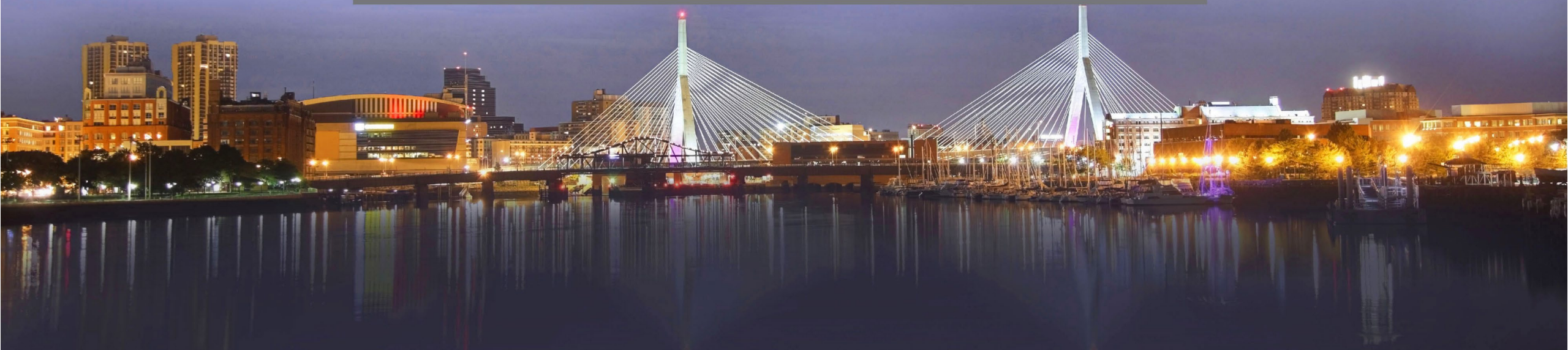
LEADING THE WAY

CampusEnergy2022

Feb. 15-18 | Westin Boston Seaport District Hotel | Boston, Mass.



INTERNATIONAL DISTRICT ENERGY ASSOCIATION

Optimizing the University of Virginia Health System Loop

Paul Stevens – University of Virginia

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Agenda

- UVA Background
- UVA Health System Loop Overview
- Optimization Partner Selection
- Engineering Study and Planning
- Optimization Implementation
- Project Results and Next Steps

