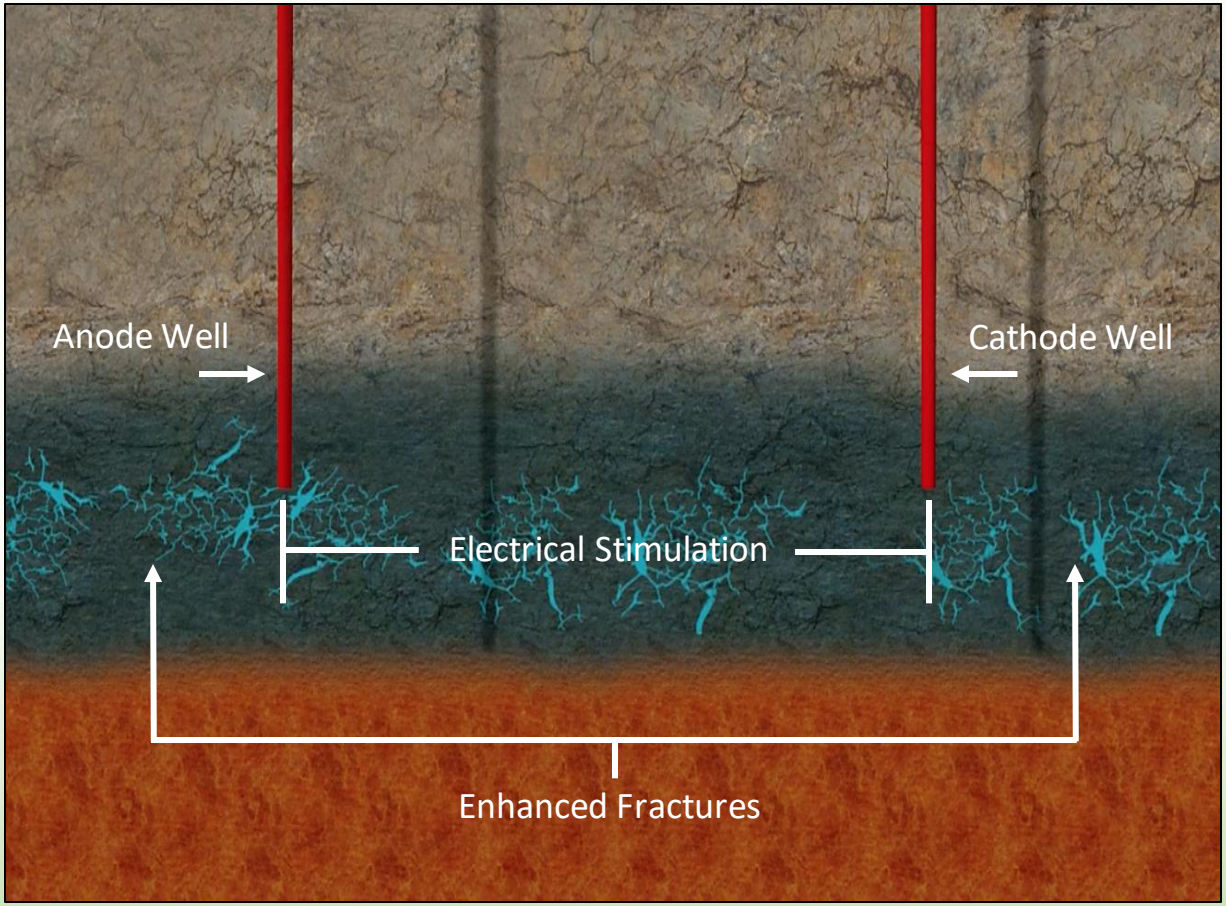
EDEN GEOTECH

Developing **inexpensive** and **sustainable** reservoir stimulation technology



Problem

Subsurface **Hydraulic Fracturing** is expensive, highly pollutive, and consumes an abundant amount of water.

Problem

Hydraulic Fracturing is:

- Capital intensive (2-4 million USD/well, every 2-3 years)
- Logistically difficult (up to 30 trucks on site and about 200 truck movements/well)
- Lengthy process (10-15 days)
- Environmentally hazardous (groundwater contamination, waste production, induced seismicity)[1]

"Fracking can lower groundwater levels and reduce water pressure in nearby aquifers…There are documented cases where homeowners living near a fracked well can literally light their water on fire because of methane gas bubbles in their pipes."

- Safe Drinking Water Foundation[2]

"Logistics and volume of truck movements cause hydraulic operations at oil and gas wells to be a risky and lengthy process"

- Completion Engineer, Weatherford

Source: [1] https://www.greenpeace.org/usa/global-warming/issues/fracking/environmental-impacts-water/
Source: [2] Safe Drinking Water Foundation, https://www.safewater.org/fact-sheets-1/2017/1/23/fracking

Solution

Pulsed Electrical Reservoir Stimulation

Zero water consumption.

Does not contaminate ground water.

Does not induce seismic activates.

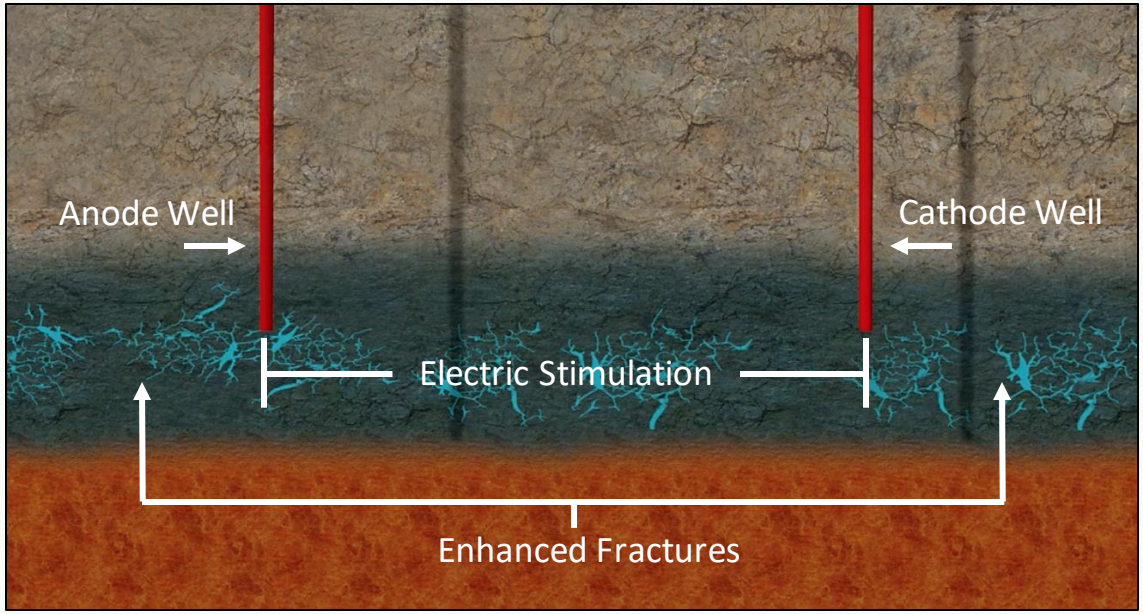
Eliminate the air-emission and injections permits

