# **NIMBLE ENERGY**

Measurement Isn't Enough: How AI/ML models will change the practices of energy and facilities Management

**OPERATIONSHERO** 

(H)

### **Company Introductions**





#### Be the **HERO** of your Operations

HeroHQ Work/PM Assets

**EventHQ** Internal/External Events

#### **EventAutomation**

BAS Integration Schedule Overrides InventoryHQ QR-Barcode Check-In/out

#### EnergyHQ

Utility Data Automation Energy Analytics Reporting

> PlanningHQ Capital Project Budgeting





## **Today's Talk:**

- 1: AI methods and risks
- 2: Why measurement is no longer enough
- 3: Modeling vs measurement case studies





### Al conversations are increasingly about risk





FIGIAL INTENNEENGE

#### Terminator



**Data Privacy** 

Data Security

**Network Security** 



AI/ML modeling methods don't need to create risks

## You can benefit without:

- Unleashing AI on your internal networks
- Giving Al control over your BAS
- Integrating or aggregating all your systems



## Why measurement is no longer enough



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#### The energy game is changing, fast

Rates are rising, while new technologies, occupant behaviors, and grid issues are increasing complexity.



#### \$0.133/kWh

September 2023

Source: EIA



#### More complex operations from new technologies

Including the rise of renewables, electrification, advanced controls, IoT, EVs, battery storage, and IAQ concerns.



#### How buildings are used is changing dramatically

Occupant behavior is shifting with the growth of remote and hybrid work and education.



#### Grid instability is creating new opportunities

There are new incentives to help stabilize the grid by using flexible load management and challenges with outages.



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## We lack the human resources & experts to capitalize

US Peak electricity demand

**\$70B+** 

in building energy incentives available annually from utility, federal, state, and local programs



Massive virtual power plant growth opportunities

Source: DOE





## Leading to missed opportunities and priority paralysis



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## **Case Study 1: Measurement Needs Context**



### **Measurement without context**

#### Measurement alone makes it hard to tell which are good or bad days





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## Models make it easy to find and diagnose potential issues





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## Models make it possible to predict the future





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## **Case Study 2: Measurement Needs Lots of Data**



#### Measurement requires many data integrations



The measure-everything approach circa 2010





### Models can extract big value from limited data



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## Case Study 3: Measurement Requires Lots of Staff and Expert Time



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#### Measurement depends heavily on experts

#### ASHRAE LEVEL II ENERGY AUDIT

#### prepared for

Sample Education Report 700 West 21<sup>st</sup> Street Cheyenne, Wyoming 82002

#### ASHRAE LEVEL II ENERGY AUDIT

#### SAMPLE ELEMENTARY SCHOOL

141791.20R000-005.268

#### 1. Executive Summary

The purpose of this Energy Audit is to provide Wyoming State Construction D with a baseline of energy usage and the relative energy efficiency of the facili Conservation Measures (ECM's). Information obtained from these analyses n an Energy Conservation Program, Federal & Utility grants towards energy cor justify a municipal bond funded improvement program, or as a basis for replac

	Building Type / Name	# Bldgs	# Stories	Year Reno
Г	Elementary School	1	3	19

The study included a review of the building's construction features, historica review of the building envelope, HVAC equipment, heat distribution systems maintenance practices.

Summary of Existing	g Energy P
Percentage Area Cooled	
Percentage Area Heated	
Total Percentage Area Conditioned	

Energy Conservation Measures

has identified four Non- Renewable Energy Conservation Mea for each measure is calculated using standard engineering methods followed ECM are provided in Appendix for reference. A 10% discount in energy savin effects amongst the ECMs. In addition to the consideration of the interactive contingency to the implementation costs to account for potential cost overruns

The following table summarizes the recommended ECMs in terms of descri reduction, and cost savings.

