ENVIRONMENTAL DEMAND RESPONSE

October 2019

WattTime™

WattTime

"Giving people the power to choose cleaner electricity"

Who We Are

- High-tech nonprofit dedicated to accelerating the development & spread of new sustainability techniques

- Built by 200+ volunteers from Google, MIT, Climate Corp, DOE, and more

- Joined forces with Rocky Mountain Institute in 2017

What We Do

- Obsessed with understanding grid emissions at a granular level and building tools to help others use that information to maximize impact and advance goals

- Effectively utilize granular emissions data (5 minute intervals) over 100 U.S. grid regions

MIDAS

Market Informed

Demand Automation

Service

MIDAS

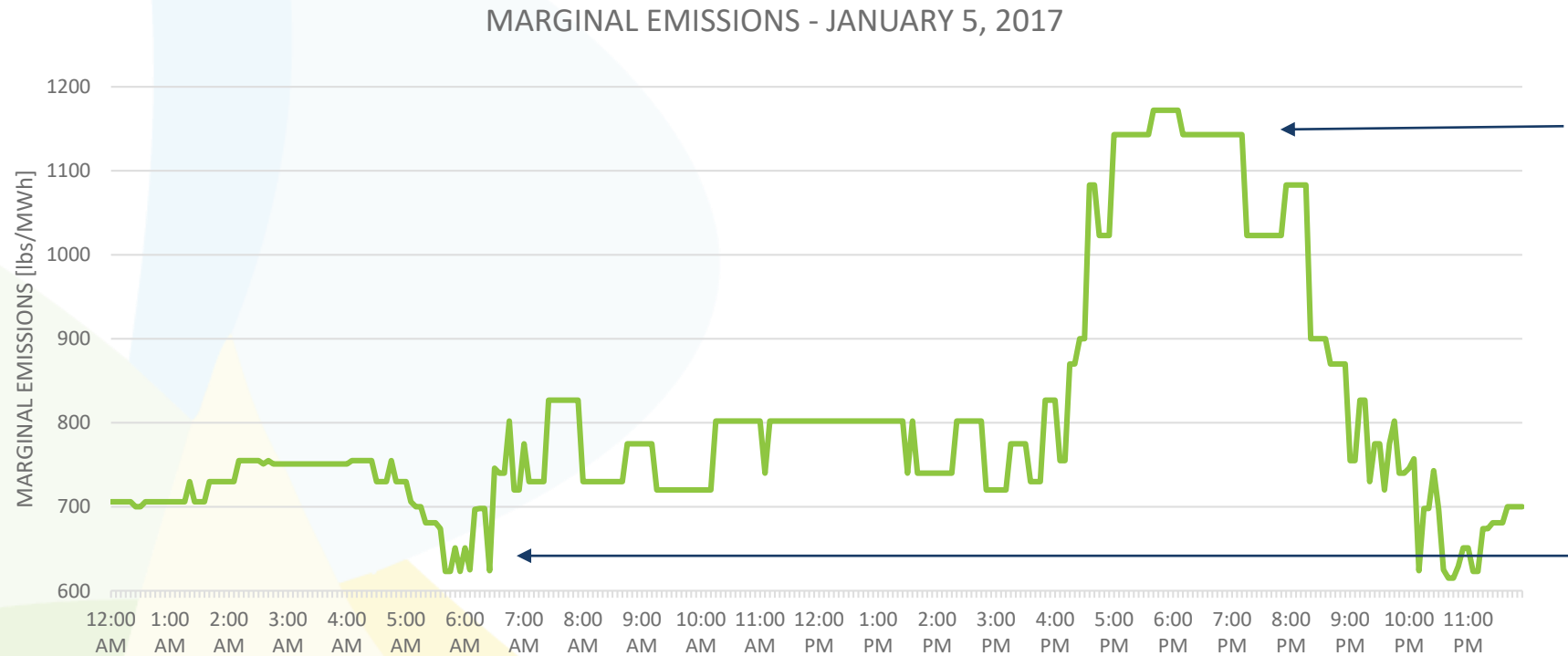## MARKET INFORMED

Grid Emissions Vary By Time

The marginal power plant that reacts when you flip a switch is always changing. Power customers don't know in real time how dirty their power is.

MARGINAL EMISSIONS - JANUARY 5, 2017

A dirty time on the grid. Using electricity at this time causes more carbon emissions.

A clean time on the grid. Using electricity at this time causes fewer carbon emissions.

