

# A SNAPSHOT OF NILM

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NAVIGANT

A top-down view of a large, dark metal pot filled with a thick, red chili con carne. The chili contains chunks of ground meat, kidney beans, and green bell peppers. The surface of the chili is glistening with oil. The pot is set on a white surface, possibly a stove.

machine learning

Is it ready yet?

data

smart meters



Let's give  
it a try.





# We use fresh ingredients.

**45 houses** w. optical sensors /  
~ 30 second resolution

**23 houses** submetered /  
~ 60 second resolution





While we're at it,  
let's try a few  
recipes.



Training  
Data



+

Machine  
Learning



=

NILM  
Algorithm

$f(x)$

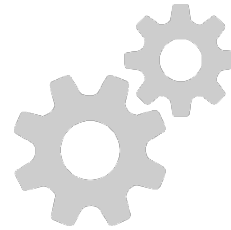


Training Data



+

Machine Learning



=

NILM Algorithm

$f(x)$

$f(x)$



# “Secret Recipe”

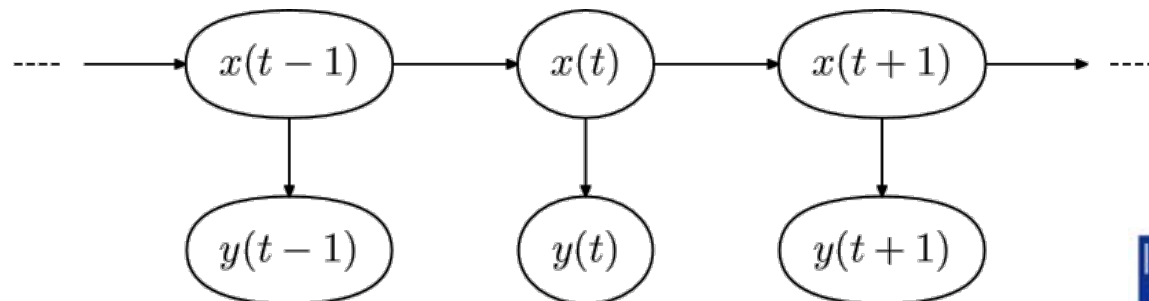
Partnered with NILM software company to evaluate their algorithm.





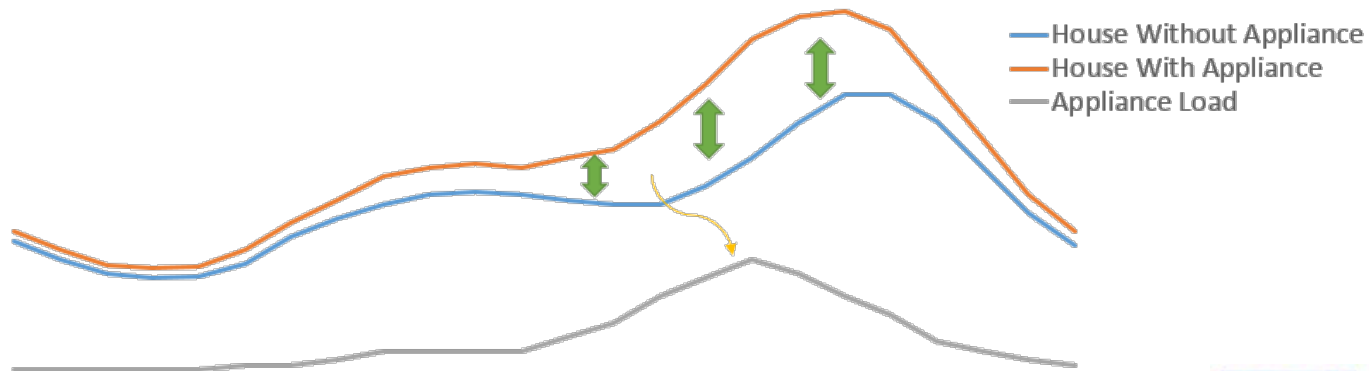
# “As Seen on Pinterest<sup>®</sup>”

Open-source algorithm  
“SparseNILM” developed  
by Steven Makonin.

