



Presentation ID: 205
Rail-Based Gravity Storage - The Advantages of Pumped Hydro without the Disadvantages
Presented by: Howard Trott, CEO





Rail-Based Gravity Storage



Over the last decade, ARES has developed, tested and patented rail-based, gravity-powered energy storage technologies. By 4th quarter 2024, we will have our first facility in operation with many more to follow.



Manufactured in the United States



No Degradation



Low Cost



Lithium Free



Non-Flammable



Water Free

A Carbon Conscious Company



Recycled Steel – US Made



Aggregate Sourced On-site



Roller Compacted Concrete – Light Water – Light Cement

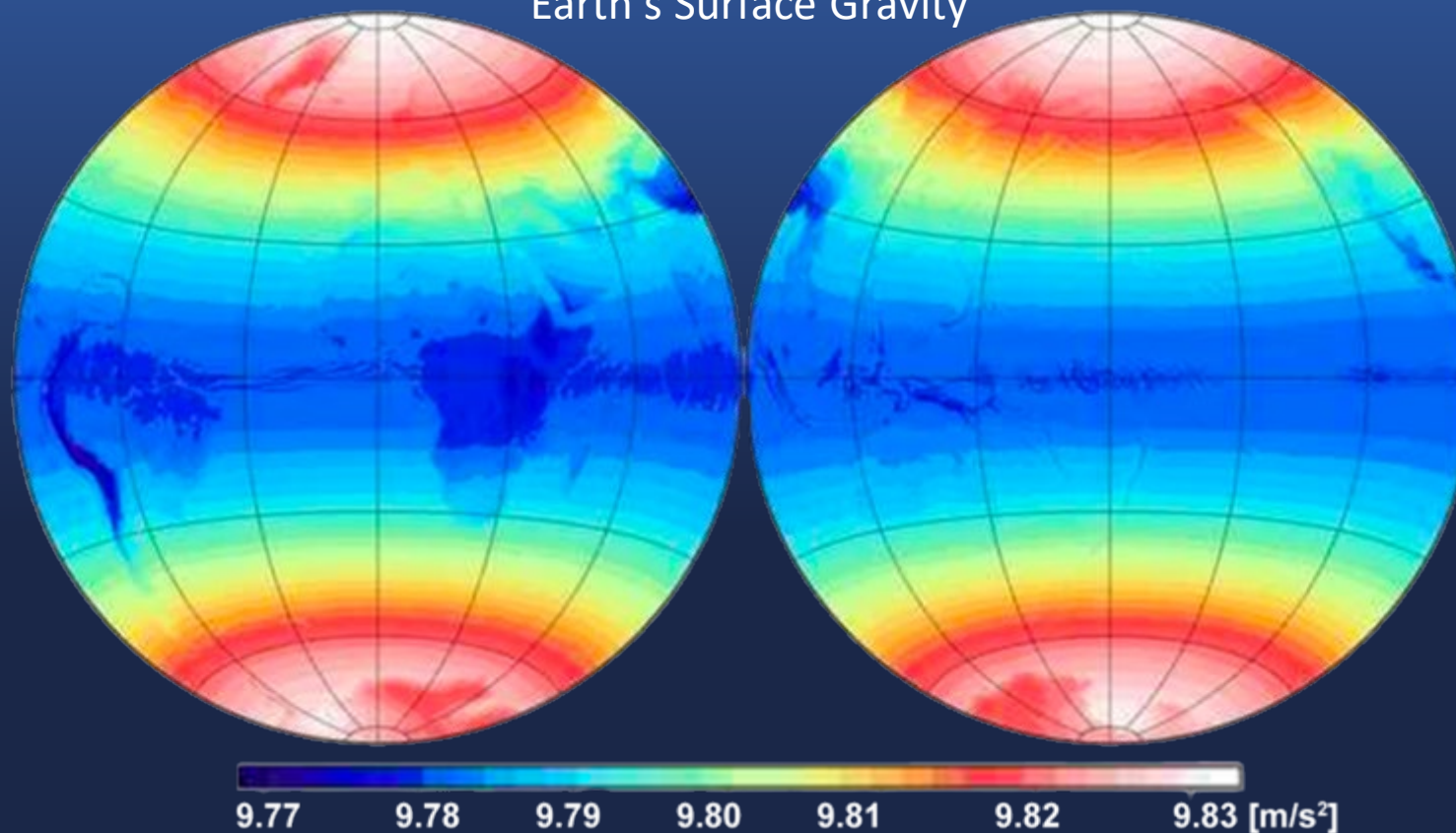


Local Manufacturing



Gravity is a natural resource like wind or solar

Earth's Surface Gravity

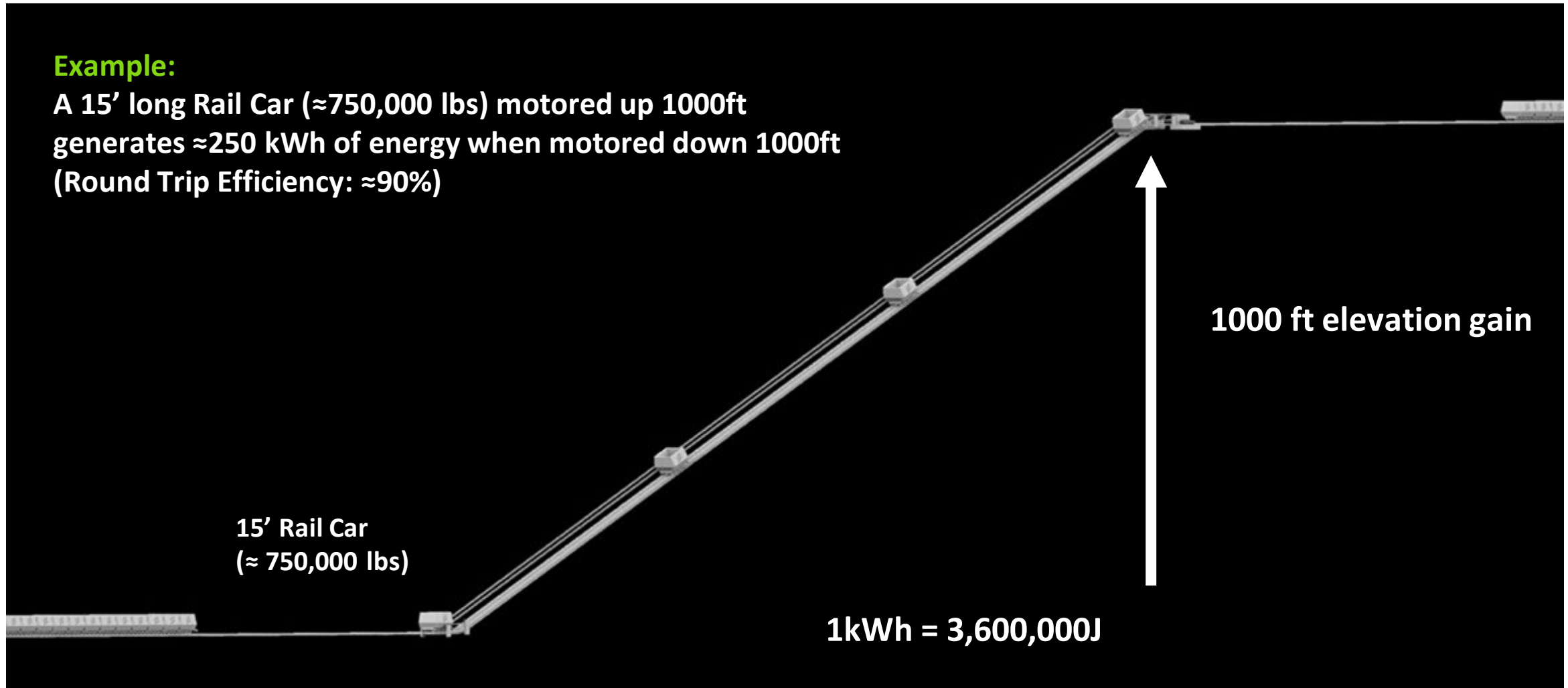


Acceleration of gravity $\approx 9.8 \text{ m} / 32 \text{ ft per sec}^2$

Energy Capacity of Mass Cars

Example:

A 15' long Rail Car ($\approx 750,000$ lbs) motored up 1000ft generates ≈ 250 kWh of energy when motored down 1000ft (Round Trip Efficiency: $\approx 90\%$)

