

Northeastern University

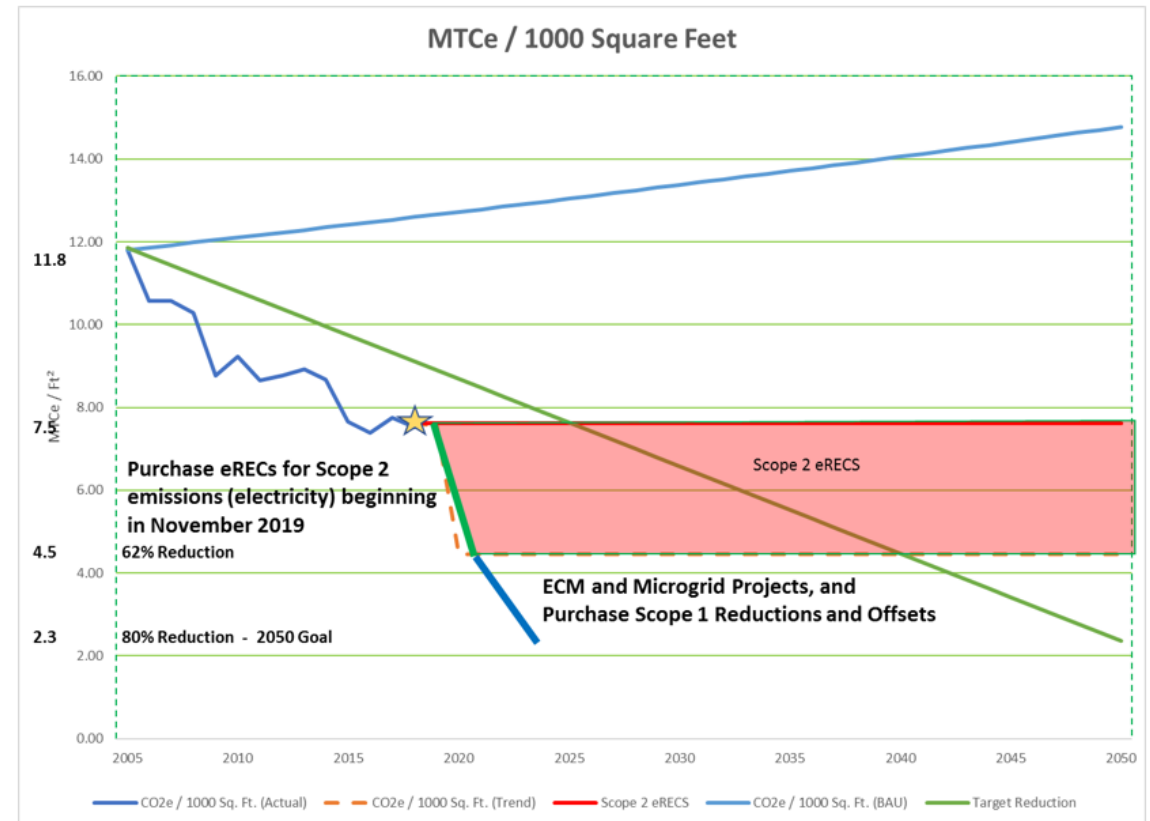
About Us:

- Urban 70+ acre campus 8M GSF and growing
- Over 36,000 students across undergrad/graduate and growing
- Learning in action: Uniquely offering Experiential Learning
- Nearly \$180M in external research funding and growing

Northeastern's Energy and Resiliency Vision for the Future:

- Reduce 2005 carbon footprint by 80% by 2050 (More Sooner)
- Improve resiliency related energy supply interruptions
- Reduce operating costs and improve cash flow
- Research partnerships and student engagement
- Maintain or improve the University's financial strength & integrity

Carbon Reduction Roadmap:

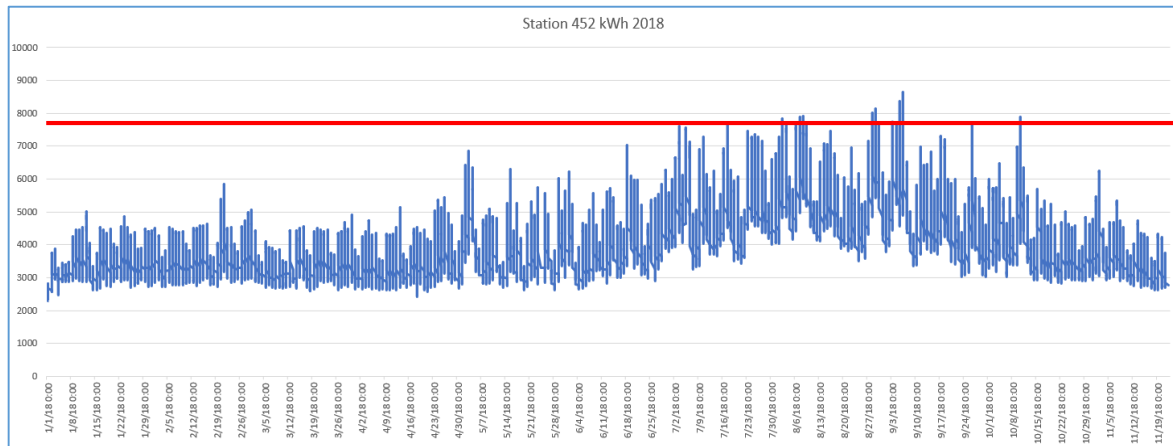


Energy Challenges

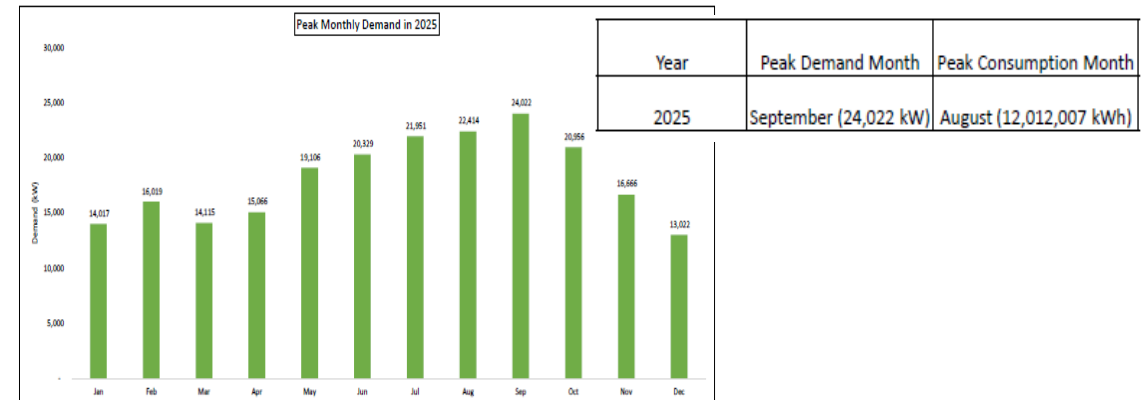
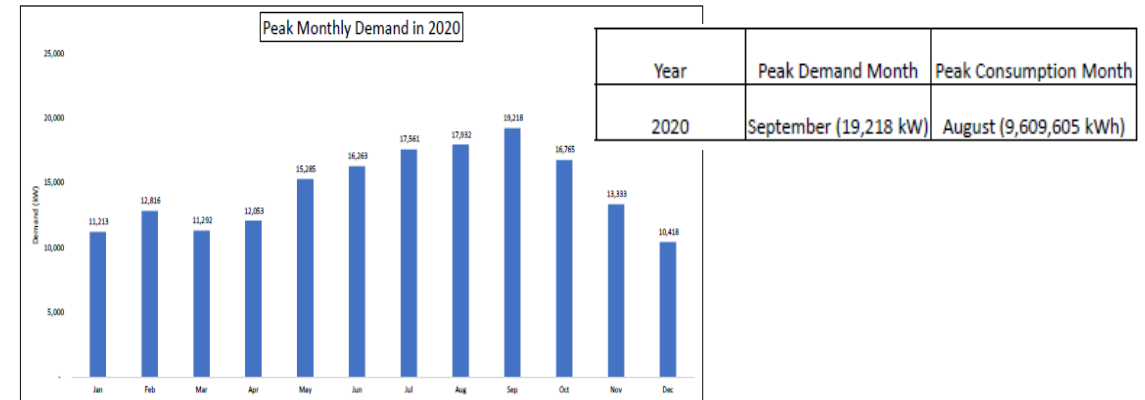
Electric Substation Capacity Issue

Substation Load Analysis: Eversource firm capacity limitation is being exceeded on one main campus feed – Forsythe

Growth		1%		NORTHEASTERN UNIVERSITY CAMPUS FEEDS STATION 452																				
2018																								
5Minute Data		Max KW		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	
9/6/18 14:00		8643		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
%		112%		Station	452																			
Feeder		1340/1401		KW	8729	8817	8905	8994	9084	9175	9266	9359	9452	9547	9643	9739	9836	9935	10034	10134	10236	10338	10442	10546
Cable Size		700KCML		AMPS	406	410	414	418	422	426	431	435	439	444	448	453	457	462	466	471	476	481	485	490
					113%	114%	115%	116%	117%	118%	120%	121%	122%	123%	125%	126%	127%	128%	130%	131%	132%	133%	135%	136%

