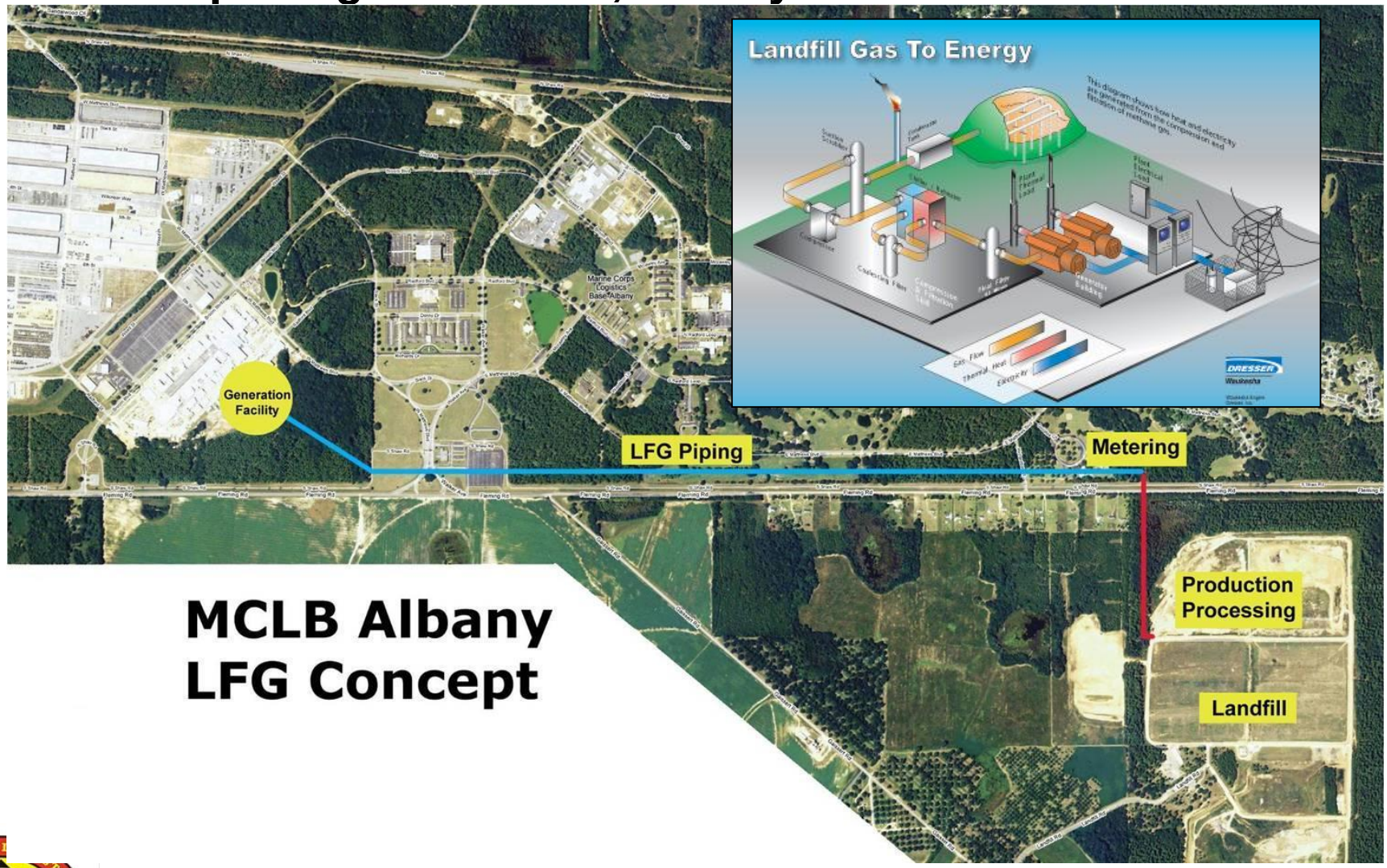
Joint Technology Exchange group
MCLB Albany Energy Program

26 Jul 2016

MARINE CORPS ENERGY
MCLB ALBANY

Installation & Environment Division

Marine Corps Logistics Base, Albany



MCLB LFGE Project Dashboard

- **Scope**
  Used DOE Energy Savings Performance Contract (ESPC) Vehicle

  Installed a dual fuel (LFG/NG) low-energy fuel generator with a heat recovery steam generator

  Installed two dual fuel (LFG/NG) boilers to burn excess LFG

  Installed a LFG compression/ dehydration station at the County landfill

  Installed over three miles of pipe between the Landfill and LFGE Facility

Benefits for MCLB and County

3.3 Million BTU/Hr heat recovery steam generator produces steam from exhaust heat

10 Million BTU/Hr of steam production from renewable fueled boilers

Constructed facility for LEED Silver certified

20 year agreement with county government for Landfill Gas at a fixed rate

22 year performance guarantee with more than $64 million in guaranteed savings to the government

19% of MCLB Albany's energy comes from renewable sources

Offsets 52,737 MMbtu of natural gas consumption annually

Offsets 42,006 MMbtu of electric power consumption annually

Exceeds EPACT05, EISA2007 and EO 13423 goals for renewable energy and on-site generation

