Seattle Building Energy Benchmarking Dataset Analysis

Presentation for Benchmarking Convening
3/4/2014

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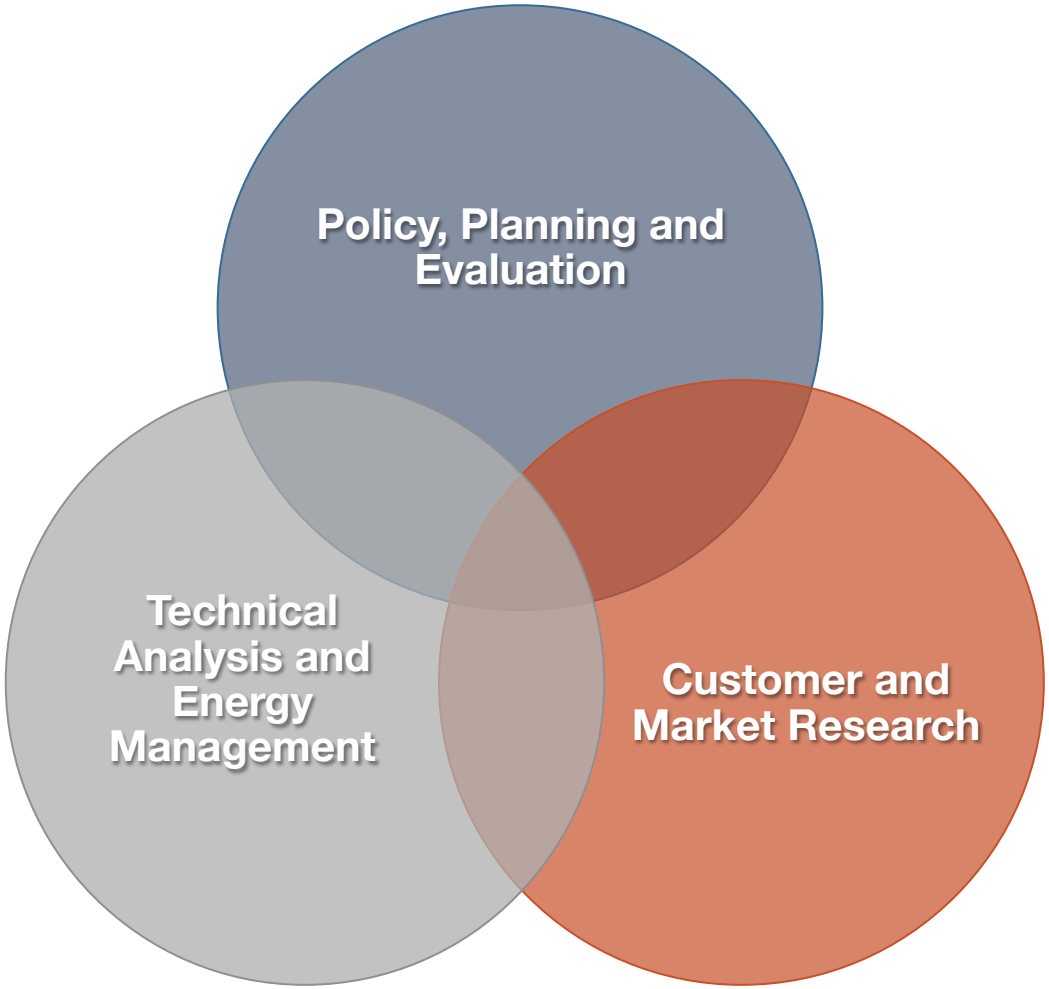
About EMI

- Founded in 1995
- Utility EE clients
- Research-based consultancy
- 24 staff with diverse backgrounds
- Interdisciplinary approach to research and consulting



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Key Findings

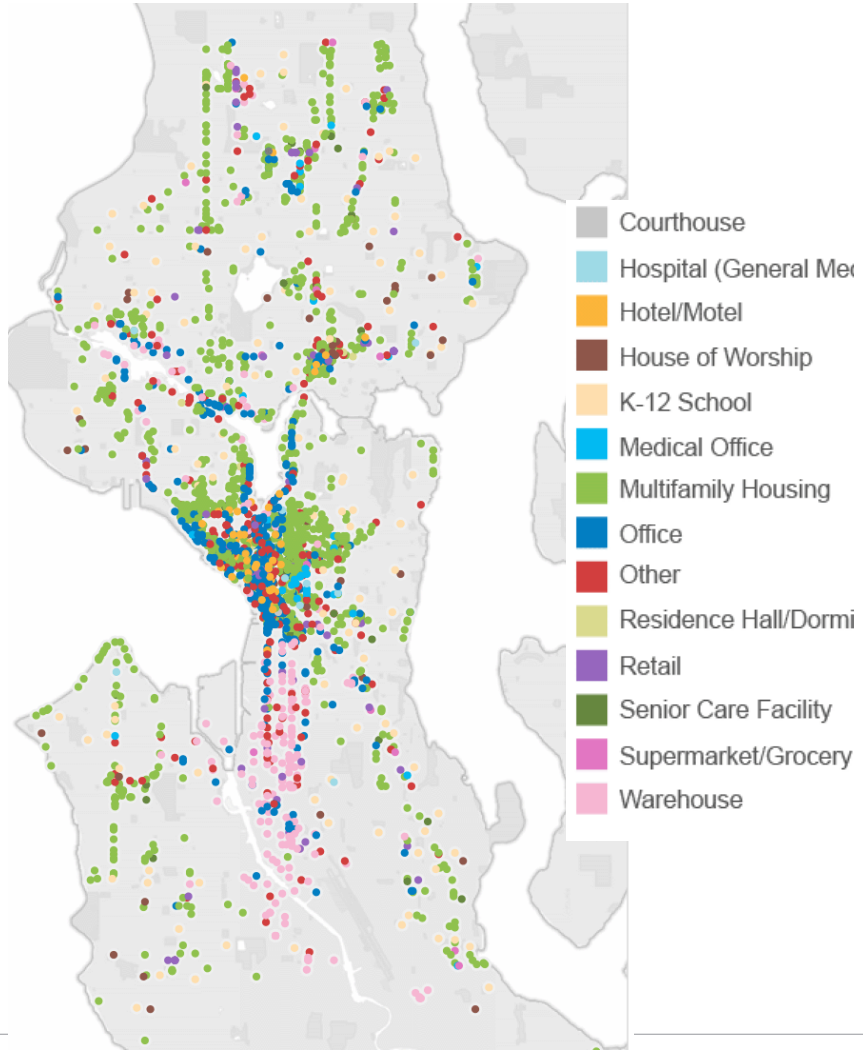
- Self-reported dataset meets accuracy tests—but data quality is ongoing process.
- Seattle is experiencing rapid dense urban development, which needs to be accounted for in longitudinal comparisons.
- Factors driving energy use are complex and interactive.
- Dataset could very valuable for targeting utility energy efficiency programs.

