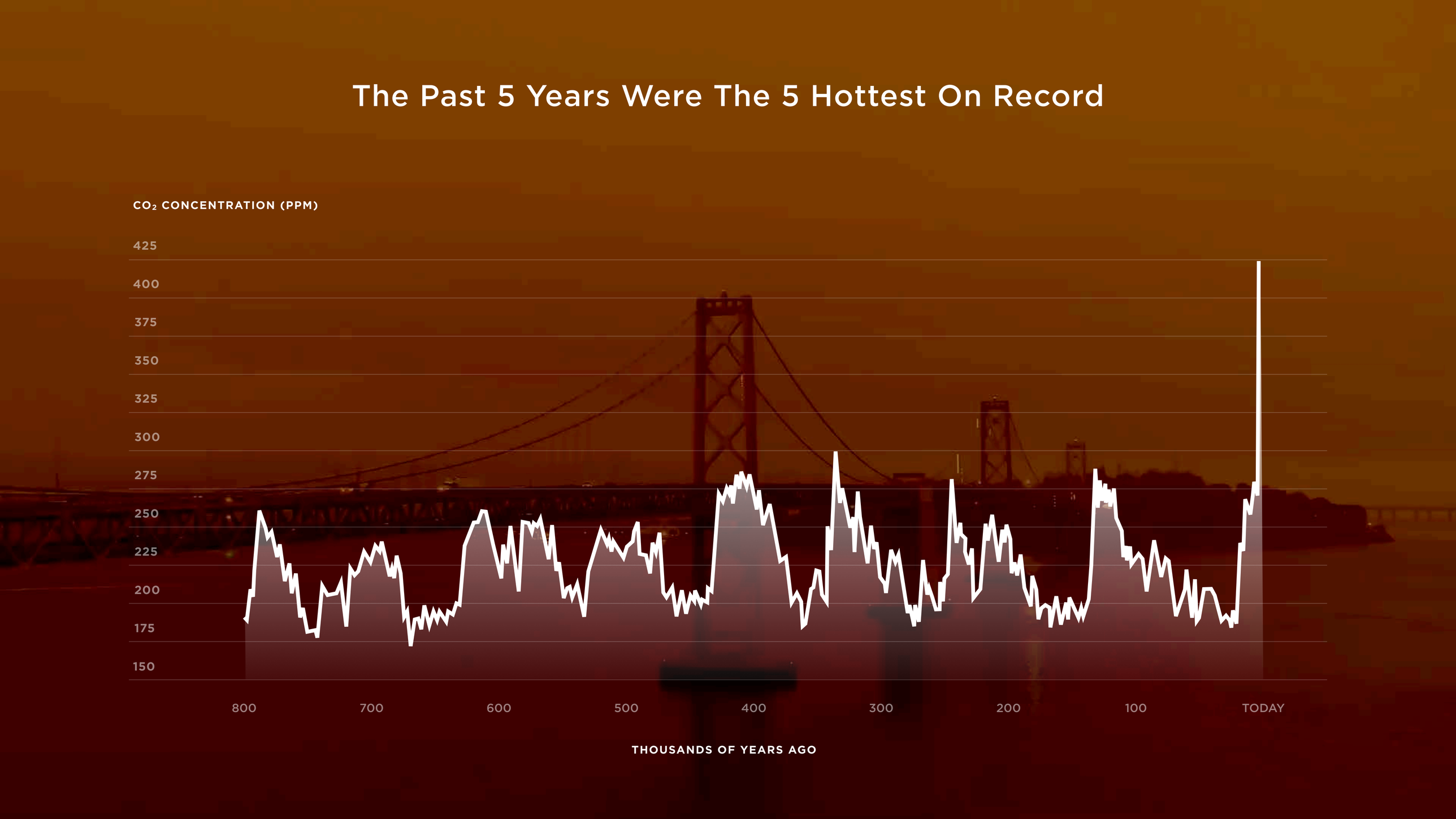
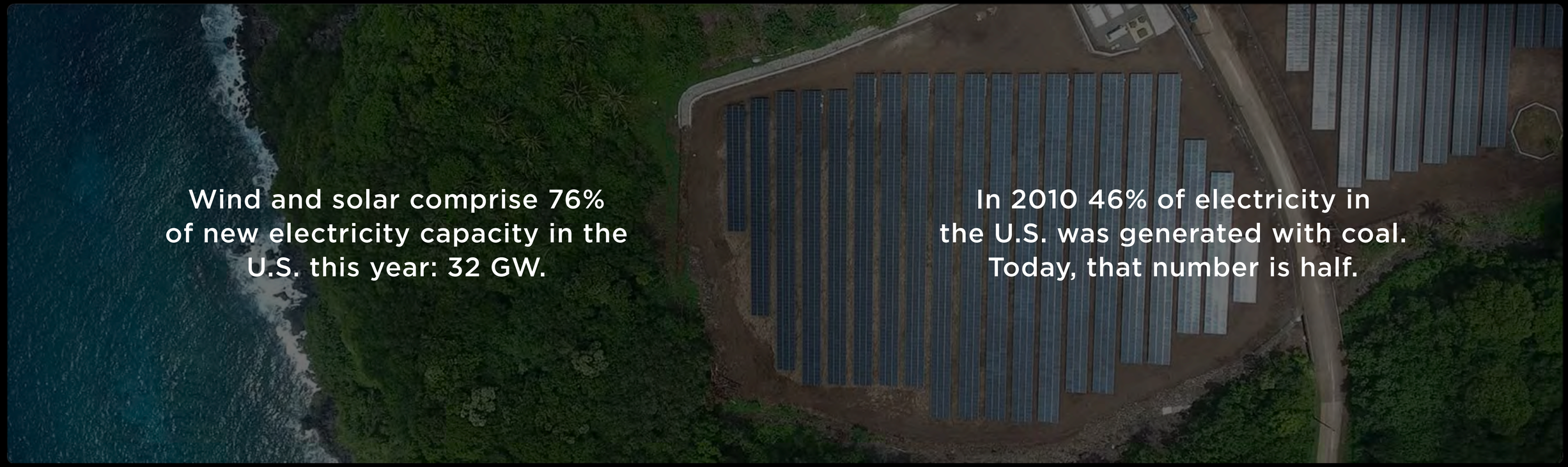
SEPTEMBER 22, 2020

The Past 5 Years Were The 5 Hottest On Record



The Trend Is Reversing But We Need To Accelerate



SOURCE: EIA.GOV

Tesla's Contribution

1+ MILLION ELECTRIC
VEHICLES DELIVERED

26 BILLION ELECTRIC
MILES DRIVEN

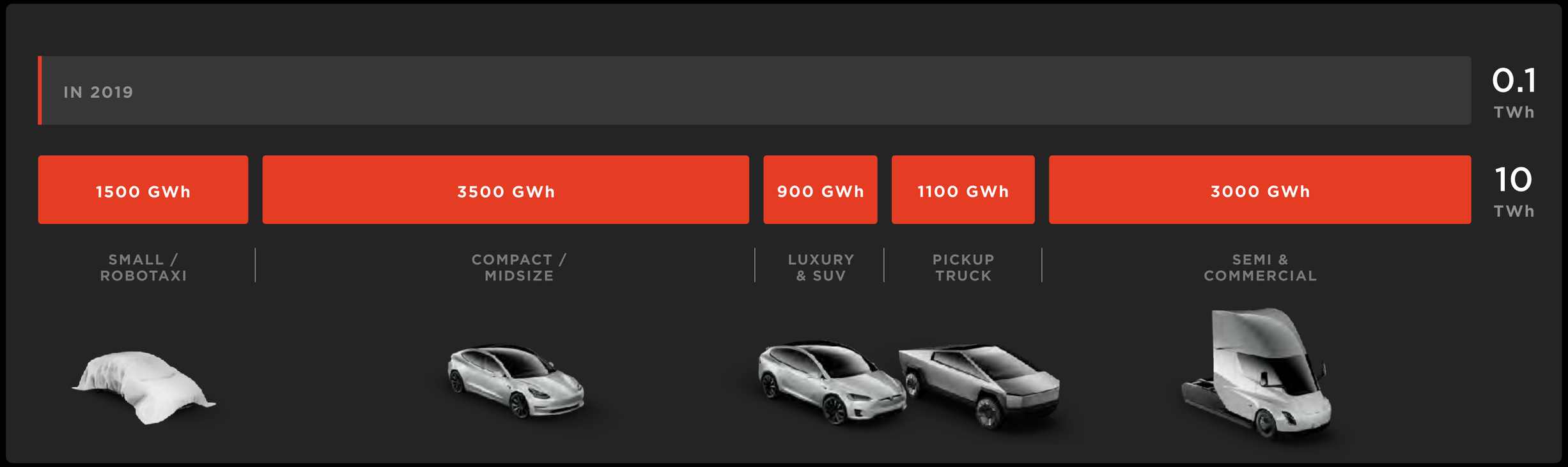
5 GWh OF
STATIONARY BATTERIES

17 TWh OF
SOLAR GENERATED

To achieve the transition to sustainable energy, we must produce more affordable EVs and Energy Storage, while building factories faster and with far less investment

Goal One: Terawatt-hour Scale Battery Production

100% ELECTRIC TRANSPORTATION REQUIRES 100X GROWTH



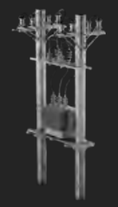
SOURCE: EV-VOLUMES.COM

Goal One: Terawatt-hour Scale Battery Production

100% RENEWABLE ENERGY REQUIRES 1600X GROWTH

IN 2019 — 0.006 TWh

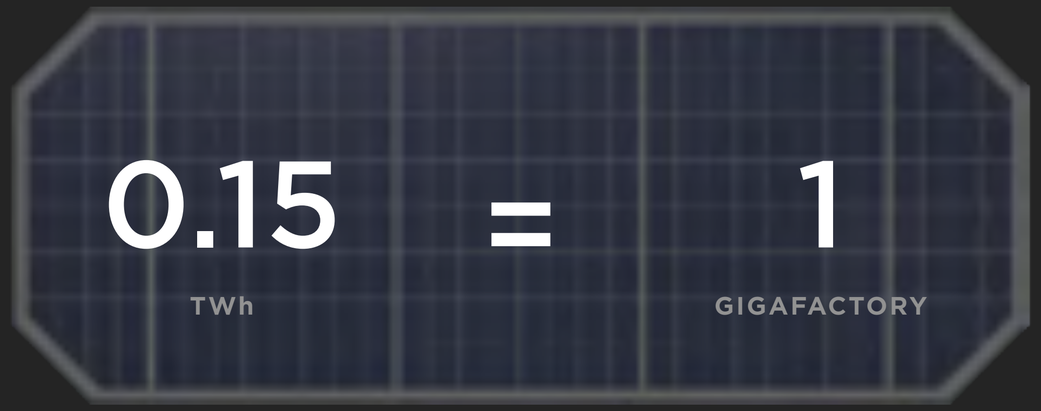
2300 GWh	1400 GWh	2100 GWh	800 GWh	1500 GWh	1900 GWh	10 TWh
NON RENEWABLE ELECTRICITY	COAL HEATING	GAS HEATING	OIL HEATING	FUTURE EV	FUTURE GROWTH	






