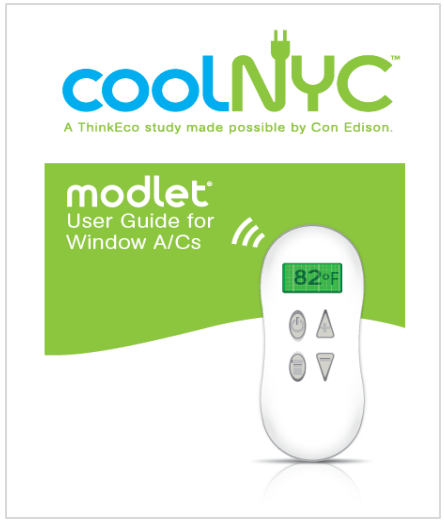

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Con Edison DR Demonstration

Prepared by
Vicki Kuo, conEdison
Mei Shibata, thinkeco
Curt Puckett, KEMA DNV

Hypotheses

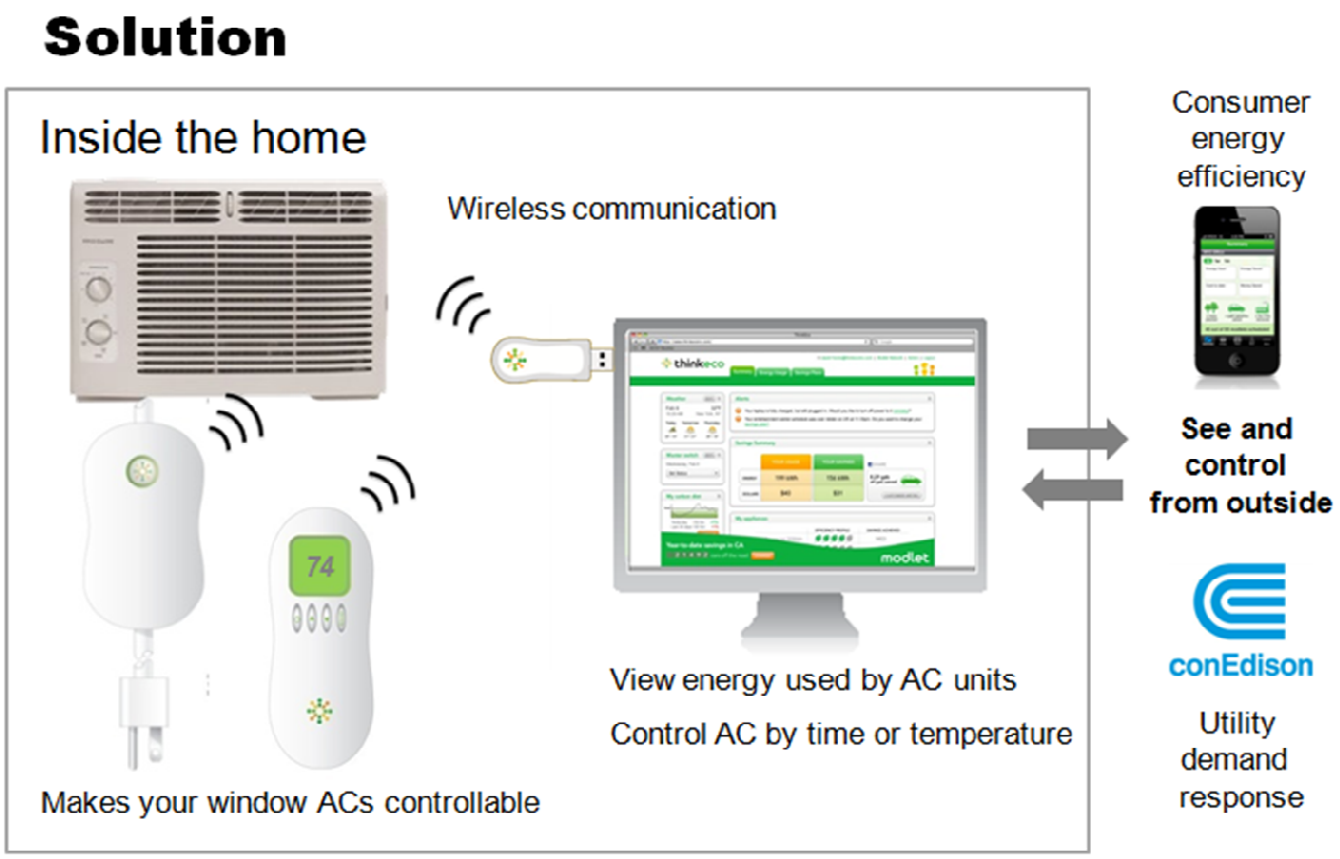
- Develop a demand response pilot for Con Edison that effectively targets room Air Conditioners (ACs) for demand response
  - Reliable reduction
  - Repeated reduction
- Technology will enable Con Edison to change the economics around residential demand response
  - Lower recruitment and service costs
  - Creates self-install solution
- The selected technology offers the least intrusive option for consumers with maximum comfort and control, thereby driving up participation rates

A Technology Solution

- Meters energy use at the plug and sends info to cloud
- Enables remote control and connectivity to plugged-in devices
- Quantifies savings for personal and utility use
- Saves energy through smart and automated power on/off

"Modlet®"

