The Atlantic Council

Enhancing the Army's Global Mission Effectiveness Through Net Zero

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2013 Army Universe

(Data collected as of 30 Sep 12)

Land Acreage

- United States 13,428,541
- Europe 133,907
- Asia 22,816
- Other Overseas 1,361

Roads (paved and unpaved)

- 9,611 Lane Miles

Paved Area (excludes roads)

(Square yards)

- 255,800,227

Railroads

- 2,347 (Miles)
- 29,336 (LF (Bridges))

Buildings

(Square feet)

- United States 776,864,319
- Europe 35,915,370
- Asia 4,899,139
- Other 3,210,417
- Leased 40,955,967
- Privatized

968 Million Square Feet

Utilities (Miles)

(Electric, Gas, Water, Sewer)

- 45,308

Army Installations

- IMCOM 66
- Army Reserve 3
- AMC 27
- DLA 5
- National Guard 48
- ARCENT 3

TOTAL 152

152 Small Cities

FY12 Army Demographics

59.8% total married
(8.7% dual military married)
6.6% single parents
880,743 family members

Environmental Clean-up Remaining

(Installation Restoration Program & Military Munitions Response Program)

- Active Sites 1,515
- BRAC Sites 310
- Formerly Used Defense Sites 1,738

Army End-Strength

- Active 550,064
- USAR 201,166
- ARNG 358,078
- Civilians 251,794
- Retired 865,117

2.2 Million People

Aviation

- Multi-use 60
- Heliport 28

Family Housing Units

- Owned 15,281
- Leased 7,945
- Privatized 83,625

106,000 Homes

Barracks

Adequate Spaces

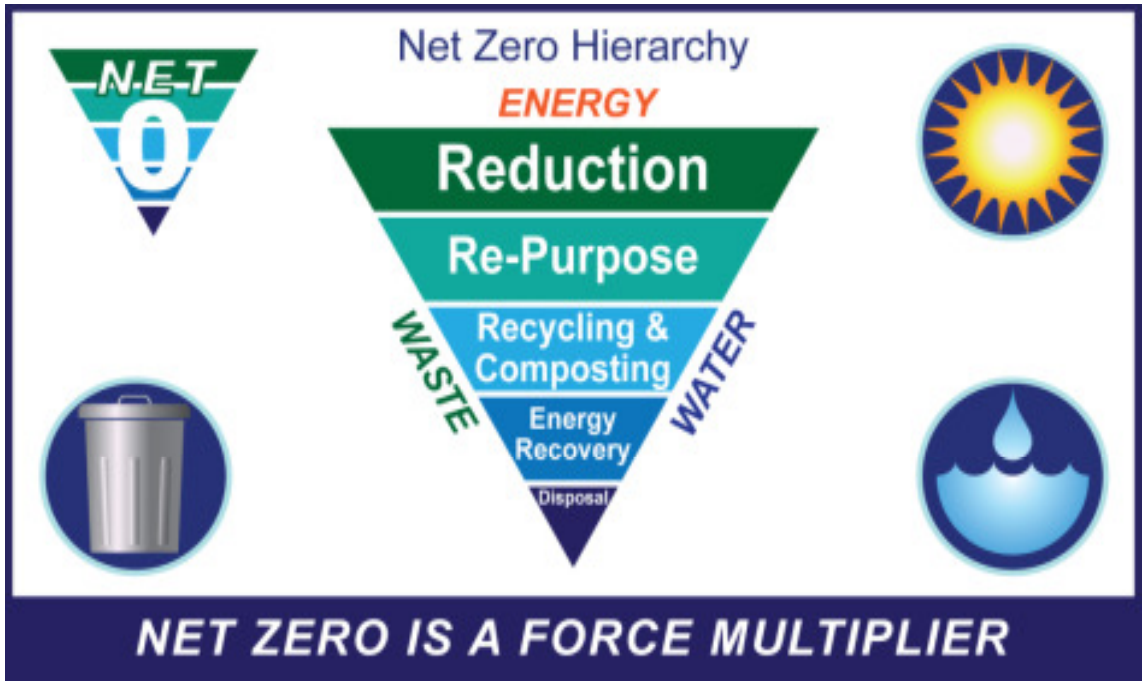
- Permanent Party 148.4K
- Training 71.8K
- ORTC 106.3K

