



FORT IRWIN, CALIFORNIA
Waste Conversion Technology Project

Responsible Stewardship
Our future security rests upon our careful and deliberate management of resources, energy, water, and the environment

*- Guiding Principles, 38th CSA
Marching Orders*

Road to Zero Waste:
A Step Toward
Energy Independence

Presented by

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Integrated Energy





Fort Irwin, California Waste Conversion Project

FORT IRWIN NATIONAL TRAINING CENTER

- Location:** Ft. Irwin, California in San Bernardino County
Approx 37 miles northeast of Barstow, California, in the north-central part of the Mojave Desert. It covers approximately 642,000 acres (over 1000 sq. miles)
- Mission:** Ft. Irwin is an U.S. Army National Training Center that has numerous Rotations that come for extensive combat training ops to include force-on-force and live-fire training. These Rotations vary in size and have been as large as 10,000 men in one rotation.
- Population:** Average daily population on Ft. Irwin is estimated at 22,726. There are approx. 5,646 Civilian workers each day.
- Current Waste Operations:** Ft. Irwin has both a Recycling Center and Composting Facility as part of its Waste Management Plan. The Ft. Irwin Sanitary Landfill has unique approach for disposing its waste. The waste is baled and placed in the landfill each day.
- Future Waste Operations:** A new Waste-to-Energy plant will streamline operations and make the project more financially viable to include consolidating waste operations to a centralized location and maximizing the recycling operations. This will be a Centralized Waste Handling Facility ("CWHF")

FT. IRWIN WASTE CONVERSION TECHNOLOGY PROJECT

- **A STEP TOWARD U.S. ARMY'S "NET ZERO" VISION: REDUCING WASTE FROM THE LANDFILL AND UTILIZING IT FOR ENERGY RECOVERY**
- **ASSISTS IN ACHIEVING U.S. ARMY'S GOAL FOR 25% RENEWABLE ENERGY BY 2025 AS WELL AS 34% GHG REDUCTION BY 2020**
 - WILL PROVIDE BASELOAD POWER TO THE BASE THAT ALLOWS FOR ENERGY SECURITY FOR ESSENTIAL SERVICES
 - WTE FACILITY CAN BE USED ON MOST INSTALLATIONS TO ACHIEVE THESE GOALS INTEGRATING OTHER RENEWABLE ENERGY TO CREATE A SUSTAINABLE MICROGRID FOR ENERGY SECURITY.
- **REDUCES LANDFILL COSTS BY ELIMINATING THE NEED FOR NEW LANDFILL CELLS IN THE FUTURE.**
 - OVER LIFE OF PROJECT THIS COULD EXCEED OVER \$18 to 20 M
 - EXTEND LIFE OF EXISTING LANDFILL,
- **THE WTE FACILITY CAN PROCESS MAJORITY OF WASTE GENERATED ON AT FT. IRWIN ASSISTING IN NET ZERO GOALS**
 - THIS WILL REDUCE DISPOSAL AND OPERATIONAL COST ASSOCIATED WITH THESE PROGRAMS
 - OPPORTUNITY FOR ADDITIONAL ENERGY RECOVERY FROM WASTE
 - ADDITIONAL WASTE FROM LANDFILL CAN BE USED FOR MORE ENERGY OUTPUT – EACH BALE WEIGHS BETWEEN 1800 - 2000LBS

FT. IRWIN WTE FACILITY: PROJECT SUMMARY

Location:	Ft. Irwin National Training Center / U.S. Army Garrison San Bernardino County – California
Project Developer:	Siemens Government Technologies under an Energy Savings Performance Contract (“ESPC”) Project for the Construction and Operation of a Waste-to-Energy Facility Two Solar Photovoltaic Carports, and Six Additional Energy Conservation Measures under Task Order
WTE Facility Site:	Integrated with existing infrastructure at Ft. Irwin Landfill and relocating the existing Recycling Operations to new Centralized Waste Handling Facility (“CWHF”)
Estimated Daily Volume of Waste:	30 to 34 tons per day of MSW (daily average) disposed of in landfill
System Size:	System is designed for up 60 tons per day (24/7 operations) with a Design Capacity for Power generation up to 1.7 MWh
Energy Output:	The WTE is able to generate “Base Load” Power - Minimum 1.3 to 1.6 MWh (Gross) Net Energy Exported to Grid – 1.0 up to 1.4 MWh; Energy Output is directly corresponds to waste input and its energy/calorific value
Interconnection:	Interconnect to Grid - Southern California Edison Electrical infrastructure at Ft. Irwin belongs to SCE.
Air District:	Mojave Desert Air Quality Management District (MDAQMD)
Permitting:	Requires modification of existing landfill permit; NEPA/CEQA Compliance. Permit to Construct from MDAQMD; Applied for a Determination of EPA Exemption of NSPS Subpart EEEE
Incentives:	Self Generating Incentive Program (SGIP) from CEC approved for \$1.2 M

