BECC 2014

Business Energy Reports: First Year's Evaluation Results

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Trial Overview

- RCT designed to detect a 0.5% effect (95% CI)
- 15K SMBs in treatment and 15K in control
- Treatment included a welcome report and six industry-focused, bi-monthly progress reports

Sample Frame

(1) Customer Electric Size Definition

	Large (L)	Medium (M)	Small (S)	No Usage (N)
Electric - Annual Usage	>= 500,000 kWh	< 500,000 kWh, >= 40,000 kWh	<40,000 kWh > 0	0

(2) Customer Gas Size Definition

	Large (L)	Medium (M)	Small (S)	No Usage (N)
Gas - Annual Usage	>= 250,000 Thms	< 250,000 Thms >= 10,000 Thms	<10,000 Thms > 0	0

(3) Customer Combined Size Definition

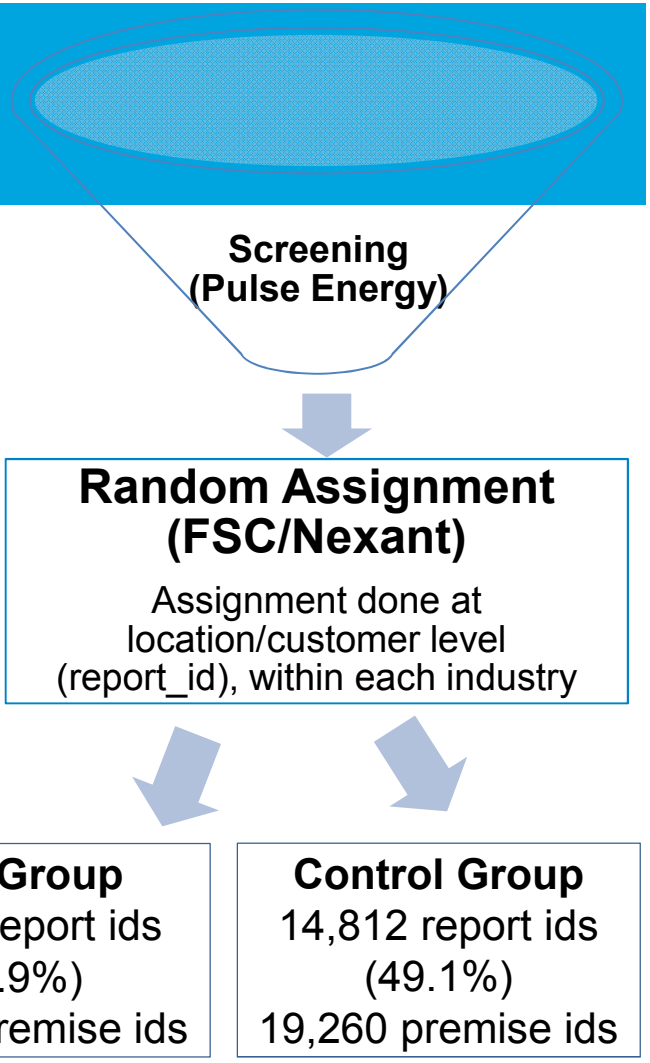
A combined (electric and gas) customer size classification (Small = S, Medium = M, and Large = L) is defined by using the largest size class (electric or gas) where the gas and electric size classifications are different. Example: A customer defined as a large gas customer and a medium electric customer would be defined as a large customer (L).

NAICS	DESCRIPTION
722211	Limited-Service Restaurants (fast food/take-out)
445110	Supermarkets-Other Grocery (not convenience stores)
8131	Religious Organizations
721110	Hotels (except Casino)-Motels
8111.1	Automotive Repair (excluding Car Washes)
6212	Offices of Dentists
445120	Convenience Stores and unclassified grocery stores
722213	Snack-Nonalcohol Beverage Bar (coffee, donut, ice cream shops)
4453	Beer, Wine, and Liquor Stores
812112	Beauty Salons
7221	Full-Service Restaurants
8123	Drycleaning & Laundry Services
7224	Drinking Place (Alcoholic Bev)
6111	Elementary and Secondary Schools
6213	Offices of Other Health Practitioner
811192	Car Washes
4481	Clothing Stores
4441	Building Material and Supplies Dealers
6211	Offices of Physicians
5411	Legal offices
812113	Nail salons
5412	Accounting offices

RCT Process

- **Before deciding on sample size, we ran simulations to assess the ability to distinguish program impacts from random noise**
- **Simulations were based on:**
  - Electricity data
  - Sites with 2 years of data
  - Analysis of monthly electric data
  - Use of the analysis protocols, difference-in-differences panel regressions, with fixed effects and time effects
- **Actual confidence intervals could vary because Pulse's screening process hadn't yet been fully implemented**

Treatment and Control Group Sizes	95% CI One-sided
5,000 each	0.8%
10,000 each	0.6%
15,000 each	0.5%
20,000 each	0.4%