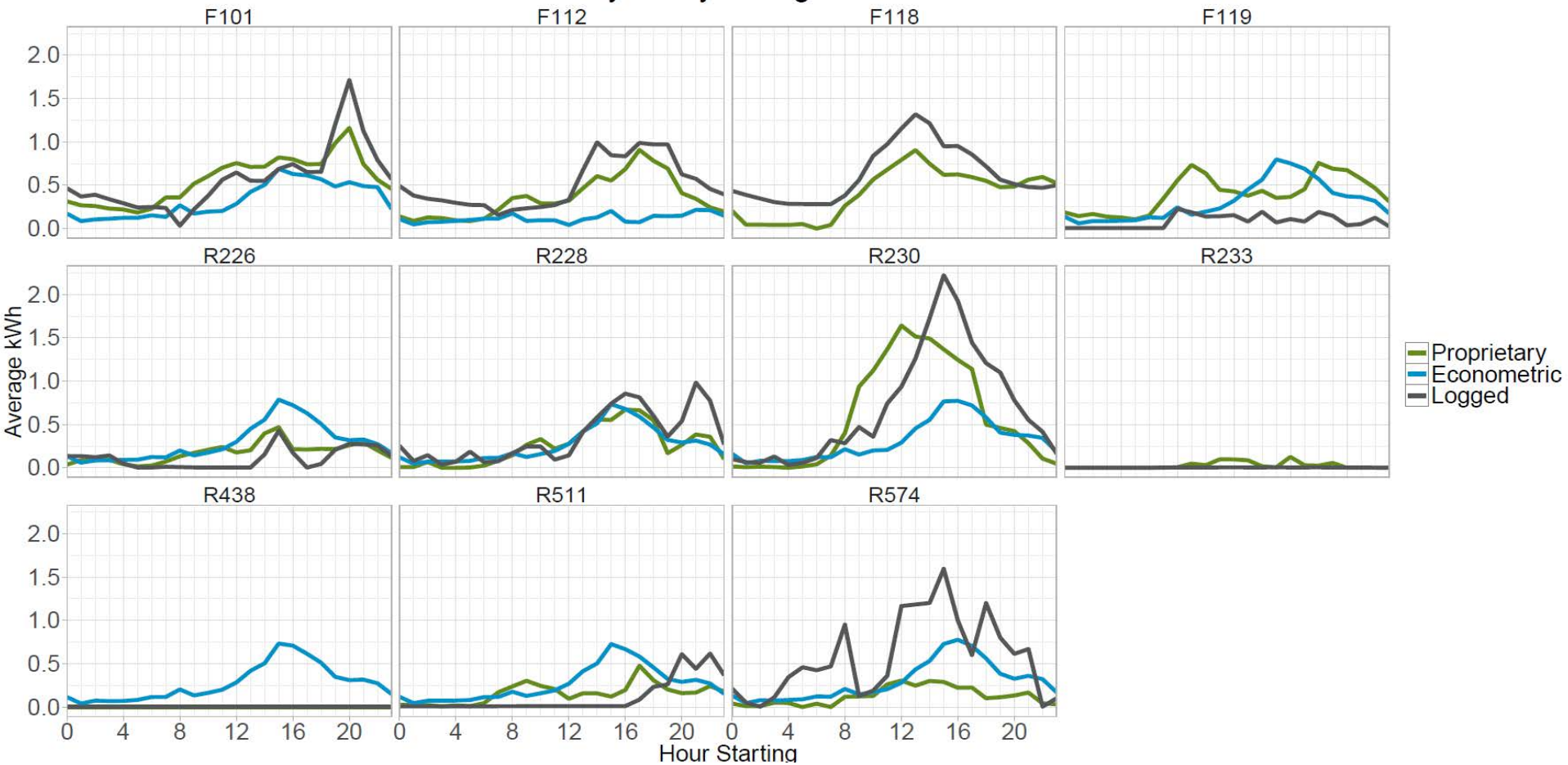


# “Grandma’s Homemade”

Implemented an established econometrics model.

