

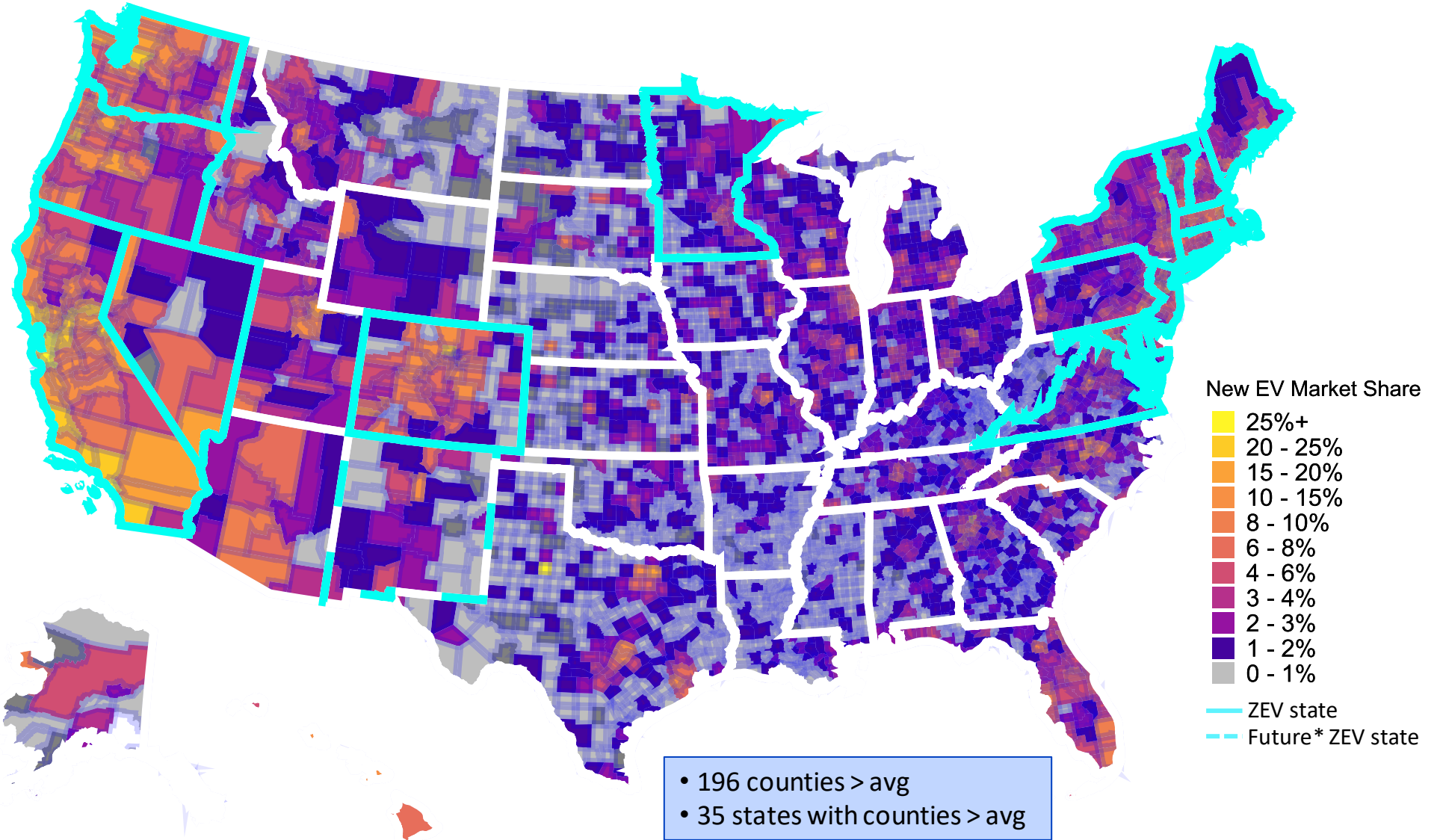


**Tucson Electric Power
Resource Planning Advisory Council**

31 August 2023

**KATHERINE STAINKEN
BRITTA GROSS**

U.S. Nationwide New EV Market Share (2023) = 8.7% Jan-May



Background and Objectives

- Government, Industry, and Fleets are **increasingly aligning on aggressive 2030 vehicle electrification goals**
- The **pace of needed year-over-year action and investment to prepare charging sites and the grid is not clear**
- Consumers and fleet operators **must have confidence in charging availability, reliability, and affordability**
- Consumers and fleets operators are **increasingly looking to the utility industry to scale up efforts** to support charging solutions, ensure the grid is capable of meeting vehicle loads

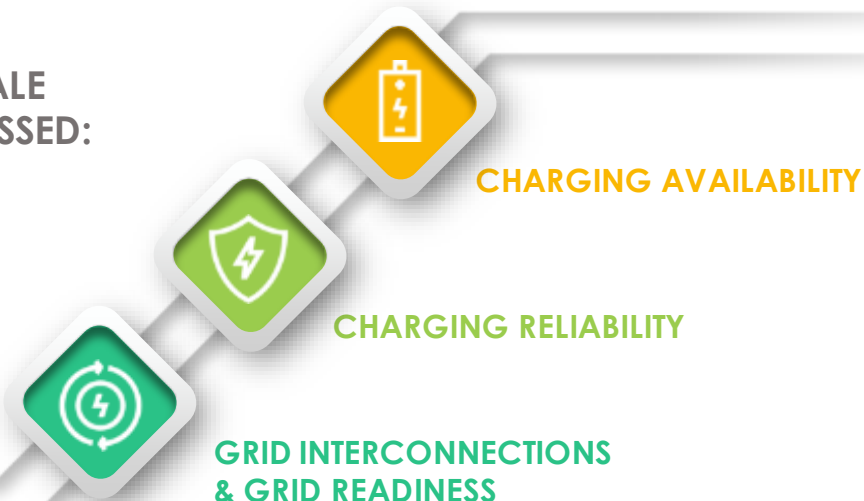
THIS TRANSITION IS UNPRECEDENTED AND COMPLEX. IT REQUIRES:

- **Extraordinary collaboration and partnering** across all the major EV stakeholder groups
- **Redesigned processes, useful tools, and increased standardization** to simplify the planning and complex interactions between major stakeholder groups
- **An evaluation of regulatory/board oversight** that may not be conducive to driving actions on the pace and scale required to meet 2030 targets



The “EVs2Scale2030” initiative is a **three-year commitment** focused on **leveraging industry scale to galvanize and align critical market stakeholders as EV goals increasingly target 50% EV market share by 2030**. EPRI will leverage its industry partnerships to mobilize utilities, OEMs, fleet operators, and charging providers, and coordinate with federal agencies and labs to support the rapid deployment of millions of electric vehicles – while minimizing grid impacts and enabling critical grid benefits.

