



## ELECTRIFYING THE OIL & GAS INDUSTRY USING ADVANCED SOLID OXIDE FUEL CELLS

# URGENCY FOR OIL & GAS TO DECARBONIZE

- 1 High emissions & air pollutants
- 2 High fuel & operational costs
- 3 Regulatory pressures

*Industry transition away from diesel generators for  
**remote power**<sup>3</sup>*

Diesel Generators emit 2x  
more CO2 than US Grid<sup>2</sup>



# THE COST OF DIESEL IN OIL & GAS

TYPICAL OIL DRILLING OPERATIONS    ONSHORE<sup>4</sup>

**USD \$700,800**

1 DIESEL GENERATOR / YEAR - 200 KW

**USD \$7,008,000**

10 DIESEL GENERATORS / YEAR - 2 MW

## COST REDUCTIONS W/ SERENITY

-  **100% OF FUEL COST SAVINGS (NG UPSTREAM BYPRODUCT)**
-  **77% OF FUEL COST SAVINGS (NG CONSUMER PRODUCT)**

### NOTES:

- \$4 a gallon, 20 gallons an hour, 24 hours a day, 365 days a year
- Does not consider cost of transporting diesel as well
- Typically need 2 MW power per drilling rig
- NG = Natural Gas

# CURRENT SOLUTIONS FALL SHORT

## PROPOSED SOLUTIONS



### DIESEL

HIGH EMISSIONS  
COSTLY & VOLATILE FUEL



### HYDROGEN

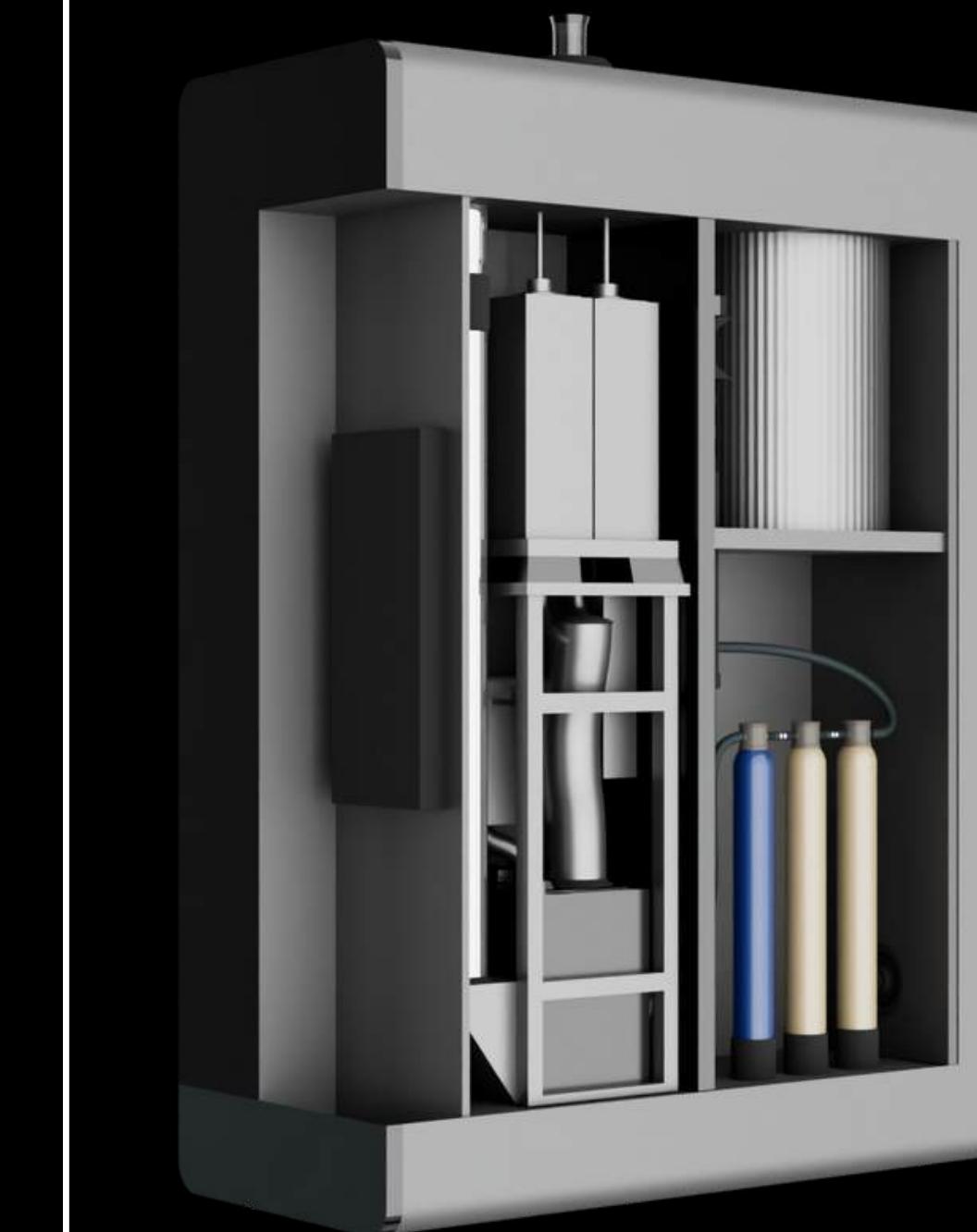
LIMITED  
INFRASTRUCTURE



### BATTERIES

HEAVY  
LIMITED POWER SUPPLY

## CONVENTIONAL SOLID OXIDE FUEL CELLS



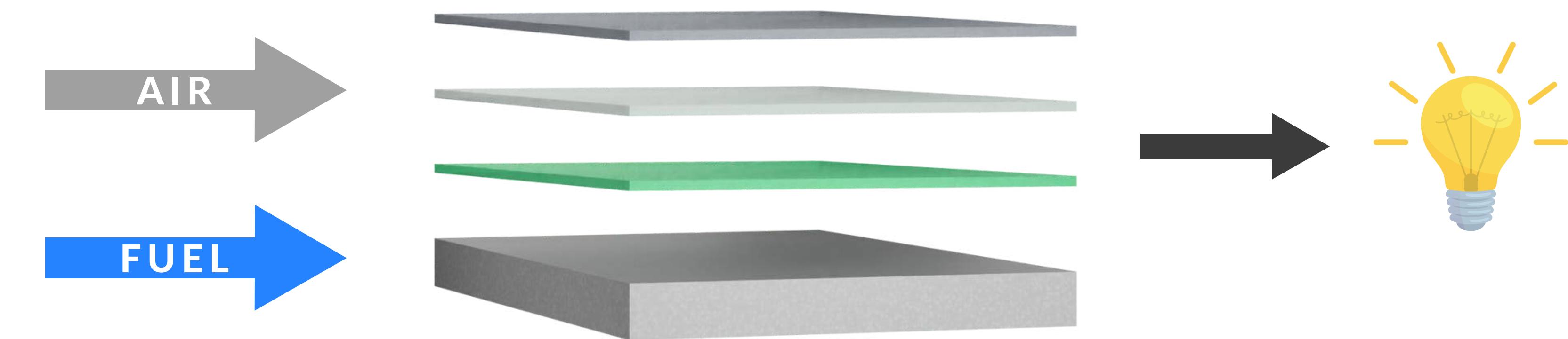
✗ SLOW START-UP TIME (> 3 HOURS)

✗ COMPLEX, LARGE, HEAVY SYSTEM

WE SOLVE THESE PROBLEMS

# A COST-EFFECTIVE SOLUTION FOR DECARBONIZING ONSITE POWER

THE SOLUTION:  
SERENITY'S SOLID OXIDE FUEL CELLS (SOFCs)



- ✓ 60% EFFICIENCY
- ✓ LOW EMISSIONS & NOISE FREE
- ✓ FUEL FLEXIBLE
- ✓ COMBINED HEAT & POWER

# NEW INNOVATIONS = NEW APPLICATIONS

300 KW SYSTEM

CONVENTIONAL TECH<sup>5</sup>



8 units | 14,500 kg | 20 m<sup>3</sup>

3 hr

SERENITY TECH

- 1 12X FASTER START-UP
- 2 20X MORE COMPACT
- 3 10X MORE COST-EFFECTIVE



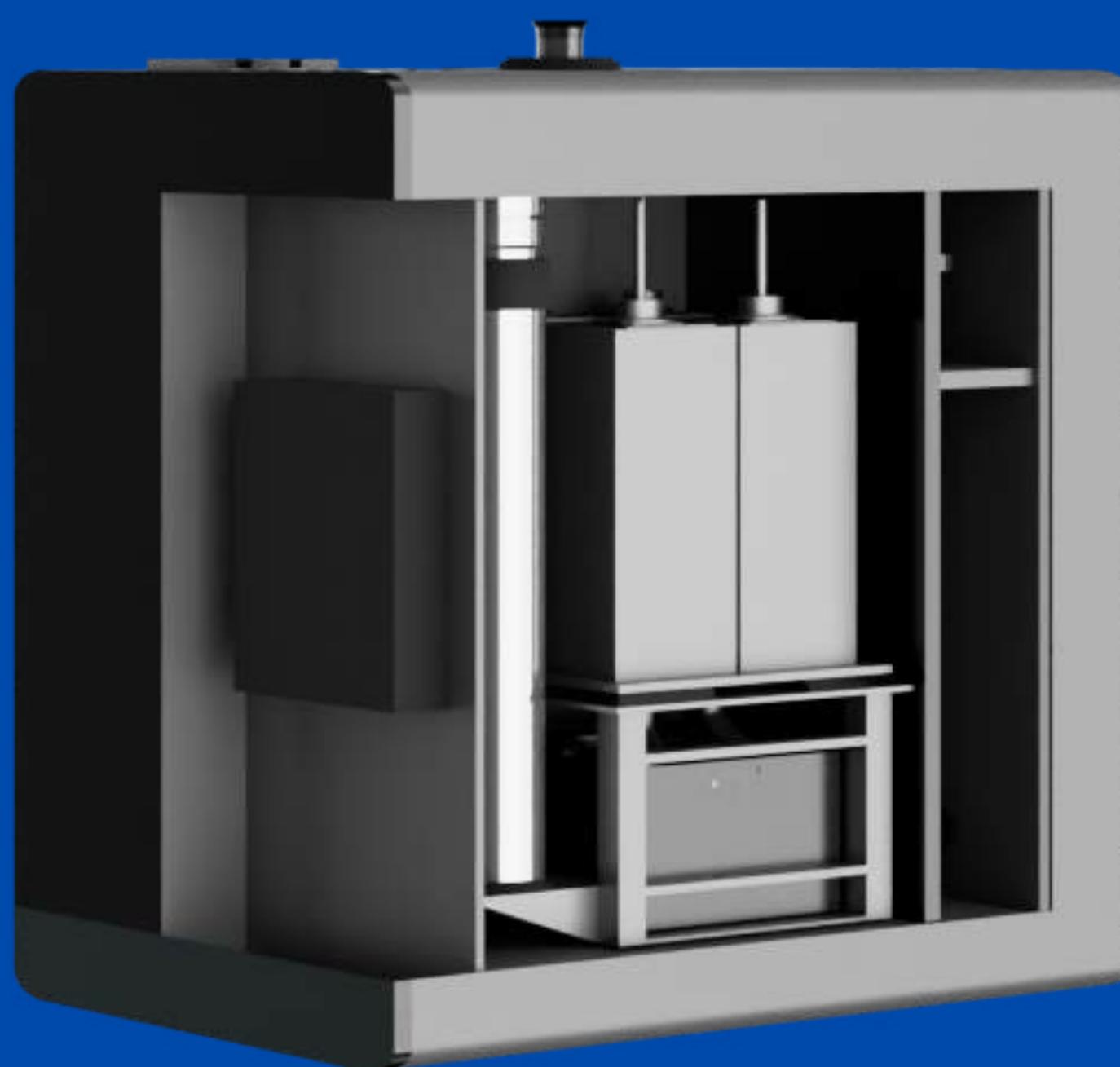
1 unit | 2,700 kg | 1 m<sup>3</sup>

15 min

# TAILORED OFF-GRID POWER SOLUTIONS



COMPACT & LIGHTWEIGHT



SPX 1.0

SPRING 2026



1

## Affordable

- Comparable CAPEX to diesel
- Use natural gas more efficiently at ~60%
- Natural gas is cost-effective vs. diesel

