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· August 15-18, 2010 · Dallas, Texas ·
· Dallas Convention Center ·

Fort Bragg – ENERGY SECURITY

Opportunities through Partnerships

Agenda

- Fort Bragg Intro, Jennifer McKenzie
  - Fort Bragg Energy Picture
- Progress Energy, Bob Dupuis
  - Investor Owned Utility
- Sandhills Utility Services LLC, Jeff Brown,
  - Utility Privatization
- Fort Bragg Case Study, Jennifer McKenzie
  - Installation Efforts
  - Bring all the pieces together
  - Closing Comments

Energy Security

Energy Security for the Army has five core characteristics: Sustainability, Surety, Survivability, Supply, and Sufficiency

Surety

(Preventing Loss of Access to Energy Sources)

Sustainability

(Supporting the Army's Mission, Community & Environment)

Survivability

(Resilience in Energy Systems – Converting Overhead to underground line)

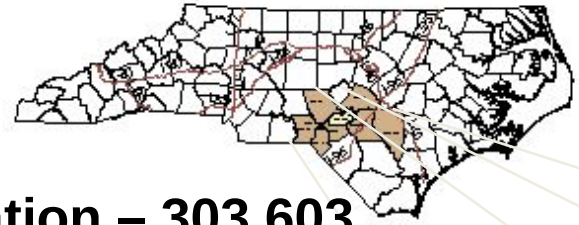
Supply

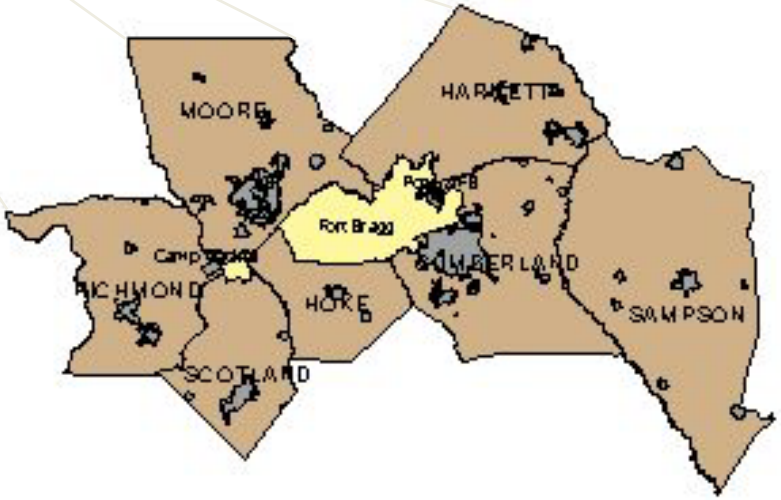
(Alternate and Renewable Sources- Solar thermal & PV, ground source heat pumps)

Sufficiency

(Adequate Power for Critical Missions- Quality & Quantity,)

FORT BRAGG - "More Than A City"





- Supported Population – 303,603
- Active Duty population- 46,000
- FY09 Total Energy Bill - $50M
- Electric Peak – 119 MW
- Total electric FY09 – 631,000 mWh
- Natural Gas Peak – 12,052 DTH
- Total NG FY09 – 1,271,326 MMBtu
- Total Building SF- 34.4M SF (5200 bldgs)
- Size- 251 Square Miles (160,770 Acres)

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FORT BRAGG COMMANDS FY13

USAG

FORSCOM

USARC

XVIII ABN CORPS

1st TSC

82d ABN DIV

JSOC

USASOC

USACAPOC

44th MED BDE

16th MP BDE

1/82d BCT

2/82d BCT

USASFC

USAJFKSWCS

4th POG

95th CA BDE

528th SUST (SO)

1st CA/PO TNG BDE

108th ADA BDE

20th ENG BDE

3/82d BCT

4/82d BCT

3d SFG

1st SWTG

82d SUST

525th BfSB

18th FIRES BDE

82d CAB (M)

SWMG

192d EOD BN

43th AG

440th AW (AFRC)

18th ASOG

139th INF REG (NCNG)

50th SIG BN

Golden Knights

10th MP BN (CID)

189th INF BDE 1st ARMY

406th AFSB

4th ROTC BDE

DENTAC

WOMACK

ASOTD

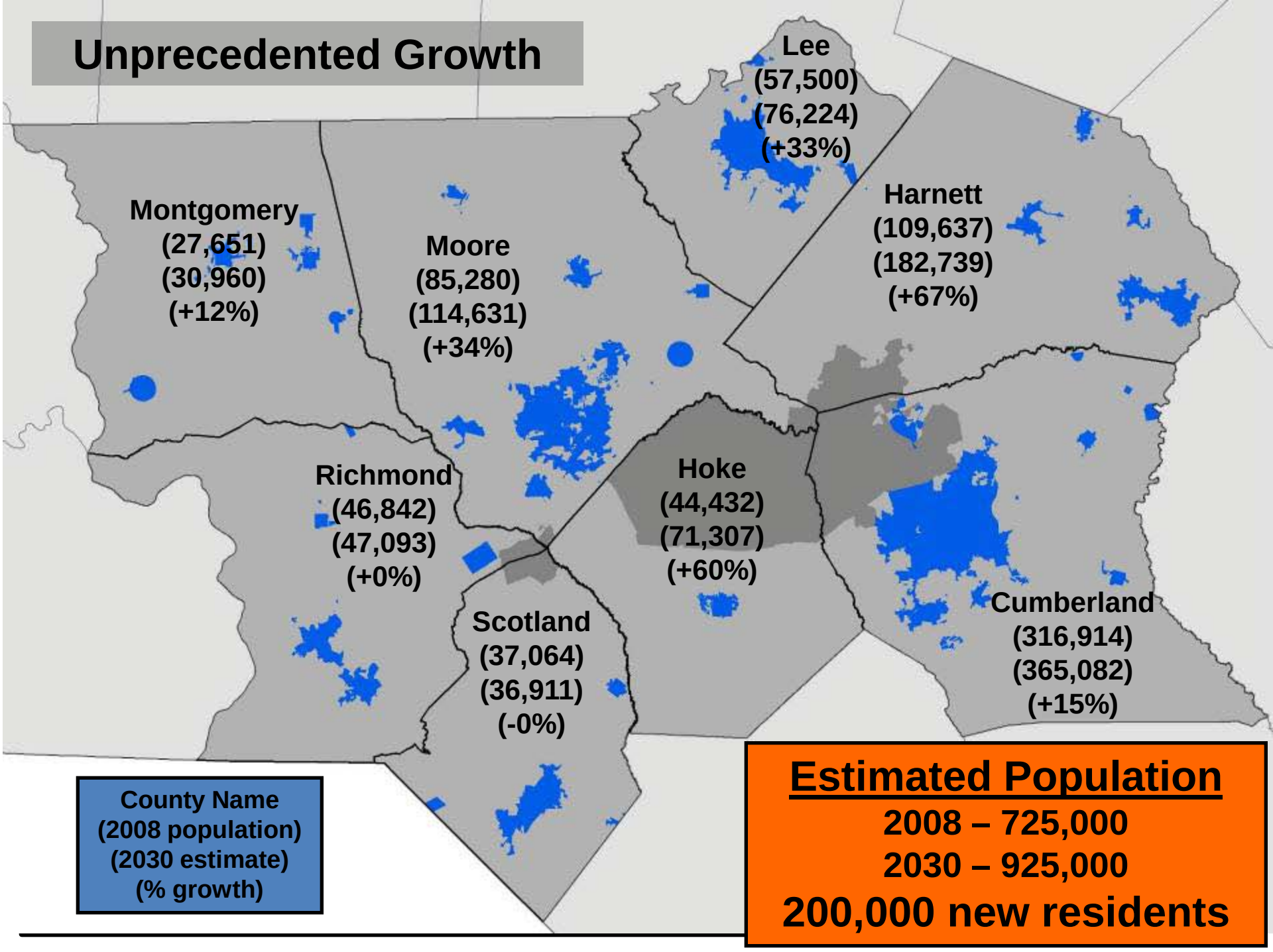
Ft. Bragg will have 58 stars (from general officers); second only to the Pentagon.

Energy Drives the Mission

Energy Drives the Mission

Energy Drives the Mission

Unprecedented Growth



Estimated Population

2008 – 725,000

2030 – 925,000

200,000 new residents

Fort Bragg Construction

- FY2005 military construction was $183M
- FY2009 MILCON was $651M, more than tripled
- From 2010 to 2012, MILCON will increase by $3.8 Billion & 10 Million SF
- **Total dollars programmed for FY2009-2014 = $7.6B**

FORSCOM HQ opening 2011

Opportunities Through Partnerships

U.S.ARMY

AAFES

Progress Energy

SANDHILLS UTILITY SERVICES, LLC

Pacific Northwest NATIONAL LABORATORY

U.S. DEPARTMENT OF ENERGY

TRANE

BRADY ENERGY SERVICES

Johnson Controls

Honeywell

SEA SAIN ENGINEERING ASSOCIATES, INC.

US Army Corps of Engineers Headquarters

imagination at work

DEPARTMENT OF THE AIR FORCE · UNITED STATES OF AMERICA

DEPARTMENT OF THE NAVY · UNITED STATES OF AMERICA

PICERNE MILITARY HOUSING

One Company. One Mission. Families First.™

TREMCO

United Technologies

American States Utility Services, Inc. A Subsidiary of American States Water Company

dodea DEPARTMENT OF DEFENSE EDUCATION ACTIVITY

Piedmont Natural Gas

Sustainable Sandhills

MARINES THE FEW. THE PROUD.

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USASOC

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Federal Energy Management Program

Progress Energy

Transmission

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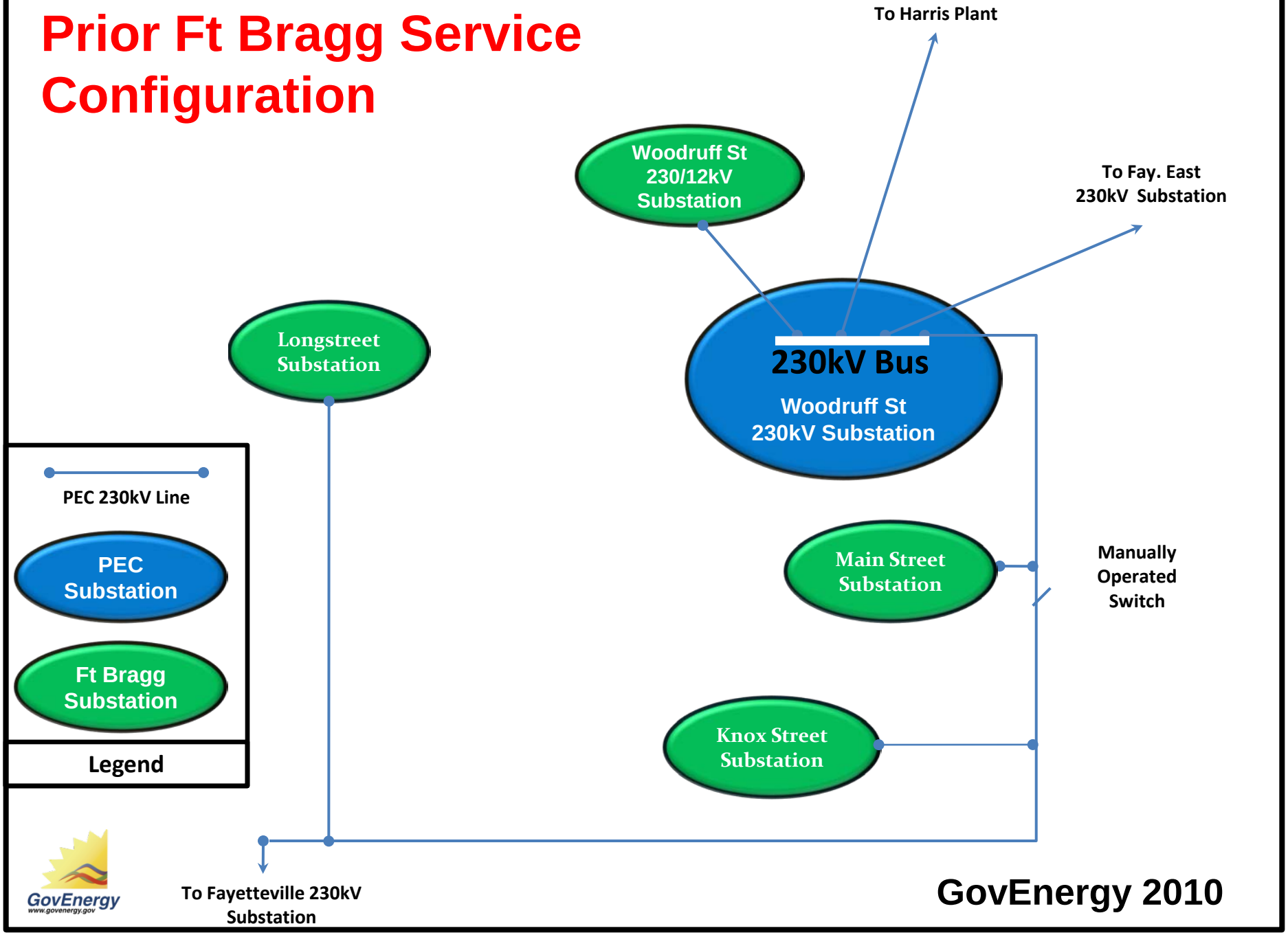
Progress Energy

Big Picture Plan

- Construct 600 Megawatt Gas-Fired Combined Cycle Power Plant in Richmond County.
- Construct a new Richmond to Fort Bragg Woodruff Street 230 kV Transmission Line
- Route through Ft Bragg to substation

Prior Ft Bragg Service Configuration



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PROJECT NEED

GROWING PROGRESS ENERGY CAROLINAS (PEC) SERVICE AREA

- 7/1/06 – 7/1/07 191,590 new NC residents
- 25k to 30k new homes & businesses added each year to our system
- Avg Home Electrical Usage gone up 46% Since 1975

  (HDTV, Computers, etc.)
- BRAC Ft Bragg Realignment Growth:
  - Region population impact: 84,540
  - 6,772 additional soldiers
  - 1,669 civilian employees
  - 12,000 family members
  - Additional facilities for soldiers and civilian employees

