Clean Coalition

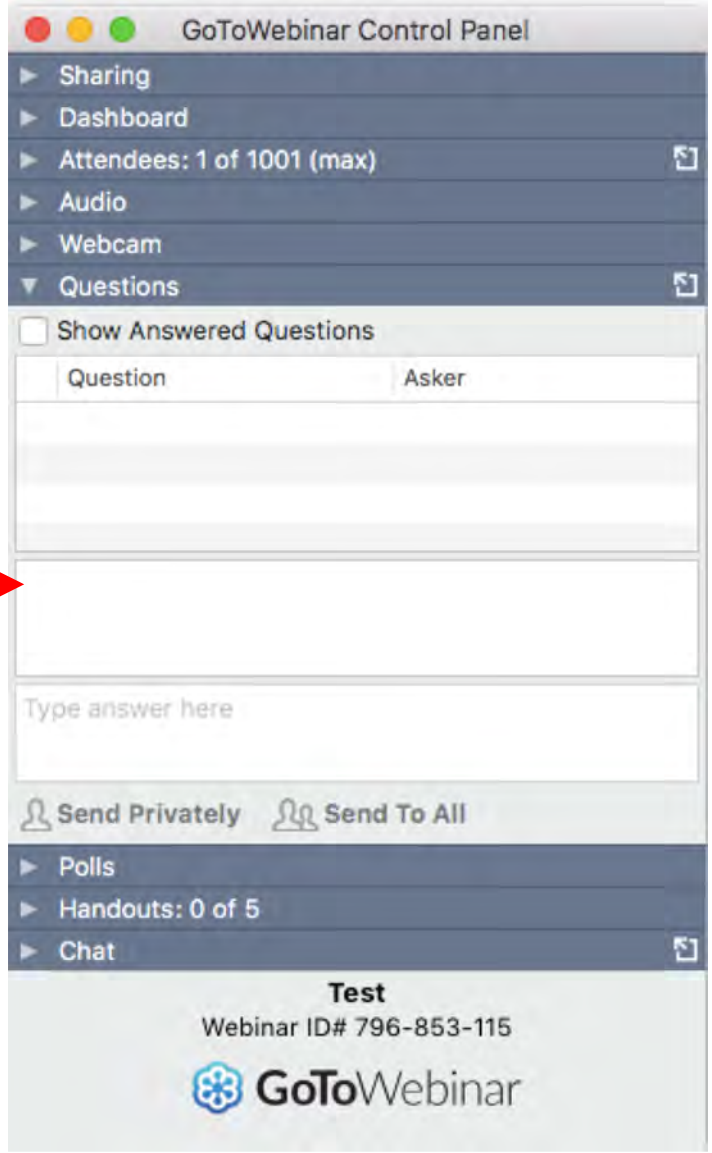
A leading load management solution for microgrids and demand response

Craig Lewis
Executive Director
Clean Coalition

Logan Rosevear
Application Engineer
Atom Power

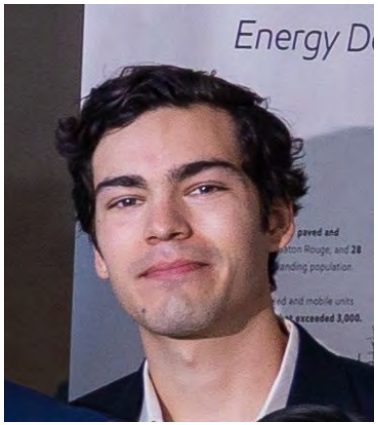
GoToWebinar FAQ

- Webinar recording and slides will be sent to registered attendees within two business days.
- All webinars are archived on clean-coalition.org, under Events.
- Submit questions in the Question pane at any time during the webinar.
  - View varies by operating system and browser.
- Questions will be answered during the Q&A portion of the webinar.
- For other questions, contact Rosana Francescato: rosana@clean-coalition.org



Presenters

Craig Lewis, Executive Director of the Clean Coalition, has over 30 years of experience in the renewables, wireless, semiconductor, and banking industries. Previously VP of Government Relations at GreenVolts, he was the first to successfully navigate a solar project through California's Renewable Portfolio Standard solicitation process. Craig was energy policy lead on Steve Westly's 2006 California gubernatorial campaign. His resume includes senior government relations, corporate development, and marketing positions at leading wireless, semiconductor, and banking companies such as Qualcomm, Ericsson, and Barclays Bank. Craig received an MBA and MSEE from the University of Southern California and a BSEE from the University of California, Berkeley.



Logan Rosevear, Application Engineer at Atom Power, has firsthand experience in the industrial and energy industries. Logan creates reference designs, coordination studies, useful tools, and market research that helps Atom Power products get applied to real-life applications. Previously, Logan worked at Commonwealth Associates, Inc., as a Protection and Control Engineer responsible for design and project completion of multi-million-dollar utility substations for AEP, and at ExxonMobil, where he was responsible for analyzing risks and costs at their Baton Rouge Refinery. Logan obtained a Masters of Global Engineering from the Ohio State University, as well as a Bachelors of Science in Electrical and Computer Engineering. He also has an active Professional Engineering license specializing in Electrical Power through the state of Michigan.

Clean Coalition

Monitoring, Communications & Control (MC2)

Core of Solar Microgrids & Community Microgrids

Craig Lewis
Executive Director
Clean Coalition
650-796-2353 mobile
craig@clean-coalition.org

Community Microgrids require three MC2 levels

Clean Coalition

1) **Grid** level: Grid Isolation Switches are needed to isolate target grid areas when the broader grid is down.

2) **Customer meter** level: Smart meters need to be able to turn customer meters on & off according to customer contracts, facility tiering, and energy availability.

3) **Behind-the-meter (BTM)** level: Individual onsite circuits need to be able to be turned on & off, and individual onsite loads need to be able to be turned on & off, or attenuated, depending on energy availability and economic opportunities.

Facility & Load tiers of a Community Microgrid

Clean Coalition

Facility tiers

Load tiers	Tier 1 facility	Tier 2 facility	Tier 3 facility
Tier 1 load			
Tier 2 load			
Tier 3 load			

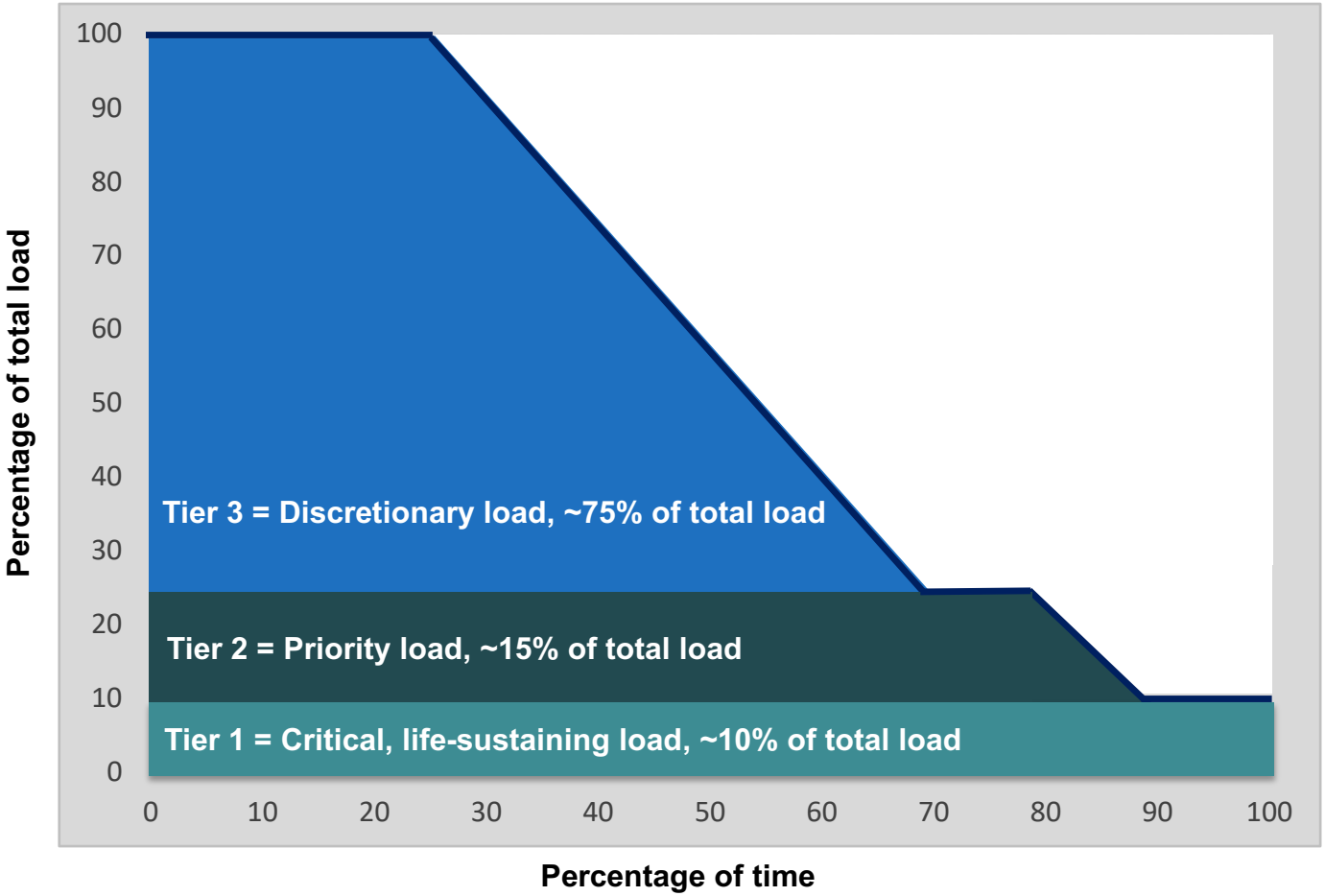
= Critical for the entire community, such as Tier 1 loads at Tier 1 facilities like fire stations

= Priority for the entire community, such as Tier 2 loads at Tier 1 facilities and Tier 1 loads at Tier 2 facilities like multi-unit housing facilities that can provide safe and easy sheltering in place

= Priority for individual facilities but not the entire community

= Discretionary loads that are not impactful to the community, whether on or off

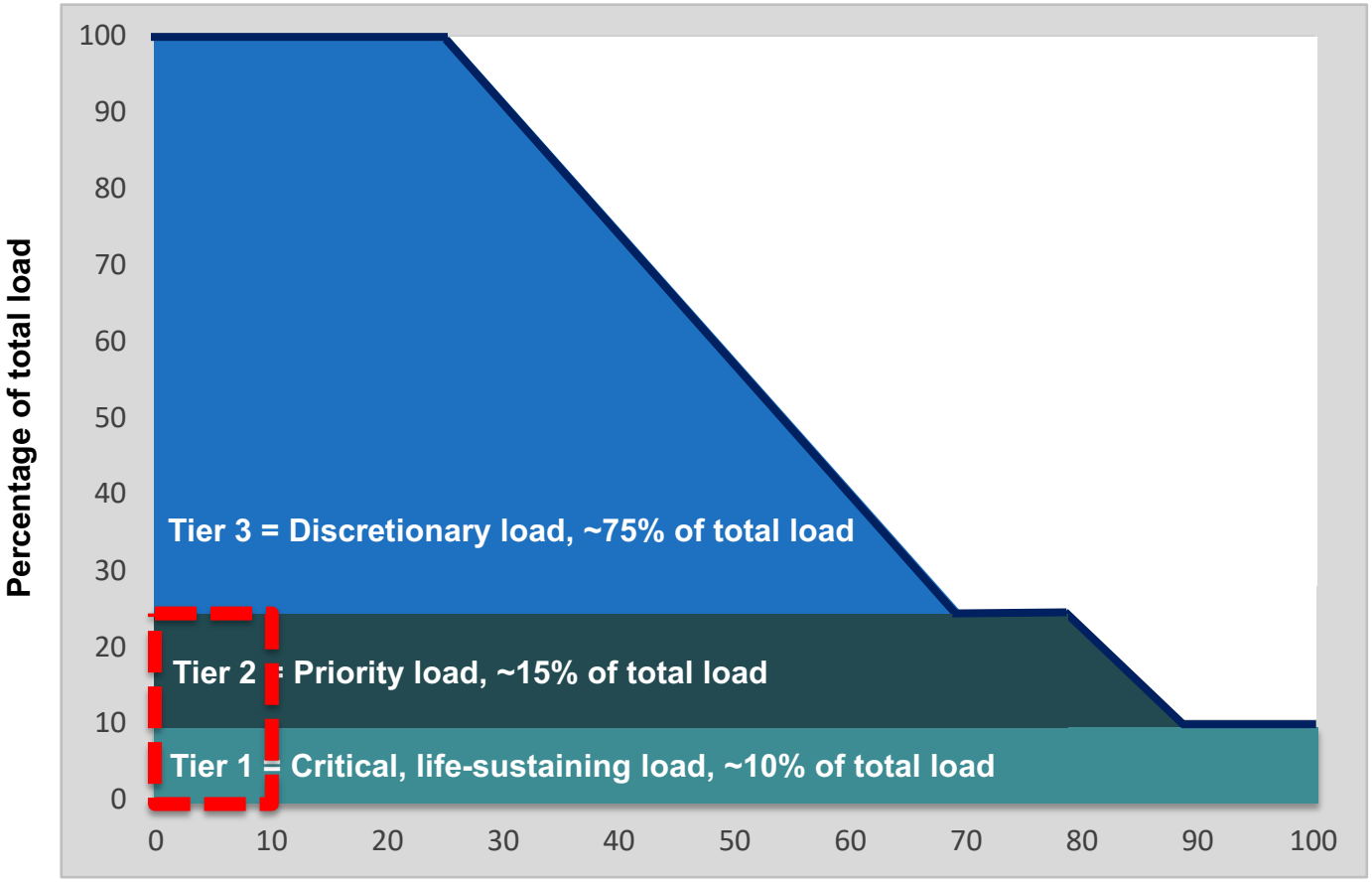
Typical load tier resilience from Solar Microgrids



Percentage of time online for Tier 1, 2, and 3 loads for a Solar Microgrid designed for the University of California Santa Barbara (UCSB) with enough solar to achieve net zero and 200 kWh of energy storage per 100 kW solar.

Diesel generators are designed for limited resilience

Clean Coalition



A typical diesel generator is configured to maintain 25% of the normal load for two days. If diesel fuel cannot be resupplied within two days, goodbye. This is hardly a solution for increasingly necessary long-term resilience. In California, Solar Microgrids provide a vastly superior trifecta of economic, environmental, and resilience benefits.

Goleta Load Pocket (GLP) Community Microgrid

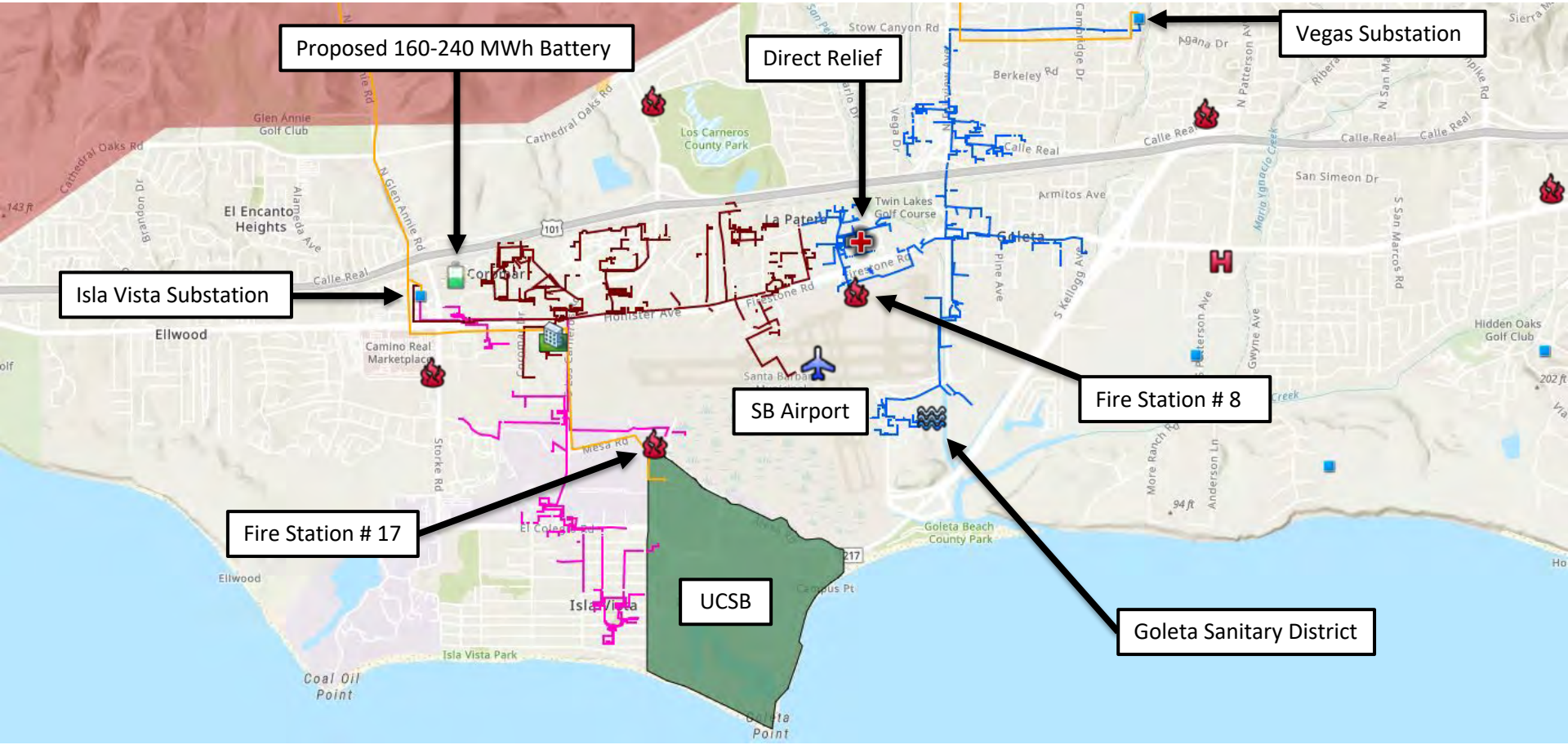
Clean Coalition

The GLP is the perfect opportunity for a comprehensive Community Microgrid

- GLP spans 70 miles of California coastline, from Point Conception to Lake Casitas, encompassing the cities of Goleta, Santa Barbara (including Montecito), and Carpinteria.
- GLP is highly transmission-vulnerable and disaster-prone (fire, landslide, earthquake).
- **200 megawatts (MW) of solar and 400 megawatt-hours (MWh) of energy storage** will provide 100% protection to GLP against a complete transmission outage ("N-2 event").
  - 200 MW of solar is equivalent to about 5 times the amount of solar currently deployed in the GLP and represents about 25% of the energy mix.
  - Multi-GWs of solar siting opportunity exists on commercial-scale built environments like parking lots, parking structures, and rooftops; and 200 MW represents about 7% of the technical siting potential.
  - Other resources like energy efficiency, demand response, and offshore wind can significantly reduce solar+storage requirements.