The “modlet®” Solution



conEdison ON IT

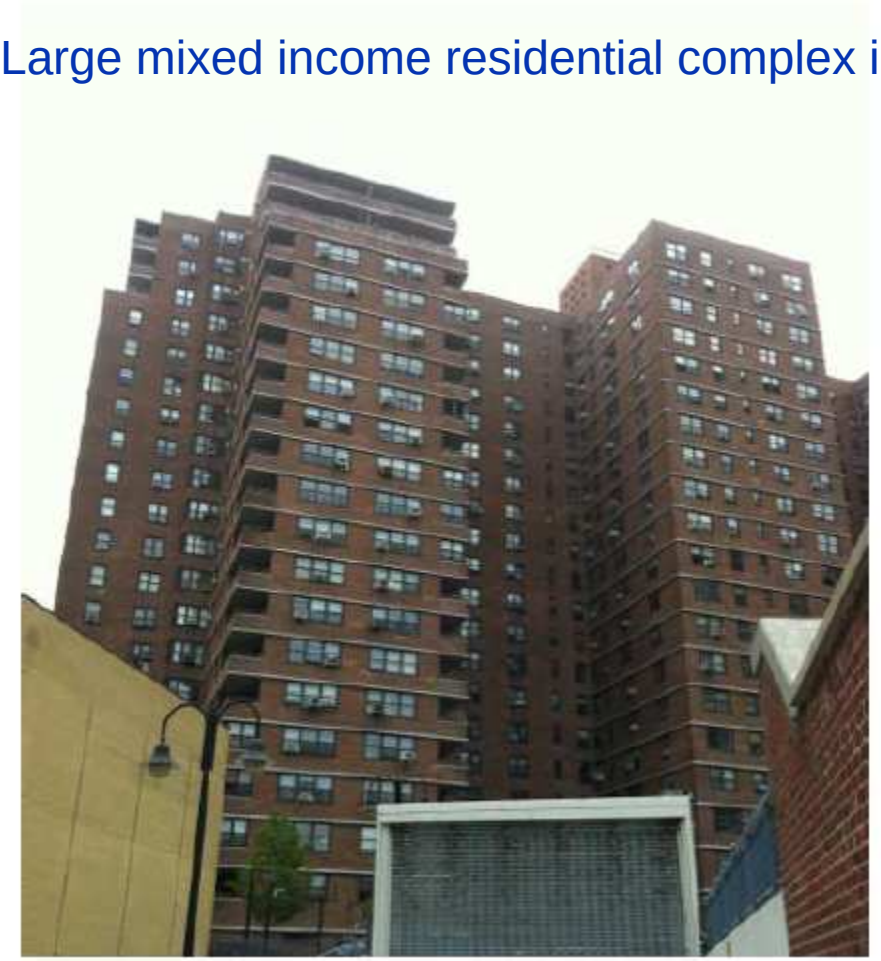
Solution

Combined solution changes the dynamics for residential DR

- **Can be self-installed by consumers:** no pricey contractors are needed and the product can be handed out at retail
- **Handles real-time energy monitoring AND tracking of DR impact:** utility can fine-tune participation rates during the summer
- **Is an attractive consumer-friendly energy efficiency tool:** big ‘what’s in it for me’ benefit for consumers

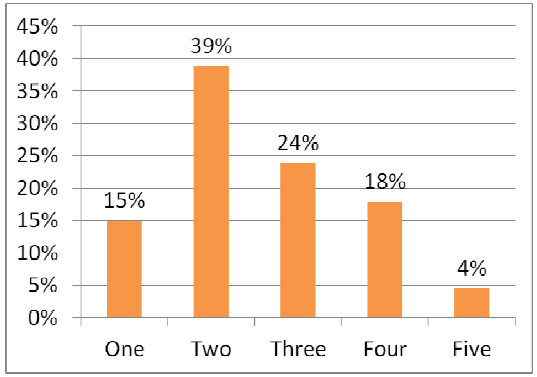
Site Selection

Large mixed income residential complex in downtown Manhattan was selected



Large mixed income residential complex in downtown Manhattan was selected

Number of room ACs



Study was branded for consumer appeal

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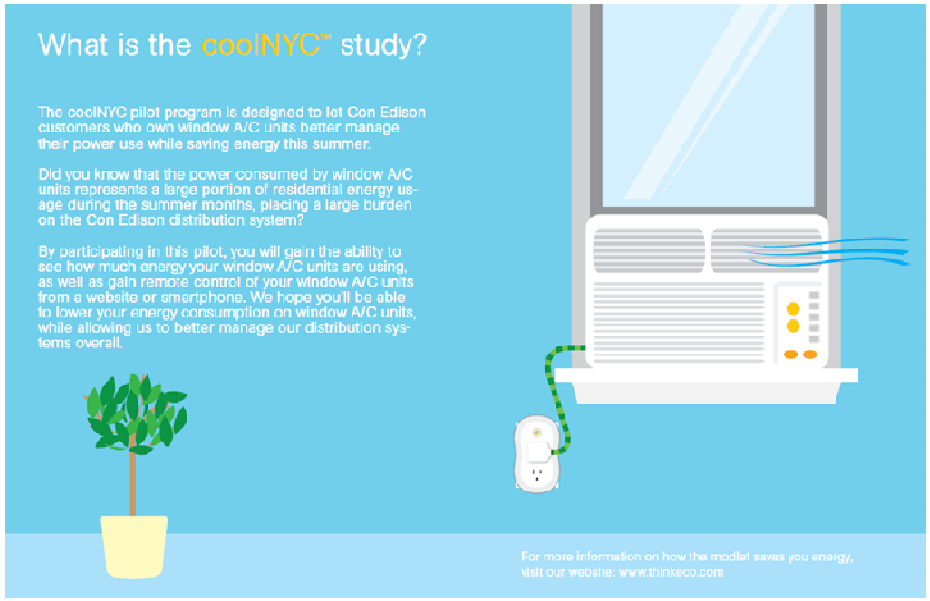
Logo – includes the Con Edison blue and thinkeco green