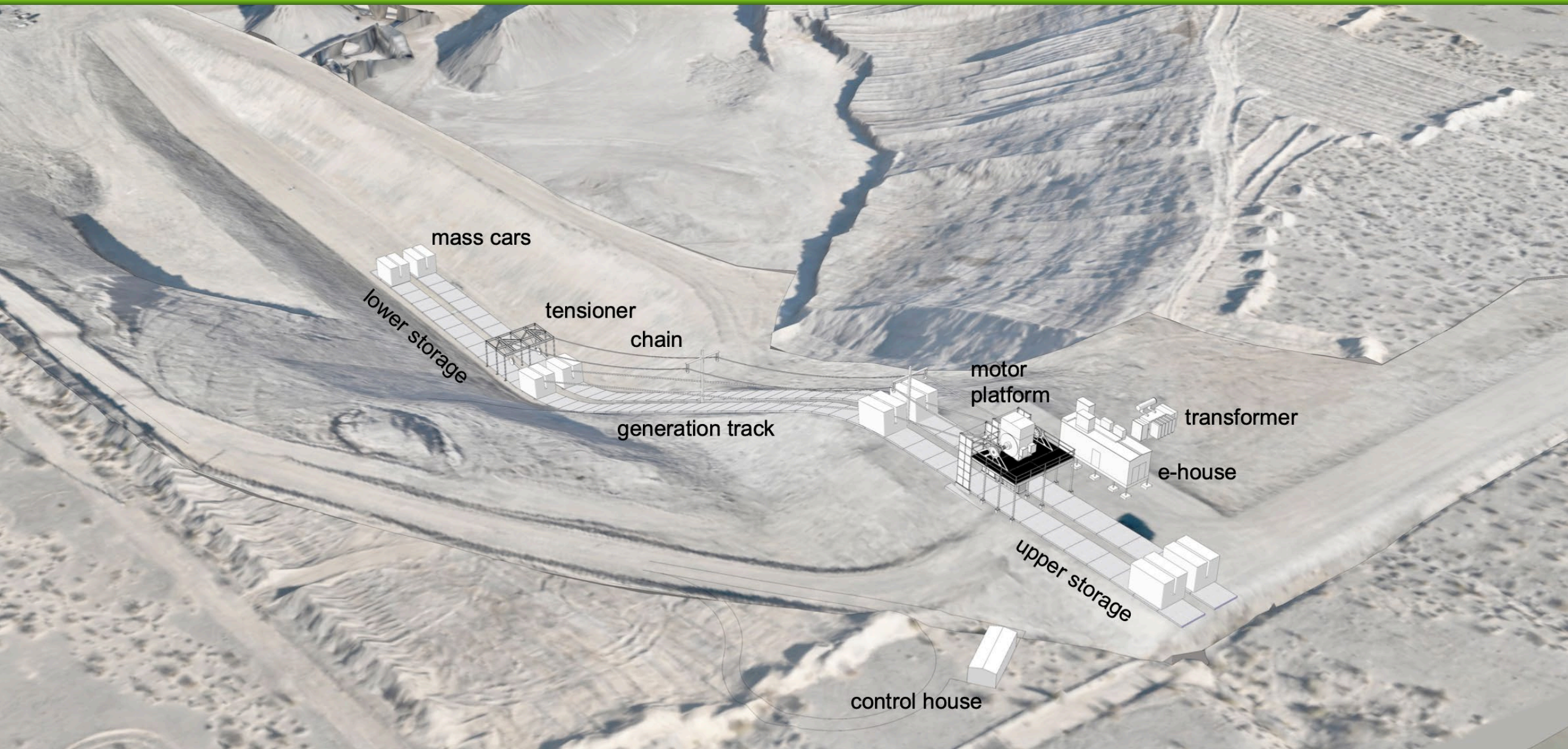


ARES Issued Patents



PAT. NO.	TITLE
11,738,781	Gravitational potential energy storage systems and methods
10,069,333	Ridgeline cable drive electric energy storage system
9,096,144	Combined synchronous and asynchronous power supply for electrically powered shuttle trains
8,952,563	Utility scale electric energy storage for utility grid ancillary services
8,674,541	Rail based potential energy storage for utility grid ancillary services
8,593,012	Utility scale electric energy storage system

Major System Components



Motor/Generator (5MW_{AC})



Mass Cars





Bystronic Laser for precise cutting and part production at the ARES Manufacturing facility (Las Vegas, NV)