Commercial Building Policy Elements

Jurisdiction	Benchmarking (Building Type and Size)		Reporting	Disclosure					Audits	RCx
	Non-residential	Multi-family	To local gov't	On public web site	To tenants	To transactional counterparties				
						Sale	Lease	Financing		
Austin	10k SF+	5+ units	✓	-	-	✓	-	-	✓	-
Boston	35k SF+	35k SF+/ 35+ units	✓	✓	-	-	-	-	✓	✓
California	5k SF+	-	✓	-	-	✓	✓	✓	-	-
Chicago	50k SF+	50K SF+	✓	✓	-	-	-	-	-	-
Washington, DC	50k SF+	50k SF+	✓	✓	-	-	-	-	-	-
Minneapolis	50k SF+	-	✓	✓	-	-	-	-	-	-
New York City	50k SF+	50k SF+	✓	✓	-	-	-	-	✓	✓
Philadelphia	50k SF+	-	✓	✓	-	✓	✓	-	-	-
San Francisco	10k SF+	-	✓	✓	✓	-	-	-	✓	-
Seattle	20k SF+	20k SF+	✓	-	✓	✓	✓	✓	-	-
Washington state	10k SF+	-	-	-	-	✓	✓	✓	-	-

Policy Coverage

- More than 2,600 commercial and multifamily buildings greater than 20,000 sf
- Data represents nearly 228 million sf
- 80% compliance rate as of June 2013 (for 2012 data)



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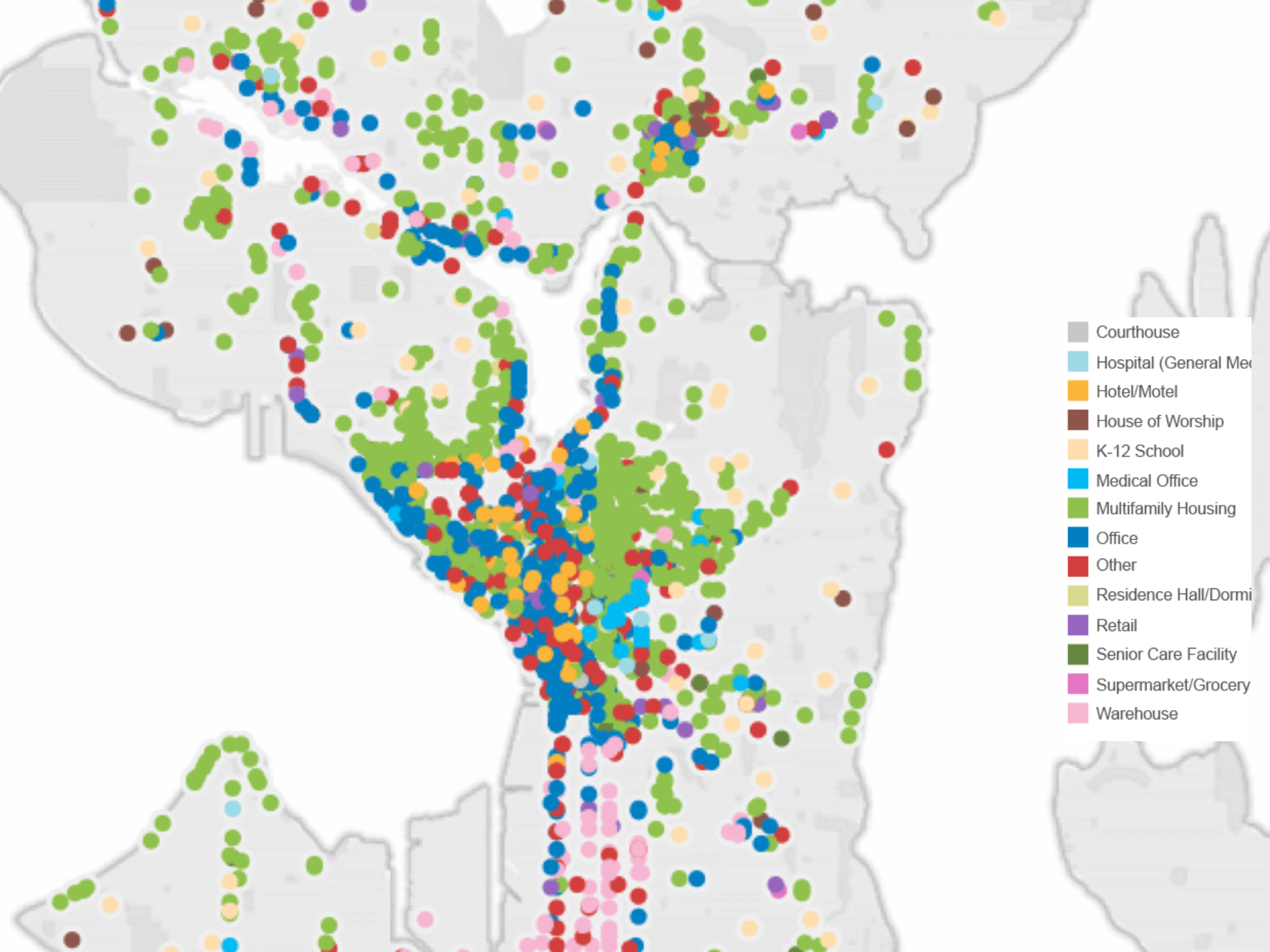
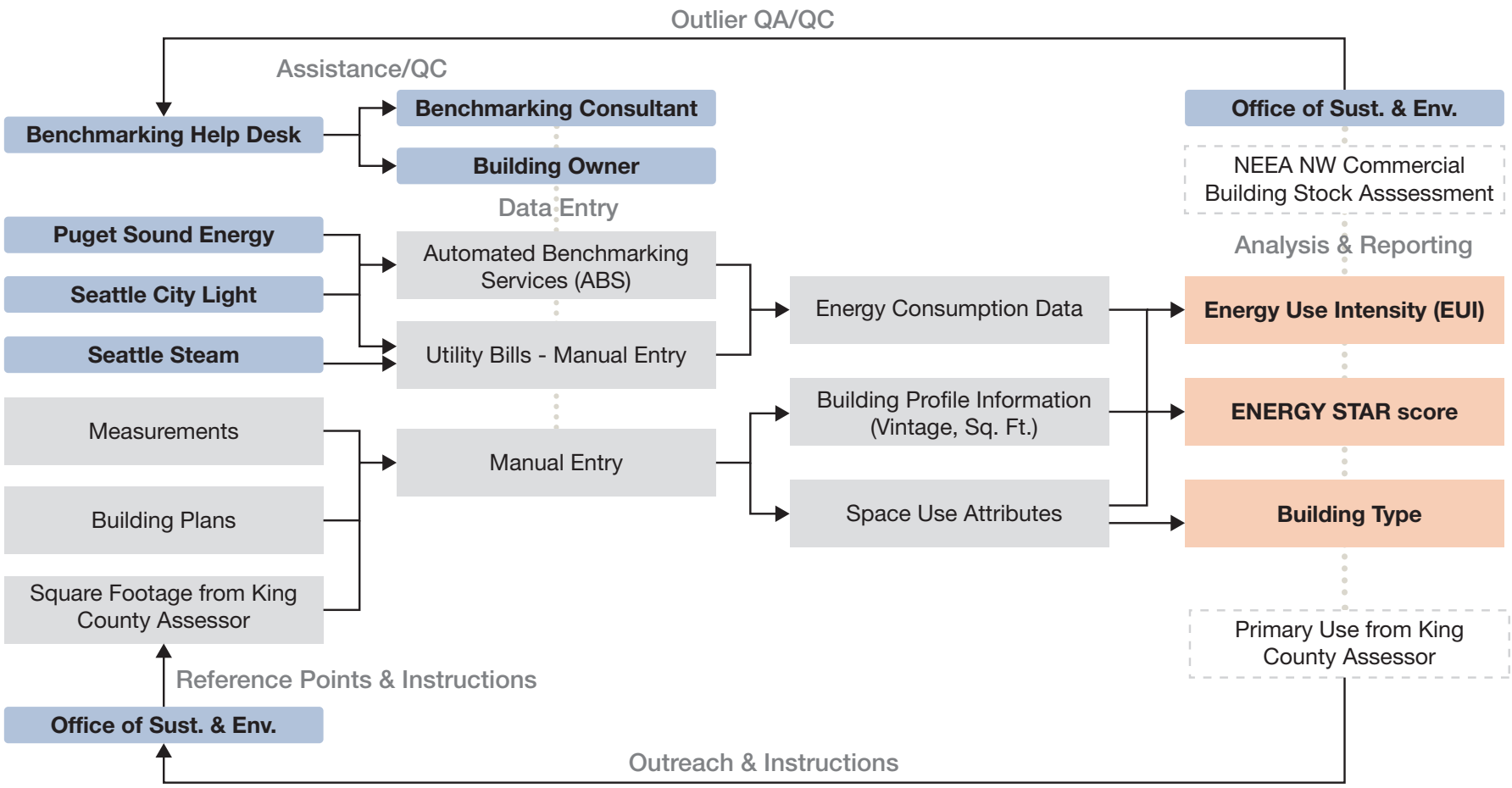
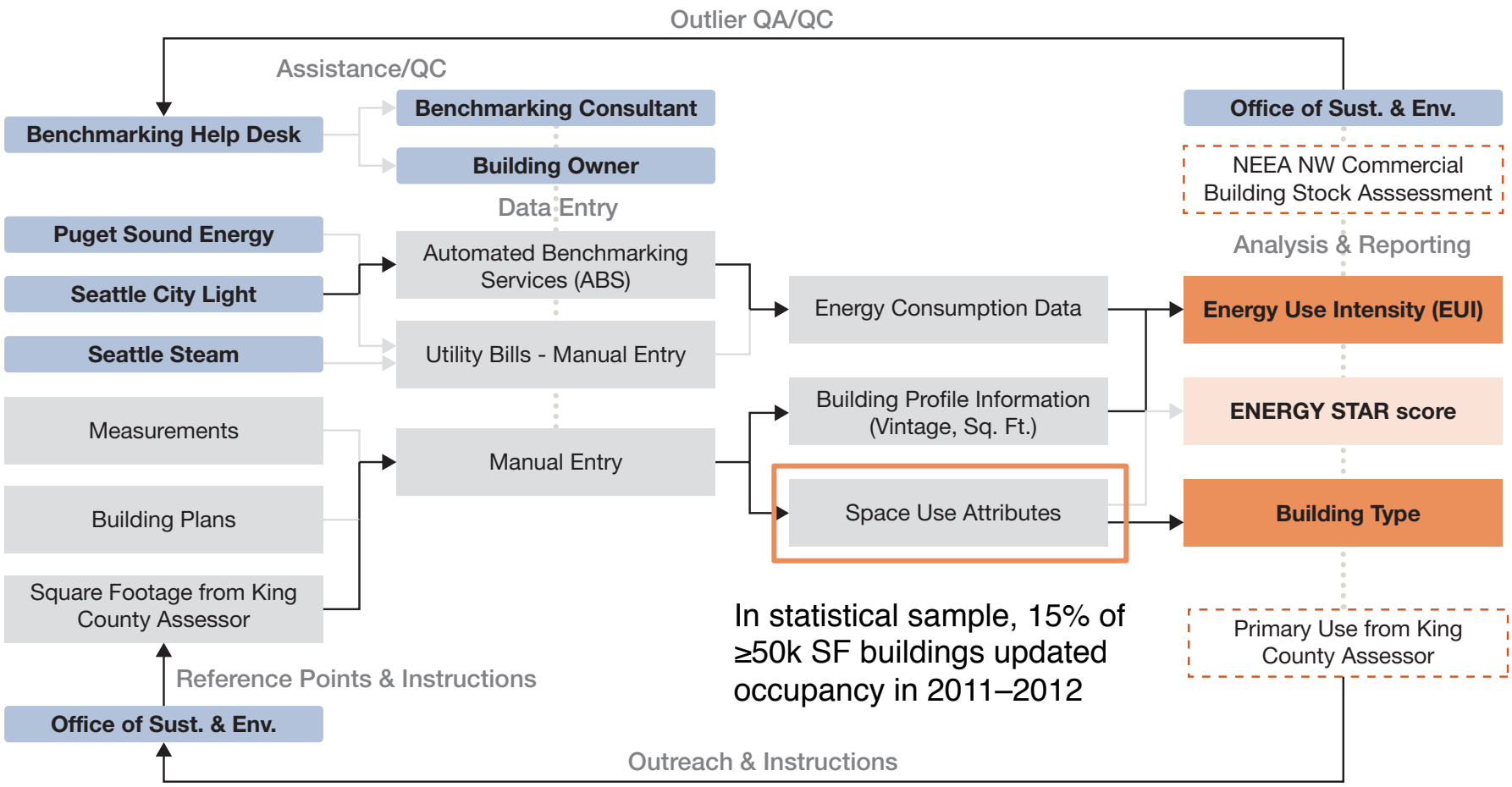