Study description



Recruitment flyer

Recruitment Process

Feb — March — April — May — June

Visit with management company

Coop board approval

Data sharing agreement

Modlets handed out

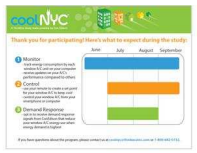
Flyers in buildings and emailed by management office

25% of all A/Cs were recruited

Staffed table in lobby of 2 separate buildings to answer questions and recruit more participants

Designed for easy self-install

User manual + one-page install guide

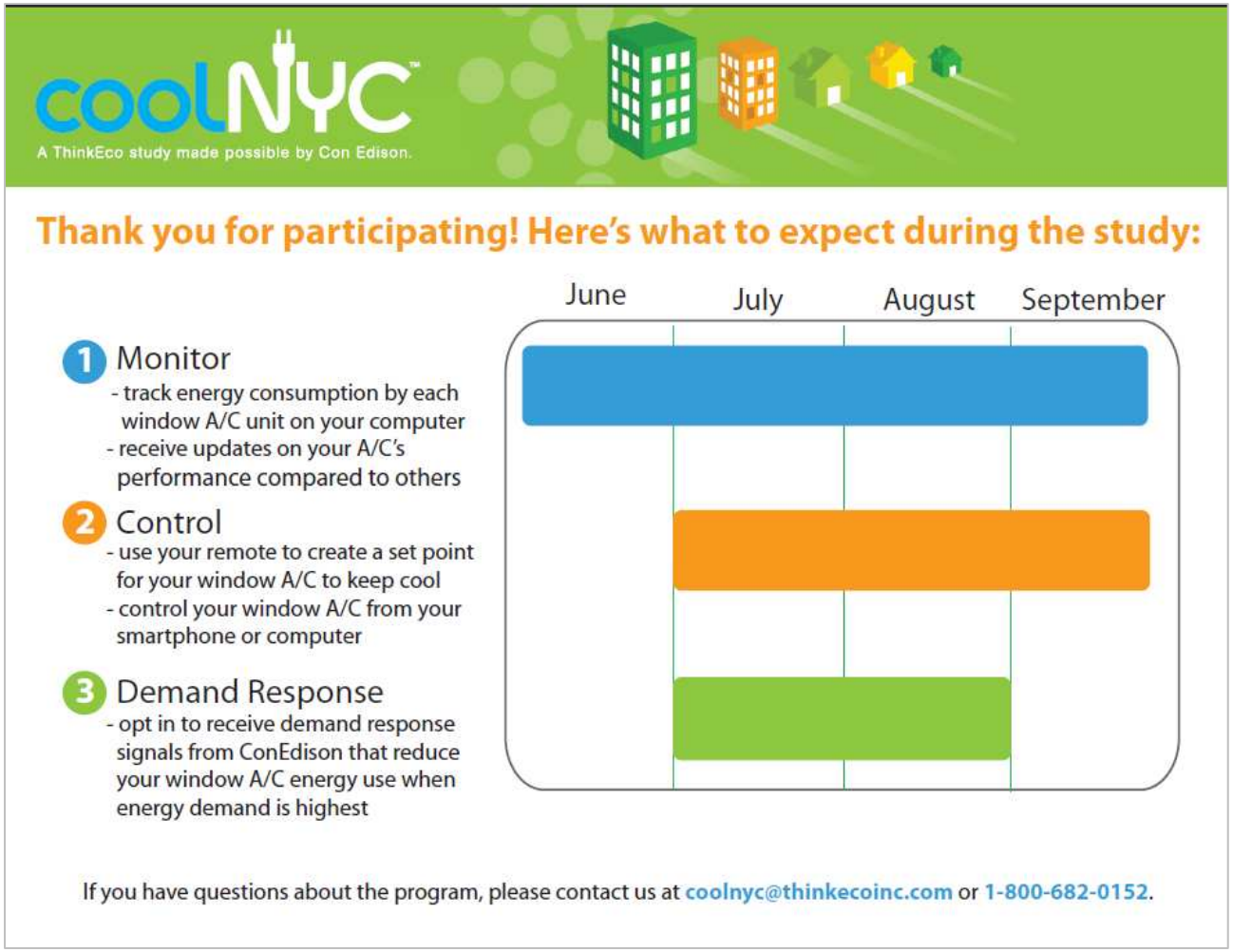


Study design postcard

x 1-5 depending on number of ACs

x 1-5 depending on number of ACs

Study Design



Robust baseline period was included

This was done because the study was structured as a single arm study – no separate control group

Positive Initial User Feedback

- “Con Ed does this? That’s really great”
- “I have installed all 3 modlets… it was easy”
- “Excellent concept. Good luck to us all for its success”
- “I can thermostat my AC now? That’s so cool”

