ecolution

POWER CO.

MODULE ACTIVE RESPONSE SYSTEM (MARS) TECHNOLOGY PRESENTATION

FEBRUARY 2023

TEAM

Leadership

Johanne G. Medina Then
CEO, Co-Founder

Johnny Then-Gautier
CTO, Co-Founder

Craig T. Bouchard
Executive Chairman, Co-Founder

Board of Advisors

Richard Giromini
CEO WABASH NATIONAL, GM

Ernest Matsuo Higa
CEO HIGA INDUSTRIES CO., LTD., U.S.-JAPAN COUNCIL, Wendy's

Jack Greenberg
CEO

William Farley
CEO FRUIT OF THE LOOM

Randolph C. Read
SANDRIDGE energy, ENZON PHARMACEUTICALS

Engineering Team

Tom Anders
Project Manager
Day & Zimmermann, wood., FLUOR, Clemson

Dev Belflower
Engineering Manager
KTM ENGINEERING, Clemson

(TJ) James Theodore
Mechanical Engineer
KTM ENGINEERING, Clemson

David Kramer
Electrical/Controls Engineering
KTM ENGINEERING

UPENN Research Team

Thomas Obermeier
Business of Climate Tech and Sustainability (Team Leader)

Clara Lyle
City Planning

Penn
University of Pennsylvania

Thomas Rokholt
Finance & Economics

Alex Cartwright
City & Regional Planning

Partnering With Cities To Deliver Clean Electricity from Harvested Kinetic Energy

SAINT PAUL MINNESOTA

CITY OF AMARILLO® OPEN SPACES ★ ENDLESS OPPORTUNITIES

- **Project objective:** To enable smart cities reduce carbon emissions by harvesting kinetic energy from moving vehicles.
- **Current status:**
  - City of St. Paul selected as ideal pilot City.
  - LOI executed between Ecolution, City of St. Paul and Brown Venture Group on 12/7/2021.
  - LOI executed between Ecolution and the City of Amarillo, Texas on 5/24/2022.
- **Ecolution's Role:** To lead a consortium bringing abundant alternative clean energy to Smart Cities.

PARTNERS

Brown Venture Group; Wabash; warecorp; Pantek Partners – Deep Tech | Asia | Investment Bankers; adstec Energy; ecobat; Day&Zimmermann; KTM Engineering; Clemson University; Wharton University of Pennsylvania; Miller Electric Company – Powering the Possibilities; Levo – Powered by Nuvve; NVIDIA; WATCO; Sharma & Associates, Inc. – Creating Innovative Engineering Solutions

SUPPORTERS

Penn – University of Pennsylvania; Meritor – Run With the Bull

MODULE ACTIVE RESPONSE SYSTEM (MARS) OVERVIEW

MARS KINETIC ENERGY AS AN ALTERNATIVE ENERGY SOURCE

EXISTING ENERGY SOURCES

GEOTHERMAL

WATER (kinetic)

BIOMASS

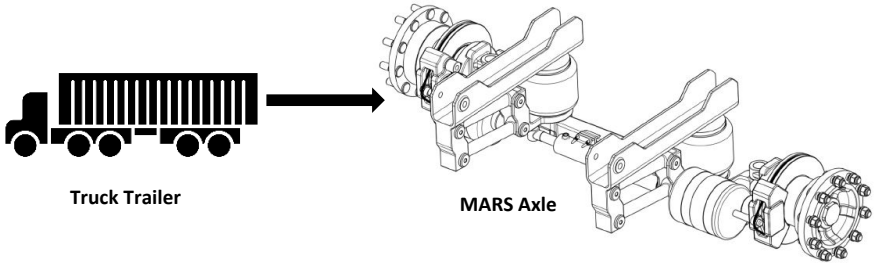
COAL

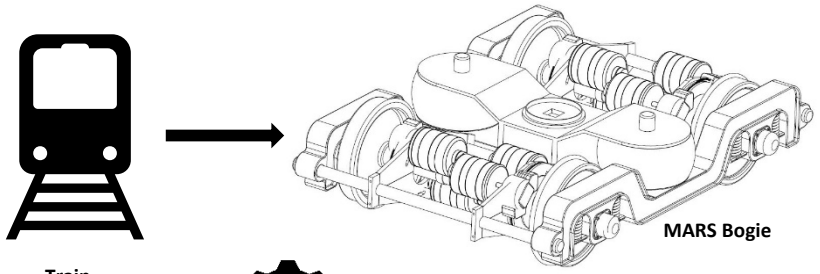
OIL

WIND (kinetic)

