



Innovative Engineering Solutions, Inc.

September 2014 Newsletter

IESI WINS SOLAR PROJECT OF THE YEAR AWARD (RICH MCCARTHY TO THE LEFT)

IN THIS ISSUE

In This Issue

- 5 Renewable (Solar) Energy Facts
- 5 Site Remediation Tips
- 5 Health & Safety Tips
- 5 Energy Efficiency Tips
- IESI wins Solar Project of the Year Award
- How Energy Services Agreements (ESA) are Structured
- 1,1,1 TCA Bioremediation

IESI- Interesting News You Can Use!

Welcome to the Innovative Engineering Solutions, Inc. (IESI) newsletter. Our newsletters present interesting and relevant information for environmental and energy services customers and practitioners. In each newsletter, we provide at least one article related to renewable energy, site remediation and energy efficiency.

5 Renewable Energy (Solar) Facts

1. When talking about solar array size, make sure that you distinguish between AC and DC output- They are not the same!
2. SREC credit values are on the rise in Massachusetts!
3. IESI installed 5% of all solar panels in the state of MA in 2013.
4. Transparent solar panels are not too far away. Prototypes have been tested. How about the idea of a solar skyscraper!
5. Solar car ports are expected to see major growth over the next few years

5 Site Remediation Tips

1. 1,4 dioxane can be treated in situ using persulfate chemical oxidation or co-metabolic aerobic bioremediation.
2. PCE and 1,1,1 TCA can be degraded anaerobically at concentrations as high as 500 ppm.
3. Oxygen sparging can generate dissolved oxygen concentrations as high as 40 mg/L in deeper groundwater expediting aerobic degradation.
4. Iron fouling is most prevalent under aerobic conditions and much less so under anaerobic conditions
5. The most important variable for in-situ remediation (of any kind) is additive distribution.

For more information contact Sami Fam, Ph.D., P.E., LSP: Sami@IESIonline.com



For more information contact Rich McCarthy, CEM RMcCarthy@IESIonline.com

Top-IESI Solar Project; Bottom- Milford Sound – Courtesy of Mike Gaudette

5 Health & Safety Tips

The following is a list of the top 5 most frequently cited standards violations following inspections of work sites by the federal Occupational Safety and Health Administration (OSHA) during fiscal year 2013.

1. Fall protection, construction (29 CFR 1926.501)
2. Hazard communication, general industry (29 CFR 1910.451)
3. Scaffolding, construction (29 CFR 1926.451)
4. Respiratory protection, general industry (29 CFR 1910.134)
5. Electrical, wiring methods, general industry (29 CFR 1910.305)

For more information contact Joe Higgins, P.E., LSP: Joe@IESIonline.com

5 Energy Efficiency Tips

1. Check your utility rate, even if you were on the correct rate last year
2. Ensure that your HVAC system circulates the correct airflow
3. Do not over-ventilate. It is a waste of energy.
4. Locate water heaters for most efficient delivery
5. Replace motors under 25 hp with energy efficient motors vs. rewinding them.

For more information contact Kathy Stanley: KStanley@IESIonline.com

IESI Wins Solar Project of the Year Award

IESI's award winning project (PV America 2104 Photovoltaic Project Distinction Award) involved installation of two separate photovoltaic solar energy generation systems on land owned by the Cistercian Nuns of Mount Saint Mary's Abbey, in Franklin, MA. The 4.8MW DC system was interconnected to a 23 kV distribution feeder and the 3.6 MW DC system was interconnected via a 13.8 kV feeder. Challenges to these systems included

wetlands, soils types, bedrock, topography and shading. The systems came on-line during the late fall of 2013. The Town of Franklin is the offtaker of the power generated by both systems and will realize an annual savings of \$270,000+/- over the duration of the 20 year PPA.



Above and below are aerial photos of the two solar fields in Franklin, MA.



Energy Services Agreements (ESA)

A number of innovative managed energy services agreement (ESA) structures are now being offered by third parties who develop projects, arrange or provide the capital, and manage the installed equipment. It is typically a pay-for-performance solution where energy efficiency is essentially being sold as a service. Building owners have no upfront cost, no capital requirement, and 100% of the project cost is financed. These innovative agreements are distinct from traditional ESCO performance contracting in multiple respects, including: (1) energy efficiency service providers assume ownership and maintenance responsibility for project assets over the lifetime of the project; (2) building owners are not required to arrange their own financing and do not

assume responsibility for principal and interest payments; (3) building owners do not bear the risk of whether an ESCO is willing and able to stand behind its performance guarantee – energy efficiency service providers are compensated only if energy savings are realized; and (4) building owner payments to the energy efficiency service providers are viewed as operating expenses. (However, more recent ESCO performance contracting is being designed to respond to a number of these differences.)