SOURCE: IHS

Goal One Problem: Today’s Battery Factories Cannot Scale Fast Enough



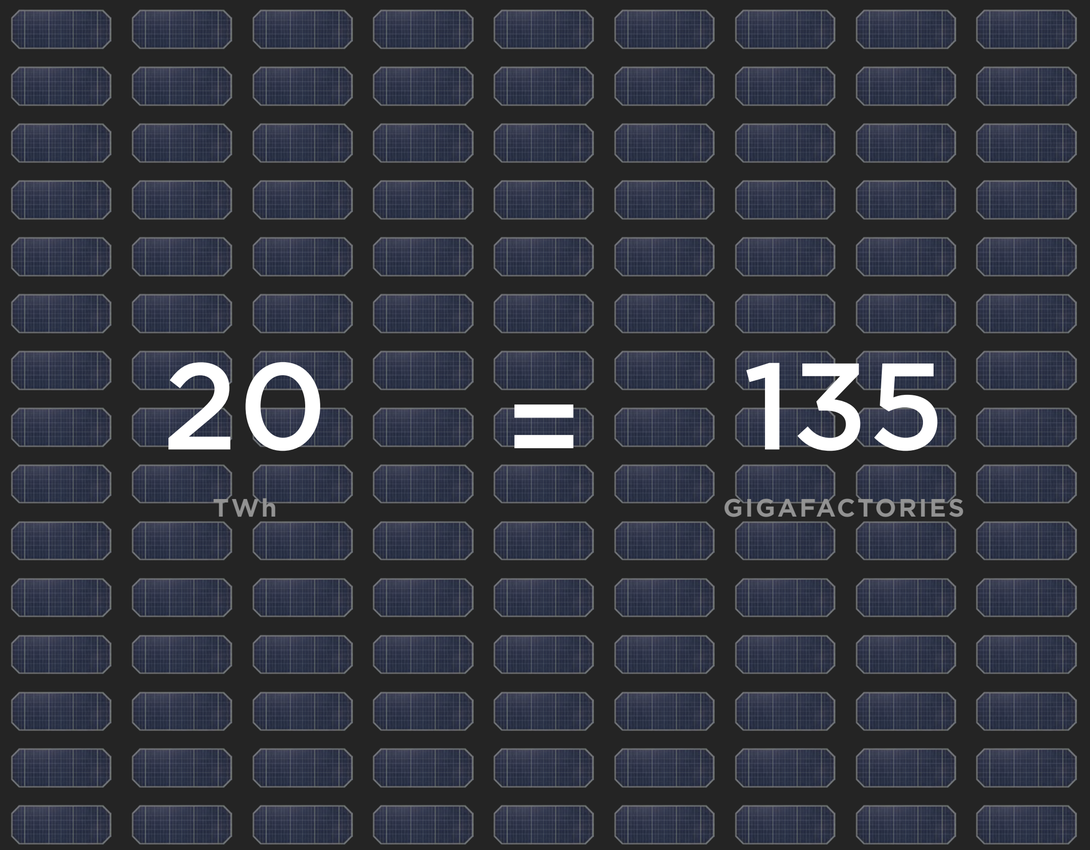
$2T

INVESTMENT IN MATERIALS, CELL, AND BATTERY MANUFACTURING

2.8M

TOTAL PEOPLE ESTIMATED

Goal One Problem: Today’s Battery Factories Cannot Scale Fast Enough



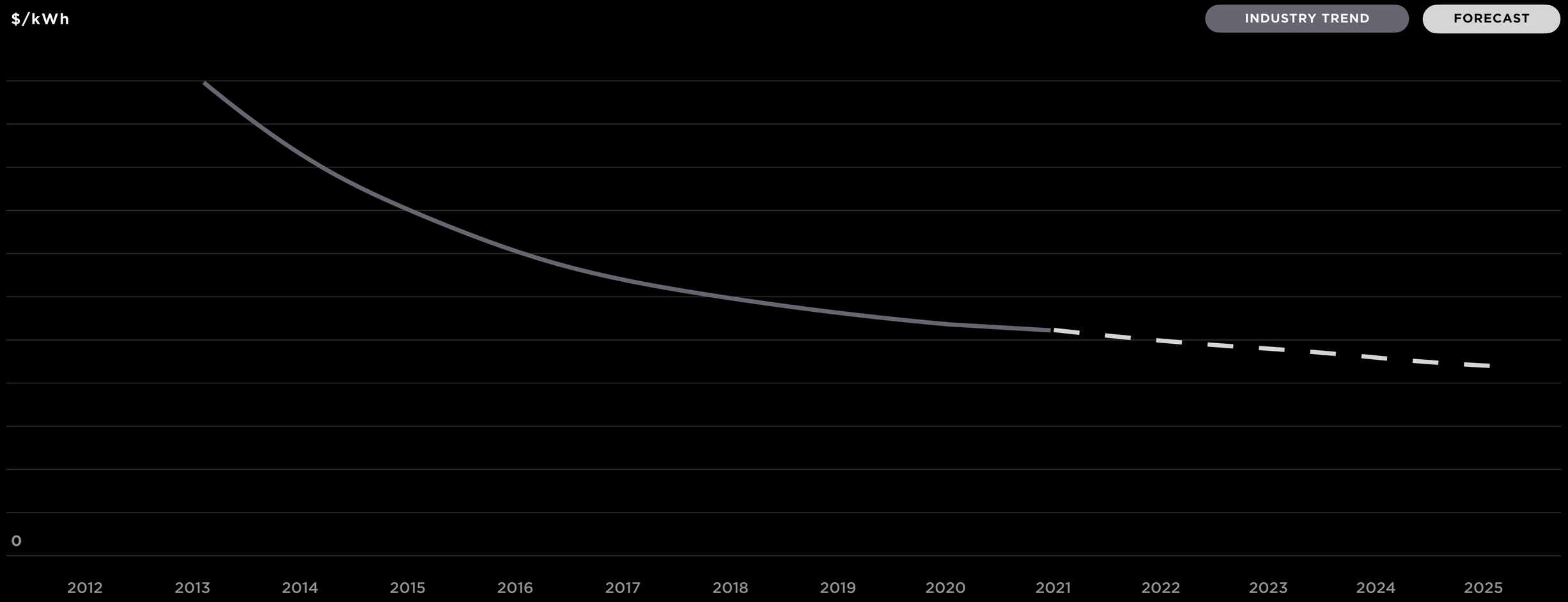
$2T

INVESTMENT IN MATERIALS, CELL, AND BATTERY MANUFACTURING

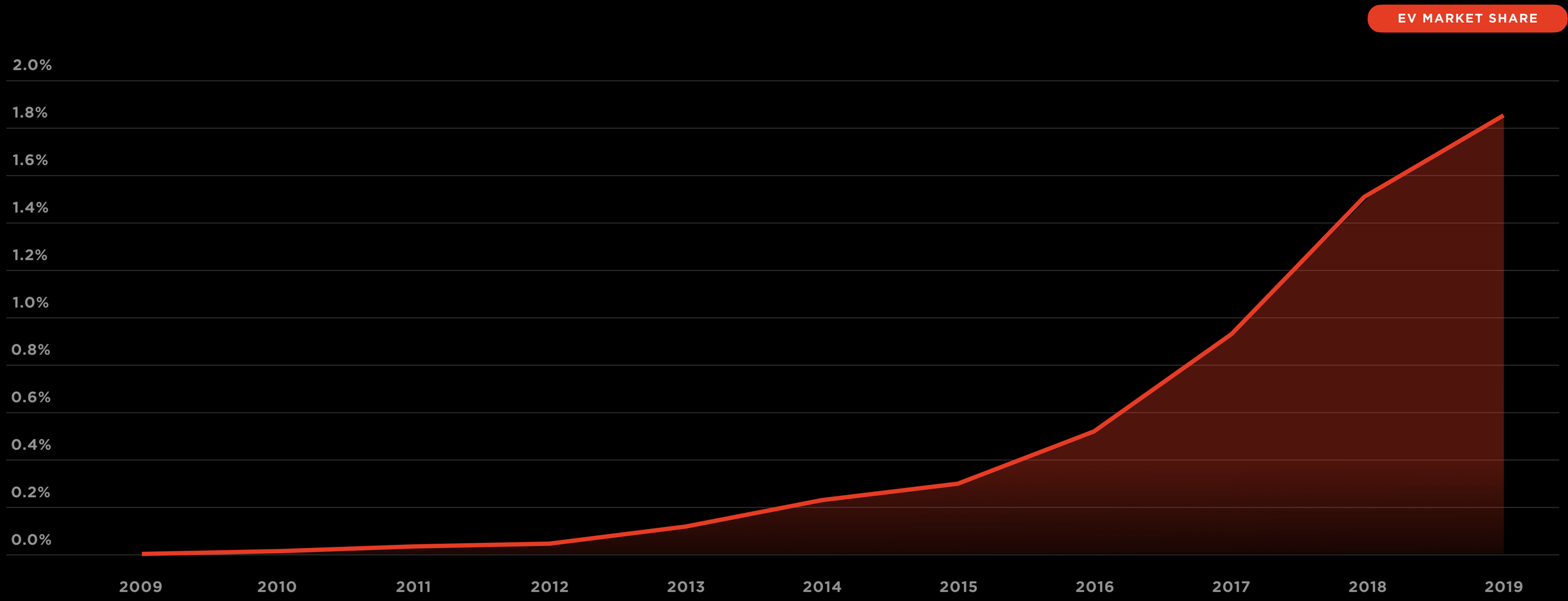
2.8M

TOTAL PEOPLE ESTIMATED

Goal Two: More Affordable Cells

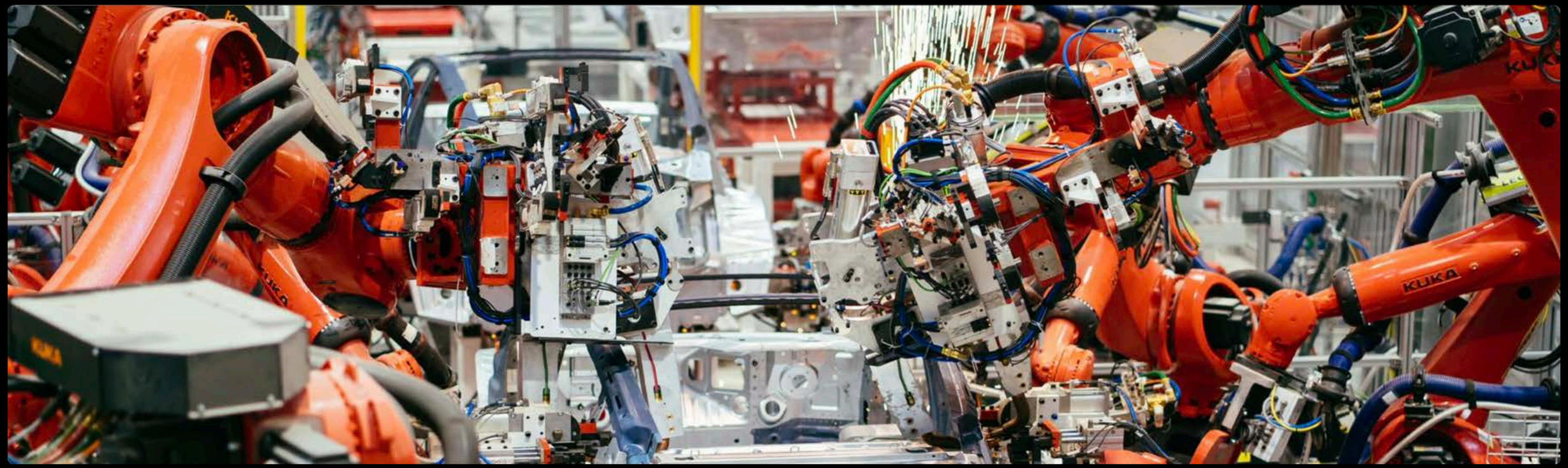


Goal Two Problem: EV Market Share Is Growing But EVs Still Aren't Accessible To All



SOURCE: EV-VOLUMES.COM / OICA

To Make The Best Cars In The World,
We Design Vehicles And Factories From The Ground Up



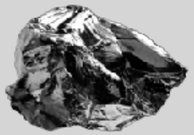
And Now We Do This For Batteries As Well

BATTERY DAY

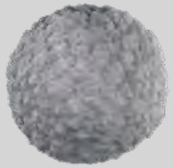
We Have A Plan To Halve The Cost Per KWh

