# Emissions Tracking and Load Response

Gavin McCormick | WattTime

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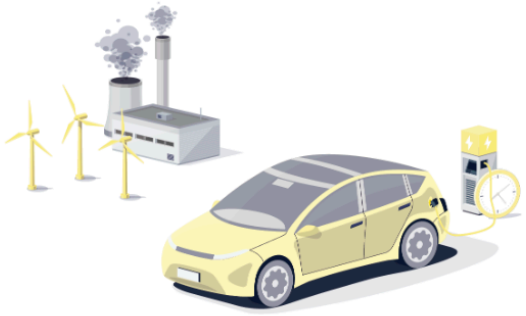
# 3 simple fixes could save 9+ gigatons of CO2 annually.

We're a nonprofit raising awareness about these solutions and providing data & technical assistance to anyone trying to implement them.

**When** we use electricity

## 3 Gt



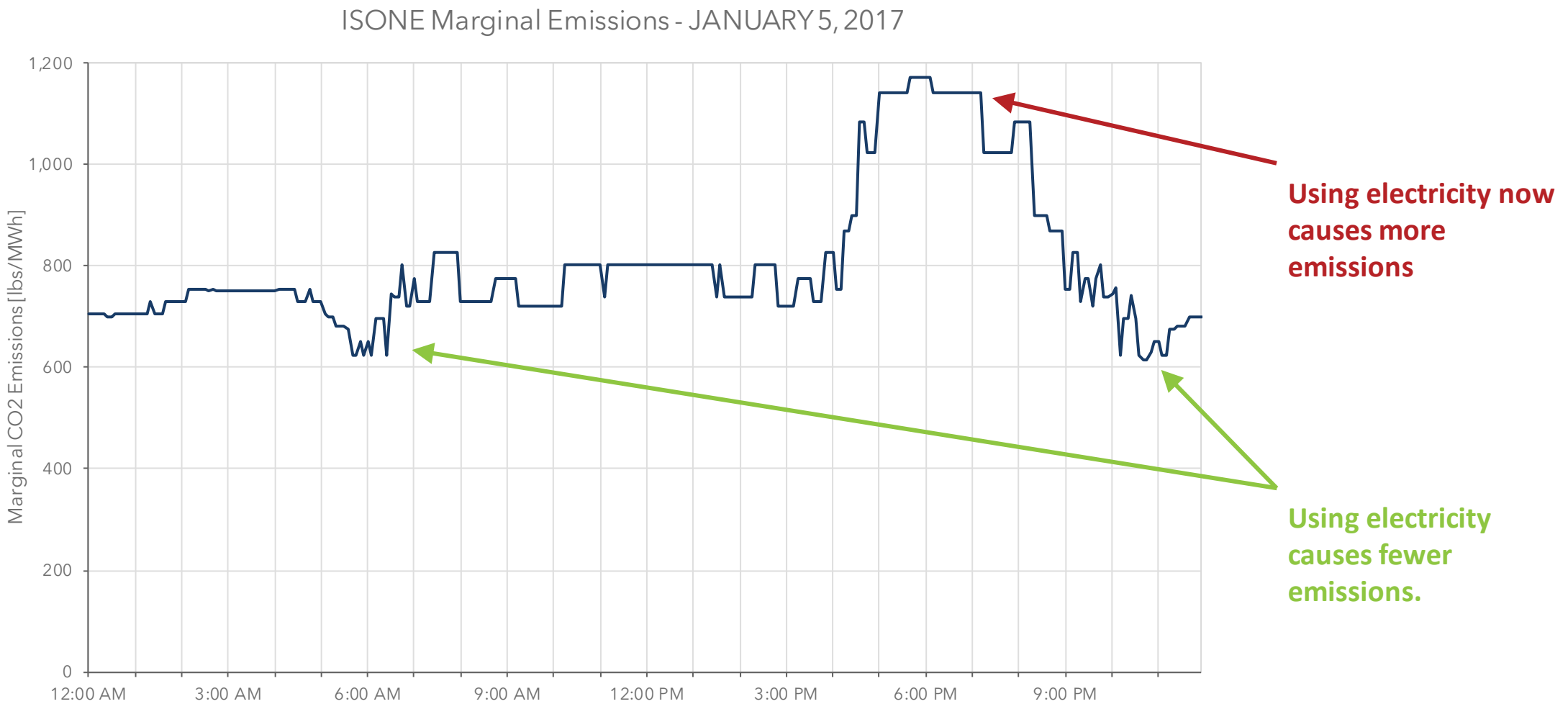