2

## Fuel Flexible

- Seamlessly switch <> natural gas, biogas, methane, hydrogen or blends

3

## Low Emissions

- Zero-low emissions depending on fuel type.
- No air-pollutants and noise-free

# A PLATFORM TECHNOLOGY

6-9

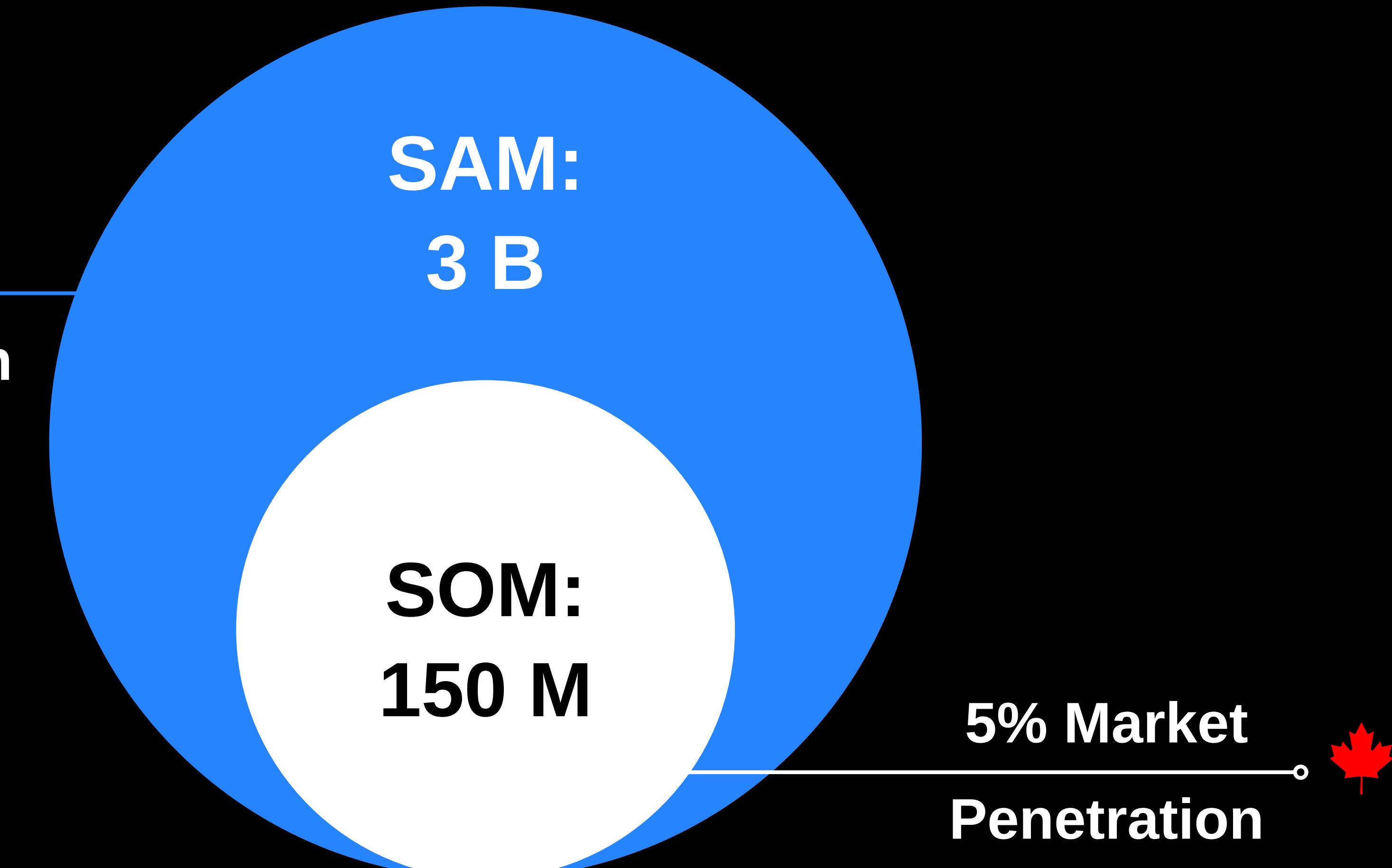
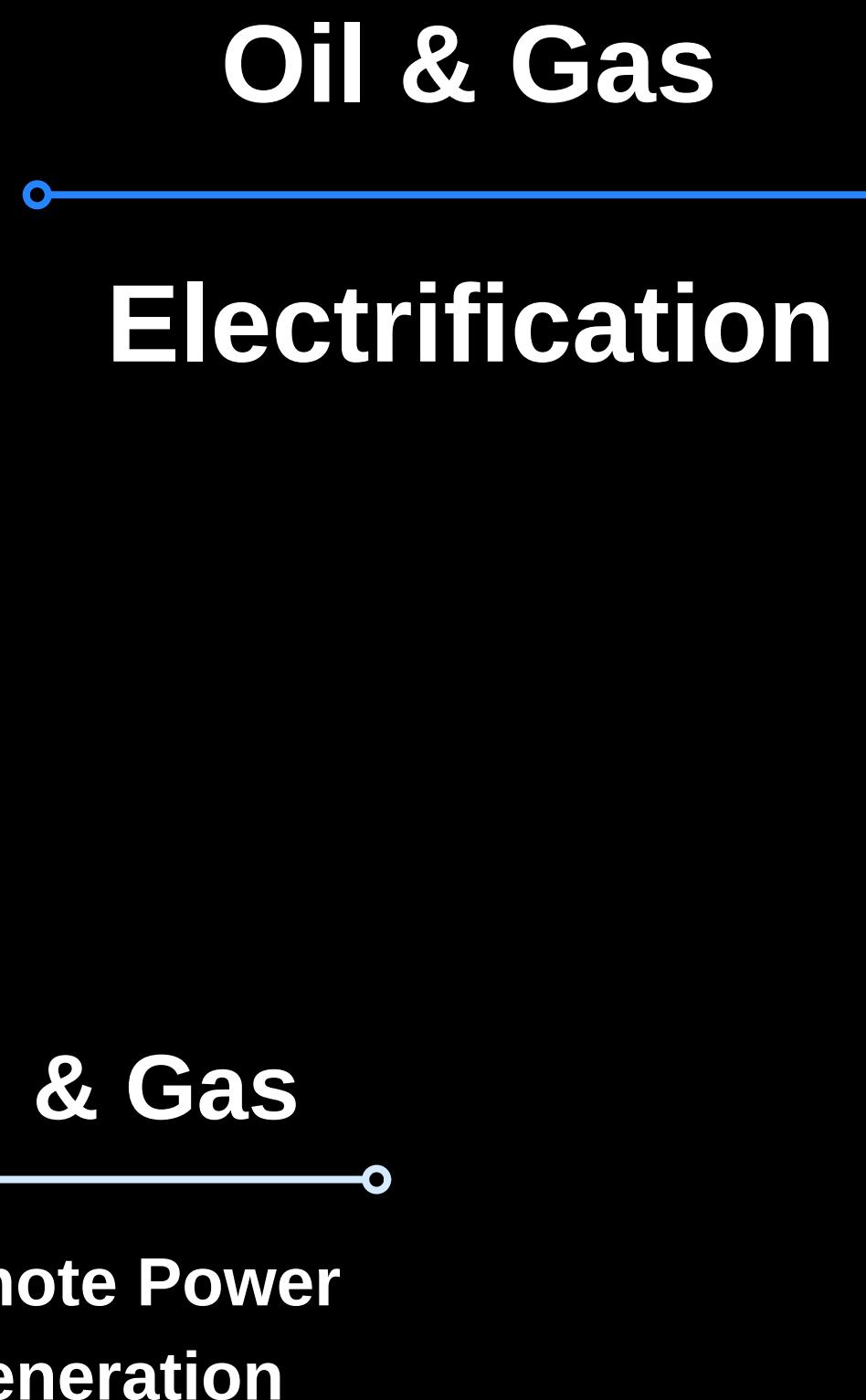
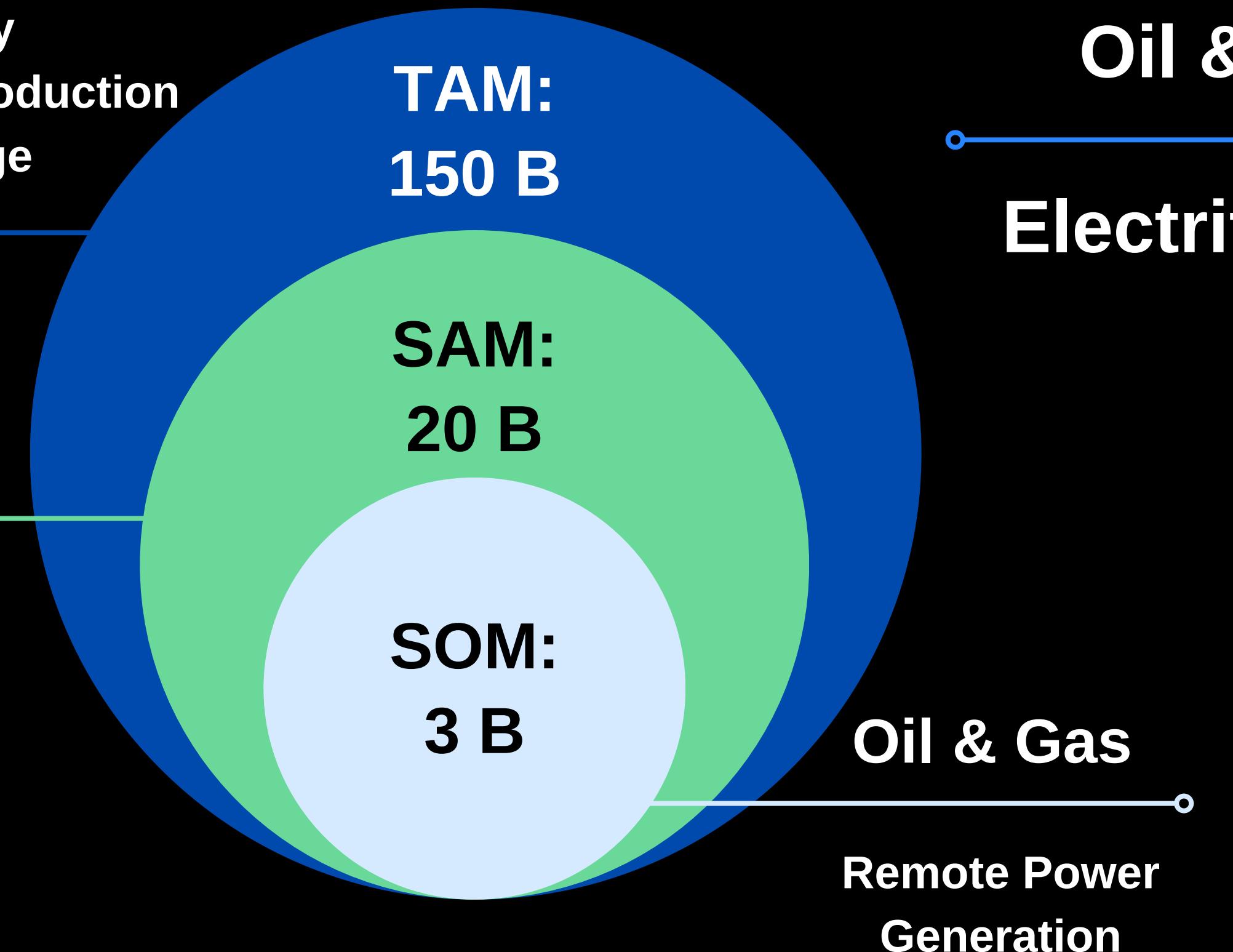


\$ AMOUNTS IN USD

## GO-TO-MARKET

### OVERALL MARKET VISION

- Power Generation
- Heavy Mobility
- Clean Fuel Production
- Energy Storage
- Remote Power Generation



5% Market Penetration

# INDUSTRY INTEREST

## → 20+ Conversations

Chevron	Idemitsu
Shell	New Jersey Natural Gas
Cenovus	Halliburton
bp	ConEdison
Canadian Natural	Lagasco
Suncor	TC Energy
Enbridge Gas	Neste
ATCO Gas	

## → Pilot Pathway

Corporate Accelerator: March - May 2025



LOI: Natural Gas Production Company

**LAGASCO**

“ — BP

*We're actively looking for SOFC solutions that can power remote operations with lower emissions and operational costs.*

— Decarbonization Specialist, bpx

“ — CENOVUS ENERGY

*When Serenity Power is ready to pilot test onsite, Cenovus would be interested in trialing their decarbonization technology to replace diesel.*