CELL DESIGN

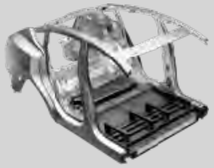
CELL FACTORY



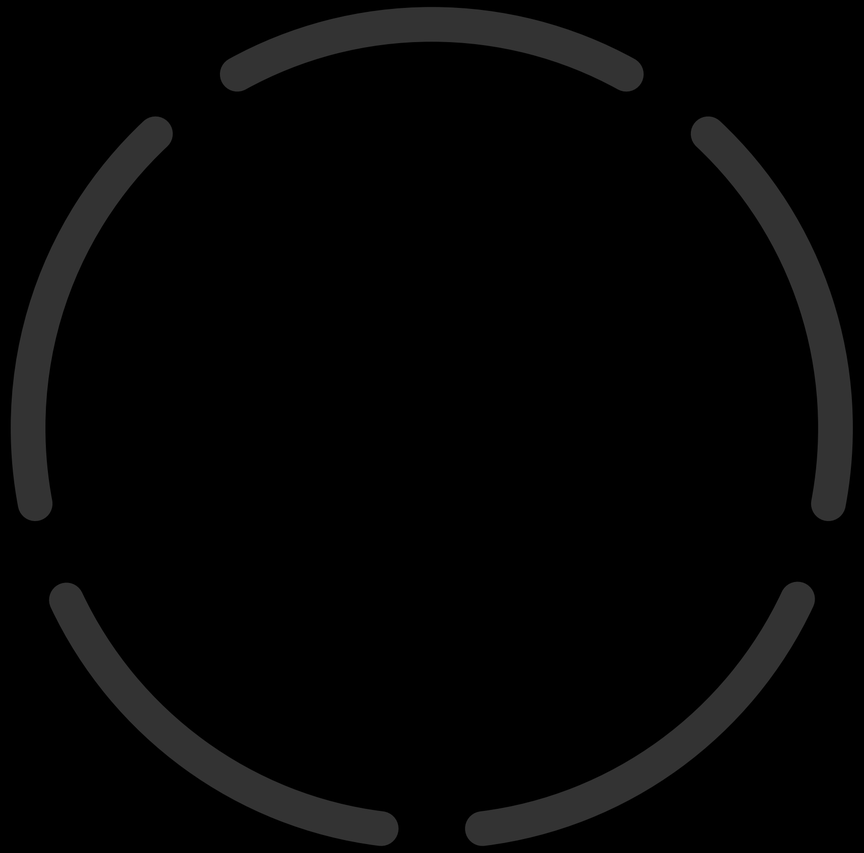
ANODE MATERIALS



CATHODE MATERIALS

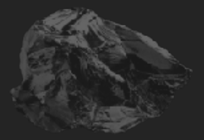


CELL VEHICLE INTEGRATION

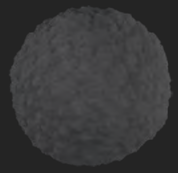


CELL DESIGN

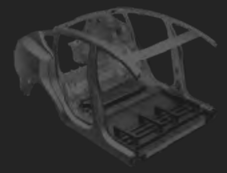
CELL FACTORY



ANODE MATERIALS

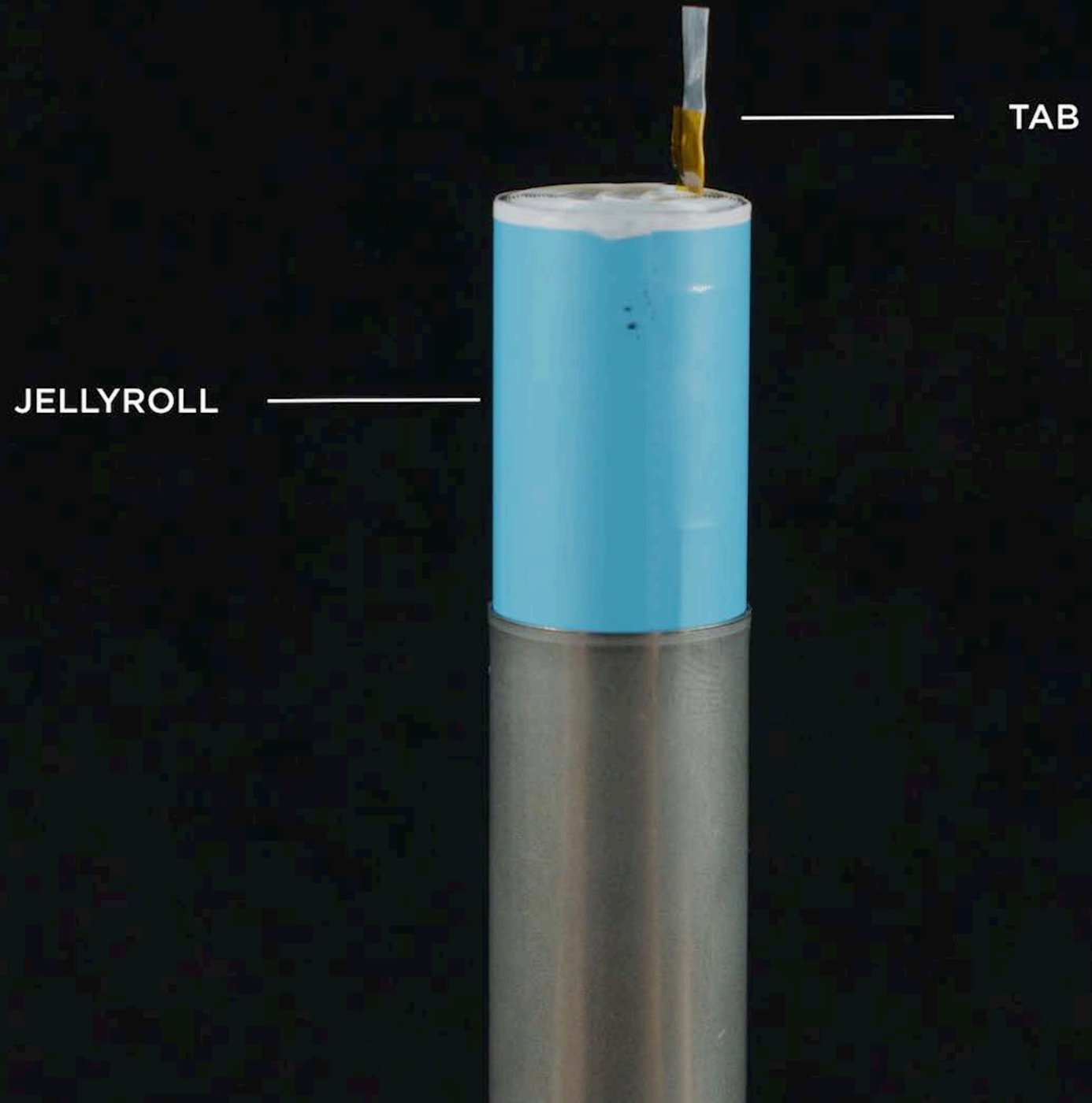


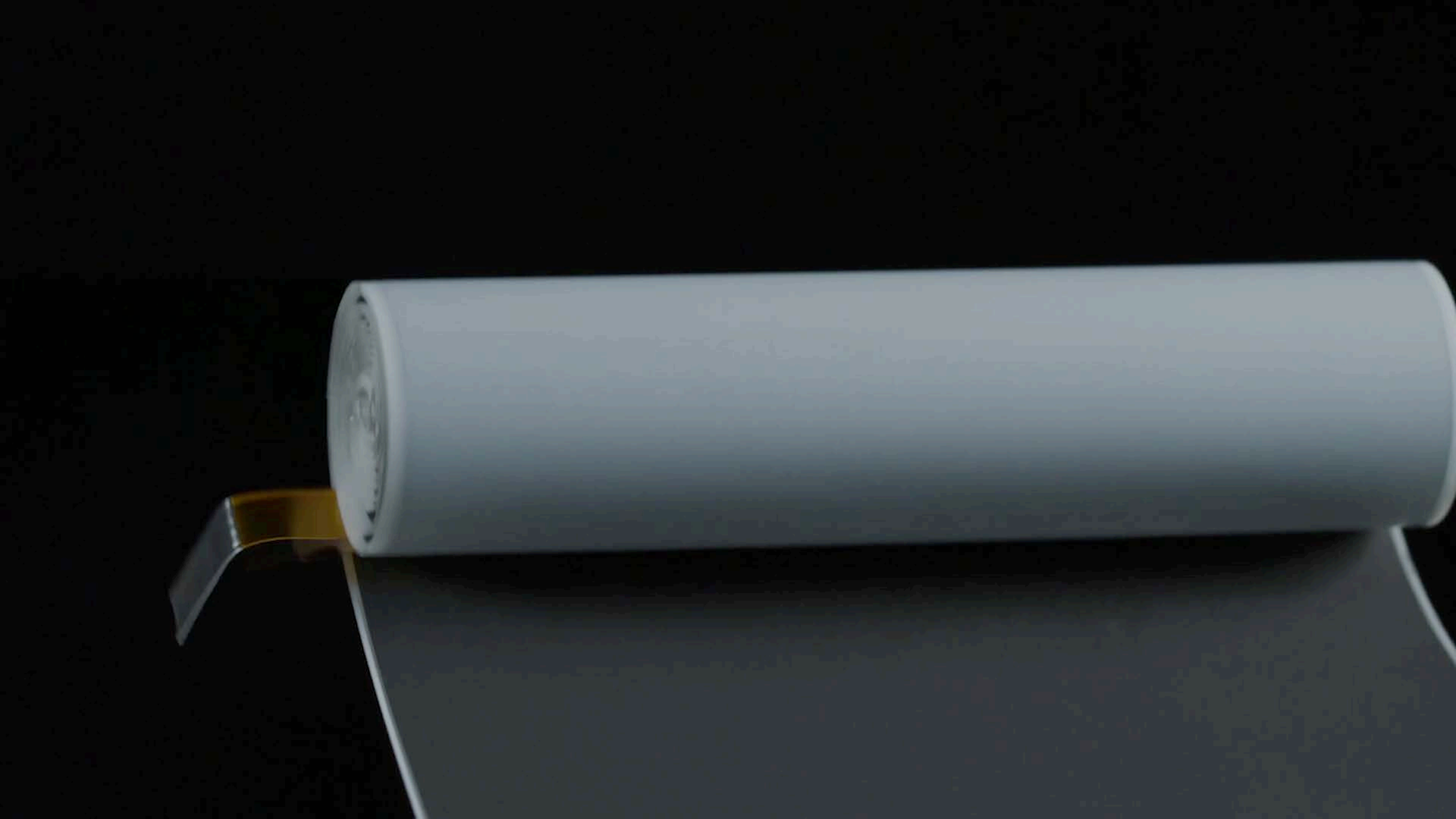
CATHODE MATERIALS

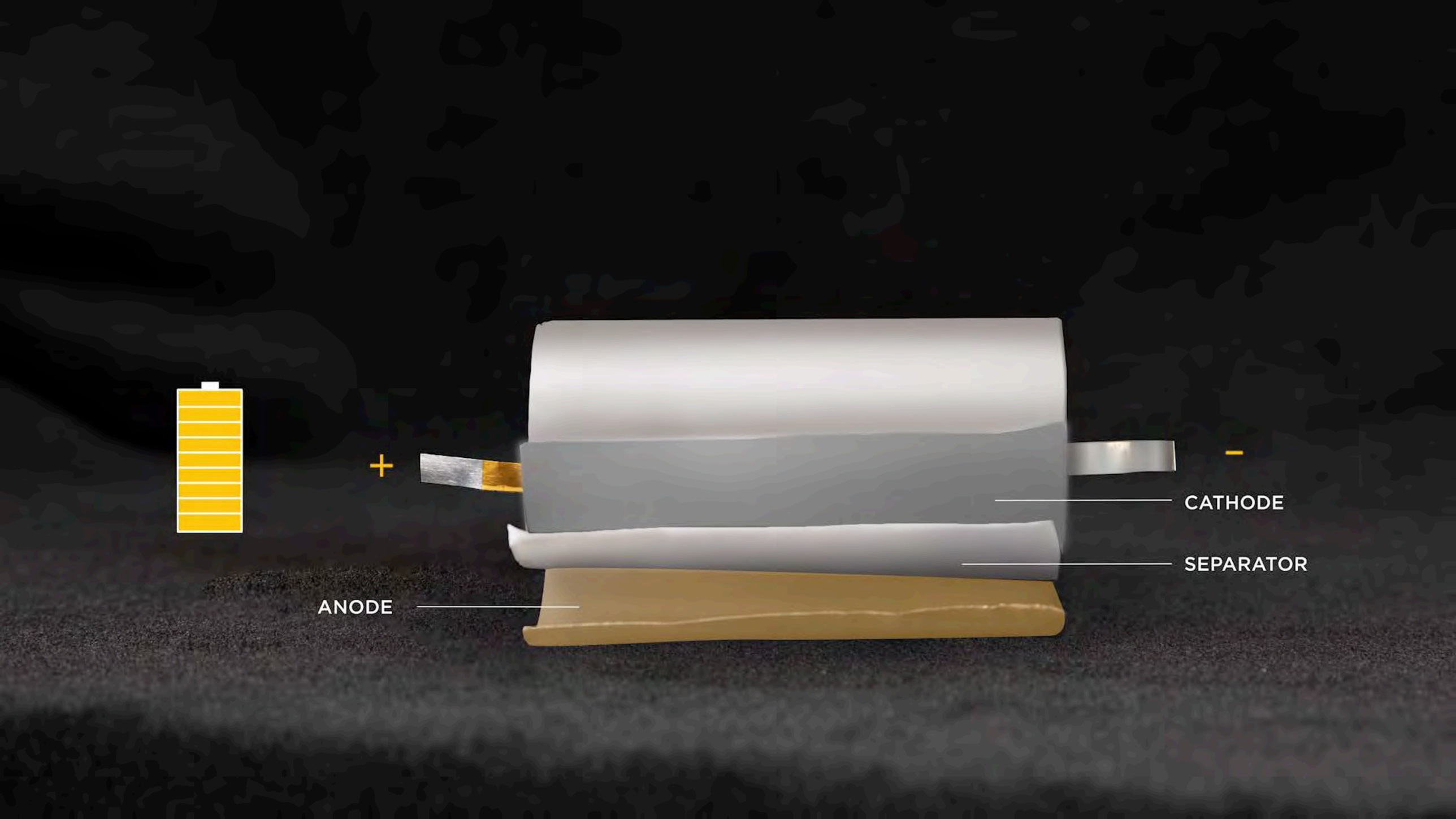


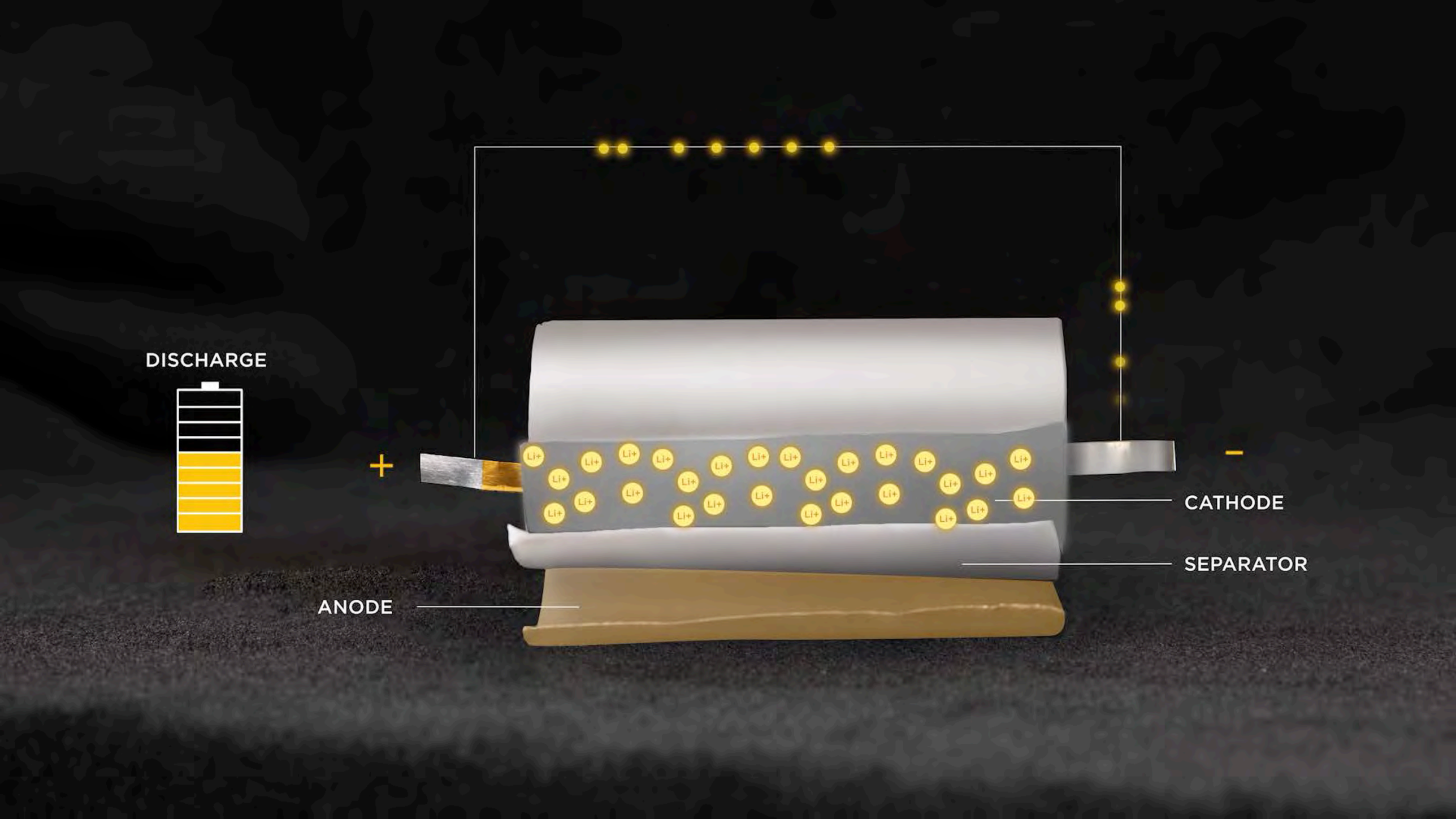