SOLAR

HARNESSING KINETIC ENERGY

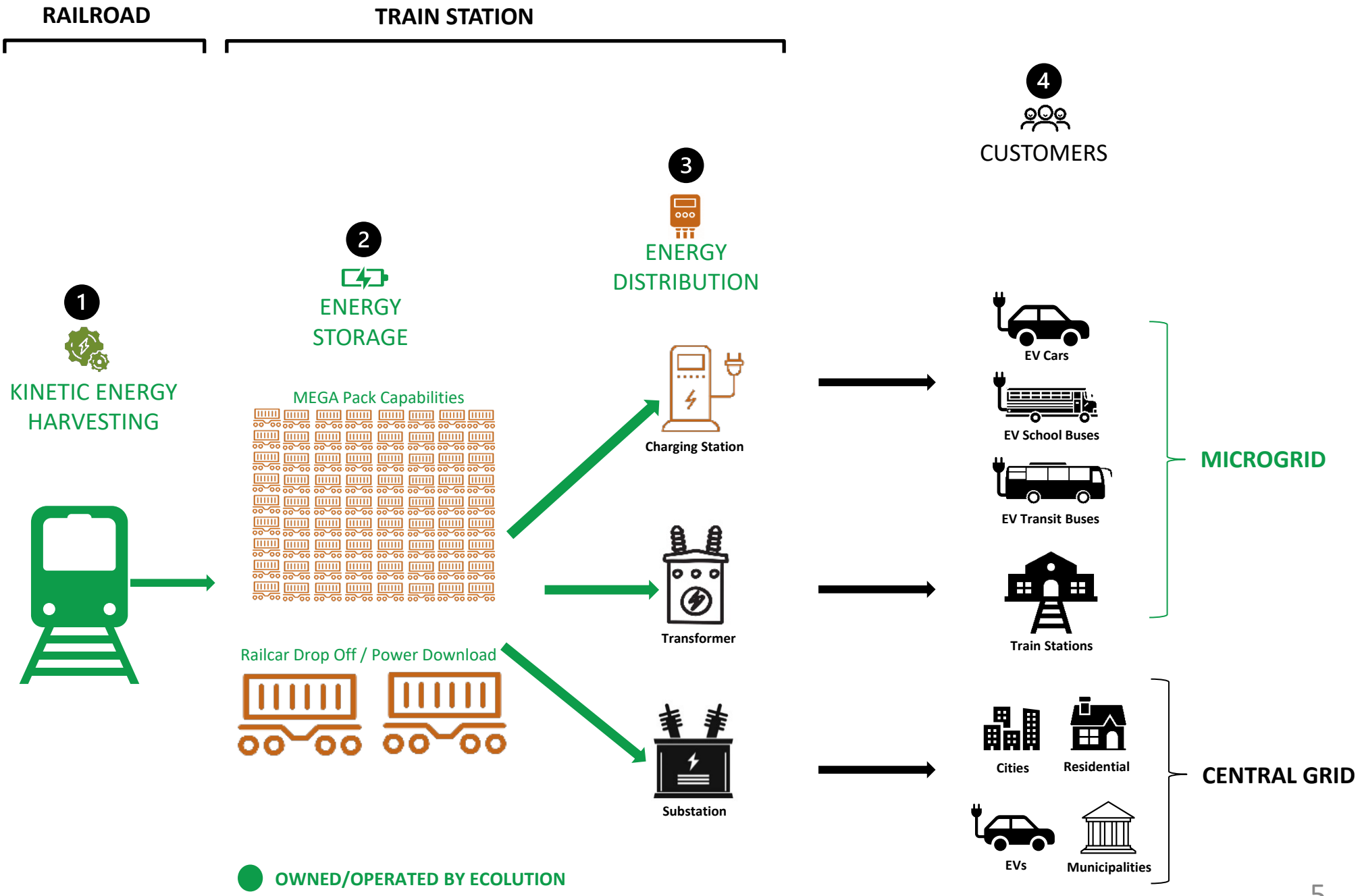




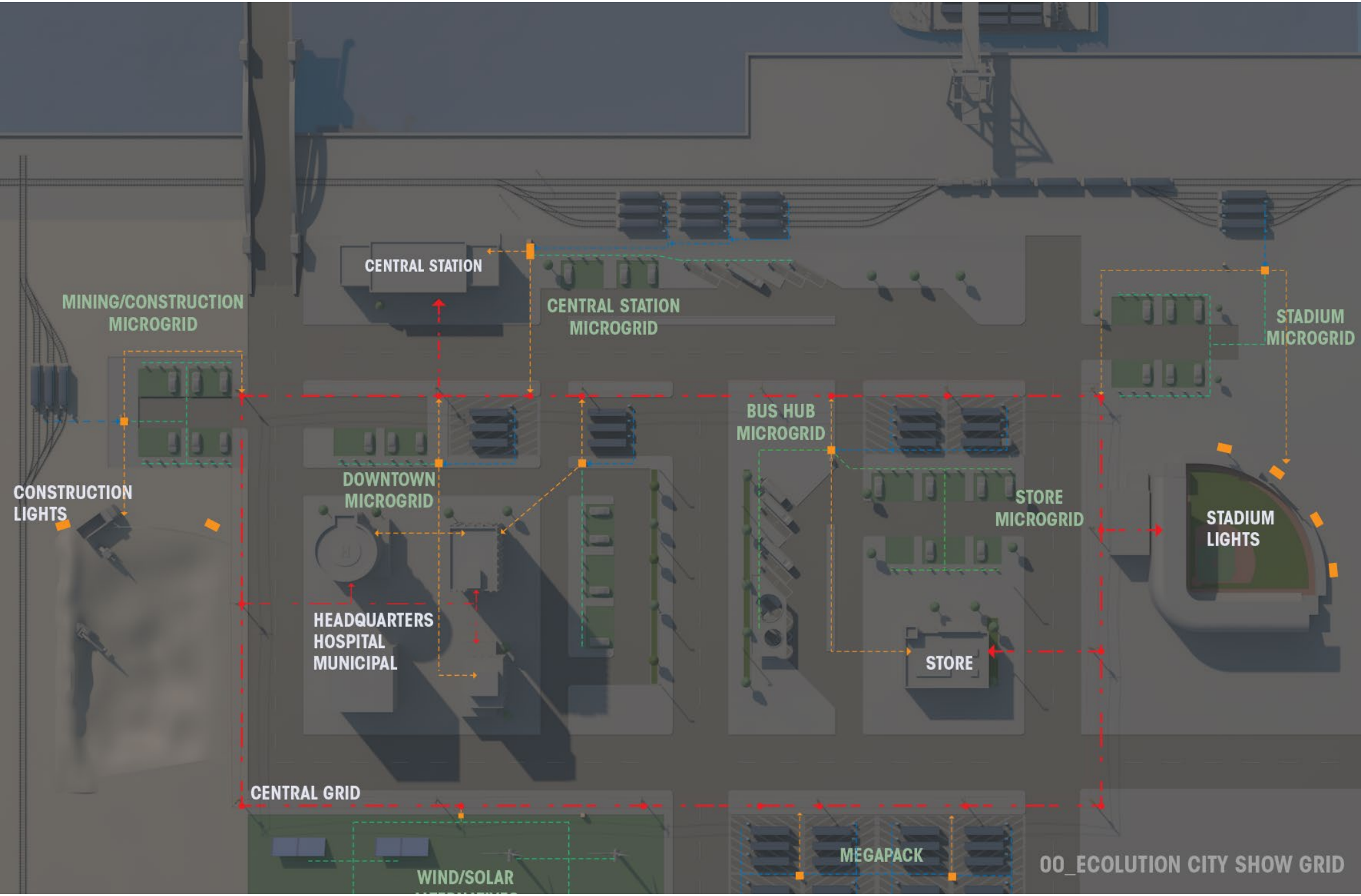
KINETIC

ELECTRIC GRID

RAIL-TO-GRID (R2G) OVERVIEW

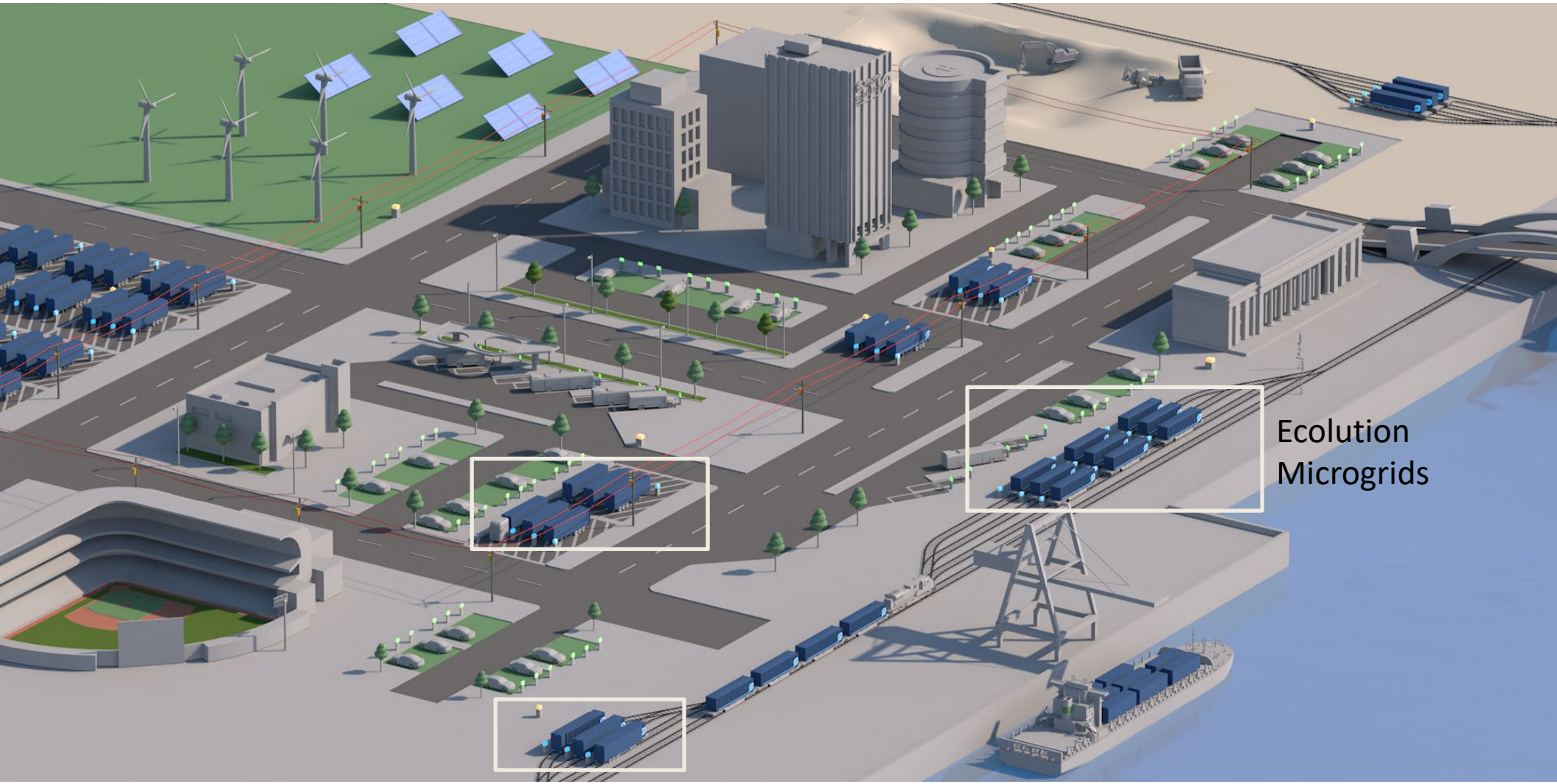


SMART CITY VISION



SMART CITY VISION