TOP BARRIERS TO SCALE THAT MUST BE ADDRESSED:



3 ENABLING ACTIONS:

- 1 Ensure utilities (and regulators) are in lock-step with vehicle OEMs, fleets, and consumers
- 2 Optimize systems and processes that support the pace of activity/investment required
- 3 Develop needed tools and technologies that enable EV scale and capture EV grid benefits

Three-Pillar Strategy

1

COALITIONS & ROADMAPS

Bilateral Convening Series

- Utility-OEM Forum
- Utility-Fleet Forum

National EV Driver Research Board

50-state eRoadMAP™ to 2030

outlining EV loads, grid impacts, leadtimes, workforce, costs

Enabling Regulatory and Oversight Framework

Equity Blueprint & Workforce Development

2

STRUCTURAL SYSTEM REFORMS

Charging Infrastructure

- Reliability: Benchmarking, Standards
- Charging innovation & affordability

Grid Readiness

- Streamlined Grid Interconnect
- Managed Charging at Scale
- Interconnect Standards for V2H/V2B/V2G

3

UNIFYING TOOLS & PILOTS

- Approved Product List (APL)
- NEVI/NEHC Coordination with EEI

- GridFAST™ Online Data Exchange
- OEM/Utility V2H/V2B Pilot
- EV Resilience/Evacuation Pilot

Collaboration + Partnerships

UTILITY INDUSTRY	AUTO & TRUCKING INDUSTRY	FLEET OPERATORS	CHARGING PROVIDERS AND FUELING RETAILERS	NGO & STANDARD-SETTING ORGANIZATIONS

GOVERNMENT

- Joint Office of Energy & Transportation (JOET)
- US DOE
- US DOT
- National Labs
- FERC/NERC
- State DOEs, DOTs, DEQs
- State PUCs
- League of Cities
- Climate Mayors

EVs2Scale2030 Advisory Board



Chair: **Xcel**, Brett Carter

Co-Chair: **PG&E**, Patti Poppe

AAI, John Bozzella

Amazon, Sujit Mandal

Ameren, Mark Fronmuller

APPA, Paul Zummo

ATE, Phil Jones

ComEd, Gil Quiniones

Daimler Truck, Diego Quevedo

EI, Kellen Scheffer

GRE, Jeff Haase

JOET, Rachael Nealer

LCRA, Khalil Shalabi

NARUC, Katherine Peretick (Michigan PSC)

National Grid, Rudy Wynter

NRECA, Angela Strickland

NYP&A, Fabio Mantovani

Southern Company, Chris Cummiskey

Project Partners



Data Collaborators

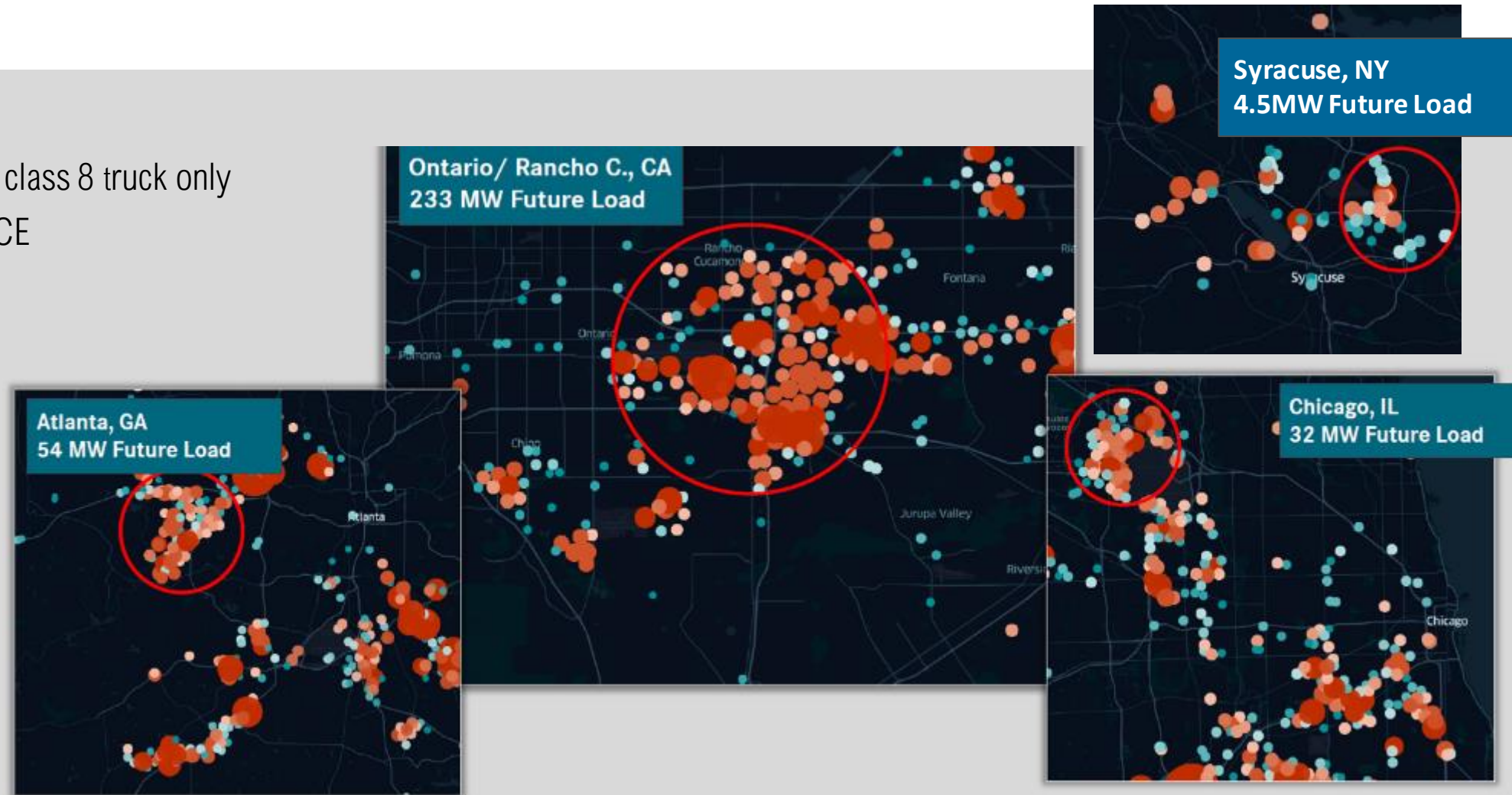


3 Key Early Deliverables:

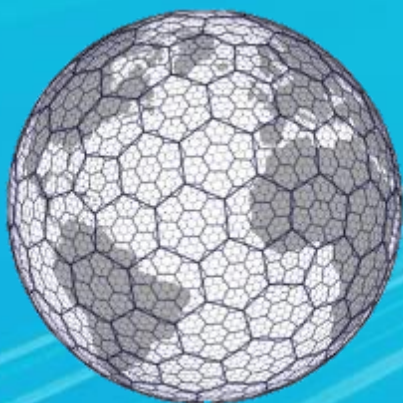
eRoadMAP™, GridFAST™, EPRI's VPL (Vetted Product List for EVSE)

Daimler Truck HD Projected Future Load “Clusters”

- Daimler heavy-duty class 8 truck only
- Currently on-road ICE
- Telematics data



Map Resolution



Uber's Hexagonal Hierarchical Spatial Index

Distribution Feeder Density Varies- but Generally 0.25 Sq Miles Will Contain One-Two Feeders



Increasing Aggregation

Vehicle/OEM/Fleet Data Should be Aggregated but is Still Useful for Utility Planning

Res	Average Hexagon Area (km ²)	Average Hexagon Area (mi ²)
0	4,357,449.42	1,682,419.93
1	609,788.44	235,440.54
2	86,801.78	33,514.34
3	12,393.43	4,785.13
4	1,770.35	683.53
5	252.90	97.65
6	36.13	13.95
7	5.16	1.99
8	0.74	0.28
9	0.11	0.04
10	0.0150	0.0058
11	0.0021	0.0008
12	0.0003	0.0001

