Overview of U.S. Navy's Conversion Technology Best Management Practices Tour

Presented by:

Professor Eugene Tseng

UCLA Engineering Extension / UWLA School of Law

New Energy Goals (SecNav 2009)

1. When awarding contracts, consider how much energy a building or system will use. Also use the overall energy efficiency and the energy footprint of a competing company as an additional factor in acquisition decisions.

2. Demonstrate a "green" strike group composed of nuclear ships, surface combatants equipped with hybrid electric alternative power systems running biofuel, and aircraft flying only biofuels in local operations by 2012 and deploy it by <u>2016</u>.

3. <u>By 2015</u>, reduce petroleum in the Navy's commercial vehicle fleet by 50 percent, adding flex-fuels and electric vehicles.

4. <u>By 2020</u>, produce at least half of the Navy's shore-based energy requirements from renewable sources.

5. <u>By 2020</u>, use alternative energy sources for at least 50 percent of the Navy's total energy needs, including ships, tanks, planes, vehicles, and shore installations. (Currently the Navy uses 17 percent renewable energy.)

http://www.navy.mil/navydata/people/secnav/Mabus/Speech/SECNAV%20Energy%20Forum%2014%20Oct%2009%20Rel1.pdf

Naval Base San Diego

Diagram of Current Navy Solid Waste Management Status

Source - Separated Recyclables

50% of San Diego Navy waste stream*

Recycling Facility

Household
Disposed Trash

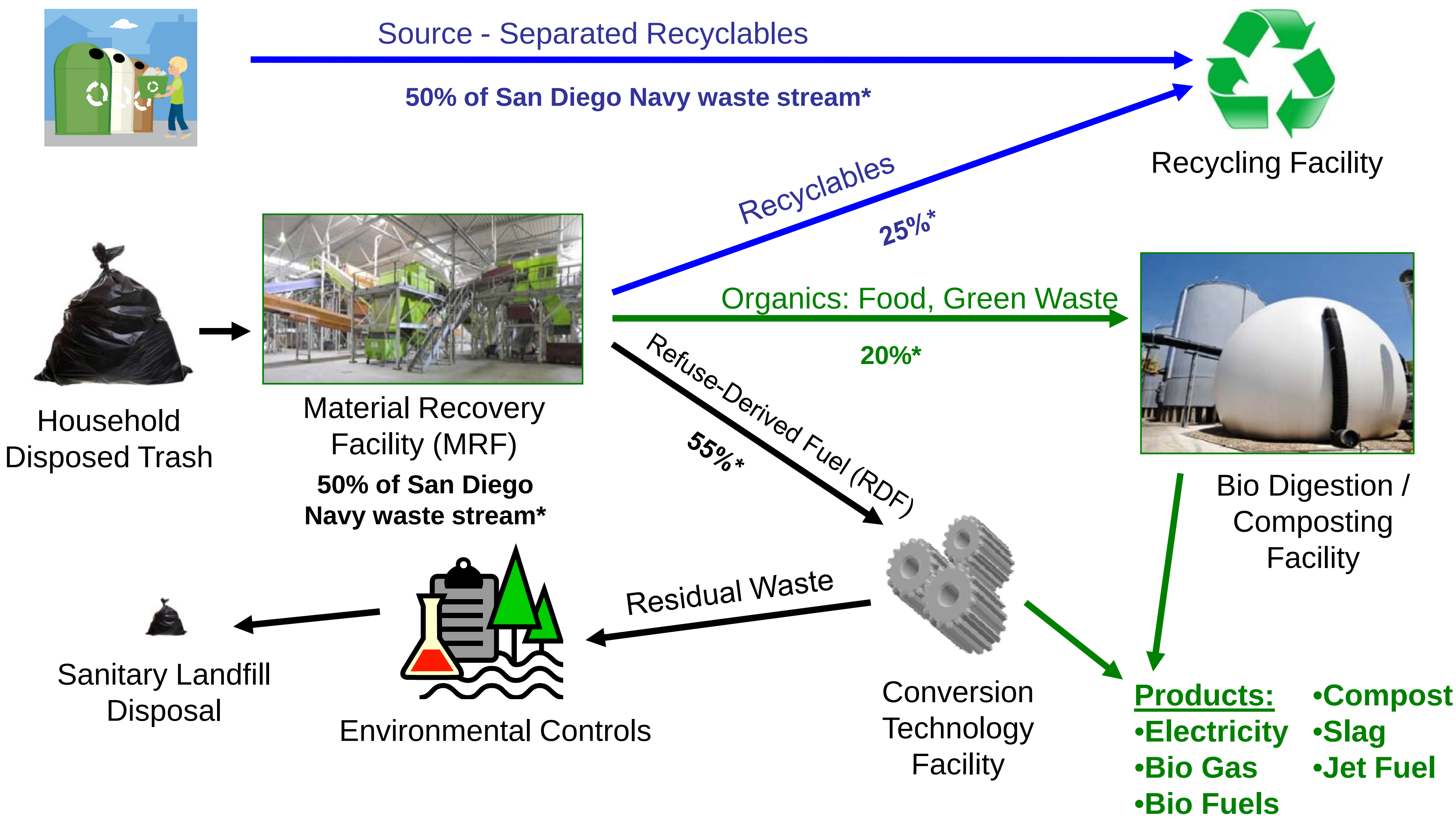
"Municipal Solid Waste"

