

Sanitation's T.I.R.E. Project 

Turning Waste Into Clean



Energy

FIRST IN THE NATION: Sanitation begins a pilot program to recycle waste into natural gas.

PUBLIC WORKS — Sanitation broke ground April 5 for the nation's first project to produce green energy from a renewable bio-resource using deep well injection.

The project, called the Terminal Island Renewable Energy project (T.I.R.E.), uses an existing oil-industry technology to convert biosolids to green energy. It injects biosolids in depleted oil and gas reservoirs more than a mile underground near the City's Terminal Island Plant. There, the earth's high internal temperatures and pressures will form methane gas – much like oil reserves formed from prehistoric creatures and

– continues



Omar Moghaddam,
Overseer of the T.I.R.E.
Project for the City,
stands in front of the
Sanitation facility on
Terminal Island.

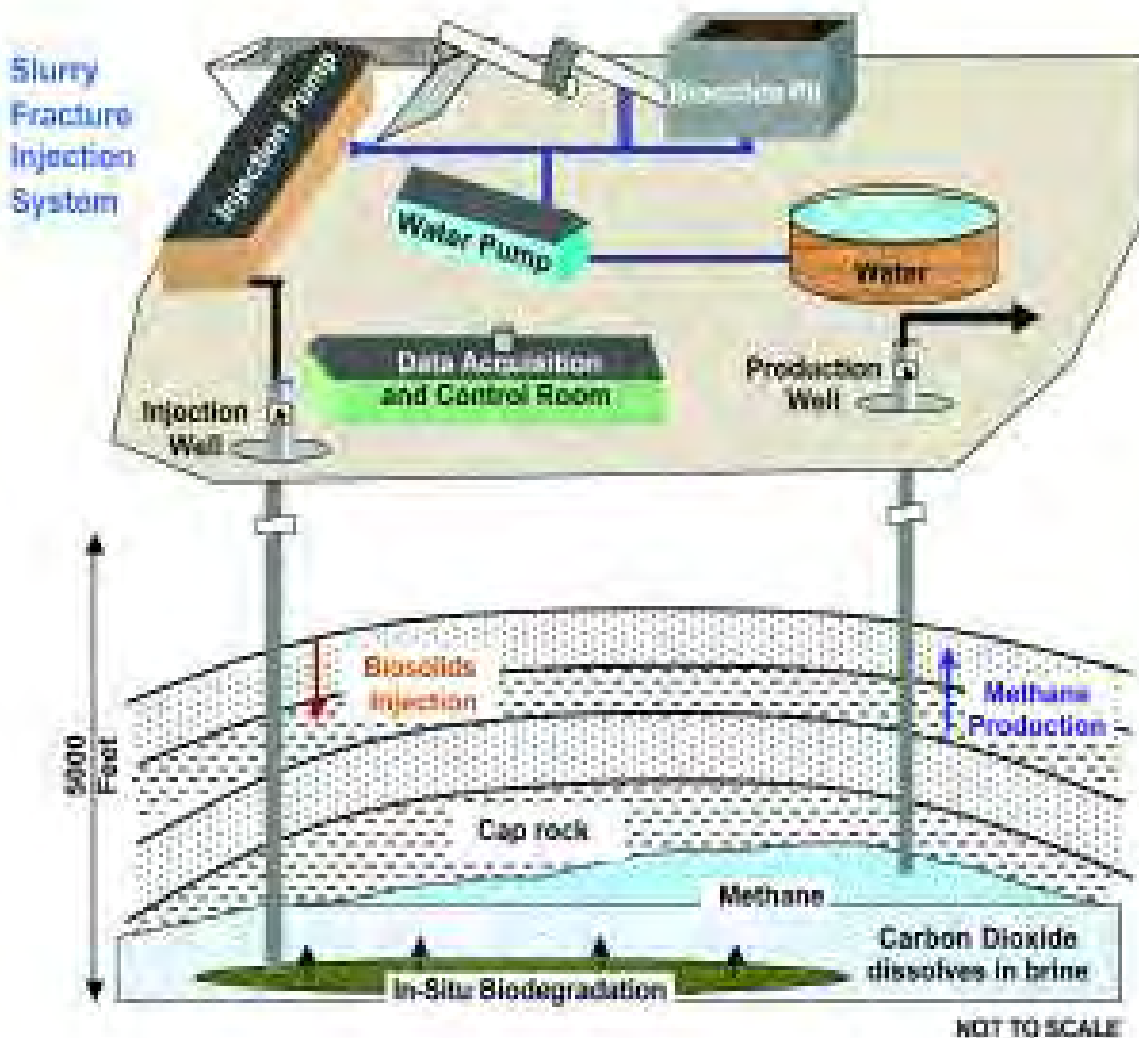
Sanitation's T.I.R.E. Project

T.I.R.E. PROJECT: How It Works

Slurry mixtures of treated, non-hazardous, municipal sludge and water will be injected into a high permeability unconsolidated sandstone formation at the Terminal Island Treatment Plant operated by City of Los Angeles. Multiple injection and monitoring wells will be drilled and completed in weakly consolidated, high permeability, sand formations at depths from about 3,800 to 5,300 ft.

