



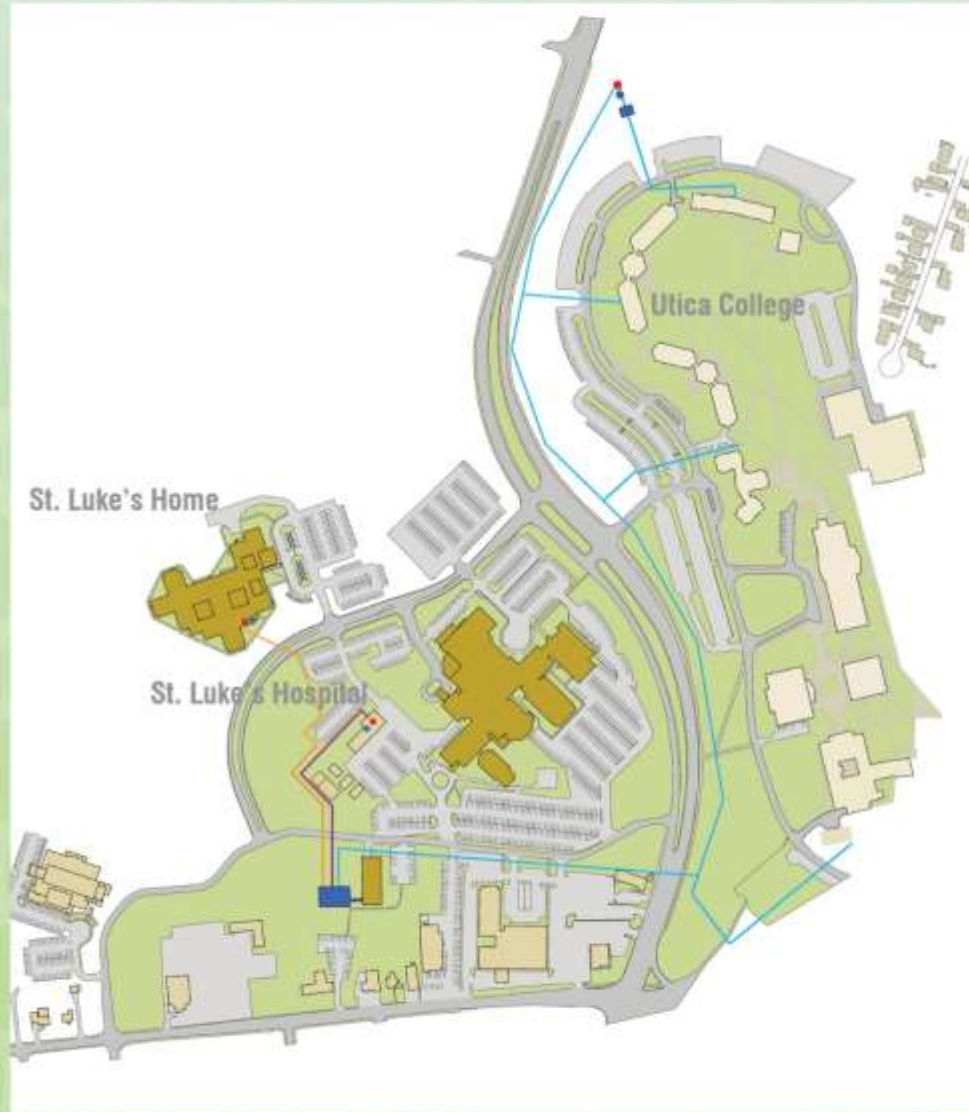
CHP Microgrids – The Realities

Overcoming the Hurdles
along the way to a
Community Microgrid

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MANAGING PARTNER
Cogen Power Technologies



- 1. Motivators**
- 2. Project Site**
- 3. Microgrid Plan & Plant Design**
- 4. Barriers to Overcome**
- 5. Project Duration**
- 6. Maximizing the Opportunity**
- 7. Outcome**
- 8. Summary**

Faxton St. Luke's Healthcare - St. Luke's Campus

- St. Luke's Hospital
 - ✓ 372-bed
 - ✓ General Medical and Surgical Hospital
- St. Luke's Home
 - ✓ 202-bed
 - ✓ 40-bed Subacute Rehabilitation Unit



