THUNDERGRID

A Landis+Gyr Company

Building the Charging Infrastructure for Heavy Vehicles

THUNDERGRID.NET

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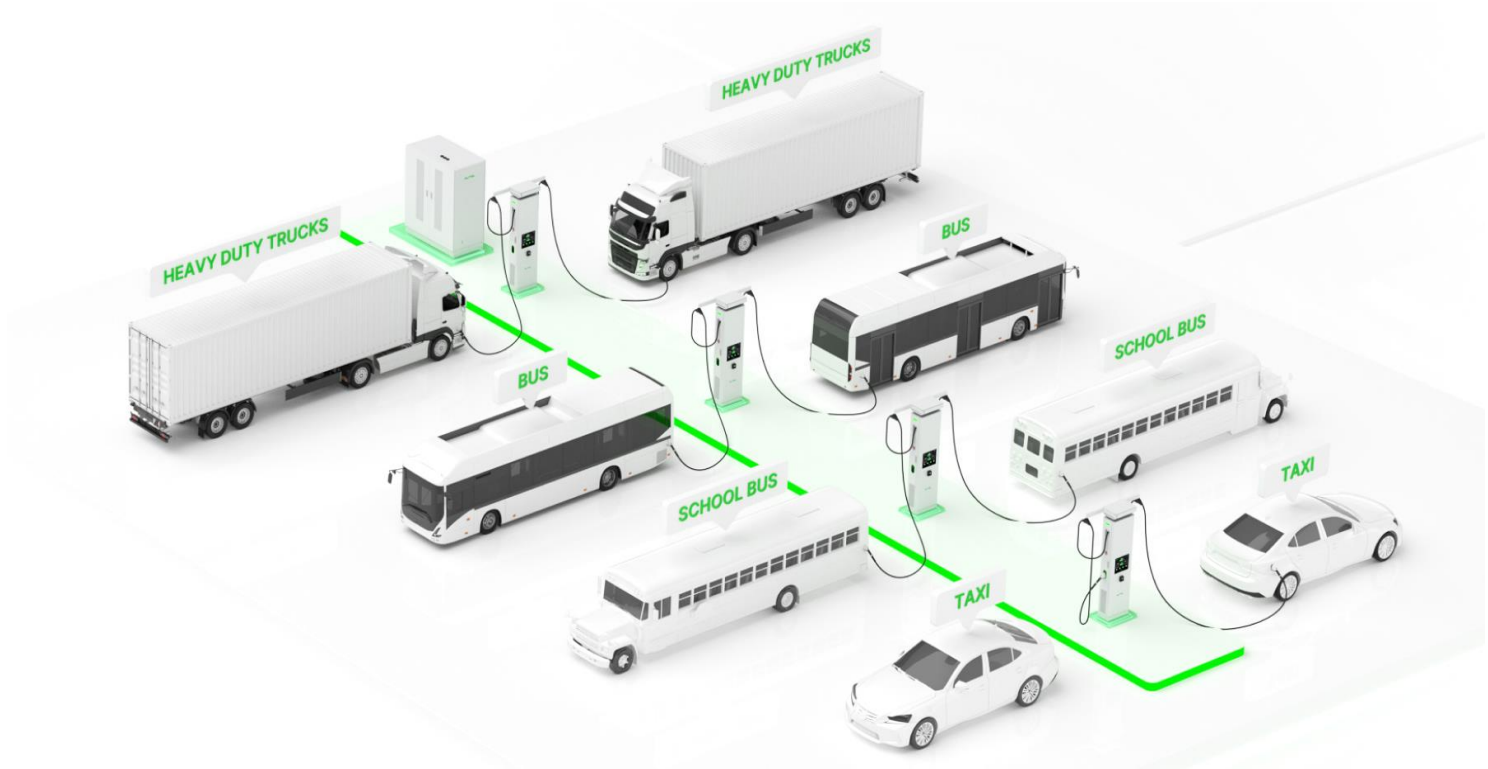

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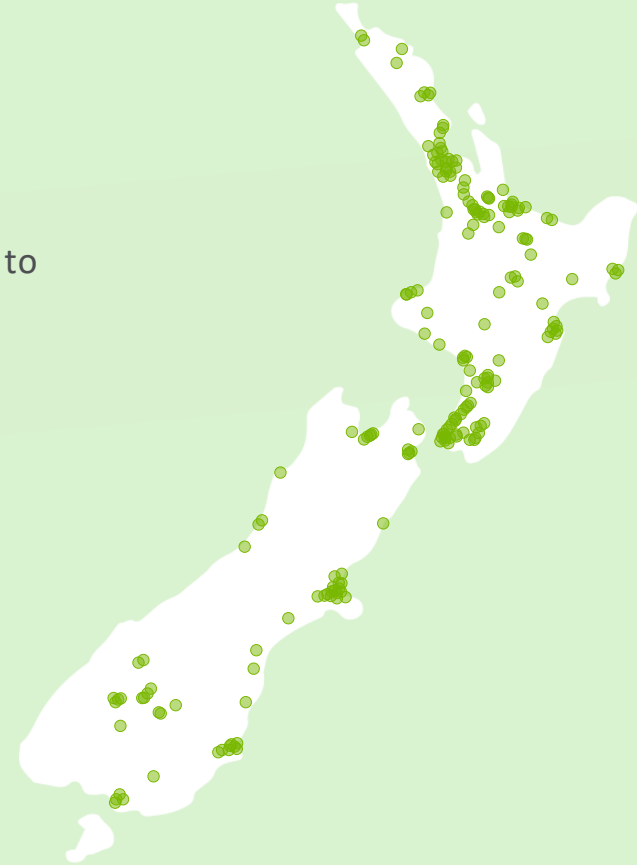
Thundergrid is New Zealand's largest commercial EV charging company, backed by Landis+Gyr we are now expanding into Australia and beyond.

Since 2017, we've been lightening the load for our customers by delivering end-to-end solutions in scalable energy management and EV infrastructure, tailored to meet the unique needs of each of our customers.

We have deployed over 2,300 chargers, in approximately 150 towns & cities throughout New Zealand, resulting in over 3.3m tons of CO_2 avoided.

Our solutions are tailored to align with our customers operational requirements and long-term objectives:

- Helping organisations electrify seamlessly,
- Reduce grid pressure, and
- Accelerate progress toward their goals.



Landis+Gyr

manage energy better

Landis+Gyr is a Swiss-headquartered, SIX Swiss stock exchange listed, global leader in energy management solutions, specialising in smart metering, grid edge intelligence, and smart infrastructure for utilities and end-consumers worldwide.

With ~7,000 employees, ~$2b annual revenue, and ~$4b market capitalization Landis+Gyr has the scale to help you manage energy better.

FROM PEOPLE TO PEOPLE

We align with your journey and requirements, and deliver reliable solutions that add long-term value

SOLUTIONS & STRATEGY

1. People	2. Vehicles	3. Infrastructure

INFRASTRUCTURE DEPLOYMENT

1. Design	2. Installation	3. Onboarding

ONGOING SUPPORT

1. People	2. Mobility	3. Infrastructure

WILL I KNOW WHAT TO DO?

Yes:
we will help you navigate the electrification environment, building strategies & business plans that help your business decide on an informed and intelligent course of action

WILL IT BE EASY?

Yes:
with our expert engineers & project managers, our comprehensive portfolio of hardware, proprietary signage, and flexible integrations, we can take care of it all for you!

WILL IT WORK?

Yes:
with our 2 years free managed service including 24/7 help-desk, scaled-supply-chain resilience, and industry partnerships, we'll ensure your electric future delivers reliable long-term value

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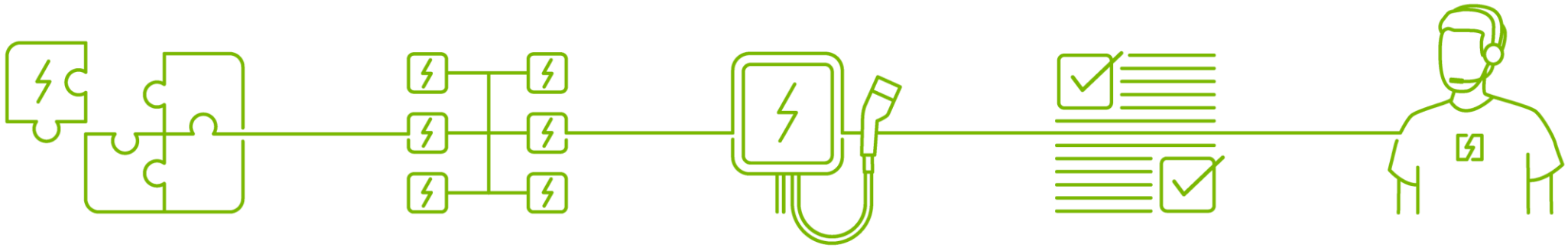
END-TO-END



STRATEGY, REVIEW & CONSULTATION

Our experts will share their extensive knowledge and experience to find the right solution for your electrification journey.