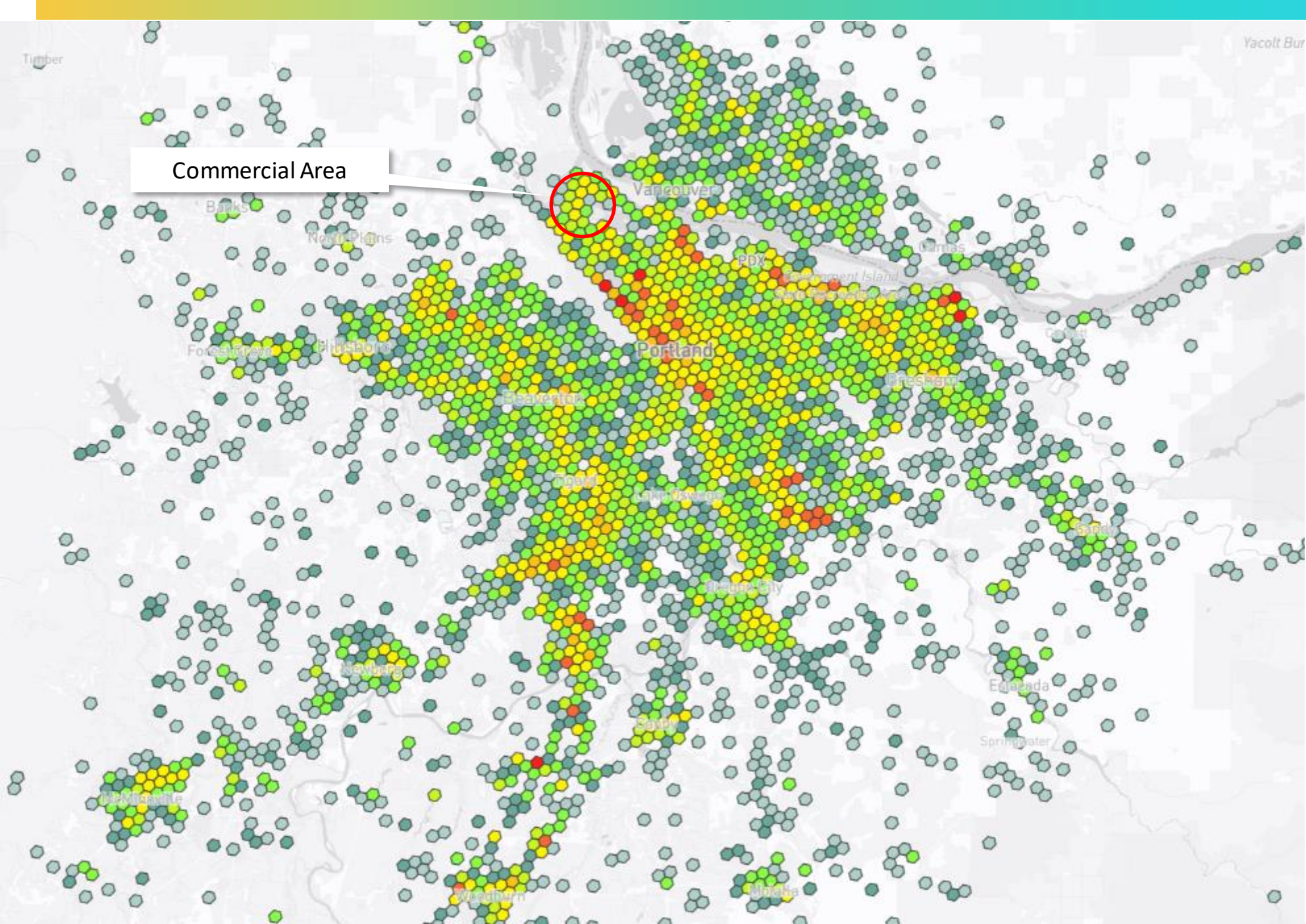
H3 resolution levels

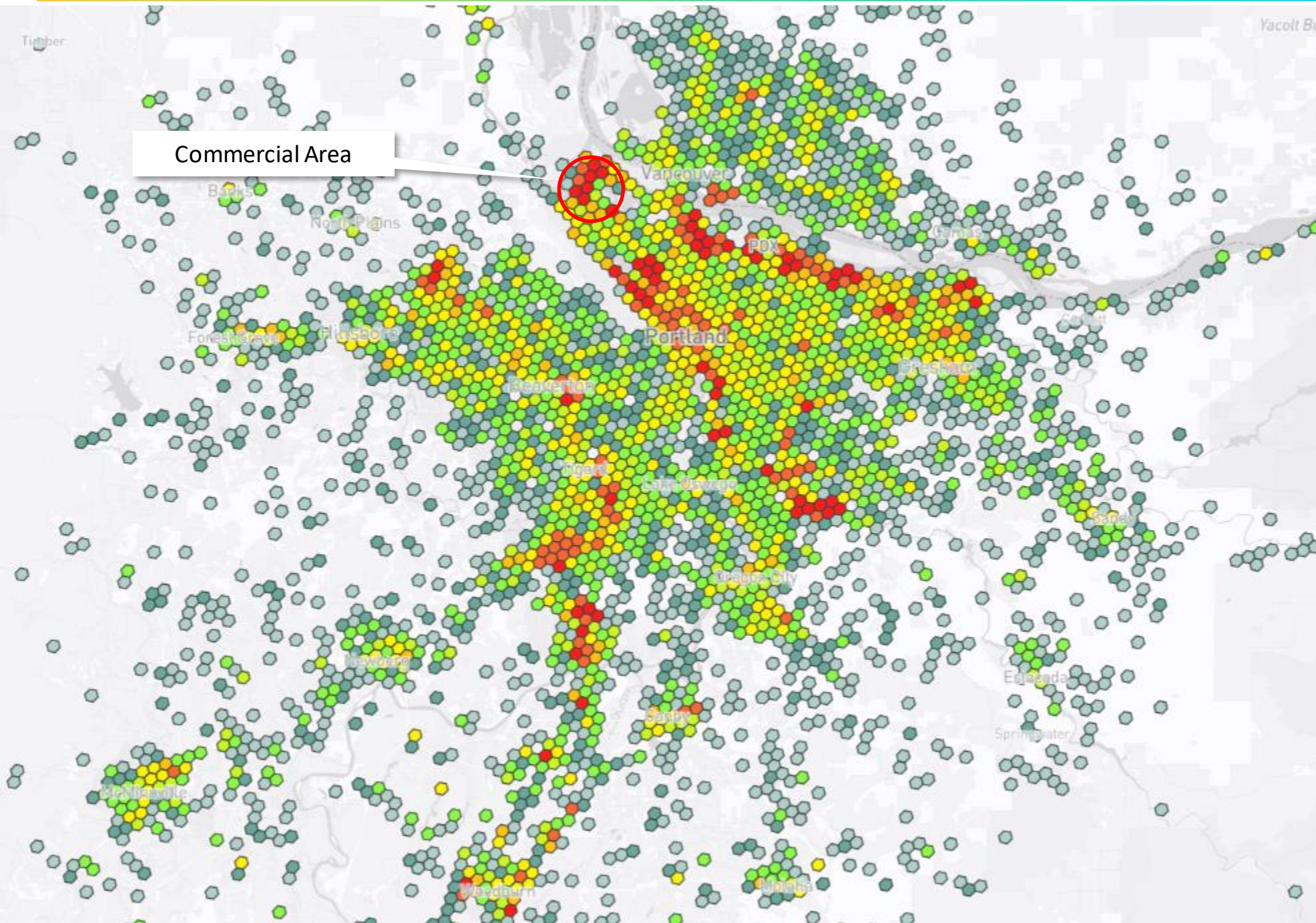
<https://www.uber.com/blog/h3/>

Portland

Commercial Area

Hex level 8