**Where** we site wind and solar

## 5 Gt

**Which** suppliers we procure from

## 1 Gt

# Like marginal prices, marginal emissions vary by time and place



**When** we use electricity

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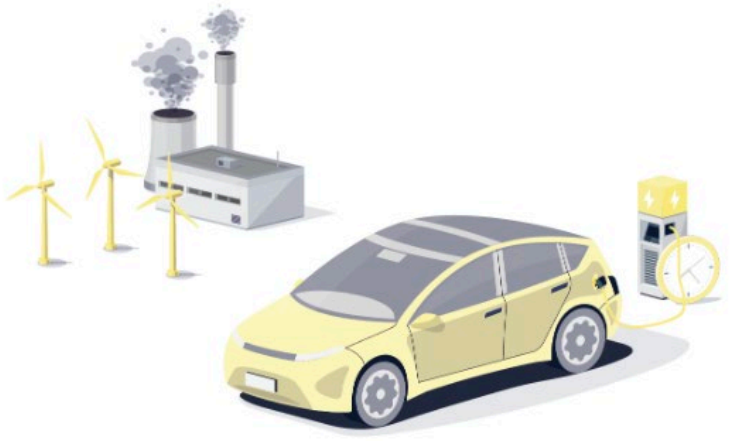
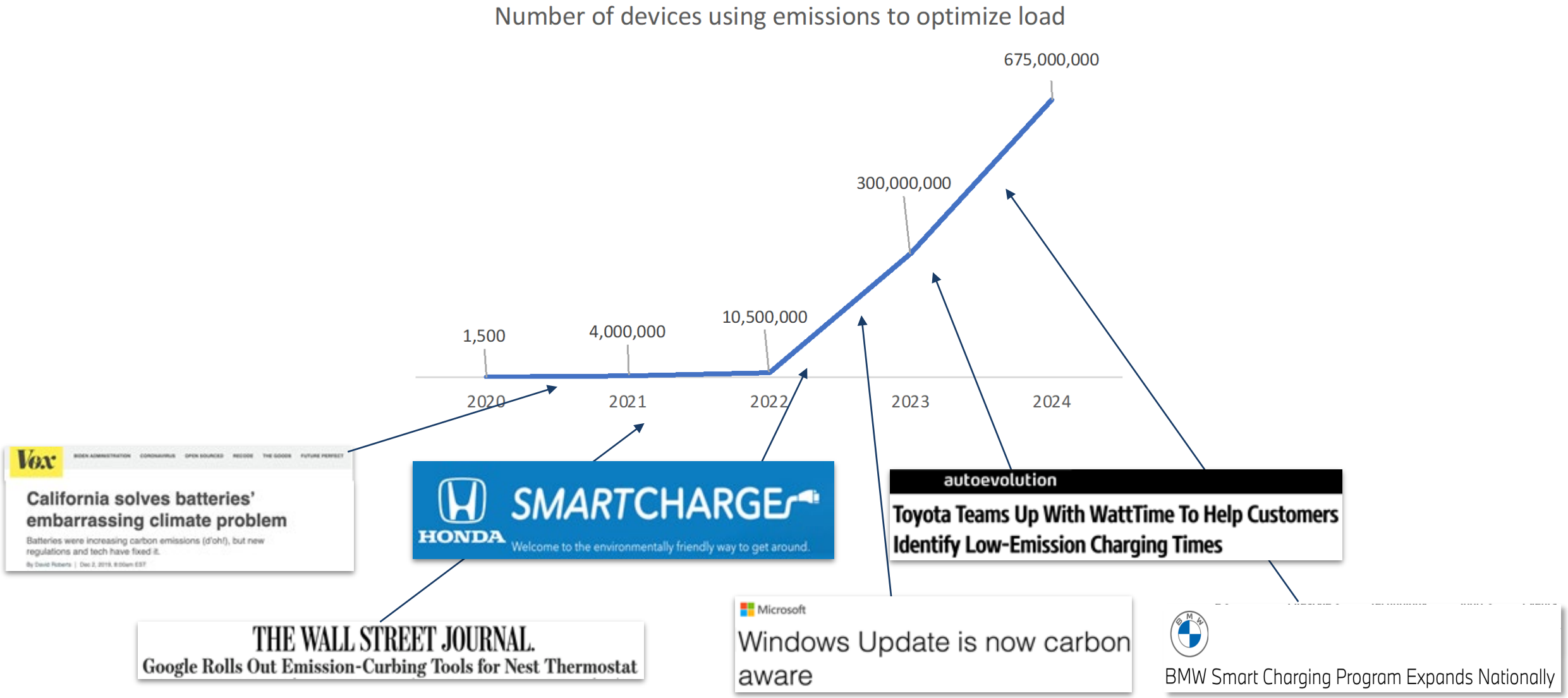
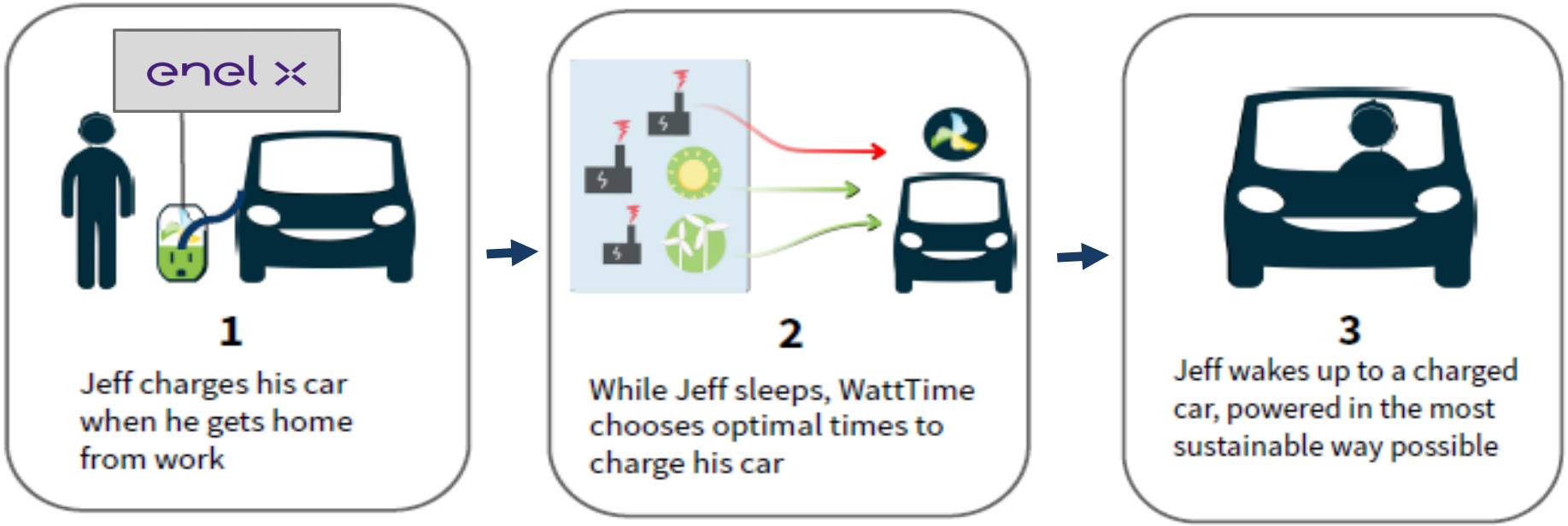


