ENERGY STAR® Products Partner Meeting 2020

Smart Home Energy Management Systems (SHEMS) Pitch Party

ENERGY STAR Products Partner Meeting

October 29, 2020

Speakers

Taylor Jantz-Sell
U.S. Environmental Protection Agency

ENERGY STAR Smart Home & Lighting Lead

"What is ENERGY STAR SHEMS?"

Wannie Park
Inspire Clean Energy

Vice President of Corporate and Business Development

"SHEMS for Clean Energy "

Adnaan Lokhandwala
Power Integrations

Senior Product Marketing Manager

"Smarter Homes with lower standby power solutions"

Advait Katarki
Eaton

Product Manager – Advanced Technology & Digitalization

"Smart power management with DERs"

Pardis Emami-Naeini
University of Washington
Postdoctoral Scholar

"IoT Privacy & Security Label"

What's an ENERGY STAR SHEMS?

Device Bundle

1 ES Smart Thermostat

2 Smart Lighting Devices

1 Plug Load Device

+

Services

Occupancy-based automation

Energy data reporting

Demand Response

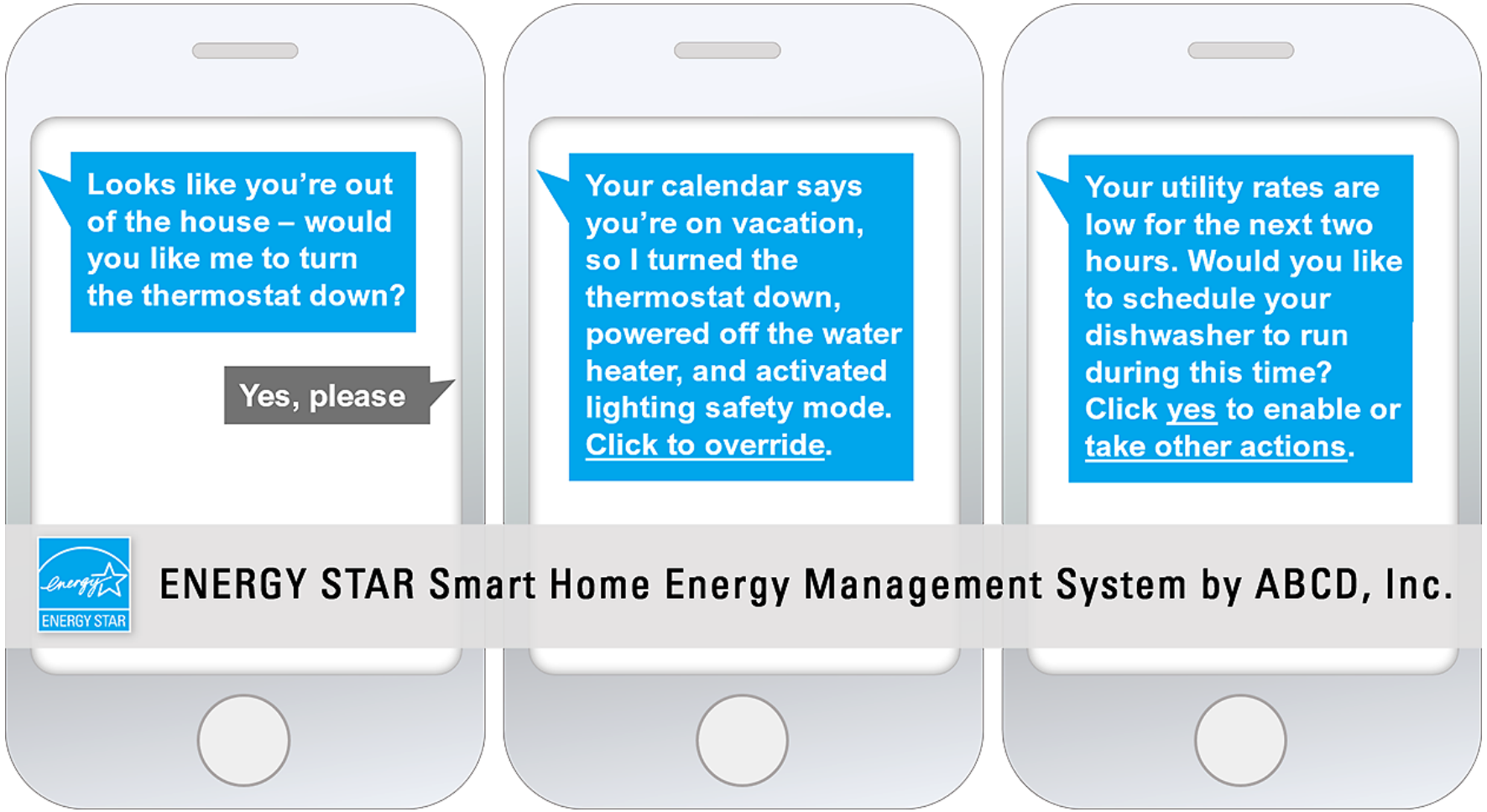
=

ENERGY STAR Certified Product

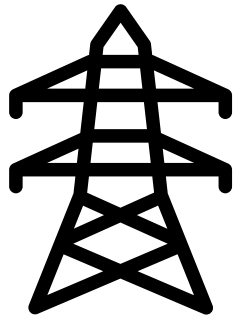
SHEMS Requirements - Devices

Device	Examples	Capabilities/Requirements
Connected Thermostat (1)		• ENERGY STAR certified
Connected lighting (2)		• Report lighting energy/power • Automated based on occupancy detection • Vacation safety mode
Connected Plug Load Device		• Disaggregate whole-home energy usage to individual circuits OR measure and control a single plug/power strip • Energy data communicated to central service • Plugs/outlets only: automated based on occupancy detection
Hub (optional)		• May be necessary to provide connectivity to other devices

What Kind of Services?



Listings will provide valuable platform info



Demand Response

Security Features

Communications Protocols

Additional Devices

On to Our Speakers!

Taylor Jantz-Sell

U.S. Environmental Protection Agency

ENERGY STAR Smart Home Strategy Coordinator

Wannie Park

Inspire Clean Energy

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SHEMS for Clean Energy

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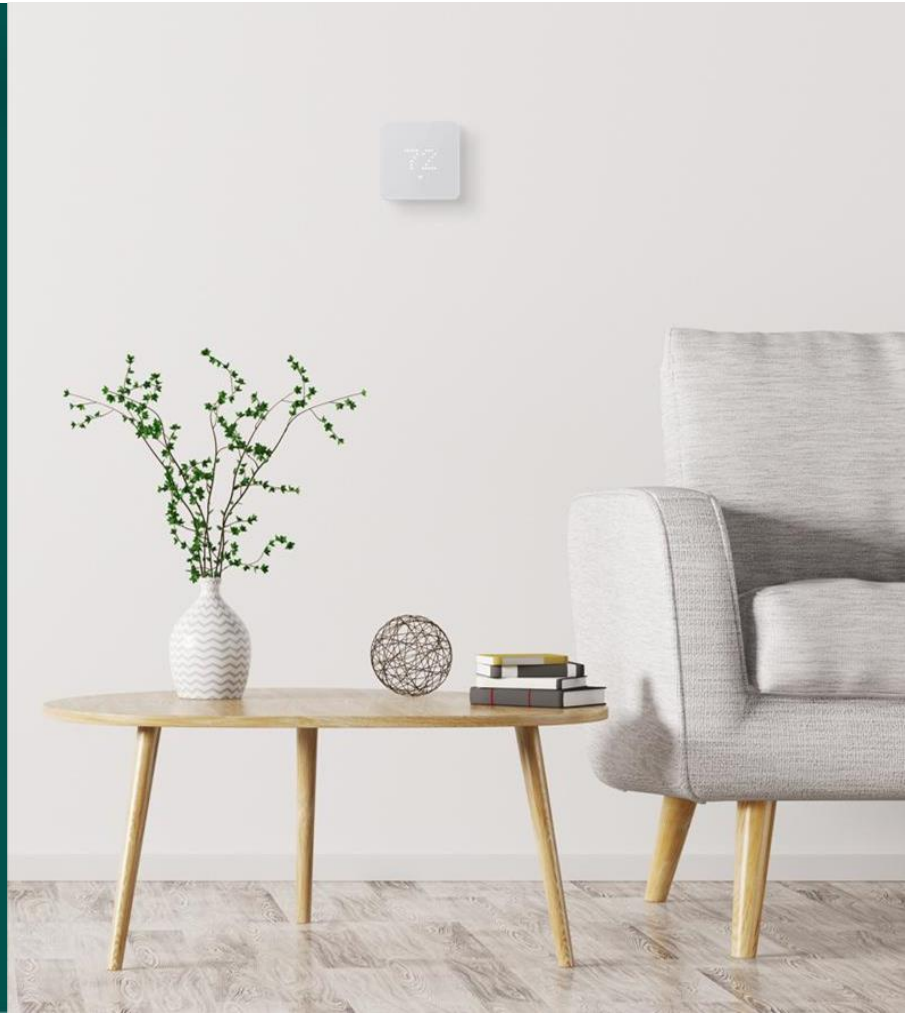
SHEMS Pitch Party
October 2020

Introduction

Inspire Experience

ENERGY STAR Integration

Key Dependencies



Contact Information

TO BUILD THE
WORLD'S MOST
CONSUMER-FOCUSED
clean power platform
AND INSPIRE A
CONNECTED
movement
OF PEOPLE TOWARDS
a brighter
energy future

Wannie Park
VP Corporate and Business Development

Email: wpark@inspirecleanenergy.com
Phone: 415-729-5208
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inspire

Inspire is transforming the way consumers access, engage, and pay for clean energy.

The first subscription service with integrated technology that combines clean energy, smart controls, and automated energy savings - all for one simple, flat price.

FOUNDED	SUBSCRIBERS	2019 REVENUE
2014	250K+	$150M+

- Mission-Driven Certified B-Corp
- Venture-Backed by Leading Tech Funds, including Obvious Ventures, Crosscut Ventures, BAM Ventures, and Bonfire Ventures.
- Headquartered in Santa Monica, CA, with beachhead in Philadelphia, PA

Forbes FORTUNE FAST COMPANY

gtm. ERNST & YOUNG ENTREPRENEUR OF THE YEAR® Certified B Corporation

inspire

To transform the way consumers access clean energy and accelerate the world’s transition to a net-zero carbon future.

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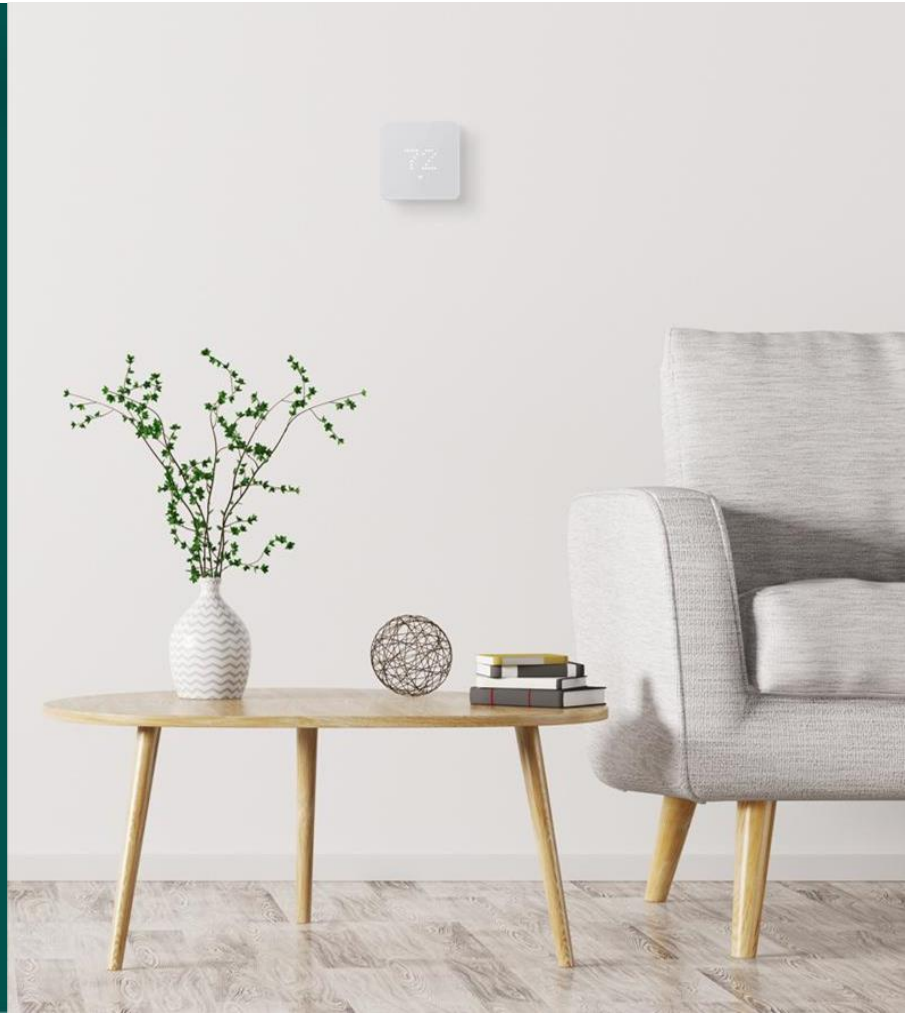


