This investment will support the development of a technology to convert waste heat (more than half of worldwide energy use) to electricity at low cost and high efficiency, which can reduce greenhouse gas emissions in the power and transportation sectors.

Energy wasted as heat in industrial and power generation processes is a vast, untapped resource - nearly 60% of the energy used to generate electricity worldwide is lost as heat according to the International Energy Agency. This leads to large inefficiencies and excess greenhouse gas emissions in the use of fossil fuels to produce power. RedWave Energy is developing a technology with the ability to capture low-temperature waste heat and convert it directly to electricity at very low cost - representing a major scientific and commercial breakthrough. The company recently received a Department of Energy ARPA-E grant, the highest validation of the technical excellence of the team and potential impact of the technology at scale.
This company furthers progress towards reducing emissions by 1 GT C/Y by 2050 by increasing the carbon efficiency of fossil fuel power plants.
Charitability and Social Impact Assessment

Environmental Issue

Today, fossil fuels are still the largest energy source for power production and heavy industrial processing around the world. This leads to a variety of issues—from the local health impacts of the air pollution associated with burning fossil fuels to the ongoing emission of CO2 and other greenhouse gases to the atmosphere, which continue to accelerate climate change. Current fossil fuel-powered infrastructure is extremely inefficient - up to 60% of the energy contained in the primary fossil fuel is emitted as waste heat in the average power plant (International Energy Agency, 2014 World Energy Balance). While some technologies exist to capture and reuse high temperature waste heat, effectively capturing and reusing low temperature waste heat (which accounts for roughly 60% of all waste heat in US industrial processes) has remained difficult (US DOE, Waste Heat Recovery: Technology and Opportunities in US Industry, 2008).

RedWave’s thermal rectenna technology represents a major breakthrough in addressing this problem, with its potential to capture low temperature waste heat and convert it directly to electricity. A technology of this type could dramatically improve the energy efficiency of industrial processes and therefore reduce the carbon intensity of electricity production and industrial processing around the world. The potential of RedWave’s technology has been recognized through a grant from the US Department of Energy’s Advanced Research Projects Agency—Energy (ARPA-E), which catalyzes cutting-edge energy research, focusing on “high-potential, high-impact energy technologies that are too early for private-sector investment.”

Direct Charitable Impacts

RedWave’s technology has the potential to protect natural resources by directly mitigating harmful environmental practices in several ways:

- Air: reduces air pollution intensity. Increasing a power plant’s fuel efficiency means less fuel is consumed to produce the same amount of electricity, reducing absolute pollution for a given level of electricity production. In addition to accelerating climate change, power plant air emissions also harm the health of nearby residents and workers.

- Air/Water/Wildlife: cools waste heat prior to emission from the plant. The ejection of waste heat streams to the local environment (whether gas or liquid) can have negative impacts on wildlife, such as the destruction of habitat, loss of biodiversity, and disruption of biological and ecological processes.

- Land: reduces demand for and negative environmental impacts of fossil fuel extraction. If the deployment of RedWave’s technology results in increased production efficiency, the power sector and heavy industry alike will demand fewer fossil fuel resources. The extraction of coal, gas, and oil exacts a heavy environmental toll, from the direct destruction of natural habitat through practices like strip mining and infrastructure building in remote and pristine areas, to accidental environmental contamination through chemical spills and leaks.

Lessens the burdens of government

RedWave’s technology has the potential to increase the efficiency of critical US electrical generation infrastructure

Indirect Charitable Impact from Climate Change Mitigation

Because this company helps to mitigate climate change, it also has indirect impacts on existing charitable purposes.

Promotes human health

Reduces pollution from fossil fuels and spread of disease

Alleviates poverty: natural disasters

Mitigates frequency and severity of natural disasters, which disproportionately affect the poor

Defends human rights

Protects communities most vulnerable to climate change effects

Combats community deterioration

Mitigates sea level rise and resource degradation

Protects the natural environment

Prevents ecosystem degradation and species extinction

Lessens the burdens of government

Reduces strain on infrastructure and need for climate-related assistance