Plant Replacement Value

- $314.6B

FY12 Installation Management Resources = $20.8B

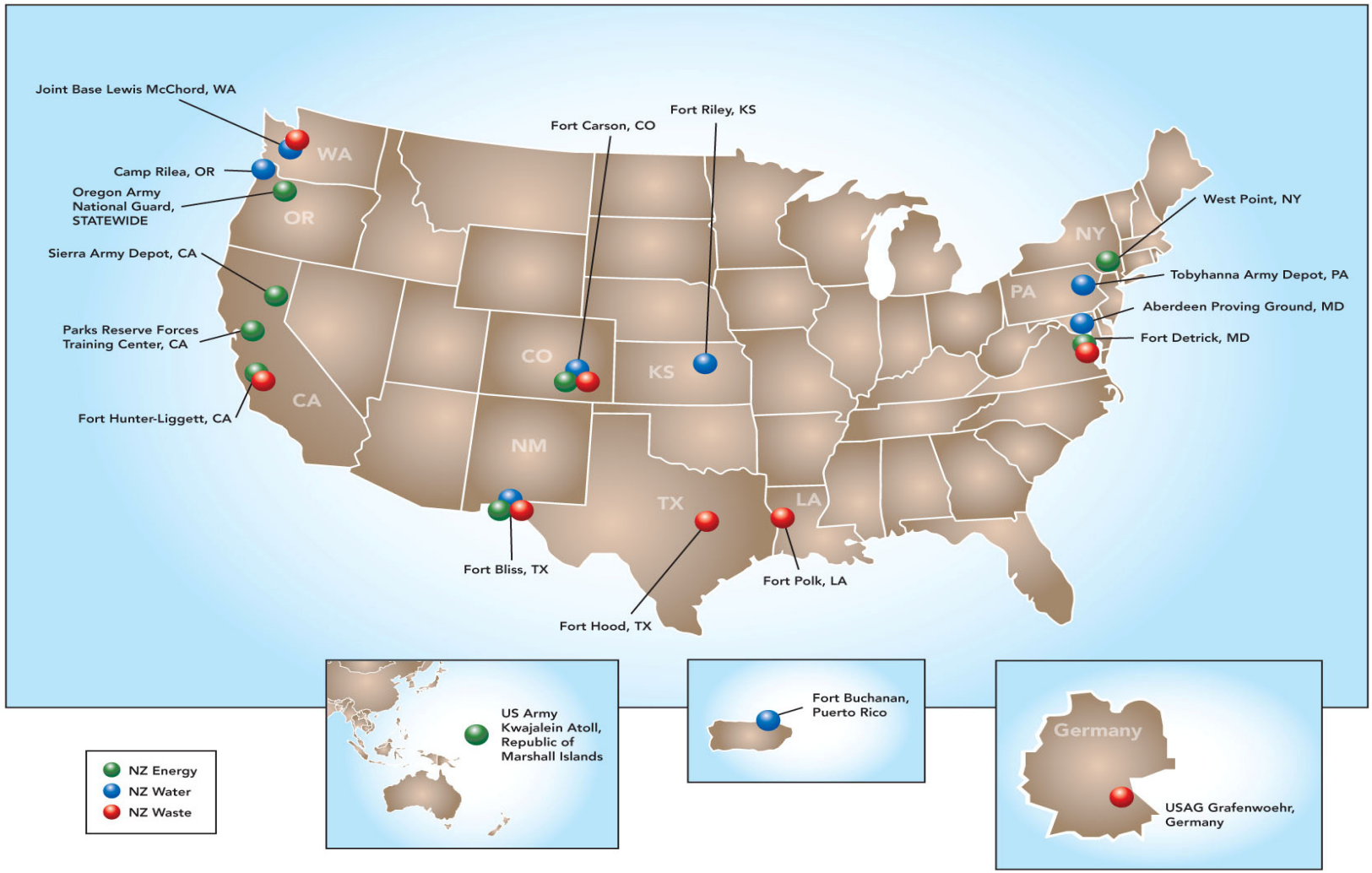
Net Zero



- **Net Zero INSTALLATION:** Applies an integrated approach to management of energy, water, and waste to capture and commercialize the resource value and/or enhance the ecological productivity of land, water, and air.