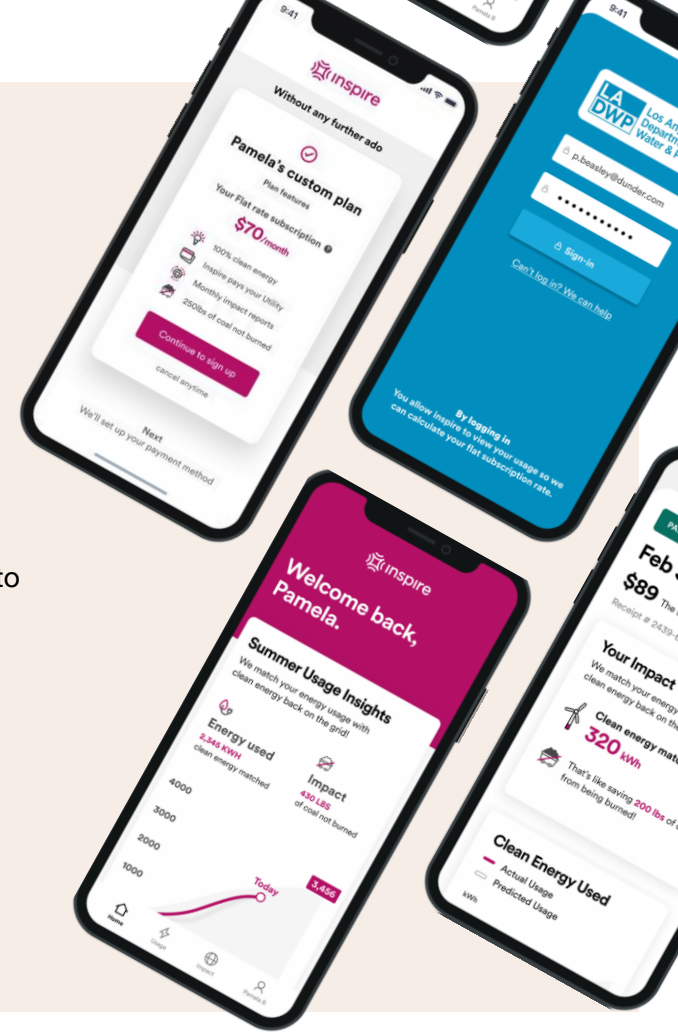
Inspire will solve consumer pain points in one seamless virtual utility experience.

Unlimited Clean Energy (Beta)
Unlimited clean energy personalized to your home, all for one flat price.

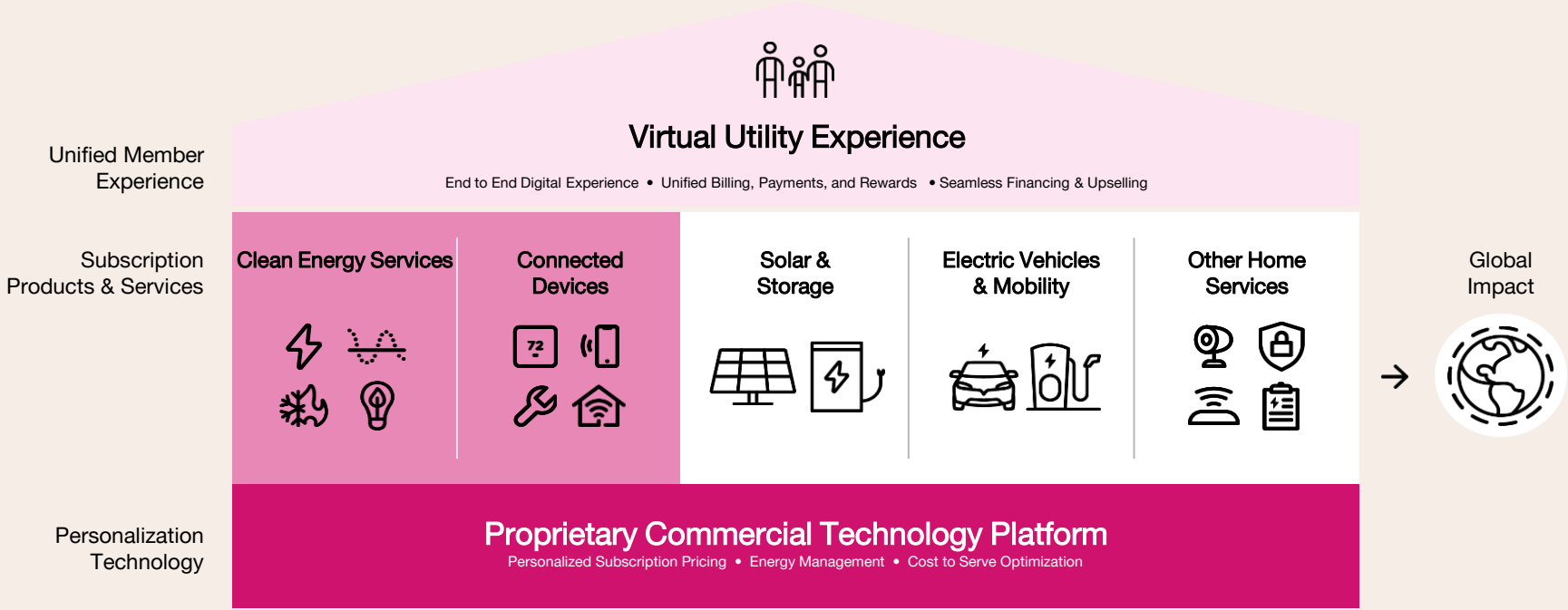
Seamless Billing & Payments (Beta)
Say goodbye to your utility bill, and hello to one simple bill with intuitive energy and impact insights.

Automated Savings & Rewards (After Beta)
Proprietary technology that rewards you with discounts on your bill for saving energy and saving the world.

Integrated Smart Technology (After Beta)
Integrated smart technology that automatically give you control and delivers energy savings.



VUE is our customer facing platform, housing all of our product and service lines in a single integrated experience.



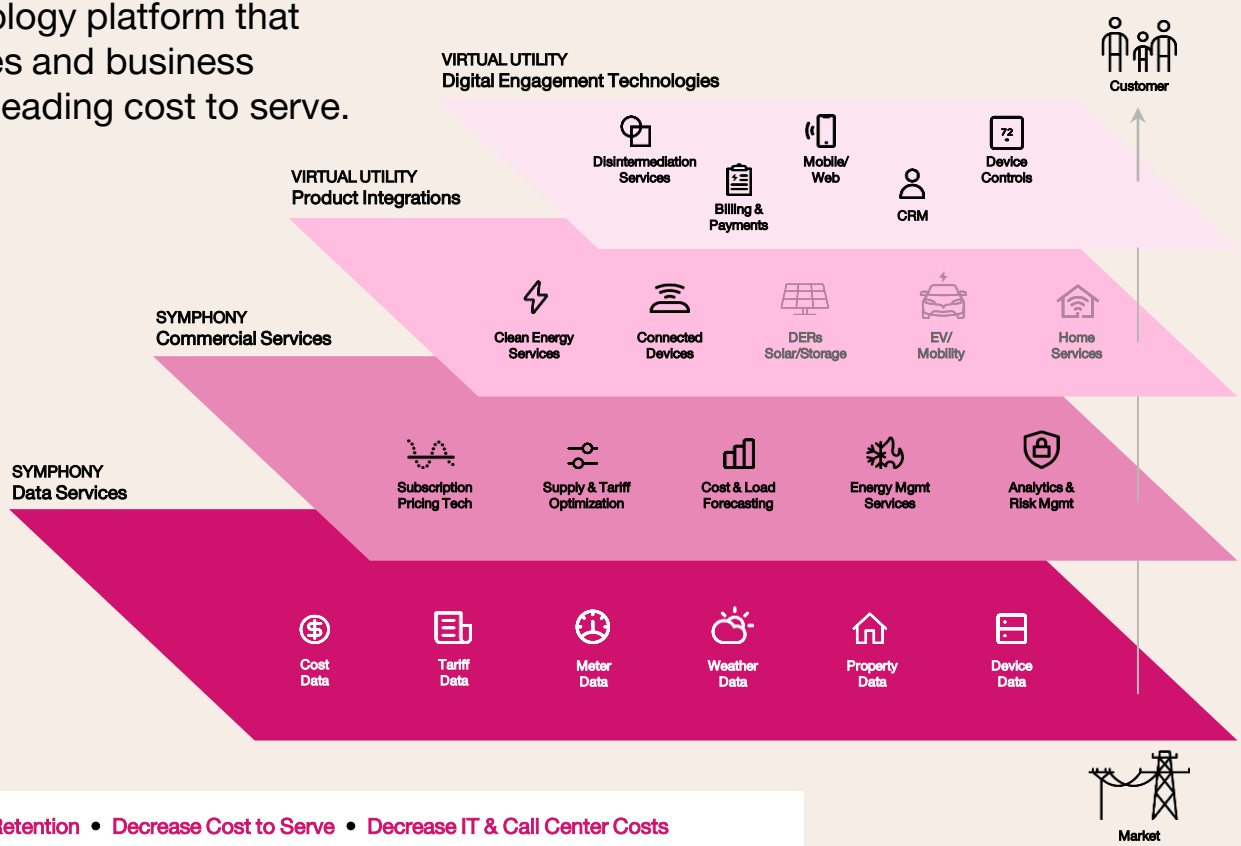
Powered by a proprietary technology platform that enables digital native experiences and business model innovation at an industry leading cost to serve.

1 **Digital-Native**
Built from the ground up to deliver web/mobile experiences that delight user and reduce servicing costs.

2 **Revenue-Focused**
Embedded commercial technology unlocks business model innovation and ability to expand revenue per user.

3 **Low Cost-to-Serve**
State of the art cloud based platform scalable to millions of users with a premium experience at lowest cost.

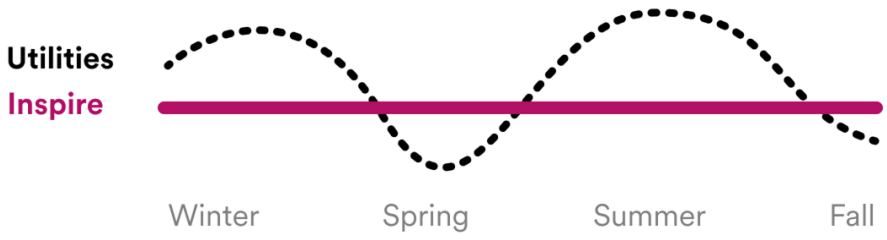
4 **Secure and Resilient**
Protected by leading protocols and updated in real time to ensure resilience and data security.