INRIX – Avg # of Stops per day



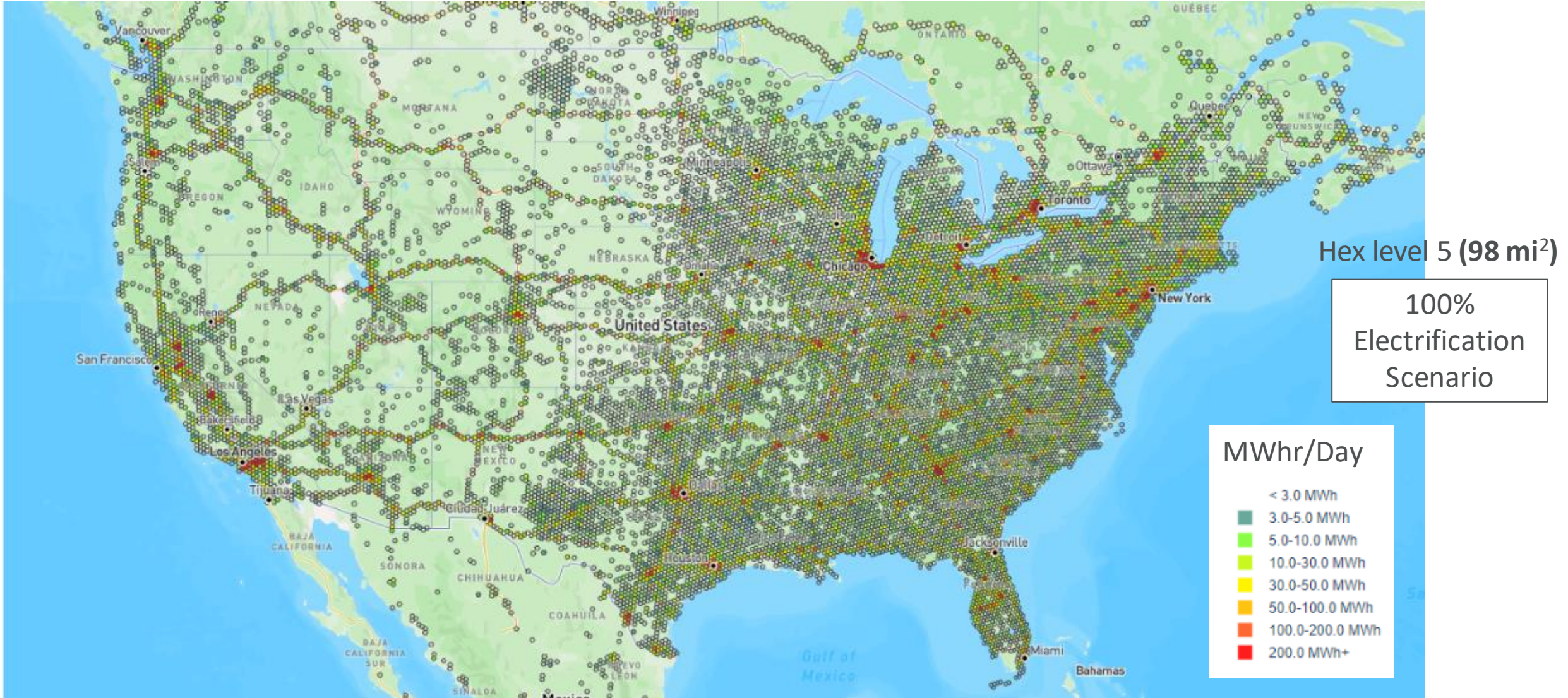


Commercial Area

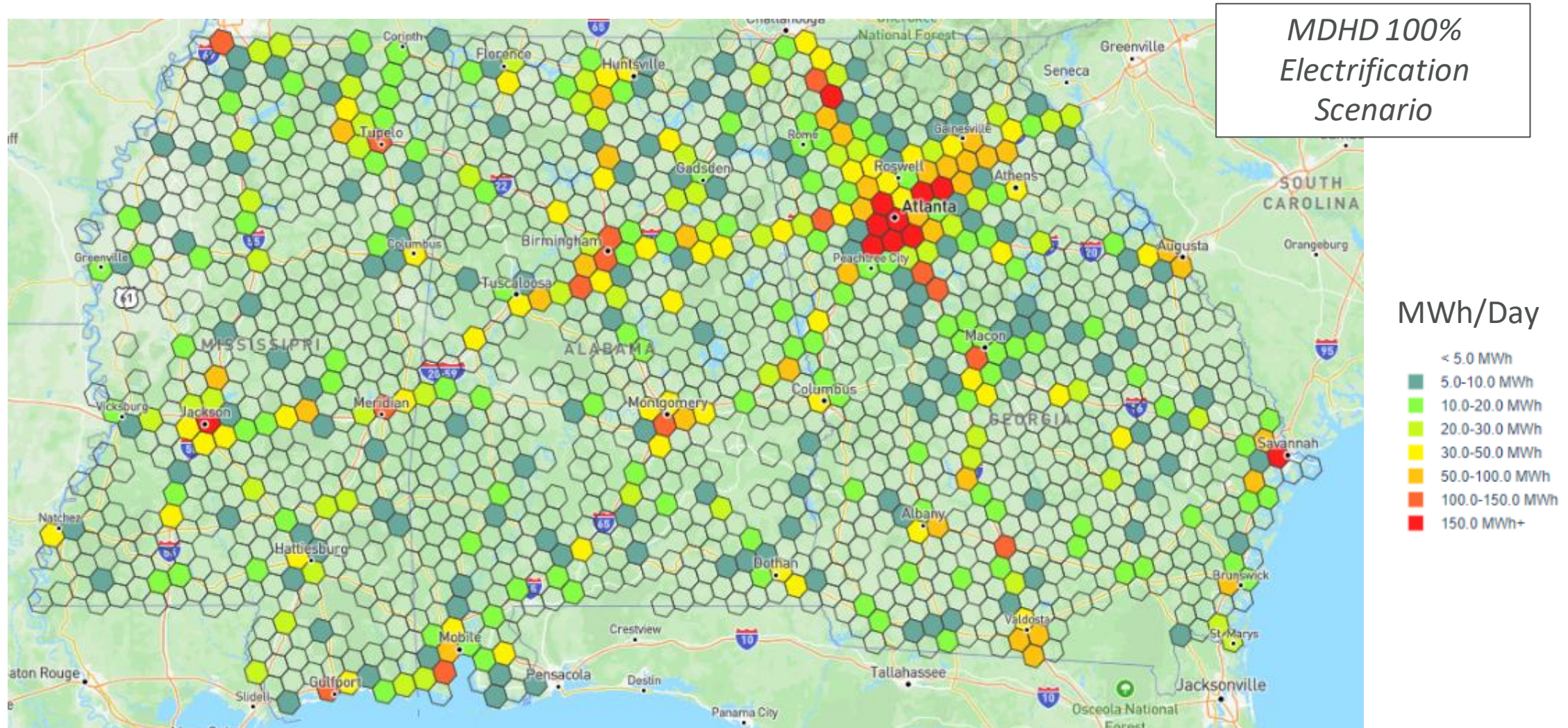
Hex level 8
 INRIX + Daimler + Volvo:
 Avg # stops per day