- **Net Zero ENERGY:** An installation that produces as much energy on-site as it uses, over the course of a year.
- **Net Zero WATER:** Limits the consumption of freshwater resources and returns water back to the same watershed so not to deplete the groundwater and surface water resources of that region in quantity or quality.
- **Net Zero WASTE:** An installation that reduces, reuses, and recovers waste streams, and converts them to resource values with zero solid waste to landfills.

Net Zero Installations



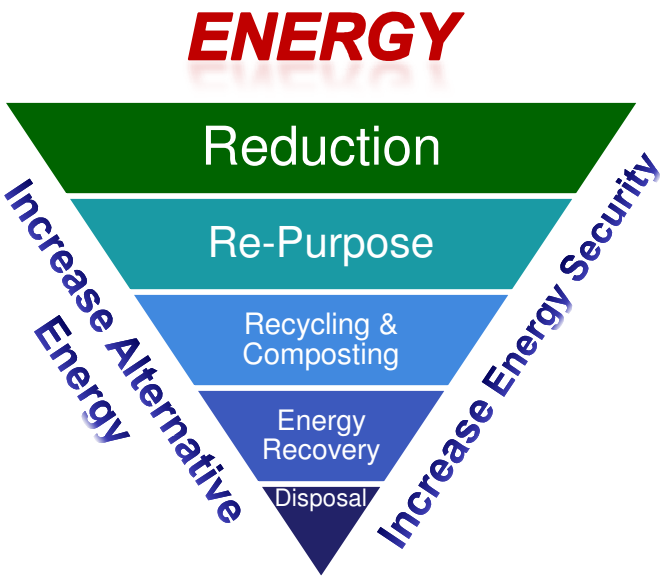
Net Zero Energy

A Net Zero ENERGY Installation is an installation that produces as much energy on-site as it uses over the course of a year.

Goals/Elements

- Enhance mission effectiveness
- Contribute to energy security
- Increase energy efficiency and conservation
- Integrate energy into master planning
- Preference for use of renewable energy for on-site power; enables operation if grid goes down
- Must address redundant energy supply sources
- Reduce dependence on fossil fuels
- Behavioral change is necessary for cultural change
- Fiscal responsibility

Net Zero Energy

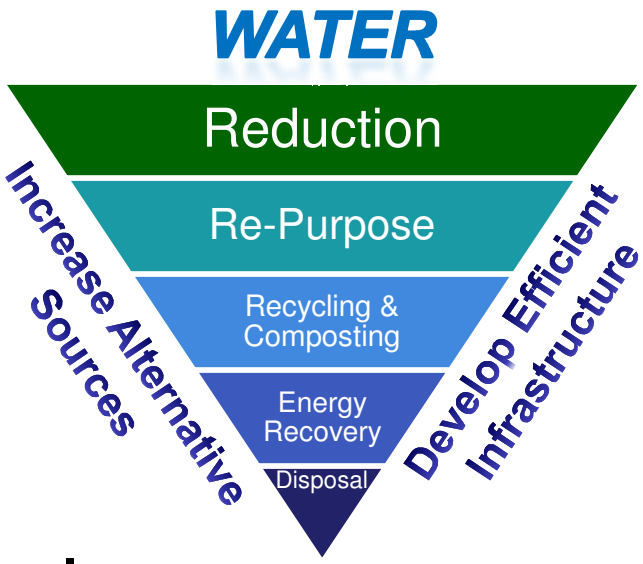


Requires integrated approach:

- Dramatic demand-side energy use reduction
- Right mix of energy generation technologies and strategies that contribute to energy security
- Clear and flexible implementation strategies based on potential technology innovations and mission changes

We must build and retrofit our building stock today with life-cycle costs in mind.