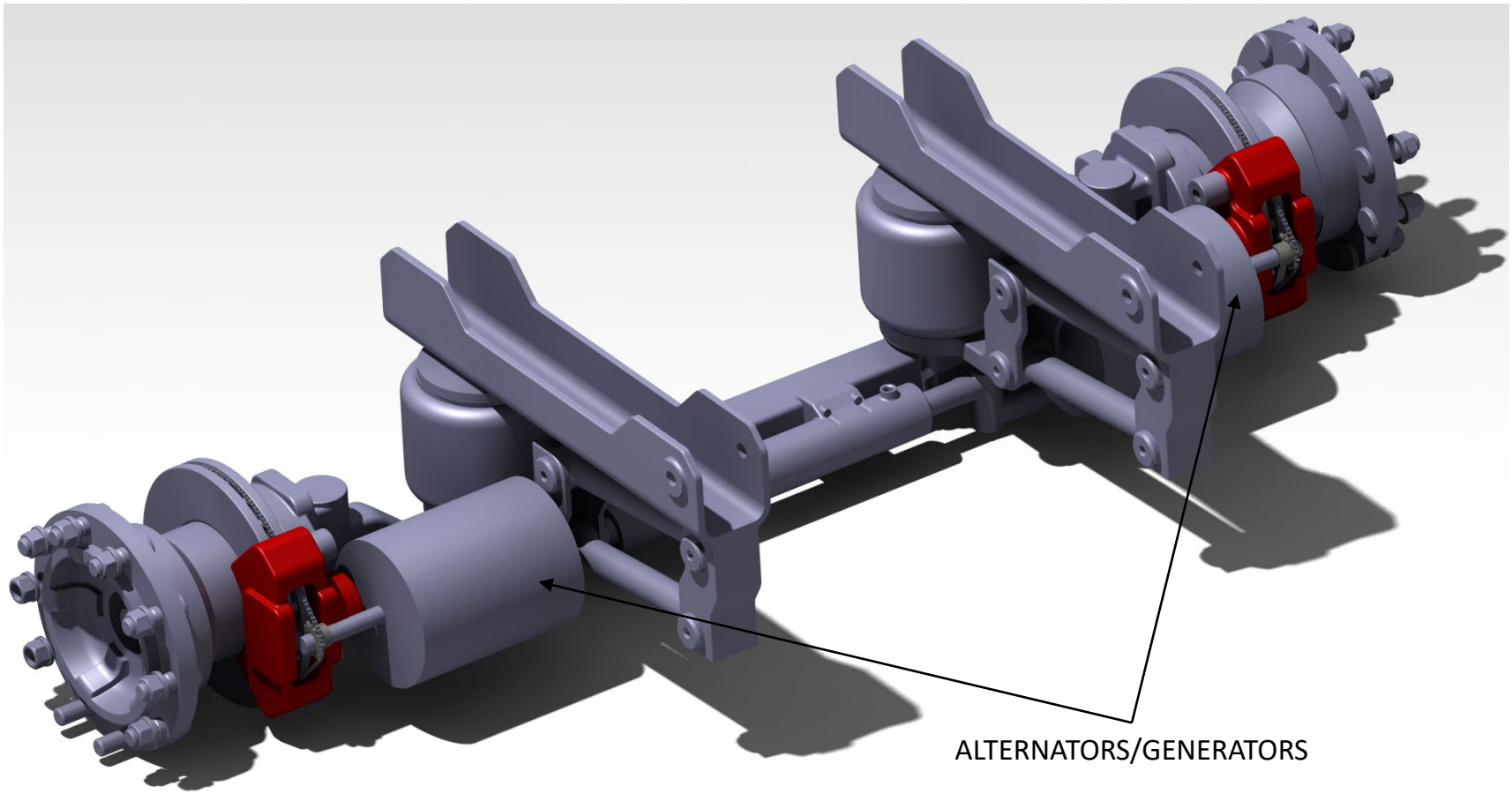
Smart city Animation available at https://ecolutionpower.com



https://vimeo.com/764643249 **Direct Smart City Link – City View**
https://vimeo.com/764643713 **Direct Smart City Link – Top View**
