



Fireeye NXM2G Intelligent “EE” Boiler Control System

A SB 9 Connecticut Energy Strategy - A NXM2G Hearing Presentation

Too many years of an Eversource PWG technology review, meant no significant energy efficiency energy savings for the thousands of buildings owned by the State of CT with Hot Water Boilers in use across the state.

U.S. Energy Systems, LLC (U.S.E.S.) is a CT Veteran Owned Small Business (VOSB) is the direct sales distributor for Fireeye, Inc. (a UTC Co) and its NXM2G Controller in ten Northeast states. U.S.E.S. - Fireeye agreement call for U.S.E.S. to develop sales opportunities for direct sales to government and commercial clients.

On Feb 23, 2014, Mr. Alan Wiernasz, President of U.S. Energy Systems presented the NXM2G boiler technology product information to David Hayward, (CEA, CEM, CDSM) Program Administrator – Energy Efficiency at Northeast Utilities in Berlin, CT. The NXM2G file was then referred to Samuel Fankhauser, Sr Energy Engineer, Joint Utility RD&D Program Administrator, Conservation and Load Management for Connecticut Power & Light /Yankee Gas to begin the review process for the NXM2G, by reviewing www.fireeye.com website.

There was one part of the early review process that seemed to a rather curious oversight by the RD&D Team, namely that of a category for “fully developed” technology, which was explain as an [i.e “commercialized with verifiable performance basis attributes and is an appropriate match for incorporation under existing PURA approved C&LM program, the proposer is referred to the specific program administrator for further discussion of that program’s implementation rules.] We are still waiting for that detailed explanation.

Fireye NXM2G Intelligent “EE” Boiler Control System

Contract # 16PSX0182 for the Energy Efficiency Retrofits for Existing Connecticut State and Municipal Buildings

2017 Fireye wins an award in the DOE / GSA High Impact Technology or H.I.T. Competition with its NXM2G Intelligent Boiler Control technology to control elimination wasteful and the unnecessary “standby and short cycling” firing cycles during routine seasonal operations.

2017 U.S. Energy Systems partners with the Connecticut Conference of Municipalities (CCM) to provide energy savings from excessive non heat call firing cycles for natural gas and oil fired hot water boilers across in Connecticut.

2017 U.S. Energy Systems and Fireye launch a No Up Front Cost Pilot Project Program in DAS State Buildings, to install the NXM2G then monitor and tracking the M&V energy savings with the Fireye NXM2G under typical winter heating loads, using the DOE IPMVP methodology. However, No Approval from Eversource.

CONTRACT

16PSX0182

Between

THE STATE OF CONNECTICUT

Acting by its

DEPARTMENT OF ADMINISTRATIVE SERVICES

AND

U.S. ENERGY SYSTEMS

ENERGY-EFFICIENCY RETROFITS FOR EXISTING BUILDINGS



Connecticut Conference of Municipalities

collaborating for the common good

CCM PARTNERS WITH U.S. ENERGY SYSTEMS ON FIREYE ENERGY EFFICIENT BOILER CONTROLS

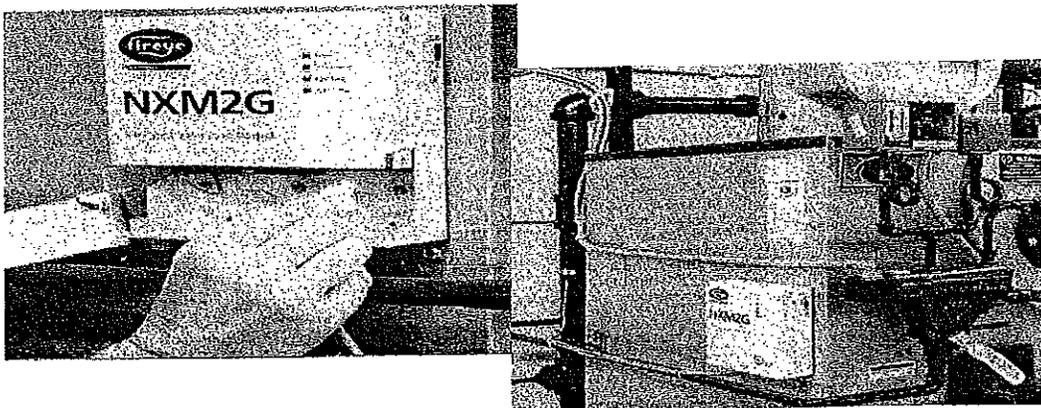
CCM and U.S. Energy have partnered to provide CCM-member towns and cities Fireye from United Technologies — the NX-M2G intelligent boiler solution that eliminates waste cycling, reducing energy use and energy cost (up to 25%). Recently selected by the General Services Administration and U.S. Department of Energy as a High Impact Technology through the Green Proving Ground (GPG) program, this technology uses temperature sensors and advanced algorithms to distinguish between boiler standby losses and actual demand for space heating, in order to conserve energy by reducing boiler "false starts" without compromising occupant comfort.