Courthouse
Hospital (General Mec
Hotel/Motel
House of Worship
K-12 School
Medical Office
Multifamily Housing
Office
Other
Residence Hall/Dormi
Retail
Senior Care Facility
Supermarket/Grocery
Warehouse

Data Quality As Process



Data Quality As Process



In statistical sample, 15% of ≥50k SF buildings updated occupancy in 2011–2012

EUI Comparisons

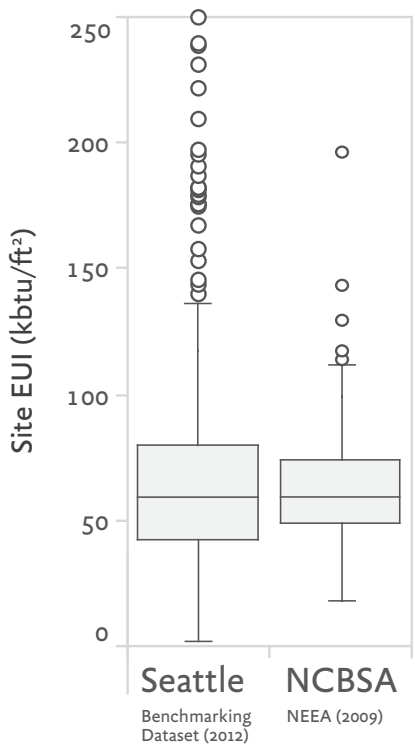


Figure A12: **Comparison of Seattle Benchmarking and NCBSA Office Building EUIs**