- < 0.1
- 0.1-0.2
- 0.2-0.5
- 0.5-1.0
- 1.0-3.0
- 3.0-5.0
- 5.0-10.0
- 10.0 +

Preliminary Vehicle Activity: MDHD Vehicles ENERGY

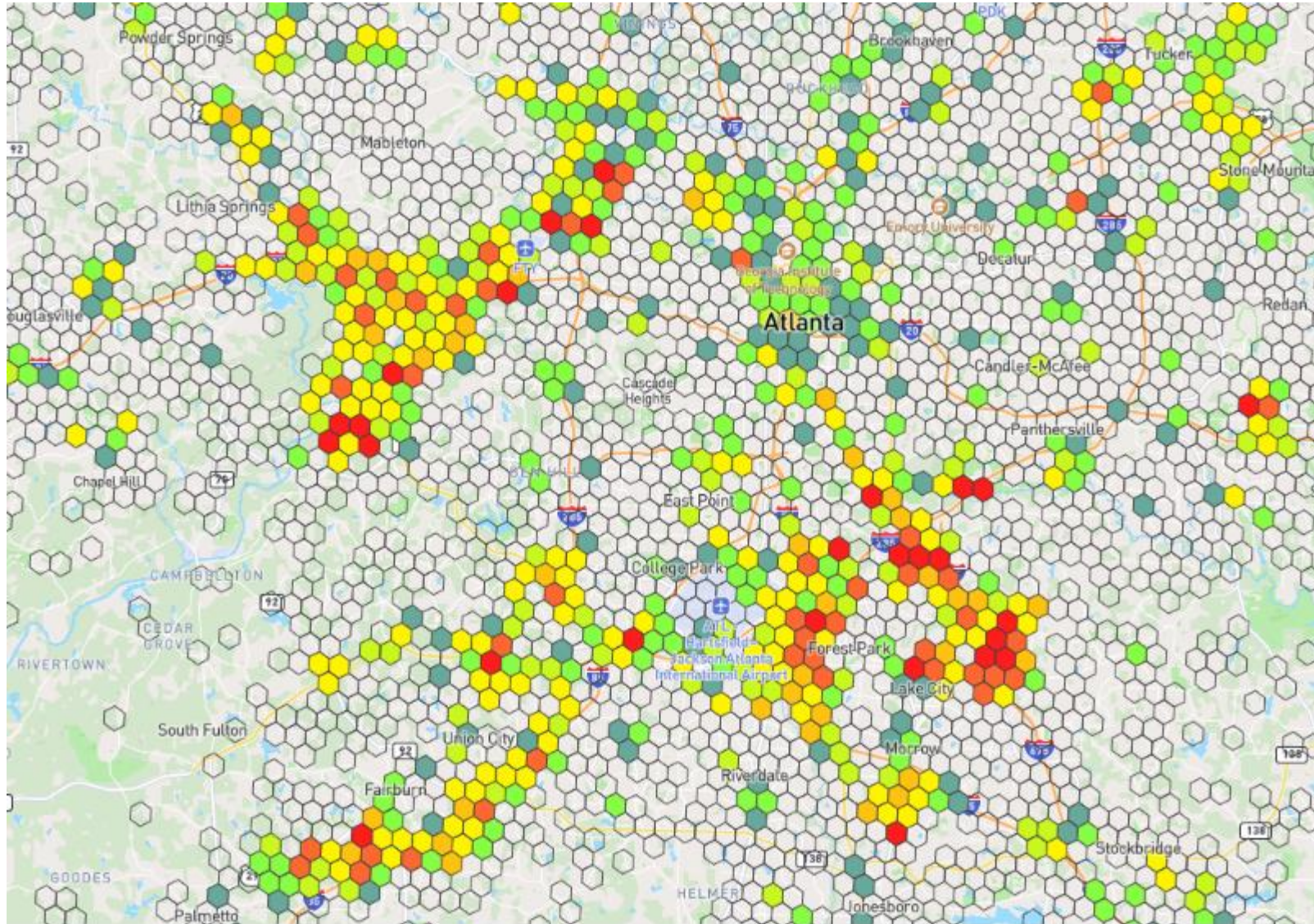


Preliminary Vehicle Activity: Southern Co ENERGY H5

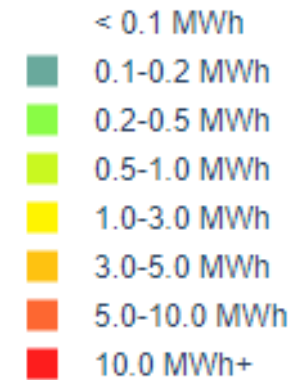


Preliminary Vehicle Activity: Southern Co H8

*MDHD 100%
Electrification
Scenario*



MWh/Day

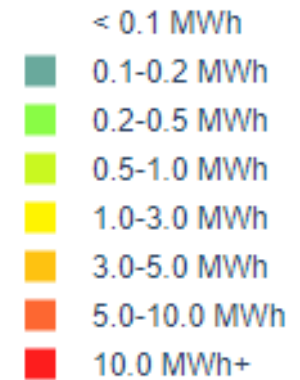


Preliminary Vehicle Activity: Southern Co H8



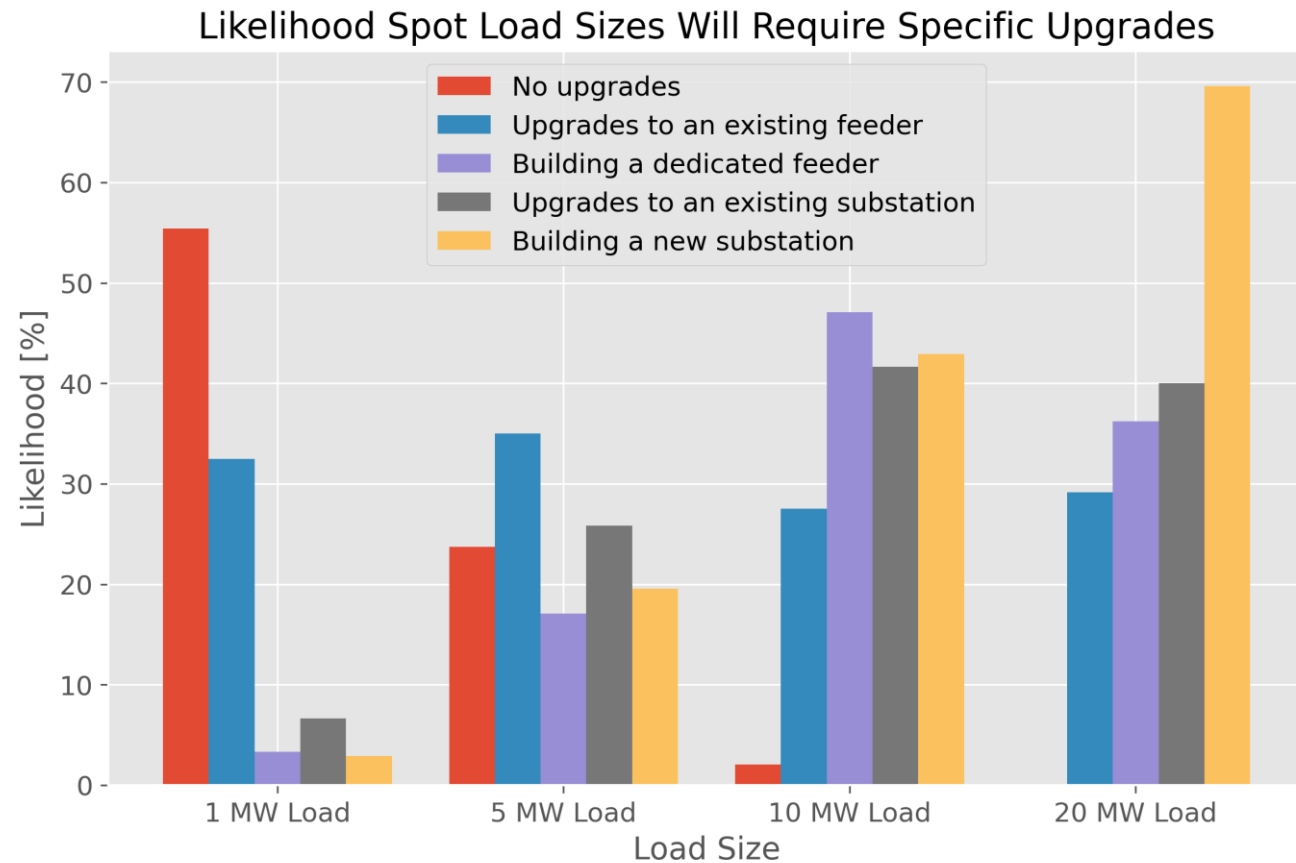
MDHD 100% Electrification Scenario

MWh/Day



Utility Grid Survey

Preliminary Responses

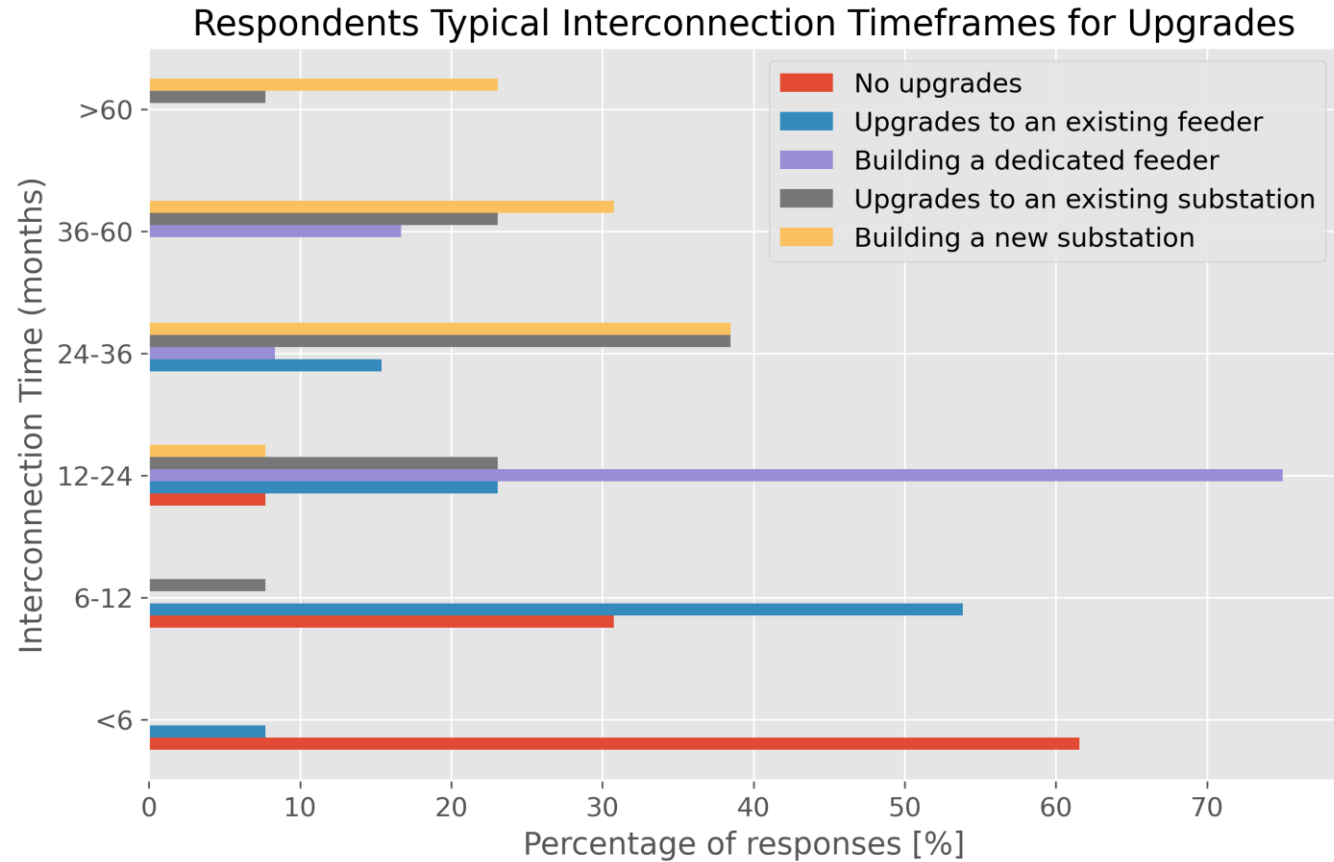