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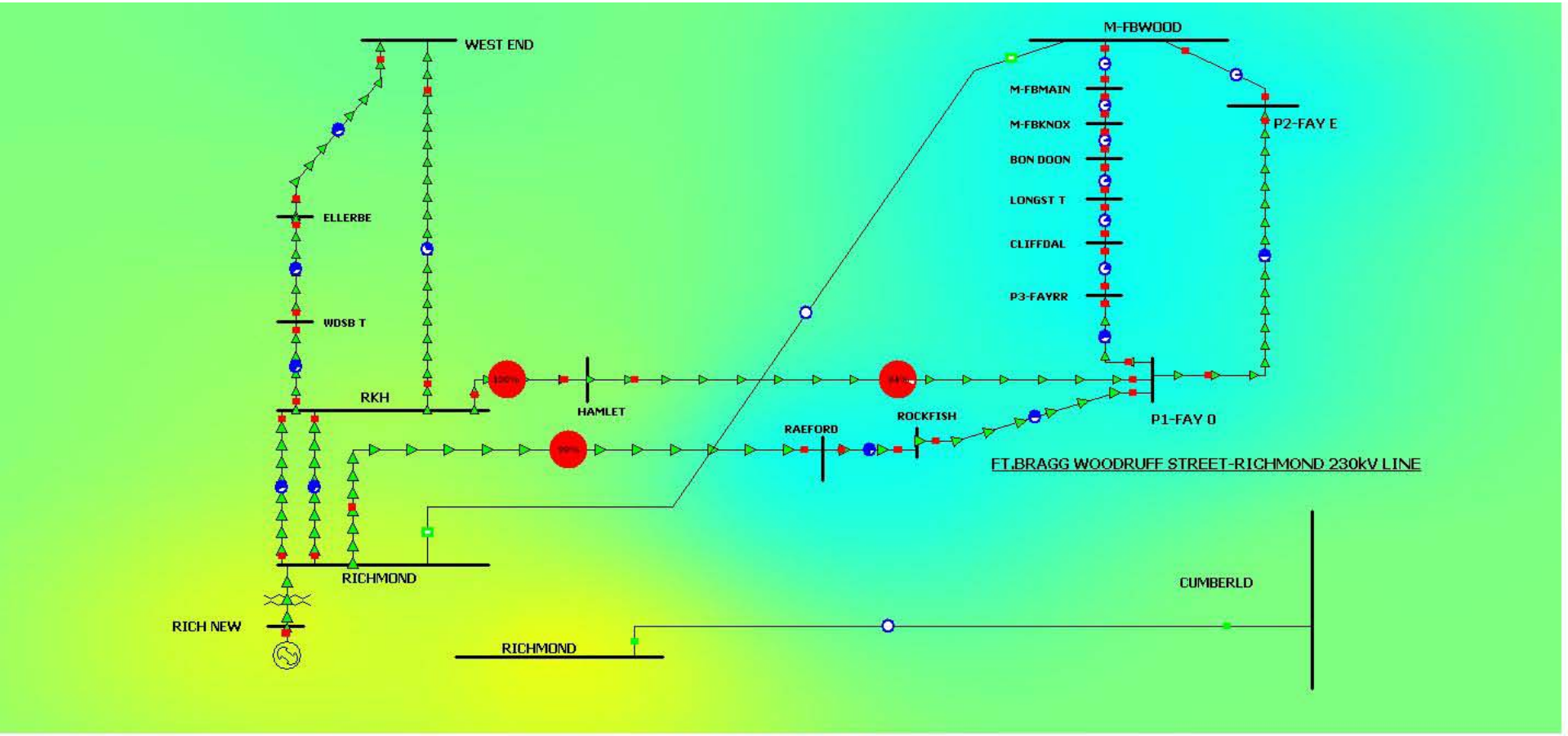
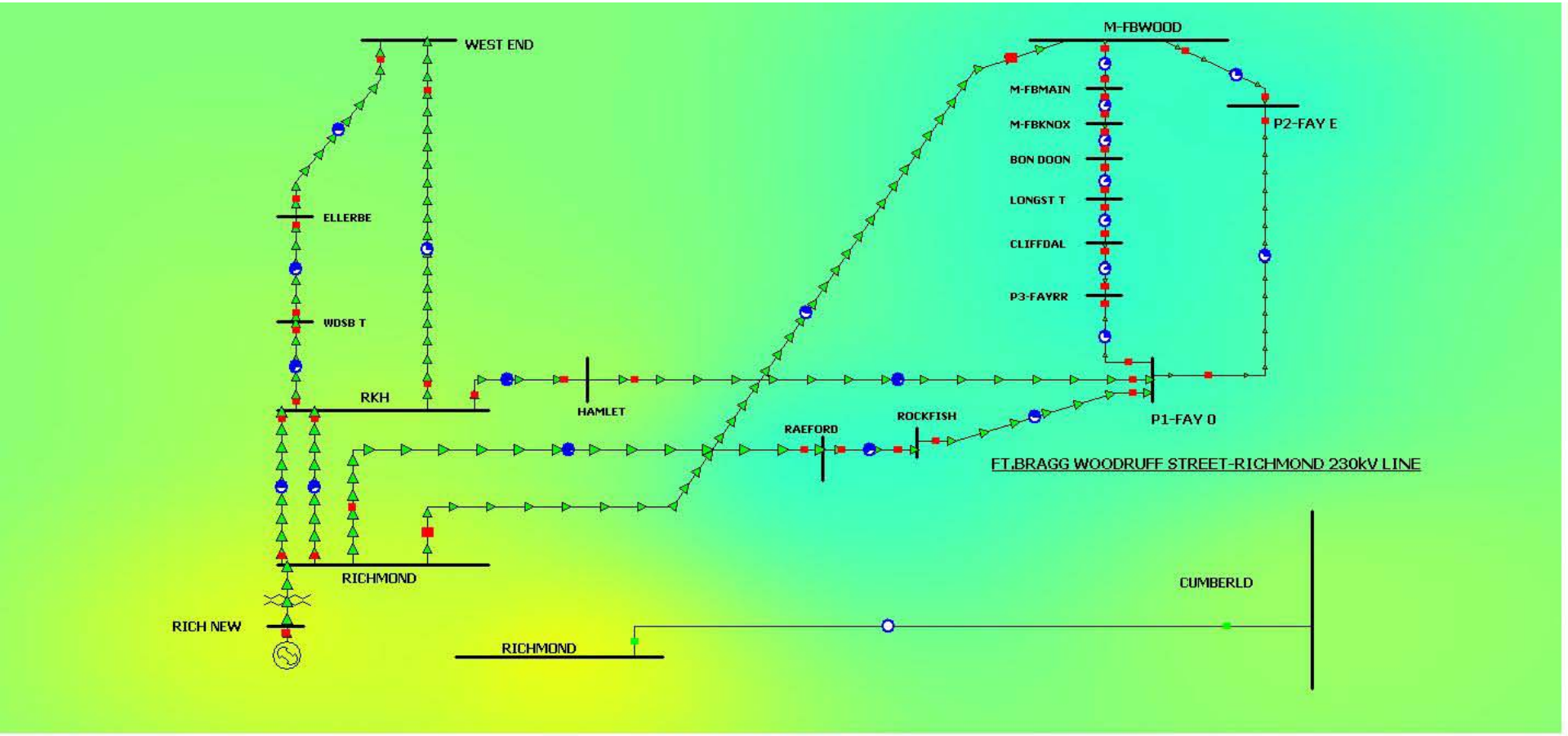
Contingency – Loss of Cumberland-Richmond 500kV Line Causes Loading Issues on Richmond-Raeford and Fayetteville-Rockingham 230kV Lines

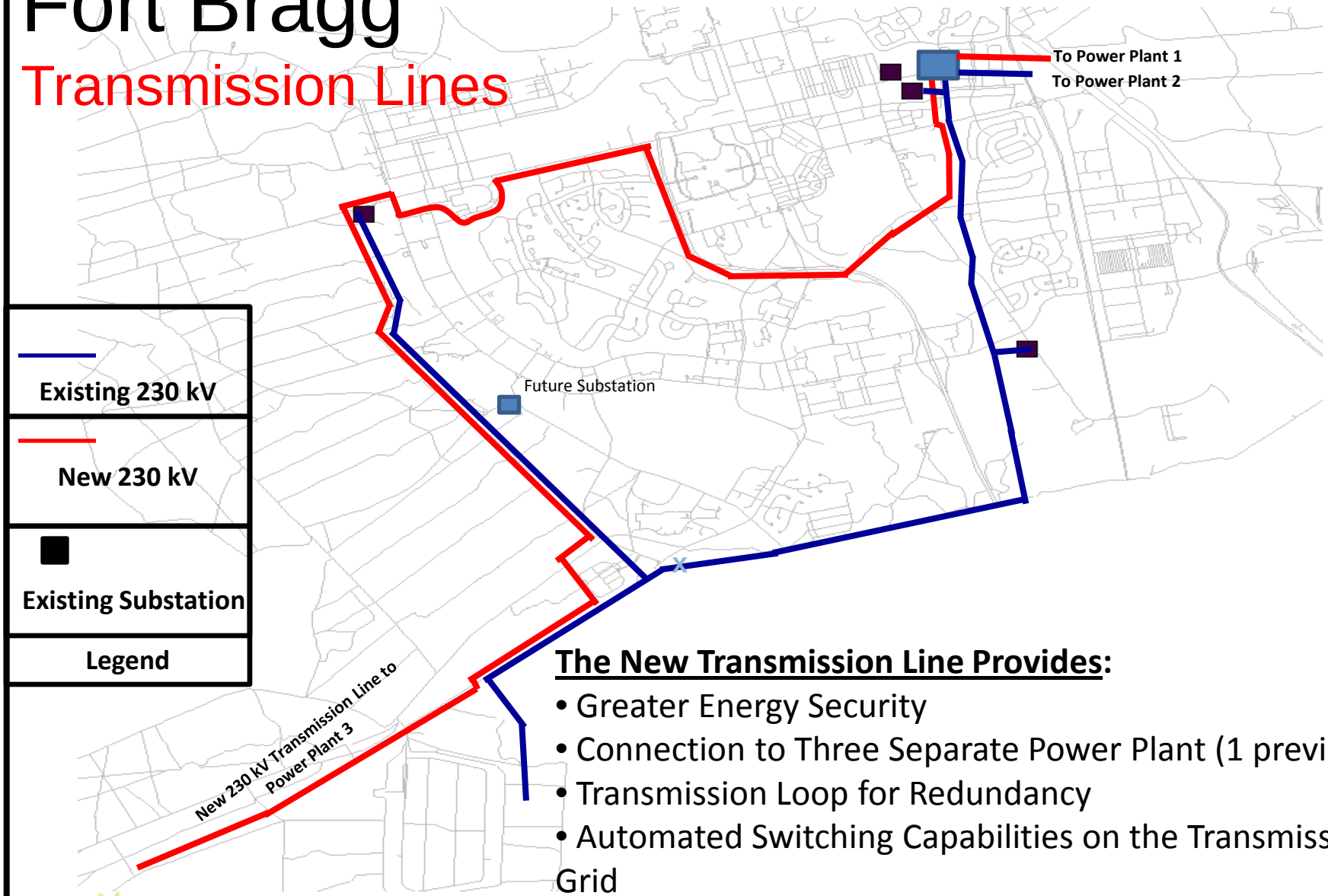


Solution – Construction of Richmond-Ft Bragg Woodruff 230kV Line Alleviates Loading Issues



Fort Bragg

Transmission Lines



<u>The New Transmission Line Provides</u>:

- Greater Energy Security
- Connection to Three Separate Power Plant (1 previous)
- Transmission Loop for Redundancy
- Automated Switching Capabilities on the Transmission Grid

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New 230 kV line on Fort Bragg

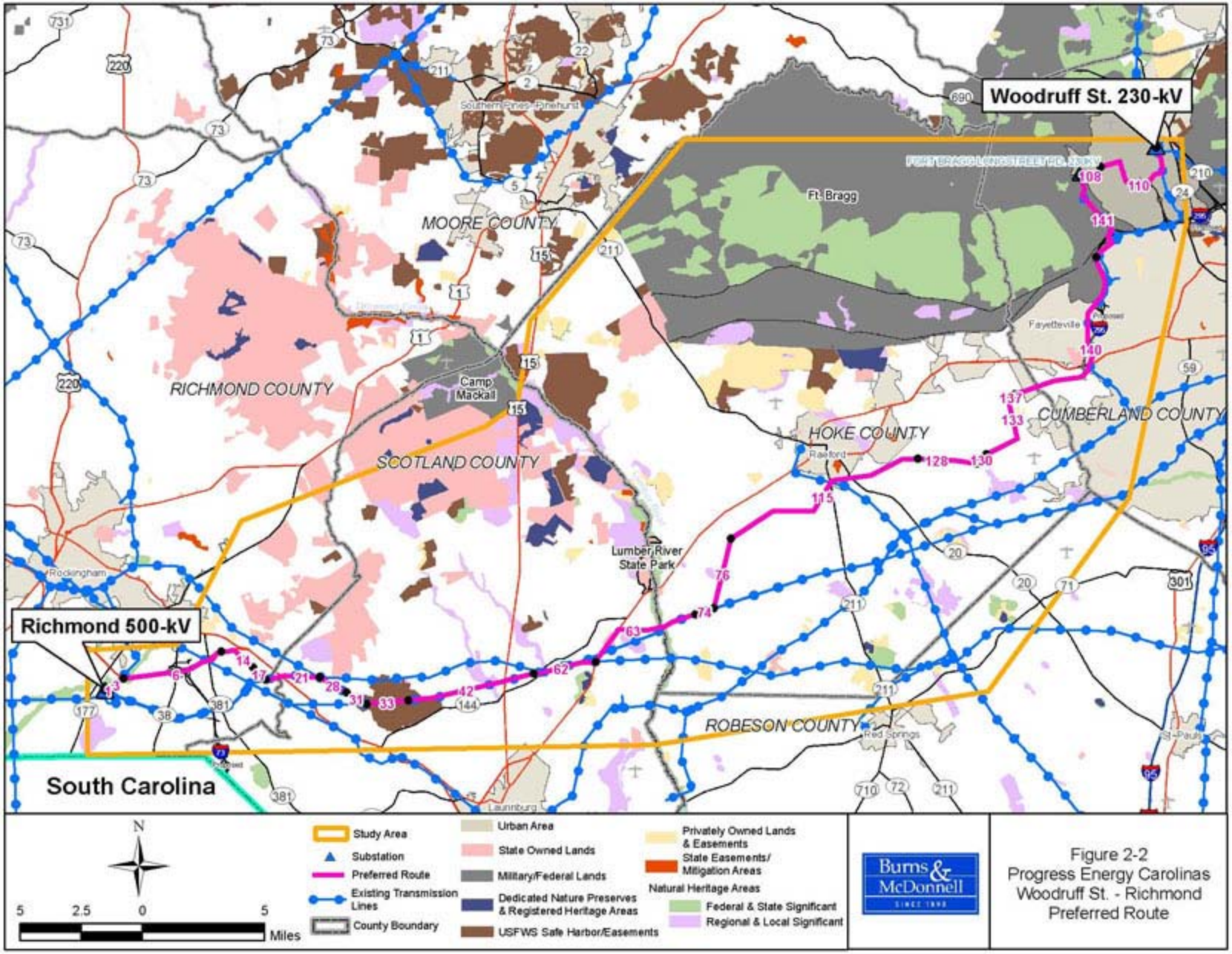
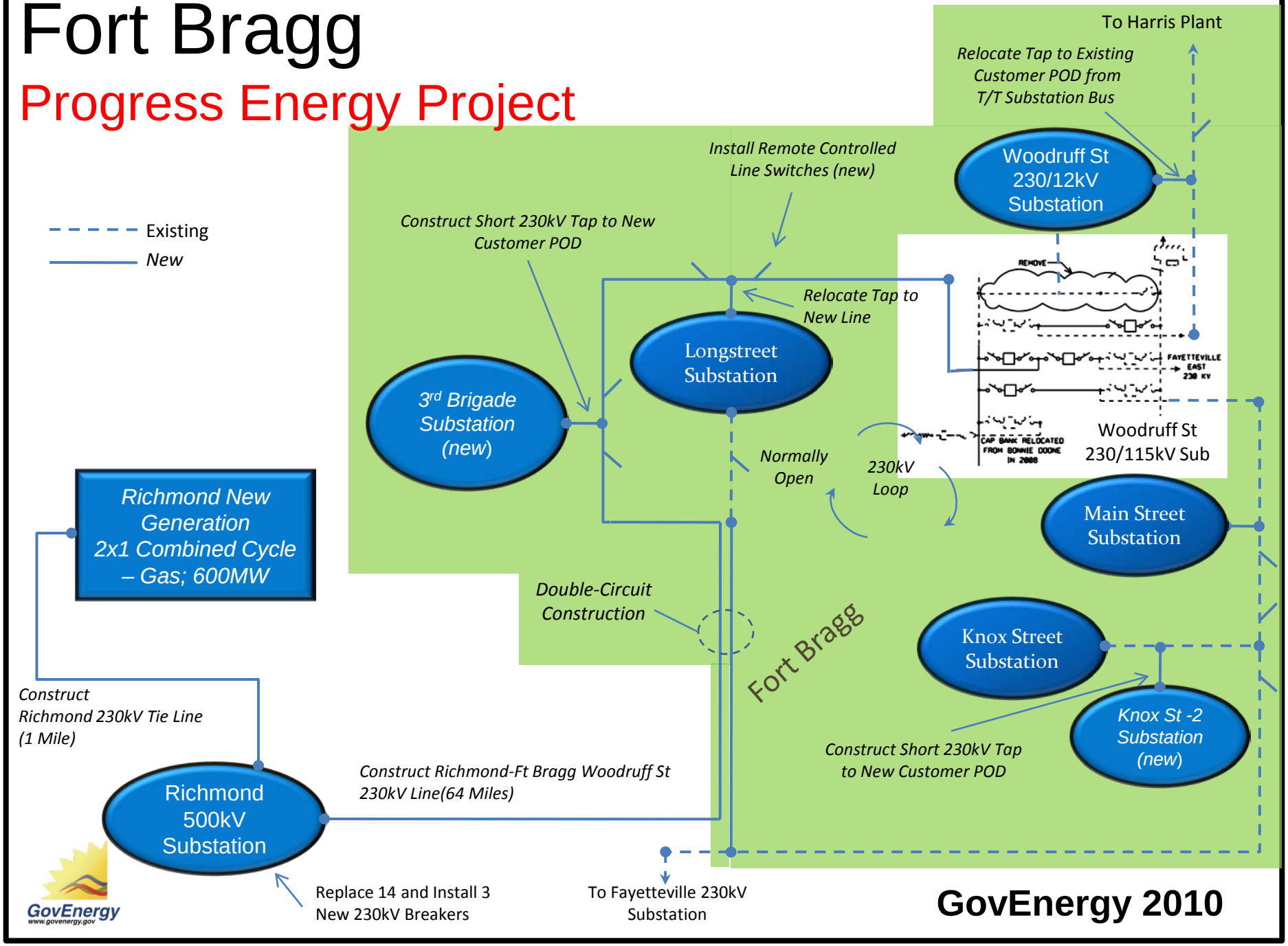