UVA Chilled Water System Summary

Installed Capacity
44,670 Tons

Peak Demand
~35,000

7 CHW Loops

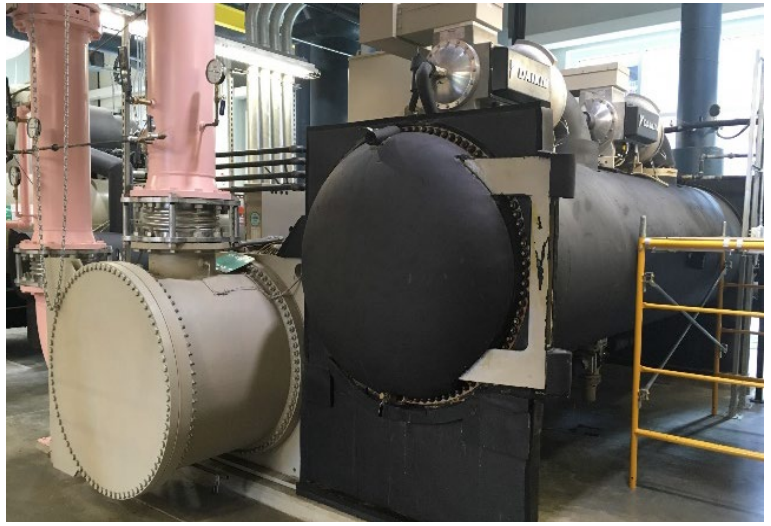
12 Plants

16 Staff

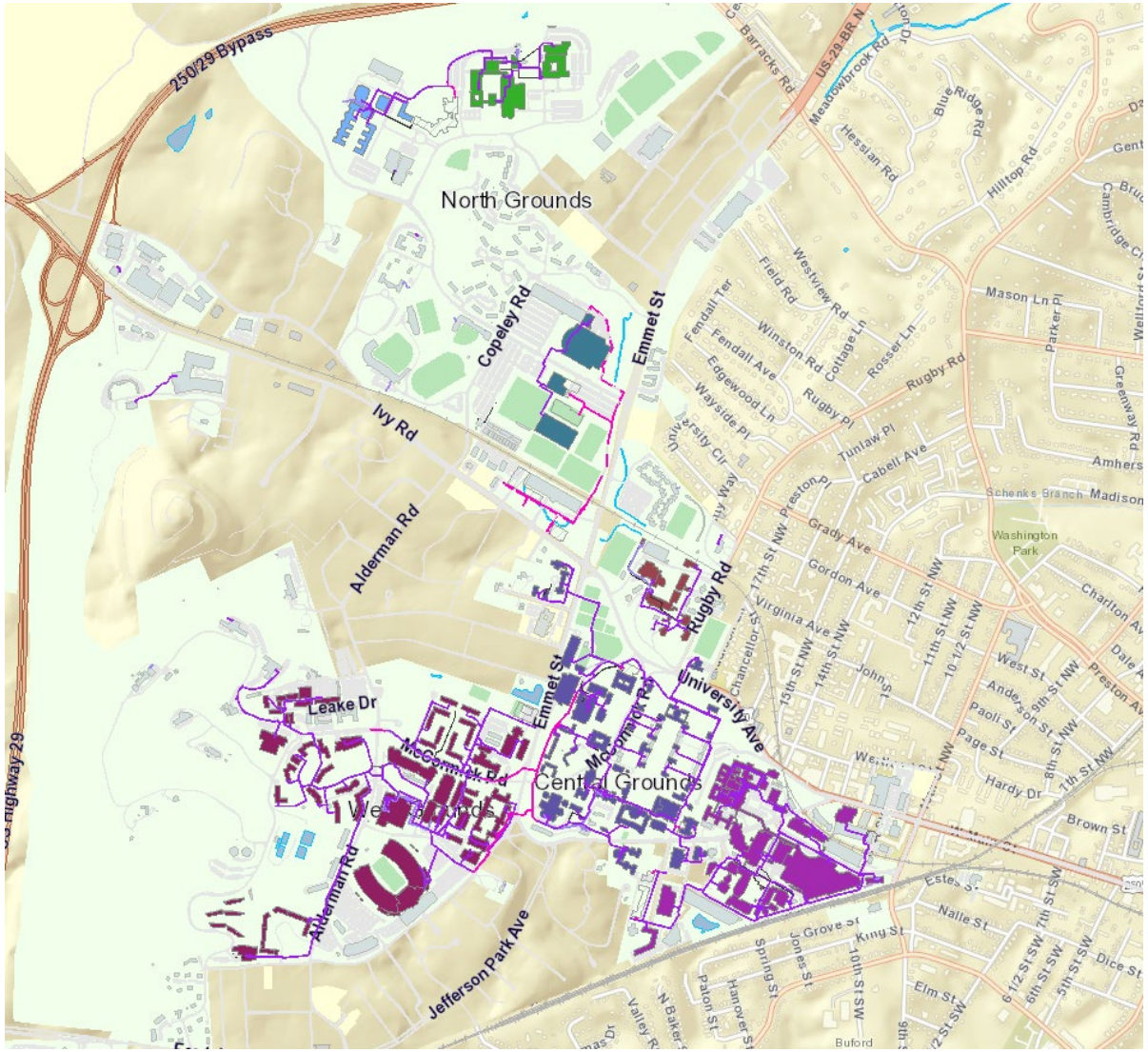
Annual Electric Bill
$5.5M

Annual Cost Of Water
~$1.3M

Asset Value
~$220M



UVA Chilled Water Area Served



Loop Efficiencies

Loop Efficiency – Three Years of Data				
Loop	**Ton-hrs**	**% of Total**	**kWh**	***kW/Ton**
McCormick Road	61,751,899	24%	53,957,784	0.87
Central Grounds	29,744,590	12%	25,453,199	0.86
Carr's Hill	4,262,019	2%	4,489,638	1.05
Massie	5,819,168	2%	8,345,466	1.43
Health System	142,500,082	56%	111,747,606	0.78
North Grounds	8,148,205	3%	6,560,299	0.81
Total	**252,225,964**		**210,553,992**	**0.83**

*kW/Ton is equal to Entire plant electrical consumption / BTUs sold (consumed)

UVA Goals

2030 – Carbon Neutral

2050 – Fossil Free

How do you accelerate plant efficiency?