Preliminary Take-a-Ways:

- **5MW load** – 30% likely to need a feeder up grade
- **10MW load** – 48% likely to need a dedicated feeder, 42% likely to need substation
- **20MW load** – 70% likely to need a new substation

Utility Grid Survey

Preliminary Responses



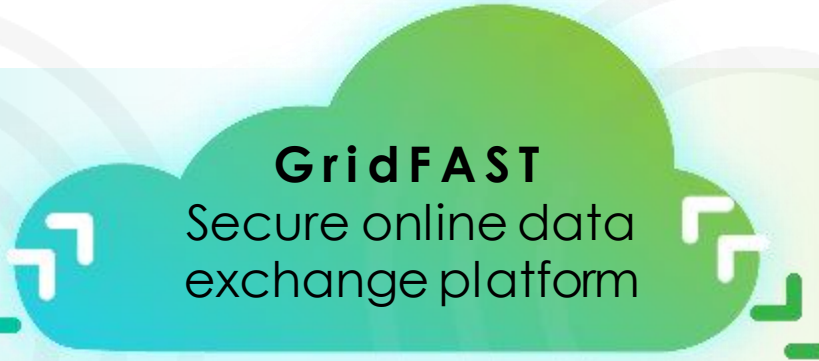
Preliminary Take-a-Ways:

- **Upgrades to an Existing Feeder:** 6-12 months
- **Dedicated Feeder Lead Time:** 12-24 months
- **Build a new Substation:** 24-36 months

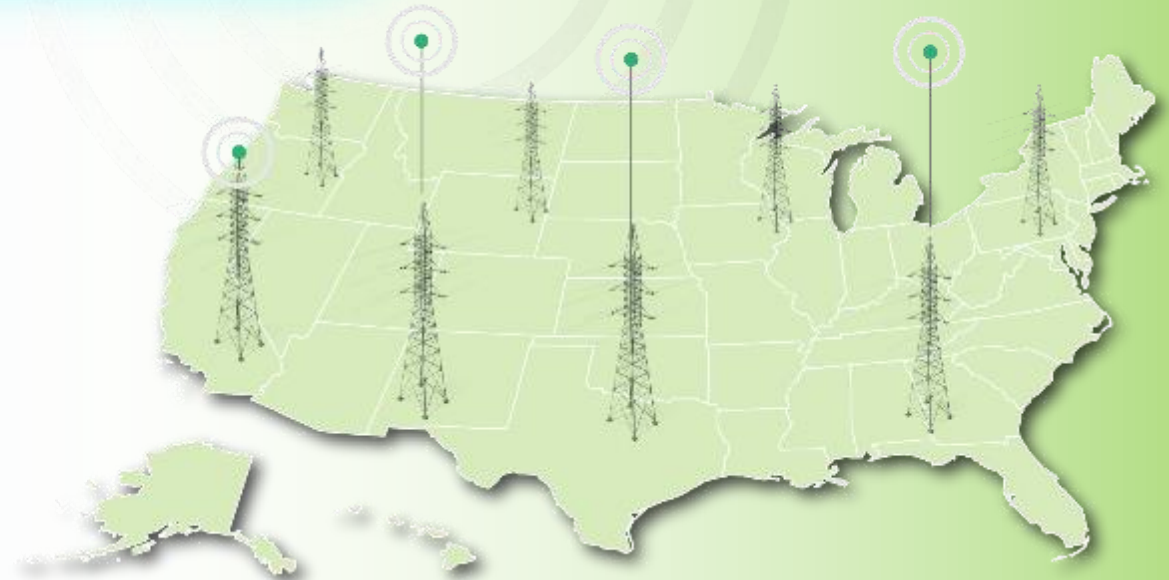
GridFAST

Improve transparency in EV charging planning to inform grid investments and accelerate grid interconnects