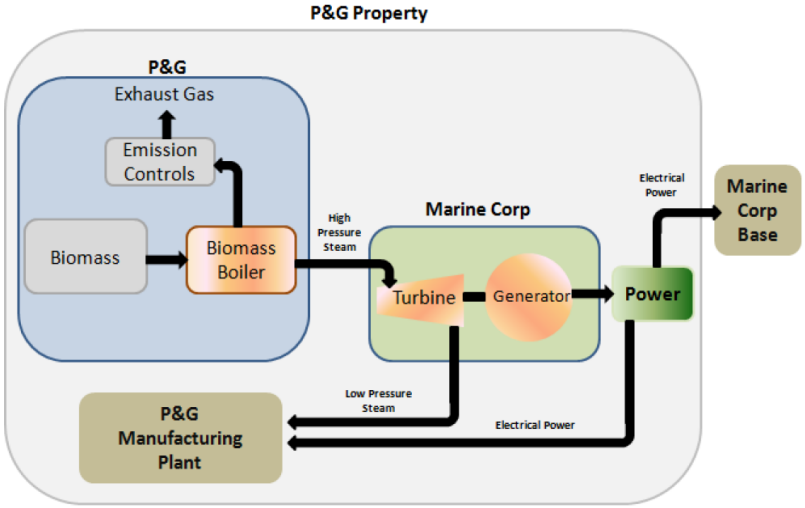
Energy Security and Energy Reliability enhanced by dual-fuel generation capacity

Ability to operate in an "island mode" on natural gas

$5 million guaranteed revenue to Dougherty County

Reduces greenhouse gas emissions by 19,200 tons annually

MCLB Biomass Project Dashboard



- Steps to Accomplish
  - Complete application to do an ESPC (use ESPC for USG's capital outlay – construct & operate 8.5MW steam to electric generator and distribute to MCLBA grid)
  - Power Purchase Agreement (MCLBA purchase steam from P&G)
  - No cost land lease for ESPC construction (same as LFGE lease with the County)
  - Complete application for Distribution Interconnection with Georgia Power
  - NEPA & permits (P&G and MCLBA shared)

- Benefits to USMC and P&G
  - 30 years of experience in feedstock and logistics (P&G assumes 100% of risk)
  - P&G responsible for biomass permitting
  - MCLBA responsible for NEPA/air permit for generator
  - P&G and USMC unable to construct and operate larger scale biomass separately, but economics should work in a joint effort
  - Net-zero for MCLBA NLT 2017 (SECNAV, MCICOM & MCIEAST fully support project)

- Challenges
- SECNAV approval for large capital development on leased property
  - ESPC legal determination
  - ESPC scoping and design
  - Distribution Interconnection with Georgia Power

MCLB GSHP BTES Project Dashboard

1) First ever cooperative interagency agreement (ESTCP-NAVFAC/SE-MCLBA), the high level R&D, engineering and monitoring effort of an ESTCP project was "wrapped around" an conventional Milcon ECIP project.

2) First next generation GHP architecture known as Borehole Thermal Energy Storage (BTES) utilized in the United States.

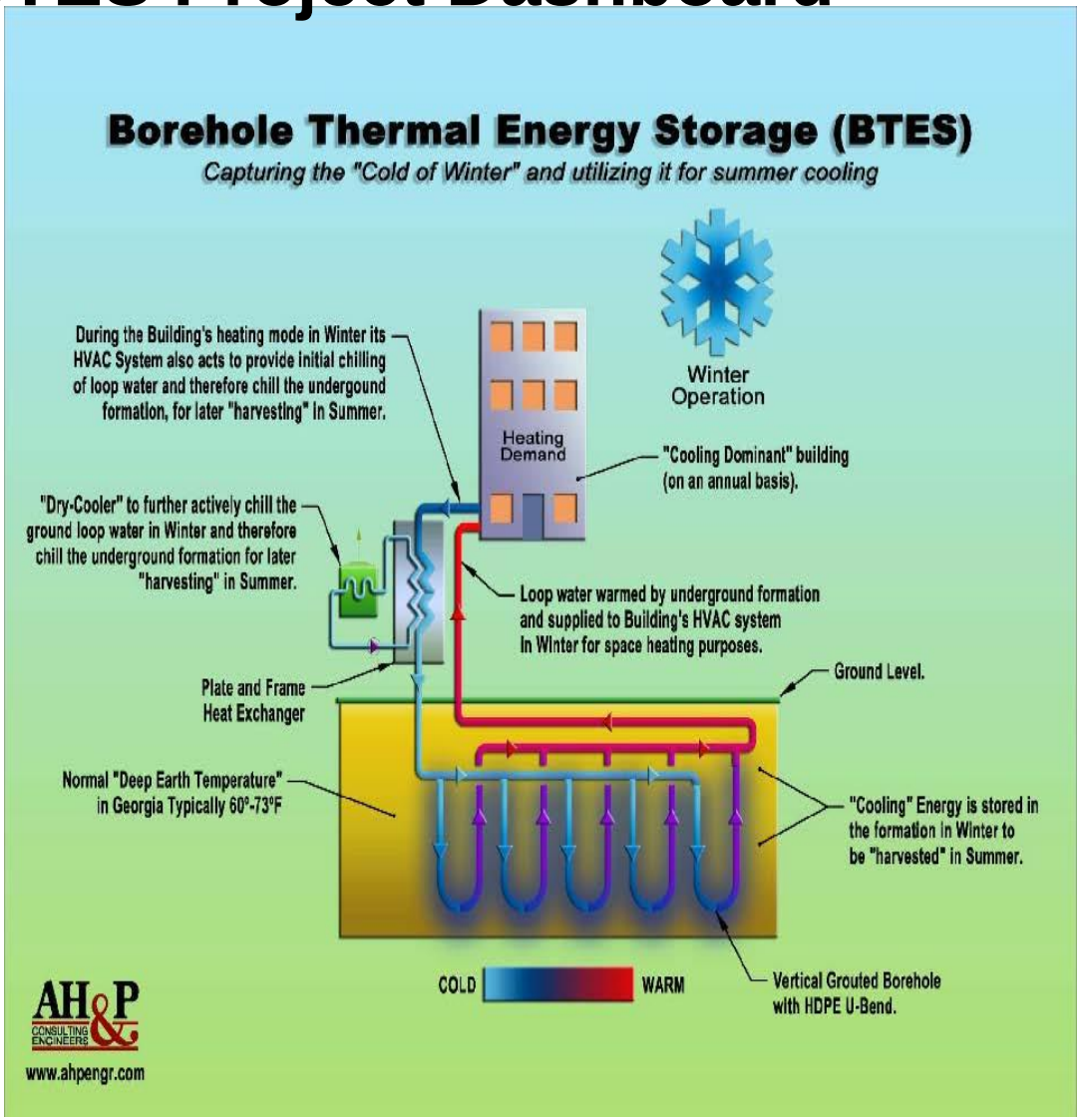
3) First large scale (550 Tons of cooling/heating capacity) geothermal system implemented by the DOE ESTCP (program).