- EV infrastructure audits and reviews
- Energy efficiency review
- Future proofing

CHARGING SYSTEM DESIGN

- Pre-work: Gather site documentation and contacts
- Site assessment: Inspect electrical distribution and capacities
- Develop and create electrical design with dynamic load management
- Create Implementation plan

HARDWARE & INSTALLATION

- Hardware supply and installation
- Control systems to enable power load management
- Project management

COMMISSIONING & TRAINING

- Configuration, commissioning and customisation of chargers
- Set up of preferred authentication methods, billing and reporting
- Onboarding of users and fleet managers

CHARGER MANAGEMENT & SUPPORT

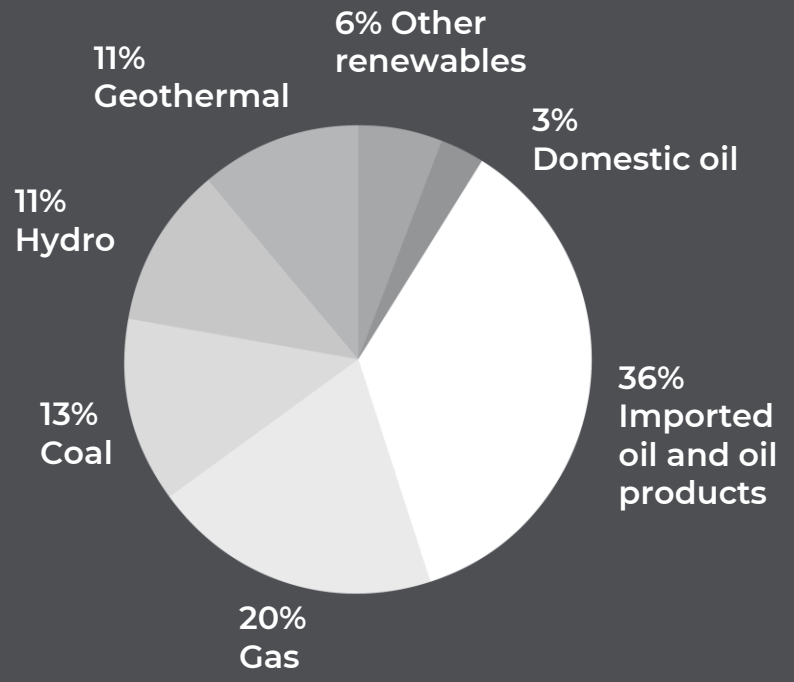
24/7 help, maintenance and updates.

- User support and helpdesk
- Billing and reimbursements
- Charging insights, analytics and reporting

Fossil fuels are hurting NZ

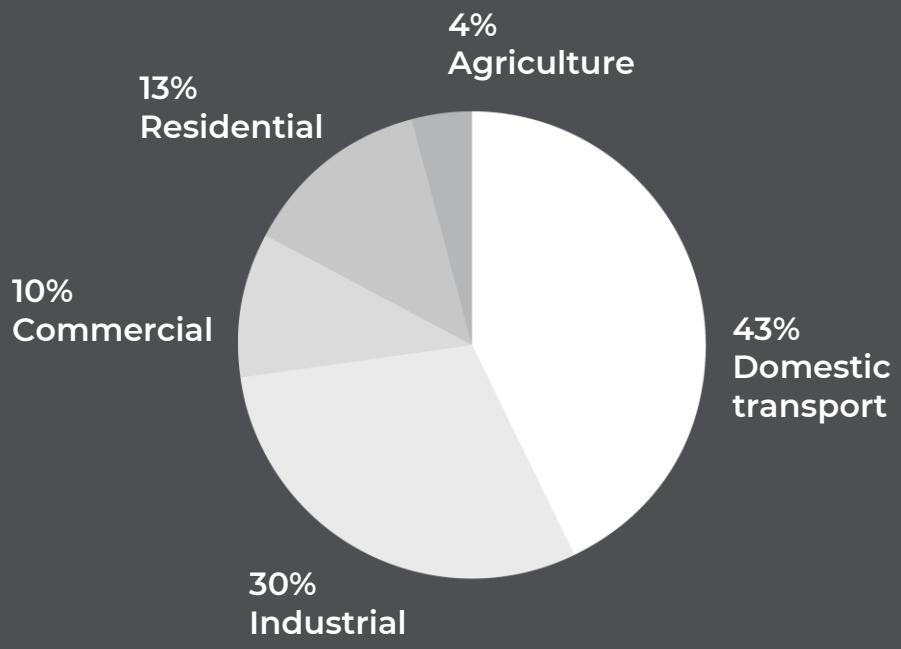
- 36% of all energy is imported into NZ
- 43% of all energy use comes from transport
- We are importing emissions
- There are 10m fossil fuel machines in NZ, 84% of them can be electrified
- **We spend up to $12 Billion every year on importing fuel**

Energy Mix
Sources of energy



Energy Mix: Sources of energy

Energy Mix
How we actually use them



Energy Mix: How we actually use them

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Electric Trucks

HEAVY VEHICLES

EV Trucks Available Today

Windrose Electric Trucks

- 600km per charge
- 49t
- 729kWh capacity
- 870kW charging

Volvo Electric Trucks

- 300km
- Up to 50t
- 250kW charging speed

Deepway Star

- 400km at 50t
- 600kWh battery
- 11900kg

EV Trucks Available Today

Scania Electric Trucks

- 600km at 29t
- 550 at 42t
- 375 at 64t

- 375kW charging speed 110m charging to 83% SoC
- 728kWh capacity

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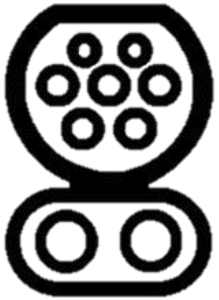
Charging Infrastructure Examples