Up to 66% cheaper.

Easier and faster to execute.

Solution

- **Pulsed Electric Reservoir Stimulation (PERS)**



Effects

- **Lower viscosity:** Changes geofluid's petrophysical properties
- **Higher flow rate:** Open pores; Increases permeability and production
- **Safer:** Leaves no residuals, no potential for contamination and waste

Benefits

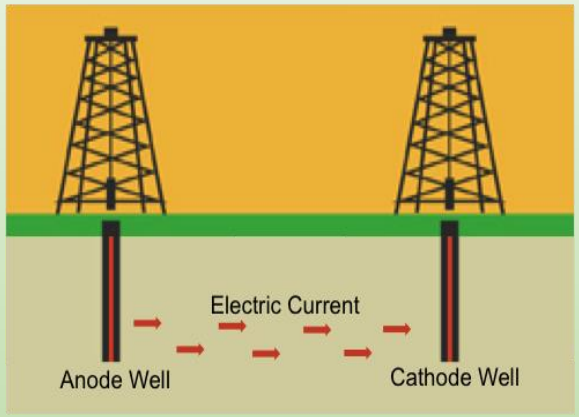
- Cost Reduced ~ **66%**
- Time Reduced ~ **40%**
- Water usage reduced - **95%**

Pulsed Electric Reservoir Stimulation

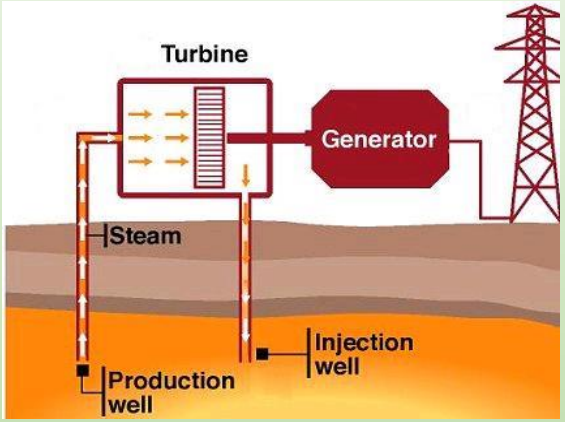
To replace hydraulic fracking with an electrical stimulation method

- Total raised **$600,000.**
- **$420K** non-dilutive funding (NSF SBIR, MIT SandBox, MassCEC Interns).
- Eligible for additional **$750K** non-dilutive NSF SBIR Phase II August 2019 and additional **$500K** non-dilutive NSF SBIR Phase II-b in August 2021.
- Applicable for unconventional and conventional plays (clastics, carbonates, and "oil-shale").

