

THE FOAM ENGINE

Wasted Opportunity

Over 80% of all electric power is generated by heat engines – engines that convert heat from a high temperature source into electricity via a thermodynamic power generation cycle.

- Up to 50% of energy consumed by the US industrial sector is discarded as waste heat
- The US industrial sector consumes approximately 1/3 of all domestic energy usage annually—over 28 Quads - quadrillion Btus
- The amount consumed is roughly the energy of 26 million US homes—over 290,000 GWh
- The industrial sector is responsible for about 1/3 of all fossil-fuel related greenhouse gas emissions, 1800 million metric tons of CO₂

Market

The market for Waste Heat power generation systems is large (\$30+ billion), growing (5% CAGR), and largely untapped (Waste Heat applications are 5% utilized). Generating power at 200kW or less from low-quality heat (under 150°C) poses scaling difficulty for the incumbent heat engine technology, the Organic Rankine Cycle (ORC). This \$3+ billion market segment is under-served and is looking for the right solution.

Innovation

RheOmega is developing the Foam Engine, a heat engine that is 30% more effective at converting heat into electricity than the incumbent technologies. The Foam Engine uses foam as the working fluid – a stabilized mixture of gas and a carrier liquid. Foam Technology enables a previously unachievable, superior power generation cycle called the Ericsson Cycle. Foam has been demonstrated to be a practical, cost-effective, commercial-scale technology in Isothermal Compressed Air Energy Storage. RheOmega has the know-how to develop Foam Technology for advanced power cycles.

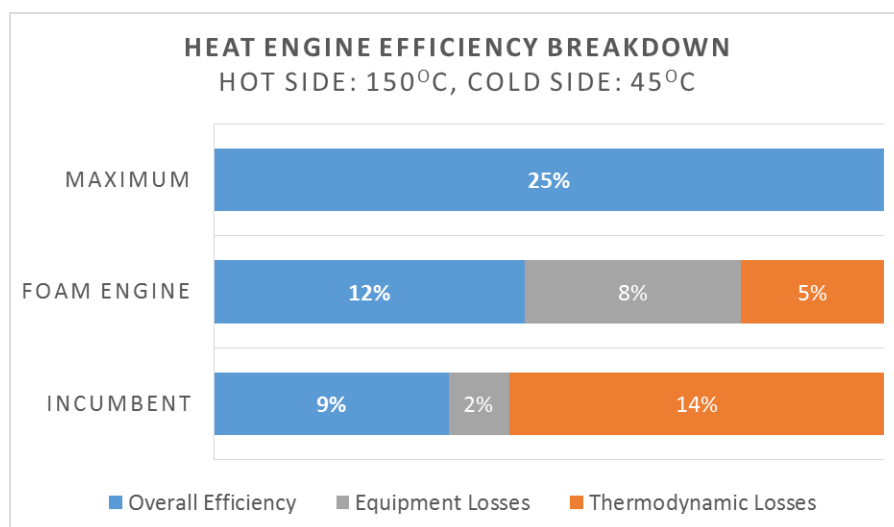


FIGURE 1: EXAMPLE EFFICIENCY BREAKDOWN COMPARING THE FOAM ENGINE TO INCUMBENT TECHNOLOGY. AN ADDITIONAL FEW POINTS OF EFFICIENCY ON A 1000kW THERMAL (~100kW ELECTRIC) HEAT ENGINE TRANSLATES TO AN ADDITIONAL \$20,000 OF SAVINGS EACH YEAR



Company

We at RheOmega aim to create an abundance of clean energy through technological innovation. We know achieving true impact on industry and the environment requires both technical and commercial success. We measure our impact by exponentially growing clean megawatt-hours, reducing emissions, and transforming waste heat into dollars.

We are obsessed with solving our customers' energy needs with cost-effective clean energy solutions. We are driven by curiosity, the thrill of invention, and the desire to leave a legacy of good.

RheOmega, LLC is a small business founded and located in beautiful seacoast NH. We are drawn to, connected with, and rooted in NH. We are supporters of and supported by New Hampshire's entrepreneurial ecosystem: contributors and members of AlphaLoft, beneficiary of NH Employment Security's Pathway to Work program, and aided by the Live Free and Start Initiative and the NH Small Business Development Center.

Team

Alexander Bell, Founder – abell@rheomega.com -

Mr. Bell is an engineer and entrepreneur who is passionate about clean energy. He was a Senior Research Engineer at General Compression, and previously, R&D Manager at SustainX; both companies were developers of Isothermal Compressed Air Energy Storage technology. At GC and SustainX, he was the "Foam Guy" responsible for the development of the near-isothermal foam technology in ICAES. He has a BS in Chemical Engineering from UNH and a Master of Engineering Management from Dartmouth where he focused on energy & entrepreneurship. Mr. Bell holds 4 US patents.

David E. Perkins, Adviser – dperkins@rheomega.com -

Mr. Perkins was most recently Chief Technology Officer for General Compression, a developer of grid-scale compressed air energy storage technology. Previously, he was CTO for Active Power, a developer of behind-the-meter power quality systems (UPS) using flywheels and compressed air storage. Perkins began his career developing pulsed power rotating machinery and applications at the University of Texas Center for Electromechanics. He received BS and MSME degrees from the University of Texas, Austin. Mr. Perkins holds 10 US patents.

Plan

RheOmega is an early stage company developing its first product for its first customers. We are fleshing out the business model and are aiming to demonstrate a Proof of Concept system within 18 months.

- **Company & Team:** we are seeking a co-founder with talent and experience finding the right markets for new technologies. We are looking for advisers, mentors, and eventually investors.
- **Market:** we are focused on customer discovery and using that process as bottom-up market research for finding product/market fit.
- **Product:** we are continuing thermodynamic cycle development, equipment selection & product cost estimation, and designing the Proof of Concept system.