2023-2035 plans defining loads,
locations, timing

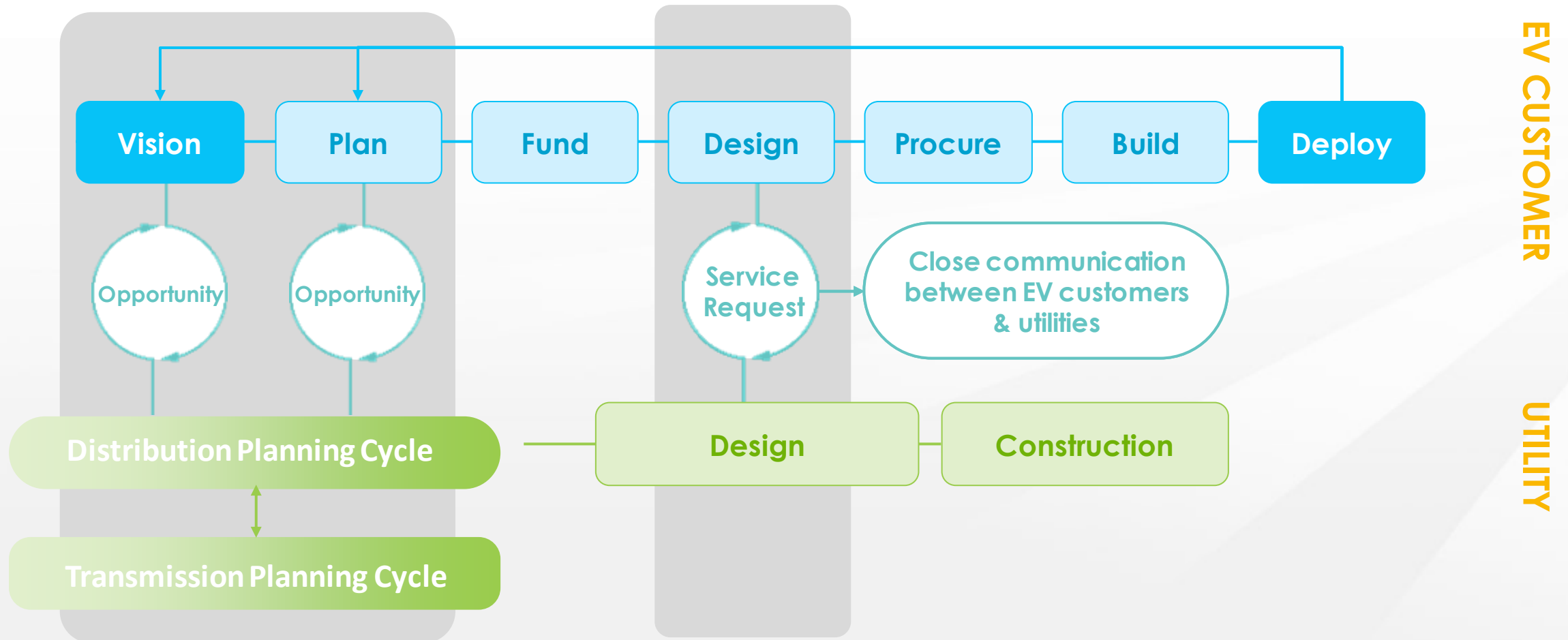


Utility hosting capacity – or proxies –
indicating grid readiness, timing to
support EV charging loads



GridFAST

How might we help EV customers and utilities get actionable information, earlier in this process?



Round One Interviews



Rental | Leasing | Logistics



ENTERPRISE HOLDINGS.



EVs2Scale 2030

The logo graphic for EVs2Scale 2030 consists of several parallel lines of varying lengths and colors (blue, green, yellow) that fan out from the bottom left towards the right, creating a sense of motion and growth.

VETTED PRODUCT LIST

Why Build a Vetted Product List?

- **Out of date Approved Product Lists** – including obsolete hardware
- Limited vendor selection - **artificially restricting competition**
- No transparency into which criteria are required by the user and how each vendor's equipment complies (or doesn't comply)
- **Lack of transparency**, means **no way to encourage standardization** or consensus-building across APLs (which could raise the level of performance of the industry)
- Utilities, State DOTs (NEVI funding), et al... **have hired teams to specifically sort out the landscape of EVSE hardware and networking systems** to determine the fit for their programs
- SCE asked us to

EPRI Approved (Vetted) Product List (EVSE/Networking)



- Reduce complexity in the market
- Improve transparency of “compliant” charging equipment (incl. new NEVI standards)
- National repository for vetted EVSE and stakeholder APLs

<https://www.epri.com/vpl>



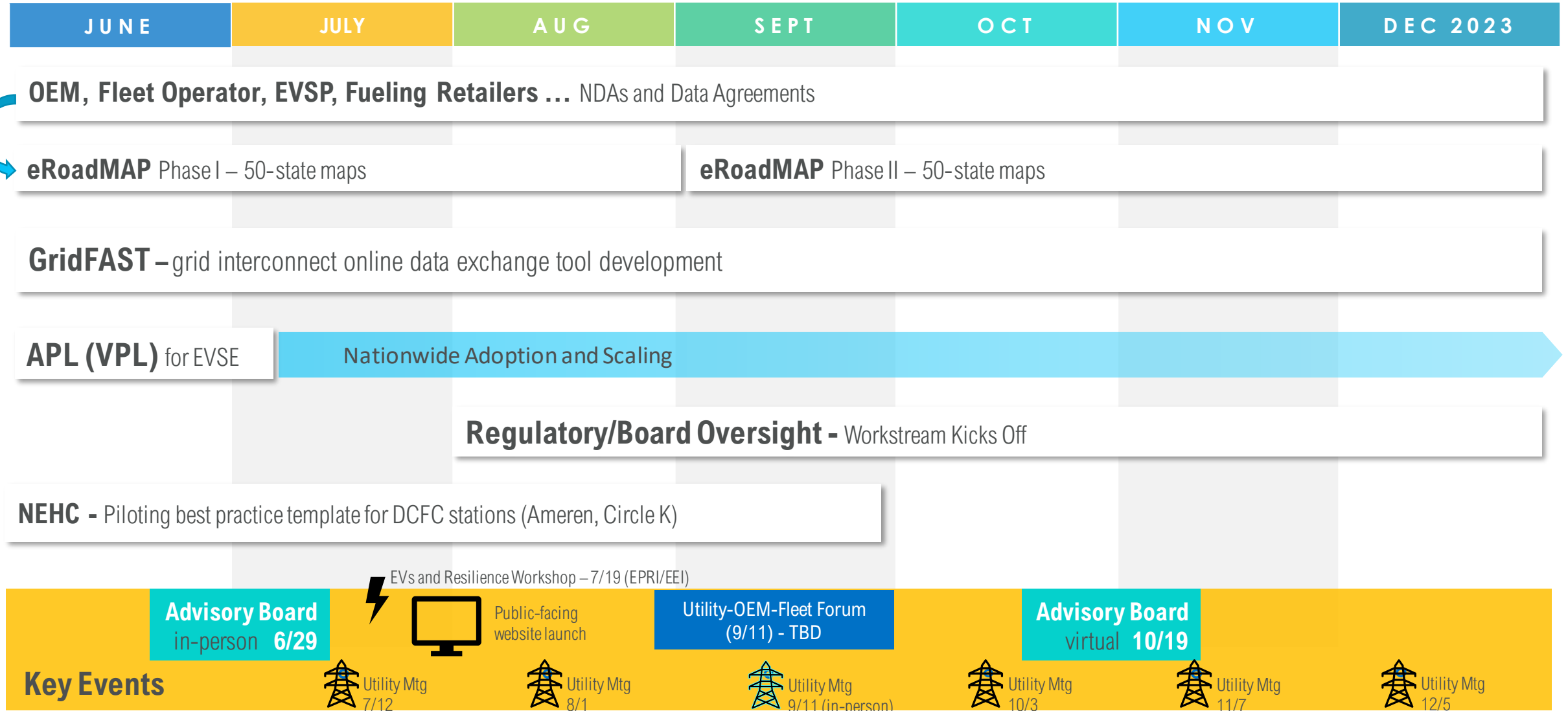
SCE's Approved Product List (first user APL)