ARES Manufacturing

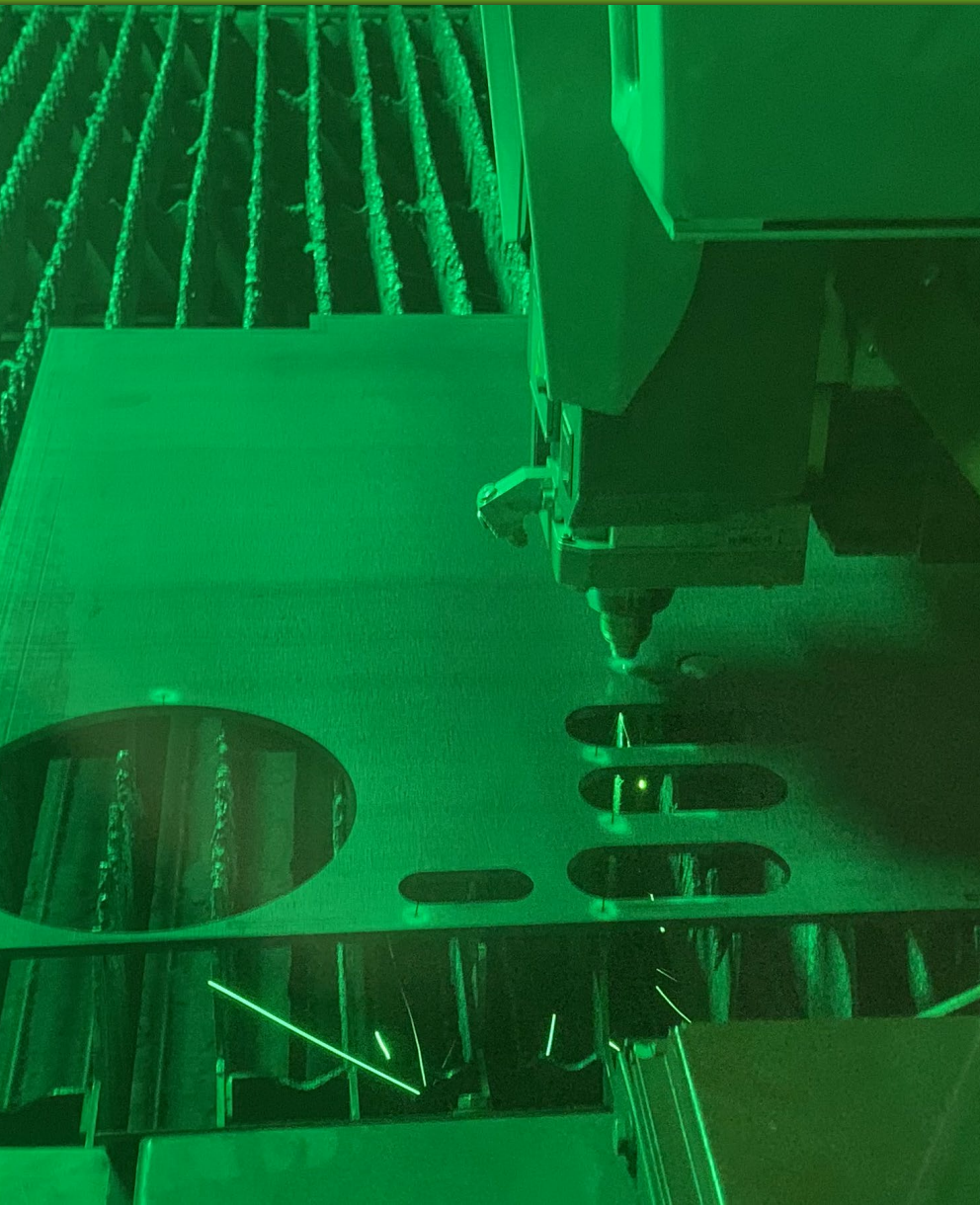


Laser fabrication



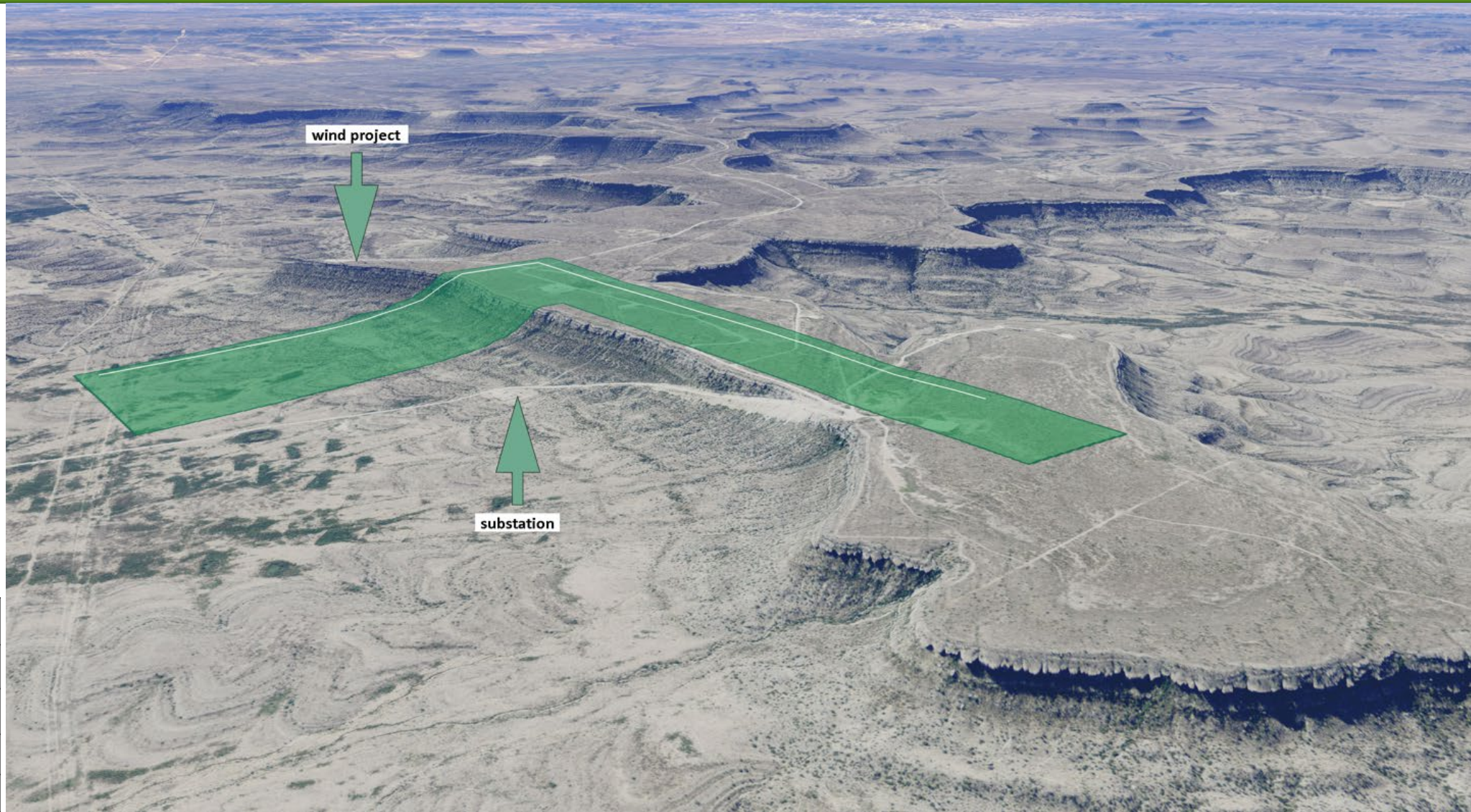
Urethane Production

ARES Manufacturing



Siting Flexibility

Siting Flexibility: Wind Farm – Texas



Elevation Gain (ft)	390
MW	75
Duration (hr)	14
MWh's	1050
Acres	221

Siting Flexibility: Solar Farm – Washington

1

Elevation Gain (ft)	720
MW	260
Duration (hr)	10
MWh's	2600
Acres	380

2

Elevation Gain (ft)	620
MW	330
Duration (hr)	8
MWh's	2640
Acres	460



Siting Flexibility: Coal Generating Station – Colorado

1

Elevation Gain (ft)	650
MW	365
Duration (hr)	10
MWh's	3650
Acres	625

2

Elevation Gain (ft)	605
MW	200
Duration (hr)	7
MWh's	1400
Acres	315

3

Elevation Gain (ft)	510
MW	230
Duration (hr)	6
MWh's	1380