— Operations Innovations, Cenovus

# COST-EFFECTIVE ENERGY SOLUTIONS



↓ 90%

LOWER MATERIAL STACK COSTS

↓ 50%

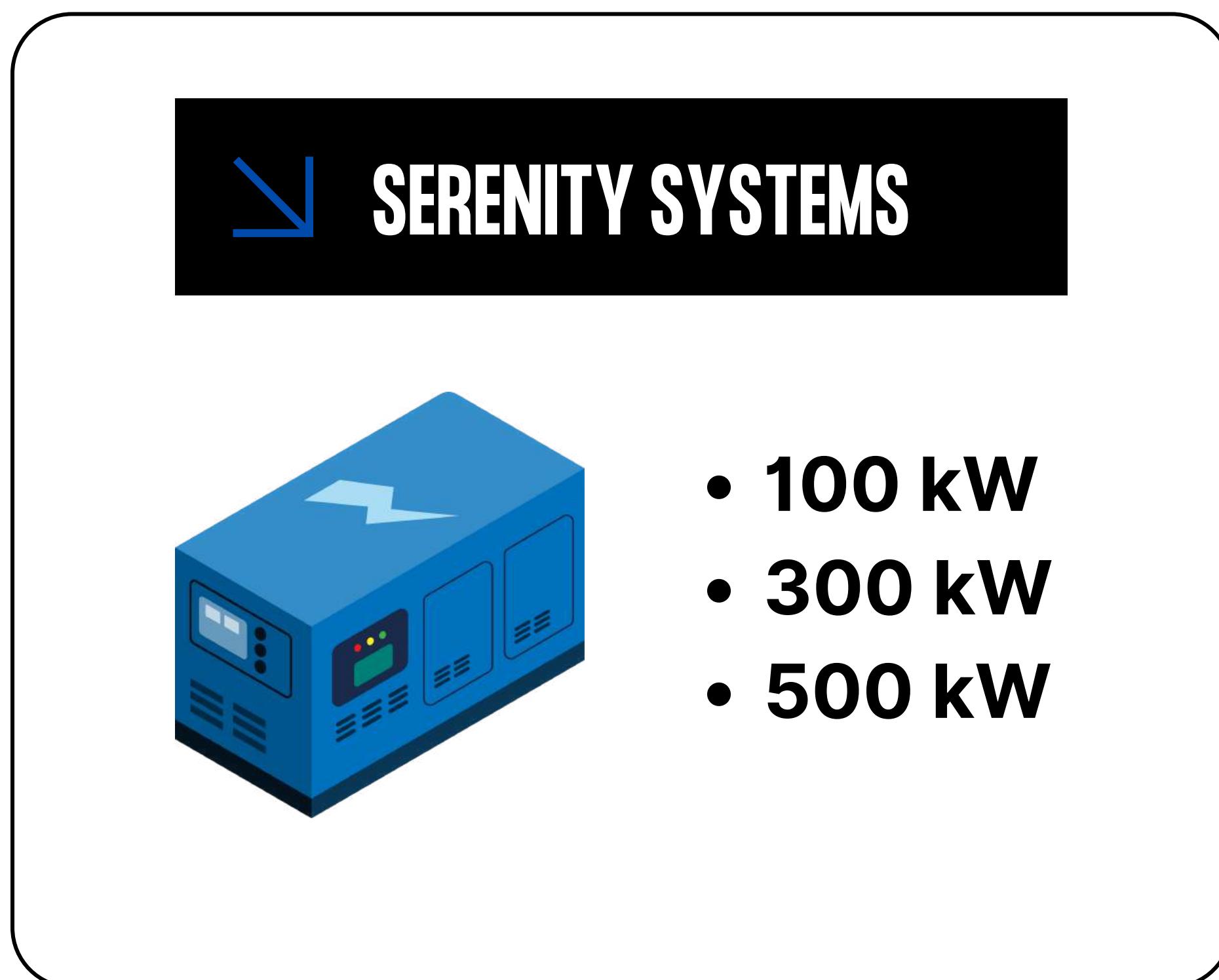
FABRICATION COST REDUCTIONS

↓ 77%

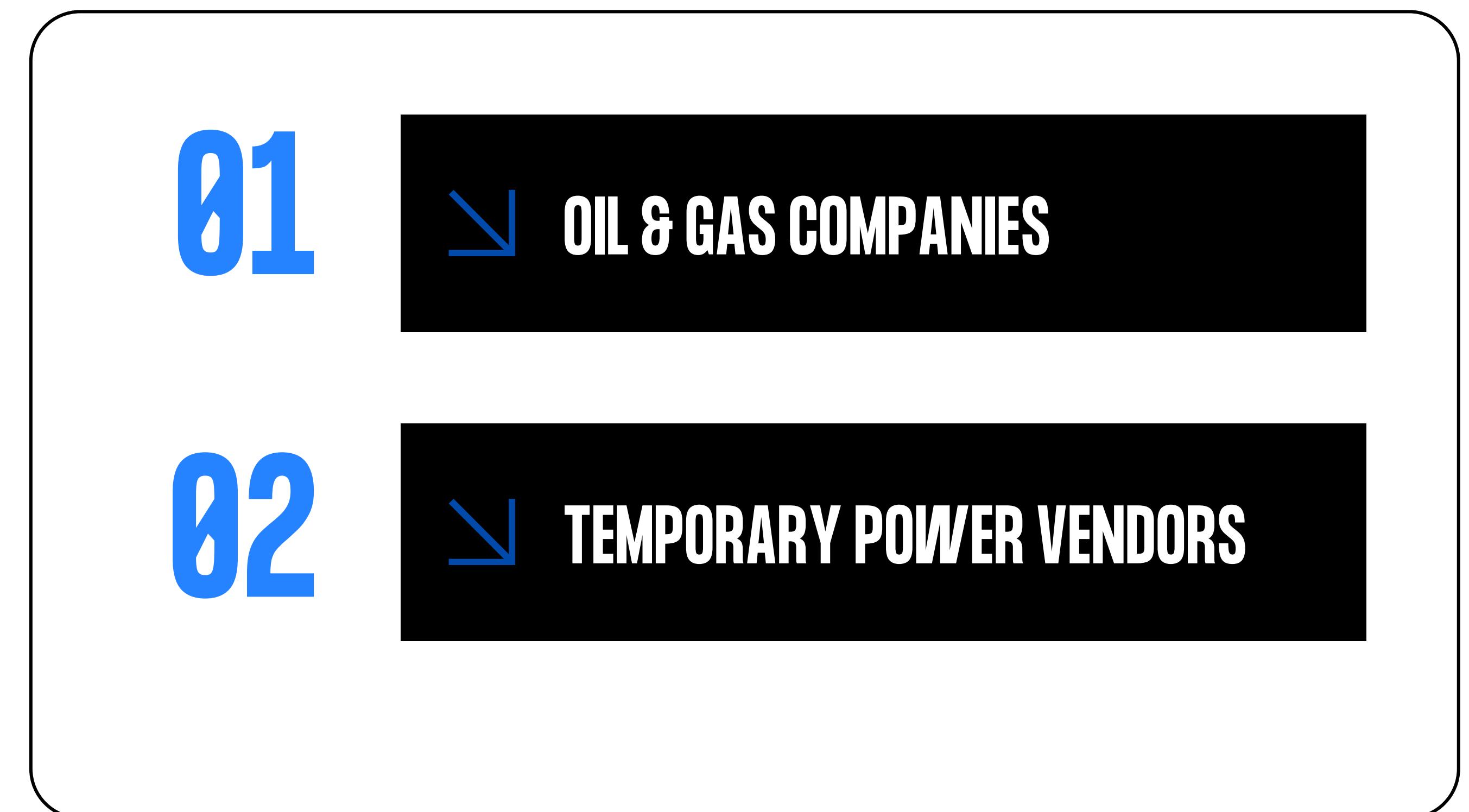
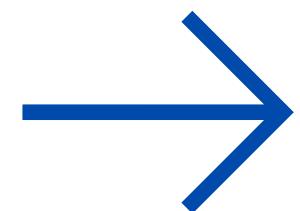
FUEL COST SAVINGS