4) First system engineered to capture the "cold of winter" (winter heat rejection) for summer use and provide "auto" well field energy balancing to extend the geothermal well field life cycle beyond 30 years.

5) First US GHP use of Fiber Optic (FO) based Distributed Temperature System (DTS) to sense temperature throughout the GHX via 9000' long FO cable measuring temperature at 1500 locations.

6) Promised HVAC saving to ESTCP was 30% of the yearly BTUs (gas+ kWh). The "after" metered data so far is August 15-September 15, 2014 versus 2015 shows a 53% reduction. Energy savings since July commissioning is 3 MMBTU/Hr. or 1266 MWH or about $100K (summer months).

7) There are significant water savings also, since the system is closed loop and does not use or dispense process water. Annual cooling tower water consumption as metered was about 3,000,000 gallons/year... but the cycles of concentration was very high resulting in mineral precipitation on the cooling tower fill...it probably "should have" been at least 4,500,000 gallons/year. Water reduction over the next 12 months will be at least 80% or 240,000 gallons/year.



MARINE CORPS LOGISTICS BASE
ALBANY, GEORGIA

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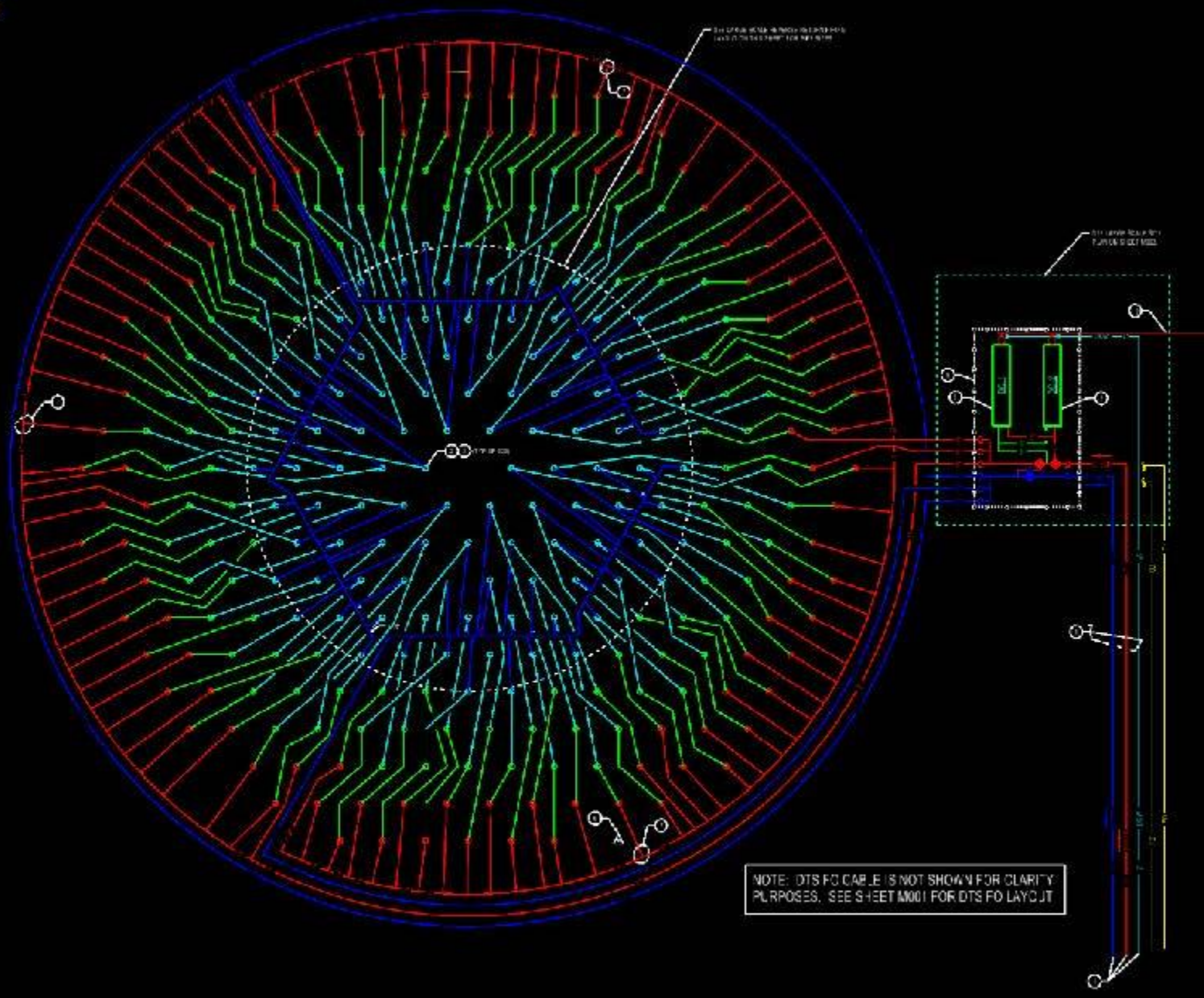
Plan View of BTES & Adiabatic Dry-Coolers