Target 66kV feeder serves critical GLP loads

Clean Coalition

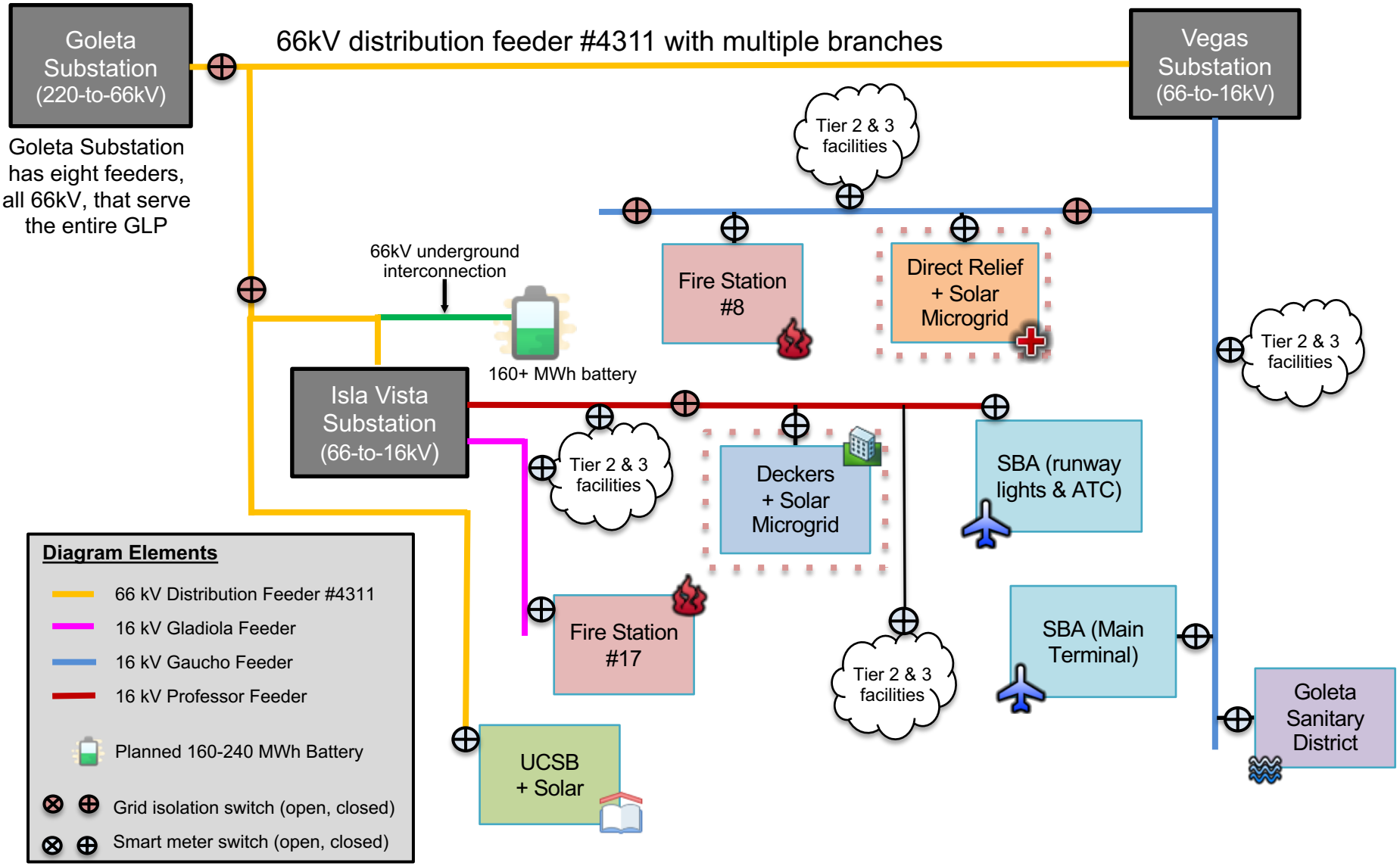


Legend

- 220 kV Transmission
- 66 kV Feeder #4311
- Substations
- 16kV Gladiola Feeder
- 16kV Gaucho Feeder
- 16kV Professor Feeder
- Santa Barbara Airport
- Tier 3 Fire Threat
- University of California Santa Barbara
- Fire Stations
- Sanitary or Water Districts
- Goleta Valley Cottage Hospital
- Direct Relief
- Deckers
- Proposed 160-240 MWh Battery

Target 66kV feeder grid area block diagram

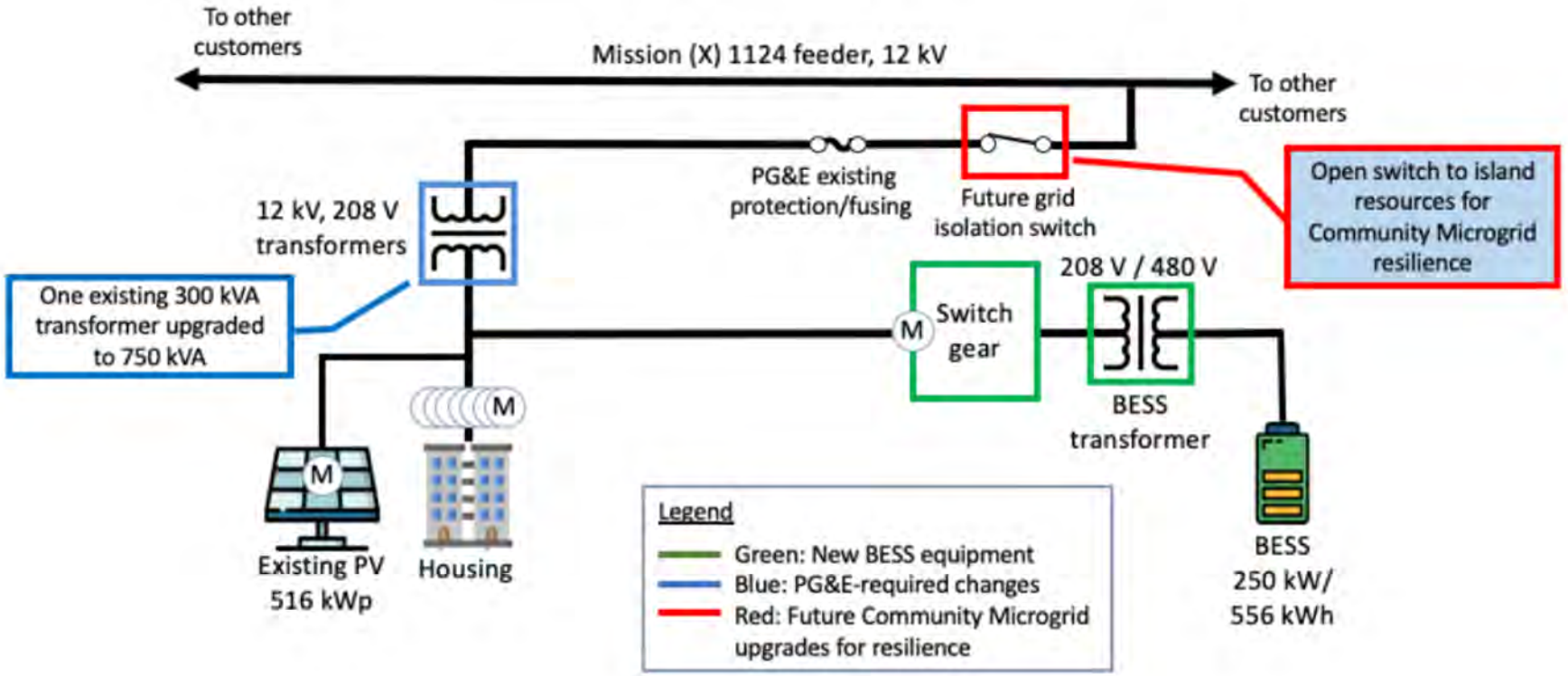
Clean Coalition



Valencia Gardens Apartments in San Francisco

Clean Coalition

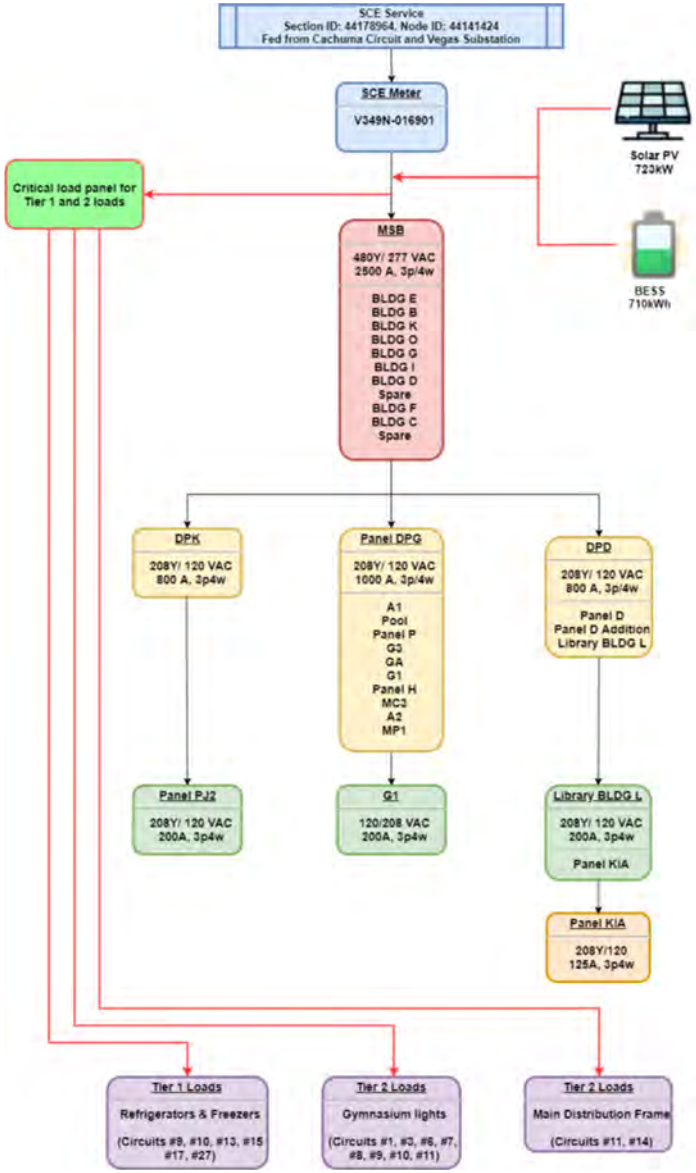
Future VGES Community Microgrid opportunity



Load Management is fundamental to VOR123

Although there are multiple potential Load Management configurations, the minimal functionality anticipated to be cost-effectively implemented is referred to as **the Critical Load Panel (CLP) approach**.

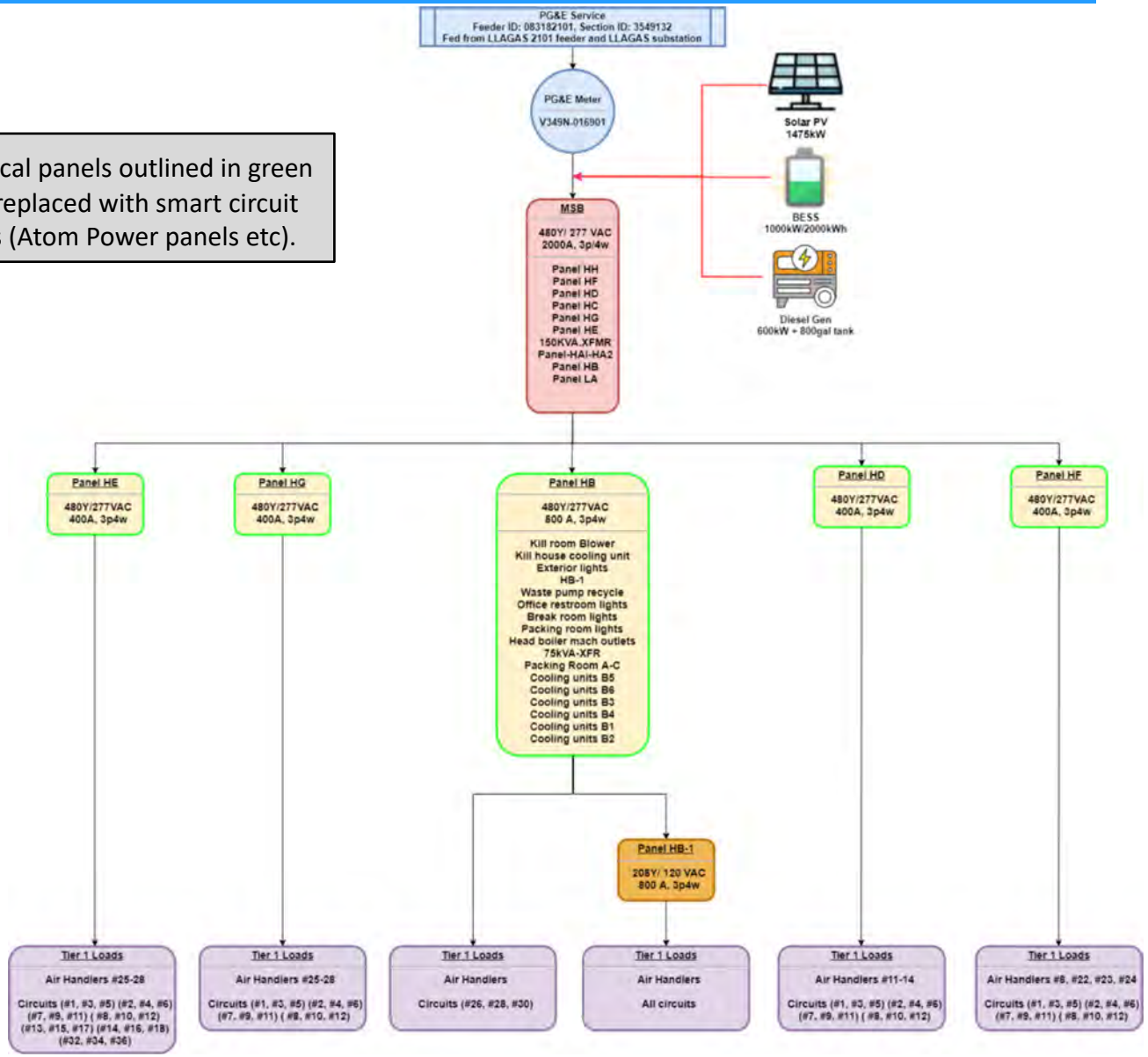
The CLP name reflects the requirement for a smart critical load panel that maintains Tier 1 loads indefinitely and toggles Tier 2 loads. In the CLP approach, Tier 3 loads will be toggled as a group by toggling power to the Main Service Board (MSB). Figure 9 illustrates the CLP approach for SMHS, with Tier 1 and Tier 2 loads being served by new dedicated wire runs that connect to a new smart critical load panel.



Circuit Flow Diagram for a large C&I facility

Clean Coalition

Electrical panels outlined in green to be replaced with smart circuit panels (Atom Power panels etc).



EV charging can be critical – and economically viable

EV charger resilience requires BTM configuration

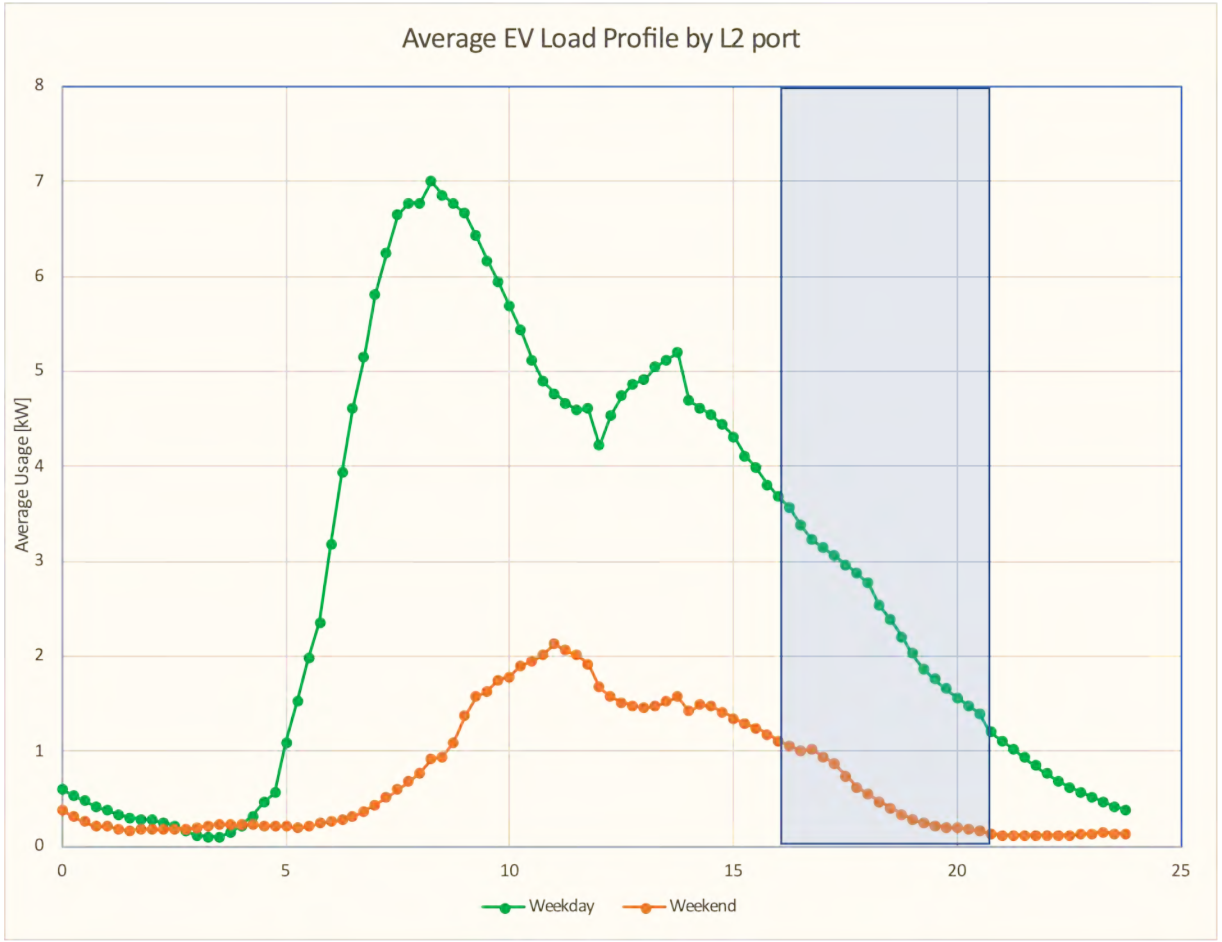
Clean Coalition

- If EV charging is on a dedicated meter, it cannot benefit from the resilience provided by a Solar Microgrid serving the main facility.
- Hence, some or all of the EV Charging Infrastructure (EVCI) should be configured behind-the-meter (BTM).
- EV charging load profiles can be easily developed and added to historical load profiles to perform net zero and economic analyses.

BTM EV charging is also required to optimize economic benefits from coming Policies & Market Mechanisms (P&MM) like those that can be reaped from vehicle-to-building capabilities.

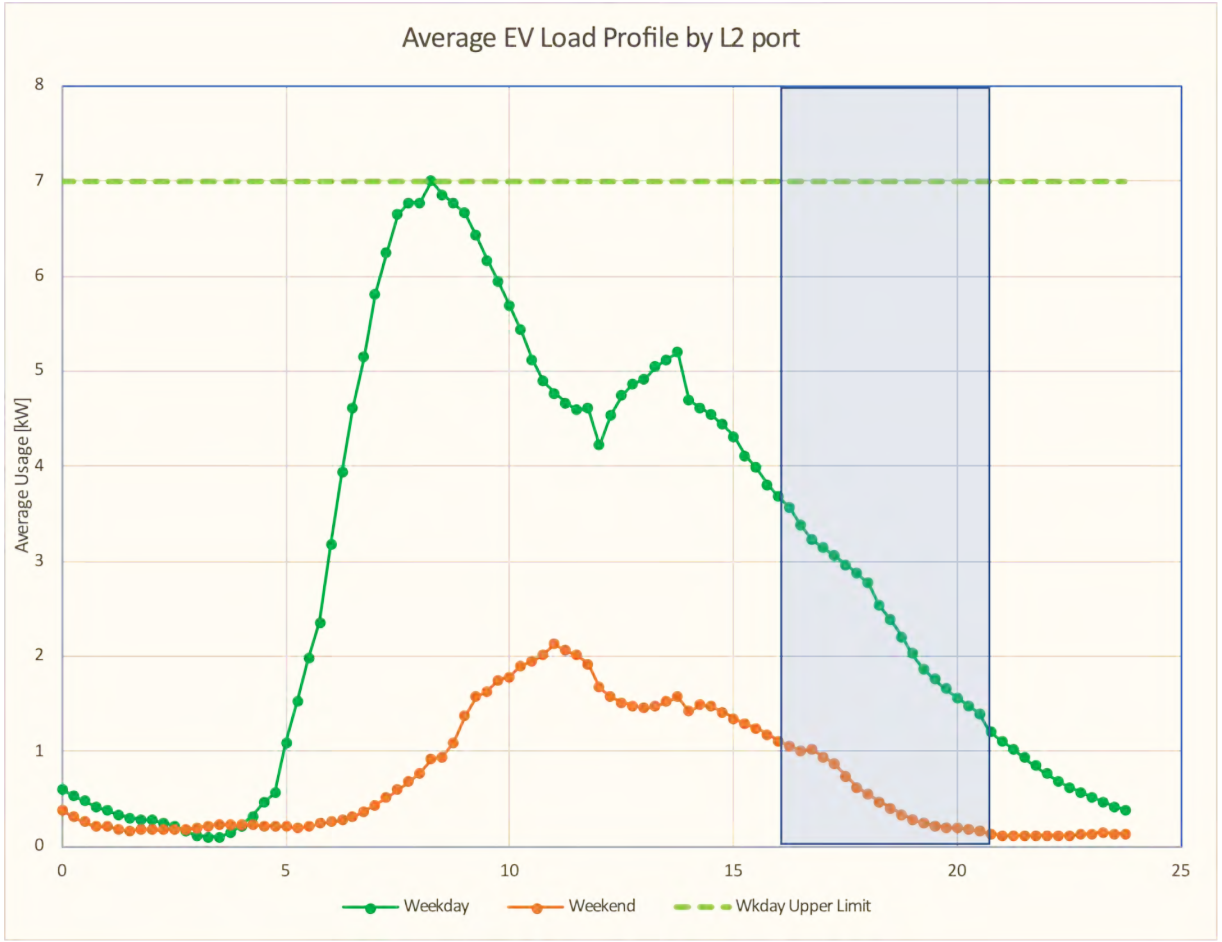
Typical office charging profile

- Weekday and weekend profiles for an office environment.
- Values show actual data gathered & averaged from a large bank of Level-2 (L2) charging ports capped at 7 kW.
- Note the weekday lunchtime curve as EVs are moved.
- The weekend (orange) curve does not reach the same peak as weekday because the lower utilization reduces the average value.