# OFFERING OIL & GAS A RELIABLE PATHWAY TO ZERO-EMISSIONS

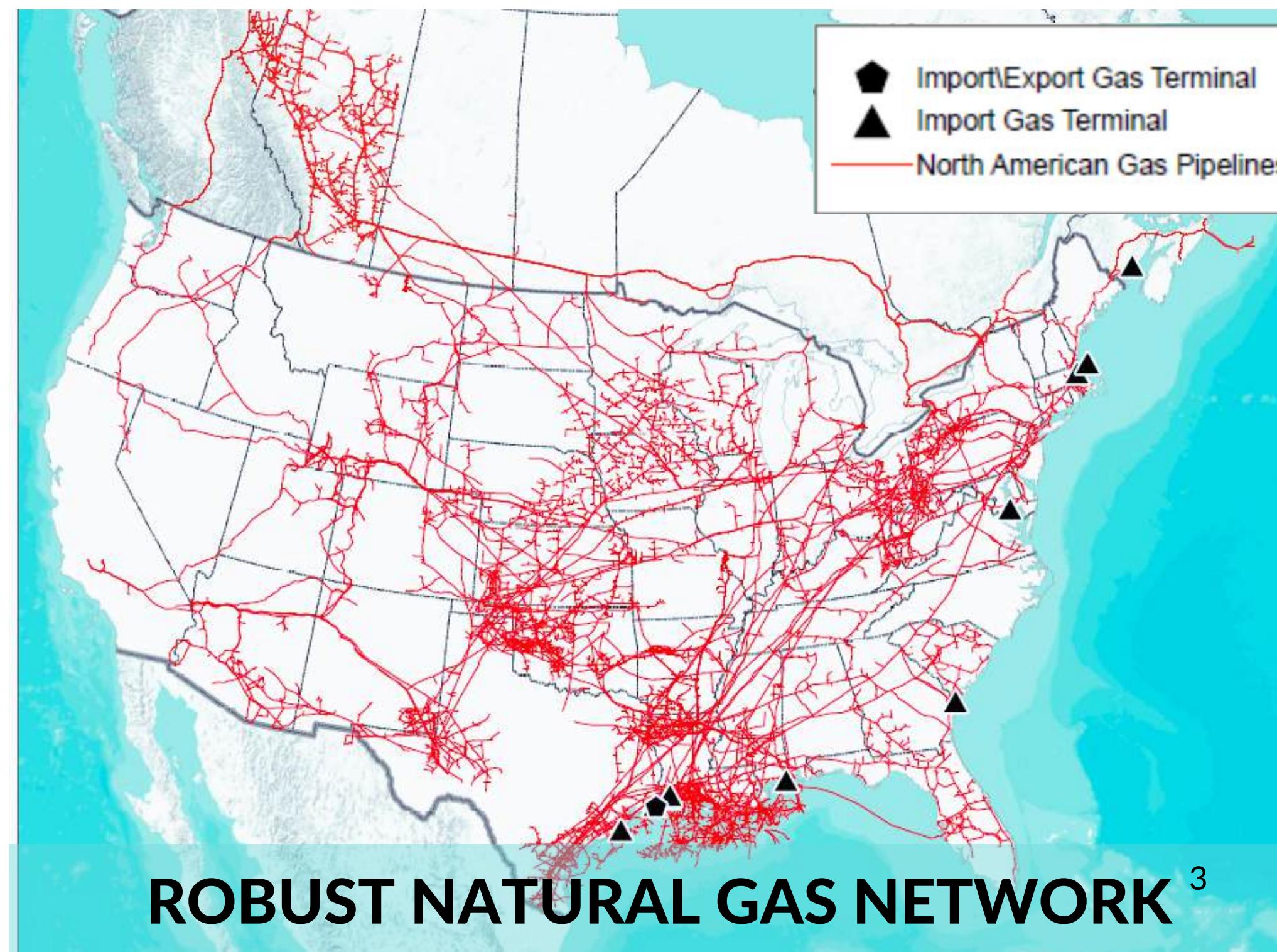
B2B MODEL



DIRECT SALES



# FUEL FLEXIBILITY: AN INFRASTRUCTURE READY SOLUTION



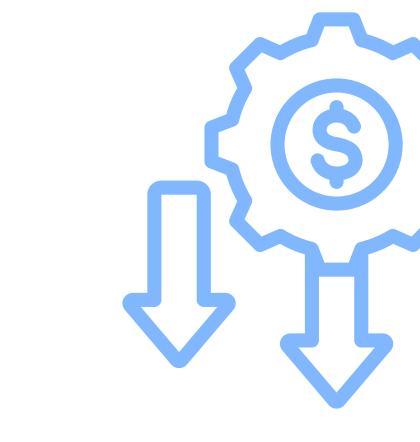
→ Natural Gas / Biogas

→ Hydrogen

→ Blends

+ more to test

# SIGNIFICANT BENEFITS TO OIL & GAS



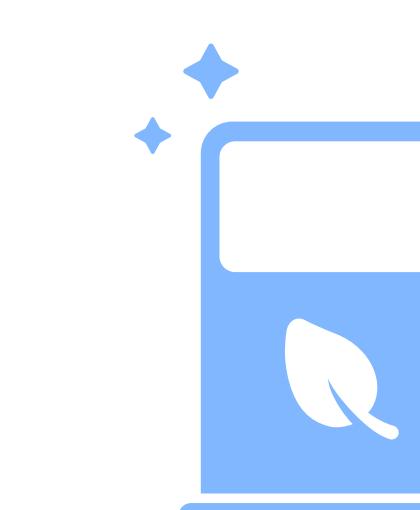
**LOWER OPERATING COSTS**



**58% CARBON REDUCTION**



**100% AIR POLLUTANT ELIMINATION**



**FUTURE-PROOF OPERATIONS**

# COMPETITOR ANALYSIS

## DIESEL

**KOHLER**

**CATERPILLAR**



**GENERAC**



## NATURAL GAS



A Rolls-Royce solution

**SIEMENS**



**KOHLER**

**GENERAC**

## BATTERIES

**Panasonic**



**SAMSUNG**



## PEMFC



**NUVERA**



**cellcentric**

## CONVENTIONAL SOFC

**ceres**



**Bloomenergy**



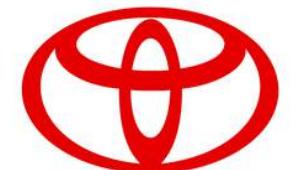
**AISIN**



## HYDROGEN ICE



**MAN Energy Solutions**



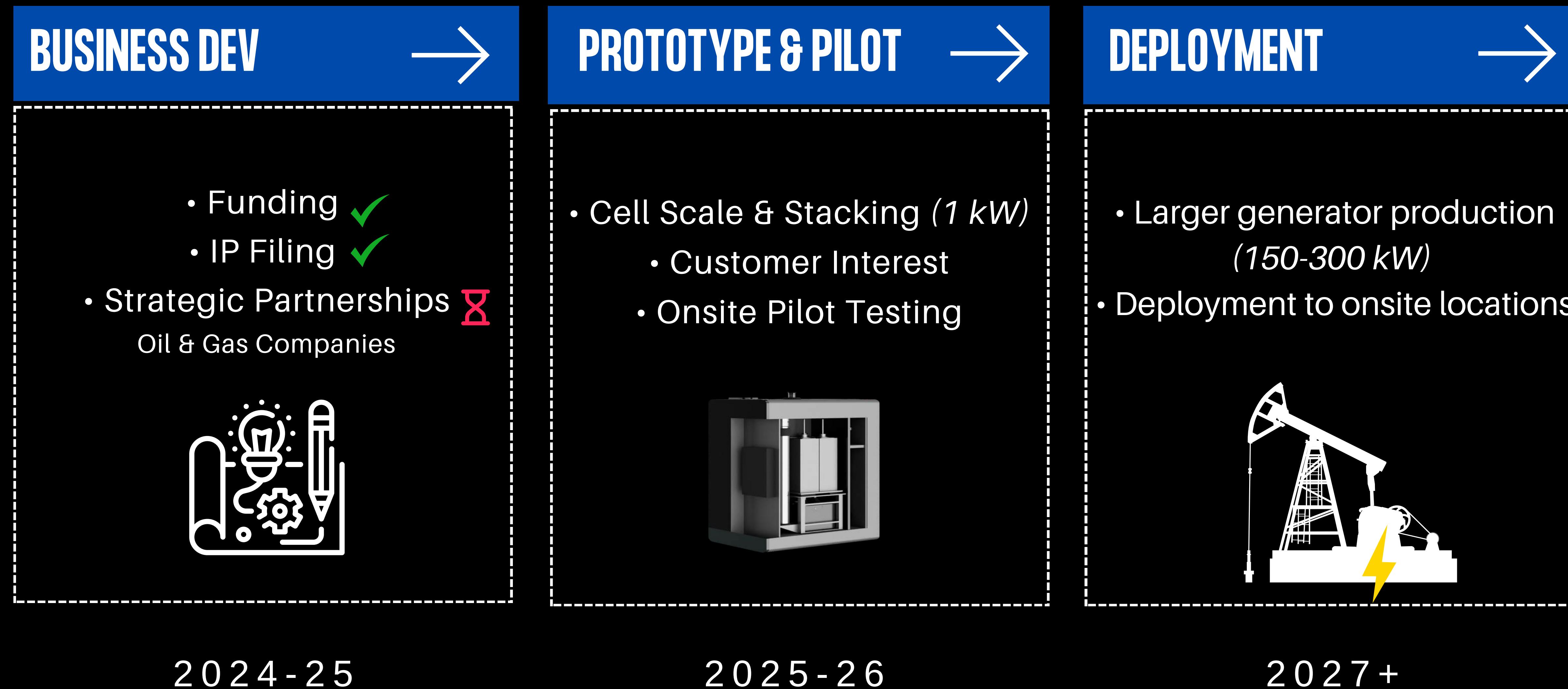
**VOLVO PENTA**

# COMPETITOR ANALYSIS

## TECHNOLOGY (SPECS FOR 300 KW) 10-21

GENERATOR FEATURES	TECHNOLOGY (SPECS FOR 300 KW)					
	Diesel	Natural Gas	Batteries	PEMFCs	Conventional SOFCs	SERENITY
Fuel Efficiency	20-30%	~30%	N/A	40%	>60%	>60%
Manufacturing Cost	\$33K	\$44K	\$417K	\$42K	\$300K	\$46K
Retail Cost	\$45K	\$60K	>\$1M	\$1M	\$3M	\$80K
System Weight	3,500 kg	5,000 kg	> 17,000 kg	>1000 kg	> 14,500 kg	~2,700 kg
System Volume	15 m <sup>3</sup>	22 m <sup>3</sup>	~40 m <sup>3</sup>	2 m <sup>3</sup>	20 m <sup>3</sup>	1 m <sup>3</sup>
Refuelling/Charging Times	Minutes	Minutes	Hours	Minutes	Minutes	Minutes
Fuel Flexibility	Diesel	Natural Gas	N/A	Extremely Pure Hydrogen	Reformed Natural Gas or Green Methane, Hydrogen	Natural Gas, Green Methane, Hydrogen
Start-Up Time	Seconds	Seconds	Seconds	Seconds	3 Hours	< 15 minutes
Cold Weather Engine Issues	None	None	Performance Drop	Product Freezing	None	None

# COMMERCIALIZATION ROADMAP



2024-25

2025-26

2027+

# SERENITY PRODUCT VISUALIZATION



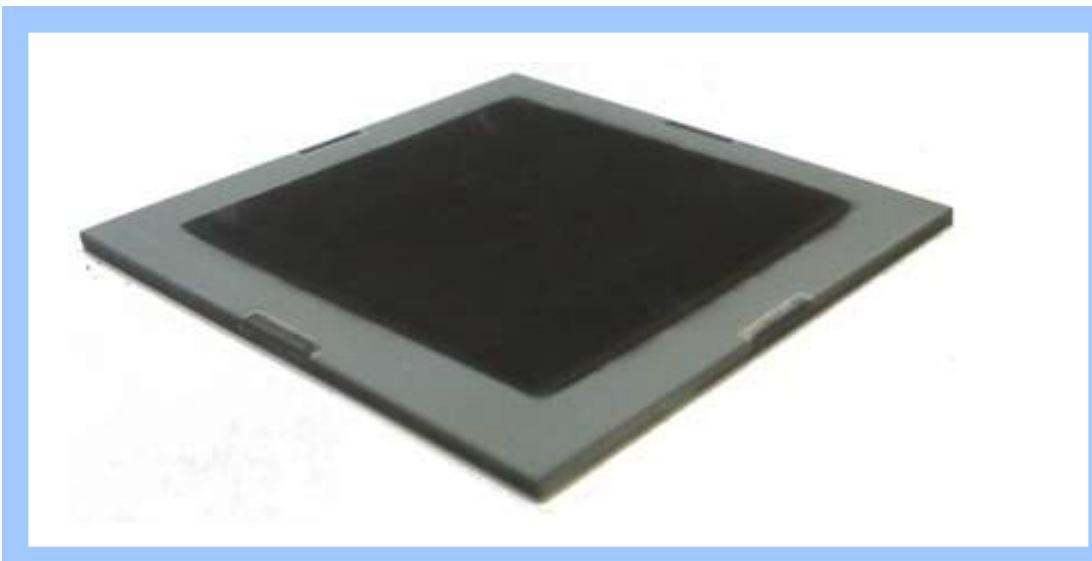
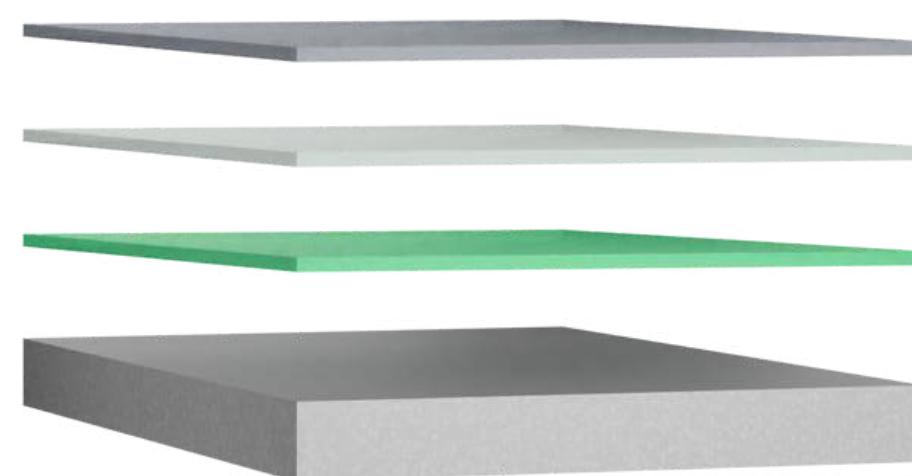
## NEXT STEPS



FUEL CELL

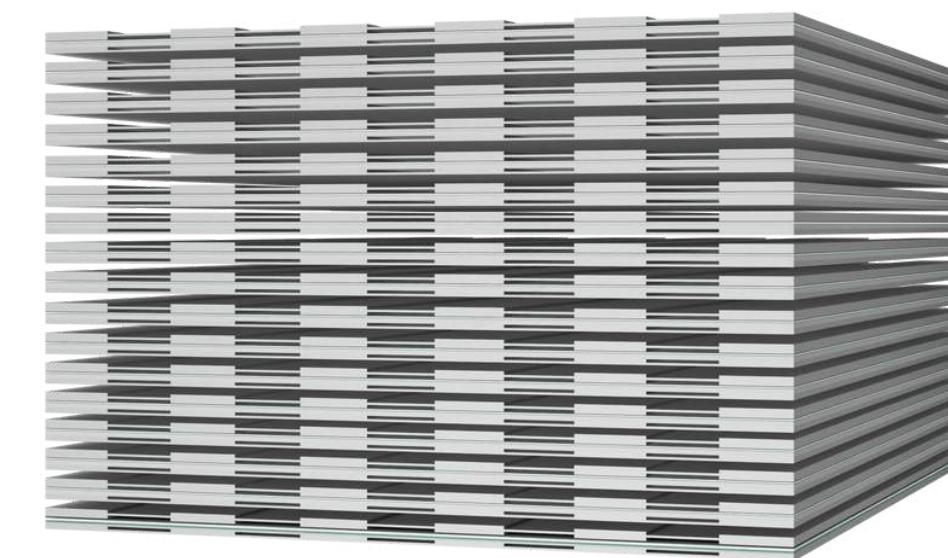
25 W

TRL 4



STACK

1 KW



SPX 1.0

1 KW

TRL 7



SPX 2.0

150-500 KW

TRL 9



PRE-SEED  
12 MONTHS

SEED

# PILOT ROADMAP

## 01 BEACHHEAD

ENTERTAINMENT

2026

**1 KW UNIT**

- Partners secured
- Test generator fast
- Test @ multiple festivals

## 02 LONG-TERM MARKET

OIL & GAS

2027 +

**> 150 KW UNITS**

- Harsher conditions to account for
- Strategic partnerships
- Customer contracts

# PRE-SEED PROJECT PLAN TO SCALE TECH

**18 MONTH RUNWAY**

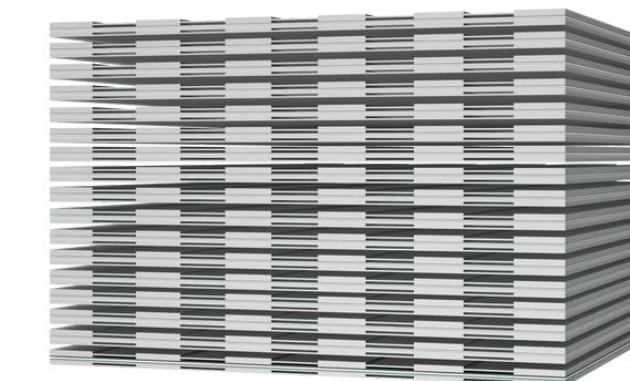
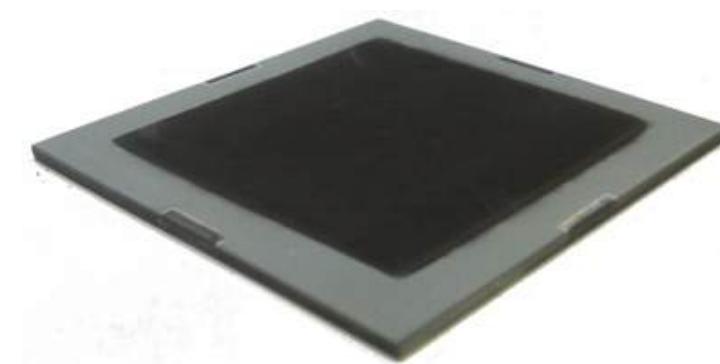
\$ AMOUNTS IN USD

**5 MONTHS**

**4 MONTHS**

**3 MONTHS**

**4 MONTHS**



**1.** Outdoor Festival  
(Food Truck)

**2.** Oil & Gas Onsite  
Operation

**CELL SCALE UP**

**STACK DEVELOPMENT**

**GENERATOR**

**PILOT TESTING**

**\$290 K**

**\$250 K**

**\$210 K**

**\$220 K**

**\$ 1.1 M**

- 12 months to MVP (\$750 K)