How does it work?

M2G is an intelligent boiler load optimization controller and has been specifically designed to prevent boiler dry cycling by differentiating between a genuine demand for heat from a demand resulting from standby losses from the boilers.

An M2G is fitted to each boiler and constantly measures and analyzes the temperature profile of each boiler in real time via digital sensors fitted to each boiler's supply and return lines. This enables the M2G to identify and prevent the boiler from standby cycling and more importantly allows the boiler to fire immediately if there is a genuine demand for heat.

If a BMS is in place, the M2G integrates with it, taking its "Stop/Start" signal directly from the BMS. Just as importantly, it recalculates the values every time the boiler reaches its required set point temperature. This allows the system to adapt to BMS variable set-points and not conflict with other existing controls.



(continued on reverse)



Six Emerging Building Technologies Selected for Evaluation by the Green Proving Ground Program

September 27, 2016 | Kevin Powell, Green Proving Ground Program Director, Public Buildings Service

Post filed in: [Green Buildings](#) | [Green Proving Ground](#) | [Technology](#) |

Yesterday, GSA and DOE asked for this year's innovative technologies to improve federal and commercial buildings in the GSA Blog. Today, the Green Proving Ground (GPG) program is excited to announce six technologies selected for testing in GSA facilities through last year's GSA/DOE Request for Information (RFI), and the publication of this year's joint RFI seeking emerging building technologies for evaluation in federal and commercial buildings.

GPG's Six Selected Technologies

GPG would like to introduce and congratulate the following six technologies selected for evaluation in GSA facilities from last year's RFI:

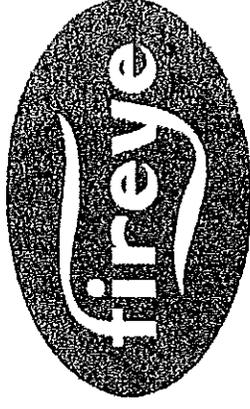
Wireless Sensors and Analytics: When occupants interact with buildings, they generate valuable data that can be used to optimize the efficiency of building operations. This technology tests the promise of the Internet of Things by using wireless, lighting-fixture-based sensors that capture data including occupancy and temperature—with the potential not only to save energy, but also to improve building security, space allocation, and asset management.

Technology provided by Enlighted, Inc.; To be evaluated in coordination with HIT Catalyst.

NXM2G - Hydronic Heating Standby Optimization: This technology uses temperature sensors and advanced algorithms to distinguish between boiler standby losses and actual demand for space heating, in order to conserve energy by reducing boiler "false starts" without compromising occupant comfort.

Technology provided by Fireye, Inc.; To be evaluated in coordination with HIT Catalyst.

Fireye Inc.
(a UTC Co)



NX-M2G Intelligent Boiler Controller in a M&V Pilot Project

**CT DAS - NXM2G PP – 10 Franklin Sq
Energy Savings by Eliminating Unnecessary
and Wasteful Boiler Firing Cycles**

**U.S. Energy Systems
East Hartford, CT**

Fireye - Parent Company Background

A black and white photograph of a city skyline at night, with numerous skyscrapers illuminated. The United Technologies logo, a stylized sunburst, is positioned in the upper left of the image. The text "United Technologies" is written in a bold, sans-serif font in the upper right. The words "Company Overview" are written in a large, bold, sans-serif font across the bottom of the image.