LMP Price Frequency
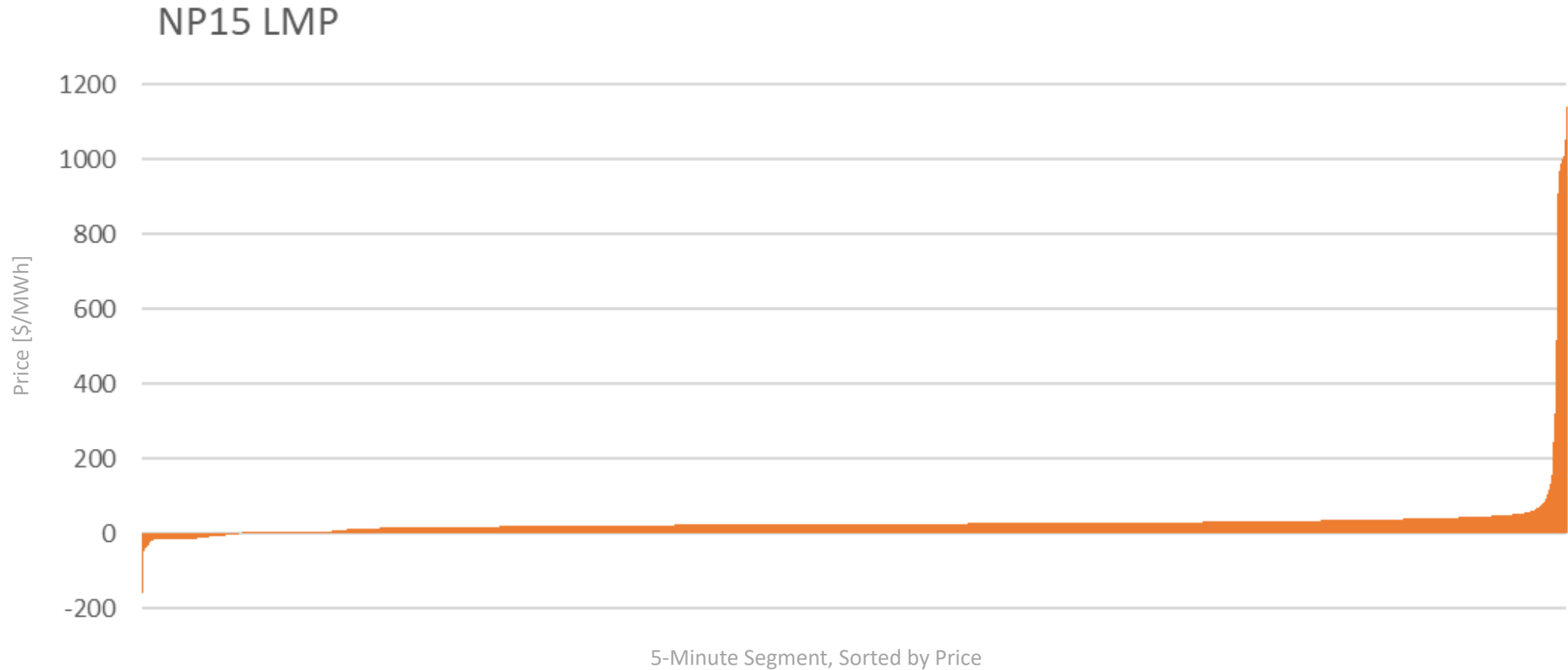
Price of electricity (In dollars per megawatt-hour, Northern California, 2017)

Combining AER & Demand Response
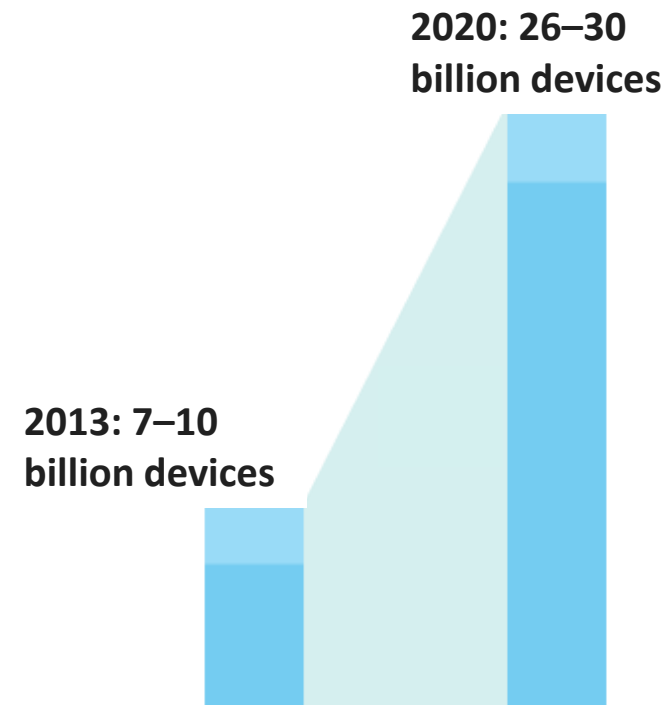

NP15 LMP

Price [$/MWh]