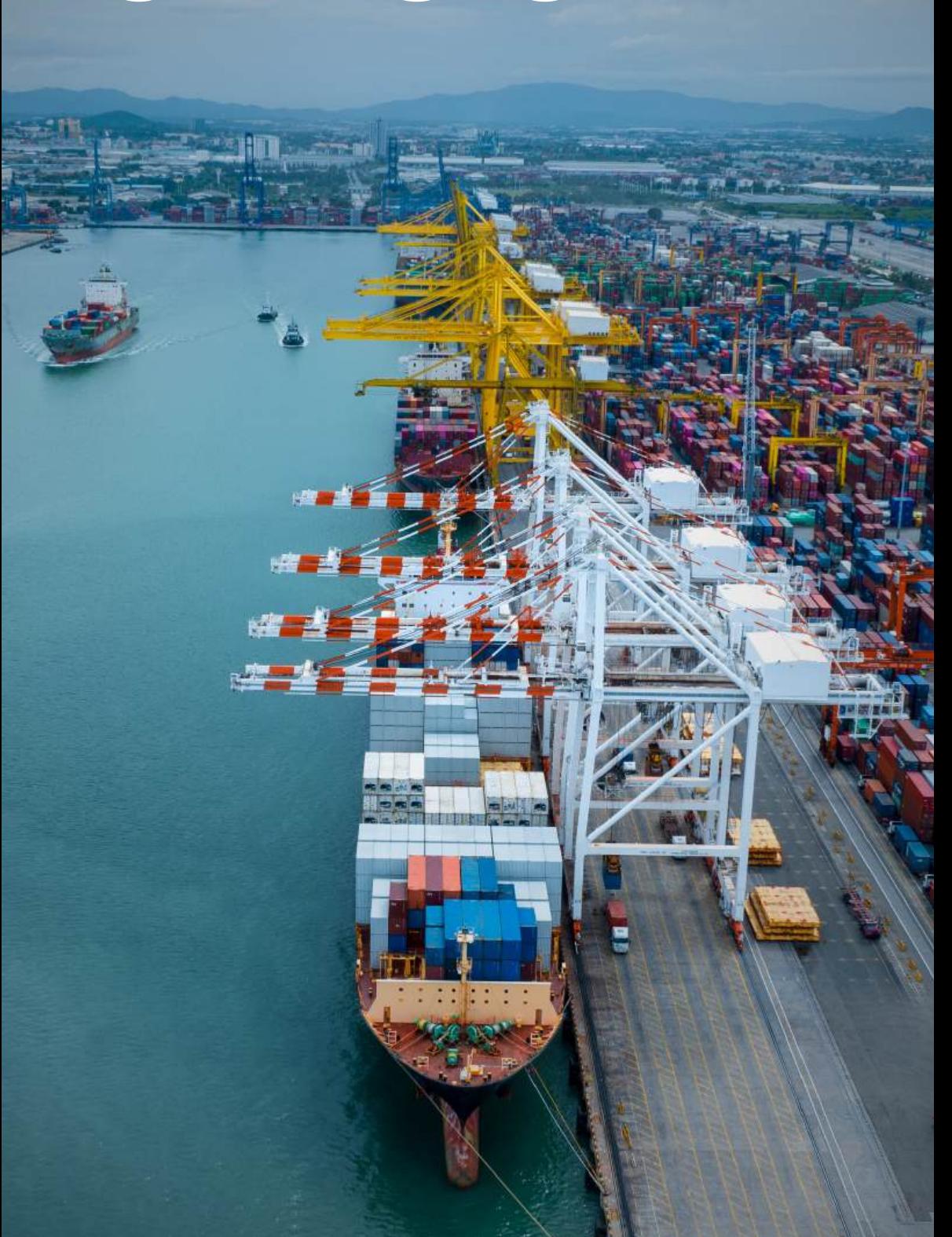
- 2 months contingency (\$150 K)

- 4 months of piloting (\$220 K)

# LOOKING AHEAD

STRONG TRACTION FOR OUR FUTURE MARKETS

## POR TS & MARITIME



- PORT AUTHORITY OF NY & NJ
- PORTS TORONTO
- MARITIME ASSOCIATION OF NY
- PORT OF MONROE
- ROYAL CARIBBEAN
- MARITIME & PORT AUTHORITY OF SINGAPORE
- PORT OF GOTHENBURG
- CITY OF YOKOHAMA
- NYK GROUP

## TRANSPORTATION



### OEMS

- VOLVO GROUP (JOINT STUDY)
- ELEMENTAL TRUCKS (LOI)
- MACK TRUCKS
- DAIMLER TRUCKS
- MERCEDES BENZ
- CUMMINS
- NEW FLYER
- TOYOTA

### FLEETS

- PEPSICO
- WALMART

# MEET OUR TEAM

ALEISHA  
CERNY



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CEO

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MATERIALS  
ENGINEERING | MASC

YVONNE  
LIU



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COO

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MECHANICAL  
ENGINEERING | MENG

DR. YIFEI  
YAN



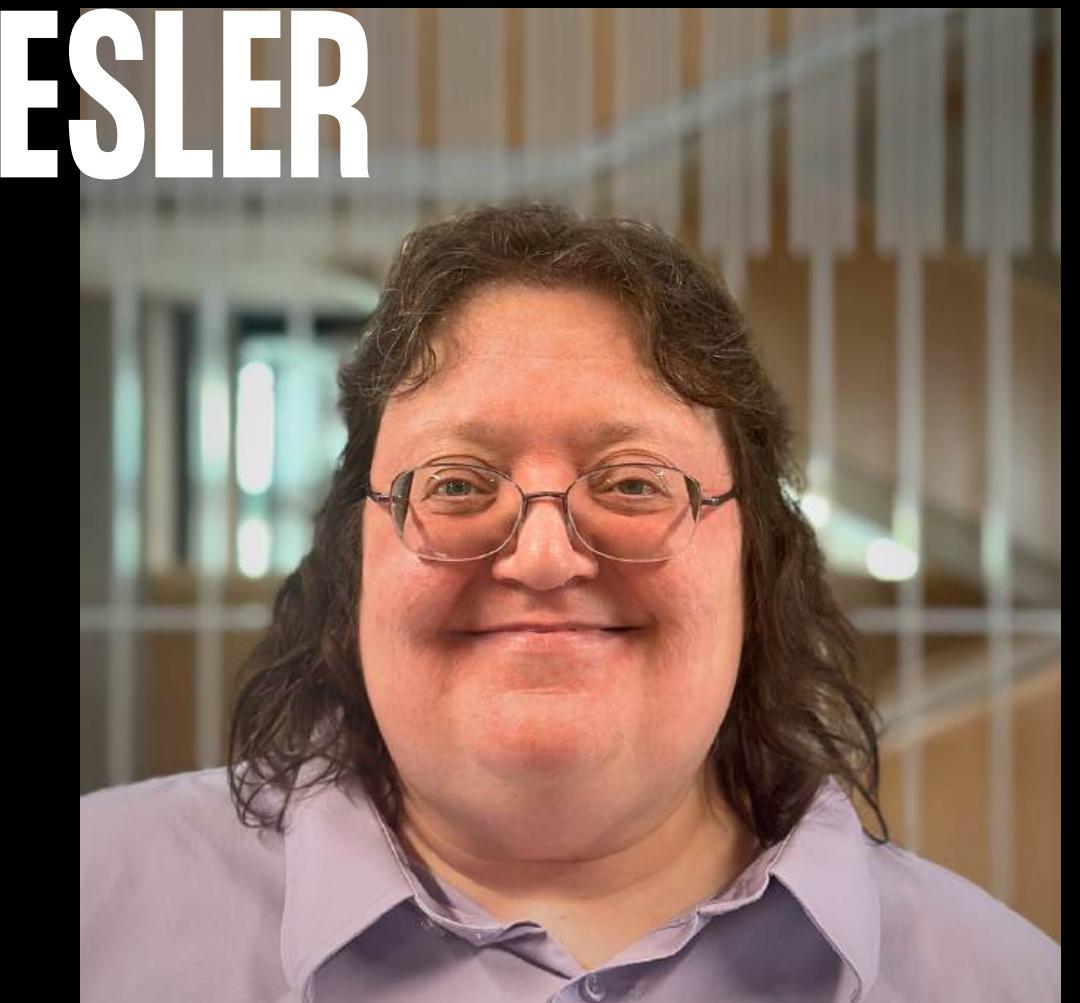
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CTO

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CHEMICAL  
ENGINEERING | PHD

DR. OLIVERA  
KESLER



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CSO

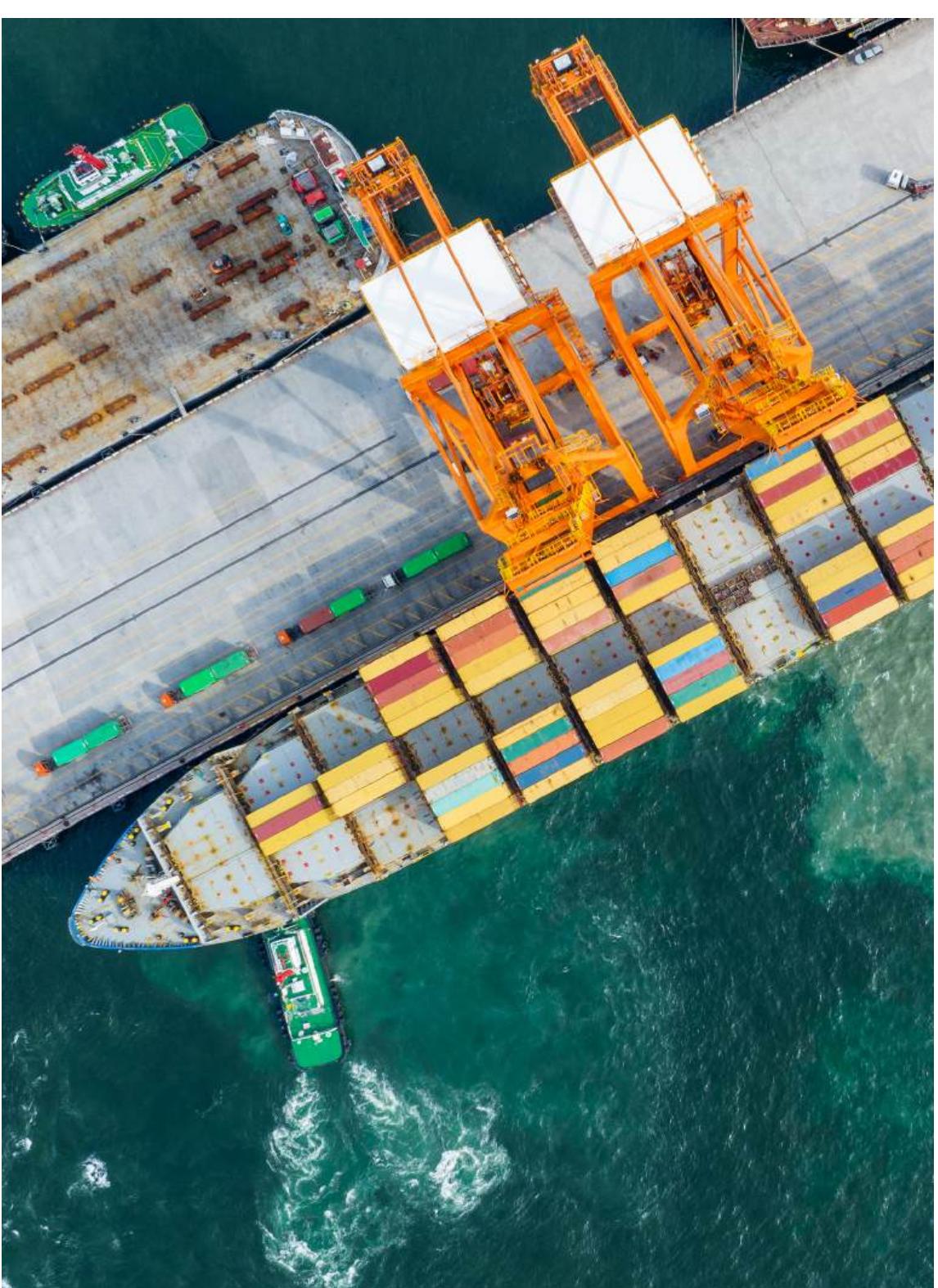
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PART-TIME

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MATERIALS SCIENCE &  
ENGINEERING | SCD

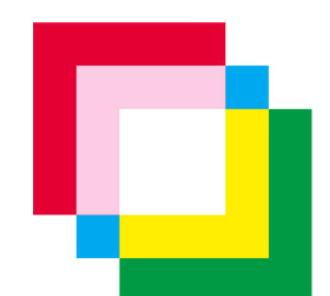
# LET'S TACKLE THE CLEAN ENERGY TRANSITION TOGETHER



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**Email**  
[contact@serenitypower.ca](mailto:contact@serenitypower.ca)

**Address**  
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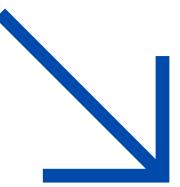


# REFERENCES

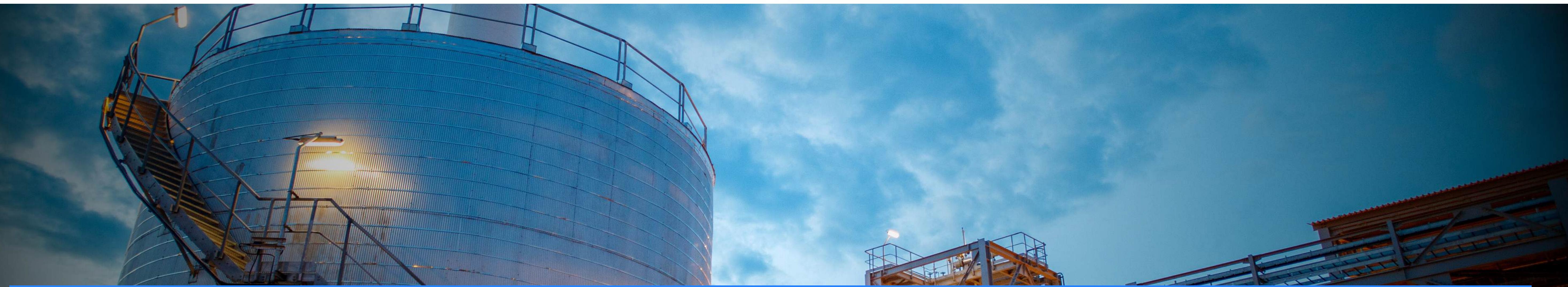
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SERENITY  
POWER



# APPENDIX



SERENITY POWER INC.