Net Zero Water



A Net Zero WATER Installation limits the consumption of freshwater resources and returns water back to the same watershed so as not to deplete the groundwater and surface water resources of that region in quantity and quality over the course of a year

Goals:

- Contribute to water security
- Reduce freshwater demand through water efficiency and conservation
- Access/Develop alternate water sources to offset freshwater demand
- Develop water-efficient green infrastructure
- Implement low-impact development to manage storm water

Elements of Net Zero Water

Water conservation and efficiencies	▪ Identify and eliminate water inefficiencies (e.g., distribution system losses, evaporative losses) ▪ Implement low-impact development strategies that retain storm water runoff ▪ Implement a water conservation awareness campaign to change employee behavior
Water reuse	▪ Implement water reuse strategies ▪ Include gray-water systems in new building designs where cost effective
Water security	▪ Improve the security and reliability of our water systems to provide dependable water service to critical infrastructure during external service disruptions ▪ If served by public water systems, establish alternate water supplies

Net Zero Waste

A Net Zero WASTE Installation reduces, reuses, and recovers waste streams, converting them to resource values with zero solid waste to landfill over the course of a year

Goals:

- Eliminate unnecessary purchase of materials
- Minimize amount of waste generated wherever feasible
- Expand efforts to re-purpose and recycle/divert used materials
- Use waste-to-energy technologies for waste that cannot be avoided, re-purposed, recycled, or composted
- Eliminate landfill disposal to the maximum extent possible

Net Zero Waste

Waste Reduction
- Improved procurement (e.g., buy less, use "recyclable" content, reduce packaging material) and other P2 efforts

Re-Purpose
- Furniture donations and re-use centers
- Match waste "products" with potential users (e.g., drywall as soil amendment)

Recycling and Composting
- Installation recycling centers
- Food waste and organics composting

Energy Recovery
- After meeting diversion goals
- Only where economically feasible

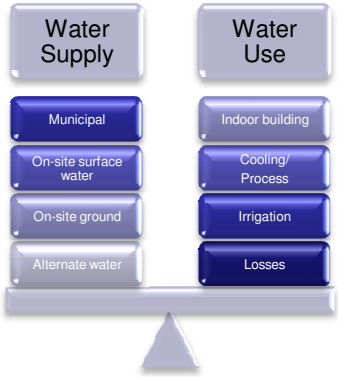
Disposal
- Last resort after other economically feasible efforts are implemented

Goal: No solid waste disposal in landfills by FY2020

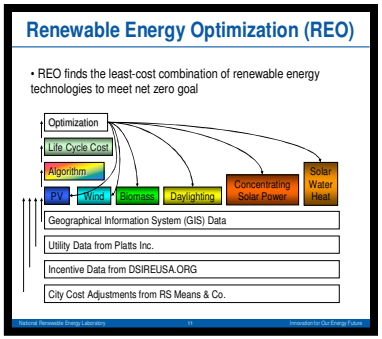
How?

Audits and Roadmaps

- **Establishing the baseline**
  - Completed energy audits at Net Zero energy pilots
  - Conducting water balance assessments at Net Zero water pilots
  - Conducting material flow analysis at Net Zero waste pilots