Oil & Gas



Geothermal Power



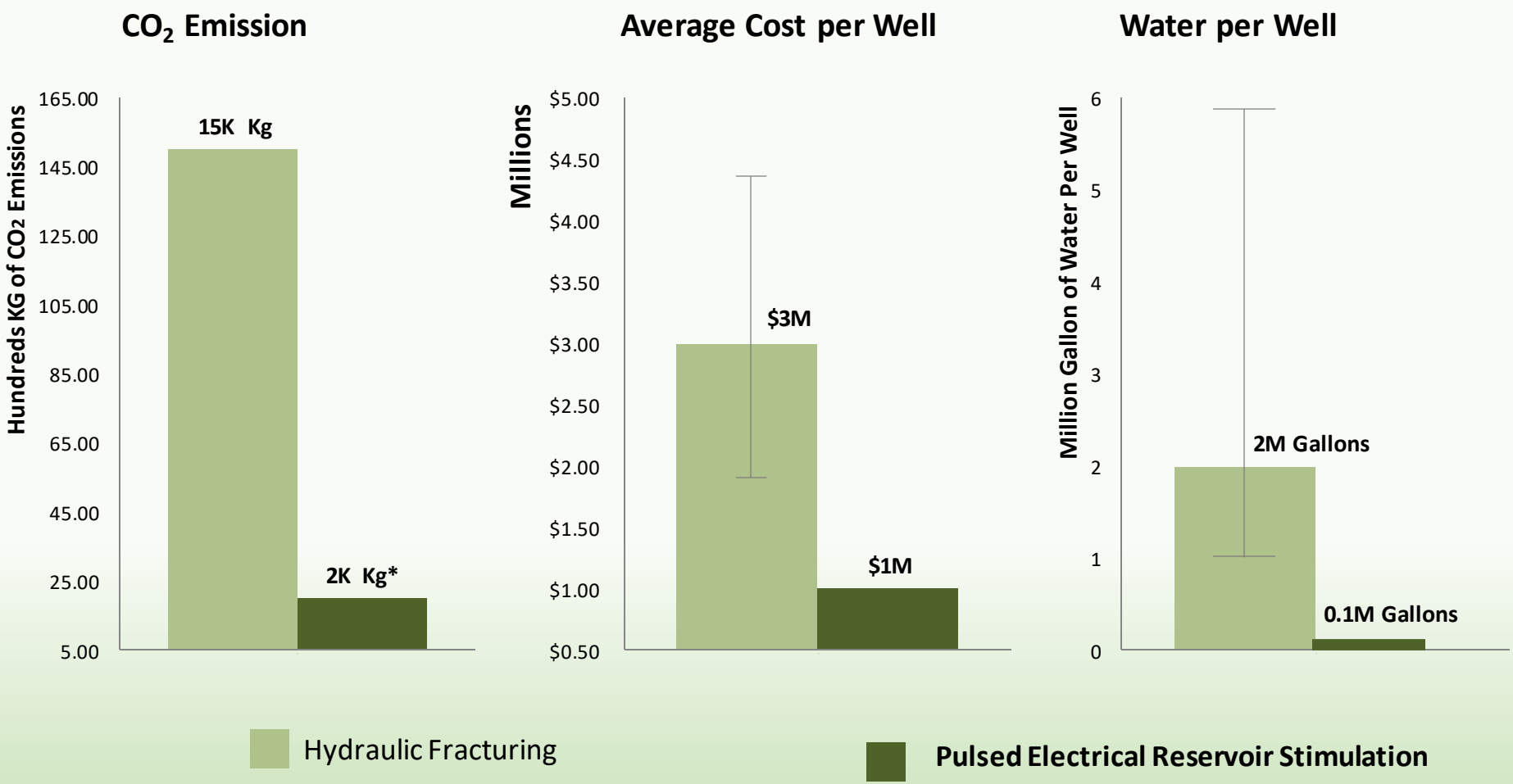
Work Plan - Hitting Milestones

- July 18 – Jul 19, NSF-SBIR Phase 1 **(Patent filed).**
  - Lab Test Samples.
  - Prototype Cores.
- April 2019, Finished NSF I-Corps customer discovery program.
- Aug 2019, NSF SBIR Phase – 2.
  - Pilot Technology LOI signed for wells in the NE.
  - Initial market entry through the partners.
- Aug 2021 – Phase II of NSF project complete.
  - Multiple Reservoir Scale Tests.
- Dec 2021 – Commercialization and Licensing Agreements.

Competitive Advantage

Characteristics \ Techniques	Pulsed Electric Reservoir Stimulation	Hydraulic Fracturing	Fracture Acidizing	Matrix Acidizing
Water Saving	✔	✗	✔	✗
Groundwater Preservation	✔	✗	✗	✗
CO_2 Emission Reduction	✔	✗	✗	✗
No Waste Production	✔	✗	✗	✗
Regulation Freedom	✔	✗	✗	✗
Cost Savings	✔	✗	✔	✔

Value Proposition



* For Off-Grid Locations only

Market & Customers

MAIN CUSTOMER: Oil & Gas Market Value[1,2]

	Oil&Gas Market Size	Well Intervention Market	Stimulation CAGR	Total # of Wells	% Stimulated Wells
2018	$2.3 Trillion	$69 Billion	12%	~1,000,000	50%

SECONDARY CUSTOMER: Geothermal Market Value & Potential[3,4]

	Geothermal Market Size	Well Intervention Market	Stimulation CAGR	Total # of Wells	% Stimulated Wells
2018	$29 Billion	$870 Million	11.5%	1,850	3%

Source: [1] https://www.eia.gov/todayinenergy/detail.php?id=25372 [2] https://www.globenewswire.com/news-release/2017/07/10/1041891/0/en/Geothermal-Energy-Market-worth-over-57-billion-by-2024-Global-Market-Insights-Inc.html
[2] https://www.marketsandmarkets.com/PressReleases/hydraulic-fracturing.asp [4] https://www.iea.org/publications/freepublications/publication/Geothermal_Roadmap.pdf

Business Model

JOINT VENTURE

Revenue Sharing

Service Provider

90 – 75% of revenue

BAKER HUGHES

Technology Provider

10 – 25% of revenue

EDEN GEOTECH

SUPPLIERS

Equipment Manufacturer

Exclusive

Probe powered by ingenuity

$ 100,000/tool

CLIENTS

E&P company

Customer

Stimulation Service Fee
$2M / Well

Post - Consulting
Additional 1%

OXY

Chevron

Mentioned companies are examples. Current negotiations are taking place with "Probe1."

Exit

Technology Acquisition

Service Companies will be partners in the piloting and commercialization phase.

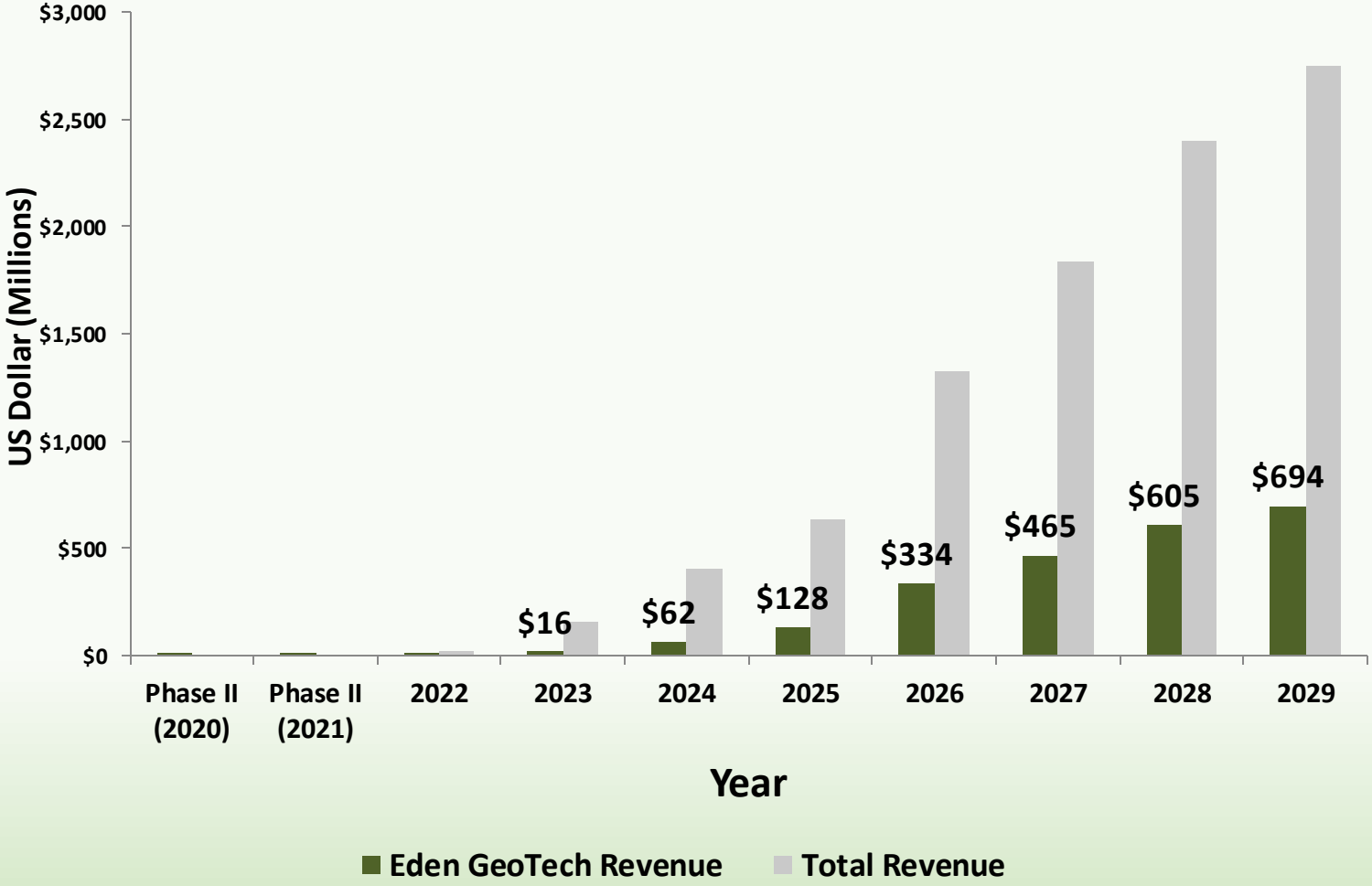
Their Gain:
- They will expand the range of services offered to their clients.
- After acquisition, they will have exclusivity in providing the service.
- Capture 100% of the earnings.

