NYSERDA's Large-Scale Thermal Program

Moderator: **Sue Dougherty / *NYSERDA***

Speakers: **Mike Rohan / *Northwell Health***

Scott DeHollander P.E. / *Cornell AgriTech*

Agenda

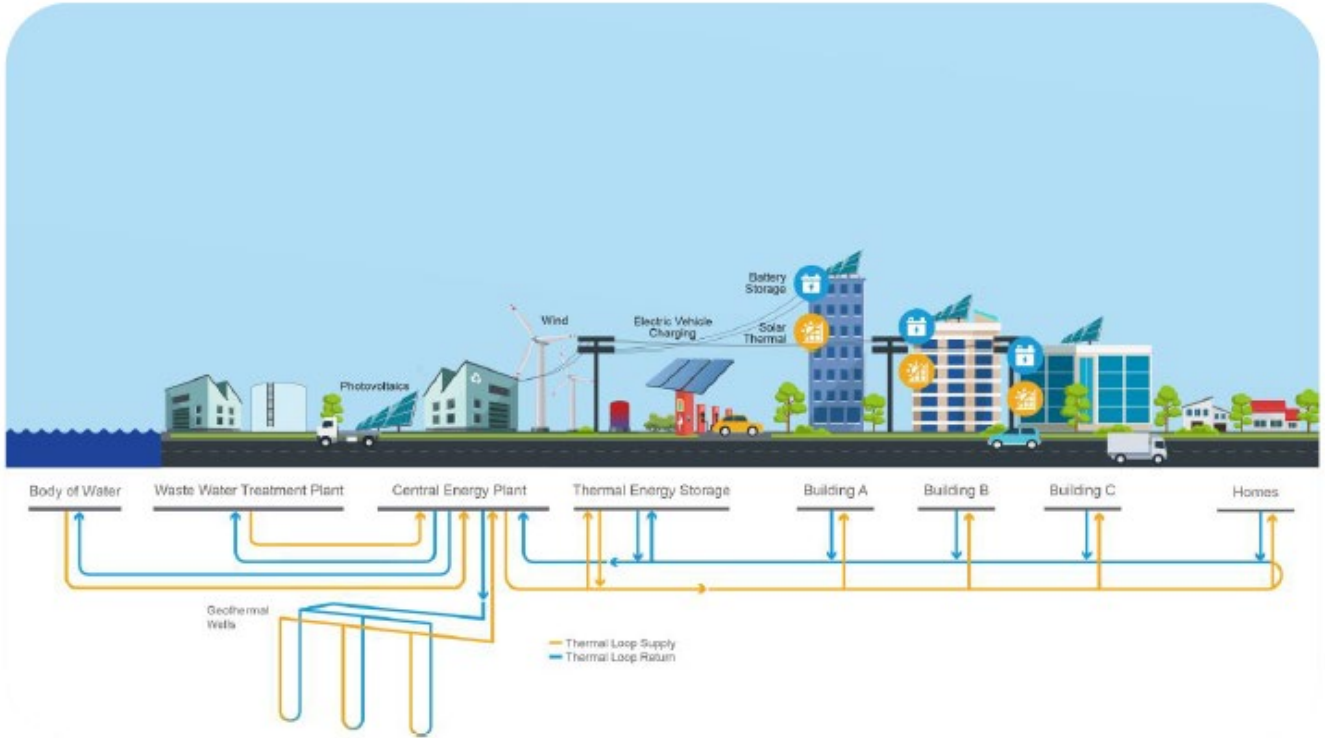
- NYSERDA's Large-Scale Thermal Program background
  - Funding support for large-scale thermal projects
  - Complementary market development activities

- Campus owner/manager experiences and perspectives
  - Role of large-scale thermal project development in energy and building decarbonization planning
  - Project examples
  - Factors that affect project development

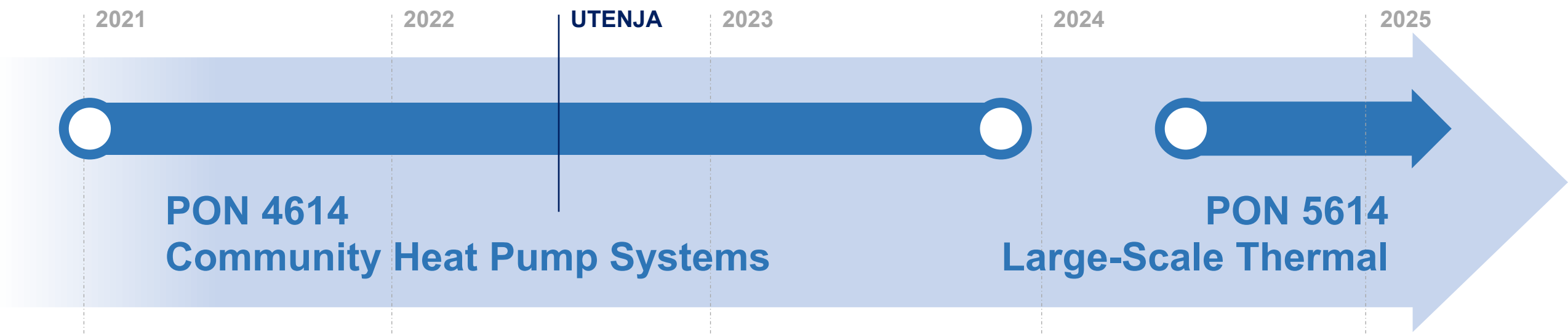
NYSERDA Strategic Outlook 2024 – 2027

“There are more than six million buildings in New York State. More than 200,000 buildings per year would need to be decarbonized for the next 30 years to address the entire building stock by 2050.”

NYSERDA’s strategies are evolving to support market transformation and effective scaling of building retrofits across the state, including exploring solutions that can work **block-by-block** and **community-by-community**.



Funding Support for Large-Scale Thermal



Funding support for a wide range of:
(1) **feasibility** studies,
(2) **design** projects, and
(3) **construction** projects

Funding support for **design** projects: single or multiple buildings, in particular **existing** buildings and **single-owner** campuses

PON 4614: Community Heat Pump Systems

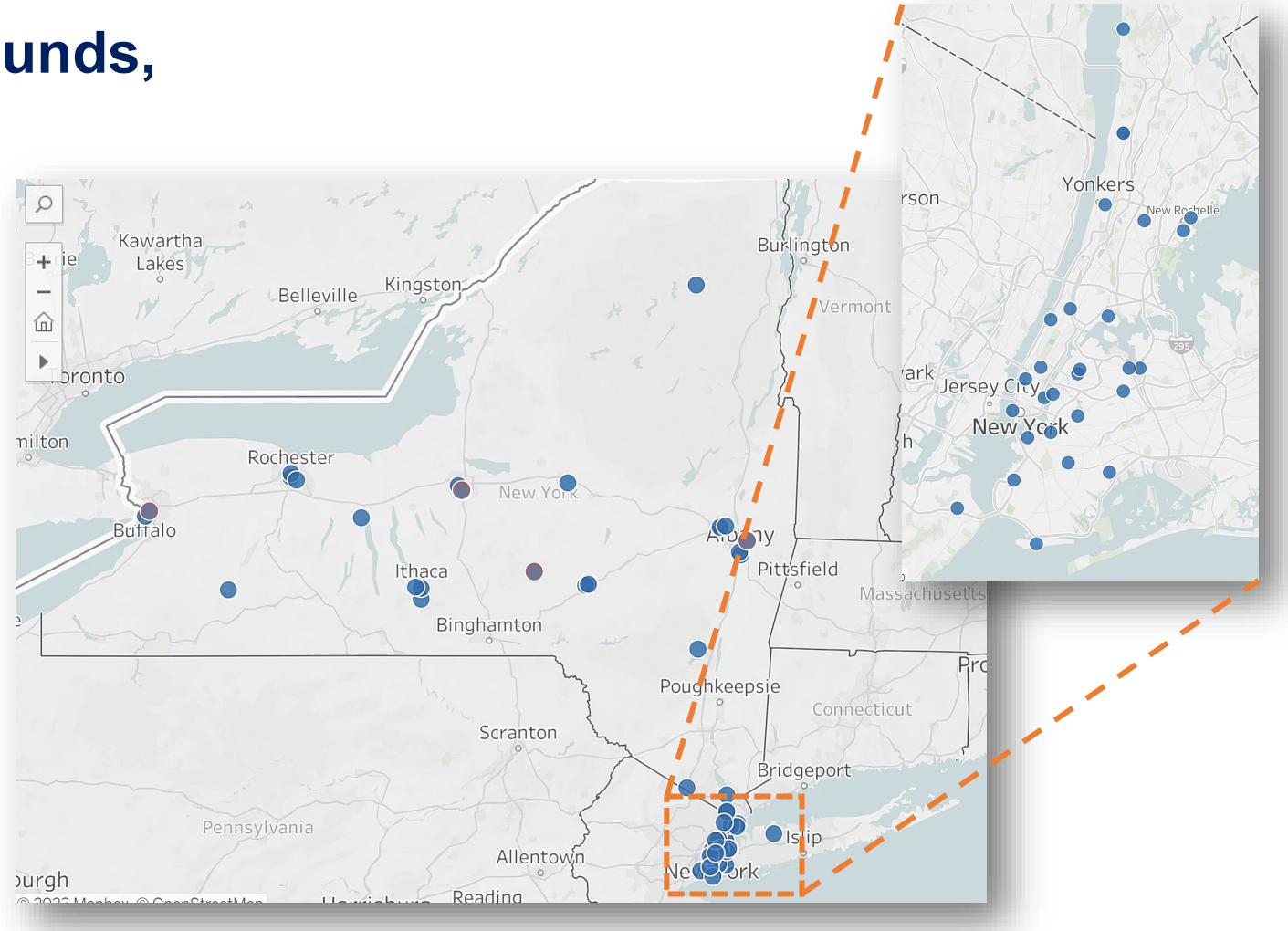
PON 4614 included **10 funding rounds,** from Q1 2021 to Q4 2023:

Funded 50+ project sites:

- **48** Category A: Feasibility
- **12** Category B: Design
- **6** Category C: Construction

>60% of funded projects are single-owner sites:

- College/university campuses
- Medical campuses
- Multi-family residential complexes
- Commercial real estate



More information available at:
https://www.nyserda.ny.gov/All-Programs/Large-Scale-Thermal/Winners

PON 5614: Large-Scale Thermal

- Strategic focus on **single-owner projects,** such as educational or medical institutions
- Intended to also support feasible projects, such as projects studied in PON 4614 and FlexTech, to become **shovel-ready projects**
- Support for **new feasibility studies** continues to be available through our FlexTech program

Colleges & Universities

Medical Campuses

Residential Complexes

Large Commercial Buildings

Multi-owner Nodes

(such as downtown corridors)

PON 5614: Large-Scale Thermal

Funding for replicable large-scale thermal system **design projects** that significantly reduce GHG from heating, cooling, and DHW primarily in existing buildings in NYS

$10 million is available in two funding rounds:

Round 1: due Sept. 26, 2024
Round 2: due Jan. 30, 2025

Single Building	Multiple Buildings
150,000 sq. ft. Minimum conditioned space	**250,000 sq. ft.** Minimum conditioned space
Maximum NYSERDA funding per award: up to **$500,000** (existing buildings) or **$300,000** (new construction)	
Required proposer cost-share: at least **50% of total project cost**	

Market Development

- Leverage consultant pool through RFQL 5856
  - Supply chain support
  - Technical services for design, development, permitting, commissioning, operations
  - Program design and technical support
  - Data collection, analysis, M&V
- Examples of potential areas of research and support
  - Outreach to project developers and building owners to build project pipeline
  - Research on thermal energy storage and waste heat recovery opportunities
  - Operational data collection and aggregation
  - Disseminate learnings and best practices

For more on PON 5614:
http://www.nyserda.ny.gov/All-Programs/Large-Scale-Thermal
(or scan QR code)

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Thermal Reengineering @ Northwell Health