Analytical Approach Adhered to Best Practices

Guideline	BER Study	Rating
Evaluation Design	Randomized Control Trial	★★★★★
Length of Baseline Period	12 month of pre-treament data included in analysis	★★★★★
Conflicts of interest	Independent 3rd party evaluator defined and implemented the program evaluation, assignment of sites to treatment and control groups, and data management and cleaning.	★★★★★
Analysis Model Specification	Panel regression with fixed effects and time effects	★★★★★
Cluster robust standard errors	Cluster robust standard errors or time aggregated data	★★★★★
Equivalency Check	Compared treatment and control group energy use, business types, geographic location, and other demographic variables when randomization was implemented.	★★★★★
Statistical significance	95% confidence intervals reported	★★★★★
Excluding Data from Households that Opt Out or Close Accounts	Only data from households that closed accounts were excluded. For gas extreme outliers were excluded from both treatment and control group.	★★★★★
Accounting for Potential Double Counting of Savings	Obtained analyzed data regarding participation in energy efficiency for a year before and after treatment for both the control and treatment groups	★★★★★

Key Evaluation Questions

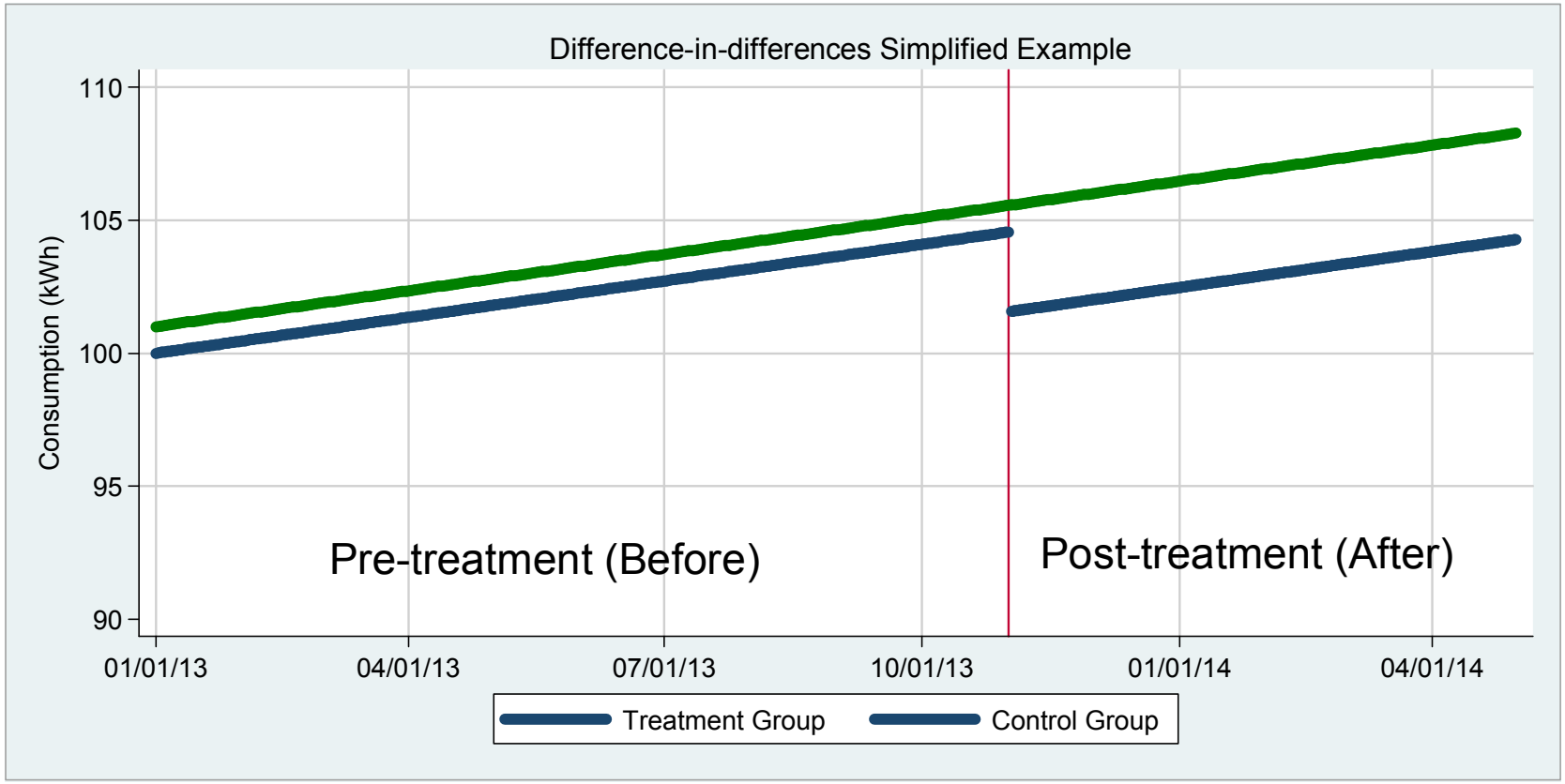
Did Treatment Affect…

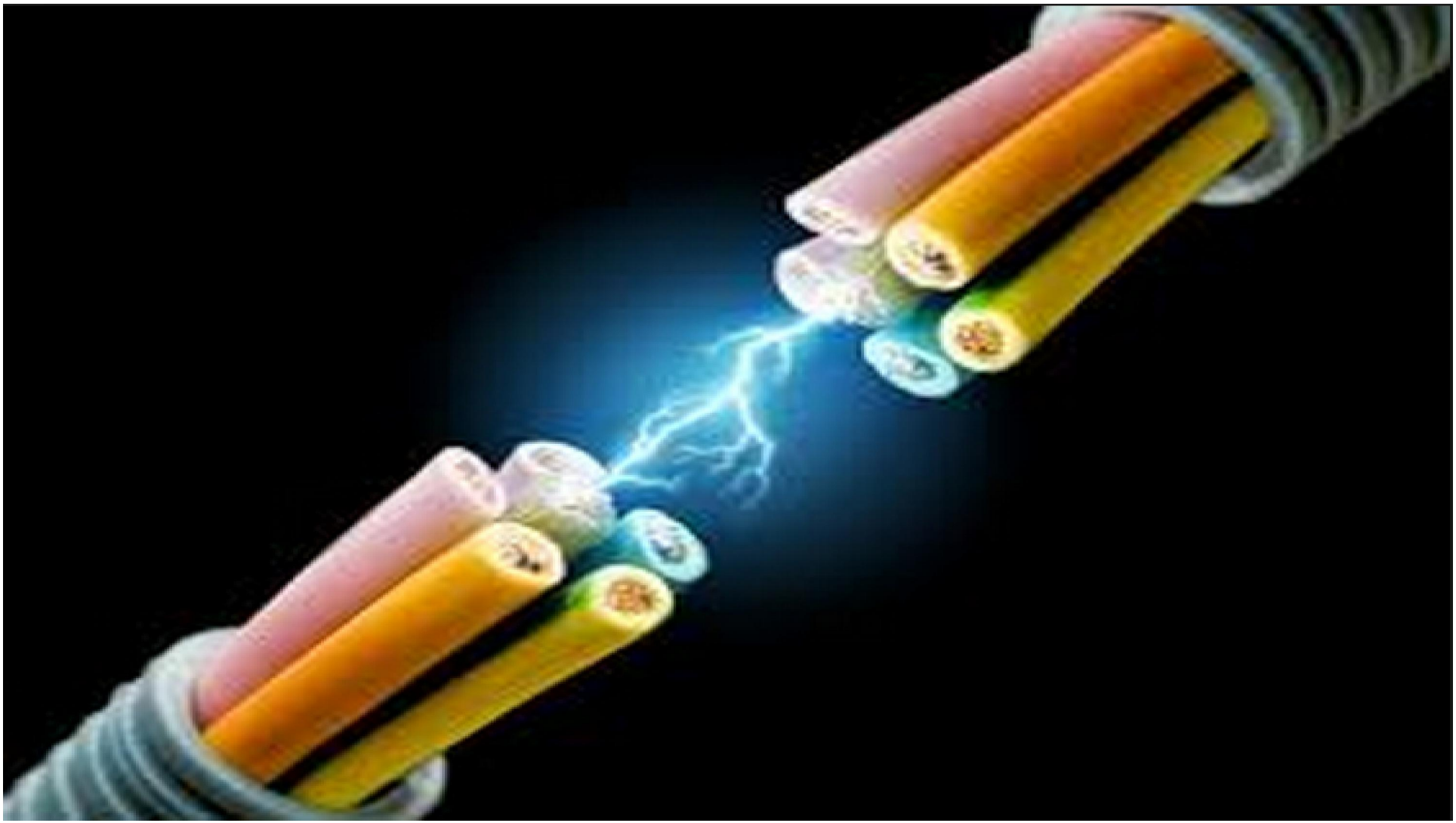
- Electric Usage
- Gas Usage
- Program Participation

Analysis Methods

1. Simple difference-in-differences (DID): two period, paired t-test.
2. DID with panel regression with fixed effects, time effects, using monthly data and clustered standard errors.
3. DID with panel regression with fixed effects, time effects, using daily data.
4. DID with panel regression with fixed effects, time effects, and additional explanatory variables, using monthly data.
5. DID with panel regression with fixed effects, time effects, and additional explanatory variables using daily data.

