

EMPowered Heat

Acceleware's **EMPowered Heat** can decarbonize high volume or high temperature industrial process heat quickly and economically by displacing combustion based heat with electromagnetic (EM) energy.

TECHNOLOGY HIGHLIGHTS

Temperature Range: 40°C - 2000°C

Power Range: 250kW - 100 MW

Efficiency: 98% conversion of electricity to EM energy

What Makes **EMPowered Heat** Unique

Reduction of base load energy requirements is a fundamental benefit of EM Powered Heat. We reduce energy consumption joule for joule versus fossil fuel-based heat and other forms of electrification.

The technology combines high efficiency (>98%) conversion of electricity to EM energy with the ability to couple that energy directly to target molecules, significantly reducing heat transfer losses and ensuring that more input energy becomes useful heat. The result for many process heat applications is an energy input reduction of 50% or more. Additionally, the technology could:

- Eliminate scope 1 GHG emissions in all scenarios and many scope 2 GHGs when powered by renewables;
- Lower GHGs by ~50% or more for most applications when grid powered;
- Run on intermittent power, reducing the burden on the grid to electrify;
- Support broad industrial process heat electrification with a system that helps balance, rather than overload the grid, and;
- Reduce footprint, minimize operating costs and maintenance requirements.



Clean Tech Inverter (CTI) TRL 9

Status: 2 MW CTI successfully field tested in a commercial environment, industrial process heat platform that can scale from 250 kW to 100 MW, being adapted to work with multiple applications.

The core technology behind EM Powered Heat applications is the Clean Tech Inverter (CTI) that pioneers the use of silicon carbide (SiC) transistor technology to enable extremely energy efficient, economic, and scalable EM heating. Having developed and proven the CTI over 15 years and with CAD \$50 million in investment (and in collaboration with GE Global Research), Acceleware is positioned to rapidly adapt and then deploy this technology to a wide range of applications.

Client Engagement

Acceleware works with clients to rapidly adapt our **EMPowered Heat** technology to meet your specific process heat needs. We follow four stages to move from concept to commercial systems quickly and cost effectively.

Stage 1 Property measurements and Simulation Studies (\$50K-\$100K)

Stage 2 Bench scale proof of concept heating systems (\$250K - \$500K)

Stage 3 Pre-commercial or commercial scale pilot test. (\$500K - \$1M)

Stage 4 Commercial deployment and long term optimization (varies by scale)

EMPowered Heat Applications

Heavy Oil

TRL 8, TRL 9 target Q4 2025

Status: \$30M commercial scale (2 MW, 500m deep, 800m horizontal well) heavy oil pilot in Marwayne, AB.

RF **XL** is expected to provide 50% lower capex and opex for thermal heavy oil production while eliminating scope 1 emissions and cutting scope 2 by 50% or more.

Carbon Capture

TRL 4, TRL 8 target Q4 2025

Status: Process efficiency and amine regeneration benefits validated at lab scale by AXE and third party lab. The current CTI design is capable of supporting a 10,000 tonne/day flue gas CCS system.

High efficiency electrification of solvent regeneration, reducing energy input up to 75%, lowers operating costs 33%, and minimizes amine solvent degradation.

Agriculture & Food

TRL 4, pilot project discussions underway

Status: EM Powered Heat dryers developed for minerals and fly ash can be readily adapted to dry agricultural bulk solids.

Drying for grains (wheat, barley, corn), oil seeds, pulse crops, protein isolate and other fractionated ingredients and processing sewage into Class A biosolids.

Pulp & Paper

Reducing energy intensity versus combustion or other forms of electric heat for drying of pulp and paper products and related thermal processes.

Mining

TRL 6, TRL 8 target Q4 2025

Status: Lab scale potash dryer pilot 2024, 1 tonne/hr potash dryer pilot Q2 2025, 10 tonne/hr potash field demo system Q1 2026.

Reducing energy intensity versus combustion or other forms of electric heat. Applications in drying, comminution, thermal fracturing, heap heating, etc.

Concrete & Cement

TRL 4 Q1 2025, TRL 6-8 target late Q4 2025

Status: Adaptation of EM Powered Heat dryer for fly ash underway Q1 2025.

Transforming waste fly ash from coal plants into concrete additive that reduces CO2 emissions.

Clean Fuels, Circular Economy and H₂

TRL 4 completed

Status: Acceleware has completed TRL 4 testing of EM Powered Heat in methane pyrolysis; Our dryer is readily adaptable to drying MSW.

Production of H₂ and graphite via methane pyrolysis with energy input of ~ 30 MJ/kg H₂ can heat/dry municipal solid waste (MSW) and prepare it for conversion to synthetic fuels, and could recycle post-consumer plastics into petrochemical building blocks.

Steel

Decarbonization of iron reduction, steel forming, and drying or preconditioning of iron ore.

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