Electric / Gas / Water

Information collection, analysis and application

Knowledge to Shape Your Future

DEVELOPING GAS LOAD PROFILES

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CILCO Background

- 203,000 Electric Customers
- 208,000 Natural Gas customers
- Serving 150 communities within central and east central Illinois.
- 4,500 square mile area
- Now AmerenCILCO

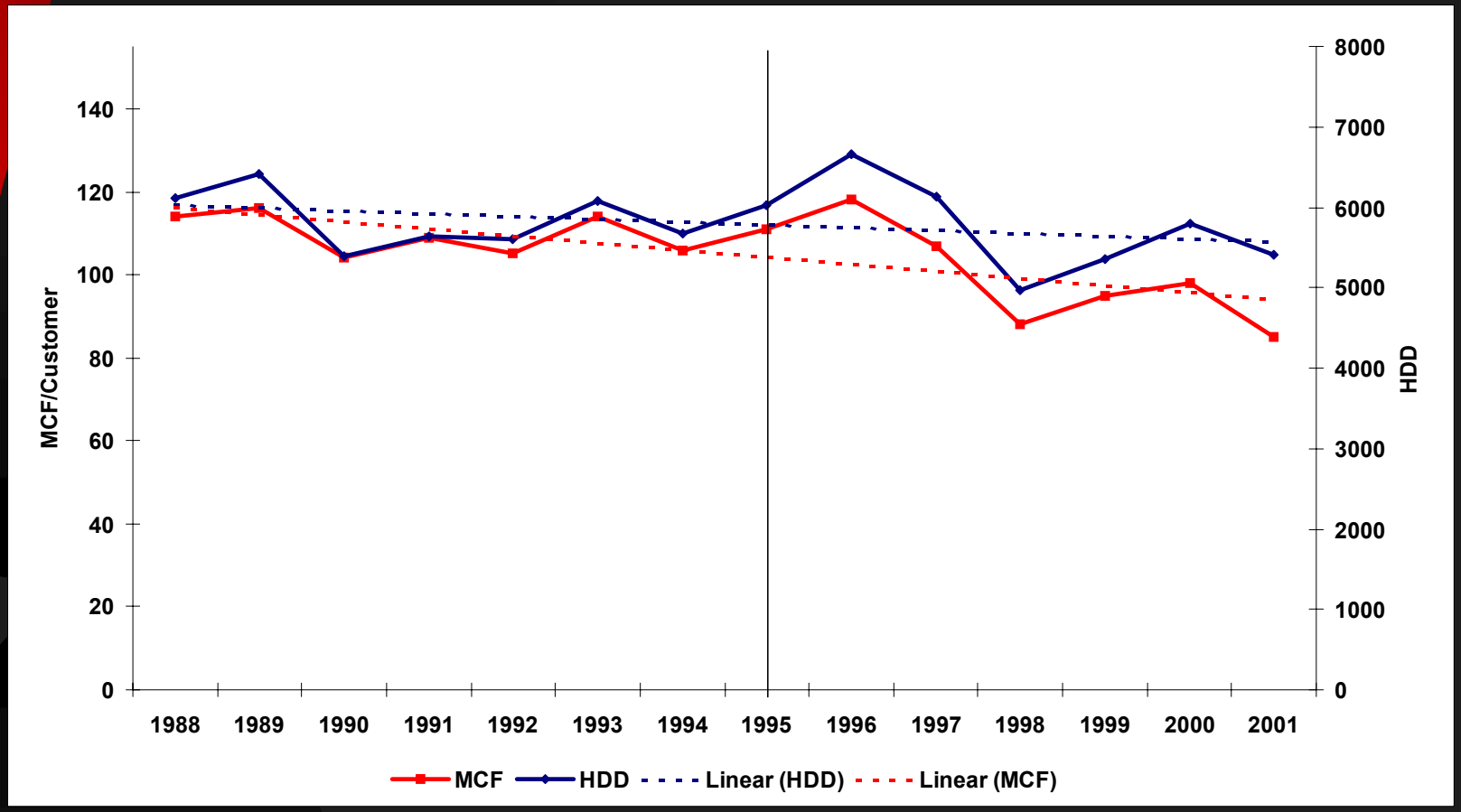
CILCO Service Territory

CILCO Gas Rate Case

CILCO Needs and Issues

- Last Gas Rate Case was in 1995
- Cost-of-Service Allocation Factors
  - Each of four winter months
    - Ave of day-before, day-of and day-after System Peak Sendout
- Weather Normalize Loads
  - 10 year, 20 year, or 30 year average
- Adjust for Trend in Declining Residential Use
  - Average residential use has been declining for the past decade
- Haven't been collecting sufficient revenue since last rate case

Historical Trend in Gas Use



Objectives

Develop 365 Day Load Profile For All Rates

- 20 Rate Groups

Weather Normalize Load Profiles

Estimate Cost of Service Allocation Factors

Available Data

Interval Data

- Largest C/I Customers
- 2001 calendar year

Billing Data

- Residential and Small Commercial Rates