Big E&P Companies are the end users (Existing communication channels)

Their Gain:
- Achieve environmental targets (reduction of negative environmental consequences).
- Reduce operational cost by the acquiring the I.P. rights (stimulation is 30% of completion cost).

Target Year: 2026
Target Price: $500 Million
P/E: 5

Financial Projections



* : Pro-forma Income Statement in the Appendix

I.P. Strategy

EDEN GEOTECH

Provisional

The company has filed 3 provisional patents and in process to file the 4th.

Patent

Filed full patent (July 3rd) for the PEWS technology. I.P. Is assigned to the company.

NDA

5-years mutual non-disclosure agreements with all 3rd parties.

Confidentality Agreement

Employees and consultants sign confidentality agreement, to not reveal info during or after their tenure.

International I.P.

Develop interantional I.P. Strategy. Currently, we aim to file for patents in Canada and China.

TradeMark

Build a trade mark and a name associated with execllency in service and quality of products, file w USPTO.

R&D

Continued R&D efforts to maintain innovative edge and increase market share with superior products.

Current Round

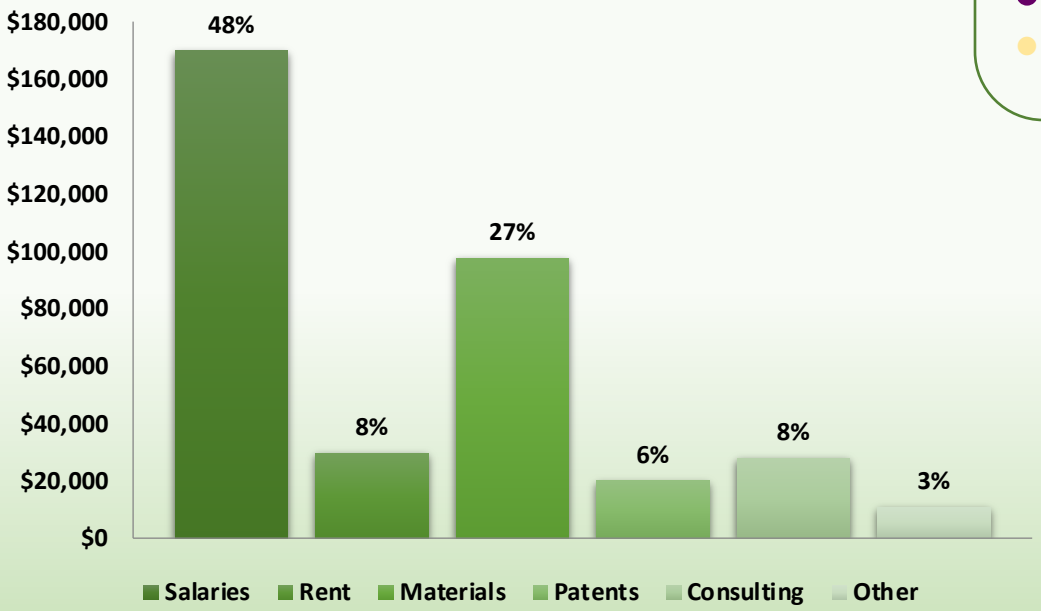
EDEN GEOTECH

Funding Goal: $350,000

Seeking $350,000 in funding in exchange for equity ($3 M valuation)

Funding Proceeds - Breakdown

- **48% - Overhead cost**
- 8% - Lab Space, Office space
- 27% - Prototyping Materials
- 6% - Patent
- 8% - Consulting
- 3% - Miscellaneous



The Team

Paris Smalls

CEO, Co-Founder | Geophysicist

Paris is a geophysicist researching seismicity and fracking in MIT. He is highly involved in MIT and Harvard student Energy clubs, and a voice in the start-up community.

Ammar Alali

COO, Co-Founder | Geophysicist

Ammar is a MIT graduate in Geophysics with 7 years experience in the oil & gas industry working as a geophysicist for Saudi Aramco.

Mehrdad Mehrvand, PhD

CTO, R&D Project Engineer

Mehrdad has 7 years R&D experience in design, fabrication and integration of mechanical, thermal and electrical fields with application. He holds PhD in Mechanical Engineering.

Fermin Carrillo

Project Manager

Fermin has 4 years of experience as a Wireline Field Engineer working at Schlumberger. He received his MBA in Project Management from Hult International Business School.