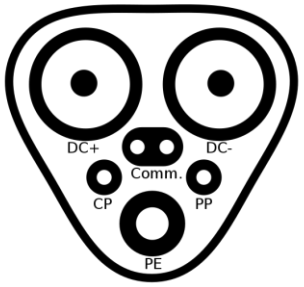
TYPES OF RAPID/ULTRA RAPID CHARGERS

- 50kW

- 100 – 400kW

- 400 – 1200kW





- Megawatt Charging

SATELLITE / DISTRIBUTED CHARGERS

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DELTA RANGE
350+Kw to MCS

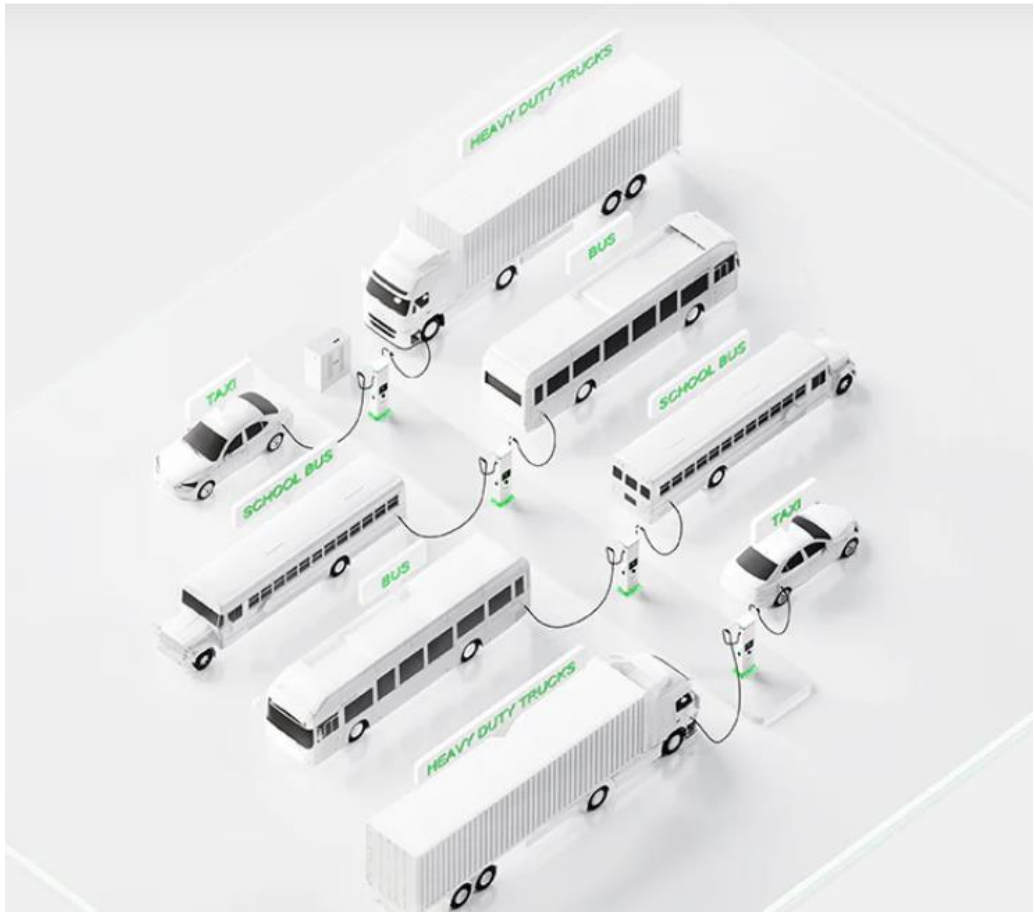
AUTEL RANGE

320/480/640 kW

KWETTA RANGE

SATELLITE / DISTRIBUTED CHARGERS

320/480/640 kW



Relocatable systems

HEAVY VEHICLES

BESS Integrated
200kW DC

AUTEL RANGE
50kW Portable

100KWH to 5MWH+
BATTERY ENERGY
STORAGE (BESS)

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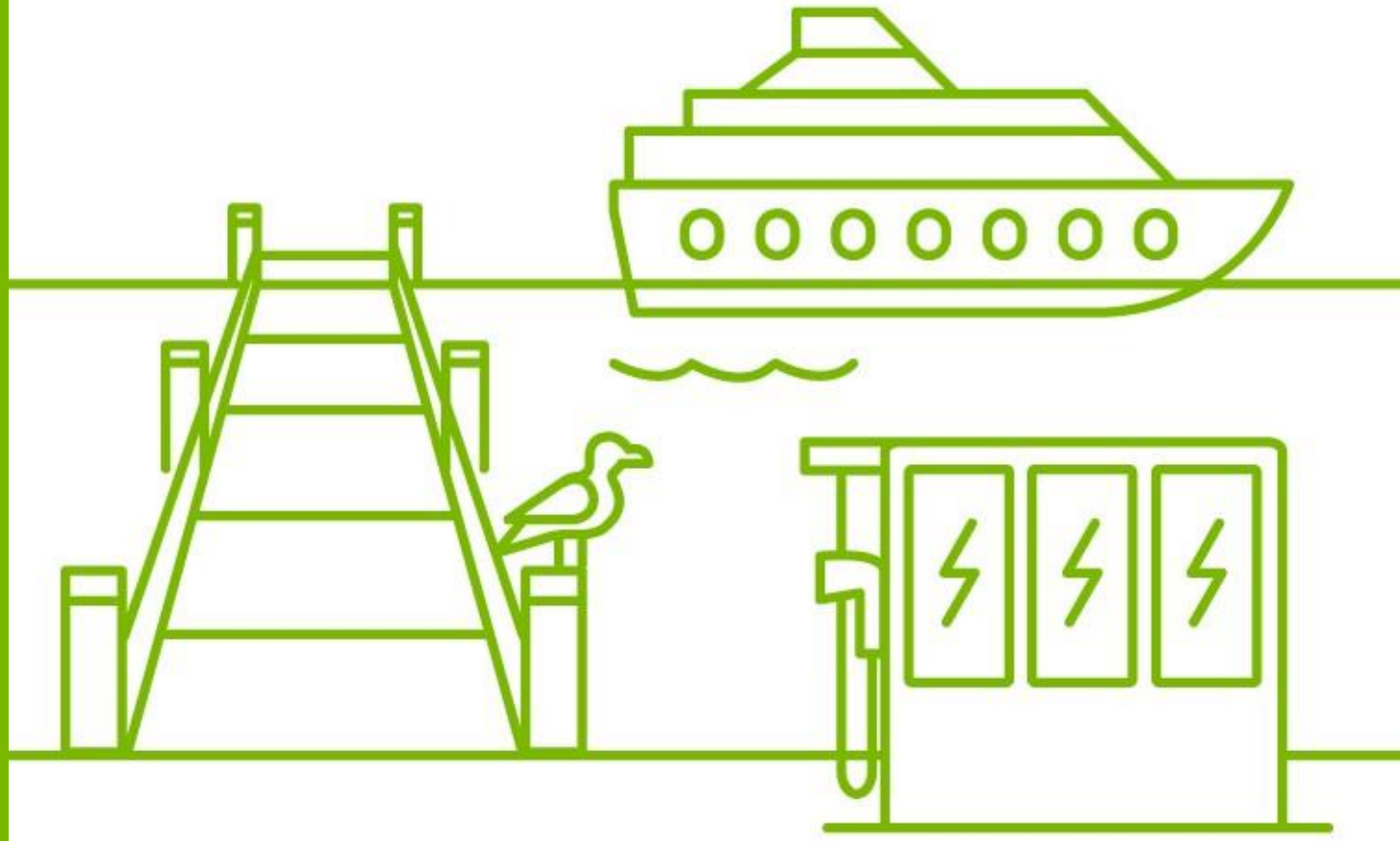
Planning Infrastructure



PLANNING FOR CHARGING

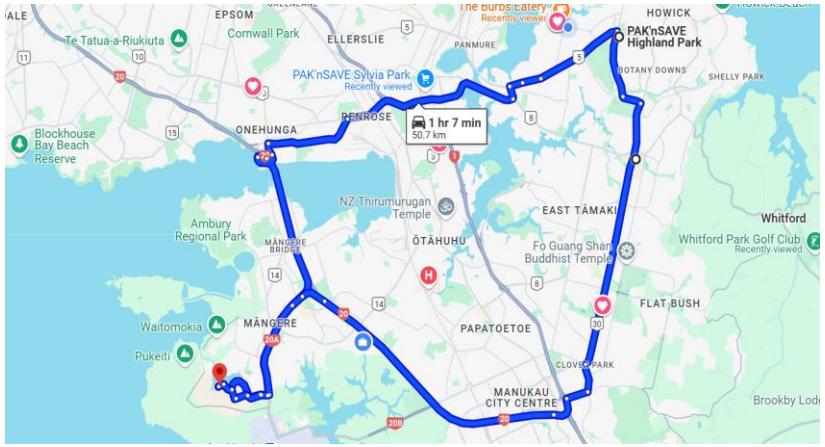
- **Where:** Depot, public highway charging, customer depot?
- **Dwell Time:** How long is the vehicle parked for and where?
- **Timeline:** Be aware it can take 12-36 months for grid upgrades if you need more site power
- **Electrical capacity:** How much spare power does the site have and will BESS or power upgrades be needed?
- **Telematics:** What do the duty cycles look like and do they change per vehicle?