  - No historical load research data on these rate classes
- 2000, 2001, partial 2002

Methodology

1. Calculate daily use for interval metered rates groups
2. Model all other rate groups using billing data
3. Estimate actual daily use for all other rate groups
4. Calibrate daily loads to actual System Sendout
   - Develop calibration factors

Methodology (cont.)

5. Normal weather (Heating Degree Days)
   - Rank and Average Method
   - 10, 20, or 30 years of History
6. Model weather sensitive interval metered rates groups
7. Estimate normal daily use for all rate groups
8. Estimate “Design Day” use
   - 78 HDD (a day with an average temperature of –13˚F)
9. Calibrate all rate groups
10. Compute COS allocation factors

Res. & Sm. Comm. Load Models

- **Model Estimation**
  - Ave Daily Usage (ADU) = HDD/day + winter + month + month*HDD + winter*HDD + bill cycle

Where:

- ADU = Use/day/cust. by mo. & billing cycle
- winter = Dec, Jan, Feb, Mar
- month = time trend variable

Res. & Sm. Comm. Load Models (cont.)

- **Simulate Actual Daily Use**

  Using:

  - Actual Daily HDD
  - Set month = 13 (Jan, 2001)
  - Add Res. Efficiency Trend
    - (GRI Study[1])
  - Bill cycle / # of cycles (1/25)