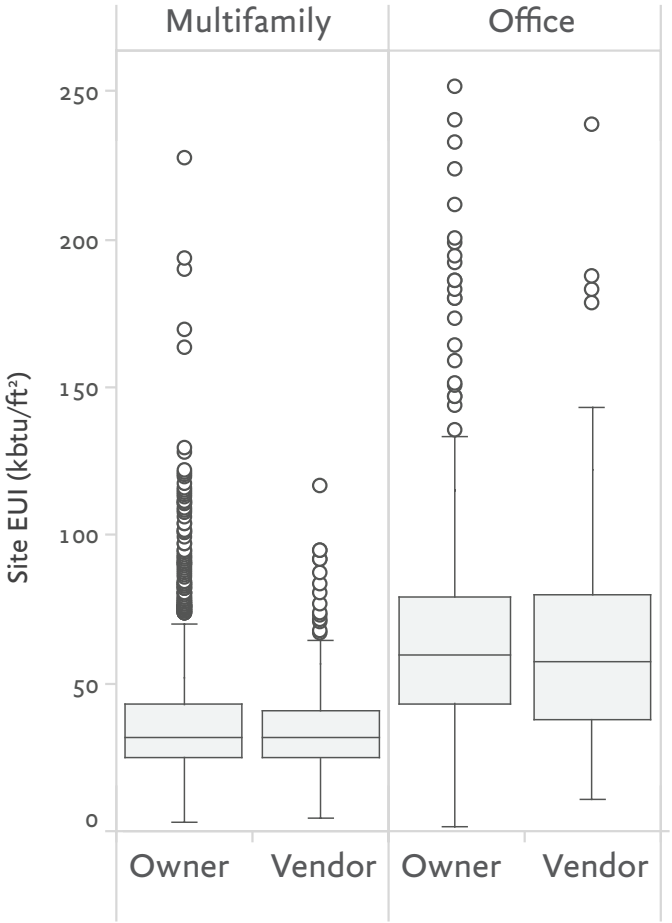
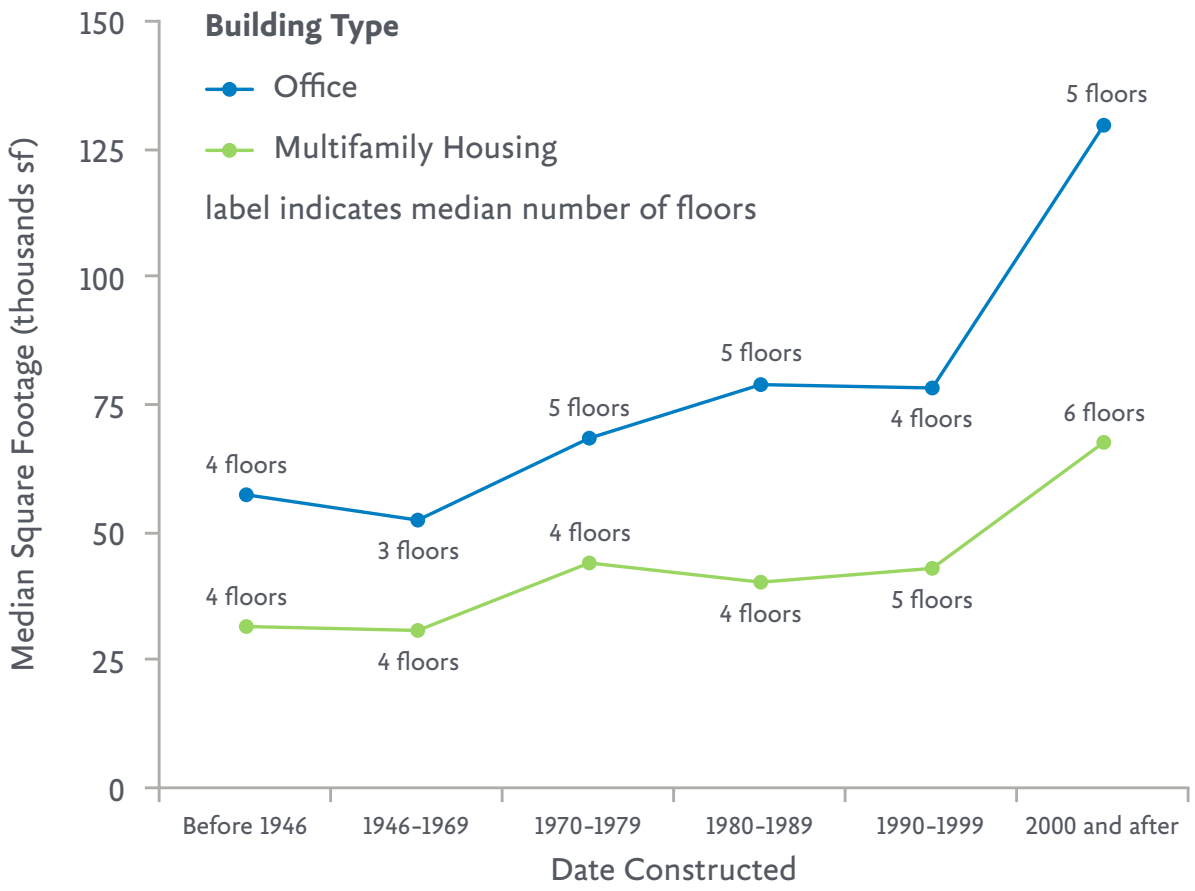