CELL VEHICLE INTEGRATION

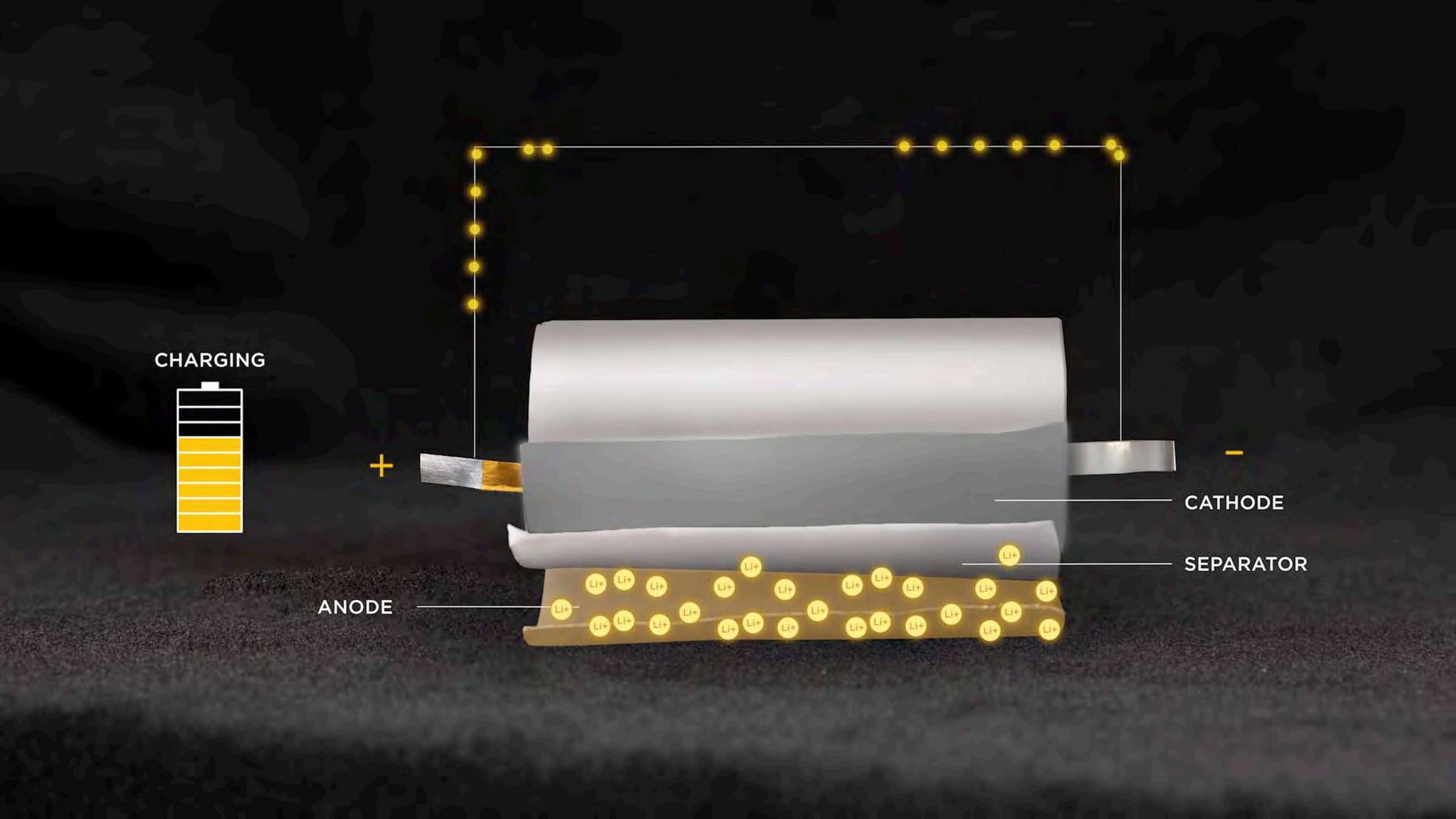

CAP
CAN


TAB
JELLYROLL




+
−
CATHODE
SEPARATOR
ANODE


DISCHARGE
+
−
CATHODE
SEPARATOR
ANODE
Li+


CHARGING
+
−
CATHODE
SEPARATOR
ANODE
Li+

1865

2008

+50%

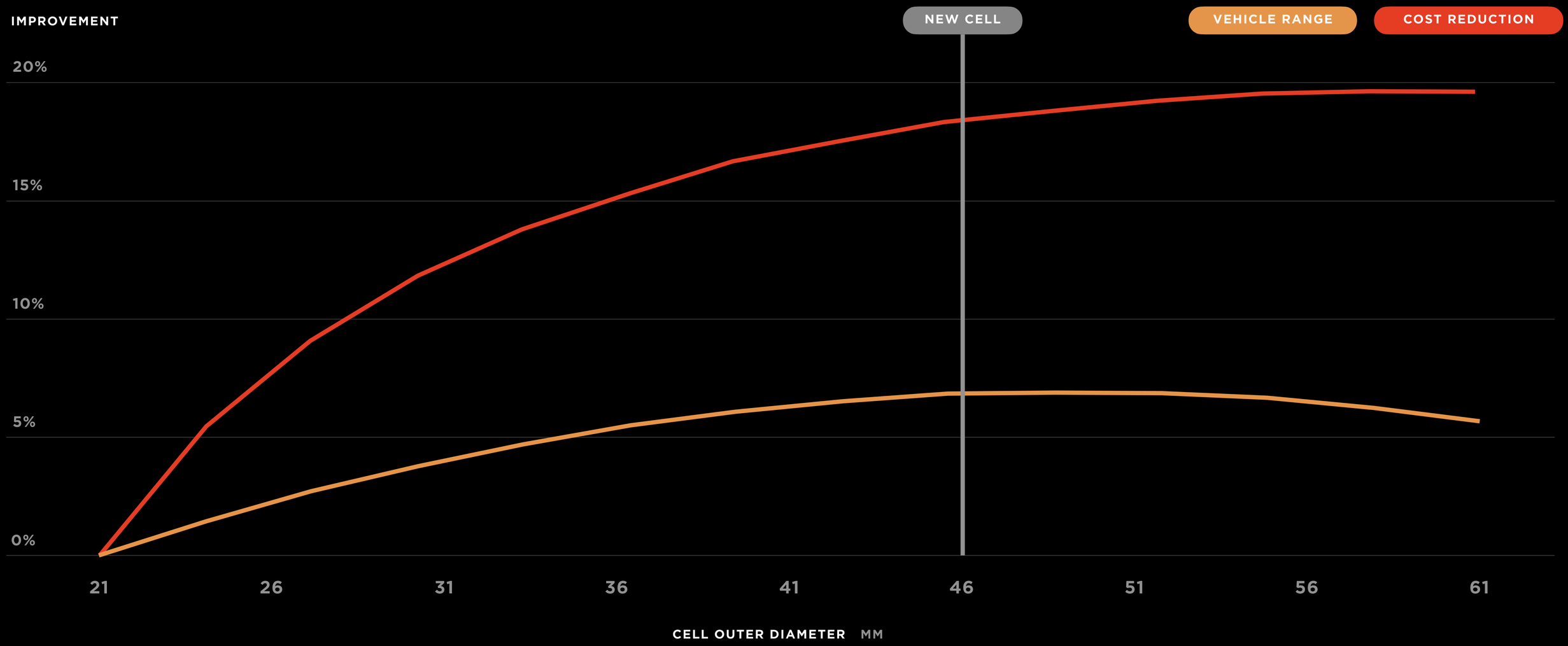
ENERGY

EVOLUTION

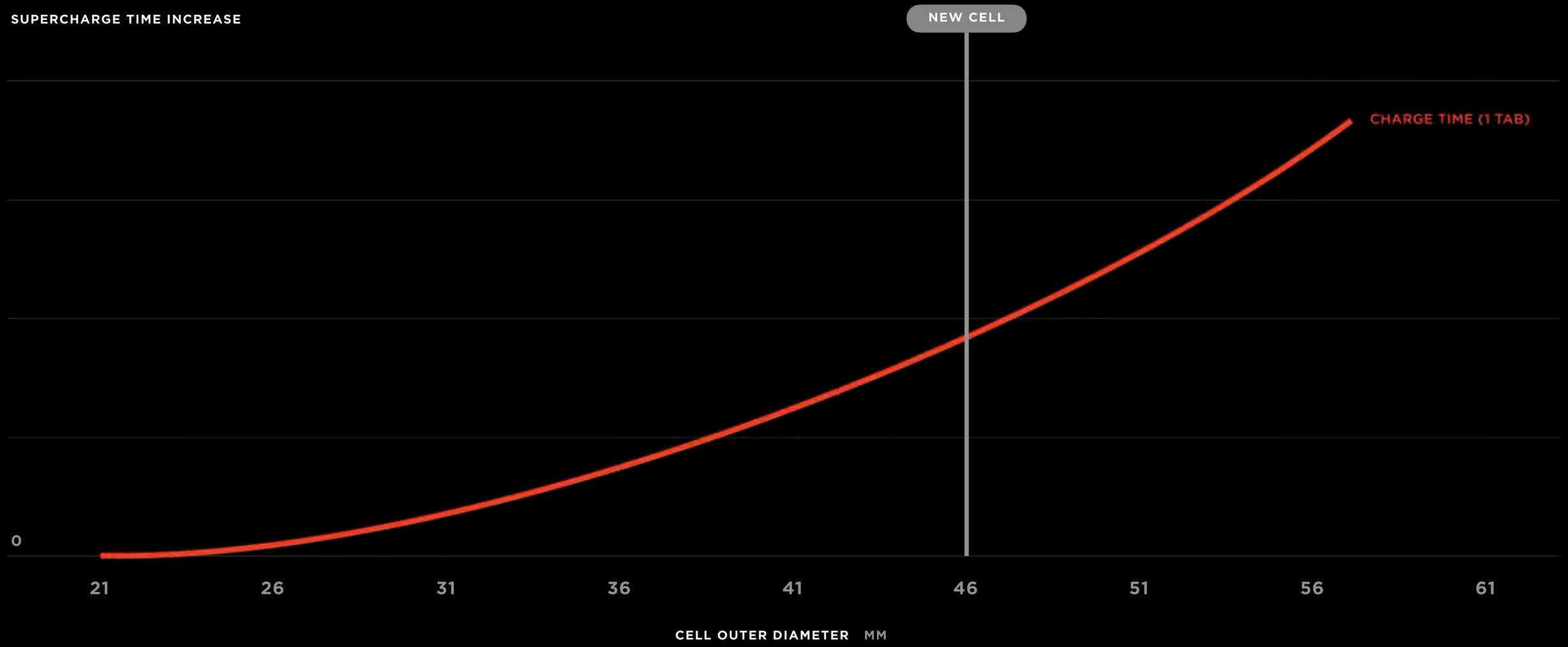
2170

2017

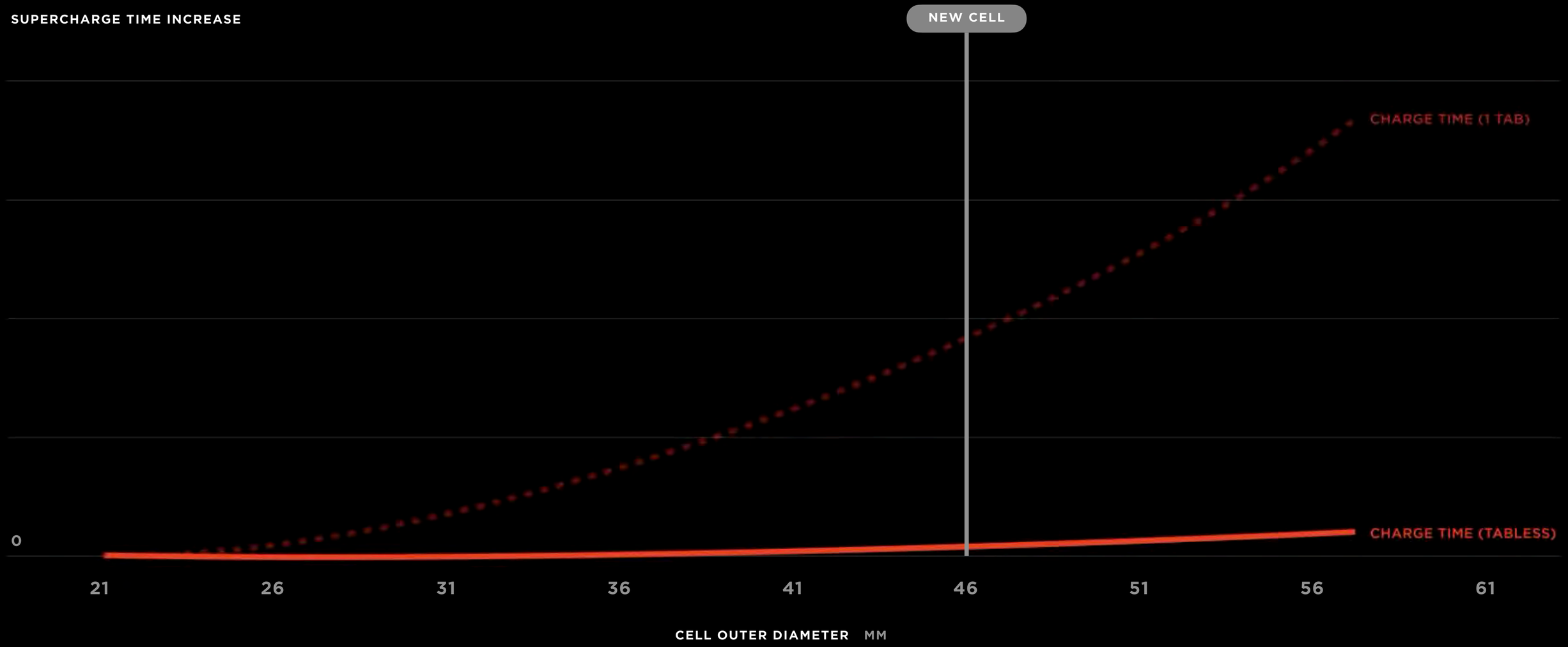
Bigger Cylindrical Cells Cost Less



The Challenge With Big Cells Is Supercharging



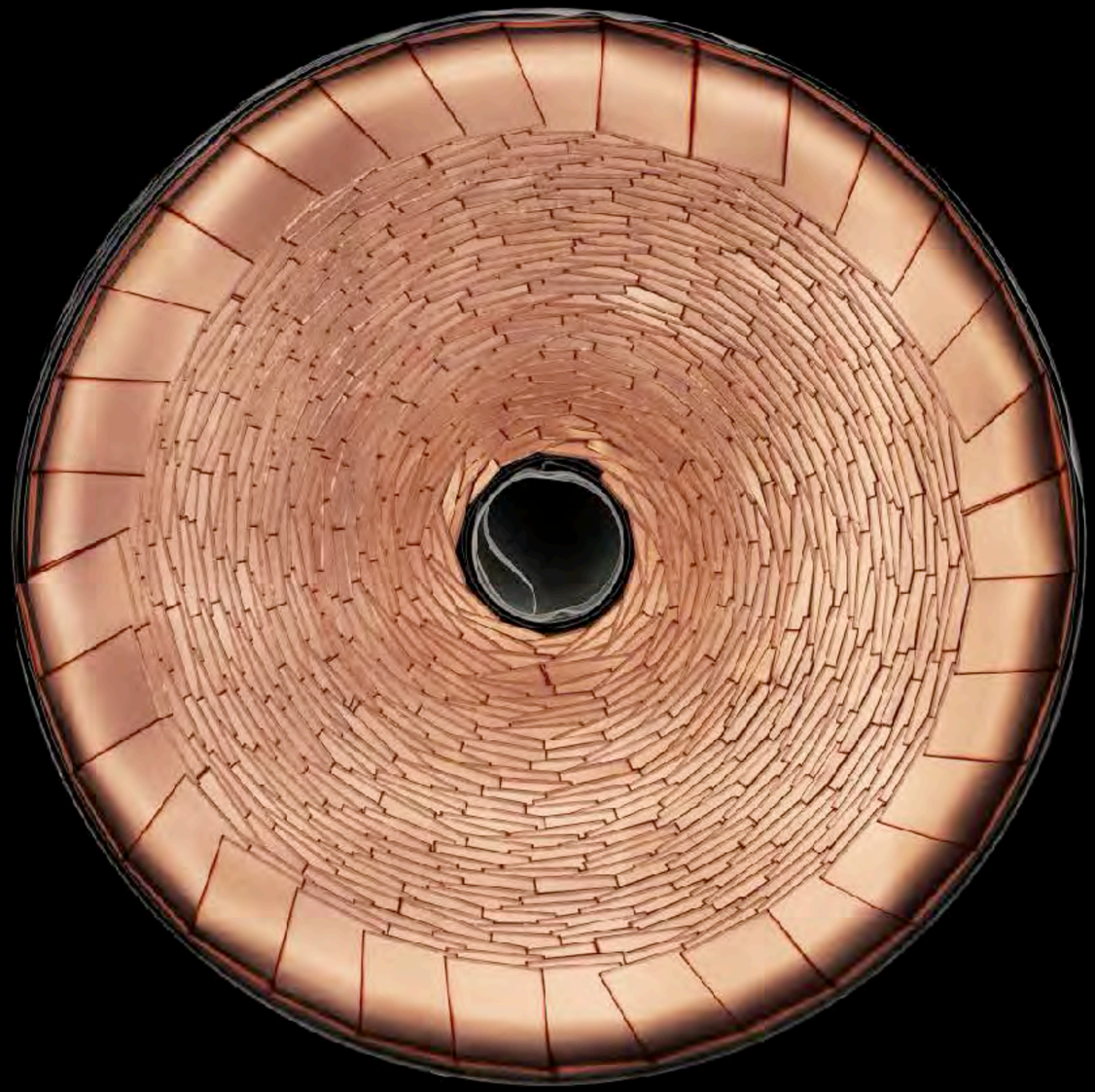
The Challenge With Big Cells Is Supercharging