https://vimeo.com/764965915 **Direct Smart City Link – Zoom Train Station**
https://vimeo.com/764979212 **Direct Smart City Link – Zoom Inner City Trailers**

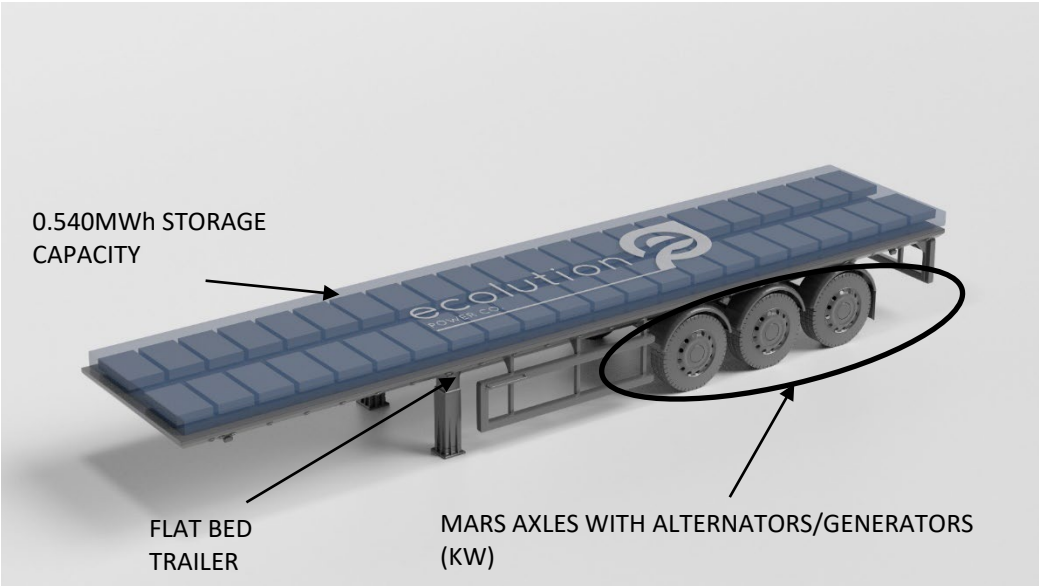
ILLUSTRATIONS

MARS TRAILER AXLE WITH ALTERNATORS/GENERATORS (POWER GENERATION KW)