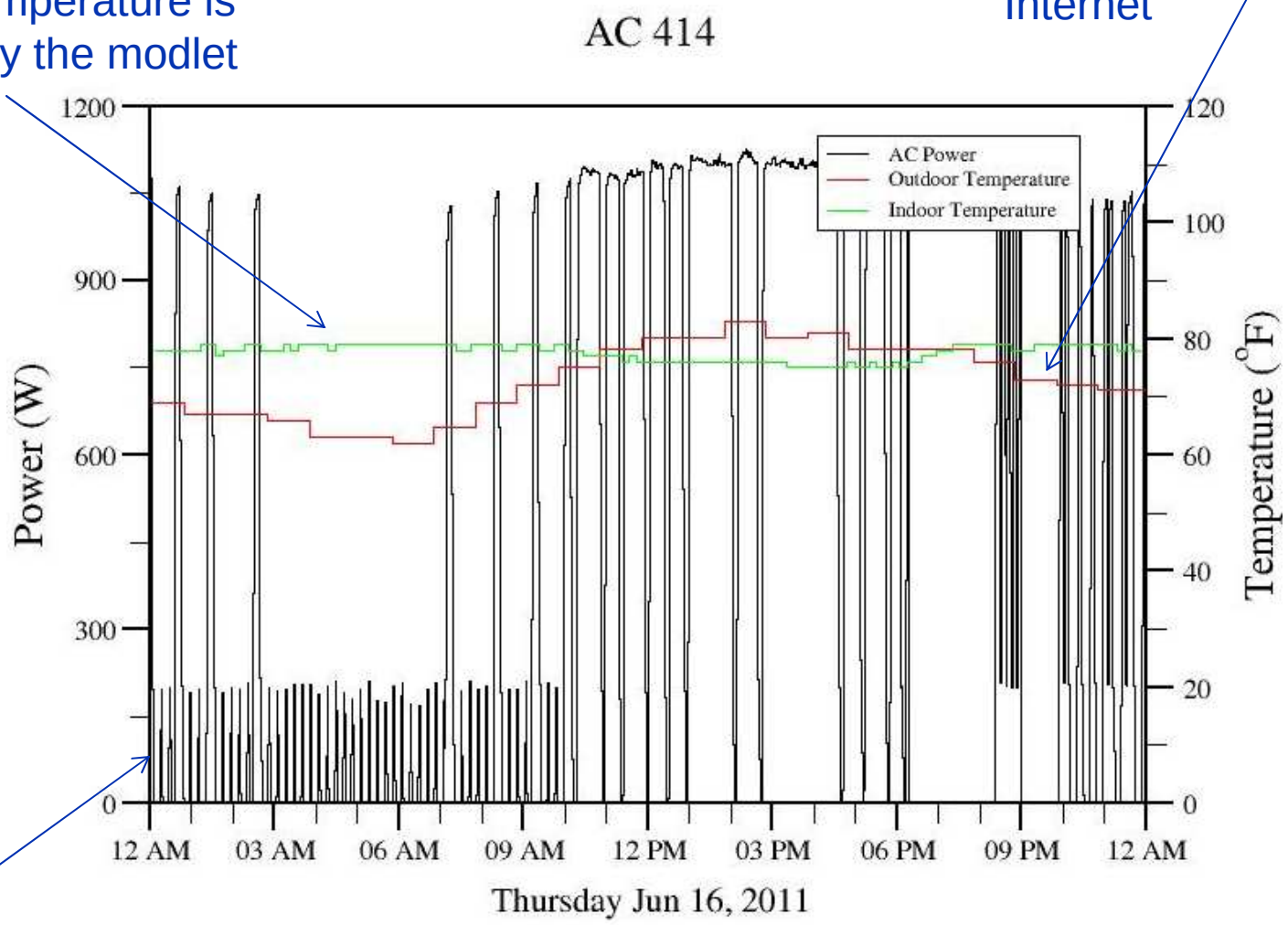
During the June monitoring month, we learned interesting facts about ACs

- How much power each AC uses
- When the AC is turned on
- How often the AC cycles (if ever)
- First time we can usefully classify ACs