Thomas Wilder

Petroleum Engineer

Thomas majored in mechanical engineering at Tuskegee University and is currently pursuing an MBA at MIT. For 5.5 yrs., he managed drilling rigs and oversaw the completion process for Chevron.

Fatou Faye

Electric Power Engineer

Fatou holds a Bachelor of Science in electrical engineer from Suffolk university. She has three years of experience performing Electromagnetic compatibility tests of electrical and electronic devices

Dr. Maureen Boyce (VC)

Advisor

Maureen is Partner at Good Growth Capital VC Fund for early stage tech companies. Maureen was Co-founder and COO of Ignition Ventures, launching start-ups.

Troy Billet

Advisor

Troy is the U.S director of Off-Grid Box, a clean technology providing affordable clean water and renewable energy in remote areas. He has 5 years of experience helping over 13 startups.

Aaron Mandell

Advisor

Aaron is an entrepreneur and engineer who has co-founded and been involved in raising capital from leading institutions for several companies at the nexus of energy and water, including AltaRock, WaterFX.

Special Partnership

Professor Mayank Tyagi

Louisiana State University
Dr. Tyagi is a Chevron Professor of Engineering in the Craft & Hawkins Department of Petroleum Engineering at LSU. He has worked on different modeling and simulation projects including reservoirs and monitoring systems.

Professor Herbert Einstein

MIT – EAPS/CEE
Prof. Einstein received both his Dipl. Ing. and Sc.D. in civil engineering from ETH-Zürich. His research interests include Rock mechanics, Underground construction, Engineering geology, and Risk analysis.

Contact Us

Email us your questions

ammar@edengeotech.com

Come visit us at

GreenTown Labs
444 Somerville Ave, Somerville, Massachusetts
USA 02143

Give us a call at

+1(857) 222-7217

Social Media

@eden_geotech

/company/edengeotech

Website

www.edengeotech.com

Appendix

The Industry in Missouri

National Rank[1]