Figure 2-2
Progress Energy Carolinas
Woodruff St. - Richmond
Preferred Route

Fort Bragg

Progress Energy Project



FORT BRAGG

AFFECT OF LOAD GROWTH

Present

- Picture here of load as is TBA

Future – with additional load

- Picture here of projection showing low voltage TBA

SANDHILLS UTILITY SERVICES, LLC

Distribution

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Sandhills Utility Services, LLC

Utility Privatization

Own, Operate, and Maintain Electric Distribution System

Electric System Design

New Project Construction

Planning & Programming

Energy Awareness Program

Utility Privatization Contractor Serving Ft. Bragg Since 2003

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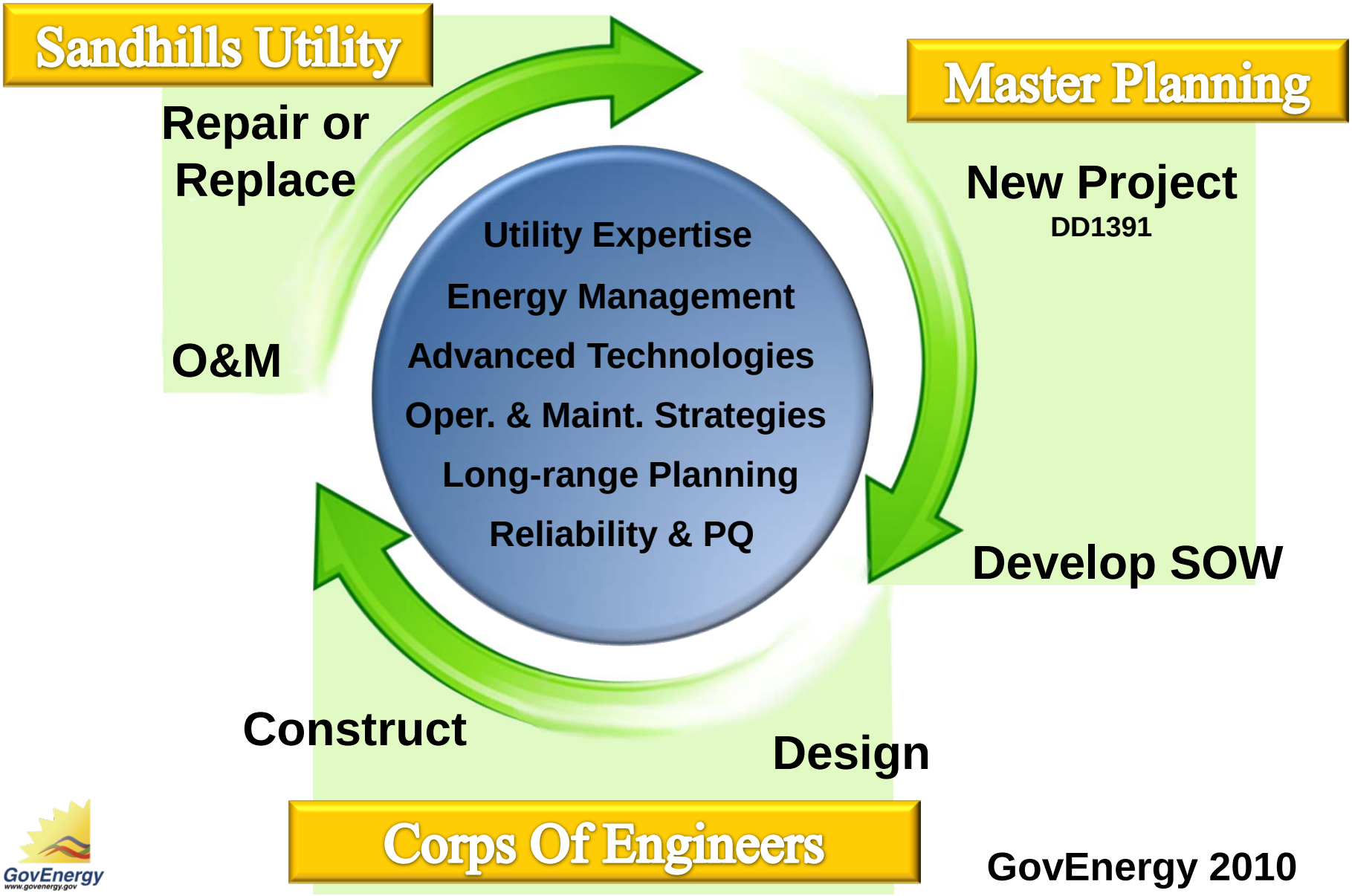
Privatization Flow



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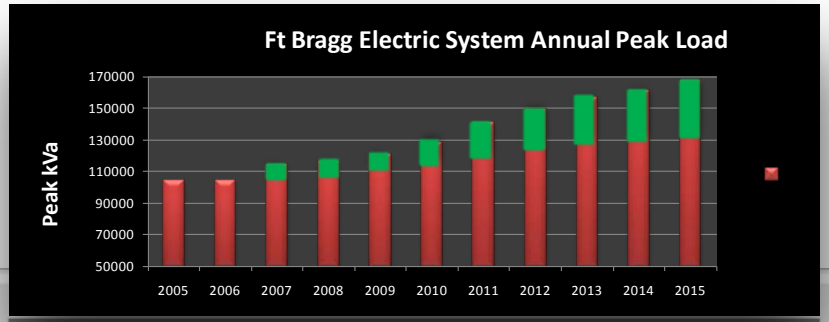
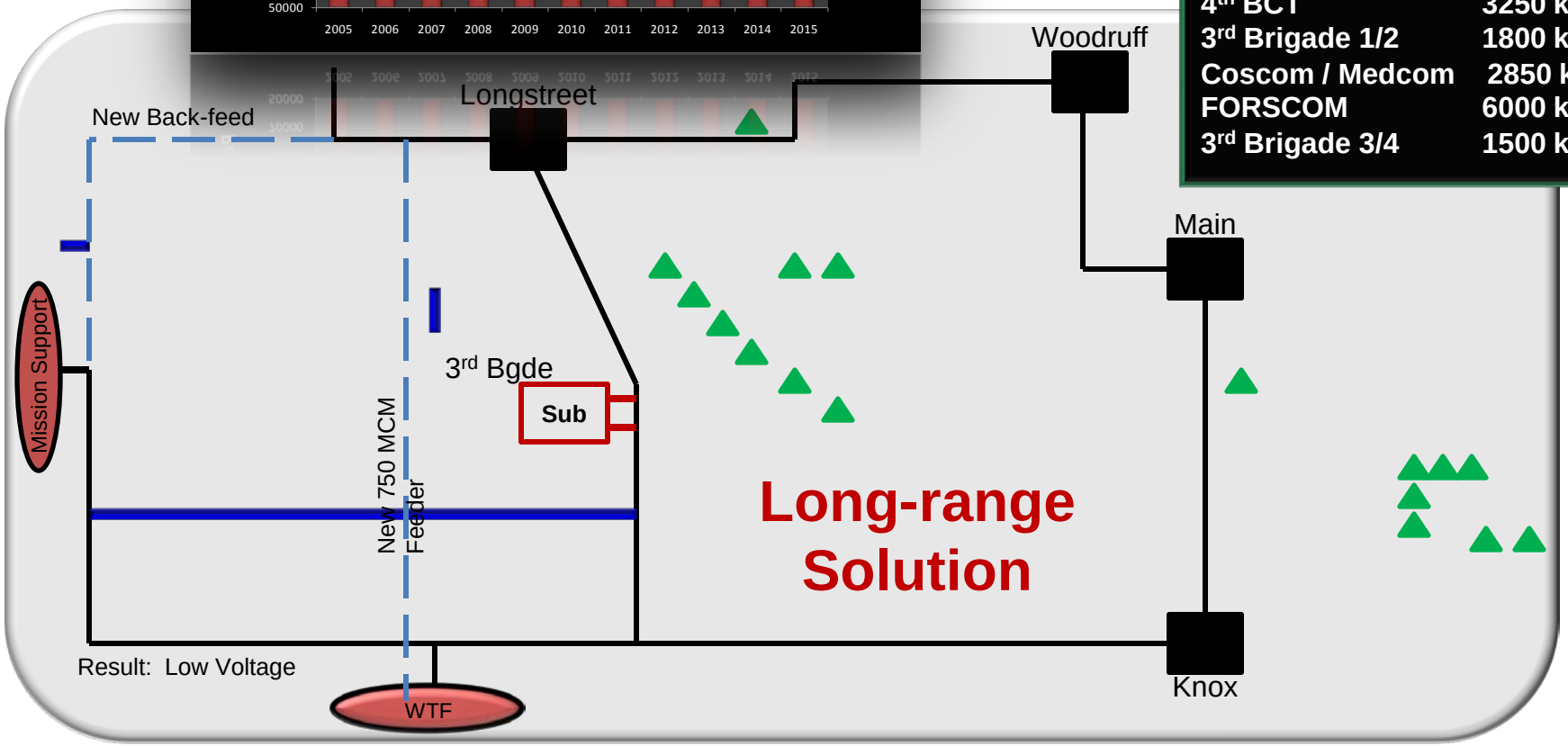
Modeling Partnership

The Value of Opportunity

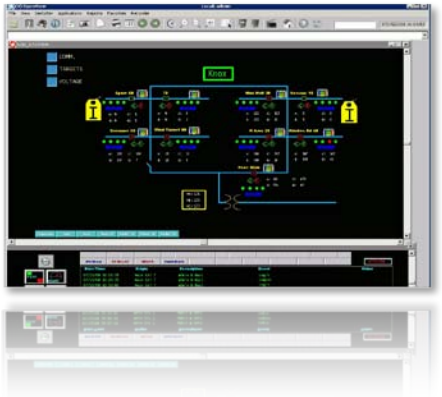


New Load Additions	
Separates 3/4	3500 kW
2nd Brigade 1/2	2665 kW
2nd Brigade 3/4	2000 kW
4th BCT	3250 kW
3rd Brigade 1/2	1800 kW
Coscom / Medcom	2850 kW
FORSCOM	6000 kW
3rd Brigade 3/4	1500 kW