MARS FLAT BED TRAILER WITH BATTERY PACK

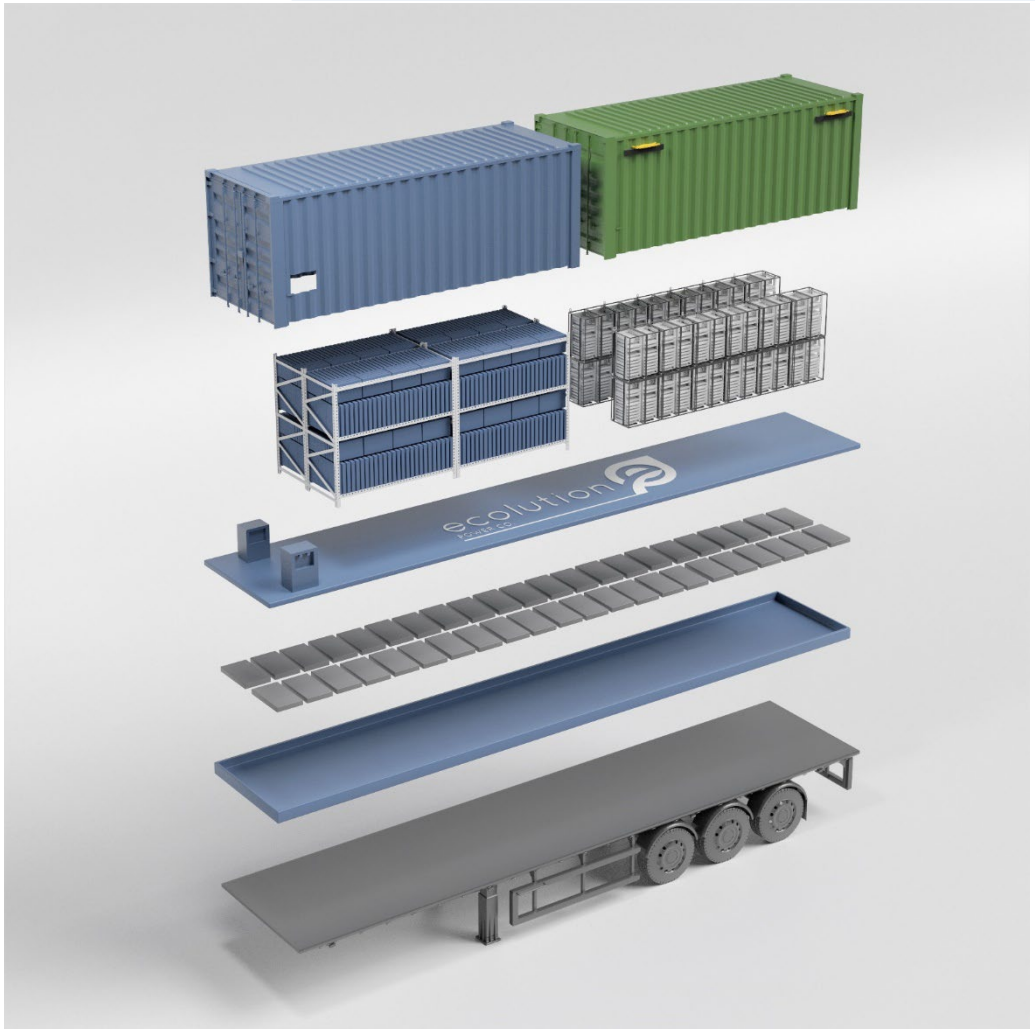
0.540MWh MARS FLAT BED TRAILER

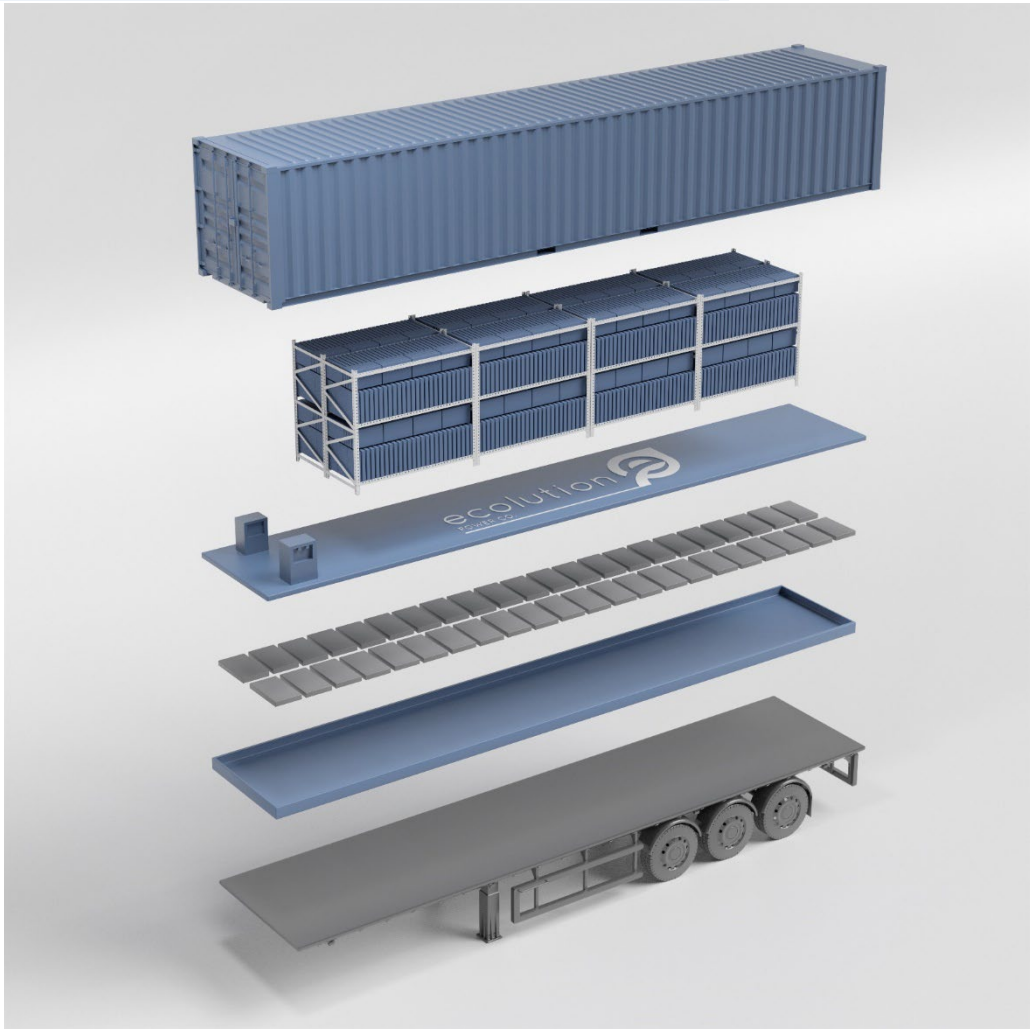


2MWh BATTERY STORAGE CONTAINER ON TOP OR MARS TRAILER

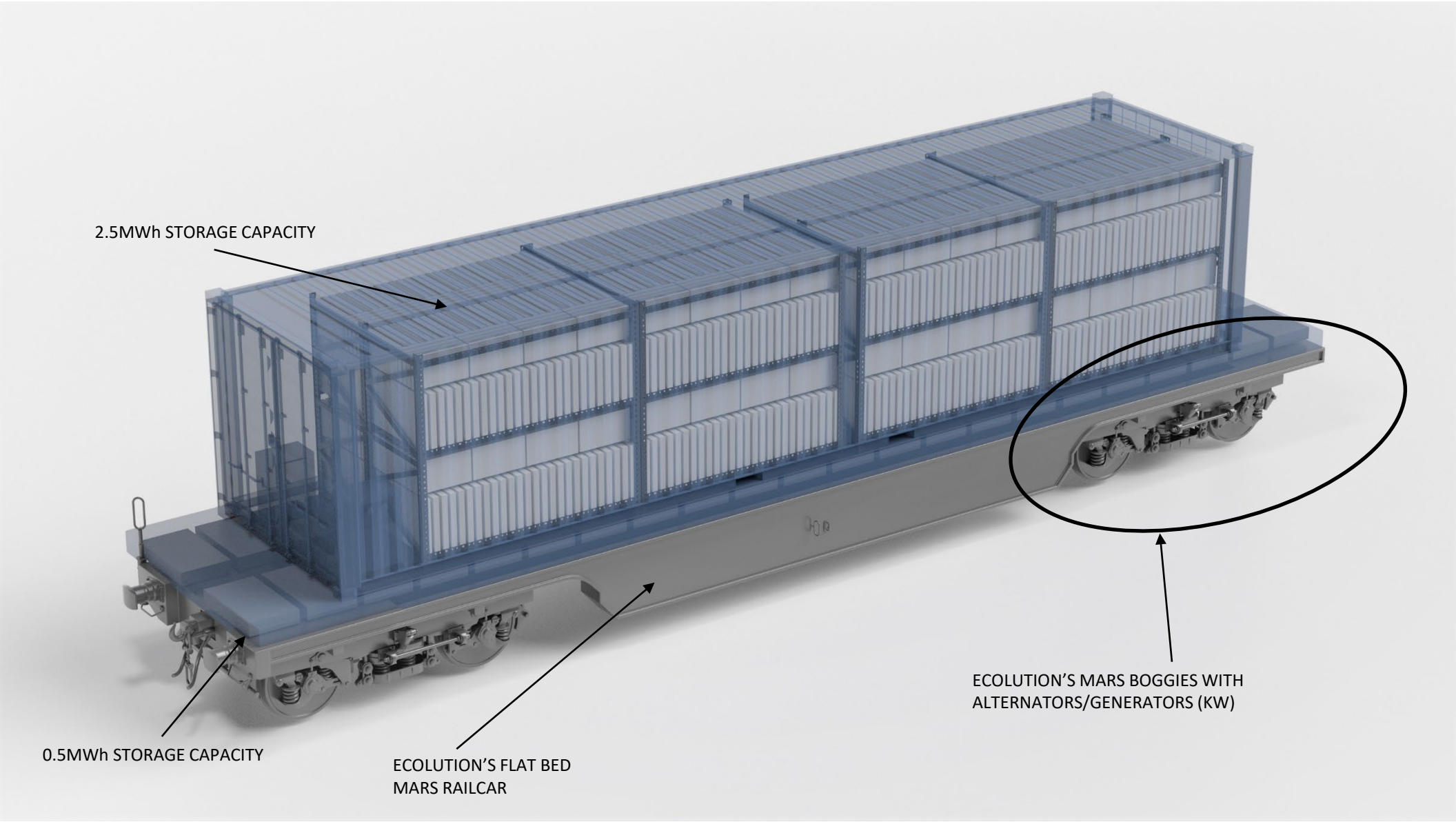
ILLUSTRATIONS

MARS FLAT BED TRAILER WITH BATTERY STORAGE



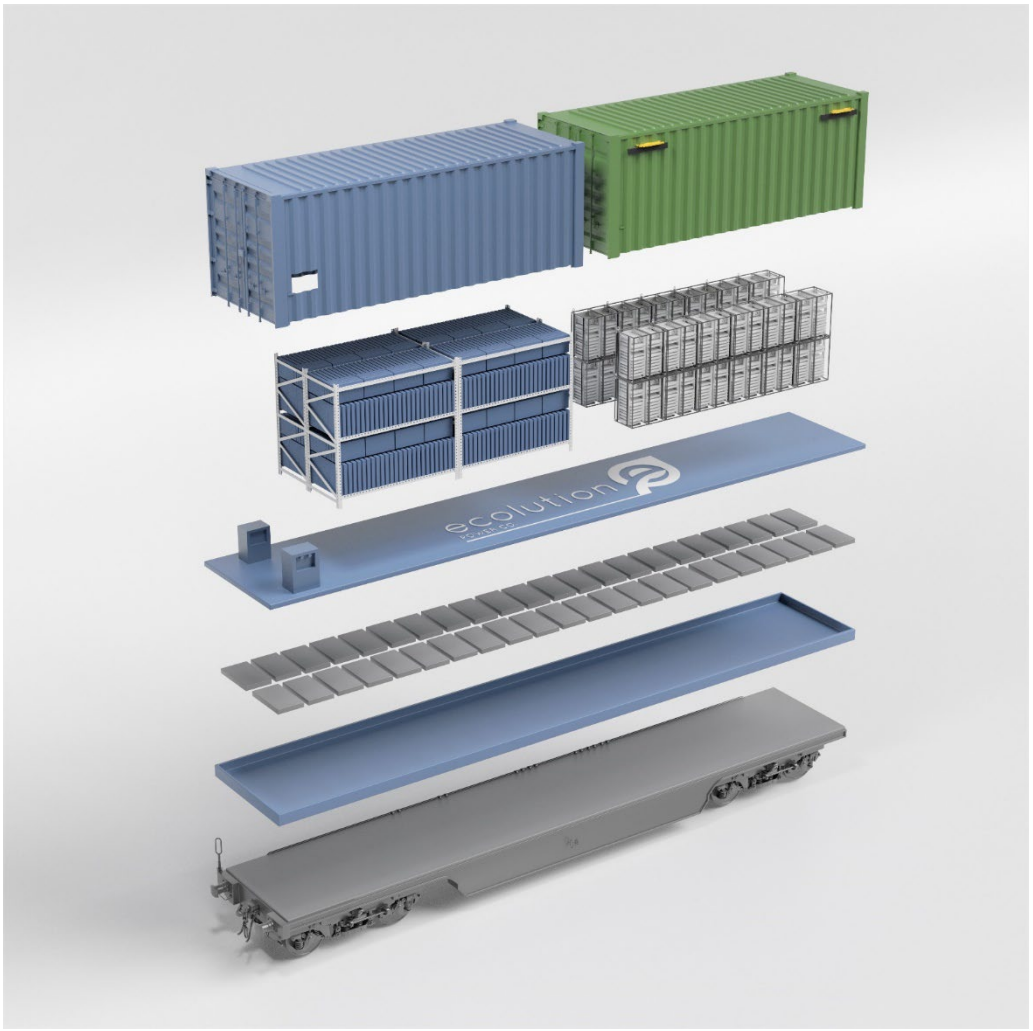


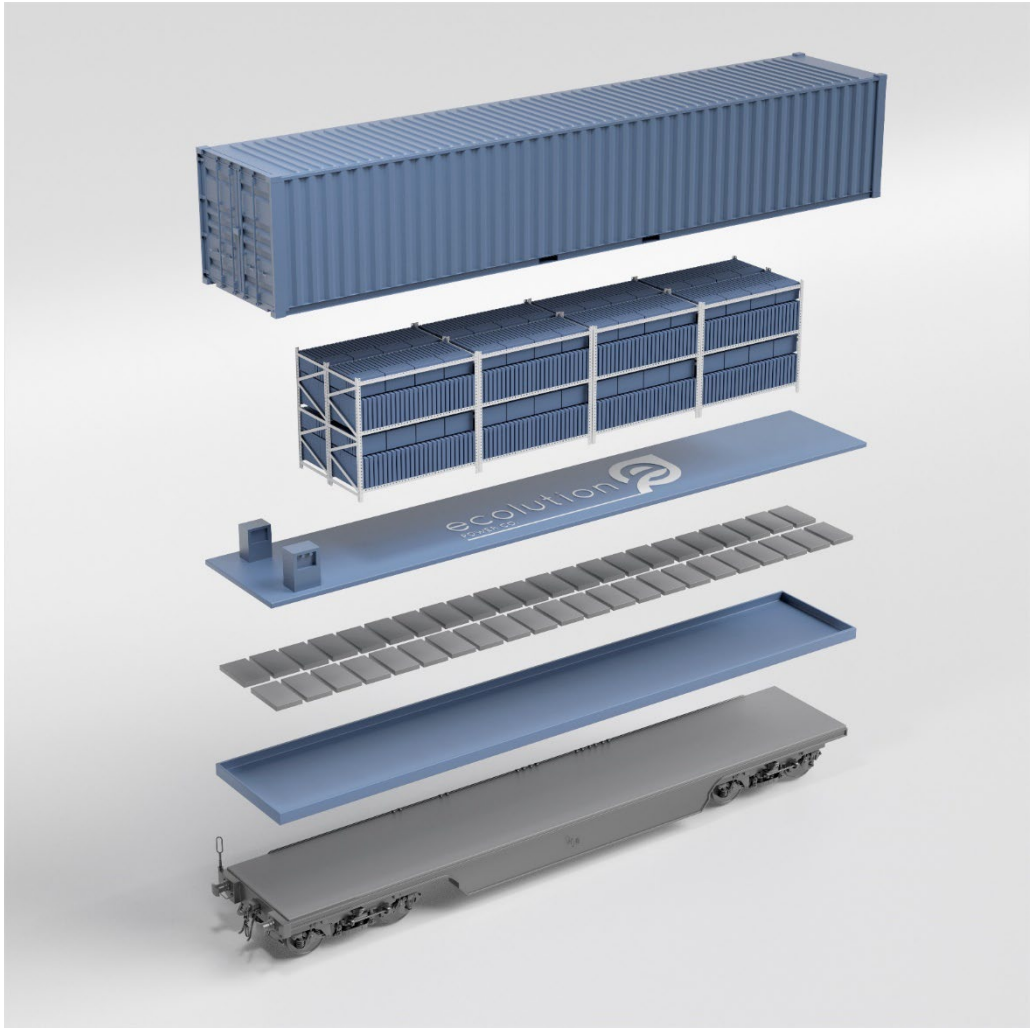
ILLUSTRATIONS



ILLUSTRATIONS

ILLUSTRATIONS





STORAGE DEMAND CAPACITY PER PRODUCT

Storage Capacity Demand ***Per*** *Unit*	Low Energy Platform		Medium Energy Platform			High Energy Platform	