Research → RFP → Evaluate → Contracting → Implementation

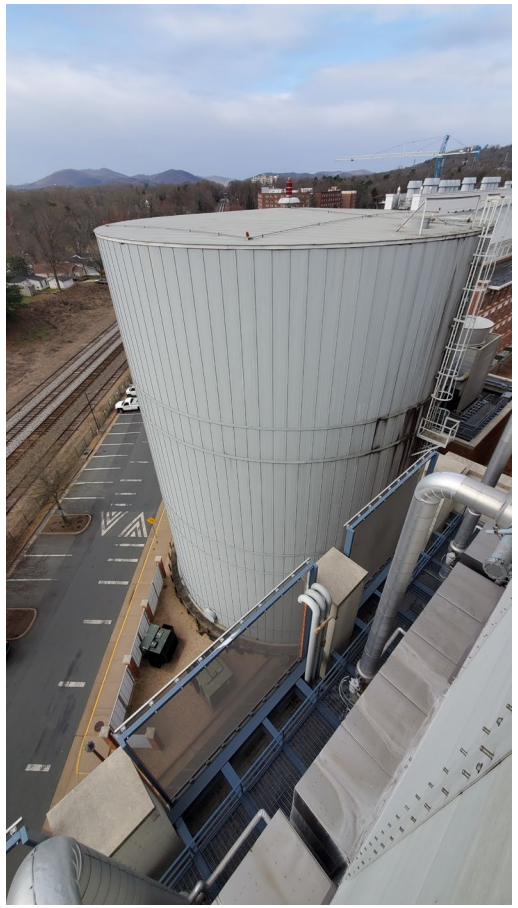
UVA Chilled Water Health System Loop

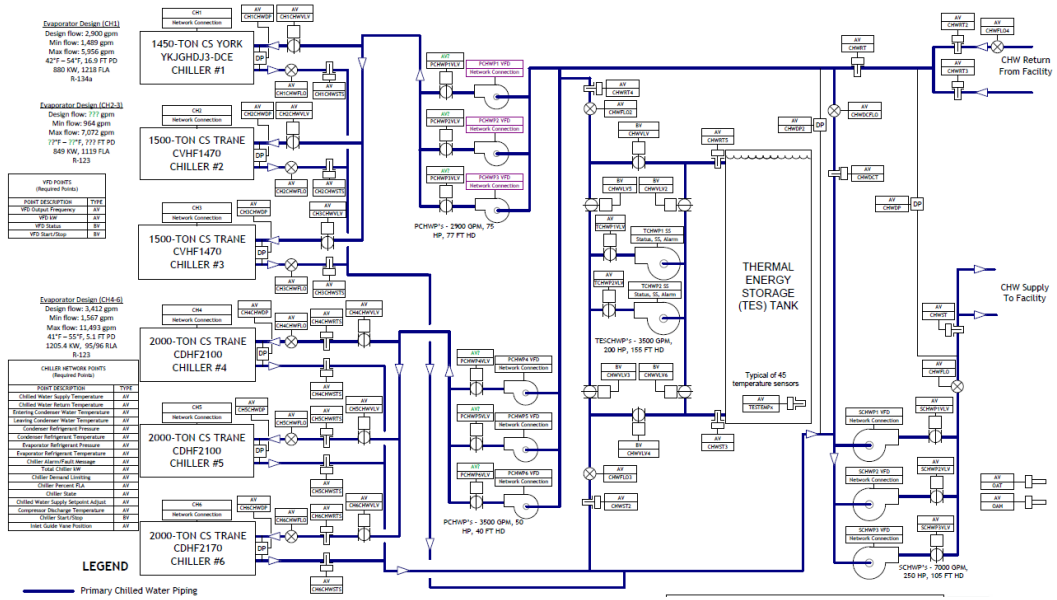
Plant Name	Chiller Name	Capacity (Tons)	Year Installed	Age	Pumping Configuration
North	HRC-1	1,800	2022	0	Primary/Secondary
South	Chiller 1	1,500	2001	21	Primary/Secondary
South	Chiller 2	1,500	2003	19	Primary/Secondary
South	Chiller 3	1,500	2003	19	Primary/Secondary
South	Chiller 4	2,000	2008	14	Variable Primary/Secondary
South	Chiller 5	2,000	2008	14	Variable Primary/Secondary
South	Chiller 6	2,000	2011	11	Variable Primary/Secondary
East	Chiller 1	2,000	2013	9	Variable Primary
East	Chiller 2	2,000	2013	9	Variable Primary
East	Chiller 3	2,000	2013	9	Variable Primary
East	Chiller 5	2,000	2018	5	Variable Primary
-	-	**20,300**	-	-	-