Ft. Irwin Waste Conversion Plant

Pyrolytic Conversion Process consists of several major components:

- Custom Designed In-Feed Conveyors with integrated Scale
- Pyrolytic Thermal Converter
- Thermal Oxidizer
- Waste Heat Boiler / Economizer
- Siemens Steam Turbine Generator
- Air Cooled Condenser
- Water Treatment Plant with Reverse Osmosis
- Air Quality Control System (BACT)
 - This system is an “all-in-one” unit specially designed for pyrolysis processes and allows for the use of SCR due to the type of ceramic filters that are used
- Induced Draft Fan / Stack

Integration of the Centralized Waste Handling Facility (CWHF):

- As part of project the Recycling Building will be moved to the WTE site. This will then streamline the operations and maintenance reducing costs
- The joint operations also allowed for some optimized design changes in the waste flow into the process.
 - Once the waste is processed through the CWHF the waste is shredded and sent out of the building by conveyors to staging area that has walking floors that delivers the waste onto the In-Feed Conveyors to the Pyrolytic Converter
 - No personnel touches the waste after it is delivered to the conveyor to the shredder in the CWHF Building. Waste is prepared during the day and stores waste for the remaining 15 to 16 hours in the day.

PERMITTING AND REGULATORY REQUIREMENTS

Working through the Challenges

DETERMINE WHAT PERMITS ARE REQUIRED FOR THE PROJECT

- NEPA / CEQA – ENVIRONMENTAL ASSESSMENT OR EIR
- AIR QUALITY PERMITS – AUTHORITY TO CONSTRUCT
- TITLE V PERMIT (FEDERAL)
- SOLID WASTE PERMITS (LEA / CALRECYCLE)
- INTERCONNECTION APPLICATION / STUDY WITH UTILITY
- BUILDING PERMITS

DEVELOP A SCHEDULE AND DETERMINE IF ANY OF THE PERMITS ARE A PRE-REQUISITE FOR ANOTHER PERMIT.

- AFFECT YOUR TIMELINES FOR THE OVERALL PROJECT AND POTENTIALLY FINANCING
- CAN PERMITS BE COMPLETED ON PARALLEL TRACKS

DETERMINE THE RISKS AND CHALLENGES FOR EACH PERMIT AND HOW THEY IMPACT OVERALL PROJECT SCHEDULE

- ASSESS HOW TO MITIGATE THESE RISKS
- ENGAGE CONSULTANTS THAT HAVE EXPERIENCE WITH LOCAL AGENCIES

Status of Permits at Fort Irwin

- **NEPA AND CEQA COMPLETED AND APPROVED JULY/AUGUST 2014 WITH FINDING OF NO SIGNIFICANT IMPACT (FONSI)**
- **MOHAVE DESERT AQMD ISSUED AUTHORITY TO CONSTRUCT PERMITS FOR THE PROJECT IN OCTOBER 2014**
- **BUILDING PERMITS ISSUED THROUGH FT. IRWIN PLANNING**
- **INTERCONNECTION APPLICATION WITH SCE WAS SUBMITTED**
 - SCE's Rule 21 determines the specific requirements for interconnection of a Generating Facility
 - Interconnect study was completed determining where the interconnection would occur and the costs. SCE owns and maintains all the transmission & distribution of electricity
 - Interconnection was approved, SCE charged for upgrades and new power lines to connect to substation. Installation of new lines completed Fall 2015
 - Delay in approval for switchgear. (Ordered and delivered in 2016)
- **EPA REGION 9 – DETERMINATION OF APPLICABILITY OF NSPA SUBPART EEEE**
 - EPA approved request for Exemption on September 2015.
- **PENDING – PERMIT FOR THE WASTE-TO-ENERGY THROUGH LEA AND CALRECYCLE. CURRENTLY IN PROCESS**
 - Ft. Irwin has completed application and it is being reviewed by LEA and CalRecycle
 - This permit has been the biggest challenge – Transformation Facility or EMSW Conversion Facility ?