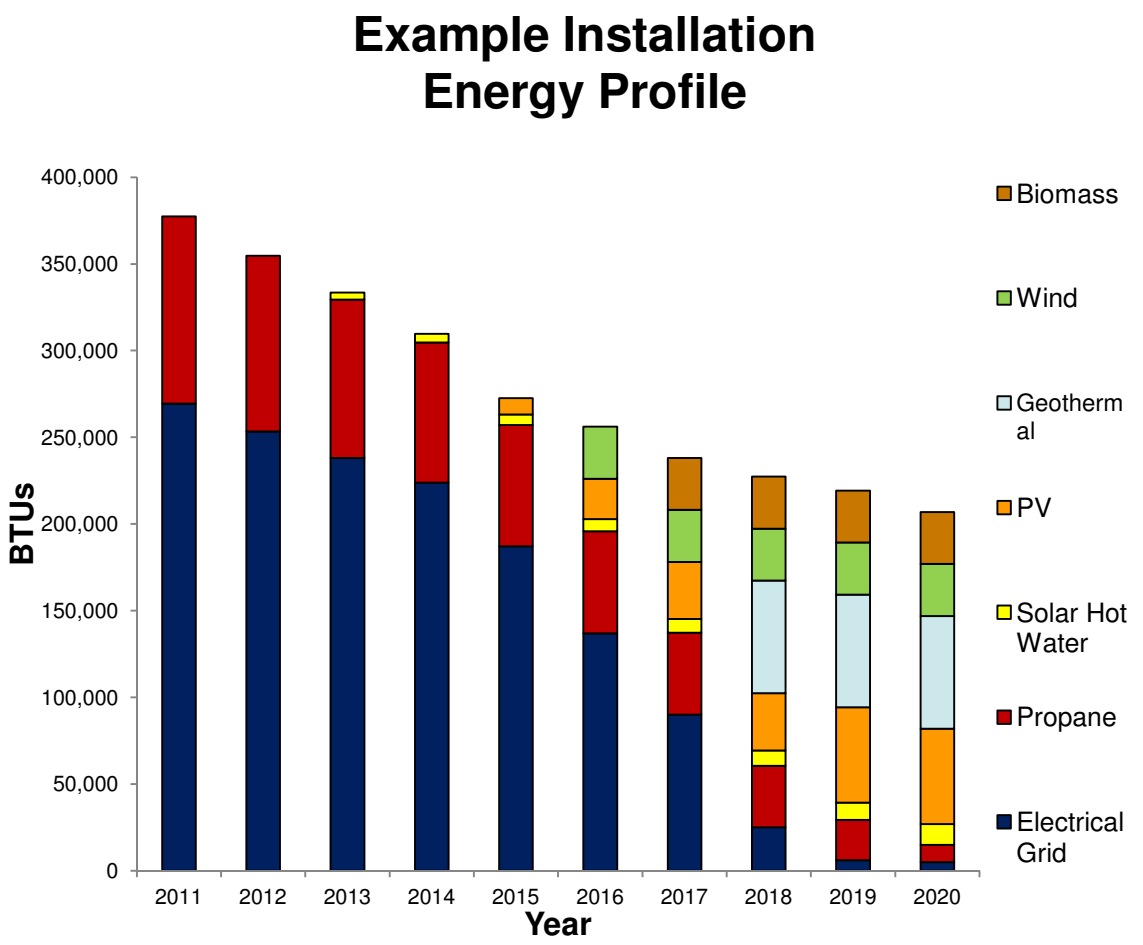
- **Assessing the potential**
  - Conducting renewable energy audits at Net Zero energy pilots
  - Identifying water re-use opportunities at Net Zero water pilots
  - Identifying additional re-use and diversion opportunities at Net Zero Waste pilots



- **Planning the future**
  - Completing Net Zero 2020 roadmaps for energy, water, and waste pilots with project lists and actions to implement over the next seven years