# Emissions-based load shifting is growing fast

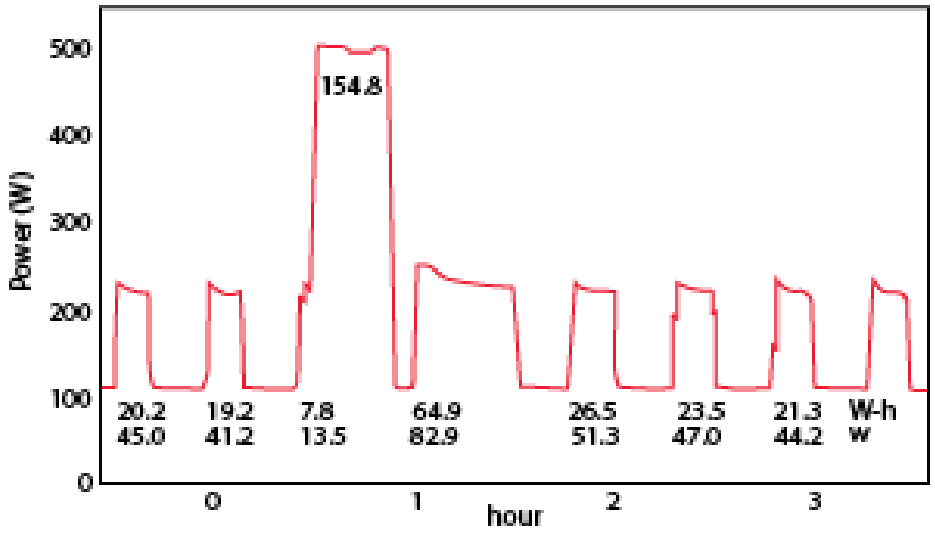


# Most is continuous “Automated Emissions Reduction”



# On average, AER shifts ~80x more KWh per user than traditional DR

Electricity consumption (typical fridge)



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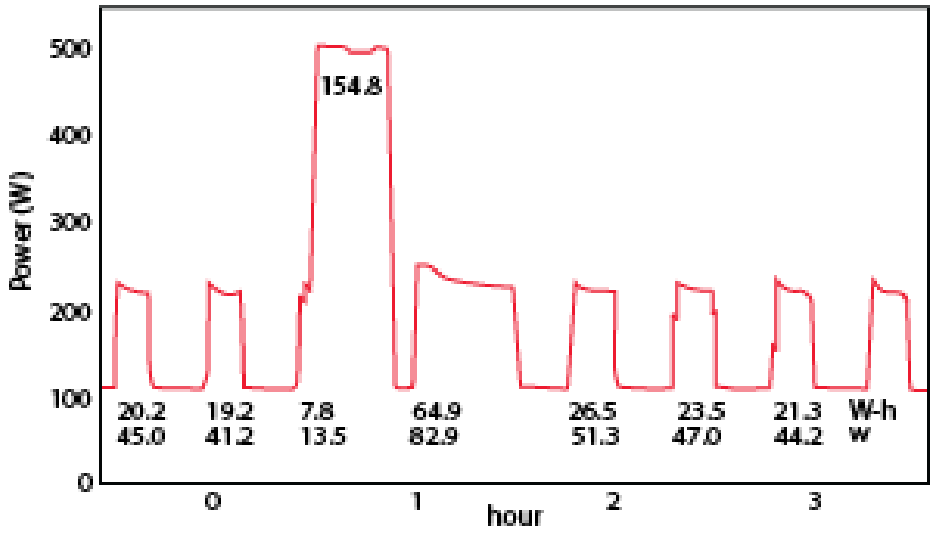
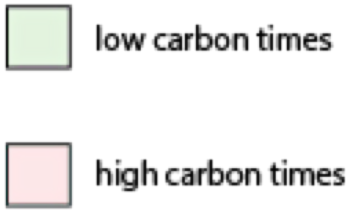
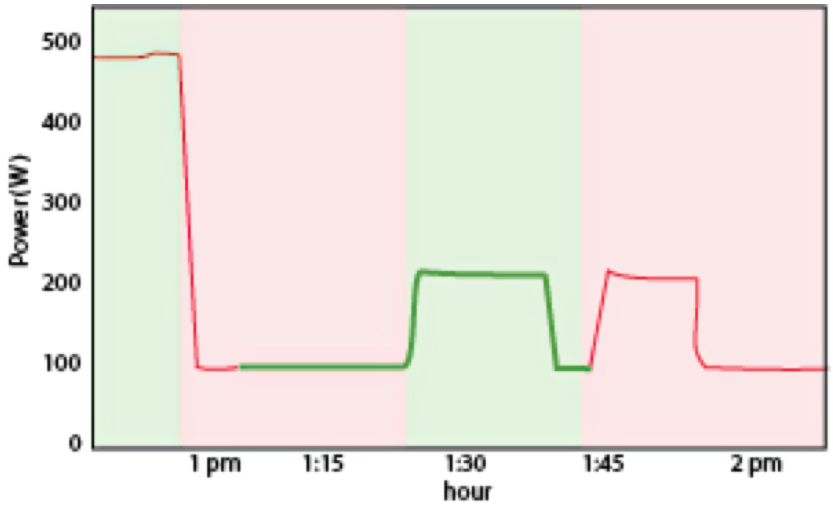


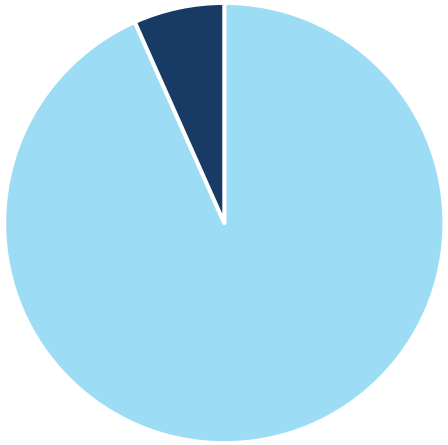




Fridge using AER



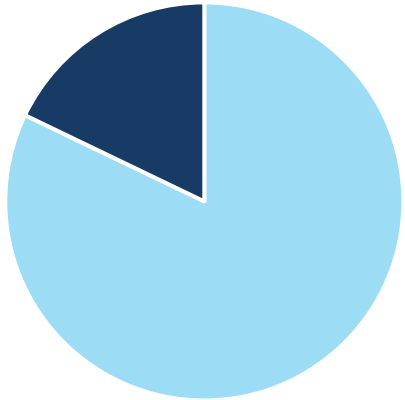
# Unlike DR, primary driver is consumer *demand*