Difference-in-Differences: Simplified Example



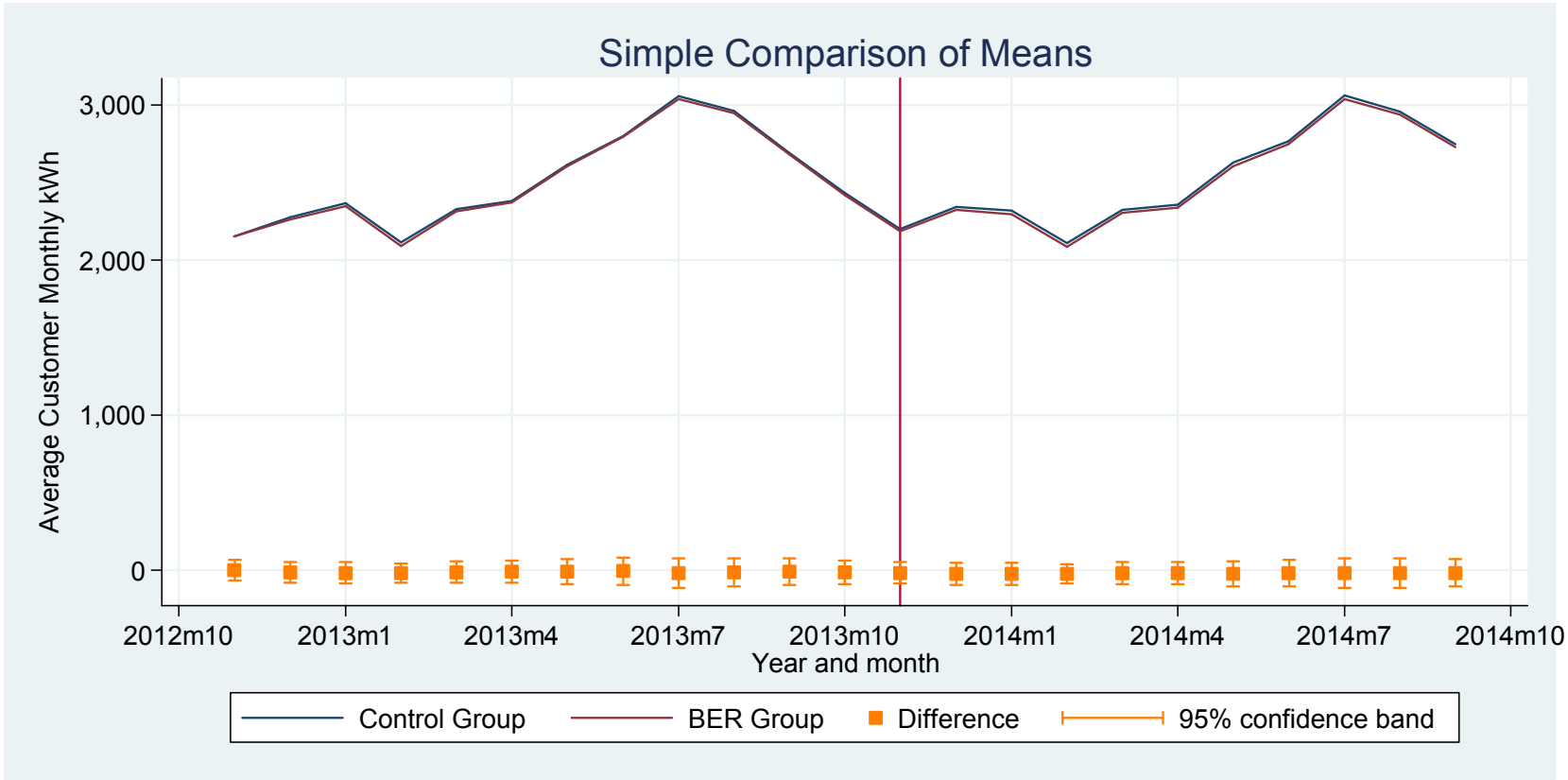


Electric Usage: Raw Data Comparison

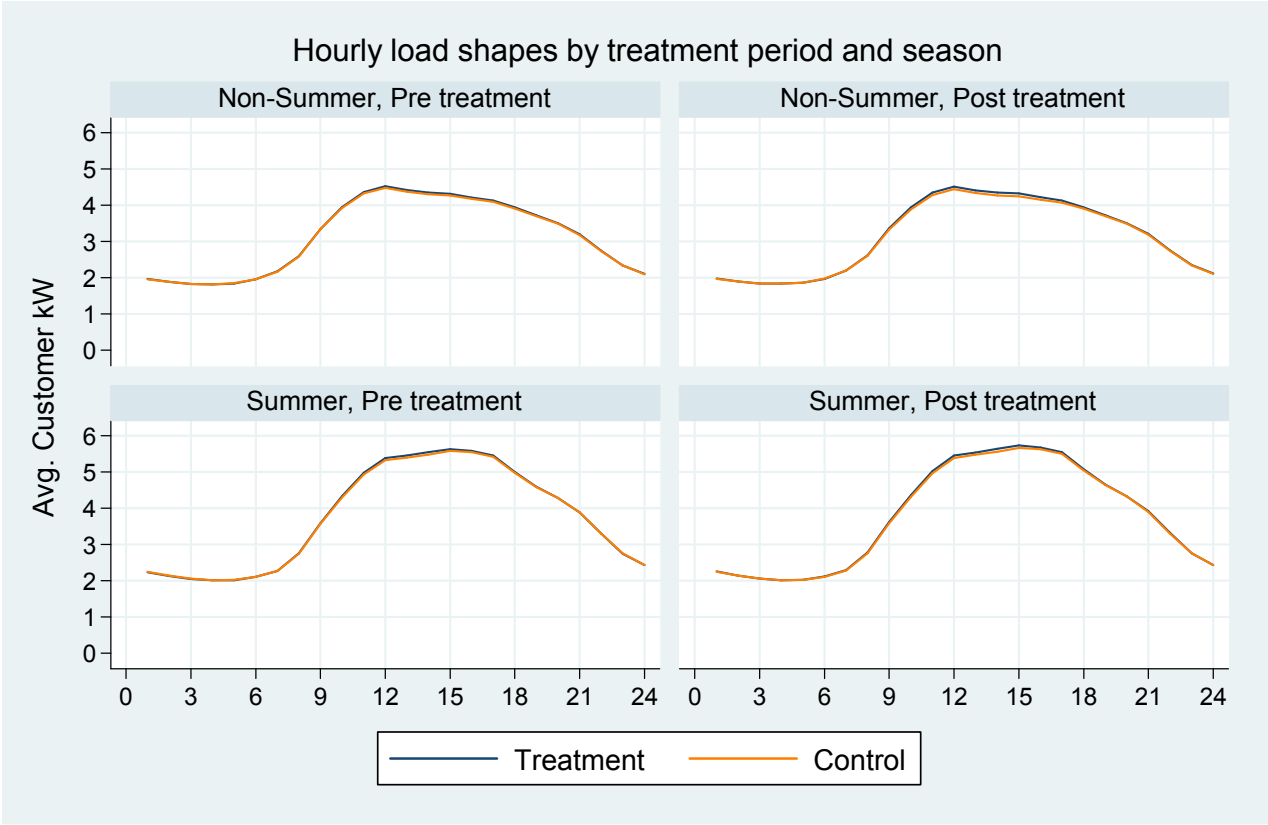
Month	Control group n=12,960			BER group n=13,417		
	Before	After	% Diff	Before	After	%Diff
January	2,364	2,319	-1.9%	2,346	2,296	-2.1%
February	2,111	2,108	-0.1%	2,091	2,084	-0.3%
March	2,327	2,323	-0.1%	2,314	2,302	-0.5%
April	2,380	2,354	-1.1%	2,370	2,335	-1.5%
May	2,612	2,629	0.7%	2,604	2,605	0.1%
June	2,798	2,764	-1.2%	2,792	2,746	-1.6%
July	3,055	3,058	0.1%	3,037	3,037	0.0%
August	2,962	2,954	-0.3%	2,947	2,936	-0.4%
September	2,688	2,748	2.2%	2,678	2,730	1.9%
October	2,407	2,563	6.5%	2,399	2,540	5.9%
November	2,163	2,201	1.7%	2,159	2,183	1.1%
December	2,273	2,344	3.1%	2,259	2,320	2.7%
Total	**30,140**	**30,365**	**0.7%**	**29,995**	**30,114**	**0.4%**

*Only includes customers at sites throughout the entire analysis period (Oct 23, 2012 to Oct 22, 2014)