GEOTHERMAL BOREHOLE THERMAL ENERGY STORAGE (BTES) BOREFIELD LAYOUT
SCALE: 1" = 30'-0"

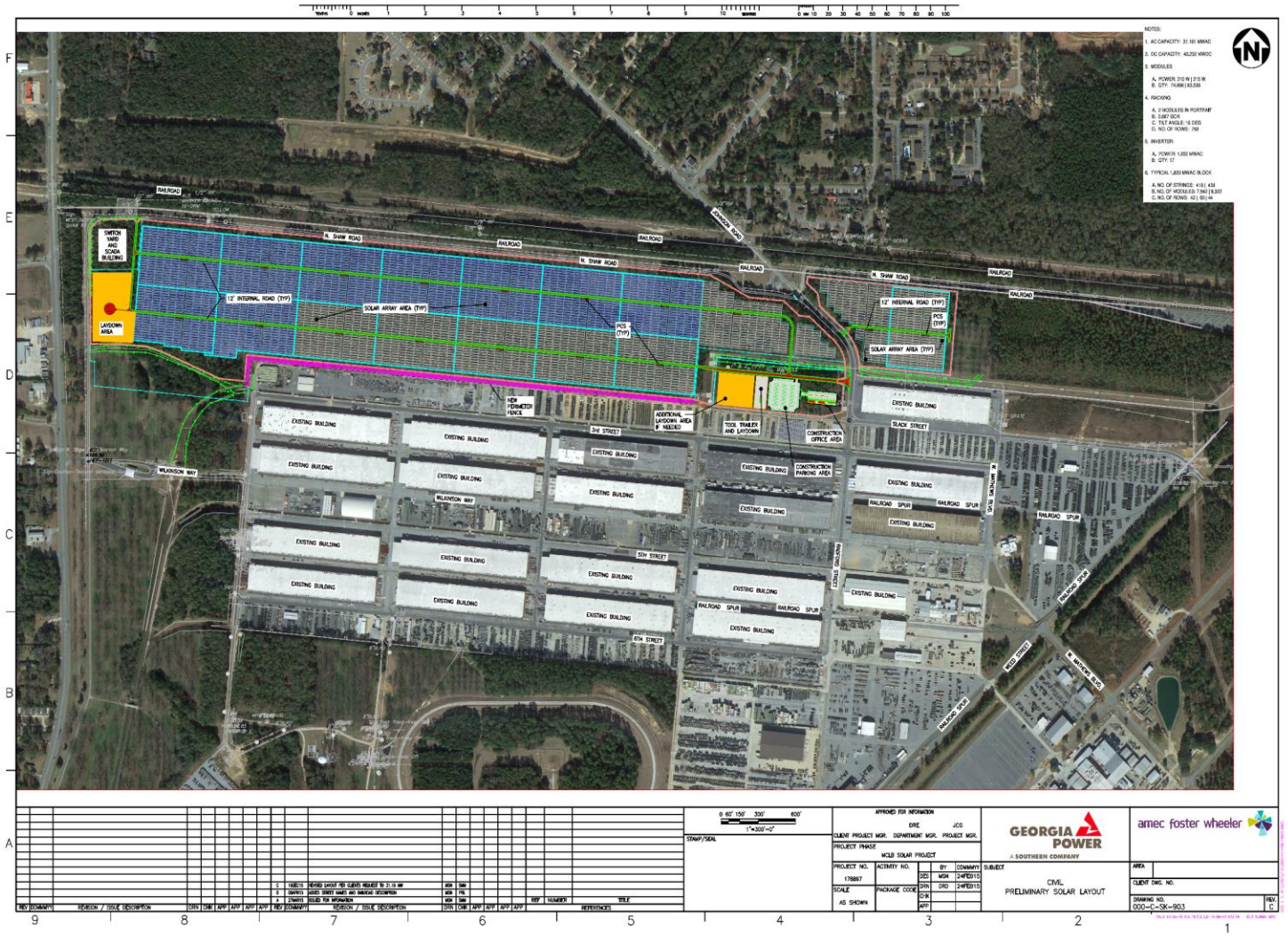
MCLB 31mW Solar Farm Project Dashboard

Partnership with Georgia Power to install a 31mW Solar Farm on base.

Georgia Power to own and operate the Solar Farm and MCLB to receive credit for the generation.

MCLB will receive a Payment in Kind to build a distribution line to the base to be used during a system wide power outage.

MCLB will also have a Payment in Kind to have a connection point established so that in the future when battery storage technology is developed the base can use this access power from the storage batteries during outages to power the base.