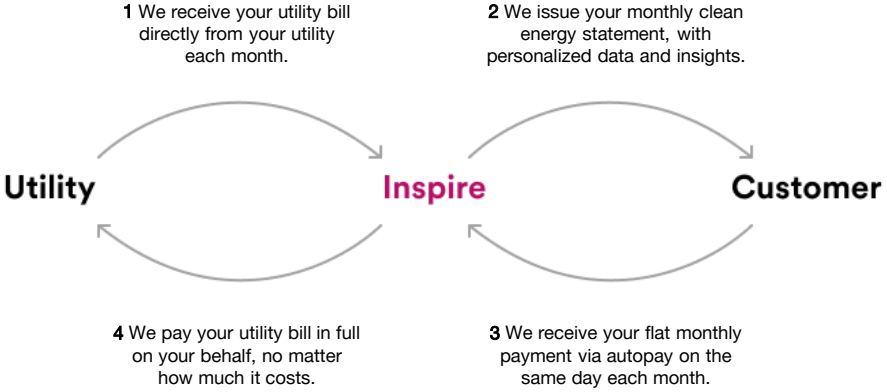
Platform Objectives: Increase ARPU • Increase Retention • Decrease Cost to Serve • Decrease IT & Call Center Costs

- **Predictable:** Predictable pricing you can count on. You pay one flat monthly price for unlimited clean energy.
- **Transparent:** No fees, no price fluctuations—nothing but clean energy.
- **Rewarding:** Use less energy & earn rewards like cash back towards your Inspire bill.

SUBSCRIPTION PRICING



HOW BILL PAY WORKS



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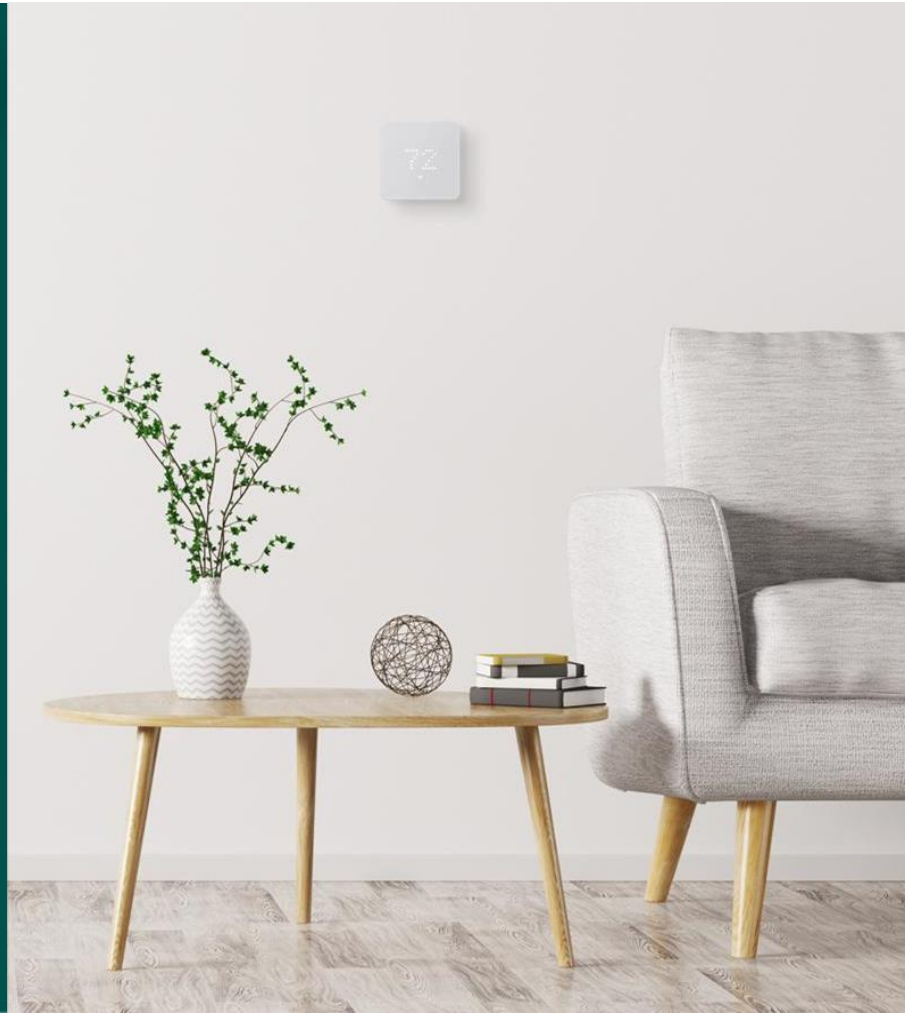


Automated savings with Integrated Smart Technology

Inspire’s user centric (hardware agnostic) energy efficiency platform works with the ENERGY STAR certified thermostat like Zen to enable comfort, savings and convenience for our users. Our built in automations can be customized to user’s lifestyle, and gives them direct savings on their energy bills.

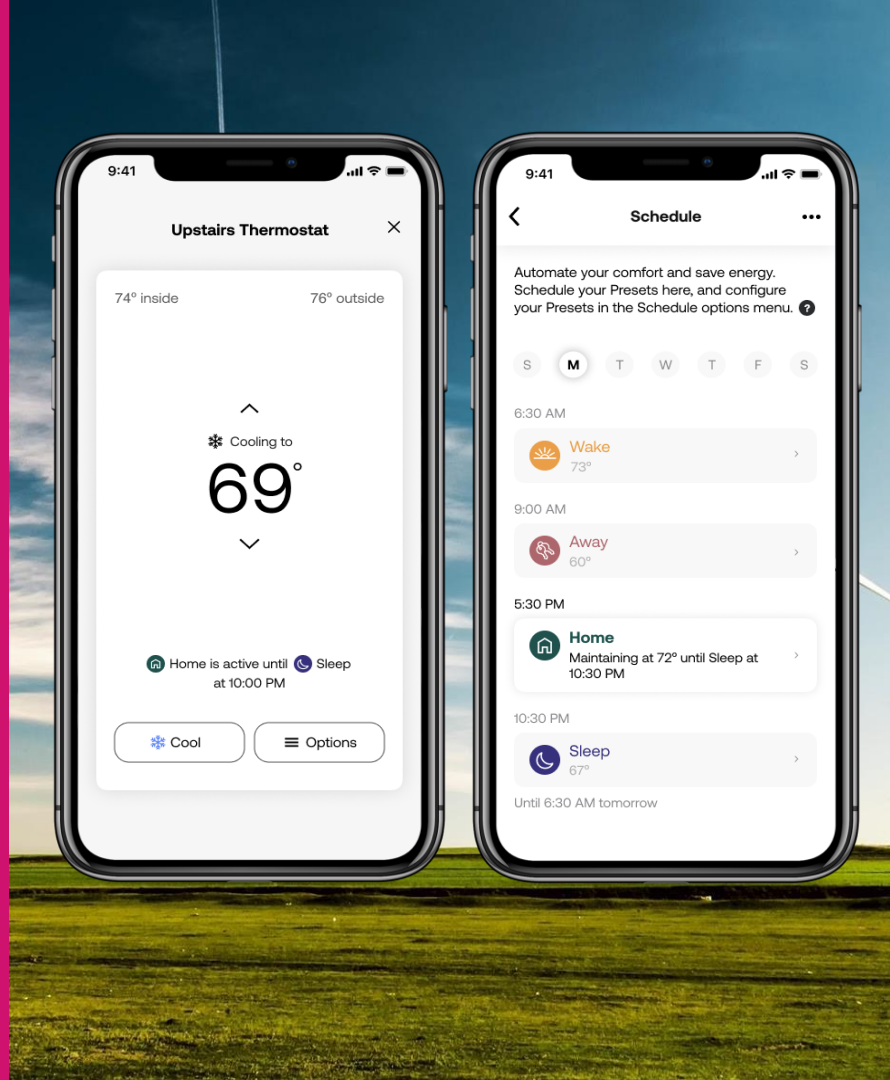
Inside the Inspire Smart Home App

Home

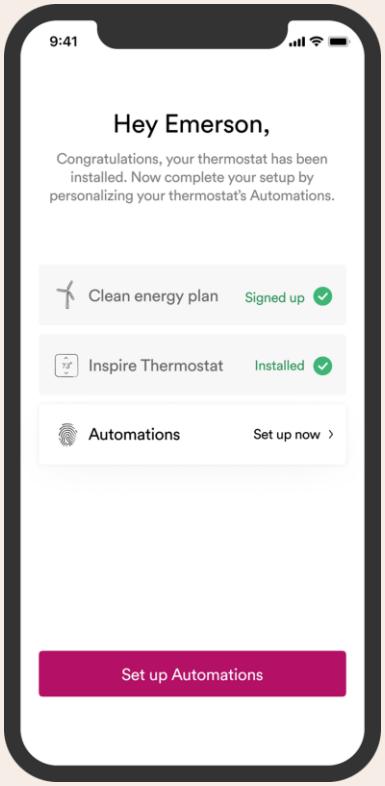
- Control temperature on the go, from anywhere.
- Set automated schedule and earn cashback.
- Grid Services and Demand Response
- Push notifications for important alerts

Settings:

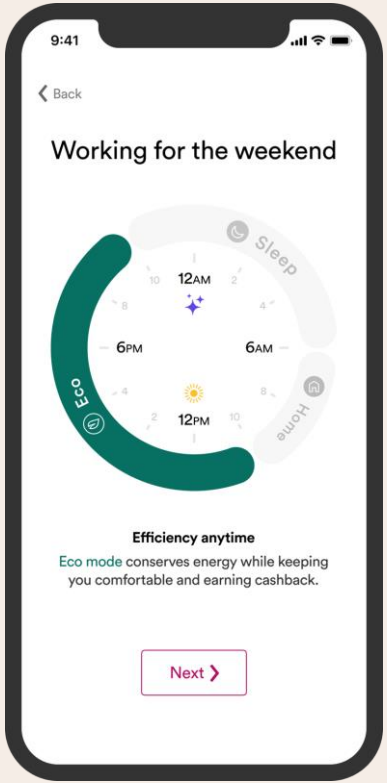
- App activity and account management



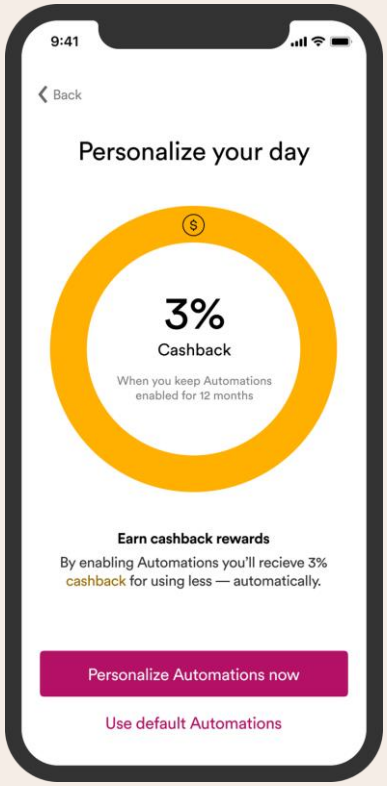
Smart Thermostat with Automated Efficiency Rewards