Figure A13: **Comparison of Owner and Vendor-Benchmarked EUIs**

Urbanization



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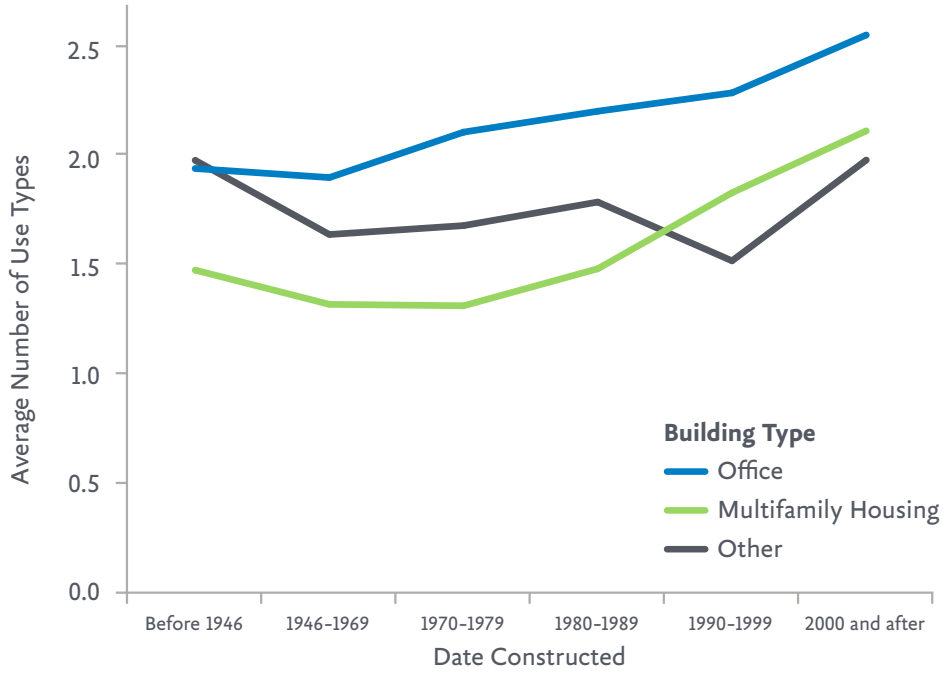
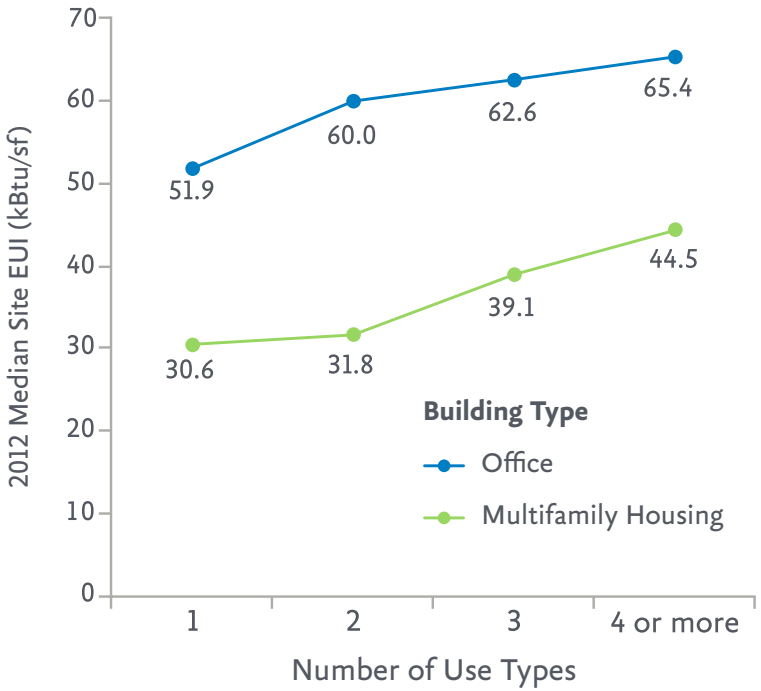
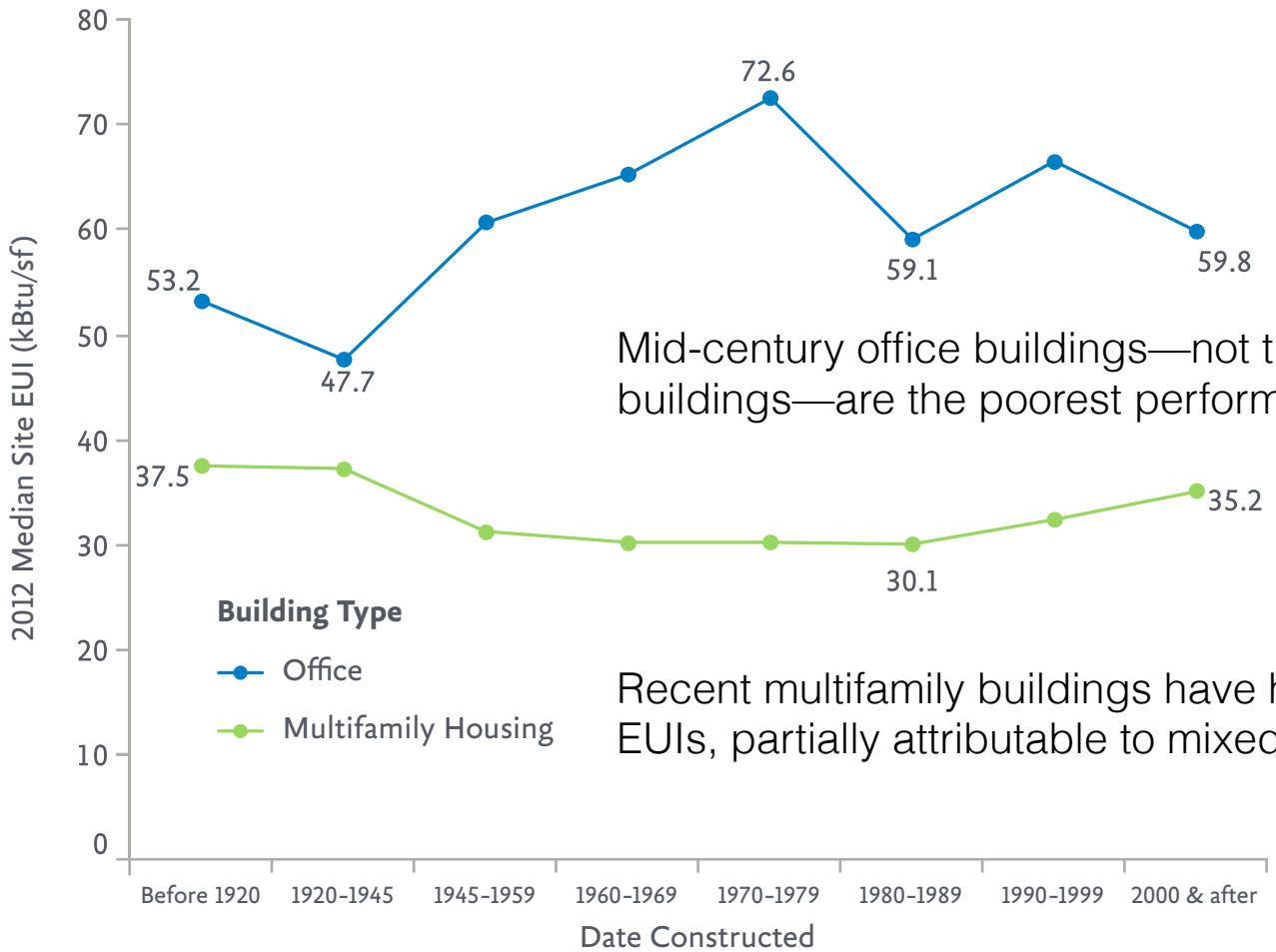
Mixed Use Buildings





Trends by Building Age



Mid-century office buildings—not the oldest buildings—are the poorest performers

Recent multifamily buildings have higher EUIs, partially attributable to mixed uses