TIP: Daily KM's/EV Efficiency= kWh required to recover range

PLANNING FOR CHARGING

We don’t always need to design for peak demand

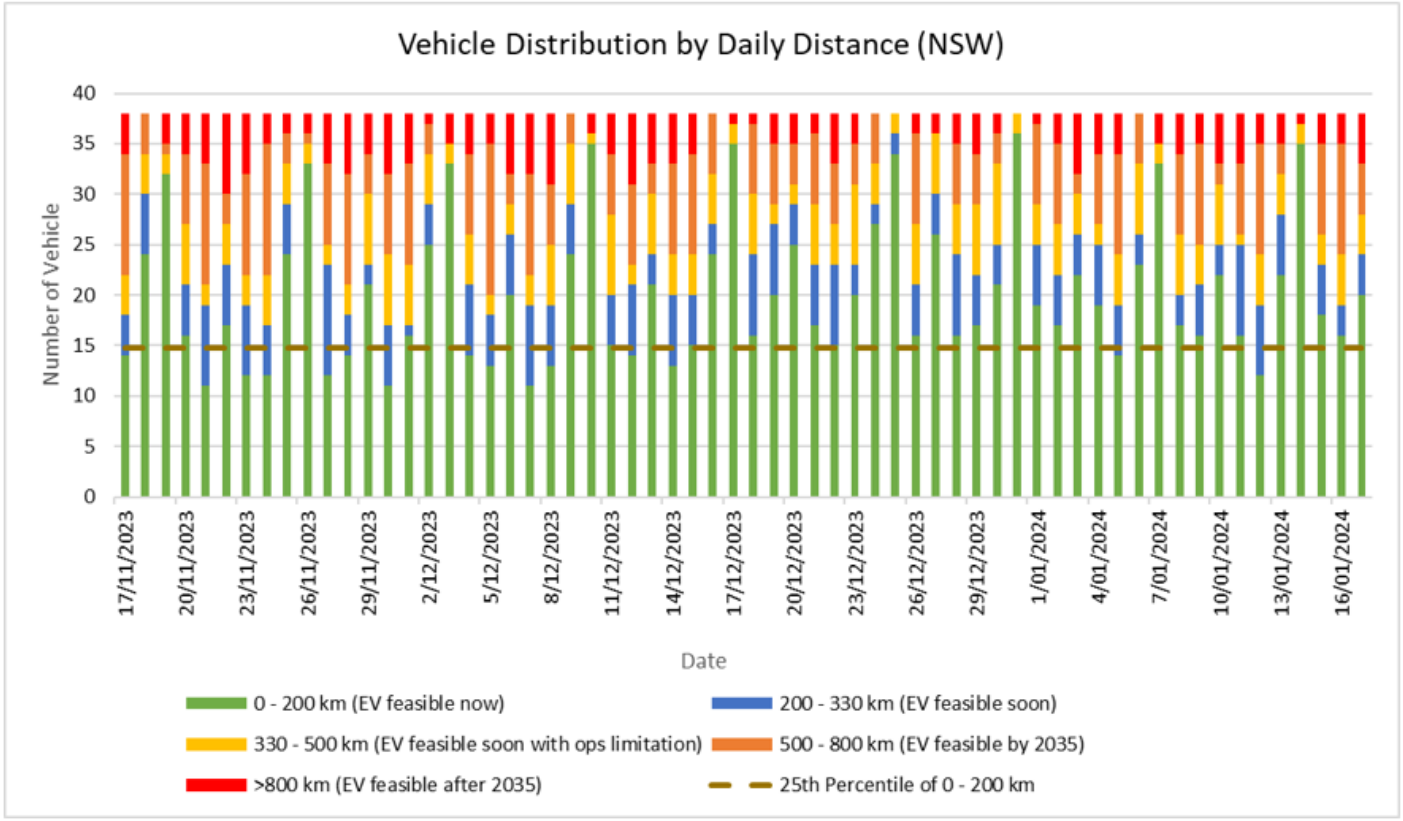
$$\frac{\text{Route Range (km)}}{\text{EV Efficiency (km/kWh)}} = \text{kWh Recovery Needed}$$



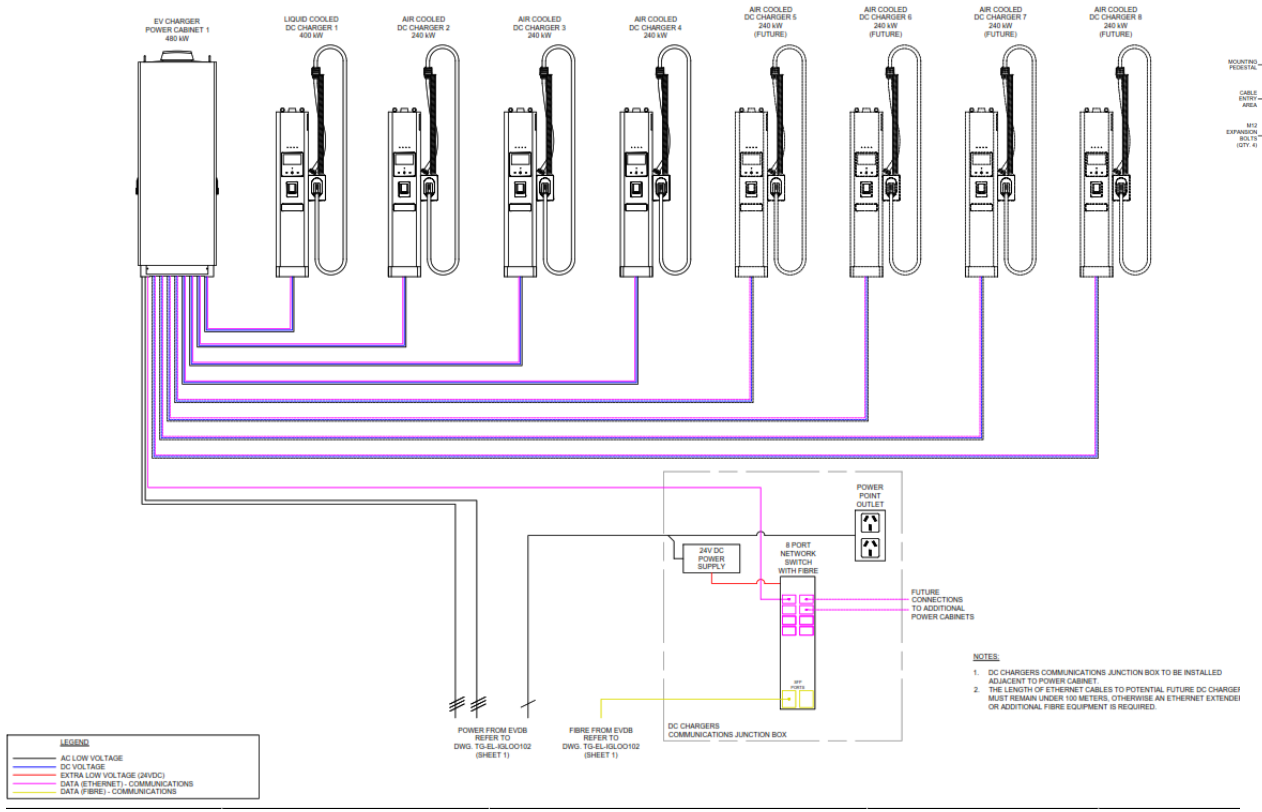
$$\frac{\text{kWh Recovery Needed}}{\text{Charger Speed kW}} = \text{Range Recovery Time (hours)}$$

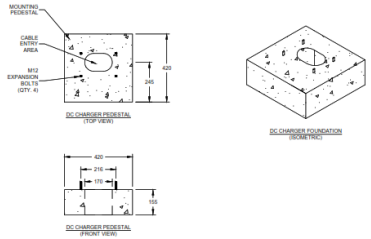
PLANNING FOR CHARGING

	Highest utilised truck	Average by state fleet	
State	**Max daily KM**	**Max daily KM**	**Avg daily KM**
A	**1,498**	**869**	**369**
B	749	499	282
C	999	669	368
D	1,065	838	306
E	613	506	184