MARCH 2025-V1

# ADVISORY BOARD



**RYAN GILLIAM, PHD**

CLEAN TECH ADVISOR & VC

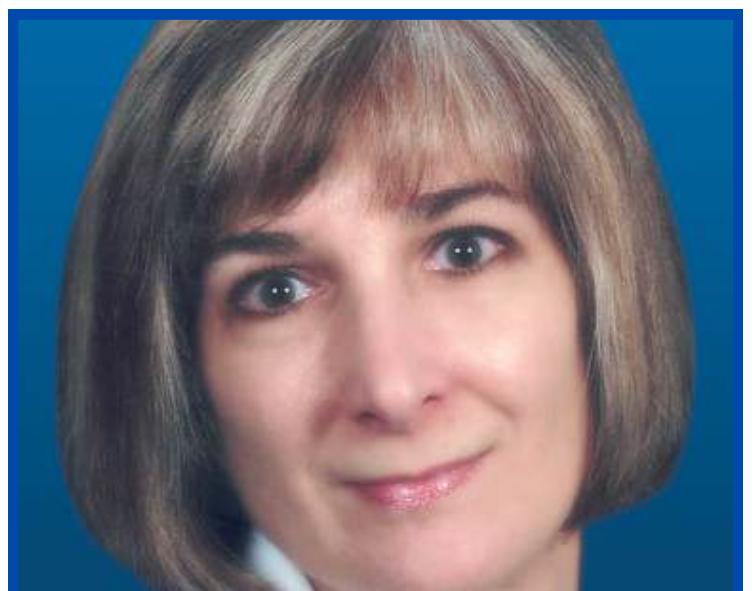
- CEO & Founder of Fortera,
- Founder of Verdagy
- 16+ years in industry



**JOSEPH CARGNELLI, MASC**

FUEL CELL & MANUFACTURING ADVISOR

- Hydrogen Executive with 20+ years
- CTO & Founder of Hydrogenics
  - Sold to Cummins for \$290 M



**LINDA DRISDELLE, PENG**

PROCESS ENGINEER & HYDROGEN ADVISOR

- Chair of Hydrogen Business Council Canada
- 25+ years as National Hydrogen Product Manager, Process Engineer (Linde), Business Manager



**W. JAMES POWELL, MBA**

OIL & GAS / HYDROGEN ADVISOR

- 30+ years of experience in energy production
- Spearheaded hydrogen strategy at ATCO



**CAROLYN HICKS, MBA**

CLEAN TECH & BATTERY ADVISOR

- CFO/COO & Co-Founder of Brill Power
- +10 years Industrial Experience



**DAVID KWIATKOWSKI, PENG**

INDUSTRY ADVISOR

- Advanced Manufacturing Technologies Leader
- 20+ years Consulting at Deloitte, 10+ years in Engineering

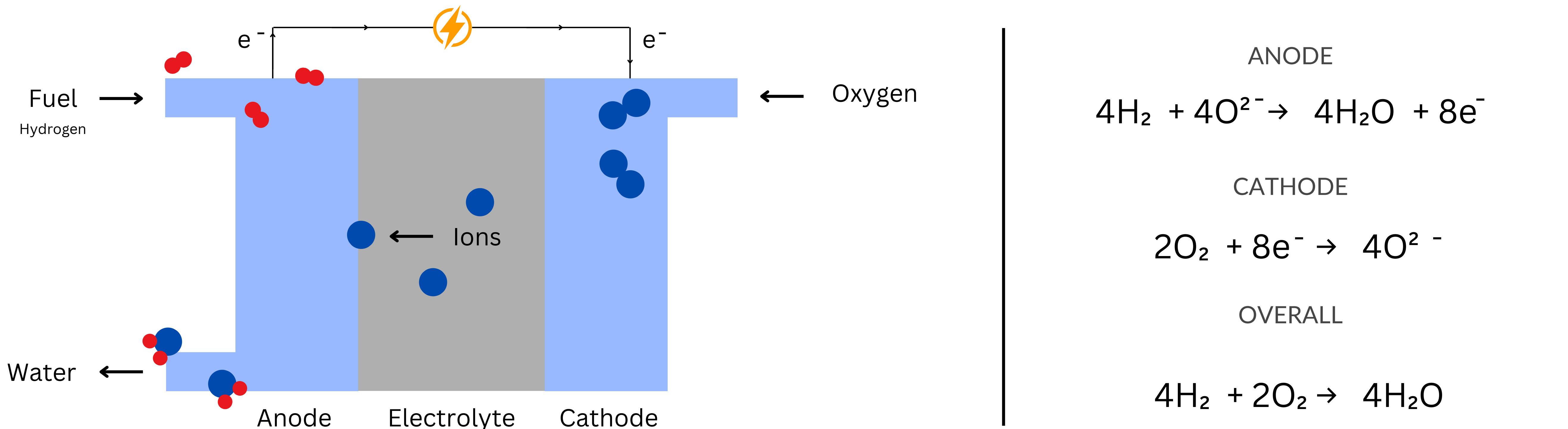
**Deloitte.**

# HOW DO FUEL CELLS WORK?

SOLID OXIDE FUEL CELL (SOFC) DEPICTION | HYDROGEN

ZERO-EMISSIONS

**FUEL + OXYGEN = ELECTRICITY + HEAT + WATER**



- 60% ELECTRICAL EFFICIENCY

- HIGH QUALITY HEAT

- ~90% EFFICIENCY COMBINED HEAT + POWER (CHP)

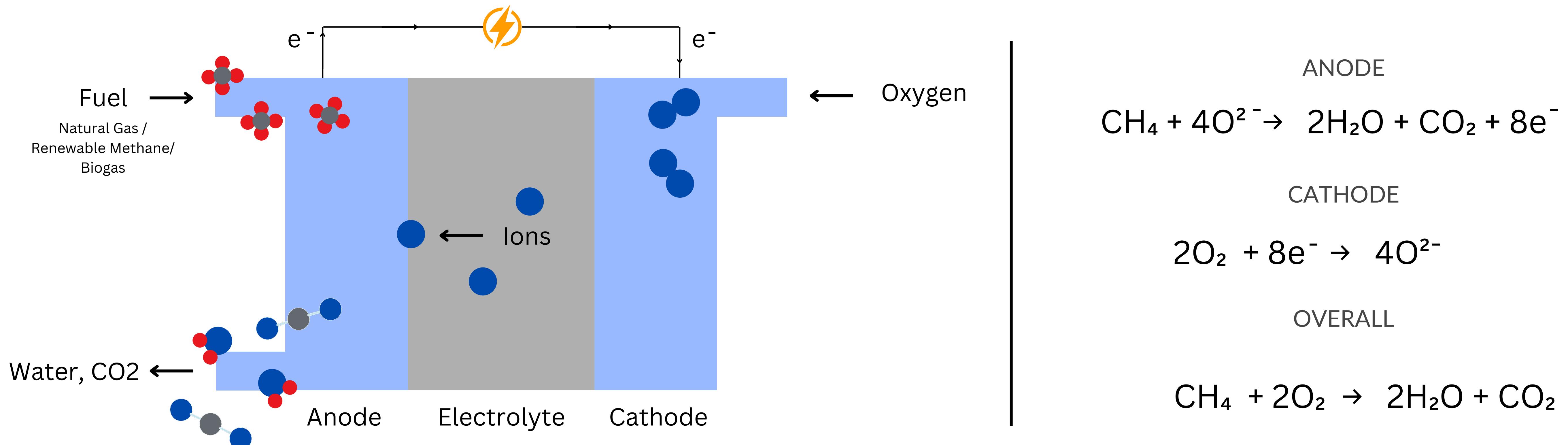
# HOW DO FUEL CELLS WORK?