Automated emissions
reduction opportunity

Demand response
target
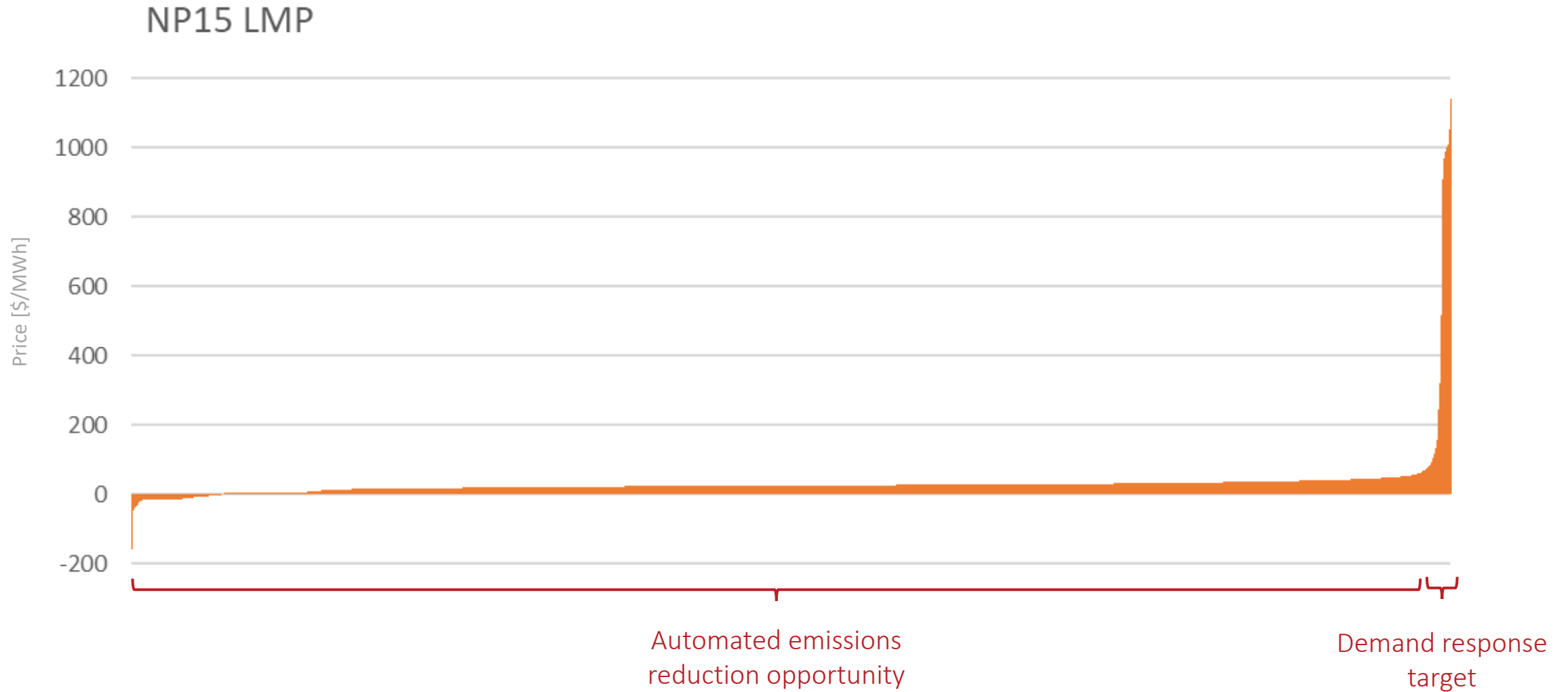
MIDAS
DEMAND AUTOMATION

Customers are increasingly demanding communicating, controllable, and "smart" devices and control systems

Smart devices, appliances, and controls are growing in availability and popularity

- The smart thermostat market is projected to quadruple in size, reaching a $4.4 billion dollar industry by 2025.`

- Large consumer technology companies are now competing for market share in the growing "smart home" space.