50% of San Diego Navy waste stream*

Sanitary Landfill
Disposal

•Navy generated waste stream: approximately 200 - 300 tons/day, refuse and recycling

Navy Integration of Conversion Technology Compatible with Waste Reduction and Recycling



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Goals/Objectives of CT Evaluation Tour

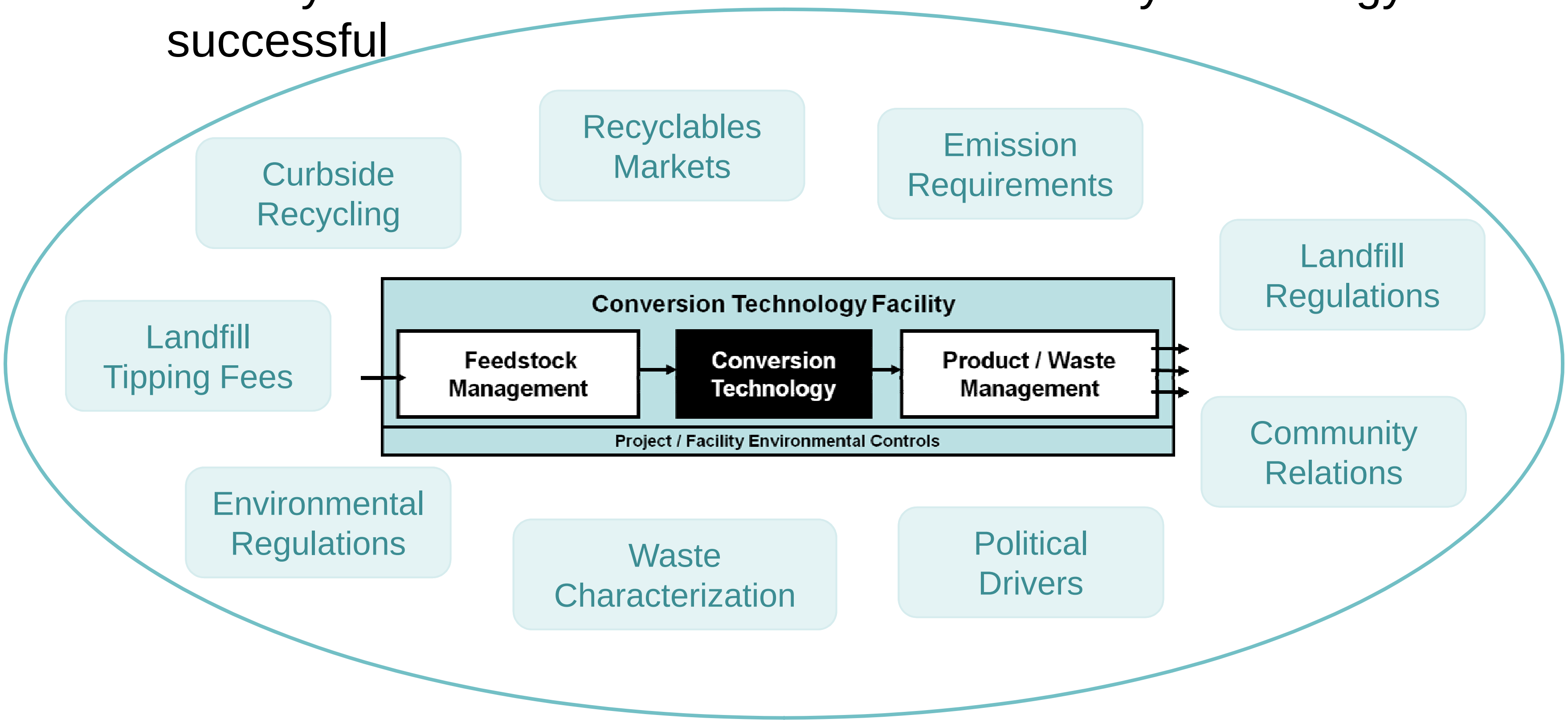
- Identify / Evaluate “Best Management Practices”
- Determine Applicability to Navy Requirements
- Understand “integrated management approaches”
- Lessons learned by existing BMPs
- Understand the impact of sociological and cultural factors on facility design and operations
- Understand the impact of legal/regulatory driven design and operational requirements
- Learn successful approaches to community participation and environmental justice