Google Maps

Engineering Study and Planning

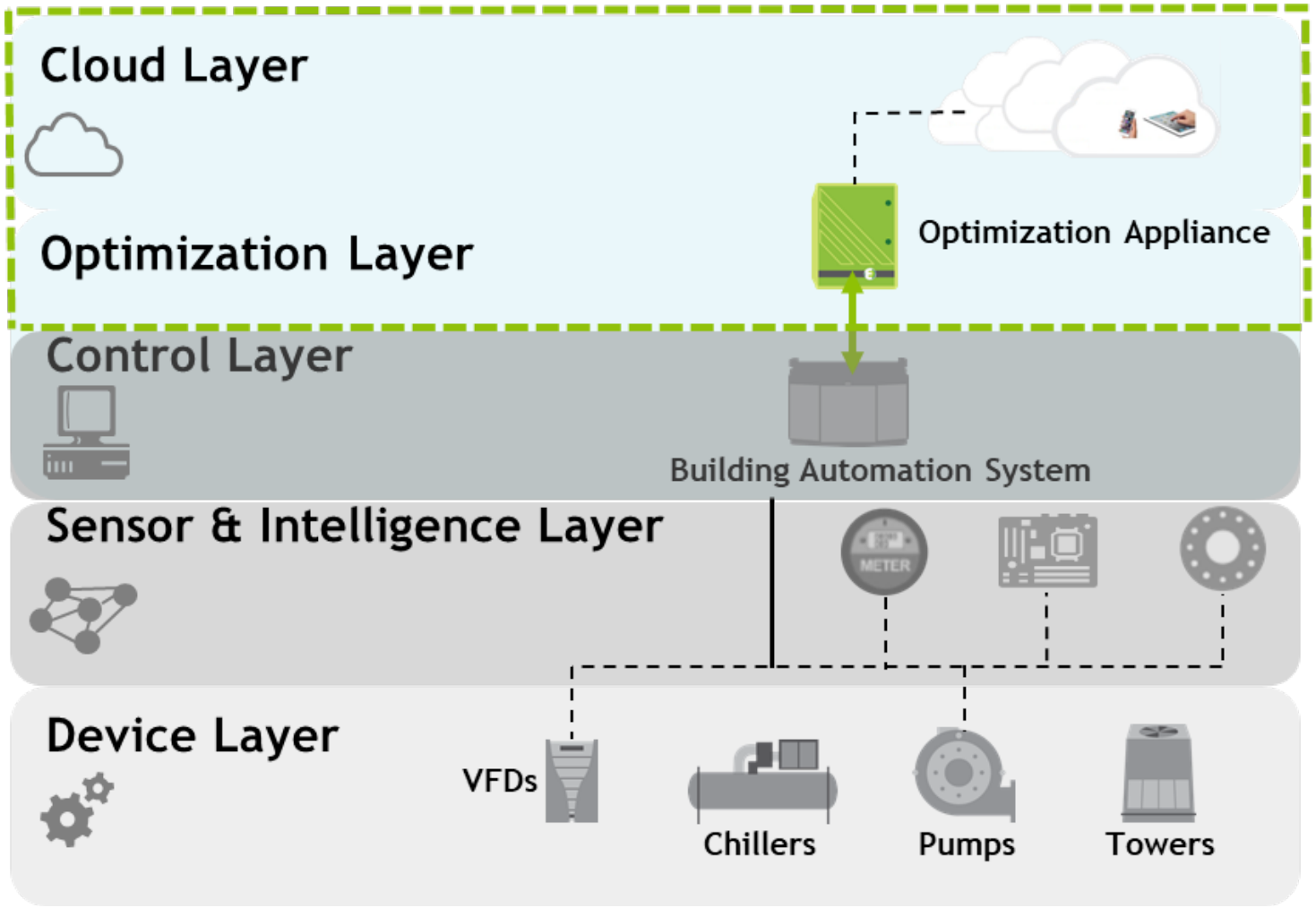
- On site assessment of equipment, piping layout, and existing conditions
- Create a detailed scope of work to be implemented
- Determine project savings
- Review of existing automation logic
- Assemble integration documents
- Final deliverable