- In institutional, commercial, and industrial facilities, business priorities are driving customers to demand connected, intelligent control systems to manage loads.
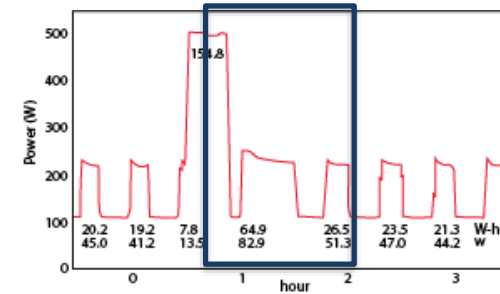
Some 30 billion devices may be connected to the Internet of Things (IoT) by 2020[2]

2020: 26–30 billion devices

2013: 7–10 billion devices

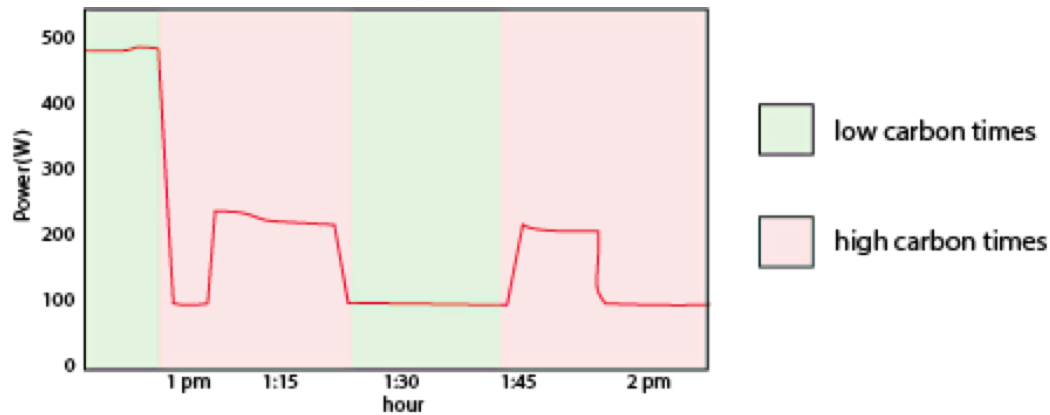Source: [1] Navigant Consulting; [2] McKinsey, December 2014

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Emissions Reductions through Timing