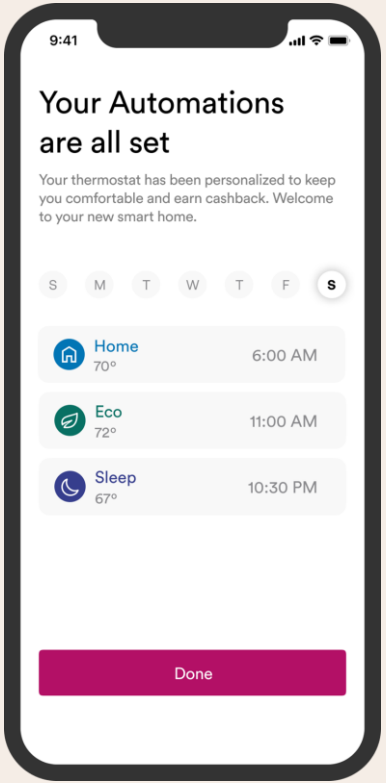
Welcome Checklist



Automations Education

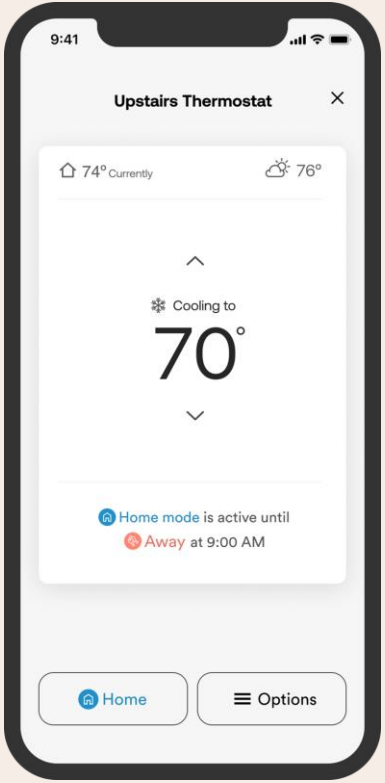


Cashback Education



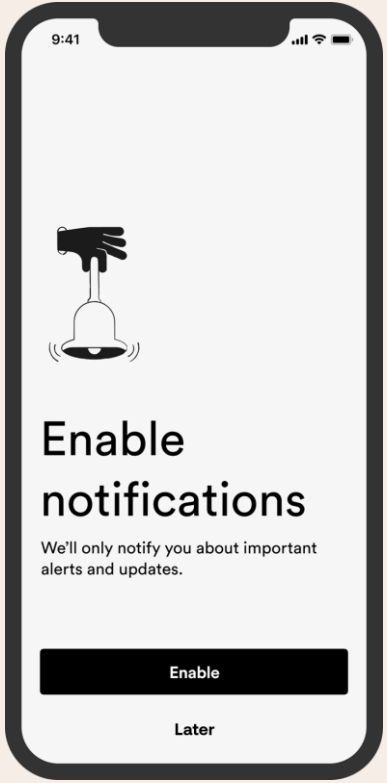
Automations Complete

Easy Controls for Everyday Comfort and Savings

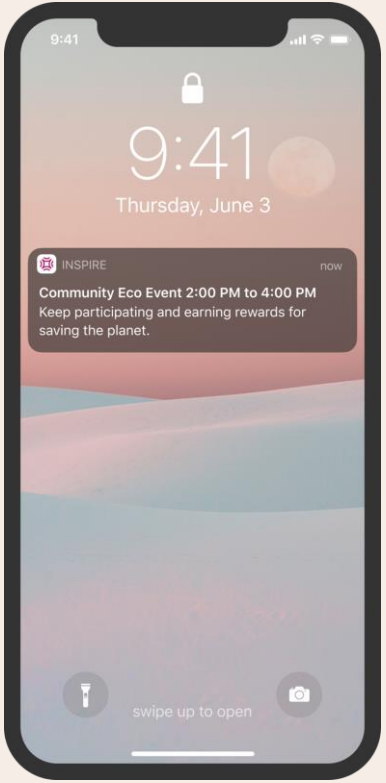


Thermostat Tab

Automations Tab



Enable Push



Push Notification

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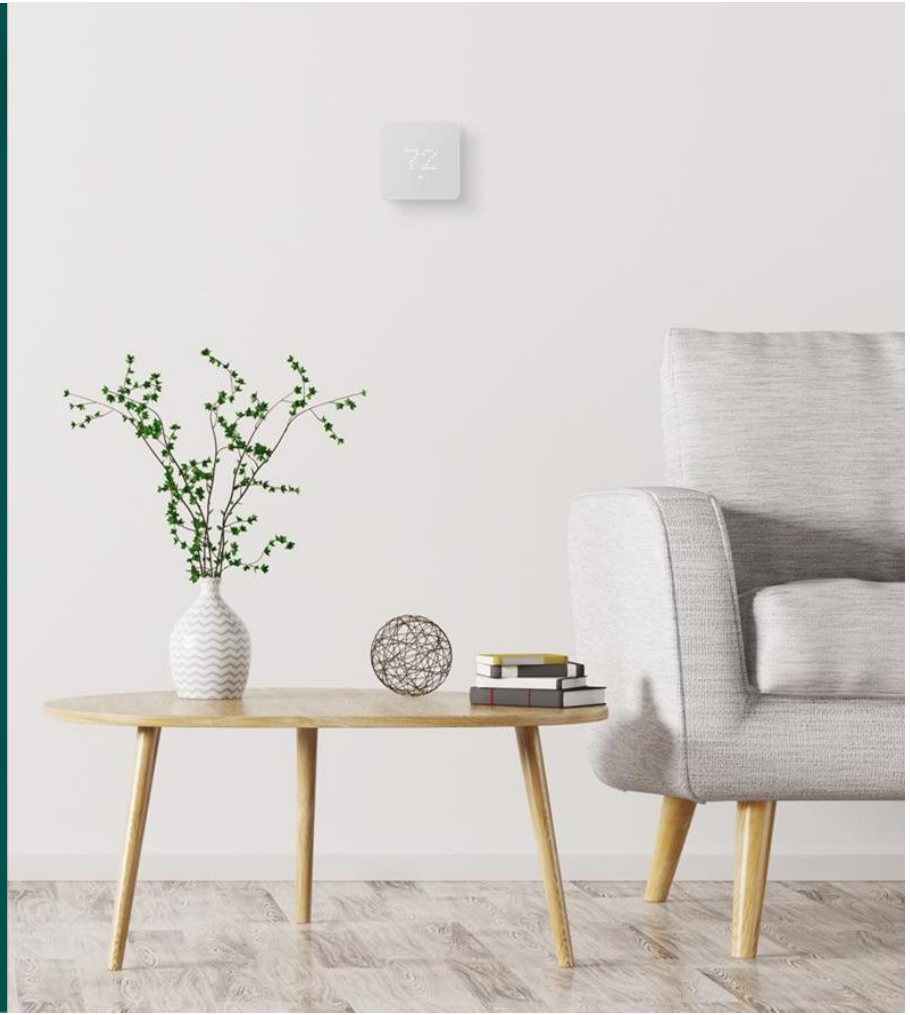
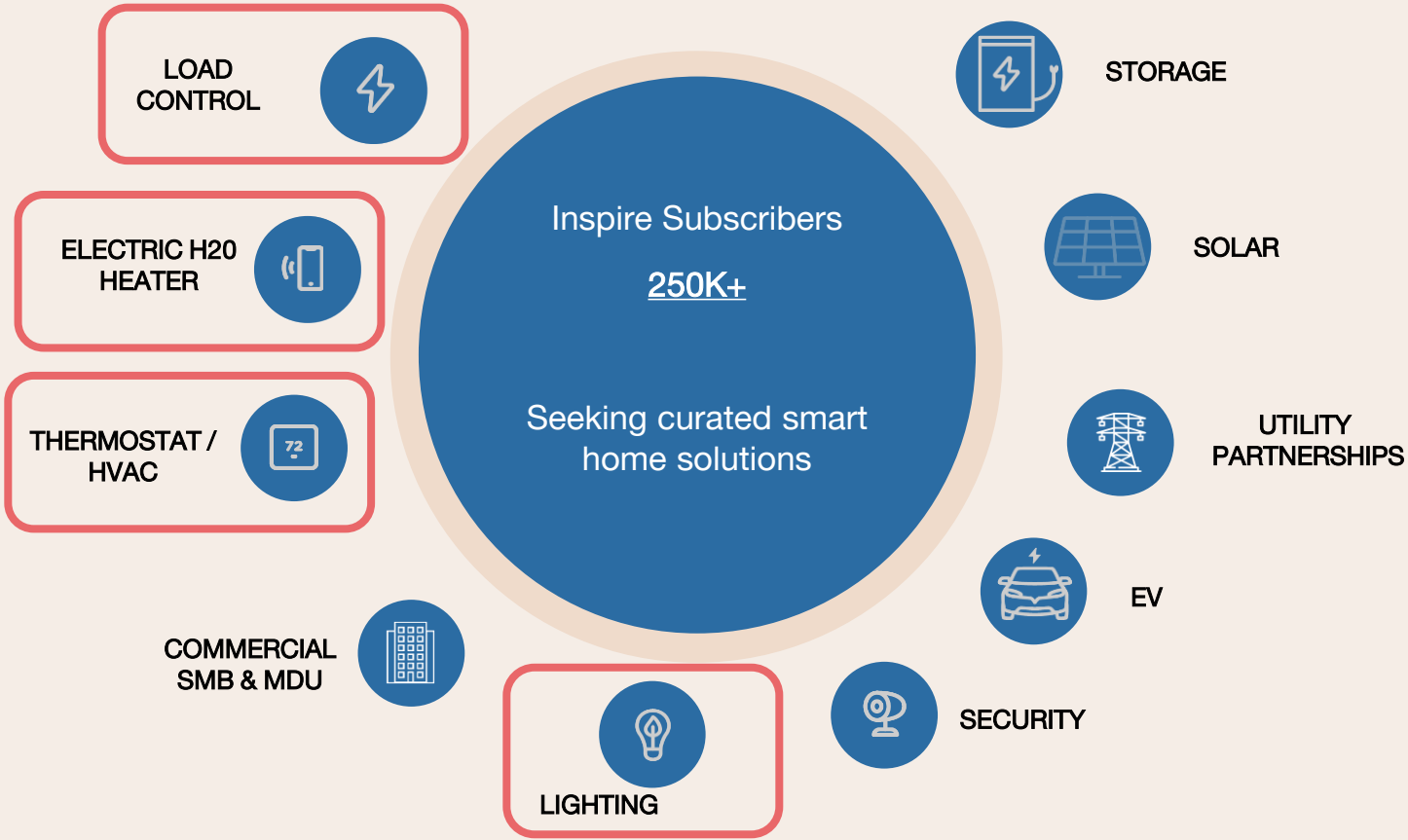


Marketplace for SHEMS



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Wannie Park
VP Corporate and Business Development

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power integrations™

Enabling Smarter Homes with Lower Energy Consumption

Adnaan Lokhandwala

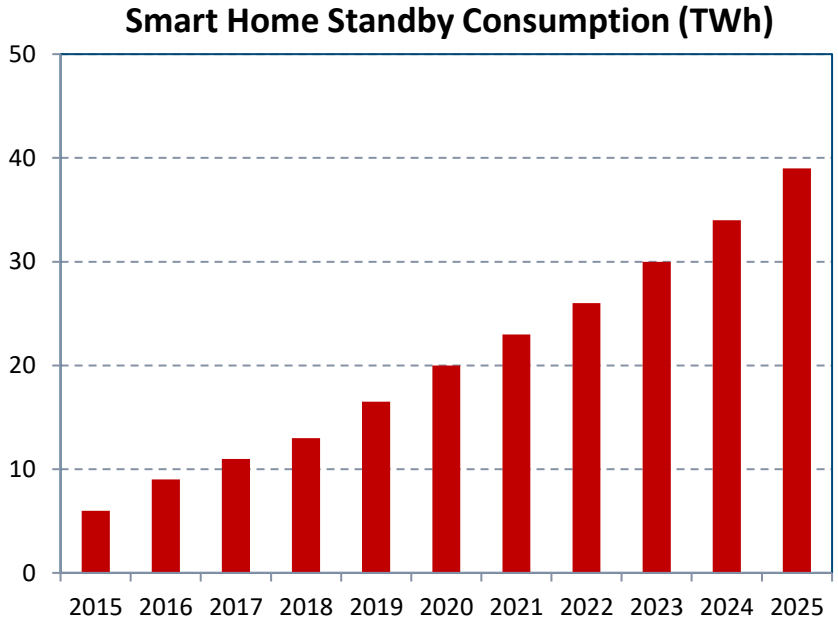
ENERGY STAR Products Partner Meeting: SHEMS Pitch Party

October 2020

ac-dc converters led drivers gate drivers motor drivers

Standby Energy Isn't Smart

- By the end of 2023, there will be more than 6.4 billion[1] smart home devices in use or an average of 21 per home
- Smart Home devices today are connected continuously with low latency which increases standby consumption
- Standby consumption from Home automation and Smart Lighting alone is expected to double over the next 5 yrs