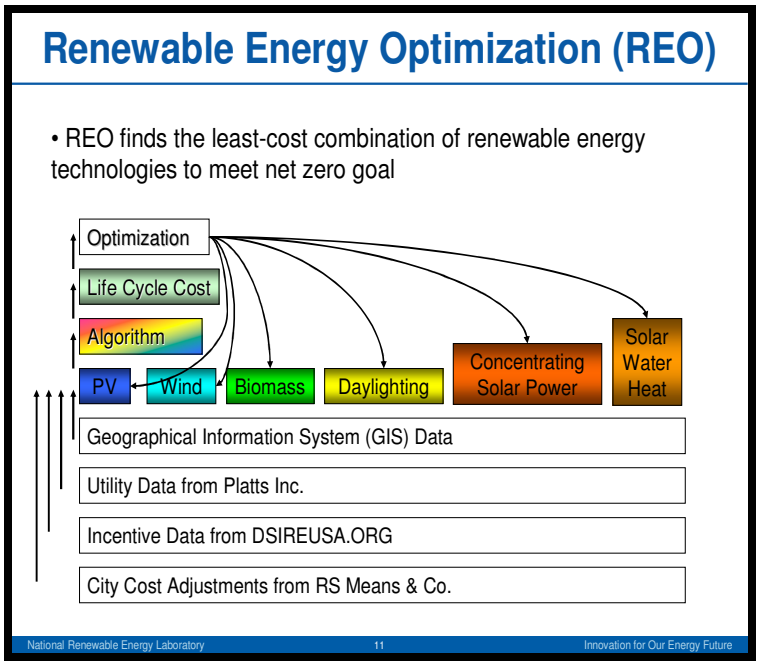
Energy Roadmaps

- Energy baseline
- Energy efficiency assessments
- Renewable energy assessments
- Energy security assessments
- Energy project list and implementation of recommendations



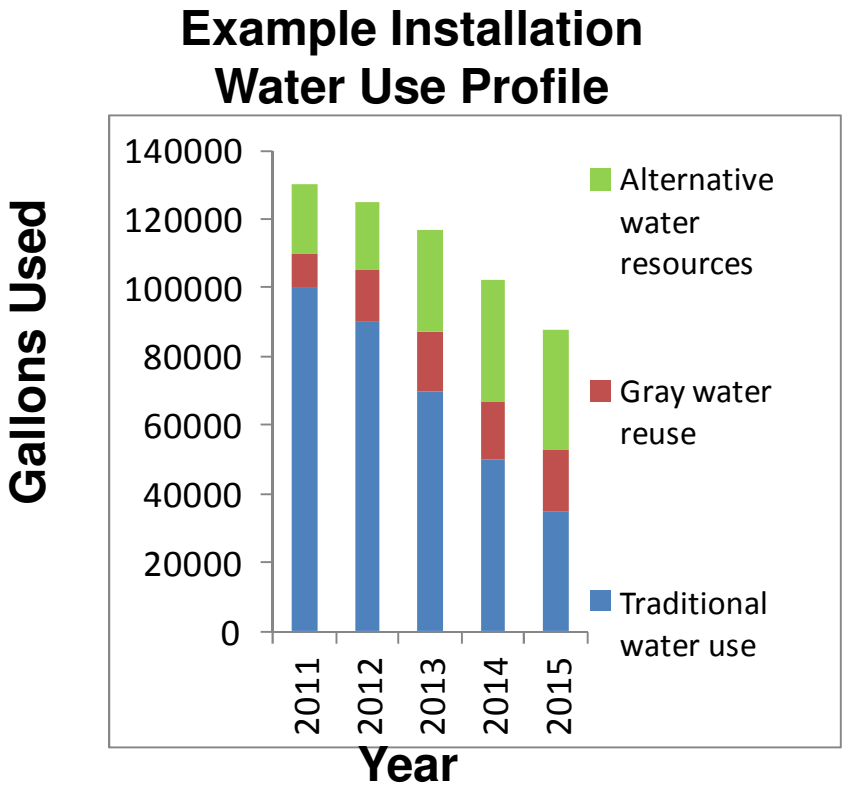
Renewable Energy Assessments

- **Process**
  - Start with screening tools
  - Conduct further analysis of promising technologies
  - Make recommendations
- **Analysis tools**
  - GIS resource screening tools
  - Renewable Energy Optimization, PVWatts, IMBY, RET Screen, Solar Analysis Model
- **Considerations**
  - Think outside the “standard tool box”