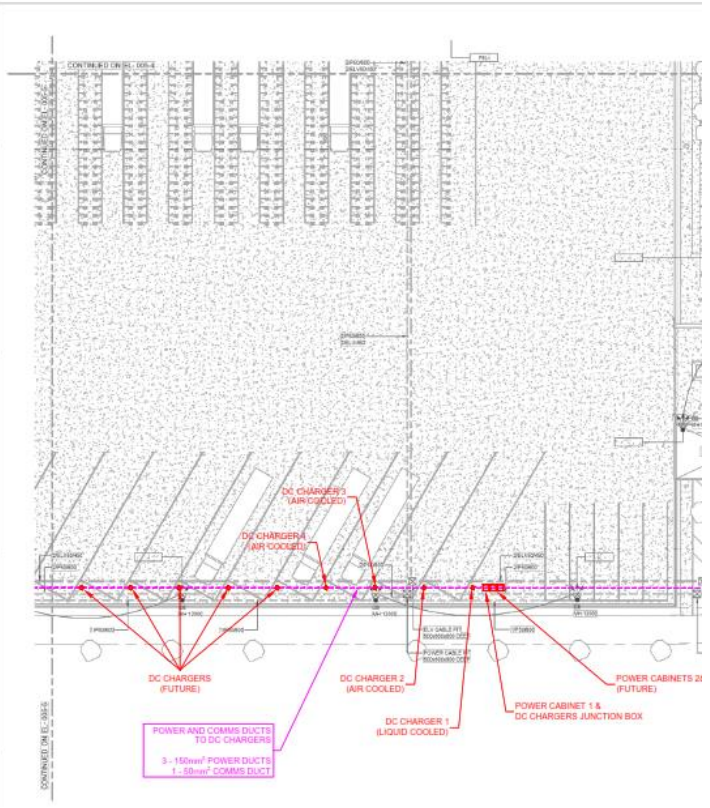


PLANNING FOR CHARGING



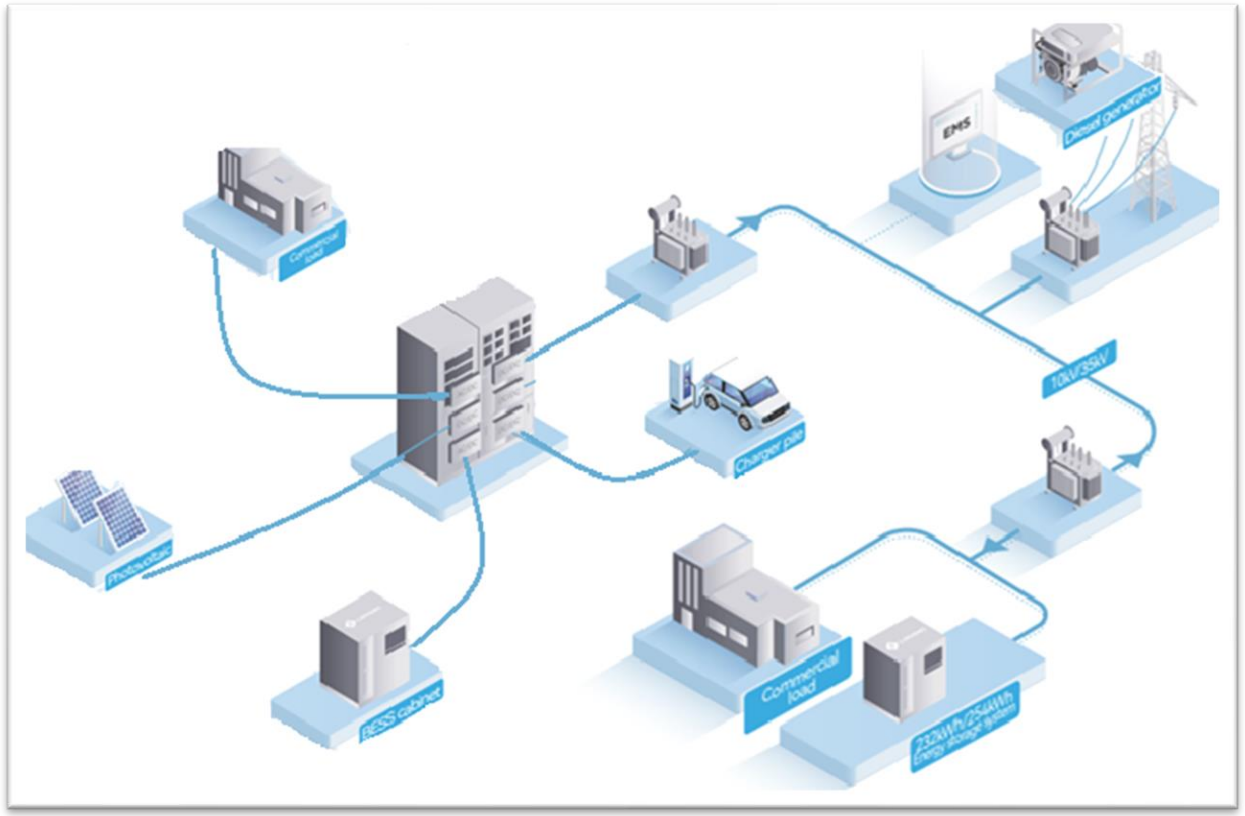


NOTES:
1. DIMENSIONS AND FOUNDATION INFORMATION



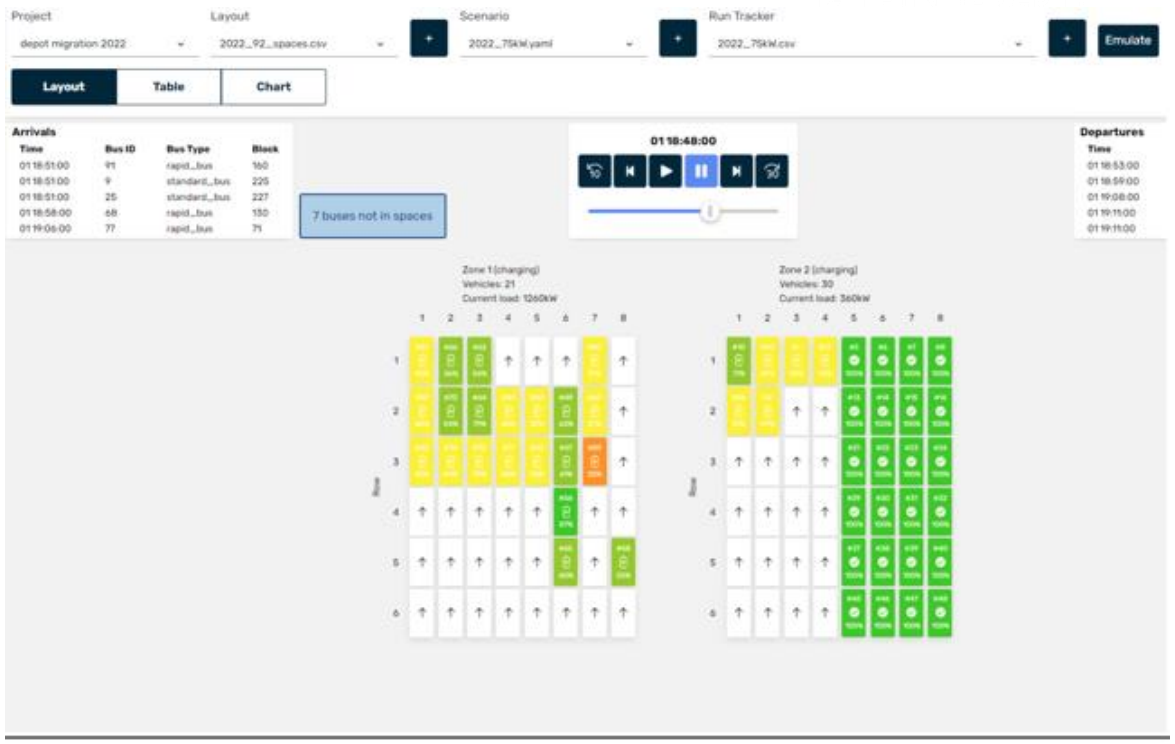
Integrating Renewables and BESS

- Battery Energy Storage Systems (BESS)
- 200kWh cabinets to 5MWh containers
- BESS can reduce installation capital costs by reducing site power needs
- Relocatable assets
- Provide resilience
- Store, consume or sell power at peak times
- Reduce fuel costs and flatten peak demand charges
- Power reservoirs to boost high power charging
- Store and use locally generated power



Energy/Fuel cost Optimization

Our charging network enables unique analytics opportunities for refining charging and opex costs



Charge Point Services

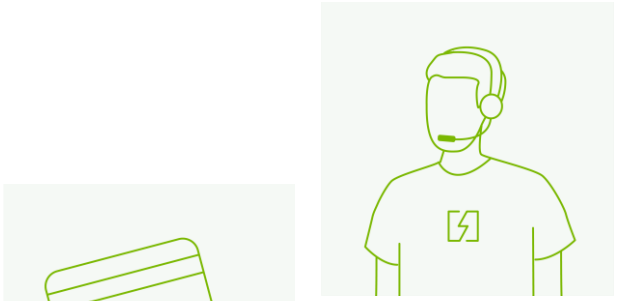
24/7 Helpdesk: Charging can be daunting. Fina a CPO that offers a helpdesk service Directly to drivers or depot/fleet managers.

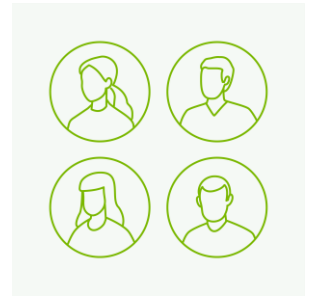
Record keeping: We will log the compliance certificates from installation and monitor the warranties in place. We will also keep a record of electrical limits so future equipment can be programmed and added to the site as needed

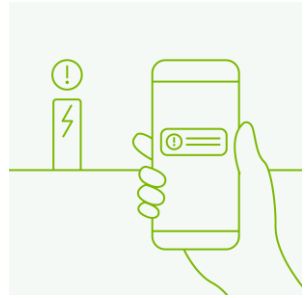
Firmware and fault diagnostics: The Thundergrid team will oversee remote firmware updates and diagnostics to explore and resolve any issues.