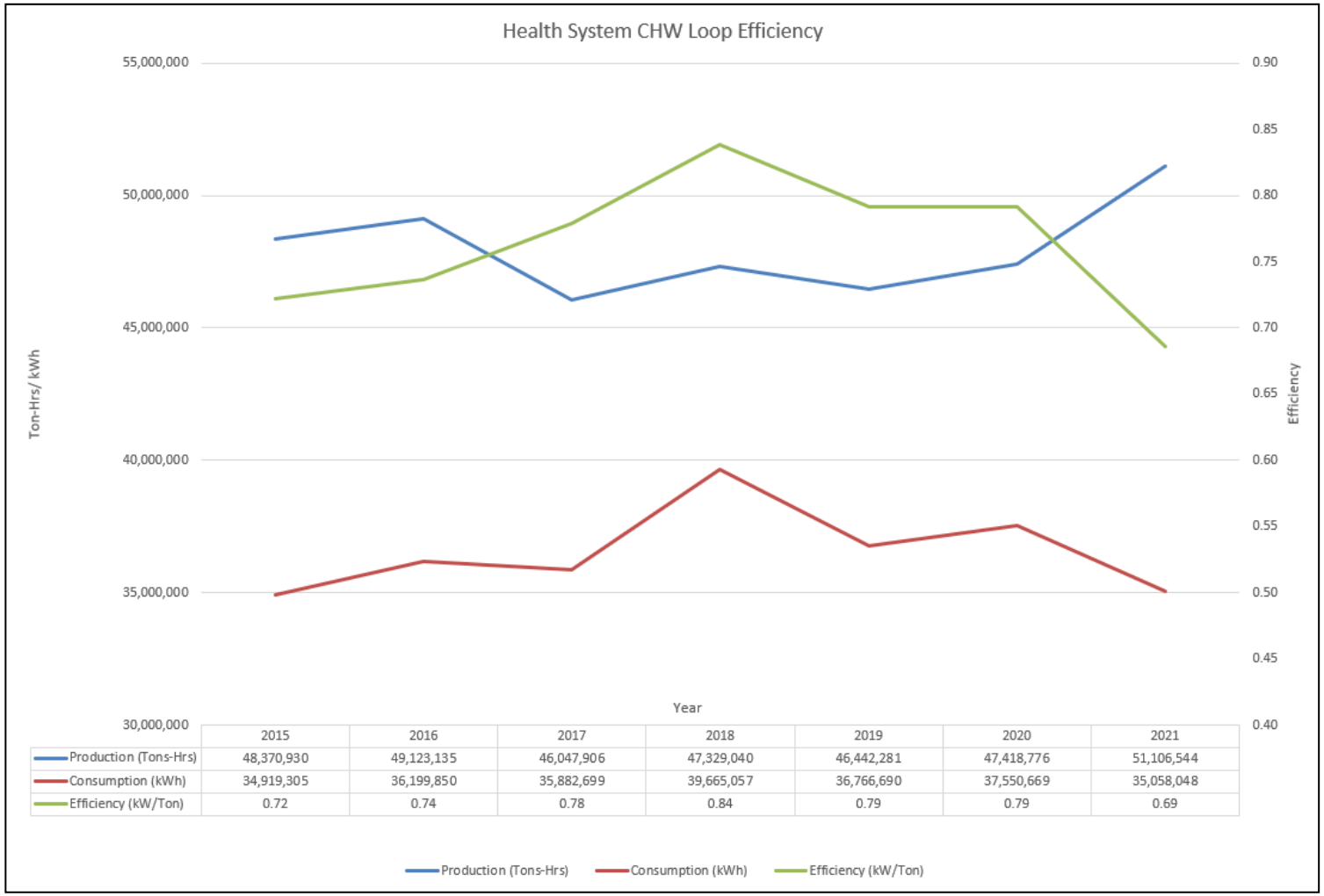
Optimization Implementation

- Treat 2 physically separate plants as 1 large plant
- Mapping and confirming **2200 points**
- Incorporating a thermal energy storage tank
- Efficient chiller staging based on load, outside air conditions
- Rigorous testing to ensure resiliency in logic
- Monitoring period for operation, efficiency



Project Results

- Average annual efficiency of **0.652 kW/Ton**
- 90% of operating hours in Optimized Mode
- Project Cost of $700k
- Simple Payback of ~2 years



	2015	2016	2017	2018	2019	2020	2021
Production (Tons-Hrs)	48,370,930	49,123,135	46,047,906	47,329,040	46,442,281	47,418,776	51,106,544
Consumption (kWh)	34,919,305	36,199,850	35,882,699	39,665,057	36,766,690	37,550,669	35,058,048
Efficiency (kW/Ton)	0.72	0.74	0.78	0.84	0.79	0.79	0.69

Next Steps

- Monitor savings on a monthly basis
- Provide equipment performance metrics on a monthly basis
- Monitor seasonal changes and adjust as necessary
- New equipment at North Plant
- Optimization of Central Campus

Questions?

Thank You!

Paul Stevens

University of Virginia

Brock Frisbie

Optimum Energy