#25

Number of Wells

10.6K Drilled

1.03K Active Wells

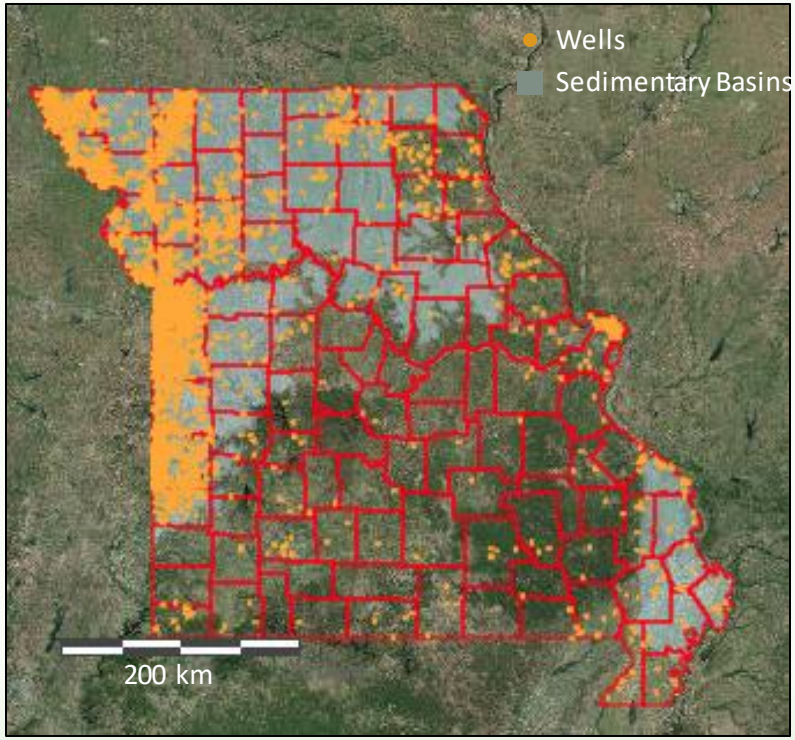
Companies

6 Active Operators

Largest: Kansas Resource Expl. & Deve., LLC

Production

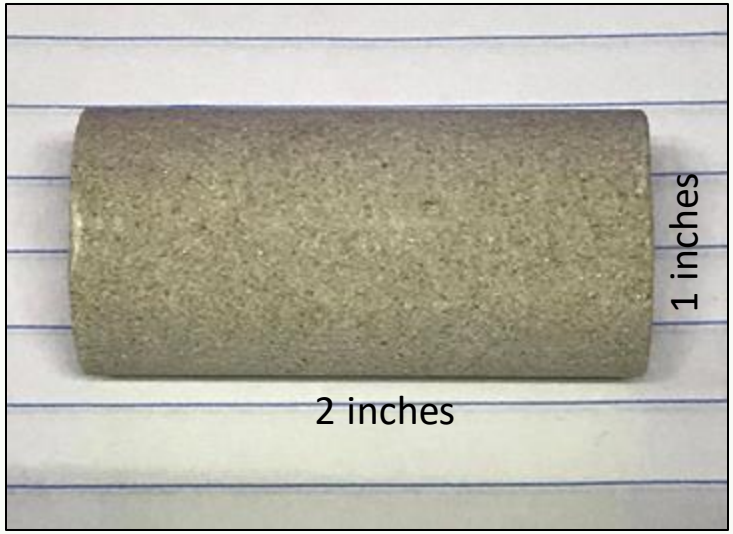
8.3K BBLs



1] https://www.shalexp.com/missouri

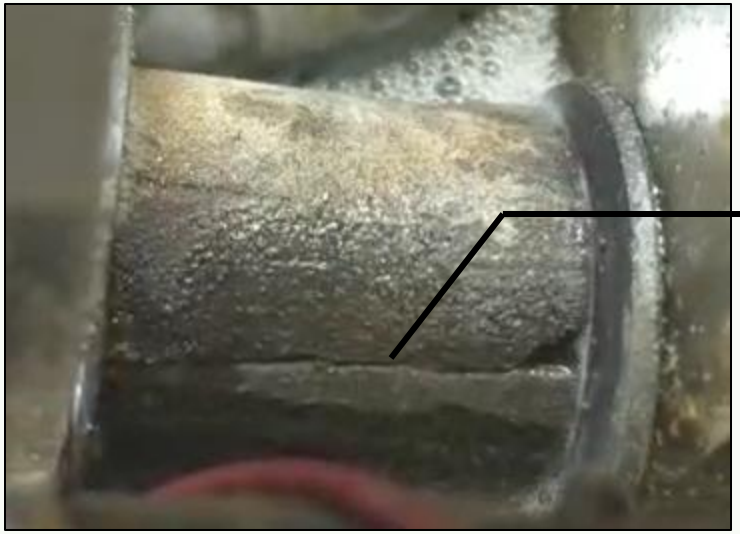
Results

Before PEWS



Permeability ~257 mD

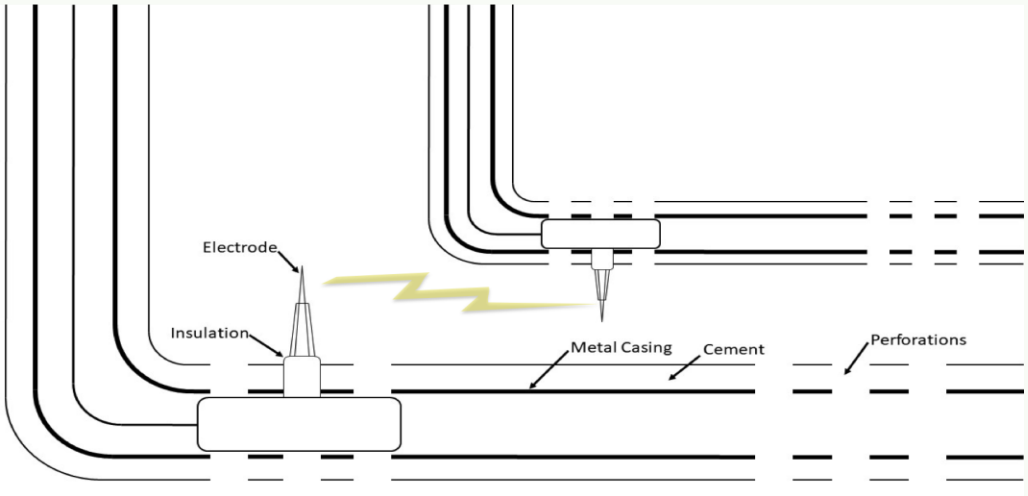
After PEWS



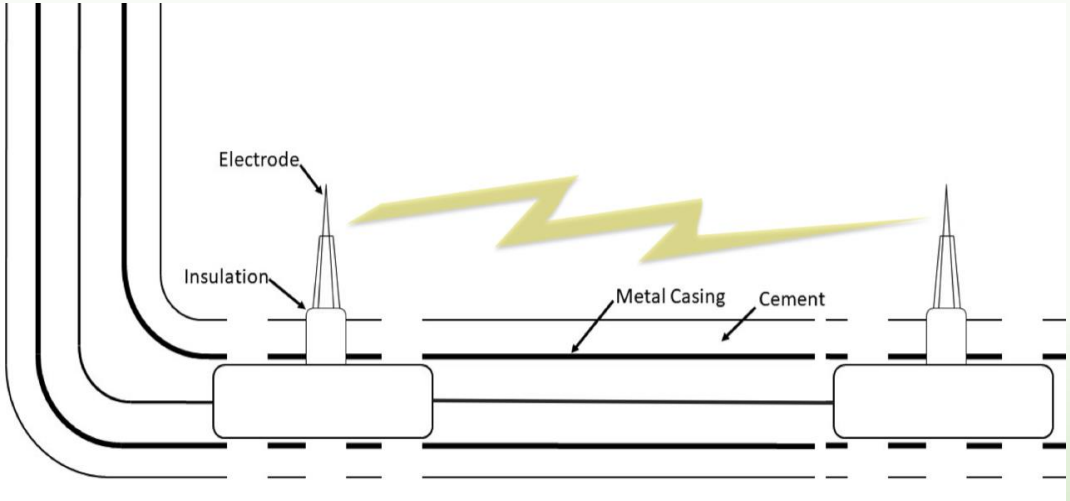
Permeability ~700 mD

2.5-3 Times Enhancement in two minutes

Configuration of the tool inside horizontal well



Two adjacent horizontal wells, where the cathode is place in one perforation of well-1 and the anode is installed in well-2.



One horizontal wells, where the cathode is place in one perforation of well and the anode is installed in another zone