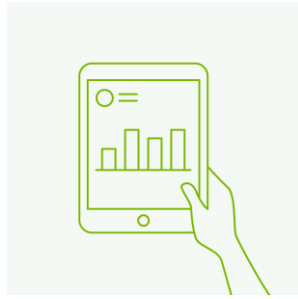
Annual Compliance Testing: Thundergrid can establish and implement an annual assessment programme for assessing chargers on/before their installation anniversary.

Call-Outs : Reactive and preventative maintenance site visits to service equipment and repair at speed.









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Load Management

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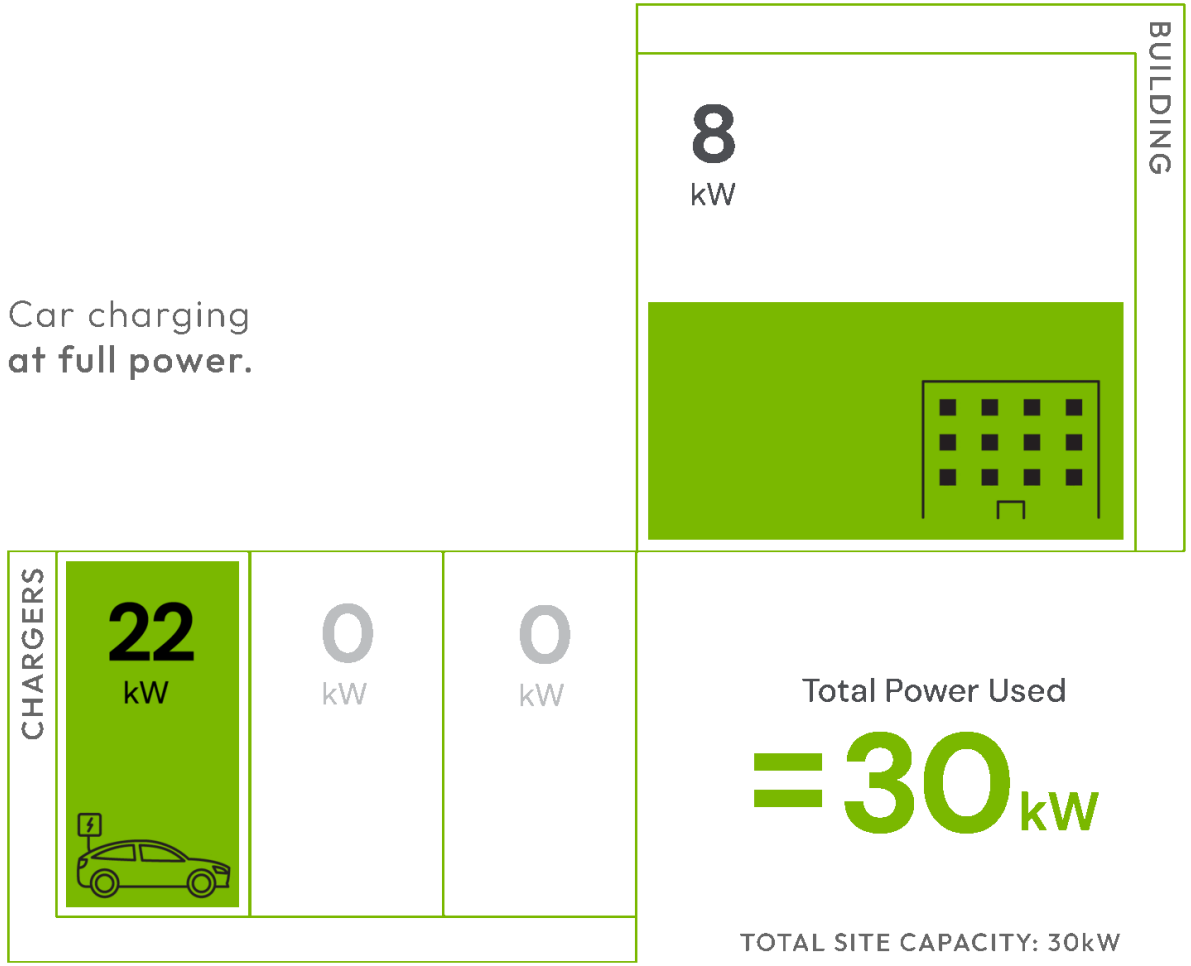
DYNAMIC LOAD MANAGEMENT

SMART CHARGERS THAT MODULATE THEIR POWER.

Dynamic load management modulates the speed of EV charging so your organisation remains in harmony with the load of your depot. Our cloud-based technology links all chargers together, clustering your EV infrastructure to remain within the limits of upstream capacity. We do this to help you avoid costly electrical upgrades.



LAYERS OF DYNAMIC LOAD MANAGEMENT

Local dynamic power management via a load guard ensures that homes and businesses are protected. This tailored offering is unique to Thundergrid hardware deployments

LOCAL ROBUST CONTROL

Local dynamic power management within the home

VIRTUAL CLUSTER

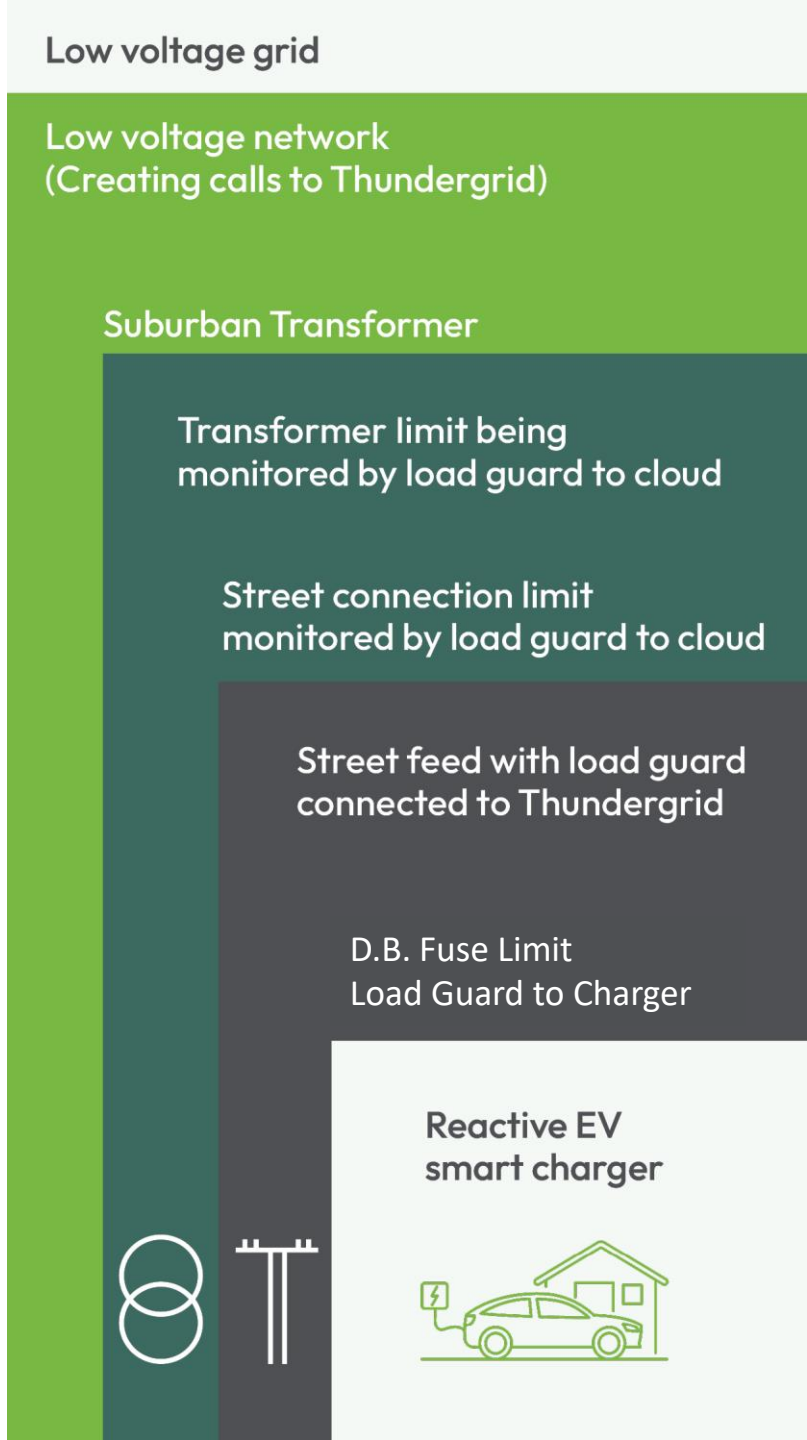
Linking stations in area groups policed by Load Guard on street circuits