Northwell Health®

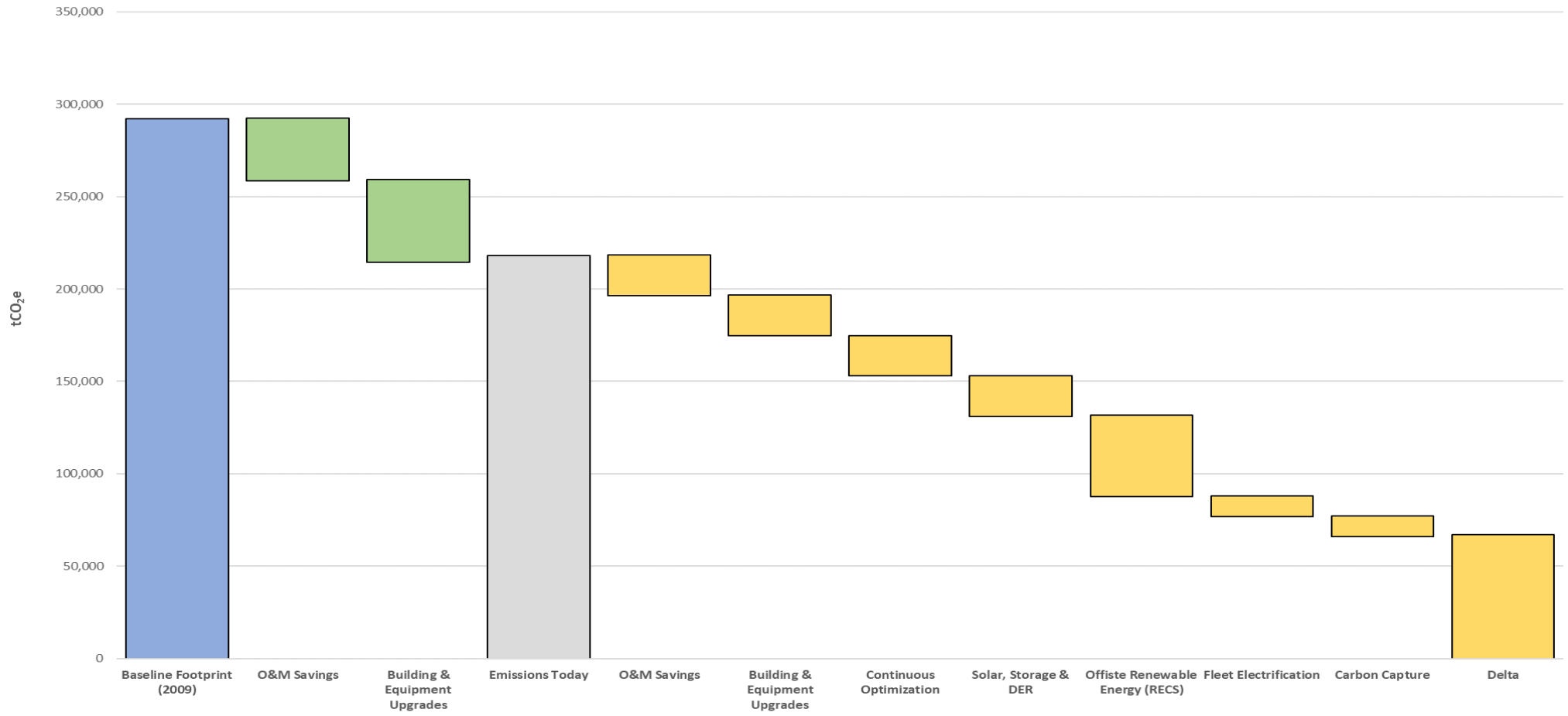
Sustainable Resilient

Thermal Reengineering

Northwell Health

Sustainable Resilient

A Balanced Hybrid Approach on our Pathway to Net Zero



Thermal Reengineering

Northwell Health

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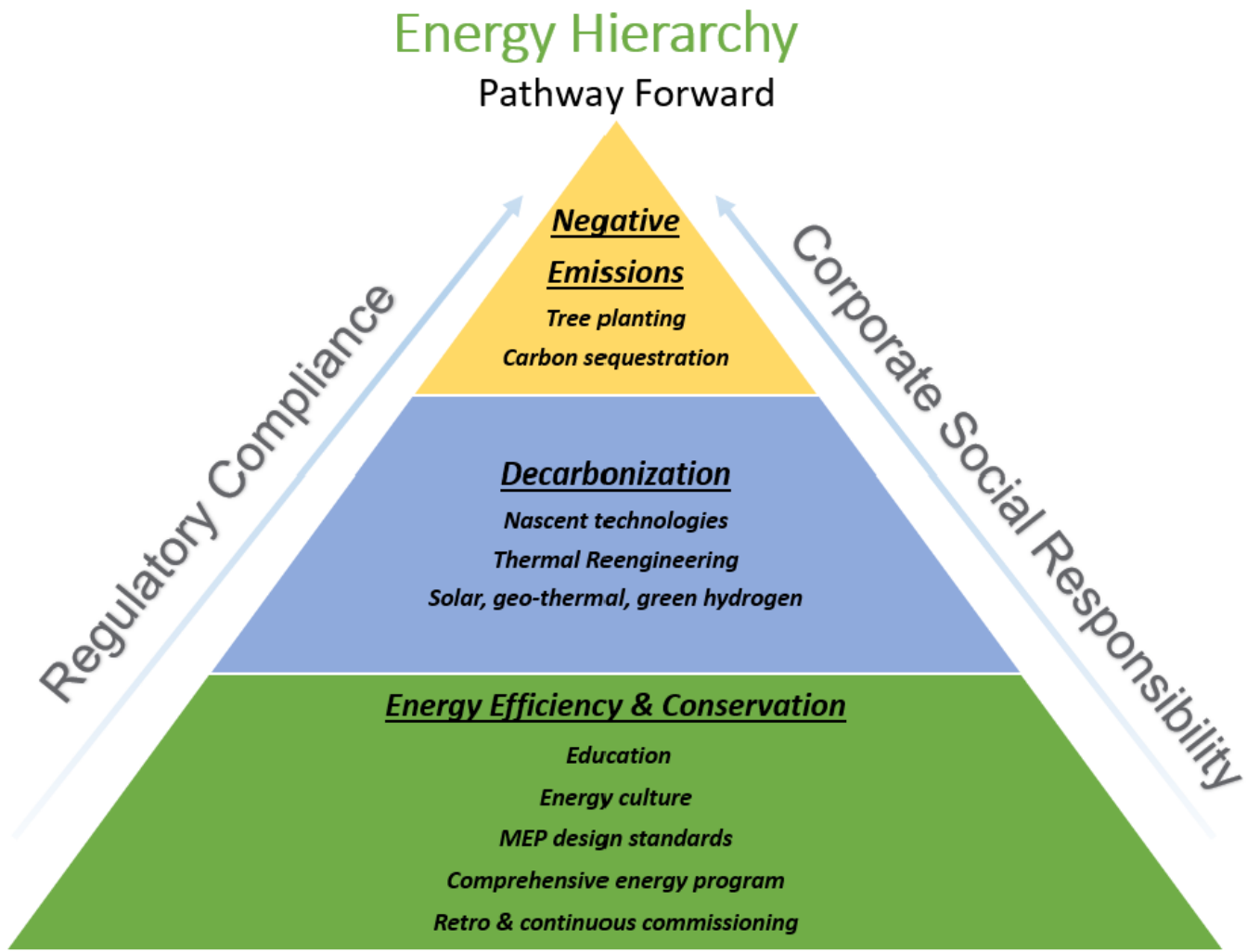
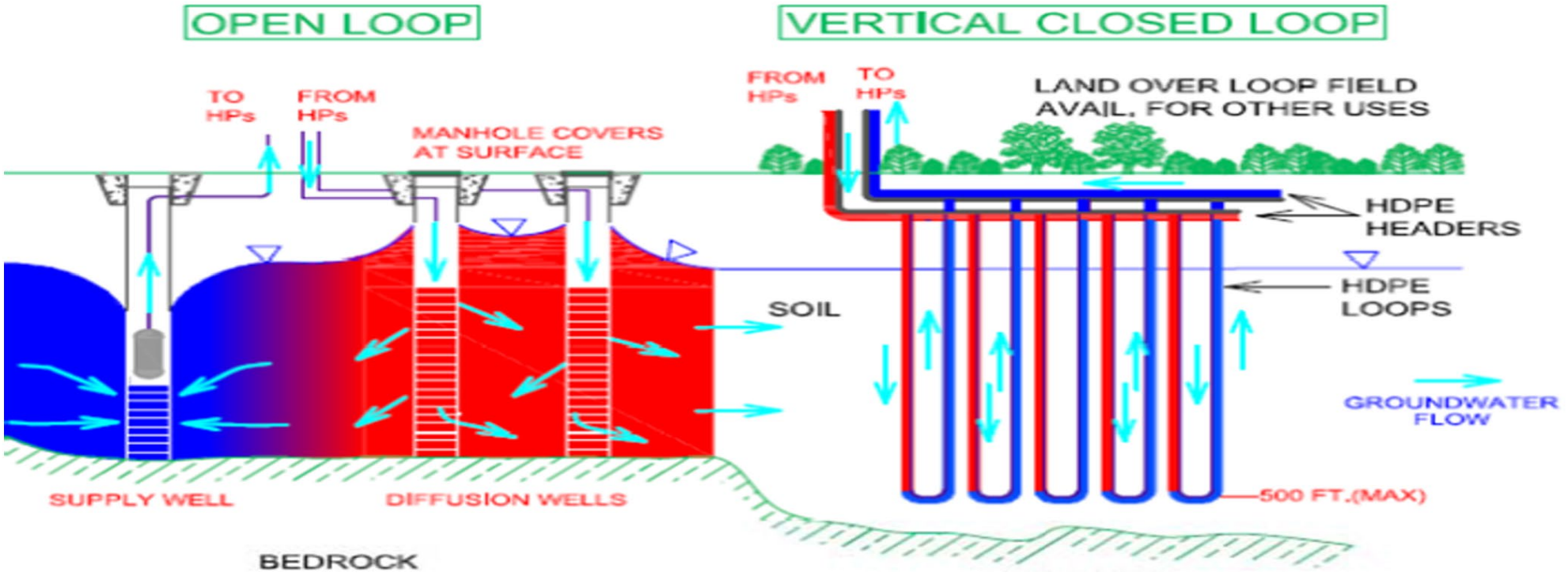


Thermal Reengineering

Geothermal Projects



Glen Cove Hospital: *Geothermal Installation in 1967, upgraded in 2017. Provides space & process cooling to eleven building campus on Long Island.*

Peconic Bay Medical Center: *Currently in design of 1,300-ton system. Test bores and conductivity testing competed. Thermal analysis in progress. Opportunity for Thermal Energy Network with adjacent properties under evaluation as a second phase projects.*

Thermal Reengineering

Large-Scale Thermal

Northwell Health

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EXISTING CONDITIONS - WELL FIELD AND TANK LOCATIONS

North Shore University Hospital:

Currently evaluating a large thermal storage reservoir and geothermal network for peak shaving as well as resiliency enhancement, as an adjunct solution to emergency generation backup for chillers.

Thermal Reengineering

Large-Scale Thermal

Northwell Health

Sustainable Resilient

Phelps Hospital – Using results of feasibility study to pursue a detailed design and identifying potential funding sources

PHELPS – NORTHWELL HEAT PUMP DESIGN:
Load Locations & Piping Route 2022-03-29

Thermal Reengineering

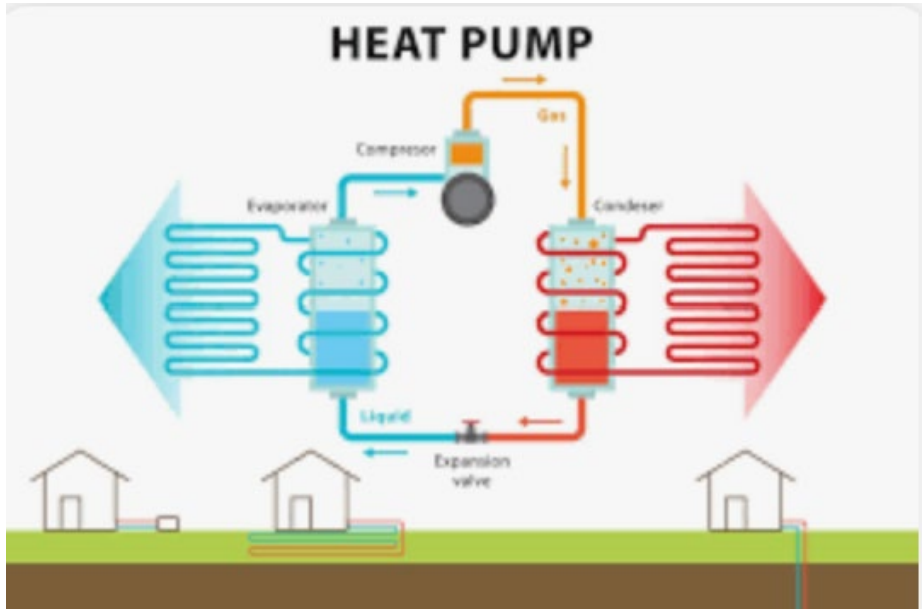
Northwell Health

Sustainable Resilient

Load Shifting & Peak Shaving: Thermal Energy Storage

Mather Hospital: *The first hospital on Long Island to incorporate ice thermal storage. Received a $1,000,000 rebate – the largest in utility (PSEG-LI) history.*

Heat Recovery: Air Source Heat Pump



Forest Hills Hospital: *An Air Source Heat Pump was recently installed, replacing a conventional chiller.*

Thermal Reengineering

Geothermal & Controlled Environment Agriculture (CEA)

Northwell Health

Sustainable Resilient

Committed to meeting the needs of the communities we serve

That means not just providing extraordinary health care, but providing community support, too.