“All-day” AC

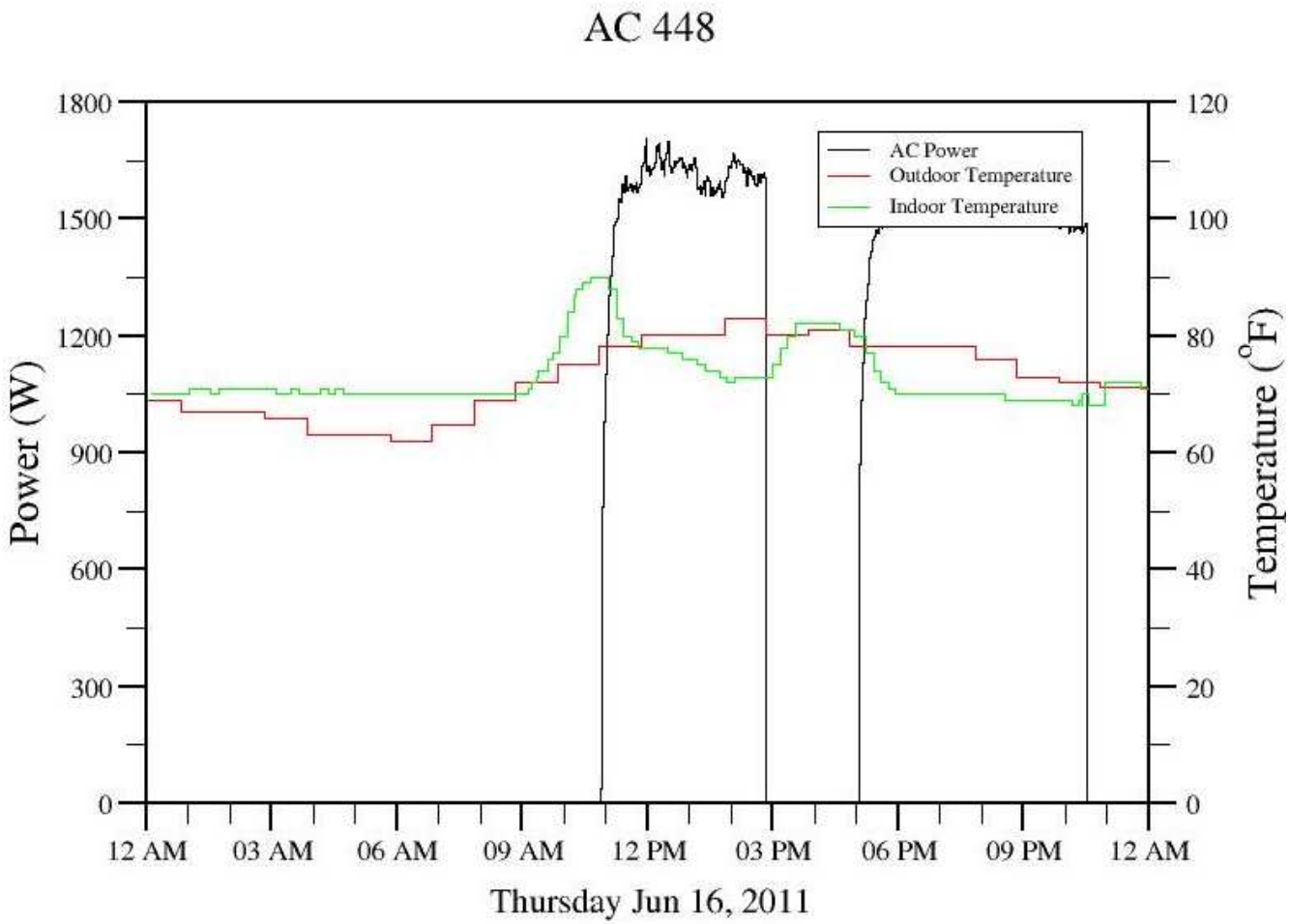
Indoor temperature is tracked by the modlet remote