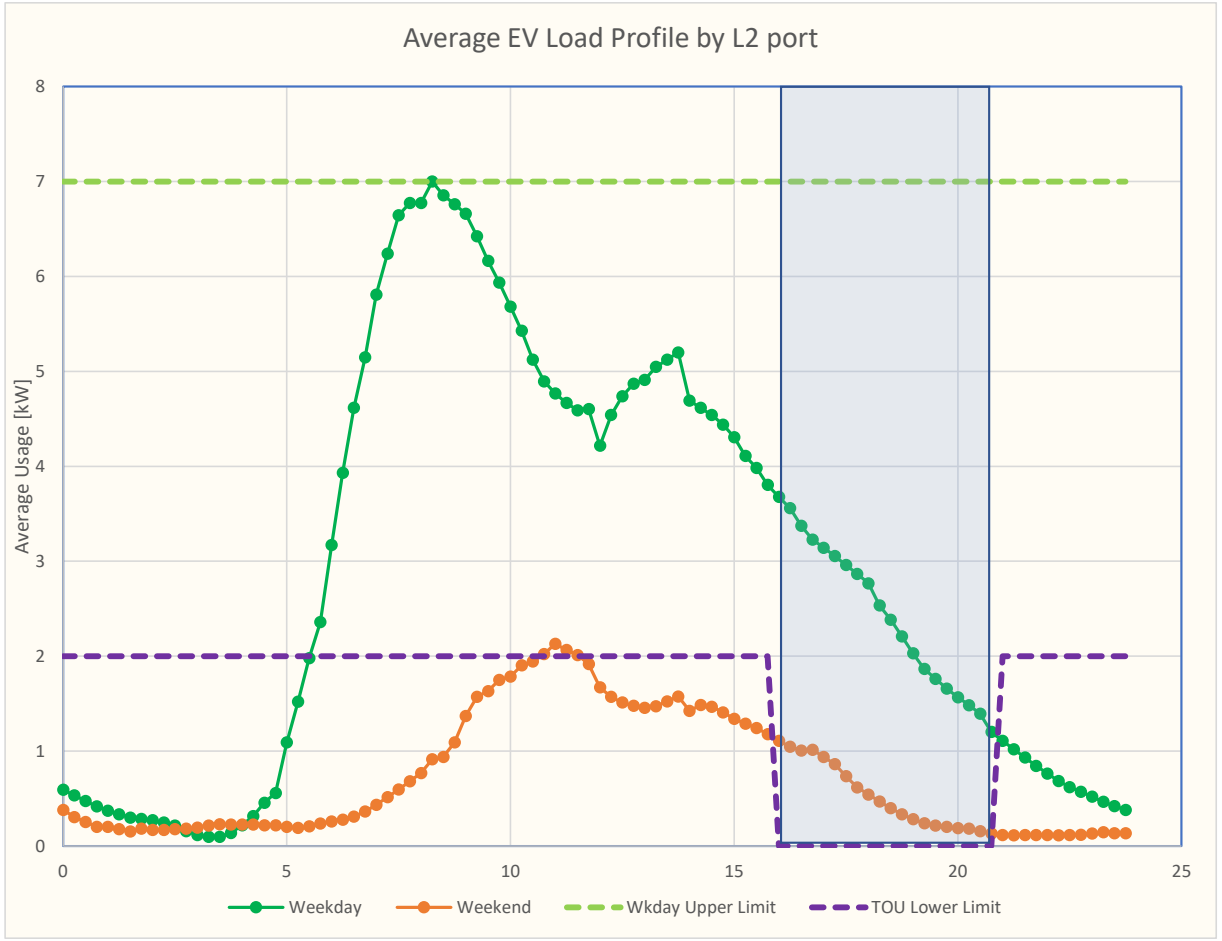
Economics could warrant EV charging constraints

- The only natural charging constraint is the power capacity of the L2 EV chargers, which is 7 kW for each port in this example.
- Economic considerations could warrant charging constraints that avoid excessive demand charges and/or minimize energy usage at peak energy rates.
- Additional economic considerations could result from monetizing demand response (DR) and other grid services.



Example profile for optimizing EV charging economics

- The purple line shows a maximum EV charging profile that could be set to avoid excessive demand charges and prohibit EV charging via peak energy rates.
- Such limits will be increasingly important as more EV charging proliferates.
- The constrained profile limits charging to 2 kW per port and completely prohibits charging during 4-9pm peak energy rates.



ATOM®
POWER

Maximizing Available Energy to Enable a Clean Tomorrow

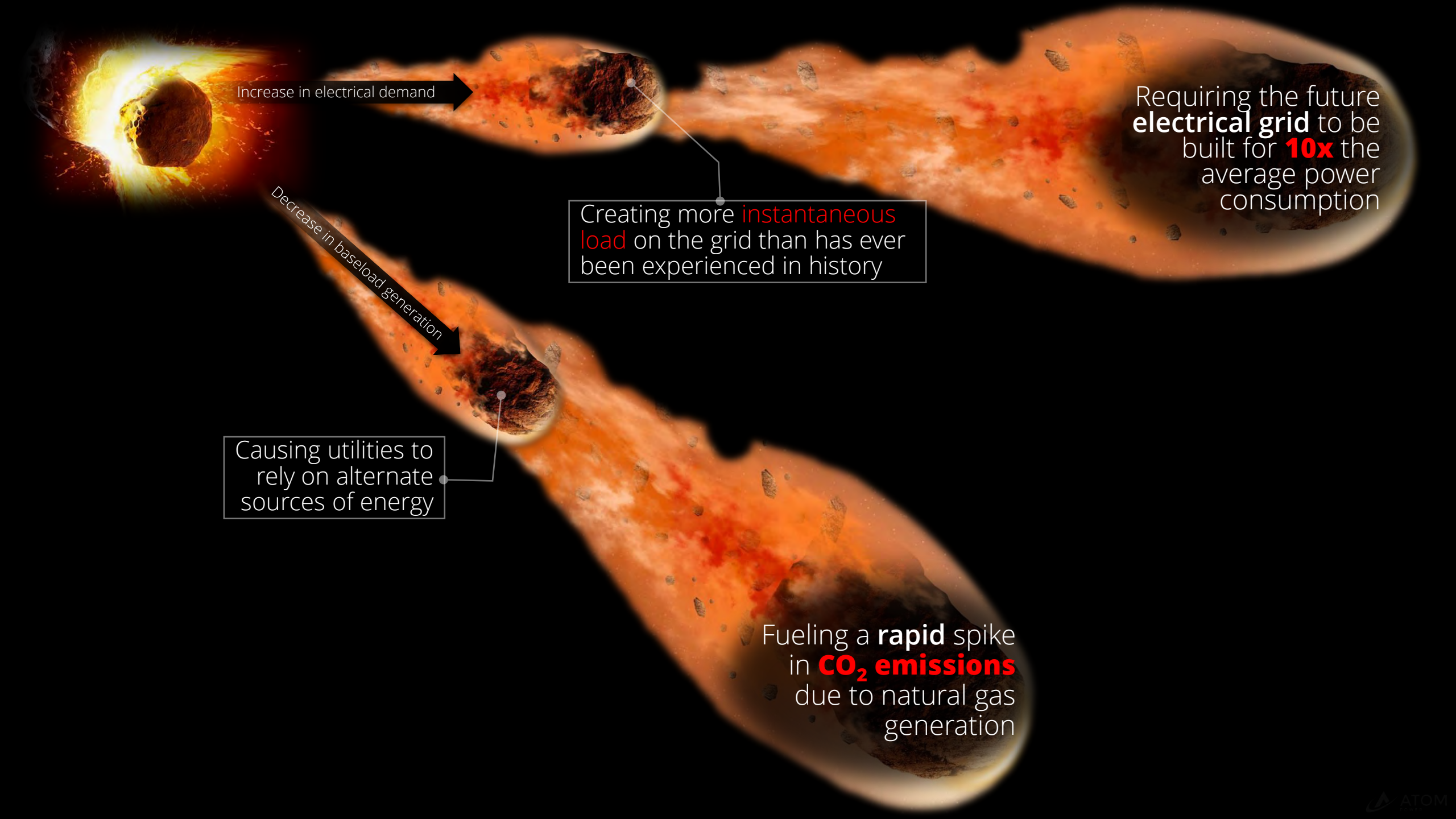
Designed & Built in North Carolina, USA

www.atompower.com

July 6, 2021

How could a new circuit breaker change the face of electricity as we know it?

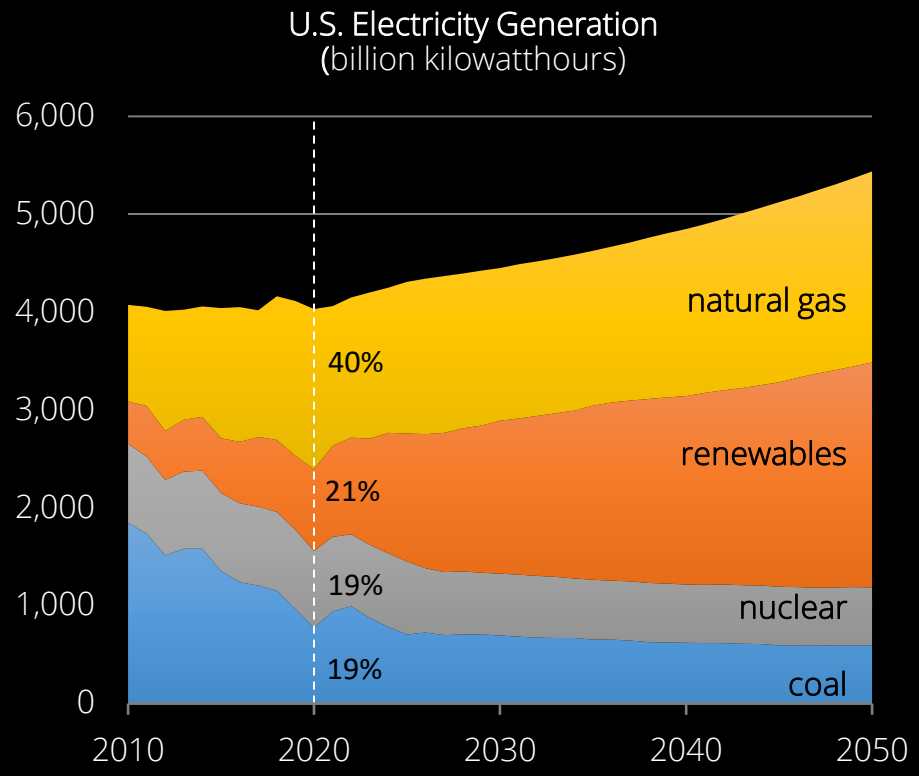
In the world of electrical power a collision is underway...


Increase in electrical demand
Creating more instantaneous load on the grid than has ever been experienced in history
Requiring the future **electrical grid** to be built for **10x** the average power consumption
Decrease in baseload generation
Causing utilities to rely on alternate sources of energy
Fueling a **rapid** spike in **CO_2 emissions** due to natural gas generation

Need data?

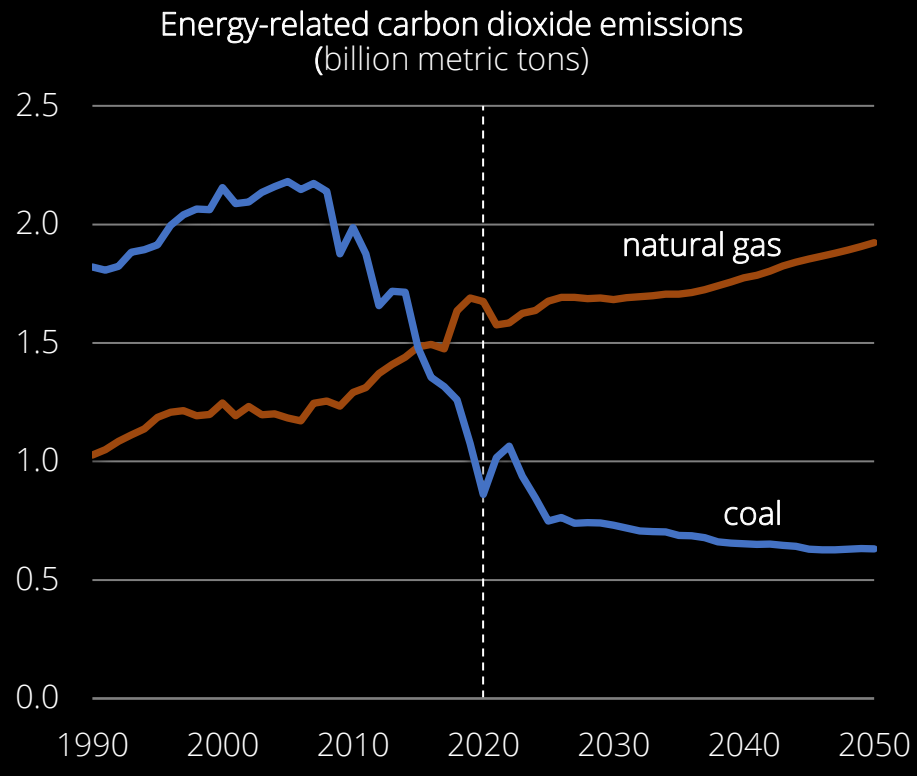
40%

of US generation is fueled by natural gas (2001 was 6.5%)



2X

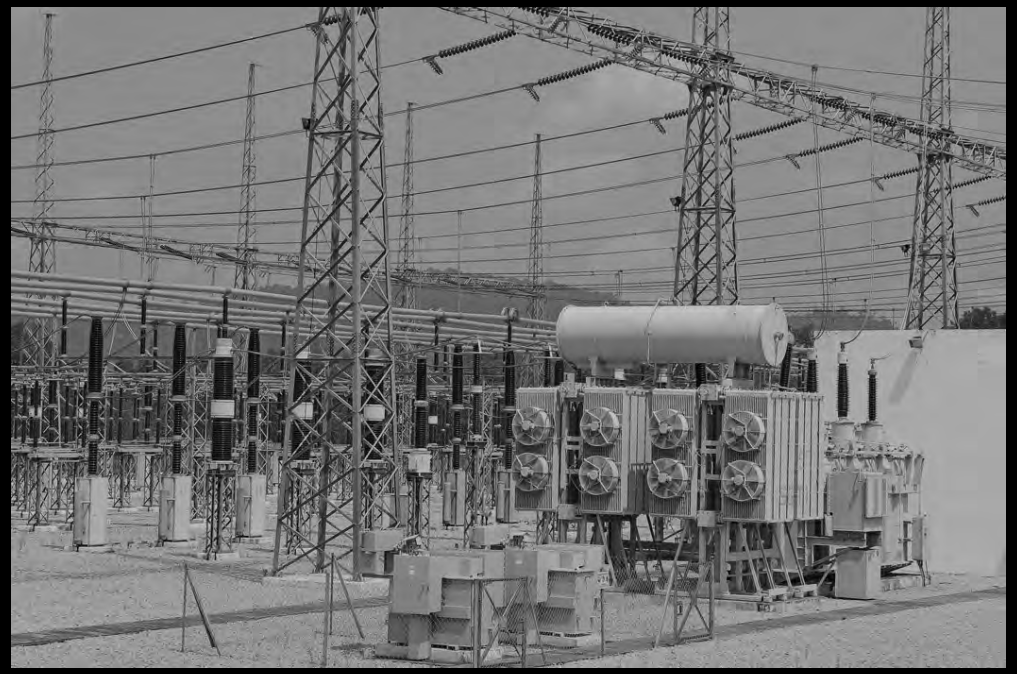
More CO_2 is emitted from natural gas than coal (and rising)



Sources: US Energy Information Administration AEO2021 Reference Case

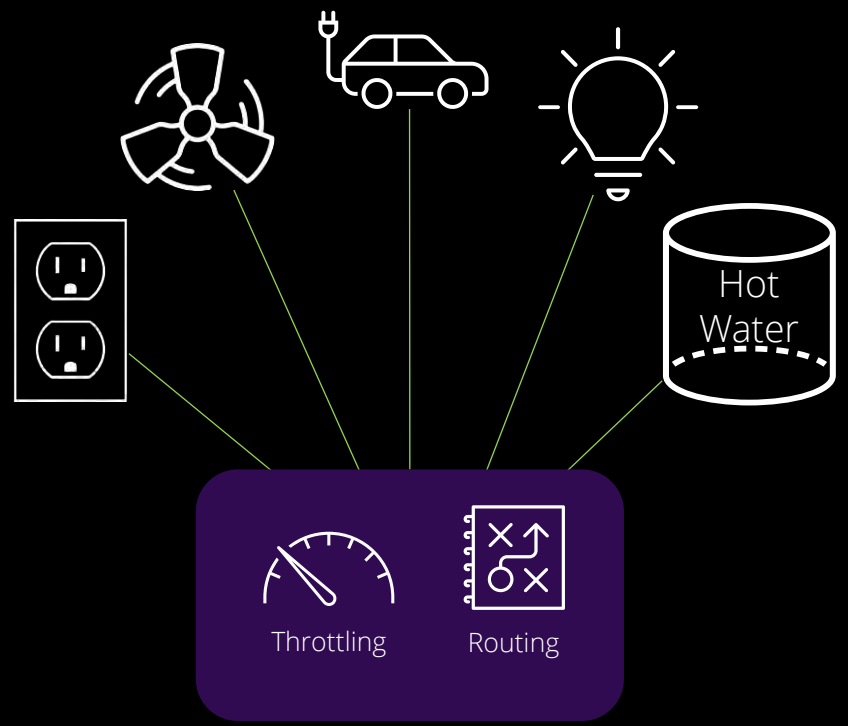
Two choices:

Increase Generation, Transmission & Distribution of Electricity



or

Increase Visibility & Control of Electrical Loads



Details of those Choices

Increase Generation:

Connected Load Approach

Build enough electrical generation, transmission, and distribution to accommodate the full electrical demand.