SIMPLER MANUFACTURING

FEWER PARTS

5X REDUCTION IN ELECTRICAL PATH



5X

ENERGY

+16%

RANGE

6X

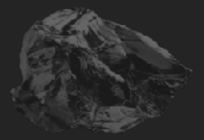
POWER

14%

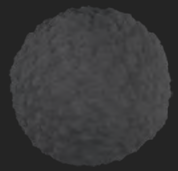
$/KWH REDUCTION

14%

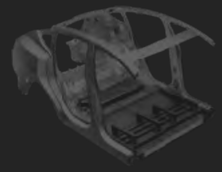
CELL FACTORY



ANODE MATERIALS



CATHODE MATERIALS

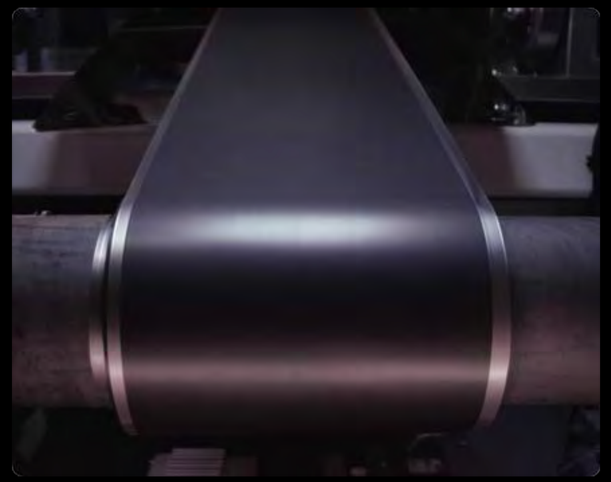


CELL VEHICLE INTEGRATION

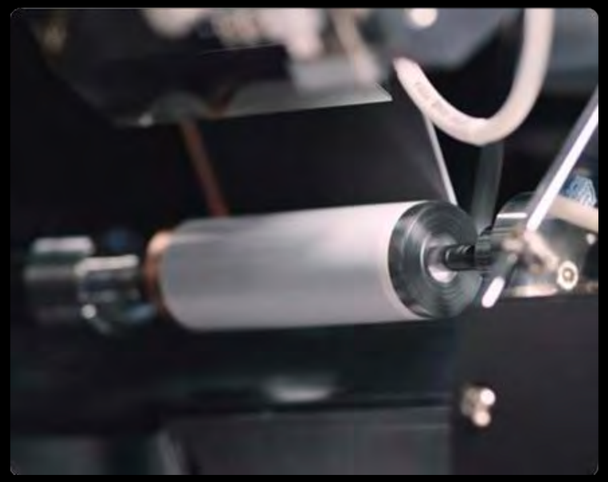
Inspiration

PRINTING

BOTTLING



ELECTRODE



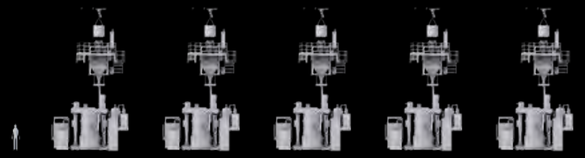
WINDING

ASSEMBLY

FORMATION

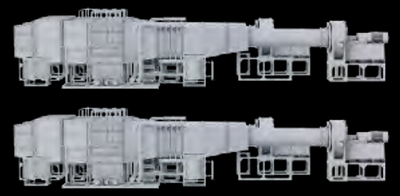
Electrode – Wet Process

1
MIX



2 & 3
COAT & DRY

SOLVENT RECOVERY



4
COMPRESS

Powder Into Film

Dry Electrode

1
MIX

2
DRY COAT

10x

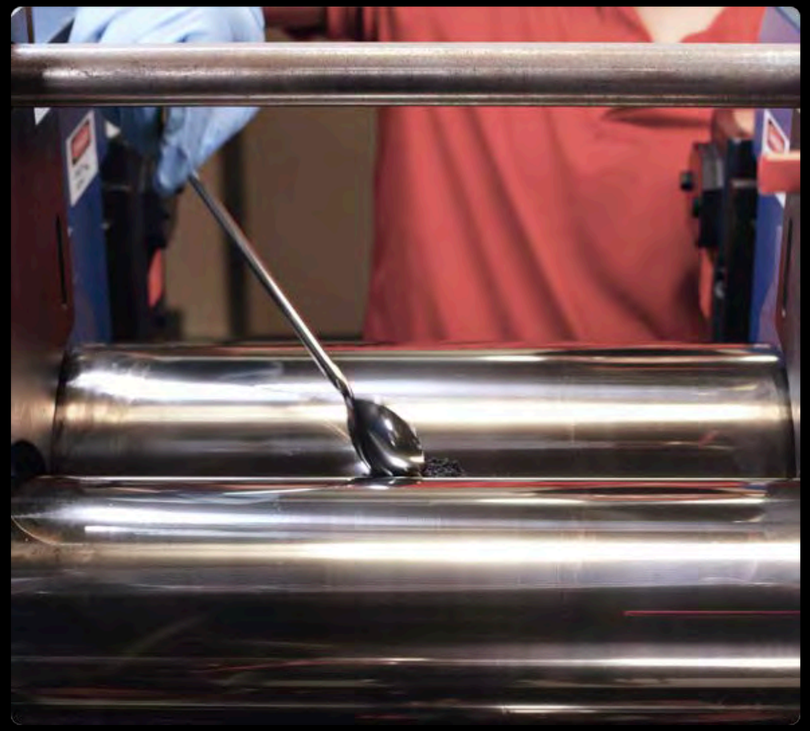
FOOTPRINT REDUCTION

10x

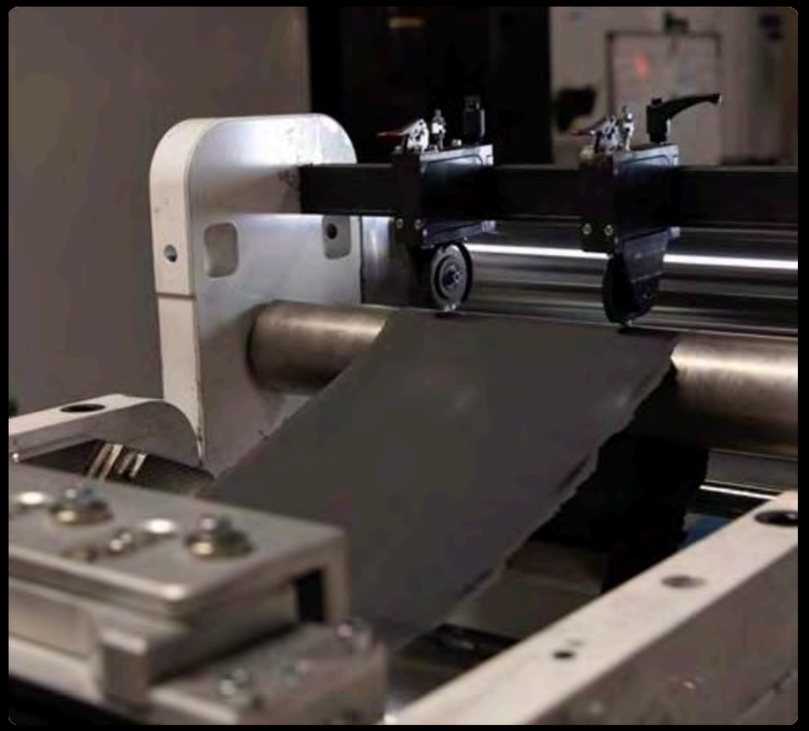
ENERGY REDUCTION

Simple is Hard

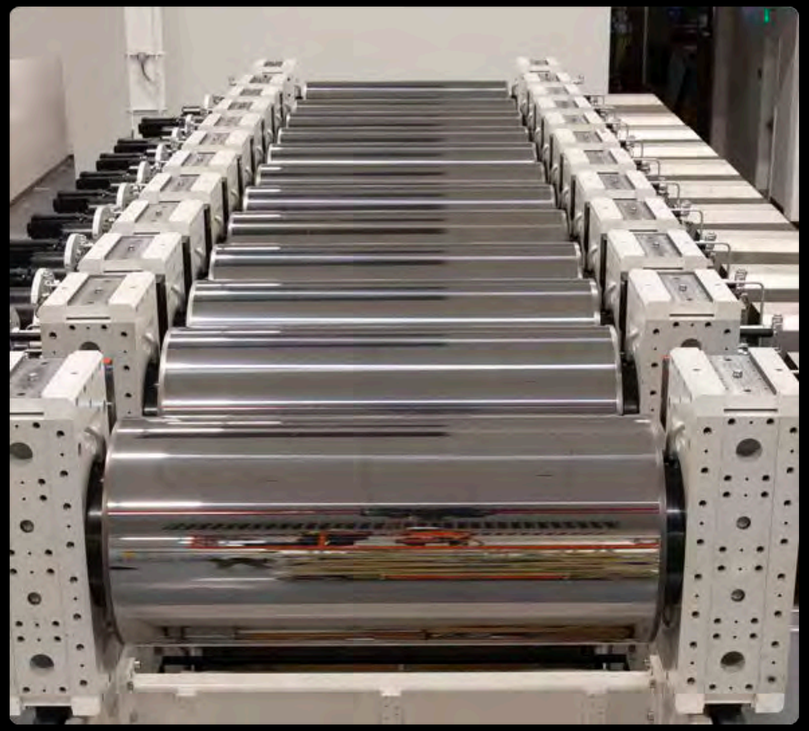
BENCH



LAB

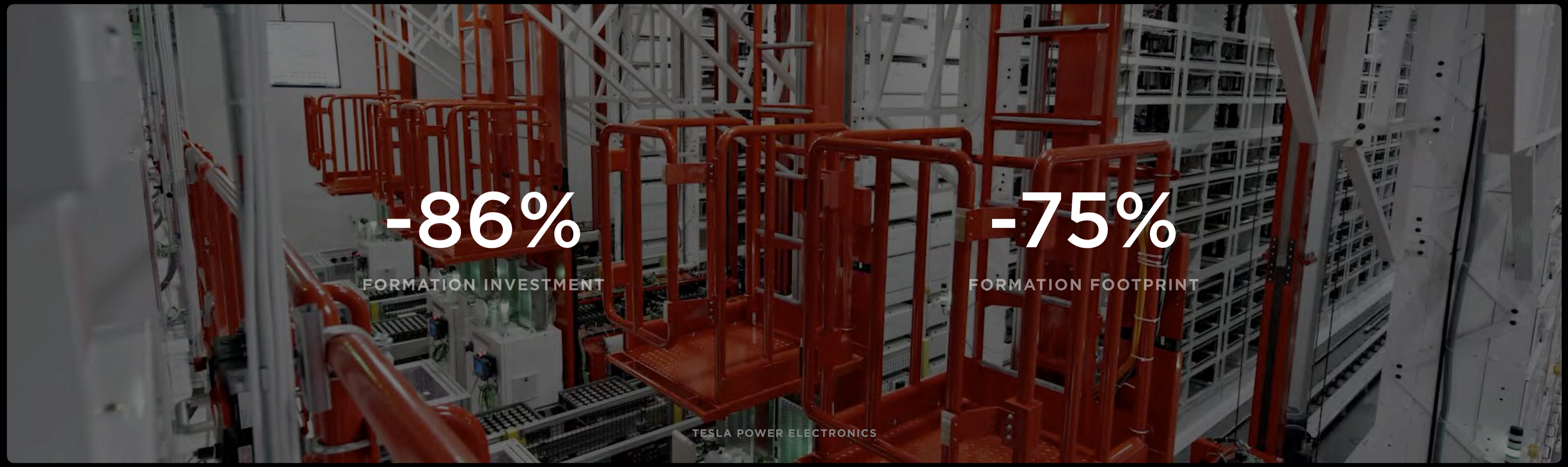


PILOT



High-Speed Continuous Motion Assembly

Tesla Power Electronics



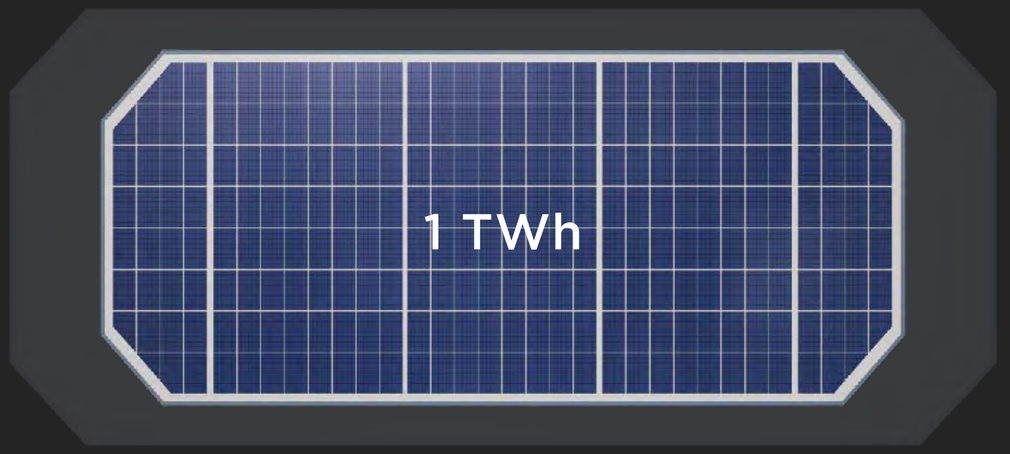
-75%

INVESTMENT PER GWH

10x

SMALLER FOOTPRINT PER GWH

2018 GIGAFACTORY



TERAFACTORY

SIMPLER ACCELERATES TWH SCALE

The Plan

100 GWh

IN 2022

3 TWh

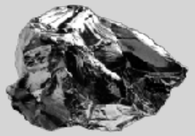
BY 2030

32%

$/KWH REDUCTION

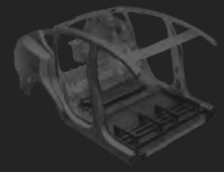
14%

18%



ANODE MATERIALS

CATHODE MATERIALS



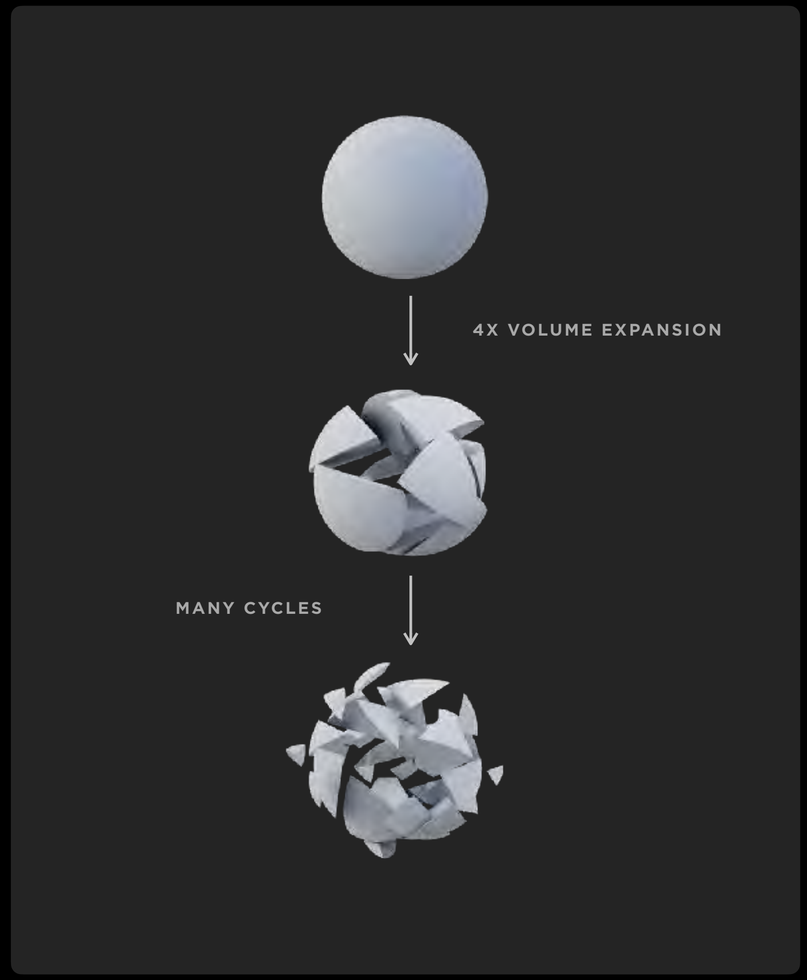
CELL VEHICLE INTEGRATION

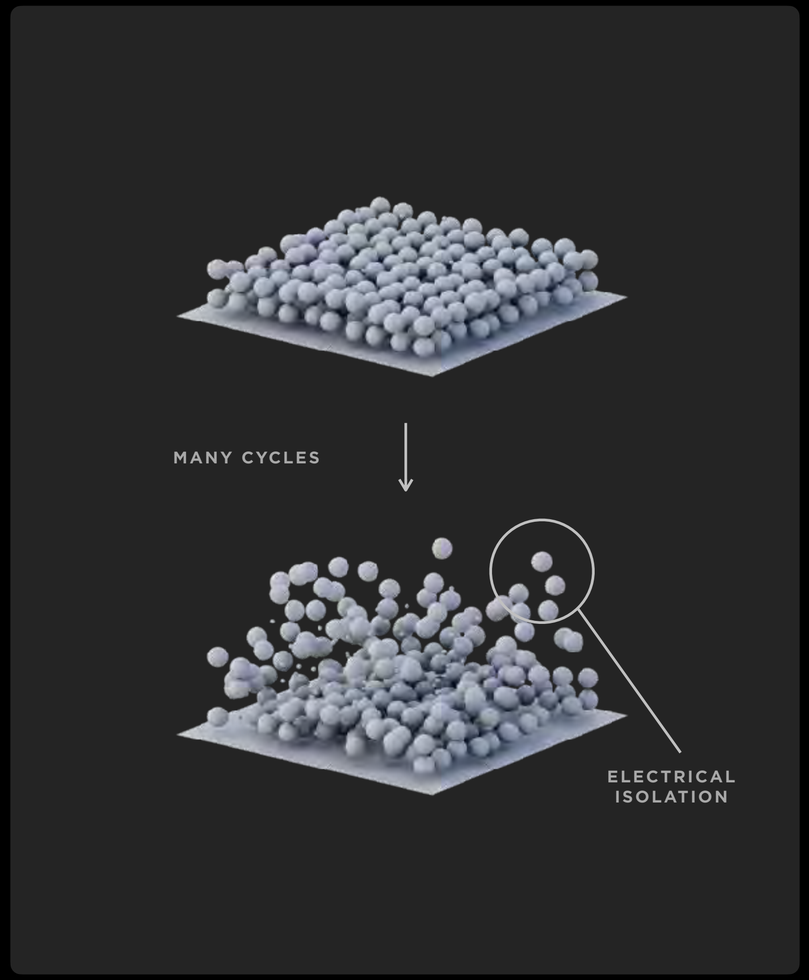
Silicon Is Awesome And Inexpensive

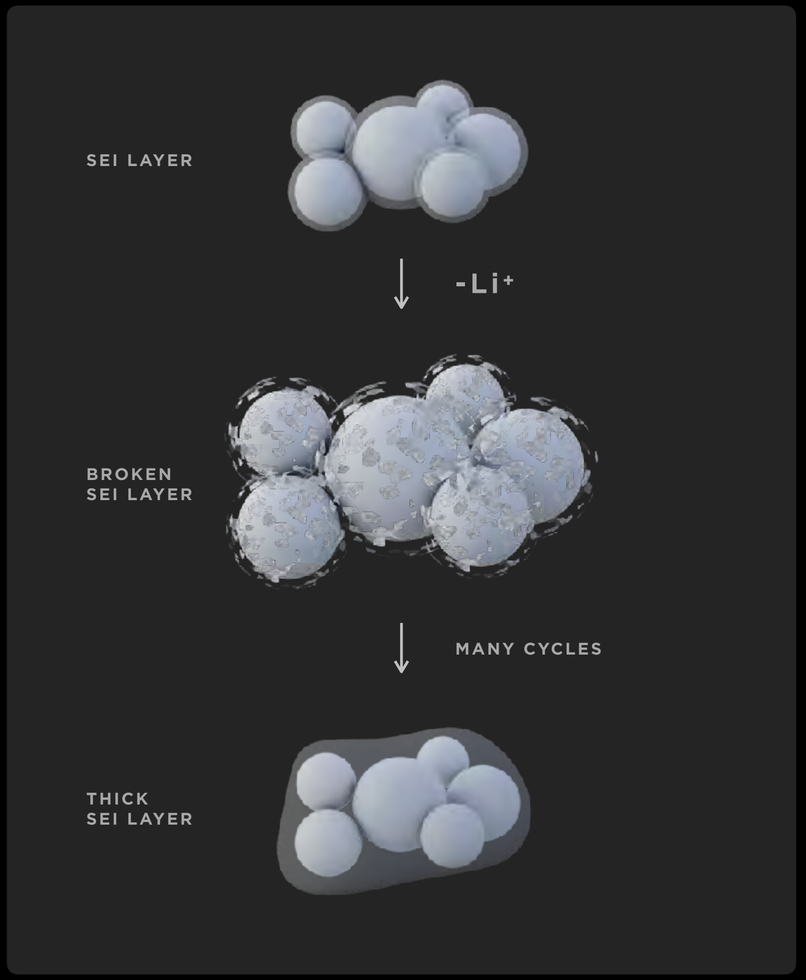
MOST ABUNDANT ELEMENT IN EARTH'S CRUST AFTER OXYGEN

STORES 9X MORE LITHIUM THAN GRAPHITE

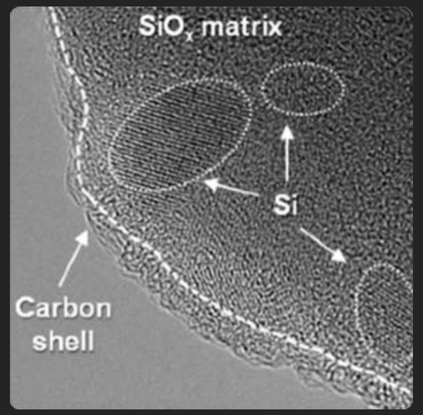
