INTEGRATED
ENVIRONMENTAL SERVICES, INC.

A Carbon Positive CO_2 Reduction Technology Offers New Hope for Solving Climate Change (a Summary)

I. The Presenter

- Integrated Environmental Services, Inc. (IES), headquartered in Southern California
- IES is a U.S. SBA certified 8(a) company with 14 years of experience tackling challenging environmental and pollution control projects for both private and public sector clients
- IES is a partner of a carbon-positive CO_2 reduction technology (the Technology, patent pending, http://www.iesinet.com/services-co2_reduction_technology.php) that converts CO_2 emissions to graphite and oxygen

II. Major Features of the Technology

- The Technology breaks the carbon-oxygen bond using only one-third of the CO_2 bond energy under normal temperature and pressure
- In addition to reducing CO_2, the Technology can also simultaneously reduce NO_x, SO_x and other greenhouse gases commonly found in the flue gas of carbon emission sources
- The Technology is carbon positive because the amount of CO_2 emissions it eliminates exceeds those created to supply the Technology's energy requirements
- The Technology has performed successfully for more than two years in the laboratory with consistent performance and results

III. Significant Value and Benefits of the Technology

- The Technology has completed its R&D phase and successfully proved a revolutionary mechanism to carbon-positive reduction of CO_2 emissions
- Unlike Carbon Capture and Storage (CCS), which captures and stores CO_2 indefinitely, the Technology actually breaks down CO_2 at the emission point sources into the valuable end-products of graphite and oxygen
- The high purity graphite can then be used in other industrial processes (e.g. hybrid electric vehicles, solar panels, batteries, and semiconductors) and oxygen in boosting boiler's combustion efficiency
- Moreover, because the Technology can simultaneous breakdown CO_2, SO_x, NO_x and other greenhouse gases in the flue gas, it can significantly reduce the construction costs of new power plants (estimated between 10% to 15% of the total construction costs)

IV. Current Activity

- IES is forming an alliance with two highly qualified entities to demonstrate the Technology in a commercial setting: a major CO_2 emitter to provide test venue and CO_2 source and an energy technology research center to monitor and validate Technology performance

V. Benefits of the Demonstration Project

- A successful demonstration will add a proven, powerful tool to a broad suite of technological options to reduce carbon emissions in the U.S.
- It may even revolutionize the approach in fighting climate change

22932 El Toro Road, Lake Forest, California, 92630 ♦ Tel: (949) 460-7000 ♦ Fax: (949) 460-7019

A Carbon Positive CO_2 Reduction Technology Offers New Hope for Solving Climate Change

Climate change represents one of the greatest environmental threats in mankind's history. The scientific consensus is that the emission of greenhouse gases, primarily carbon dioxide (CO_2) from the burning of fossil fuels, is a significant contributing cause of climate change[1]. Integrated Environmental Services (IES), headquartered in Southern California, has partnered in a carbon-positive CO_2 reduction technology (patent pending) that converts CO_2 emissions into graphite and oxygen. The technology is carbon-positive because it only requires approximately one third of the CO_2 bond energy to split the CO_2 molecule. The technology has performed consistently for more than two years in the laboratory and shows significant additional benefits in simultaneously reducing CO_2, SOx, NOx and other greenhouse gases in the flue gas emitted from industrial processes. IES is in the process of selecting a facility for a large scale demonstration project. The objective is to demonstrate the technology in a field setting and to showcase the effectiveness and cost advantages in reducing CO_2 emissions when compared to other technologies. IES is also working to lay the groundwork for the technology's rapid deployment upon successful completion of the demonstration project.