DR study
UC Berkeley



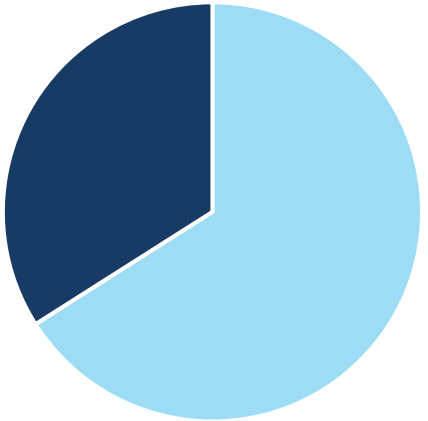
Chose AER  Declined AER

EVs study
EMotorWerks



Paid extra for AER  Bought normal device

Smart thermostats study
Delta Institute



Chose device with AER  Chose normal device

# Though C&I and policy use growing too

**Live today**

Data centers
Energy storage
AI compute jobs
Factories
Trucking

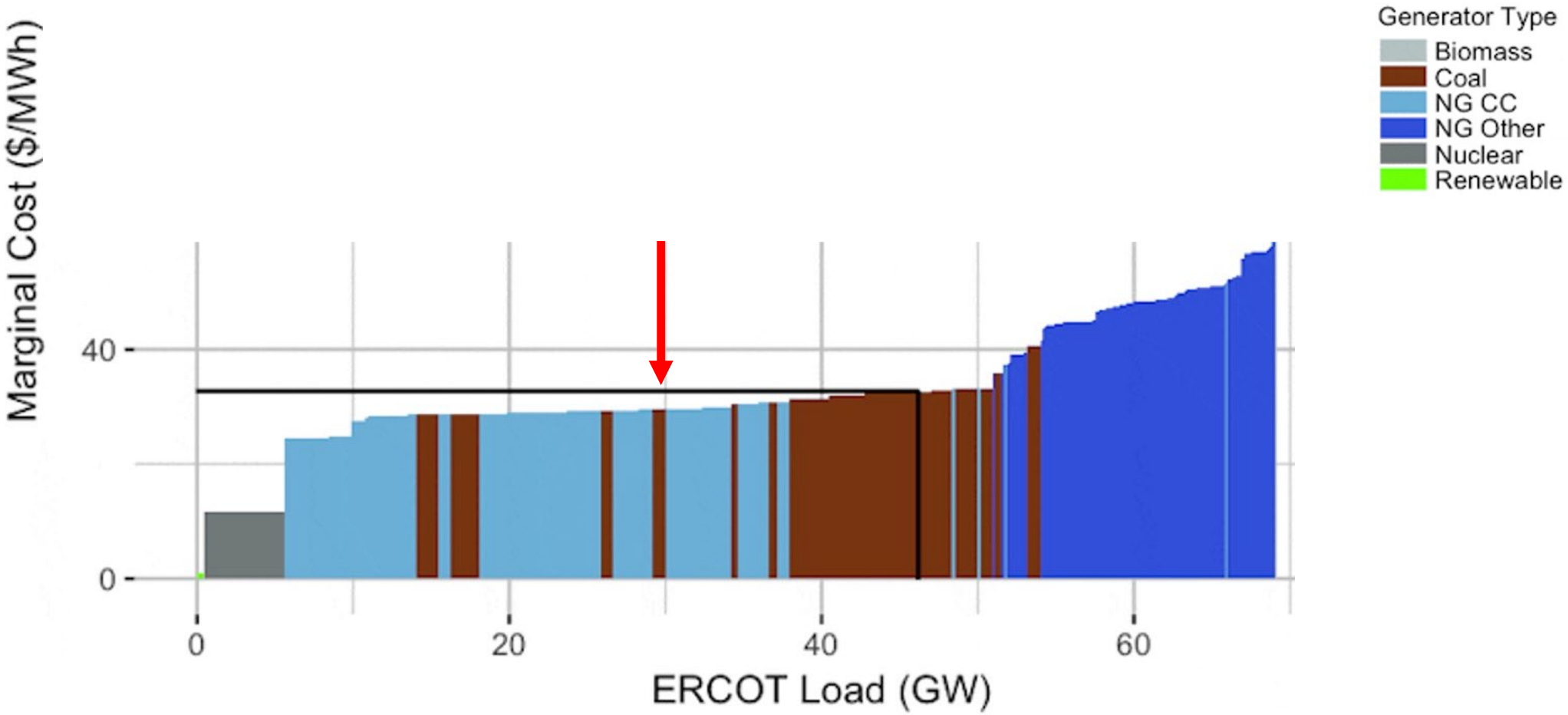
**Soon to be announced**

Carbon removal
Blockchain

**Exploring**

Hydrogen

# C&I's main question: what's the emissions *impact* of shifting load?



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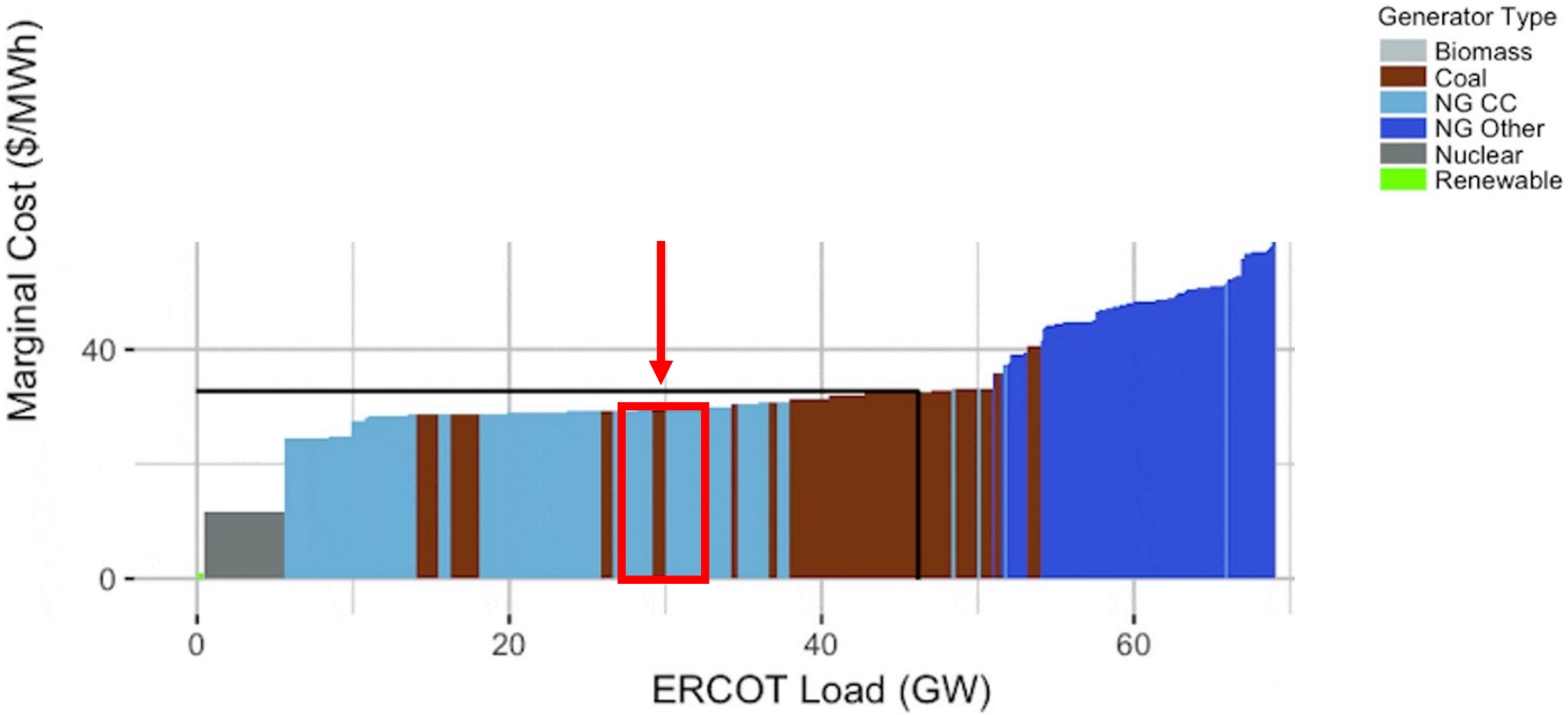

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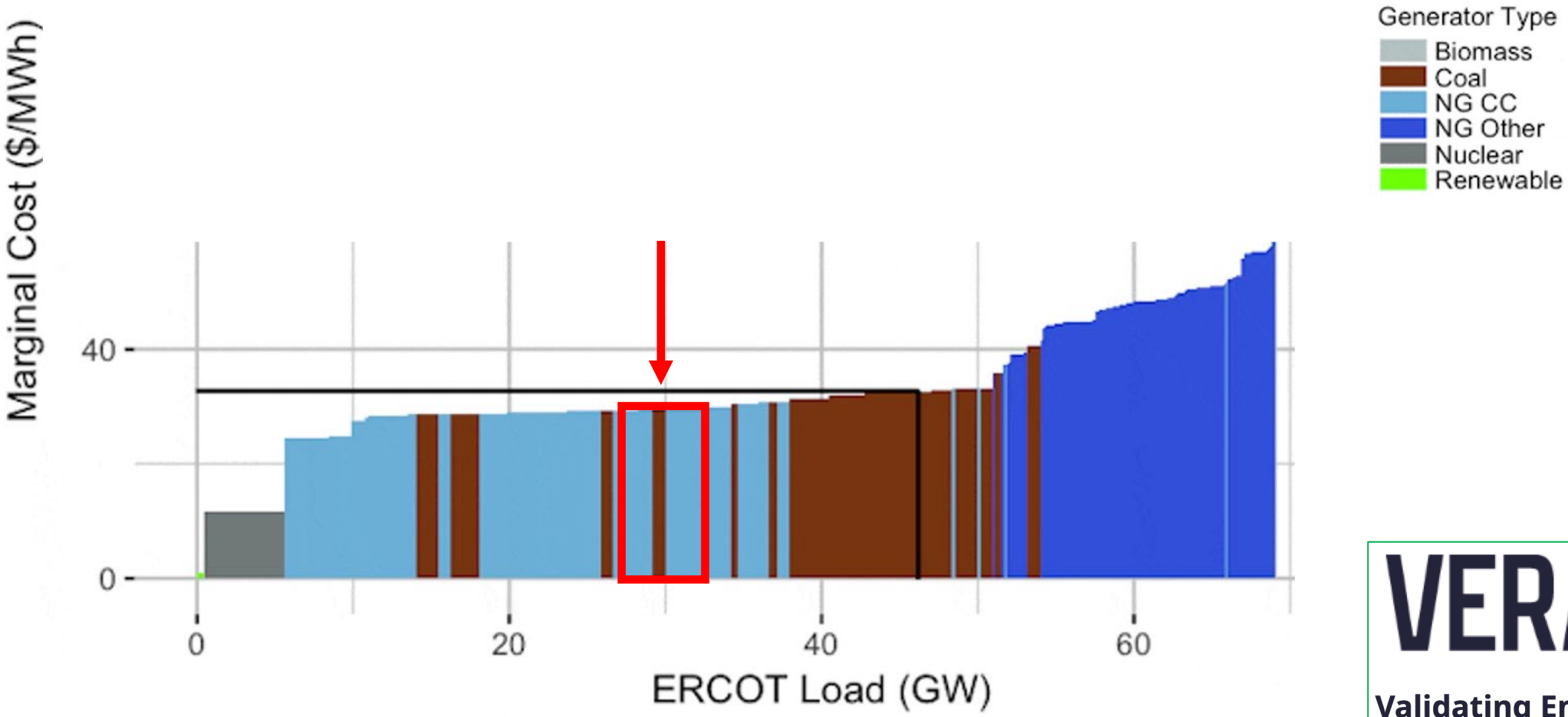