- Much electricity use is at least partially flexible in time
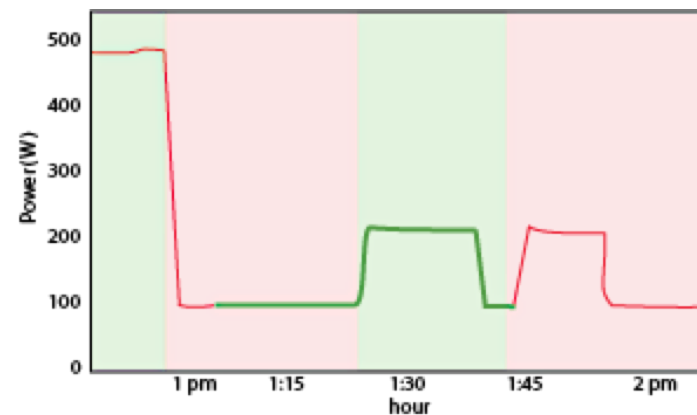- E.g. devices with compressor cycles can sync cycles to cleaner moments
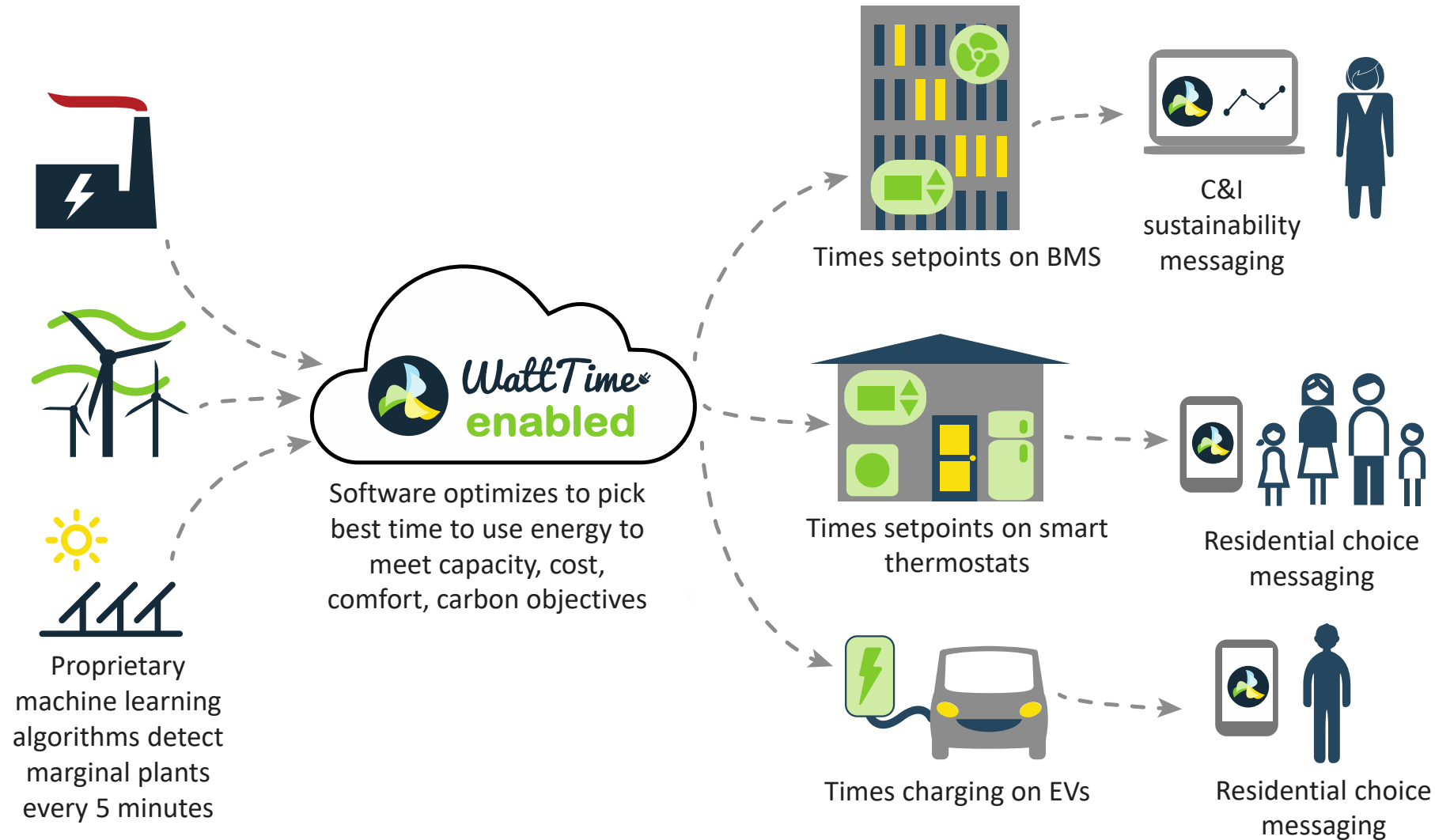
Example: fridge cycles