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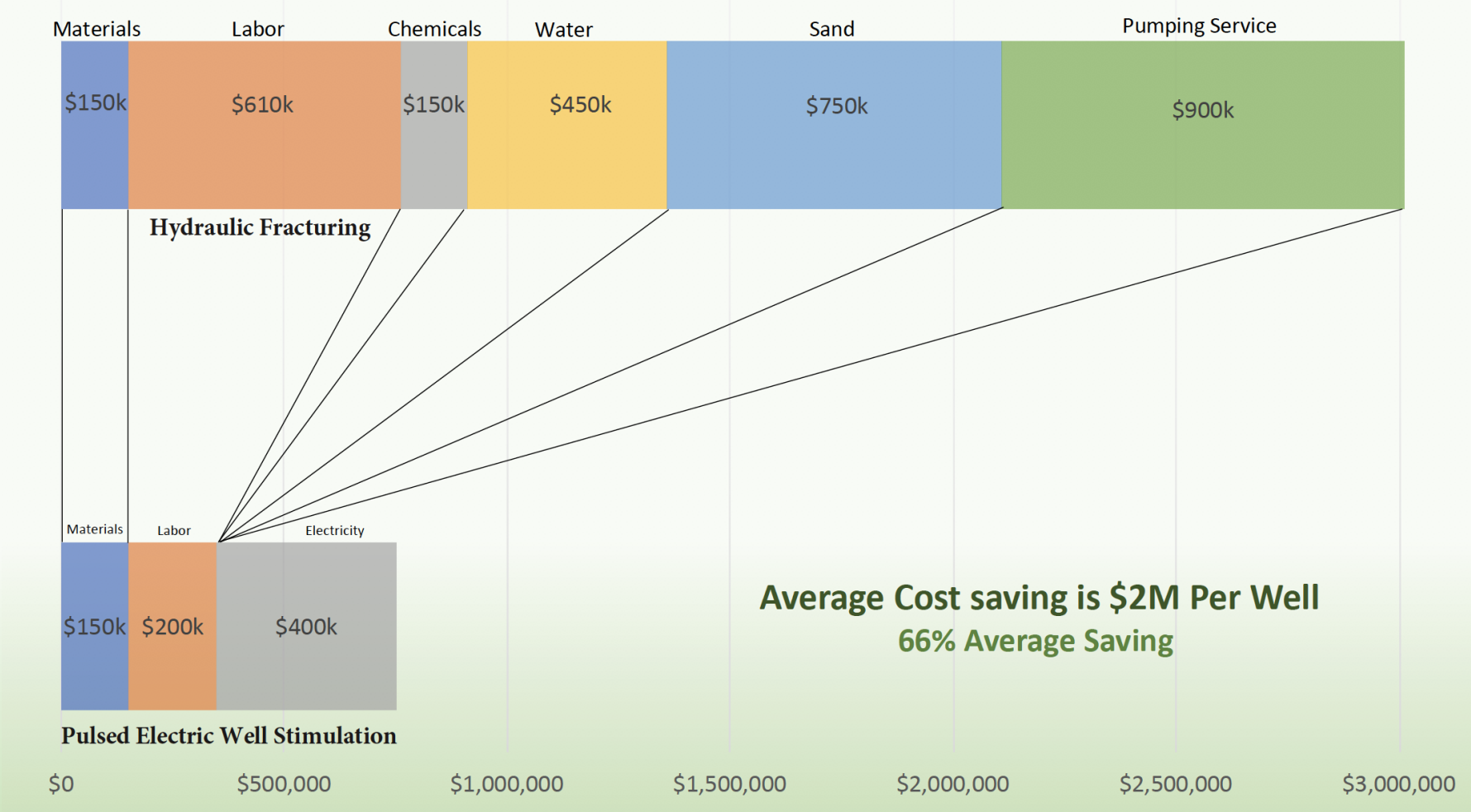
Cost Breakdown

HYDRAULIC FRACTURING VS PULSED ELECTRIC WELL STIMULATION



Average Cost saving is $2M Per Well

66% Average Saving

Partners & Sponsors

EDEN GEOTECH

MIT Venture Mentoring SERVICE

CanGEA
CANADIAN GEOTHERMAL ENERGY ASSOCIATION

MIT Sandbox

NSF | CORPS NSF Innovation Corps

Geothermal Resources Council GRC

ENERGY & ENVIRONMENT CLUB
A STUDENT CLUB AT HARVARD BUSINESS SCHOOL

MASSACHUSETTS CLEAN ENERGY CENTER

CLEAN ENERGY PRIZE

MIT delta v

GREENTOWN LABS

NSF SBIR/STTR
SMALL BUSINESS INNOVATION RESEARCH
SMALL BUSINESS TECHNOLOGY TRANSFER

Financial Statement

Pro Forma Income Statement - Revenue Sharing Agreement

Eden GeoTech
For years 2020 to 2029

	Market	Phase II (2020)	Phase II (2021)	2022	2023	2024	2025	2026	2027	2028	2029
	Served available Market size	34,521,095,300	35,970,981,303	37,481,762,517	39,055,996,543	40,696,348,398	42,405,595,031	44,186,630,022	46,042,468,483	47,976,252,159	49,991,254,750
	Market growth rate	NA	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
	Number of Projects	0.00	0.00	9.00	78.00	203.00	318.00	662.00	920.00	1199.00	1374.00
	Sales (Revenue) base for sharing agreement	$0	$0	$18,000,000	$156,000,000	$406,000,000	$636,000,000	$1,324,000,000	$1,840,000,000	$2,398,000,000	$2,748,000,000
	% market share - total market	0.0%	0.0%	0.0%	0.4%	1.0%	1.5%	3.0%	4.0%	5.0%	5.5%
	Revenue % for Eden GeoPower	0.0%	0.0%	10.0%	10.0%	15.0%	20.0%	25.0%	25.0%	25.0%	25.0%
2	**Revenues**										
	Revenue from partner agreement	0	0	1,800,000	15,600,000	60,900,000	127,200,000	331,000,000	460,000,000	599,500,000	687,000,000
	Consulting or after sale services	0	0	18,000	156,000	609,000	1,272,000	3,310,000	4,600,000	5,995,000	6,870,000
	SBIR/STTR Contract R&D	375,000	375,000	0	0	0	0	0	0	0	0
	Phase IIb			500,000							
	Sponsors financial support	150,000	200,000	1,500,000							
	Total Revenue	**$525,000**	**$575,000**	**$3,818,000**	**$15,756,000**	**$61,509,000**	**$128,472,000**	**$334,310,000**	**$464,600,000**	**$605,495,000**	**$693,870,000**
3	**Expenses**										
	Marketing			25,000	216,667	563,889	883,333	1,838,889	2,555,556	3,330,556	3,816,667
	Materials and manufacturing	0	0	1,700,000	14,733,333	38,344,444	60,066,667	125,044,444	173,777,778	226,477,778	259,533,333
	Administrative (G&A)			350,000	500,000	1,301,282	650,000	800,000	1,111,782	950,000	1,100,000
	Prototype expenses (Alpha)	150,000	200,000								
	Prototype expenses (Beta)			1,000,000							
	SBIR Expenses (Direct and Indirect)	350,467	350,467	500,000							
	Internal R&D	0	0	381,800	1,575,600	6,150,900	12,847,200	33,431,000	46,460,000	60,549,500	69,387,000
	Consulting	0	0	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
	Facilities	0	0	20,000	173,333	451,111	706,667	1,471,111	2,044,444	2,664,444	3,053,333
	Total Expenses	**$500,467**	**$550,467**	**$4,001,800**	**$17,223,933**	**$46,836,626**	**$75,178,867**	**$162,610,444**	**$225,974,560**	**$293,997,278**	**$336,915,333**
4	**Operating Earnings (EBIT)**										
	Operating Earnings (EBIT)	**24,533**	**24,533**	**(183,800)**	**(1,467,933)**	**14,672,374**	**53,293,133**	**171,699,556**	**238,625,440**	**311,497,722**	**356,954,667**
	Operating Margin %	4.7%	4.3%	-4.8%	-9.3%	23.9%	41.5%	51.4%	51.4%	51.4%	51.4%
5	**Income**										
	Income Before Tax	24,533	24,533	-183,800	-1,467,933	14,672,374	53,293,133	171,699,556	238,625,440	311,497,722	356,954,667
	Tax rate	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
	Taxes	8,586	8,586	0	0	5,135,331	18,652,597	60,094,844	83,518,904	109,024,203	124,934,133
	Net Income	**$15,946**	**$15,946**	**-$183,800**	**-$1,467,933**	**$9,537,043**	**$34,640,537**	**$111,604,711**	**$155,106,536**	**$202,473,519**	**$232,020,533**
	Net income as %/sales	3.0%	2.8%	-4.8%	-9.3%	15.5%	27.0%	33.4%	33.4%	33.4%	33.4%