Pros: you'll have all power available

Cons:

- Extremely expensive
- Takes a long time
- Dramatic increase in greenhouse gas production

or

Increase Visibility & Control:

Managed Load Approach

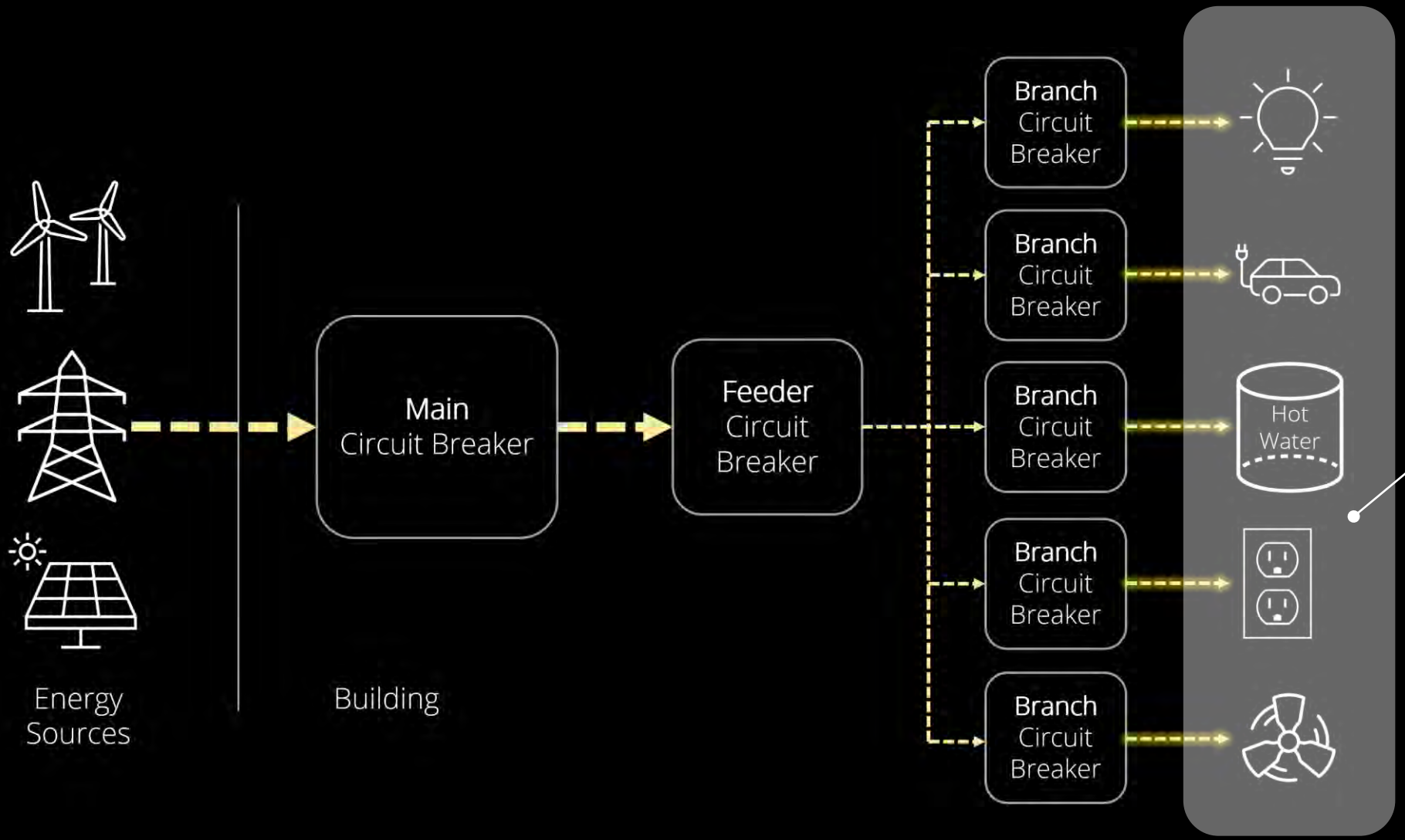
Manage the loads at their end use and "flatten the curve" of peak demand through Intelligent Demand Response.

Pros:

- Fractional cost of the Connected Load approach
- Dramatic reduction in greenhouse gases
- Can be implemented immediately
- Gains visibility and control granularly
- Lowers consumer electricity costs

Cons: hard to implement universally

The model of every electrical system in the world

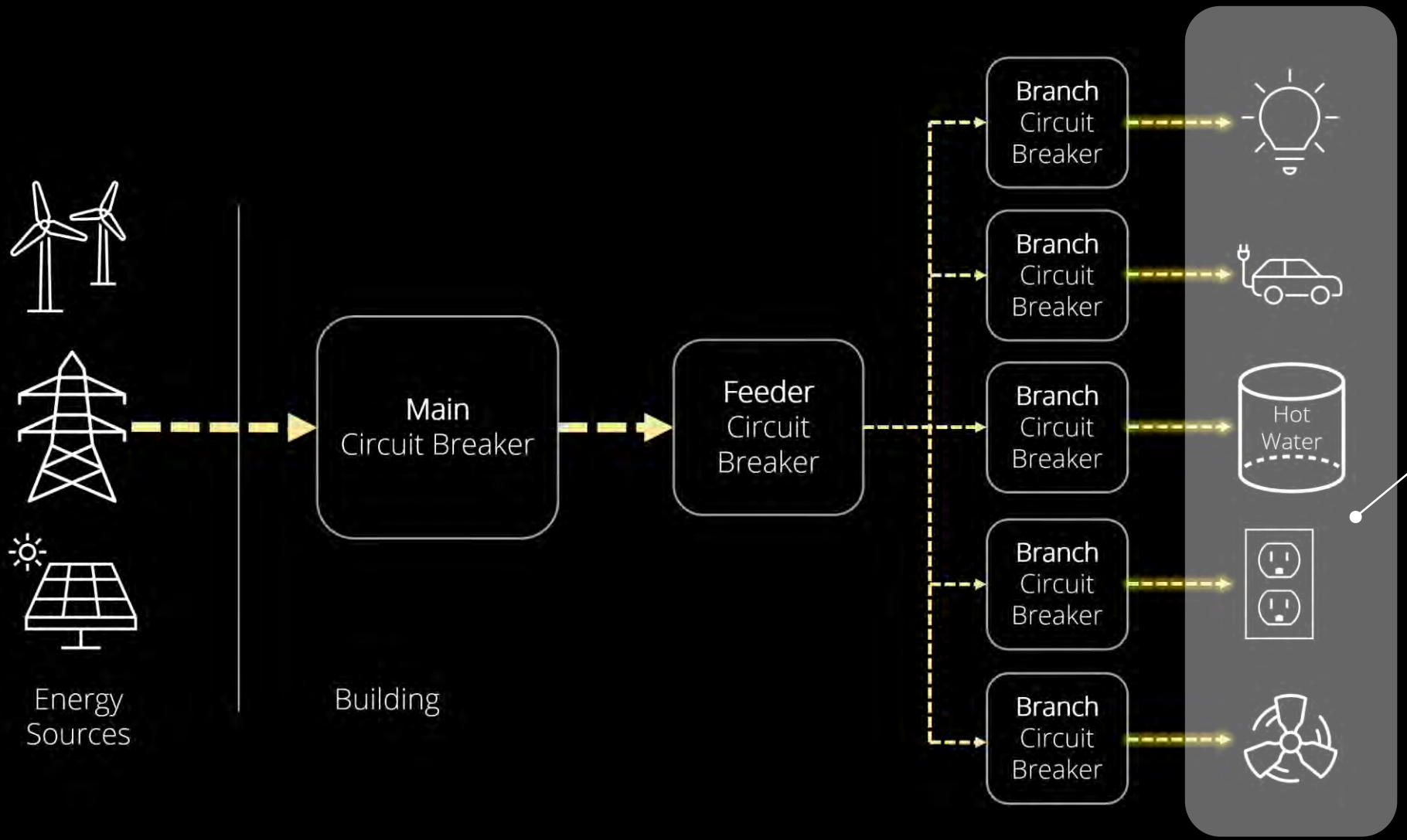


Important: ⚠

The electrical loads are what define the grid requirements

Generation, transmission, and distribution of electric power are dependent solely on the instantaneous electrical loads from consumers.

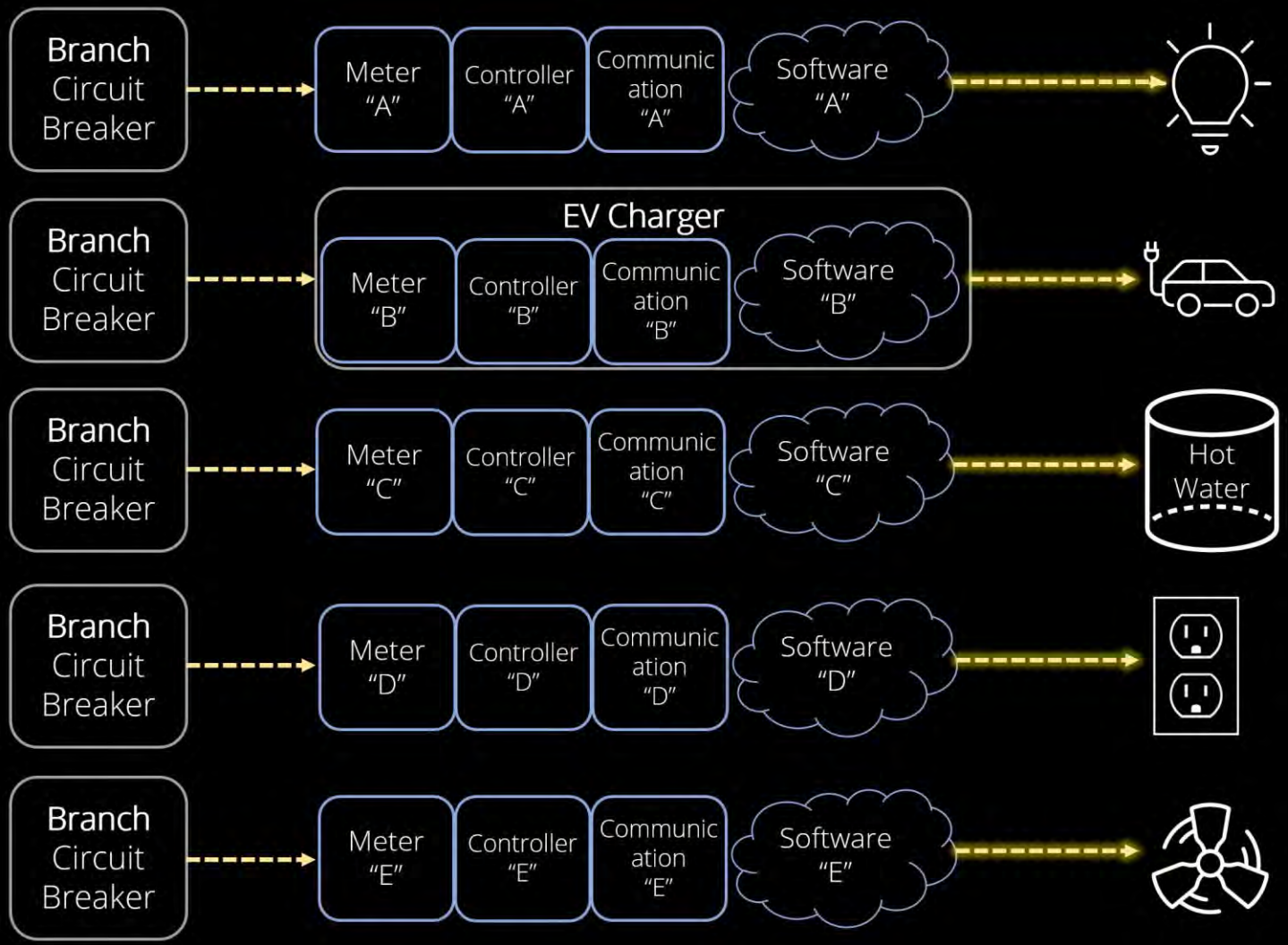
The model of every electrical system in the world



To universally have visibility and control of the grid, you need universal, intelligent, reliable, and highly secure devices here

....but all these loads are different, from different manufacturers and at different locations throughout a building

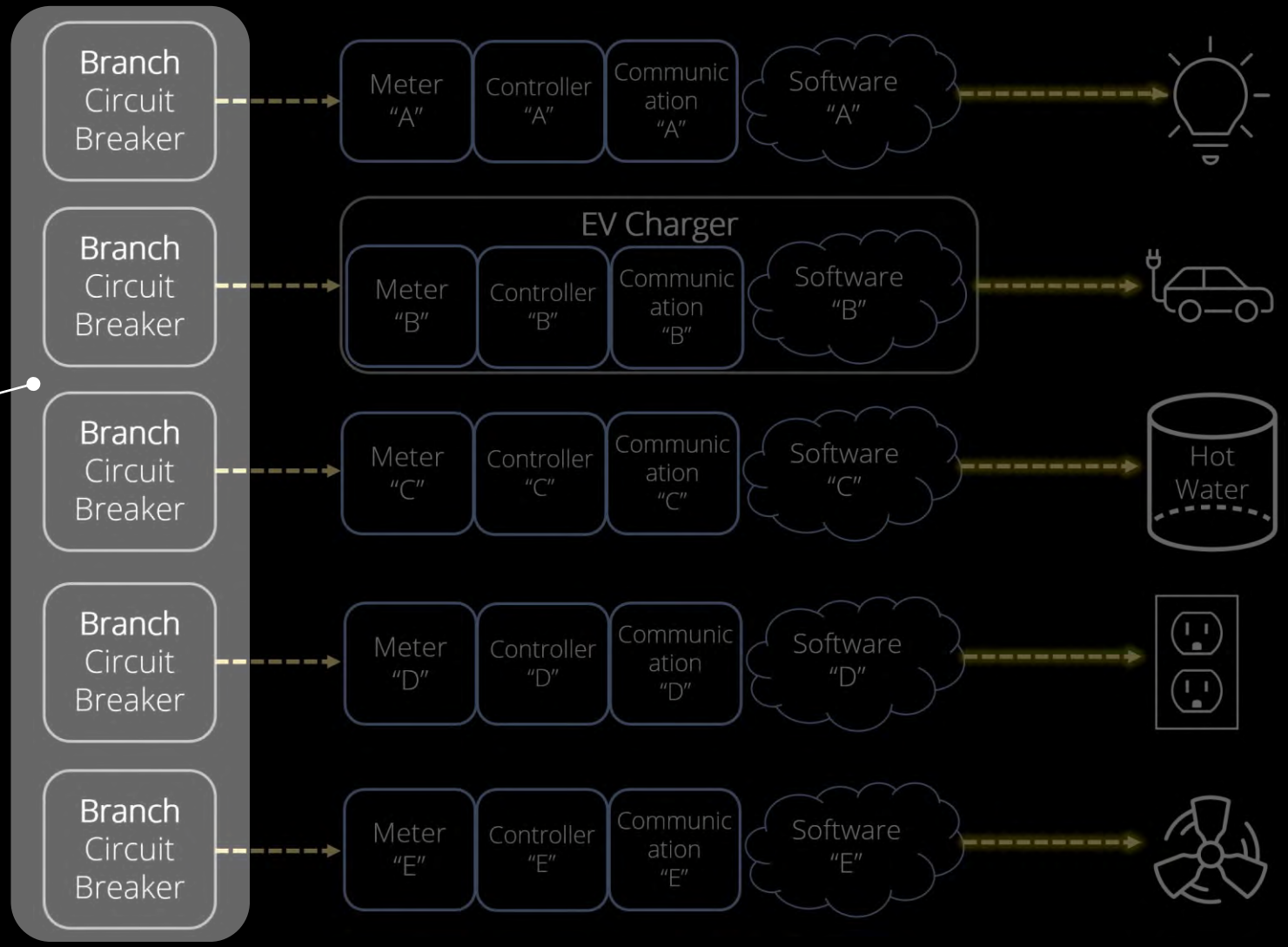
How this *could* be accomplished



But all these metering and control devices are different, from different manufacturers: some hardware, some software.

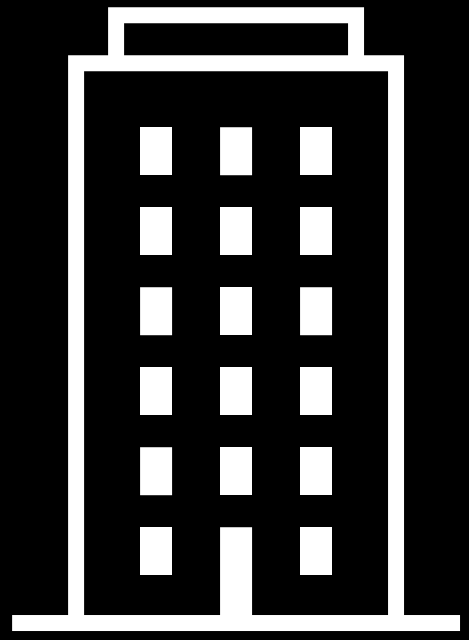
Unification is lost and this fact prohibits a scalable solution

What if we looked here?



Circuit Breakers are Everywhere

~32 per house



~130 per floor

Thousands of Circuit Breakers per Neighborhood

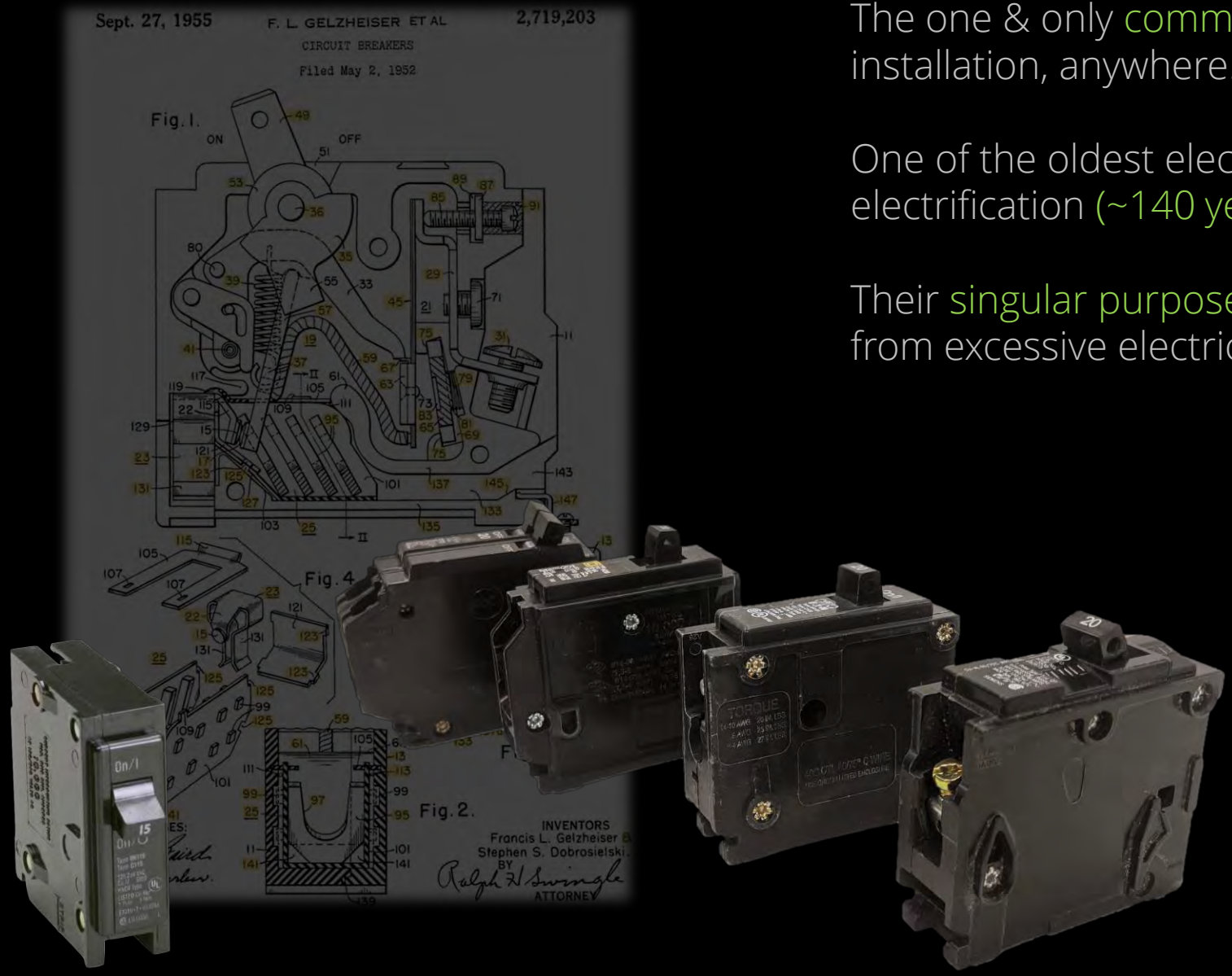
Over 150 Million Sold in North America Each Year

Millions of Circuit Breakers per City

“If you can control the circuit breaker,
you can control all of power distribution.”

- Ryan Kennedy, 2003

The humble circuit breaker



The one & only common electrical product in any installation, anywhere.

One of the oldest electrical products in the history of electrification (~140 years since first patent).

Their singular purpose is to protect the electrical load from excessive electrical current.