UNITED TECHNOLOGIES
211,500 employees
Net sales of USD 65.1 billion worldwide
in 2014¹

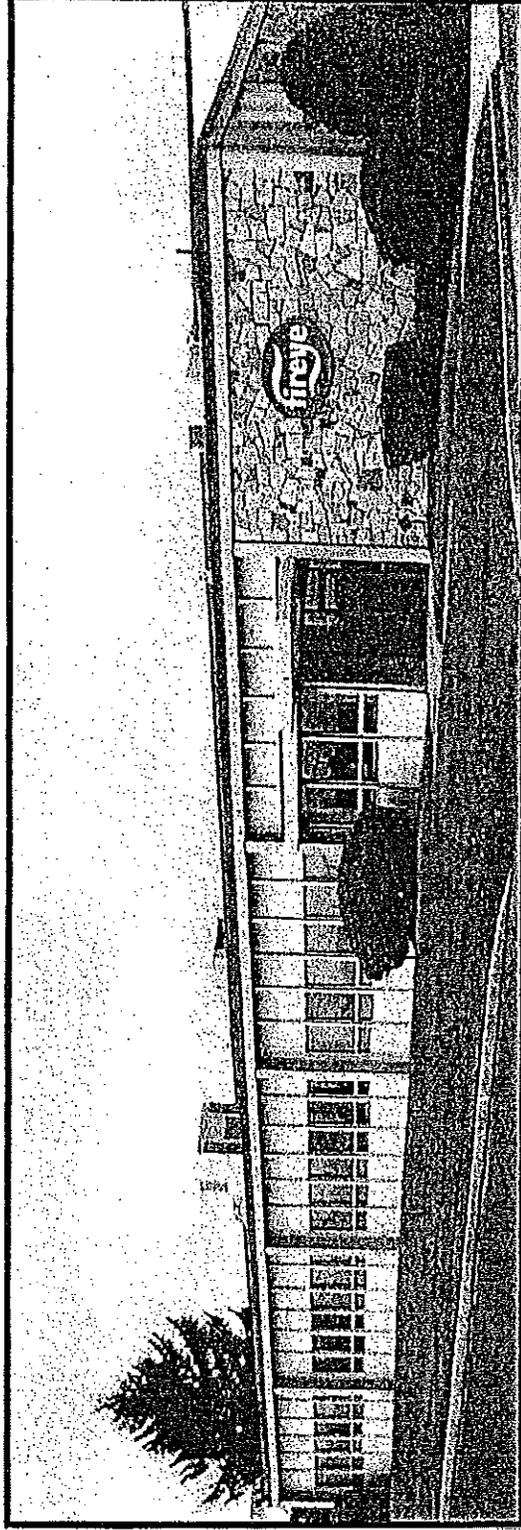
United Technologies

Company Overview

UTC Building & Industrial Systems

UTC Building & Industrial Systems, which includes Otis and UTC Climate, Controls & Security, is the world's largest provider of building technologies.³ Its elevator, escalator, fire safety, security, building automation, heating, ventilation, air-conditioning and refrigeration systems and services promote integrated, high-performance buildings that are safer, smarter and more sustainable.

Fireye, Inc. UTC Manufacturing Company



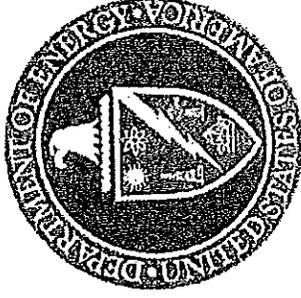
- 67,000 sq. foot (owned) manufacturing facility
- Products sold globally
- Over 9,000 NX-M2G installations worldwide
- 75 years of market leadership in burner/boiler safety and combustion controls
- U.S. DOE/GSA High Impact Technology (H.I.T.) Winner