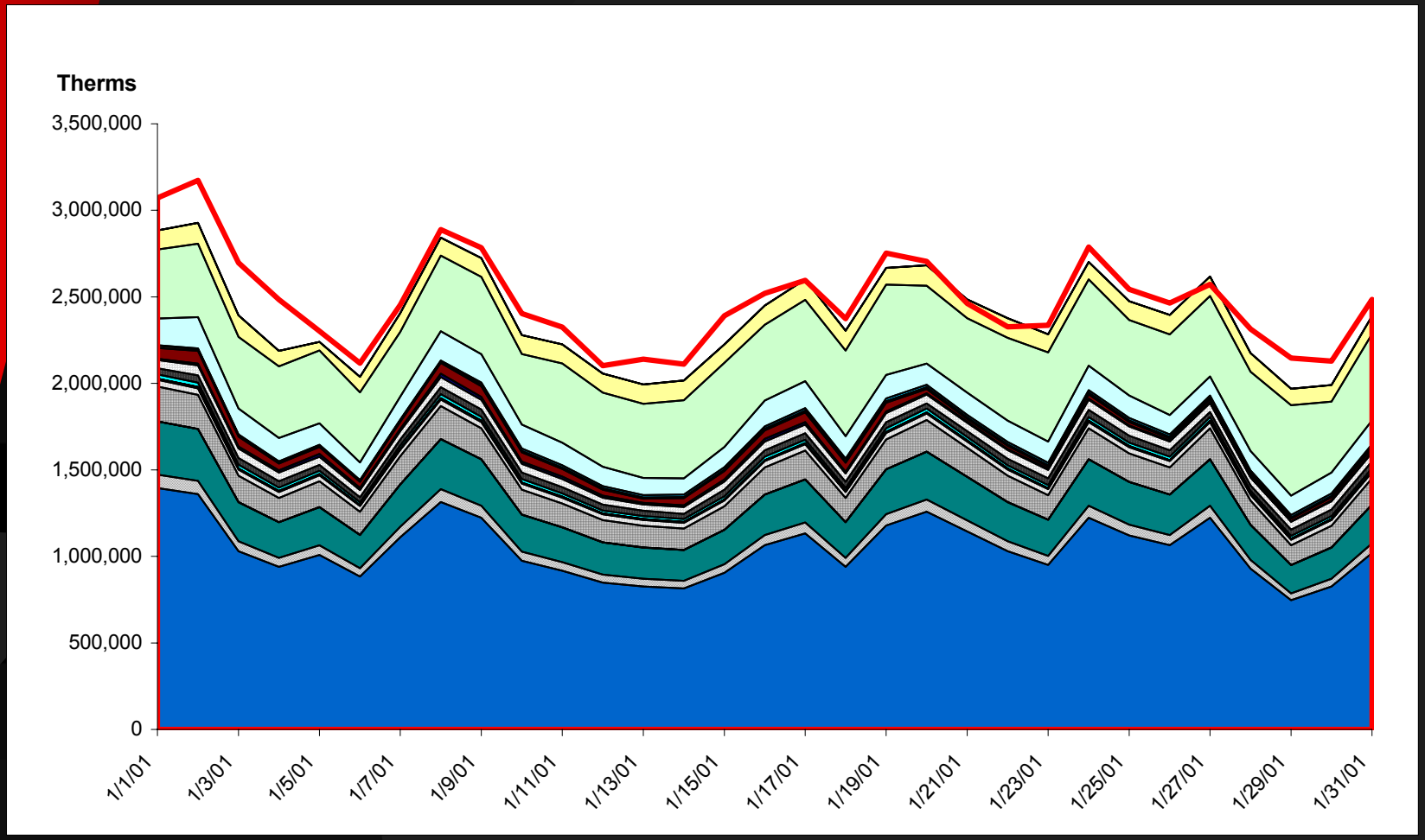
[1] "Evaluating The Decline in Residential Gas Usage", Final Report (Revised), May 2000. Prepared by GRI, Battelle Memorial Institute, Regional Economic Research, and Energy Center of Wisconsin.