Up to 400 tons per day of biosolids will be injected into soft, high porosity, formation sands, using technology optimized for solid waste slurry injection, for five years. At this depth the material will undergo a natural process of high-temperature anaerobic biodegradation, similar to the process of diagenesis naturally deposited organic layers undergo over time after deposition and burial. Retention in the high temperature (114° – 159°F) saline environment of the deep geologic formation will treat and convert the biosolids into methane, carbon dioxide and non-volatile residual solids.

The carbon dioxide will be preferentially dissolved and sequestered in the formation brine, while relatively high purity methane will migrate and become trapped in the reservoir to be recovered for beneficial use at the surface, or stored for subsequent use.



- continued from previous page

plants. The process also produces carbon dioxide, but this greenhouse gas remains trapped in the deep subsurface through sequestration.

Overseeing the project for the City is Homayoun R. (Omar) Moghaddam, Division Manager, Sanitation. Omar has been leading the project since its first proposal stage in 2001.

Terralog Technologies USA, which introduced the idea to City officials nearly a decade ago, is developing the T.I.R.E. Project in partnership with the Public Works; Terralog owns the technology patent and engineered the project. Already, the project has gained the attention of scientists nationally. John A. Apps, Senior Scientist Emeritus, Lawrence Berkeley National Laboratory said, "The pioneering of deep injection disposal of treated biosolids by the City of Los Angeles could pave the way in eventually providing economic benefits and a cleaner environment to millions of citizens of major cities throughout the world."

When it is fully operational, Sanitation will convert biosolids into approximately 3,500 kilowatts or 3.5 megawatts of electricity, enough green energy to power nearly 3000 homes at a value of more than \$2.4 million per year. For now, the clean gas produced by the process will flow into a fuel cell, which will create power



Turning Waste Into Clean Energy



Workers have started digging the two mile-deep holes that are critical to the T.I.R.E. Project.



Mayor Antonio Villaraigosa drills the ceremonial first hole at the T.I.R.E. Project press event.



City officials pose for a photo at the T.I.R.E. Project press event.

About Omar Moghaddam

Homayoun (Omar) R. Moghaddam
*Overseer, T.I.R.E. Project for the City of Los Angeles
 Division Manager, Regulatory Affairs Division,
 Bureau of Sanitation, Public Works*

More than 26 years experience in water/wastewater, energy and research, renewable energy, refineries, operations of the resource recovery from biosolids, biomass and cogeneration facilities; regulatory and legislative affairs; negotiated air quality, water recycling and waste discharge permits, negotiated energy contracts.



Formerly:

- Division Manager, Energy and Applied Research
- Senior Operations Engineer, Hyperion Energy Recovery System
- Senior Engineer, Air Quality Management (certified)
- Senior Engineer, Energy and Utility Manager
- Resource Development Engineer
- Certified Professional Engineer, State of California
- Certified Permitting Professional, South Coast Air Quality Management District

Omar lives in Redondo Beach with his wife, Afsaneh; daughter, Chloe; and son, Kian.

to be used onsite. The DWP, in a separate project, is building the fuel cell and electricity component.

Among innovative technological features of the T.I.R.E. project are carbon sequestration, use of fuel cells powered by methane and a state-of-the-art monitoring system.

Environmental and Economic Advantages

The demonstration project will include extensive field monitoring and sampling from the offset monitoring wells to quantify slurry placement, biodegradation rates, carbon dioxide and methane separation, carbon dioxide sequestration and saturation in formation brine, and free gas migration and production. This technology provides the following environmental and economic benefits:

- **Improves Groundwater Protection**
- **Provides Clean Renewable Energy Source**
- **Reduces CO2 Emissions to Atmosphere**

The TIRE Project will reduce air emissions and trucking costs currently associated with transporting biosolids to various land application sites, reduce greenhouse gases due to the sequestering of biosolids underground (up to 400 tons per day), and produce renewable electricity from biogas. The TIRE Project will also save millions of dollars in capital, operating, and maintenance costs that otherwise would have been spent on dewatering facilities.

- **Enhanced treatment and sterilization of biosolids**
- **Provides a local solution, reducing long distance truck traffic**
- **Reduced greenhouse gas emissions to the atmosphere**
- **Enhances Thermal Treatment and Sterilization**



The invitation to the press event stressed the project's energy efficiency potential.



Rita Robinson, Director of Sanitation and Club Board Member (right), answers questions during the groundbreaking press event.

