

Net Zero Startup Challenge

Energy Innovation Day: Startup Showcase

Envision Digital



Agenda

- Introduction to Net Zero Startup Challenge
- Pitch presentations
 - Green Li-ion
 - Ampotech
 - H3 Dynamics
 - Vector InfoTech
 - Datakrew
 - EtaVolt

Net Zero Startup Challenge

Partnership between:



Who is this for?

For energy companies, specifically startups and small & medium enterprises (SMEs), looking to develop their capabilities and grow their business in the smart and clean energy landscape.

Read more about the Challenge
by scanning the QR code:



Industry Partner:



Training Partner:



Startup Partner:



Uncover New Opportunities with EnOS™



Unlock New Revenue Streams

By understanding how data can be monetized.



Develop Business Applications With Ease

To accelerate innovation and shorten time to market.



Enhance Business Resilience While Reducing Cost

With numerous scenario-based cost optimization – from asset monitoring to highly-complex what-ifs.

Shortlisted Companies

NET ZERO STARTUP CHALLENGE



Congratulations to the following shortlisted companies!



Green Li-ion

Ashton Tan

Business Development Manager

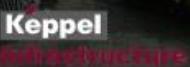


BUILD A BETTER FUTURE FOR SINGAPORE WITH THE
NET ZERO STARTUP CHALLENGE

Organized by



Supporting Partners



Startup Partner



Training Partner

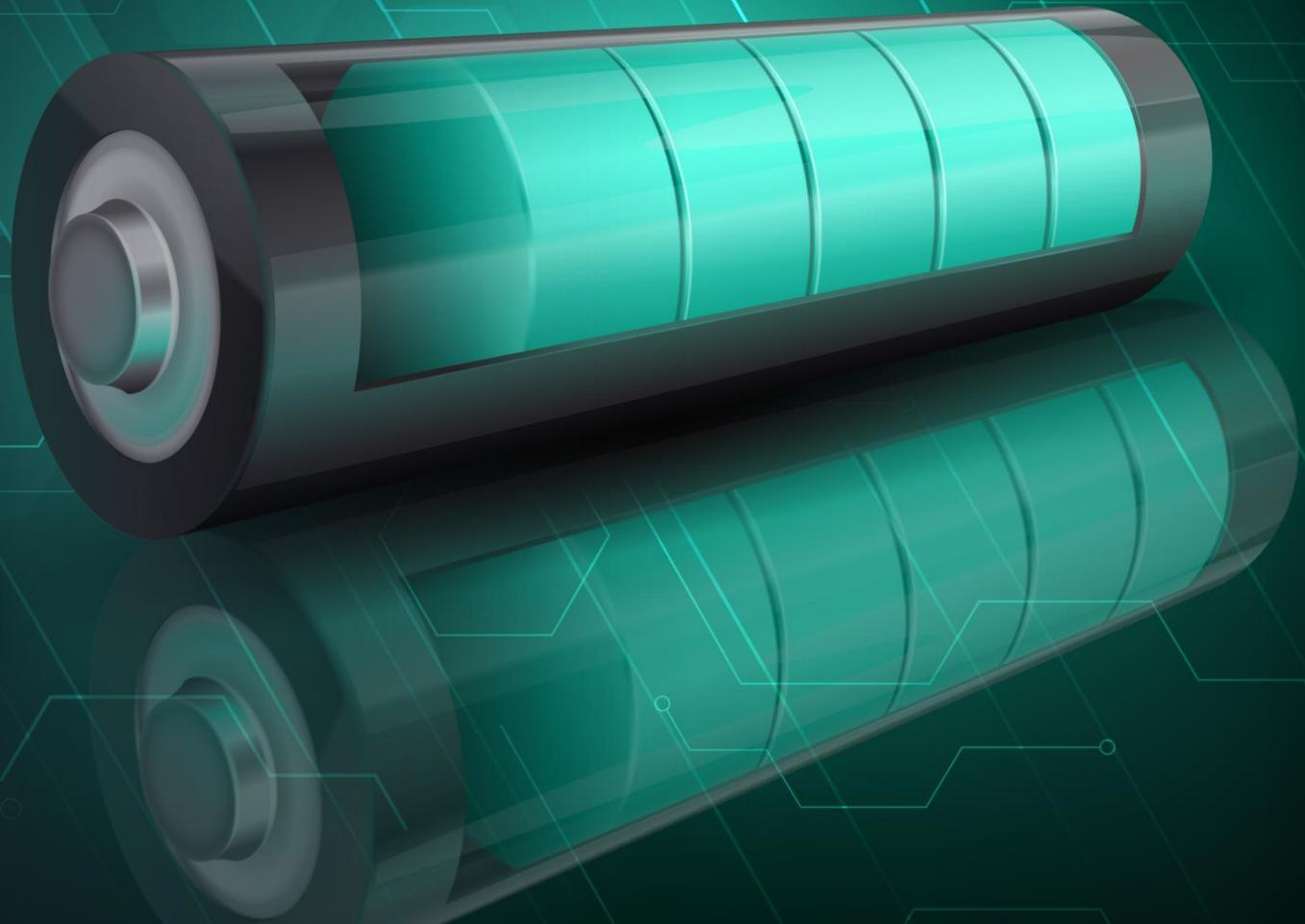




greenunion

energy reborn

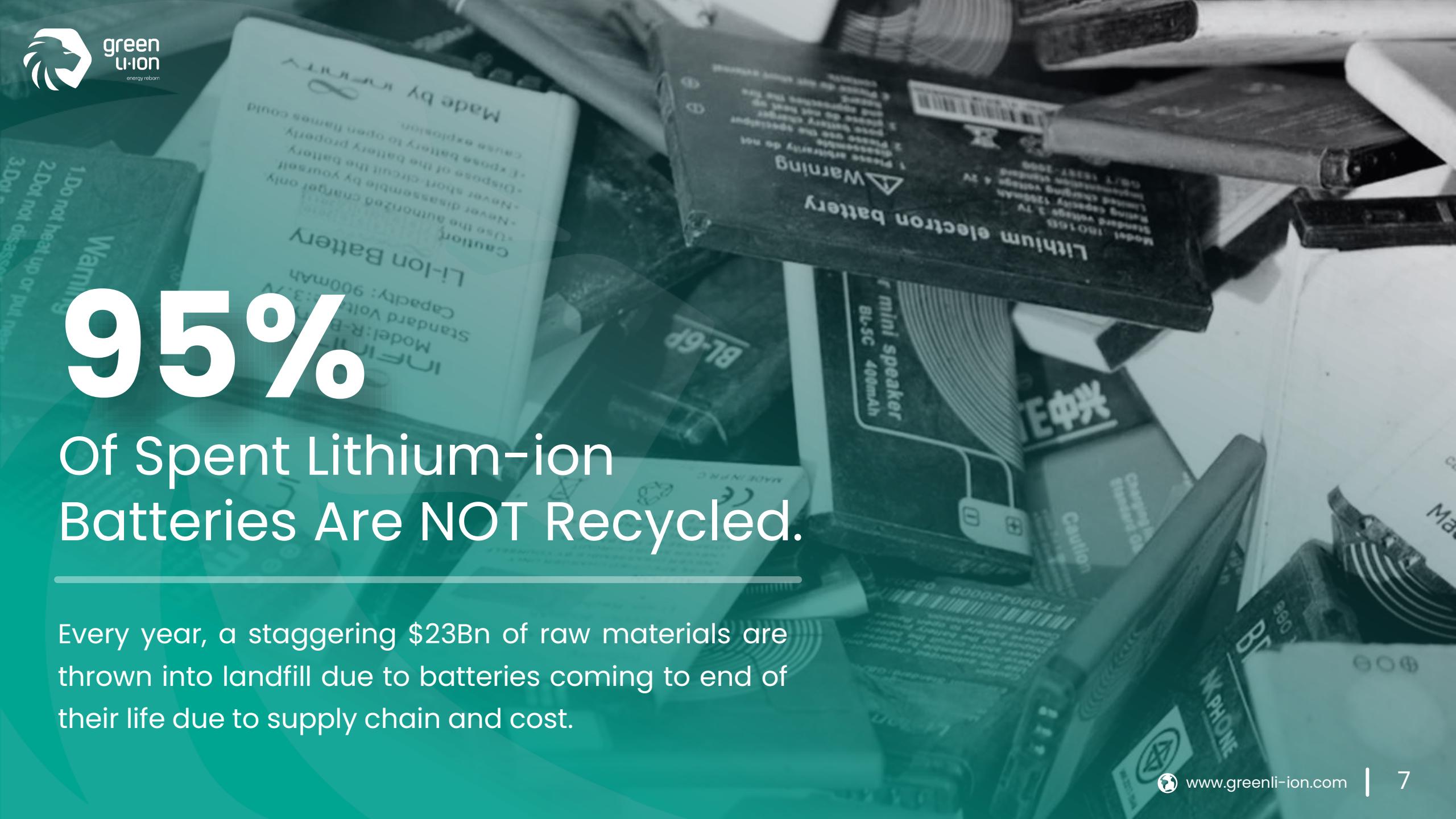
THE CIRCULAR ECONOMY SOLUTION FOR BATTERIES



95%

Of Spent Lithium-ion
Batteries Are NOT Recycled.

Every year, a staggering \$23Bn of raw materials are thrown into landfill due to batteries coming to end of their life due to supply chain and cost.



GLOBAL BATTERY RECYCLING

We Are On A Mission To Become The Worlds First Circular Economy Solution For Lithium-ion Batteries.

\$2B



2005

\$24B



2025

1 in 3

Vehicles Will Be Electric



2030



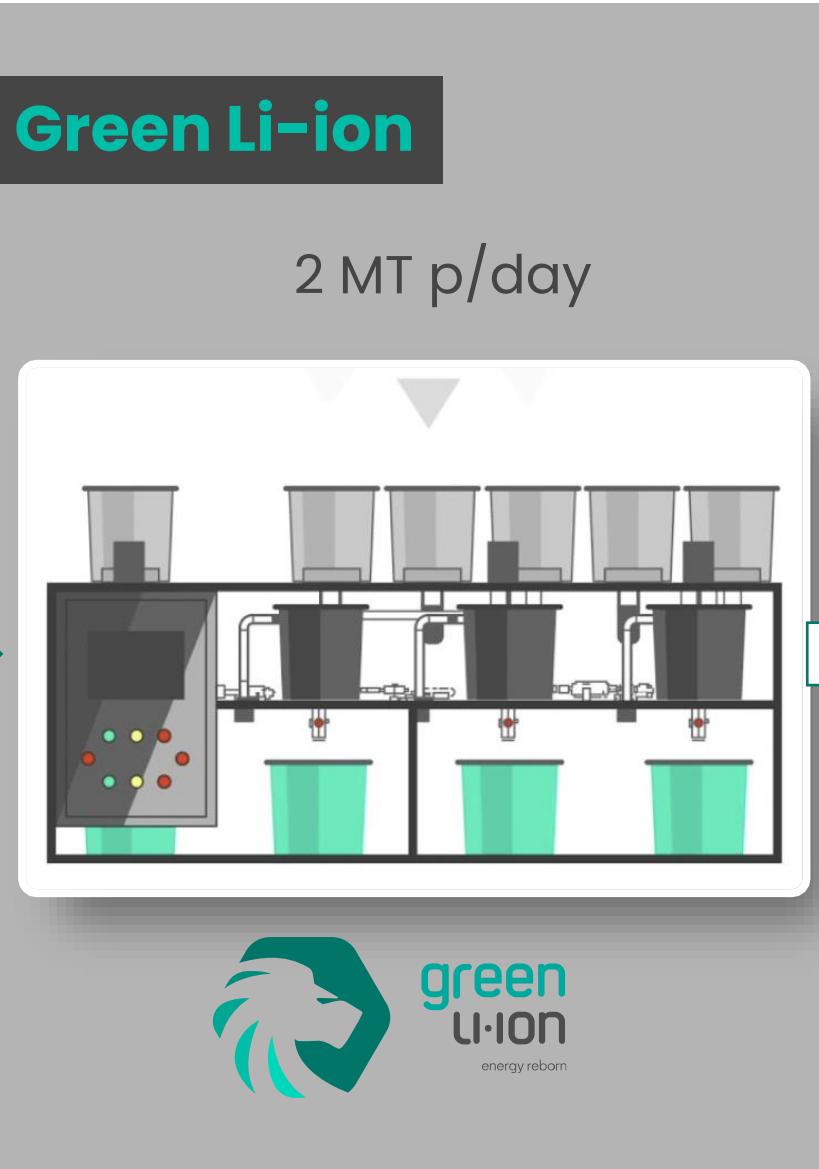
GREEN LI-ION Is Vastly More Profitable

Our Clients

Current Recyclers produce black mass

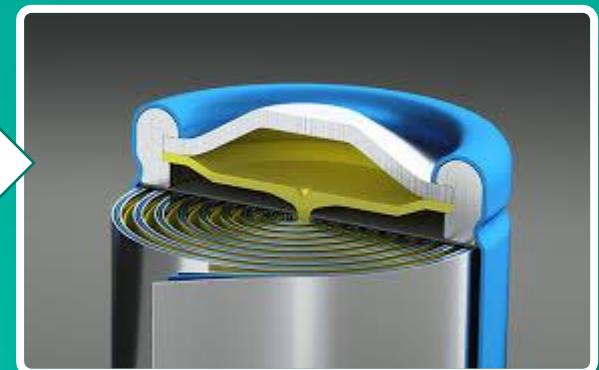


Material Valued
<\$5,000 p/MT



Manufacturers

GREEN LI-ION Produces Battery Grade Cathode Material



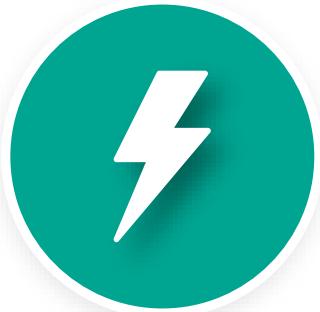
Valued at
\$39,000

Improves profit & efficiency up to **10x**



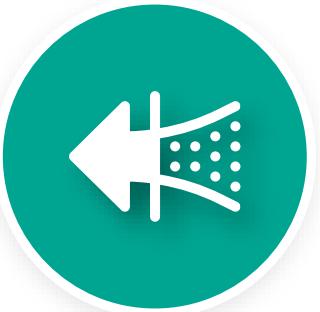
GREENER

- ✓ Zero toxic discharge
- ✓ Zero landfill
- ✓ Lower reliance on mining
- ✓ 8x less carbon footprint than competitors