Outdoor temperature is obtained from the Internet

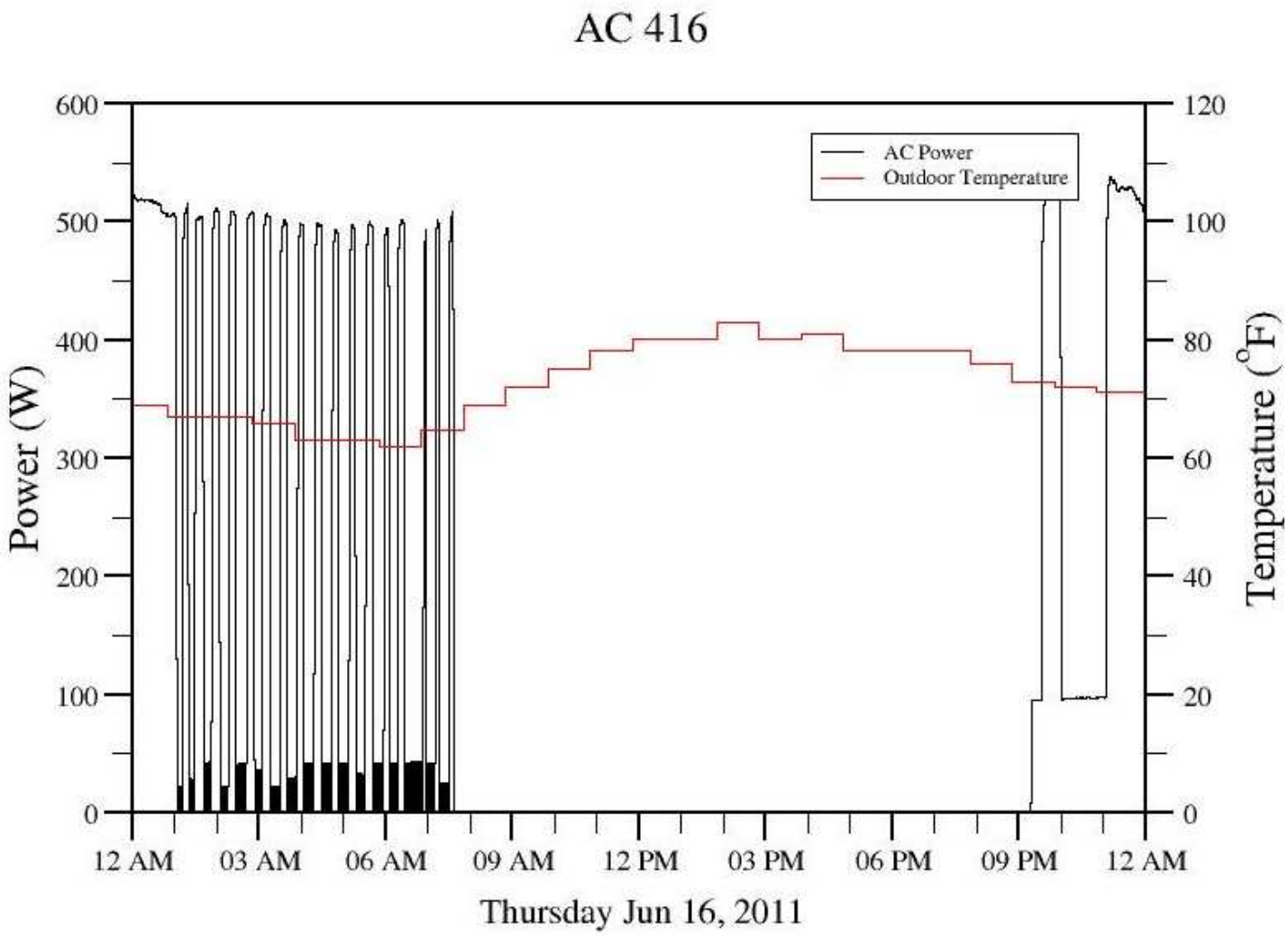


AC power usage is tracked by the modlet

“Day-time” AC


AC 448
AC Power
Outdoor Temperature
Indoor Temperature
Power (W)
Temperature (°F)
1800
1500
1200
900
600
300
0
120
100
80
60
40
20
0
12 AM
03 AM
06 AM
09 AM
12 PM
03 PM
06 PM
09 PM
12 AM
Thursday Jun 16, 2011

“Night-time” AC



Demand Response Begins

End user features enabled

(1) Users can schedule their window AC's to turn on and off based on their preference

Or, with an app

(2) And use the remote control unit to thermostat their ACs

Just change the target temperature settings on the remote unit

(3) Users Could Opt Out

Through the software before the event

BEDROOM AC	Default	82 °F	81 °F	ENABLED	TURN OFF
LIVING ROOM AC	Default	83 °F		DISABLED	TURN OFF
Gideon	Default	81 °F	73 °F	ENABLED	TURN OFF

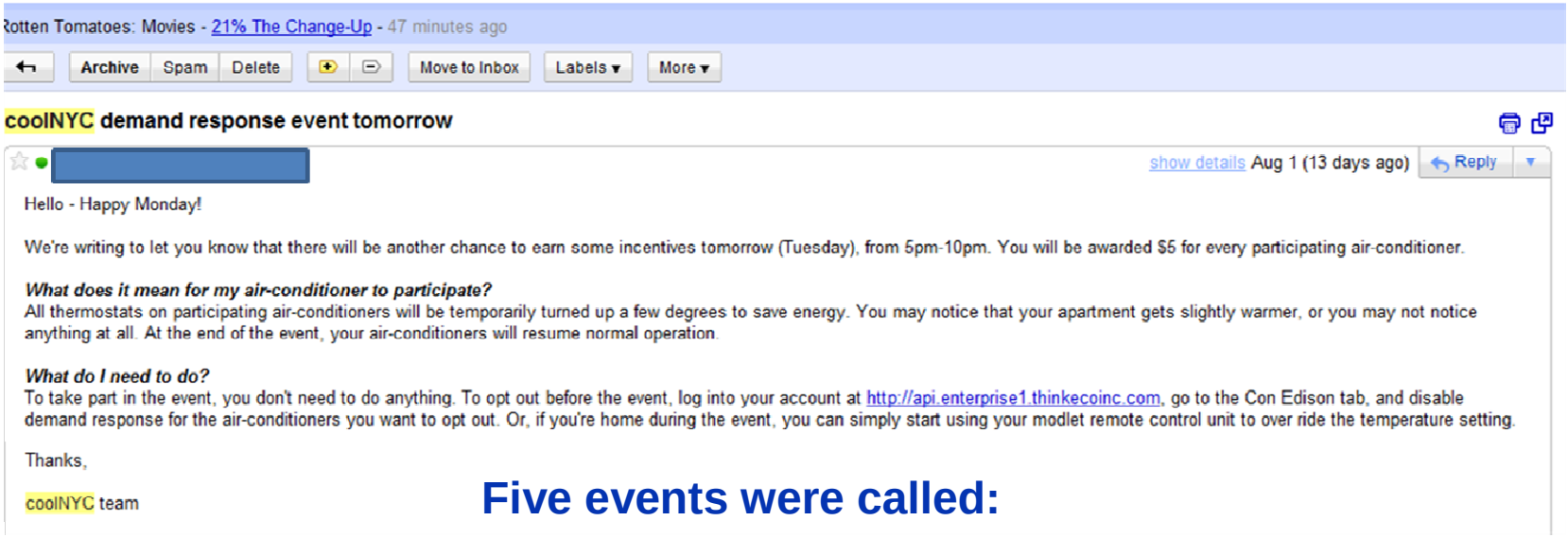
Disable here

Using the remote during the event

Just change temperature settings on the remote unit

Demand Response Alerts & Events

Alerted 24 hours before an event, and again 2 hours before



Rotten Tomatoes: Movies - 21% The Change-Up - 47 minutes ago

Archive | Spam | Delete | Move to Inbox | Labels ▾ | More ▾

coolNYC demand response event tomorrow

show details Aug 1 (13 days ago) Reply

Hello - Happy Monday!