Parts of a CT Project

- **<u>Part 1: Feedstock Management (“MRF Processing”):</u>**
  - Feedstock Unloading and Storage
  - Processing to Remove Non-Acceptable Materials and Non-Processible Materials
  - Processing to Remove Recyclables
  - Recyclables Storage / Loading
  - Handling and/or Disposal of Non-Recyclable Materials
  - Processing to Refine Materials into a CT Feedstock(s)
  - Handling and/or Disposal Non-CT Feedstock Materials
  - Storage, Blending, and Metering of CT Feedstock(s) for CT Backend
- **<u>Part 2: “Conversion Technology”</u>**
  - CT Process (includes power generation and/or biofuels production processes, and also includes Environmental Controls)
- **<u>Part 3: Product / Waste Management</u>**
  - CT Product(s) Storage / Distribution
  - CT Process Residuals for Treatment/Disposal

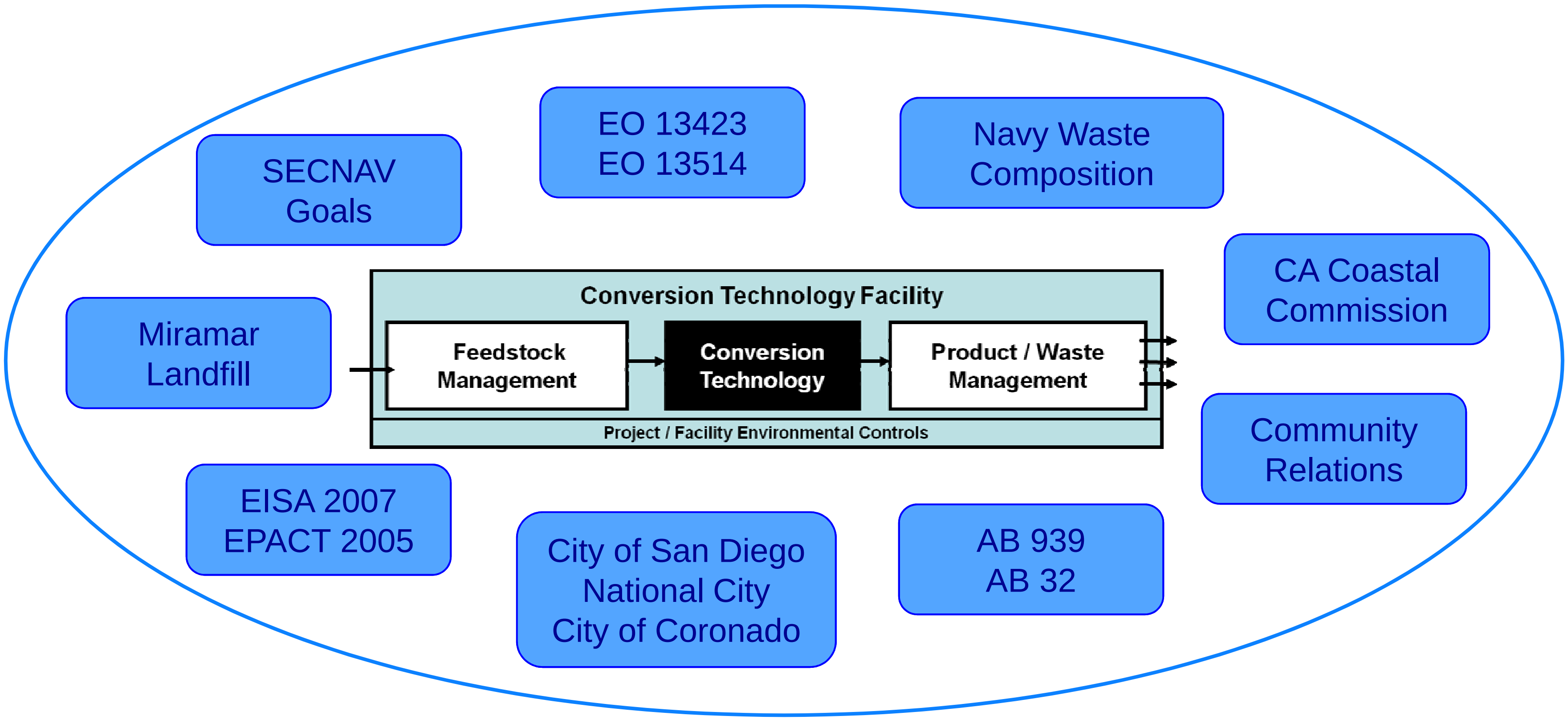
Keys to Successful Technology Evaluation

- Evaluate the Facility in Context
  - –Social/Political/Legal Environment
  - –Feedstock Preprocessing (source separation, curbside recycling)
  - –Identify external factors which make that facility/technology successful