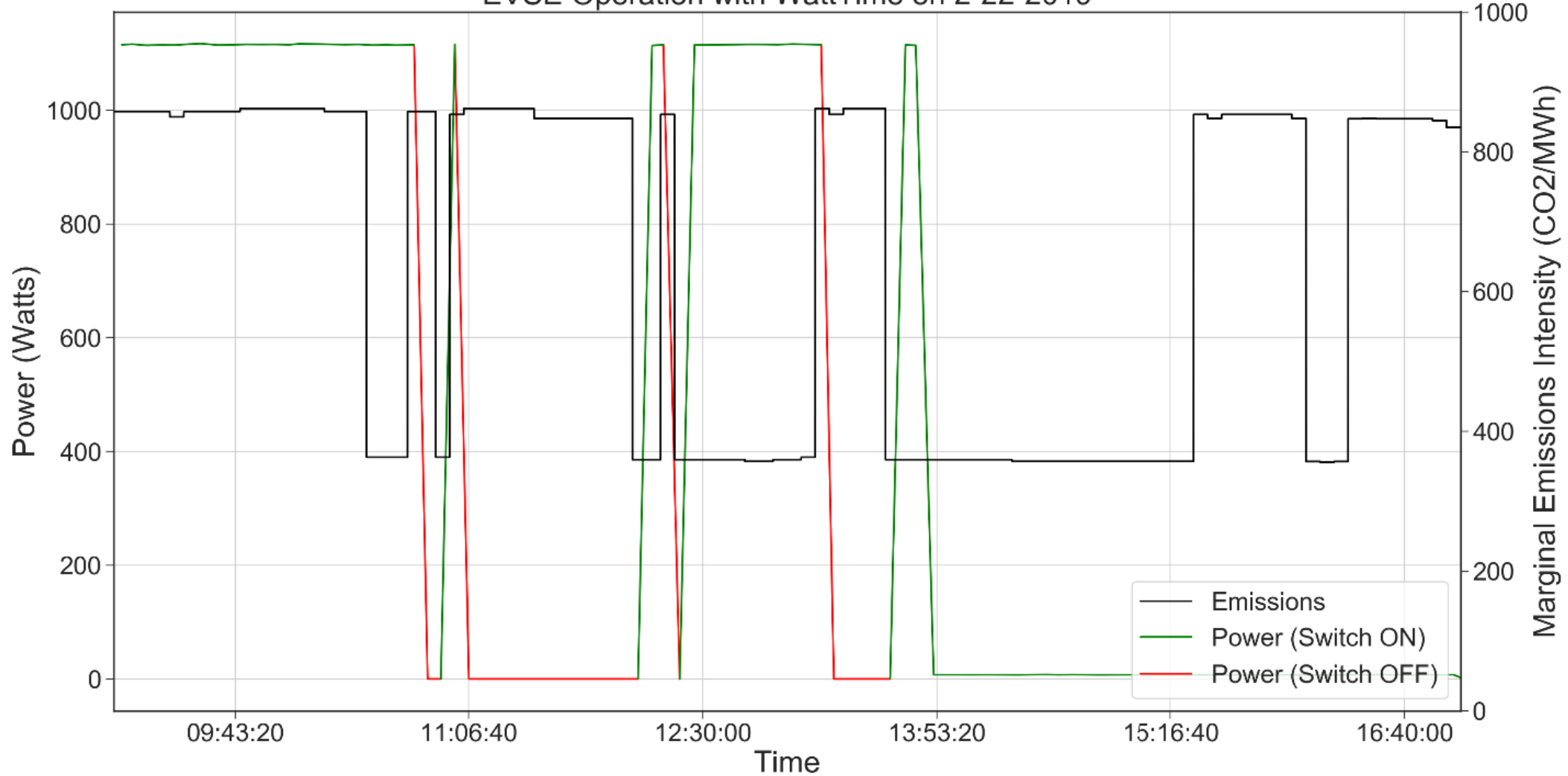Normal operation

Emissions-optimized

low carbon times

high carbon times

Automated Emissions Reduction Platform

Proprietary machine learning algorithms detect marginal plants every 5 minutes

WattTime enabled

Software optimizes to pick best time to use energy to meet capacity, cost, comfort, carbon objectives

Times setpoints on BMS

C&I sustainability messaging

Times setpoints on smart thermostats

Residential choice messaging

Times charging on EVs

Residential choice messaging

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DRET: Automated Emissions Reduction