We're writing to let you know that there will be another chance to earn some incentives tomorrow (Tuesday), from 5pm-10pm. You will be awarded $5 for every participating air-conditioner.

What does it mean for my air-conditioner to participate?
All thermostats on participating air-conditioners will be temporarily turned up a few degrees to save energy. You may notice that your apartment gets slightly warmer, or you may not notice anything at all. At the end of the event, your air-conditioners will resume normal operation.

What do I need to do?
To take part in the event, you don't need to do anything. To opt out before the event, log into your account at http://api.enterprise1.thinkecoinc.com, go to the Con Edison tab, and disable demand response for the air-conditioners you want to opt out. Or, if you're home during the event, you can simply start using your modlet remote control unit to over ride the temperature setting.

Thanks,

coolNYC team

Five events were called:

		Temperature (°F)		Temperature (°C)		
Date	Event Time	Average	Maximum	Average	Maximum	Opt Out
7/21/2011	12 pm - 5 pm	82.7	93	28.2	34	6
7/22/2011	2 pm - 5 pm	84.3	95	29.1	35	4
8/2/2011	5 pm - 10 pm	82.9	100	28.3	38	5
8/17/2011	5 pm - 10 pm	80.5	93	26.9	34	5
8/25/2011	5 pm - 10 pm	79.6	85	26.4	29	5

DNV KEMA Provided Independent 3rd Party Evaluation

- Multiple Baselines Examined
  - Baseline days were selected based on the days with the smallest absolute difference with respect to the average usage during the observed time frame
    1. Hours before one hour prior to the start of the event ("Before Only" Method)
    2. Hours after one hour subsequent to the end of the event ("After Only" Method)
    3. Hours before one hour prior to the start of the event and hours after one hour subsequent to the end of the event ("Before and After" Method)
    4. The temperature method selected the three most appropriate days based on those days with the highest correlation to the event day's weather
- Multiple Adjustment Factors Examined
    1. Hours before one hour prior to the start of the event ("Before Only" Method);
    2. Hours after one hour subsequent to the end of the event[1] ("After Only" Method); and
    3. Hours before one hour prior to the start of the event and hours after one hour subsequent to the end of the event ("Before and After" Method).
    4. For the NYISO Baseline Method, two hours were selected. They were the two hours starting four hours before the start of the event (i.e. if the event started at noon then 8 am and 9 am were selected).
- Additive and Multiplicative factors were examined (25 Baselines in Total)

Baselines Estimated

Selection Method	True-Up Method	True-Up Basis
1. Before and After	Before and After	Additive
2. Before and After	Before and After	Multiplicative
3. Before and After	After Only	Additive
4. Before and After	After Only	Multiplicative
5. Temperature	Before and After	Additive
6. Temperature	Before and After	Multiplicative
7. Temperature	After Only	Additive
8. Temperature	After Only	Multiplicative
9. NYISO	Before Only	Multiplicative