ENERGY OUTPUT FROM 50 TPD WTE FACILITY

Based on Volume of Waste Processed

	Volume Feedstock	Air Cooled Condenser			Wet Cooled Condenser		
	TPD	kw	kw-hrs/yr	Water gpy	kw	kw-hrs/yr	Water gpy
Base	32	1,100	7,997,880	1,100,000	1252	9,103,042	19,000,000
Landfill Mining	37	1,260	9,161,208	1,100,000	1448	10,525,392	21,327,273
	42	1,420	10,324,536	1,100,000	1643	11,947,742	23,654,545
	47	1,575	11,451,510	1,100,000	1839	13,370,092	25,909,091

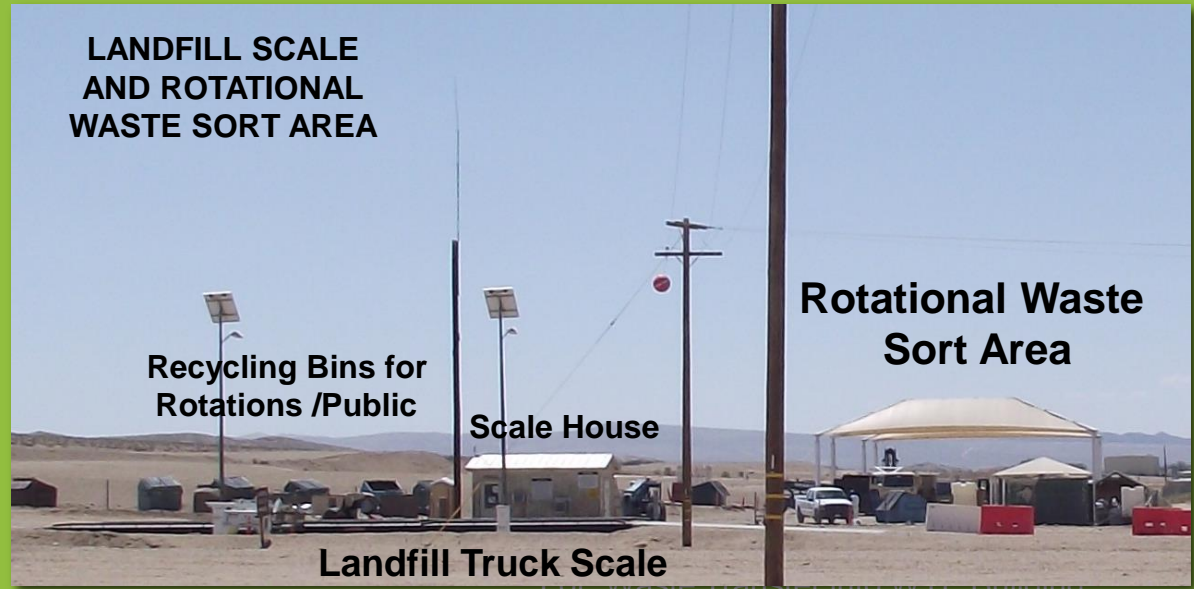
Potential Increases in Performance

- Potential Output could increase to 1.6 MW utilizing landfill mining.
- Waste generation on base potentially could increase to 55 TPD over the next 10-15 years
 - Generation Would Increase to over 2 MW, and generate 15,684,172 kw-hrs annually
- Wet Cooling would increase performance on average of 14% over dry cooling
 - 55 TPD would achieve 2.4 MW, and generate 17,559,000 kw-hrs annually

Ft. Irwin Landfill Operations



Active Landfill Cell



LANDFILL SCALE
AND ROTATIONAL
WASTE SORT AREA

Recycling Bins for
Rotations /Public

Scale House

Rotational Waste
Sort Area

Landfill Truck Scale

For Waste Transfer into WTE Building



Baler Controls

Waste In-Feed Conveyor

Baler

Bagging System



WASTE BALER
OPERATIONS

Ft. Irwin Recycling Waste Operations



Manual Sorting Line



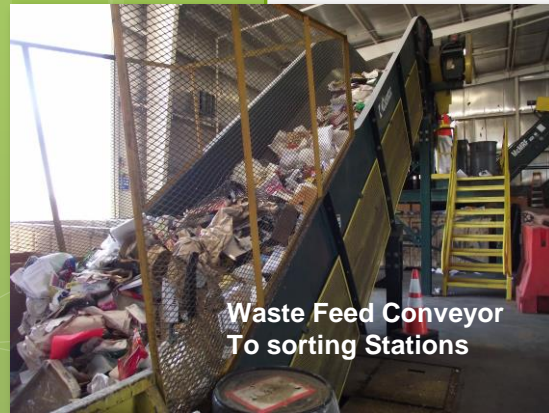
Removal of Recyclables
from Sorting area