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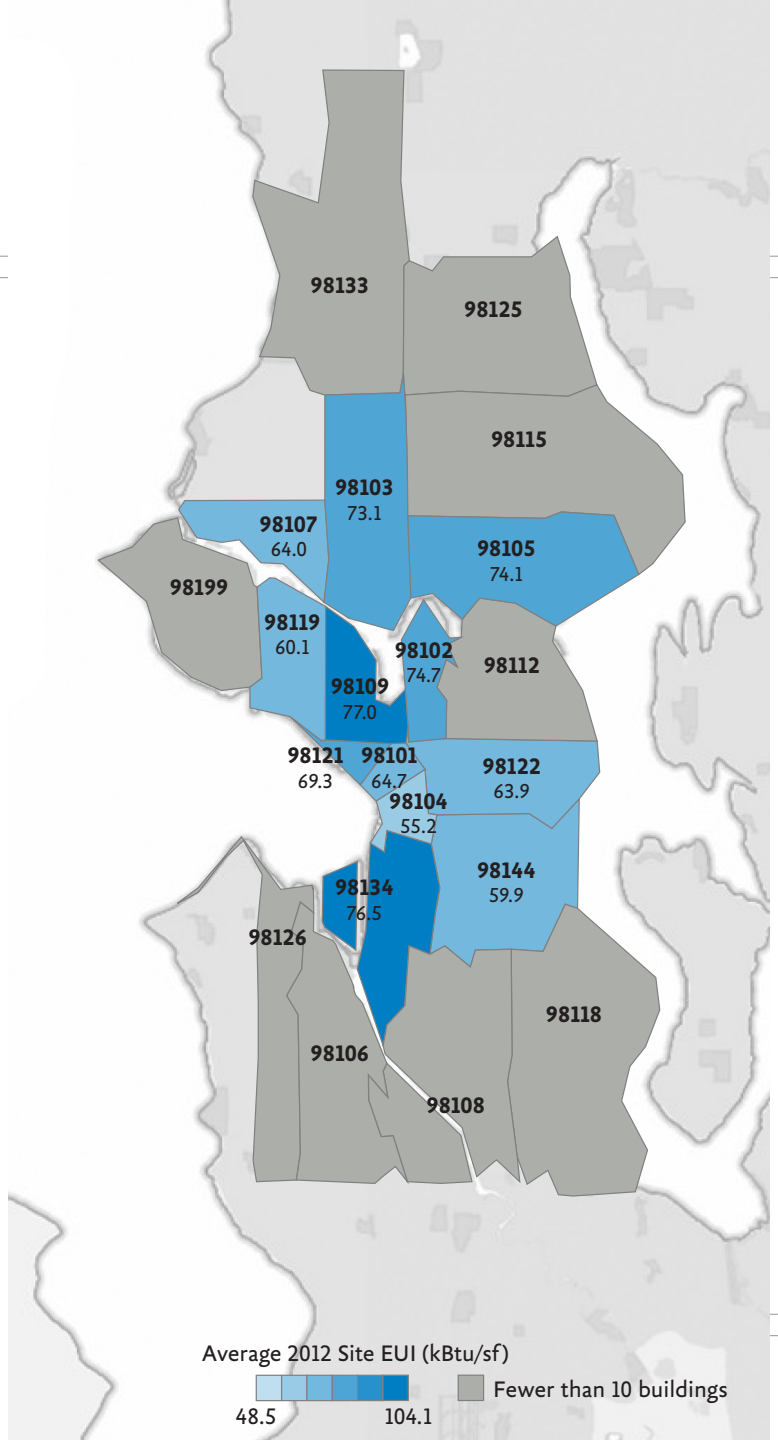
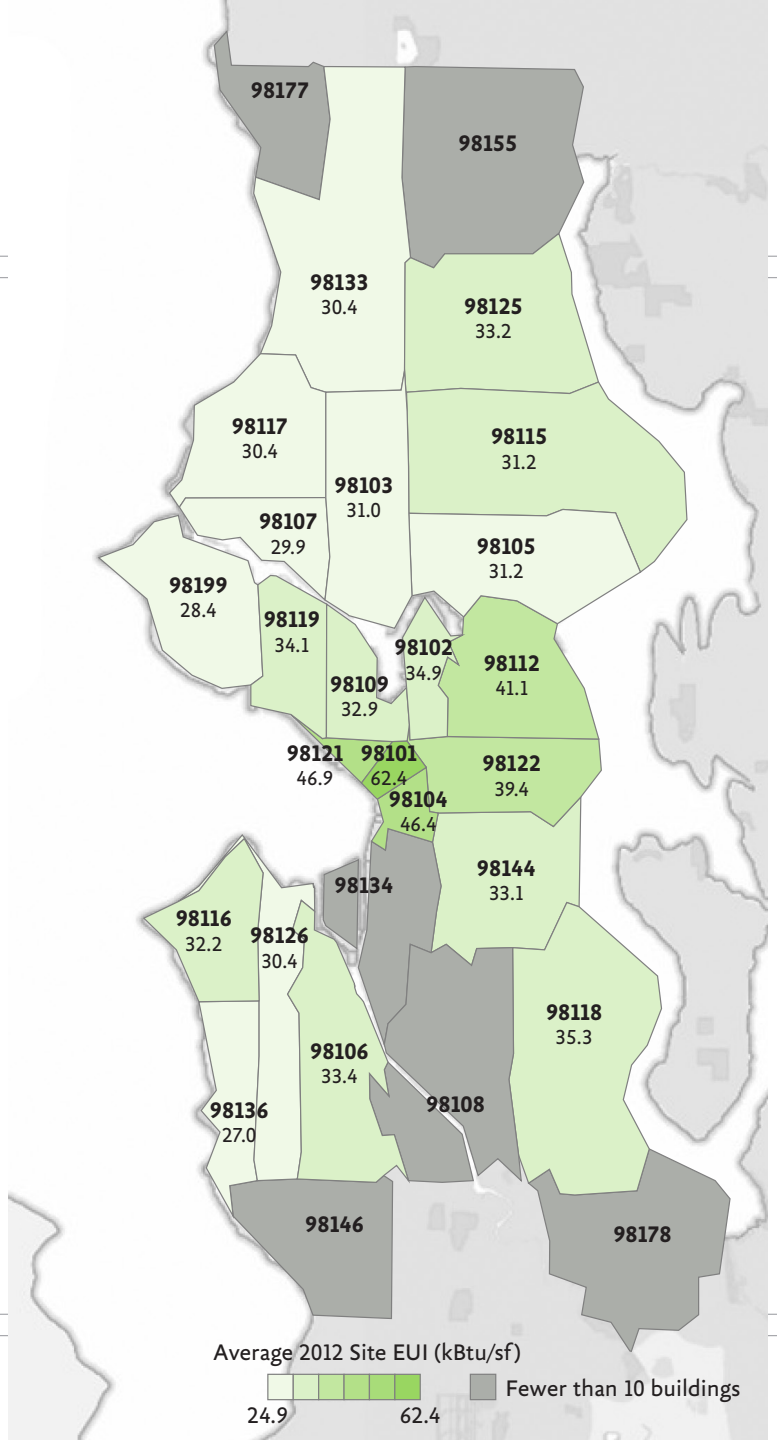
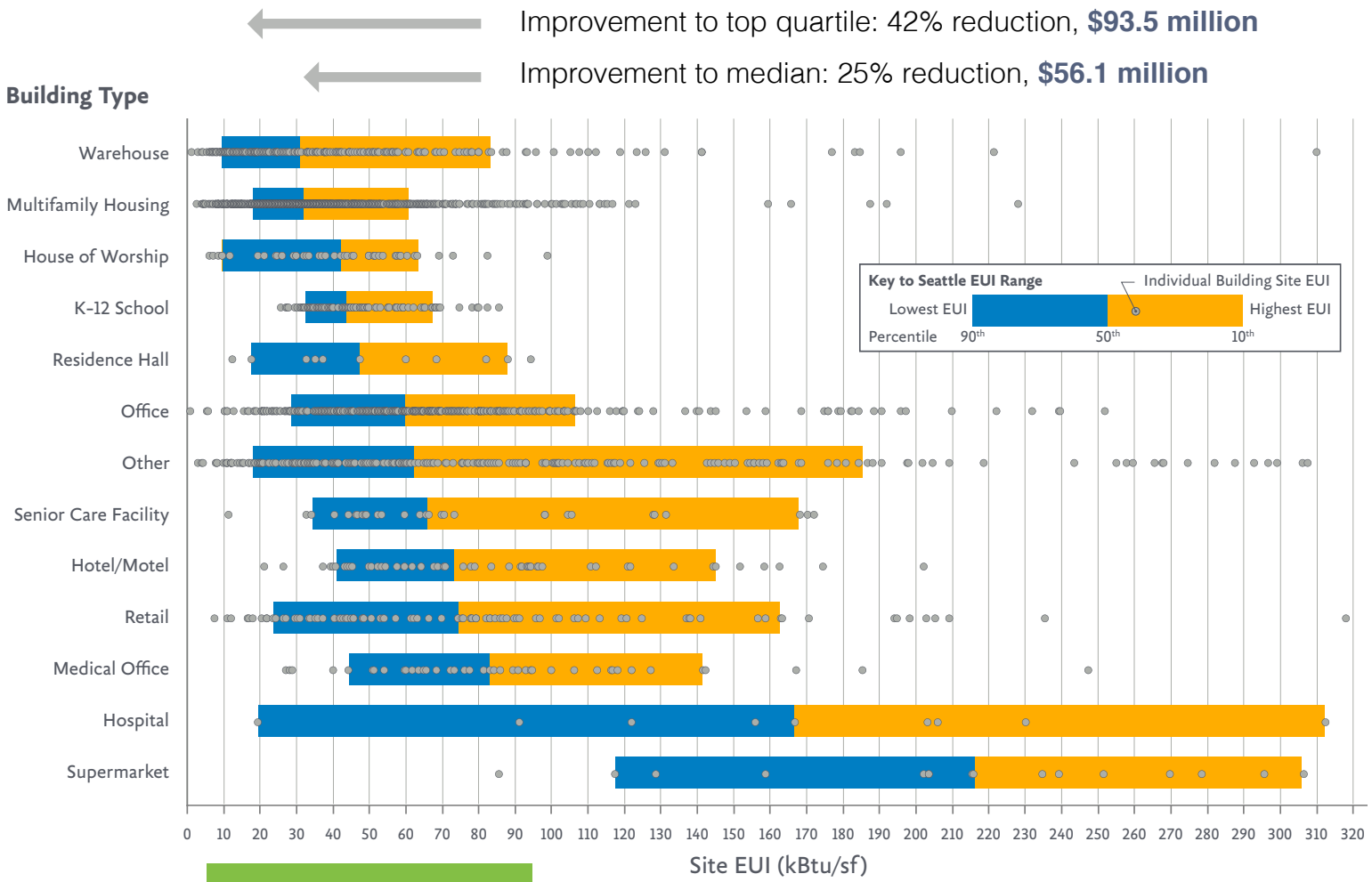