Southern California Edison Charge Ready Program Updated June 9, 2023			
These EVSE meet the program requirements established by SCE for the various Charge Ready programs.			
Charge Ready Light Duty:			
Brand	Model	Types	Max Power (kW)
Audel	MaxiCharger US AC W12-L-4G	AC	8.3
AudE	UF44441-40	AC	8.3
Blink	IQW2-80U-M1P0-N-25-40 (Advanced)	AC	8.3
Blink	IQW2-80U-M3-R3-N-25-40 (Advanced-LTE-W)	AC	8.3
Blink	IQW2-80U-W1-M1-N-25-40	AC	8.3
BTCPower	EVP-1001-30-#	AC	7.2
BTCPower	EVP-2001-30-#	AC	7.2
BTCPower	EVP-2001-40-#	AC	7.2
BTCPower	EVP-2002-30-#	AC	7.2
BTCPower	EVP-2002-40-#	AC	7.2
ChargePoint	CPF50-L18-DUAL-40	AC	8.3
ChargePoint	CPF50-L18-40	AC	8.3
ChargePoint	CPF50-L23-DUAL-40	AC	8.3
ChargePoint	CPF50-L23-40	AC	8.3
ChargePoint	CT401-G-W1	AC	7.2
ChargePoint	CT402-G-W1	AC	7.2
ChargePoint	CT402S-G-W1	AC	7.2
ChargePoint	CT402S-G-W1-PMSMT40	AC	7.2
ChargePoint	CT402S-G-W1	AC	7.2
ChargePoint	CT402S-G-W1-PMSMT40	AC	7.2
ChargePoint	CT402S-G-W1	AC	7.2
ChargePoint	CT402S-G-W1-PMSMT40	AC	7.2
ChargePoint	CT402S-G-W1	AC	7.2
ChargePoint	CT402S-G-W1-PMSMT40	AC	7.2
Eaton	GMEV400CHCIE-WC	AC	9.6
Eaton	GMEV400CHCIB-WC	AC	9.6
Eaton	GMEV400CHCIE-WC	AC	19.2
Eaton	GMEV400CHCIB-WC	AC	19.2
Eaton	GMEV325B-DC1	AC	7.7
Eaton	GMEV325B-DC1	AC	7.7
Eaton	GMEV325B-R1B1/GMEV325R	AC	7.7
Eaton	GMEV325B-R1C1	AC	7.7
Epic Charge	EC40-AC	AC	11.5
Epic Charge	EC50-AC	AC	13.2
Epic Charge	EC848-AC	AC	11.5
Epic Charge	EC880-AC	AC	13.2
Loop	EVS-32A-L-2-001	AC	7.68
Loop	EVS-32A-L-2-002	AC	7.68
Tellus Power	UP180U-RMP-###	AC	7.2
Tellus Power	UP180U-RMP-###	AC	7.2
Charge Ready Transport (AC):			
Brand	Model	Types	Max Power (kW)
ABB	SAGC18-D91	AC	9.6
ABB	SAGC18-253	AC	9.6
ABB	SAGC105902	AC	9.6
AED	SAGC105903	AC	19.2
AEB	SAGC105904	AC	8.2
ABB	SAGC105905	AC	9.6
Audel	MaxiCharger US AC W12-L-4G	AC	7.2
Audel	MaxiCharger US AC W12-L-4G	AC	8.3
Audel	UF11111-40	AC	8.3
Audel	UF11111	AC	19.2
Blink	IQW2-80U-M1-R2-N-25 (Advanced-LTE)	AC	19.2
Blink	IQW2-80U-M1-R2-N-25-40 (Advanced)	AC	8.3
Blink	IQW2-80U-H-R3-N-25 (Advanced-LTE-W)	AC	19.2
Blink	IQW2-80U-H-R3-N-25-40 (Advanced-LTE-W)	AC	8.3
Blink	IQW2-80U-W1-N1-N-25 (Smart)	AC	8.3
Blink	IQW2-80U-W1-N1-N-25-40	AC	8.3
Blink	MC200	AC	7.2
BTCPower	EVP-1001-30-#	AC	7.2
BTCPower	EVP-2001-30-#	AC	7.2
BTCPower	EVP-2001-40-#	AC	7.2
BTCPower	EVP-2001-70-#	AC	16.0
BTCPower	EVP-2002-30-#	AC	7.2
BTCPower	EVP-2002-40-#	AC	7.2
ChargePoint	CPF50-L18-40A-L7	AC	19.2
ChargePoint	CPF50-L18-DUAL	AC	7.2
ChargePoint	CPF50-L18-DUAL-40	AC	8.3
ChargePoint	CPF50-L18	AC	7.2
ChargePoint	CPF50-L18-40	AC	8.3
ChargePoint	CPF50-L23	AC	7.2
ChargePoint	CPF50-L23-DUAL	AC	7.2
ChargePoint	CPF50-L23-DUAL-40	AC	8.3
ChargePoint	CPF50-L23-40	AC	8.3
ChargePoint	CT401-G-W1	AC	7.2
ChargePoint	CT402-G-W1	AC	7.2
ChargePoint	CT402S-G-W1	AC	7.2
ChargePoint	CT402S-G-W1	AC	7.2
ChargePoint	CT402S-G-W1-PMSMT140	AC	7.2
ChargePoint	CT402S-G-W1	AC	7.2
Charge Ready Transport (DC):			
Brand	Model	Types	Max Power (kW)
ABB	HVC-81C	DC	190
ABB	Terra T24-###	DC	120
ABB	Terra T64-###	DC	180
ABB	Terra T24 DC Wallbox	DC	24
ABB	Terra S4	DC	50
ABB	Terra S4 HV	DC	50
ABB	Terra S4-###	DC	50
ABB	Terra HP-175	DC	175
ABB	Terra HP-350	DC	350
Audel	UF060A3001	DC	60
Audel	UF060A3001	DC	80
Audel	UF100A3001	DC	100
Audel	UF120A3001	DC	120
Audel	UF140A4001	DC	140
Audel	UF160A4001	DC	160
Audel	UF180A4001	DC	180
Audel	UF200A4001	DC	200
Audel	UF220A4001	DC	220
Audel	UF240A4001	DC	240
BTCPower	EVP-C-100	DC	100
BTCPower	EVP-C-150	DC	150
BTCPower	EVP-C-200	DC	200
BTCPower	EVP-FC-50-001	DC	50
BTCPower	EVP-FC-50-002	DC	50
BTCPower	HPCT2-100-480-#	DC	120
BTCPower	HPCT2-150-480-#	DC	150
BTCPower	HPCT2-100-100-#	DC	100
BTCPower	HPCT2-200-180-#	DC	240
BTCPower	HPCT2-360-180-#	DC	360
BTCPower	L3H-25-###-CS	DC	25
BTCPower	L3H-50-###-CS	DC	50
BTCPower	L3A-00-180-###	DC	180
BTCPower	L3A-150-480-###	DC	150
BTCPower	L3A-180-480-###	DC	180
BTCPower	L3A-30-450-###	DC	50
BTCPower	L3R-100-480	DC	100
Charge Amc	CLS500-M100-A10001	DC	360
ChargePoint	CPC250C-500-CCS1-C-ID	DC	50

- APL criteria defined by user (e.g. SCE) with EPRI support
- User APL updated in realtime as new vendor equipment is added into the system
- No cost to users (all costs paid by EVSE vendors)

Timeline of Early Efforts and Quick Wins



EVs2Scale 2030



Thank You