Utica College

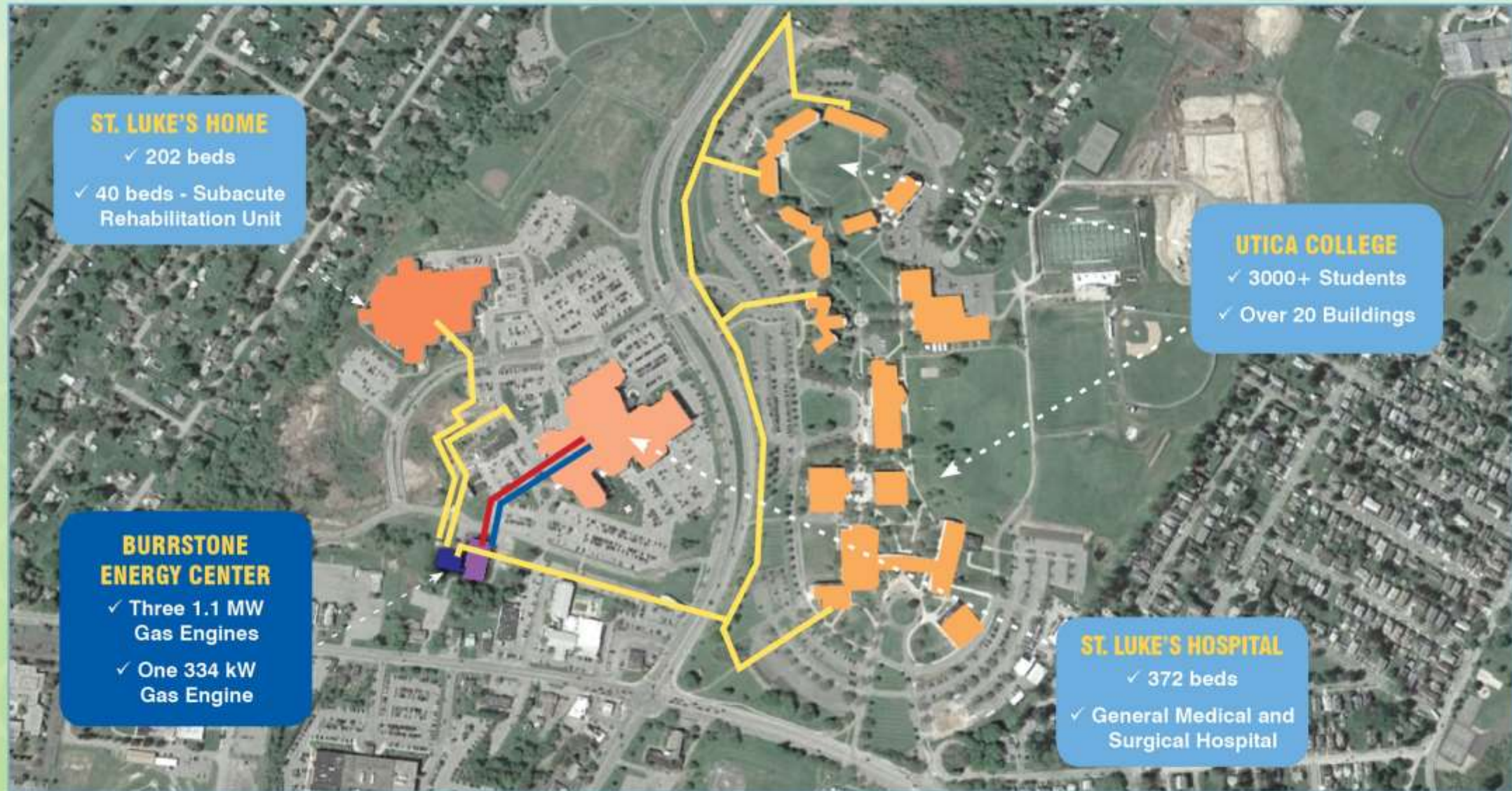
- 3000+ Students
- Over 20 Buildings



Understanding of Common Goals

IDENTIFIED OBJECTIVES

- Provide more reliable and better quality power
- Reduce operational costs
- Lessen demand on the local utility grid and hospital boilers
- Reduce operational issues during power outages
- Reduce greenhouse gas emissions
- Off balance sheet project



WE FINANCED, OWN & OPERATE

Project Overview

- New 5,400 SF Building
- \$15 Million Design-Build Project
- Start - Nov 2007 | Operational - Aug 2009
- Black Start Capability
- Load Management System

Output

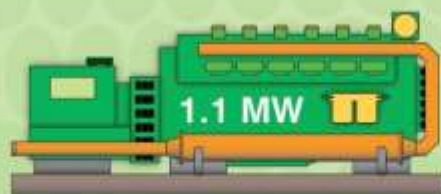
- 3.6 MW of 13.2 kV electricity,
- 7000 lbs/hr of 85 psig Steam
- 700 gpm of 200 degree hot water