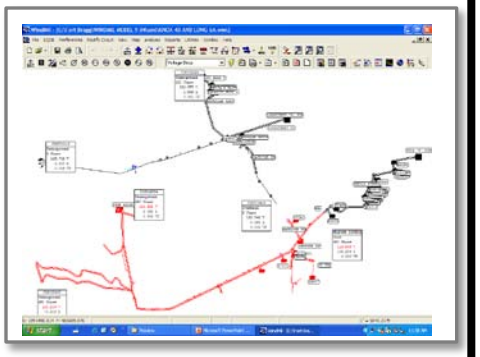


ELECTRIC SYSTEMS TECHNOLOGIES

Real-Time Management
Works together to enhance Energy Security



- GIS/CIS
- SCADA
- Engineering Analysis
- Wireless Communications



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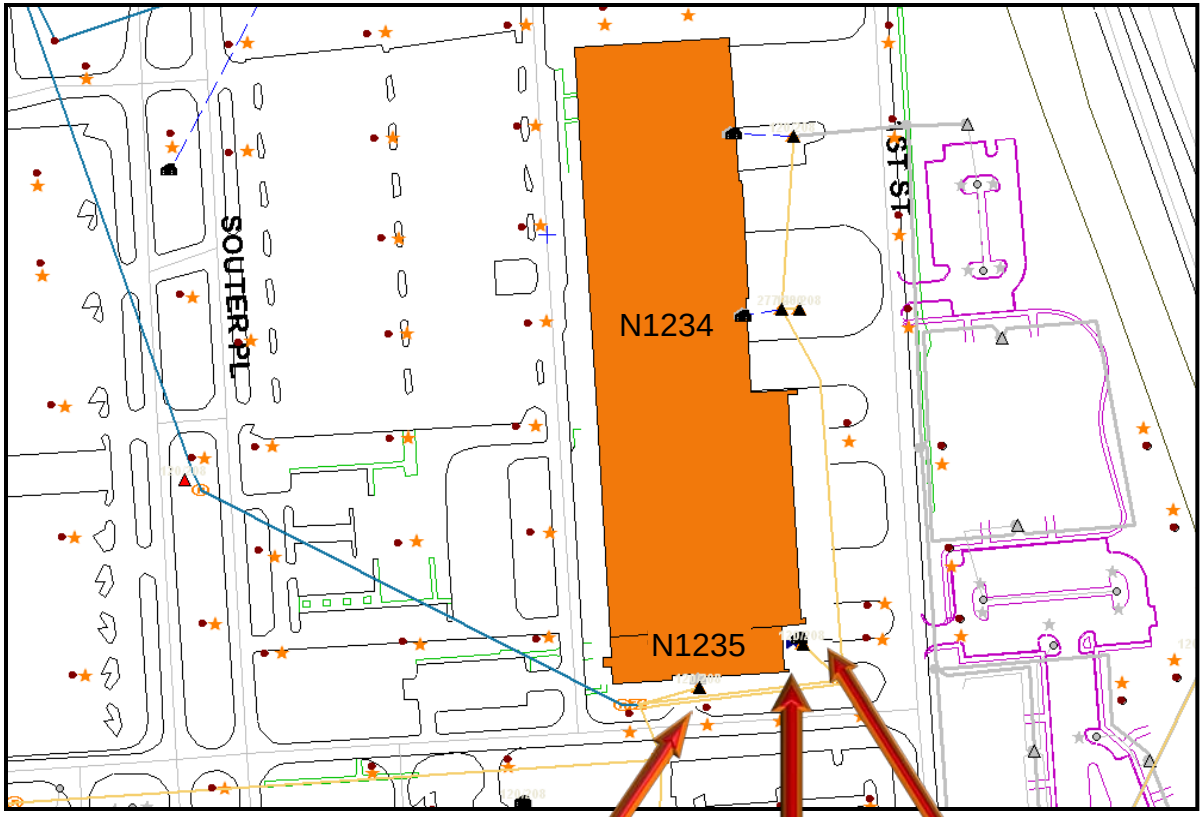
ELECTRIC SYSTEMS TECHNOLOGIES

GRAPHICAL / CUSTOMER INFORMATION SYSTEMS

Benefits

- Automates Operations
- Enhanced Customer Service
- Improves Asset Management and Operational Efficiency
- Expedites Outage Response



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ELECTRIC SYSTEMS TECHNOLOGIES

GRAPHICAL / CUSTOMER INFORMATION SYSTEMS

Transformer

GENERAL | MILSOFT

Size	750
Phase	CBA
TYPE	Underground
Pole ID	6102192
Conductor ID	6006152
Col. Comment	Z=5.5%
TRANID	102741
SUS_NUM	102741
MANUFACTURER	Manufacturer
IMPEDANCE	5.5
IN SERVICE?	Yes
Secondary Voltage	120/208
Serial #	820115-1
Bank Type	3UG XFMR
Primary Key	6000937

Customer

METER | GENERAL | LIGHTS | ELECTRICAL

Building Number	8-5476-C
Address	2-5404 Butner Rd
Field Meter Number	163163
Manufacturer	Manufacturer
Model	
Meter Type	
Class	
Form	6S
Voltage	120/208
Configuration	
# of Wire(s)	7
Phase	CBA
CT Ratio	400:5
PTRatio	
Multipler	35
Service Type	4-Wire
Entrance Type	
Mounting Type	
KW Demand	450
Meter Reading	395
Inspect Date	10/01/10
Installed By	D. Wallace
Installed Date	08/01/07
Calibration Required	
Calibration Date	
Comments	

Generator

XFR SWITCH | FUEL TANK

GENERAL | SYSTEM | GENERATOR | MOTOR

Generator Mfg	GenMan
Generator Mfg Date	6/2/2004
Generator Serial #	E040649543
Generator Model #	DGCG-5673144
Generator KW	80
Generator KVA	100
Generator Voltage	120/208
Phase	ABC
Start Type	Automatic
Generator Diagram	0612-6764
Generator Spec #	Spec-A; 200 starts; 64.2 hrs
Generator Location	Outside
Generator	

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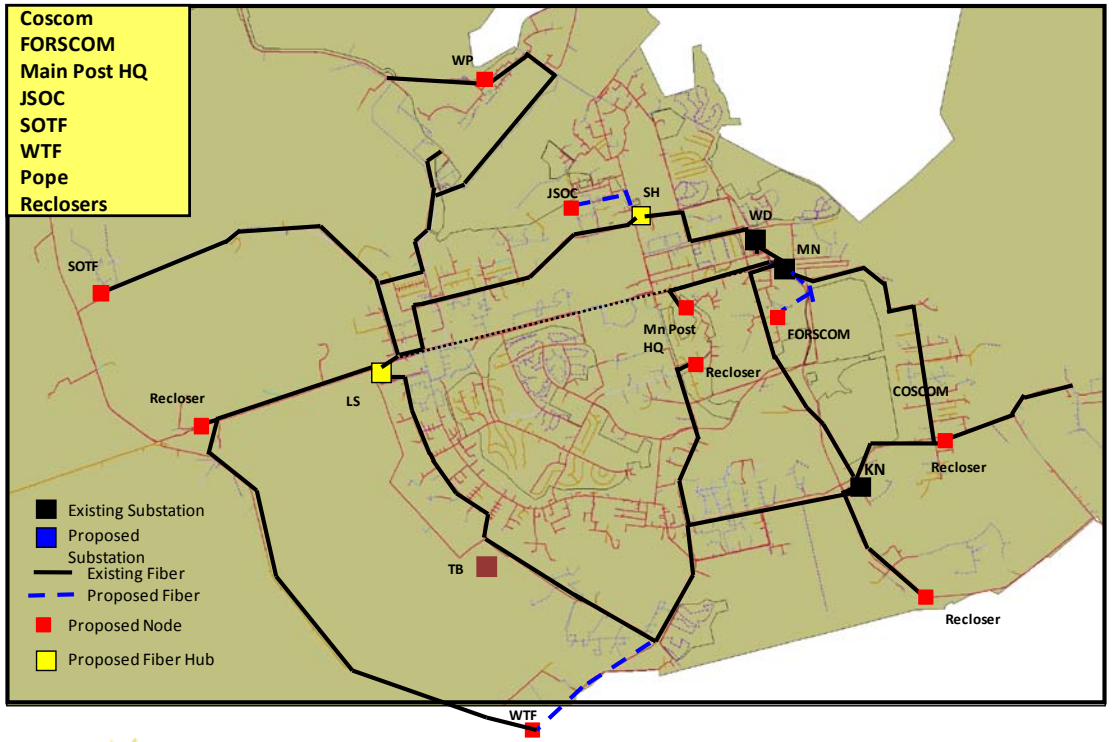
ELECTRIC SYSTEMS TECHNOLOGIES

SUPERVISORY CONTROL AND DATA ACQUISITION

SCADA



Benefits

- Reduces operational costs
- Provides Real-time Knowledge of System Performance
- Improves System Efficiency
- Automated Report Generating

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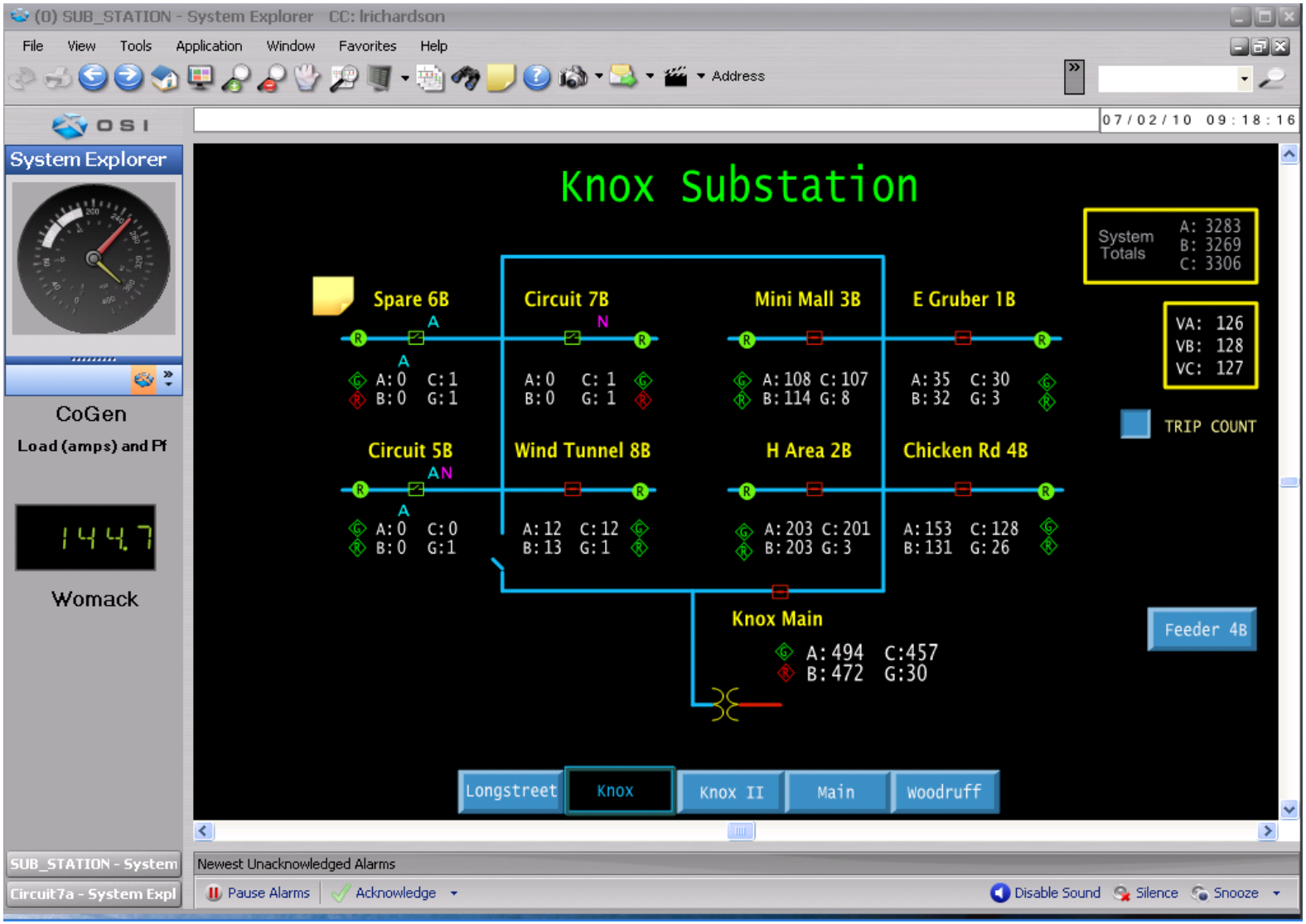
SCADA - Station Level



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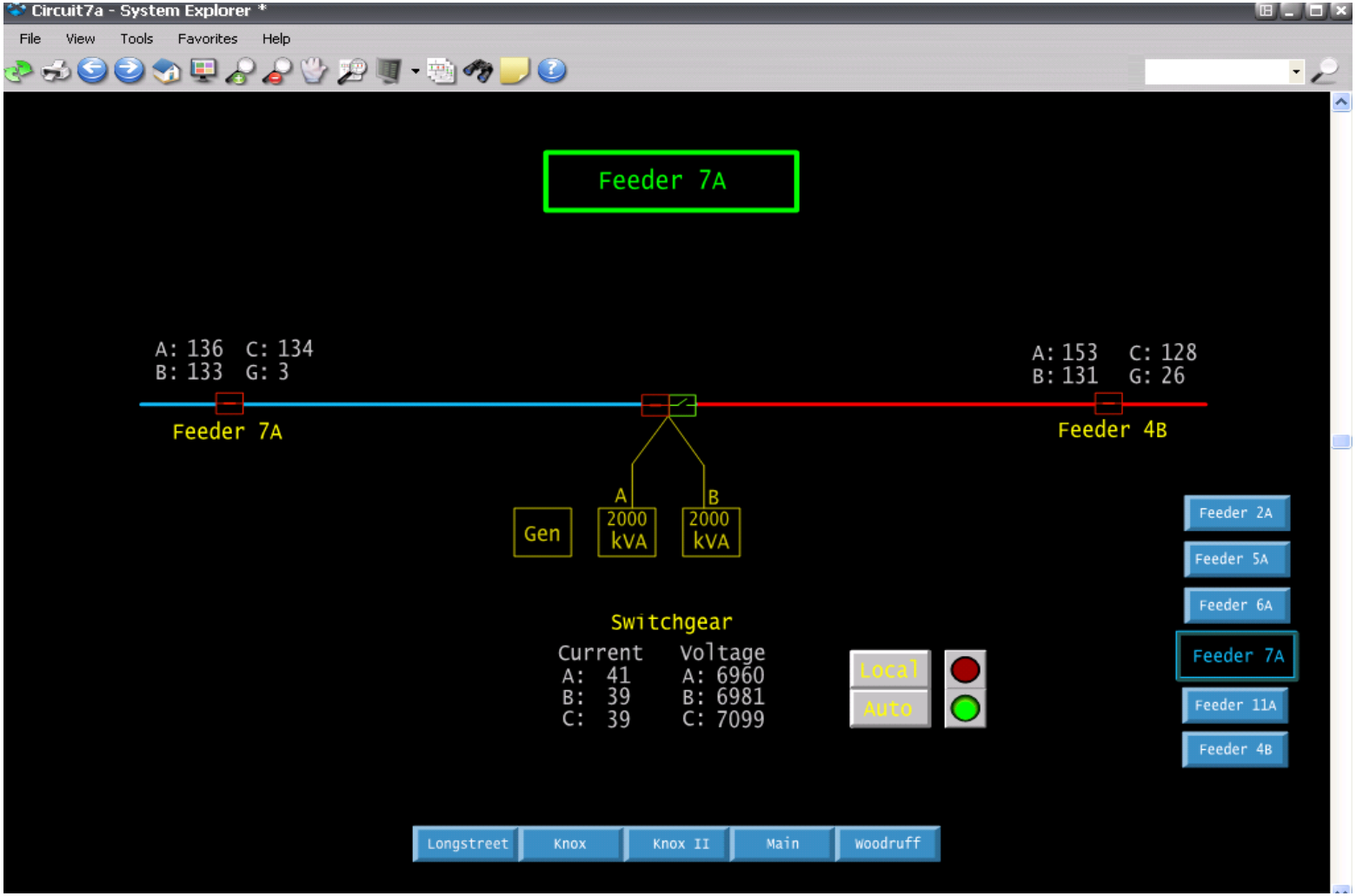
SCADA - Feeder Level