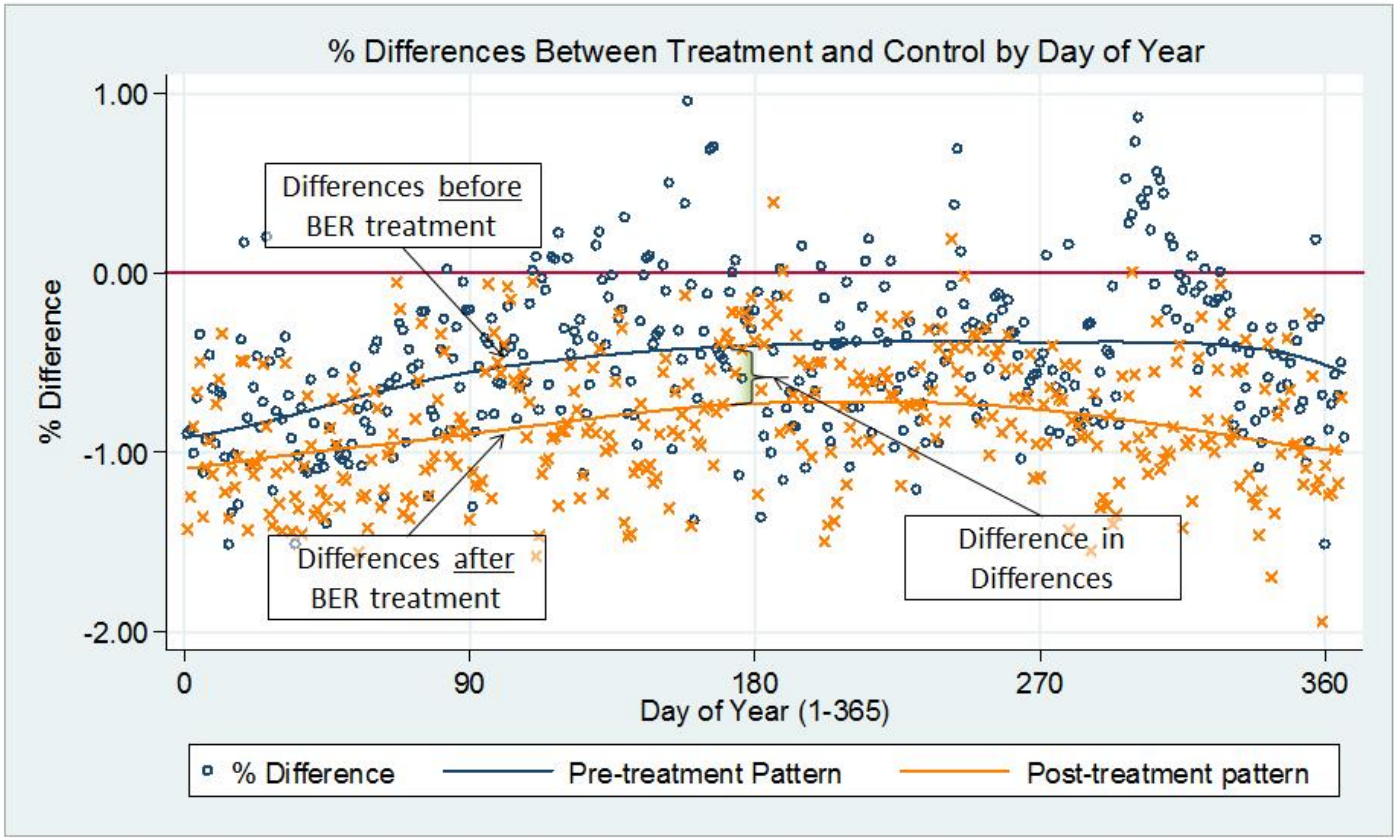
Electric Usage: Simple Means Comparisons