FASTER

- ✓ 10x FASTER
- ✓ Process all batteries!
- ✓ No sorting = faster than current pyro and hydro processes



PURER

- ✓ Our end product is battery grade cathodes materials
- ✓ Pure and therefore at a higher value



4X PROFITABLE

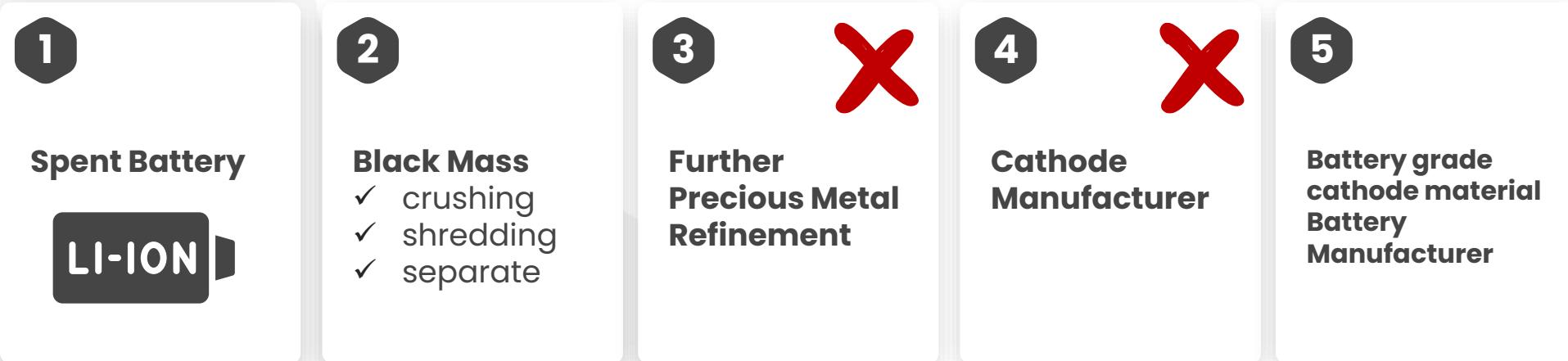
- ✓ Process produces pure precious metal compounds increasing profit from \$5,000 to \$39,000 per ton

INTEGRATES SEAMLESSLY INTO EXISTING INDUSTRIAL TECHNOLOGY

Our technology adds to current recycling process to improve & enhance efficiency and profits of traditional recycling processes. **Our product can bolt on to existing battery recycling machinery.**

Disrupting Supply Chain to Improve PROFIT

Current Recycling



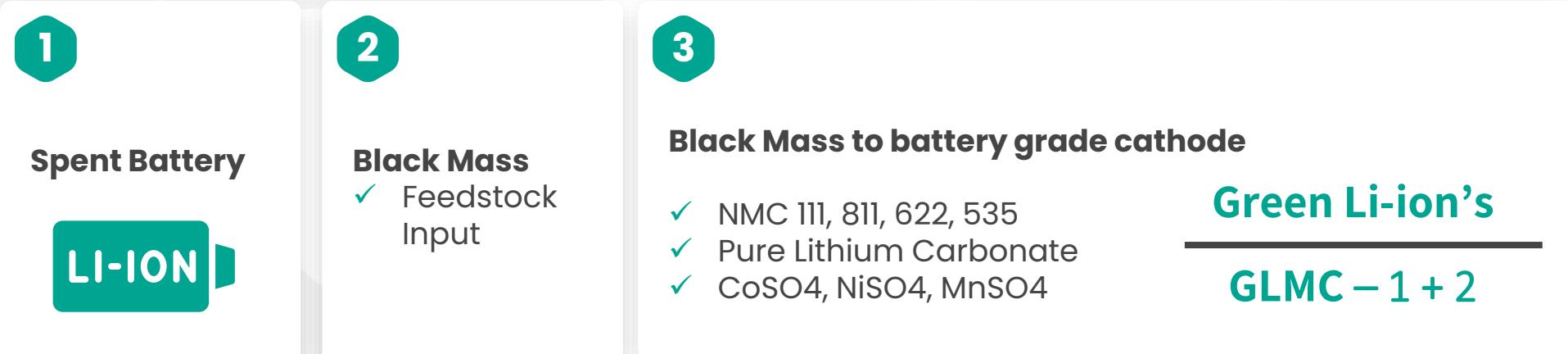
Competitors

Battery Recyclers & 2nd Use
(Redwood, TES, LI-Cycle, Umicore)

Tanaka Refinery, SK, China, JX Nippon

SK, Sumitomo & Pulead

Panasonic, LG, CATL



Green Li-ion's

GLMC – 1 + 2

Closing the loop on **Battery Rejuvenation**



Step 1.

Acquisition of spent batteries

Green Li-ion's Clients collect spent batteries. Also after they complete Stage 4 below.

Step 4.

Material used in new batteries

Battery manufacturers will build their new battery cells using Green Li-ion rejuvenated cathode material reducing reliance on mining and their carbon footprint considerably

Step 2.

Crushing of Batteries

GL Clients Dismantle, Discharge, Shred, Crush & Separate metals / non metals = BLACK MASS

Black mass would travel up to 50,000 Miles around the global to be refined and turned into cathode material.

Step 4.

Battery Grade Cathode Material Sales

Green Li-ion has built a network of Cathode material brokers and buyers to facilitate efficient re-use of our cathode production. Our brokers will sell the material to Battery Manufacturers.

Step 3.

GLMC Cathode Creation

With the GLMC technology a metric ton (28,000 iphone8s) can be rejuvenated every 10 hours into battery grade cathode material.



No one has a technology **Ready to directly manufacture battery grade cathode material**

COMPANY	TECHNOLOGY	OUTPUTS
 green Li-ION energy reborn	Hydrometallurgy (Co-Precipitation + Superior Separation)	<ul style="list-style-type: none">✓ Purest & Only Multiple Battery Grade Cathode Materials✓ Fastest time for spent battery to cathode✓ Recycle ALL types of lithium batteries in one batch
 PATENTED PROCESS	Pyrometallurgy	<ul style="list-style-type: none">✓ Extremely high energy consumption & Cost✓ Only recovery of the Ni and Co✓ cannot recycle all types of Li-Battery
	Hydrometallurgy	<ul style="list-style-type: none">✓ Low purity but a previous leader at <80% cobalt✓ low purity of other products✓ cannot recycle all types of Li-Battery
	Hydrometallurgy	<ul style="list-style-type: none">✓ Main focus on the crushing machine (black Mass)✓ Mixed metals recovery only✓ Recent NASDAQ IPO at \$1.4 Billion
	Pyrometallurgy	<ul style="list-style-type: none">✓ Raised \$700m Series A at \$3.6 Billion✓ Currently only produce metals salts✓ Not currently using proprietary technology
	Hydrometallurgy	<ul style="list-style-type: none">✓ Claims NMC Cathode to Cathode✓ Needs sorting and no Anode material✓ No production of metals salt
	Hydrometallurgy	<ul style="list-style-type: none">✓ Claims cathode to cathode production✓ Can handle NMC 111 622 only at lab scale
	Pyrometallurgy	<ul style="list-style-type: none">✓ Highest energy consumption / cost✓ High loss of Li and Mn precious metals✓ Cannot recycle all types of Li-Battery

PURE BATTERY GRADE CATHODES

We create highly controllable and customizable outputs.
Our Co-Precipitation process can achieve 99.9% accuracy in cafe production.

Green Li-ion is the only technology to skip production of mixed precious metal salts and immediately produce re-usable Battery Cathodes

Rejuvenation as a service:
Our technology is enabled through Pty modular design. Engineered to be scaled into existing facilities and flexibly manage different outputs.

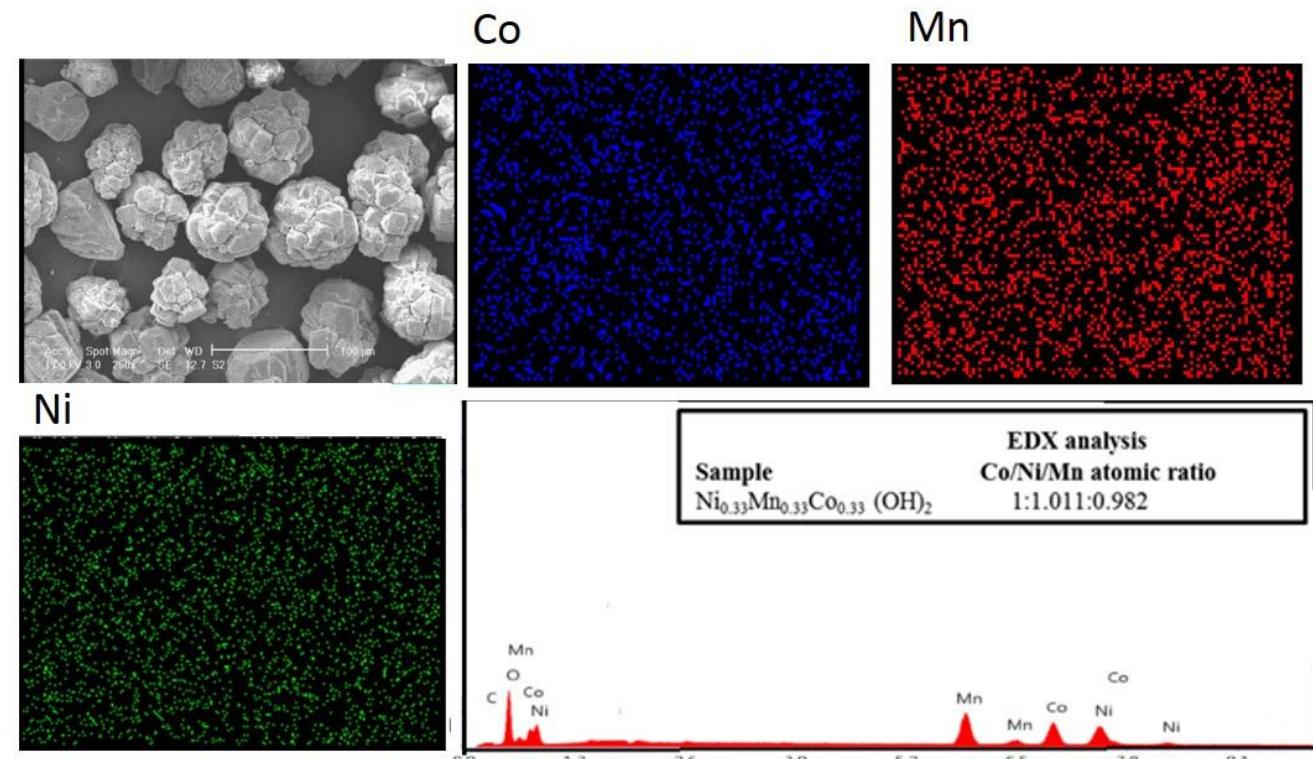


Fig. I. The mapping and EDX (Energy-dispersive X-ray spectroscopy) spectra of regenerative material.