VERACI T

**Validating Emissions Rates for Accurate Consequential Impact Taskforce**

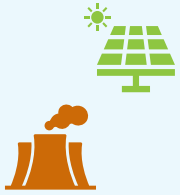
**Where** we site wind and solar

# 5 Gt

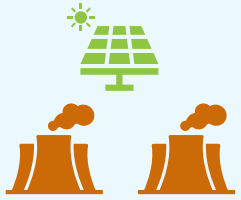
# Even larger potential to reduce emissions by optimizing siting

The exact same solar panel reduces global carbon dioxide emissions by about…

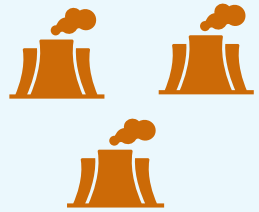
**500**
lbs/hour if it's in San Francisco, CA



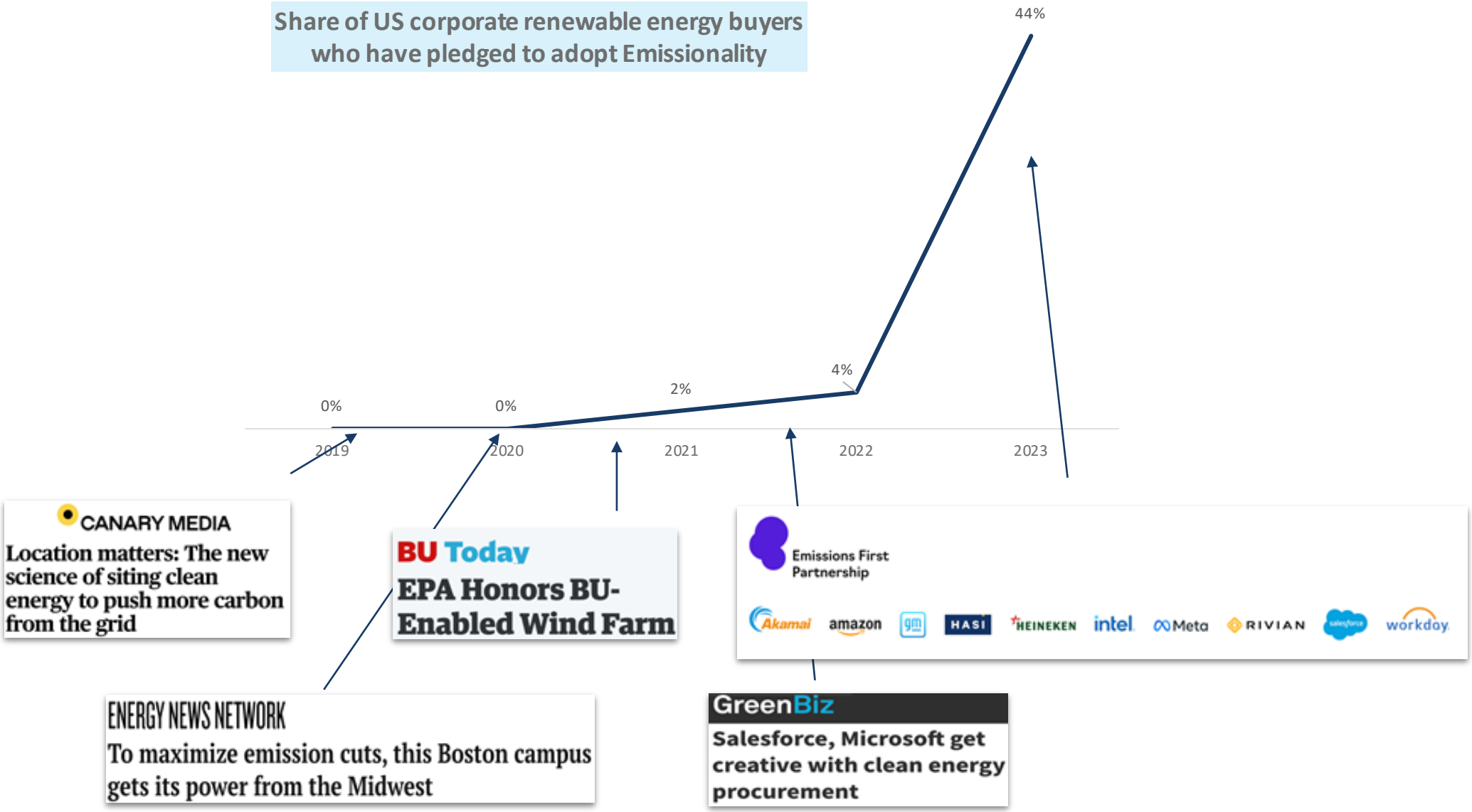
**1,400**
lbs/hour if it's in Charleston, WV