- Three 1.1 MW and One 334 kW Lean Burn Natural Gas Reciprocating Engines
- 300 Ton Double Effect Steam Absorption Chiller
- 100 Ton Hot Water Absorption Chiller
- 125 kW Black Start Generator



ST. LUKE'S HOSPITAL



UTICA COLLEGE



ST. LUKE'S
NURSING HOME



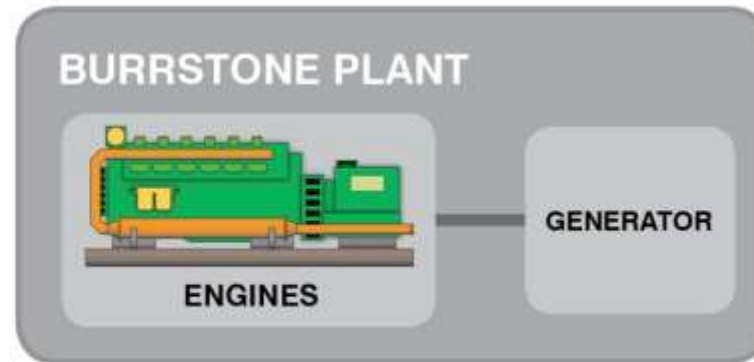
3.6 MW NATURAL GAS PLANT



STEAM
ABSORPTION CHILLER

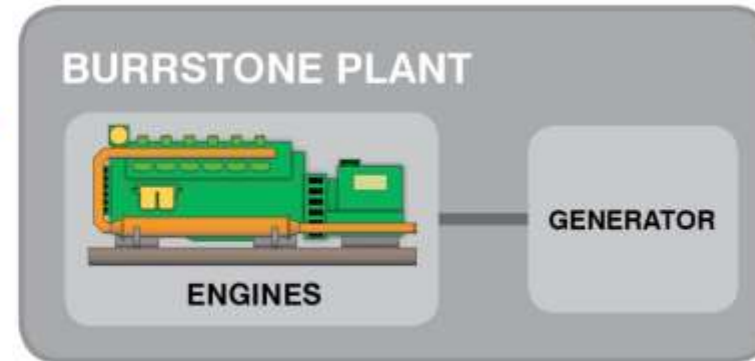