Challenge: Volume Expansion





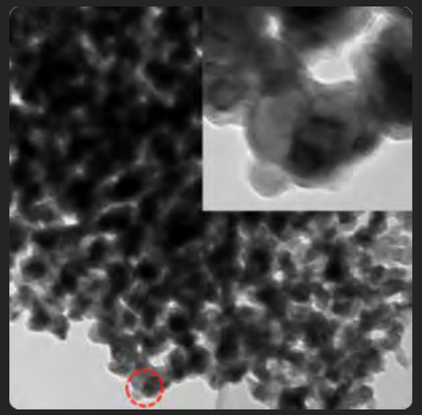


Current Approaches To Silicon Are Highly Engineered Expensive Materials



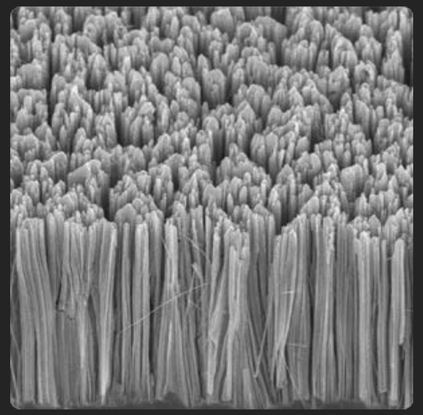
SILICON STRUCTURED IN SIO GLASS

6.6 $/KWh



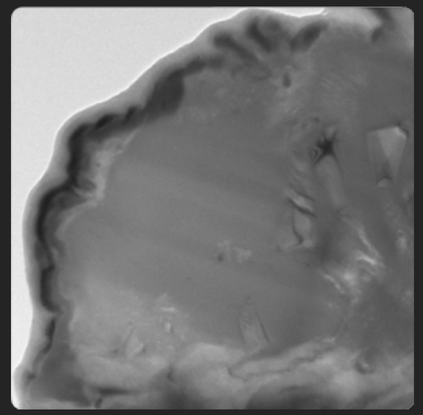
SILICON STRUCTURED IN GRAPHITE

10.2 $/KWh



SILICON NANOWIRES

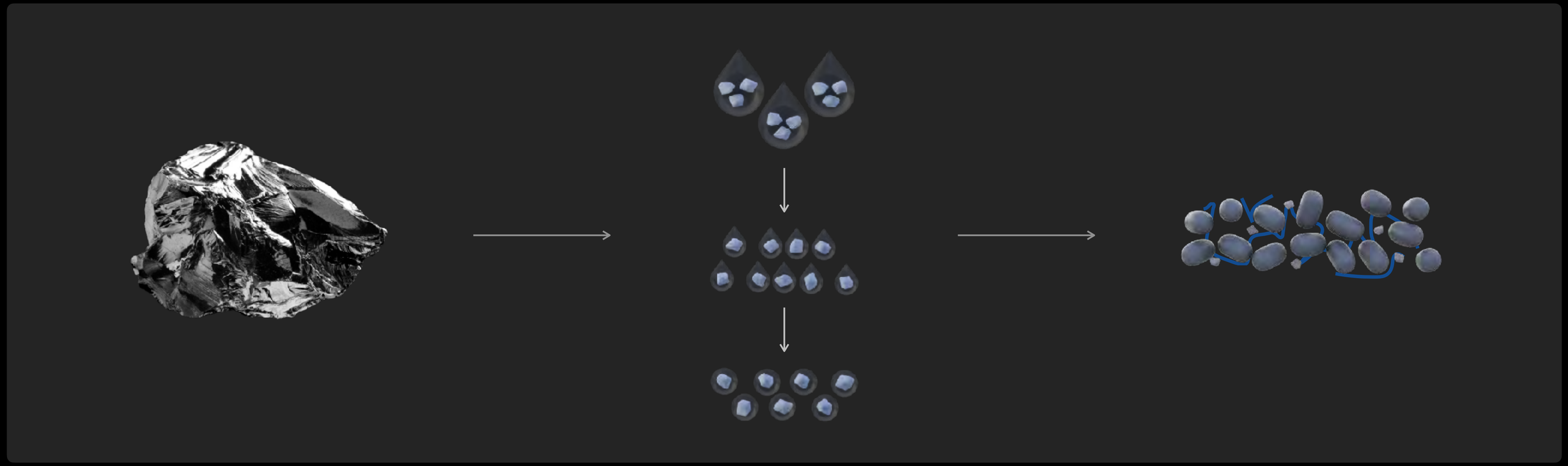
>100 $/KWh



TESLA SILICON

1.2 $/KWh

Instead, We Design For Expansion And Use Raw Silicon To Increase Range 20%



RAW METALLURGICAL SILICON

STABILIZE SURFACE

THROUGH ELASTIC,
ION-CONDUCTING POLYMER COATING

ROBUST NETWORK

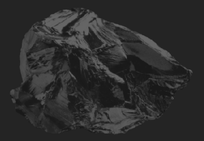
HIGHLY ELASTIC BINDER
+ ELECTRODE DESIGN

37%

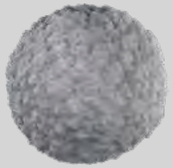
$/KWH REDUCTION

14%

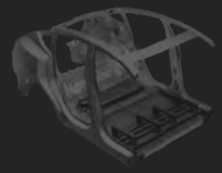
18%



5%



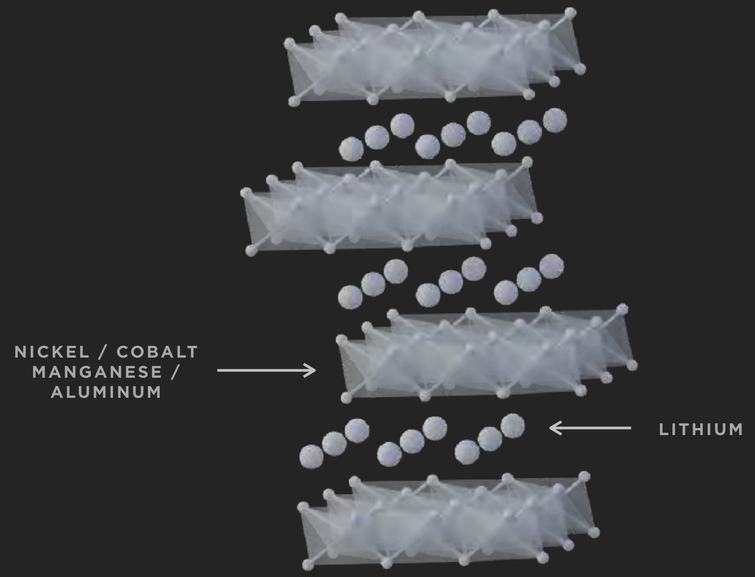
CATHODE MATERIALS



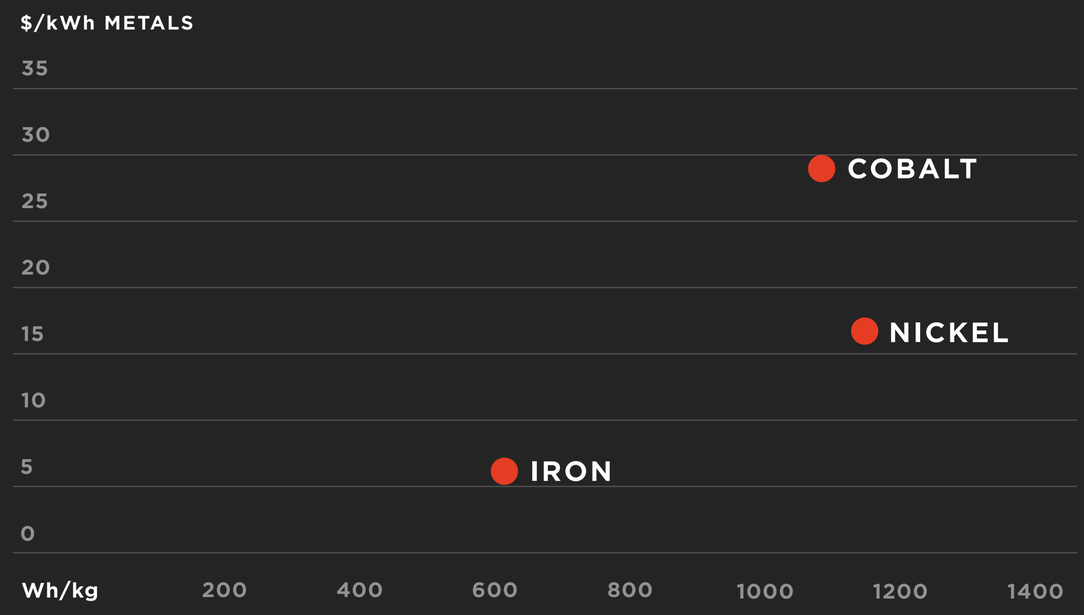
CELL VEHICLE INTEGRATION

What Is A Battery Cathode?

CATHODES ARE LIKE BOOKSHELVES

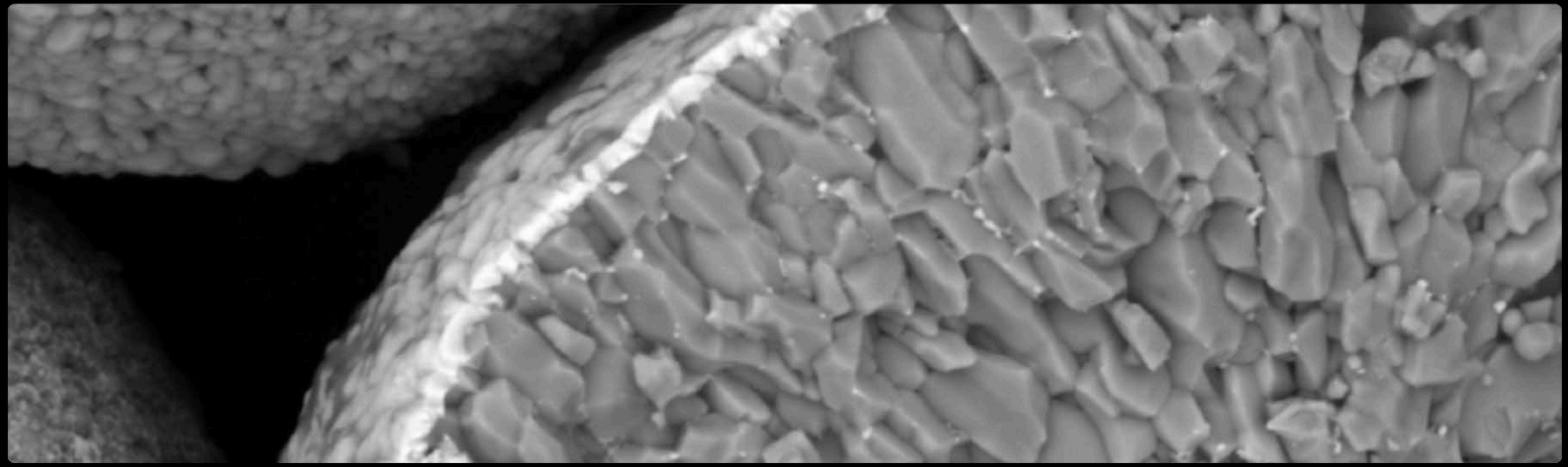


METAL COST MATTERS

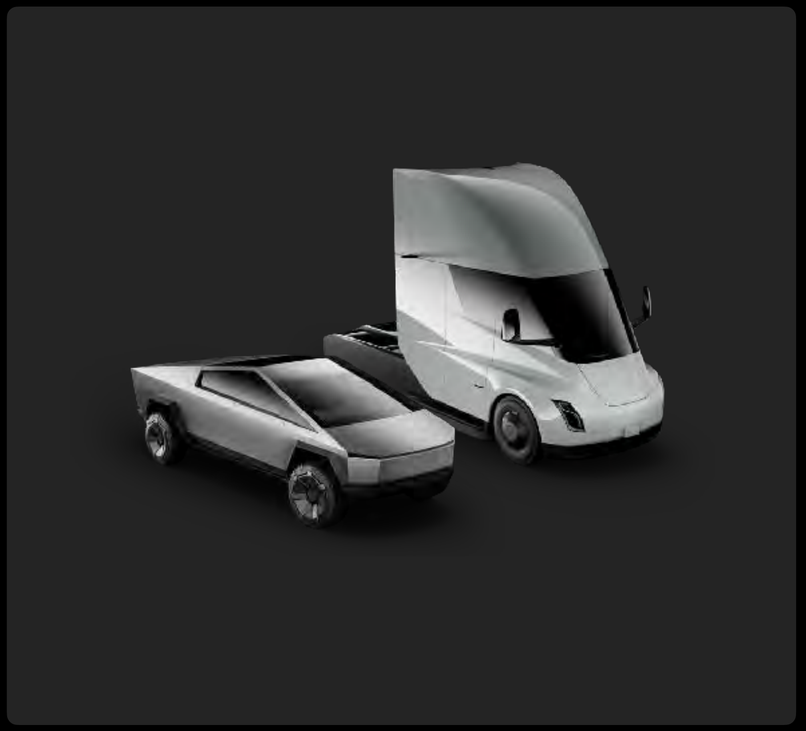


High Nickel Cathode Development

MAXIMIZE NICKEL, REMOVE COBALT | NOVEL COATINGS & DOPANTS | 15% REDUCTION IN CATHODE $/KWh



Diversified Cathode Approach



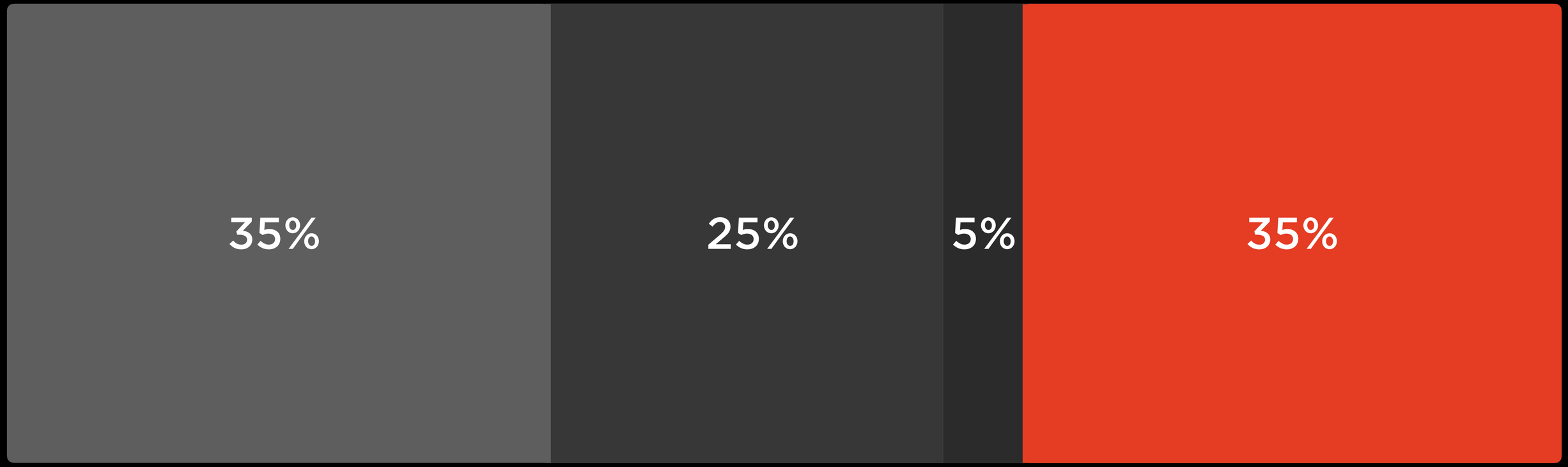
IRON BASED
LONG CYCLE LIFE

NICKEL + MANGANESE
LONG RANGE

HIGH NICKEL
MASS SENSITIVE

The Cathode Manufacturing Processing Is A Big Target

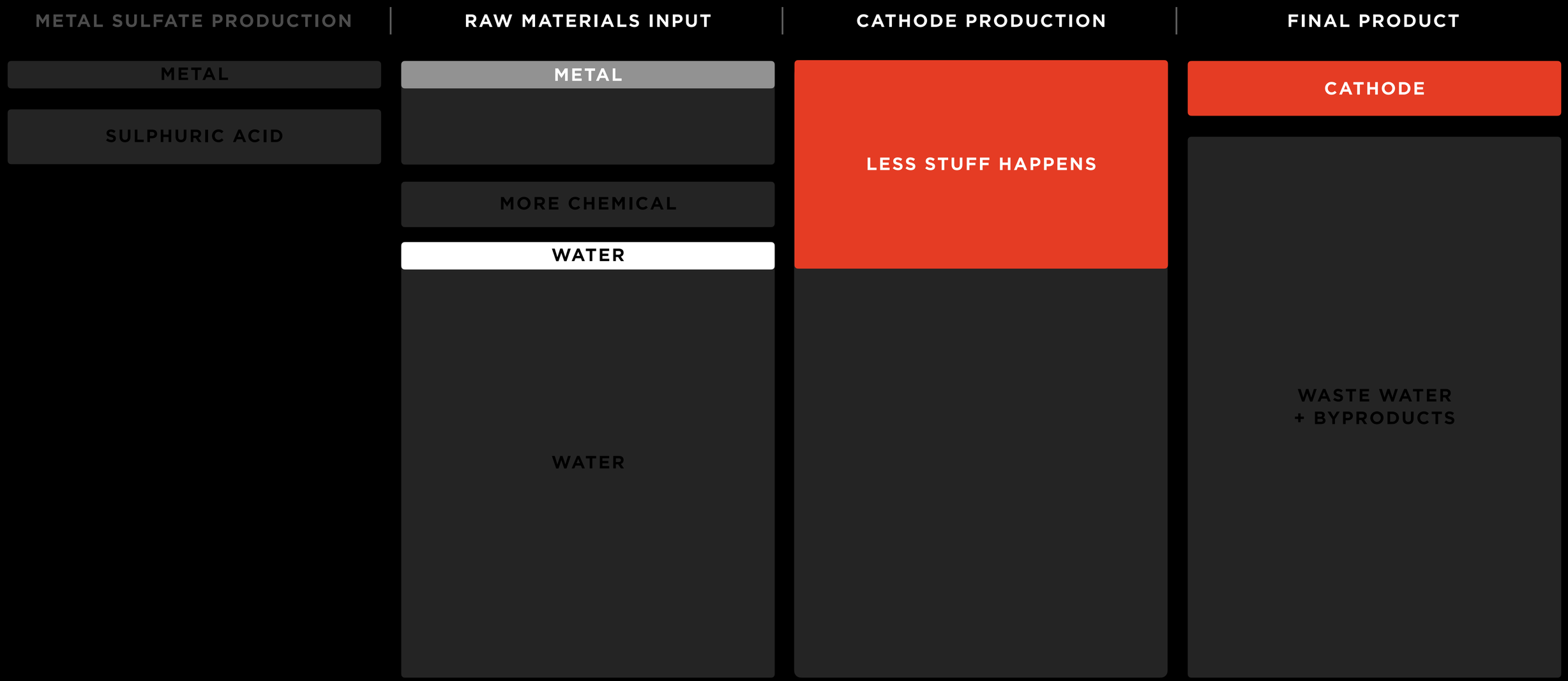
CATHODE COST BREAKDOWN



Traditional Cathode Process

METAL SULFATE PRODUCTION	RAW MATERIALS INPUT	CATHODE PRODUCTION	FINAL PRODUCT
METAL	METAL SULFATE	A BUNCH OF STUFF HAPPENS	CATHODE
SULPHURIC ACID	MORE CHEMICALS		WASTE WATER + BYPRODUCTS
	WATER		