VIRTUAL AREA CLUSTER

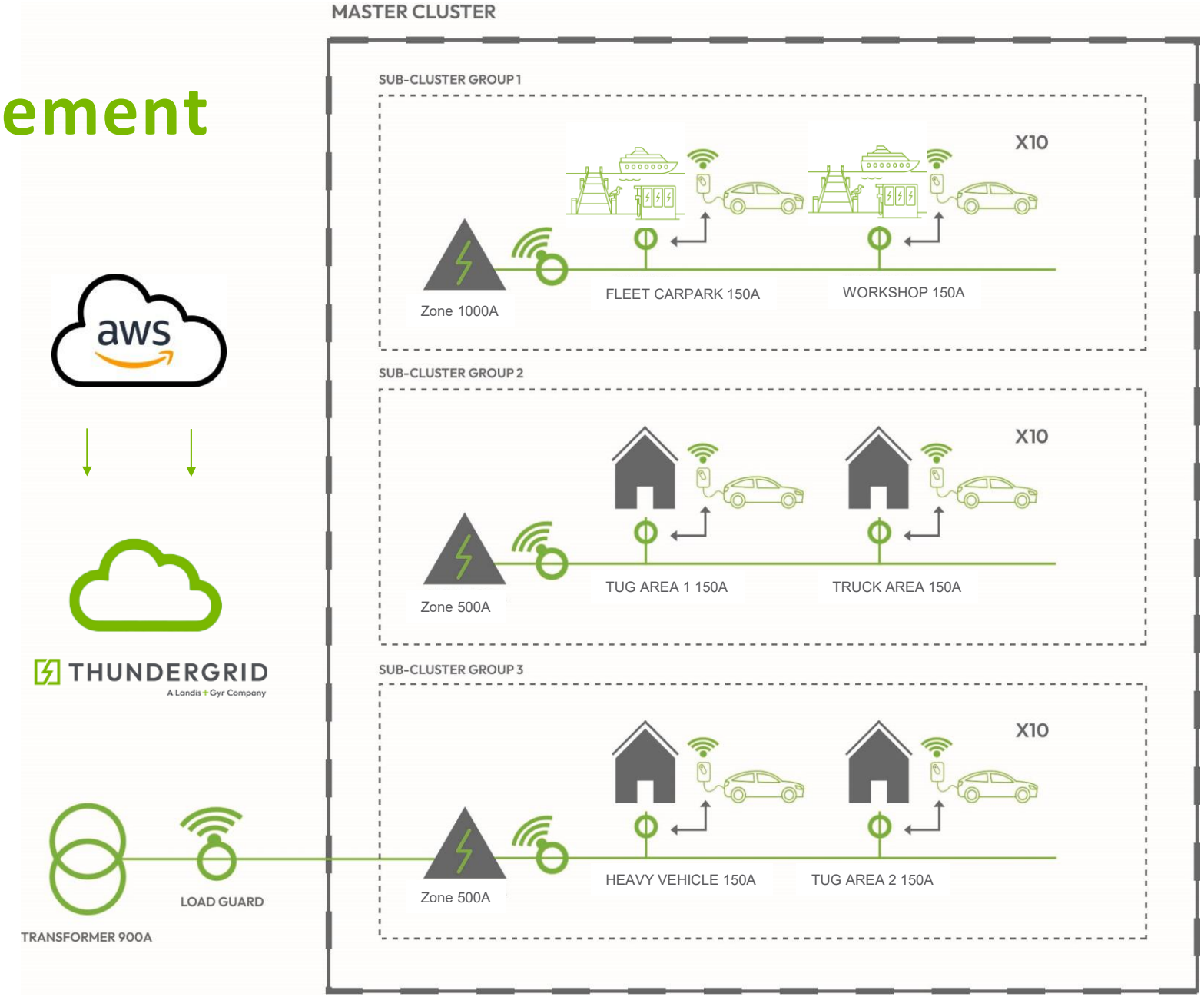
Linking ‘cluster groups’ together to stay within network limits

LOW VOLTAGE NETWORKS

Accesses Thundergrid flexible demand to avoid network upgrades.



Virtual Load Management across the Depot



REPORTING, INSIGHTS & BILLING

Our charging network enables unique analytics opportunities for distribution networks across airports.

REPORTING

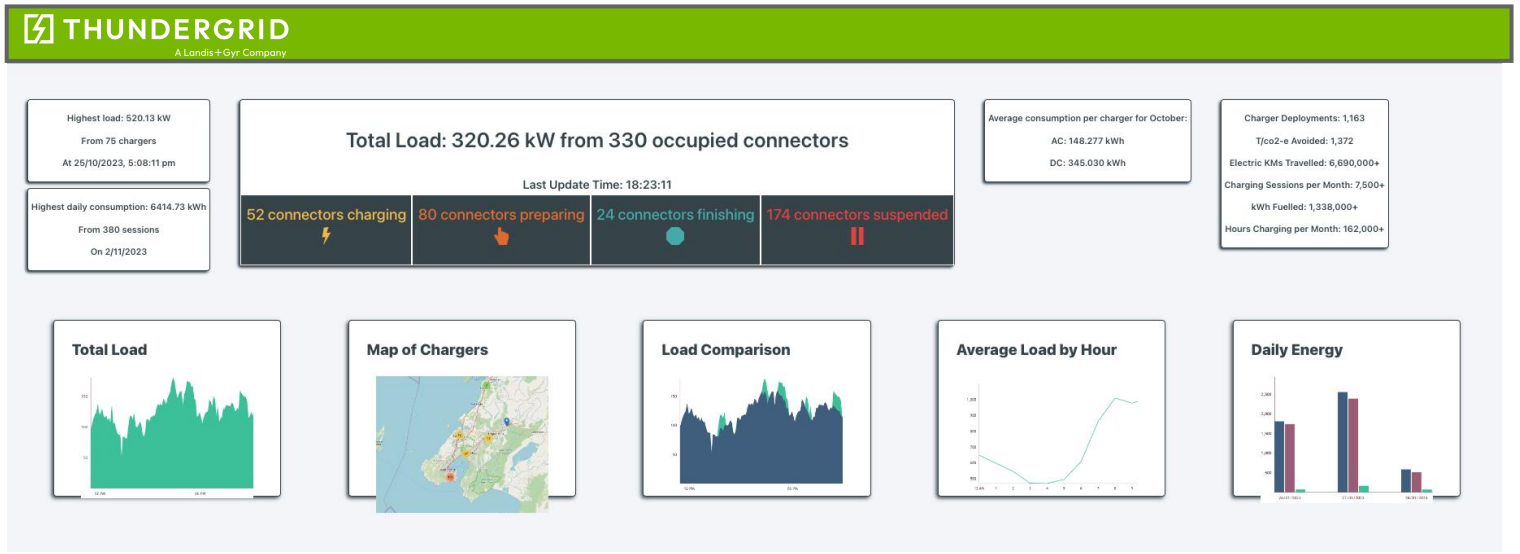
Some distribution networks do not have detailed access to live data on their low voltage networks. We can enable a real time view of their electricity network status using our chargers.

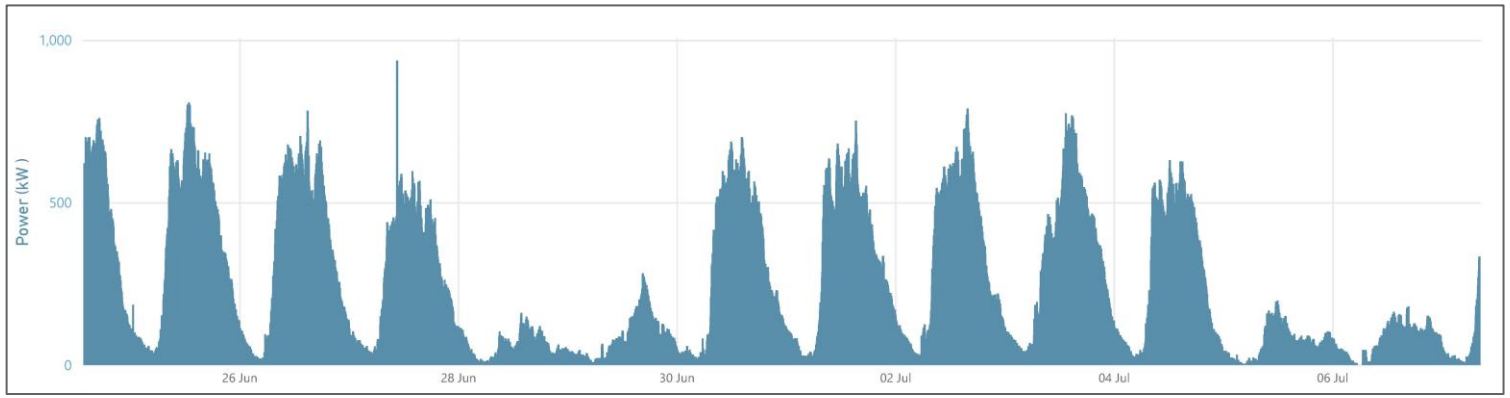
CHARGING INSIGHTS

Through analysis of our data feeds, we are able to provide real time insights of charging load across a distribution network.