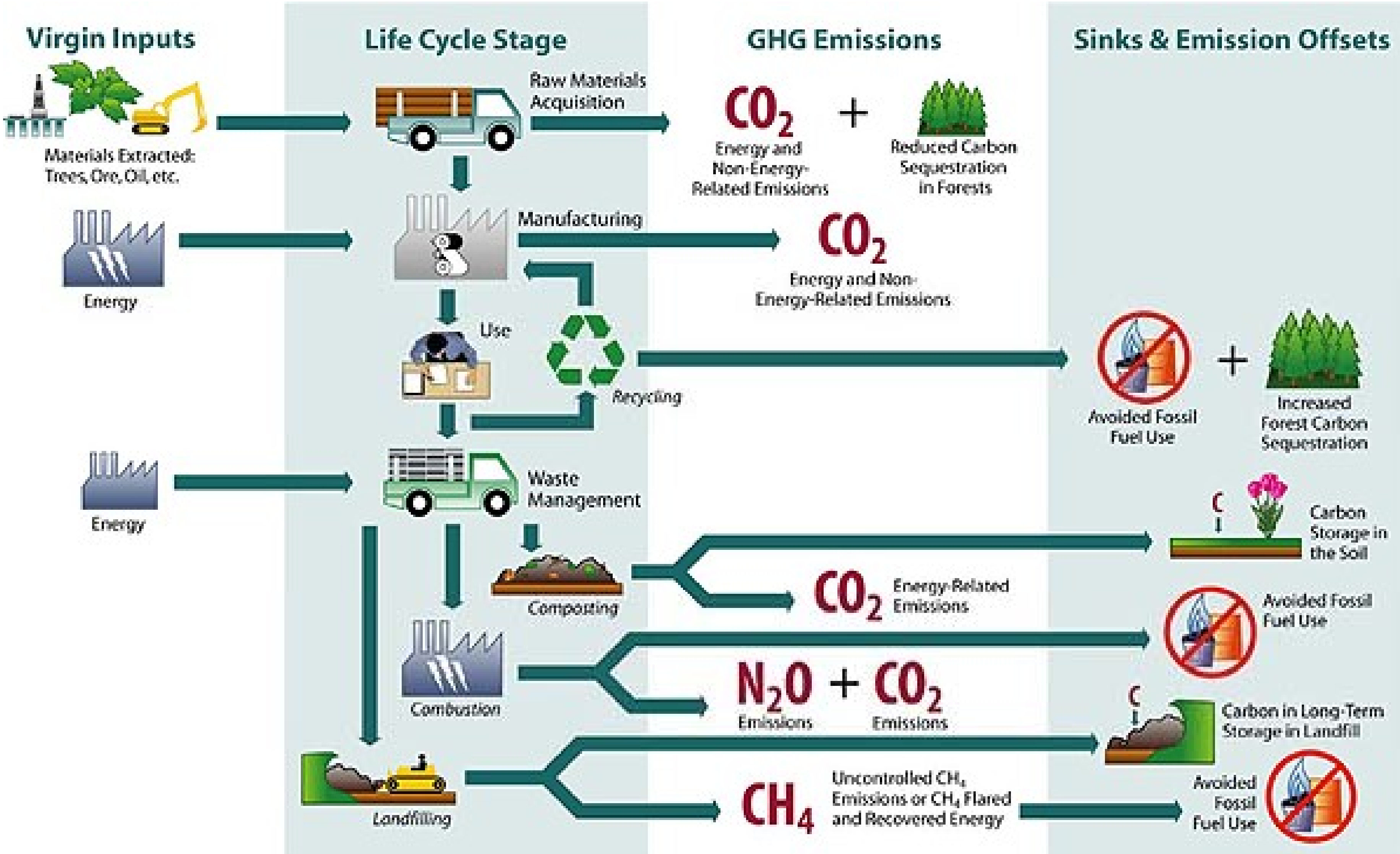


Keys to Successful Technology Transfer

- Choose technologies that will be successful in the Navy Context
  - –Internal factors: Navy waste stream, SECNAV goals
  - –External factors: Legal / Regulatory Environment, Sociological / Political / Community influences