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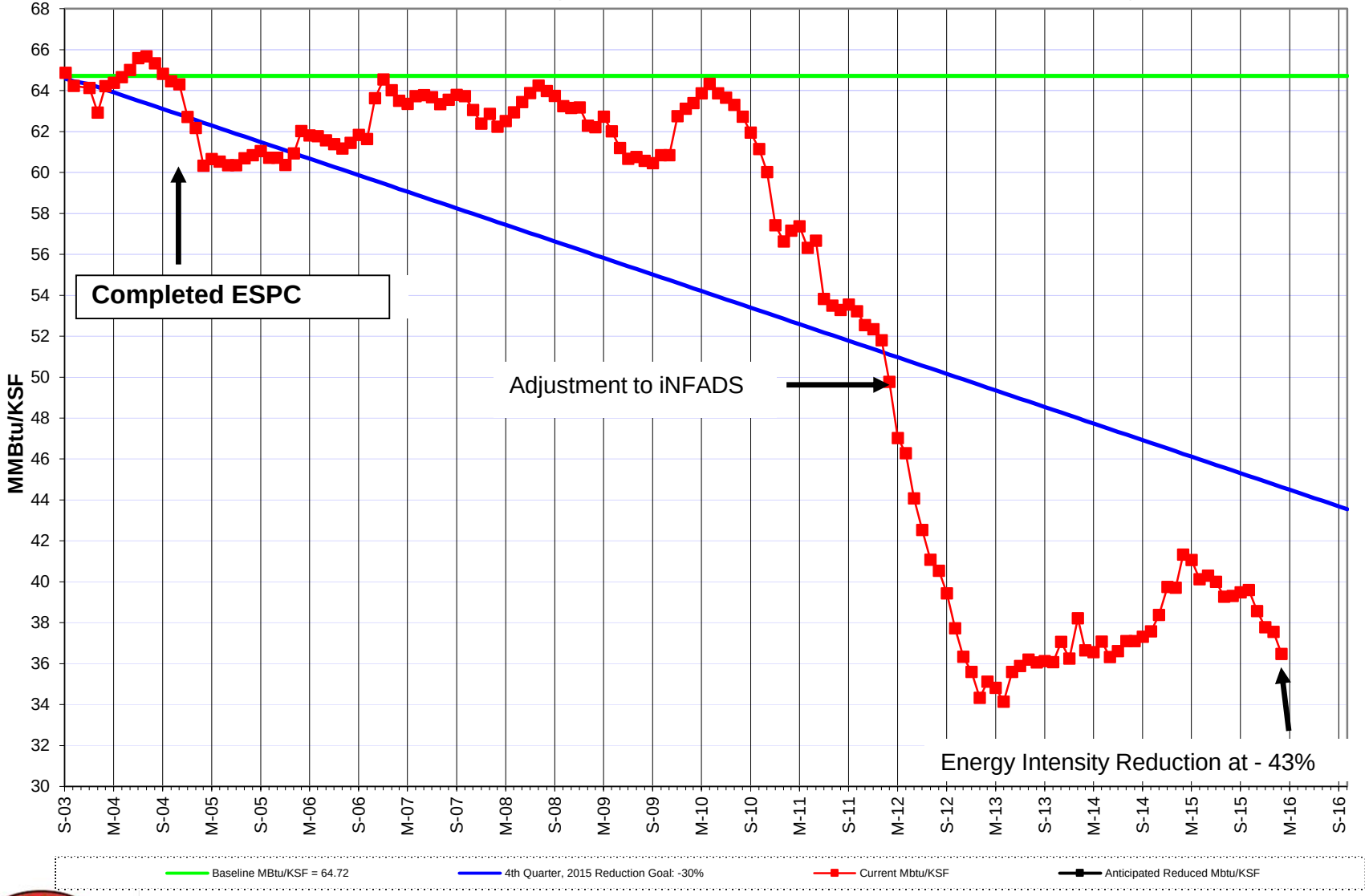
MCLBA Energy Reduction (intensity) Progress



