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

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

| Anode Well | Electric Current | Cathode Well |

Geothermal Power

| Turbine | Generator |
| Production well | Injection well |
| Steam | |

6
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.

  - 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

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Pulsed Electric Reservoir Stimulation</th>
<th>Hydraulic Fracturing</th>
<th>Fracture Acidizing</th>
<th>Matrix Acidizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Saving</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
<td>✗</td>
</tr>
<tr>
<td>Groundwater Preservation</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>CO₂ Emission Reduction</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>No Waste Production</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Regulation Freedom</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Cost Savings</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✔</td>
</tr>
</tbody>
</table>
Value Proposition

**CO₂ Emission**

- 15K Kg
- 2K Kg*

**Average Cost per Well**

- $3M
- $1M

**Water per Well**

- 2M Gallons
- 0.1M Gallons

*For Off-Grid Locations only*
# Market & Customers

## MAIN CUSTOMER: Oil & Gas Market Value\(^1,2\)

<table>
<thead>
<tr>
<th>Oil&amp;Gas Market Size</th>
<th>Well Intervention Market</th>
<th>Stimulation CAGR</th>
<th>Total # of Wells</th>
<th>% Stimulated Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>$2.3 Trillion</td>
<td>$69 Billion</td>
<td>12%</td>
<td>~1,000,000</td>
</tr>
</tbody>
</table>

## SECONDARY CUSTOMER: Geothermal Market Value & Potential\(^3,4\)

<table>
<thead>
<tr>
<th>Geothermal Market Size</th>
<th>Well Intervention Market</th>
<th>Stimulation CAGR</th>
<th>Total # of Wells</th>
<th>% Stimulated Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>$29 Billion</td>
<td>$870 Million</td>
<td>11.5%</td>
<td>1,850</td>
</tr>
</tbody>
</table>

Source:

\(^3\) [Markets and Markets](https://www.marketsandmarkets.com/PressReleases/hydraulic-fracturing.asp)  
\(^4\) [IEA](https://www.iea.org/publications/freepublications/publication/Geothermal_Roadmap.pdf)
Mentioned companies are examples. Current negotiations are taking place with “Probe1.”

**Business Model**

**SUPPLIERS**
- Equipment Manufacturer
  - Exclusive

**Service Provider**
- 90 – 75% of revenue

**Technology Provider**
- 10 – 25% of revenue

**JOINT VENTURE**

**Revenue Sharing**

**Service Provider**
- $100,000/tool

**Stimulation Service Fee**
- $2M / Well

**Post - Consulting**
- Additional 1%

**CLIENTS**
- E&P company
  - Customer

- OXY
- Chevron
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

Year

Eden GeoTech Revenue | Total Revenue

- Phase II (2020)
- Phase II (2021)
- 2022: $16
- 2023: $62
- 2024: $128
- 2025: $334
- 2026: $465
- 2027: $605
- 2028: $694

* : Pro-forma Income Statement in the Appendix
I.P. Strategy

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

- **International I.P.**
  - Build a trade mark and a name associated with excellence in service and quality of products, file with USPTO.

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

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

- **TradeMark**
  - Develop international I.P. Strategy. Currently, we aim to file for patents in Canada and China.
Seeking $350,000 in funding in exchange for equity ($3 M valuation)

Funding Goal: $350,000

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.

### 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.

### 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.

### 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.

### 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

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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 Rank¹

#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

¹https://www.shalex.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 placed in one perforation of well-1 and the anode is installed in well-2.