Life Cycle Assessment/Analysis

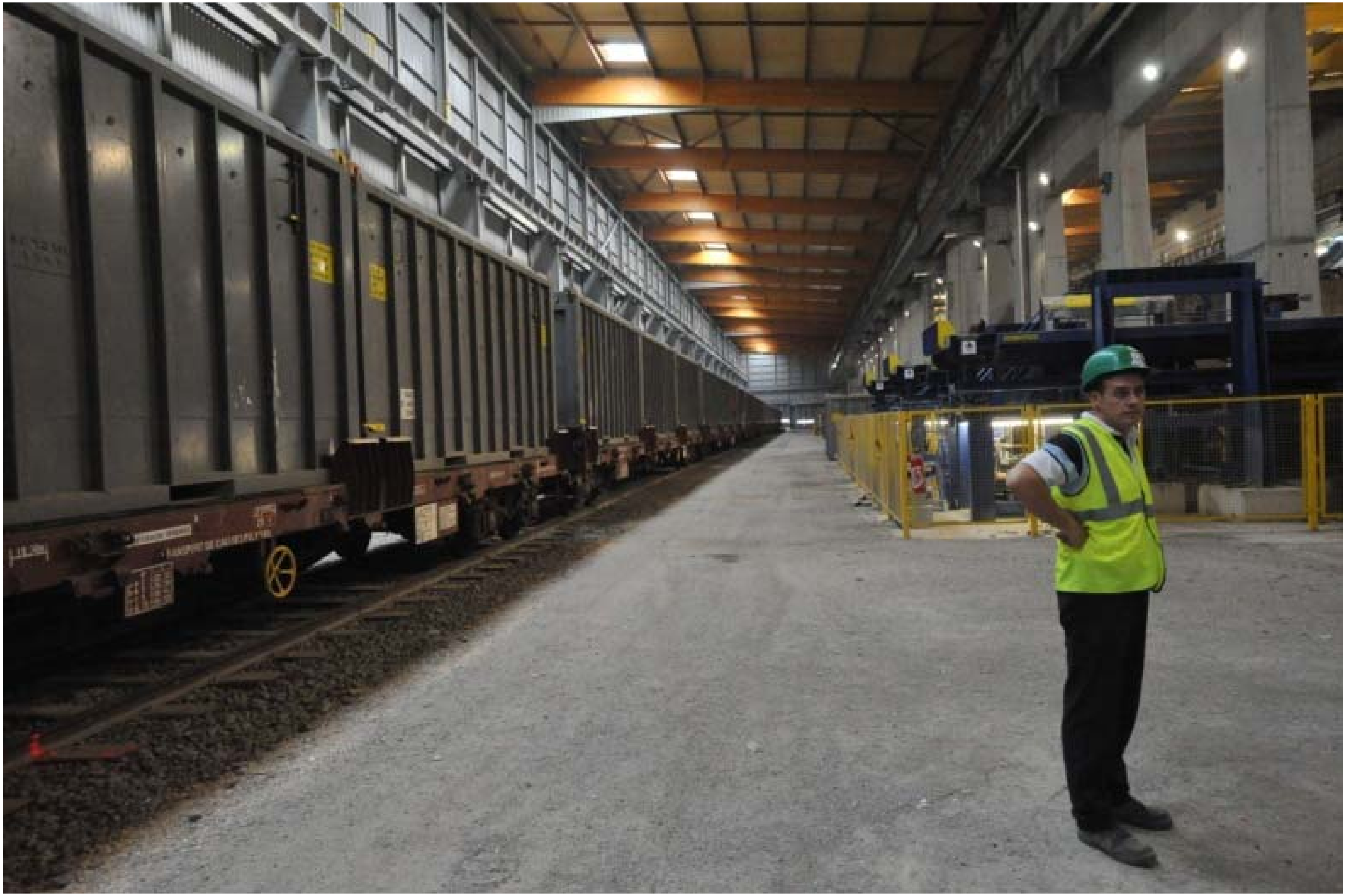


RDF/ Organics MRF Separation (Germany)

RDF / Organics MRF Equipment (Madrid, Spain)

EveRe MRF: RDF & Organics MRF

EveRe Train Unloading



Valdemingomez Technology Park Visitor Center, Madrid, Spain

Valdemingomez Technology Park Visitor Center, Madrid, Spain

Valdemingomez Technology Park Education Center

Valdemingomez Technology Park Education Center

EveRe Community Viewing Walkway

Anaerobic Digestion Technology (Hille, Germany)

AD Biogas Collection System (Hille, Germany)

Biogas Monitoring /Metering System (Hille, Germany)

Aerobic Composting Bays (Hille, Germany)

Aerobic Composting Bays

Vertical AD Technology (Hille, Germany)

EveRe Vertical Anaerobic Digester

Anaerobic Digester and Biogas Storage (Madrid, Spain)

Final Compost Screenings (Hille, Germany)