SOLID OXIDE FUEL CELL (SOFC) DEPICTION | NATURAL GAS

57% LESS CO<sub>2</sub> THAN DIESEL | ZERO-EMISSIONS USING RNG

FUEL + OXYGEN = ELECTRICITY + HEAT + WATER + CO<sub>2</sub>



- 60% ELECTRICAL EFFICIENCY

- HIGH QUALITY HEAT

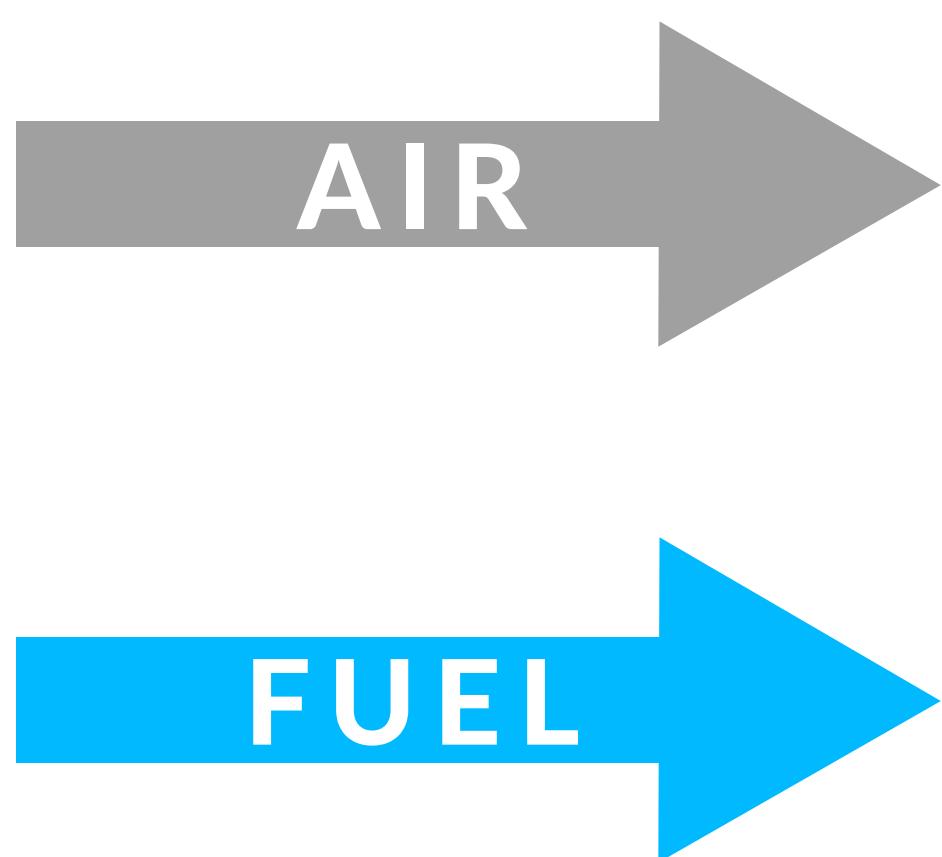
- ~90% EFFICIENCY CHP

- CO<sub>2</sub> CAPTURE POSSIBLE

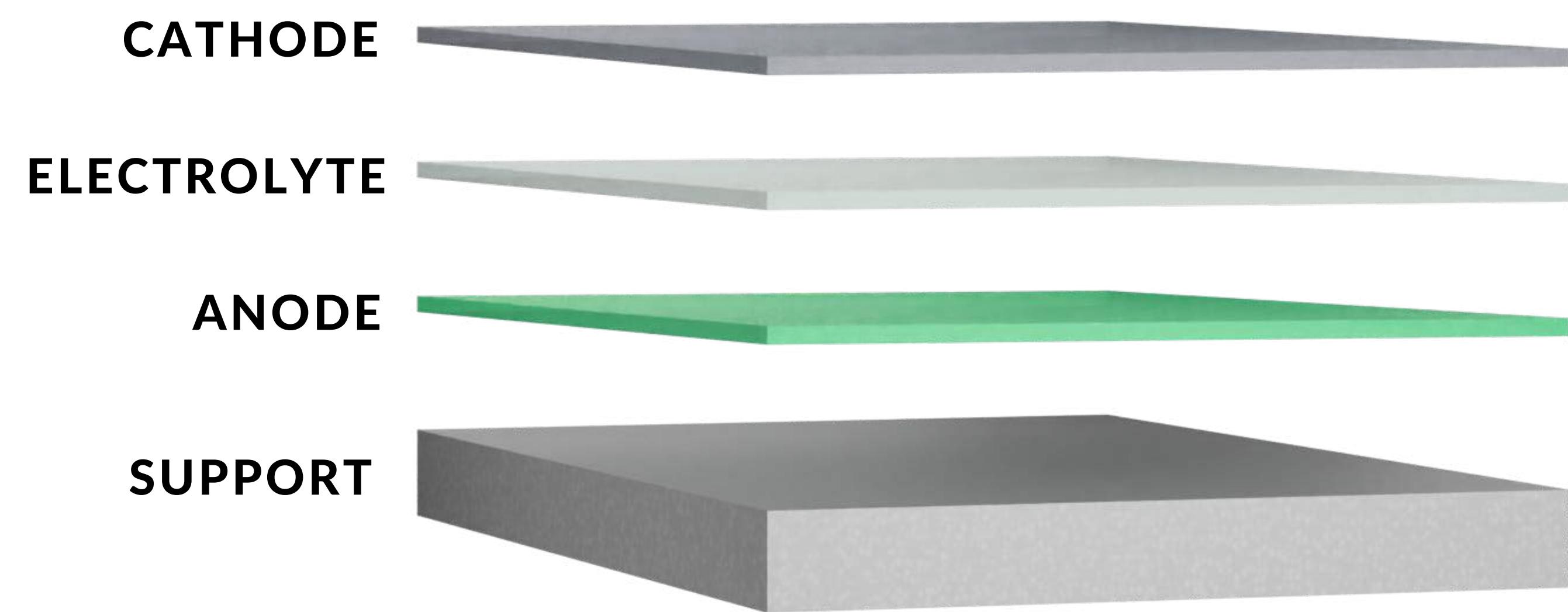
# HOW SERENITY SOFCS WORK



AIR PASSES OVER CATHODE



O<sub>2</sub> IONS REACT W/ FUEL



REACTION PRODUCES  
ELECTRICITY

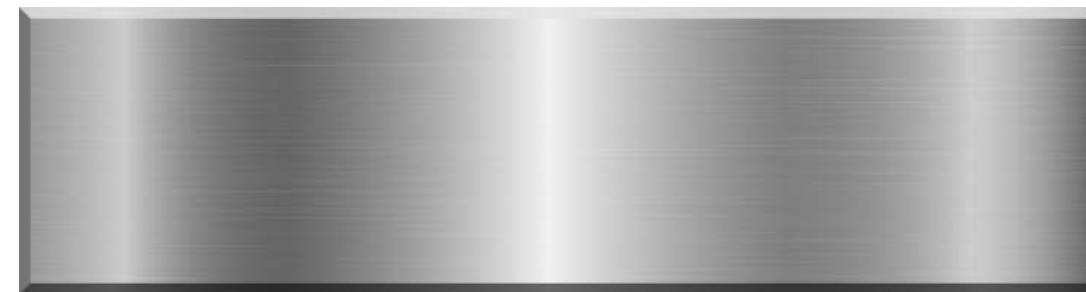


FUEL PASSES OVER ANODE

# SECRET SAUCE: TECHNOLOGY COMPONENTS

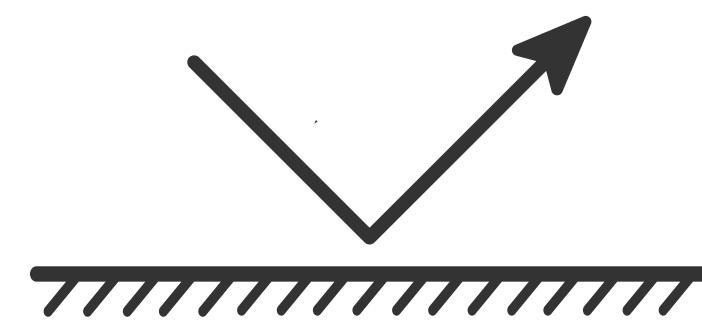


## METAL-SUPPORTED DESIGN



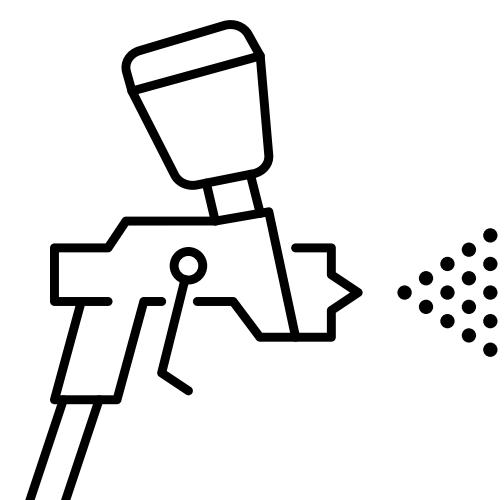
- We use a porous stainless steel metal-supported architecture that enables rapid thermal cycling/ramping, 12x faster electricity production, and improves the mechanical durability of traditional SOFCs. Stainless steel is widely available, cost-effective and reduces material costs by 90%.

## CARBON-RESISTANT FUEL ELECTRODE



- We've developed a new fuel electrode composite that does not experience coking when exposed to hydrocarbon fuels. This eliminates traditional fuel pre-processing equipment, allowing fuel to be directly fed to the stack, ultimately reducing 20x volume and 10x weight.
- No carbon deposition in 600 hours of testing in methane

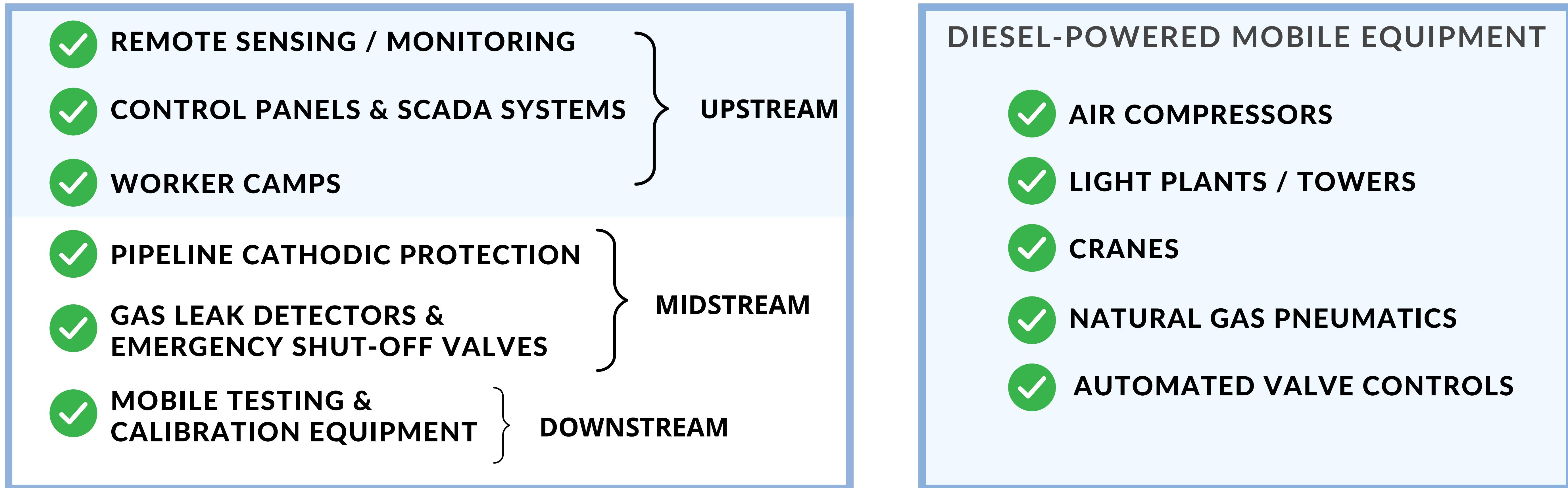
## RAPID MANUFACTURING



- We're using a technique called plasma spraying which has the potential to lower cost & increase durability compared to wet-ceramic fabricated cells
- Power densities, OCV's comparable to those of some wet ceramic-produced cells
- Good thermal cycling stability & redox stability (12 tests, 1000 hours each)