Electric Usage: Hourly Load Shapes

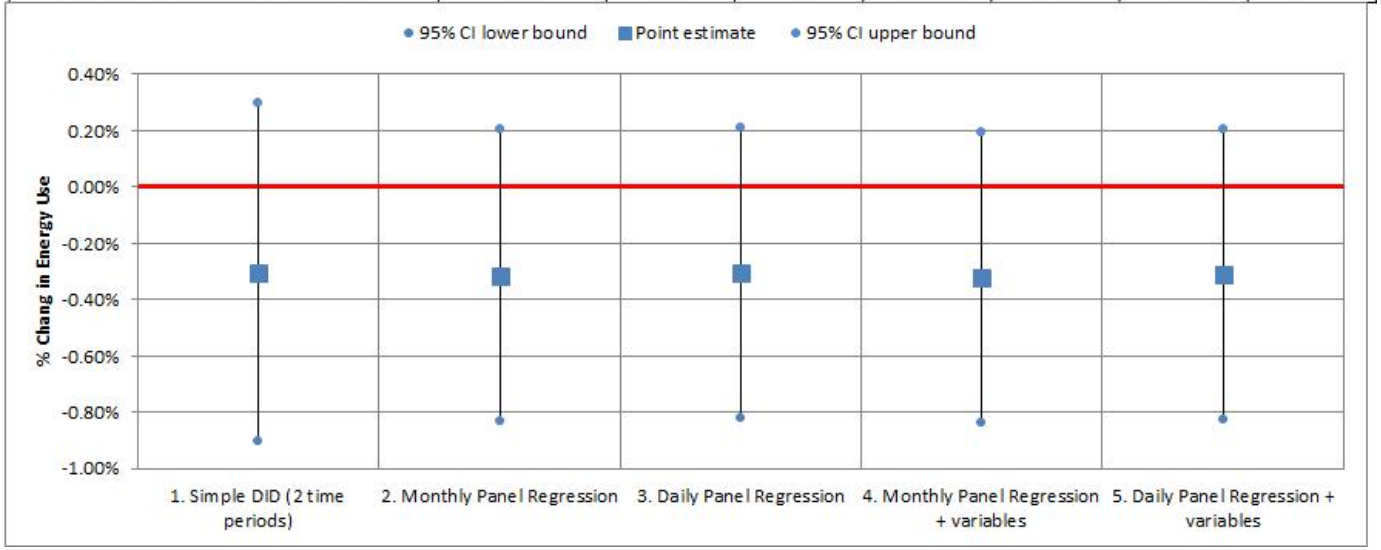


Seasonal Patterns Scarcely Discernable



Electric Usage: Main Finding is ~0.3% Effect

Method	Change in Annual Consumption per site (kWh)	95% Confidence		% Change	95% Confidence		Statistically Significant
		Lower	Upper		Lower	Upper	
1. Simple DID (2 time periods)	-91.4	-272.7	89.8	**-0.30%**	-0.90%	0.30%	No
2. Monthly Panel Regression	-94.6	-250.5	61.2	**-0.31%**	-0.83%	0.20%	No
3. Daily Panel Regression	-92.4	-248.1	63.3	**-0.31%**	-0.82%	0.21%	No
4. Monthly Panel Regression + variables	-97.0	-252.9	58.9	**-0.32%**	-0.84%	0.19%	No
5. Daily Panel Regression + variables	-94.3	-250.1	61.4	**-0.31%**	-0.83%	0.20%	No



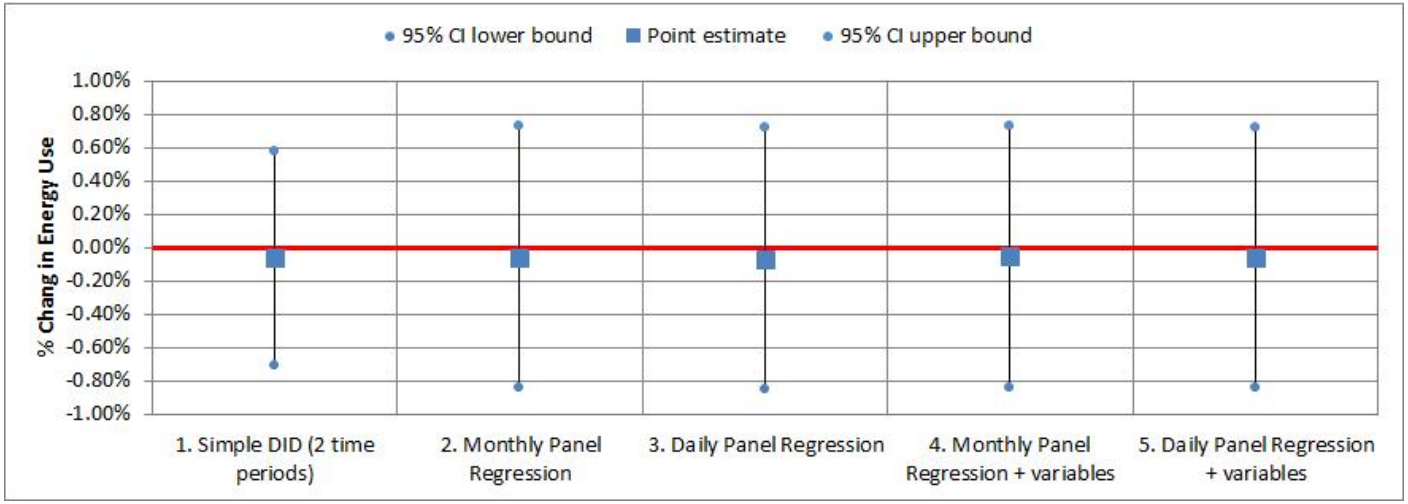
Gas Usage: Raw Data Comparison

Month	Control group n=8,318			BER group n=8,702		
	Before	After	% Diff	Before	After	%Diff
January	263	220	-16.6%	258	217	-16.0%
February	211	191	-9.6%	207	188	-9.2%
March	190	181	-4.9%	189	180	-4.9%
April	164	167	1.5%	164	166	0.9%
May	161	160	-0.8%	160	159	-1.2%
June	151	150	-0.6%	151	150	-1.0%
July	150	148	-1.5%	150	148	-1.7%
August	155	152	-2.0%	154	151	-1.9%
September	147	144	-2.2%	148	144	-2.1%
October	164	160	-2.3%	163	160	-2.1%
November	179	183	2.1%	178	181	1.8%
December	234	255	8.9%	230	248	8.2%
Total	**2,170**	**2,110**	**-2.8%**	**2,152**	**2,091**	**-2.9%**