Recommended Non- Renewable Energy	Conservation
Total Projected Initial ECM Investment	\$86,499 (In Current Dolla
Estimated Annual Cost Savings Related to ECMs	\$18,692 (In Current Dolla
Net Effective ECM Payback	4.63 years
Estimated Annual Energy Savings	11.13%
Estimated Annual Utility Cost Savings (excluding water)	12.09%
Estimated Annual Utility Cost Savings (excluding water)	\$11,255
Estimated Annual Water Cost Savings	41.77%
Estimated Annual Water Cost and Consumption Savings	275kGal and \$9

#### ASHRAE LEVEL II ENERGY AUDIT

SAMPLE ELEMENTARY SCHOOL

141791.20R000-005.268

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SAMPLE ELEMENTARY SCHOOL 2204 PLAINVIEW ROAD CHEYENNE, WYOMING 82009



### Models are automated, real-time, and scalable

	folio Estimated Saving	s Summary	/				
i Total Annual Cost Savings Opportunity \$646,686	Т	otal Annual Energy Savings Or	oportunity Fa	Total A Total A	nnual Electric : avings Summ	Savings Opportunity nary	
	Selec	t a Facility to View Savings Opportunities	0	Facility Total I	Energy Usage and Estin	nated Savings	0
i Analyzed Eligible Facilities 27	Q Search Administratio Administratio Branch Midd Brook Eleme	on Building on Office Annex le ntary	l	100,000 200,000	300,000	Total Energy Usage (kWh) Estimated Energy Savings (kWh)	Facility Estimated Energy Savings 32.8%
	<ul> <li>Chatham Lea</li> <li>East Element</li> <li>Forest Middli</li> <li>Forest Middli</li> <li>Forest Middli</li> <li>Franklin Elem</li> <li>Glenwood Element</li> </ul>	irning Center ary e e School Baseball/Softball Stadium hentary ementary School	b	Facility Elec	tric Usage and Estimat	ted Savings Total Electric Usage (kWh) Estimated Electric Savings (kWh)	i Facility Estimated Electric Savings <b>3.1%</b>
	Opportunity Type	Recommendation	Summary				
	Operational	Increase Cooling Setpoints	Your facility	cooling setpoint is lower than tha	it of similar facilities. Dur ck is not being employed	ing the cooling season check the occupied a I to properly schedule the run time of cooling	nd unoccupied cooling setpoints. It is possible that g equipment.
	Operational	Reduce Equipment Schedules	Your facility use. A buildi optimal start	equipment load is higher than th ng automation system (BAS) or HV. /stop programming.	at of similar facilities. Loo AC optimization system i	ok for opportunities to turn off equipment du may be used to schedule equipment and sys	uring times of low occupancy or reduced building tems that operate within a building and implement
	Retrofit	Add Insulation	You can redu assess oppo	ice your facility's heating and cooli tunities of adding more insulation	ng loads by adding insul or improving the quality	ation to the building's walls; ceiling; roofs; an y and installation of current insulation.	d foundations. Check current insulation levels and
	Retrofit	Improve Heating System Efficiency	Your facility consumption reduce your	heating load is higher than that o . Check the heating systemincluo system's energy consumption.	f similar facilities in the s	same climate zone. Your HVAC system perfor and controlsfor efficient operations. Upgrad	mance has a significant impact on energy ling your system to a more efficient model will
	Petrofit	Deduce Outside Air Infiltration	Vour facility	ase high infiltration of outside air	Infiltration is the amount	t of uncontrollad outsida air that is brought i	nto a building such as air coming in under doors or





## Models can run 24x7 and are inexpensive to deploy



Instead of continuously analyzing reports and dashboards, energy experts can be used efficiently when problems and opportunities are detected.



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#### The 10% Recap

- AI/ML modeling can provide benefits without creating new risks
- Measurement is no longer enough because:
  - The energy game is changing: costs + technology + grid instability
  - We lack the human resources & experts to capitalize
  - Leading to missed opportunities and priority paralysis
- Model-based methods solve these challenges by:
  - Creating the context measurement lacks
  - Generating big value from limited data
  - Reducing team and expert constraints
  - Running real-time, scalably, and 24x7 at low cost



# **NIMBLE ENERGY**

**OPERATIONS HERO** 

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