Interval Metered Loads

- Sum Across Hours
- Aggregate by Day
- No Modeling at this stage

Calibrate Loads to System Sendout

January



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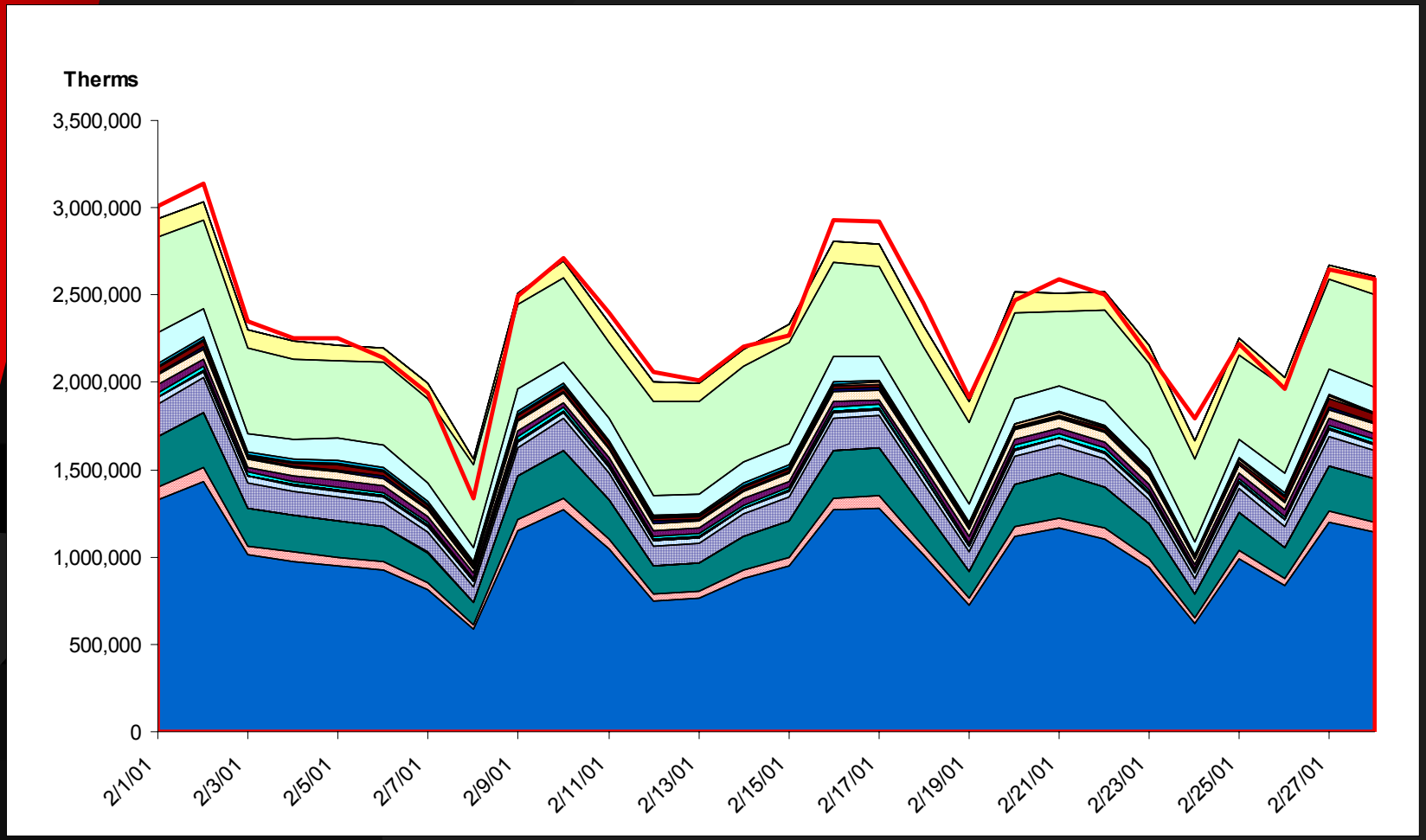
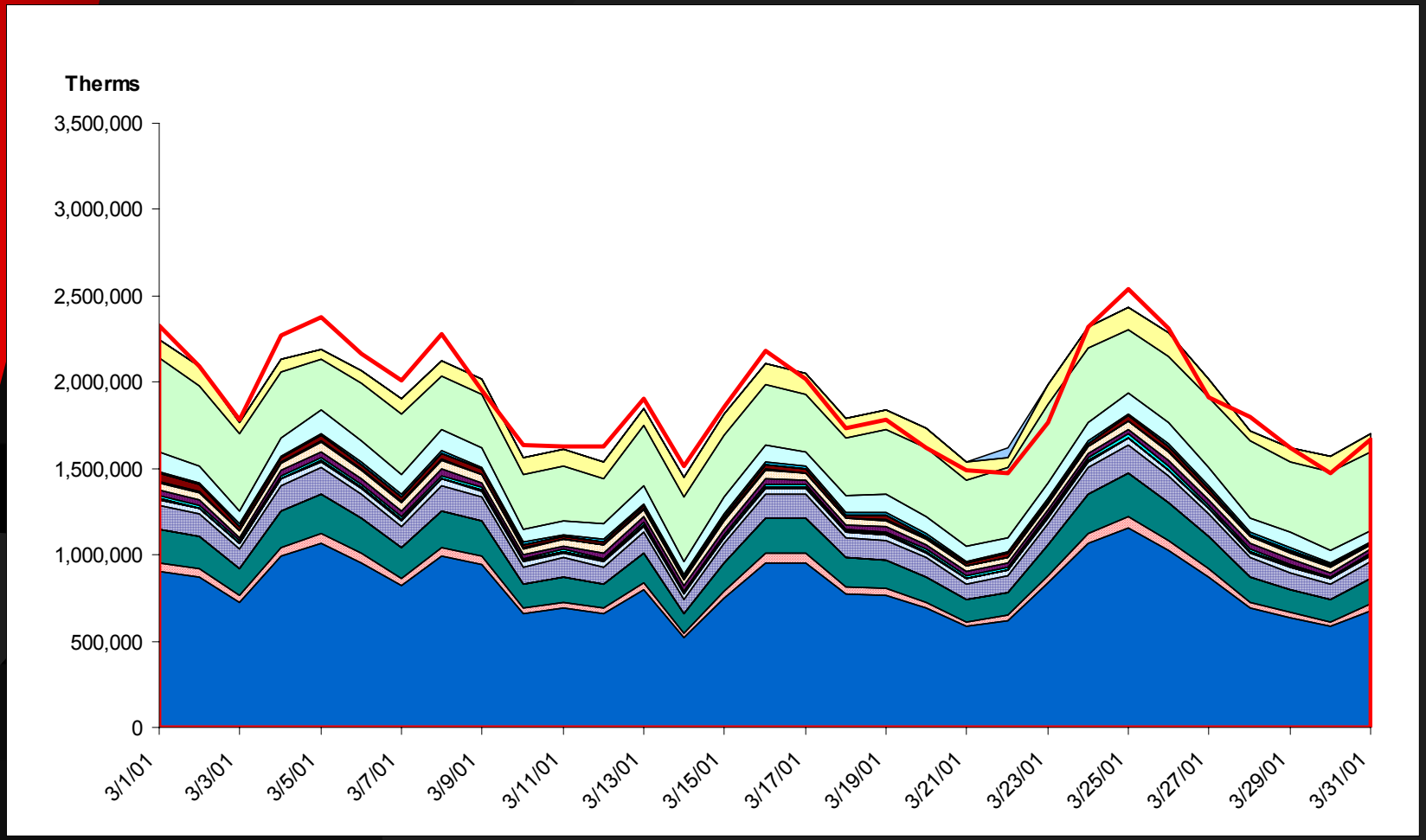
Calibrate Loads to System Sendout