Rejuvenating 100% Of Li Battery Chemistries

Type	Cathode	Anode	Application	Recycling products
Lithium Cobalt Oxide (LCO or Li-cobalt)	LiCoO ₂ cathode (~60% Co)	Graphite	Mobile phones, tablets, laptops, cameras	LiCoO ₂ , graphite
Lithium Manganese Oxide (LMO or Li-manganese)	LiMn ₂ O ₄	Graphite	Power tools, medical devices, electric powertrains	LiMn ₂ O ₄ , graphite
Lithium Nickel Manganese Cobalt Oxide (NMC)	LiNiMnCoO ₂	Graphite	E-bikes, medical devices, EVs, industrial	LiNiMnCoO ₂ , graphite
Lithium Iron Phosphate (LFP or Li-phosphate)	LiFePO ₄	Graphite	Portable and stationary needing high load currents and endurance	FePO ₄ , Li ₂ CO ₃ and graphite
Lithium Nickel Cobalt Aluminum Oxide (NCA or Li-aluminum)	LiNiCoAlO ₂ (~9% Co)	Graphite	Medical devices, industrial, electric powertrain (Tesla)	Li ₂ CO ₃ , graphite, NiCo(OH) ₂
Lithium Titanate (LTO or Li-titanate)	NMC	Li ₂ TiO ₃	Electric powertrain (Mitsubishi i-MiEV, Honda Fit EV), solar-powered street lighting	LiNiMnCoO ₂ , TiO ₂

We make reoccurring revenue

Profit Share Licence Model

01 6 Month ROI on investment

02 Client has use of machines for 10 year life

03 License agreement (GL holds title)

**BATTERY
RECYCLER /
MANUFACTU
RE LICENSES
OUR TECH**

04 GL will have a profit share of 30% of unit Gross Profit per machine as license fee

05 GL will have the exclusive maintenance contract

06 GL will supply 1x Maintenance engineer

REVENUE

- ✓ Reoccurring revenue from the profit sharing agreement
- ✓ Commodity pricing agreed in advance (SMM & LME)

Founded by Recycling & Energy Pioneers



DR. REZA KATAL

CHIEF TECHNOLOGY OFFICER

a passionate creator with 10 years industry exposure to the hydrometallurgical processing of Lithium- Ion batteries with a PHD from the National University of Singapore. He developed Green Li-ions novel battery rejuvenation process technology.



LEON FARRANT

CHIEF EXECUTIVE OFFICER

an accomplished CEO & Leader with 15 years experience driving the performance and success of global energy industry companies as well as being a successful entrepreneur with a Bachelors degree in commerce and an MBA.

recognition



HSBC

Cities of the Future

IMG

SG
Passion
Made
Possible



BUSINESS
Management
Excellence
Awards



BUSINESS
INSIDER
AUSTRALIA



Microsoft



GLOBAL
INCUBATOR
NETWORK
AUSTRIA

- ✓ HSBC's Cities Of the Future hosted by IMG & Unbound Global Winner of Urban Champions award 2021.
- ✓ Microsoft's Global Social Entrepreneurs, 2021.
- ✓ Recognized as SOSV's Climate Tech 100, 2021.
- ✓ Recognized as Asia's 27th most transformative company 2021.
- ✓ Dr Reza Katal – 7th Most Transformative Leader in Energy Business Insider Australia 2021.
- ✓ Leon Farrant – Executive of the Year- Energy. SBR Management Excellence Awards 2021

Utilizing the best **Talent in Asia**

**STEPHEN GOW****VP - Commercial**

a senior engineering and commercial professional with an accomplished track record in contract and legal management during 32-year career in energy industry.

**Dr EBRAHIM AKHONDI****VP - Technology**

a forward-thinking chemical expert & innovator with 15 years experience bringing novel deep technology to commercial levels.

**TING SHENG GAN****Lead Automation Engineer**

a professional with 11 years experiences in industrial automation and machine designing engineering.

**ROB PRIMAUX****Director – Projects USA**

with 30 years experience delivering complex global engineering & manufacturing projects in the chemical and energy industry.

**GRACE LEE****Head Of Finance**

Financial; professional with experience listing companies as well as taking high performing start ups through to round D funding. ACCA & ISCA accredited.

**Dr TEO YING SHEN****CHEMIST**

an environmental engineer who pushes the limit of clean energy technologies using advanced application chemistry.

**SYAZWAN SALAM****Process Engineer**

With a Bachelor's degree in Chemical & Biomolecular Engineering have knowledge in Processes, Mechanical, piping, and specifications.

**THERESA POH****Office Manager**

our commercial leader with great exposure to the resources industry and ensuring corporate governance in Singapore and abroad.

**SUKARNO JU'ARI****Electrical Engineer**

With a Bachelor's degree in electronics have knowledge in electrical, automation, and specifications.

**JANELLE ALCANAR****Junior Accountant**

Bachelor of Finance have knowledge in accounting, investments and budgeting

Utilizing the best **Talent in Asia**

**CANDICE LI****Lab Assistant**

a research and development professional in quantitative analyses on precious metals to make waves in the innovation of our technology.

**ASHTON TAN****Business Development Manager**

a strategic business development professional experienced bringing 10 years of experience in leveraging industry and market trend knowledge to develop consultative approaches.

**DARIA ARBUZOVA****Business Development Manager**

an experienced Business Development Manager with over 9 years of experience in Renewable energy and Raw Materials Industry all around the world with a successful track record of origination, deals closing and business extension.

ADVISORY BOARD

**Prof. Seeram Ramakrishna**

Chair of Circular Economy Taskforce and Director of Center of Nanofibers & Nanotechnology at National University of Singapore; Leader in Future of Manufacturing.

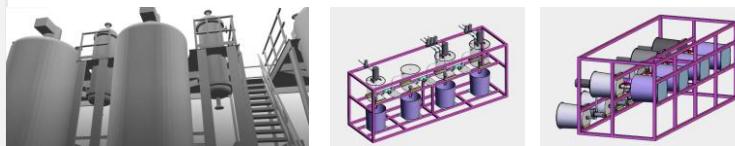
**Ad Ketelaars**

Start-up ecosystem builder with 30+ years experience in leading and managing emerging and global fortune 500 companies.

We have already locked in \$15 Million ARR

Commercial size (728MT/pa)

GLMC x 4 Sold



USD \$2,480,000 Price



**Licensing agreements signed x 4
~ \$3,000,000 ARR p/machine**

Commercial size (150MT/pm)

GLLFP-1



1x Sold



License agreement

19 Prospects

9 x Engaged Clients

+

4 x New MOU's



4 x PAYING CLIENTS



**2 x Major Battery companies
using Green Li-ion Cathode material**



THANK YOU
FOR MORE INFORMATION CONTACT US!

Contact Us

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- 📍 46 Kim Yam road, 01-05/06/07, Singapore 239351
- ✉️ leonf@greenli-ion.com
- 🌐 www.greenli-ion.com

Connect with Green Li-ion





AMPOTECH

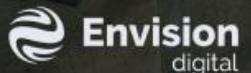
Ampotech

William Temple

CEO & Co-Founder

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The way our cities and buildings use energy is changing

Rooftop PV



EV Charging



District Cooling



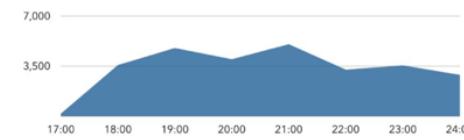
Smart Homes



Data is the key to realizing value from these emerging technologies and systems

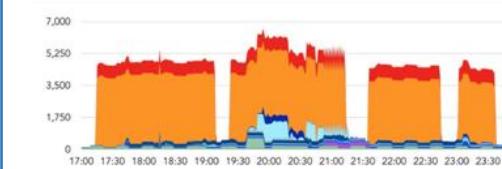
Electricity metering has not kept up with emerging digital energy systems

The Past



- Billing and energy audit
- Fixed infrastructure
- Closed system
- Minute to hour timescale

The Future



- Business insight and AI
- Flexible & reconfigurable
- Open system
- Second or sub-second scale



We are modernizing metering and data management with IoT and AI

2015

Launched



S\$2.3M+

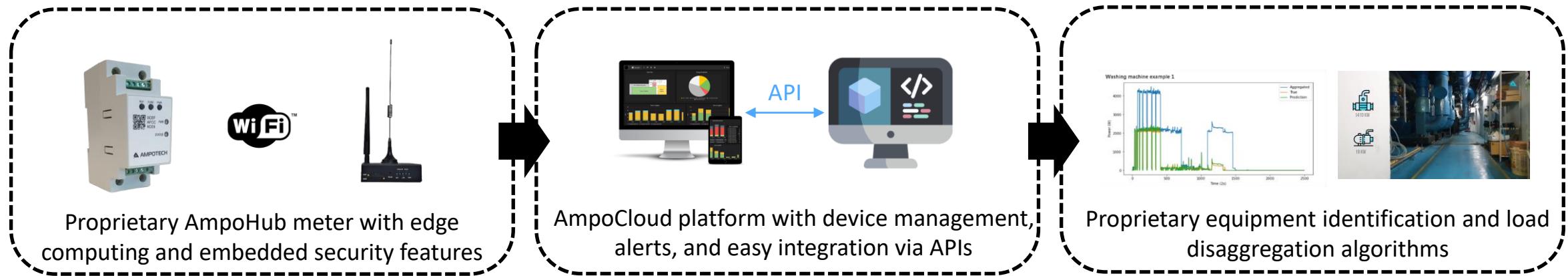
Total Funding

> 1000

Locations



Our technology helps businesses deliver energy solutions more efficiently



> 50%

Installation time saved
versus wired BMS or EMS

20-40%

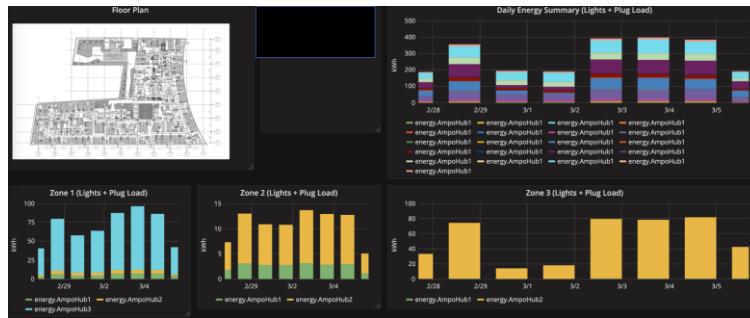
Typical cost savings
versus off the shelf system integration

1

Product owner to support
hardware, software, data science

Our solutions are proven in commercial, industrial, and residential projects

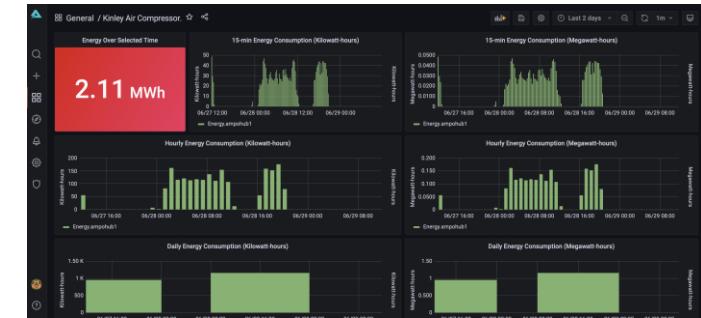
Lighting & Plug Load Monitoring



Solar PV Monitoring



Industrial Machine Monitoring



Fault Detection for Remote FM



Home Energy Management



Connect with Ampotech



H³Dynamics

H3 Dynamics

Shaun Koo

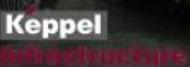
Chief Technology Officer

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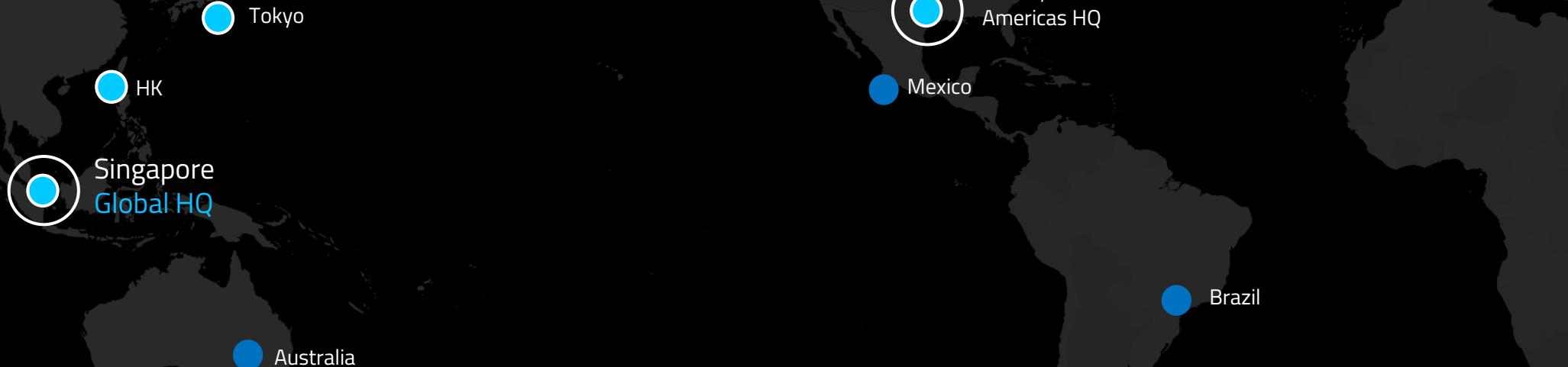
ABOUT US

Founded in [Singapore \(HQ\)](#) in 2015, **84** employees

[Singapore HQ](#) with operating subsidiaries in Austin, France, and Hong Kong.