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DOE BEST PRACTICES

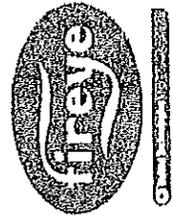
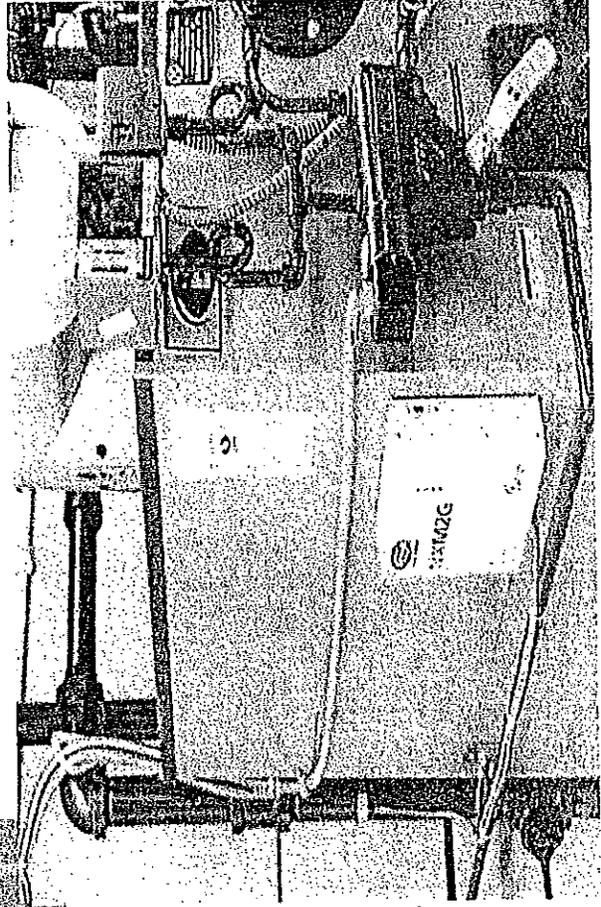
http://www1.eere.energy.gov/femp/pdfs/OM_9.pdf



Optimization Areas with Potential Energy Savings:

- **Minimize Boiler Idling & Short-Cycling Losses (5-10%)**
- **Utilize Efficient Burners / Combustion Systems (2-10%)**
- **Maintain Clean Water-Side Heat Transfer Surfaces (0-10%)**
- **Minimize Radiant Losses from Boilers (1.5-5%)**
- **Utilize Feedwater Economizer for Waste Heat Recovery (1-4%)**
- **Minimize & Automate Boiler Blow-down (0.5%-1.5%)**
- **Utilize Boiler Blow-down Heat Recovery (0.5–2%)**
- **Benchmark the Fuel Costs of Thermal Energy (~1%)**

NXM2G Pilot Project One Day Installation



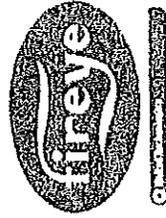
Fireye NXM2G Controller Energy Savings PURA Building Pilot Project, New Britain, CT

<u>March 2016</u>	<u>March 2017</u>	<u>Change / %</u>	<u>No NXM2G</u>
CCF - 1949	CCF - 1242	- 707 / - 36.2%	- 459 / 1490
HDD - 454	HDD - 347	- 107 / - 23.6%	(- 12.7%)**
Ratio- 4.29	Ratio- 3.57	- .72 / - 16.7%*	[CCFperHDD]

[CCF/Natural gas consumed HDD/Heating Degree Day]

<u>April 2016</u>	<u>April 2017</u>	<u>Change / %</u>	<u>No NXM2G</u>
CCF- 2101	CCF- 2850	+ 749/+ 35.6%	+1210 / 3311
HDD- 600	HDD- 946	+ 346/ + 57.6%	(- 21.9%)**
Ratio 3.50	Ratio 3.01	- 49 / - 14%*	[CCFperHDD]

Note: * The Net Monthly Savings *16.7% and *14%
Without NXM2G – March & April would have had
**12.7% to **21.9% Less in Energy Savings



NXM2G Measurement & Verification Report for State of Connecticut

Pilot Sites: 10 Franklin Square, New Britain, CT
Department of Energy & Environmental
Protection (DEEP) / Public Utilities
Regulatory Authority (PURA) Building
10 Franklin Square, New Britain, CT 06051