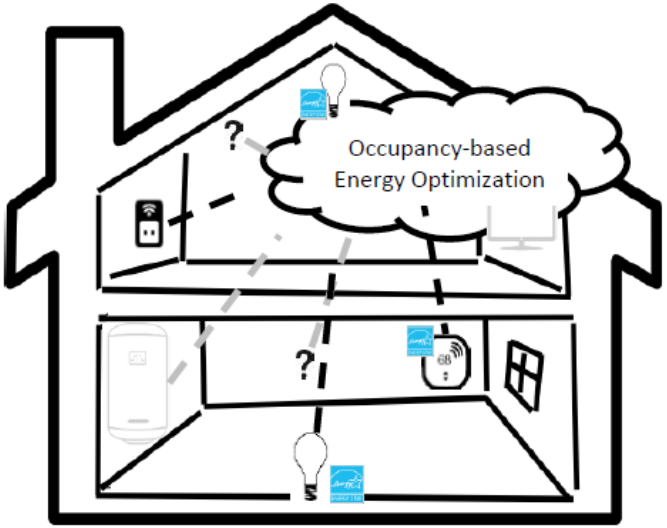
Source: IEA-4E

1. Strategy Analytics, 2019

ENERGY STAR SHEMS 1.0 Power Recap

- **Devices + Occupancy Info + Automation**

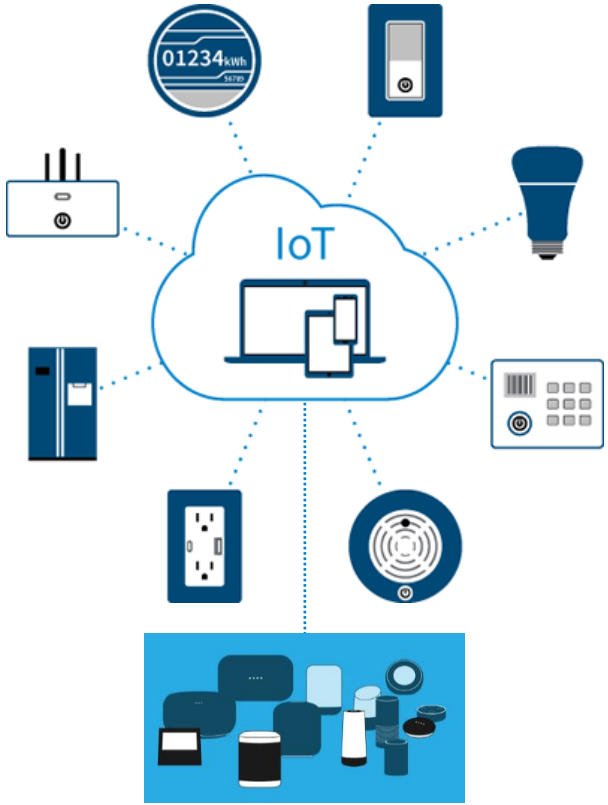
- **Key Elements**
  - Reliable occupancy detection and optimizations
  - Limit standby power of connected devices
  - Closed loop feedback to users on energy impact with their settings



Device	Standby Power Limit
Connected Thermostat	3W
Smart Switch/Lamp	0.5W
Connected Plug Load Device	1W
Hub (optional)	No limit, must be reported

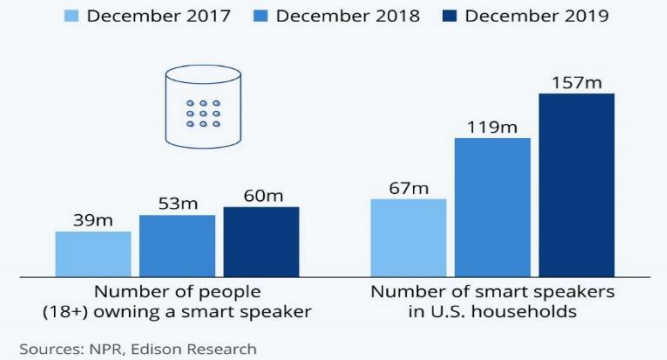
Smart Home Evolution

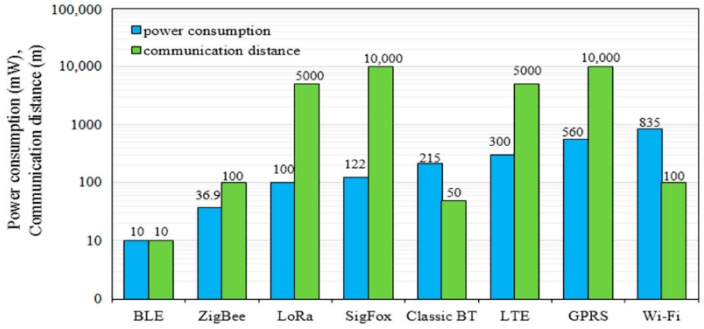
- **Several smart device categories exist now with most controlled independently**
- **Lack of global connectivity standard and device interoperability –**
  - each manufacturer follows its preferred wireless protocol
  - often devices with same protocol do not communicate
- **Smart Speakers have become the new hub/gateway in a connected home –**
  - polyglot - several wireless protocols integrated
  - can connect devices with different protocols
  - cloud interface and remote access



Smart Speakers & Device Connectivity

- **Smart Speaker adoption continues to rise rapidly in US households with 135% growth seen in past 2 years**
- **WiFi is the most universally known global communication protocol but is power hungry**
- **Lower power wireless protocols can help meet device standby power limits but very often need a gateway**
  - Cloud interface enables device control w/o range restrictions, offers faster processing capabilities



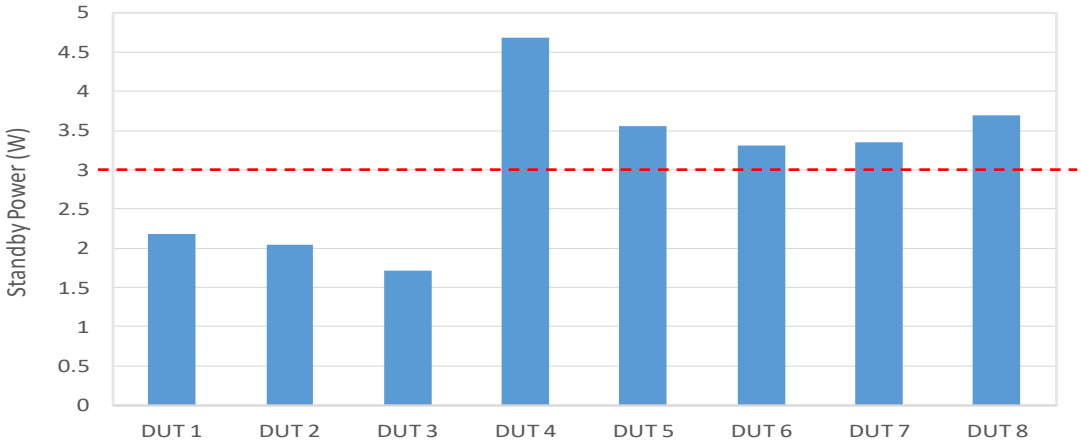


Wireless technology typical power consumption and communication distance

Smart Speaker Standby Study

- Estimated[2] energy consumption in standby alone in yr. 2024 is 11.1 TWh

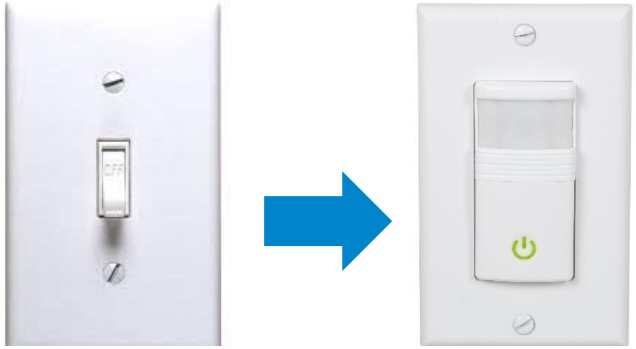
- Limiting standby power - increasing offline power supply light-load efficiency and reducing wireless consumption in standby are both needed to address this issue

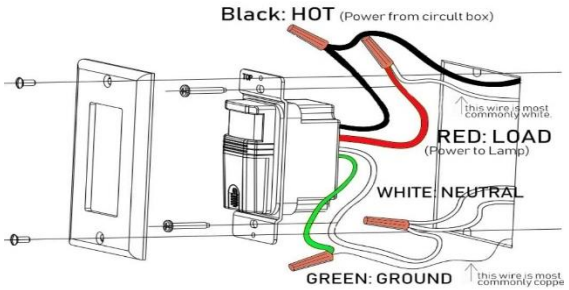


2. Based on 4 hr. smart speaker active use per day and Business Insider Intelligence shipment forecasts

Room Level Occupancy Sensing

- **Smart Lighting in homes offers several benefits to consumers including energy efficiency, automation, convenience etc.**
- **Manual wall switches are transitioning to wireless/voice or fully automated devices**
- **Occupancy sensor data from switch could be used for home level energy optimizations as required in ENERGY STAR SHEMS**
  - Eliminates need for additional sensors
  - Hardwired power source, no battery replacements
  - Products can meet <0.5 W standby power
- **Neutral return wire is typically required for power**





Adapting to New and Existing Home Wiring

- **Typically older homes only have a Hot wire at the wall switch, no Neutral return**
  - Mechanical on-off switches do not require power and simply open/close the circuit
- **Some products "leak" through the load but can lead to flicker/ghosting with LED lamps if the standby consumption is high**
- **Efficient power supplies with very low leakage current in standby can enable products[2,3] which can be powered without a Neutral wire**

BLE smart switch without Neutral wire using LinkSwitch-TN2

2. *No Neutral smart switch DER-832*
3. *Lutron Maestro* MS-A102-WH

Summary

- **Minimizing standby consumption and reliable occupancy detection are critical in achieving the true energy savings potential with ENERGY STAR SHEMS**

- **Rising standby energy in homes with the rapid growth of smart speakers as hubs**
  - EPS adapters today mainly focus on no-load power and 25-100% load efficiency, not standby
  - Standby consumption must be monitored and limited

- **Smart wall switches with occupancy sensor/s can become an excellent source for home level energy optimizations**
  - Technology available today for compatibility with both new and existing home wiring
  - Install and forget - hardwired power source, no battery replacements

power integrations™

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ac-dc converters led drivers gate drivers motor drivers

Intelligent Power Management Key to DER Integration

Advait Katarki
Product Manager – Advanced Technology & Digitalization

Eaton Corporation

2020 ENERGY STAR Products Partner Meeting – SHEMS Pitch Party

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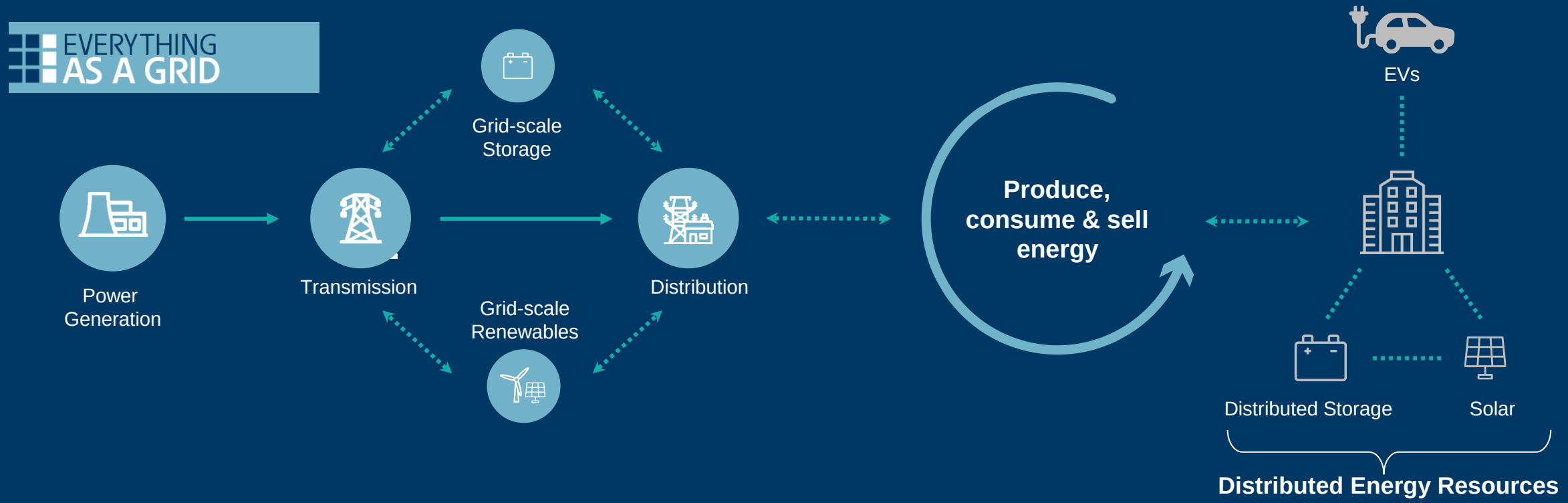
Energy transition creates an Everything as a Grid environment



Storage and Specialized Infrastructure

Traditional Power Infrastructure

Optimization Software Service

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How do we enable a modern, bi-directional grid?