H3Zoom.ai: Cloud based AI/ML + workflow automation for digitized site/structure monitoring and rectification

Board members from EDBI, Toyota, and Grosvenor



ABOUT US

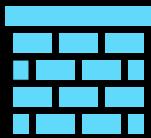
Overview – H3Zoom.ai by H3Dynamics



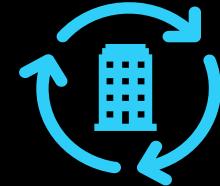
Singapore (HQ)
France
United States



+ 900 assets
inspected globally



+ 8 million SQM
inspected area



Indoor & Outdoor
inspection



Safer, Faster, Better, Cheaper

Traditional Inspection



Time 4 – 8 weeks



> 70%-time savings



Safety 17 accidents (2018)



0% safety risks



Productivity Low



> 80% productivity gains



Cost \$ 12-25 k / building



> 50% cost savings

H³Zoom by H³Dynamics

Key Clientele



Breaking New Ground



areas shaded white belong to JTC

Awards



#1 Prize at
Echelon 2019

Bold Idea
Challenge
2018 APAC

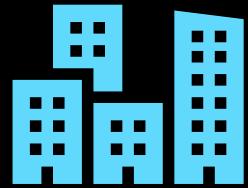
SG:D
TechBlazer
Awards 2018
Final round
Most
Impactful
Category

Asean ICT
Award 2018
Finalist Most
Positive
Impact

Slingshot
2019
Qualifying
Round

ACCOMPLISHMENTS

A pioneer and industry leader for digital Periodic Façade Inspections



> 900 buildings
inspected globally



> 1,500 inspections
completed world-wide



118 PFI inspections
in progress



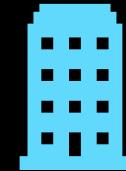
11 HDB town councils
present and inspecting



35,000 Hours
amount of data processed



5 countries of operations



254m highest
building inspected



50 active customers
and partnerships

ACCOMPLISHMENTS



Co-development and commercialization

THE STRAITS TIMES SINGAPORE | HOUSING
Inspector Drone can check out building facades

Tech system developed by JTC and H3 Zoom.ai could be making the rounds at industrial parks next year

H3Zoom.ai

These concerns have led the Building and Construction Authority (BCA) to announce regulations for mandatory facade inspections of buildings, which might kick in next year.

Currently, most inspections are carried out by people, and could be costly, risky and tedious. The process of marking out defects, taking photographs and churning out a report could take up to four to six weeks, depending on the building's dimensions.

Most inspections are carried out by people, and could be costly, risky and tedious. The process of marking out defects, taking photographs and churning out a report could take up to four to six weeks, depending on the building's dimensions.

The H3 Zoom.ai Facade Inspector, which is operated by a two-man team, aims to slash the time taken to a few days using artificial intelligence to mark facade defects.

THE STRAITS TIMES



HOUSING &
DEVELOPMENT
BOARD

Preferred vendor for town council deployment



Periodic Façade Inspection launch partner

Using Drones to Conduct Periodic Façade Inspections

KUHAN COMPETENT PERSON - PROFESSIONAL ENGINEER H3 ZOOM.AI BY H3 DYNAMICS

When we use the drone and A.I. system,

MORE VIDEOS

Using Drones to Conduct Periodic Façade Inspections

SHAWN KOO CHIEF TECHNOLOGY OFFICER H3 ZOOM.AI BY H3 DYNAMICS

There is an algorithm that automatically masks windows

MORE VIDEOS

THE STRAITS TIMES

HDB is also looking into using drones with its partner H3Zoom.ai to inspect building facades, to improve worker safety and reduce dependence on manual labour.

Typically, workers in suspended gondolas inspect buildings. It may take several days to inspect one block manually.

In a pilot trial conducted in Yuhua and Sembawang from July to October last year, the drone inspections took at most a day to complete.

DRONES FOR BUILDING FAÇADE INSPECTION

- Future drone inspection system taps a cloud software platform to conduct a visual scan of building facades captured during inspection.
- Leveraging AI, it processes photos and identifies building defects in the cloud. It can detect and categorise the types of defects, and tag them to a visual of the building, including the exact location of the defect.
- The platform would then deliver a report to highlight the severity of the defects detected and recommend possible remedies.



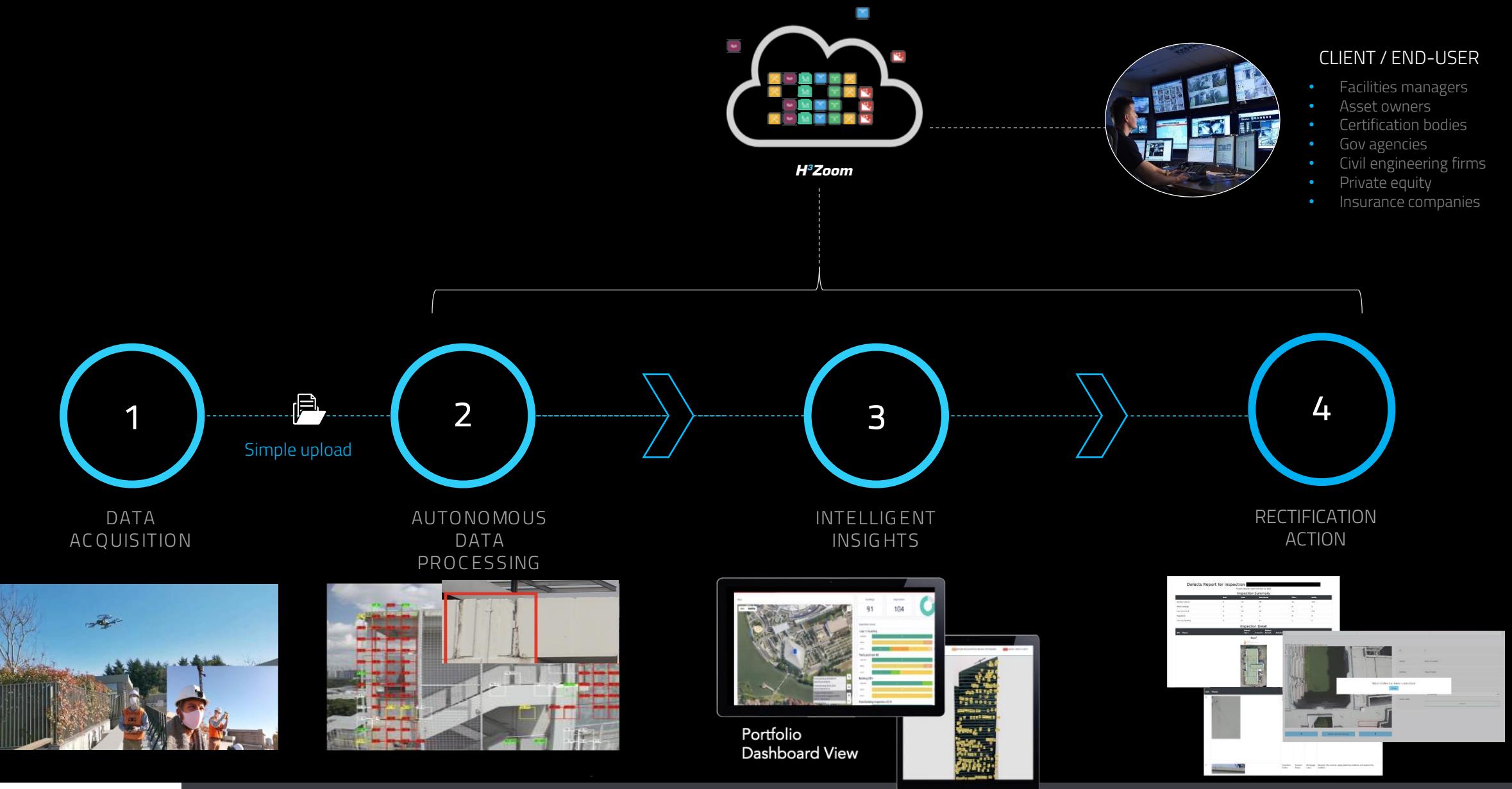
GROSVENOR First international deployment in high-end residence



PROBLEM STATEMENT

Buildings represent **39%** of global greenhouse gas emissions

Data acquisition >> one platform, multiple data acquisition methods; diversifying sensor acquisition methods



PROCESS OF APPLYING THERMAL ANALYSIS



1

RGB IMAGE OF
BUILDING FAÇADE
TAKEN BY DRONE AT
NIGHT



2

THERMAL IMAGE OF
BUILDING FAÇADE
IS ALSO TAKEN AT THE
SAME TIME WITH THE
RGB IMAGE

NO INTERPRETATION

ONLY VISUAL CUES



3

THERMAL ANALYSIS
APPLIED TO
INTERPRETING
THERMAL IMAGE WITH
LOCATION OF AREA
WITH POTENTIAL HIGH
ENERGY LOSS

WHAT ARE THE BENEFITS?



SAFER WORKPLACE

Our solution improves safety by reducing work-at-height incidents through automated drone inspections that can reach elevated and hard to access areas.



FASTER INSPECTIONS

Accelerate the building inspection process by over 70%. Automated drone scans and machine-learning for quicker inspection turn-around times.



LOWER COSTS

Reduction of labor and equipment costs by over 50%. Achieve cost-savings throughout the building lifecycle.



HIGH ACCURACY

Reduce human errors during building condition assessments through image analytics, digital workflows, documentation, and inspection visibility.



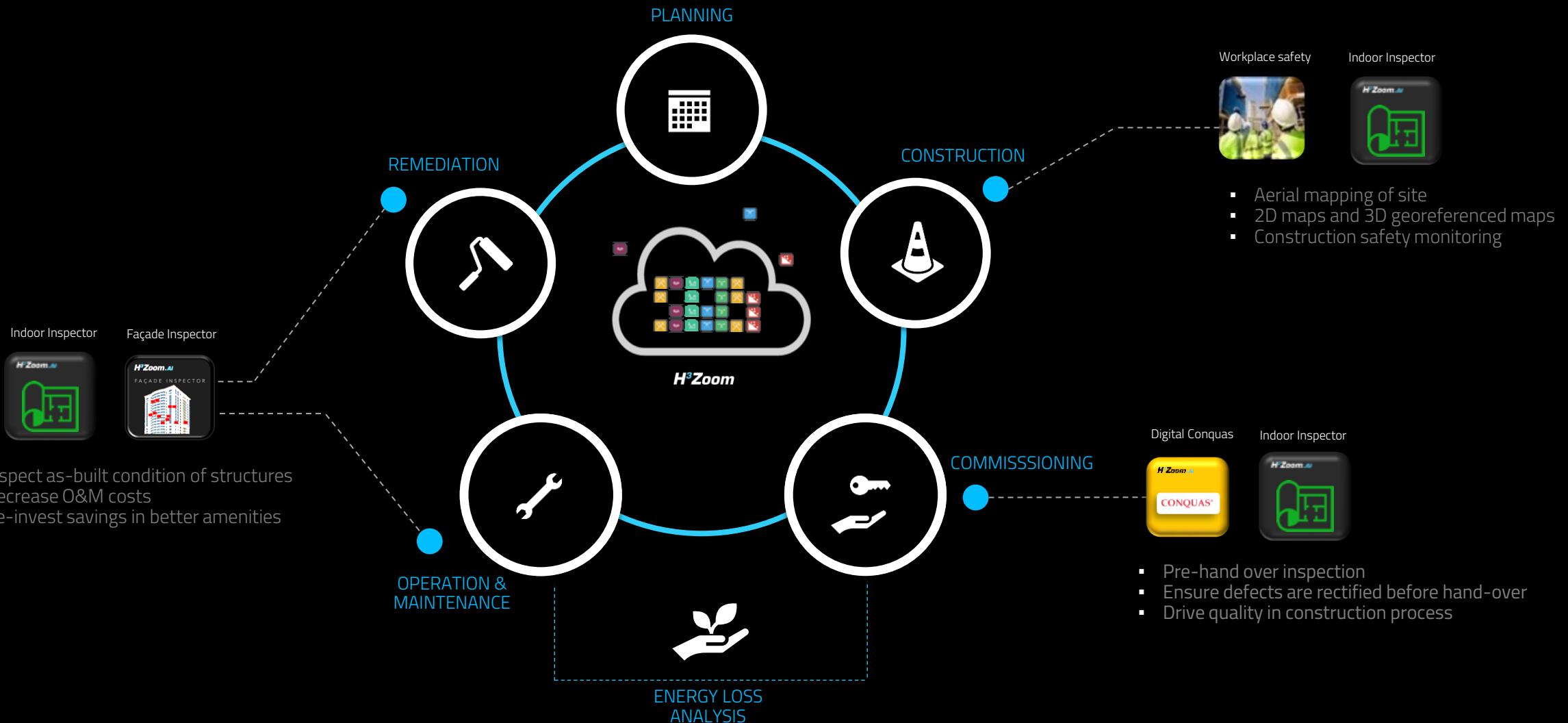
HIGHLY SCALABLE

Scale your facility management and operational processes through actionable insights. Access the platform through web and mobile everywhere and anytime.