Pilot Period: 02/13/2017 – 04/28/2017

Report Date: June 2, 2017

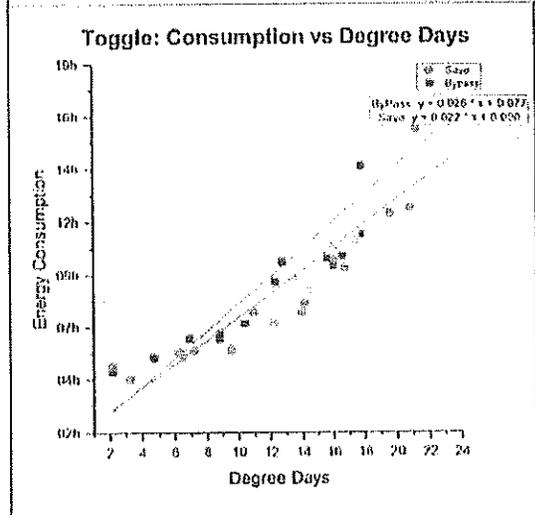
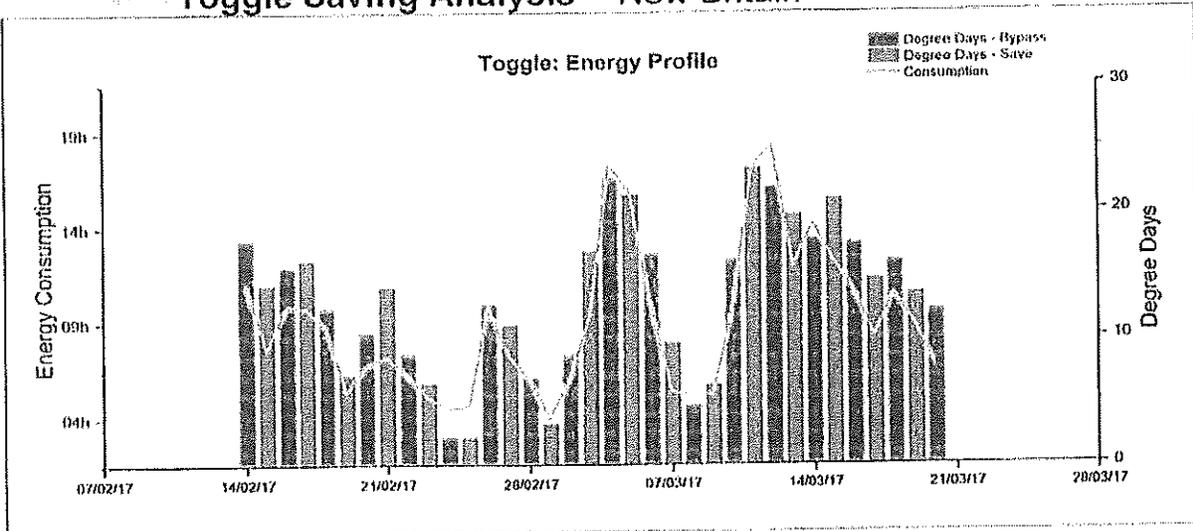
Title: NXM2G Measurement & Verification Report

Customer: State of Connecticut

Customer Reference: 359a- U.S. Energy Systems, LLC, CT Contract

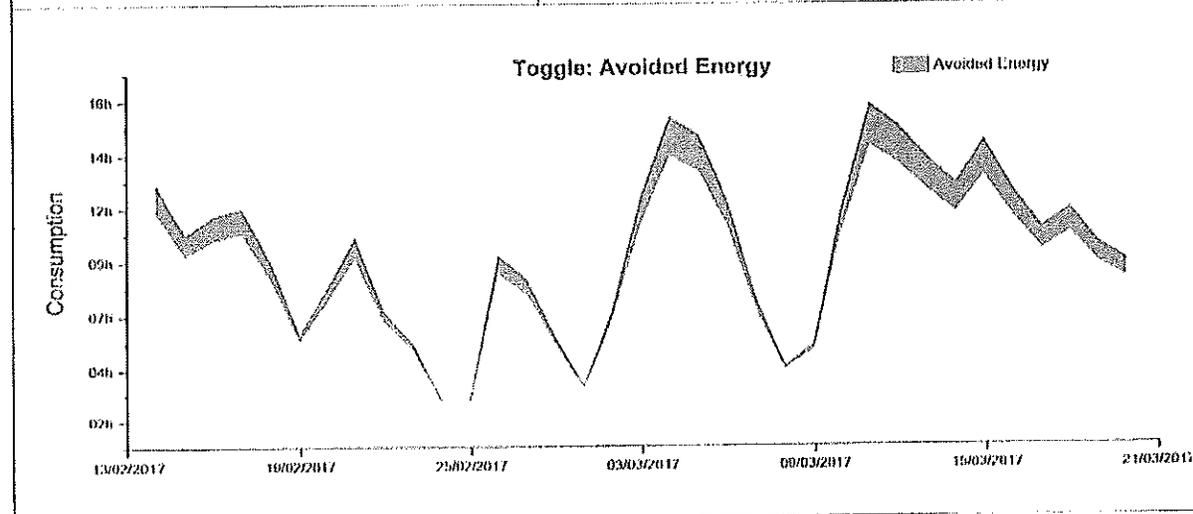
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Fireeye Inc.
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Derry, NH 03038
www.fireeye.com