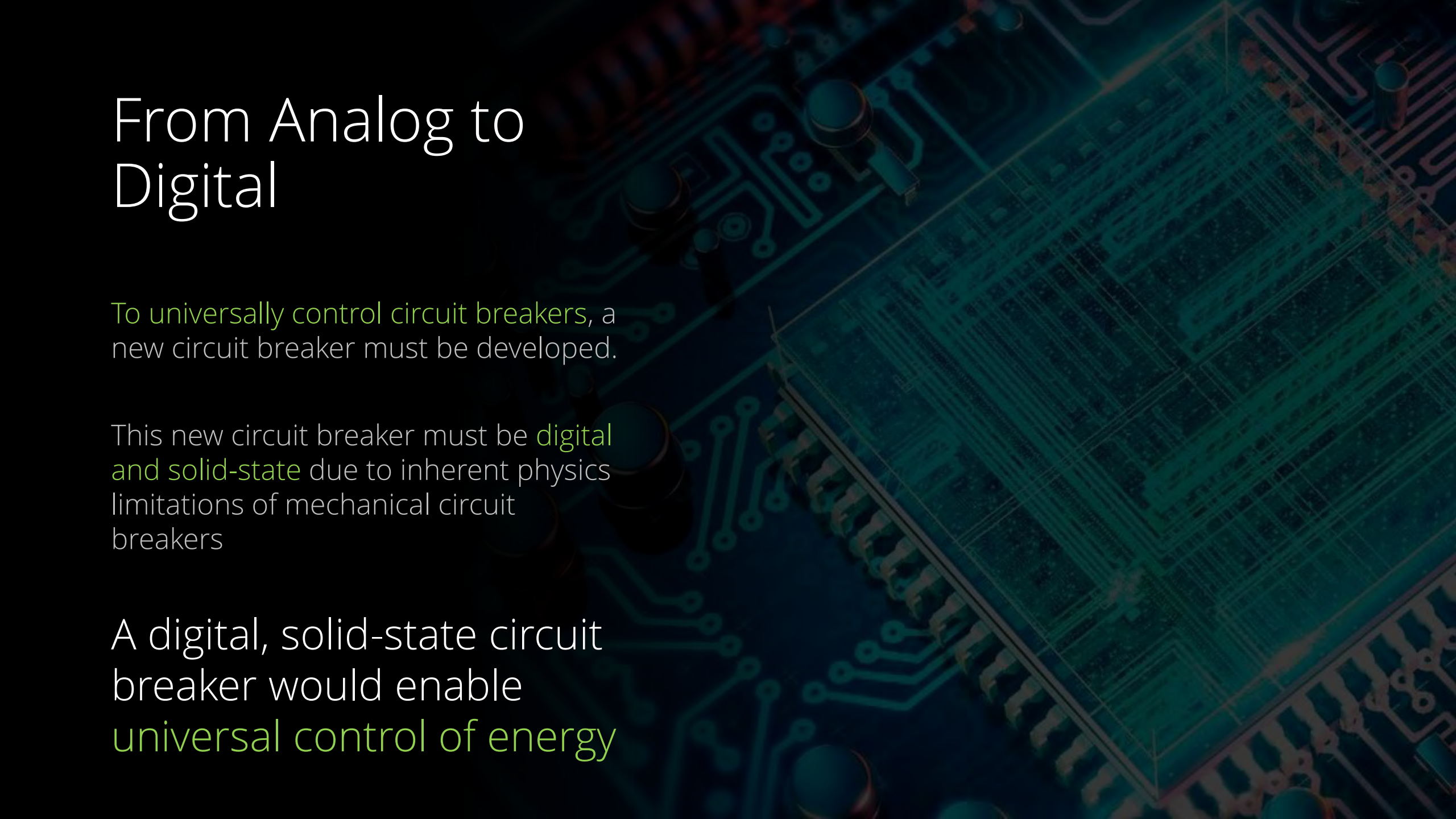
Circuit breakers are exclusively mechanical in nature and their function hasn't changed much in the last 80 years.

From Analog to Digital

To universally control circuit breakers, a new circuit breaker must be developed.

This new circuit breaker must be digital and solid-state due to inherent physics limitations of mechanical circuit breakers

A digital, solid-state circuit breaker would enable universal control of energy



So why aren’t there any on the market?

The Barrier to Entry is High

Highly Regulated Environment

- Underwriter's Laboratories (UL)
- National Fire Protection Association (NFPA)
- ….with standards established for mechanical circuit breakers, not solid-state circuit breakers

Long Established Means & Methods

- Circuit breakers have been built for over a century without much change
- Extremely difficult to gain acceptance with a circuit breaker using completely new technology

Dominated by Few Companies

- Siemens
- ABB
- Eaton
- Schneider
- ….who hold most of the knowledge-base on circuit breakers

Technically Difficult

- Requires deep knowledge of the power semiconductor industry
- Requires power semiconductors that are super high-power density, low-loss and highly fault tolerant
- Software and control system must be life-safety reliable and fail-safe
- All software must have extreme levels of cybersecurity

...but one company has done it


This is...
ATOM
POWER

In 2019,
Atom Power
commercialized the
first solid-state
Digital Circuit Breaker

And received the first ever UL listing for a solid-state circuit breaker in history

NOTICE OF COMPLETION
AND
AUTHORIZATION TO APPLY THE UL MARK

2019-05-03

MR. Taylor Santore
Atom Power Inc
10420-Q Harris Oaks Blvd
Charlotte, NC, 28269, US

Our Reference: File E477842 , Vol. 1 and Vol. 2 Order: 12716915
Project 4788876880
:

Project Scope: (DIXS) Solid-State Circuit Breaker Cat. No. AS3P60 rated 60A, 480Y/277Vac, 100kA
(DIVQ) Circuit Breaker Enclosure Cat. No. ASBE60 rated 480Y/277Vac, 100kA

Dear MR. Taylor Santore:

Congratulations! UL's investigation of your product(s) has been completed under the above Reference Number and the product was determined to comply with the applicable requirements. This letter temporarily supplements the UL Follow-Up Services Procedure and serves as authorization to apply the UL Mark at authorized factories under UL's Follow-Up Service Program. To provide your manufacturer(s) with the intended authorization to use the UL Mark, you must send a copy of this notice to each manufacturing location currently authorized under File E477842 , Vol. 1 and Vol. 2.

Records in the Follow-Up Services Procedure covering the product are now being prepared and will be sent in the near future. Until then, this letter authorizes application of the UL Mark for 90 days from the date indicated above.

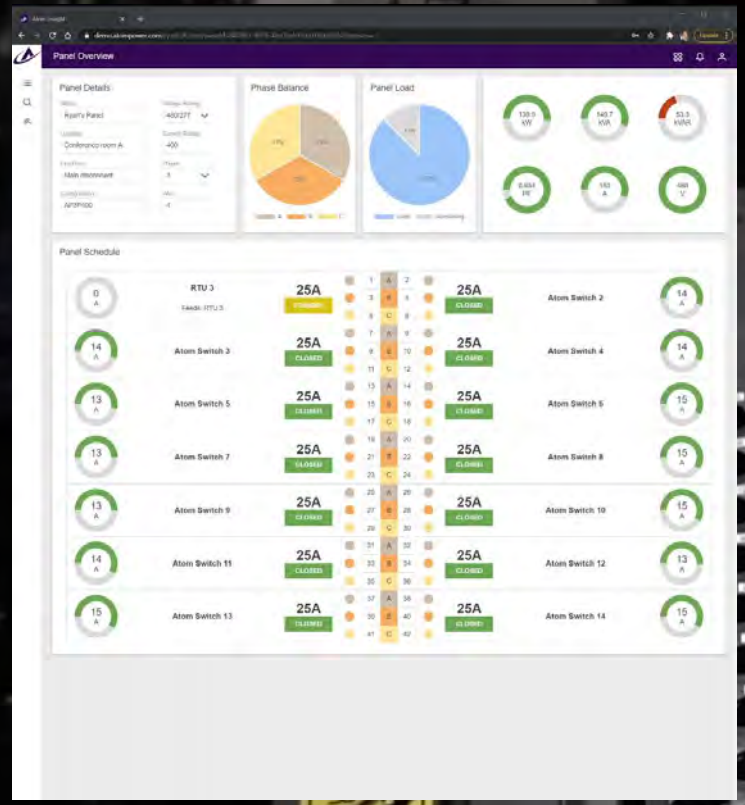
Additional requirements related to your responsibilities as the Applicant can be found in the document "Applicant responsibilities related to Early Authorizations" that can be found at the following web-site: http://www.ul.com/EAResponsibilities

Any information and documentation provided to you involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

We are excited you are now able to apply the UL Mark to your products and appreciate your business. Feel free to contact me or any of our Customer Service representatives if you have any questions.

Very truly yours, Reviewed by:

For the First Time, Power Distribution Became Fully Digital



Paving the way for the energy transition...

Demand Response (DR)

Distributed Energy (DER)

Electric Vehicle (EV) Charging

All performed through a universal device

We are now on our 3rd Generation of products

And are 100% vertically integrated

Atom PCB's &
Firmware

Atom SiC Power
Semiconductors

Atom Switch™
Solid-state
circuit breakers

Atom Panel™

Atom Insight™
(cloud & on-premise)

Our
Customers

Solid-state circuit breakers - Scalability

BASE PRODUCTS
Atom Panel,
Atom Switch Circuit Breakers,
and Atom Insight Cloud
(3rd Generation)

Effectively the same product

EV Charging

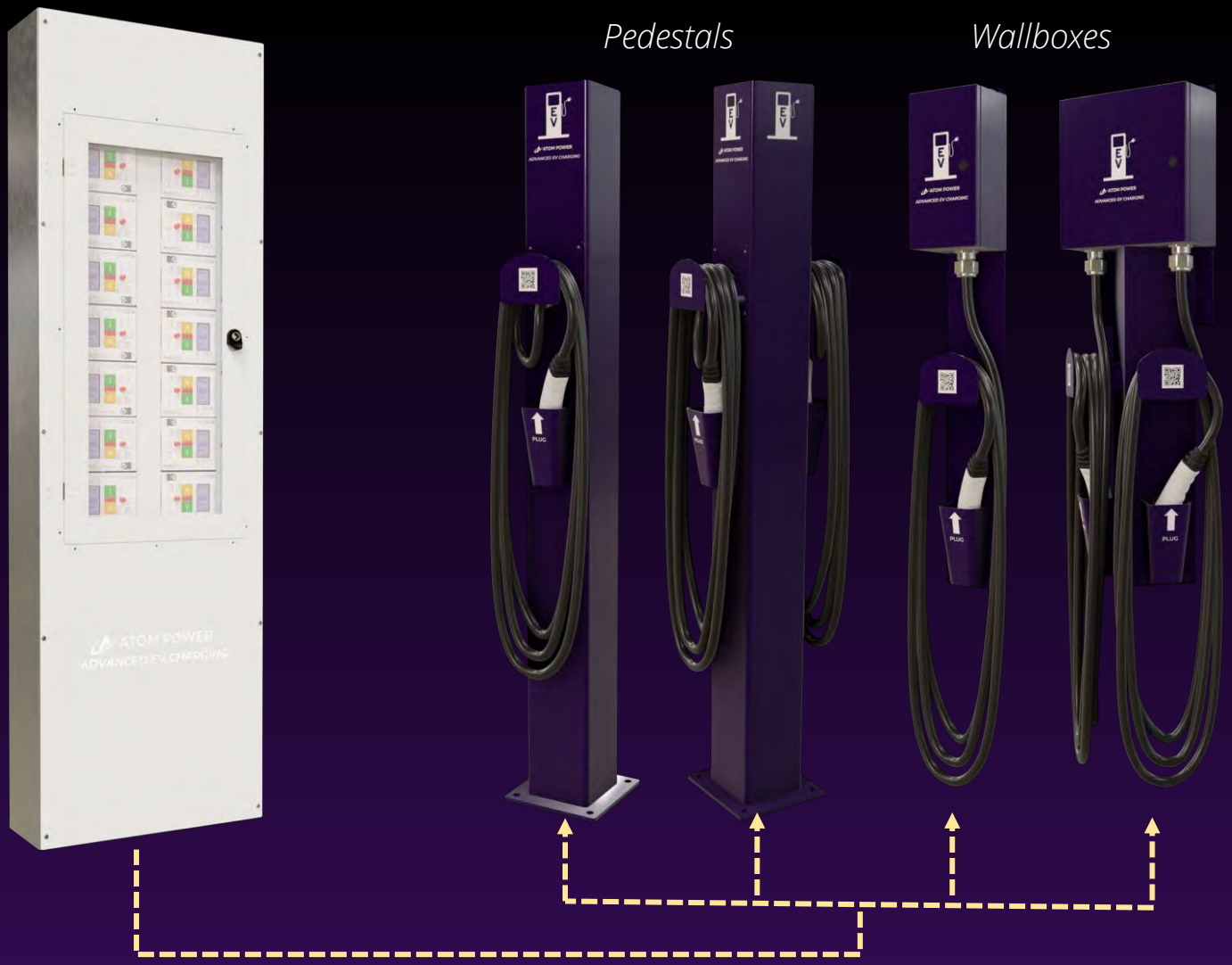
Same product

Derivative of Gen 3 Technology

Miniature Circuit
Breakers

- Commercial Fleet EV Charging
- Multifamily EV Charging
- Industrial Applications
- Residential DR & DER (DERMS)
- Data Center Rack Distribution

1 EV Charging from the Breaker – the only way to scale



Value Highlights:

- Simple – Easy demand response (DR), easy energy management. 50% component reduction
- Scalable – It *is* the power system and is built to scale up to full range of Level 2 charging
- Cost effective – average 50% savings across most major networked charging systems

Public Release: November, 2021

2 Residential – a universal method of Demand Response

Atom Switch
Miniature Circuit Breakers

Existing Panel Installation

Value Highlights:

- Simple – Easy demand response (DR), easy distributed energy routing (DER), built-in WiFi, hubless
- Scalable – Fits into 80% of existing homes and 70% of existing commercial buildings
- Cost effective – average 60% savings in existing homes, 40% savings in new construction

Product Release: mid-2022

Industry Impacts

>500 Megatons of GHG Reduction per year

Commercial Fleets can accelerate EV adoption at 50% cost

A clean tomorrow

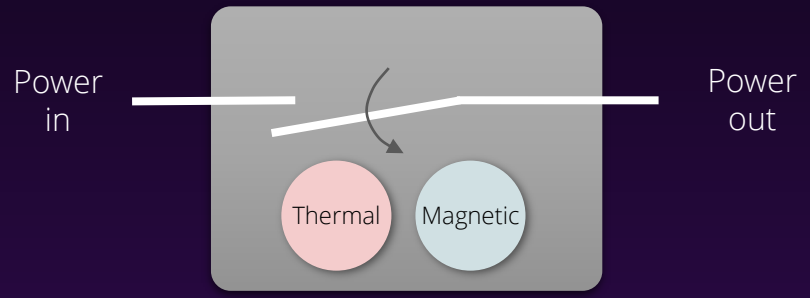
Utilities & co-ops can save $Billions in peak demand offset

Enabling Sustainable electrification growth

Circuit Breakers & Power Distribution

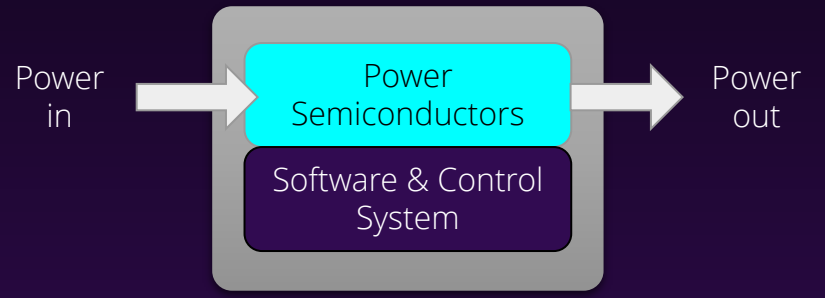
What is a Solid-State Circuit Breaker?

Traditional Circuit Breakers



Pure mechanical operation/breaking

Solid-State Circuit Breaker



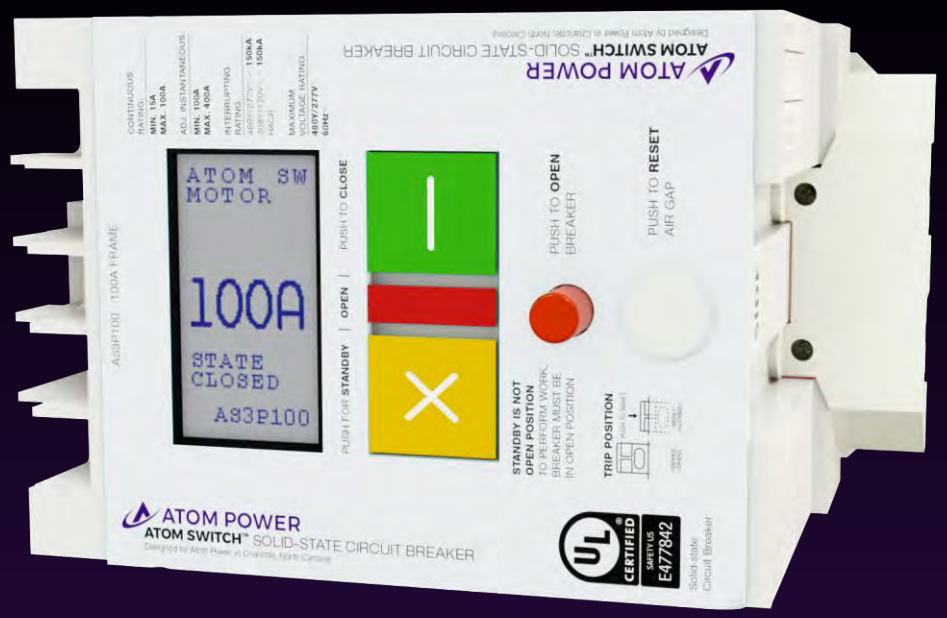
Semiconductor breaking (no moving parts)

Breaker operations are digital via software

Why solid-state? Let's compare

Metric	Traditional Mechanical	Solid-State
Endurance	~10,000 operations under full load	~10,000,000 operations under full load
Interrupting Capacity	Various different SKU's but only up to 100KAIC: 10K, 14K, 18K, 22K, 35K, 42K, 50K, 65K, 85K, 100K	Every product rated for 200KAIC
Arc flash hazards	Hazard is there and can be high	No arc flash hazard
Efficiency	For contactors/relays resistance across contacts	Solid-state has lower Rdson across die
Making/breaking current rating	Varies across contactor make, model and manufacturer but is almost always less than the full load rating of the contactor	Same as the breaker rating
Contact welding	Contacts can weld closed, causing hazardous conditions	No contact welding risk
Reactive loads	Performance and risk vary depending on type of load	No performance variability
Cost out	No more room for cost-out	Price declining with adoption

The Atom Switch Solid-State Circuit Breaker - Highlights



Full Digital Control (remote software operation)

Fastest Circuit Breaker in the World

200,000-amp Interrupting Rating (highest of any breaker)