98133
98125
98115
98103
73.1
98107
64.0
98105
74.1
98199
98119
60.1
98102
74.7
98112
98109
77.0
98121
69.3
98101
64.7
98122
63.9
98104
55.2
98144
59.9
98134
76.5
98126
98118
98106
98108
Average 2012 Site EUI (kBtu/sf)
48.5
104.1
Fewer than 10 buildings


98177
98155
98133
30.4
98125
33.2
98117
30.4
98115
31.2
98103
31.0
98107
29.9
98105
31.2
98199
28.4
98119
34.1
98102
34.9
98112
41.1
98109
32.9
98121
46.9
98101
62.4
98122
39.4
98104
46.4
98144
33.1
98134
98116
32.2
98126
30.4
98118
35.3
98106
33.4
98136
27.0
98108
98146
98178
Average 2012 Site EUI (kBtu/sf)
24.9
62.4
Fewer than 10 buildings

Savings Potential



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Next Steps

- EMI working with Seattle City Light to use benchmarking data to assess program penetration and target opportunities.
  - Performance perspective vs. widget perspective
- Given complexity, how do we provide fair and actionable comparisons to building owners?
- ENERGY STAR for multifamily and mixed uses

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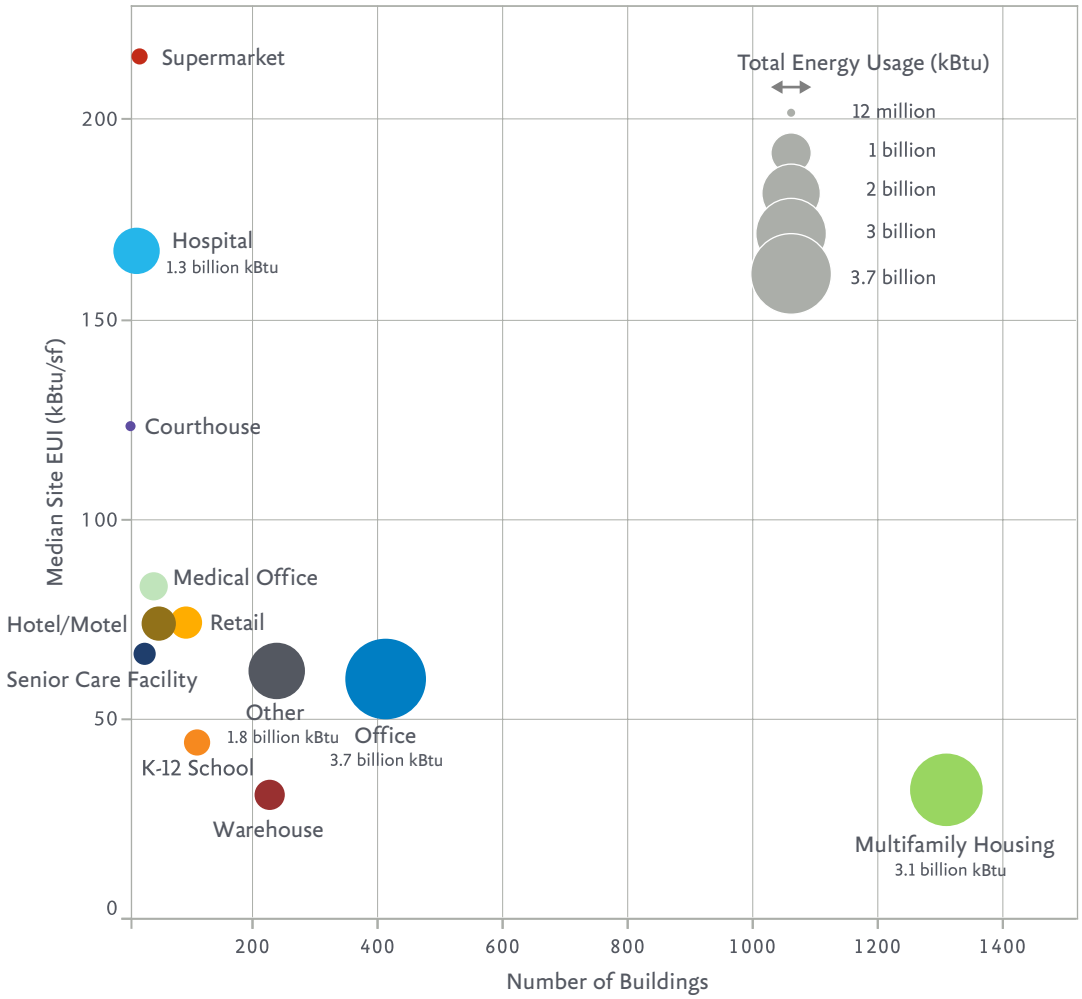
Seattle Benchmarking Analysis

http://www.seattle.gov/environment/buildings-and-energy/energy-benchmarking-and-reporting