Toggle Saving Analysis - New Britain



State	Total on time	Total off time	Longest on time	Total Degree Days
Bypass day	150:22:27	1500:17:52	1:53:24	195.1
Save day	135:47:00	1526:01:19	1:53:20	192.5
Sum	286:09:27	3026:19:11		
Total Run Time	30 Days			

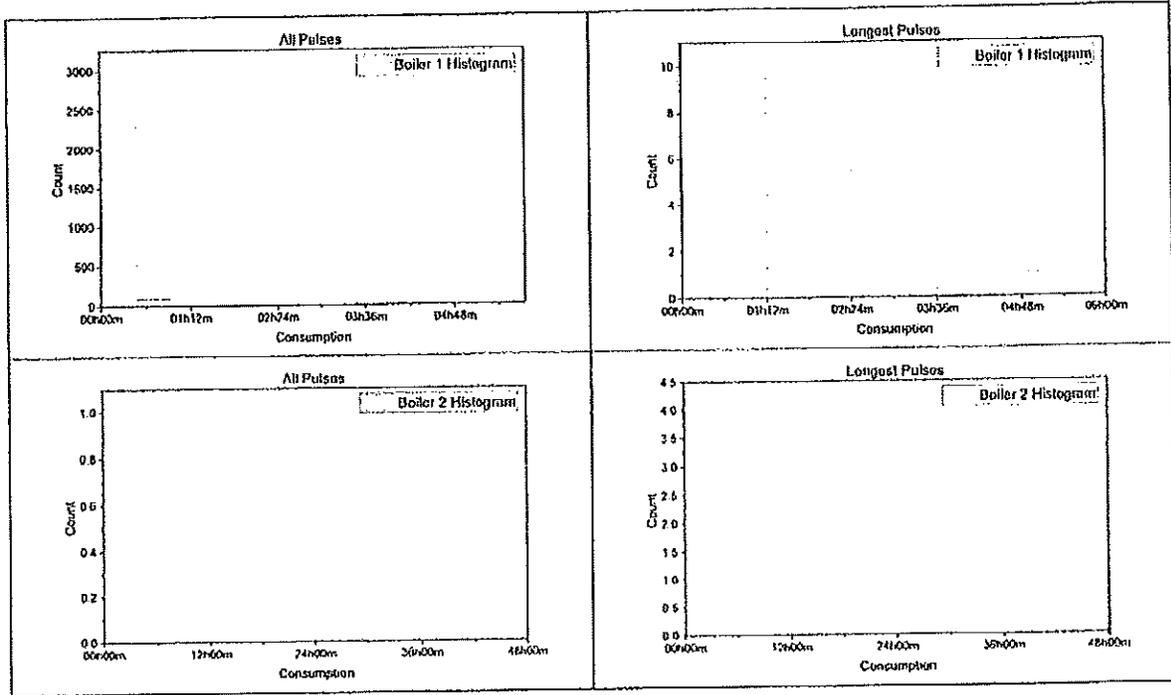
Regression	# Data points	Y intercept	Std Dev.	Slope	R ²	Confidence Level
Bypass	15	0.077	0.065	0.026	0.866	95%
Save	15	0.090	0.062	0.022	0.870	95%