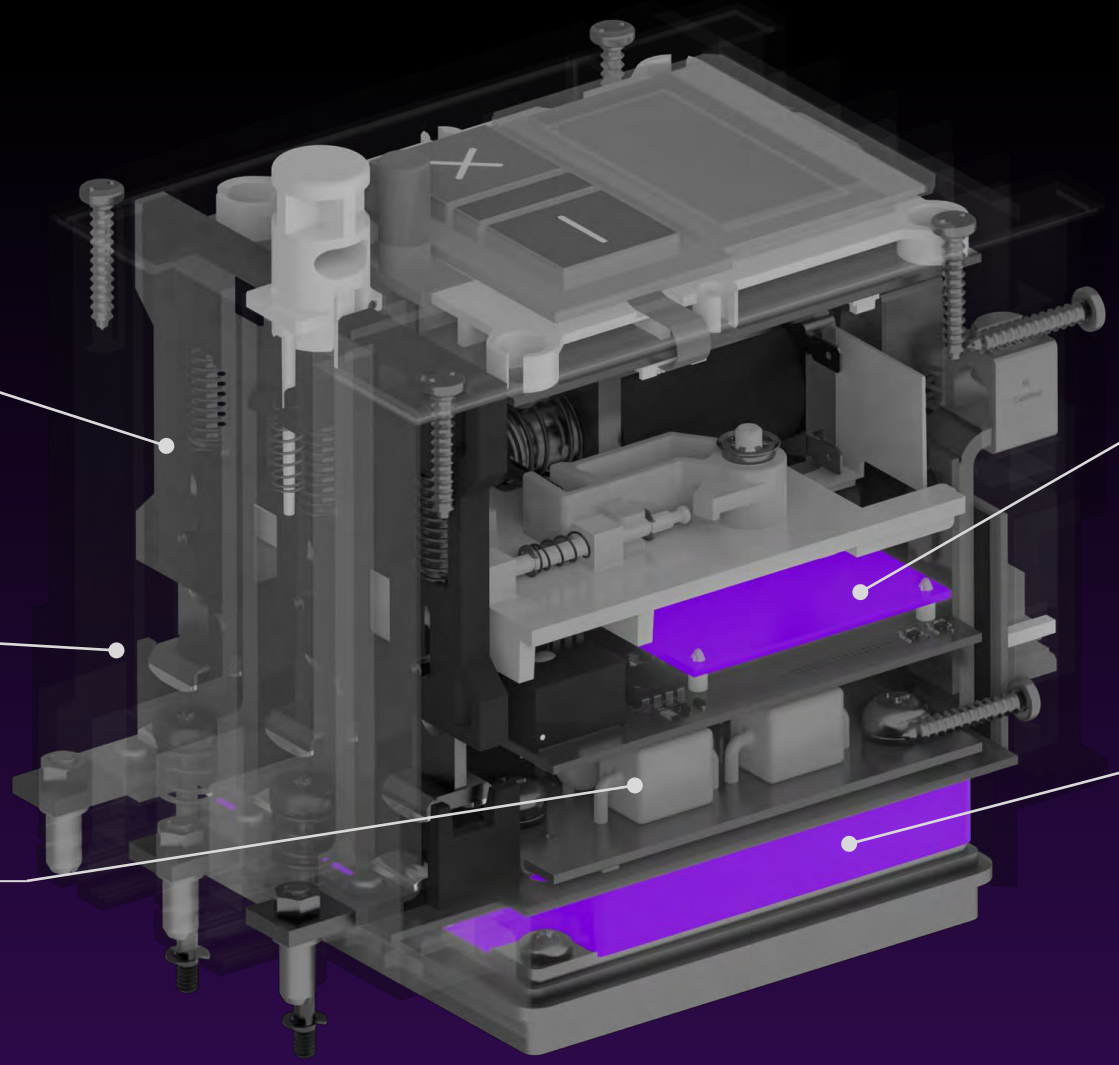
Integrated Metering (KW, KVA, V, A, PF)

Multiple Circuit Breakers in One Product

UL 489 Listed (can install within any facility in North America)

480VAC up to 100A

The Atom Switch Solid-State Circuit Breaker - Technology



#3. Air Gap Disconnect

Required by UL 489. The air gap disconnect allows for galvanic isolation and physical lockout of the breaker

#4. Case & Mechanics

Mechanical wraps, connection peripherals and ultimately the molded case of the product

#5. TVS Array

Transient voltage suppression array to allow for high inductive load switching and surge events

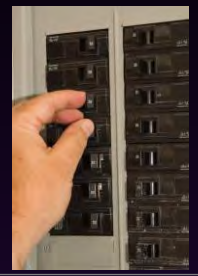
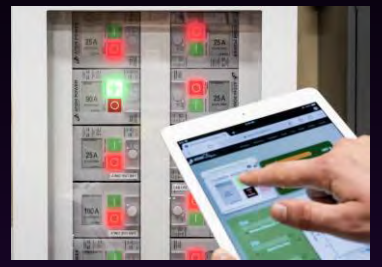
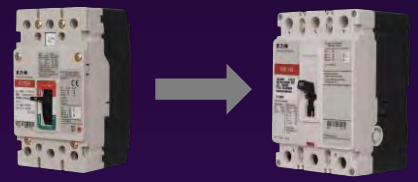
#1. Control Logic & Firmware

Ultimate control, visibility, and capabilities lie here. Individually tested to and listed under UL 489SE.

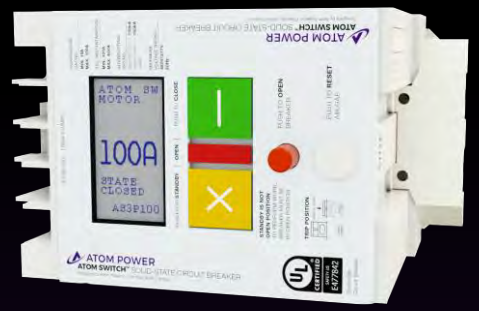
#2. Power Semiconductors

Speed, fault tolerance, efficiency and power capability lie here. Individually tested to and listed under UL 1557. Atom Power is vertically integrated here and manufacture our own silicon-carbide (SiC) power modules

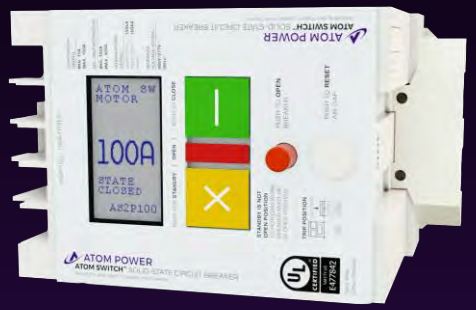
The Atom Switch Solid-State Circuit Breaker – Industry Impacts

Technology Leap	Before	After
3,000X Faster Circuit Interruption		No Explosion
Remote Control is Easy & Repeatable		
Takes the place of 100's of traditional electrical components	Circuit Breaker Contactor Protective Relays Power Meter Load Shed Data & Comms	 One Product
Can Digitally Change Characteristics	 Have a 50-amp breaker and need a 100-amp or other? It's a new breaker	 Same Product. Change through software

We are now on our 3rd Generation of products



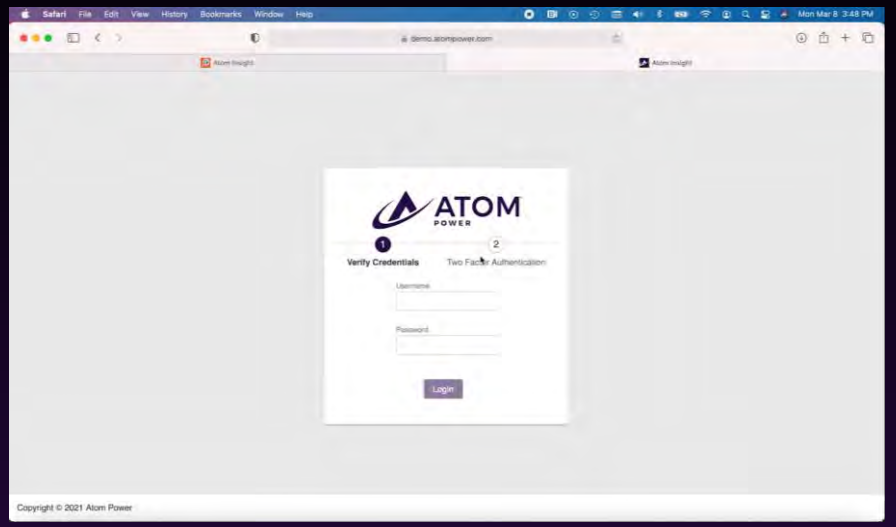
100-amp, 3-phase
Atom Switch



100-amp, 2-pole Atom
Switch

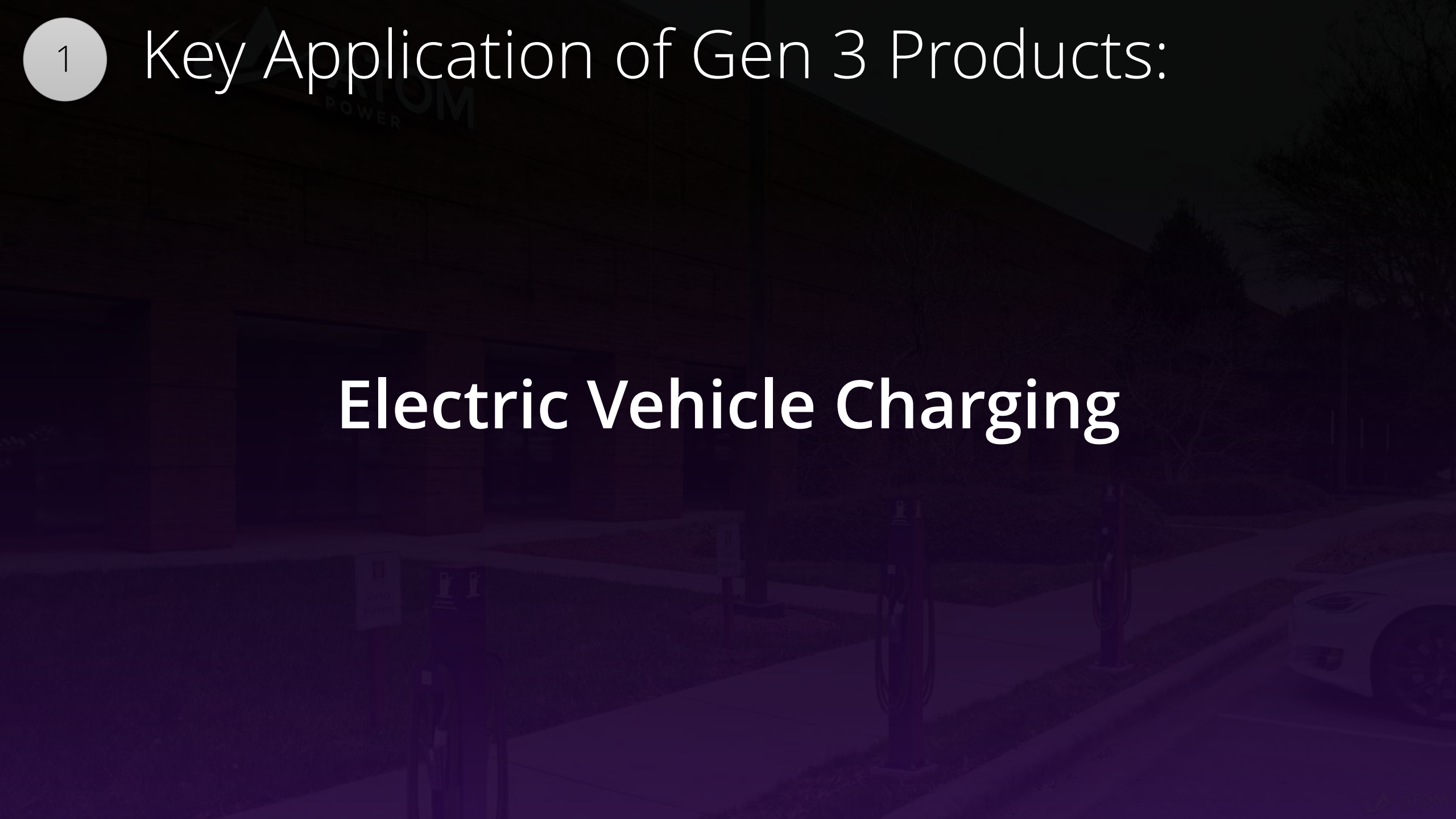
100-amp
Atom SiC Power Module

400-amp, 3-phase
Atom Panel



Atom Insight
Software

1 Key Application of Gen 3 Products:



Electric Vehicle Charging

1 EV Charging Strategy - Markets

Customers care about:

- Energy Management
- Simple
- Scalable
- Cost effective
- Low asset overhead
- Future-proof solution

Markets & Technology Findings:

- Most consumer EV drivers are going to charge at home.
- Energy Management is critical for Fleets.
- Charging a car should be as easy as everything else we plug in.
- High density Level 2 charging is suitable in most applications.

Atom Power Market Priorities

1. Captive fleet
2. Courtesy charging
3. Commercial
4. Multi-Family

1 Atom Power EV Charging – Products

Atom Panel
AP3P400-EVSE

Atom Insight™
(cloud software)

Atom Insight™
(On-premise software)

Atom Switch™ Circuit Breakers
AS2P60-EVSE &
AS2P100-EVSE

Single Outlet Pedestal
AEVPED1

Dual Outlet Pedestal
AEVPED2

Single Outlet Wallbox
AEVBOX1

Dual Outlet Wallbox
AEVBOX2

1 Atom Power EV Charging – direct from the Circuit Breaker…

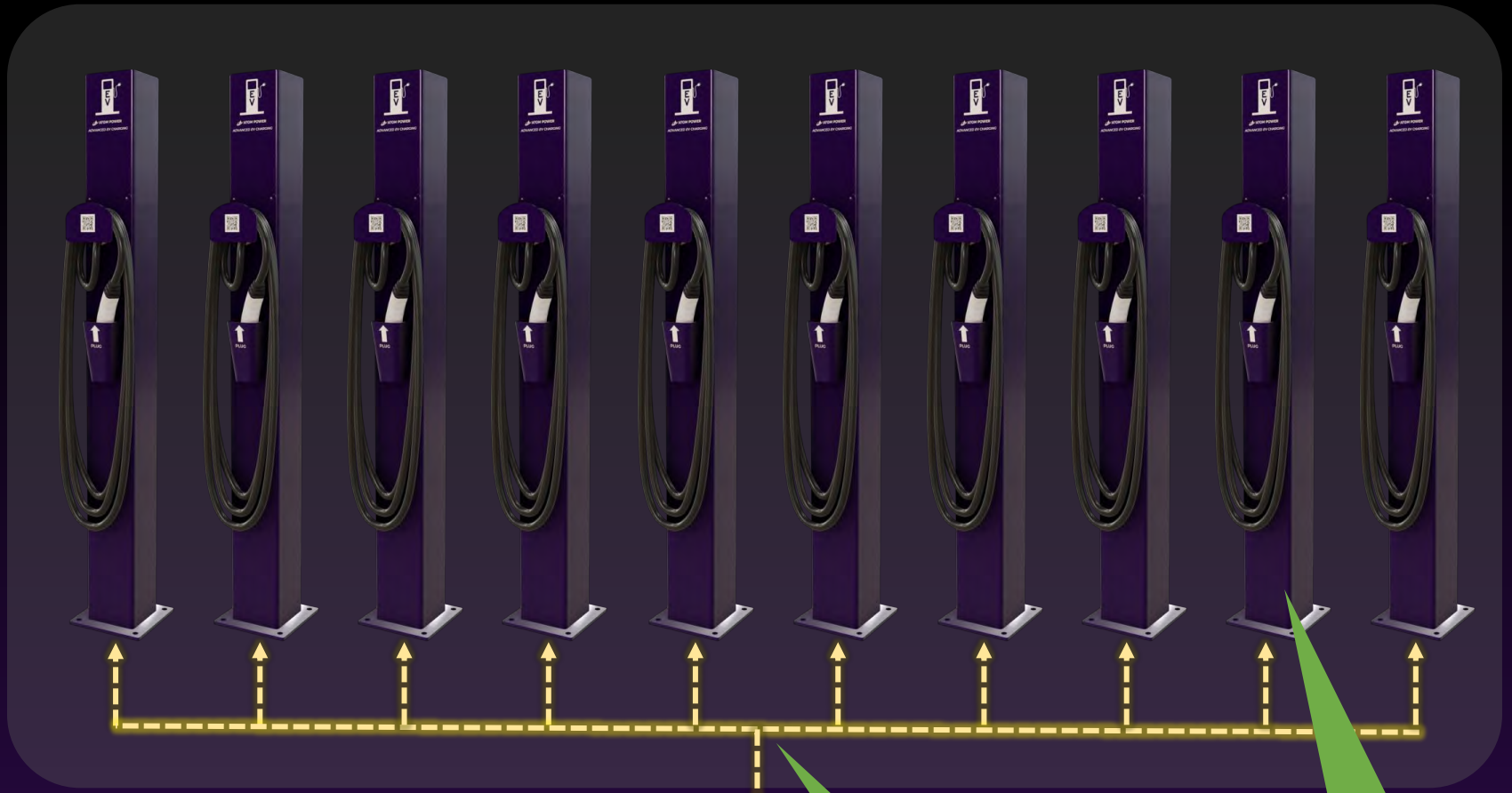
Smart stuff in the building

48A or 80A per charge point

Integrated Energy Management

Metering, data, communication

Cloud API



Simple stuff in the public areas (just a plug)

Acts as a bollard

1 Atom Power EV Charging – Value Propositions

1. Easy – there is no easier way to install EV infrastructure, manage the EV infrastructure and perform demand response
2. Cost Effective – average cost savings of 50% across competitive solutions
3. Scalable – utilizing *Dynamic Energy Management,* maximum energy output from existing building capacity is realized, while universally meeting Code requirements. On premise and/or cloud
4. High Density – more KW per charge point with flexibility on facility charge output and capability of product to realize full 80A charge output
5. Less Risk – smart, high value assets are in the building, the low-cost EV plugs are in the public areas

1 Atom Power EV Charging – Easy Install

Make it easy for contractors to install Atom Power:

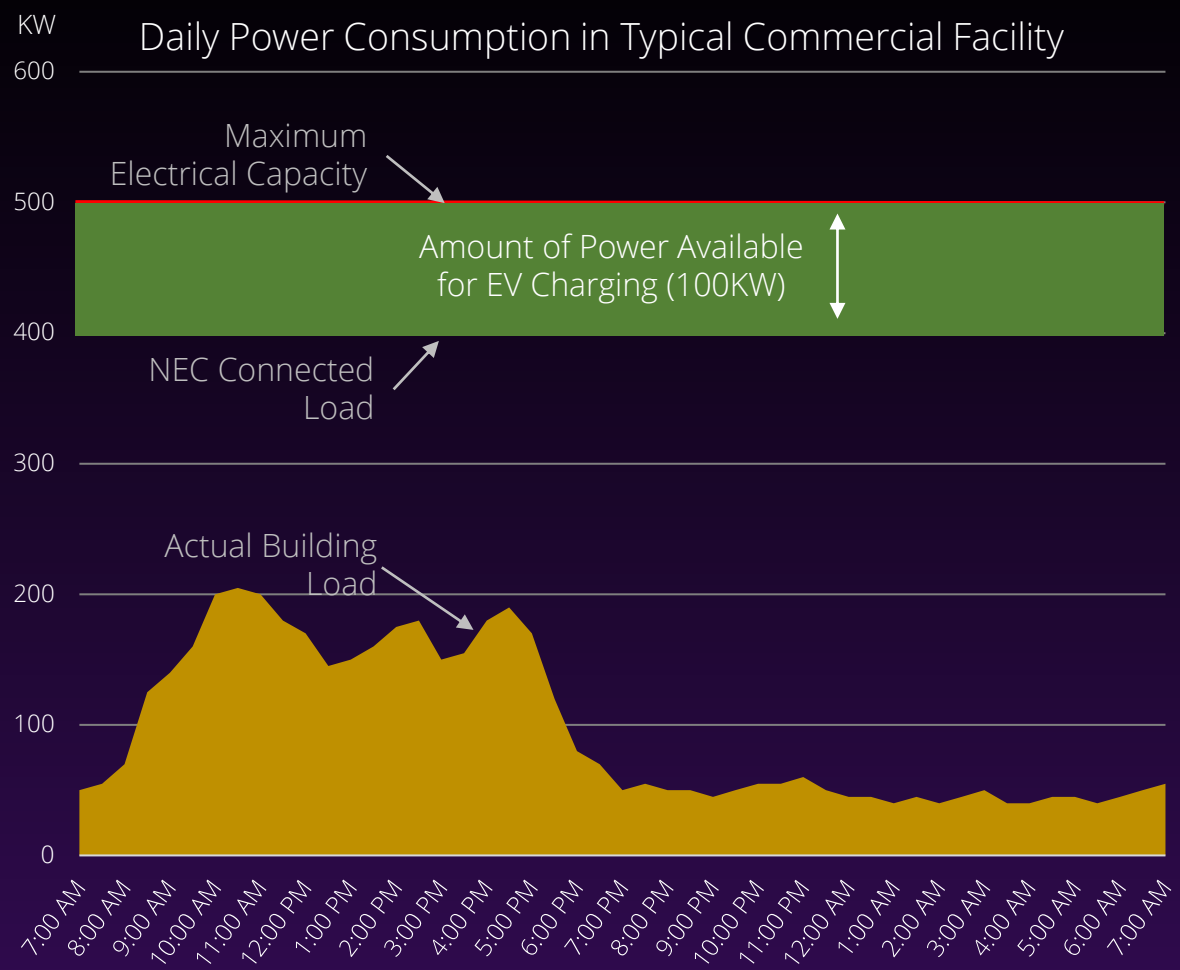
1. Install panel
2. Run conduit/wire out to pedestals or wall boxes
3. Bolt down the pedestal or wall box
4. Energize
5. Easy setup onsite with on-premise software
6. Add more chargers on-the-fly in the future