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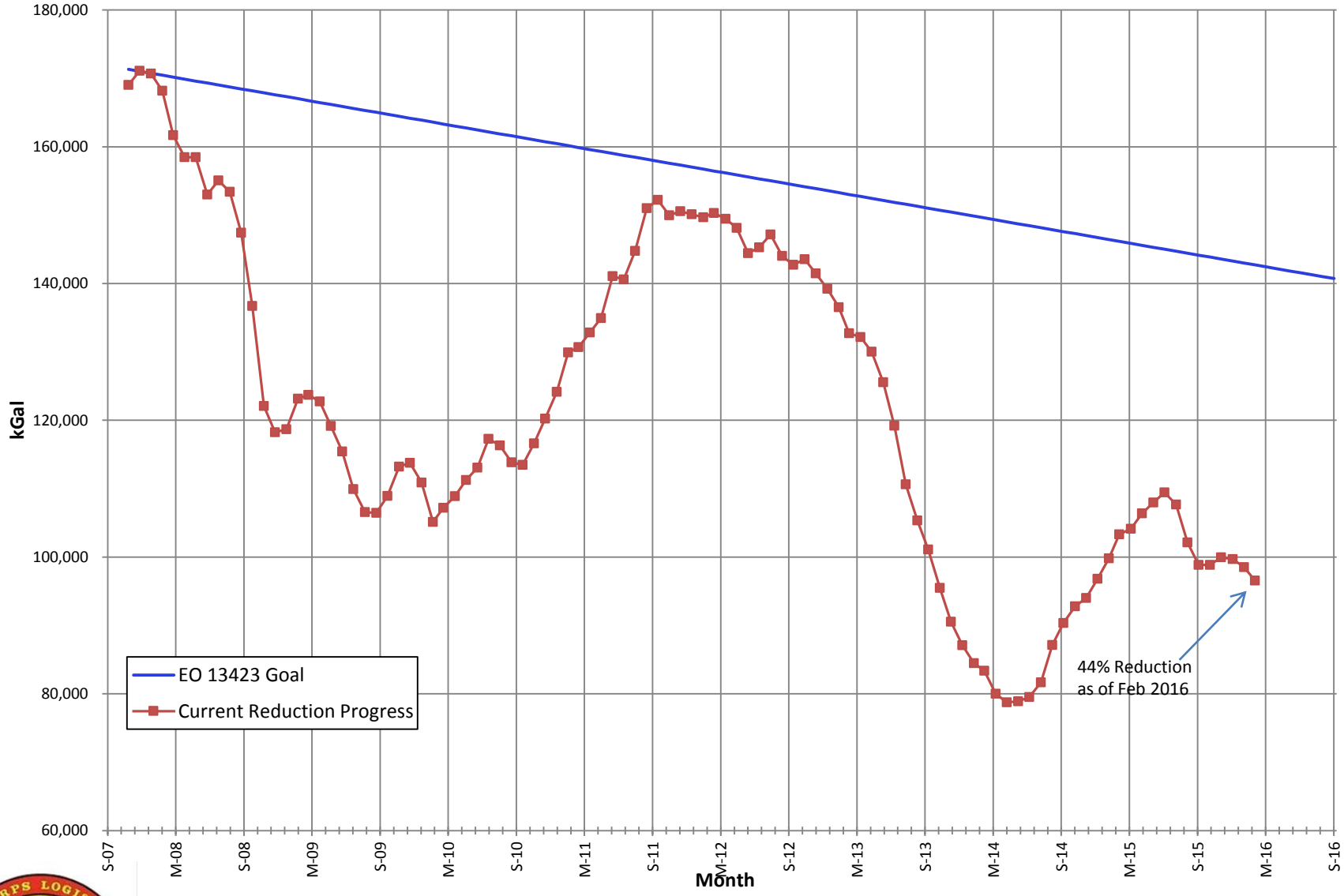