Biomass Energy Crop Program, Hille, Germany

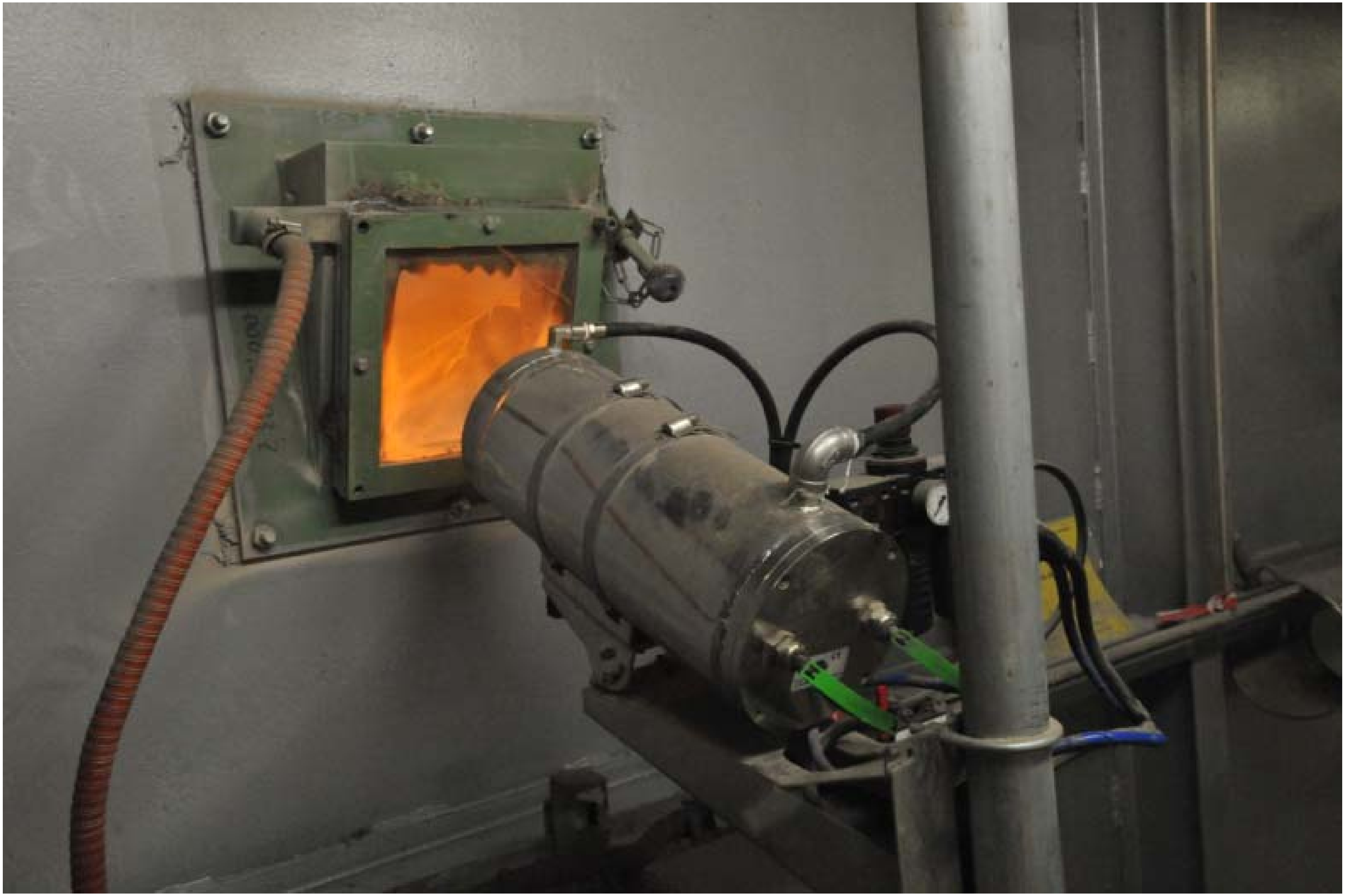
RDF Transport to Remote Incinerator (Hille, Germany)

Remote Incinerator (Process Steam to Local Industry)

RDF Receiving and Feed to Incinerator

EveRe Integrated Facility (Marseille, France)