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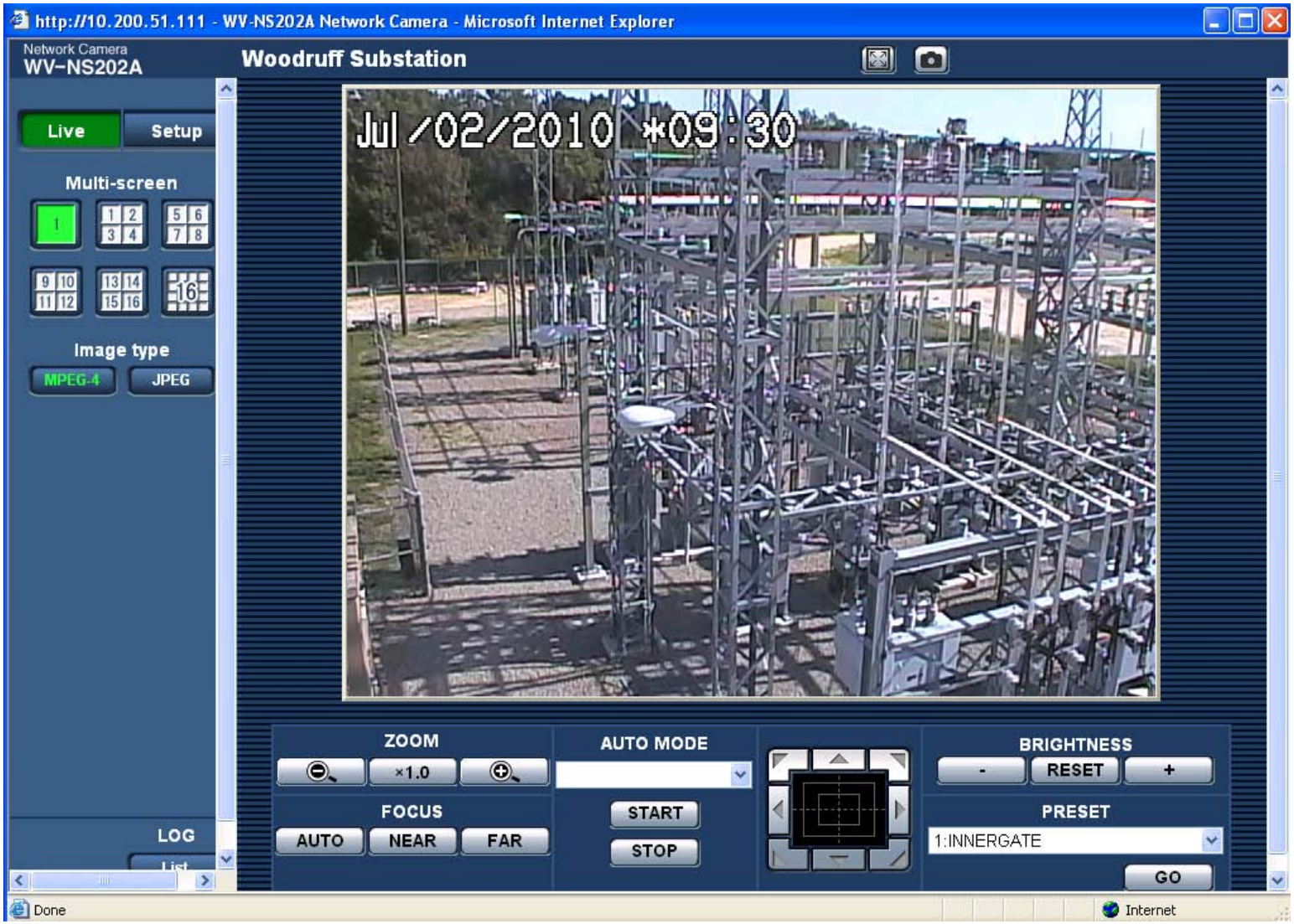
SCADA – Station View



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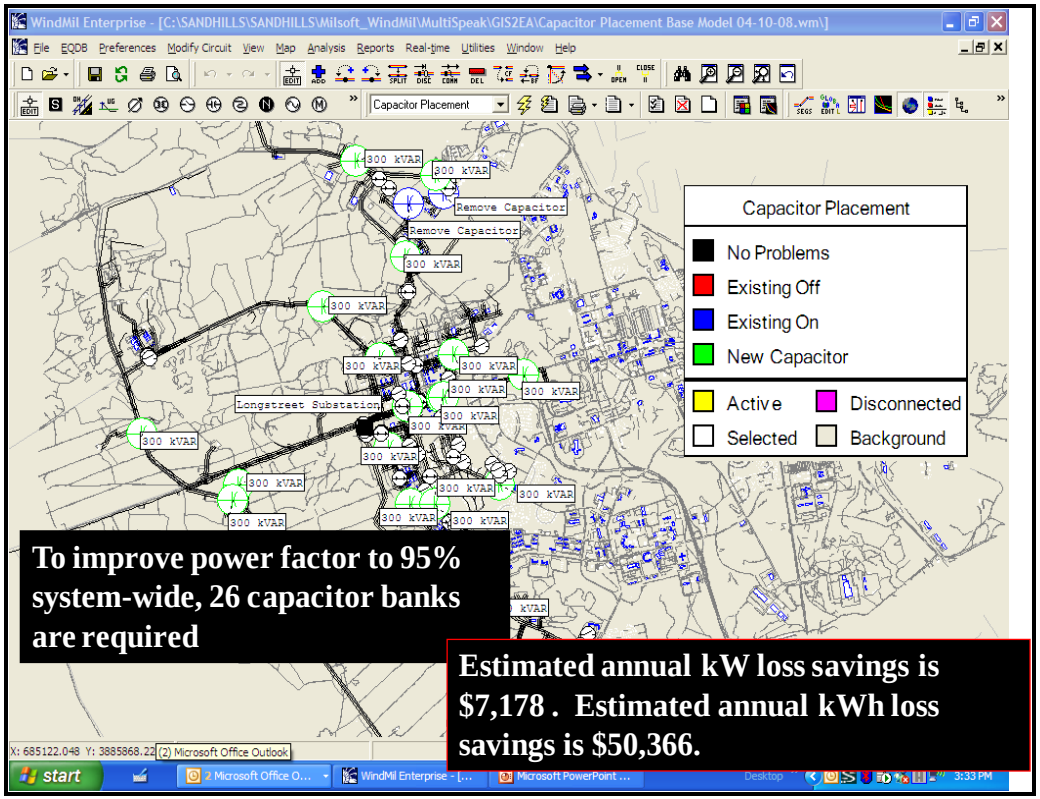
ELECTRIC SYSTEMS TECHNOLOGIES

POWER SYSTEM ENGINEERING ANALYSIS

Capacitor Study



Benefits

- Accurate Model of Electric System
- Ability to Analyze Load Growth Scenarios
- Ability to Maintain System Integrity

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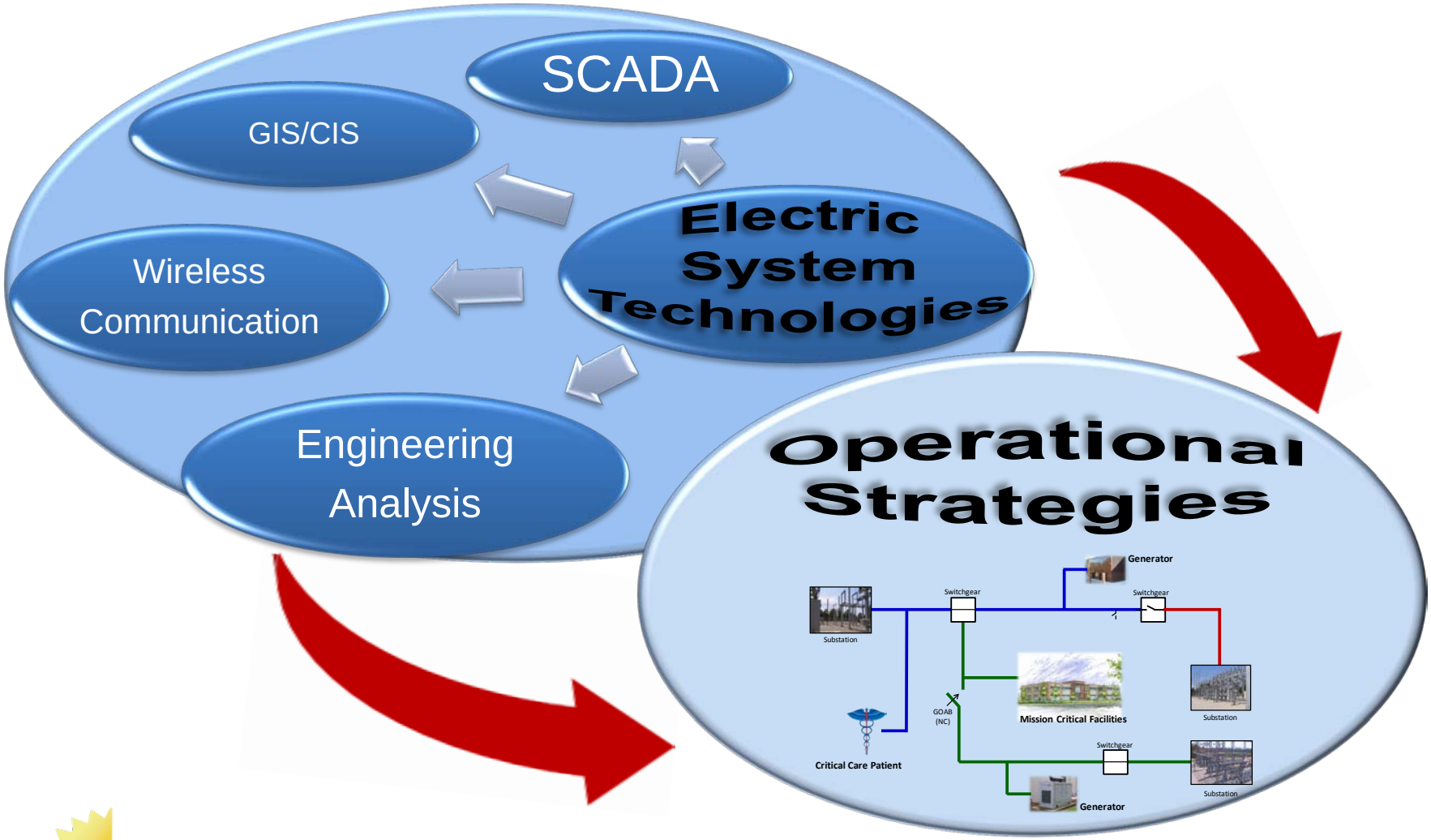
OPERATIONAL STRATEGIES

DEFINING LONG-TERM OUTAGE RESTORATION



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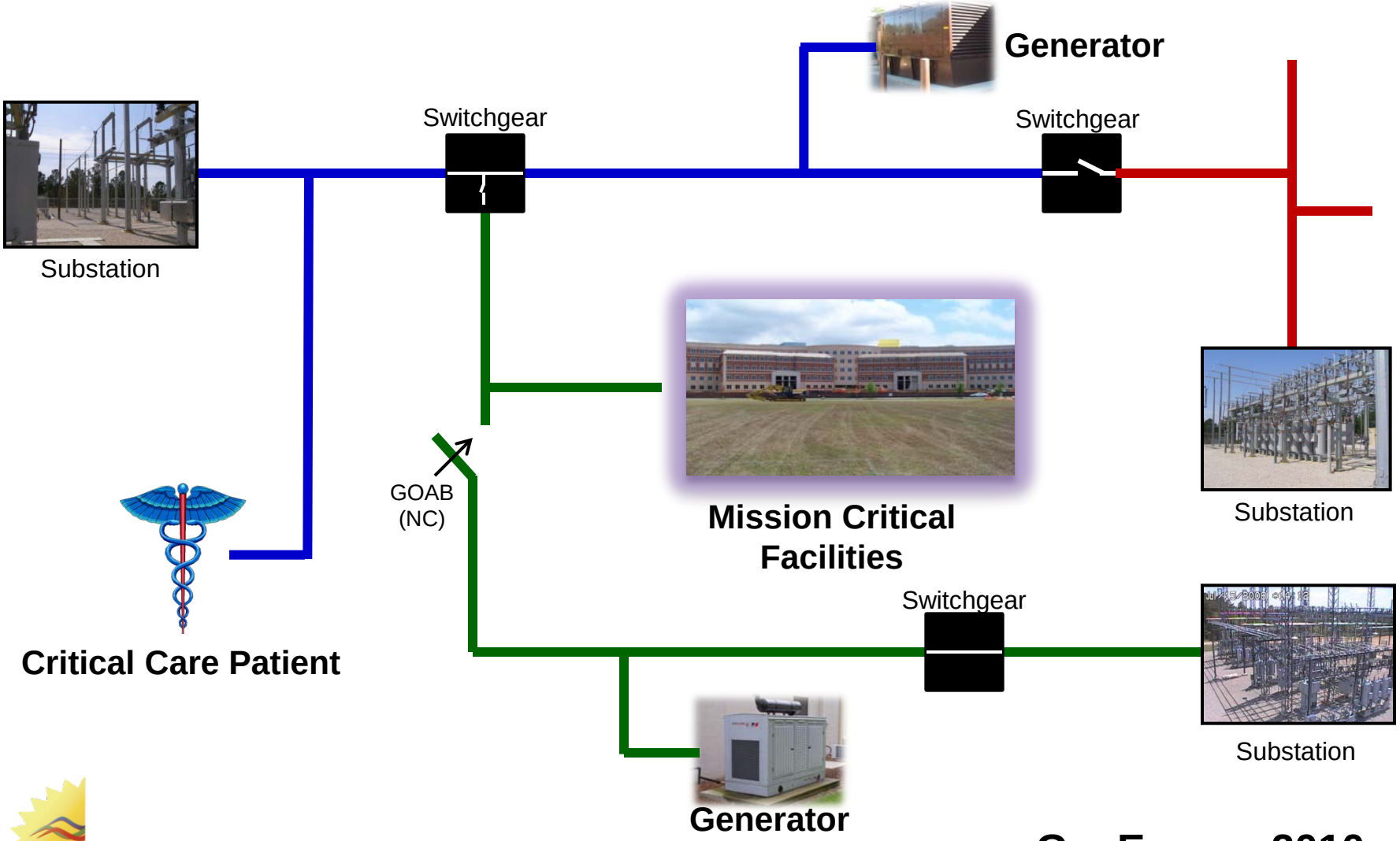
OPERATIONAL STRATEGIES