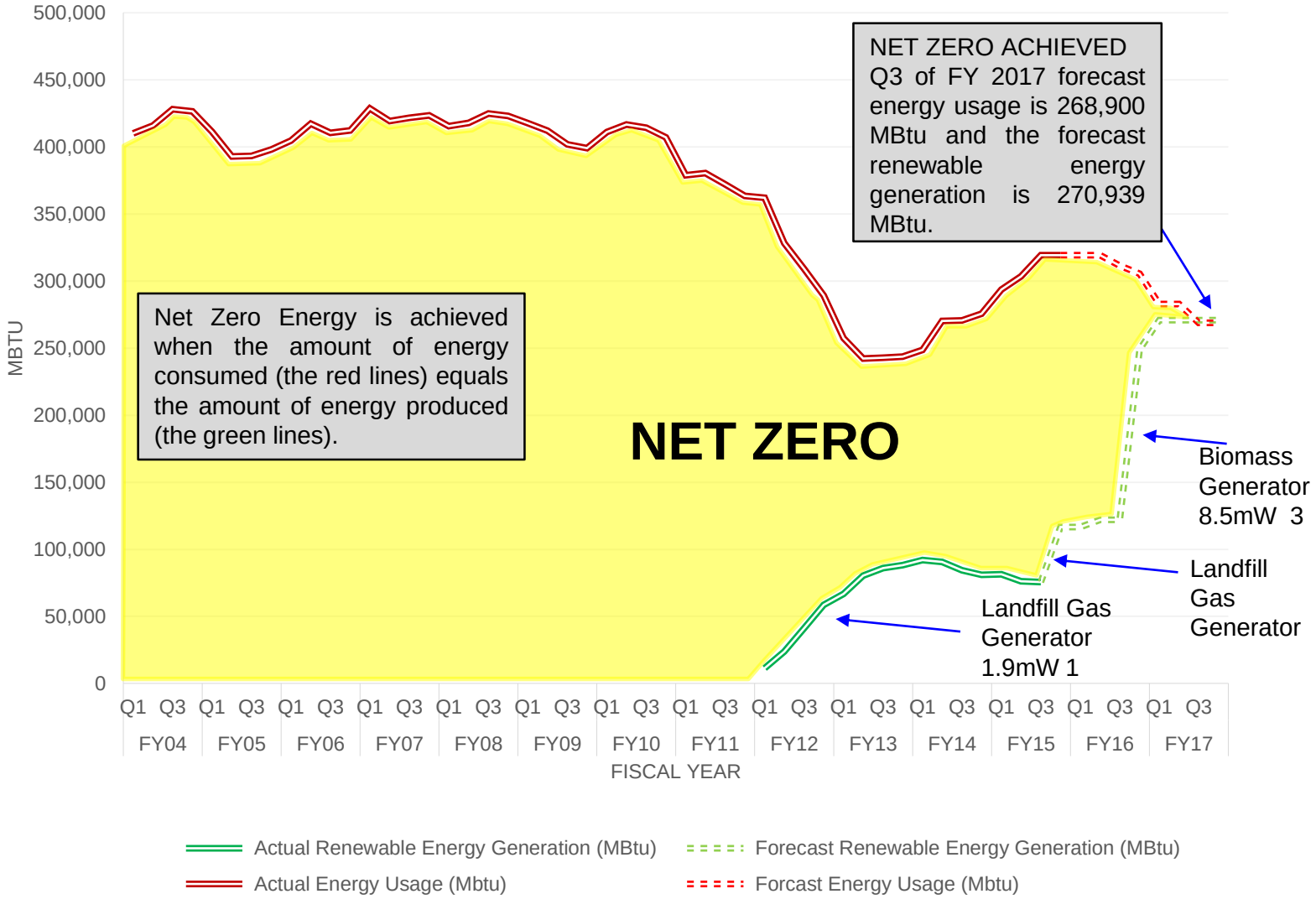
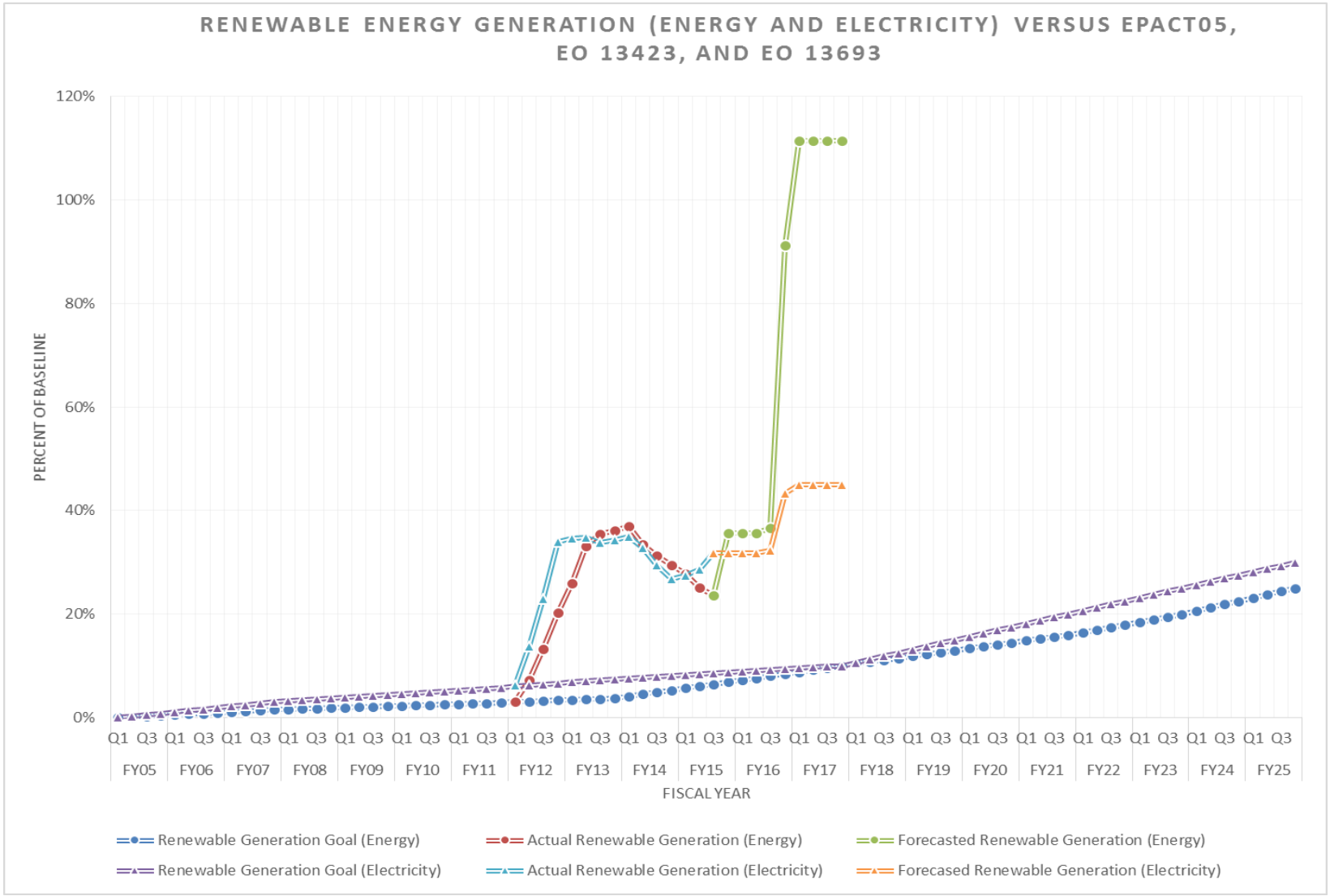
MCLB Albany Water Reduction Progress