- **Data analytics & AI to** better manage DERs, forecast & curb peak load
- **Energy storage & EVs** help absorb demand fluctuation
- **Self generation** as consumers participate
- **Automation** to be less vulnerable from human errors & cyber attacks
- **Resiliency** needs to be built into components to detect, deter & respond to climate disasters

AI: Artificial Intelligence; DER: Distributed Energy Resources; EV: Electric Vehicle

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Energy Management Circuit Breakers – What else can a circuit breaker do?

Monitor & control various household appliances with feature rich smart circuit breakers!

Benefits of Eaton's EMCB:

- Branch circuit control: Ability to Open & Close at the branch circuit level
- Precise & accurate metering: Built in revenue-grade metering with ±0.2% accuracy. Supports bi-directional metering for Solar, EV
- Connected & always up-to-date: Wi-Fi connected circuit breaker. Breaker connects to Eaton cloud and supports automatic OTA Updates
- Open Platform: Ability to integrate with Home Energy Management and utility demand management systems through Eaton's Open API
- SHEMS compatible: Meets requirements to be included as Home Sub-metering component of SHEMS

Available in:

1, 2-pole configurations
15A – 50A

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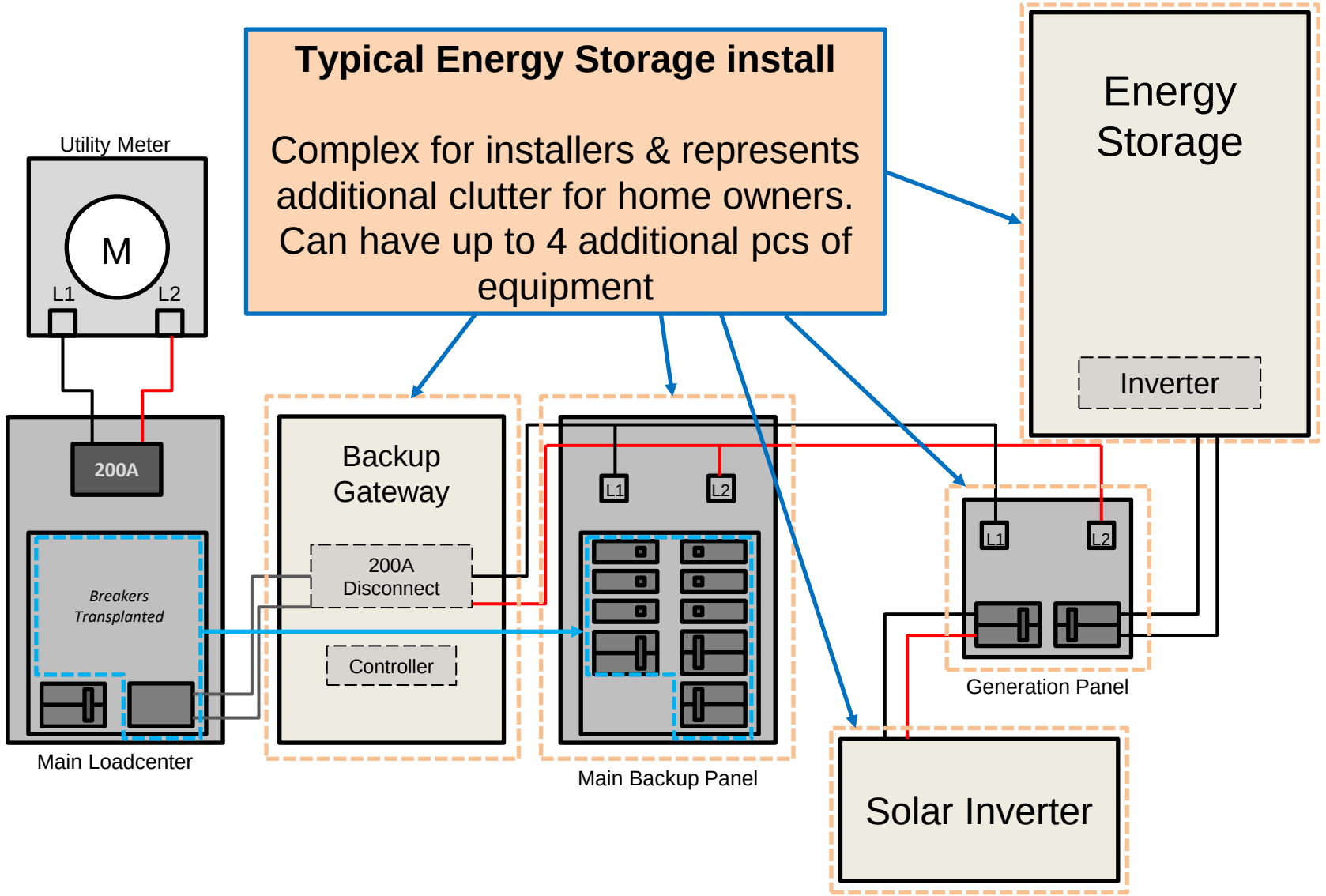
This is how a typical battery storage system installation looks like



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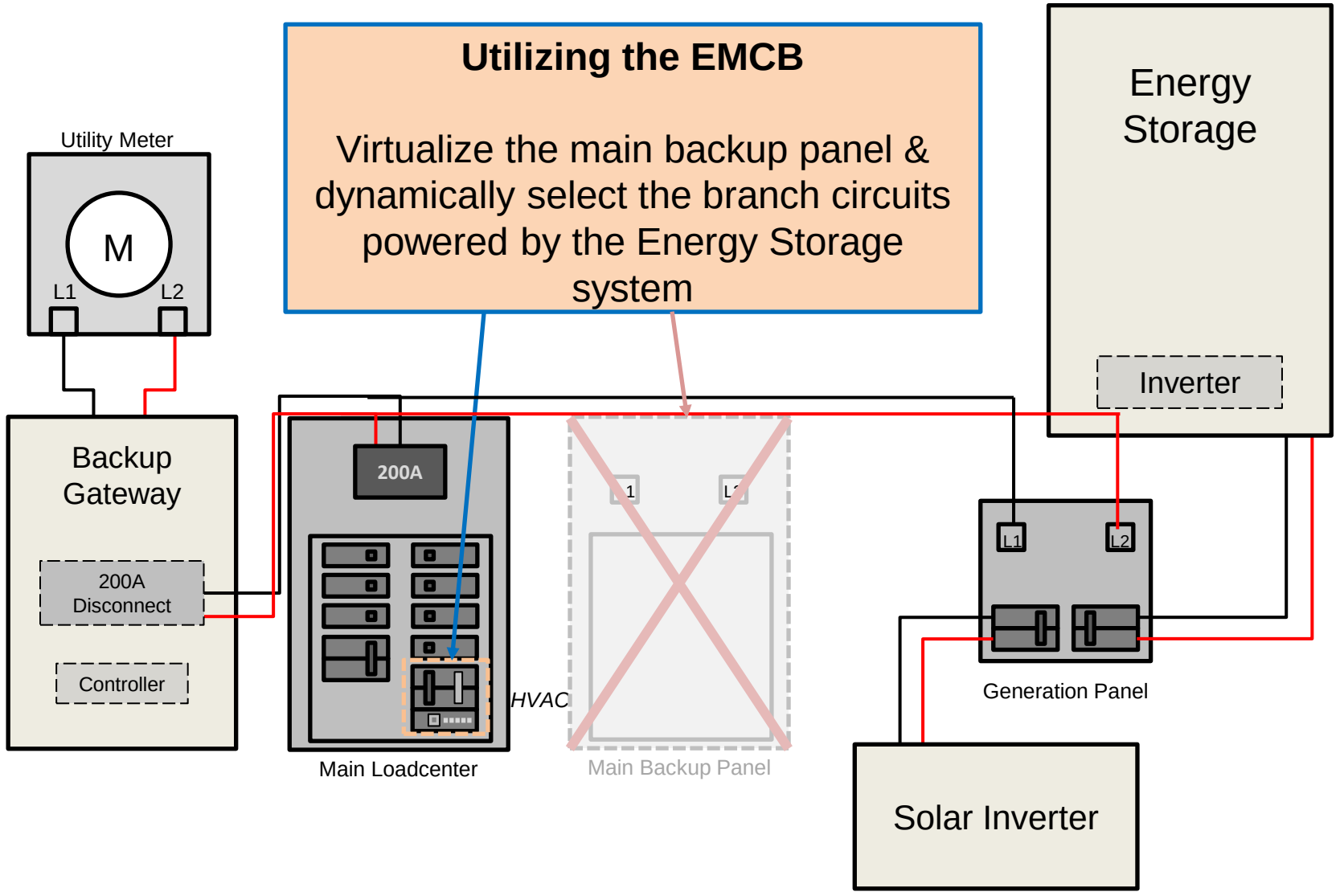
Through the use of intelligent circuit breakers, we can simplify the installation & improve adoption of DERs



Powering Business Worldwide

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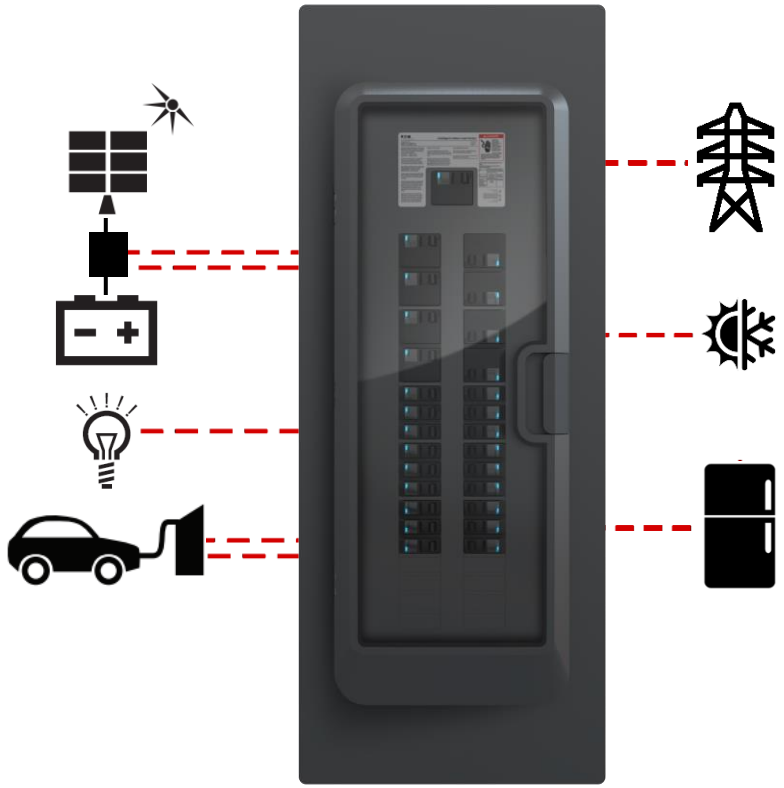
Intelligent breakers orchestrate efficient management & integration of DERs

- Whole home energy management
- Monitor on-site power generation through renewables
- Integrate EV charging efficiently & cost effectively
- Optimize energy consumption based on renewables generation & ToU tariff
- Provide granular view & control at the branch circuit level to utilities for demand response



ToU: Time of Use; DER: Distributed Energy Resources

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Thank you

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Product Manager – Advanced Technology & Digitalization

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Ask the experts: What Should Be on an IoT Privacy and Security Label?