Food as health in the news

Northwell, Island Harvest address food insecurity

Northwell sponsors mobile farmer's market for food insecure Long Islanders

Thermal Reengineering

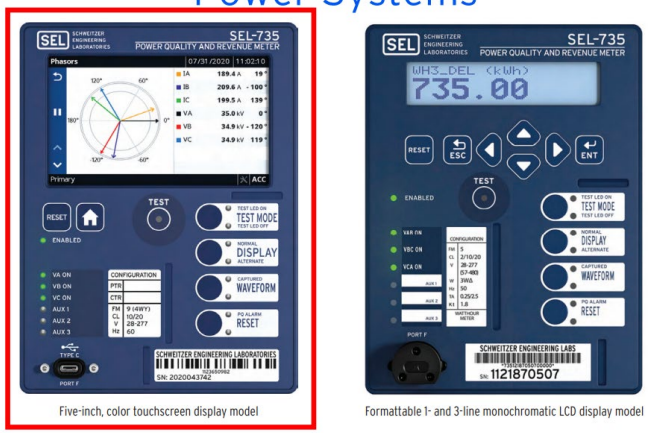
Grid-Interactive Efficient Buildings

Northwell Health

Sustainable Resilient

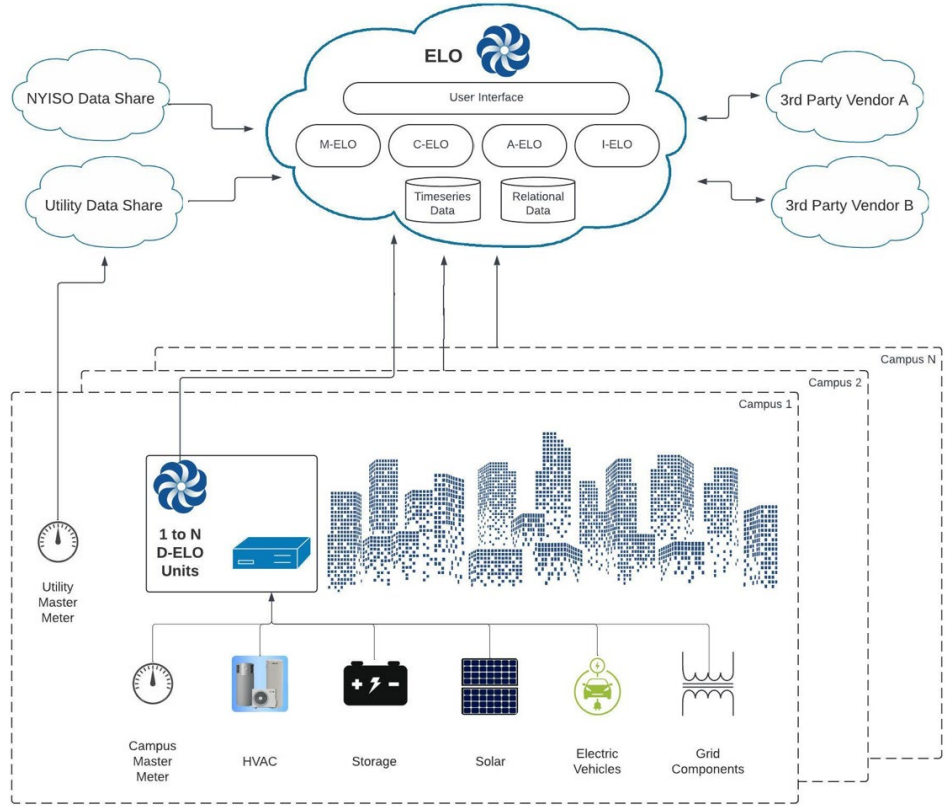
SEL-735 Power Quality and Revenue Meter

Precise Metering for High-Value Power Systems



Five-inch, color touchscreen display model

Formattable 1- and 3-line monochromatic LCD display model

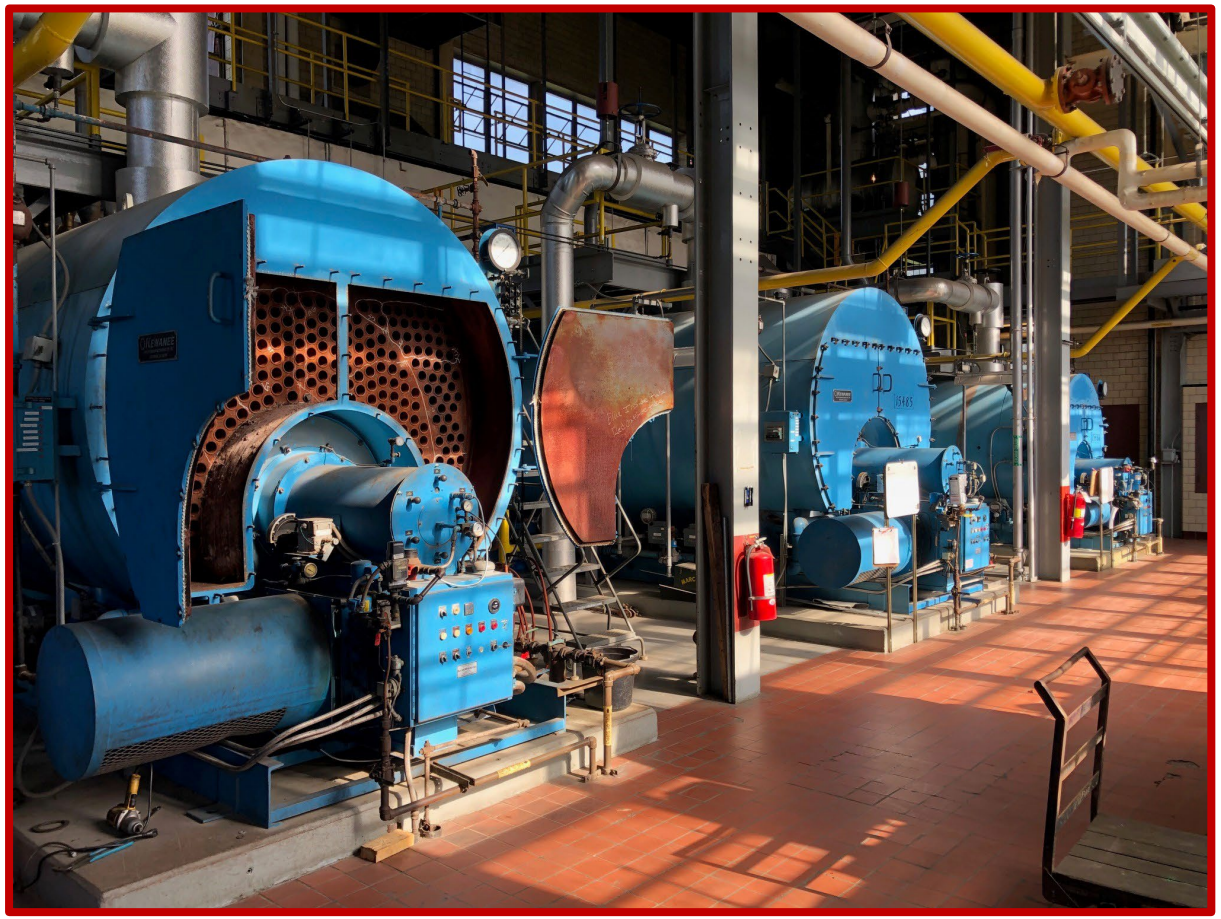


What is a grid-interactive efficient building (GEB)? The downstate power grids are regularly challenged due to age, capacity, and alteration. Behind-the-meter energy assets including energy efficiency, demand response, geothermal, solar PV, thermal storage — are typically valued, scheduled, implemented, and managed separately. The GEB vision is the integration and continuous optimization of these assets for the benefit of building owners and occupants, as well as the grid and our neighbors.

Cornell AgriTech

New York State Agricultural Experiment Station

AgriTech Heating and Cooling Decarbonization Overview



AgriTech Heating Plant 2022

Project Background

1. Received feasibility funding through NYSERDA's PON 4614 to evaluate AgiTech's central utility plant and infrastructure to inform capital planning and identify feasible heating and cooling decarbonization solutions.
2. Prioritized alignment with Cornell University's Climate Action Plan and incorporated SUNY, SUCF, State and Federal standards as key metrics.
3. Identified synergies with current/planned Campus construction as opportunities to begin strategic implementation.
4. Developed concept, phased implementation approach and order of magnitude construction costs.