Saving (%) 8.48%



Toggle Saving Analysis - New Britain





Toggle Saving Analysis - New Britain

Notes

Description	Toggle
Operator	
Pilot Period	02/14/2017 - 03/15/2017
DD Weather Site	HARTFORD-BRAINARD AIRPORT, CT, US (72.65W, 41.74N)
M2G installation date	02/13/2017
Consumption data used	T-mac
Points Excluded	None
# of masked data points	0
Data Range Filter	N/A
# of Boilers	2

Customer and Site Details

Customer Ref (SAP)	
Address1	
Address2	
Town	
Post Code	

Graph equation

	$Y=mx+c$
Bypass	$Y = 0.077 + 0.026X$
Save	$Y = 0.090 + 0.022X$

Masked Data - Outliers removed

	Data point #	Date	Consumption	DD
Bypass	N/A			
Save	N/A			

Missing Days

None

Statistics

	Bypass	Save
Number of points	15	15
Degrees of freedom	13	13
R ²	0.8656	0.8700

Parameters

		Value
Bypass	Intercept	0.077
	Slope	0.026
Save	Intercept	0.090
	Slope	0.022

Summary

	Intercept		Slope		Statistics
	Value	Standard Error	Value	Standard Error	Adj. R ²
Bypass	0.077	0.041	0.026	0.003	0.855
Save	0.090	0.035	0.022	0.002	0.860

Input Data

Data source	Location (Folder)
AMR or T-mac or Other	N:\Clients\P15 Live Projects Non-UK\State of Conn
Degree Days	N:\Clients\P15 Live Projects Non-UK\State of Conn

List of exports - files exported from Origin

Location	type
N:\Clients\P15 Live Projects Non-UK\State of Connecticut Municipal Bldgs\New Britain\Xtn_Week 1\ State of Connecticut 14022017 - 20032017\	csv tdms bmp opj doc



Toggle Saving Analysis - New Britain

Toggle: Stats Table

Date	Boilers ON Bypass	Boilers ON Save	Degree Days Bypass	Degree Days Save	Boilers ON Grand Total	Degree Days Total	Savings
02/14/2017	11:24:33	--	17.8		11:24:33	17.8	
02/15/2017	--	08:11:46		14.2	08:11:46	14.2	
02/16/2017	10:18:32	--	15.6		10:18:32	15.6	
02/17/2017	--	10:12:26		16.1	10:12:26	16.1	
02/18/2017	09:14:31	--	12.3		09:14:31	12.3	
02/19/2017	--	06:00:48		7.2	06:00:48	7.2	
02/20/2017	07:19:16	--	10.4		07:19:16	10.4	
02/21/2017	--	07:47:18		14	07:47:18	14	
02/22/2017	06:51:27	--	8.8		06:51:27	8.8	
02/23/2017	--	05:43:49		6.5	05:43:49	6.5	
02/24/2017	05:07:57	--	2.2		05:07:57	2.2	
02/25/2017	--	05:18:13		2.2	05:18:13	2.2	
02/26/2017	10:09:45	--	12.7		10:09:45	12.7	
02/27/2017	--	07:48:00		11	07:48:00	11	
02/28/2017	06:39:22	--	6.9		06:39:22	6.9	
03/01/2017	--	04:42:32		3.3	04:42:32	3.3	
03/02/2017	06:37:37	--	8.8		06:37:37	8.8	
03/03/2017	--	09:49:08		16.8	09:49:08	16.8	
03/04/2017	17:31:29	--	22.6		17:31:29	22.6	
03/05/2017	--	16:06:04		21.3	16:06:04	21.3	
03/06/2017	10:25:35	--	16.6		10:25:35	16.6	
03/07/2017	--	06:02:44		9.6	06:02:44	9.6	
03/08/2017	05:46:19	--	4.7		05:46:19	4.7	
03/09/2017	--	05:55:04		6.3	05:55:04	6.3	
03/10/2017	09:56:47	--	16		09:56:47	16	
03/11/2017	--	17:18:18		23.4	17:18:18	23.4	
03/12/2017	18:30:20	--	21.9		18:30:20	21.9	
03/13/2017	--	12:17:32		19.7	12:17:32	19.7	
03/14/2017	14:28:57	--	17.8		14:28:57	17.8	
03/15/2017	--	12:33:18		20.9	12:33:18	20.9	
	150:22:27	136:47:00	195.1	192.5	286:09:27	387.6	8.48%