One horizontal well, where the cathode is placed in one perforation of well and the anode is installed in another zone.
Cost Breakdown

HYDRAULIC FRACTURING VS PULSED ELECTRIC WELL STIMULATION

Hydraulic Fracturing:
- Materials: $150k
- Labor: $610k
- Chemicals: $150k
- Water: $450k
- Sand: $750k
- Pumping Service: $900k

Pulsed Electric Well Stimulation:
- Materials: $150k
- Labor: $200k
- Electricity: $400k

Average Cost saving is $2M Per Well
66% Average Saving
Partners & Sponsors
# Financial Statement

## Pro Forma Income Statement - Revenue Sharing Agreement

### Eden GeoTech
**For years 2020 to 2029**

<table>
<thead>
<tr>
<th>1. Market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Served available Market size</td>
<td>34,521,095,300 35,970,981,303 37,481,762,517 39,055,966,543 40,696,348,398 42,405,595,031 44,186,630,022 46,042,468,483 47,976,252,159 49,991,254,750</td>
</tr>
<tr>
<td>Market growth rate</td>
<td>NA 4.2% 4.2% 4.2% 4.2% 4.2% 4.2% 4.2% 4.2% 4.2%</td>
</tr>
<tr>
<td>Number of Projects</td>
<td>0.00 0.00 9.00 78.00 203.00 318.00 662.00 920.00 1199.00 1374.00</td>
</tr>
<tr>
<td>Sales (Revenue) base for sharing agreement</td>
<td>$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</td>
</tr>
<tr>
<td>% market share - total market</td>
<td>0.0% 0.0% 0.0% 0.4% 1.0% 1.5% 3.0% 4.0% 5.0% 5.5%</td>
</tr>
<tr>
<td>Revenue % for Eden GeoPower</td>
<td>0.0% 0.0% 10.0% 10.0% 15.0% 20.0% 25.0% 25.0% 25.0% 25.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Revenues</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue from partner agreement</td>
<td>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</td>
</tr>
<tr>
<td>Consulting or after sale services</td>
<td>0 0 18.00 156.00 609.00 1,272.00 3,316.00 4,600.00 5,995.00 6,670.00</td>
</tr>
<tr>
<td>SBIR/SSTI Contract R&amp;D</td>
<td>375,000 375,000 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Phase IB</td>
<td>500,000</td>
</tr>
<tr>
<td>Sponsors financial support</td>
<td>150,000 200,000 1,500,000</td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td><strong>$525,000</strong> <strong>$575,000</strong> <strong>$3,818,000</strong> <strong>$15,756,000</strong> <strong>$61,509,000</strong> <strong>$128,472,000</strong> <strong>$334,310,000</strong> <strong>$464,600,000</strong> <strong>$605,495,000</strong> <strong>$693,870,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Expenses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing</td>
<td>0 0 25.00 216.67 563.88 883.33 1,838.89 2,555.56 3,330.56 3,816.67</td>
</tr>
<tr>
<td>Materials and manufacturing</td>
<td>0 0 1,700.00 14,733.33 38,344.44 60,066.67 125,044.44 173,777.78 226,477.77 259,533.33</td>
</tr>
<tr>
<td>Administrative (G&amp;A)</td>
<td>0 0 350.00 500.00 1,301.28 650.00 800.00 1,111.78 950.00 1,000.00</td>
</tr>
<tr>
<td>Prototype expenses (Alpha)</td>
<td>150,000 200,000</td>
</tr>
<tr>
<td>Prototype expenses (Beta)</td>
<td>1,000.00</td>
</tr>
<tr>
<td>SBIR Expenses (Direct and Indirect)</td>
<td>350,467 350,467</td>
</tr>
<tr>
<td>Internal R&amp;D</td>
<td>0 0 381.80 1,575.60 6,150.00 12,847.20 33,431.00 46,460.00 60,549.00 69,387.00</td>
</tr>
<tr>
<td>Consulting</td>
<td>0 0 25.00 25.00 25.00 25.00 25.00 25.00 25.00 25.00</td>
</tr>
<tr>
<td>Facilities</td>
<td>0 0 20.00 173.33 451.11 706.67 1,471.11 2,044.44 2,664.44 3,053.33</td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td><strong>$500,467</strong> <strong>$550,467</strong> <strong>$4,001,800</strong> <strong>$17,223,933</strong> <strong>$46,836,626</strong> <strong>$75,178,867</strong> <strong>$162,610,444</strong> <strong>$225,974,560</strong> <strong>$293,997,278</strong> <strong>$336,915,333</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. Operating Earnings (EBIT)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Earnings (EBIT)</td>
<td>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</td>
</tr>
<tr>
<td>Operating Margin %</td>
<td>4.7% 4.3% 4.8% 9.3% 29.0% 41.5% 51.4% 51.4% 51.4% 51.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Income</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Before Tax</td>
<td>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</td>
</tr>
<tr>
<td>Tax rate</td>
<td>35% 35% 35% 35% 35% 35% 35% 35% 35% 35%</td>
</tr>
<tr>
<td>Taxes</td>
<td>8,586 8,586 0 0 5,135,331 18,652,597 60,094,844 83,518,904 109,024,203 124,934,133</td>
</tr>
<tr>
<td><strong>Net Income</strong></td>
<td><strong>$15,946</strong> <strong>$15,946</strong> <strong>-183,800</strong> <strong>-1,467,933</strong> <strong>9,537,043</strong> <strong>34,640,537</strong> <strong>111,604,711</strong> <strong>155,106,536</strong> <strong>202,473,519</strong> <strong>232,020,533</strong></td>
</tr>
<tr>
<td>Net income as %/sales</td>
<td>3.0% 2.8% 4.8% 9.3% 15.5% 27.0% 33.4% 33.4% 33.4% 33.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cash Proxy</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT</td>
<td>$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</td>
</tr>
<tr>
<td>Add: Matching Grants</td>
<td>24,533 24,533 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>- Capital Expenditures</td>
<td>24,533 24,533 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>- Loan Payments</td>
<td>0 0 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>+ Investments (Paid in Capital)</td>
<td>0 0 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td><strong>Net Addition (Subtraction) from Cash</strong></td>
<td><strong>$24,533</strong> <strong>$24,533</strong> <strong>$183,800</strong> <strong>$1,467,933</strong> <strong>$14,672,374</strong> <strong>$53,293,133</strong> <strong>$171,699,556</strong> <strong>$208,625,440</strong> <strong>$311,497,722</strong> <strong>$356,954,667</strong></td>
</tr>
<tr>
<td><strong>Year-End Cash Proxy</strong></td>
<td><strong>$24,533</strong> <strong>$49,065</strong> <strong>$134,735</strong> <strong>$1,602,668</strong> <strong>$13,069,706</strong> <strong>$66,362,839</strong> <strong>$238,062,394</strong> <strong>$446,687,834</strong> <strong>$758,185,556</strong> <strong>$1,115,140,223</strong></td>
</tr>
</tbody>
</table>