In response to climate change, the industrialized nations are looking to reduce their CO_2 emissions by as much as 50% or more by 2050[2]. As more than half of U.S. CO_2 emissions come from fossil fuel burning power plants and industrial facilities[3], elimination of these emissions alone could achieve the 50% goal in the U.S. Increased use of renewables (solar, wind, etc.), nuclear plants, conservation and energy efficiency can provide some progress, but it is generally agreed that these solutions cannot fully replace fossil fuels within the required timeframe[4]. Consequently, in order to meet the 50% reduction goal, fossil fuel burning power plants and industrial facilities need to be retrofitted with CO_2 reduction technology. The International Energy Agency recently concluded that to meet this ambitious goal, each year between 2010 and 2050, on average, 35 coal and 20 gas-fired power plants would need to be retrofitted[4].

At present, the only proven CO_2 reduction technology being considered is carbon capture and storage (CCS) in which CO_2 emissions are captured at the emissions source, transported by pipeline (some times over great distances) and injected into underground reservoirs for indefinite storage. Unfortunately, various government studies have shown that, while feasible, CCS is not the primary solution to the global climate change challenge and likely to be uneconomic, with estimated potential costs that could double the price of electricity[5,6]. Further, assuring the long-term underground storage of the CO_2 may be problematic. With CCS' problems, the task of finding a reliable, affordable, carbon positive and energy efficient CO_2 reduction technology has became more urgent than ever.

22932 El Toro Road, Lake Forest, CA 92630 Tel: (949)460-7000 www.iesinet.com
Contact: info@iesinet.com No phone calls please

Instead of capturing and storing CO_2, IES' approach is to actually break down the CO_2 into its component atoms: carbon and oxygen. Rather than creating a waste stream that has to be transported, injected, safe-kept and monitored in underground storage indefinitely, IES' technology converts the CO_2 into valuable end products that can be used in other industrial processes (e.g., high-purity graphite is used in hybrid electric vehicles, batteries, solar panels, and semiconductors). Until now, due to the strong bond energy between the atoms in CO_2, breakup of CO_2 has proved to be uneconomic and carbon negative. That is, the generation of the required energy to break the bond produced more CO_2 than was eliminated by the process. Our patent pending technology solves this challenge. By pre-processing the CO_2, the molecular bonds can be broken with only about a third of the bond energy (somewhat like a crude oil refinery uses catalytic devices to reduce the energy needed to refine crude oil). As a result, the process becomes carbon positive, eliminating more CO_2 than is produced in generating the required energy.

No single technology exists that can solve the climate change process while maximizing economic growth. The challenge is to find the best mix of technologies that achieves the necessary reduction in greenhouse gases. In determining which technologies need to be pursued, three important criteria need to be weighed. First, is the technology carbon positive? In selecting the right mix of solutions, it is critical that a proposed technology not result in more greenhouse gas emissions over its full life cycle than the technology eliminates. Second, can the technology be employed in the requisite timeframe in order to meet the 2050 goal? Third, how does the technology rank with respect to cost and economic impact when compared to other greenhouse gas reduction solutions? Selecting the right technology mix is essential to minimize the adverse economic impacts from transitioning to the carbon neutral economy needed to reverse climate change. IES' carbon positive CO_2 reduction technology represents a measurable and significant breakthrough in addressing the climate change crisis, providing favorable answers to all three questions. It has the potential to significantly advance the rapid achievement of very ambitious reductions in greenhouse gas emissions while still promoting worldwide economic growth.

---

[1] http://en.wikipedia.org/wiki/Global_warming

[2] The European Union has set a goal of a 50% reduction in greenhouse gas emissions by 2050. See http://ec.europa.eu/climateaction/eu_action/index_en.htm.

[3] *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006*, U.S. Environmental Protection Agency, USEPA#430-R-08-005, April, 2008.

[4] *Energy Technology Perspectives 2008,* International Energy Agency (IEA), July 2008

[5] *Submission to the UNFCCC Secretariat on carbon dioxide capture and geological storage as a Clean Development Mechanism Project Activity.* Carbon Capture and Storage Association, June 2008. See http://unfcc,int/resource/docs/2008/smsn/ngo/024.pdf

[6] *The Economics of Carbon Capture and Storage*, Frederic Beauregard-Tellier, Parliamentary Information and Research Service, PRB 05-103E, March 13, 2006.