Cornell AgriTech Project Synergy

Hedrick Mechanical System Refits

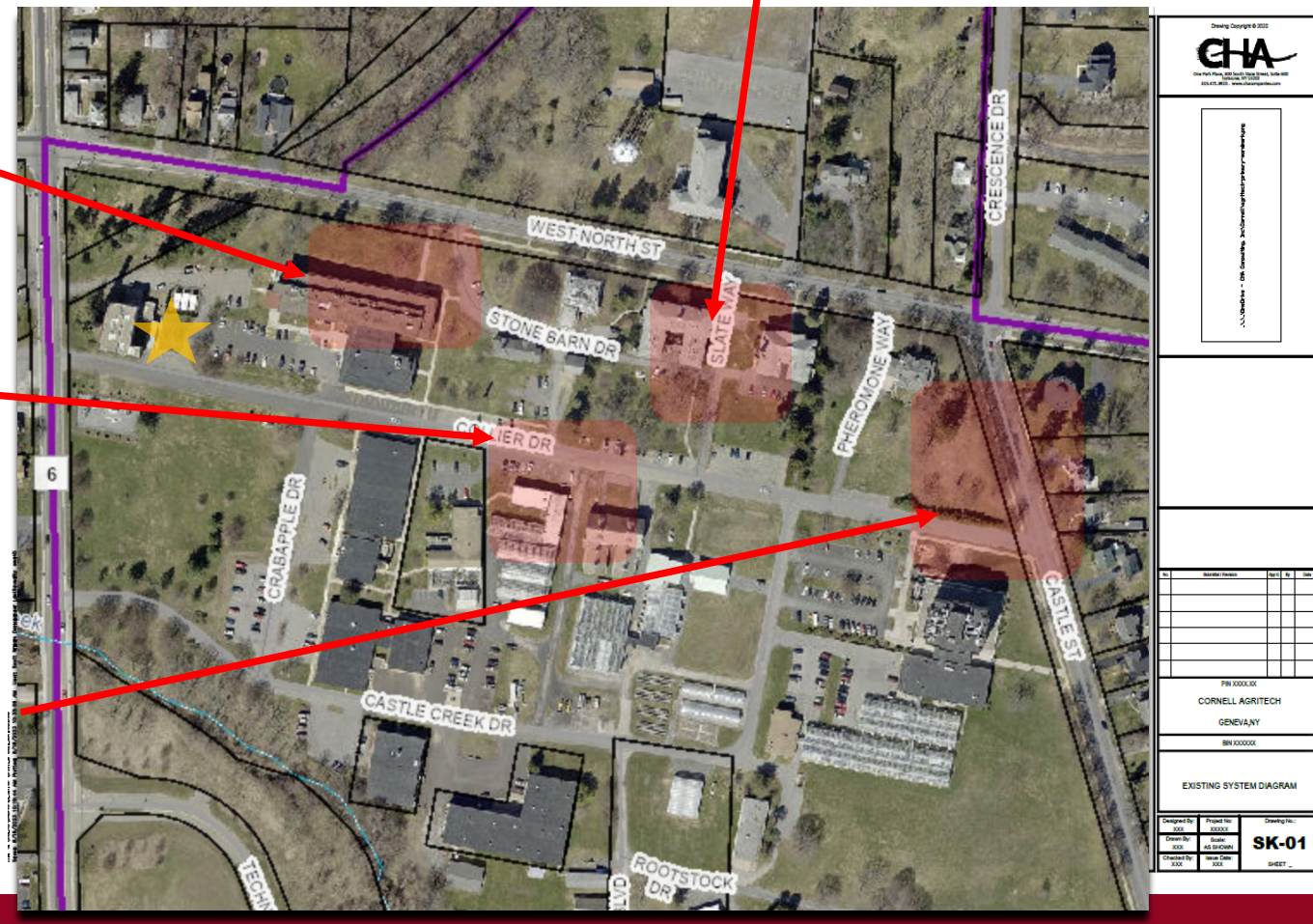
$20M – Food Science Building Mechanical Refit (2025)

$50M - National Grape Improvement Center "NGIC" (2024)

★ Campus Heating Plant

$3M - Barton Fire Service Upgrades (2024)

AgriTech campus 2021, approx. 350 sf conditioned space
600K sf overall



SUCF Sustainability Strategies AgriTech Adaptations

NYS Mandates:	Goals	AgriTech Applications
Executive Order 166 (EO166)	Reduce GHG emissions (from 1990 levels): • 40% by 2030 • 80% by 2050	PON4614 - 40% reduction achieved by campus steam to hot water conversion 80% reduction achieved by ground source heat pumps
New Efficiency New York	2025 statewide energy efficiency target of 185 trillion British thermal units (TBtu) of site energy savings	
The Climate Leadership and Community Protection Act (CLCPA)	Carbon free electricity system by 2040 • Reduce GHG 85% below 1990 levels by 2050	85% reduction is feasible by use of ground source heat pumps
SUNY and SUCF Directives/Drivers	**Goals**	
SUCF Directive 1B-2	• Commitment to clean energy • Deep energy retrofits on existing buildings • Net zero carbon new buildings	NYSEG Commercial and Industrial Rebate Program, Energy efficiency programs (bulbs and weather striping), Converting building heating from steam to hot water.
SUNY Clean Energy Roadmap	Guidelines to help accelerate progress towards NYS's goal to reduce GHG 40% by 2030	40% reduction achieved by campus steam to hot water conversion

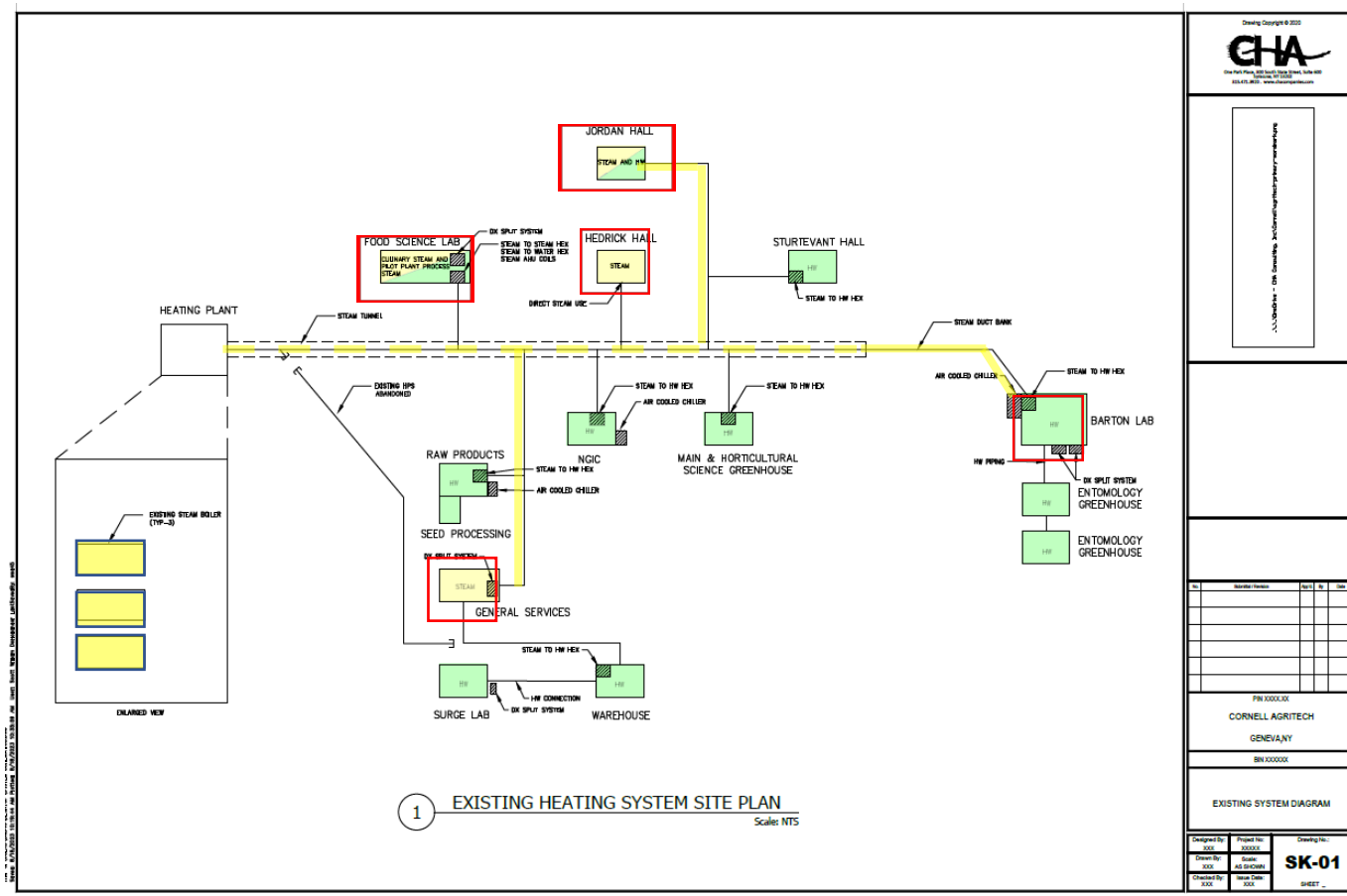
Using an additive and flexible approach to achieve NYS GHG directives