Tesla Cathode



-66%

INVESTMENT

-76%

PROCESS COST

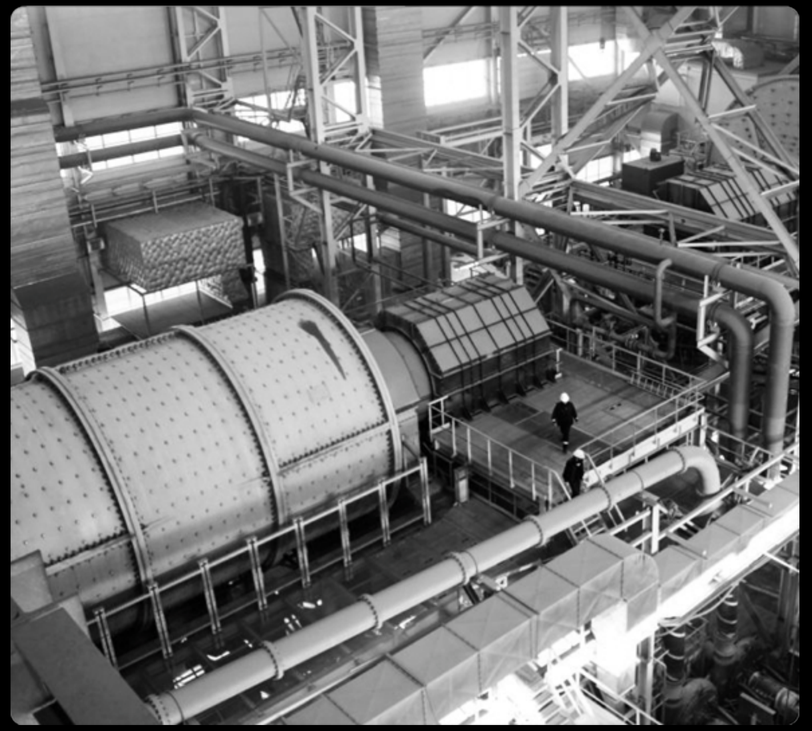
0

WASTE WATER

Directly Consuming Nickel Powder Simplifies Metal Refining & Recycling

SUSTAINABLY MINED/SOURCED ORES

OPTIMIZED REFINING

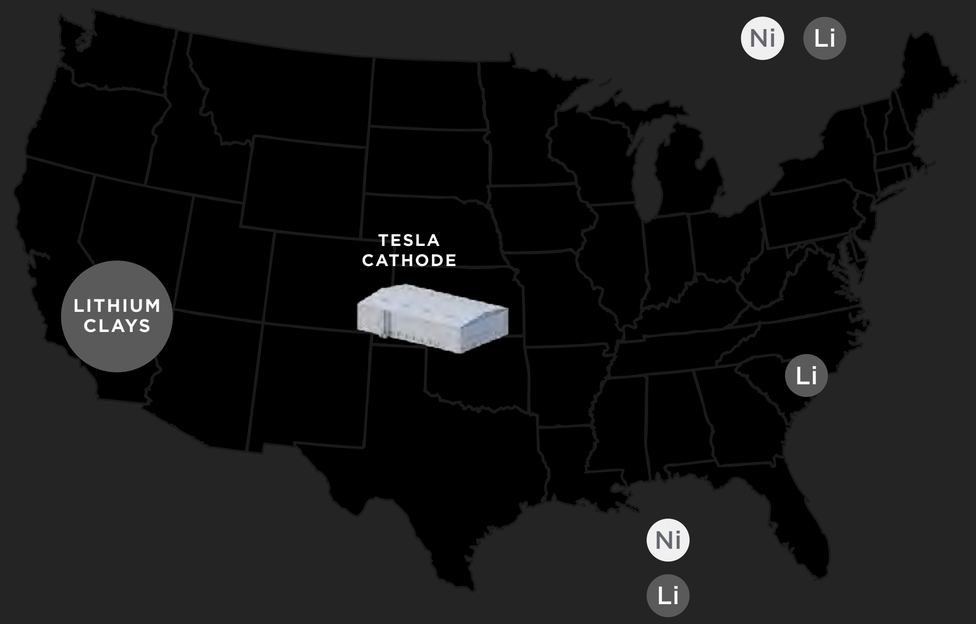


RECYCLED BATTERIES

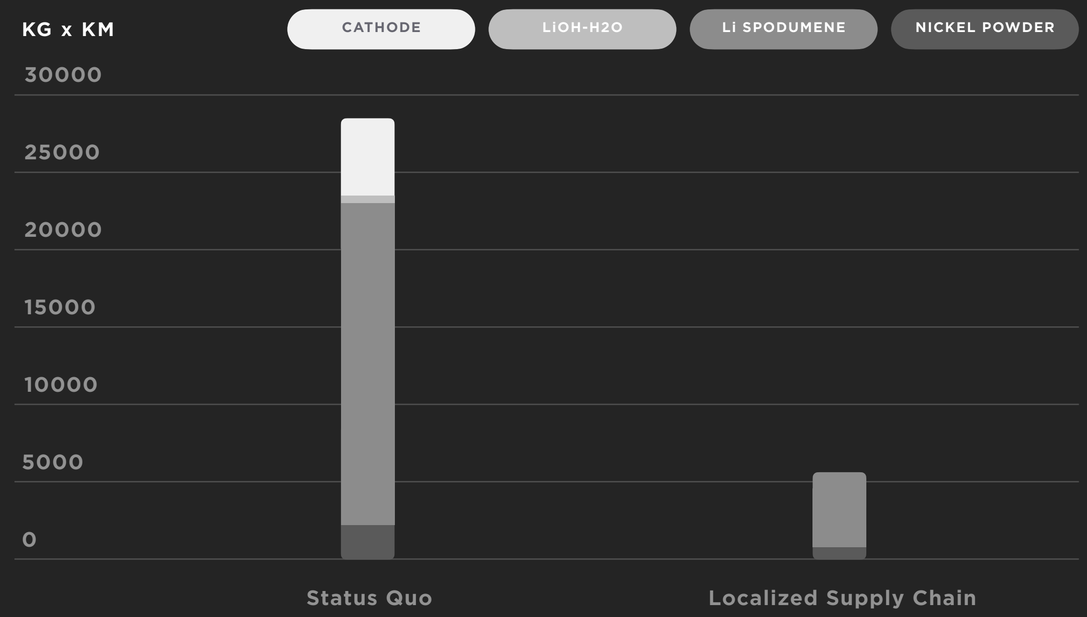
ELIMINATES BILLIONS IN BATTERY GRADE NICKEL PRODUCTION

North American Cathode Production

BUILD PLANT

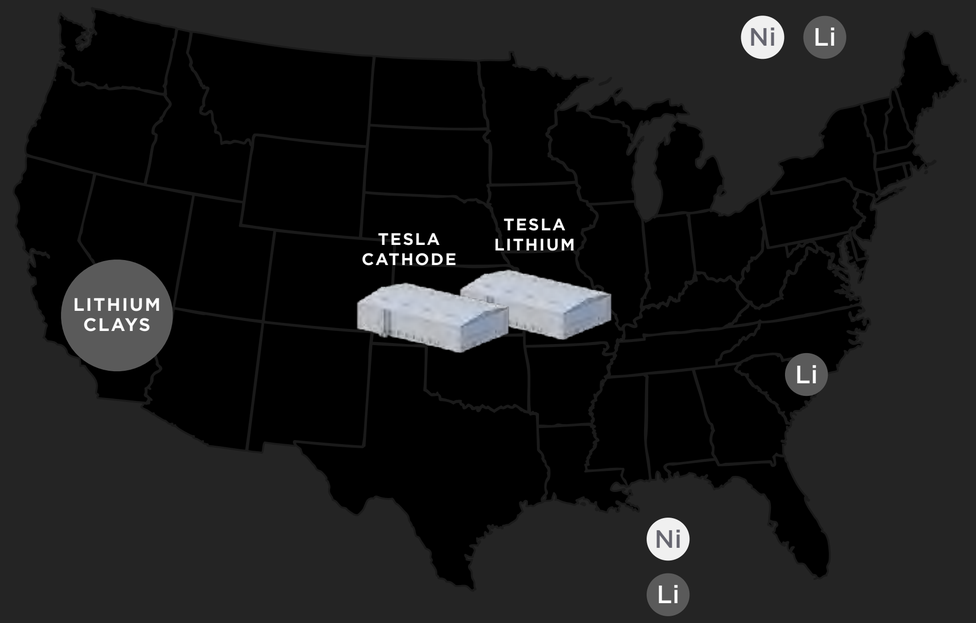


SHORTEN TRAVEL DISTANCE



North American Lithium Production

COLOCATE LITHIUM CONVERSION



SULFATE-FREE PROCESS

33%

REDUCTION IN LITHIUM COST

100%

ELECTRIC FACILITY

Access Even More Lithium

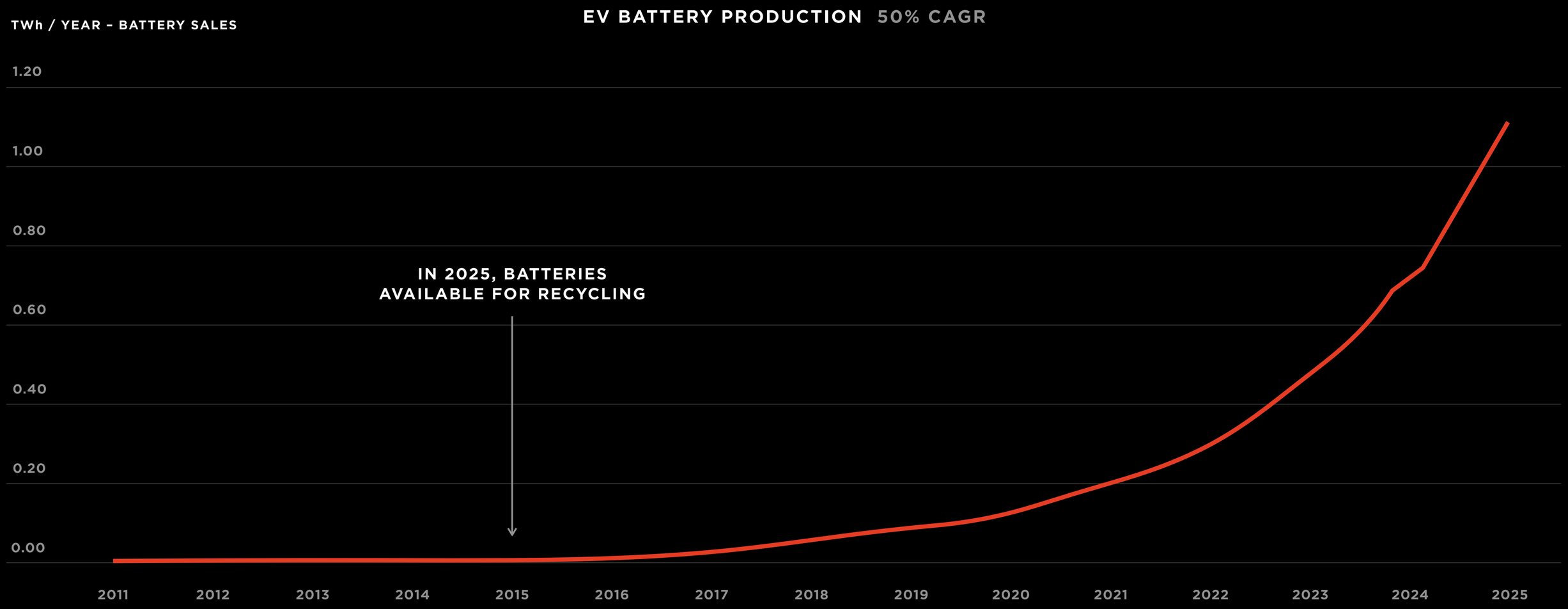
SIGNIFICANT UNTAPPED LITHIUM IN CLAY | TESLA ACID-FREE, SALINE EXTRACTION | TESLA SECURED TWH-SCALE RESOURCE