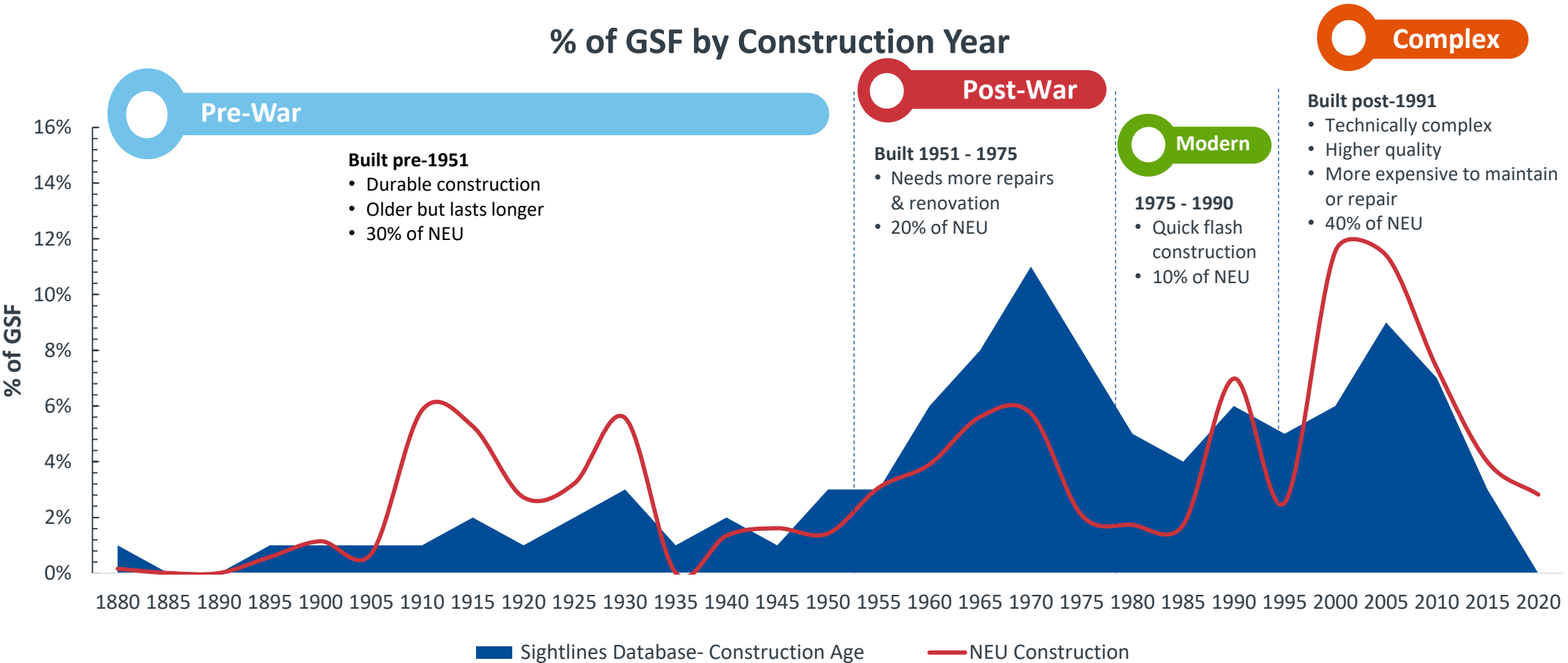


Electric Peak Projections – 2020 and 2025



Putting Your Campus Building Age in Context

Northeastern's construction profile allows for strategic planning



Critical Infrastructure Analysis

Multiple Tasks, Many Skill Sets

- Matrix of Locations (12+ Sites over 12+ months)
- Structural Analysis
- Proximity to Fuel
- Campus Steam Infrastructure
- Campus Electric Infrastructure

Criteria & Constraints

- Economics
- Campus and Academic Disruption
- Operations and Maintenance
- Campus Resiliency

Critical Infrastructure and the Microgrid

- Implements part of the Carbon Reduction Roadmap
- Increases the electrical capacity and reliability of the campus infrastructure
- Reduces annual utility operating costs
- Addresses electric and steam deferred maintenance needs
- Improves the resiliency of the University's utility infrastructure
- Frees valuable campus real estate

Regarding Critical Infrastructure, Resiliency & Microgrids, to enable a Carbon Free Boston, we must address the existing inefficiencies in the City's building stock and its critical infrastructure that is limiting advancement in moving to a carbon free platform, and the current lack of viable and affordable alternatives to fossil fuel within the City of Boston..