AgriTech Current Configuration

Annual NG usage 66,700 MMBtu

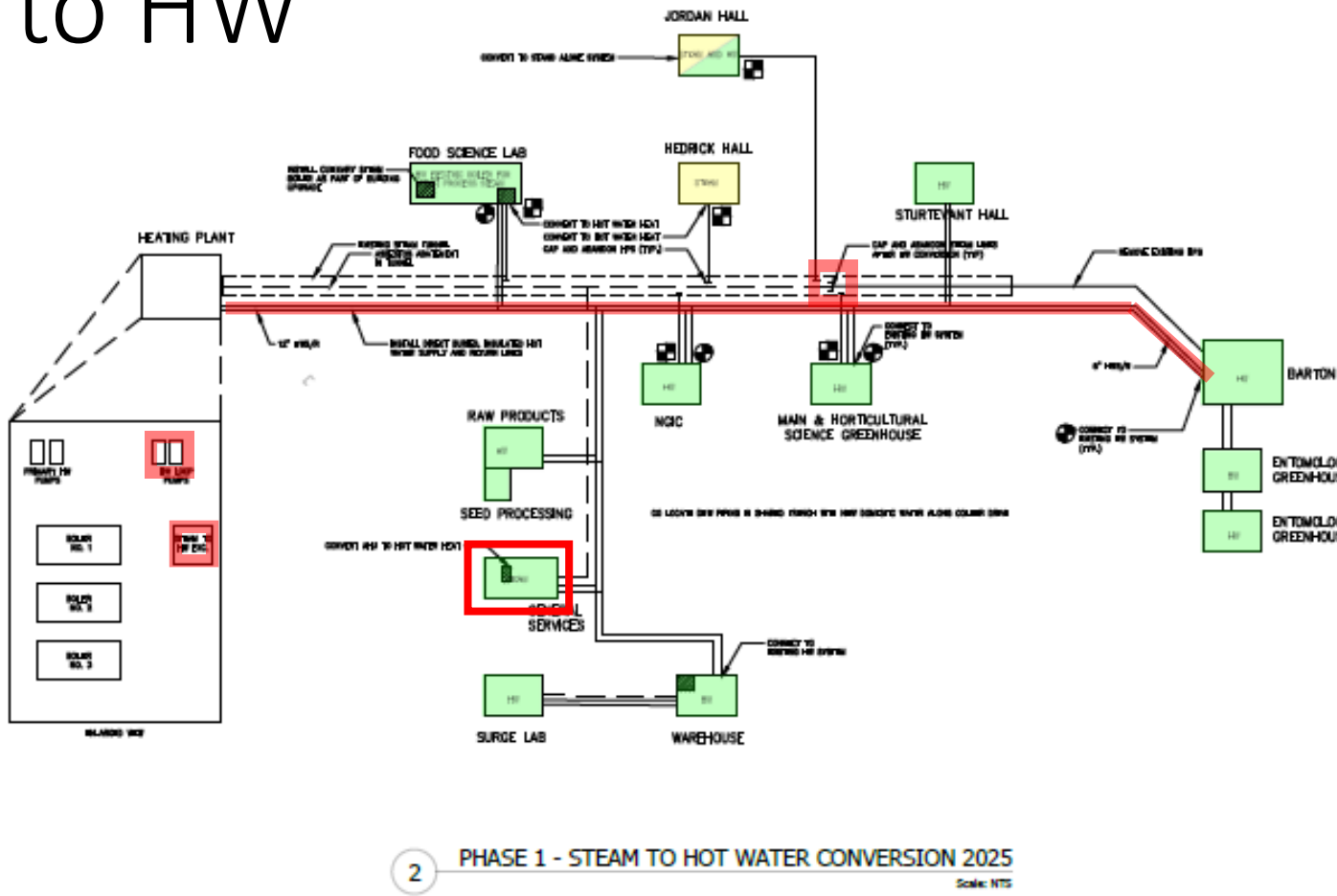
Annual Power usage 1,128 MWhr

- 3 Fire Tube Boilers: (2) 700hp, 350hp
  - Current Annual Cost of Energy $894,520 (includes cost of GHG)
  - Steam to building hydronic heating system (green) most exist buildings 180F (greenhouses) ; spray lab 200F
- Steam Tunnel walkable (dashed); duct style (solid)
  - Food Science, and NGIC are connectable thru tunnel
- Steam Usage
  - Steam building primary heat remaining in: Hedrick, General Services as well as portions of Food Science, Jordan (yellow), Raw Products
  - Food Science Pilot Plant culinary steam and “process steam” 100-psi and 60-psi conversion expected by 2025
  - Steam Autoclaves: (3) Barton, (2) Food Science, (1) Hedrick. Currently 2 electric on campus (USDA and Surge)



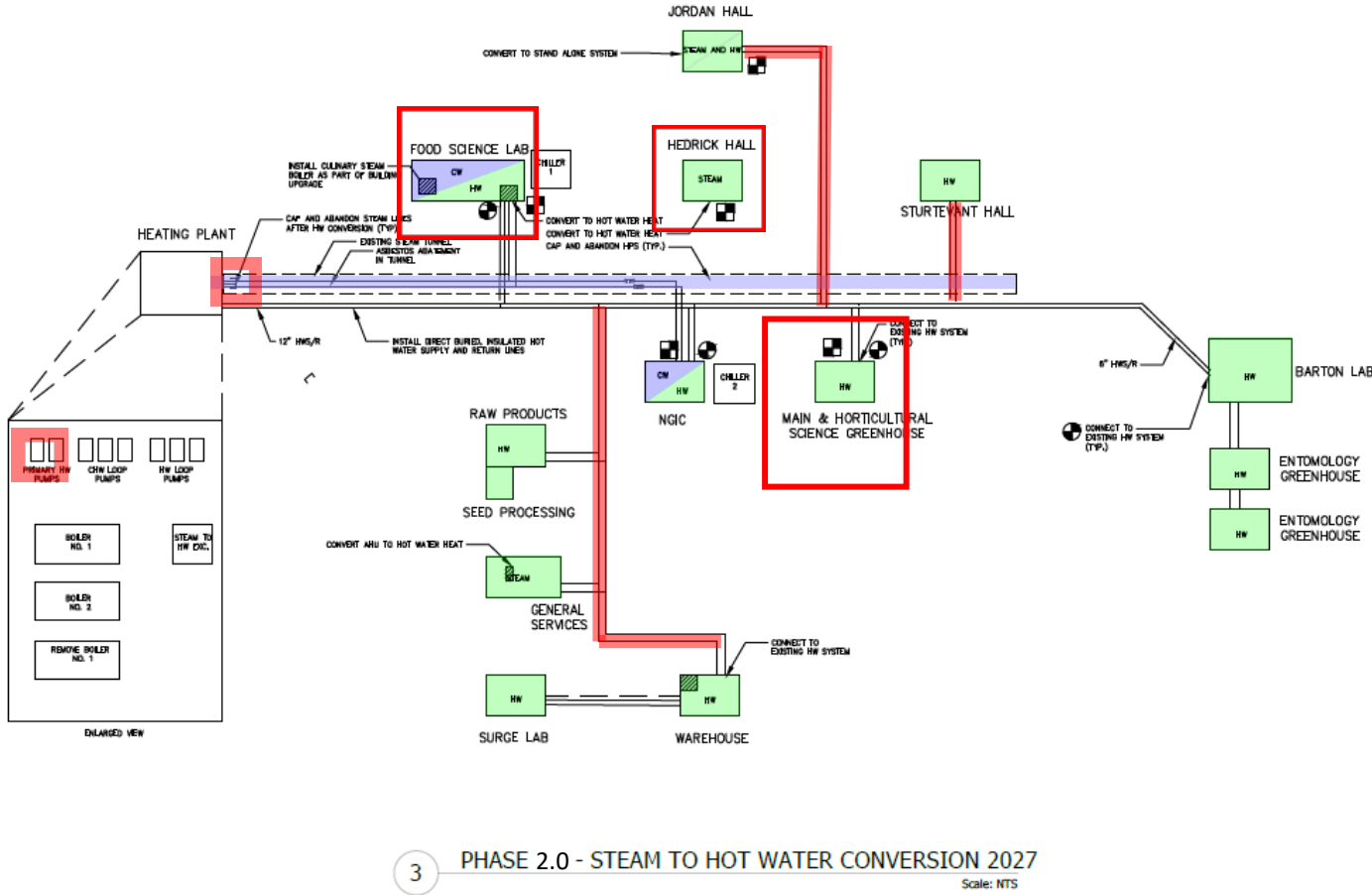
$2.5M Phase 1 – Steam to HW

- Add steam to HW Heat Exchangers (HX) at Heating Plant with distribution pumps
- Terminate tunnel steam at Sturtevant takeoff
- Install 1250 trench feet of Hot Water (HW) piping to Barton in common trench with domestic water to be replaced as part of NGIC and Barton projects
- Food Science Pilot Plant culinary steam change to Elec.
- Steam Autoclaves convert to Elec.: (1) Hedrick, (1) Sturtevant replace (2) Barton, (1) Food Science, Barton Sterilized DI
- Building steam to HW conversions branch services and “low hanging fruit” focus