ENOUGH LITHIUM IN NEVADA TO ELECTRIFY THE ENTIRE U.S. FLEET

Recycling Elements From Cells Is Far More Desirable Than From Raw Ores

SOURCE	NICKEL	LITHIUM	COBALT
RECYCLED CELLS	20%	2.7%	2%
TYPICAL ORES	1.2%	0.7%	0.2%

Recycling Resource Is 10+ Years Delayed

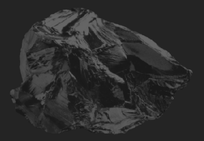


49%

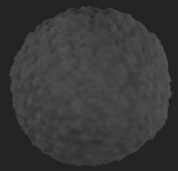
$/KWH REDUCTION

14%

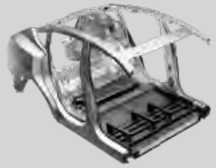
18%



5%



12%



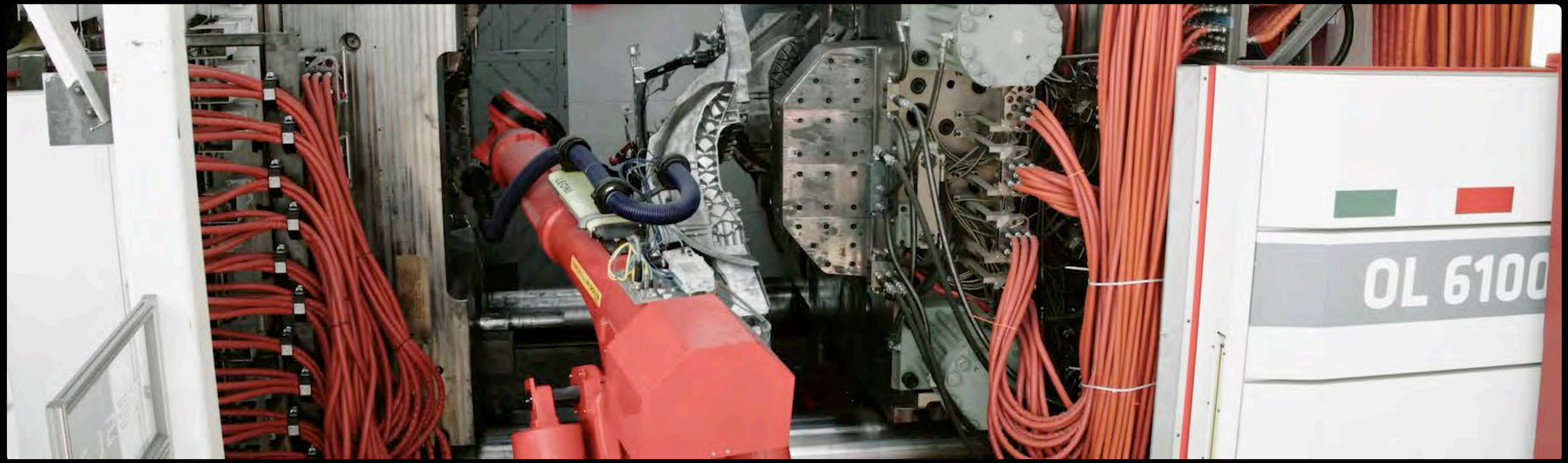
CELL VEHICLE INTEGRATION

40%

REAR UNDERBODY COST SAVINGS

-79

PARTS PER CAR

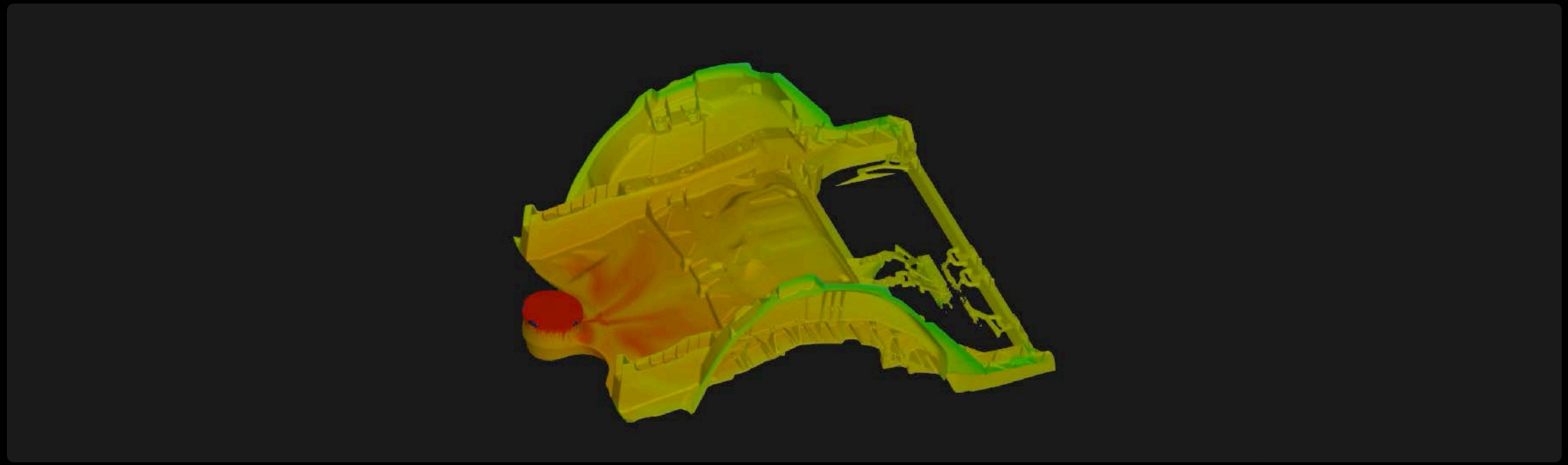


MODEL Y GIGA CASTING

Giga Casting Innovations

SHOT SIZE ∝ VELOCITY ∝ PRESSURE ∝ TONNAGE

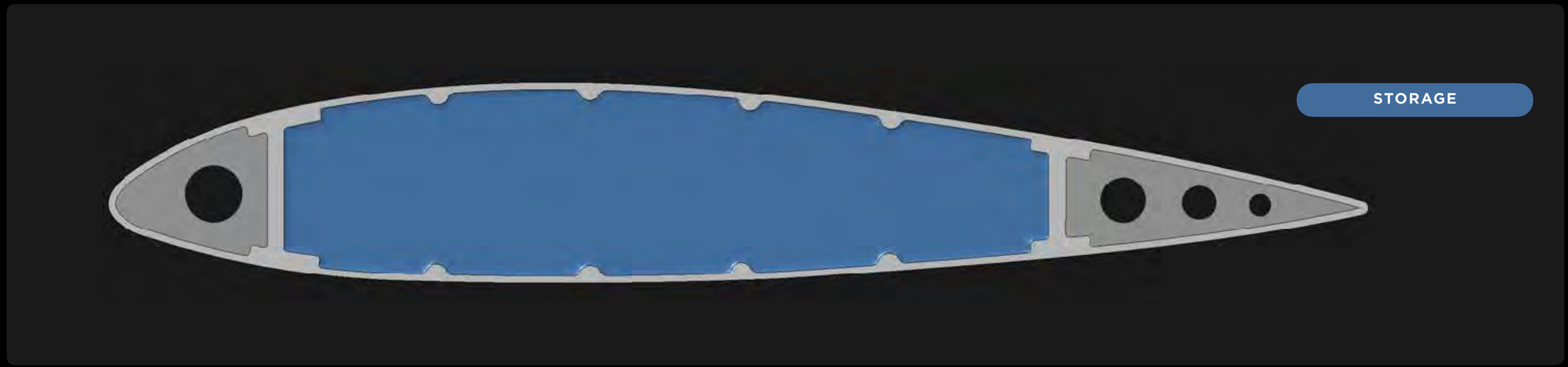
NEW ALLOY, NO HEAT TREATING OR COATINGS



Structural Fuel Tanks Improve Mass And Range

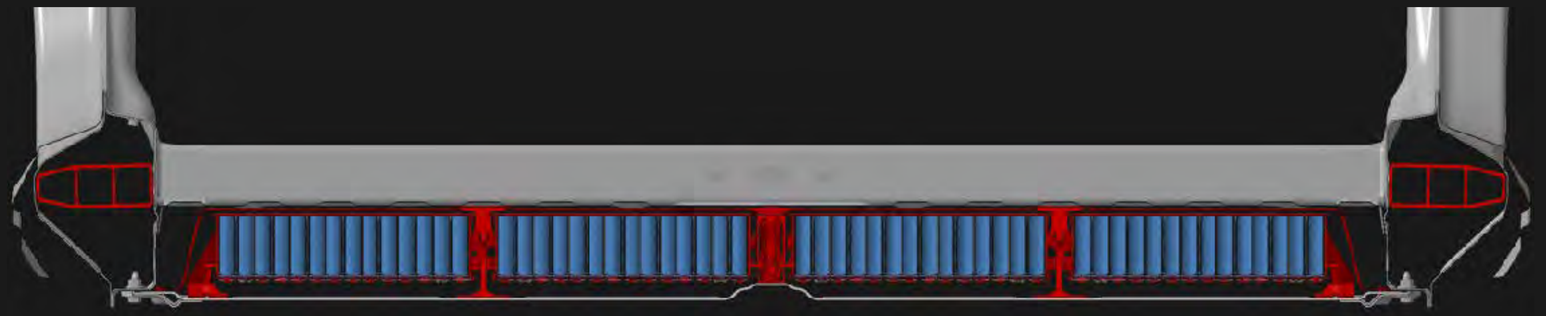
EARLY
AIRCRAFT WING

MODERN
AIRCRAFT WING



Structural Batteries Improve Mass And Range

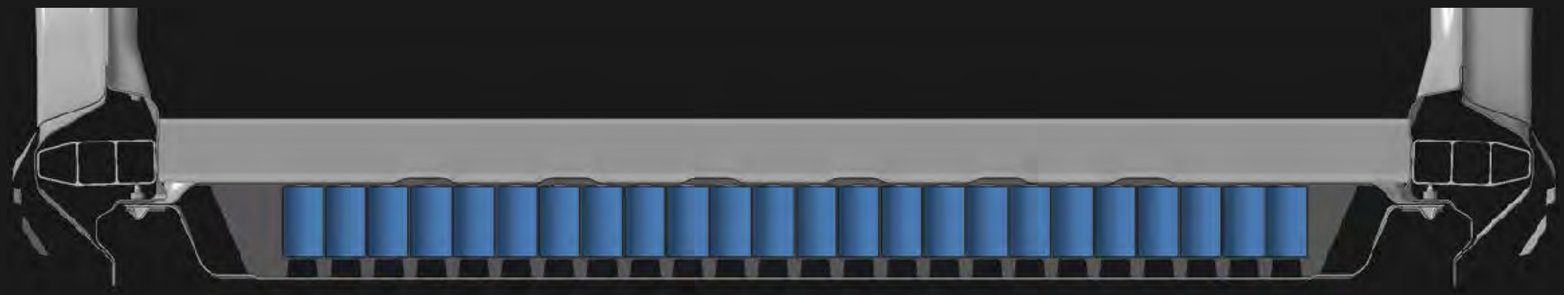
MODERN AUTOMOTIVE BATTERY



STORAGE

EXCESS STRUCTURE

FUTURE AUTOMOTIVE BATTERY



STORAGE

Revolution In Body + Battery Engineering

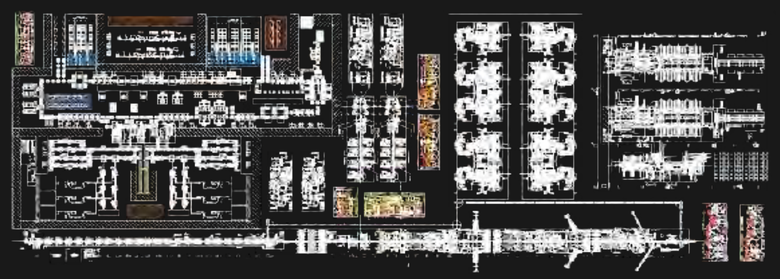
10% MASS REDUCTION | 14% RANGE INCREASE OPPORTUNITY | 370 FEWER PARTS

Simpler, Smaller, Integrated Battery + Body Factory Of The Future

55% REDUCTION IN INVESTMENT PER GWH

CURRENT

35% REDUCTION IN FLOORSPACE



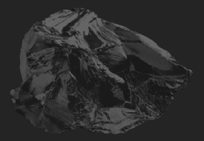
FUTURE

56%

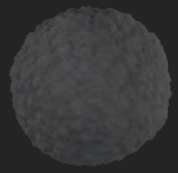
$/KWH REDUCTION

14%

18%



5%



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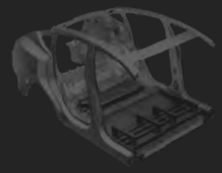
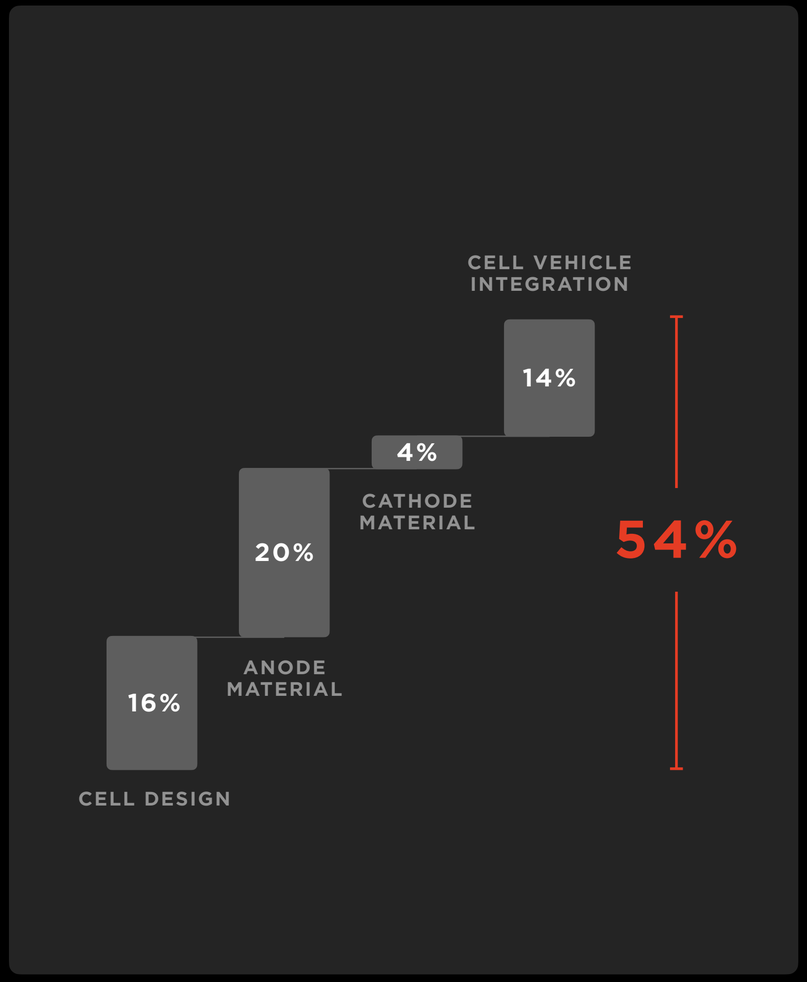


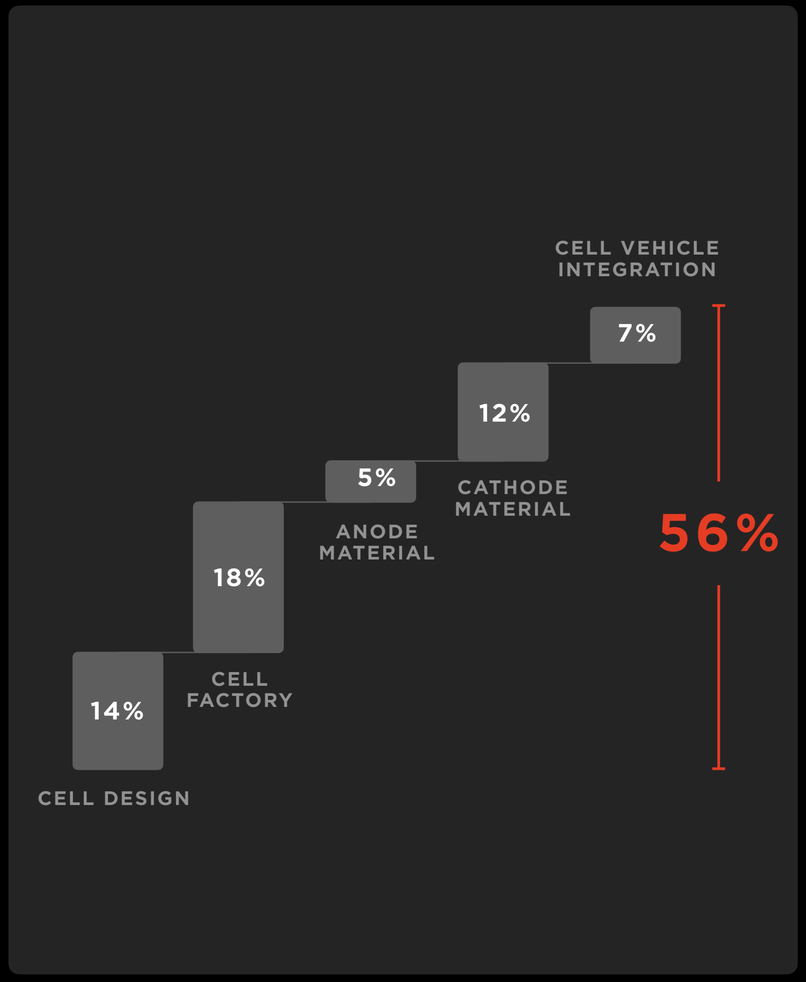
7%

Stacking Up The Benefits Of Tesla's Vertical Integration

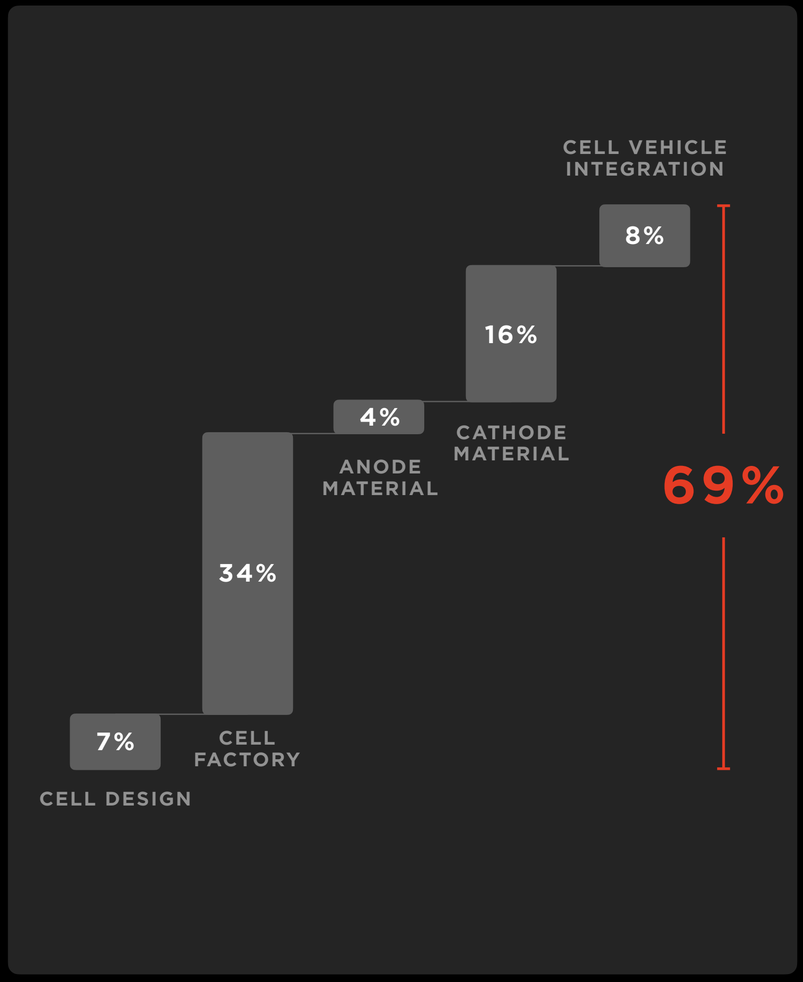
RANGE INCREASE



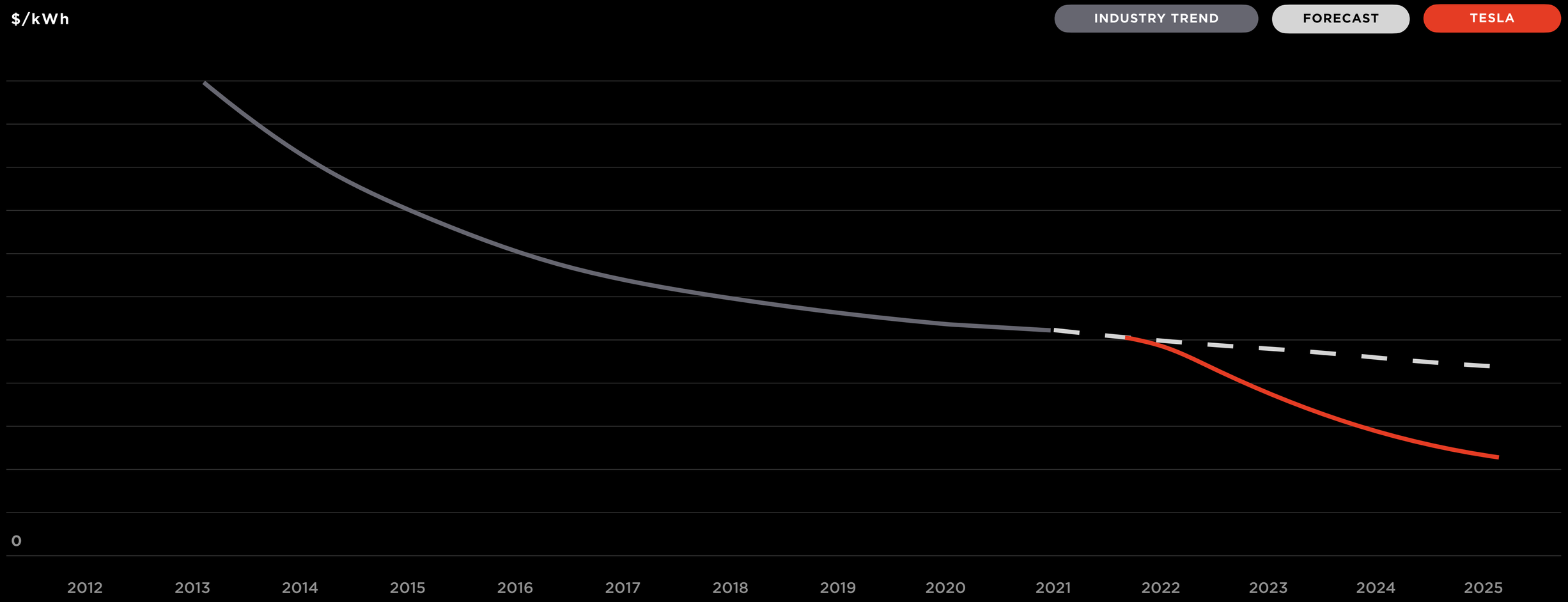
$ / KWH REDUCTION



INVESTMENT PER GWH REDUCTION



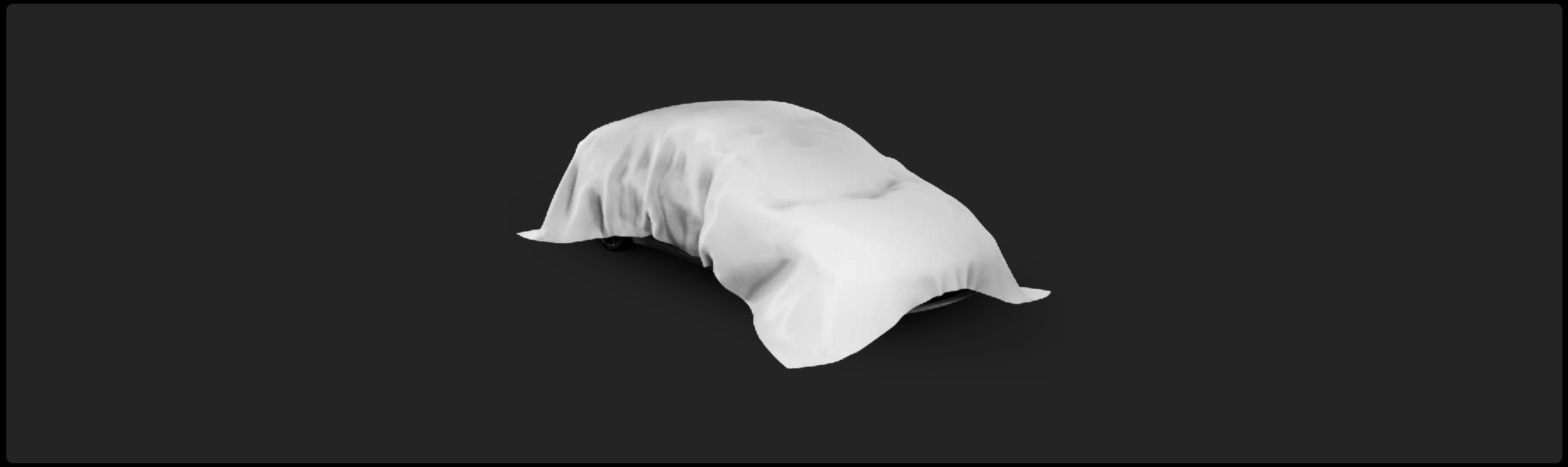
A New Trajectory



Help Us Accelerate The Transition

What Does This Mean For Our Future Products?

Electric Vehicle Powertrains That Cost Less Than Combustion Engines



$25,000 PASSENGER CAR

AND Extreme
Performance and Range

1.30.3

LAGUNA SECA

<2 sec

0-60 MPH

200 mph

TOP SPEED

<9 sec

1/4 MILE

>1100

HORSEPOWER

>520 mi

RANGE

FORWARD-LOOKING STATEMENTS

Certain statements in this presentation, including statements regarding future products and technologies, expected features and performance of products, manufacturing expansion, cost reductions, and availability of raw materials, are forward-looking statements that are subject to risks and uncertainties. These forward-looking statements are based on management's current expectations. Various important factors could cause actual results to differ materially, such as the risks identified in our SEC filings, including under the sections captioned "Risk Factors" in our Forms 10-K and 10-Q. Tesla disclaims any obligation to update any forward-looking statement contained in this presentation.