DEFINING LONG-TERM OUTAGE RESTORATION



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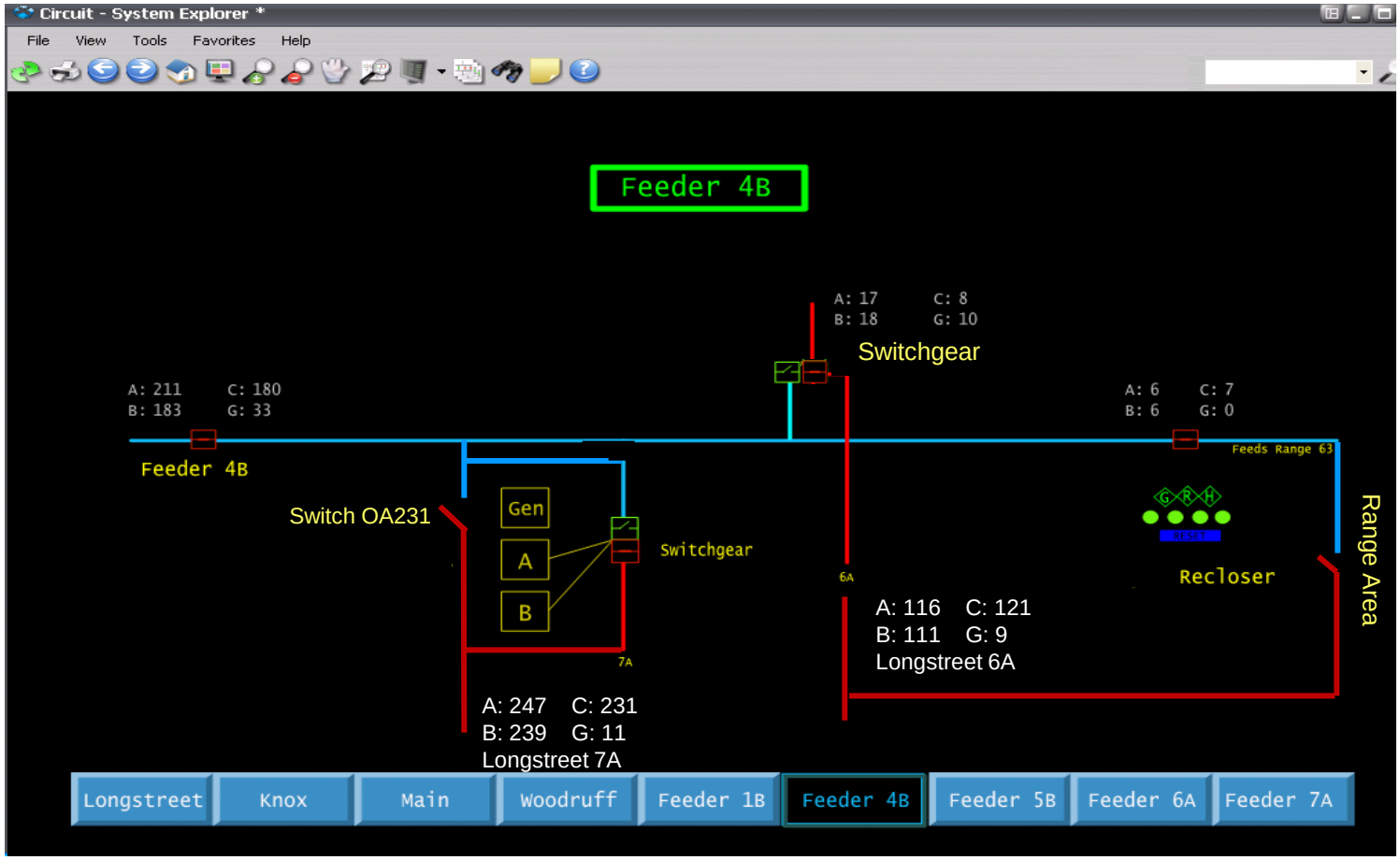
OPERATIONAL STRATEGIES

DEFINING LONG-TERM OUTAGE RESTORATION



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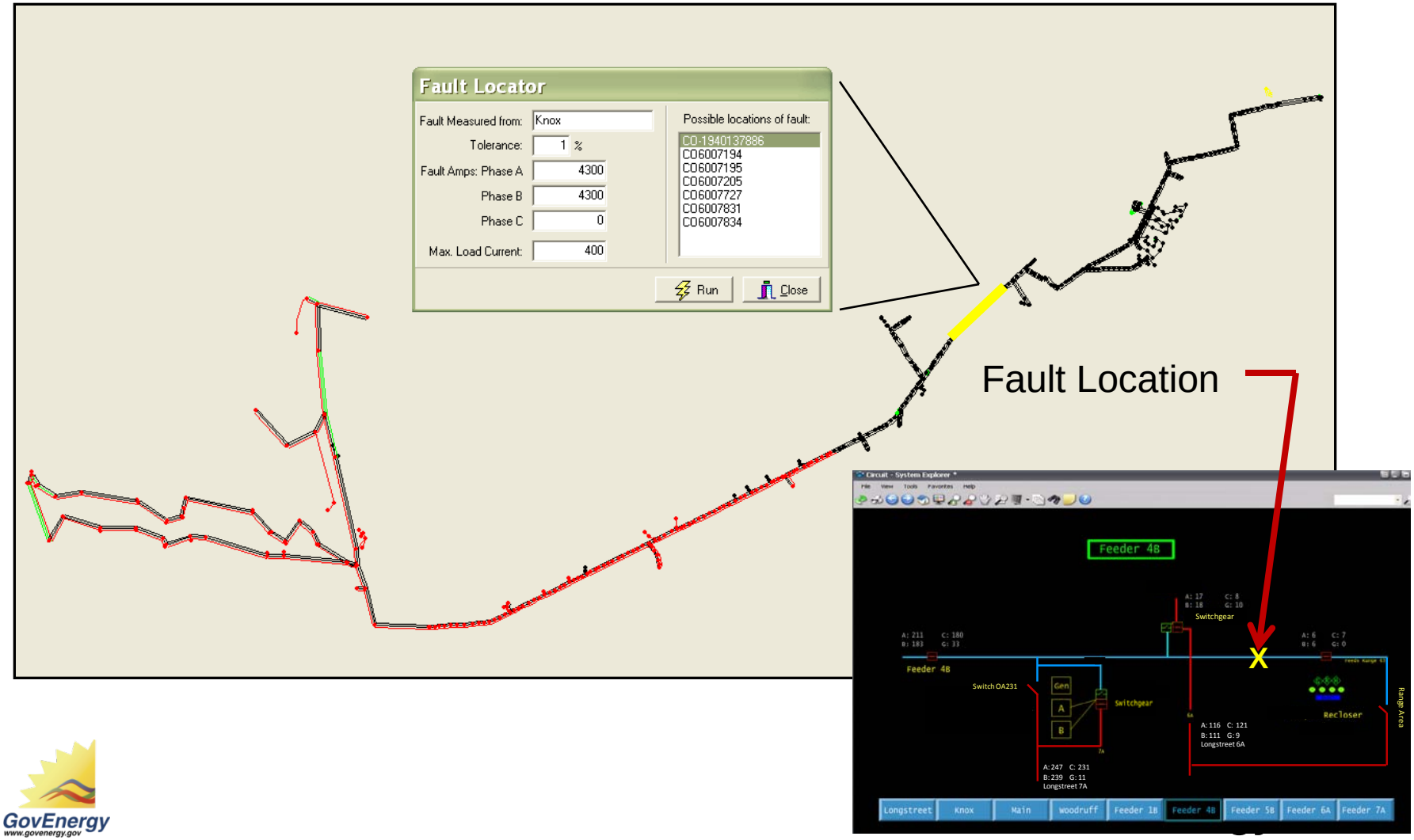
OPERATIONAL STRATEGIES

DEFINING LONG-TERM OUTAGE RESTORATION



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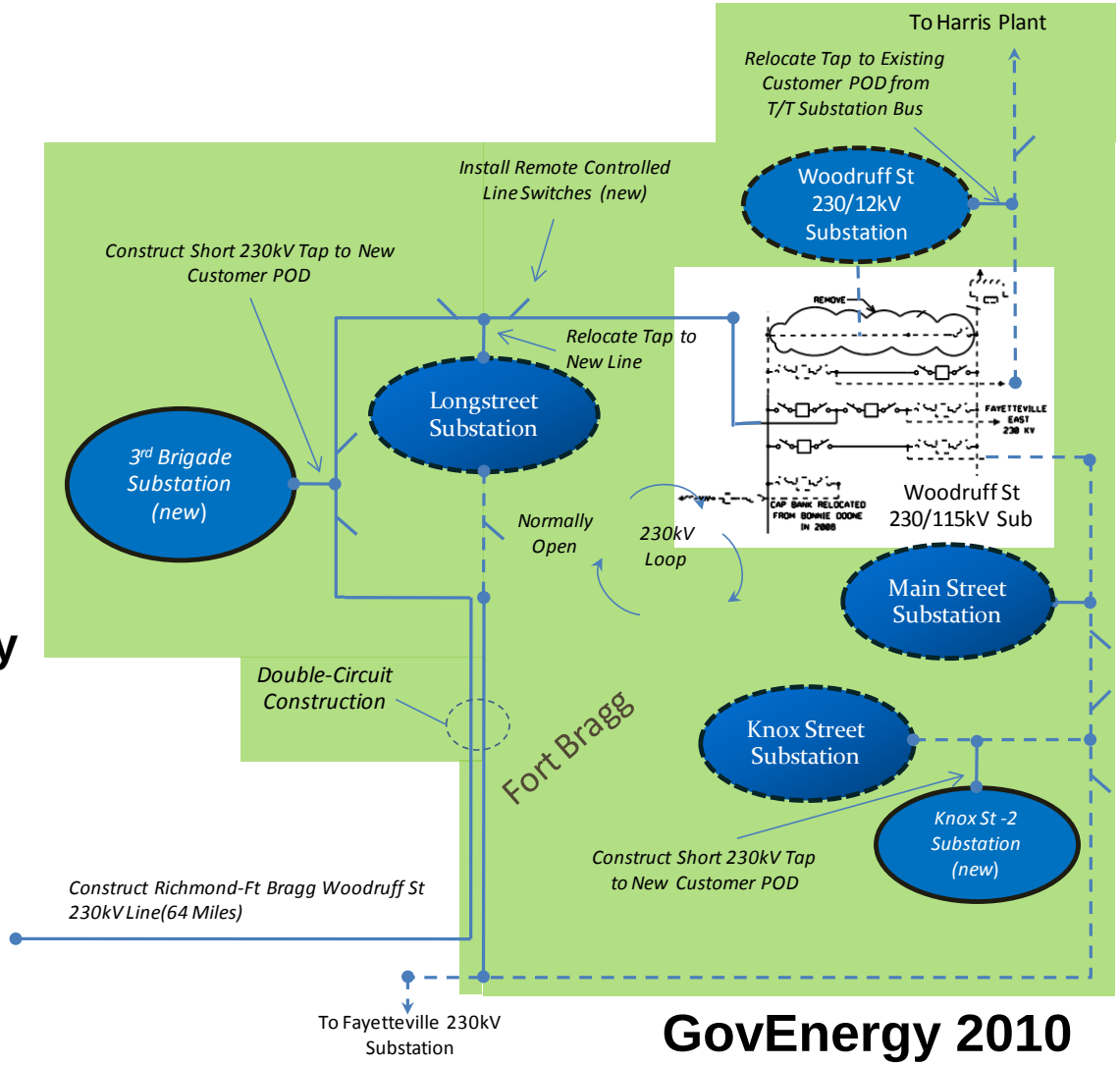
The Value of Opportunity

Through Partnership

Holistic Approach

Benefits

- Met the Needs of Army & Progress Energy
- Reduced Construction Costs for Progress Energy
- Eliminated Additional Future Costs for the Army
- Enhanced Transmission Grid Reliability
- Provides Future Options For Capacity Increases



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Ft. Bragg Energy Security Story

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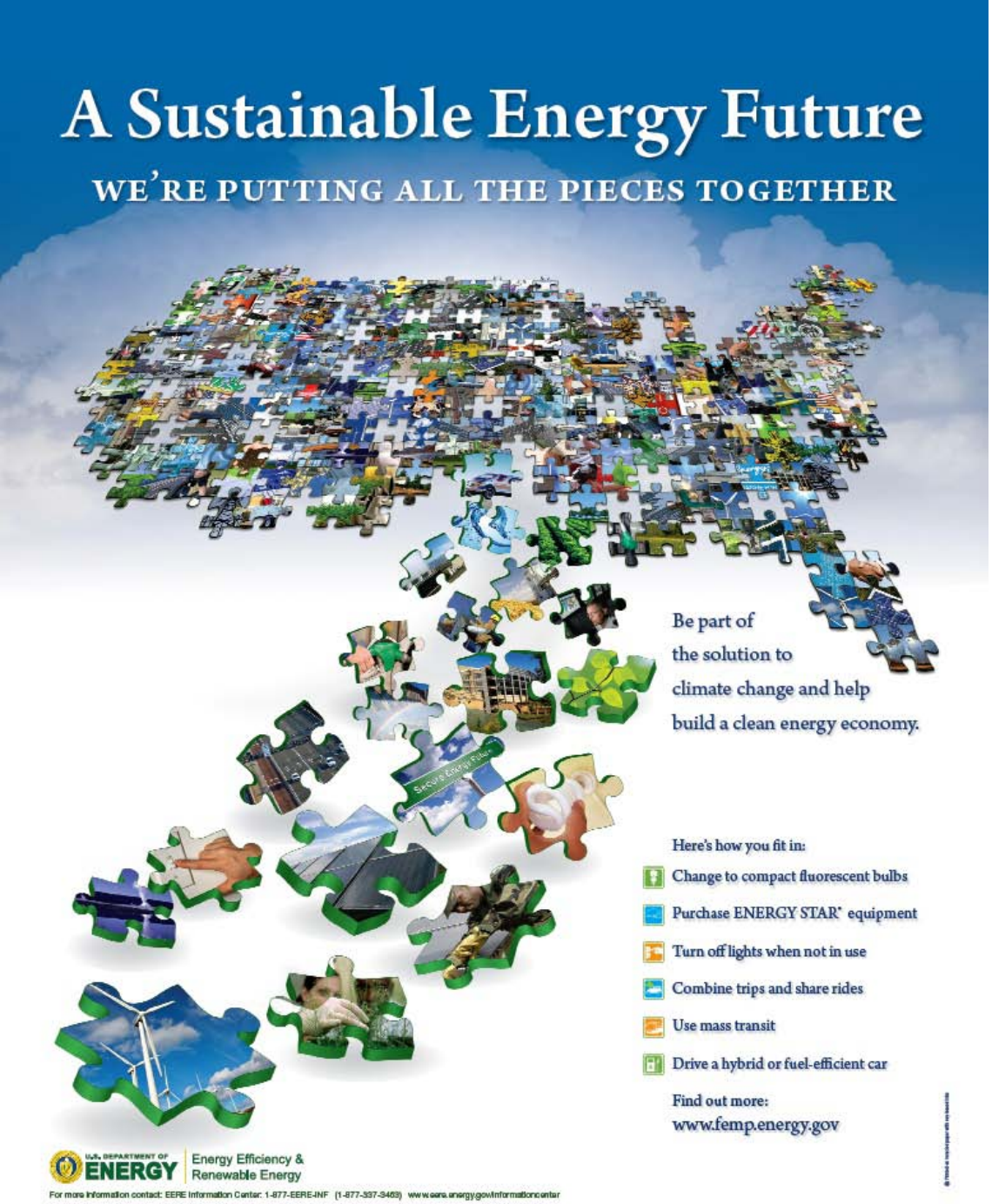


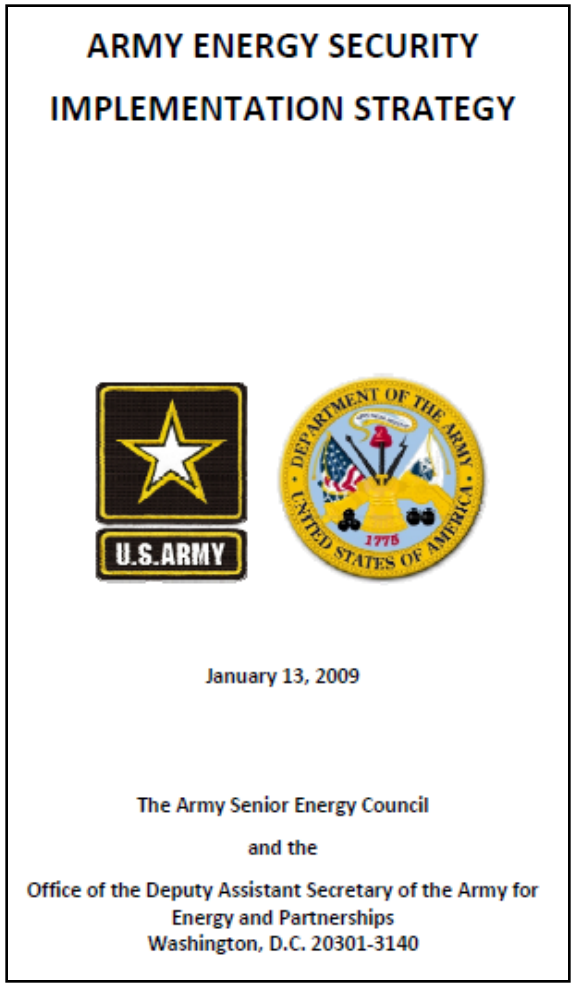
Where's the Box Top to the Puzzle?