NET ZERO ENERGY PLAN




RENEWABLE ENERGY GENERATION (ENERGY AND ELECTRICITY) VERSUS EPACT05, EO 13423, AND EO 13693
PERCENT OF BASELINE
120%
100%
80%
60%
40%
20%
0%
Q1 Q3 Q1 Q3
FY05 FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16 FY17 FY18 FY19 FY20 FY21 FY22 FY23 FY24 FY25
FISCAL YEAR
Renewable Generation Goal (Energy)
Actual Renewable Generation (Energy)
Forecasted Renewable Generation (Energy)
Renewable Generation Goal (Electricity)
Actual Renewable Generation (Electricity)
Forecased Renewable Generation (Electricity)

Summary of Energy Initiatives

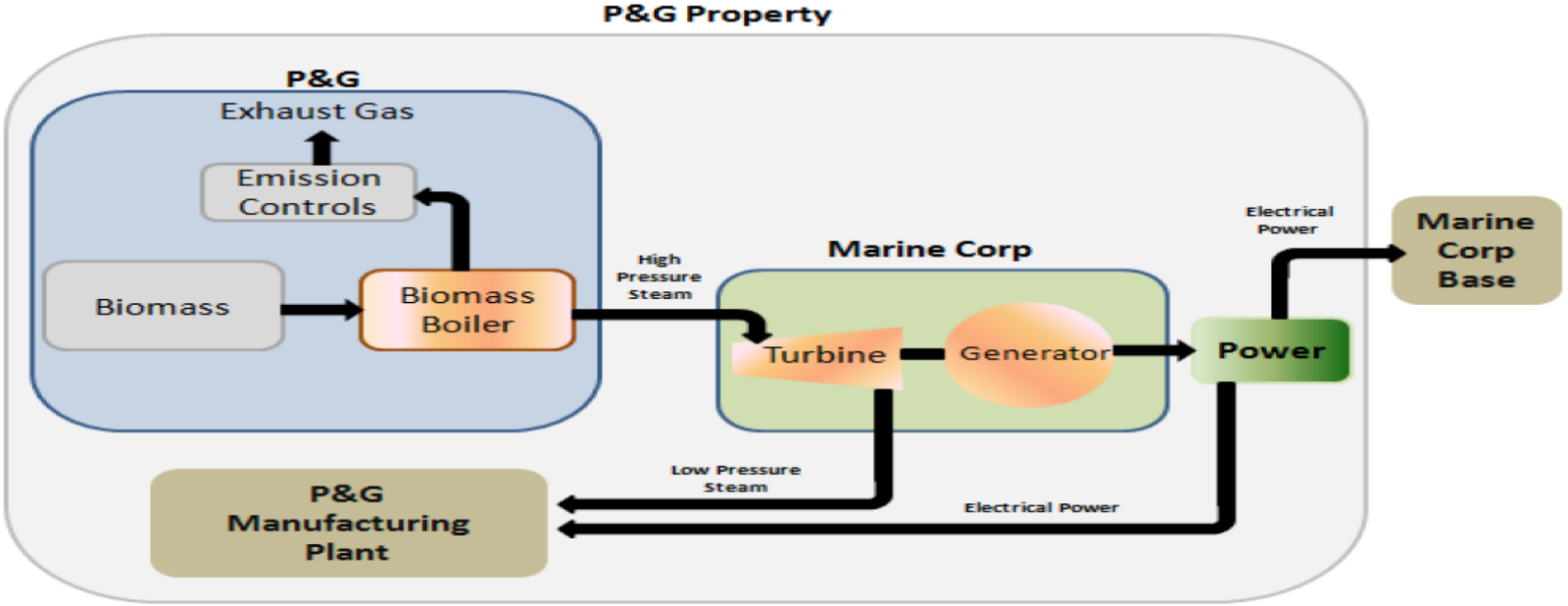
- Adding 89 Gas and Water Meters to the AMI System
- RetroCx 4 Buildings using Army COE at Huntsville, AL
- Replacement of Industrial Wastewater Treatment Plant
- Initiated ESPC DO# 3 to achieve Biomass Net-Zero by Summer 2017
- Replacement of Water Distribution System Complete Nov 2015
- Replacement of Gas Distribution System Underway Complete Jun 2016
- GSHP Borehole Thermal Energy Storage (BTES) for B3700 under ESTCP project – First 6 months shows 55% savings
- Installation of second LFGE 2.1mW generator underway Complete April 2016
- Expanded Direct Digital Control System (77 bldgs)
- Update Building Facade & interior lighting to LED Fluorescent Base Wide
- Completed 2nd Production Plant Albany Audit (Processes) Oct 2015
- Signed contract with Georgia Power to install and operate a 31mW Solar Farm on MCLB
- Ground Source Heat Pumps in 8 Buildings incorporating BTES Technology

Questions


HEADQUARTERS
MARINE CORPS
LOGISTICS BASE
ALBANY
NO PARKING IN CIRCLE
STANDING TRAFFIC ONLY

Backup Slides

MCLB Biomass Project Dashboard



- **MCLBA Timeline for P&G Biomass Project:**
  - Entered direct discussions w/ P&G about partnering to do a large scale Biomass project – Sep 2011
  - MCLBA sent an email to HQMC, MCIEAST, & NAVFACSE advising of partnership wP/G that would result in MCLBA achieving Net-Zero - May 2012
  - MCLBA working w/ NAVFACSE to get approval to send an RFP to all 16 ESCO's– Jun 2012
  - Request has been held up by NAVFAC EXWC due to concerns w/respect to language in the NDAA prohibiting "construction" on ESPC projects-Aug 2012
  - NAVFACSE Point Paper to propose way ahead Dec-2012
  - LANT sent out RFI for Biomass project – May 2013
  - Email from HQMC stating that they will pursue an alternate financing vehicle such as the Energy Savings Performance Contract (ESPC) for this renewable opportunity- Sep 2013
  - Commanding Officer MCLBA sends initial ESPC project notification to met Net-Zero – Sep 2013
  - MCLBA scheduling meeting w/ Georgia Power to discuss distribution interconnection agreement – Dec 2013

Modular Heat Recovery GHP

Adiabatic Dry-Cooler