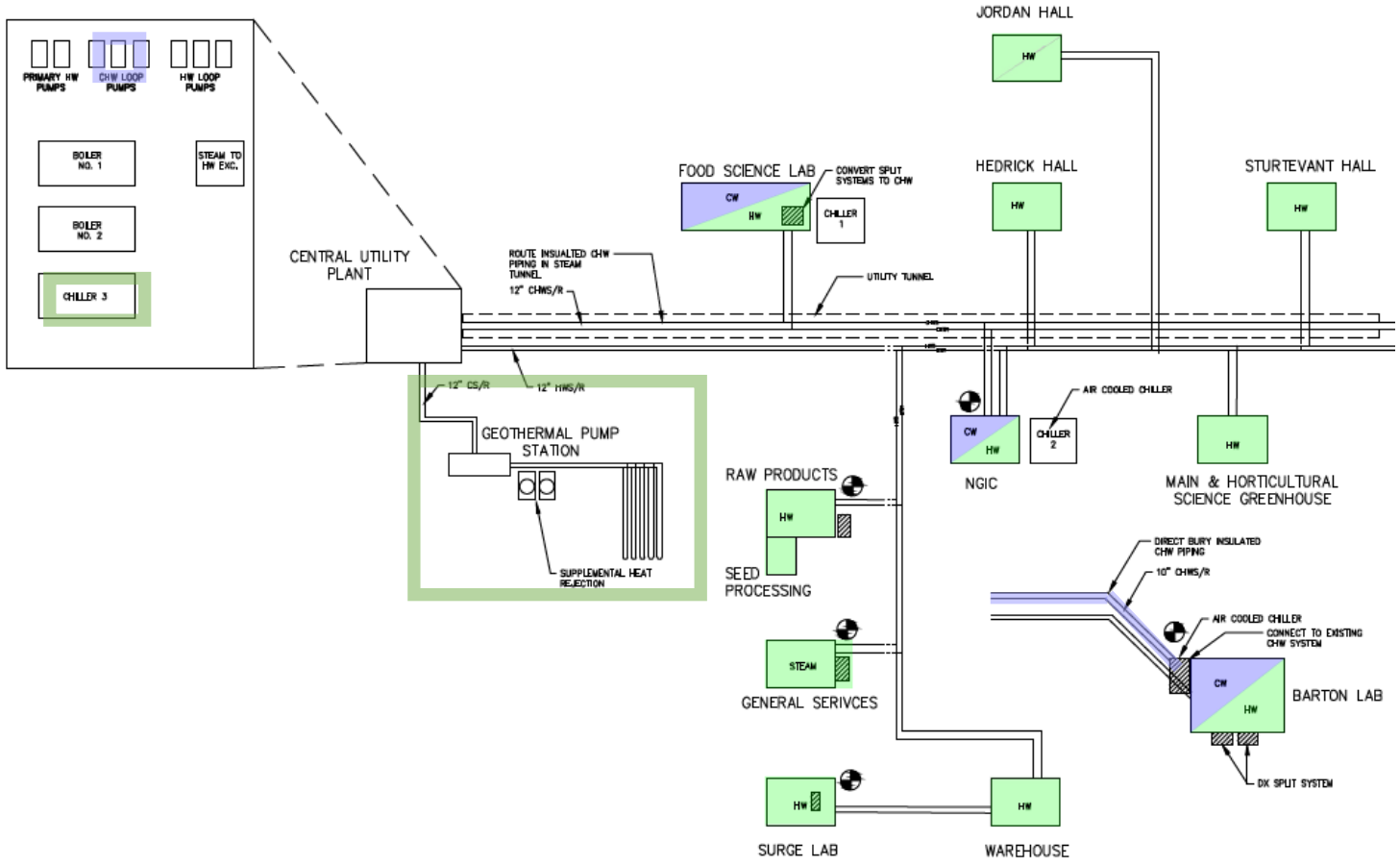
$10.5 M Phase 2.0 – Steam to HW Conversions and CW Addition

- Complete District Hot Water Plant
- Complete campus Steam to Hot Water building conversions
- Terminate Steam Distribution at Heating Plant
- Complete District Hot Water Piping
- Install 950 feet of CW piping linking Food Science and NGIC on abated Steam Tunnel pipe racks



$5M Phase 3.0 – Geothermal add and CW expansion

- Add Geothermal 33% capacity
- Add Heat Pump Unit 1 to Heating Plant
  - Shoulder season heating and cooling load on new Heat Pump / Chiller unit 1
  - Supplemental heat from Boilers 2 and 1 (remaining)
- Supplemental cooling on distributed chillers
  - Dispatch to district from distributed units
  - Utilize excess building Design Day capacity for district Average Day demands
  - Shared redundancy vs individual building
- CW expansion to Barton