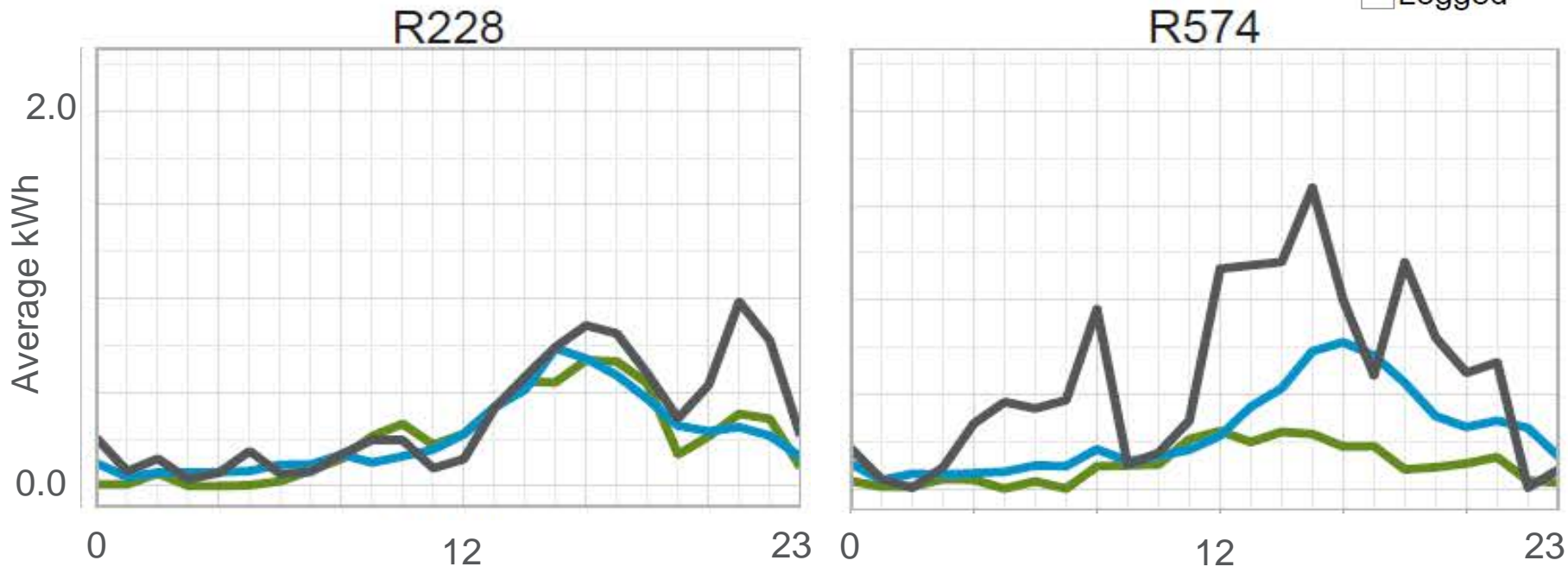


### NILM Weekday Hourly Averages for Central AC



# Central AC Hourly Averages (Sites)

- Proprietary
- Econometric
- Logged





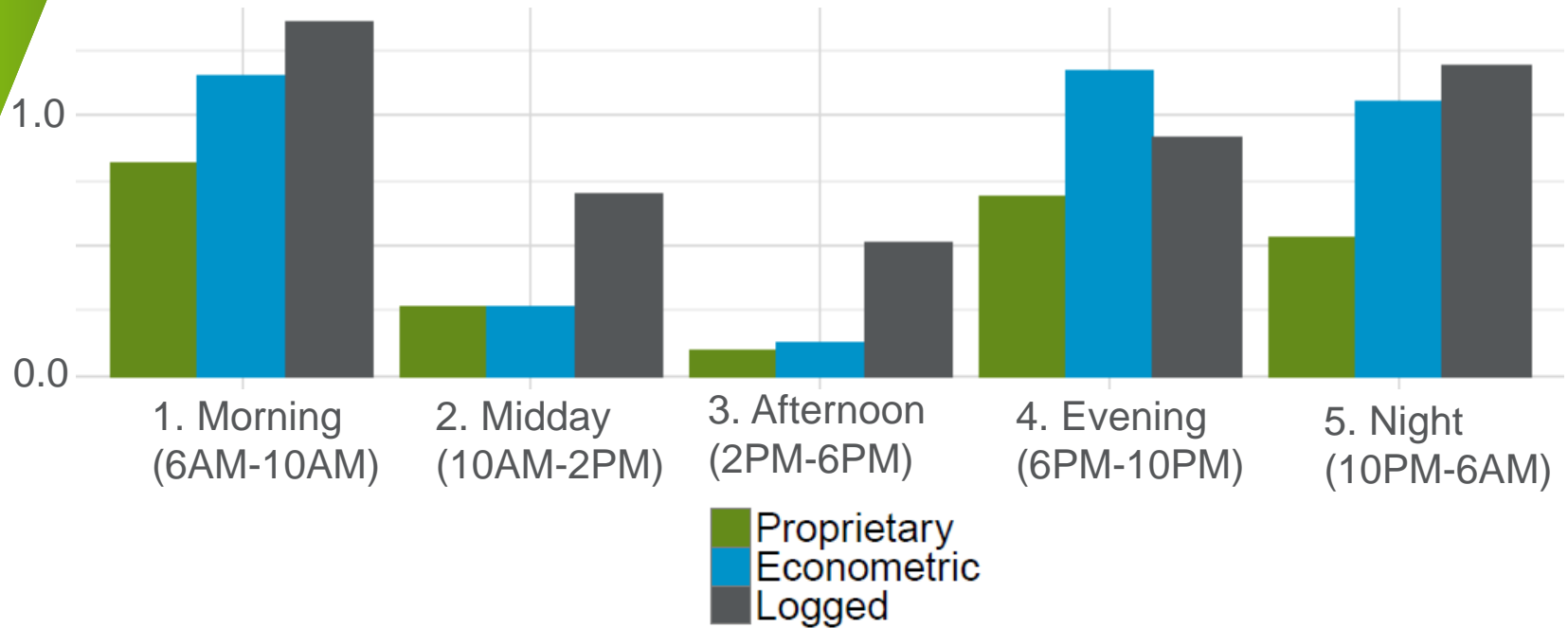
$$CV = \frac{\sigma}{\mu}$$

$$CV_{mean} = \frac{RMSE_{mean}}{\bar{y}_{logged}} = \frac{\sqrt{\frac{\sum_{i=1}^n (y_i - \bar{y}_{logged})^2}{n-1}}}{\bar{y}_{logged}}$$

$$CV_{disagg} = \frac{RMSE_{disagg}}{\bar{y}_{logged}} = \frac{\sqrt{\frac{\sum_{i=1}^n (y_i - \hat{y}_i)^2}{n-1}}}{\bar{y}_{logged}}$$



## CV Comparison for Central AC (Weekend)



1. You need some “ILM” data.
2. Software providers may or may not help you cook.
3. “New” houses are still a challenge.



# THANK YOU

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