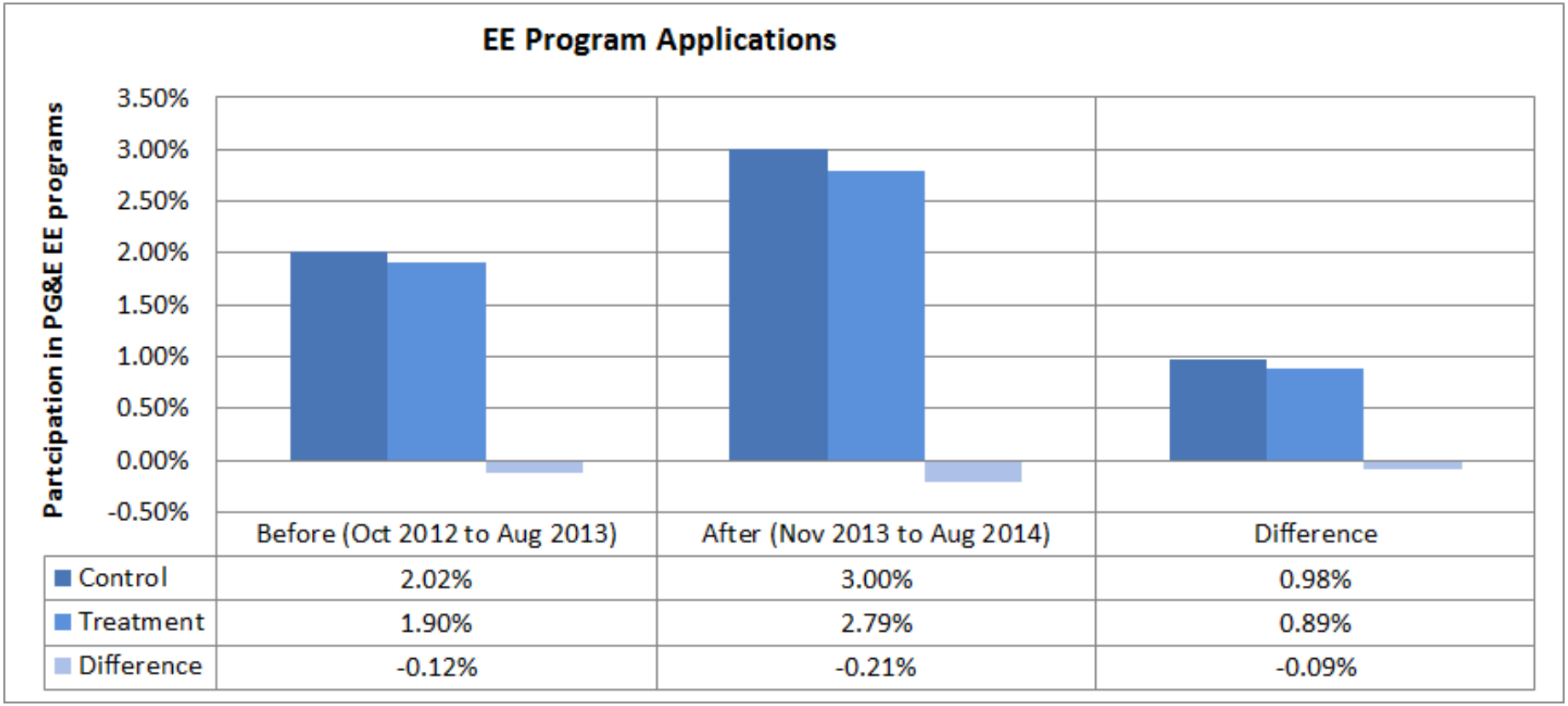
*Only includes customers at sites throughout the entire analysis period (Oct 23, 2012 to Oct 22, 2014)

Gas Usage: No Effect Detected

Method	Change in Annual Consumption per site (Therms)	95% Confidence		% Change	95% Confidence		Statistically Significant
		Lower	Upper		Lower	Upper	
1. Simple DID (2 time periods)	-1.3	-14.7	12.1	**-0.06%**	-0.70%	0.58%	No
2. Monthly Panel Regression	-1.2	-17.6	15.3	**-0.06%**	-0.84%	0.73%	No
3. Daily Panel Regression	-1.3	-17.7	15.0	**-0.06%**	-0.85%	0.72%	No
4. Monthly Panel Regression + variables	-1.1	-17.5	15.4	**-0.05%**	-0.84%	0.73%	No
5. Daily Panel Regression + variables	-1.2	-17.6	15.2	**-0.06%**	-0.84%	0.73%	No



No Effect on EE Program Participation



	Before (Oct 2012 to Aug 2013)	After (Nov 2013 to Aug 2014)	Difference
Control	2.02%	3.00%	0.98%
Treatment	1.90%	2.79%	0.89%
Difference	-0.12%	-0.21%	-0.09%

Key Takeaways

- Estimated percentage reductions in electric usage are very consistent regardless of method used, ranging from 0.30% to 0.32%
- The effects are smaller than expected and smaller than what the study was designed to detect using the analysis protocols
- Estimated percentage reductions in gas usage are consistently less than 1/10th of 1% regardless of method used.

Questions?

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