**2,600**
lbs/hour if it's in New Delhi, India



# Unsurprisingly, it's growing even faster



# Comparing optimization strategies

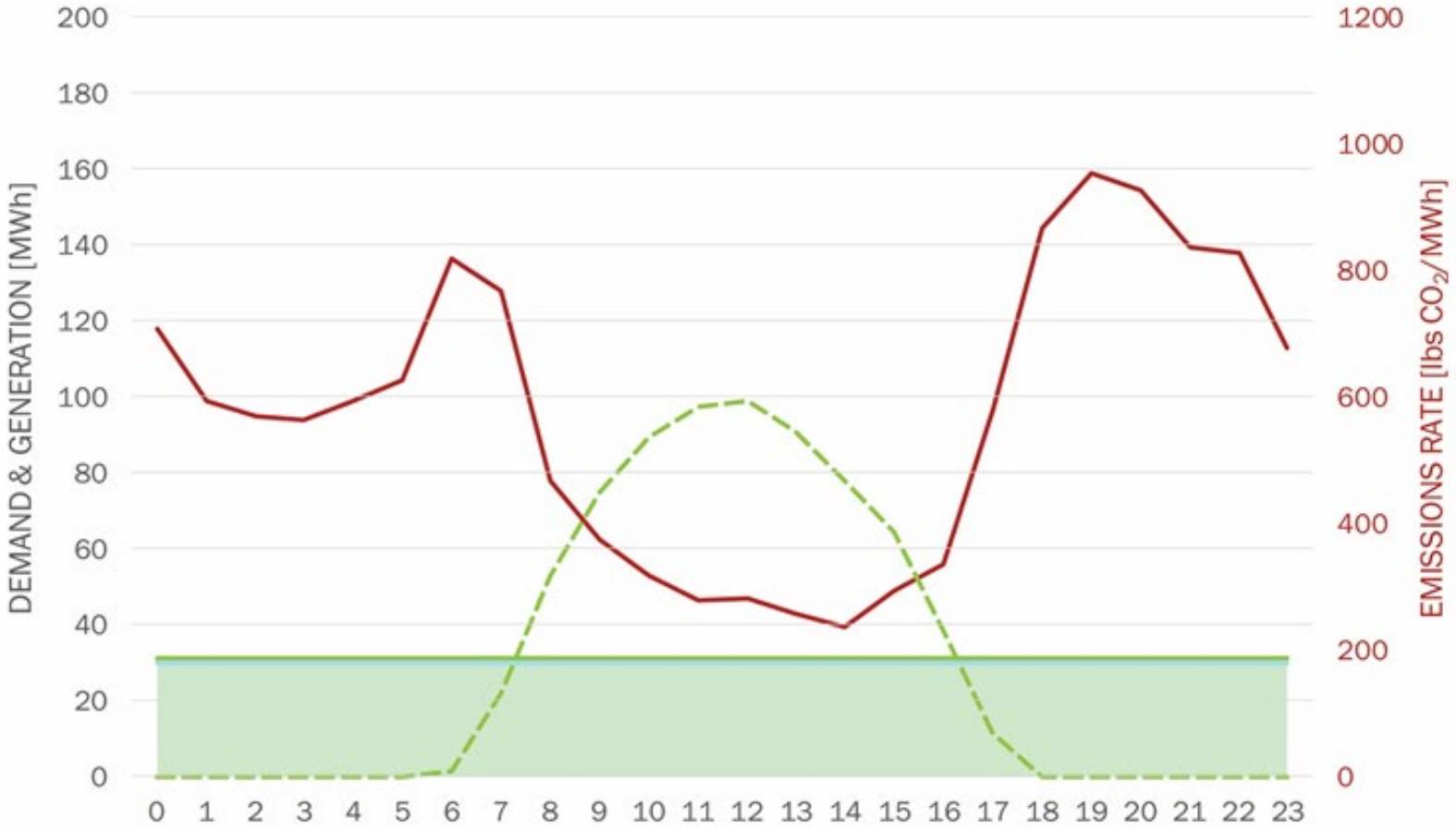
# Comparing emissions optimization strategies

## 1. No optimization


| | Load Emissions | Generation Emissions | Net Emissions |
|---|---|---|---|
| **1** | **187 tons** | **-106 tons** | **81 tons** |
| | | | |
| | | | |
| | | | |

# Comparing emissions optimization strategies

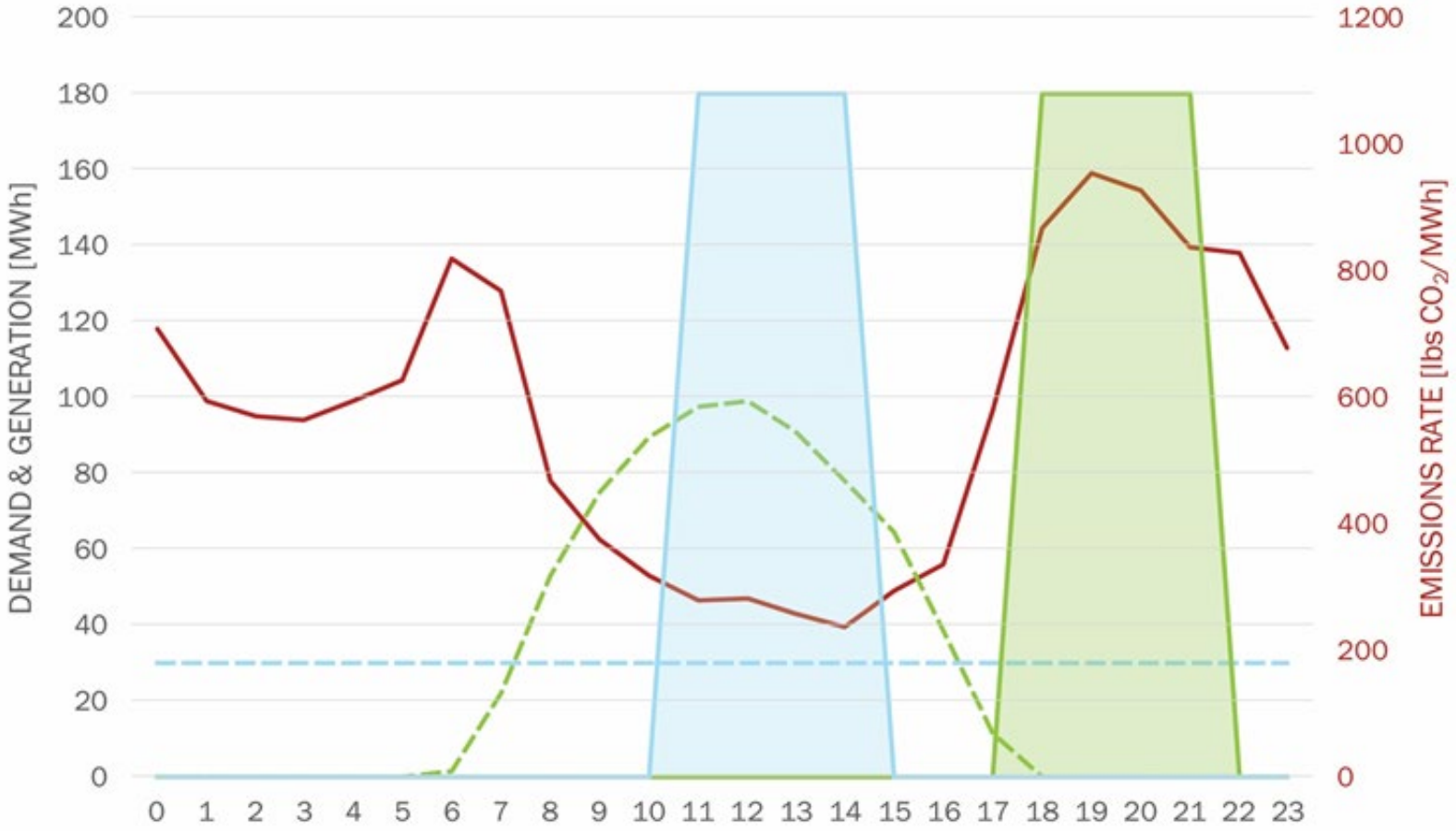
## 2. Optimizing to “three pillars” (deliverable and hourly-matched)




