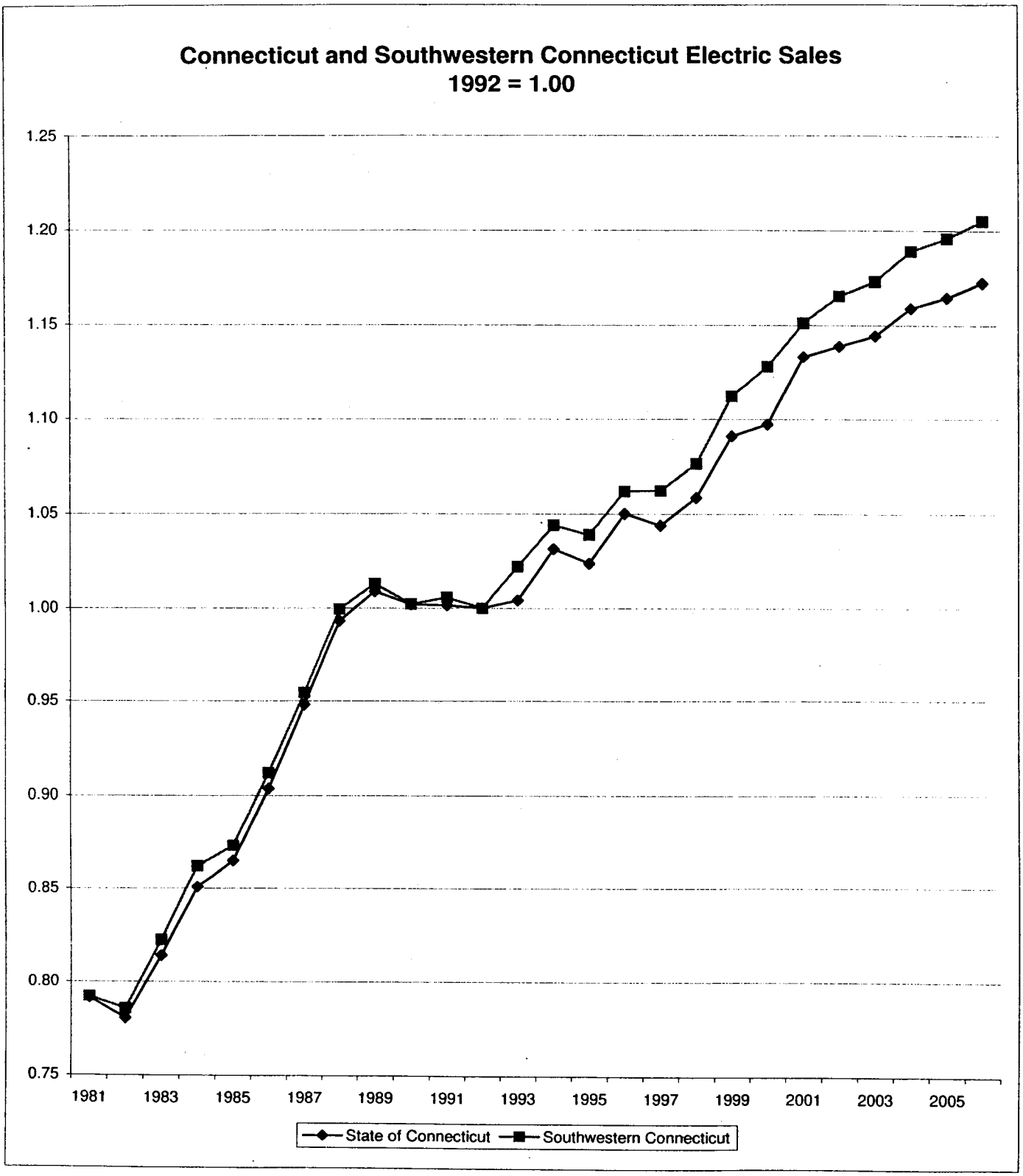
Electric Demand Has Grown Steady with Economic Growth.



Southwestern Connecticut 2001 sales = 15349 GWH
Connecticut 2001 sales = 30682 GWH