EVSE Operation with WattTime on 2-22-2019

https://www.etcc-ca.com/reports/automated-emissions-reduction-dispatch-signal-dr-emerging-technologies-assessment
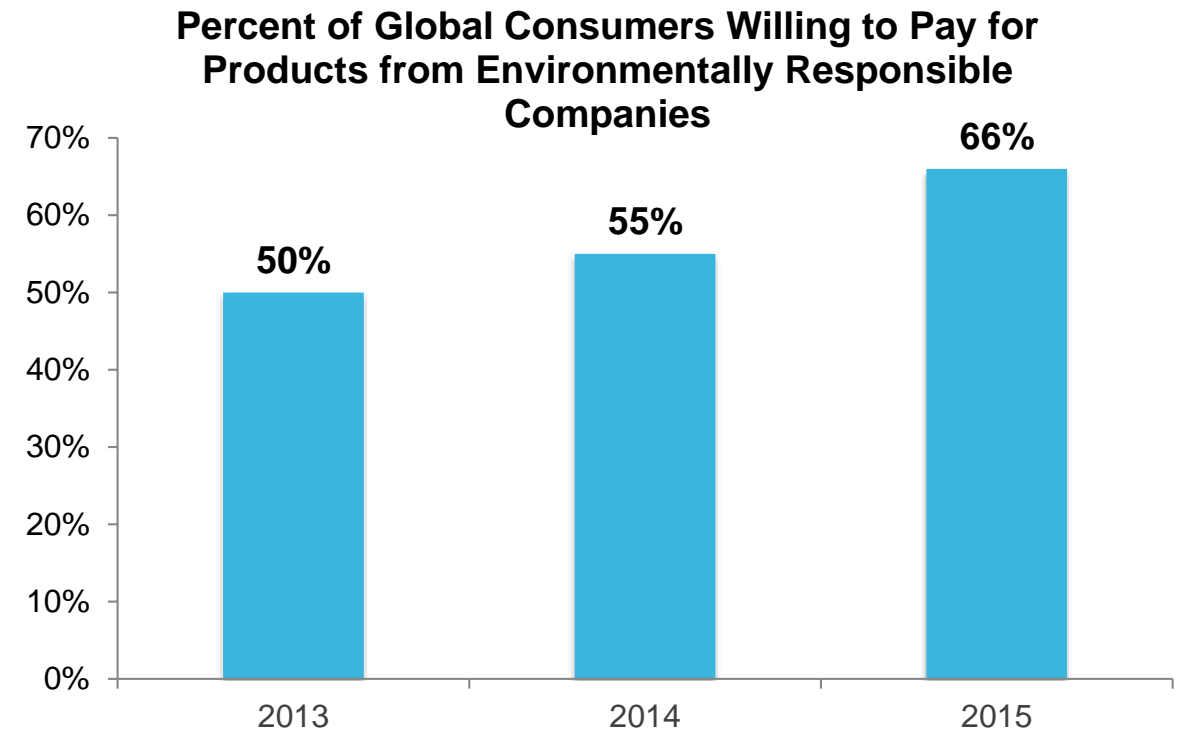
MIDAS
SERVICE

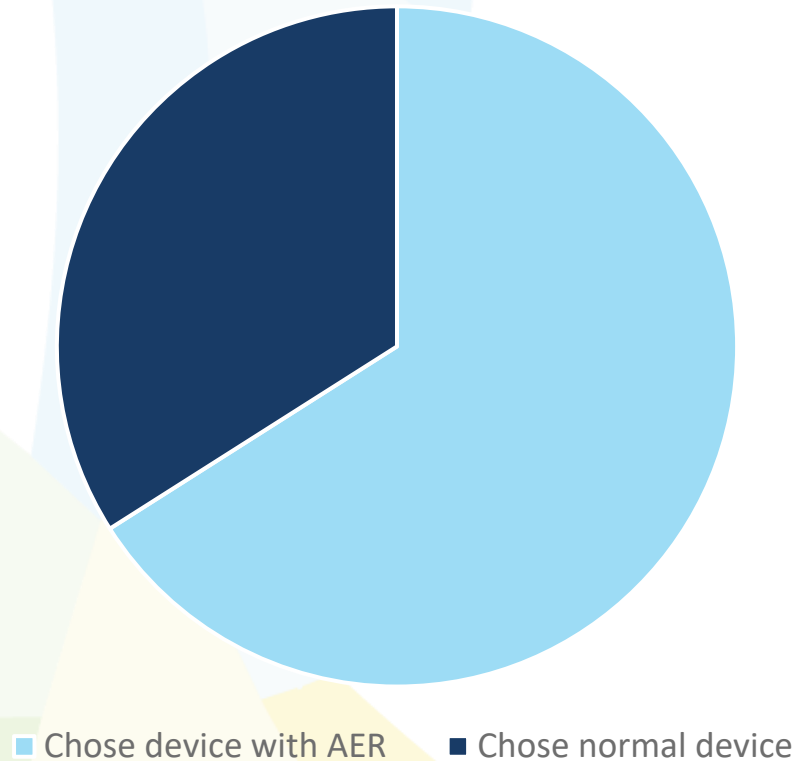# Individual consumers are expecting more environmentally friendly options, and are willing to pay for them

Consumers in America want and expect more sustainable solutions

- A survey of 1,500 customers conducted by SmartEnergy IP found that 32% expect their utility to adopt automation technologies to save energy[1]

- A 2016 Gallup poll revealed that 73% of Americans want to emphasize alternative energy instead of oil and gas production[2]

Consumers are increasingly willing to pay for environmentally conscious brands [3]

Percent of Global Consumers Willing to Pay for Products from Environmentally Responsible Companies