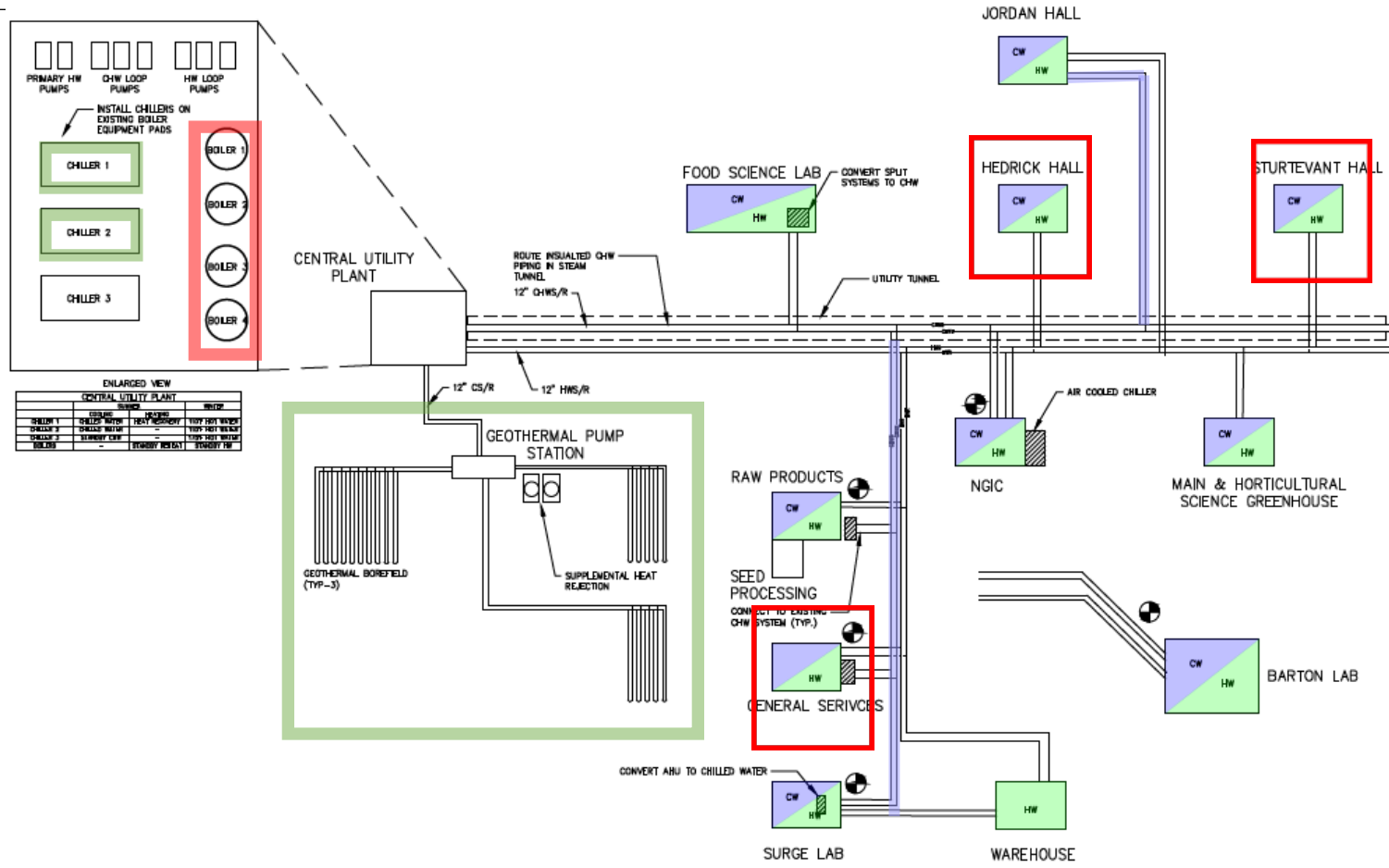


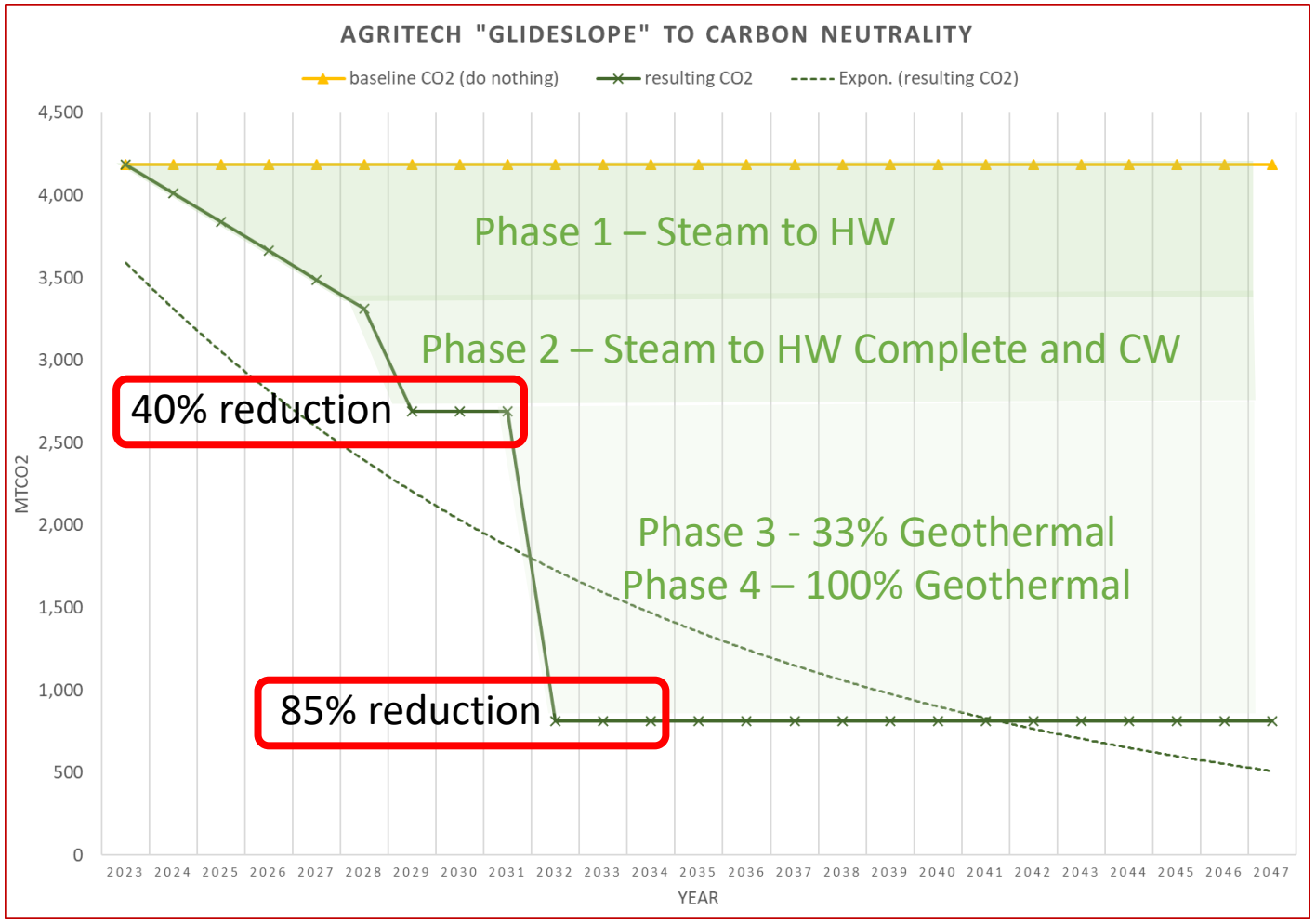
Annual NG usage 2,051 MMBtu

Annual Power usage 4,931 MWhr

$13.5 M Phase 4.0 – Complete

- Expected Annual Cost of Energy $680,641
  - GHG costs avoided $480K
- Add Geothermal 100% capacity
- Add Heat Pump Units 2 and 3 to Heating Plant total 3 (n+1 at 95% heating load)
  - Supplemental heat from Boiler 1 (remaining) until end of life then replacement with modular HW boiler
- Extend district Chilled Water to branch services





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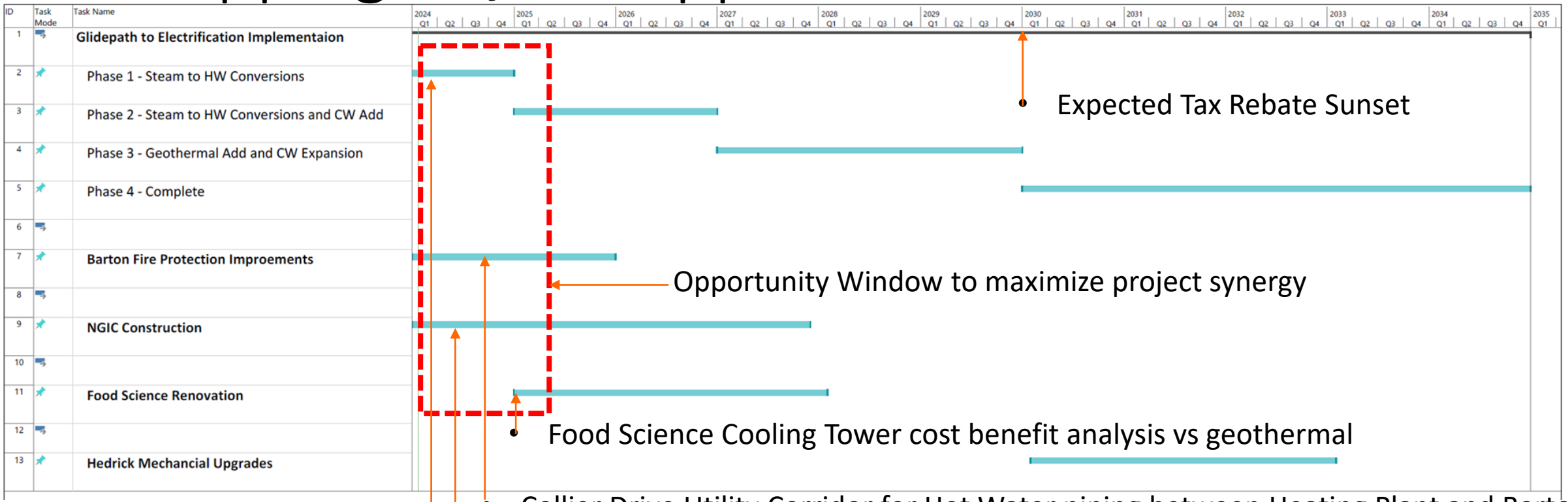
SUNY Clean Energy Roadmap	Guidelines to help accelerate progress towards NYS's goal to reduce GHG 40% by 2030 Achieved by 2029

Overlapping Projects Opportunities to Maximize



Summary

- AgriTech is in the midst of significant State and Federal investment near $75M over next 5 years.
- “Glideslope” to align with Cornell Carbon Neutrality Goal by 2035 has been developed.
- SUCF Roadmap and NYS EO166 40% reduction by 2030 is achievable with $13.0M investment.
  - **SUCF 100% funding commitment for design underway**
  - **Currently identifying a solution provider to perform design and potential funding sources**
  - **SUCF construction commitment phases 1 and 2 up to $15M “Design Ready”**
- NYS Climate Leadership and Community Protection Act (CLCPA) 85% reduction by 2050 is achievable with additional $18.5M.

Thank You!

Cornell CALS
College of Agriculture and Life Sciences

NYSERDA's Large-Scale Thermal Program

Moderator: Sue Dougherty / *NYSERDA*

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Backup Slides

PON 5614: Large-Scale Thermal

NEW YORK STATE | NYSERDA

Complete Feasibility Study

Ensure there is thermal resource testing/data

Partner with eligible proposer

- A list of solutions providers available on website: http://www.nyserda.ny.gov/district-thermal-systems
- Providers on the list have not been vetted by NYSERDA

Submit 5614 proposal

Proposer submits application in Salesforce portal before due date

NYSERDA evaluation

- Competitive process
- Proposer interviews may be requested, as applicable
- A proposer not selected may request a debrief and apply under a successive round

Funding awarded

- Funding is disbursed in milestone payments
- Max contract term of 4 years

For more: **http://www.nyserda.ny.gov/All-Programs/Large-Scale-Thermal**
or contact: **District.Thermal@nyserda.ny.gov**

PON 4614: Community Heat Pump Systems

Municipal charettes

With support from NYSERDA, Pace Energy & Climate Center, organized 12 learning events from Q1 2023 through Q4 2024.

The charettes brought together municipal officials, NYSERDA staff, and experts in thermal energy systems to discuss challenges and best practices around TENs development.

Sharing research

NYSERDA has shared research supporting the PON 4614 process, including reports on TENs opportunities in NYS.

Sharing learnings

NYSERDA has shared reports from many of the PON 4614 winners, making the learnings from these feasibility, design, and construction projects available to the broader public.