| PAM (2020) | 118,503,199,306 |
| TAM (2020) | 4,176,400,000 |
| SAM (2020, US) | 34,521,095,300 |
### Business Model Canvas

<table>
<thead>
<tr>
<th>Key Partners</th>
<th>Key Activities</th>
<th>Value Propositions</th>
<th>Customer Relationships</th>
<th>Customer Segments</th>
</tr>
</thead>
</table>
| • Altarock Energy (technology development, testing, commercialization) | • Research and technology development | • For purchaser/decision maker:  
- Save expensive operational, equipment, and logistic costs (water, proppant, pumping) in hydraulic fracturing up to 60%  
- No current limitations by governments/regulations  
- Increased number of fracking services/projects  
- Increased hydrocarbon and electricity production | • 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) | • Purchaser/decision maker:  
- VP of operations, completion manager, completion engineer at Oil/gas/geothermal companies  
|   | • Testing at lab  
• Scaling the technology and testing at partners facilities and wells  
• Networking, new partners | | | • 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  

### 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  

### For end users:  
• Easier operations, time efficient (%70), more control  

### For Influencers:  
• Promotion  
• Sustainable solution  
• Safer area to live  

### Channels
• Licensing technology with oil and gas services and EGS geothermal companies.

### 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)

### 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.
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Oil & Gas

Geothermal Power