SUSTAINABLE

Enabler of energy efficiency and demand flexibility in buildings. These "smart" buildings benefit from advanced sensing and controls, systems integration, data analytics and energy optimization to actively reduce energy use and demand while also improving occupant comfort, health, productivity and facility resilience.





Façade Inspector – how it works

completed by client, third party operations and equipment, or our own team in some cases



DIGITIZED
DATA ACQUISITION



- LIDAR
- IMAGES
- VIDEO
- OTHER



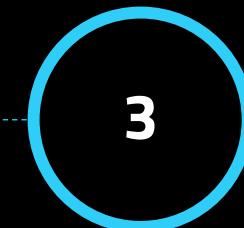
Simple upload



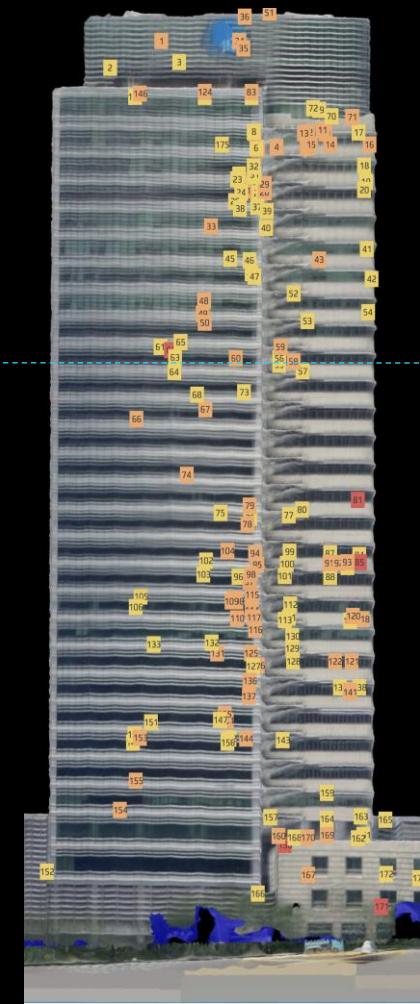
HFZoom



AUTONOMOUS DATA
PROCESSING
AND THERMAL ANALYSIS



INTELLIGENT
INSIGHTS



POTENTIAL INTEGRATION WITH ENVISION



DECARBONIZATION
(LOCATION DATA)
(THERMAL ANALYTICS)



Connect with H3 Dynamics



Vector InfoTech Systems & Networks Int. Pte. Ltd.



Vector InfoTech

Muhammad Farhan Bin Jailani

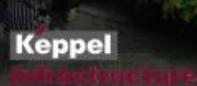
Technical Sales Lead

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Supporting Partners



Startup Partner



Training Partner



Introducing VISN

Local Team

Young, Vibrant and Sustainability-Focused company established in June 2020 to help our clients make sustainability goals a reality.

Foundations

A local startup, spun off from a history in industrial networks & telecommunications.



Systems Integrator

Our DNA is that of a system-integrator, embracing sustainability as our renewed strategic focus.

Business Building

Leverage on its people's rich expertise to be engineering field-specialists for new opportunities in sustainable solutions for the built environment.

Why we work in sustainability & net-zero

Global Context

- As of today, 39% of global carbon emissions are produced by buildings, and 60% of global electricity are consumed by buildings, where people live and work.
- To move faster towards a net-zero future, finding ways to efficiently manage a building's existing assets has become important driver for current innovations.



VISN's Position

- Hence, we decided to focus on digital systems for existing building operations, new assets for renewable supply, solutions for new demand sources like EV charging, and software applications that advance the deployment of each of these solution categories.

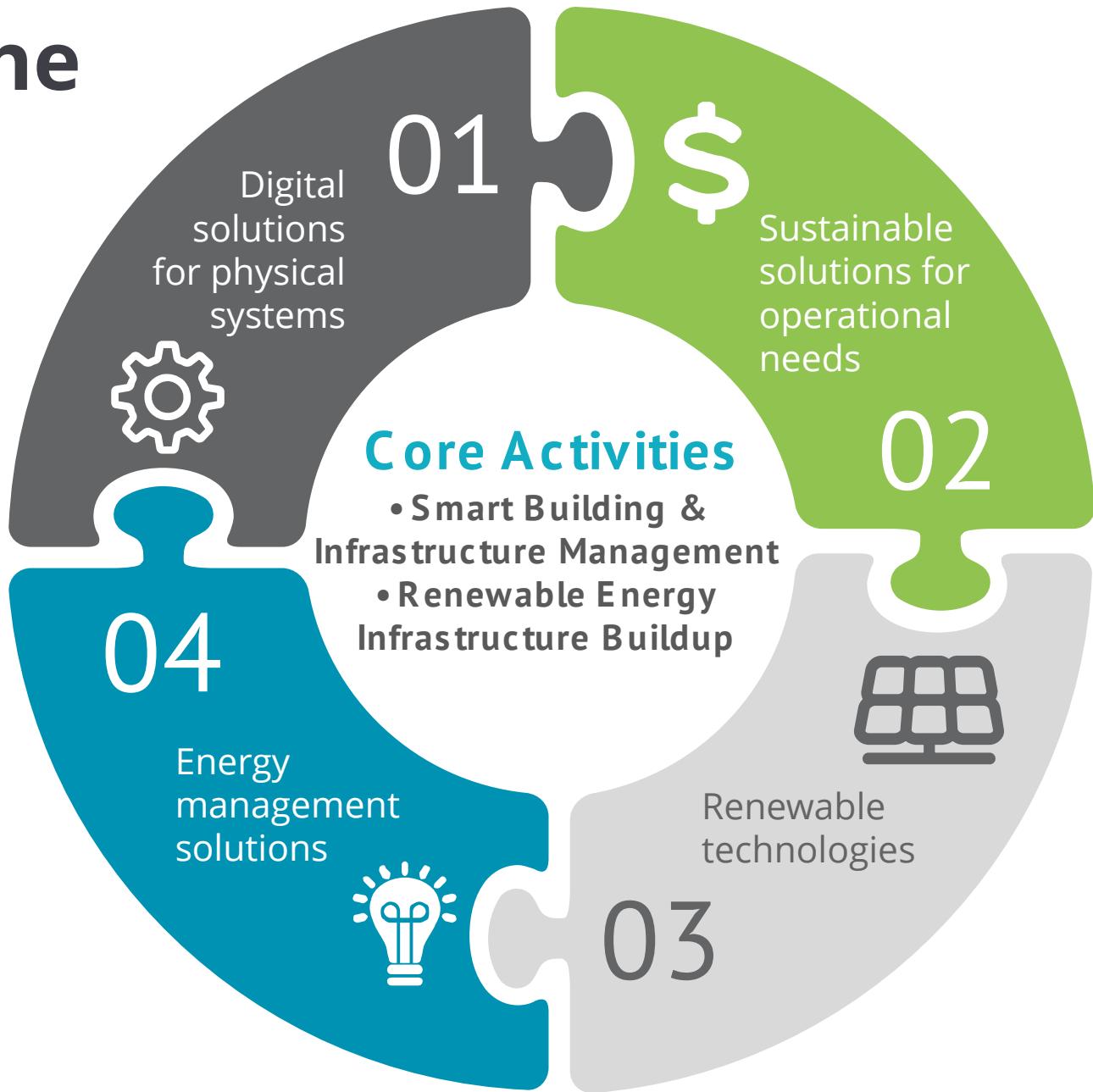
How we contribute to the net-zero agenda

Our core activities and 4 practice domains.

What have we done to-date?

Today, we are proud to share 2 of such projects we have been doing with our partners.

- HDB Asset Monitoring System, in partnership with *ST Engineering*
- Pulau Ubin Microgrid, in partnership with *EDPR Sunseap APAC*



HDB Asset Monitoring System

- HDB vision to build “intelligence-driven estates with exceptional facilities management and extraordinary retail experiences”
- Integrate existing systems and assets with new sensors to facilitate the sending of data to Smart Estate Management System (SEMS) and/or for the operation of the cloud BMS.
- All sensors are open standards-based, cloud-compatible, and adaptable to evolving future technology needs.
- Phase 1-3 officially handed over and in full operational since early 2022. Phase 4 scheduled to complete by Aug 2022.



Pulau Ubin Micro-Grid

Micro-grid in Pulau Ubin, an island north-east of Singapore and aims to assess the reliability of electricity supply within a micro-grid infrastructure using intermittent renewable energy sources such as solar photovoltaic (PV) technology. Solar Green Roof and an advanced energy storage system to increase the use of renewable energy on the island.

- Cleaner energy
- Reliable electricity supply
- Cost-competitive electricity
- Scalability



EV Charging Infrastructure.. a different take.

The vision of a 100% EV future in Singapore will become a reality, but how fast can we get there?

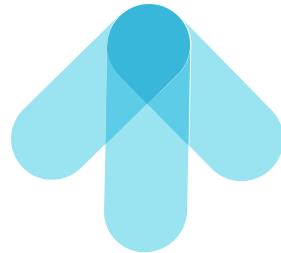
We want to accelerate EV adoption by providing an alternative approach to speed up EV infrastructure build-up. One that allows for higher accessibility and availability of EV chargers while providing end users with a positive charging experience.

High Accessibility Plug and Play Electric Vehicle (EV) Charging in Brown-field Infrastructure, Optimised Through AIoT-enabled Energy Orchestration of Grid Supply, Solar Photovoltaic (PV) System, and Energy Storage System (ESS).



Optimising charging infrastructure buildup through demand-side innovation.

“Avoid enforced upgrades”



Providing highly accessible & available charging facilities for extended-based usage.

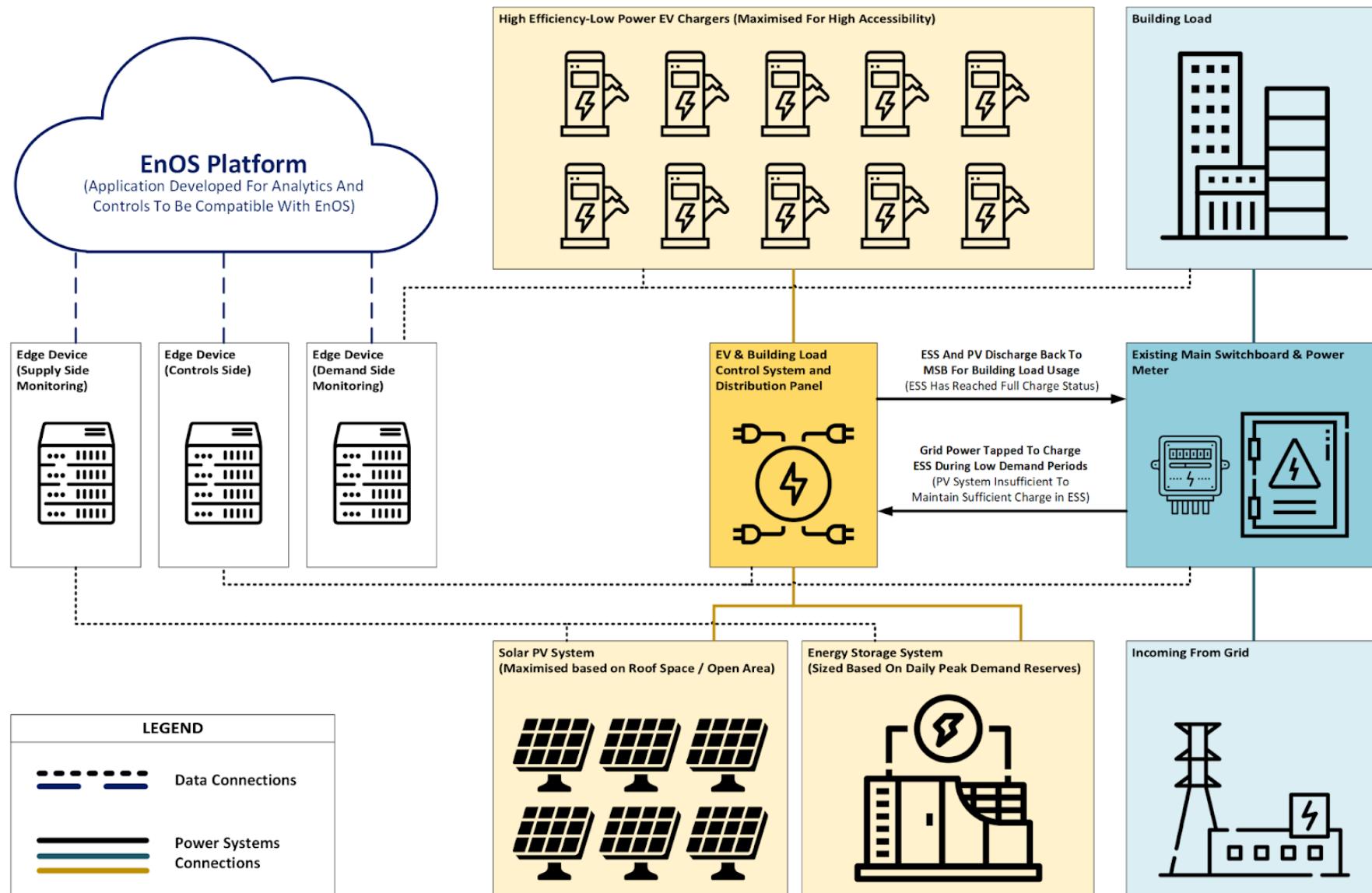
“Democratize EV charging”



Delivering first-class user experience by matching users' true needs to pricing models.