Energy Security

Energy Security Goals (ESGs):

1.Reduce Energy Consumption

2. Increase Energy Efficiency across Platforms and Facilities
3. Increase use of Renewable/Alternative Energy
4. Assure access to sufficient Energy Supplies
5. Reduce adverse effects on the Environment



ARMY ENERGY SECURITY

IMPLEMENTATION STRATEGY

January 13, 2009

The Army Senior Energy Council

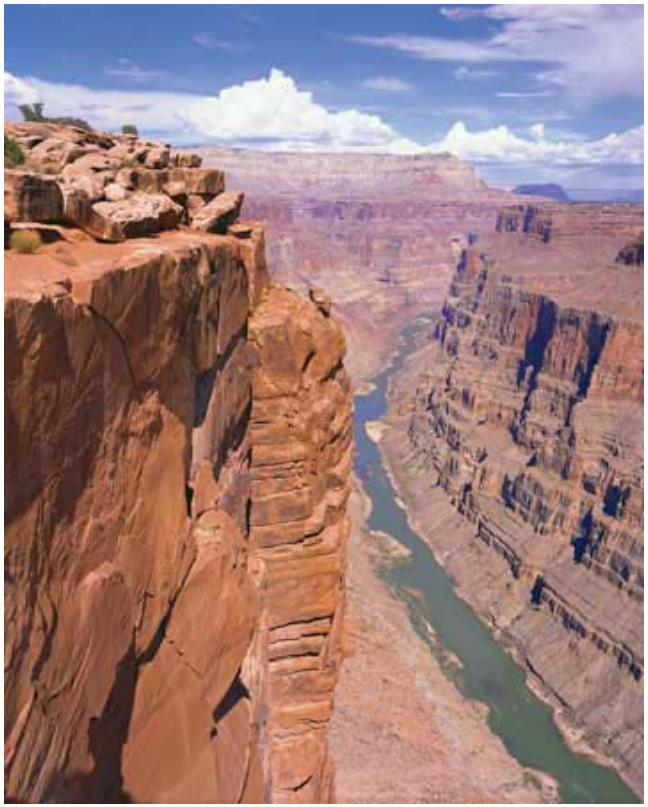
and the

Office of the Deputy Assistant Secretary of the Army for Energy and Partnerships
Washington, D.C. 20301-3140

Go forth and do these great things…

…….. with your existing funds.

Adapting Our Approach
Colorado River



This approach lacked partnering; we were tearing down not building up

The initial approach was intense, reactive and random. There was no systematic plan.

Adapting Our Approach Mississippi River

The adjustment was made to address the problems with more direction and intentionality.

Formed partnerships and become more acquainted with the scenery.

Opportunities Through Partnerships

U.S.ARMY

Pacific Northwest NATIONAL LABORATORY

AAFES

U.S. DEPARTMENT OF ENERGY

Progress Energy

SANDHILLS UTILITY SERVICES, LLC

TRANE

BRADY ENERGY SERVICES

Johnson Controls

Honeywell

SEA SAIN ENGINEERING ASSOCIATES, INC.

US Army Corps of Engineers Headquarters

imagination at work

DEPARTMENT OF THE AIR FORCE

DEPARTMENT OF THE NAVY

PICERNE MILITARY HOUSING

TREMCO

United Technologies

American States Utility Services, Inc.

dodea DEPARTMENT OF DEFENSE EDUCATION ACTIVITY

Piedmont Natural Gas

Sustainable Sandhills

MARINES THE FEW. THE PROUD.

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Federal Energy Management Program

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Energy Program Convergence

Energy Policies

Laws, EO, CFR, USC, etc
Implementing Agency
Department of Defense
Army
Major Commands

Industry Standards

ASHREA
IESNA
IECC
ANSI
NEC/NESC
IGSHPA

Construction Team

Unit's Mission
Project Funding Source
General Contractor
USACE
A/E

FORT BRAGG

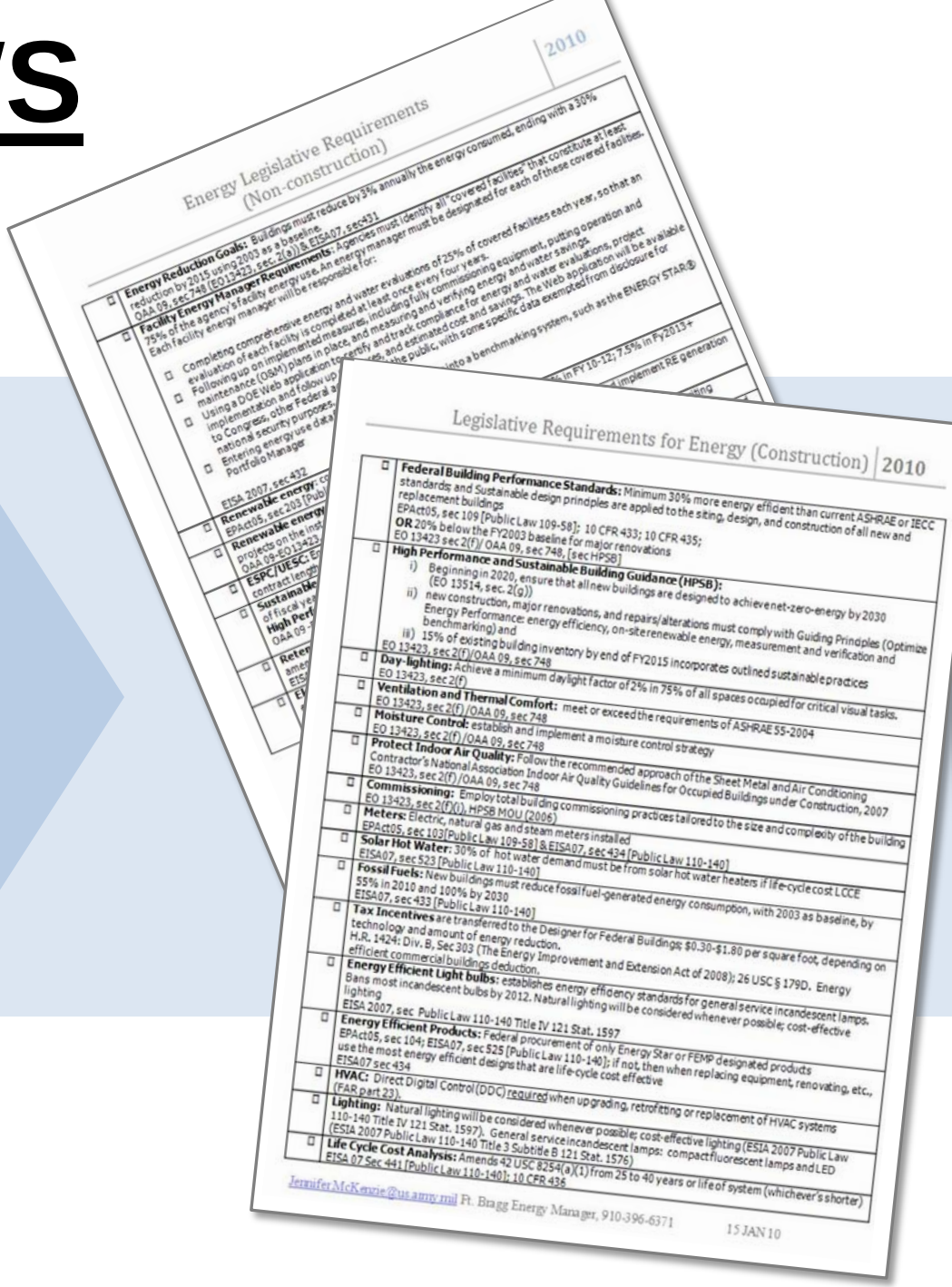
(or any other installation)

Bring it all Together

Contract Language
Adequate Funding
Project Execution

ENERGY LAWS

EPACT 05
EISA 07
NDAA 10
EO 13423
EO 13514



Energy Legislative Requirements (Non-construction) 2010

- **Energy Reduction Goals:** Buildings must reduce by 3% annually the energy consumed, ending with a 35% reduction by 2015 using 2003 as a baseline.
  OAA 09, sec 748 (EO 13423, sec. 2(a)) & EISA07, sec431
- **Facility Energy Manager Requirements:** Agencies must identify all "covered facilities" that constitute at least 75% of the agency's facility energy use. An energy manager must be designated for each of these covered facilities. Each facility energy manager will be responsible for:
  - Completing comprehensive energy and water evaluations of 25% of covered facilities each year, so that an evaluation of each facility is completed at least once every four years.
  - Following up on implemented measures, including fully commissioning equipment, putting operation and maintenance (O&M) plans in place, and measuring and verifying energy and water savings.
  - Using a DOE Web application to certify and track compliance for energy and water evaluations, project implementation and follow up, and estimated cost and savings. The Web application will be available to Congress, other Federal a[illegible] the public, with some specific data exempted from disclosure for national security purposes.
  - Entering energy use data into a benchmarking system, such as the ENERGY STAR® Portfolio Manager
  - [illegible] in FY 10-12; 7.5% in Fy2013+
  - [illegible] implement RE generation
  - [illegible]ing

  EISA 2007, sec 432
- **Renewable energy:** co[illegible]
  EPAct05, sec 203 [Publ[illegible]
- **Renewable energy** [illegible]
  projects on the inst[illegible]
  OAA 09-EO 13423 [illegible]
- **ESPC/UESC:** Ex[illegible]
  contract length [illegible]
- **Sustainable** [illegible]
  of fiscal yea[illegible]
  High Perf[illegible]
  OAA 09 - [illegible]
- **Retro**[illegible]
  amen[illegible]
  EISA[illegible]
- **E**[illegible]

Legislative Requirements for Energy (Construction) 2010

- **Federal Building Performance Standards:** Minimum 30% more energy efficient than current ASHRAE or IECC standards and Sustainable design principles are applied to the siting, design, and construction of all new and replacement buildings
  EPAct05, sec 109 [Public Law 109-58]; 10 CFR 433; 10 CFR 435;
  OR 20% below the FY2003 baseline for major renovations
  EO 13423 sec 2(f)/ OAA 09, sec 748, [sec HPSB]
- **High Performance and Sustainable Building Guidance (HPSB):**
  i) Beginning in 2020, ensure that all new buildings are designed to achieve net-zero-energy by 2030 (EO 13514, sec. 2(g))
  ii) new construction, major renovations, and repairs/alterations must comply with Guiding Principles (Optimize Energy Performance: energy efficiency, on-site renewable energy, measurement and verification and benchmarking) and
  iii) 15% of existing building inventory by end of FY2015 incorporates outlined sustainable practices
  EO 13423, sec 2(f)/OAA 09, sec 748
- **Day-lighting:** Achieve a minimum daylight factor of 2% in 75% of all spaces occupied for critical visual tasks.
  EO 13423, sec 2(f)
- **Ventilation and Thermal Comfort:** meet or exceed the requirements of ASHRAE 55-2004
  EO 13423, sec 2(f) /OAA 09, sec 748
- **Moisture Control:** establish and implement a moisture control strategy
  EO 13423, sec 2(f) /OAA 09, sec 748
- **Protect Indoor Air Quality:** Follow the recommended approach of the Sheet Metal and Air Conditioning Contractor's National Association Indoor Air Quality Guidelines for Occupied Buildings under Construction, 2007
  EO 13423, sec 2(f) /OAA 09, sec 748
- **Commissioning:** Employ total building commissioning practices tailored to the size and complexity of the building
  EO 13423, sec 2(f)(i), HPSB MOU (2006)
- **Meters:** Electric, natural gas and steam meters installed
  EPAct05, sec 103 [Public Law 109-58] & EISA07, sec 434 [Public Law 110-140]
- **Solar Hot Water:** 30% of hot water demand must be from solar hot water heaters if life-cycle cost LCCE
  EISA07, sec 523 [Public Law 110-140]
- **Fossil Fuels:** New buildings must reduce fossil fuel-generated energy consumption, with 2003 as baseline, by 55% in 2010 and 100% by 2030
  EISA07, sec 433 [Public Law 110-140]
- **Tax Incentives** are transferred to the Designer for Federal Buildings: $0.30-$1.80 per square foot, depending on technology and amount of energy reduction.
  H.R. 1424: Div. B, Sec 303 (The Energy Improvement and Extension Act of 2008); 26 USC § 179D. Energy efficient commercial buildings deduction.
- **Energy Efficient Light bulbs:** establishes energy efficiency standards for general service incandescent lamps. Bans most incandescent bulbs by 2012. Natural lighting will be considered whenever possible; cost-effective lighting
  EISA 2007, sec Public Law 110-140 Title IV 121 Stat. 1597
- **Energy Efficient Products:** Federal procurement of only Energy Star or FEMP designated products
  EPAct05, sec 104; EISA07, sec 525 [Public Law 110-140]; if not, then when replacing equipment, renovating, etc., use the most energy efficient designs that are life-cycle cost effective
  EISA07 sec 434
- **HVAC:** Direct Digital Control (DDC) required when upgrading, retrofitting or replacement of HVAC systems (FAR part 23).
- **Lighting:** Natural lighting will be considered whenever possible; cost-effective lighting (EISA 2007 Public Law 110-140 Title IV 121 Stat. 1597). General service incandescent lamps: compact fluorescent lamps and LED (EISA 2007 Public Law 110-140 Title 3 Subtitle B 121 Stat. 1576)
- **Life Cycle Cost Analysis:** Amends 42 USC 8254(a)(1) from 25 to 40 years or life of system (whichever's shorter)
  EISA 07 Sec 441 [Public Law 110-140]; 10 CFR 436

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Solving the Energy Puzzle

Projects
- Demo Projects/M&V results
- LCCA and SOW Development

Energy Regulation
- Checklists
- Contract Language/Specifications

Information Briefing
- Provide all information from start to finish
- Meeting with subcontractor/industrial forums