Incinerator: Recovery of Energy Value of RDF



EveRe Electrical Generation Facility

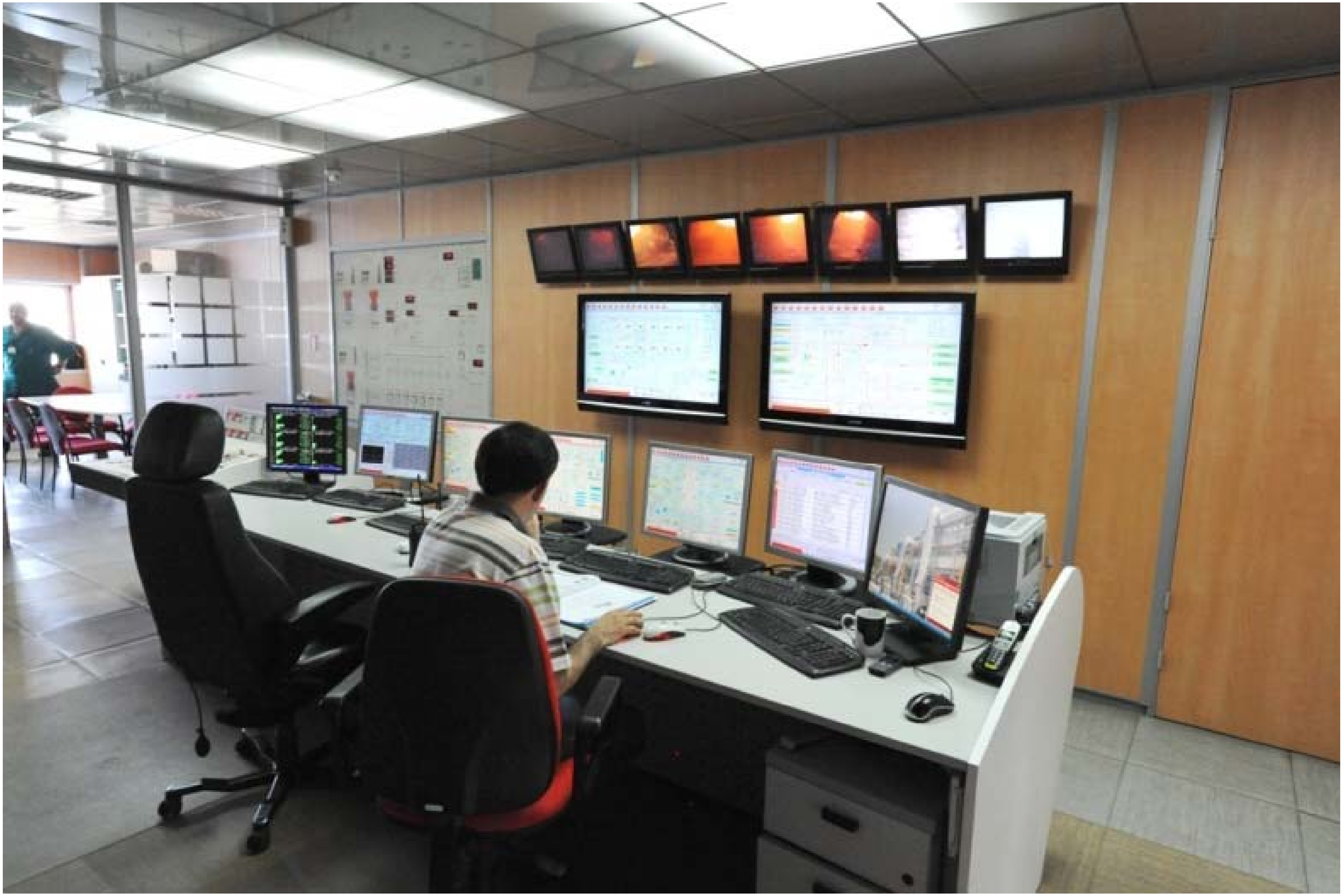
EveRe Aerobic Composting and Biofilter

EveRe Green Design (Natural Lighting)

Control Room / Crane Operator

Emission Control Equipment and Stack (Madrid, Spain)

WTE Control Room



Real Time Emission Monitoring (Madrid, Spain)

Envac System (Madrid, Spain)

Surge Storage Area (Under Disposal Port)

Central Collection / Pneumatics

Container to be Loaded on Trucks

ISVAG Facility, Belgium

Control Room (Pit and Crane Operations Viewing Area)

Incinerator

Explanation Poster

Grate Drive Mechanism

Incinerator

Ash Loadout to Truck

Community / Meeting Room

Ebara Facility Entrance (Japan)

Community-Based Facility

Community Swimming Pool

Community Hot Tub

Community Thrift Store

Community Tea Room

Bali Facility, Taiwan, Community Pool

Alfo Food Processing Facility, Japan

Alfo Food Processing Facility (Japan)

Bioenergy (Foodwaste Processing) Facility, Japan

Bioenergy (Foodwaste Processing) Facility, Japan

Digester, Gas Storage, and Flare

Noise Suppressed IC Engines (Bioenergy Facility)

Bali Incinerator, Taiwan (I.M. Pei)