“Give users a choice”

Solution Architecture



Partner with us

1

Bridge

Critical bridge between
advanced technologies
and *client needs*

2

Integrate

Go-to systems integrator
for bespoke client needs

3

Implement

Field specialist for
implementation of
physical systems



What we bring to the table:

- Strong project execution
- Experienced system integrator
- Extensive sub-con network
- First-class client service
- Strong teamwork

Connect with Vector InfoTech





Datakrew

Sumanta Bose

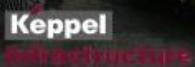
CEO

BUILD A BETTER FUTURE FOR SINGAPORE WITH THE
NET ZERO STARTUP CHALLENGE

Organized by



Supporting Partners



Startup Partner



Training Partner





Energy Innovation 2022

OXRED – Unified intelligence for next-generation connected EV batteries

By Datakrew Pte. Ltd.

www.datakrew.com

[/company/DataKrew](https://www.linkedin.com/company/DataKrew)

[/DataKrewTech](https://www.facebook.com/DataKrewTech)

[@DataKrew](https://twitter.com/DataKrew)



Your EV battery is a dormant bomb, ready to 💣🔥 at any time

Technology

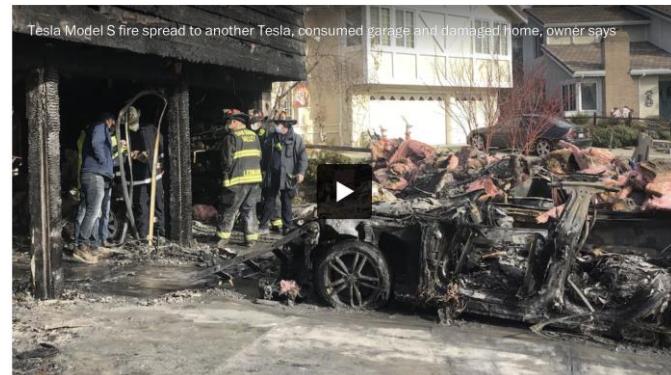
While they were asleep, their Teslas burned in the garage. It's a risk many automakers are taking seriously.

A fire inspector cited the thermal management system in one of the Tesla Model S sedans as one of two possible causes of the blaze, which showed what can happen when one electric car ignites another in a garage.

HOME > TRANSPORTATION

A California couple's Tesla caught fire while charging overnight, ignited another Tesla next to it, and caused a massive house fire. They haven't been home in 8 months.

Anna Cooban Aug 5, 2021, 11:40 PM



Okinawa EV dealership catches fire in Mangalore

Written by Shakti Nath Jha

June 25, 2022 4:30:13 pm



Massive fire at EV parking in Delhi, over 90 vehicles charred

Videos and images of the incident are being widely shared on social media.

By Saloni Tandon - Published On: June 8, 2022 | Last Updated: June 8, 2022



London bus explosion: Five electric buses go up in a fireball – smoke seen for miles

FIVE electric double decker buses have exploded at the Potters Bar Bus Garage near London.



BURNING EVS

ELECTRIC CARS HAVE ONE PROBLEM: THEY KEEP LIGHTING PEOPLE'S HOUSES ON FIRE

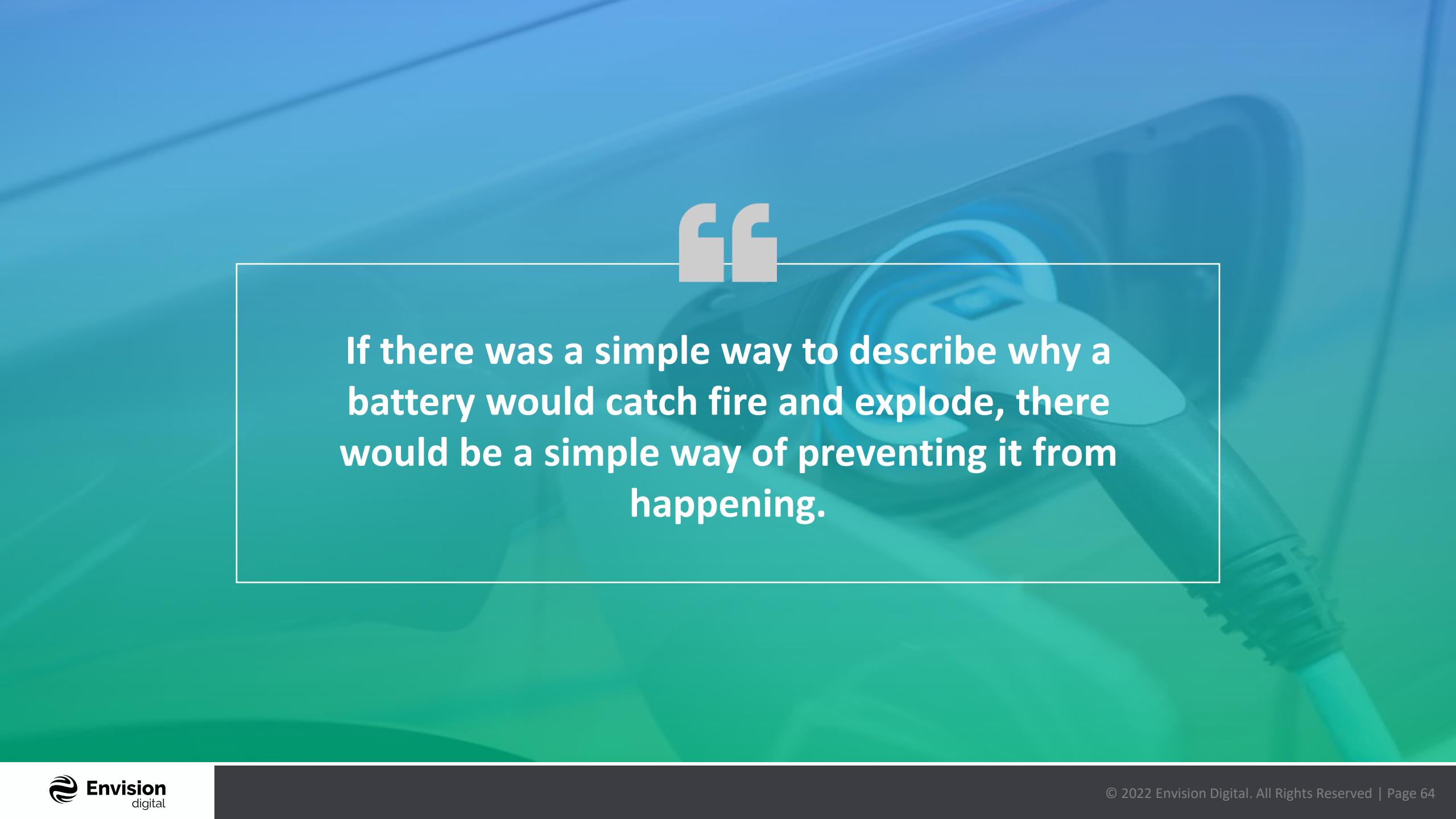
"IF WE HAD LIVED UPSTAIRS IN THIS HOUSE, WE'D BE DEAD."

FUTURISM

EV battery explodes, killing 1 and injuring 3 in Andhra Pradesh

The victim K Siva Kumar purchased the electric bike only on Friday. The detachable battery of the vehicle was kept on charging in his bedroom on Friday night and it suddenly exploded in the early hours when all were fast asleep, Suryaopet Inspector of Police V Janaki Ramaiah said.

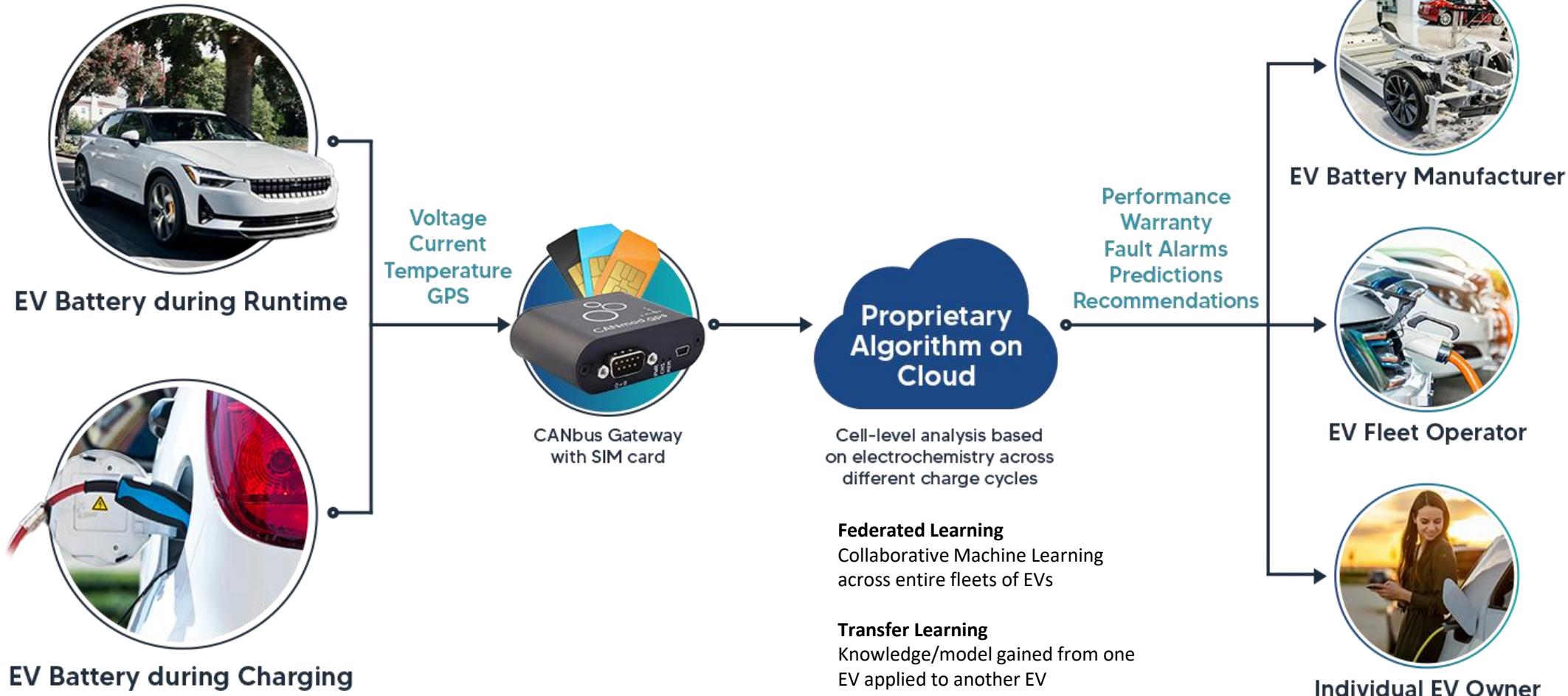




“

If there was a simple way to describe why a battery would catch fire and explode, there would be a simple way of preventing it from happening.