# OIL & GAS TECHNOLOGY USE CASE

MVP: 1 - 2 KW

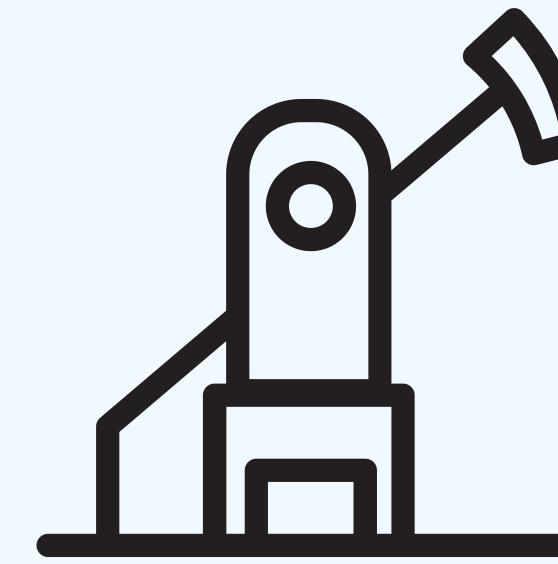


## NEXT STEPS

DEFINE PILOT SCOPE & APPLICATION WITH FIELD PARTNERS & VISIT SITE

# OIL & GAS TECHNOLOGY USE CASE

**100 - 500 KW**



## UPSTREAM

PUMPING, DRILLING, EXTRACTION



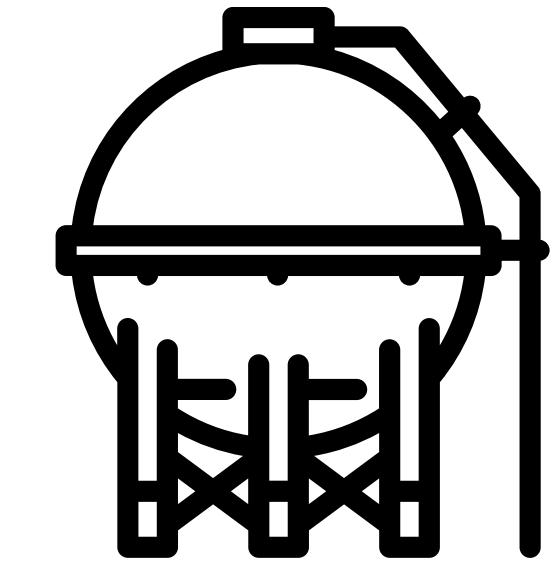
**ELECTRIFY DRILLING RIGS**



**WELLHEADS**



**EXPLORATION + WORKER CAMPS**



## MIDSTREAM

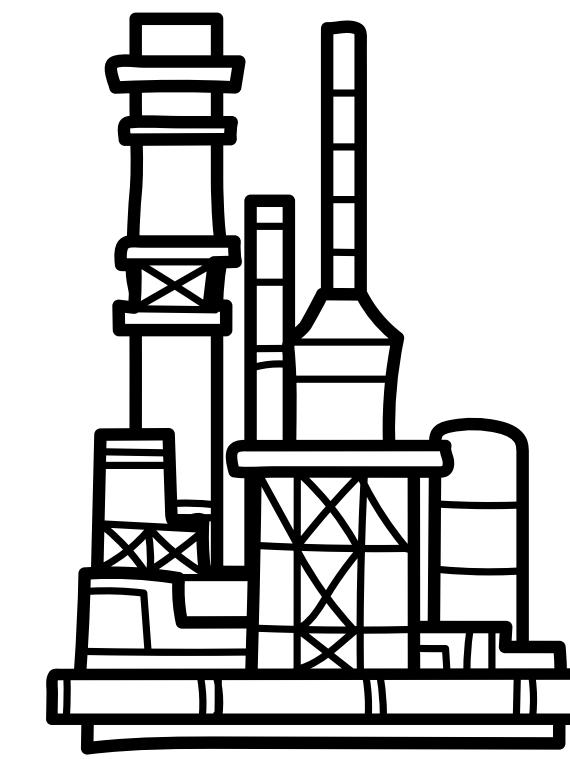
TRANSPORT, STORAGE, MARKETING OF PRODUCT



**PUMPING STATIONS**



**STORAGE TERMINALS & LOADING FACILITIES**



## DOWNSTREAM

REFINING + CUSTOMER DISTRIBUTION

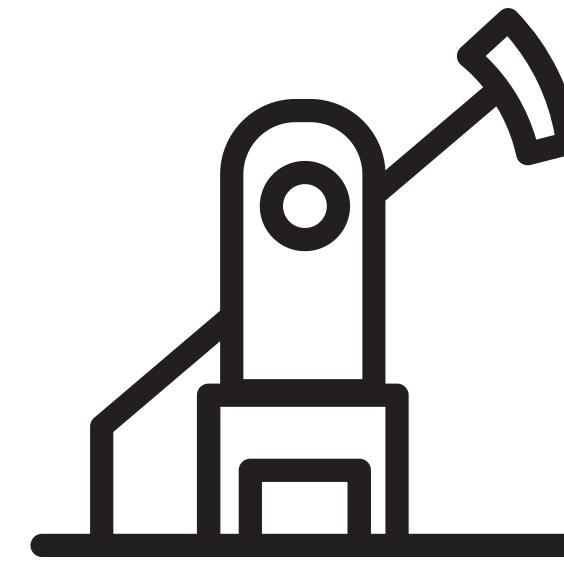


**FUEL DISTRIBUTION TERMINAL**

# OIL & GAS NEEDS TO DECARBONIZE

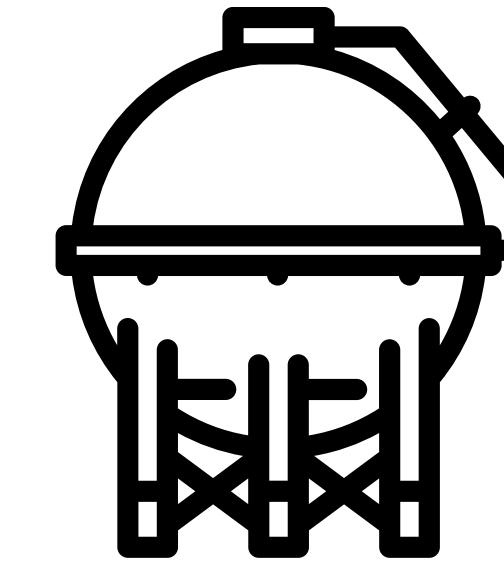
## ENERGY CONSUMPTION ACROSS THE VALUE CHAIN

NATURAL GAS, CRUDE OIL, REFINED PRODUCT



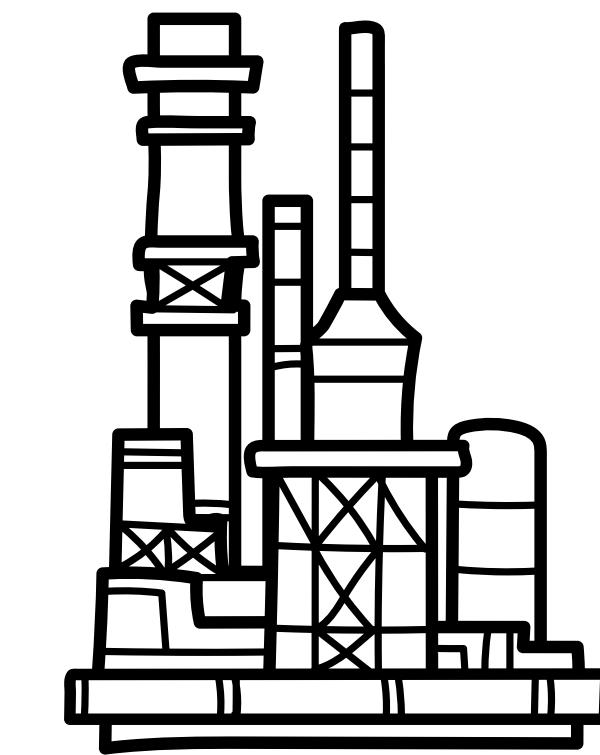
### UPSTREAM

PUMPING, DRILLING, EXTRACTION



### MIDSTREAM

TRANSPORT, STORAGE, MARKETING OF PRODUCT



### DOWNSTREAM

REFINING + CUSTOMER DISTRIBUTION

**~45%**

**~10%**

**~45%**

**“OIL & GAS SECTOR MUST REDUCE ITS EMISSIONS BY > 3.4 GTCO<sub>2</sub>E / YEAR BY 2050  
- THAT'S 90% REDUCTION IN CURRENT EMISSIONS.”**

# PILOT ROADMAP

## 01 BEACHHEAD

ENTERTAINMENT

2026

**1 KW UNIT**

- Partners secured
- Test generator fast
- Test @ multiple festivals

## 02 LONG-TERM MARKET

OIL & GAS

2027 +

**> 150 KW UNITS**

- Harsher conditions to account for
- Strategic partnerships
- Customer contracts

# 01 PILOT PLAN

ENTERTAINMENT **1 KW UNIT**



## USE CASES

- Festivals
- Award Shows
- Film/TV
- Food Trucks

## PARTNERS



## SUMMER 2026

Test at 4-5 outdoor festivals as auxiliary units  
Troubleshoot before harsher condition tests

# 02 PILOT PLAN

OIL & GAS SITE

NOW: 1 KW UNIT  
FUTURE: 150 KW SYSTEMS



## USE CASES AT DRILL SITES

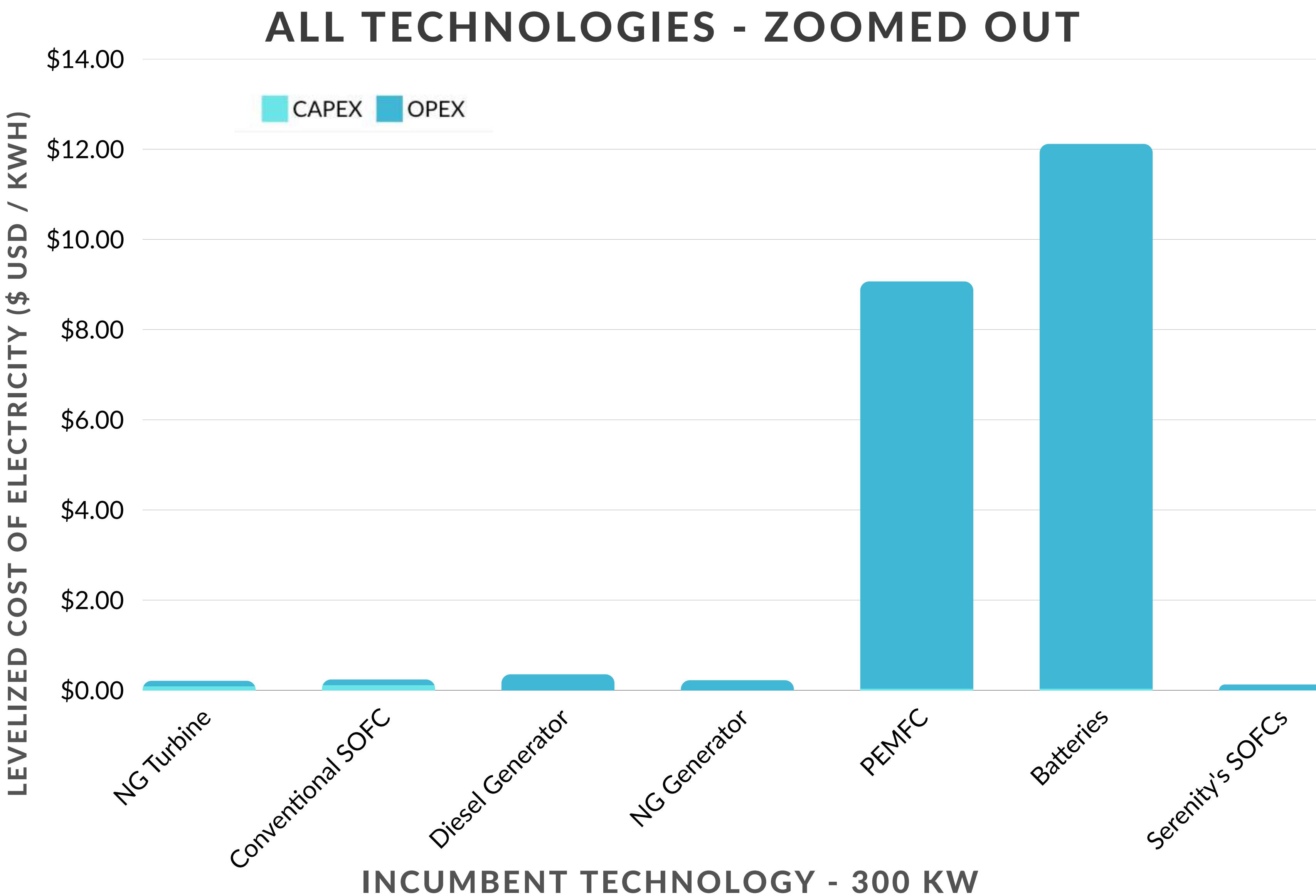
- Worker Camps
- Remote Sensing
- Lighting Towers
- Emergency Power
- Mobile Equipment

## PARTNERS



# TEA KEY TAKEAWAYS

LCOE by technology: Serenity's SOFCs have a slightly higher CAPEX than diesel but deliver substantial OPEX savings.



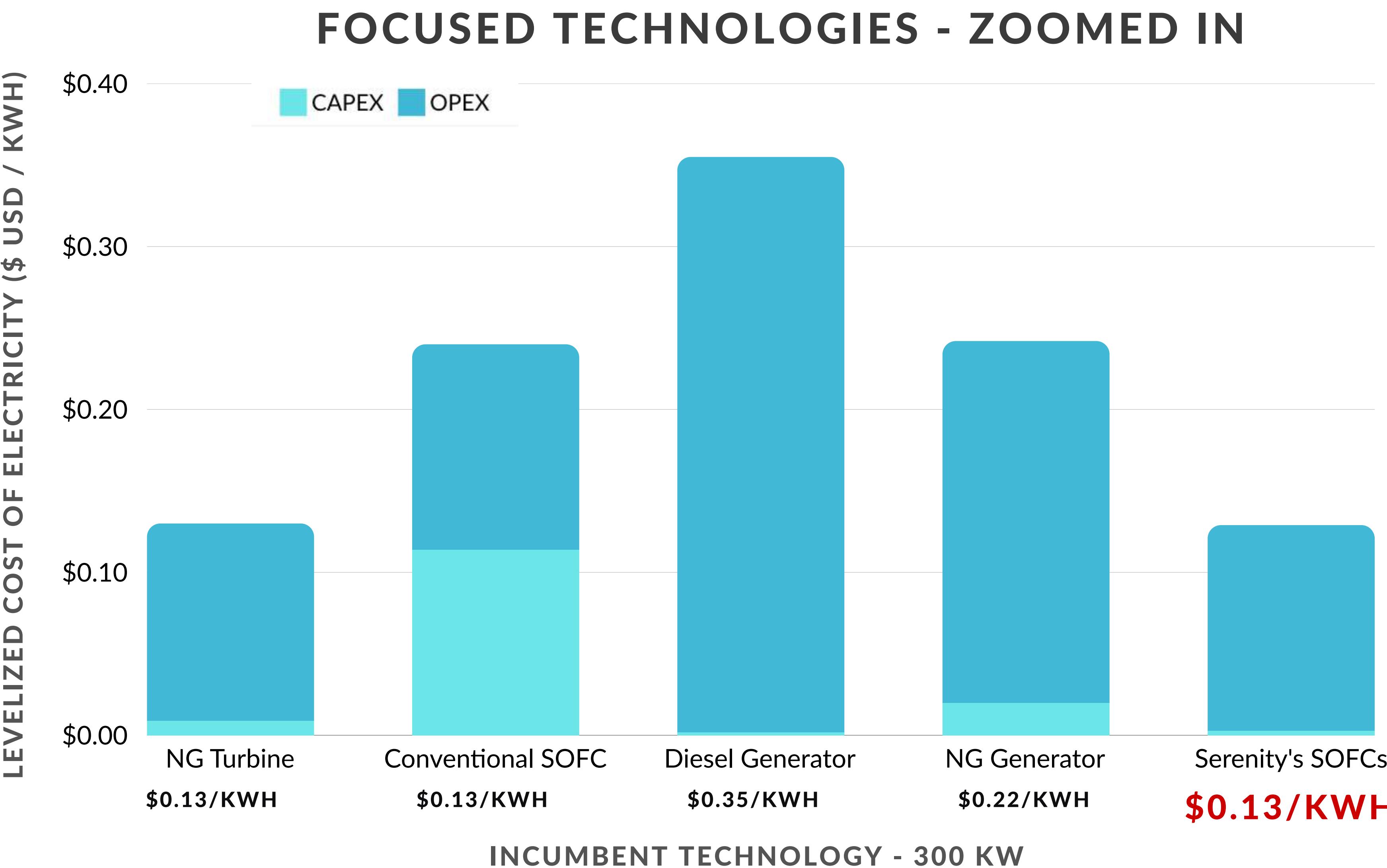
### SERENITY POWER SUMMARY

Input Parameters	Input	Units
System Size	300	kW
Peak Power	500	kW
Operating Time	10	Years
Manufacturing Cost	\$46 K	USD
Fuel Cost (NG)	\$2.0M	USD
System Mass	2,700	kg
System Volume	1	m <sup>3</sup>
CO <sub>2</sub> emission (NG)	7.8 K	Ton
CO <sub>2</sub> emission savings	14 K	Ton

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