Pardis Emami-Naeini Yuvraj Agarwal Lorrie Faith Cranor Hanan Hibshi Shreyas Nagare

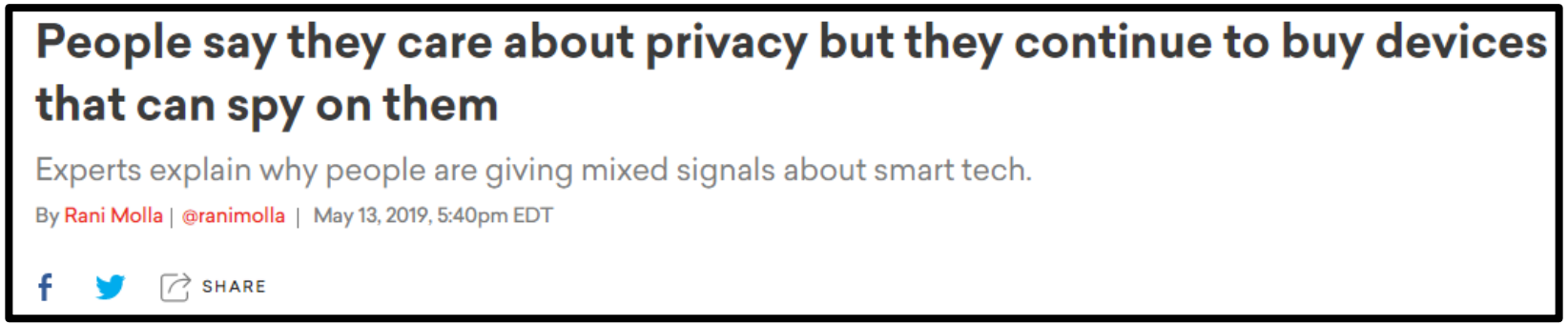
2020 ENERGY STAR Products Partner Meeting; SHEMS Pitch Party

CyLab Usable Privacy & Security Laboratory

synergy systems, networking and energy efficiency

CyLab Carnegie Mellon University Security and Privacy Institute

People are concerned about losing their privacy



People say they care about privacy but they continue to buy devices that can spy on them

Experts explain why people are giving mixed signals about smart tech.

By Rani Molla | @ranimolla | May 13, 2019, 5:40pm EDT

SHARE

Help Net Security
October 14, 2019

Share

Consumers concerned about connected home privacy, still few implement safety practices

Smart devices spark privacy concerns among consumers: study

Sibile Marcellus
Reporter
Yahoo Finance December 14, 2018

Follow

Smart devices are getting hacked

'I can see you in bed. Wake up!' Woman says stranger hacked Ring camera

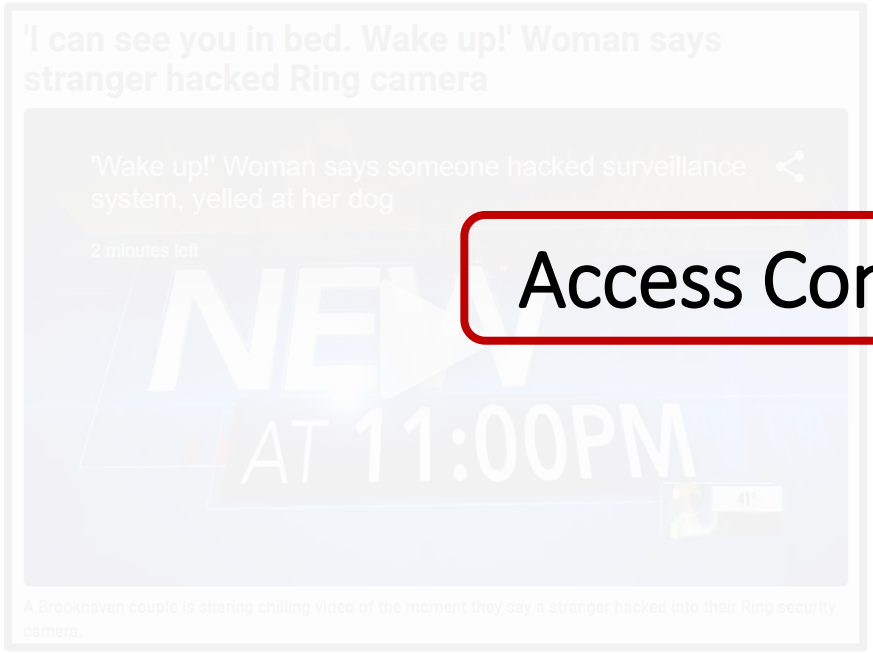
A Brookhaven couple is sharing chilling video of the moment they say a stranger hacked into their Ring security camera.

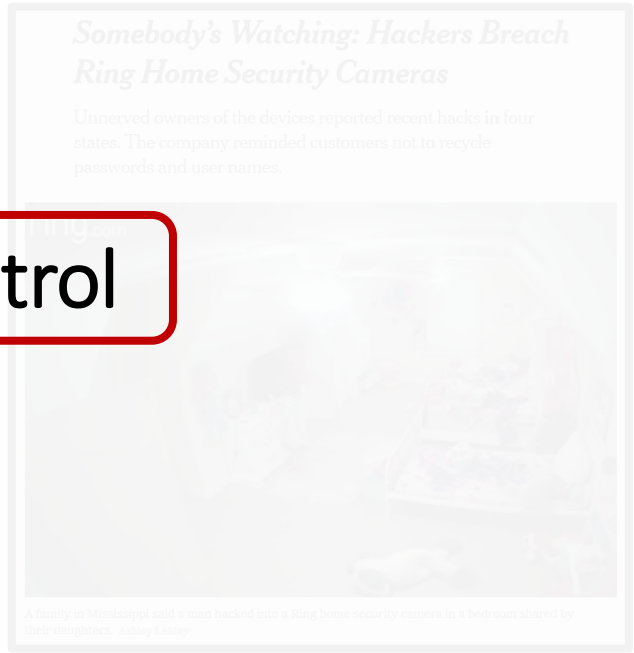
Somebody's Watching: Hackers Breach Ring Home Security Cameras

Unnerved owners of the devices reported recent hacks in four states. The company reminded customers not to recycle passwords and user names.

A family in Mississippi said a man hacked into a Ring home security camera in a bedroom shared by their daughters. Ashley LeMay

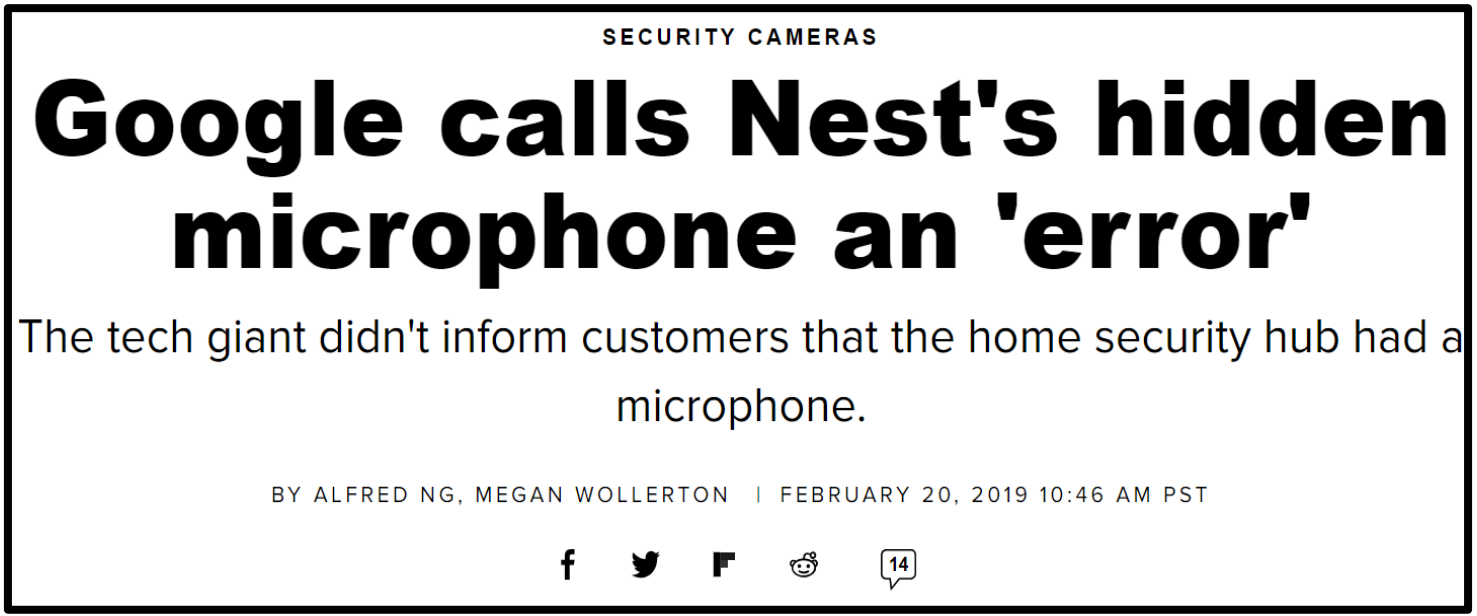
Smart devices are getting hacked





Access Control

IoT companies are sometimes forgetful



SECURITY CAMERAS

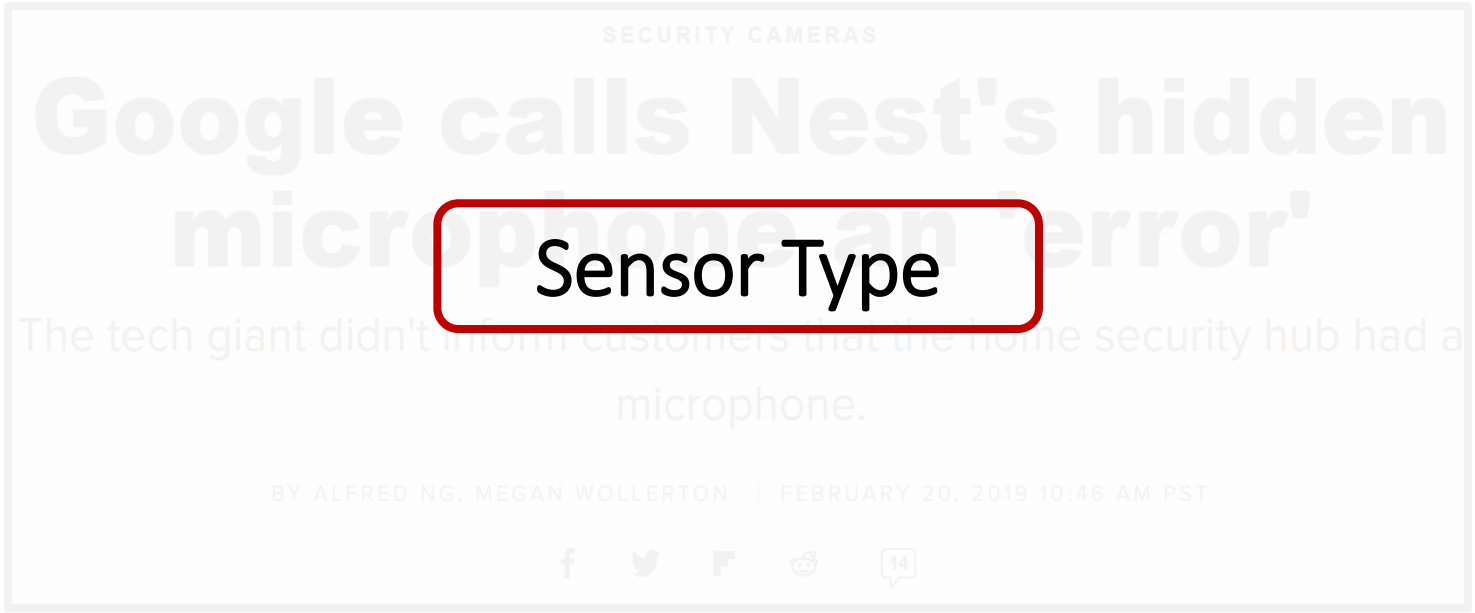
Google calls Nest's hidden microphone an 'error'

The tech giant didn't inform customers that the home security hub had a microphone.