OXRED improves battery lifetime, predicts faults, eliminates accidents and



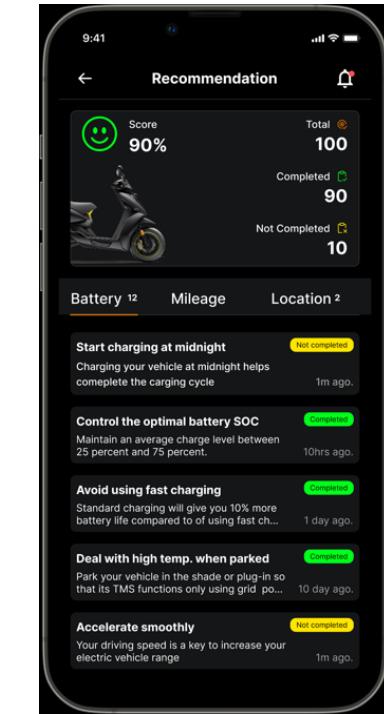
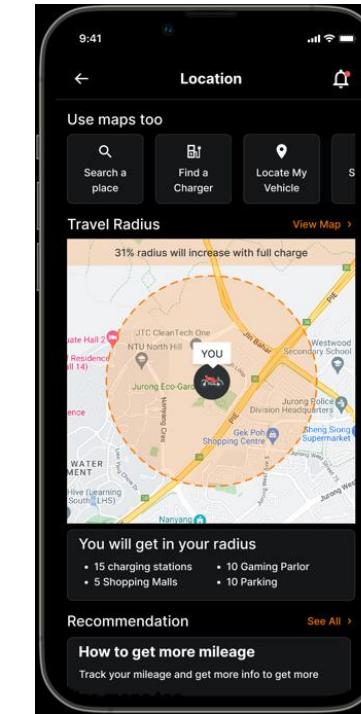
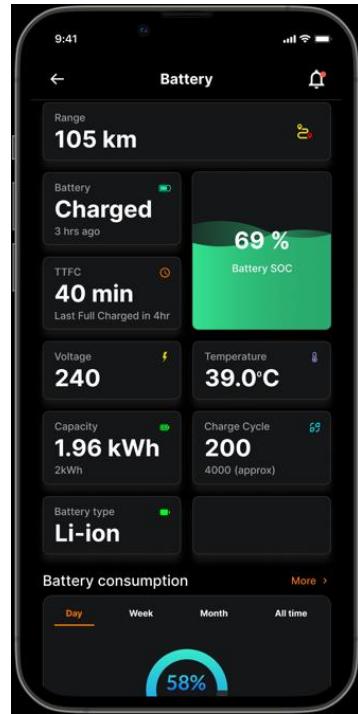
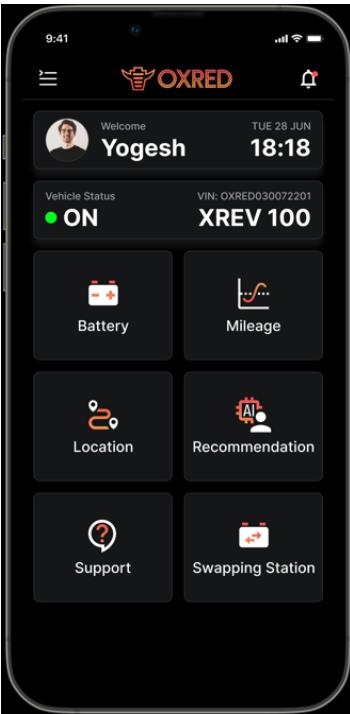
OXRED – Customer vs Benefits Matrix

Benefits

	Battery Manufacturers	Fleet Operators	EV Owners
Performance	Ensure battery quality, monetize battery data, improve R&D	Avoid faulty battery from being in circulation	
Warranty	Tie warranty with number of charge cycles instead of age	Extend warranty based on use, not on age or distance	
Fault Alarms	Get alerts and offer maintenance services for new revenue	Get alerts and recall faculty vehicles from circulation	Get alerts and avoid accidents such as fire and explosions
Recommendations		Get recommendations for battery repair/replacement	Get recommendation to start/stop charging (ideal operation)
Predictions		Get prediction of battery remaining useful lifeline (SOH)	Get prediction of mileage (helps in travel planning)

OXRED User App

App



Datakrew in a snapshot

Company

ABOUT US

- Singapore-based, backed by ESG & NTU
- Deep-tech IoT/AI start-up
- Patented battery diagnostics algorithm
- Backed by no-code IoT/AI platform
- Proven industrial traction with experience in **IoT, AI, battery chemistry, material science**
- Experienced team with PhDs

 www.datakrew.com

 /company/DataKrew

 /DataKrew

Our Investors

 BEENEXT

LIGHTHOUSE
CANTON

 AngelList

Cloud Capital

Marquee Angels

Our Customers



Datakrew team

Management Team



Sumanta Bose, CEO
Ex-Temasek Research Scientist in IoT & Security. PhD from NTU SG.



Arjun Singh, CTO
Ex-Aviabird Enterprise Software Architect with 5 years experience.



Swapnajit Roy, CBO
Ex-Citibank, Ex-IBM Sales Strategist & Analyst with 7 years experience.



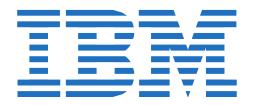
Naina Gupta, Firmware Lead & Security Architect
PhD from NTU SG.



Arpan Jati, Hardware Lead
PhD from IIIT India.

+ Team of **40 members** spread across 4 countries/time-zones

Alma Mater and Work Experience of Senior Team Members and Advisors





Safer EVs for *Future Generations*

+65 98612535

www.datakrew.com

info@datakrew.com



Connect with Datakrew





EtaVolt

Dr Stanley Wang

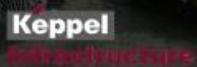
CEO & Co-Founder

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ETAVOLT Management Team



Dr Stanley Wang
Co-Founder
Chief Executive Officer

- 15 yrs in solar research, manufacturing & tech transfer
- PI EDB-SCR&P Programme Director ERI@N, NTU
- 7 years with REC Solar Singapore with managerial role
- UNSW PhD, Photovoltaic Eng.



Dr Andy So
Co-Founder
Chief Technology Officer

- 15 yrs in solar research & industry, BIPV and automotive production process (BOSCH)
- 7 years with Bosch Singapore with managerial role
- Certified PM & Agile Master; Start-up & innovation mgt.
- UNSW PhD, Photovoltaic Eng.



Dr Gordon Ling
Co-Founder
Head of Engineering

- >10 yrs in solar renewable energy R&D
- PV process, manufacturing & product development expert; Quality control mgt.
- REC Solar Singapore, leading role
- NUS (SERIS) PhD, Electrical and Computer Eng



Solar PV for
our sustainable
world, but in
reality...

	Today	2030	2050
PV Installations	700GW	1,600 GW	4,500 GW
PV Waste	250k Tonnes	8M Tonnes	78M Tonnes



Unprecedented
environmental problem &
creating serious
challenges

Delivering a TRUE circular PV economy by Etavolt

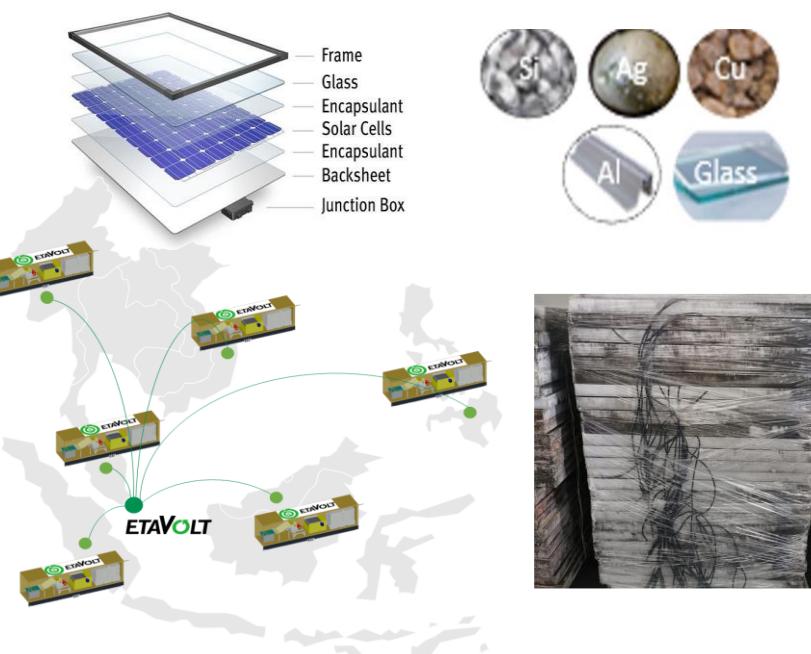
PV Regeneration Solution

Onsite PV performance recovery and degradation protection



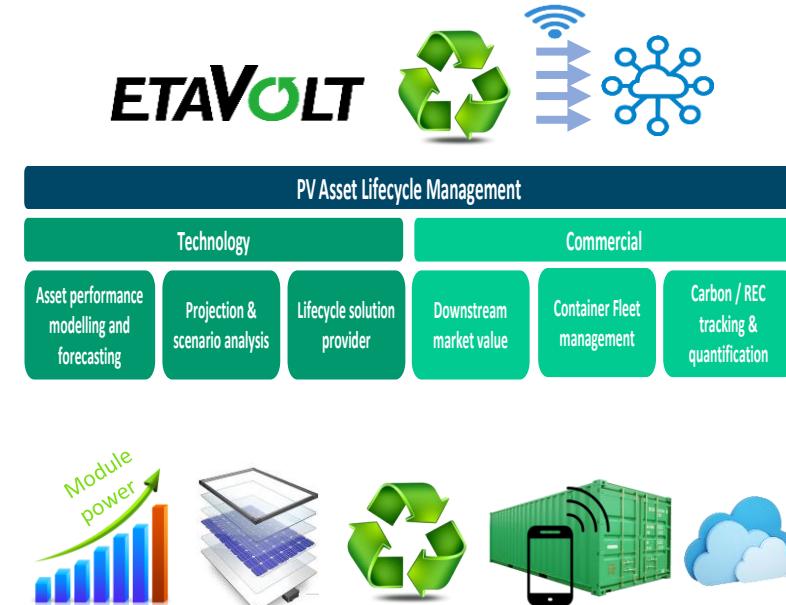
Advanced PV Recycling

Component deconstruction, reutilization and closing the loop of the sustainability cycle



Digitalized PV Lifecycle Management

Advanced IoT implementation for economic value enhancements



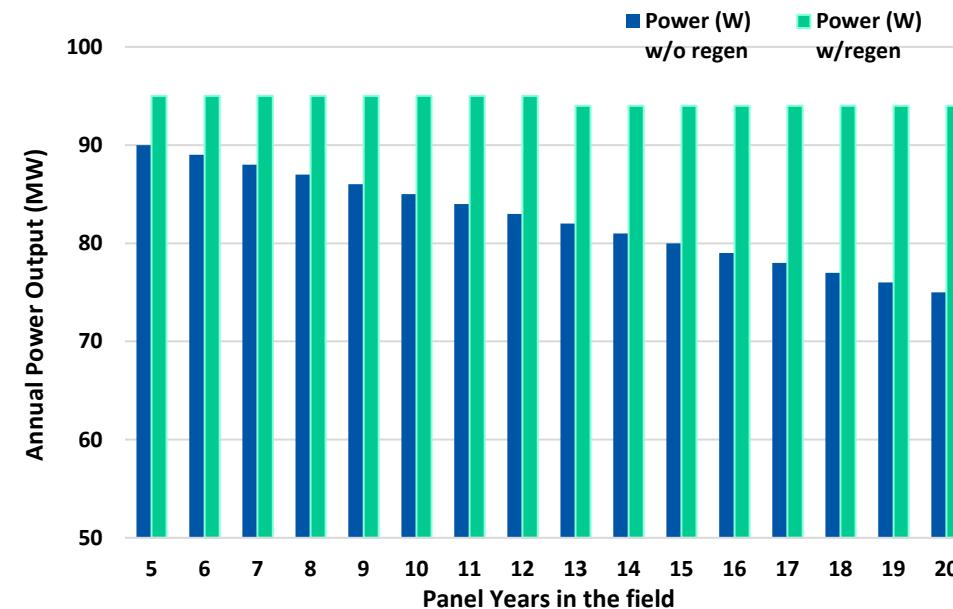
Advanced Regeneration Testbed

Monitored performance results (Kedah Malaysia)



Customer Prefer EtaVolt's Regeneration Solution

Case Study: Degraded Panels vs Regen Solution (100MW Solar Farm)



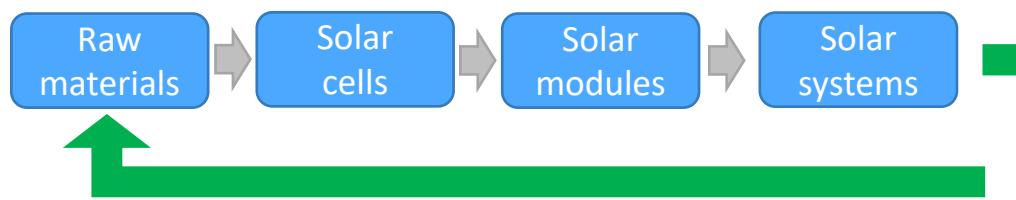
Solar arrays - modules with and without the advanced regeneration technology are installed on a commercial building rooftop in Kedah, Malaysia.