There are a growing number of energy efficiency service firms offering financing solutions under ESAs, including IESI. Under some conditions, building owners pay a service fee based on historical energy costs. IESI, in turn, pays the utility bill and earns its fee from savings generated by the efficiency improvements. The fee becomes an operating expense that replaces the utility bill. At the end of the ESA term (typically 5-10 years), title associated with the improvements passes to the owner. Despite the simplicity of the aforementioned approach, the ideal projects generally need to be relatively large (preferably greater than \$500,000) to cover all the upfront expenses and administration costs. Also, annual energy expenditures need to be relatively high (preferably approaching \$0.5 million per year).

1,1,1 TCA Bioremediation

Bioremediation of 1,1,1-trichloroethane (TCA) is more challenging than bioremediation of other chlorinated solvents, such as tetrachloroethene (PCE) and trichloroethene (TCE). TCA transformation often occurs under methanogenic and sulfate reducing conditions and is mediated by Dehalobacter. The source area at a recently completed IESI project site contained moderately permeable medium sand with a low hydraulic gradient and is approximately 0.5 acre. TCA contamination generally extended to 35 feet, with the highest concentrations at approximately 20 feet. The concentrations then decreased with depth; several wells contained 300 to 600 milligrams per liter (mg/L) of TCA prior to bioremediation. The area of treatment also contained 2 to 30 mg/L of TCE from an upgradient source. Initial site groundwater conditions indicated minimal biotic dechlorination and the presence of up to 20 mg/L nitrate and 90 mg/L sulfate. Microcosm testing indicated that TCA dechlorination was inhibited by the site's

relatively low pH (5) and high TCA concentration. After the pH was adjusted and TCA concentrations were reduced to less than 35 mg/L (by dilution with site water), dechlorination proceeded rapidly. Throughout the remediation program, increased resistance to TCA inhibition (from 35 to 200 mg/Lmg/L) was observed as the microbes adapted to the elevated TCA concentrations. Active remediation was completed in 2010 (4 years of operation) and there has been no rebound in site VOC concentrations since 2010. TCA has essentially been eliminated from the groundwater and transformed to chloroethane. The generated chloroethane has been degrading for the past 4 years and is also expected to fully degraded within a few more years. For more information, please read the full article in Remediation Journal (Spring 2012) or contact Sami@IESIonline.com



Photo of one of the dozens of groundwater recirculation trailers designed, constructed and installed by IESI.

About IESI

Innovative Engineering Solutions, Inc., is a leading provider of environmental consulting services for the remediation of contaminated properties - including chemical facilities and manufactured gas plants.

IESI provides the consistent, high quality, responsive, and low-cost environmental services associated with smaller firms, but with the depth and expertise of larger traditional environmental consulting firms.

IESI offers a wide variety of remediation services to its clients, which can generally be grouped into four categories: Bioremediation, Hydrocarbon Cleanup, Regulatory Compliance Audits, and Manufactured Gas Plant Cleanup. Please explore the rest of this site or contact one of our principals for further information. The combination of our technical, design, laboratory, and most importantly practical common sense and experience, makes us the best remediation firm in the United States

IESI Energy Services provides customers with comprehensive solutions to energy efficiency and renewable energy concerns. Our competencies include the expertise required to develop, engineer, design, permit, procure, build, project manage and commission energy efficiency projects from the audit stage through project completion. Our projects take advantage of all available utility incentives. Our sustainable technology team provides an integrated sustainable design process, working with all stakeholders, to deliver successful renewable and sustainable energy projects including solar, biogas, geothermal, biomass and landfill-gas-to-energy technologies. Through June 2014, IESI has constructed over 30 MW of solar projects and has an additional 15 MW under contract. In 2013, IESI installed approximately 6% of all solar panels in Massachusetts. We work with our customers in taking a creative financing approach to projects and can incorporate leasing, debt financing, asset-based lending and power purchase agreements as well as other financing methods into projects.



Photo of one of the dozens of groundwater recirculation trailers designed, constructed and installed by IESI.



Photo of a solar powered remediation trailer for 1,4 dioxane.

For More Information:

Corporate Office
 Innovative Engineering Solutions Inc.
 25 Spring Street
 Walpole MA
 508-668-0033 x 221
 Website: IESIonline.com