The Seattle Dataset



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Buildings by Era

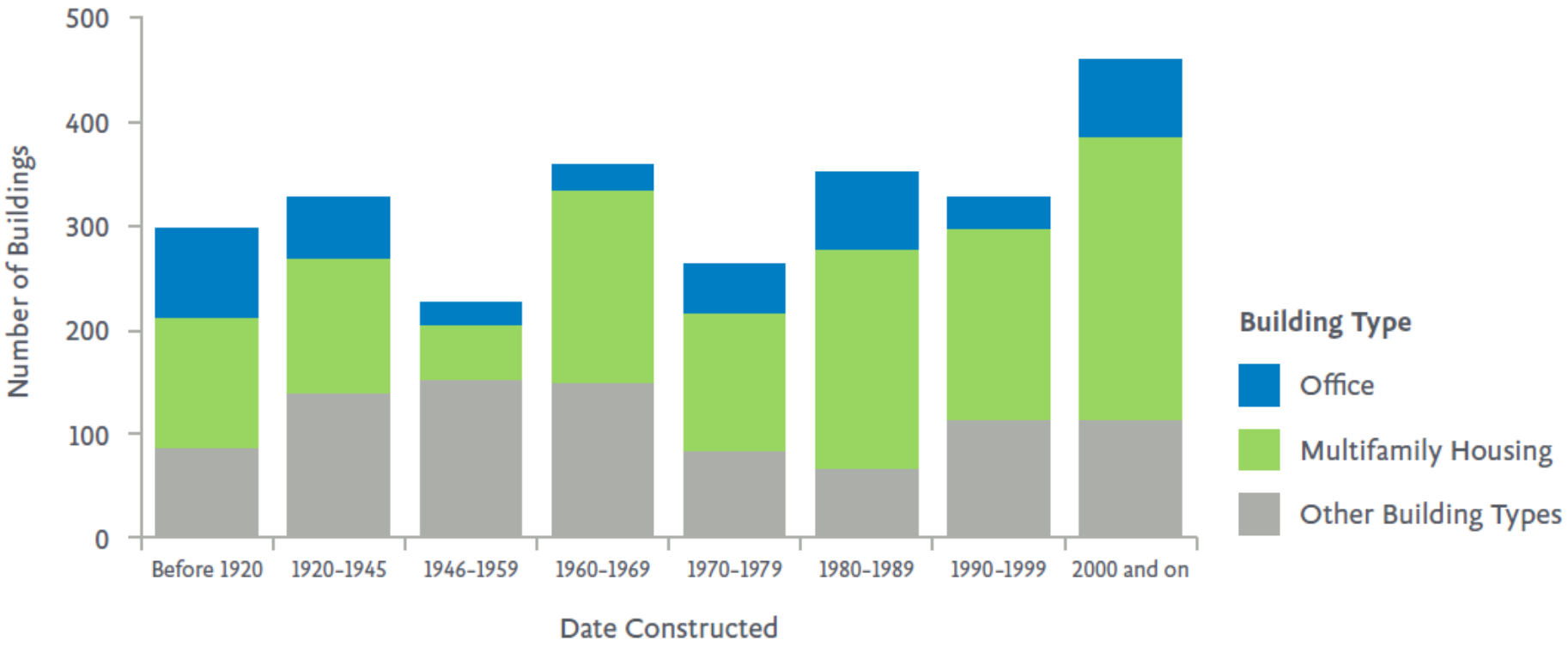
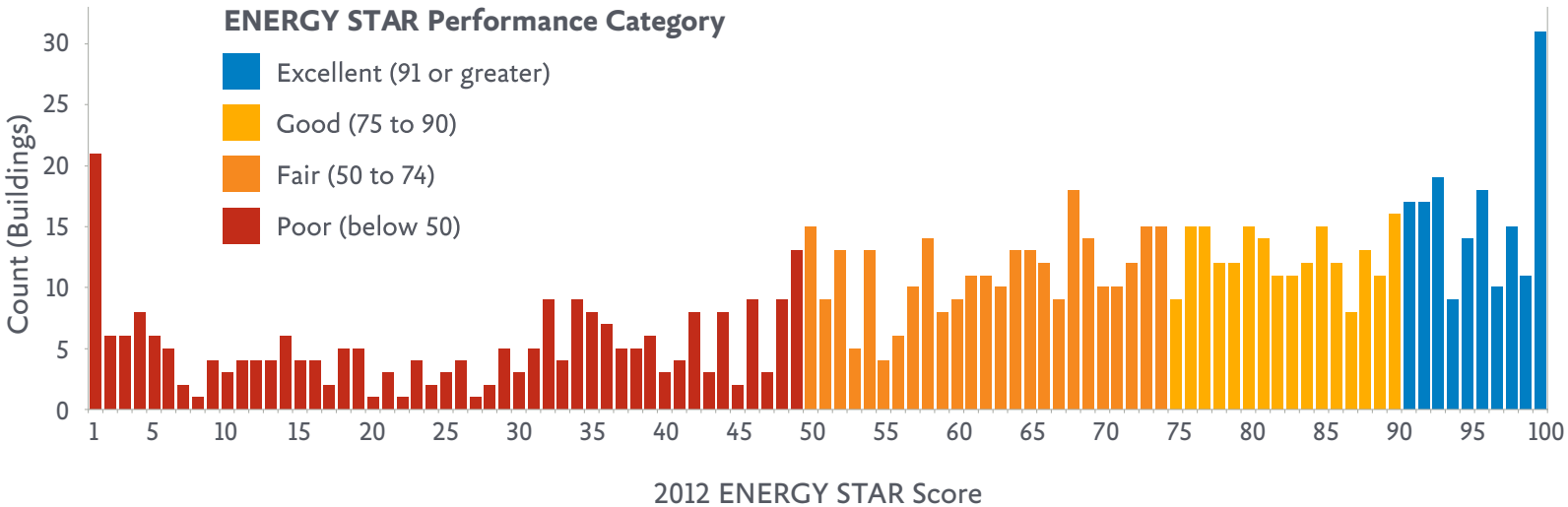


Figure 3: **Building Construction by Time Period**

EUI Range by Building Type

Type of Building	2012 Annual Energy Use Intensity (Site EUI in kBtu/sf)					Number of Buildings*	Year Built (median)	Size (median sf)	EPA ENERGY STAR (median)
	Median	Lowest Use (1st Quartile)	Medium-Low (2nd Quartile)	Medium-High	Highest Use				
Multifamily Housing	31.9	≤25	26-32	33-43	≥44	1309	1981	39,212	NA
Office	59.8	≤42	43-60	61-80	≥81	419	1972	64,858	75
Other	61.7	≤33	34-62	63-115	≥116	240	1960	40,854	69
Warehouse	30.4	≤16	17-30	31-52	≥53	228	1962	43,080	56
K-12 School	43.5	≤36	37-43	44-55	≥56	114	1962	55,427	72
Retail	74.1	≤42	43-74	75-106	≥107	94	1967	53,500	68
Hotel/Motel	73.1	≤53	53-73	74-97	≥98	52	1988	107,117	68
House of Worship	42.0	≤26	27-42	43-54	≥55	45	1952	26,374	63
Medical Office	82.9	≤62	63-83	84-112	≥113	41	1984	66,588	47
Senior Care Facility	65.6	≤48	48-66	67-104	≥105	29	1995	94,370	51
Supermarket	215.4	≤202	203-215	216-269	≥270	17	1996	46,280	59
Residence Hall	47.3	≤33	34-47	48-82	≥83	11	1960	34,560	77
Hospital	166.5	≤122	123-167	168-206	≥207	9	1961	879,000	67

National Comparison



The average score for all buildings was 68, meaning that overall, **Seattle buildings performed 18% better than the national median**.

Footage Accuracy