Year	Percent
2013	50%
2014	55%
2015	66%

Source: [1] Navigant Research; [2] Gallup; [3] Nielsen

Customer preference for AER translated into actual change in buying behavior
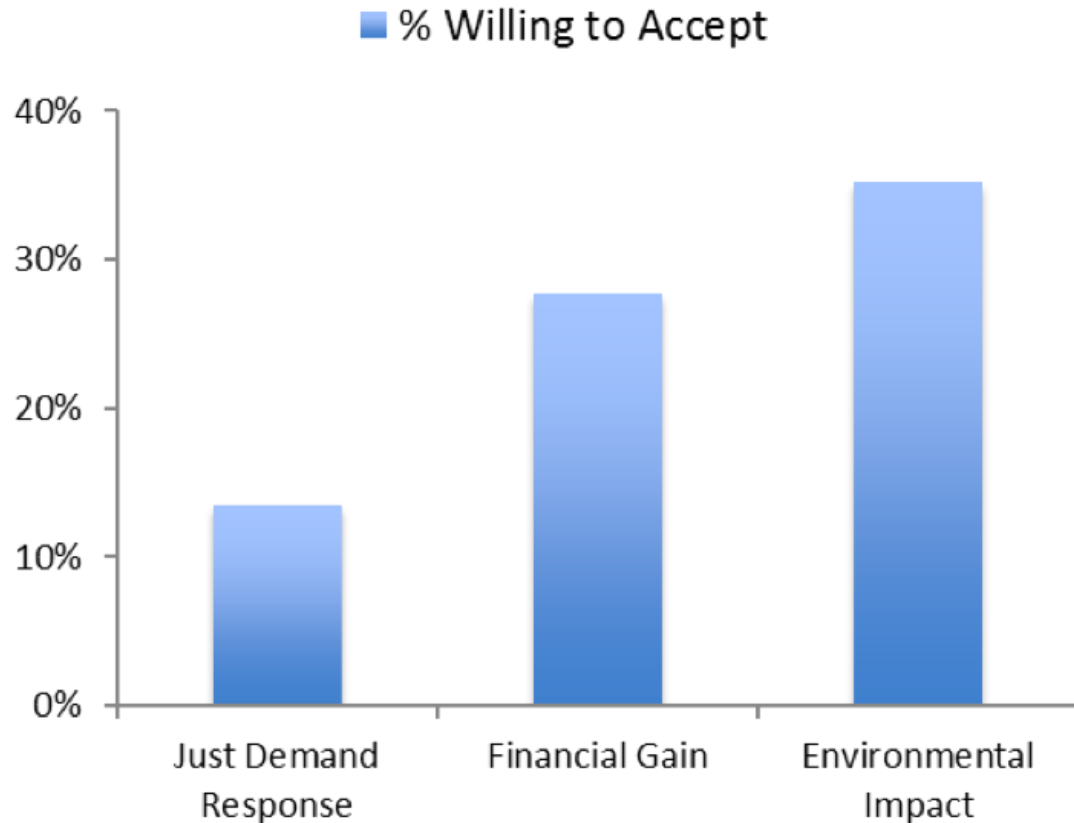
Study (Delta Institute):

- 100 individuals in Chicago offered a free thermostat and asked to choose between two identical devices, one with WattTime's AER feature and one without

Result:

- Yes. 2/3 of customers chose the thermostat with AER.

■ Chose device with AER   ■ Chose normal device

Demand Response Participation with AER

% Willing to Accept

Chart categories: Just Demand Response, Financial Gain, Environmental Impact

Study (WattTime):
- 300 randomly selected individuals across 30 U.S. states were asked if they would sign up for a hypothetical ADR program. Unbeknownst to these individuals, they were randomly assigned to different ADR program descriptions: a regular program, one that offered an unusually large financial incentive ($600/month per thermostat), or one with AER.

Result:
- Adding environmental impact to a DR program (by adding AER to it) increased signups. Contrary to researcher expectations, AER increased signups *even more* than financial gain did.

Existing Products

enel x

Store Residential Commercial Utilities Partners News

Contact

Emission-Minimizing EV Charging Feature (software upgrade)

- Synchronizes with grid generation sources
- Enables you to charge your EV when the cleanest energy is available on the grid
- Reduces carbon emissions impact of EV charging

$50.00
+ FREE shipping

ADD TO CART

− 1 +

Support

HOW EVOLVE WORKS

MIDAS Proposal

Overlay emissions reductions and energy choice onto existing DR programs

Provide energy choice for customers

Achieve cost-effective continuous load shifting

Automated, device dependent program

Select market signals [emissions, energy, capacity, distribution, curtailment]

Thank You

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