February



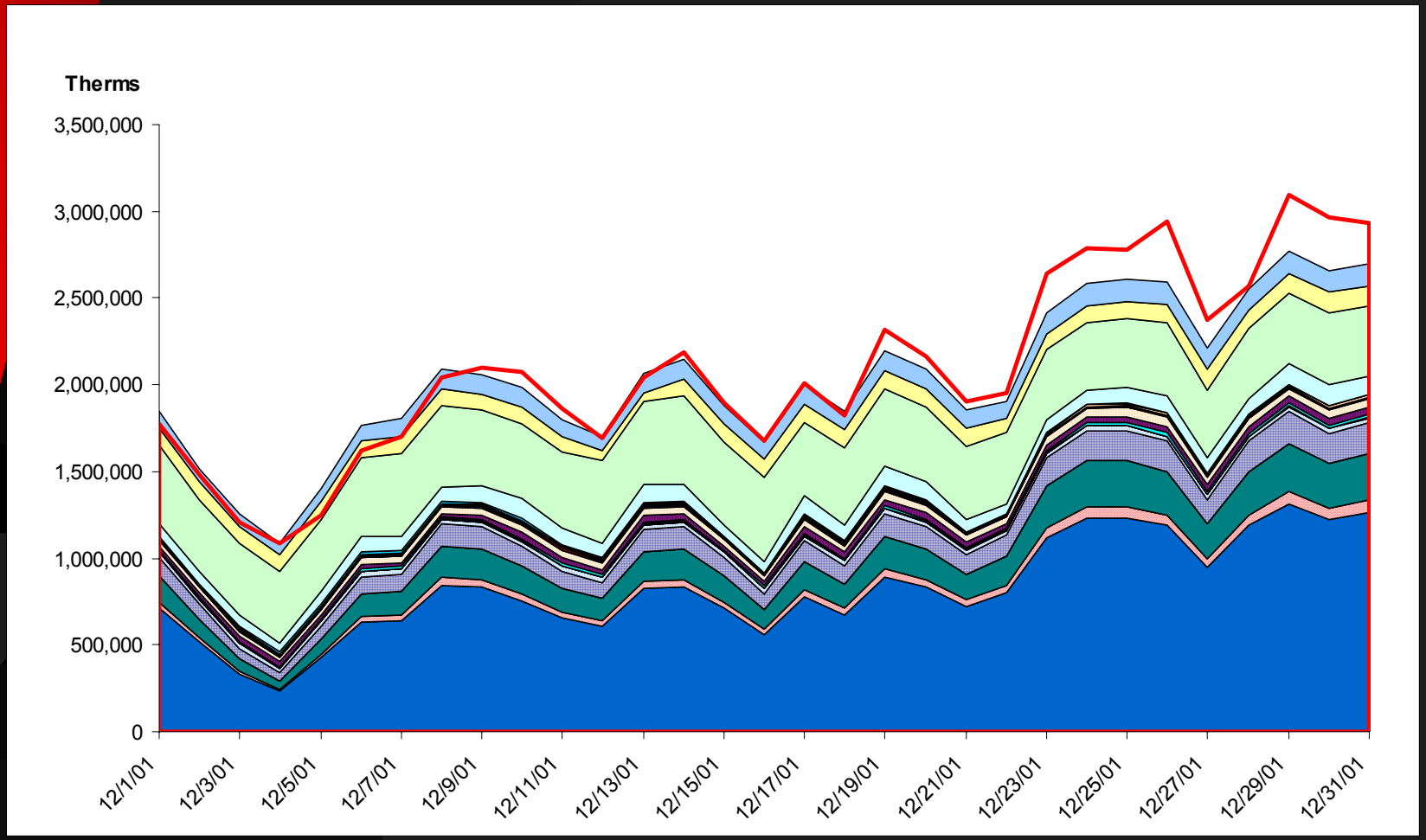
Calibrate Loads to System Sendout

March



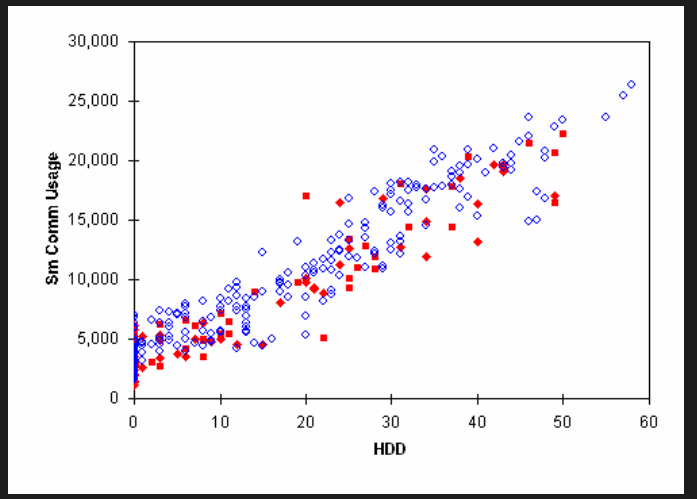
Calibrate Loads to System Sendout

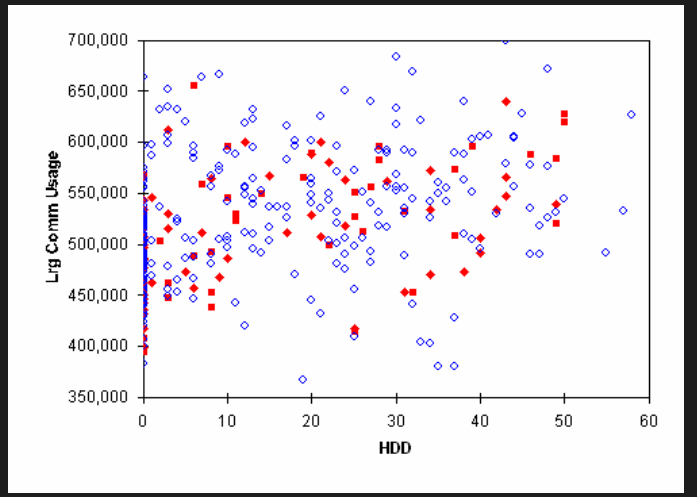
December



Model Weather Sensitive Large C&I

- **Identify Sensitive Classes**
  - Plot Therms vs. HDD
- **Daily Model Specification**
  - Weather Variables
    - HDD, LagHDD
  - Calendar Variables
    - Weekdays, weekends, holidays
  - Monthly Trend Variable
    - Linear





Weather Normalize Load Profiles

- **Normal Weather**
  - Years of History (10, 20, 30)
  - Rank Days in Mo. By HDD
  - Ave. Across Years
  - Map to 2001 Calendar
- **Est. Normalized Daily Use**
  - Apply Normal Weather
- **Calibrate Loads**
  - Apply Calibration Factors
    - No Calibration of Interval Metered Rates

Normalized Peak Day Allocation Factors

Class		January			February			March			December		
		200101	200101	200101	200102	200102	200102	200103	200103	200103	200112	200112	200112
Normalized System Peak	**Peak (therms)**	3,396,822	3,265,306	2,385,890	3,319,534	3,370,053	2,437,909	2,467,497	2,576,413	2,427,060	2,904,730	2,578,226	2,856,416
	Date	1/1/01	1/2/01	1/3/01	2/1/01	2/2/01	2/3/01	3/24/01	3/25/01	3/26/01	12/29/01	12/30/01	12/31/01