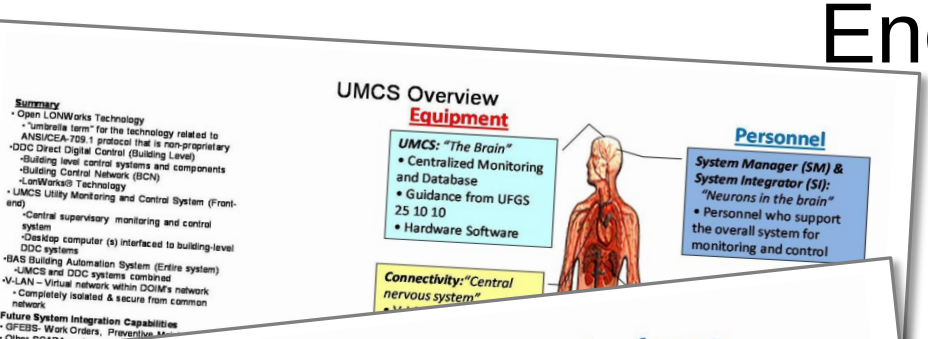
Fact Sheets
- One page hand outs that explains technology
- Tell what works for our area

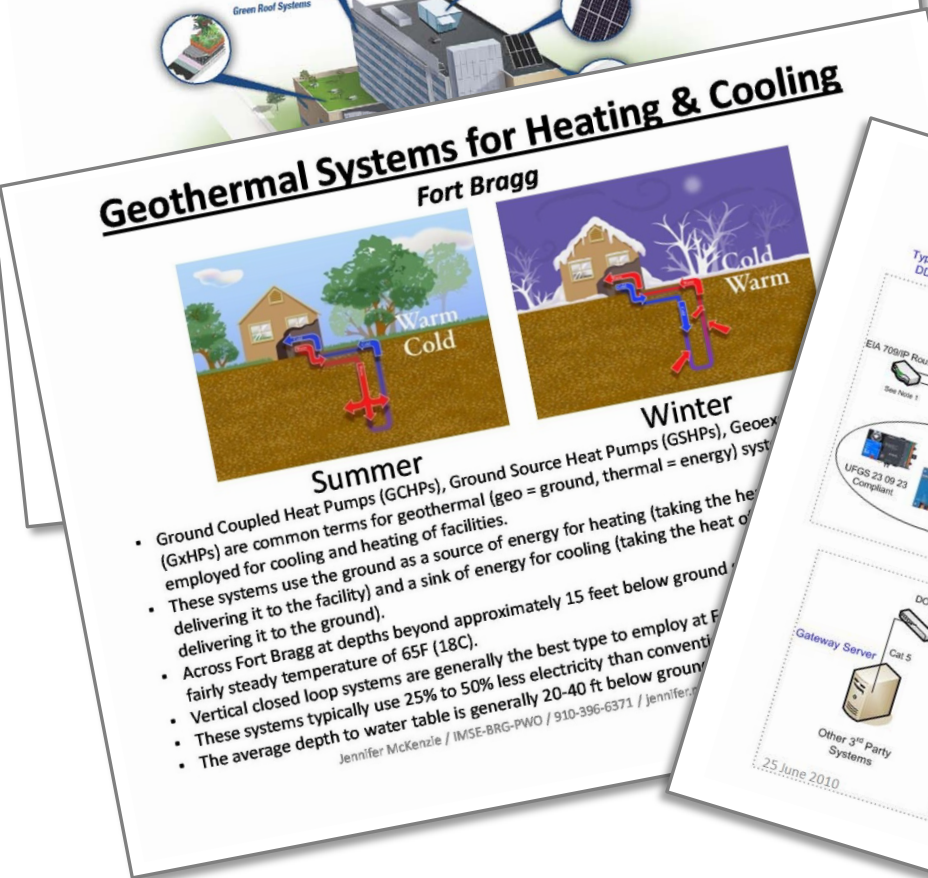
Master Plans
- Determine Facts through Working Groups
- Objective Determine Path Forward

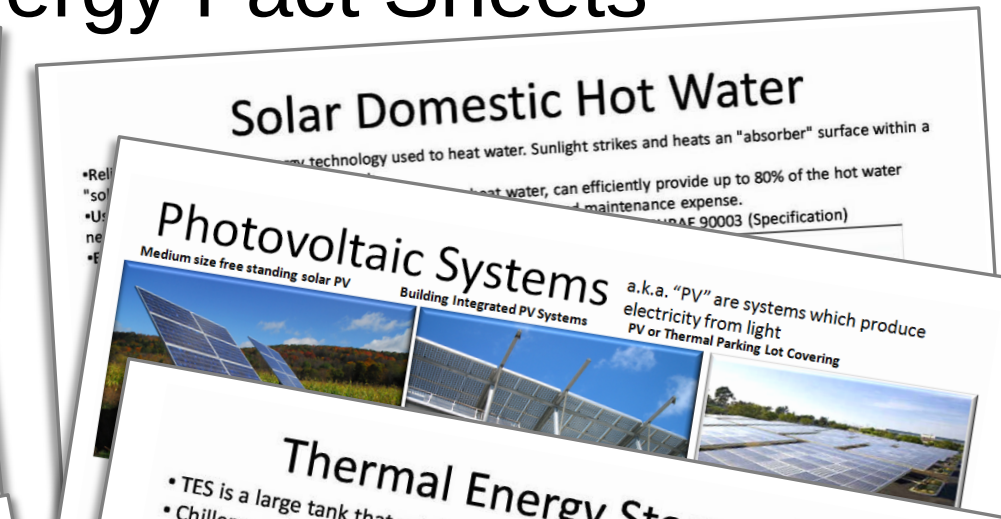
Energy Checklist
- Construction (All Buildings) and Non-Construction
- EPACT 05, EISA 07, Executive Orders
- Project Comments, Dr. Checks

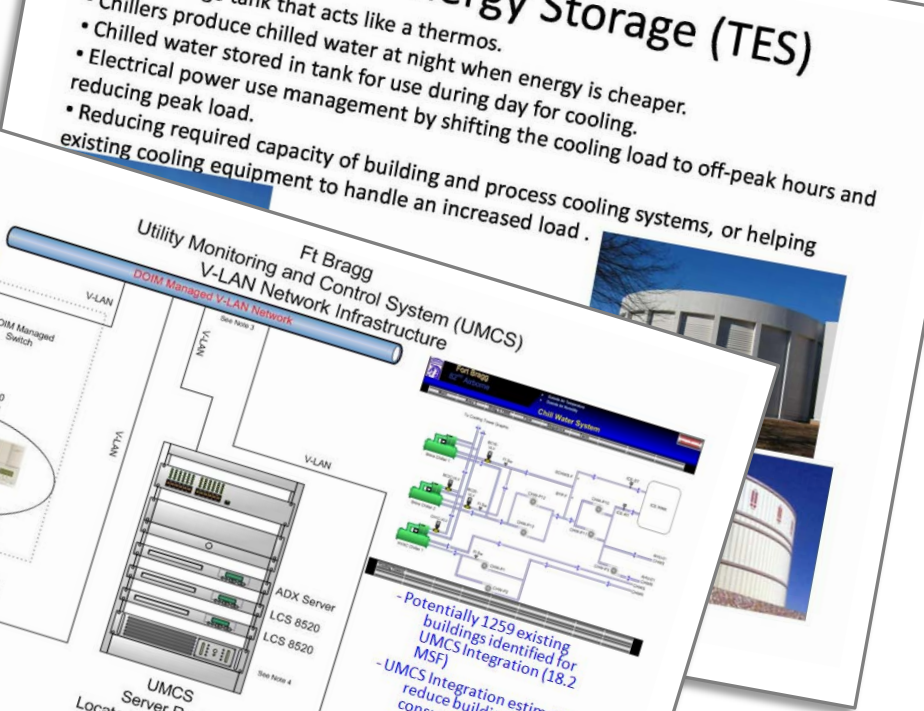
….Bringing It All Together

Energy Fact Sheets









Ft. Bragg Energy Actions

Funds- Other People's Money (OPM)

FY07	$730K
FY08	$21.53M
FY09	$22.40M
FY10	$16.00M
FY11	$19.83M

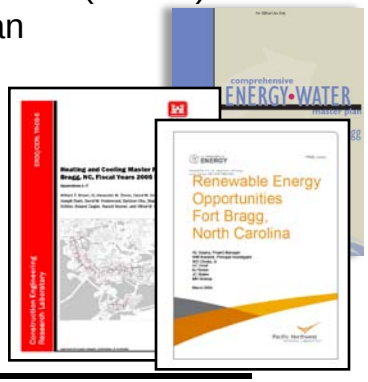
Energy Staff

Full-time	6
Part-time	4
TOTAL	10

FY06 Energy Mgr was additional duty

Energy Plans

- Comprehensive Energy and Water Master Plan
- Utility Monitoring and Control System (UMCS) Plan
- Central Energy Plants Master Plan
- Energy Implementation Plan
- Renewable Energy Master Plan
- Energy Master Plan (TBD)
- Energy Technology Templates
- Commissioning Action Plan
- Energy Awareness Plan
- Energy Security Plan

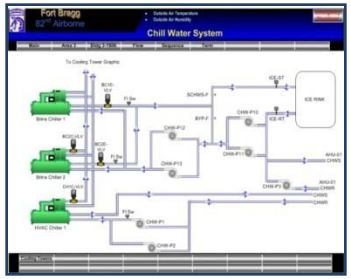


Identifying Problems

Meters- Energy Usage

Energy Awareness - Changing Behavior

Open doors A/C on



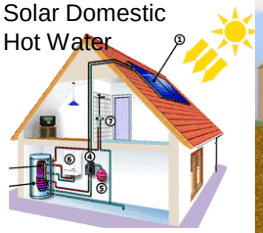
UMCS- Energy Control

Central Energy Plants

Incorporating Technologies

Solar Walls

Solar Domestic Hot Water



Group Source Heat Pumps

Fuel Cells

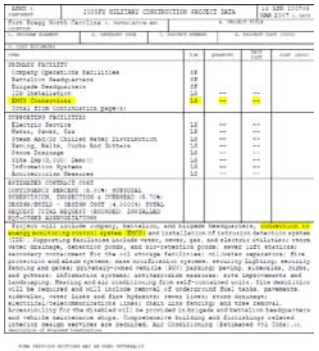
Thermal Energy Storage (TES)

CFL

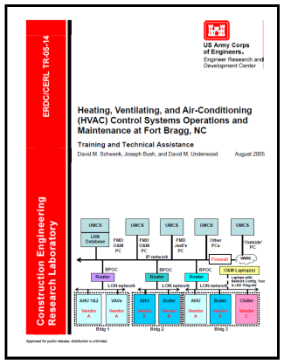
Utility Monitoring and Control System

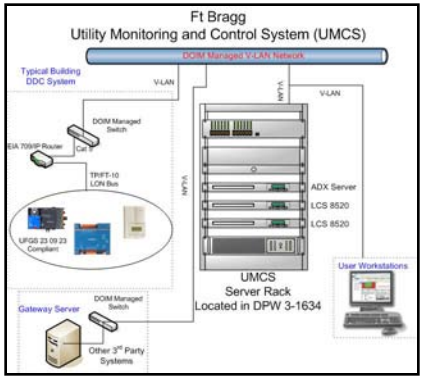
UMCS

No Centralized System

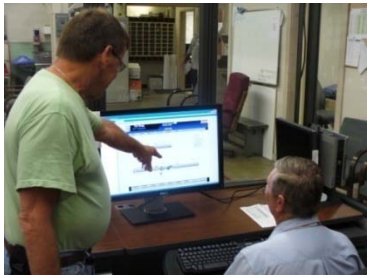


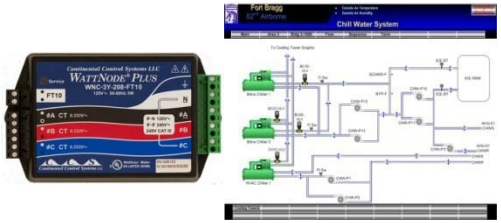
Master Plan

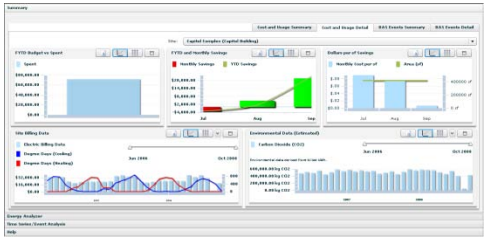




Expanding the System





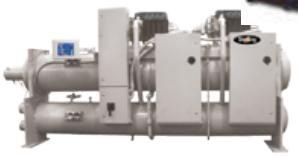


= Saving Energy ($$$)

Challenge → **Solution** → **Results**

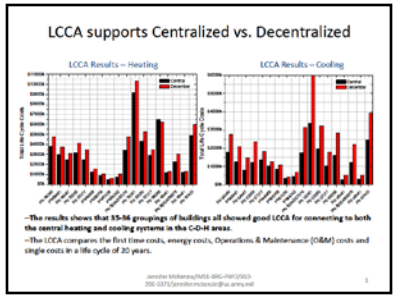
Central Energy Plants Modernization

Inconsistent Approach



New complex not connected to adjacent CEP

Master Plan



Developing and Executing Projects

= Saving Energy ($$$)

Challenge → **Solution** → **Results**

Fort Bragg Energy Specification

Bring It All Together (Our Puzzle Boxtop)

One Hundred Tenth Congress
of the
United States of America
AT THE FIRST SESSION

A BILL

Making supplemental appropriations for job preservation and creation, infrastructure investment, energy efficiency and science, assistance to the unemployed, and State and

MILCON

ASHRAE
Advancing HVAC&R to serve humanity and promote a sustainable world

Army Regulation 420–1

Facilities Engineering

Army Facilities Management

Data From Other Installations

- Appendix 15. Lighting Systems
  - 15.1 General Requirements: Vacancy Sensors
  - 15.2 Interior Retrofit
  - 15.3 New Construction
  - 15.4 Open Bay
  - 15.5 Exterior
  - 15.6 Day Lighting
  - 15.7 Contract Language
- Appendix 16. Mechanical Systems

Ft. Bragg Energy Specification Appendices (238 pages)

- Appendix 1. Fort Bragg Energy Policy Letter 53
- Appendix 2. Fort Bragg Memorandum of Information
- Appendix 3. Energy Polices and Army Requirements to Energy Use
  - 3.1 Current Polices and Directives on Energy Conservation
  - 3.2 Legislative Requirements for Energy (Construction) 2009
  - 3.3 Legislative Requirements for Energy (Non-Construction) 2009
  - 3.4 Baseline and target energy budgets to meet EPACT 2005 requirements for new construction
  - 3.5 LEED Energy Credits
  - 3.6 LEED Checklist

FORT BRAGG

PUBLIC WORKS

Energy Specifications

Challenge → **Solution** → **Results**

Opportunities Through Partnerships

- Nurture and develop the partnerships
- Tie the vision to master planning
- Simplifying the big picture (technology)
- Emphasize security

GovEnergy 2010