| | Load Emissions | Generation Emissions | Net Emissions |
|---|---|---|---|
| 1 | 187 tons | -106 tons | 81 tons |
| **2** | **187 tons** | **-187 tons** | **0 tons** |
| | | | |
| | | | |

# Comparing emissions optimization strategies

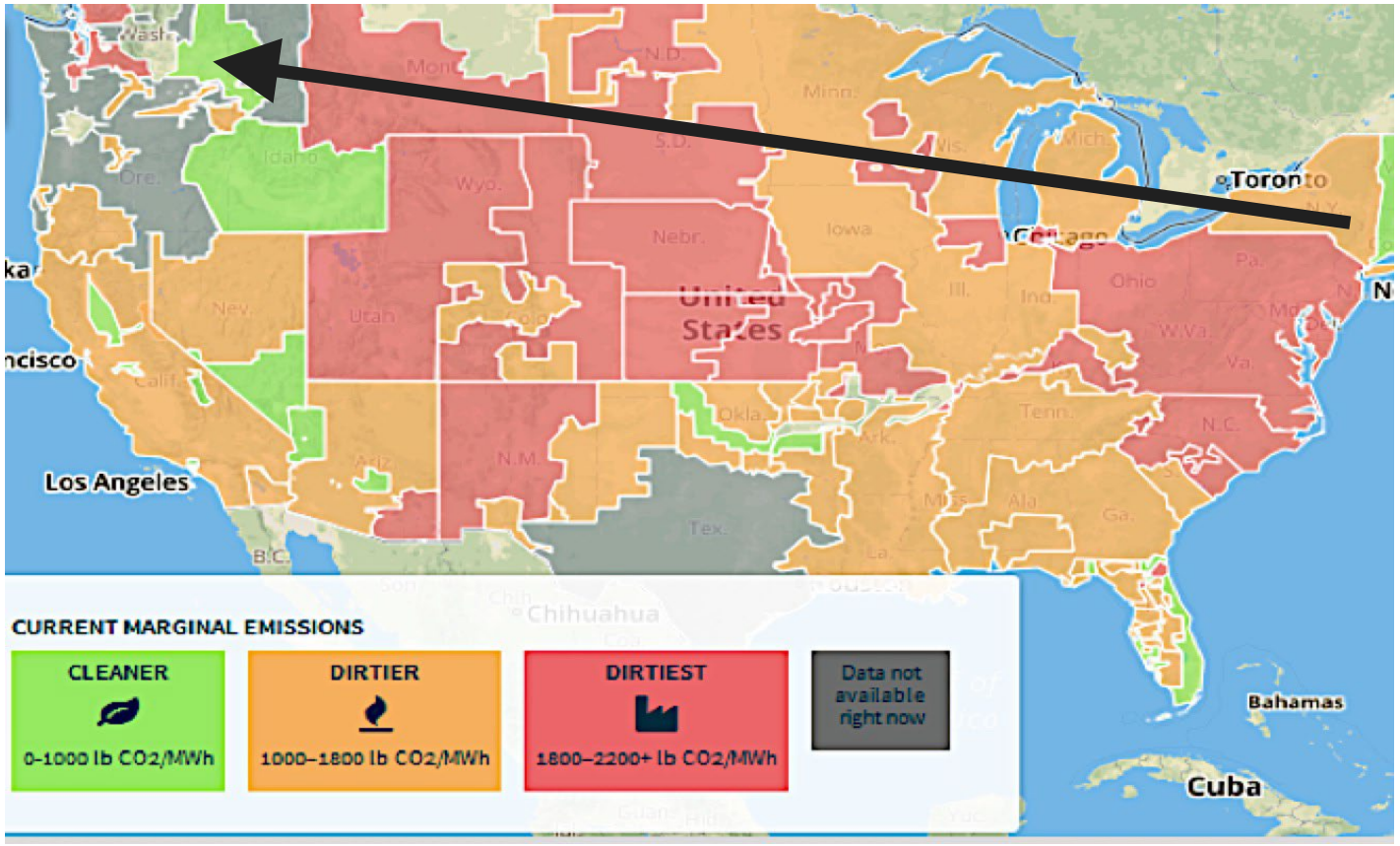
## 3. Optimizing timing to minimize emissions




| | Load Emissions | Generation Emissions | Net Emissions |
|---|---|---|---|
| 1 | 187 tons | -106 tons | 81 tons |
| 2 | 187 tons | -187 tons | 0 tons |
| 3 | **86 tons** | **-292 tons** | **-206 tons** |
| | | | |

# Comparing emissions optimization strategies

## 4. Optimizing place to minimize emissions




| | Load Emissions | Generation Emissions | Net Emissions |
|---|---|---|---|
| 1 | 187 tons | -106 tons | 81 tons |
| 2 | 187 tons | -187 tons | 0 tons |
| 3 | 86 tons | -292 tons | -206 tons |
| **4** | **187 tons** | **-609 tons** | **-422 tons** |

# Thank you!

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