Residential	N	190,083	190,083	190,083	190,083	190,083	190,083	190,083	190,083	190,083	190,083	190,083	190,083
Total	System CP	1,690,993	1,545,998	979,110	1,541,122	1,607,396	1,057,050	1,137,110	1,218,646	1,066,397	1,406,162	1,167,018	1,402,209
	% of Total System Peak	49.8%	47.3%	41.0%	46.4%	47.7%	43.4%	46.1%	47.3%	43.9%	48.4%	45.3%	49.1%
Commercial	N	17,637	17,637	17,637	17,637	17,637	17,637	17,637	17,637	17,637	17,637	17,637	17,637
Total	System CP	793,616	730,614	472,866	725,002	755,565	507,449	539,994	576,548	510,481	628,280	527,013	628,639
	% of Total System Peak	23.4%	22.4%	19.8%	21.8%	22.4%	20.8%	21.9%	22.4%	21.0%	21.6%	20.4%	22.0%
Industrial	N	52	52	52	52	52	52	52	52	52	52	52	52
Total	System CP	912,213	988,694	933,914	1,053,410	1,007,092	873,410	790,394	781,218	850,182	870,288	884,194	825,568
	% of Total System Peak	26.9%	30.3%	39.1%	31.7%	29.9%	35.8%	32.0%	30.3%	35.0%	30.0%	34.3%	28.9%

In Conclusion

Good estimates of gas load profiles can be developed using monthly cycle billing data and calibrated to daily system sendout provided the less weather sensitive loads are interval metered. These estimates can subsequently be used to develop cost of service allocation factors.