	Reefer Trailer	Reefer Flat Bed Rail Car	EV Truck Range Extender	Garbage Trucks	Road Ranger Van	Power Gen. Trailer	Power Gen. Rail Car
No. of units	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Capacity in kWh	100.00 kWh	200.0 kWh	400.0 kWh	400.0 kWh	100.0 kWh	800.0 kWh	800.0 kWh
Capacity in MWh	0.10 MWh	0.2 MWh	0.4 MWh	0.4 MWh	0.1 MWh	0.8 MWh	0.8 MWh
Capacity in GWh	0.0001 GWh	0.000 GWh	0.000 GWh	0.000 GWh	0.000 GWh	0.001 GWh	0.001 GWh

Storage Capacity Demand ***All*** *Units*	Low Energy Platform		Medium Energy Platform			High Energy Platform	
	Reefer Trailer	Flat Bed Rail Car	EV Truck Range Extender	Garbage Trucks	Road Ranger Van	Power Gen. Trailer	Power Gen. Rail Car
No. of units	**5,000**	**5,000**	**5,000**	**5,000**	**5,000**	**5,000**	**5,000**
Capacity in kWh	500,000.0 kWh	1,000,000.0 kWh	2,000,000.0 kWh	2,000,000.0 kWh	500,000.0 kWh	4,000,000.0 kWh	4,000,000.0 kWh
Capacity in MWh	500.0 MWh	1,000.0 MWh	2,000.0 MWh	2,000.0 MWh	500.0 MWh	4,000.0 MWh	4,000.0 MWh
Capacity in GWh	0.5 GWh	1.0 GWh	2.0 GWh	2.0 GWh	0.5 GWh	4.0 GWh	4.0 GWh

Total Storage Capacity Demand All Units	**14.0 GWh**

A ROAD MAP TO WORLD CLASS STRATEGIC PARTNERS

SUPPLY CHAIN

BUSINESS MODEL

R&D

- Ecolution partners with strategic ODMs for **MARS** component design
- Ecolution partners with OEMs for **MARS** component assembly / retrofit