BY ALFRED NG, MEGAN WOLLERTON | FEBRUARY 20, 2019 10:46 AM PST

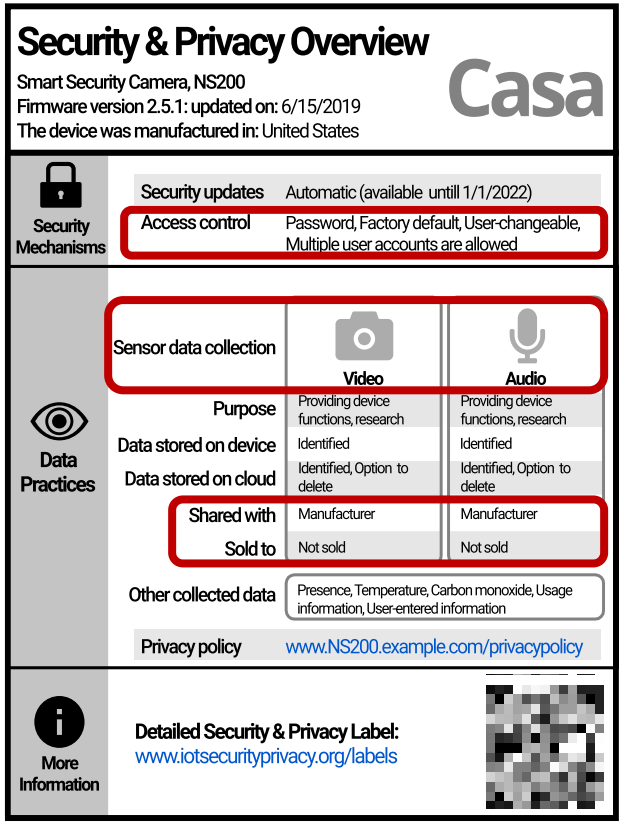
14

IoT companies are sometimes forgetful



Sensor Type

How to effectively provide this information?



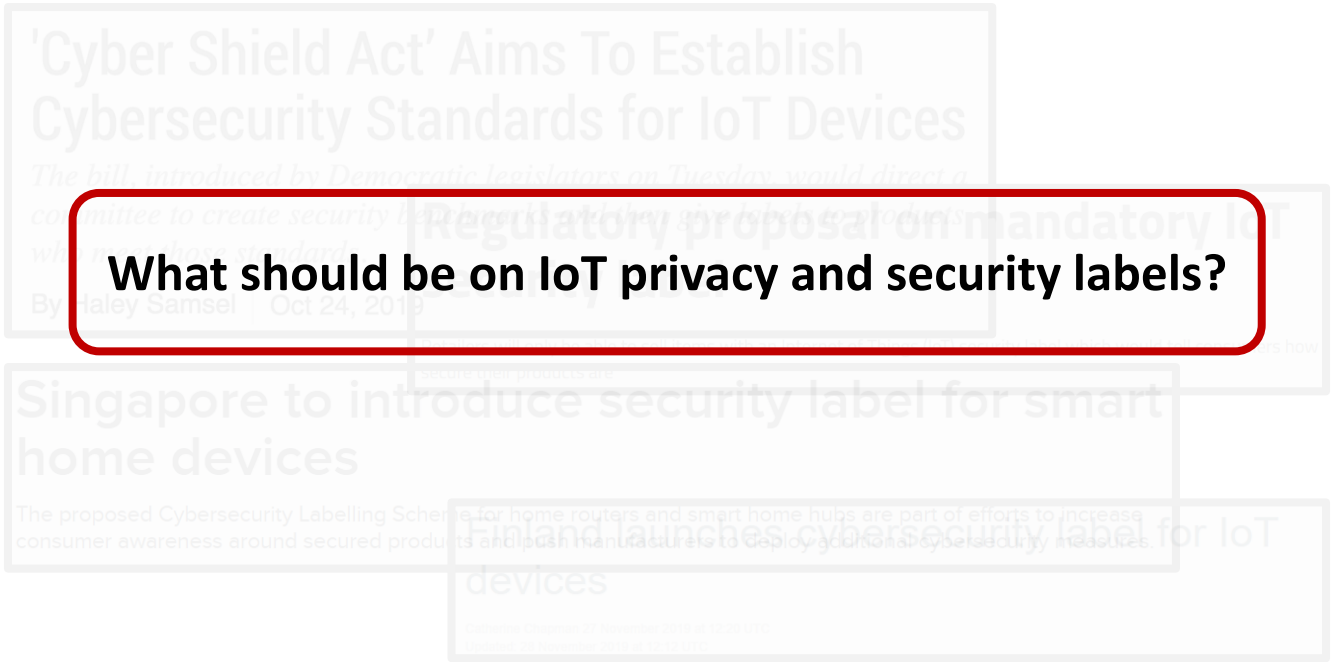
Consumers show positive attitude toward labels

- **Almost all** wanted to know about privacy and security before the purchase
- **Almost all** were willing to pay a premium for such info (10% - 30%)

> *As opposed to those long documents that you usually need to read, I think this is a very efficient way and I cannot think of a better way than this.*

Policy makers are also excited about IoT labels

Policy makers are also excited about IoT labels



What should be on IoT privacy and security labels?

Labels to inform consumers’ purchase behavior

> *What's good about a label is that it empowers the consumer to make a more active decision about cybersecurity rather than just being completely helpless as to what the security of her device might be. […] Someone's gotta be looking out for consumers and giving the consumers this information.*

Primary layer (Sep'19)

Security & Privacy Overview

Smart Security Camera, NS200
Firmware version 2.5.1: updated on: 6/15/2019
The device was manufactured in: United States

Casa

Security Mechanisms

Security updates	Automatic (available untill 1/1/2022)
Access control	Password, Factory default, User-changeable, Multiple user accounts are allowed

Data Practices

	Video	Audio
Purpose	Providing device functions, research	Providing device functions, research
Data stored on device	Identified	Identified
Data stored on cloud	Identified, Option to delete	Identified, Option to delete
Shared with	Manufacturer	Manufacturer
Sold to	Not sold	Not sold

Other collected data	Presence, Temperature, Carbon monoxide, Usage information, User-entered information
Privacy policy	www.NS200.example.com/privacypolicy

More Information

Detailed Security & Privacy Label:
www.iotsecurityprivacy.org/labels

Secondary layer (Sep'19)

Security & Privacy Details

Smart Security Camera, NS200
Firmware version 2.5.1, updated on: 6/15/2019
The device was manufactured in: United States

Casa

Security Mechanisms

Security updates	Automatic (available until 1/1/2022)
Access control	Password, Factory default, User-changeable, Multiple user accounts are allowed
Security oversight	Audits performed by internal security auditors
Ports and protocols	www.NS200.example.com/port
Hardware safety	www.NS200.example.com/hwsafety
Software safety	www.NS200.example.com/swsafety
Personal safety	www.NS200.example.com/usersafety
Vulnarability disclosure and management	www.NS200.example.com/vulreport
Software and hardware composition list	www.NS200.example.com/BOM
Encryption and key management	www.NS200.example.com/key

Data Practices

	Video	Audio	Presence	Temperature	Carbon Monoxide
Collection frequency	When user requests it	Continuous, Adjustable	Periodic, Option to opt-out	Continuous, Option to opt-in	Continuous, Option to opt-out
Purpose	Providing device functions, research	Providing device functions, research	Providing device functions	Providing device functions	Providing device functions
Data stored on device	Identified	Identified	De-identified	De-identified	De-identified
Local data retention time	Up to a month	Up to a month	Up to a year	Up to a year	Up to a year
Data stored on cloud	Identified, Option to delete	Identified, Option to delete	No cloud storage	De-identified	De-identified
Cloud data retention time	Up to a month	Up to a month	No cloud storage	Up to a month	Up to a month
Shared with	Manufacturer	Manufacturer	Not shared	Manufacturer, Third-party	Third-party, option to opt-out
Sharing frequency	Periodic, Adjustable	Periodic, Adjustable	Not shared	Continuous	Continuous
Sold to	Not sold	Not sold	Not sold	Third-party	Third-party, Option to opt-out

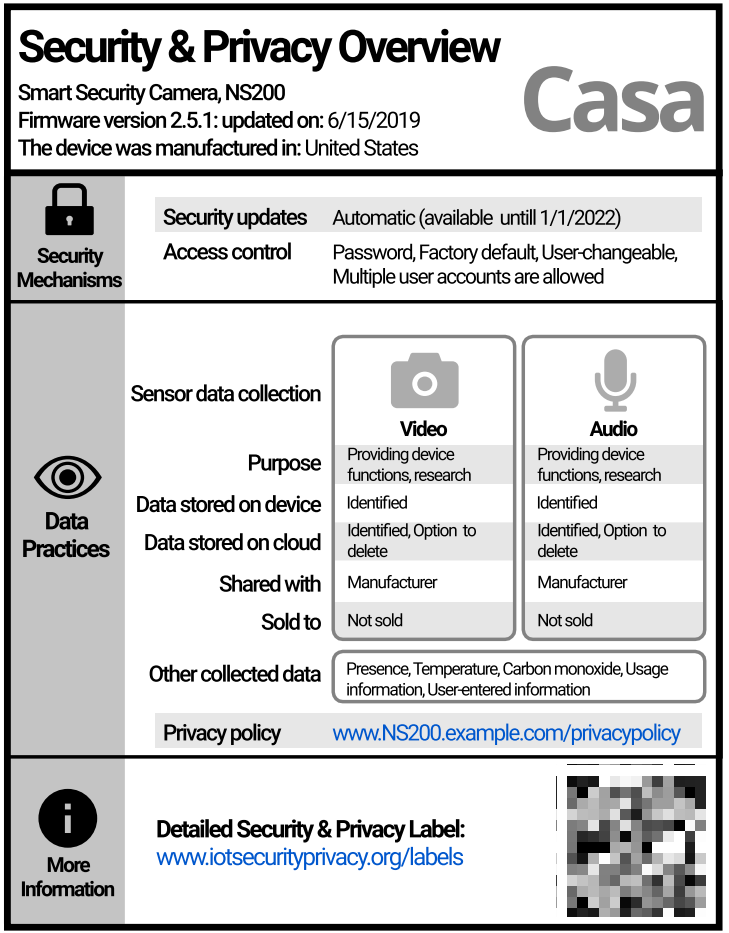
Other collected data	Usage information, User-entered information
Data linkage	Data may be linked with internal and external data sources
What could be inferred from user's data	No data inference
Special data handling practices for children	Yes
In compliance with	GDPR, ISO27001
Privacy policy	www.NS200.example.com/privacypolicy

More Information

Call Casa with your questions at	412-313-2793 (24/7 support)
Functionality with no internet	Limited functionality on offline mode
Functionality with no data processing	Limited functionality on dumb mode
Physical actuations and triggers	Device blinks when motion is detected
Compatible platforms	Amazon Alexa

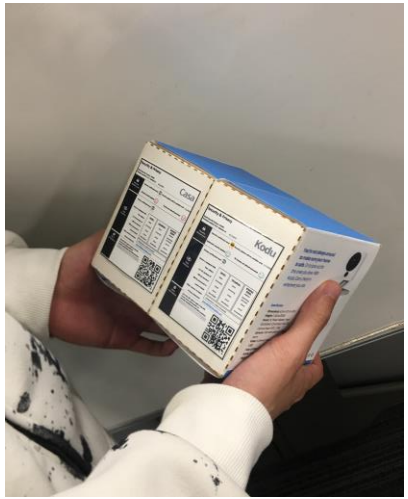
Primary layer

- Security update lifetime
- Type of collected data
- Availability of automatic security updates
- Availability of default passwords



Semi-structured interviews with IoT consumers

- Recruited 15 IoT consumers from the United States
- Conducted 1-hour semi-structured interviews



Label should work for both consumers and experts

> *Labels are both for customers and experts such as tech journalists and consumer advocacy groups. If they see something that is questionable, they will raise it in the public press or will raise it with regulatory authorities. The label is not just for the consumer, but there's another feedback process that works through experts.*

IoT labels to provide transparency

- IoT consumers are concerned
- Proposed legislation lacks the specifics of the label
- Experts recommended 47 pieces of information
- Information divided into primary and secondary layer to make it accessible
- Specification and label generator now available

Next steps for label deployment

- Testing the design elements of the label
- Understanding how much of a premium IoT consumers are willing to pay to have better privacy and security
- Looking for IoT manufactures for a pilot deployment on their products

www.IoTSecurityPrivacy.org

pardis@cs.washington.edu

CUPS
CyLab Usable Privacy & Security Laboratory

synergy
systems, networking and energy efficiency

CyLab Carnegie Mellon University
Security and Privacy Institute