Just a hollow pedestal and plug - easy

Just a junction box and plug - easy

1 Atom Power EV Charging – Scalable Energy Management

Current Status Quo:



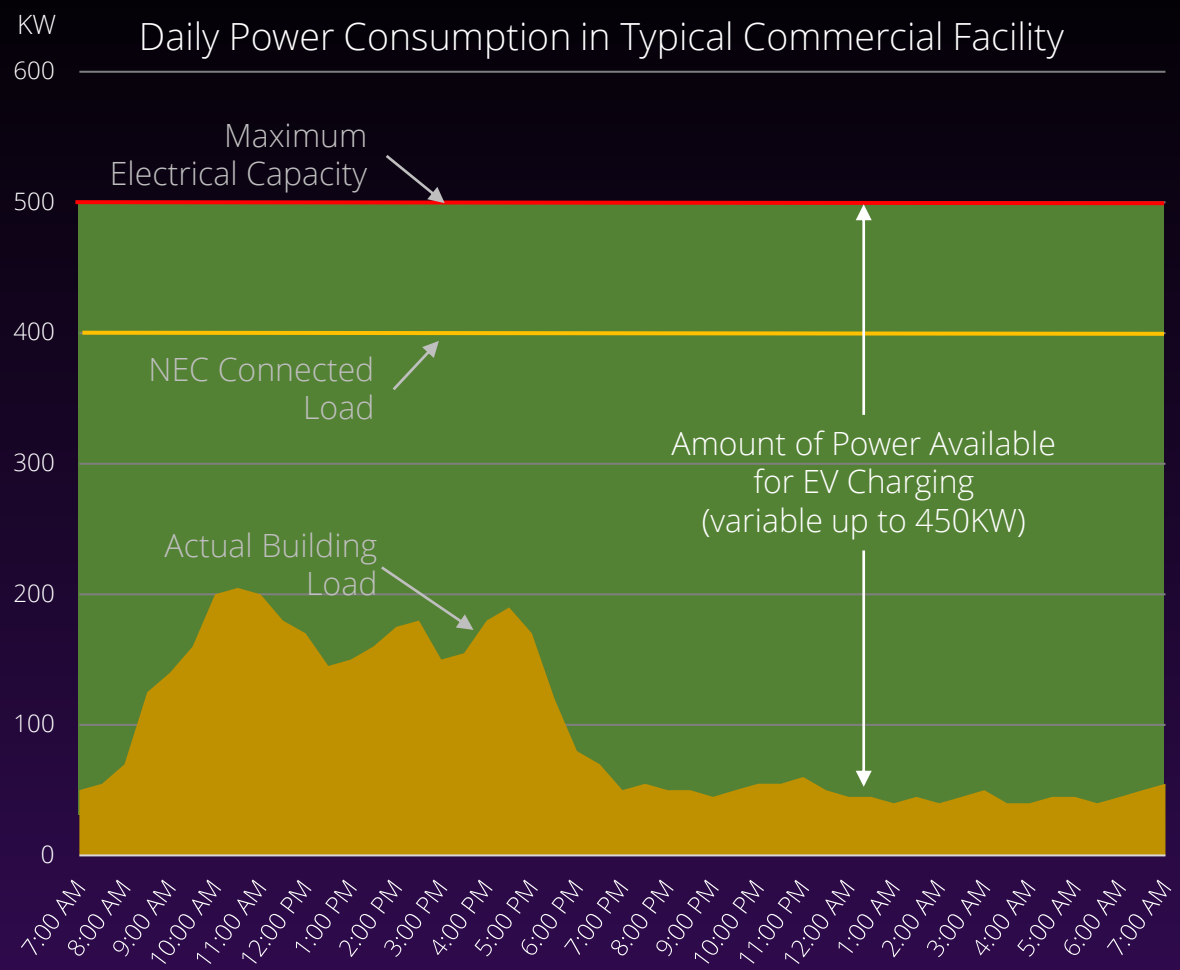
Case Study:

- Maximum Electrical Capacity = 500KW
- NEC Connected Load Calculations (required for permitting) = 400KW
- Existing energy management systems only allow for provisioning EV's at Max Capacity minus NEC Connected Load
- **Available for EV Charging = 100KW**

But most facilities almost *never* reach the calculated connected load!

1 Atom Power EV Charging – Scalable Energy Management

Dynamic Energy Management with Atom Power:



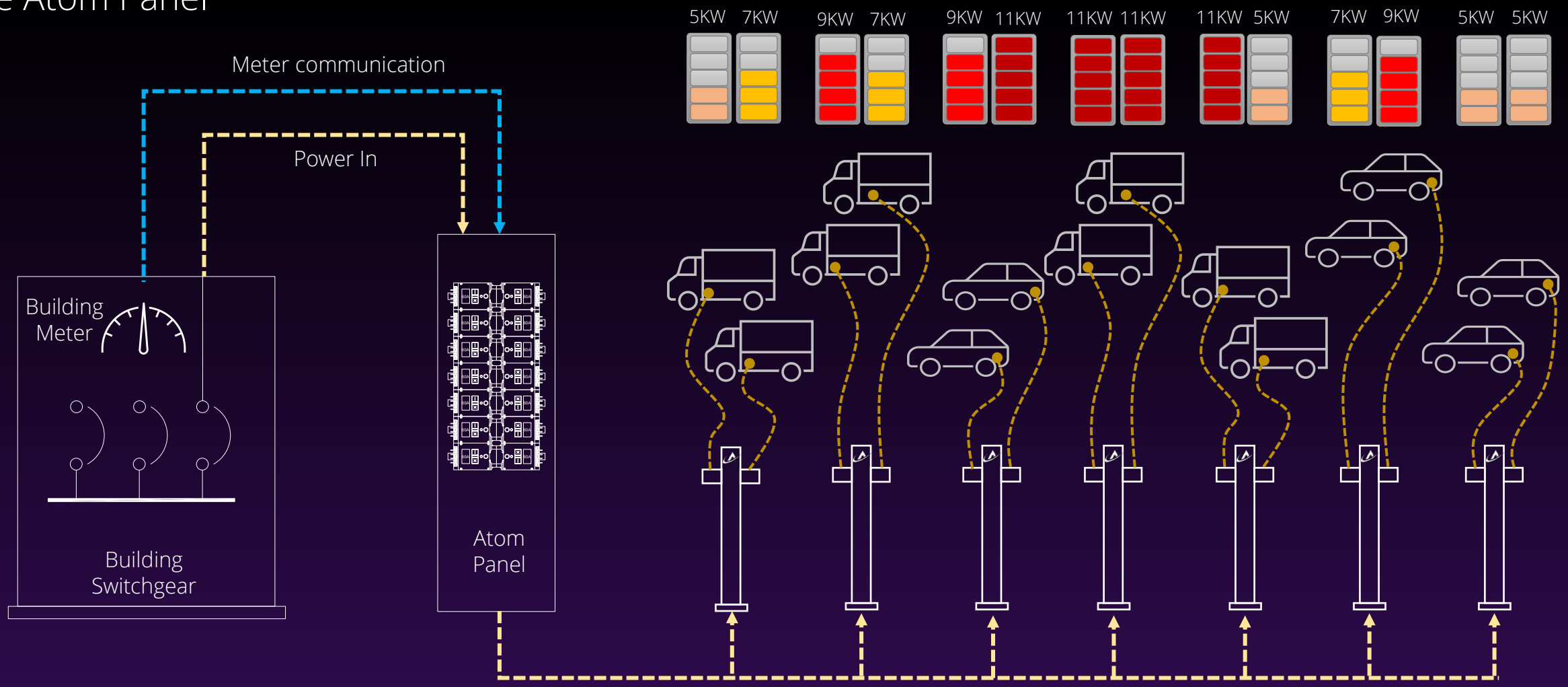
Case Study:

- Maximum Electrical Capacity = 500KW
- NEC Connected Load Calculations (required for permitting) = 400KW
- Atom Power dynamically adjusts the EV charge rate based on *actual* building load
- **Available for EV Charging = up to 450KW**

This is a standard feature of all Atom Power products. Easy to implement and scalable for any facility.

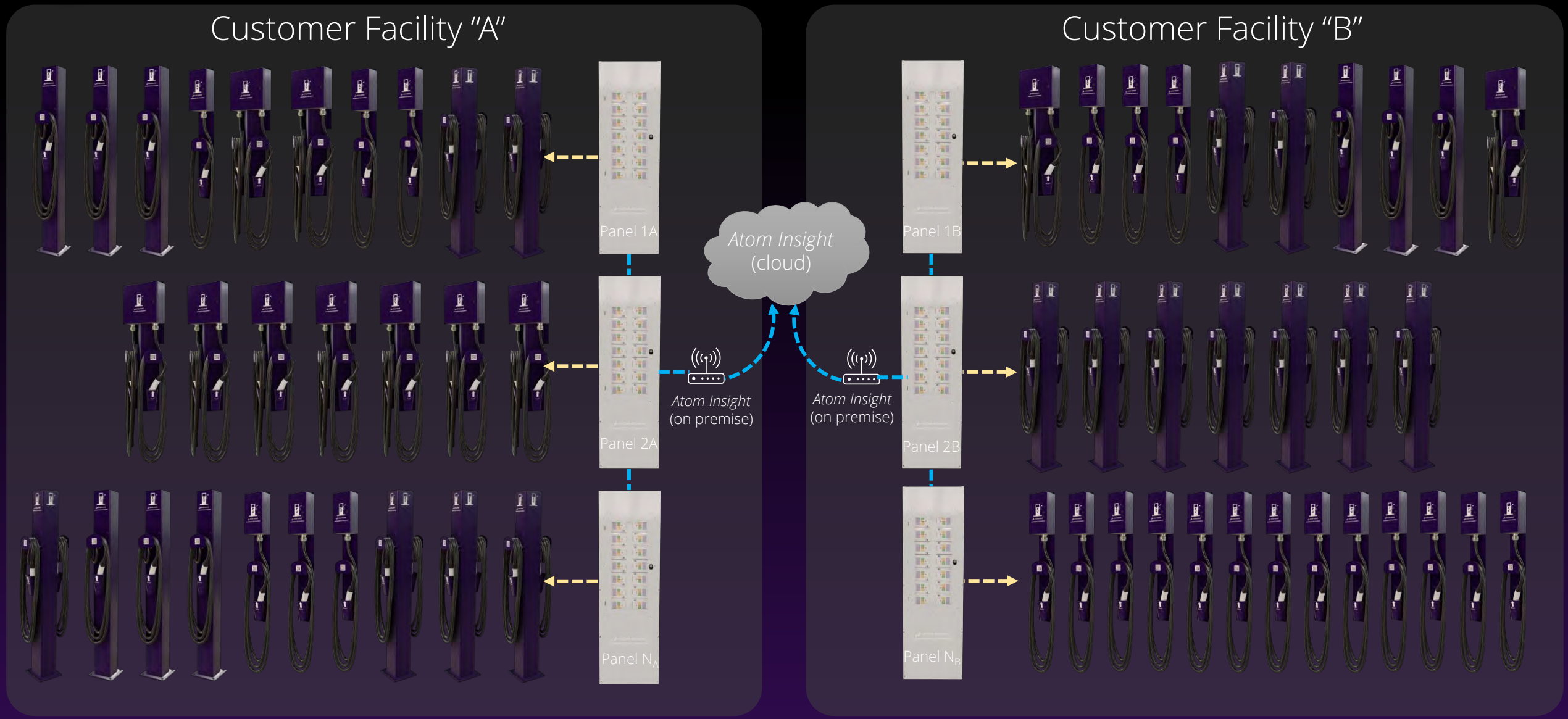
1 Atom Power EV Charging – Scalable Energy Management

Each EV circuit is individually controlled through the Atom Panel



Output based on facility capacity

1 Atom Power EV Charging – Scalable Installation

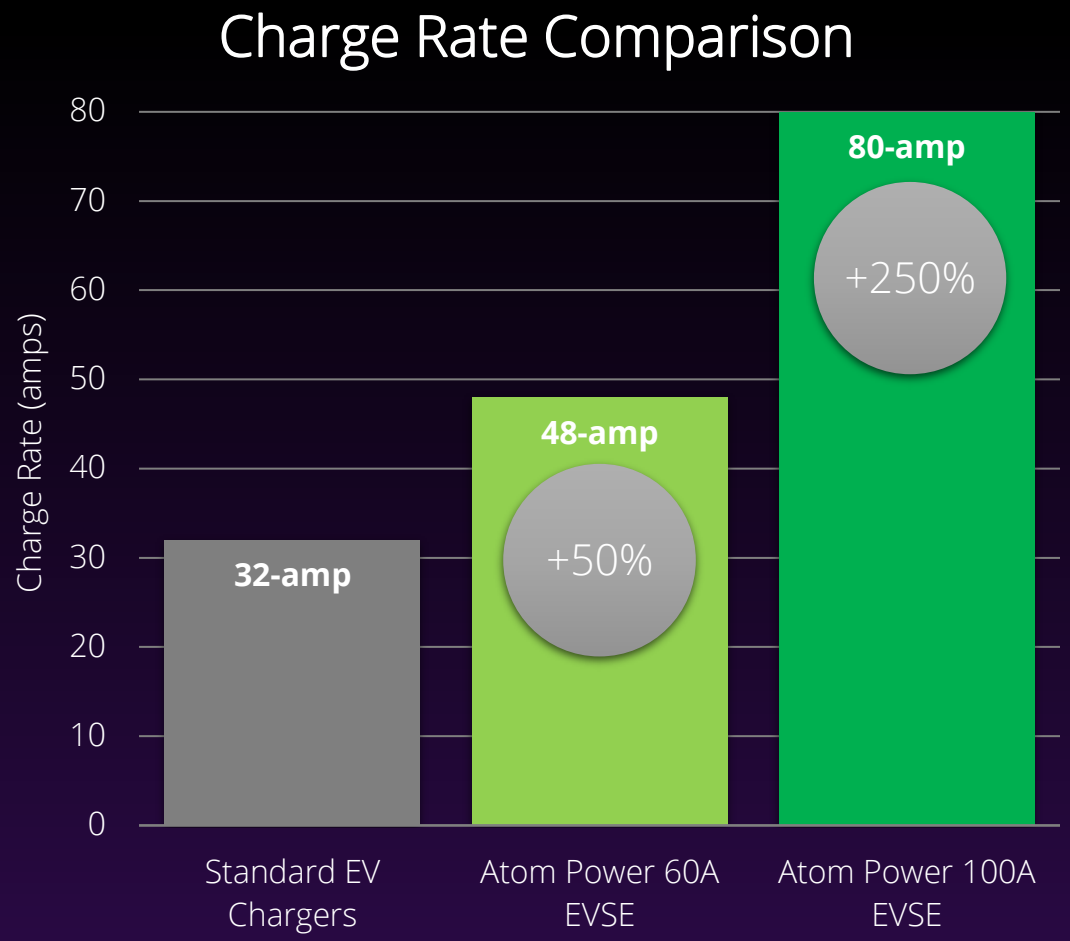


Any plug configuration, all connected

1 Atom Power EV Charging – High Density

100-amp Atom Switch
(80-amp charging)
AS2P100-EVSE

60-amp Atom Switch
(48-amp charging)
AS2P60-EVSE



1 Atom Power EV Charging – Less Risk

High value stuff in the electric room behind lock & key

Little to no maintenance

If maintenance required, it's a circuit breaker. This is what electricians know (not specialty equipment)

Simple, low cost pedestals or wall boxes in the public area

Acts as a bollard (can get hit)

No hazardous voltage when not in operation

No maintenance

Miniature Circuit Breaker

2 Miniature Circuit Breaker - Origins

Atom Power can take our same technology and shrink into a 1” form factor (miniature circuit breaker), solving most DR & DER scalability problems.

At scale, this means visibility and control of most North American power.

2

Miniature Circuit Breaker

Residential

First product release: mid-2022

2 The Case for Residential Demand Response (2020, pre-EV adoption)

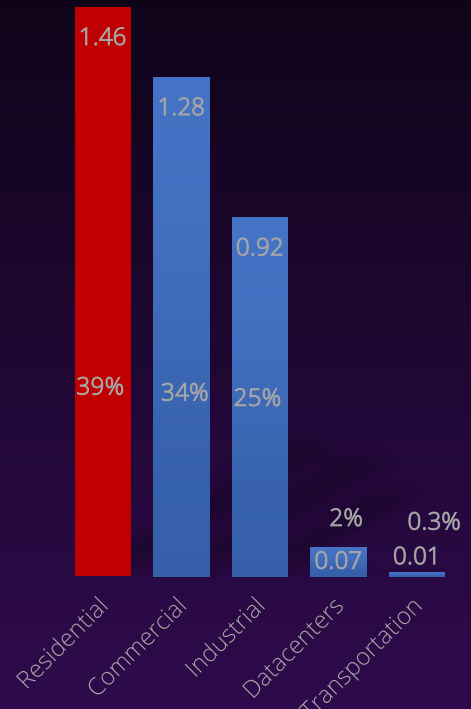
39% of US Electrical Consumption is Residential

74% of Residential Energy could be demand-managed without customer impact

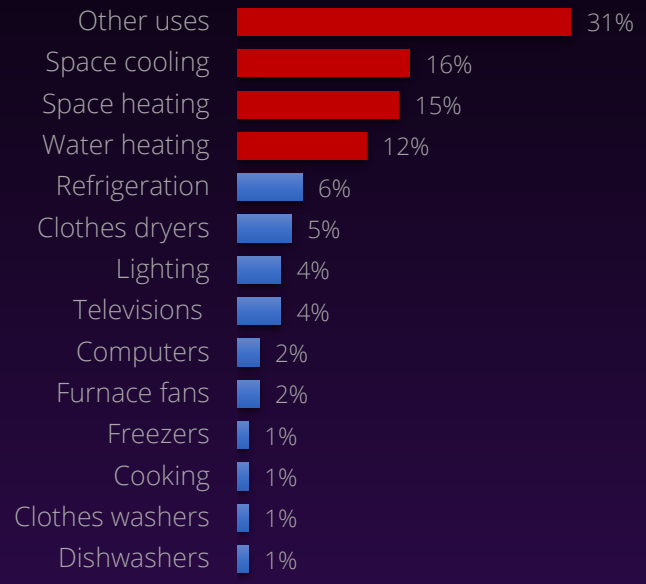
29% of the Entire US electrical grid (17 terawatts average) has demand management opportunity

420 Megatons GHG reduction available through universal DR

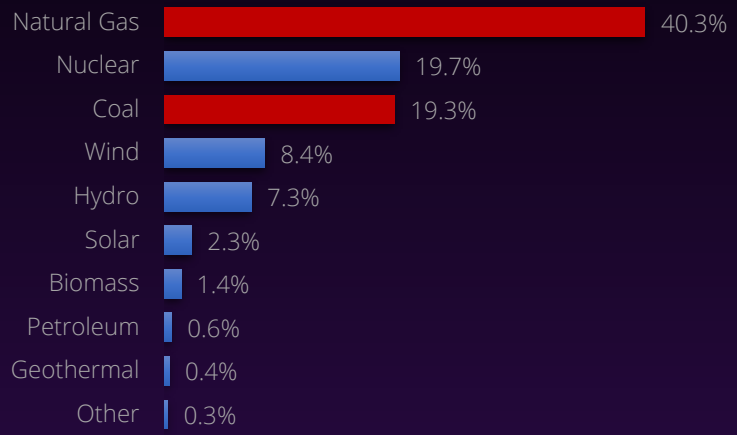
US Electricity Consumption (trillions of kilowatthours)