Component Manufacturers
Original Design Manufacturers
(ODM)

- ODMs design **MARS** components
- ODMs sell **MARS** components to OEM

Manufacturers
Original Equipment Manufacturers
(OEM)

- OEM purchases **MARS** components from ODM to assemble final product (s)
- OEM sells final product to customer / end user

OUR BUSINESS

Customers / end user

FedEx, TARGET, amazon, Walmart, Sysco, SAINT PAUL MINNESOTA, CITY OF AMARILLO

TARGET USE CASE

R&D exclusive work	Strategic	Strategic
WABASH, MERITOR, WATCO, KTM	adstec Energy, ecobat, MERITOR	WABASH, WATCO

Licensing fees	Energy-as-a-Service $/kWh
Carbon Credits / Renewable Energy Certificates (REC)	Subsidies / Investment Tax Credit / Inflation Reduction Act

2022 MILESTONES

- **In February 2022**, the Company engaged Sharma & Associates Inc., a Chicago based train consultant to initiate Phase I proof of concept of the MARS technology on rail cars. Agreement to start Phase I work was executed on June 12th, 2022 and completed on August 12th, 2022. Two simulations were completed: Route 1 and Route 2. Simulation results of "Route 1", with 351 miles of track, moderate hilly route with grades ranging within -1.2% to +1%, with almost 60% descending grades, 20% ascending grades, and about 20% as nearly flat. The train consists of 100 cars (loaded hopper cars with GRL of 263,000 lbs.) with 3 head-end locomotives. The total energy wasted during braking (deceleration/slow down state only) was about 5,519 kWh (5.5 MWh) from dynamic braking and 12,895 kWh (12.9 MWh) from air braking, totaling about 18,400 kWh (18.4 MWh) of wasted energy. The MARS technology, which is about 70% efficient, will be able to harvest about 12,880 kWh (12.9 MWh) of the wasted energy.
- **In April 2022**, Phase I of proof-of-concept bench test was successfully completed in Greenville, SC with the Company's engineering firm, Day & Zimmerman, at the fabrication facilities of KTM. Phase II is in progress and the Company expects to have the first Wabash trailer prototype by Q1 2023. Wabash National and Meritor are key supporters during this early stage.
- **In May 2022**, the Company executed its second Letter of Intent (LOI) with the City of Amarillo, Texas (First City was the City of St. Paul, MN back in November 2021). The Company wishes to bring patented rail-to-grid technology and power trailer clean energy technology to Amarillo as a pilot to generate, store and distribute electricity in the Texas Communities. Said initiative may help the Cities meet its decarbonization goals, foster economic development, and provide a template for smart cities across the world.
- **In June 2022**, the Company has entered into negotiation for letters of intent in South Africa, Nigeria and Montenegro.
- **In July 2022**, the US Patent Trademark Office has examined the continuation patent application that was filed for the MARS invention and deemed all of the claims patentable. Accordingly, it issued Notice of Allowance giving the Company until September 29th, 2022 to pay the issue fee. The Ecolution Team will file another continuation application before this application issues to allow the Company to seek claims of varying scope to address later uncovered references and/or to tailor them to any third-party products or systems.
- **In August 2022**, the Company entered into a strategic business cooperation (the "BC") with Ecobat Solutions, Inc. The purpose of the potential agreement between the parties is to: (1) Provide the Company with a sustainable end-of-life program for the lithium-ion batteries it uses in the ordinary course of its business; (2) Provide the Company with batteries suitable for a second-life applications; and (3) To organize a strategic BC between Ecobat and the Company for the procurement of lithium-ion batteries for Ecobat's Pre-Refining Activities.
- **In September 2022**, the Company, Miller Electric, GEN-Z EV and ADS-TEC Energy are in discussions to build a road ranger prototype to help states during disaster recovery or evacuation situations, and to provide additional mobile fast charging road assistance to Electric Vehicles (EVs) during evacuation situation utilizing the Company's MARS technology to harvest kinetic energy. Miller Electric delivered the road ranger van to be retrofitted with MARS technology to the Company at the KTM facilities in Greenville, SC.
- **In October 2022**, the Company announced it has joined NVIDIA Inception, a program that nurtures startups revolutionizing industries with technology advancements. The Company is focused on driving the next generation of clean and renewable energy through transportation. Its MARS technology captures kinetic energy from moving vehicles to turn them into moving power plants, which can then distribute energy to global power grids. NVIDIA Inception will allow the Company to further develop its revolutionary technology and grow its business through new connections. The program will also allow the Company to collaborate with industry-leading experts and other AI-driven organizations.
- **In October 2022**, the Ecolution team visited WATCO Companies, LLC in Jacksonville, FL. The Company has selected WATCO to build the first rail car prototype at the Jacksonville, FL facility. WATCO and Sharma Associates will work in collaboration to deliver the first rail car prototype. WATCO will provide engineering design, fabrication, assembly and testing for the prototype.
- **In November 2022**, the Company is completed its global PCT patent filings for the MARS technology application in trains. In January 2021 the global PCT gave the Company the opinion that all 21 claims pertaining to power generation in moving trains should be granted. Patents are being filed in the USA, EU, Germany, India, South Africa, ARIPO, Nigeria, Japan, Korea, China, UK, Canada, Australia, United Arab Emirates, Brazil, Indonesia, Mexico and Saudi Arabia. The Company is also in the process of filing the next generation of the MARS technology that will allow the harvesting of kinetic energy in light weight vehicles. The Company is also filing a new embodiment of the existing MARS technology in trailers that will subsequently allow and increase IP protection globally.
- **In November 2022**, the Company is in the process of engaging ENSPI, an expert in renewable energy, energy utility, energy management and carbon credit consultant. ENSPI will help the Company simulate scenarios for carbon credits opportunity, write the whitepapers to support carbon credit assumptions, register the classification of credits the Company is eligible for and registering new categories of carbon credit the Company may be eligible for. The quantification of carbon credits has not been accounted in our business model as of today. ENSPI will help the Company do this.

ecolution

POWER CO.

A JUST-IN-TIME ROLLING ELECTRIC GRID

www.ecokwh.com
info@ecokwh.com