Recycling Center



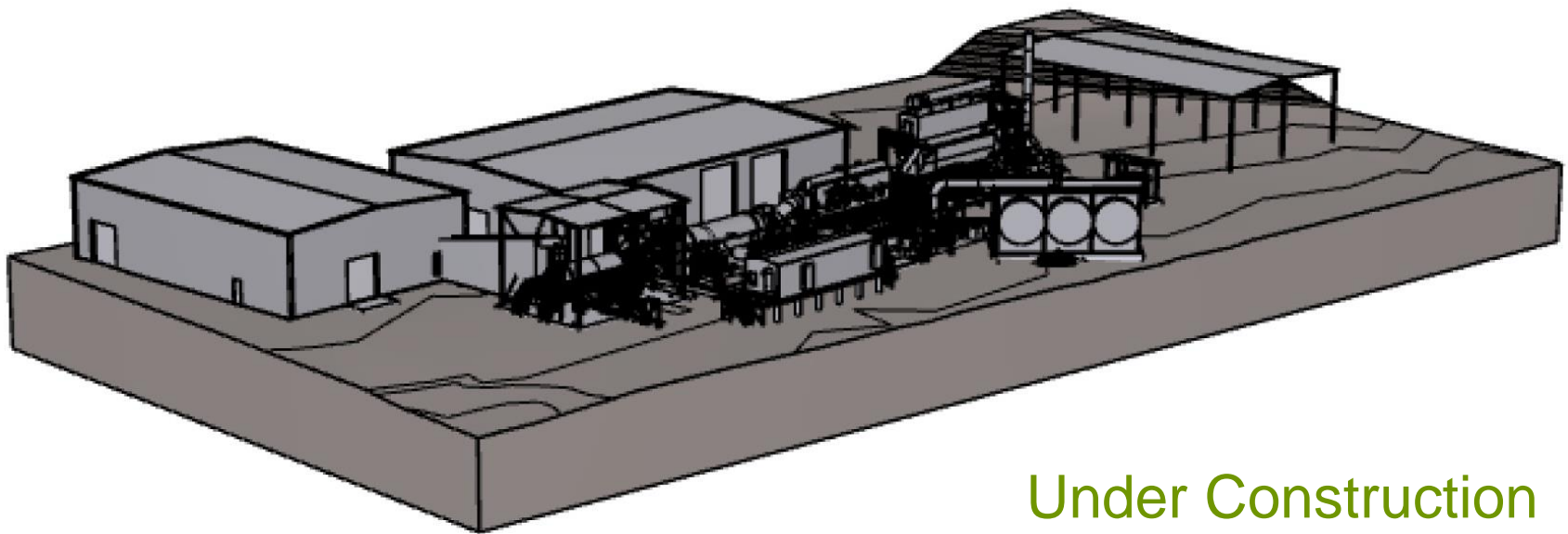
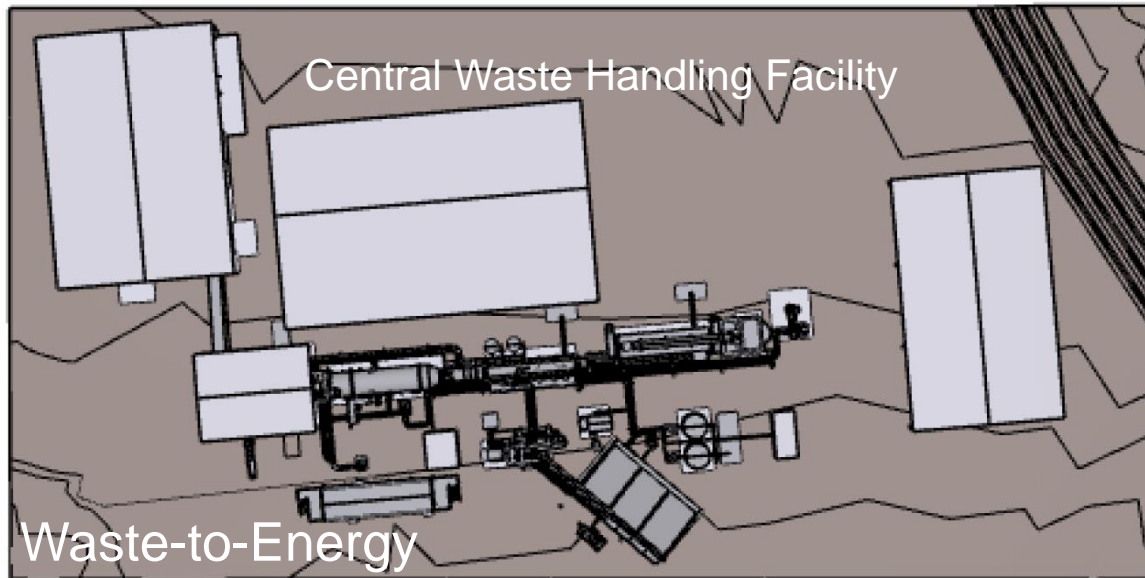
Pre-Sorting
Tipping Floor



Waste Feed Conveyor
To sorting Stations



FORT IRWIN PROJECT LAYOUT



Ft. Irwin Waste-to-Energy Plant

PYROLYTIC WASTE CONVERSION TECHNOLOGY





Thermal Converter



Waste-to-Energy Process Line



Economizer

ID Fan / Stack



Thermal Oxidizer



Air Quality Control System



PDC Building

Steam Turbine Generator



Waste Heat Boiler



**FOR MORE INFORMATION
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