Acres	319

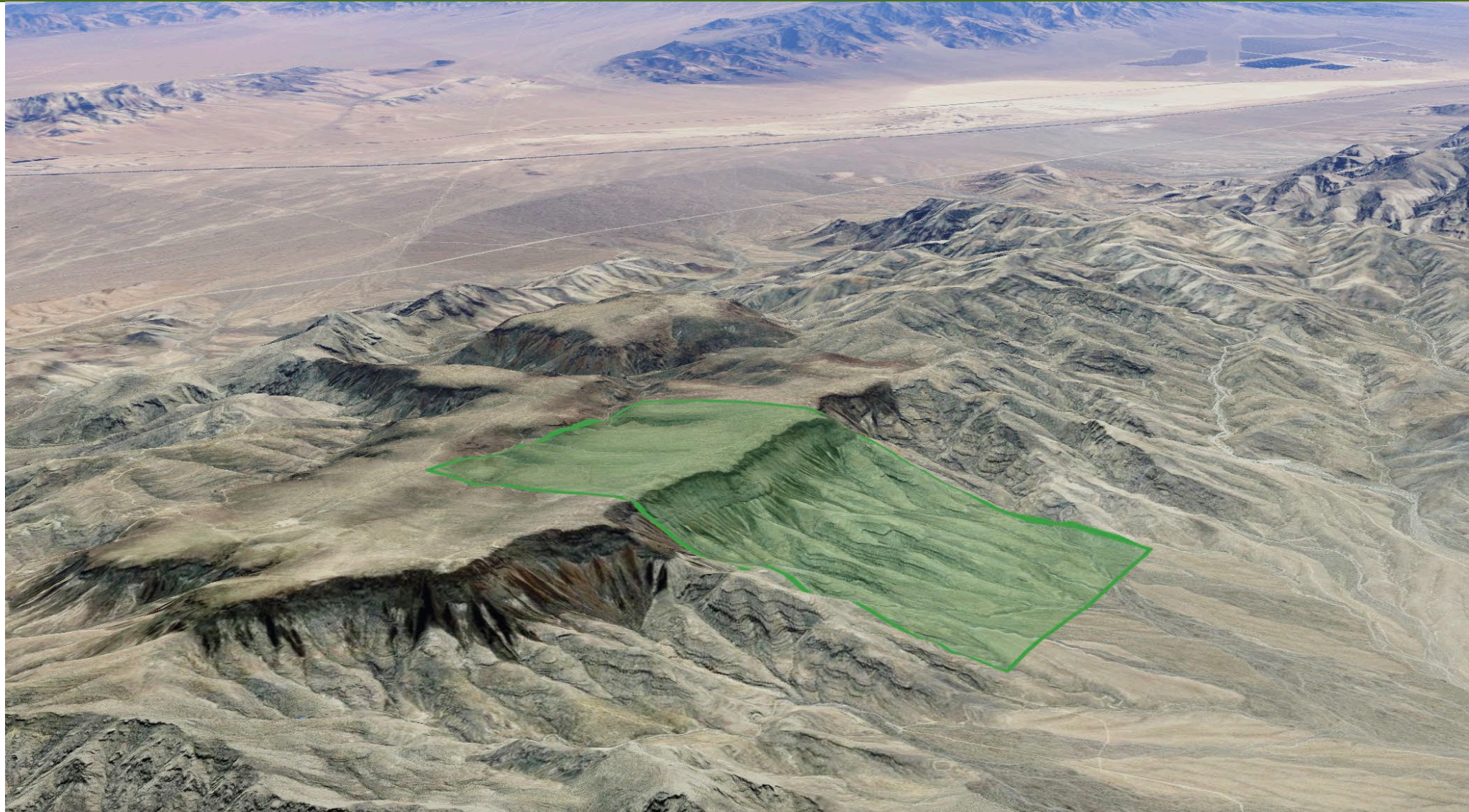


Siting Flexibility: Near Substation – Pahrump, Nevada

Elevation Gain (ft)	600
MW	50
Duration (hr)	9
MWh's	450
Acres	192



Siting Flexibility: Near Solar Farm - Table Mountain, Nevada



Elevation Gain (ft)	1200
MW	800
Duration (hr)	24
MWh's	19200
Acres	1751

Competitive Advantages



Fully Sustainable

Comprised of a recycled steel superstructure, foundation, track(s) and chain(s); low carbon mass cars – with recycled steel bases – filled with locally sourced crushed aggregate; highly efficient electric motors; and freely available gravity.

- No rare earth minerals

Scalable

Project size is a function of number of mass cars, elevation differential and distance.

- 15 minutes to 24+ hours duration

Flexible

Low impact design allows customers to build (and buy) as much as needed at any given time, with ability to quickly scale up or down in the future.

Reliable

Motor and chain drive system are proven technologies with a low maintenance burden.

- The system's division into 5 MW track sections allows for isolated repairs ensuring the majority of capacity is available at all times.

High Ramp Rate

Steep grades enable quick responsiveness.

Easy Siting

Operates effectively on elevation differentials as low as 300 feet.

Cost Effective

Leverages readily available equipment.

A dark, blue-tinted photograph of a rugged mountain range with sharp peaks and rocky slopes, serving as the background for the top half of the slide.

Thank You