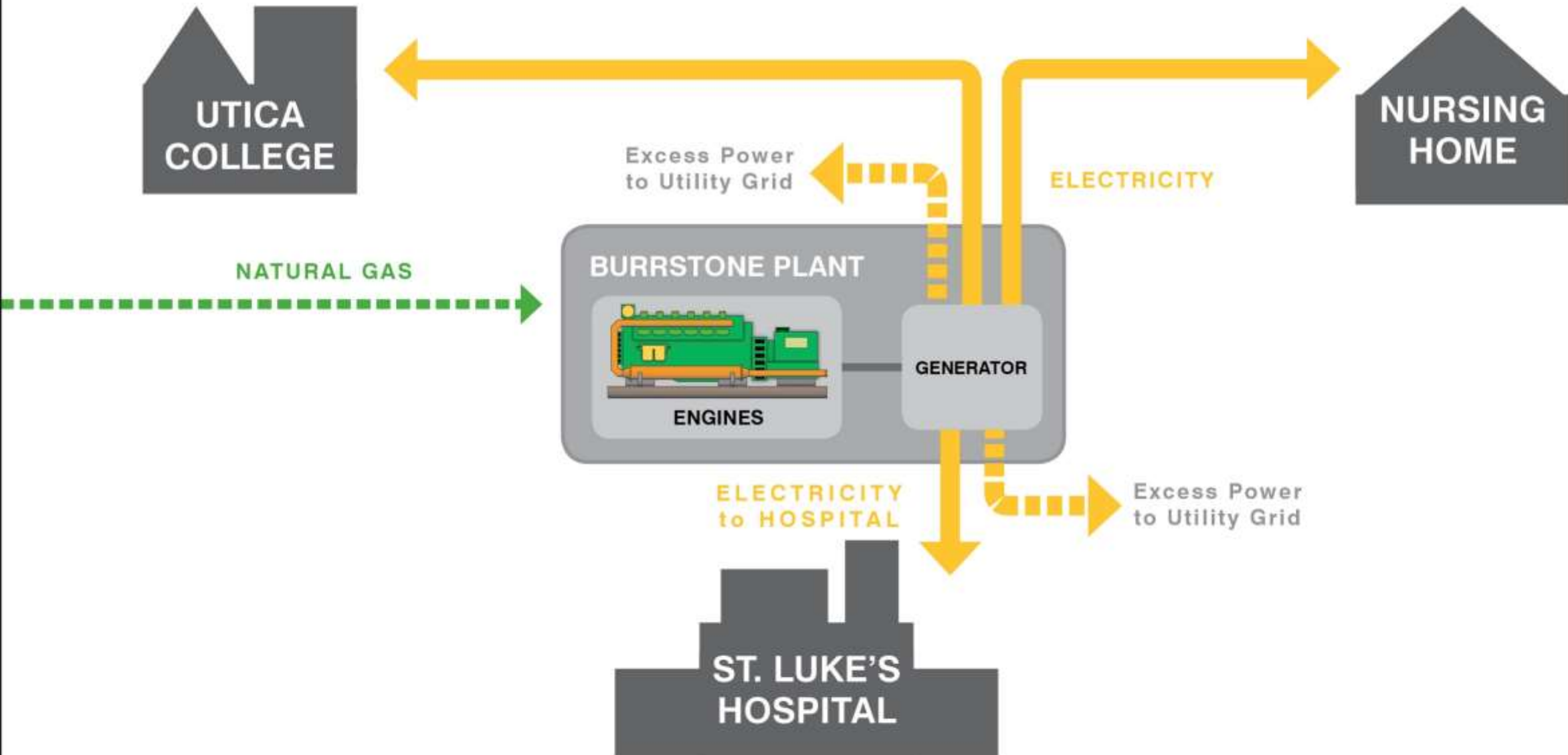
HOT WATER
ABSORPTION CHILLER

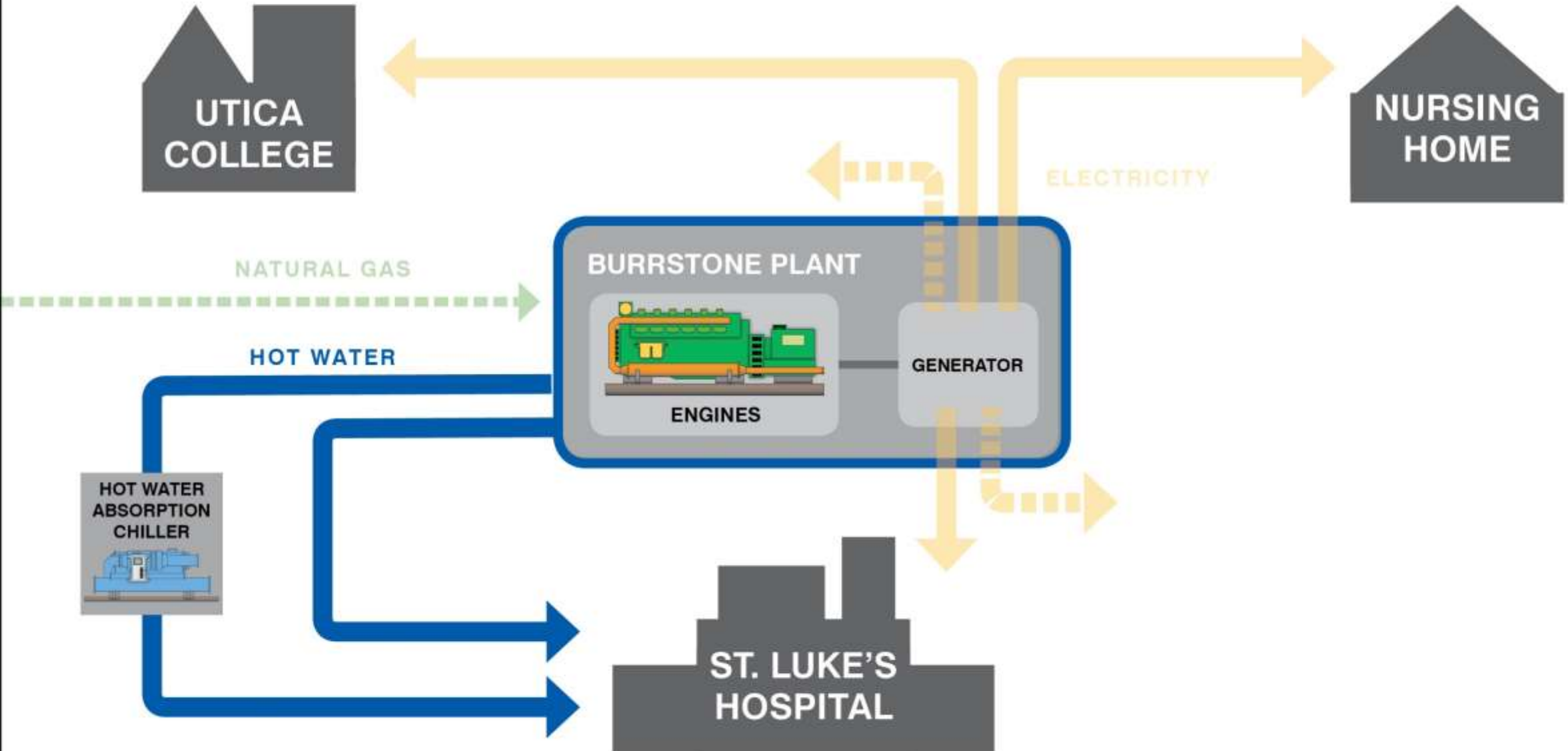


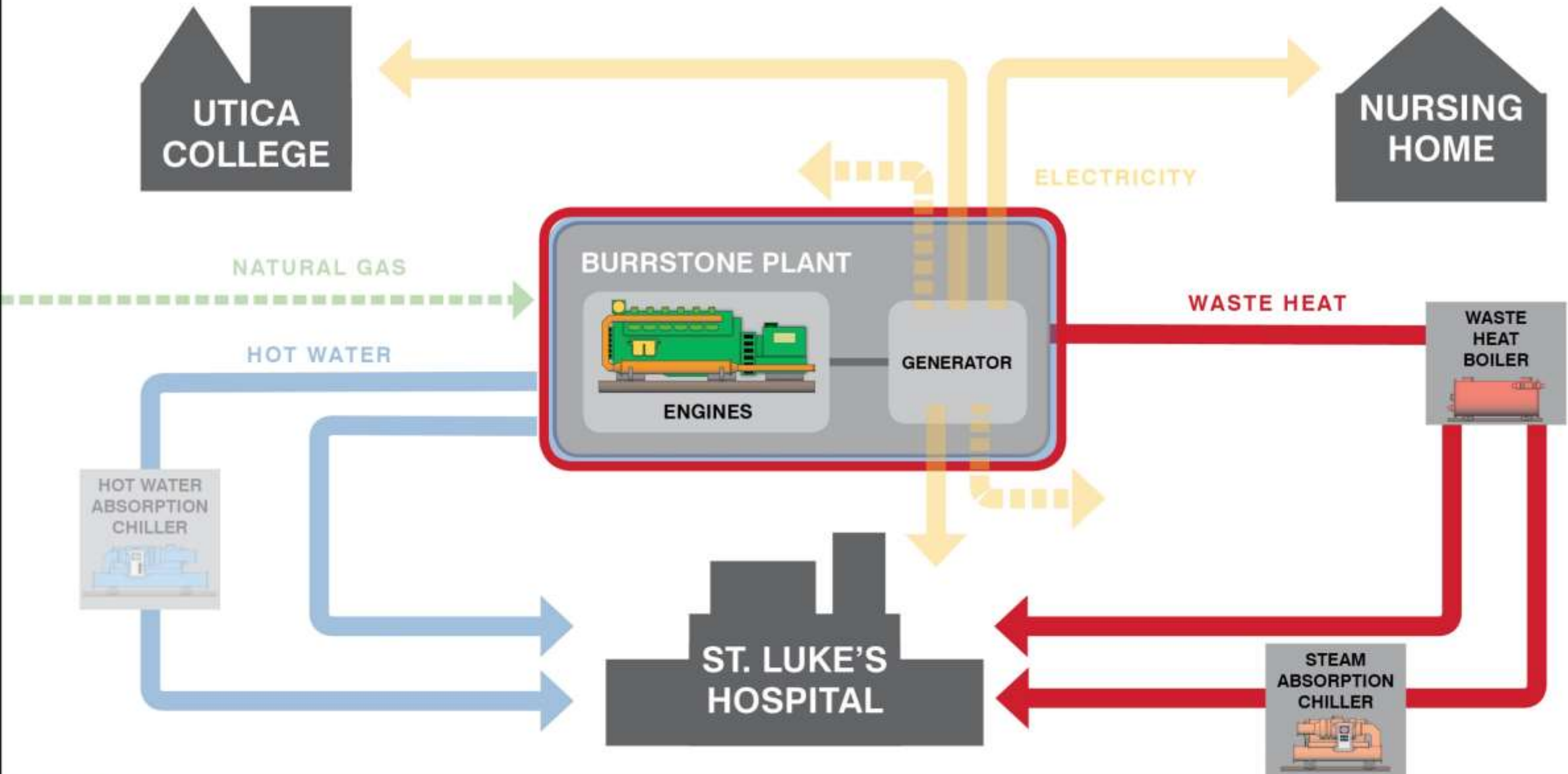


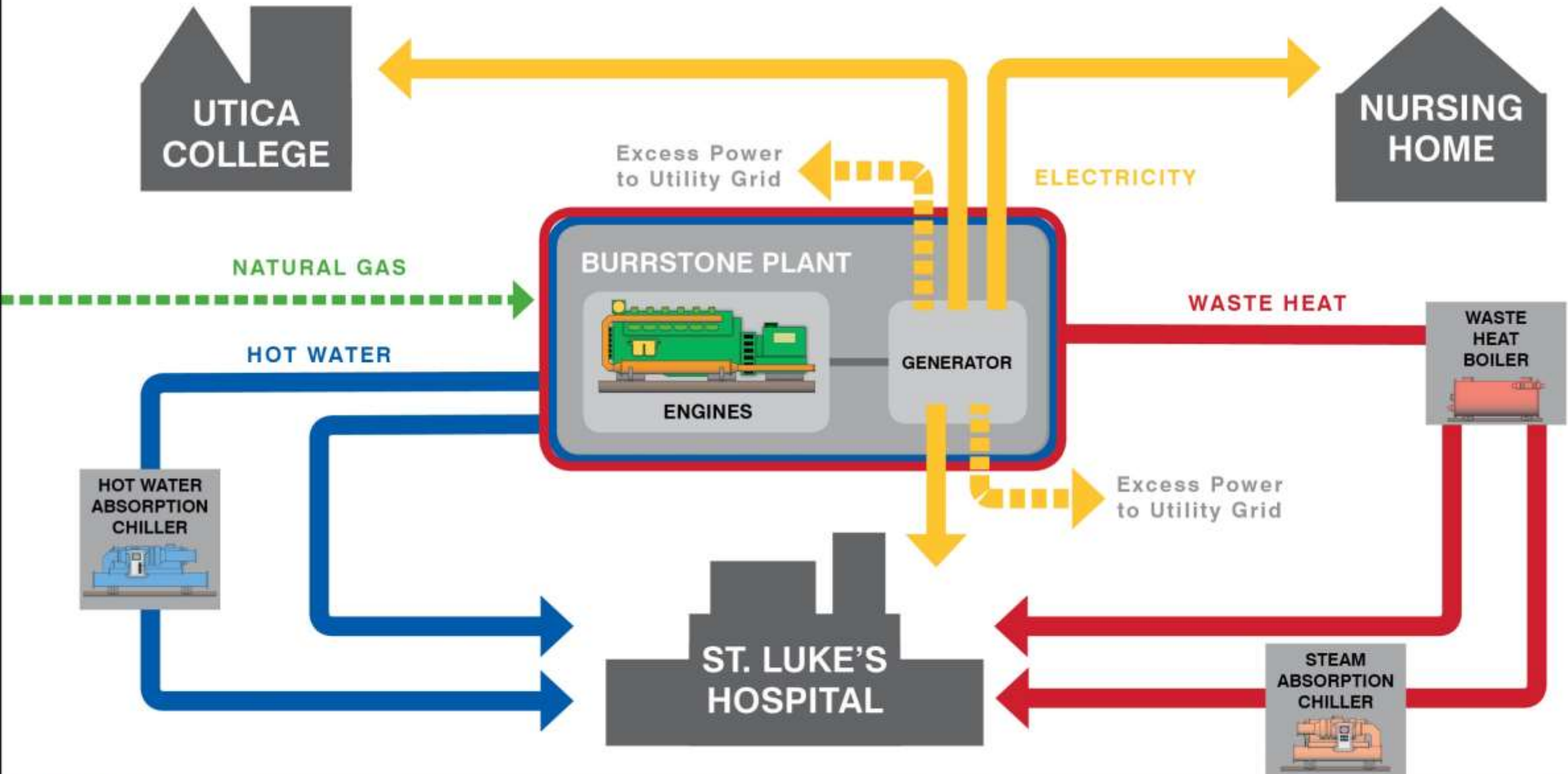
NATURAL GAS













- **Distribution of thermal energy to all three customers was not cost effective because:**
 - ✓ Physical distance between the three
 - ✓ Older college campus did not have a central boiler plant
- **Site next to Hospital boiler plant was most economical location**
 - ✓ Steam header close by
 - ✓ Natural gas service close by
 - ✓ Steam tunnel to hospital campus accessible to install hot water lines
- **Need for more Hospital summer thermal load was met with**
 - ✓ A 300 ton steam absorption chiller
 - ✓ A 100 ton hot water absorption chiller

Utility

- Trying to connect all three Customers to the same prime mover
- Aggregating 4 electric services down to 1 at Utica College
- Crossing a public road with CHP Power line
- Exporting power from 3rd party owned CHP Plant through Customer Utility breaker
- PPA negotiations with electric utility
- Separate Utility electric service for 3rd Party owned CHP Plant
- Buying existing Utility equipment
- Utility Stranded Asset Costs