Key benefits of regenerated solar arrays

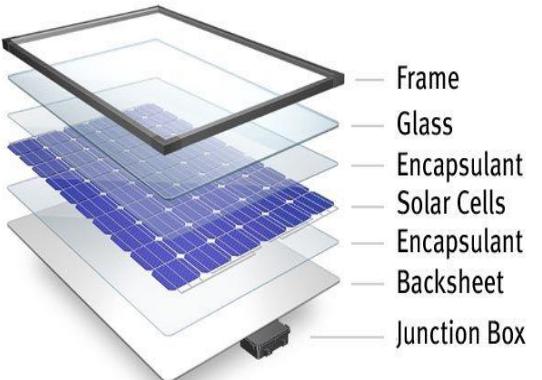
- Higher initial performance & power
- Long term stability
- More power over existing installed areas (+8%)

	Reference	Regenerated
Initial month (kW)	25.0	26.6
Average power over first 12 months (kW)	24.3	27.0
Relative change to reference array (%)	-2.8	+8.0

Delivering a TRUE circular PV economy

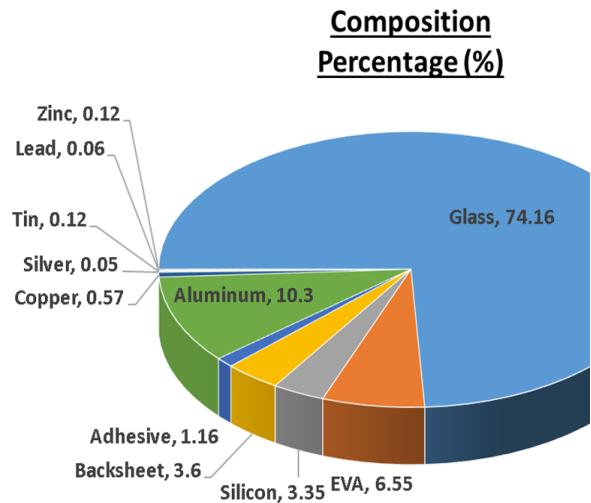


Status: Completed
Location: KTPH, SG
Qty: 500 panels
Type: Mono-Si
Module power : 160W
Usage years: 6



Market potential

- Exponential increasing PV waste¹
- Turning recycled materials into raw materials (~multiB\$ market)
- Highly scalable business

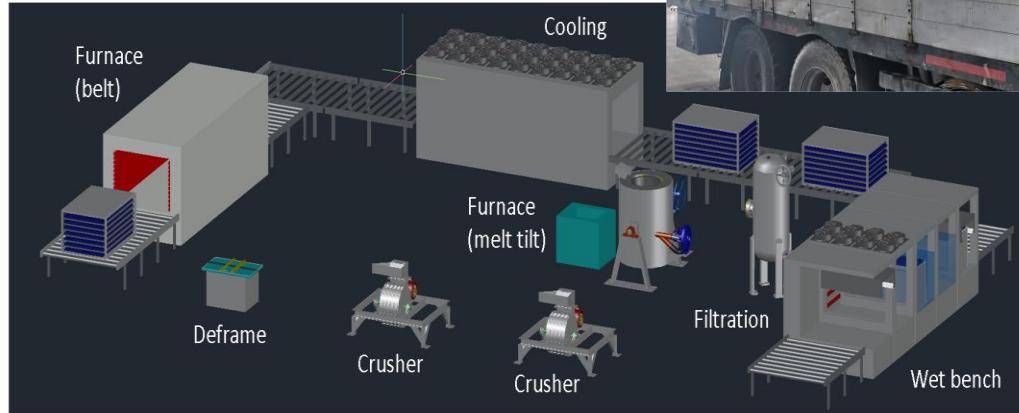


PV Recycling Deployments

01

Full Scale PV Recycling plant

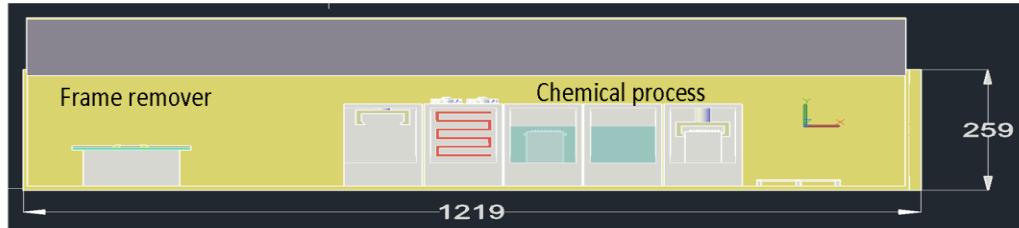
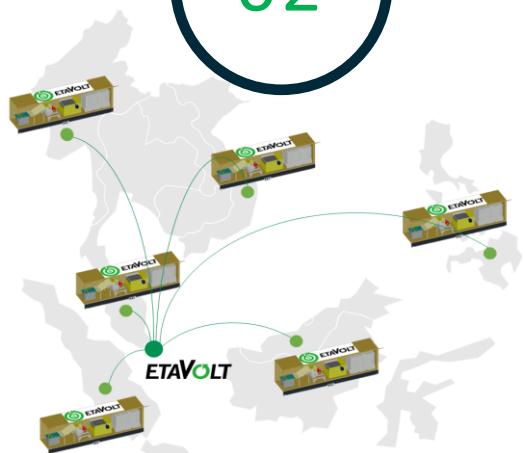
Integrated PV recycling at a single site
Advanced material recovery (target >95%)
High TRL levels with in-house IP
Strong market demand (SG, MY, TH)



02

Decentralized Outdoor PV Recycling solution

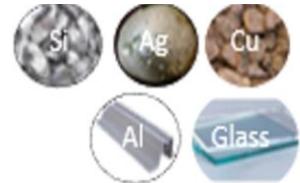
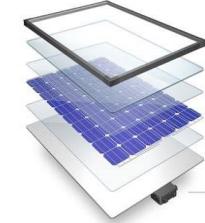
Recycling tools within 40GP container
Achieves on-site PV recycling
Reduces logistics and manpower costs
Complements the in factory regeneration





ETAVOLT

Delivering Digitalized
Circular PV economy



PV Asset Lifecycle Management

Technology

Asset performance
modelling and
forecasting

Projection &
scenario analysis

Lifecycle solution
provider

Commercial

Downstream
market value

Container Fleet
management

Carbon / REC
tracking &
quantification

Expected Benefits to Singapore



Delivers an integrated digitalized
circular PV lifecycle management
solution



Maximize performance &
commercial values of PV assets



Tech, Commercial and
Environmental impacts, maximize
energy & lifespan extension



Providing actionable insights to
enhance PV development &
ownership



Maximize raw material recovery
for PV systems & reduce carbon
emissions



Highly Scalable Business model in
Singapore and beyond,
compliment SolarNova program

Track Record



Enabling Sustainable Solar Energy Business through Advanced Regeneration & Recycling Technology

IP status: 4 filing in progress*; 2 in preparation

Publication status: 2 journals & 1 white paper

* Including 1 NTU exclusive IP license

Etavolt technology to address
the
and recover
144GW US7.2B

degraded solar farm panels

solar energy economical losses
due to degraded panels



Spin-off from ERIAN NTU in 2019 (Nov), seed fund raised & received various grant funding (ESG Startup Founder, SGTECH POC, Market Readiness Assistance) total:

\$830k in
Funding*

* Not incl. EDB solar CRP01-021 grant \$1.4M



Since 2020 for solar recycling business with leading e-waste recycler Recycling in Singapore, successfully handled:

>1.5k Solar Panels*

* \$15k revenue amount to-date



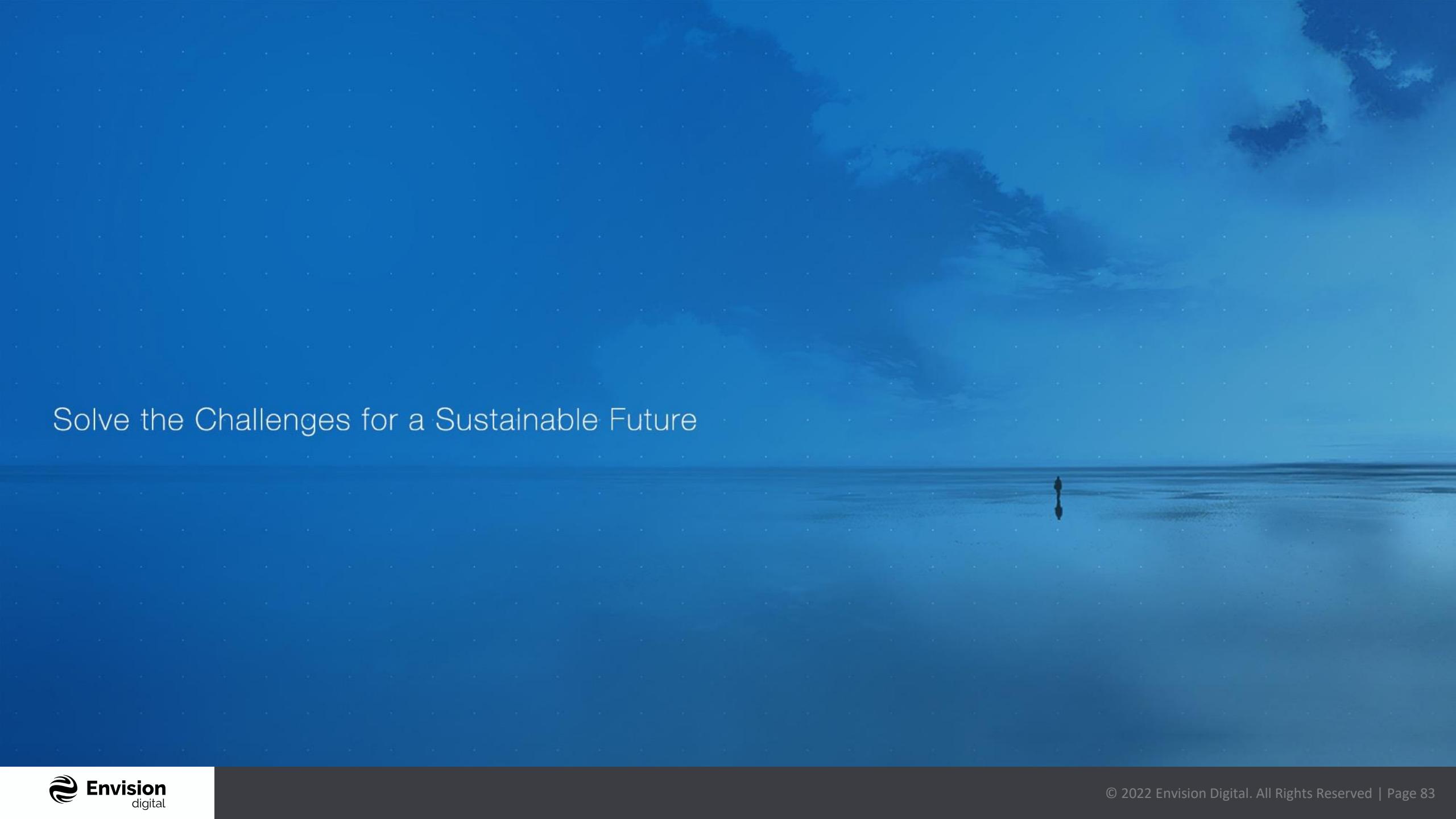
Partnerships & Customers

12+ MOU and LOI signed

Connect with EtaVolt



THANK YOU

A wide-angle photograph of a beach at dusk or dawn. The sky is a deep, hazy blue, transitioning from dark at the top to lighter near the horizon. A single figure of a person is walking along the water's edge towards the center of the frame. The ocean is calm with very slight ripples. In the background, there are dark silhouettes of trees and rocks along the shore.

Solve the Challenges for a Sustainable Future



Envision Digital is a global AIoT technology leader headquartered in Singapore with over 500 employees across ten offices in China, France, Norway, the Netherlands, the United Kingdom and the United States.

Envision Digital owns EnOS™ – the world-class AIoT operating system which currently connects and manages over 63 million smart devices and 120GW of energy assets globally. Its monitoring, advanced analytics, forecasting and optimising applications provide insights to help clients better manage their assets and portfolio performance. Its offering extends to: Smart Renewables (Hydro, Solar, Wind); Smart Cities; Smart Buildings; Connected Energy; Smart Plants; and Smart Networks; partnering companies and governments in their digital transformation journey.

As a major player in the AIoT operating system, Envision Digital is growing an ecosystem of partners to enable energy and digital transformation globally. Its growing list of over 250 customers and partners spans across ten industries and includes: Accenture, Amazon Web Services, Govtech, Keppel, Microsoft, Nissan, Tableau, Total, PSA International, and Sonnen.

For more information

To learn more about EnOS™ , contact your Envision sales representative or your Envision Business Partner, or visit the following website:

<http://www.envision-digital.com/meet-enos/>

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