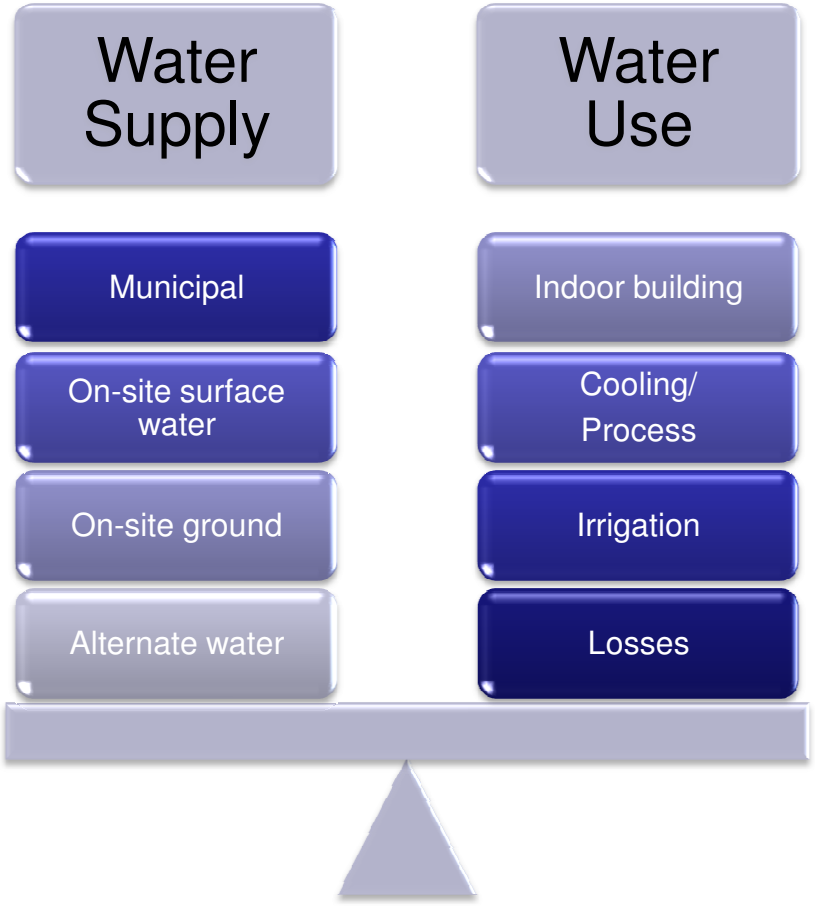


Water Roadmaps

- **Water Balance**
  - Identify largest end-users
  - Set priorities
- **Water Efficiency**
  - Perform LCC analysis on measures
  - Rank order projects
  - Include technology and behavioral changes needed
- **Roadmap Workshop**
  - Collaborate with site
  - Set priorities
  - Identify funding
  - Determine acquisition strategy
- **Roadmap and Master Planning**
  - Finalize strategy
  - Incorporate into master planning