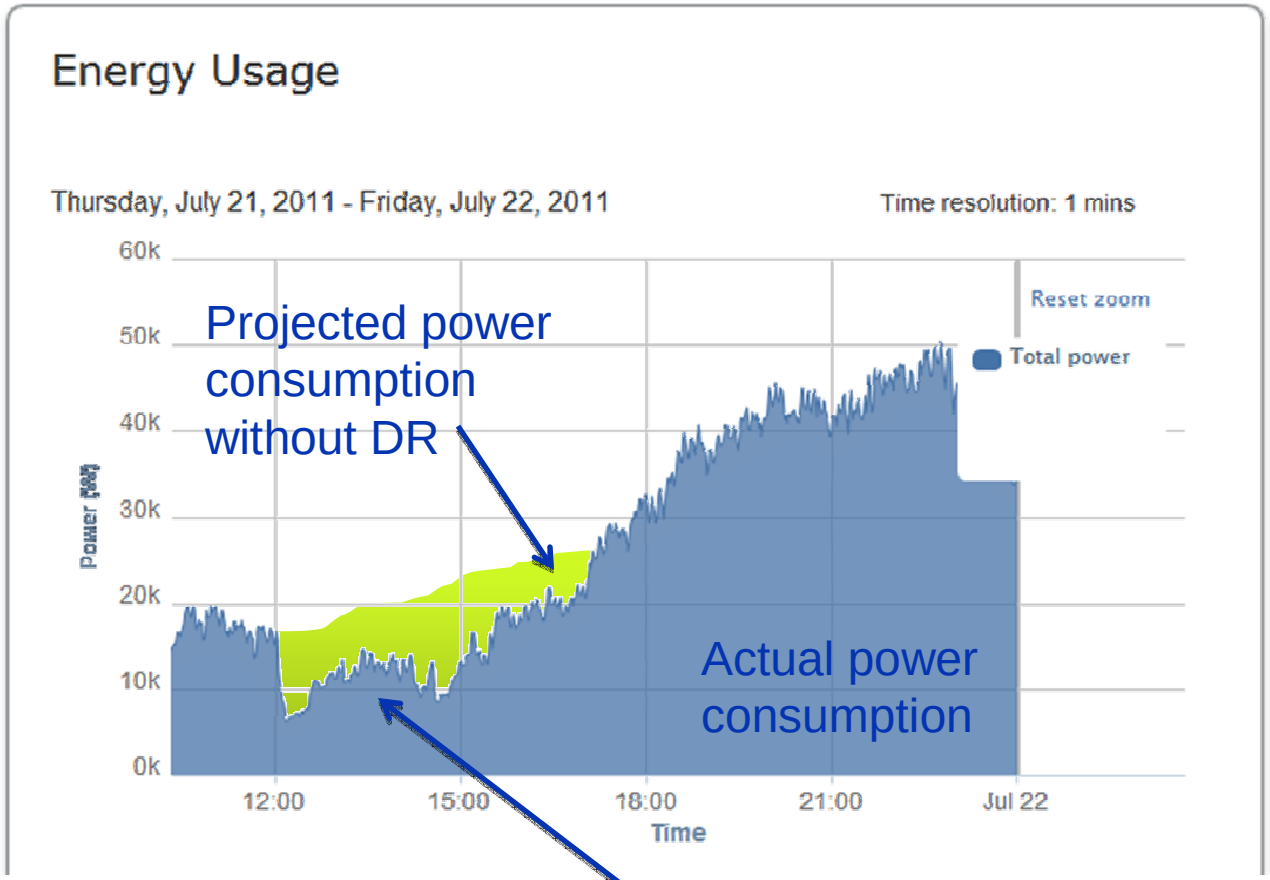
Results

	Analysis Approach								
	Matched Day	Matched Day	Matched Day	Matched Day	Matched Day	Matched Day	Matched Day	Matched Day	NYISO
Selection Basis	Before and After	Before and After	Before and After	Before and After	Temperature	Temperature	Temperature	Temperature	Before
True Up Basis	Before and After	Before and After	After	After	Before and After	Before and After	After	After	Before
True Up Method	Additive	Multiplicative	Additive	Multiplicative	Additive	Multiplicative	Additive	Multiplicative	Multiplicative
Average Reduction During Event (W)									
7/21/2011	53	68	103	93	48	55	122	98	39
7/22/2011	113	86	102	53	113	92	114	83	110
8/2/2011	57	10	65	61	18	19	36	18	20
8/17/2011	24	41	4	8	-6	45	27	46	46
8/25/2011	21	75	9	11	26	93	22	23	74
Reduction Percentage									
7/21/2011	22%	27%	36%	34%	21%	23%	40%	35%	35%
7/22/2011	35%	29%	33%	20%	35%	30%	35%	28%	28%
8/2/2011	20%	4%	23%	22%	8%	8%	14%	8%	8%
8/17/2011	18%	26%	4%	6%	-6%	28%	19%	29%	29%
8/25/2011	15%	39%	7%	9%	18%	44%	16%	17%	17%

Summary

Date	Median	Average	Maximum	Minimum
7/21/2011	81	80	122	39
7/22/2011	97	95	114	53
8/2/2011	27	35	65	10
8/17/2011	25	24	46	-6
8/25/2011	23	35	93	9
Date	**Median**	**Average**	**Maximum**	**Minimum**
7/21/2011	30%	30%	40%	21%
7/22/2011	32%	31%	35%	20%
8/2/2011	11%	13%	23%	4%
8/17/2011	18%	15%	29%	-6%
8/25/2011	16%	20%	44%	7%

Estimated Impact on July 21st

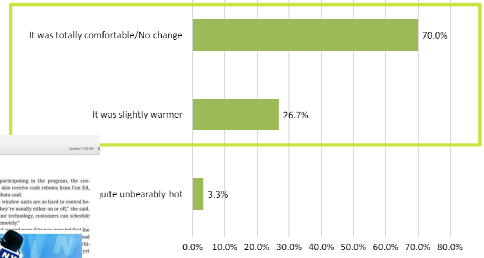


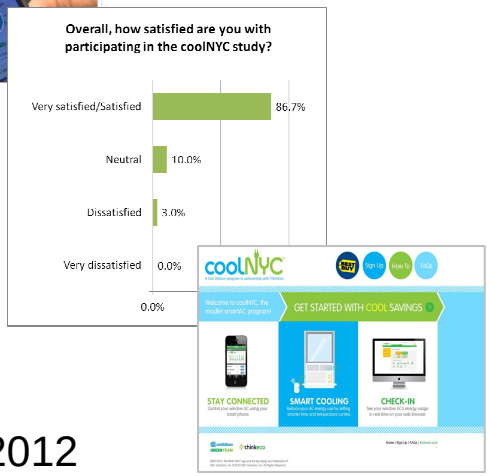
"Thank you and Con Ed for making it happen"

"It was really easy to participate"

Customer Perception and Miscellaneous Observations

- Only 3% of customer thought it was unbearably hot during the event
- Project generated a lot of positive press for Con Edison
- 80% of participants thought 24 hours was sufficient notice
- 60% of participants thought they would be willing to participate in 3 or more additional events
- 87% of participants were very satisfied or satisfied with their participation in the program
- 75% of 2011 participants signed up for 2012
  - An additional 40 A/C units from the same complex signed on for 2012
- 2012 pilot expanded to include additional buildings
- Won PLMA 2012 Innovative Marketing Award





Con Edison and ThinkEco Launch Window Air Conditioner Energy Savings Program

4/26/2012

As temperatures begin to climb this summer, Con Edison and ThinkEco have partnered to launch a window air-conditioner program that will allow customers to use less energy, protect the environment and help maintain reliable service during times of peak demand in New York City.