Customers

- **Contract Negotiations for 15 year Energy Service Agreement**
 - ✓ Three Unique Entities =
3 CEOs,
3 COOs,
3 Facility Directors,
and 3 Attorneys
 - ✓ Savings Guarantees
 - ✓ Line of demarcation for ownership of new infrastructure
 - ✓ Who is responsible for maintaining, etc
- **25 year Land Lease was necessary to locate plant on Hospital property**

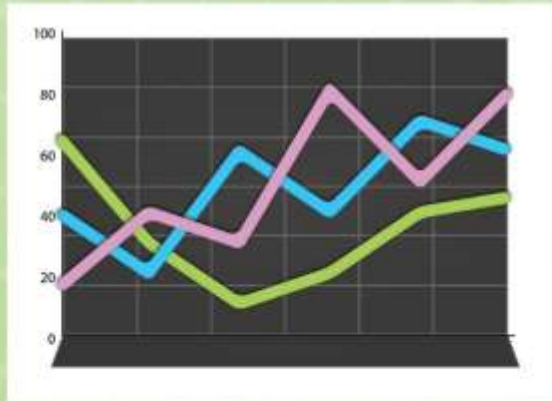


- Property reviews for installing new underground CHP electric lines
- ...did I mention contract negotiations...



Financial Lender

- Explaining what a CHP microgrid is back in 2006
- Proformas...what happens if \$12/DT gas goes down to \$8.50/DT
- Minimizing their risk



- Explaining to their 3rd party assessor
 - ✓ How a microgrid will work so he can create a project value
 - ✓ How our ESA worked so he can determine a contract value
- Estoppel agreement

Authorities Having Jurisdiction

- **Local Authorities**

- ✓ Dealing with town board and school district
- ✓ Payment in lieu of taxes (PILOT) agreement

- **NYS Department of Taxation**

- ✓ Obtain sales tax abatement certification
- ✓ Tracking it with 25 different subcontractors.



- **NYS Department of Transportation**

- ✓ Permit to install CHP power line under road



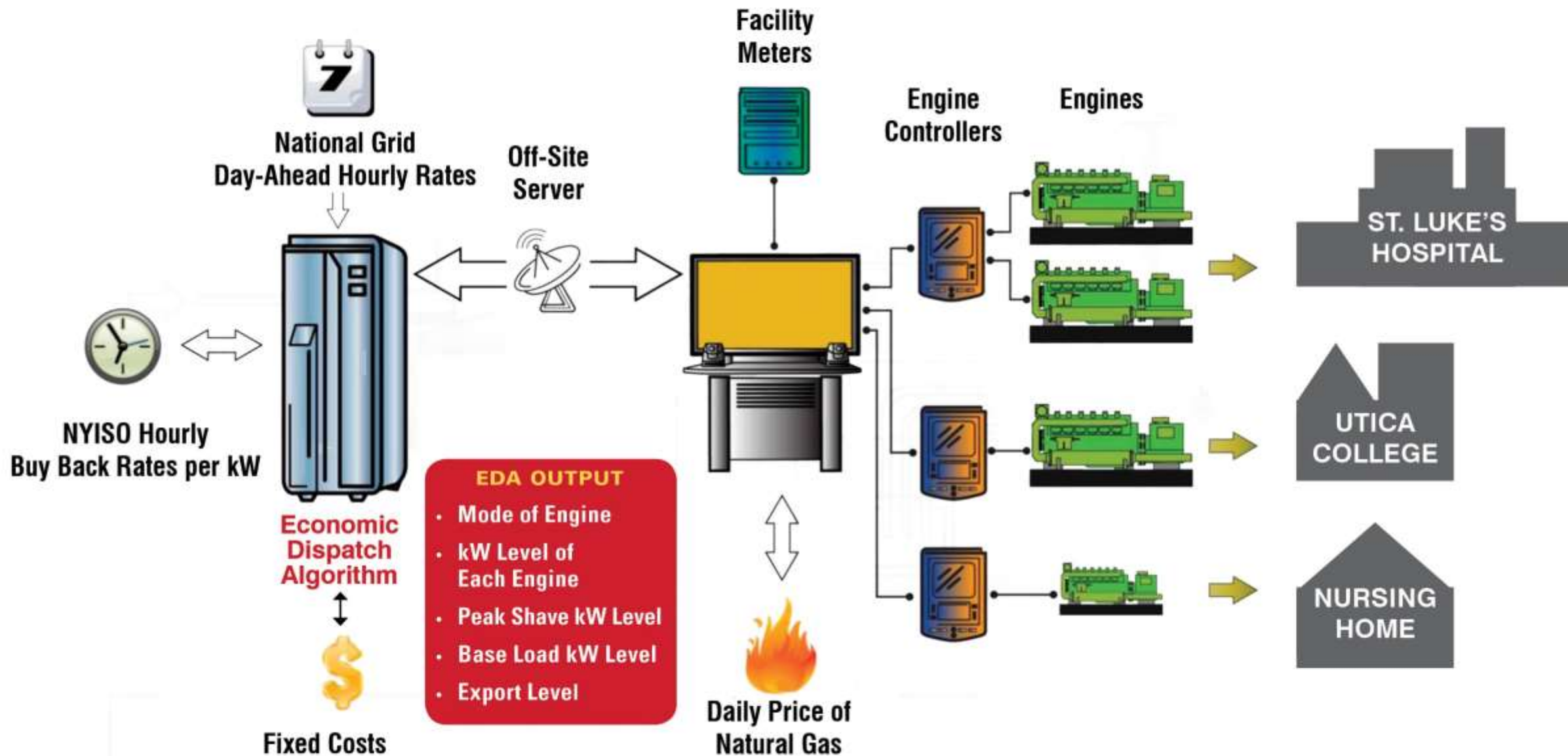
- **NYS Public Service Commission -
Petition to:**