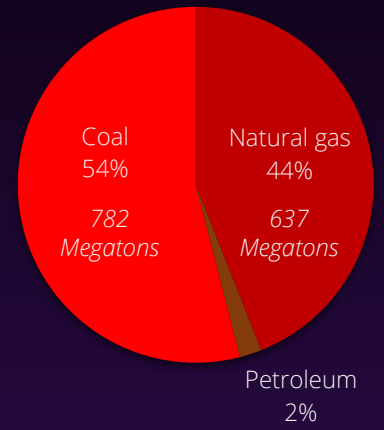
US Residential Electricity Usage



US Utility-Scale Electricity Generation by Source



Electric Power Sector GHG Emissions by Source
1,448 Megatons Total

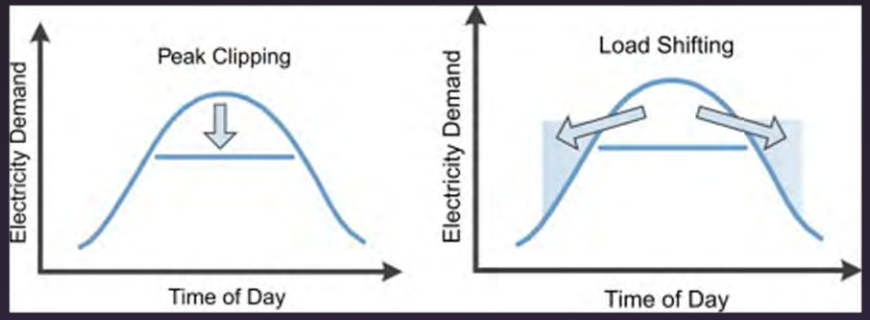


All data obtained from www.eia.gov and based on 2020 values

2 Miniature Circuit Breaker - Residential

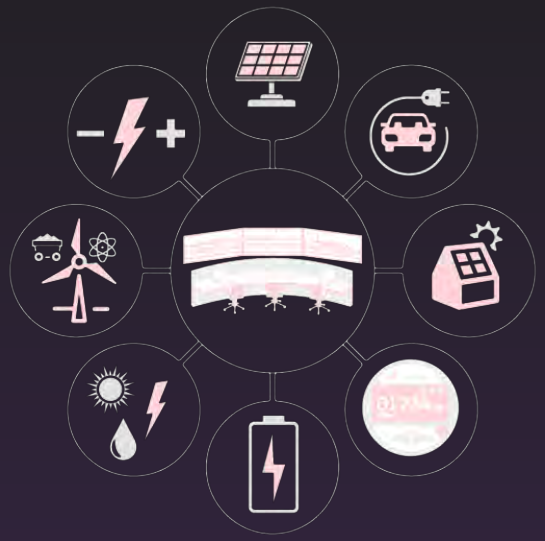
Demand has been organically driven primarily by the following:

Demand Response (DR)



Utilities & Energy Aggregators

Distributed Energy Resources (DER)



Residential Developers

DR and DER is collectively known as “DERMS”

2 Miniature Circuit Breaker - Residential

Scale:

Fits into any existing or new panelboard built on the NEMA 1" frame *and no hub required.*
(80% of homes, 70% of commercial)

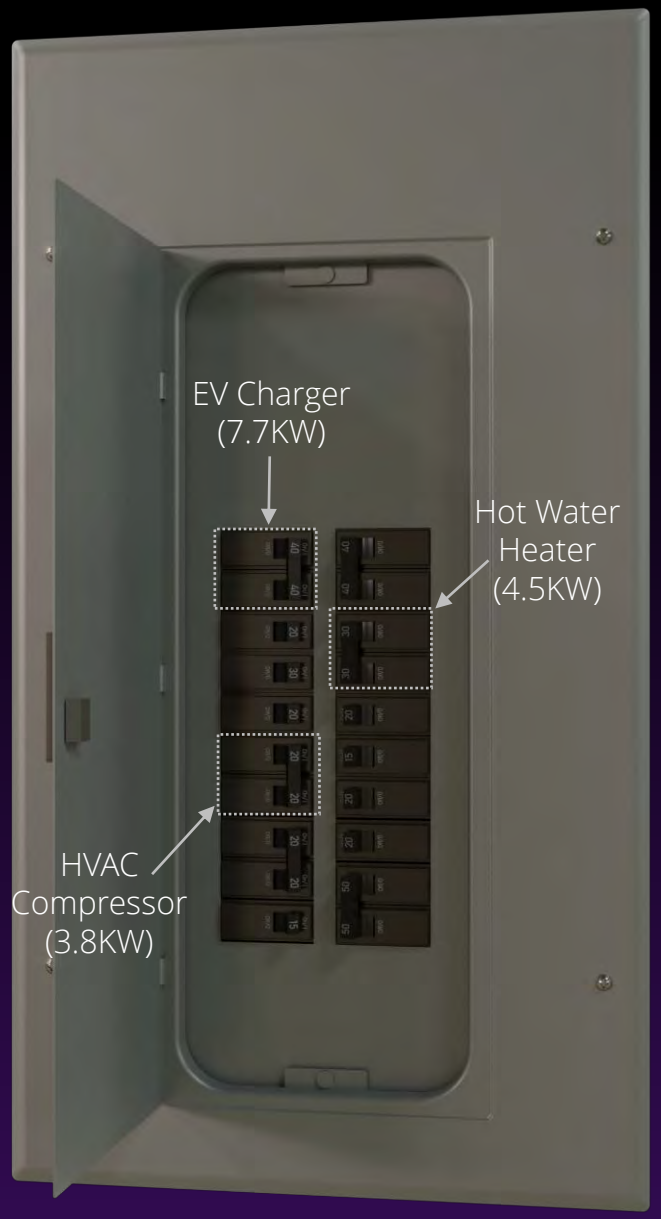
2 Miniature Circuit Breaker - Residential

Scale:
Atom Switch Miniature CB prototypes installed in existing residential panels

2 Miniature Circuit Breaker – Residential Value Propositions

1. Easy – DR and DER applications can now be performed within the products everyone has in the home already – the circuit breaker
2. Cost Effective – Approximately 50% cost savings in DR applications, 30-50% cost and component reduction in DER applications
3. Scalable – the 1” form factor fits into 80% of existing and new homes allowing for new, scalable opportunities for DR and DER in both existing and new.

2 Miniature Circuit Breaker – Residential DR - Easy



Replace with Atom Switch circuit breakers

Customer Wi-Fi

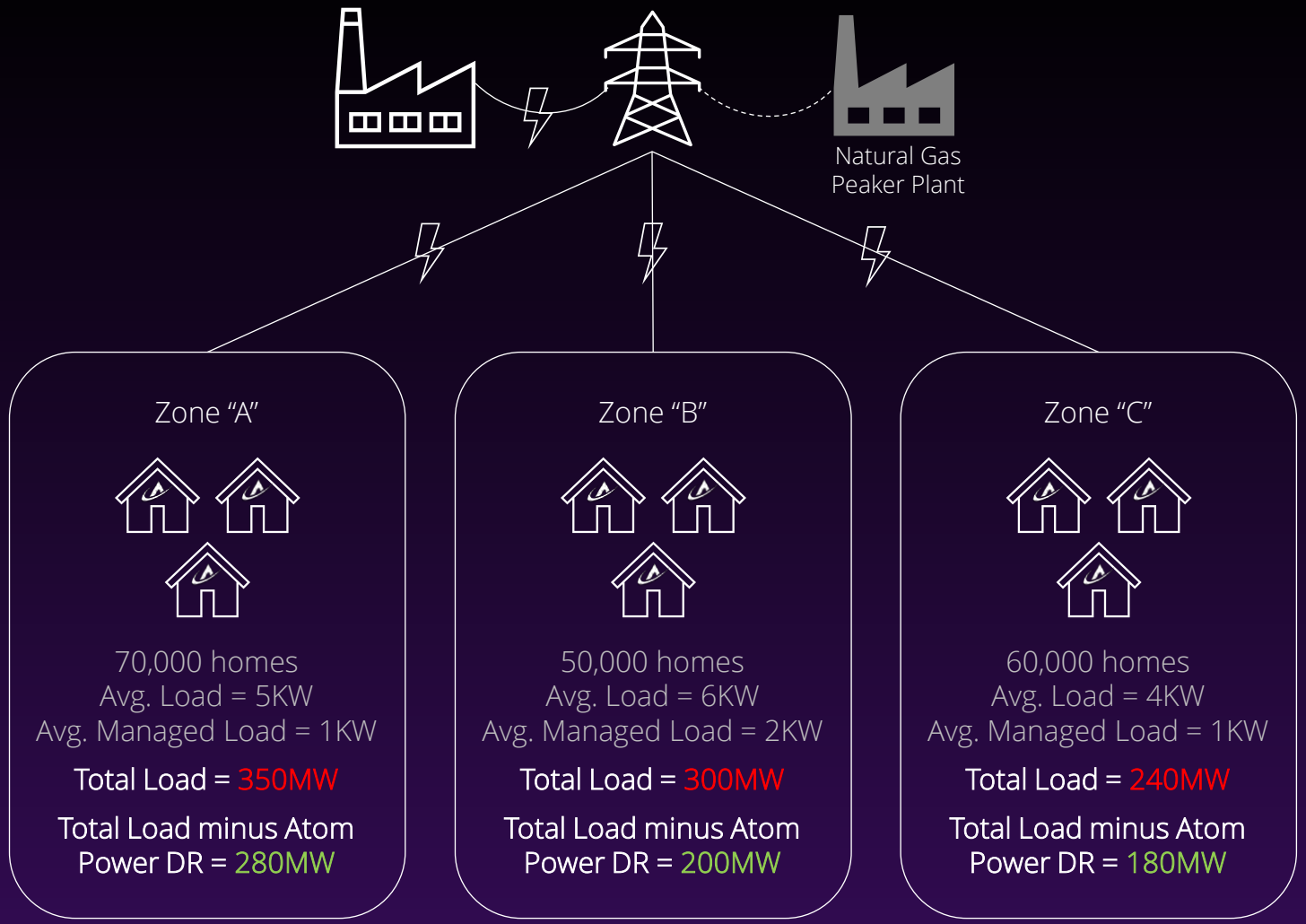
Visibility, Control and Connectivity are all achieved through a simple circuit breaker replacement.

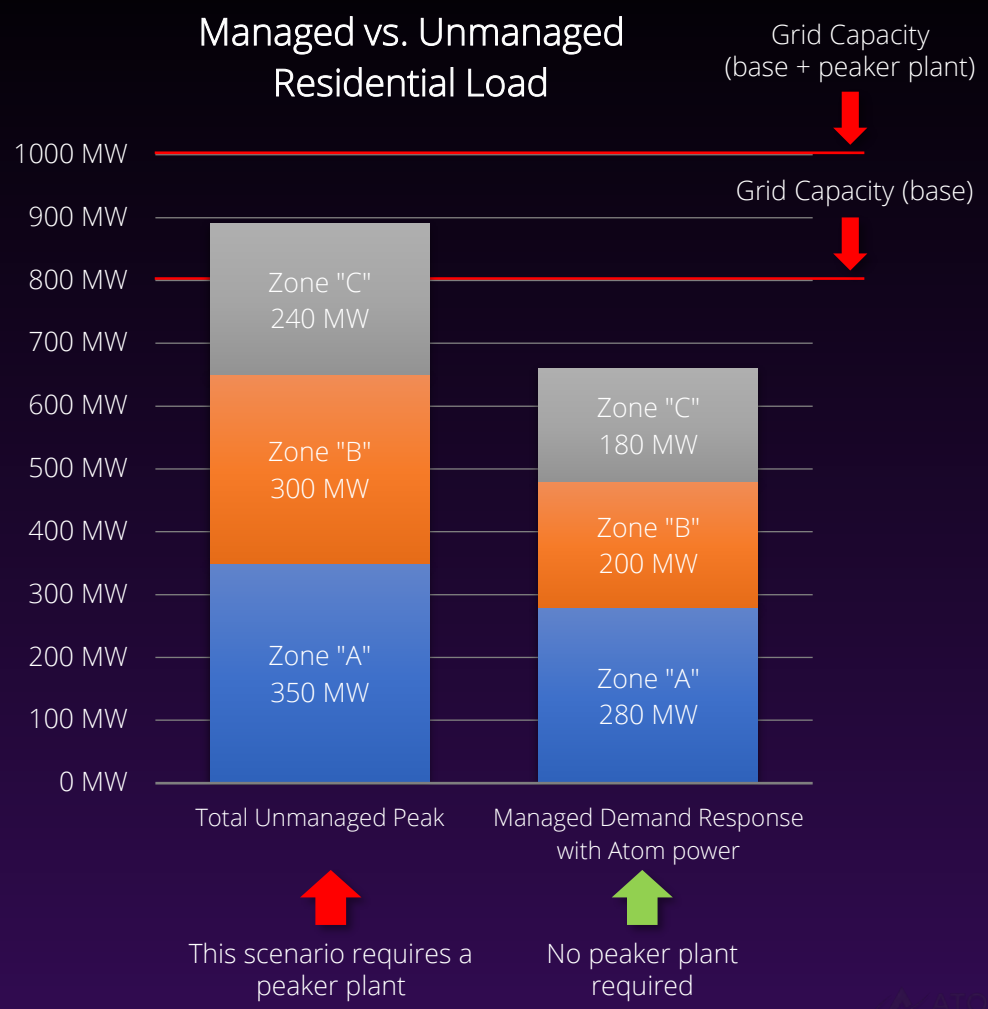
Demand Response and Energy Management has never been easier

16KW of load managed simply by replacing 3 circuit breakers

2 Miniature Circuit Breaker – Residential - Scalable

Scalable Demand Response (DR) – Peaker Plant Reduction (for industry background, click here)





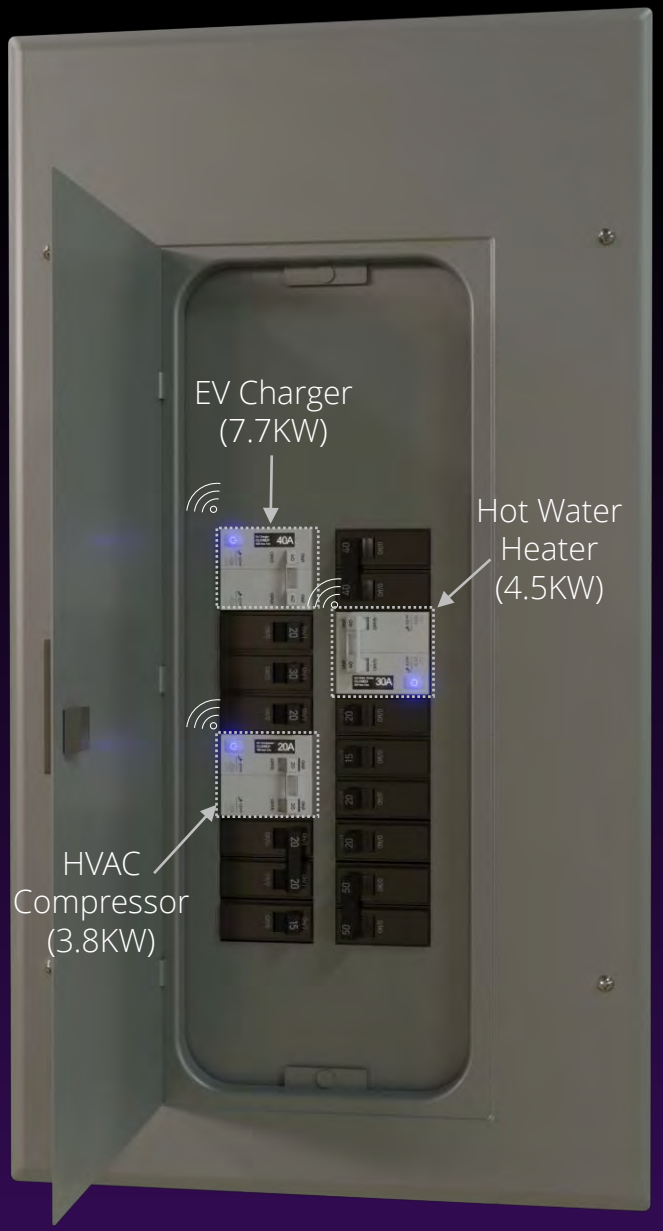
2 Miniature Circuit Breaker – Residential DER - Case Study

Here's the visual difference:

Today

With Atom Power

2 Miniature Circuit Breaker – Residential DR - Case Study



Existing or New Neighborhood (2022):

- 4,000 homes
- 200-amp (38KW) service to each at 240VAC
- DR opportunities include: EV Charger, Hot Water Heater and HVAC compressor
- Cost of Atom Switches per house: $935
- Cost of Atom Switches per neighborhood: $3.74M
- Total DR Loads per house: 16KW
- Total DR Opportunity for neighborhood: 64MW
- Total $/MW of DR opportunity: $58,438 per MW managed load, or $58.44 per KW

Payback to a utility varies. Atom Power has found on average that utility value (savings) for DR implementation is ~$120/KW/year

Atom Power saves utilities and co-ops ~$60/KW on average

2 Miniature Circuit Breaker

Commercial Buildings

First product release: mid-2022 (same as residential)

2 Miniature Circuit Breaker – Commercial Buildings

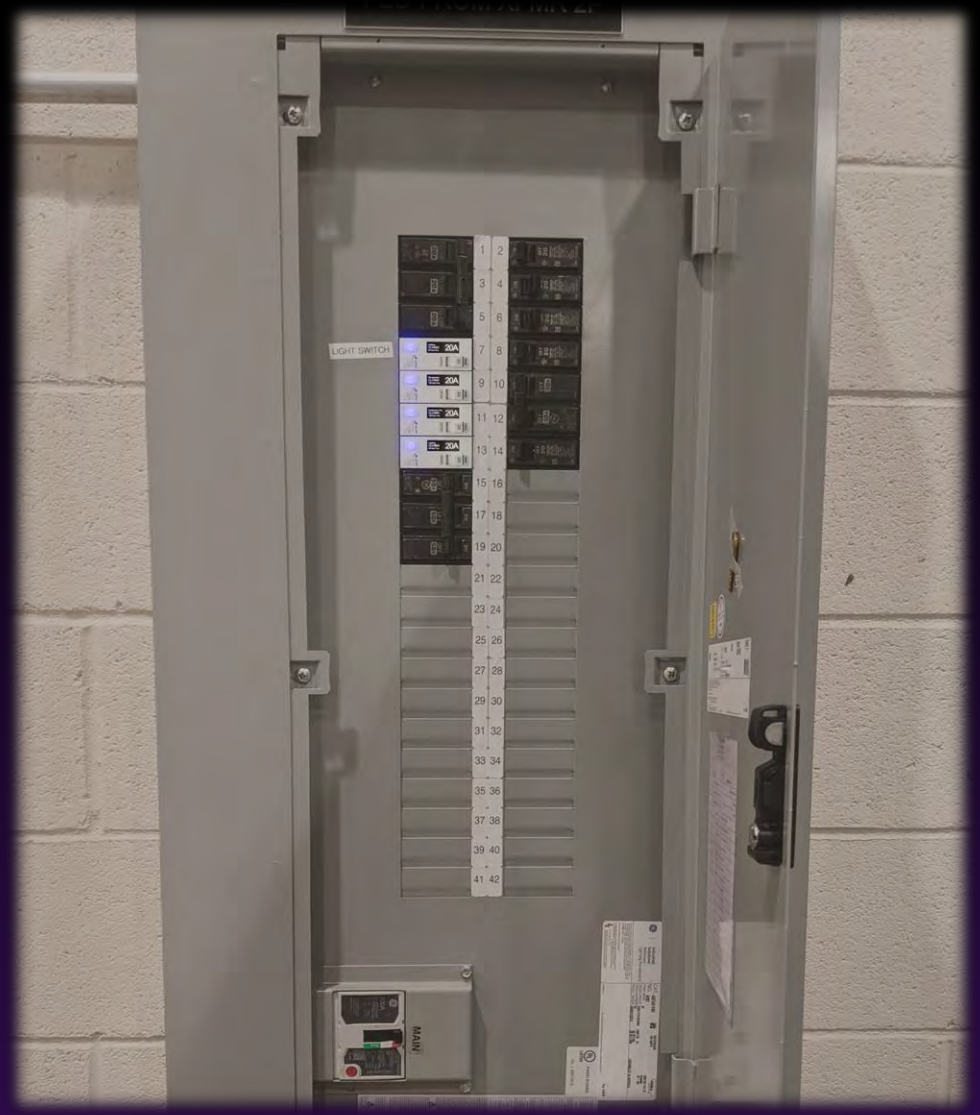
The same 1” Form Factor fits into ~70% of commercial 208V class systems (plugs and lights mostly)

Energy management and demand response with a simple circuit breaker replacement

In this case, lighting and plug loads within this panel are now metered, controlled and on an energy management schedule

(back)

2 Miniature Circuit Breaker – Commercial Buildings



Value Propositions*:

Value	Enabling Feature
LEED and International Energy Conservation Code (IECC) compliance	Remote on/off control of lighting and plug loads with built-in metering, easily connected to front-end building management software
Lighting control cost reduction	Remote on/off control, easily connected to front-end building management software
Peak demand savings	Remote on/off control of specific loads related to peak demand opportunities
Energy savings	Remote on/off control of high value energy intensive loads

**as communicated directly from customers*

(back)

Questions?