Water Balance

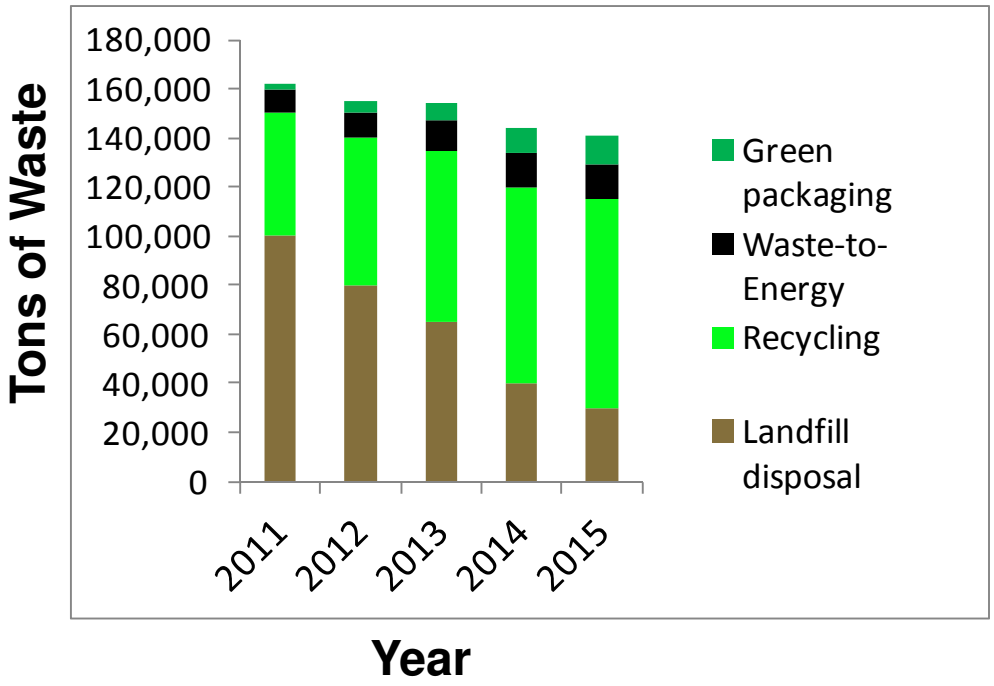


Water Balance = comparison of water supplied to water used.

Waste Roadmaps

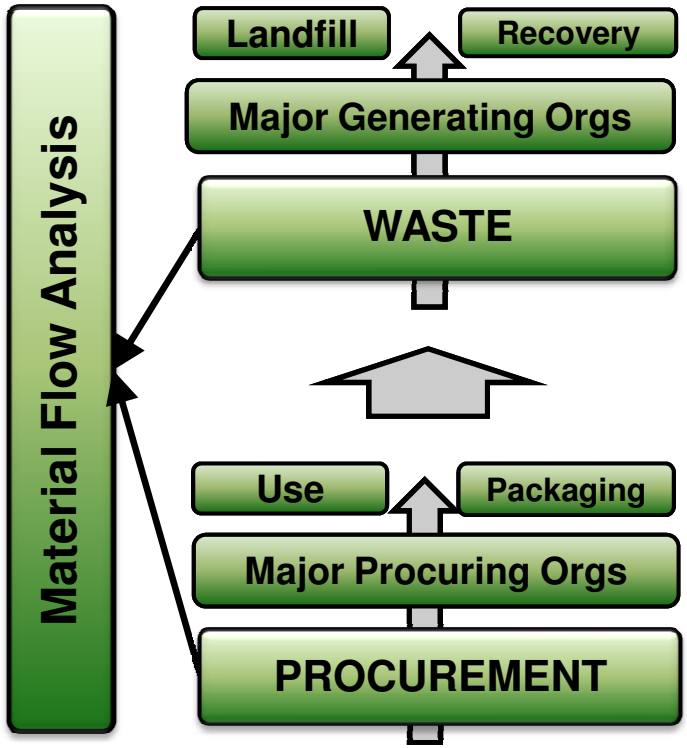
- Material flow analysis
- Improved procurement practices
- Re-purpose / Re-use strategy
- Recycling and composting strategy
- Potentially viable technologies

Example Installation Waste Profile



Material Flow Analysis

- **Objective**
  - Analyze waste streams (outputs) and procurement (inputs) to support Net Zero waste strategies
- **Approach**
  - Use readily available data
  - Organize analysis by activity type
  - Identify priority waste streams for reduction / elimination



Systems-of-Systems Approach

- **Interconnections**
  - Energy and water
  - Water and waste
  - Waste and energy
- **Net zero must be addressed holistically across energy, water, and waste**

Net Zero – External Collaboration

- **Federal agencies:**
  - Department of Energy
  - Environmental Protection Agency
  - General Services Administration
- **Local and regional partnerships**
  - Pilot installations are working with local communities to develop local and regional solutions (e.g., renewable energy, recycling, waste-to-energy)
- **Public-private partnerships**
  - Targeted to implement large-scale renewable energy projects

Next Steps

- Finalize Army-wide Net Zero policy
- Publish an implementation guide for Garrison Commanders
- Create a publically-releasable summary of water balance assessments and project road maps by the end of 2013
- Create a publically-releasable summary of Net Zero energy studies by the end of 2013
- Release of a progress report by Spring 2013
- Identify and then institutionalize best practices


ARMY STRONG