- ✓ Obtain waiver to not be treated as a regulated utility
- ✓ Cross a public road

- **FERC**

- ✓ Obtain a "Qualified Facility" certification so we could export power

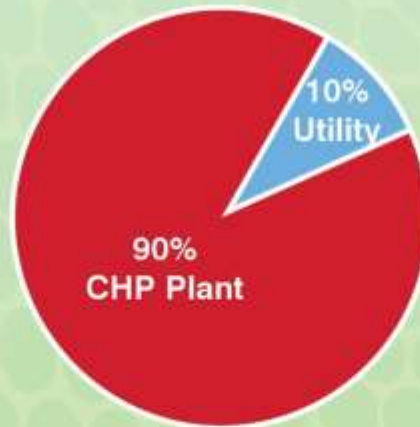
Maximizing the Opportunity - Economic Dispatch System



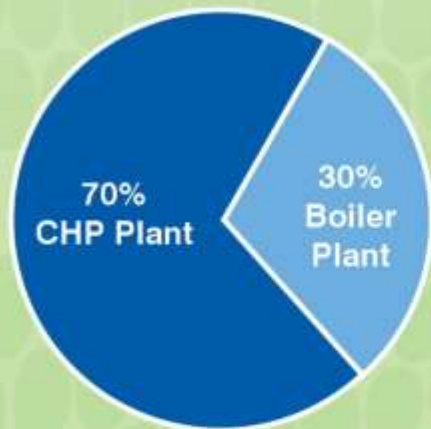
Annual Customer Energy provided by Burrstone Plant

St. Luke's Hospital

ELECTRICITY



STEAM/HOT WATER

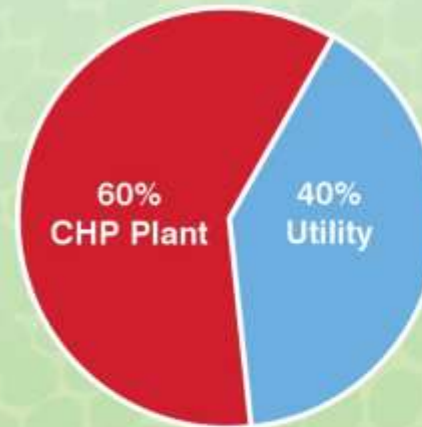


CHILL WATER



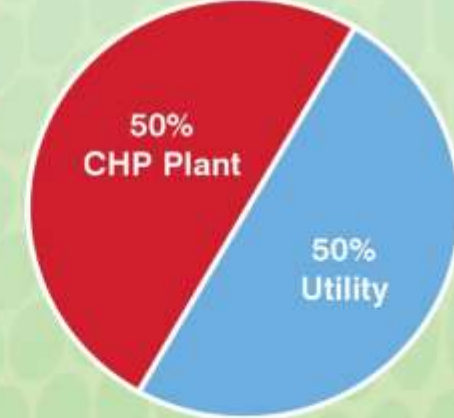
Utica College

ELECTRICITY



Nursing Home

ELECTRICITY



Total Energy Output since August 2009

ELECTRICITY GENERATED	170 Million kilowatt hours
ELECTRICITY EXPORTED	14 Million kilowatt hours
STEAM	123 Million pounds
HOT WATER	143,900 MMbtu

Making a microgrid happen is not a sprint...



...but a marathon with many hurdles to cross along the way.

Questions?



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