BILLING

Have complete visibility on public payments, tariff design all on your own system through API's.





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Ownership Models

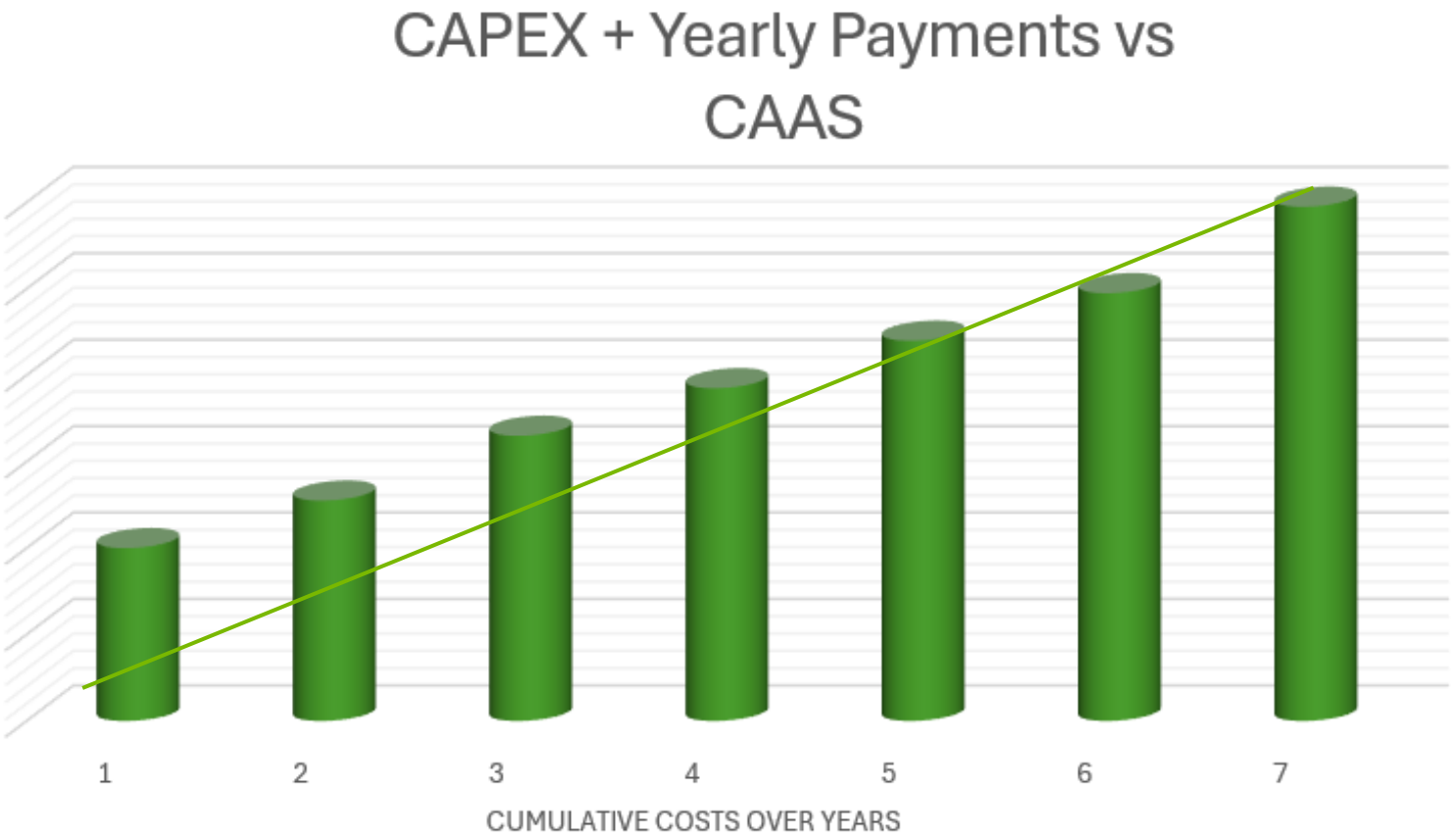
Ownership Models

CAPEX Project

- Pay CAPEX for project upfront.
- Pay for yearly maintenance.
- Pay for reactive maintenance.
- Pay for yearly software fee.

Charging As A Service (CAAS)

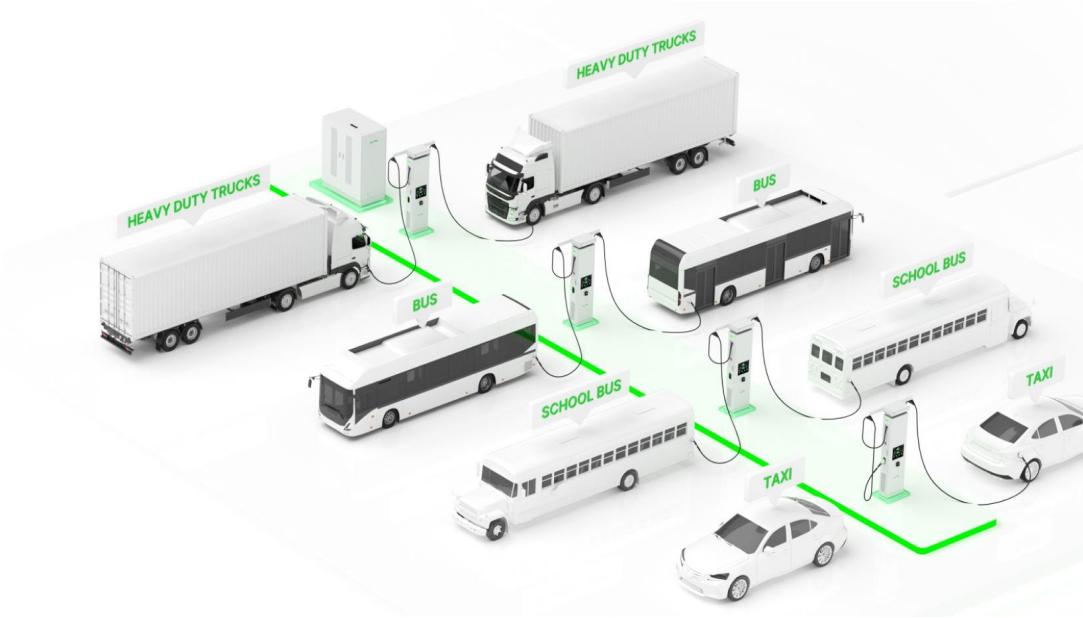
- OPEX Monthly fee includes
  - Project cost
  - Yearly maintenance
  - 1 x yearly free reactive maintenance
  - Yearly software fee
- Terms can be from 3 – 7 years



*Indicative graph only. All units are estimates and changes depending on project

Tips for Depot Charging

1. Plan charging infrastructure ahead of buying the EV, work with a business like Thundergrid to help with strategy and planning
2. Source OCPP complaint HW (Ideally equipment that supports self identification at the plug such as Auto charge or ISO1158)
3. Review site capacity and model connection size (with or without BESS)
4. Right size the chargers that meet the modelled recharge speed, don't over spec if you don't need to.
5. Always plan ducting and distribution if resurfacing a yard, dock way, or depot if given the chance
6. Consider above ground cabling and plinth-based chargers if you are unsure of long-term configuration. Mobile chargers and BESS integrated could help
7. Depot charging is most logical place to charge in 80% of cases
8. Successful fleet plan: Route > Vehicle > Charger
9. Balance 'plug availability' against single high-power charging
10. Consider redundancy and service (what happens if a charger is down, who to call, spares)



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THANK YOU!

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