Cash Proxy										
EBIT	**$ 24,533**	**$ 24,533**	**$ (183,800)**	**$ (1,467,933)**	**$ 14,672,374**	**$ 53,293,133**	**$ 171,699,556**	**$ 238,625,440**	**$ 311,497,722**	**$ 356,954,667**
+ Matching Grants										
- Capital Expenditures								$ 30,000,000		
- Loan Payments										
+ Investments (Paid in Capital)										
Net Addition (Subtraction) from Cash	$24,533	$24,533	-$183,800	-$1,467,933	$14,672,374	$53,293,133	$171,699,556	$208,625,440	$311,497,722	$356,954,667
Year-End Cash Proxy	**$ 24,533**	**$ 49,065**	**$ (134,735)**	**$ (1,602,668)**	**$ 13,069,706**	**$ 66,362,839**	**$ 238,062,394**	**$ 446,687,834**	**$ 758,185,556**	**$ 1,115,140,223**

PAM (2020)	118,503,199,306
TAM (2020)	41,367,400,000
SAM (2020, US)	34,521,095,300

Consulting service fee	1.00%
R&D investment	10%
Increase in marketing expense	10%

Business Model Canvas

EDEN GEOTECH

Key Partners

- Altarock Energy (technology development, testing, commercialization)
- Shell Techworks (R&D)
- Saudi Aramco (Potential).

Key Activities

- Research and technology development
- Testing at lab
- Scaling the technology and testing at partners facilities and wells
- Networking, new partners

Key Resources

- Technical team members with right expertise
- Access to data from unconventional oil/gas & EGS wells.
- Access to laboratory resources and equipment to make experimental analysis
- Intellectual property protection

Value Propositions

- **For purchaser/decision maker:**
  - Save expensive operational, equipment, and logistic costs (water, proppant, pumping) in hydraulic fracking up to 60%
  - No current limitations by governments/regulations
  - Increased number of fracking services/projects
  - Increased hydrocarbon and electricity production
- **For end users:**
  - Easier operations, time efficient (%70), more control
- **For Influencers:**
  - Promotion
  - Sustainable solution
  - Safer area to live

Customer Relationships

- A team member works for a potential customers, Aramco. This connection will be used to get into and expand in the market
- Letter of support from Shell.
- A team member is former employee of a service company (Schlumberger)

Channels

- Licensing technology with oil and gas services and EGS geothermal companies.

Customer Segments

- **Purchaser/decision maker:**
  - VP of operations, completion manager, completion engineer at Oil/gas/geothermal companies
- **End users:**
  - Company man, Reservoir engineer, frac engineer, at operators and service companies
- **Influencer/recommender:**
  - Completion engineers, field engineer, production engineer, logistic engineer
  - National Institute of Environmental Health Sciences, regulators
  - People living locally, news agencies
- **Saboteur:**
  - Pumping and proppant (sand, chemicals) service providers

Cost Structure

- Technology development and testing costs
- Operational costs, salaries, office/lab rents
- marketing, conferences, booths, and legal costs

Revenue Streams

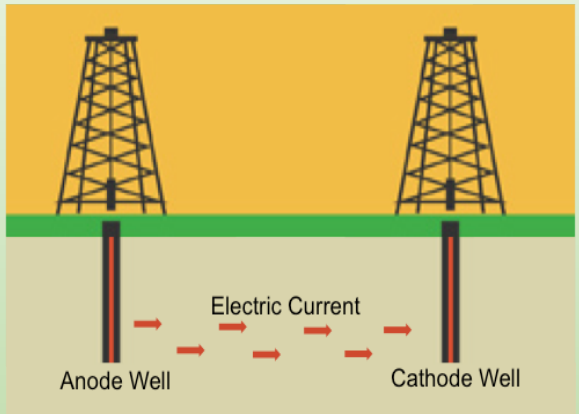
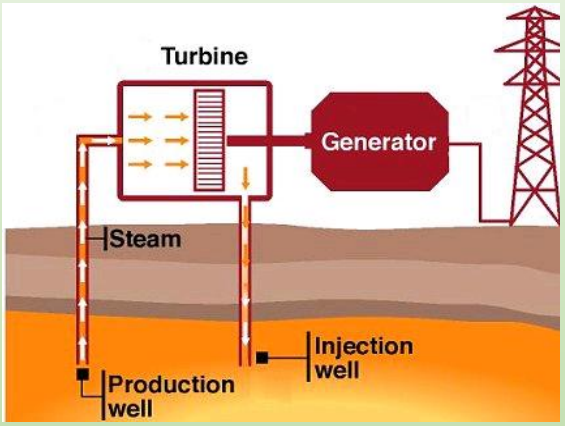
- Licensing fee to oil and gas services companies
- Service fee for every time the technology is used in the field.
- Equipment rental.

Pulsed Electric Well Stimulation

To replace hydraulic fracking with an electrical stimulation method

- Total raised **$600,000.**
- **$420K** non-dilutive funding (NSF SBIR, MIT SandBox, MassCEC Interns).
- Eligible for additional **$750K** non-dilutive NSF SBIR Phase II August 2019 and additional **$500K** non-dilutive NSF SBIR Phase II-b in August 2021.
- Applicable for unconventional and conventional plays (clastics, carbonates, and "oil-shale").

Oil & Gas



Geothermal Power