Sealed Tipping Bay Doors

Teaching Tour Walkways

Isolated Walkways by Generator

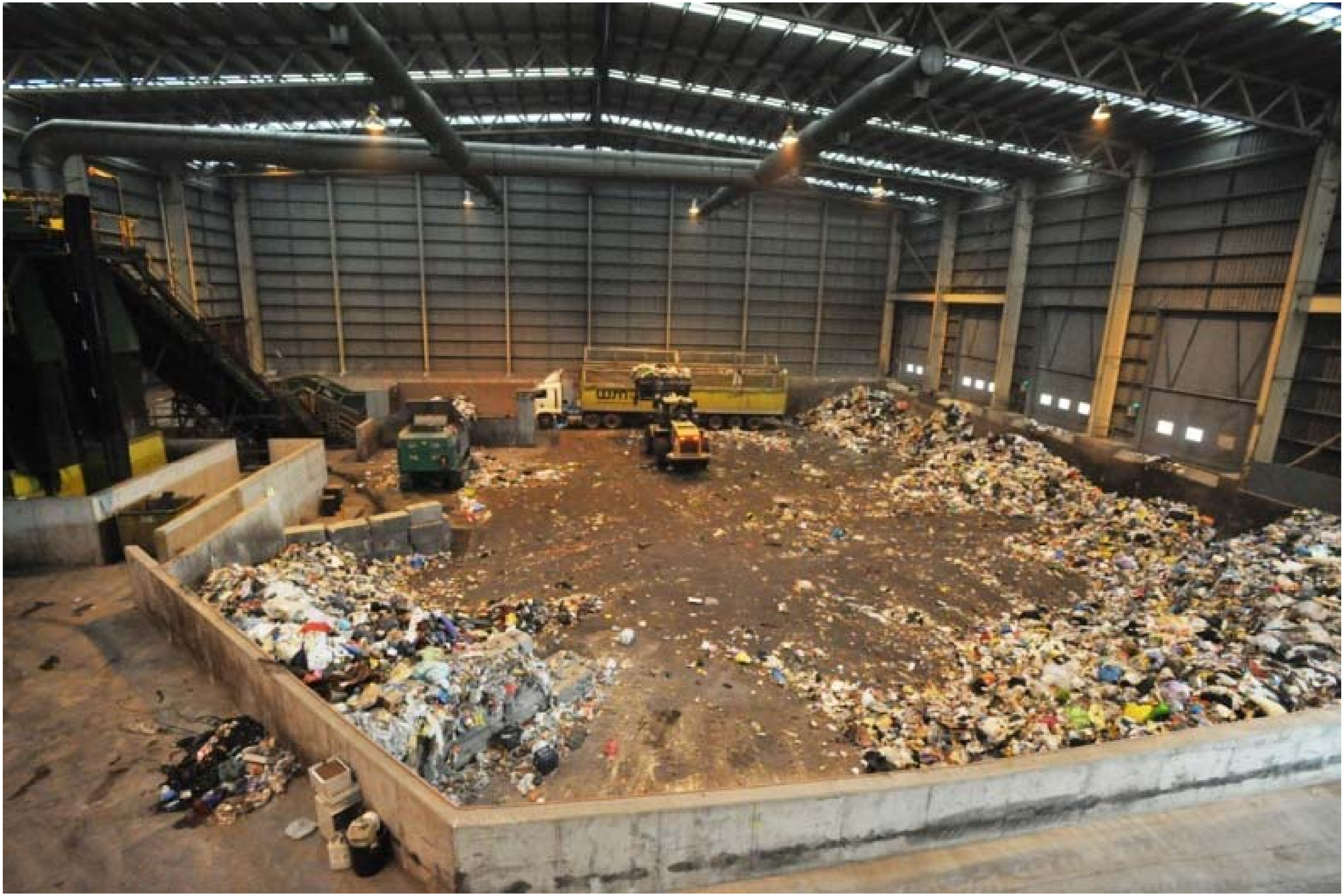
Ash Storage Control Room

EveRe Ash Treatment / Metal Recovery

Molten Slag (JFE Fluidized Gasifier, Japan)

Products from Bottom Ash (Japan)

WSN Ecolibrium Facility (Australia)



Wet Sorting / Processing (WSN Ecolibrium Facility)

Dolls from Recycled Materials (Bali, Taiwan)

Differences Between Europe / Asia

- European Union and Japan have extensive statutory/policy drivers for waste to energy
- EU utilizes larger “Regional Facilities”
- Japan utilizes more “Community-Based” facilities
- More “community integration” in Japan
- Most extensive odor / dust control in Japan
- More use of fluidized bed technology in Japan
- More extensive source separation in Japan
- Japanese facilities reprocess mass burn WTE ash
- Beneficial use of ash into building tiles
- Extensive education component in both EU / Japan

Additional Observations

- Cultural / sociological factors are significant, certain cultures embraces technology / science
- Significantly more “social” preprocessing
- “Homogeneous” society, common goals
- More trust in government / science than in U.S.
- Opposition exists in all countries
- Extensive understanding of how conversion technology (and waste management) is related to global warming

Why is Conversion Technology Successfully Utilized in Other Countries?

- Limited Land Availability
- Maximum Effort Expended on 3R's
  - Needed to make WTE/CT more accepable
- Landfill Ban / Statutory Drivers
  - Minimize Greenhouse Gas Production
- Lack of Natural Resources
  - Trash is Renewable Energy Source
- High Level of Government Infrastructure and Financial Support
- High Tipping Fees for Disposal

Navy CT / Renewable Energy Task Force